



**HEWLETT
PACKARD**

OPERATING AND SERVICE MANUAL

SPECTRUM ANALYZER RF SECTION 8555A

SERIAL NUMBERS

This manual applies directly to serial numbers prefixed 1436A.

With modifications described in Section VII this manual also applies to serial numbers prefixed 987, 1043A, 1114A, 1116A, 1138A, 1143A, 1203A, 1219A, 1232A, 1311A, 1325A, and 1326A, 1343A, 1416A, and 1429A.

For additional important information about serial numbers see "Instruments Covered by Manual" in Section I.

**COPYRIGHT © HEWLETT-PACKARD COMPANY 1971, 1974
1400 FOUNTAIN GROVE PARKWAY, SANTA ROSA, CALIFORNIA, 95404, U.S.A.**

**MANUAL PART NUMBER 08555-90027
MICROFICHE PART NUMBER 08555-90028**

Printed: AUGUST 1974

CONTENTS

| Section | Page | Section | Page |
|---|------------|---|------------|
| I GENERAL INFORMATION | 1-1 | V ADJUSTMENTS | 5-1 |
| 1-1. Introduction | 1-1 | 5-1. Introduction | 5-1 |
| 1-6. Warnings and Cautions | 1-1 | 5-4. Equipment Required | 5-1 |
| 1-9. Instruments covered by Manual | 1-2 | 5-15. Factory Selected Components | 5-2 |
| 1-14. Description | 1-2 | 5-17. Related Adjustments | 5-2 |
| 1-19. Options | 1-3 | 5-22. Input Operating Voltages, Check and Adjustment | 5-3 |
| 1-22. Accessories Supplied | 1-3 | 5-23. +20/+10 Volt Power Supply Check and Adjustment | 5-4 |
| 1-24. Equipment Required but not Supplied | 1-3 | 5-24. YIG Driver Adjustments | 5-5 |
| 1-27. Warranty | 1-3 | 5-25. 2nd LO (1500 MHz) Check and Adjustment | 5-8 |
| 1-29. Recommended Test Equipment | 1-3 | 5-26. 1.5 GHz Notch Filter and 2.05 GHz Low Pass Filter Check | 5-9 |
| II INSTALLATION | 2-1 | 5-27. 2nd Converter 2.05 GHz Bandpass Adjustment | 5-10 |
| 2-1. Initial Inspection | 2-1 | 5-28. 500 MHz Local Oscillator and Driver Check and Adjustment | 5-12 |
| 2-2. Mechanical Check | 2-1 | 5-29. 550 MHz Bandpass Filter and 50 MHz Filter Adjustment | 5-14 |
| 2-4. Electrical Check | 2-1 | 5-30. 50 MHz Amplifier Check and Adjustment | 5-16 |
| 2-6. Claims for Damage | 2-1 | 5-31. Tuning Stabilizer Control Adjustments | 5-19 |
| 2-9. Preparation for Use | 2-1 | 5-32. Tuning Stabilizer VCXO Adjustments | 5-20 |
| 2-10. Shipping Configuration | 2-1 | 5-33. Analogic Test and Adjustment | 5-24 |
| 2-12. Power Requirements | 2-1 | | |
| 2-15. Power Cable | 2-1 | VI REPLACEABLE PARTS | 6-1 |
| 2-17. Operating Environment | 2-1 | VII MANUAL CHANGES | 7-1 |
| 2-19. Interconnections | 2-2 | 7-1. Introduction | 7-1 |
| 2-23. Storage and Shipment | 2-2 | 7-5. Manual Change Instructions | 7-2 |
| 2-24. Original Packing | 2-2 | 7-6. Instrument Changes by Component | 7-29 |
| 2-28. Other Packaging Materials | 2-2 | 7-7. Instrument Improvement Modifications | 7-31 |
| | | 7-8. Production Memo, 8555A-1-72 | 7-31 |
| | | 7-9. Service Note, 8555A-1 | 7-33 |
| III OPERATION | 3-1 | VIII SERVICE | 8-1 |
| 3-1. Introduction | 3-1 | 8-1. Introduction | 8-1 |
| 3-3. Panel Features | 3-1 | 8-3. Principles of Operation | 8-1 |
| 3-5. Operator's Checks | 3-1 | 8-5. Recommended Test Equipment | 8-1 |
| 3-7. Operating Instructions | 3-1 | 8-7. Troubleshooting | 8-1 |
| 3-9. Controls, Indicators and Connectors | 3-1 | 8-11. Repair | 8-1 |
| | | 8-21. General Service Hints | 8-3 |
| IV PERFORMANCE CHECKS | 4-1 | 8-24. General Service Information | 8-5 |
| 4-1. Introduction | 4-1 | 8-31. Integrated Circuits and Symbols | 8-6 |
| 4-4. Equipment Required | 4-1 | APPENDIX A | A-1 |
| 4-6. Front Panel Checks | 4-1 | A-1. Introduction | A-1 |
| 4-8. Preset Adjustments | 4-1 | A-3. Description | A-1 |
| 4-9. Display Adjustments | 4-1 | A-5. Manual Changes to Incorporate Option | A-1 |
| 4-10. RF and IF Section Adjustments | 4-1 | | |
| 4-11. Ampl Cal Adjustment | 4-2 | | |
| 4-12. Ampl Cal Check for Linear Sensitivity Accuracy | 4-2 | | |
| 4-14. Front Panel Checks | 4-3 | | |
| 4-15. Performance Tests | 4-3 | | |
| 4-20. Scan Accuracy | 4-5 | | |
| 4-21. Frequency Response | 4-7 | | |
| 4-22. Sensitivity | 4-10 | | |
| 4-23. Noise Sidebands | 4-11 | | |
| 4-24. Residual FM | 4-12 | | |
| 4-25. Dial Accuracy | 4-13 | | |
| 4-26. Residual Responses | 4-15 | | |

ILLUSTRATIONS

| Figure | Page | Figure | Page |
|--|------|---|------|
| 1-1. Model 8555A Spectrum Analyzer RF Section with 8552B IF Section and 141T Display Section | 1-0 | 7-2. 500 MHz LO Assembly A2A4 (P/O Change A) | 7-4 |
| 1-2. Circuit if Equipment Ground Lead Opens | 1-1 | 7-3. Third Converter Assembly A2, Bottom View (P/O Change A) | 7-4 |
| 1-3. Instrument Identification | 1-1 | 7-4. P/O Service Sheet 4, Figure 8-28, Third Converter (P/O Change A). | 7-5 |
| 1-4. Typical Spectrum Analyzer Sensitivity and Frequency Response | 1-6 | 7-5. Partial Schematic of Figure 8-17 (P/O Change C) | 7-6 |
| 1-5. Typical Spectrum Analyzer Resolution (Fundamental Mixing) | 1-6 | 7-6. Partial Schematic of Figure 8-41 (P/O Change C) | 7-7 |
| 1-6. HP 08555-60077 Service Kit Required for Adjustment & Service Procedures | 1-11 | 7-7. Partial Schematic of Figure 8-17 Showing A1P6 Pin Changes (P/O Change E) | 7-8 |
| 2-1. RF Section and IF Section Interconnections | 2-3 | 7-8. Position of R20, Figures 8-37, 8-60, and 8-63 (P/O Change E) | 7-10 |
| 3-1. Front Panel Controls, Connectors and Indicators | 3-4 | 7-9. Partial Schematic of Figure 8-65, Zero Scan Signal Line to A1A2 (P/O Change E) | 7-10 |
| 3-2. Typical Display and IF Section Controls, Connectors and Indicators | 3-6 | 7-10. Connector Pin Location Diagram of Figure 8-72 (P/O Change E) | 7-11 |
| 3-3. Operational Adjustments | 3-8 | 7-11. Partial Diagram of Figure 8-41, YIG Driver and Oscillator (P/O Change H) | 7-16 |
| 3-4. General Operating Instructions, .01 to 18.0 GHz | 3-10 | 7-12. Part of Figure 8-74, RF/IF Section Interconnection Diagram (P/O Change H) | 7-17 |
| 3-5. Signal Identification Technique | 3-12 | 7-13. Scan Width Switch Assembly A1A2, Figure 8-60 (Change M) | 7-20 |
| 3-6. External Mixer (HP 11517A) Operating Instructions | 3-16 | 7-14. Scan Width Switch Assembly A1A2, Schematic Diagram, Figure 8-61 (Change M) | 7-21 |
| 4-1. CRT Display, 0 to 100 MHz | 4-1 | 7-15. Switching Regulator Board Assembly A9A1 (08555-60056), Figure 8-70 (Change P) | 7-22 |
| 4-2. Vertical Gain Adjustment | 4-2 | 7-16. Switching Regulator Schematic Diagram (08555-60056), Figure 8-72 (Change P) | 7-23 |
| 4-3. Scan Width Accuracy Test Setup | 4-5 | 7-17. Tuning Stabilizer VCXO Assembly A14A2 (08555-60058), Figure 8-53 (Change Q) | 7-24 |
| 4-4. Scan Width Accuracy Measurement | 4-5 | 7-18. Tuning Stabilizer, VCXO Pulse Ampl Assembly A14A2, Figure 8-55 (Change Q) | 7-25 |
| 4-5. Scan Width Accuracy Test Setup | 4-6 | 7-19. YIG Driver and Oscillator, Figure 8-41 (Change V) | 7-28 |
| 4-6. Frequency Response Test Setup, 0.1 to 2.05 GHz | 4-7 | 7-20. Switching Regulator Board Assembly A9A1 (08555-60098) | 7-32 |
| 4-7. Frequency Response Test Setup, 1.5 to 18 GHz | 4-8 | 7-21. Modified A4 Board | 7-34 |
| 4-8. Noise Sideband Test Setup | 4-11 | 7-22. Connection to A10XA4-8 | 7-34 |
| 4-9. Residual FM Test Setup | 4-12 | 7-23. Partial Schematic of Modified A4 Assembly | 7-34 |
| 4-10. Demodulation Sensitivity Measurement | 4-13 | 8-1. Transistor Operation | 8-6 |
| 4-11. Dial Accuracy Test Setup | 4-13 | 8-2. Field Effect Transistor Operation | 8-7 |
| 5-1. +20/+10 Volt Power Supply Check and Adjustment Test Setup | 5-4 | 8-3. Examples of Diode and Transistor Marking Methods | 8-7 |
| 5-2. YIG Driver Adjustments | 5-5 | 8-4. Integrated Circuit Packaging | 8-8 |
| 5-3. 2nd LO Frequency and Power Level Adjustment | 5-8 | 8-5. Basic AND and OR Gates | 8-9 |
| 5-4. 1.5 GHz Notch Filter and 2.5 GHz Low Pass Filter Check & Adjustment Procedure | 5-9 | 8-6. Basic NAND and NOR Gates | 8-9 |
| 5-5. 2nd Converter 2.05 GHz IF Bandpass Adjustment | 5-11 | 8-7. Logic Comparison Diagrams | 8-9 |
| 5-6. 500 MHz LO and LO Driver Adjustment Test Setup | 5-12 | 8-8. Operational Amplifier Equivalent Circuit | 8-10 |
| 5-7. 550 MHz Bandpass Filter and 50 MHz Filter Adjustment Test Setup | 5-14 | 8-9. 8555A RF Section Troubleshooting Tree | 8-12 |
| 5-8. 50 MHz Amplifier Check and Adjustment Test Setup | 5-16 | 8-10. 8555A RF Section Top/Bottom Internal Views | 8-13 |
| 5-9. Tuning Stabilizer Control Adjustment Test Setup | 5-19 | 8-11. 8555A RF Section Block Diagram | 8-15 |
| 5-10. Tuning Stabilizer VCXO Adjustment Test Setup | 5-21 | 8-12. 1st Converter Assy, Simplified Schematic | 8-16 |
| 6-1. Chassis Sheetmetal, Illustrated Parts Breakdown | 6-19 | 8-13. Switch Assembly A1A3 | 8-16 |
| 7-1. 500 MHz LO Drive Assembly A2A2 (P/O Change A) | 7-3 | 8-14. Attenuator Assembly A13 | 8-16 |
| | | 8-15. 1st Converter Assembly A12 | 8-17 |
| | | 8-16. INPUT Connector J1 Exploded View | 8-17 |

ILLUSTRATIONS (cont'd)

| Figure | Page | Figure | Page |
|--|------|---|------|
| 8-17. Input Attenuator and 1st Converter Schematic Diagram | 8-17 | 8-52. Tuning Stabilizer Control Assy A5 and Discriminator Assy A14A1 | 8-31 |
| 8-18. Second Mixer Diode Forming Dimensions in Inches | 8-18 | 8-53. Tuning Stabilizer VCXO Assembly A14A2 | 8-32 |
| 8-19. Second Converter Voltage Filter A11A3 | 8-19 | 8-54. Tuning Stabilizer Assembly A14 | 8-33 |
| 8-20. Second Converter Assembly A11 (Voltage Filter A11A3 Removed) | 8-19 | 8-55. Tuning Stabilizer VCXO/Pulse Ampl Assy A14A2, Discriminator A14A1, and Sampler Assy A14A5 | 8-33 |
| 8-21. Second Converter | 8-19 | 8-56. Logic State Versus Harmonic Band Number | 8-34 |
| 8-22. Third Converter Assy A2 Top View (50 MHz Ampl Removed) | 8-20 | 8-57. Band Buffer Assembly A6 | 8-35 |
| 8-23. 500 MHz LO Drive Assembly A2A2 | 8-20 | 8-58. Band Code Switch Logic, Schematic Diagram | 8-35 |
| 8-24. 500 MHz LO Assembly A2A4 | 8-21 | 8-59. Simplified Scan Width Circuit | 8-36 |
| 8-25. 550 MHz Ampl Assembly A2A1 | 8-21 | 8-60. Scan Width Switch Assembly A1A2 | 8-37 |
| 8-26. 550/50 MHz Mixer Assembly A2A3 | 8-21 | 8-61. Scan Width Switch Assembly A1A2 | 8-37 |
| 8-27. Third Converter Assembly A2, Bottom View | 8-21 | 8-62. Bandwidth Switch Assembly A1A1 | 8-38 |
| 8-28. Third Converter | 8-21 | 8-63. Scan Width Switch Assembly A1A2 | 8-38 |
| 8-29. CRT Display, Gain Change Base Line Lift | 8-22 | 8-64. Simplified RF Section Analogic Circuit | |
| 8-30. Third Converter Assembly, Side View | 8-22 | 8-65. RF Section Analogic | 8-39 |
| 8-31. 50 MHz Ampl. Assembly, A2A5 | 8-23 | 8-65. RF Section Analogic Schematic Diagram | 8-39 |
| 8-32. Input Mixer Network A16 | 8-23 | 8-66. Bandwidth Switch Assembly A1A1 | 8-41 |
| 8-33. 30 MHz Ampl. in Third Converter Casting | 8-23 | 8-67. Bandwidth Switching and Ampl Cal | 8-41 |
| 8-34. 50 MHz Ampl. and Input Mixer Gain Comp Network | 8-23 | 8-68. Switching Regulator Simplified Diagram | 8-42 |
| 8-35. Signal Identifier Timing Diagram | 8-24 | 8-69. Switching Regulator Assembly A9 | 8-42 |
| 8-36. Signal Identifier and Attenuator Driver Assembly A7 | 8-24 | 8-70. Switching Regulator Board Assembly A9A1 | 8-43 |
| 8-37. Scan Width Switch Assembly A1A2 | 8-25 | 8-71. +10/+20 Volt Power Supply Assembly A8 | 8-43 |
| 8-38. Signal Identifier | 8-25 | 8-72. Switching Regulator and +10/+20 Volt Power Supply | 8-43 |
| 8-39. YIG Driver Assembly A4 | 8-26 | 8-73. Connector Pin Location Diagram | 8-45 |
| 8-40. YIG Oscillator Assembly A3 | 8-27 | 8-74. RF/IF Section Interconnection Diagram | 8-45 |
| 8-41. YIG Driver and Oscillator | 8-27 | 8-75. Tuning Head Assy A1A4, Illustrated Parts Breakdown | 8-46 |
| 8-42. Control Generator Timing Diagram | 8-28 | 8-76. Second Converter Casting, Illustrated Parts Breakdown | 8-47 |
| 8-43. Tuning Stabilizer Control Assembly A5 | 8-28 | | |
| 8-44. Band Buffer Assy A6 with Mixer Gain Network A16 | 8-29 | A-1. Frequency Response for Option 002 | A-2 |
| 8-45. Control Generator and 1/n Attenuator | 8-29 | A-2. Typical VSWR Versus Frequency for Option 002 | A-2 |
| 8-46. Discriminator Block Schematic | 8-30 | A-3. 8555A RF Section, Top and Bottom Internal Views (Option 002) | A-6 |
| 8-47. VCXO Harmonics and Lock Points | 8-30 | | |
| 8-48. Discriminator Output Error Signal | 8-31 | | |
| 8-49. Tuning Stabilizer Assembly A14 | 8-31 | | |
| 8-50. Tuning Stabilizer Control Assembly A5 | 8-31 | | |
| 8-51. Discriminator Assembly A14A1 | 8-31 | | |

TABLES

| Table | Page | Table | Page |
|--|------|--|------|
| 1-1. 8555A/8552A/8552B Specifications | 1-4 | 6-3. Code List of Manufacturers | 6-21 |
| 1-2. Supplemental Performance | | 7-1. Manual Changes by Serial Number | 7-1 |
| Characteristics | 1-6 | 7-2. RF Section Chassis Wiring from Connector J6 (P/O Change E) | 7-12 |
| 1-3. Operating Accessories | 1-8 | 7-3. Tuning Head Wiring from Connector A1P6 (P/O Change E) | 7-14 |
| 1-4. Test Equipment Required | 1-9 | 7-4. Summary of Instrument Changes | 7-29 |
| 1-5. Test Accessories | 1-10 | 8-1. Factory Selected Components | 8-2 |
| 4-1. Front Panel Checks | 4-4 | 8-2. Adjustable Components | 8-2 |
| 4-2. Frequency Response | 4-9 | 8-3. Schematic Diagram Notes | 8-4 |
| 4-3. Frequency Sensitivity, 10 kHz | | 8-4. Etched Circuit Soldering Equipment | 8-5 |
| Bandwidth | 4-10 | 8-5. RF Section Chassis Wiring from Connector J6 | 8-44 |
| 4-4. Performance Test Card | 4-16 | 8-6. Tuning Head Wiring from Connector A1P6 | 8-44 |
| 5-1. Analogic Display Calibration Check | 5-24 | 8-7. RF Section Wiring from Connector P3 | 8-44 |
| 5-2. Check and Adjustment Test Card | 5-25 | A-1. Frequency Response for Option 002 | A-4 |
| 6-1. Reference Designators and Abbreviations Used in Parts List | 6-1 | | |
| 6-2. Replaceable Parts | 6-2 | | |

WARNINGS

SAFETY

If this instrument is to be energized via an auto-transformer for voltage reduction, make sure the common terminal is connected to the earthed pole of the power source.

BEFORE SWITCHING ON THIS INSTRUMENT, the protective earth terminals of this instrument must be connected to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding).

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders must be avoided.

Whenever it is likely that the protection offered by fuses has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

GROUNDING

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting the protective earth terminal is likely to make this instrument dangerous. Intentional interruption is prohibited.

HIGH VOLTAGE

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

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

Adjustments and Service described herein is performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

CAUTIONS

GROUNDING

BEFORE SWITCHING ON THIS INSTRUMENT, ensure that all devices connected to this instrument are connected to the protective (earth) ground.

BEFORE SWITCHING ON THIS INSTRUMENT, ensure that the line power (mains) plug is connected to a three-conductor line power outlet that

has a protective (earth) ground. (Grounding one conductor of a two-conductor outlet is not sufficient.)

LINE VOLTAGE SELECTION

BEFORE SWITCHING ON THIS INSTRUMENT, make sure the instrument is set to the voltage of the power source.

MODEL 8555A



Figure 1-1. Model 8555A Spectrum Analyzer RF Section with 8552B IF Section and 141T Display Section

SECTION I GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual contains all information required to install, operate, test, adjust and service the Hewlett-Packard Model 8555A Spectrum Analyzer RF Section. This section covers instrument identification, description, options, accessories, specifications and other basic information.

1-3. Figure 1-1 shows the Hewlett-Packard Model 8555A Spectrum Analyzer RF Section with the Model 8552B Spectrum Analyzer IF Section and the Model 141T Display Section.

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

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

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

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

SECTION V, ADJUSTMENTS, provides information required to properly adjust and align the instrument after repairs are made.

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

SECTION VII, MANUAL CHANGES, normally will contain no relevant information in the original issue of a manual. This section is reserved to provide back-dated and up-dated information in manual revisions or reprints.

SECTION VIII, SERVICE, includes all 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. WARNINGS AND CAUTIONS

1-7. **WARNING.** Ensure that the Spectrum Analyzer and any device connected to it are both properly grounded to the same power line ground. An interrupted path from earth ground to an instrument chassis safety ground (an open third-wire ground lead in a cord; for example, see Figure 1-2 below) can develop a potential (V) equal to one half of the power line voltage. This may cause a shock hazard as well as damage to the instrument.

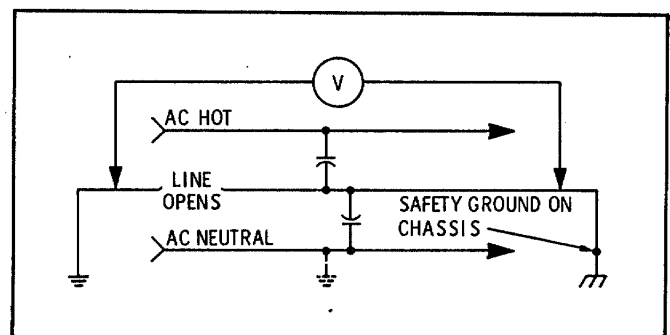


Figure 1-2. Circuit if Equipment
Ground Lead Opens

1-8. **CAUTION.** The input circuits of the Model 8555A are susceptible to burnout if fed an excessively high signal level. To avoid costly repairs and unnecessary down time the following precautions must be taken:

1. Use maximum attenuation when applying signals of unknown amplitude.
2. Ensure that the Spectrum Analyzer Display Section and any signal source to be coupled to the Spectrum Analyzer are both connected to the same power-line ground before connecting an RF cable to the 8555A RF Input. It has been established by HP that floating either instrument from ground may cause damage to the Spectrum Analyzer input mixer assembly.
3. The input attenuation setting should not be changed while dc is applied to the RF Input.
4. Do not connect impulse generators to the Model 8555A RF Input unless they are connected through a Model 8445A Pre-selector.

- Observe the following maximum input levels:

| Maximum Input Levels | Power | | Volts | | |
|----------------------------|------------------|----------------|------------------|-------|------|
| | dBm | Watts | Dc | Rms | Peak |
| Input .01-18 GHz Connector | +33 ¹ | 2 ¹ | ±20 ² | 10 | 14.4 |
| Incident on Input Mixer | +10 | 10 mW | ±20 ² | 0.707 | 1.0 |

¹The Input Attenuation Control must be in the 30 dB or greater position when applying +33 dBm or input Mixer will be damaged. The power levels listed apply for peak or average power.

²Do not exceed ±20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second.

1-9. INSTRUMENTS COVERED BY MANUAL

1-10. This instrument has a two-part serial number (see Figure 1-3). The first four digits and the letter comprise the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument.

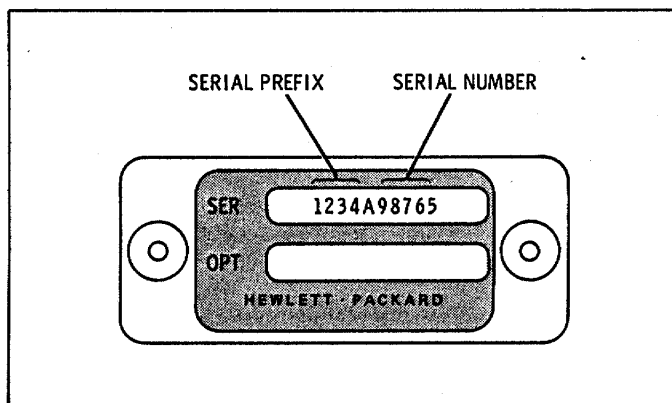


Figure 1-3. Instrument Identification

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.

1-11. 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.

1-12. 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.

1-13. 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.

1-14. DESCRIPTION

1-15. The HP Model 8555A Spectrum Analyzer RF Section is shown in Figure 1-1 with the Model 8552B Spectrum Analyzer IF Section and the Model 141T Display Section. Table 1-1, Specifications, and Table 1-2, Supplemental Performance Characteristics, are for the 8555A RF Section when used with an 8552A/B IF Section and a 140-series Display Section.

1-16. The 8555A plug-in is the microwave RF Section for use with the 8552-series IF section and the 140-series display section. Together they comprise a receiver that electronically scans an input signal and provides a visual display in the frequency domain. Input signal amplitude is plotted on the CRT as a function of frequency. The amplitude (Y-axis) of the CRT is calibrated in absolute units of power (dBm) or voltage (μV/mV) (50-ohm system); accordingly, absolute and relative measurements of both amplitude and frequency can be made.

1-17. The analyzer RF and IF sections form a highly sensitive super-heterodyne receiver with spectrum-scanning capabilities over the frequency range of 10 MHz to 40 GHz in 14 frequency bands. The analyzer presents a calibrated CRT display up to 2 GHz wide. Absolute calibration accuracy is maintained from 10 MHz to 18.0 GHz in 10 bands, using internal mixing. The frequency range from 12.4 GHz to 40 GHz is covered in 4 bands through the use of external mixers.

1-18. Instrument controls are arranged so that the operator can identify, type, and measure signal parameters with a minimum of switching. For wide-spectrum analysis, the operator can choose a preset scan width covering the full range of each frequency band. For a more detailed study, the spectrum width can be progressively narrowed to

as little as 2 kHz/div, or the scanning capabilities can be eliminated altogether to use the instrument as a fixed-tuned receiver. A 300 kHz IF bandwidth is automatically selected for full-scan operation; for variable-scan and fixed frequency operation, bandwidths as narrow as 100 Hz can be selected. A single switch will automatically enable the first LO tuning stabilization circuit when scan widths of 100 kHz per division, or less, are selected. A signal identifier circuit, controlled by an on/off switch, allows the operator to quickly determine the harmonic mixing mode and select the appropriate frequency band. The signal identifier can be enabled for scan widths of 1 MHz per division or less.

1-19. OPTIONS

1-20. Option 001. Replaces type N with type APC-7 connector.

1-21. Option 002 for the Model 8555A is a limiter which can be installed between the RF Section's INPUT port and the input attenuator to protect input circuitry from being overdriven. See Appendix A for details regarding Option 002.

1-22. ACCESSORIES SUPPLIED

1-23. The RF Section is shipped with three coaxial type terminations and one multi-section termination. The coaxial terminations are installed on the EXT MIXER port, the FIRST LO OUTPUT port and the SECOND LO OUTPUT port. (See Figure 3-1, items 17, 18, and 19.) The multi-section termination is shipped taped to the top of the RF Section. Install the multi-section termination on the Display Section rear panel. (See item 3, Figure 3-3.) The coaxial terminations are HP part number 11593A and the multi-section termination is HP part number 08553-60122.

1-24. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-25. The 8555A Spectrum Analyzer RF Section must be mated with an 8552-series Spectrum Analyzer IF Section and one of the 140-series Display Sections or 140-series Oscilloscope Mainframes before the units can perform their function as a spectrum analyzer. The 140S/140T/143S Display Sections are equipped with a fixed-persistence/non-storage CRT, whereas the 141S and 141T Display Sections are equipped with a variable-persistence storage CRT. Overlays, to provide LOG and LINEAR graticule scales, are available for use with the standard 140A and 141A Oscilloscope Mainframe.

1-26. Operating accessories for use with the 8555/8552/140 Spectrum Analyzer are listed in Table 1-3. Operating accessories include a waveguide mixer, adapters, filters and a frequency comb generator. An external waveguide mixer and appropriate adapters are required over the frequency range of 18 to 40 GHz.

1-27. WARRANTY

1-28. The 8555A Spectrum Analyzer RF Section is warranted and certified as indicated on the inner front cover of this manual. For further information contact the nearest Hewlett-Packard Sales and Service Office; addresses are provided at the back of this manual.

1-29. RECOMMENDED TEST EQUIPMENT

1-30. Tables 1-4 and 1-5 list the test equipment and test equipment accessories required to check, adjust, and repair the 8555A Spectrum Analyzer RF Section.

Table 1-1. 8555A/8552A/8552B Specifications

FREQUENCY SPECIFICATIONS

FREQUENCY RANGE

Tuning Range

With internal mixer: 0.01 - 18.00 GHz.

With external mixer: 12.4 - 40 GHz.

Selectable continuous coarse (by means of push-pull knob) and fine tuning determine display center frequency.

Harmonic Mixing Mode

Signal Identification: Signal identifier separates unknown input signal in center of CRT into two images 2 divisions apart with image on left slightly less in amplitude when the calibrated frequency scale is advanced to the appropriate band.

Scan Width

Full Scan: Inverted marker positioned by tuning control identifies the frequency that becomes the center frequency for scan width per division and zero scan modes. The width of the scan depends on mixing mode. Scan width = $n \times 2000$ MHz, where n is the mixing mode; e.g., for $n = 2$, scan width is 4 GHz.

Per Division: 16 calibrated scan widths from 2 kHz/div to 200 MHz/div in a 2, 5, 10 sequence.

Manual Scan: (Available with 8552B only.) Scan determined by front panel control; continuously variable across CRT in either direction.

Zero Scan: Analyzer becomes fixed tuned receiver with frequency set by frequency and fine tune controls and selectable bandwidths by bandwidth control. Amplitude variations are displayed versus time on CRT.

FREQUENCY ACCURACY

Dial Accuracy: $n \times (\pm 15 \text{ MHz})$ where n is the mixing mode.

Scan Accuracy: Frequency error between two points on the display is less than 10% of the indicated separation.

Stability:

Total Analyzer Residual FM (Fundamental Mixing)

| | |
|--------------|--------------|
| Stabilized | Unstabilized |
| <100 Hz | <10 kHz |
| peak-to-peak | peak-to-peak |

First LO residual FM typically 30 Hz.

Noise Sidebands: For fundamental mixing. More than 70 dB below CW signal, 50 kHz or more away from signal, with 1 kHz IF bandwidth and 100 Hz video filter.

RESOLUTION

Bandwidth Ranges: IF bandwidths of 0.10 to 300 kHz provided in a 1, 3 sequence.

Bandwidth Accuracy: Individual IF bandwidth 3 dB points calibrated to $\pm 20\%$. (10 kHz bandwidth $\pm 5\%$).

Bandwidth Selectivity:

| IF Bandwidth | 60 dB/3 dB Bandwidth Ratio | |
|-------------------|----------------------------|-------|
| | 8552A | 8552B |
| 10 kHz - 300 kHz | 20:1 | 20:1 |
| 1 kHz - 3 kHz | 20:1 | 11:1 |
| 0.1 kHz - 0.3 kHz | 25:1 | 11:1 |

AMPLITUDE SPECIFICATIONS

ABSOLUTE CALIBRATION RANGE

Measurement Range



See "Input Specifications" for maximum levels to INPUT .01 - 18 GHz connector and to input mixer.

Log Reference Level: From -130 dBm to +10 dBm, in 10 dB steps. Log reference level vernier, 0 to -12 dB continuously.

Linear Sensitivity: From 0.1 $\mu\text{V}/\text{div}$ to 100 mV/div in a 1,2 sequence. Linear sensitivity vernier 1 to 0.25 attenuation ratio continuously.

Sensitivity

Average Noise Level: Specified for 1 kHz bandwidth. Using lower bandwidths will improve average noise level; e.g., use of 100 Hz bandwidth will improve noise level in the 1.5 to 3.55 GHz frequency range from -117 dBm to -127 dBm max.

With INTERNAL Coaxial Mixer

| Frequency Range (GHz) | Mixing Mode (n) | IF Freq. (MHz) | Average Noise Level (dBm max.) |
|-----------------------|-----------------|----------------|--------------------------------|
| 0.01 - 2.05 | 1- | 2050 | -115 |
| 1.50 - 3.55 | 1- | 550 | -117 |
| 2.07 - 6.15 | 2- | 2050 | -108 |
| 2.60 - 4.65 | 1+ | 550 | -117 |
| 4.11 - 6.15 | 1+ | 2050 | -115 |
| 4.13 - 10.25 | 3- | 2050 | -103 |
| 6.17 - 10.25 | 2+ | 2050 | -105 |
| 6.19 - 14.35 | 4- | 2050 | -95 |
| 8.23 - 14.35 | 3+ | 2050 | -100 |
| 10.29 - 18.00 | 4+ | 2050 | -90 |

With 11517A EXTERNAL Waveguide Mixer and Appropriate Waveguide Tapers

| Frequency Range | Average Noise Level (Typ.) |
|-----------------|----------------------------|
| 12.4 - 18.0 GHz | -90 dBm |
| 18.0 - 26.5 GHz | -85 dBm |
| 26.5 - 40.0 GHz | -75 dBm |

Table 1-1. 8555A/8552A/8552B Specifications (Continued)

Residual Responses: Referred to signal level at input mixer on fundamental mixing: <-90 dBm.

Display Range

Log: 70 dB, 10 dB/div with 8552B 2 dB/div log expand on a 16 dB display.

Linear: From 0.1 mV to 100 mV/div in a 1, 2 sequence on an 8-division display.

Display Uncalibrated Light: Panel light warns operator of uncalibrated amplitude display if the IF or video bandwidth selected is too narrow for combination of scan width and scan time selected.

Input Attenuator Range: 0 - 50 dB in 10 dB steps.

ABSOLUTE CALIBRATION ACCURACY

The overall absolute calibration accuracy of the spectrum analyzer in a particular application is a function of the measurement technique. The following elements also affect absolute calibration accuracy:

Frequency Response: With 10 dB input attenuator setting.

| Frequency Range (GHz) | Mixing Mode (n) | IF Freq. (MHz) | Frequency Response (dB max.) |
|-----------------------|-----------------|----------------|------------------------------|
| 0.01 - 2.05 | 1- | 2050 | ±1.0 |
| 1.50 - 3.55 | 1- | 550 | ±1.0 |
| 2.07 - 6.15 | 2- | 2050 | ±1.25 |
| 2.60 - 4.65 | 1+ | 550 | ±1.0 |
| 4.11 - 6.15 | 1+ | 2050 | ±1.0 |
| 4.13 - 10.25 | 3- | 2050 | ±1.5 |
| 6.17 - 10.25 | 2+ | 2050 | ±1.5 |
| 6.19 - 14.35 | 4- | 2050 | ±2.0 |
| 8.23 - 14.35 | 3+ | 2050 | ±2.0 |
| 10.29 - 18.00 | 4+ | 2050 | ±2.0 |

IF gain variation with different bandwidth settings: (at 20°C).

Log: ±0.5 dB.

Linear: ± 5.8%.

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

Linear: ±2.8% of full 8-division deflection.

Input RF Attenuator: Frequency response typically ±0.6 dB from 10 MHz to 18 GHz.

Log Reference Level: Accurate to ±0.2 dB (±2.3% Linear Sensitivity).

Log Reference Level Vernier: Accurate to ±0.1 dB (1.2%) in 0, -6, and -12 dB positions; otherwise, ±0.25 dB (±2.8%).

Calibrator Output: Amplitude -30 dBm, ±0.3 dB. Frequency 30 MHz, ±0.3 MHz (8552A), ±3 kHz (8552B).

INPUT SPECIFICATIONS

Input Impedance: 50Ω nominal (0.01 - 18 GHz).

Reflection Coefficient: <0.130 (1.30 SWR) for input RF attenuator settings ≥10 dB.

Maximum Input Level:



DO NOT EXCEED THE FOLLOWING MAXIMUM INPUT LEVELS:

| Maximum Input Levels | POWER ¹ | | VOLTS ² | | |
|-------------------------------|--------------------|-------|--------------------|-------|-------|
| | dBm | Watts | DC | Rms | Peak |
| Input 0.01 - 18 GHz Connector | +33 | 2 | ±20 | 10 | 14.14 |
| Incident on Input Mixer | +10 | 10mW | ±20 | 0.707 | 1.0 |

¹ The INPUT ATTENUATION control must be in the 30 dB or greater position when applying +33 dBm or input mixer will be damaged. The power levels listed apply for peak or average power.

² Do not exceed ± 20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second. Do not change INPUT ATTENUATION levels when dc voltages are applied to RF INPUT Connector.

RF Input Connector: Type N female.

External Mixer Input Connector: BNC female; LO power transfer to external mixer through connector as well as 2.05 GHz IF signal return to spectrum analyzer. LO power typically 0 dBm.

SCAN TIME SPECIFICATIONS

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

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

GENERAL SPECIFICATIONS

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

Dimensions: Model 140T or 141T Display Section, 9-1/16 in. H (incl. feet) x 16-3/4 in. W x 18-3/8 in. D (229 x 425 x 467 mm). Model 143S Display Section, 21 in. H (incl. feet) x 16-3/4 in. W x 18-3/8 in. D (533 x 425 x 467 mm).

Weight:

- Model 8555A RF Section: Net 14 lb 15 oz (6,8 kg).
- Model 8552A IF Section: Net 9 lb (4,1 kg).
- Model 8552B IF Section: Net 9 lb (4,1 kg).
- Model 140T Display Section: Net 37 lb (16,8 kg).
- Model 141T Display Section: Net 40 lb (18 kg).
- Model 143S Display Section: Net 62 lb (28,1 kg).

Table 1-2. Supplemental Performance Characteristics

SUPPLEMENTAL PERFORMANCE CHARACTERISTICS

AMPLITUDE CHARACTERISTICS

For typical sensitivity and frequency response versus input frequency, see Figure 1-4.

Spurious Responses Due to Second Harmonic Distortion: With -40 dBm incident on input mixer.

| Frequency Range | 2nd Harmonic Distortion |
|-----------------|-------------------------|
| 0.1 - 6.2 GHz | <63 dB |
| 6.2 - 10.3 GHz | <69 dB |
| 10.3 - 14.4 GHz | <54 dB |
| 14.4 - 18.5 GHz | <51 dB |

Spurious Responses Due to Third Order Intermodulation Distortion: <-70 dB with -30 dBm incident on input mixer and signal separation >1 MHz.

Video Filter: Post-detection filter used to average displayed noise. With 8552A nominal bandwidths: 10 kHz and 100 Hz. With 8552B nominal bandwidths: 10 kHz, 100 Hz, and 10 Hz.

Gain Compression: For internal mixer gain compression <1 dB for -10 dBm peak or average signal level to input mixer. 11517A external mixer (12.4 - 40 GHz) gain compression, <1 dB for -15 dBm peak or average signal level to input mixer.

FREQUENCY CHARACTERISTICS

RESOLUTION

See Figure 1-5 for curves of typical 8555A/8552A and 8555A/8552A spectrum analyzer resolution for different bandwidths.

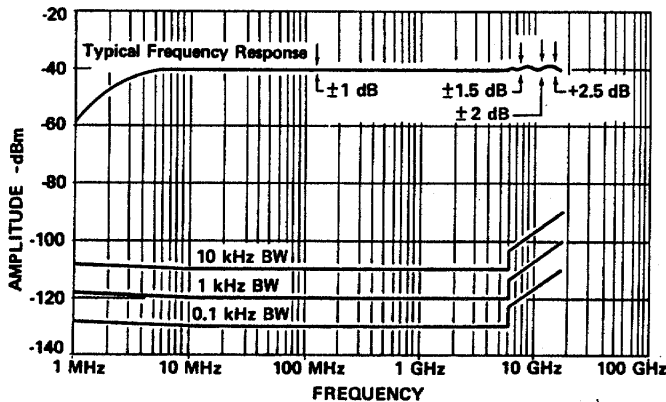


Figure 1-4. Typical Spectrum Analyzer Sensitivity and Frequency Response

FREQUENCY DRIFT

Long Term Drift: (At fixed center frequency, after 2-hour warm-up).

Stabilized: ±3.0 kHz/10 min.

Unstabilized: ±25 kHz/10 min.

Stabilization Range: First LO can be automatically stabilized to internal crystal reference for scan widths of 100 kHz/div or less.

OUTPUT CHARACTERISTICS

First LO Output: +10 dBm; 50 ohms; 2.05 - 4.10 GHz.

Second LO Output: +10 dBm; 50 ohms; 1500 MHz.

Third LO Output: +5 dBm; 50 ohms (rear panel); 500 MHz.

Pen Lift Output: 0 to 14 volts (0 volts during scan cycle). Output available in Int and single scan modes and Auto, Line, and Video scan trigger.

Vertical Output: 100 mV per major division on CRT display; output impedance <100 ohms.

SCAN CHARACTERISTICS

Scan Mode:

Int: Analyzer repetitively scanned by internally generated ramp; synchronization selected by scan trigger.

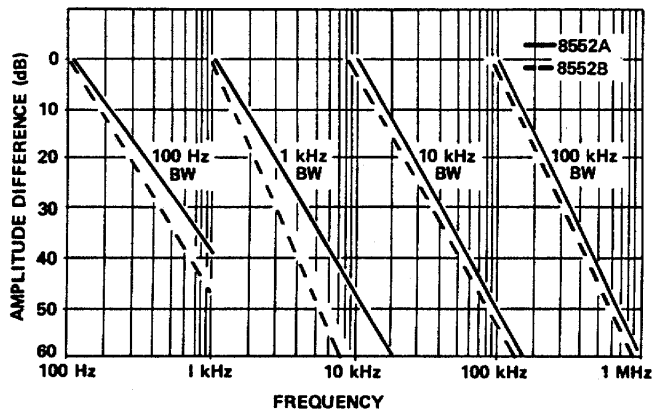


Figure 1-5. Typical Spectrum Analyzer Resolution (Fundamental Mixing)

Table 1-2. Supplemental Performance Characteristics (cont'd)

SUPPLEMENTAL PERFORMANCE CHARACTERISTICS (Continued)

Single: Single scan with reset actuated by front panel pushbutton.

Ext: Scan determined by 0 to +8 volt external signal; scan input impedance >10 k Ω .

Blanking: -1.5V external blanking signal required.

Manual: Scan determined by front panel control; continuously variable across CRT in either direction (8552B only).

Scan Trigger: For Internal Scan Mode, select between:

Auto: Scan free runs.

Line: Scan synchronized with power line frequency.

Ext: Scan synchronized with >2 volt (20 volt max.) trigger signal (polarity selected by internally located switch in IF Section).

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).

DISPLAY CHARACTERISTICS

Variable Persistence/Storage (Model 141T):

Plug-ins: Accepts Model 8550-series Spectrum Analyzer plug-ins and Model 1400-series time domain plug-ins.

Cathode-ray Tube:

Type: Post-accelerator storage tube, 9000 volt accelerating potential; aluminized P31 phosphor; etched safety glass faceplate reduces glare.

Functions Used with Time Domain Plug-ins Only: Intensity modulation, calibrator, beam finder.

Special Order: Chassis slides and adapter kit: Fixed slides, order HP Part Number 1490-0714; pivot slides, order HP Part Number 1490-0718; slide adapter kit for mounting slides on scope, order HP Part Number 1490-0721.

Persistence:

Normal: Natural persistence of P31 phosphor (approximately 0.1 second).

Variable:

Normal Writing Rate Mode: Continuously variable from less than 0.2 second to more than one minute (typically two or three minutes).

Maximum Writing Rate Mode: Typically from 0.2 second to 15 seconds.

Erase: Manual; erasure takes approximately 350 ms; CRT ready to record immediately after erasure.

Storage Time: Normal writing rate; more than 2 hours at reduced brightness (typically 4 hours). More than one minute at maximum brightness. Fast writing speed; more than 15 minutes (typically 30 minutes) at reduced brightness or more than 15 seconds at maximum brightness.

Functions Used with Time Domain Plug-ins Only: Intensity modulation, calibrator, beam finder.

Normal Persistence (Model 140T):

Plug-ins: Same as 141T.

Cathode-ray Tube:

Type: Post-accelerator, 7300 volt potential medium-short persistence P7 phosphor; tinted and etched safety glass faceplate reduces glare. (Normal persistence of P7 phosphor approximately 0.3 sec).

Graticule: 8 x 10 division (approximately 7,6 x 9,5 cm) parallax-free internal graticule; five subdivisions per major division on horizontal and vertical axes.

Functions Used with Time Domain Plug-ins Only: Same as 141T.

Normal Persistence Large Screen Display (Model 143S):

Plug-ins: Same as 141T.

Cathode-ray Tube:

Type: Post-accelerator, 20 kV accelerating potential, aluminized P7 phosphor. (Persistence approximately 0.3 sec.)

Graticule: 8 x 10 divisions (approximately 8 x 10 inch) parallax-free internal graticule, five subdivisions per major division on horizontal and vertical axes.

Functions Used with Time Domain Plug-ins Only: Same as 141T.

GENERAL CHARACTERISTICS

CRT BASELINE CLIPPER: Front panel control adjusts blanking of CRT trace baseline to allow more detailed analysis of low-repetition-rate signals and improved photographic records to be made.

Temperature Range: Operating, 0° to +40°C; storage, -40° to +75°C.

Table 1-3. Operating Accessories

| Model Number | Name | Description |
|--------------|--------------------------|---|
| 11517A | Waveguide Mixer | Mixes inputs from 12.4 to 40 GHz with frequencies from first LO HP 10503A Coaxial Cable terminated with BNC male connectors supplied with Mixer |
| 11518A | Adapter | For mating 11517A Waveguide Mixer to P-band (12.4 to 18.0 GHz) system |
| 11519A | Adapter | For mating 11517A Waveguide Mixer to K-band (18.0 to 26.5 GHz) system |
| 11520A | Adapter | For mating 11517A Waveguide Mixer to R-band (26.5 to 40 GHz) system |
| 8406A | Frequency Comb Generator | For calibrating scan-width function; generates precision markers with 1-, 10-, and 100-MHz spacing |
| 8403A | Bandpass Filter | Pass band: 1 - 2 GHz |
| 8431A | Bandpass Filter | Pass band: 2 - 4 GHz |
| 8432A | Bandpass Filter | Pass band: 4 - 6 GHz |
| 8433A | Bandpass Filter | Pass band: 6 - 8 GHz |
| 8434A | Bandpass Filter | Pass band: 8 - 10 GHz |
| 8435A | Bandpass Filter | Pass band: 4 - 8 GHz |
| 8436A | Bandpass Filter | Pass band: 8 - 12.4 GHz |
| 8444A | Tracking Generator | Functions as a frequency response measurement system when used with the Spectrum Analyzer. The system can be used as a sweeper or signal generator 10 MHz to 1.3 GHz. |
| 8445B | Automatic Preselector | Functions to reduce or eliminate signal intermodulation, and multiple and spurious responses. Preselector is a low-pass filter over the 0 to 1.8 GHz range and a voltage tuned filter over the 1.8 to 18 GHz range. |
| 8447D | Preamp | 100 kHz - 1.3 GHz low noise preamp; improves sensitivity or average noise level or RF Section approximately 18 dB |
| 360 series | Low-pass Filter | 360A cuts off at 700 MHz, 360B cuts off at 1200 MHz |
| 362A series | Low-pass Filter | Acts like bandpass when used with waveguide; available for X, P, K, R bands; eliminates signals outside normal waveguide band |

Table 1-4. Test Equipment Required

| Item | Minimum Specifications | Suggested Model | Use* |
|--|--|--|------|
| Frequency Comb Generator | Frequency markers spaced 1, 10, 100 MHz apart; usable to 4 GHz Frequency Accuracy: $\pm 0.01\%$ Output Amplitude: > -40 dBm | HP 8406A Comb Generator | P, A |
| HF Signal Generator | Frequency Range: 1–50 MHz Output Amplitude: > -20 dBm Output Amplitude Accuracy: $\pm 1\%$ Frequency Accuracy: $\pm 1\%$ Output Impedance: 50 ohms | HP 606A/B HF Signal Generator | P |
| VHF Signal Generator | Frequency Range: 40–455 MHz Frequency Accuracy: $\pm 1\%$ Output Amplitude: > -20 dBm Output Impedance: 50 ohms | HP 608E/F VHF Signal Generator | A, T |
| UHF Signal Generator | Frequency Range: 450–1230 MHz Frequency Accuracy: $\pm 1\%$ Output Amplitude: > -20 dBm Output Impedance: 50 ohms | HP 612A UHF Signal Generator | T |
| Signal Generator | Frequency Range: 1.0–2.1 GHz Frequency Accuracy: $\pm 1\%$ Output Amplitude: > -20 dBm Output Impedance: 50 ohms | HP 8614A/B Signal Generator | A, T |
| Signal Generator | Frequency Range: 2.0–4.0 GHz Frequency Accuracy: $\pm 1\%$ Output Amplitude: > -20 dBm Output Impedance: 50 ohms | HP 8616A/B Signal Generator | A |
| Sweep Oscillator | Frequency Range: 0.1–18 GHz Output Amplitude: > -20 dBm Output Impedance: 50 ohms | HP 8690B Sweep Oscillator with 8693A/B RF Unit 8694A/B RF Unit 8695A/B RF Unit 8699B RF Unit | P |
| Audio Oscillator | Frequency Range: 10 Hz–10 kHz Output Amplitude: 2 Vrms Frequency Accuracy: 2% Output Impedance: 600 ohms | HP 200CD Audio Oscillator | P |
| Test Oscillator | Frequency Range: 10 kHz–1.3 MHz Frequency Accuracy: $\pm 3\%$ Output Amplitude: 3 Vrms Output Impedance: 50 ohms | HP 652A Test Oscillator | A |
| Frequency Counter | Frequency Range: 100 kHz–18.5 GHz Accuracy: $\pm 0.001\%$ Sensitivity: 100 mV rms Readout Digits: 7 digits | HP 5245L Frequency Counter w/ HP 5257A Transfer Oscillator | A, T |
| *Use: P = PERFORMANCE; A = ADJUSTMENT; T = TROUBLESHOOTING | | | |

Table 1-4. Test Equipment Required (cont'd)

| Item | Minimum Specifications | Suggested Model | *Use |
|----------------------|---|--|------|
| Tunable RF Voltmeter | Bandwidth: 1 kHz Frequency Range: 1–1000 MHz Sensitivity: 10 mV–1 Vrms Input Impedance: \geq 0.1 megohms | HP 8405A Vector Voltmeter | T |
| Digital Voltmeter | Voltage Accuracy: \pm 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 w/ HP 3443A Plug-in | A, T |
| Oscilloscope | Frequency Range: Dc to 50 MHz Time Base: 1 us/div to 10 ms/div Time Base Accuracy: \pm 3% Dual Channel, Alternate Operation Ac or dc Coupling External Sweep Mode Voltage Accuracy: \pm 3% Sensitivity: 0.005 V/div | HP 180A with HP 1801A Vertical Amplifier and HP 1821A Horizontal Amplifier HP 10004 10:1 Divider Probes (2) | A, T |
| Power Meter | Frequency Range: 0.01–18.0 GHz Accuracy: \pm 1% Power Range: -20 to +10 dBm | HP 432A Power Meter with HP 8478B Thermistor Mount | A, T |
| Power Supply Dual DC | Output Voltage: Variable, 0–30 Vdc Output Current: 0–300 mA Meter Accuracy: 3% | HP 6205B Power Supply | T |
| DC Volt-Ohm-Ammeter | Voltmeter Voltage Range: 1 mV–300V Accuracy: \pm 1% Input Resistance: 10 megohms Ammeter Current Range: 1 μ A–1A Accuracy: \pm 2% Ohmmeter Resistance range: 1 ohm–100 megohm Accuracy: \pm 5% reading at center scale | HP 412A Volt-Ohm-Ammeter | A, T |

Table 1-5. Test Accessories

| Item | Required Features | Suggested Model |
|-------------|---|-----------------|
| Service Kit | Contents: 140/141 Display Section to Spectrum Analyzer Plug-in Extender Cable Assembly (HP 11592-60015) IF to RF Unit Interconnection Extender Cable Assembly (HP 11592-60016) Selectro Female to BNC Male Test Cable, 36 inches long (HP 11592-60001) Selectro Male to Selectro Female Test Cable, 8 inches long yellow (HP 11592-60003) | HP 08555-60077 |

Table 1-5. Test Accessories (cont'd)

| Item | Required Features | Model |
|-------------|---|-------------------------------|
| Service Kit | Selectro Female to Selectro Female Cable, 8" long, red (HP 11592-60002) Extender Board Assy, 15 pins, 30 conductors, for plug-in circuit boards (HP 11592-60011) Extender Board Assy, 10 pins, 20 conductors, for plug-in circuit boards (HP 5060-0256) Extender Board Assy, 12 pins, 24 conductors, for plug-in circuit boards (HP 5060-0257) Extender Board Assy, 24 pins, 48 conductors, for plug-in circuit boards (HP 5060-0258) Cable Assy, R & P Female to BNC Male (HP 11592-60013) Cable Assy, SMA Male to BNC Male (HP 08555-60076) Wrench, box-end slotted 3/16-inch (HP 08555-20097) Selectro Jack-to-Jack Adapter (HP 1250-0827) Wrench, open-end, 15/64-inch (HP 8710-0946) OSM Plug-to-Plug Adapter (HP 1250-1158) | HP Service Kit 08555-60077 |

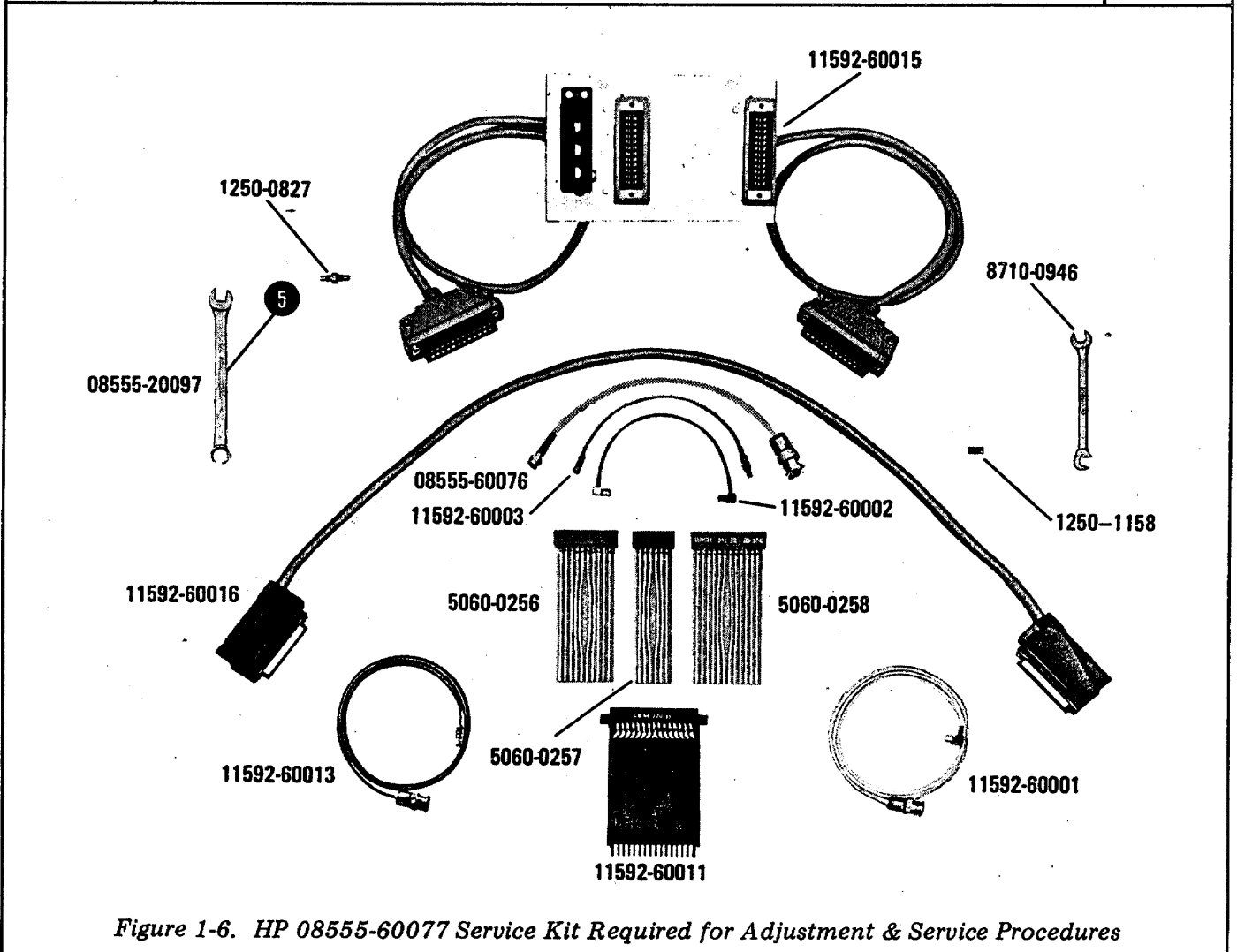


Figure 1-6. HP 08555-60077 Service Kit Required for Adjustment & Service Procedures

Table 1-5. Test Accessories (cont'd)

| Item | Required Features | Suggested Model | Use* |
|---------------------------|--|--|-------|
| 10 dB Fixed Attenuator | Frequency Range: Dc—12.4 GHz Flatness: ± 0.2 dB | HP 8491A, Option 10 | A |
| 12 dB Variable Attenuator | Frequency Range: Dc—1 GHz Flatness: ± 0.3 dB | HP 355C | A |
| VHF Attenuator | Frequency Range: Dc—1 GHz 0—60 dB in 10 dB steps | HP 355D | A |
| 50-ohm Termination | Frequency Range: Dc—18 GHz VSWR: 1:1 Power Rating: 0.5 Watts Connector: Type N Male | HP 909A Coaxial Termination, Option 012 | P, A |
| Dual Directional Coupler | Frequency Range: 100 MHz—2 GHz Directivity: 32 dB | HP 778D Dual Directional Coupler | P, A |
| Directional Coupler (2) | Frequency Range: 1.7—12.4 GHz Directivity: 26 dB | HP 779D Directional Coupler | P |
| Coaxial Short | Type N Male Shorting Plug | HP 11512A | P |
| Low Pass Filter | Cut-off Frequency: 2.2 GHz Insertion Loss: ≤ 1 dB below 0.9 times cut-off frequency Rejection: ≥ 50 dB at 1.25 times cut-off freq. | HP 360C Low Pass Filter | P |
| BNC Tee | Two BNC Female Connectors, one Male BNC Connector | UG-274A/U HP 1250-0781 | T |
| Adapter | SMA Jack to BNC Plug | HP 1250-0831 | A |
| Adapter | BNC Jack to BNC Jack | UG-914A/U HP 1250-0080 | A |
| Adapter | BNC Male to Type N Female | UG-349A/U HP 1250-0077 | A, T |
| Adapter (2) | BNC Female to Type N Male | UG-201A/U HP 1250-0067 | P,A,T |
| Crystal Detector | Frequency Range: 0.01—12.4 GHz Frequency Response: ± 0.5 dB | HP 423A | P |
| Logic Level Indicator | Compatibility: DTL or TTL Power Requirements: 5 volts $\pm 10\%$ across any two pins | HP 10528A Logic Clip | T |
| Voltage Probe | Dual Banana Plug-to-Probe Tip and Clip (Ground) Lead | HP 10025A Straight-through Voltage Probe | A, T |
| Cable Assy (2) | 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 |

*USE: A = ADJUSTMENT; P = PERFORMANCE; T = TROUBLESHOOTING

Table 1-5. Test Accessories (cont'd)

| Item | Required Features | Suggested Model | Use* |
|--|---|--|------------------------------|
| Cable Assembly | Dual Banana Plug to Clip Lead and Probe, 60 inches long | HP 11003A | A |
| Cable Assembly | Male Type N Connectors, 72 inches long | HP 11500A | A |
| Tuning Tool, Blade | Nonmetallic Shaft, 6 inches long | General Cement 5003 (HP 8730-0013) | A, T |
| Tuning Tool, Slot | Nonmetallic, 6-inch shaft | Gowanda PC9668 | A, T |
| Wrench | Open-end, 15/64-inch | HP 8710-0946 | A, T |
| Wrench | Open-end, 5/16-inch | HP 8720-0030 | A, T |
| Wrench | No. 6, Allen Driver | HP 5020-0289 | A, T |
| Wrench | No. 10, Allen Driver | HP 5020-0291 | A, T |
| Wrench | Nut Driver, 5/16-inch | HP 8720-0003 | A, T |
| Screwdrivers | Phillips No. 1 Phillips No. 2 Pozidriv No. 1 (Small) Stanley No. 5531 Pozidriv No. 2 (Medium) Stanley No. 5332 | HP 8710-0899 HP 8710-0900 | A, T A, T A, T A, T |
| Tuning Tool, Slot | Nonmetallic, 2.5-inch shaft | HP 8710-0095 | A, T |
| Cover Assy | Modified display section cover (see Paragraph 3-40) | Modified HP 5060-0740 | A, T |
| Soldering Iron | 47-1/2 watt | Ungar No. 776 with No. 4037 Heating Unit | A, T |
| Dummy Load | Resistance: 83 ohms, 5% Wattage: 20 watts (100 ohm HP 0819-0019 and 500 ohm HP 0819-0035 in parallel) | HP 0819-0019 HP 0819-0035 | T |
| Voltage Divider | Resistance: 22.97K 1% 1/4W 21.5K (HP 0757-0199) in series with 1.47K (HP 0757-1094) | HP 0757-0199 HP 0757-1094 | A |
| Variable Resistor | Resistance: 2.5K ohms variable | HP 2100-2729 | A |
| Tuning tool kit, slug | Modified 5/16-inch nut driver (HP 08555-20122) with modified number 10 Allen driver (HP 08555-20121) | HP 08555-20122 HP 08555-20121 | A |
| *USE: A = ADJUSTMENT; P = PERFORMANCE; T = TROUBLESHOOTING | | | |

SECTION II INSTALLATION

2-1. INITIAL INSPECTION

2-2. Mechanical Check

2-3. Check the shipping carton for evidence of damage immediately after receipt. If there is any visible damage to the carton, request the carrier's agent be present when the instrument is unpacked. Inspect the instrument for physical damage such as bent or broken parts and dents or scratches. If damage is found refer to paragraph 2-6 for recommended claim procedures. If the instrument appears to be undamaged, perform the electrical check (see paragraph 2-4). The packaging material should be retained for possible future use.

2-4. Electrical Check

2-5. The electrical check consists of following the performance test procedures listed in Section IV. These procedures allow the operator to determine that the instrument is, or is not, operating within the specifications listed in Table 1-1. The initial performance and accuracy of the instrument are certified as stated on the inside front cover of this manual. If the instrument does not operate as specified, refer to paragraph 2-6 for the recommended claim procedure.

2-6. CLAIMS FOR DAMAGE

2-7. If physical damage is found when the instrument is unpacked, notify the carrier and the nearest Hewlett-Packard Sales/Service office immediately. The Sales/Service office will arrange for repair or replacement without waiting for a claim to be settled with the carrier.

2-8. The warranty statement for the instrument is on the inside front cover of this manual. Contact the nearest Sales/Service office for information about warranty claims.

2-9. PREPARATION FOR USE

CAUTION

Before applying power, check the rear panel slide switch on the Display Section for proper position (115 or 230 volts).

2-10. Shipping Configuration

2-11. Because of individual customer requirements, shipping configurations are flexible.

Preparation for use is based on the premise that the RF and IF Sections are installed in a Display Section to make the Spectrum Analyzer physically and functionally complete for use. Since the RF and IF Sections are usually received separately, the plug-ins must be mechanically fitted together, electrically connected, and inserted in a display section or oscilloscope mainframe of the 140-series. For mechanical and electrical connections, refer to Figure 2-1 and paragraph 2-20.

2-12. Power Requirements

2-13. The Spectrum Analyzer can be operated from a 50- to 60-hertz input line that supplies either a 115-volt or 230-volt ($\pm 10\%$ in each case) power. Consumed power varies with the plug-ins used but is normally less than 225 watts. Line power enters the Display Section or Mainframe, where it is converted to dc voltages, and then is distributed to the RF and IF Sections via internal connectors.

2-14. The 115/230 power selector switch at the rear of Display Section must be set to agree with the available line voltage. If the line voltage is 115 volts, the slide switch must be positioned so that 115 is clearly visible. The instrument is internally fused for 115-volt operation, when shipped. If 230-volt source is to be used, refer to fuse replacement procedures in the display section manual.

2-15. Power Cable

2-16. To protect operating personnel, the National Electrical Manufacturers Association (NEMA) and the International Electrotechnical Commission (IEC) recommends that the instrument panel and cabinet be grounded. The Spectrum Analyzer is equipped with a three-conductor power cable; the third conductor is the ground conductor and when the cable is plugged into an appropriate receptacle, the instrument is grounded. To preserve the protection feature when operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter and connect the green lead on the adapter to ground.

2-17. Operating Environment

2-18. The Spectrum Analyzer uses a forced-air cooling system to maintain required operating temperatures within the instrument. The air intake and filter are located on the rear of the Display Sec-

tion; air is exhausted through the side panel perforations. When operating the instrument, choose a location which provides at least three inches of clearance around the rear and both sides. Refer to the Display Section manual for maintenance instructions for the cooling system.

2-19. Interconnections

2-20. The RF and IF Sections are normally shipped separately, the plug-ins must be mechanically fitted together, electrically connected, and then inserted in the Display Section or mainframe. To make these connections, refer to Figure 2-1 and proceed as follows:

a. Set the IF Section on a level bench. Locate slot near right rear corner of RF Section; also, locate metal tab on IF Section that engages with this slot.

b. Grasp the 8555A RF Section near middle of chassis and raise until it is a few inches above the IF Section.

c. Tilt RF Section until front of assembly is about 2 inches higher than the rear.

d. Engage assemblies in such a way that metal tab on the rear of the IF Section slips through the slot on RF Section.

e. With the preceding mechanical interface completed, gently lower RF Section until electrical plug and receptacle meet.

f. Position RF Section as required to mate the plug and receptacle. When plug and receptacle are properly aligned, only a small downward pressure is required to obtain a snug fit.

g. Position the latch on each side of the RF Section to lock the RF and IF Sections together.

h. Remove the 50-ohm lead assembly AT4 (shipped taped to top of the RF Section) and install at the AUXILIARY "A" connector on the rear panel of the Display Section. On Display Sections not equipped with an AUXILIARY "A" connector, install 50-ohm load assembly AT4 at AUXILIARY "A" connector on rear of RF Section.

i. Pick up the RF/IF Sections and center in opening of Display Section. Push forward until assembly fits snugly into Display Section mainframe.

j. Push in front latch to securely fasten assembly in place.

2-21. To separate the RF/IF Sections from Display Section and to separate the RF Section from the IF Section, proceed as follows:

a. Push front panel latch in direction of arrow until it releases.

b. Firmly grasp the middle of latch flange and pull RF/IF Sections straight out.

c. Unlock the latch on each side of the RF section and exert an upward pulling force on front edge of RF Section.

d. When the two sections separate at the front, raise RF Section two or three inches and slide metal tab at rear of IF Section out of the slot with which it is engaged.

2-22. Three HP 11593A 50-ohm Terminations are supplied with each HP 8555A. They should be connected to the unused EXT MIXER, FIRST LO OUTPUT, and SECOND LO OUTPUT connectors on the front panel.

2-23. STORAGE AND SHIPMENT

2-24. Original Packaging

2-25. The same containers and materials used in factory packaging can be obtained through the Hewlett-Packard Sales/Service offices listed at the rear of this manual.

2-26. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating service required, return address, instrument model number and full serial number. Mark the container FRAGILE to assure careful handling.

2-27. In any correspondence refer to the instrument by model number and full serial number.

2-28. Other Packaging Materials

2-29. The following general instructions should be followed when 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.

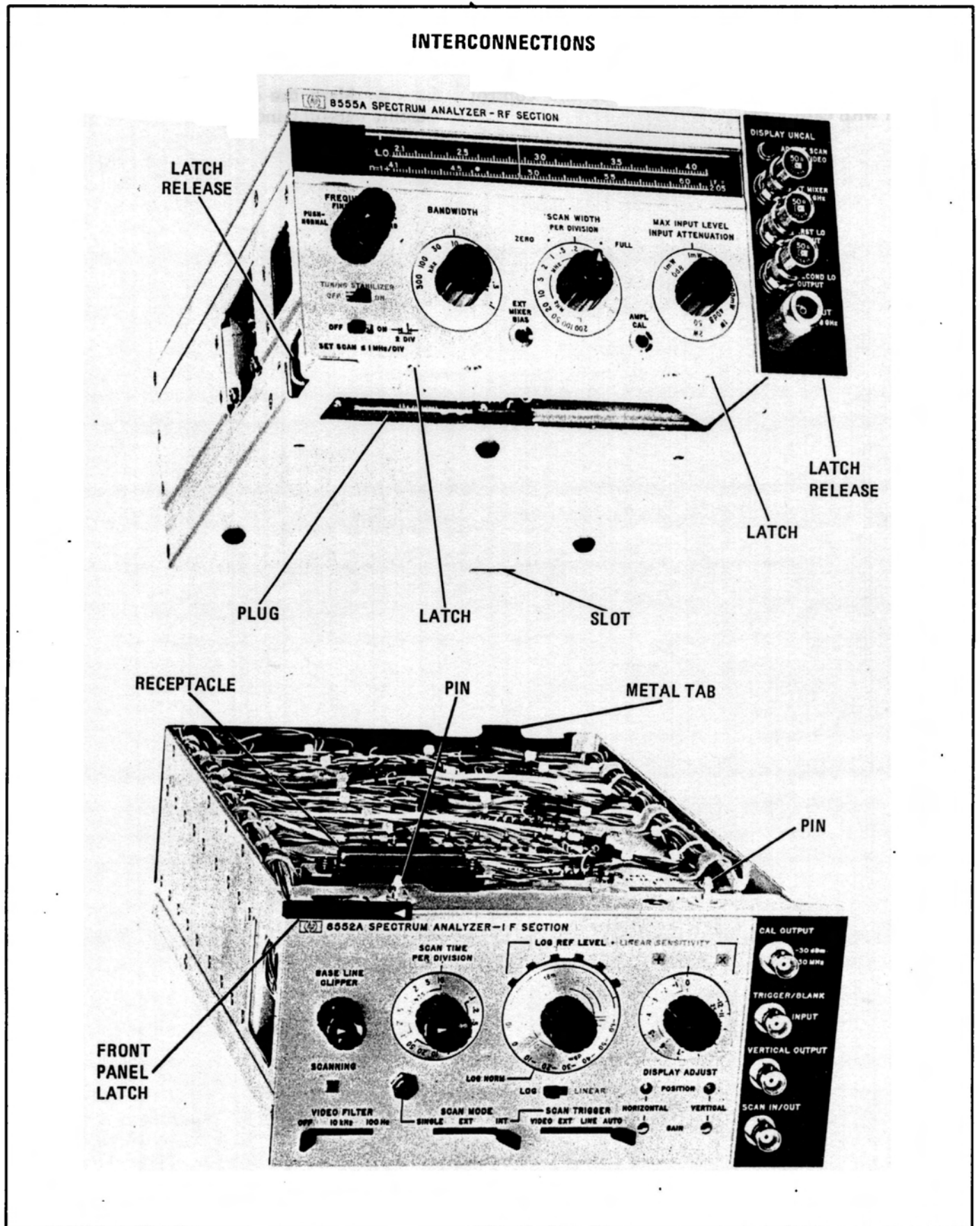


Figure 2-1. RF Section and IF Section Interconnections

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 complete operation instructions for the HP 8555A/8552A/140-series Spectrum Analyzer. Front panel controls, connectors and indicators, for the 8555A RF Section, are identified and described in Figure 3-1. Controls and indicators, for a typical Display Section and IF Section, are identified and described in Figure 3-2. Refer to the appropriate IF Section and Display Section manuals for identification and description of controls, indicators, and connectors not contained in this manual. Operational adjustments are detailed in Figure 3-3 and general operating instructions are provided in Figures 3-4 through 3-6.

3-3. PANEL FEATURES

3-4. Front panel features of the 8555A RF Section are described in Figure 3-1. Front and rear panel views of the HP 8555A/8552A/140T Spectrum Analyzer are shown in Figure 3-3. For a detailed description of the IF Section and Display Section controls and indicators, refer to the operation and service manuals for those instruments. Interconnection wiring between the RF Section and the IF Section and between the RF Section and the Display Section is contained in Section VIII of this manual.

3-5. OPERATOR'S CHECKS

3-6. Upon receipt of the instrument, or when one or more sections of the analyzer are changed, perform the operational adjustment procedures listed in Figure 3-3. This procedure corrects for minor differences between units and ensures that the RF Section, IF Section and Display Section are properly matched.

3-7. OPERATING INSTRUCTIONS

3-8. General operating instructions are contained in Figure 3-4. These instructions will familiarize the operator with basic operating functions of the spectrum analyzer. Additional information covering signal identifying techniques and external mixer operation is contained in Figures 3-5 and 3-6.

3-9. CONTROLS, INDICATORS AND CONNECTORS

3-10. Front panel controls, indicators, and connectors are identified and briefly described in Figures

3-1 and 3-2. Operational Adjustment procedures are given in Figure 3-3. Additional information, to assist the user during instrument operation, is given in the following paragraphs.

3-11. RF Input. The RF Section is normally shipped with a Type N input connector. (Option 001 instruments are shipped with a Type APC-7 input connector.) Refer to Section VI for part numbers associated with connector J1. (See Input Mixer Diode Characteristics below.) The mixer diode, in the First Converter Assembly A12, will burn out if overloaded. This diode is *not* separately replaceable; it is part of a thin film microcircuit enclosed in the sealed assembly. To protect the mixer diode it is a good operating practice to always set the INPUT ATTENUATION control to 50 dB before connecting the signal input.

CAUTION

**DO NOT EXCEED THE FOLLOWING
MAXIMUM INPUT LEVELS:**

| Maximum Input Levels | POWER ¹ | | VOLTS ² | | |
|-----------------------------|--------------------|-------|--------------------|-------|-------|
| | dBm | Watts | DC | Rms | Peak |
| Input 0.01-18 GHz Connector | +33 | 2 | ±20 | 20 | 14.14 |
| Incident on Input Mixer | +10 | 10mW | ±20 | 0.707 | 1.0 |

¹ The INPUT ATTENUATION control must be in the 30 dB or greater position when applying +33 dBm or input mixer will be damaged. The power levels listed apply for peak or average power.

² Do not exceed ± 20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second. Do not change INPUT ATTENUATION levels when dc voltages are applied to RF INPUT Connector.

CAUTION

Do not connect impulse generators to 8555A input. These mechanical type switching devices can generate pulses in excess of 300 volts. The broadband output from impulse generators can destroy both input attenuator and first converter. See additional information in paragraphs 3-11 through 3-13 of Operating and Service manual prior to instrument operation.

3-12. Input Attenuation. The input attenuator is connected between the RF INPUT (.01–18 GHz) and First Converter. The attenuator should be set to reduce the signal level at the attenuator output to -10 dBm average (signal compression level). The maximum input level, for each position of the attenuator control, for less than 1 dB signal compression, is indicated in red on the attenuator control dial. Unless extra sensitivity is required, at least 10 dB of input attenuation should be used. This provides a 50-ohm termination for currents at the IF and LO frequencies that appear at the mixer's input port. With the input attenuator set to 0 dB, the RF INPUT is a dc block, capable of withstanding ± 20 volts. In other attenuator positions the input is a dc return to ground of about 50-ohms and is capable of handling ± 400 mA (see CAUTION). When in the 0 dB position the input impedance is greater than 50 ohms. This may cause some mismatch, VSWR, and display amplitude variation as the input frequency changes.

CAUTION

Care must be taken when applying dc voltage to the RF INPUT of the analyzer. Do *not* change INPUT ATTENUATION setting while dc is applied. Apply only dc voltages with rise time less than 10^6 volts per second and current with rise times less than 2×10^4 amperes per second. Do *not* exceed ± 20 volts dc or 1.0 volt ac peaks.

3-13. Mixer Overload Characteristics. The input mixer will provide absolute calibration at signal levels up to -10 dBm, incident on the mixer. Smaller signal levels will generally be necessary for distortion measurements to assure that the measurement does not include distortion from the 8555A mixer. (See distortion data in Table 1-2 Supplemental Performance Characteristics.)

3-14. EXT MIXER Connector. Provides an output for the 2.05 to 3.1 GHz first LO signal. A dc bias voltage, adjustable from the front panel, is supplied to the external mixer through this connector. The 2.05 GHz IF signal generated by the external mixer is applied through this same connector. The HP 11517A Waveguide Mixer is recommended as an accessory along with Waveguide Adapters 11518A, 11519A and 11520A for use over the 12.4 to 40 GHz frequency range. Maximum input power for less than 1 dB signal compression is typically .03 mW peak for the 11517A. To protect the external mixer diode, inputs should never exceed 1 milliwatt. Terminate the EXT MIXER input with the 50-ohm load supplied when not in use. When using external mixing, terminate the .01–18 GHz INPUT with the 50-ohm load or set INPUT ATTENUA-

TION to 10 or 20 dB. The input attenuator is not in the external mixing circuit, but does control the LOG REF LEVEL index lamps. Amplitude display accuracy will be approximate with INPUT ATTENUATION set to match external mixer loss.

3-15. FIRST LO OUTPUT. A 2.05 to 4.1 GHz output from the YIG-tuned oscillator at a level of approximately +10 dBm. Available at a test point and for use with accessory equipment. Terminate the FIRST LO OUTPUT with the 50-ohm load supplied when not in use.

3-16. SECOND LO OUTPUT. A 1.5 GHz output from second LO at a power level of approximately +9 dBm. Available as a test point and for use with accessory equipment. Can be used as a test signal with INPUT ATTENUATION set to at least 20 dB. Terminate the SECOND LO OUTPUT with the 50-ohm load supplied when not in use.

3-17. Frequency Scales. Set of 14 scales selected by the Band Switch Lever. Harmonic number ($n =$) associated with selected scale is shown on left edge of frequency scale. IF frequency (550 MHz or 2.05 GHz being used) is shown on the right edge of the scale.

3-18. LO Scale. Indicates the fundamental frequency of the first LO (YIG). Cursor positioned by the FREQUENCY control indicates the LO fundamental center frequency in the ZERO and PER DIVISION SCAN WIDTH modes.

3-19. BAND Scale. Indicates the frequency range of each of the 14 frequency bands. Green dot on the selected Frequency Scale indicates the frequency BAND.

3-20. FREQUENCY Control. Coarse tunes the analyzer's center frequency in the ZERO and PER DIVISION SCAN WIDTH modes. It is a two-speed control (push-pull action) providing normal or rapid tuning. Do *not* use coarse tuning when analyzer is stabilized (TUNING STABILIZER ON and SCAN WIDTH PER DIVISION set to blue color-coded numbers). When stabilized, coarse tuning will cause signal to jump off CRT screen.

3-21. FINE TUNE. Three turn control fine tunes the analyzer's center frequency in the ZERO and PER DIVISION SCAN WIDTH modes. Use FINE TUNE control to tune analyzer in stabilized mode (see FREQUENCY control above). Provides a 1 MHz tuning range of the 1st LO (YIG) on fundamental mixing.

3-22. DISPLAY UNCAL. Warning indicator associated with BANDWIDTH, SCAN WIDTH, SCAN TIME PER DIVISION and VIDEO FILTER controls. Lamp lights when control settings are

such that the calibration of the instrument is impaired. On some control settings it is acceptable for the DISPLAY UNCAL light to be "on" if the light subsequently goes "off" when either the SCAN TIME PER DIVISION or SCAN WIDTH PER DIVISION control is switched one position counterclockwise. The indicator lamp bulb is replaceable from the front panel. HP Part Number 2140-0259, incandescent lamp, 12 volt, .06 ampere, type T1 bulb. Turn plastic lens cover counterclockwise to remove cover.

3-23. BAND Switch Lever. Selects frequency scale from a set of 14 frequency scales. The band switch lever also controls a shaft encoder on the frequency scale drum that performs several functions:

- a. Controls attenuation of the 1st LO (YIG-tuned osc.) tuning ramp to maintain scan width calibration when using harmonic mixing.
- b. Optimizes the bias for the input mixer to match the harmonic number (n) of the YIG-tuned oscillator. (n = harmonic number, shown on left of each frequency scale.)
- c. Controls the overall gain of the RF Section to maintain absolute calibration when using internal mixing.

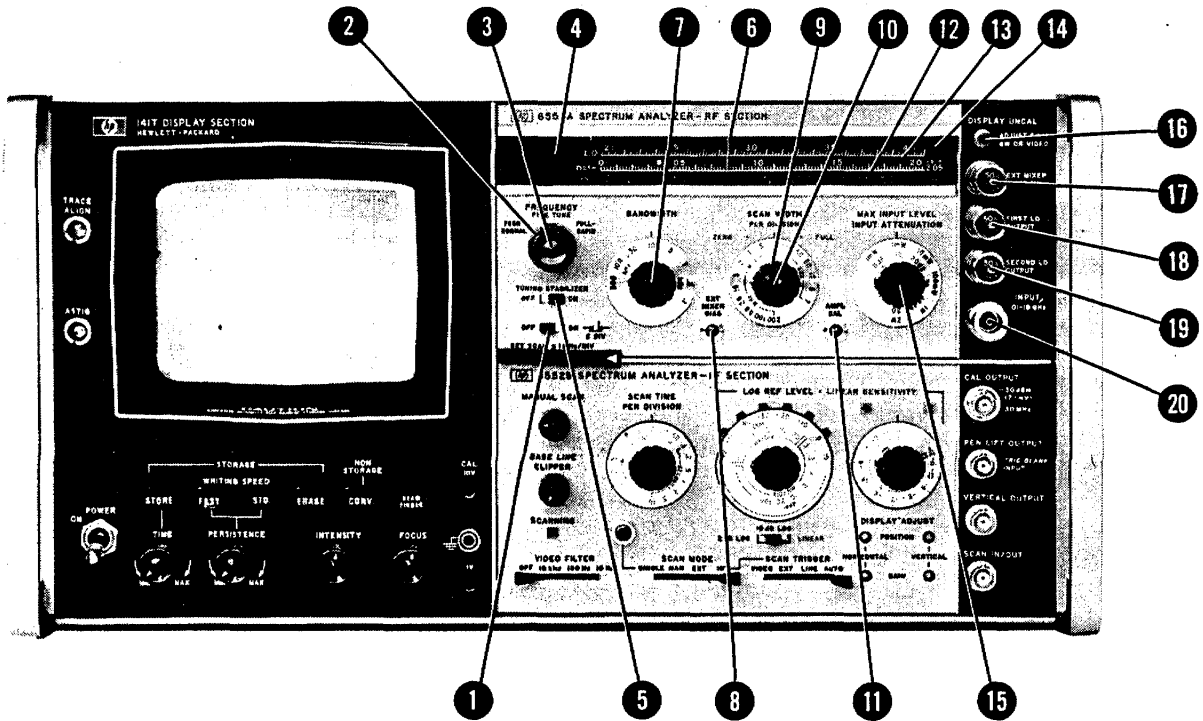
- d. Controls switching of the IF signal path. Bypassing and disabling the second converter on the 1+ and 1- (550 MHz IF bands). Bypassing the first converter when using external mixing on the n=6, 10- and 10+ frequency bands.

- e. Provides n ± information to signal identification circuit.

- f. Provides frequency information to accessory equipment.

3-24. TUNING STABILIZER Switch. ON/OFF control for tuning stabilization circuit. The tuning stabilizer locks the first LO (YIG) to a 1 MHz voltage-controlled crystal oscillator (VCXO) to reduce residual FM of the first LO. The circuitry is enabled when the switch is set to ON and the SCAN WIDTH switch is in the ZERO or blue color-coded PER DIVISION positions.

3-25. SIGNAL IDENTIFIER Switch. ON/OFF control for signal-identification circuit. The signal identifier circuit provides a method of determining which harmonic of the 1st LO is mixing with the input signal to give the display on the CRT. The circuitry is enabled when the switch is ON and SCAN WIDTH PER DIVISION control is set to 1 MHz or below. (See Signal Identification Technique, Figure 3-5).



- 1** **SIGNAL IDENTIFIER Switch:** Used in signal-identification technique to identify which harmonic is being mixed with the input signal to obtain the display. See Figure 3-5.
- 2** **FREQUENCY Control:** Coarse tunes analyzer center frequency. Push-pull action provides either normal or rapid tuning.
- 3** **FINE TUNE Control:** Fine tunes analyzer center frequency. Three turn tuning control used in narrow (stabilized) scan widths.
- 4** **Band Switch Lever:** Frequency range selection control. Bi-directional control, rotates Frequency Scales and Frequency Band Shaft Encoder. Shaft Encoder controls digital logic to provide automatic attenuation of 1st LO (YIG-tuned oscillator) tuning ramp to maintain calibration on harmonic mixing. The logic circuitry also controls the input mixer bias and gain of the RF Section to maintain absolute calibration. In addition, the logic circuitry controls relay switching for external mixer operation (10.4 to 40 GHz) and for 2nd converter bypass (1+ and 1-* bands).

Figure 3-1. Front Panel Controls, Connectors and Indicators

- 5 **TUNING STABILIZER Switch:** Used to lock the 1st LO to a harmonic of a voltage-tuned crystal oscillator for scan widths of 100 kHz per division or less.
- 6 **Dial Pointer:** Indicates center frequency to which analyzer is tuned by FREQUENCY Control (2) in PER DIVISION and ZERO scan modes. Also indicates LO center frequency in PER DIVISION and ZERO scan modes. Indicates marker frequency in FULL scan mode. Ganged to FREQUENCY Control; FINE TUNE does not move dial pointer.
- 7 **BANDWIDTH Control:** Selects 3 dB IF bandwidths to determine analyzer resolution in ZERO and PER DIVISION positions of SCAN WIDTH Mode Switch (10). 300 kHz bandwidth automatically selected in FULL scan mode.
- 8 **EXT MIXER BIAS:** Adjusts bias on external waveguide mixer diode; adjusted for optimum mixer sensitivity.
- 9 **SCAN WIDTH PER DIVISION:** Indicates frequency scan calibration; scan widths from 2 kHz/div to 200 MHz/div are selectable. Scan is symmetrical about center frequency selected by FREQUENCY (2) and FINE TUNE (3). Enabled by SCAN WIDTH mode switch (10).
- 10 **SCAN WIDTH Mode Switch:** Selects ZERO, PER DIVISION (9) or FULL scan modes. In ZERO scan mode, analyzer acts as a fixed tuned receiver at the frequency selected by FREQUENCY (2) and FINE TUNE (3). In FULL scan mode, the analyzer scans the full range of the selected frequency band.
- 11 **AMPL CAL:** Used to match RF Section with IF Section. Sets overall gain of analyzer for absolute amplitude calibration.
- 12 **Frequency BANDS:** Set of fourteen, indicates frequency ranges of analyzer. Green dot on Frequency Scale also indicates frequency BAND selected.
- 13 **Frequency Scale:** Set of fourteen scales, selected by frequency BAND lever.
- 14 **YIG-tuned Oscillator (LO) Fundamental Frequency Scale:** Pointer indicates LO center frequency.
- 15 **INPUT ATTENUATION:** Attenuates input signal from 0 to 50 dB in 10 dB steps. Maximum input signal for 1 dB signal compression, indicated on outer dial scale.

CAUTION

**DO NOT EXCEED THE FOLLOWING
MAXIMUM INPUT LEVELS:**

| Maximum Input Levels | POWER ¹ | | VOLTS ² | | |
|-----------------------------|--------------------|-------|--------------------|-------|-------|
| | dBm | Watts | DC | Rms | Peak |
| Input 0.01-18 GHz Connector | +33 | 2 | ±20 | 10 | 14.14 |
| Incident on Input Mixer | +10 | 10mW | ±20 | 0.707 | 1.0 |

¹ The INPUT ATTENUATION control must be in the 30 dB or greater position when applying +33 dBm or input mixer will be damaged. The power levels listed apply for peak or average power.

² Do not exceed ± 20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second. Do not change INPUT ATTENUATION levels when dc voltages are applied to RF INPUT Connector.

- 16 **DISPLAY UNCAL:** Display uncalibrated warning lights when relationship between scan time, scan width, bandwidth, and video filtering is such that accuracy of vertical calibration is impaired.
- 17 **EXT MIXER Input:** External mixer input for analyzer operation over 10.4 to 43 GHz frequency range. BNC female connector; accepts cable from external mixer. Supplies LO signal to external mixer and returns IF Signal from mixer. Terminate in 50 ohm load when not in use. See Figure 3-6, External Mixer Operation.

CAUTION

To prevent damage to external mixer do not apply more than 1 mW to 11517A mixer.

- 18 **FIRST LO OUTPUT:** 2 to 4 GHz output from YIG-tuned oscillator. Female BNC connector, terminate in 50-ohm load when not in use.
- 19 **SECOND LO OUTPUT:** 1.5 GHz output from second LO. Female BNC connector, terminate in 50-ohm load when not in use.
- 20 **RF INPUT:** Input for .01 to 18 GHz signals. Female type N connector (Option 001 APC-7 connector).

CAUTION

See 15 above.

*Indicates 550 MHz FIRST IF.

Figure 3-1. Front Panel Controls, Connectors and Indicators (cont'd)

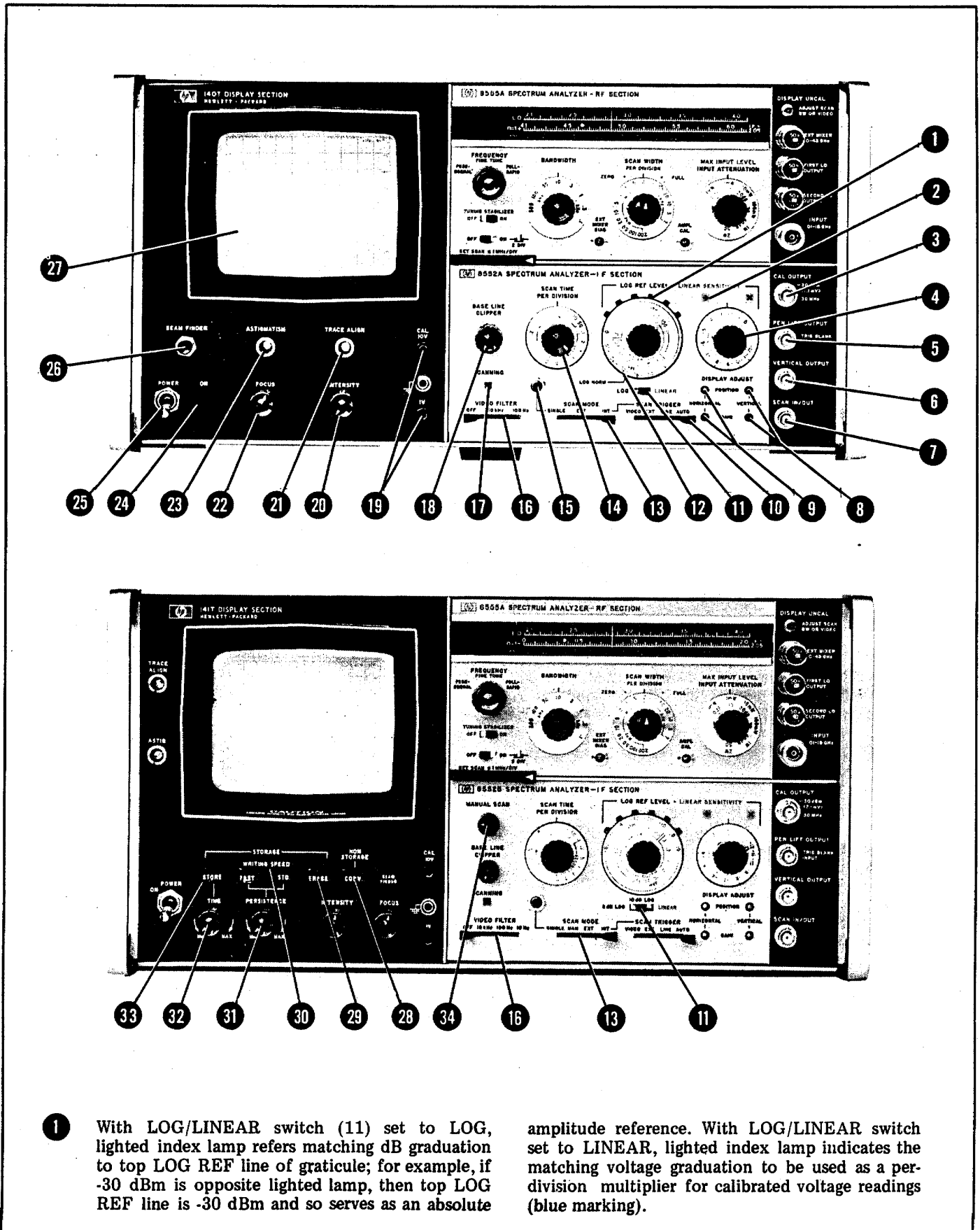


Figure 3-2. Typical Display and IF Section Controls, Connectors and Indicators

- 2 Plus "+" lights when logarithmic amplification (11) is selected; times "x" lights when linear amplification (11) is selected. With "+" lighted, LOG REF line is sum (black numerals) of LOG REF LEVEL controls). With "x" lighted, per division absolute voltage amplitude is product of blue numeral LINEAR SENSITIVITY control settings.
- 3 Provides a 30-MHz signal at -30 dBm for amplitude calibration of spectrum analyzer.
- 4 Indicates 1 dB increments for logarithmic amplification; indicates multiplication factors up to unity for linear amplification.
- 5 Provides pen lift operation to HP 7005, 7035, 7004, 7034 and all new TTL compatible HP recorders. Provides input for external blanking signal (-1.5V) for external scan mode operation. Provides input for external positive or negative trigger pulses (2-20V), normally negative, polarity selected by internal switch in IF Section) for external scan trigger operation.
- 6 Detected video output proportional to vertical deflection on CRT.
- 7 For receiving an external scan ramp or output coupling for the internally-generated scan ramp. Input or output function determined by INT/EXT positions of SCAN MODE switch.
- 8 Adjusts vertical position and gain of trace.
- 9 Adjusts horizontal position and gain of trace.
- 10 Selects scan trigger mode.
- 11 Selects 10 dB logarithmic or linear display mode in 8552A plus another 2 dB log position in 8552B.
- 12 The dB graduation (black numerals), opposite the lighted index lamp, indicate the power level at the LOG REF graticule line on CRT when LOG/LINEAR (11) is set to LOG. With LOG/LINEAR set to LINEAR, the voltage graduations (blue numerals), opposite the lighted index lamp, indicate the per division multiplier for calibrated voltage amplitude.
- 13 Selects scan ramp mode. Ramp is internally generated for SINGLE/INT positions but it must be externally supplied for EXT position. (Refer to Item 7). Model 8552B has an added manual scan mode position. (Refer to Item 34.)
- 14 Controls SCAN TIME PER DIVISION.
- 15 Press to initiate scan with SCAN MODE switch set to SINGLE. Press during scan to stop and reset scan.
- 16 Selects 100 Hz, 10 kHz or OFF position of lowpass filter for detected video in 8552A plus an added 10 Hz in 8552B.
- 17 Lights for duration of each scan for single and internal scan modes.
- 18 Blanks lower part of trace to prevent over-exposure of photographs due to high intensity of baseline. Blanking function also prevents blooming with a variable-persistence storage display section.
- 19 Provides 1- and 10-volt, peak-to-peak, 60 Hz squarewave outputs.
- CAUTION**
- These calibrated outputs should never be used with the spectrum analyzer. (These outputs are for use only with the 1400-series oscilloscope plug-ins.)
- 20 Adjusts brightness of CRT display.
- CAUTION**
- Excessive brightness for a static or very slow-moving trace may burn the phosphor and permanently damage the CRT. This caution is applicable to both the fixed and variable-persistence/storage CRT; however, the latter is especially vulnerable to operational errors of this type.
- 21 Makes base line parallel with the horizontal graticule line.
- 22 Focuses CRT beam.
- 23 Used with FOCUS control (22) to obtain smallest spot with maximum roundness.
- 24 Lights when line voltage is applied and instrument is turned on.
- 25 Switches line voltage to instrument.
- 26 When used with 1400-series oscilloscope plug-ins, intensifies and returns beam to CRT, regardless of deflection potentials. Produces no effect on analyzer displays.
- 27 Display CRT with graticule lines.
- 28 Selects non-storage function.
- CAUTION**
- Use storage function when possible to prevent damage to the CRT.
- 29 Press to ERASE when in STD or FAST writing speed.
- 30 Selects writing speed.
- 31 Varies time the trace is visible.
- 32 Selects storage time.
- 33 Press to store signal display. Storage time (relative display brightness) in storage mode is adjusted by (32).
- 34 Manual scan control positions the electron beam on CRT when using MAN SCAN mode.

Figure 3-2. Typical Display and IF Section Controls, Connectors and Indicators (cont'd)

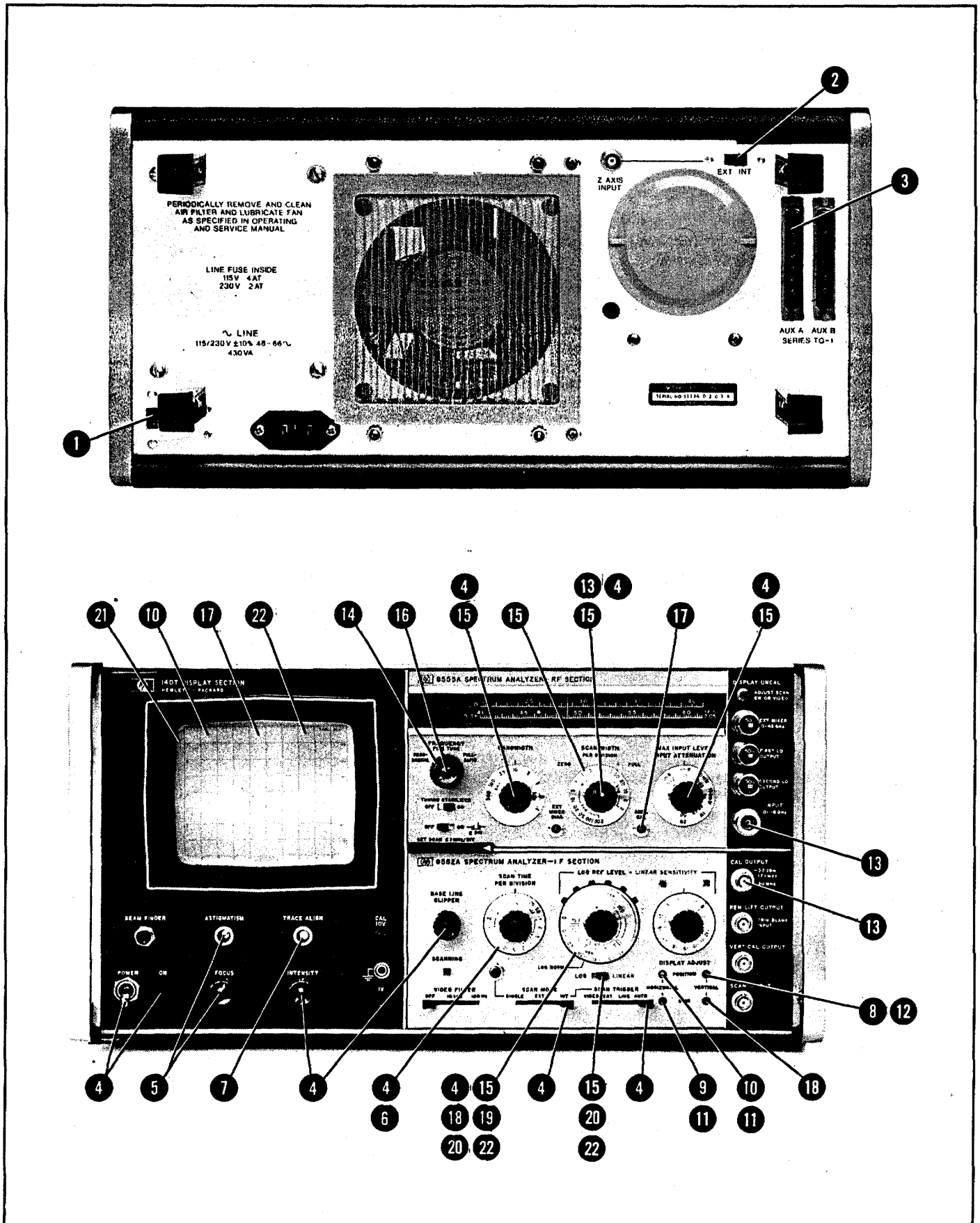


Figure 3-3. Operational Adjustments

INPUT POWER AND INTENSITY MODULATION

- 1 Set 115/230 switch to correspond with available input voltage. (The instrument is fused for 115-volt, 50/60 Hz operation; if 230-volt power is used, refer to the display section service manual for fuse replacement procedures.)
- 2 Set INT/EXT switch to INT. (Set to EXT only if CRT is to be externally modulated — normally used with 1400-series time-domain plug-ins.)

- 3 Connect 50-ohm termination AT4.

FOCUS AND ASTIGMATISM ADJUSTMENTS

- 4 Set:
POWER ON (up; observe that ON lamp lights)
BASE LINE CLIPPER, fully ccw
SCAN WIDTH (inner/red) to ZERO
INPUT ATTENUATION to 10 dB
BANDWIDTH to 0.3 kHz
SCAN TIME PER DIVISION to 10 SECONDS
SCAN MODE to INT.
SCAN TRIGGER to AUTO
TUNING STABILIZER to ON
FINE TUNE Control centered
LOG/LINEAR to LOG
LOG REF LEVEL Vernier: max CCW
INTENSITY clockwise until trace is medium bright (approx. 1 o'clock position).
BAND to 0–2.05 GHz
VIDEO FILTER to OFF
- 5 Adjust FOCUS and ASTIGMATISM controls until combined effect produces best resolution (maximum roundness without fuzz) of the dot.

TRACE ALIGNMENT

- 6 Set SCAN TIME PER DIVISION to 10 MILLI-SECONDS.
- 7 If not already aligned, adjust TRACE ALIGN until trace is aligned with horizontal line of graticule.

HORIZONTAL POSITION AND GAIN

- 8 For convenience in making these adjustments, move trace to upper half of graticule by adjusting the VERTICAL POSITION control.
- 9 Rotate HORIZONTAL GAIN until trace is of minimum length.
- 10 Rotate HORIZONTAL POSITION until trace is centered on CENTER FREQUENCY line of graticule.
- 11 Alternately adjust HORIZONTAL POSITION/GAIN controls until trace begins at first line of graticule and ends at last.

- 12 Readjust VERTICAL POSITION until trace aligns with bottom line of graticule.

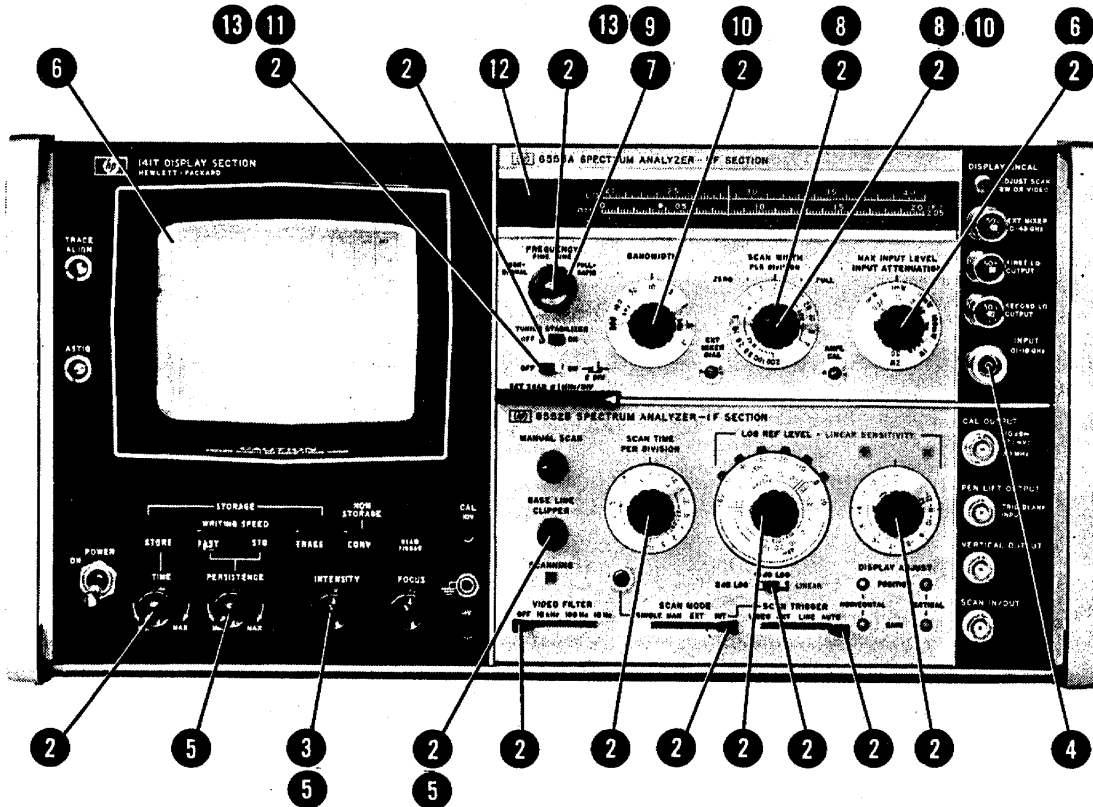
VERTICAL POSITION AND GAIN

- 13 Connect CAL OUTPUT (30 MHz/ -30 dBm) signal to RF INPUT; select 100 kHz BANDWIDTH, 10 MHz PER DIVISION SCAN WIDTH and set LOG REF LEVEL to +10 dBm.
- 14 Tune FREQUENCY to align LO feedthru signal on -3 graticule line. The 30 MHz calibration signal should appear at the CENTER FREQUENCY graticule line with a harmonic at the +3 graticule line (60 MHz). The dial marker should indicate approximately 30 MHz.
- 15 Reduce SCAN WIDTH PER DIVISION to 0.2 MHz. Center signal on display with FREQUENCY control. Reduce SCAN WIDTH PER DIVISION to 2 kHz (keep signal centered on display with FINE TUNE). Set LOG REF LEVEL to -30 dBm.
- 16 FINE TUNE to center signal on display.
- 17 Rotate AMPL CAL until trace is centered on top line of graticule at the CENTER FREQUENCY position.
- 18 Rotate LOG REF LEVEL counterclockwise and note that the signal decreases one division (10 dB) for each calibrated switch position. If trace moves one division per step in lower part of graticule but the amplitude creeps upward near top of graticule, adjust VERTICAL GAIN until each step is equal.

LINEAR AND LOGARITHMIC ADJUSTMENT

- 19 Rotate LOG REF LEVEL control until signal trace appears on fourth graticule line from bottom.
- 20 Set LOG/LINEAR switch to LINEAR and rotate LOG REF LEVEL control until 1 mV/DIV is matched with the lighted index lamp.
- 21 Reading from bottom of graticule (LIN scale), signal amplitude should be 7.1 millivolts. If it is not, adjust AMPL CAL for a signal amplitude of 7.1 millivolts.
- 22 Set LOG/LINEAR switch to LOG. Rotate LOG REF LEVEL control until -30 dBm graduation matches the lighted index lamp. Signal trace should align with top (LOG REF) line of the graticule.

Figure 3-3. Operational Adjustments (cont'd)



1 Perform Operational Adjustments, Figure 3-3.

2 Set controls as follows:

| | |
|-------------------------|----------|
| POWER | ON |
| BANDWIDTH | 300 kHz |
| SCAN WIDTH | FULL |
| SCAN WIDTH PER DIVISION | 20 MHz |
| INPUT ATTENUATION | 50 dB |
| FINE TUNE | Centered |

| | |
|------------------------|-------------|
| TUNING STABILIZER | ON |
| SIGNAL IDENTIFIER | OFF |
| BASE LINE CLIPPER | 9 o'clock |
| SCAN TIME PER DIVISION | 0.2 SECONDS |
| LOG REF LEVEL | +10 dBm |
| LOG REF LEVEL Vernier | max CCW |
| LOG/LINEAR | 10 dB LOG |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |
| VIDEO FILTER | 10 kHz |

Figure 3-4. General Operating Instructions, .01 to 18.0 GHz

- 3 Adjust INTENSITY for a display trace.

CAUTION

**DO NOT EXCEED THE FOLLOWING
MAXIMUM INPUT LEVELS:**

| Max- imum Input Levels | POWER ¹ | | VOLTS ² | | |
|---|--------------------|-------|--------------------|-------|-------|
| | dBm | Watts | DC | Rms | Peak |
| Input 0.01 - 18 GHz Connec- tor | +33 | 2 | ±20 | 10 | 14.14 |
| Incident on Input Mixer | +10 | 10mW | ±20 | 0.707 | 1.0 |

¹ The INPUT ATTENUATION control must be in the 30 dB or greater position when applying +33 dBm or input mixer will be damaged. The power levels listed apply for peak or average power.

² Do not exceed ± 20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second. Do not change INPUT ATTENUATION levels when dc voltages are applied to RF INPUT Connector.

- 4 Connect input signal (any frequency between 10 MHz and 18 GHz) to RF INPUT.
- 5 Adjust PERSISTENCE, INTENSITY and BASE LINE CLIPPER for a display trace without blooming.
- 6 Observe display for presence of a signal. If a signal is not observed, reduce INPUT ATTENUATION in steps while observing display for a signal.
- 7 When a signal (or signals) is obtained on the display, tune FREQUENCY control to position inverted marker under signal (under largest signal, if more than one signal is viewed on the display).

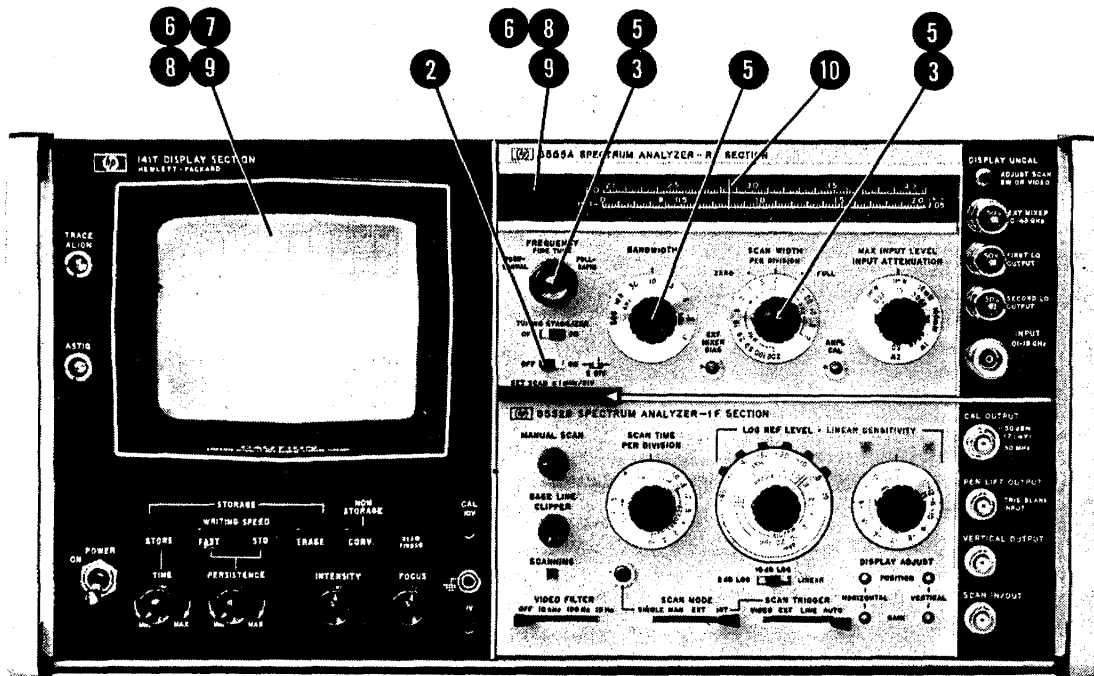
- 8 Set SCAN WIDTH to PER DIVISION, SCAN TIME PER DIVISION to 20 MILLISECONDS and adjust INTENSITY for a convenient display.
- 9 Center signal on display with FREQUENCY control.
- 10 Reduce SCAN WIDTH PER DIVISION to 1 MHz and BANDWIDTH to 30 kHz, keeping signal centered on display with FREQUENCY control. Increase SCAN TIME PER DIVISION to 50 MILLISECONDS.
- 11 Set SIGNAL IDENTIFIER to ON. Note amount and direction signal shifts on alternate scan traces.
- 12 Rotate Frequency Scales with Band Switch Lever until the signal shifts two divisions to the left on alternate scans and is approximately 5 dB less in amplitude.

NOTE

When switching from the n=1±, 550 MHz IF Frequency Bands, allow a few seconds for instrument stabilization. Voltage to the 2nd LO (1.5 GHz) is removed when these bands are selected.

- 13 Set SIGNAL IDENTIFIER switch to OFF. Center signal on CRT with FREQUENCY control. Read frequency of signal indicated by cursor on Frequency Scale.
- 14 If additional signals were observed during step 7 above, they may be identified in the same manner. Set SCAN WIDTH to FULL, SCAN WIDTH PER DIVISION to 20 MHz, BANDWIDTH to 30 kHz, and SCAN TIME PER DIVISION to 0.2 SECONDS. Tune FREQUENCY control to position inverted marker under signal of interest. Repeat steps 8 through 13 to identify signal frequency.

Figure 3-4. General Operating Instructions, .01 to 18.0 GHz (cont'd)



NOTE

This procedure is given in two parts. Steps 1 through 10 provides one signal identification technique for use during normal operation. Steps 11 through 27 provides a procedure for operator familiarization.

- 1 Center unknown signal on the display (use FINE TUNE when analyzer is stabilized).

- 2 Set SIGNAL IDENTIFIER switch to ON.
- 3 Reduce SCAN WIDTH PER DIVISION to 1 MHz. Keep signal centered on display with FINE TUNE control.
- 4 Alternate sweep scans across the display. CRT will displace the unknown signal to the left or right of center.

Figure 3-5. Signal Identification Technique

5 Reduce SCAN WIDTH PER DIVISION and BANDWIDTH to separate other signals on the display. Keep the signal under investigation centered on the display.

6 Note direction and spacing of signal shift on the CRT. When the correct harmonic (n) number and sign (+ or -) is selected by the BAND Switch Lever, the signal will shift two divisions to the left. The shifted signal is reduced in amplitude by approximately 5 dB.

7 If signal shifts to the right two divisions, the harmonic number is correct, however the sign (+ or -) on the left edge of the Frequency Scale is wrong.

8 If the signal shifts less than two divisions on the CRT, press the BAND Switch Lever "up" to increase the harmonic number. Note that the signal shifts in the opposite direction with each change in sign and increases in width with each increasing harmonic number.

9 Change Band Switch Lever until the signal shift is two divisions apart with the reduced signal on the left. FINE TUNE to align the reduced signal on the -2 graticule line with the signal to be identified on the Center Frequency graticule line.

10 Read frequency indicated by the cursor on the Frequency Scale. The signal frequency is related to the first LO harmonic by the equation $F_{sig} = nFLO \pm IF$.

where F_{sig} = signal frequency
 n = harmonic number
 FLO = LO fundamental frequency
 IF = frequency of first IF

NOTE

In the following familiarization procedure a known input signal is applied and the harmonic numbers producing the signals on the CRT display are identified. The input mixer is overdriven to produce signals that would not normally be present on the display.

CAUTION

DO NOT EXCEED THE FOLLOWING MAXIMUM INPUT LEVELS:

| Maximum Input Levels | POWER ¹ | | VOLTS ² | | |
|-------------------------------|--------------------|-------|--------------------|-------|-------|
| | dBm | Watts | DC | Rms | Peak |
| Input 0.01 - 18 GHz Connector | +33 | 2 | ±20 | 20 | 14.14 |
| Incident on Input Mixer | +10 | 10mW | ±20 | 0.707 | 1.0 |

¹ The INPUT ATTENUATION control must be in the 30 dB or greater position when applying +33 dBm or input mixer will be damaged. The power levels listed apply for peak or average power.

² Do not exceed ± 20 volts dc. Apply only dc voltages with rise times less than 10⁶ volts per second. Do not change INPUT ATTENUATION levels when dc voltages are applied to RF INPUT Connector.

- 11 Set analyzer controls as follows:
- FREQUENCY Full CCW
 - FINE TUNE Centered
 - BAND n=1- 0-2.05 GHz
 - TUNING STABILIZER ON
 - SIGNAL IDENTIFIER OFF
 - BANDWIDTH 100 kHz
 - SCAN WIDTH FULL
 - SCAN WIDTH PER DIVISION 20 MHz
 - INPUT ATTENUATION 50 dB
 - VIDEO FILTER 10 kHz
 - SCAN TIME PER DIVISION 0.2 SECONDS
 - SCAN MODE INT
 - SCAN TRIGGER AUTO
 - LOG/LINEAR LOG
 - LOG REF LEVEL (+30 dBm)*
 - POWER ON
 - WRITING SPEED STD
 - INTENSITY 12 o'clock
 - PERSISTENCE MAX

*2 steps CCW from +10 dBm

Figure 3-5. Signal Identification Technique (cont'd)

- 12 Adjust INTENSITY for a visible scan trace without blooming. ERASE display as necessary between adjustments. Adjust BASE LINE CLIPPER to blank lower portion of scan trace. Repeat adjustments as necessary during the following steps.

CAUTION

INPUT ATTENUATION should be set to at least 20 dB before proceeding with the following step.

- 13 Remove 50-ohm termination from SECOND LO OUTPUT and connect a cable from SECOND LO OUTPUT to RF INPUT.
- 14 Tune FREQUENCY control to position the marker under the signal between the +2 and +3 graticule lines.
- 15 Note reading on Frequency Scale. Cursor indicates 1.5 GHz.
- 16 Switch SCAN WIDTH to PER DIVISION. Center signal on display with FREQUENCY control. ERASE display to remove stored signals.
- 17 Set PERSISTENCE to MIN, SCAN WIDTH PER DIVISION to 1 MHz and SCAN TIME to 20 MILLISECONDS.
- 18 Center signal on display. Set SIGNAL IDENTIFIER to ON. Note signal shifts to the left and is reduced in amplitude on alternate sweep scans.
- 19 Set SCAN WIDTH PER DIVISION to 20 MHz, SCAN WIDTH to FULL, INPUT ATTENUATION to 40 dB and SCAN TIME PER DIVISION to 0.2 SECONDS.

- 20 Note signal display similar to Figure 3-5a. Decrease INPUT ATTENUATION to 30 dB. Note display similar to Figure 3-5b. Note that some signal levels increased more than 10 dB. The input mixer is being overdriven (see Mixer Diode Characteristics, paragraph 3-13).

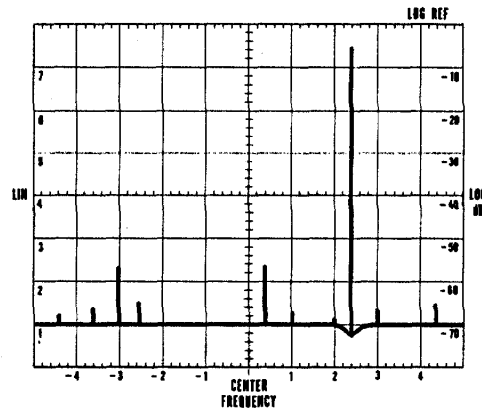


Figure 3-5a.

- 21 Tune FREQUENCY control to place marker under signal at +3 graticule line.
- 22 Set PERSISTENCE to MIN, SCAN WIDTH to PER DIVISION, SCAN WIDTH PER DIVISION to 10 MHz and SCAN TIME PER DIVISION to 50 MILLISECONDS. Center signal on display with FREQUENCY control. Reduce SCAN WIDTH PER DIVISION to 1 MHz. Note amount and direction of signal shift.
- 23 Select n=3- 4.10 to 10.25 GHz Frequency BAND. Note change in direction and amount of shift as BAND Switch Lever is pressed. Read frequency on Frequency Scale (9 GHz).

Figure 3-5. Signal Identification Technique (cont'd)

24 Set SCAN WIDTH to FULL and tune FREQUENCY to place marker under any signal on the display. Disregard DISPLAY UNCAL light at this time. Repeat step 22 for selected signal.

25 Change BAND Switch Lever until the correct display is obtained. Read frequency of signal on Frequency Scale.

26 The signal at the -4.2 graticule line (just above the analyzer's noise level) is the 9 GHz signal from the n=5- harmonic. Signal shifts to the left approximately 1 and 2/3-divisions on n=4- Frequency Band.

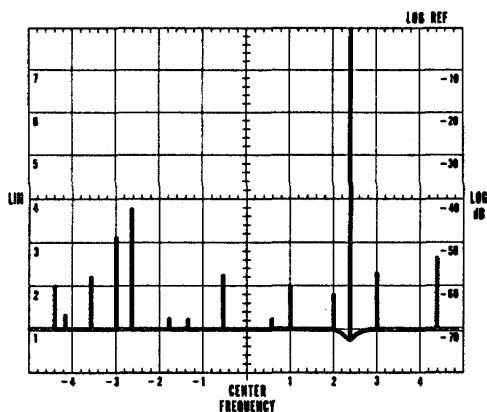


Figure 3-5b

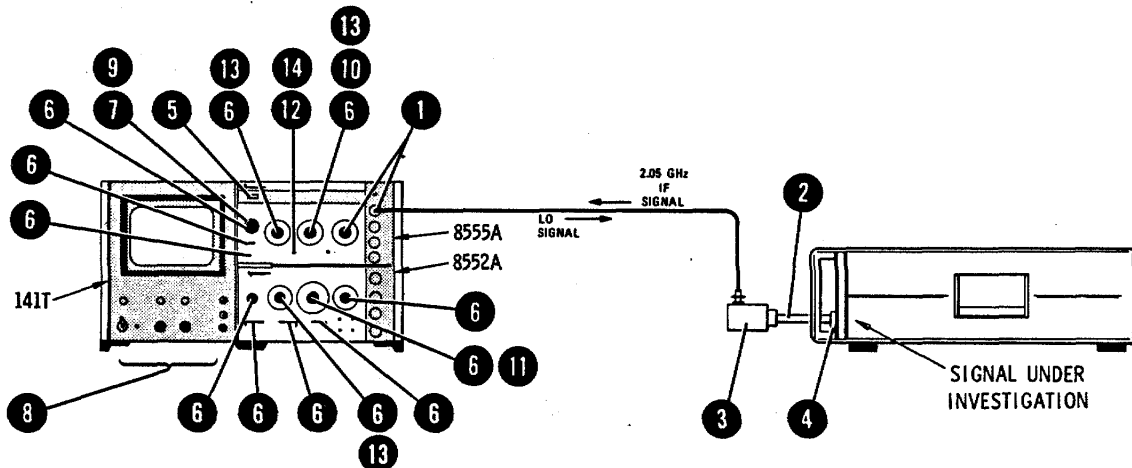
27 Signals shown in Figure 3-5b (mixer overdriven) are as follows:

| Graticule Line | Harmonic | Frequency Scale |
|----------------|----------|-----------------|
| -4.4 | n = 3- | 4.5 GHz |
| -4.2 | n = 5- | See step 26 |
| -3.0 | n = 1+ | 4.5 GHz |
| -2.6 | n = 2- | 3.0 GHz |
| -1.8 | n = 3- | 6.0 GHz |
| -1.6 | n = 2+ | 7.5 GHz |
| -1.4 | n = 4- | 9.0 GHz |
| +0.6 | n = 3- | 7.5 GHz |
| +1.0 | n = 2- | 4.5 GHz |
| +2.0 | n = 2+ | 9.0 GHz |
| +2.4 | n = 1- | 1.5 GHz |
| +3.0 | n = 3- | 9.0 GHz |
| +4.4 | n = 1+ | 6.0 GHz |

28 Use the formula below to determine the harmonic mixing mode for modes not on the Frequency Scales (i.e., 5, 7, 8 and 9).

$$n_{\text{true}} = \frac{2 \text{ cm}}{\text{actual shift}} \times (\text{displayed } n)$$

Figure 3-5. Signal Identification Technique (cont'd)



NOTE

Amplifier is not calibrated when using external mixer.

- 1 Set INPUT ATTENUATION to 20 dB*. Connect cable supplied with waveguide mixer to EXT MIXER input.

CAUTION

Discharge cable to avoid damage to mixer diode. Touch edge of male BNC connector on cable to edge of female BNC connector on mixer to discharge cable. See 11517A Operating Note.

- BANDWIDTH 300 kHz
- SCAN WIDTH FULL
- SCAN WIDTH PER DIVISION 10 MHz
- TUNING STABILIZER ON
- SIGNAL IDENTIFIER OFF
- BASE LINE CLIPPER 12 o'clock
- SCAN TIME PER DIVISION 0.2 SECONDS
- LOG REF LEVEL 0 dB
- LOG REF LEVEL Vernier CCW
- VIDEO FILTER OFF
- SCAN TRIGGER AUTO
- SCAN MODE INT

(Input attenuator is not in external mixing circuit, but switch controls position of LOG REF LEVEL index lamps and attenuator provides termination for internal mixer input port to decrease crosstalk.)

- 2 Connect cable to mixer. The LO signal from the RF Section and the mixing products to the RF Section are carried in this cable.
- 3 Connect appropriate waveguide adapter to the mixer.
- 4 Connect waveguide adapter to signal source. For linear operation, adjust signal source for output no greater than .03 milliwatt. For minimum intermodulation and spurious signals, keep input signal level at -30 dBm or below.
- 5 Set Frequency Band Switch to lowest BAND which covers range of signal under investigation. (External mixer bands are as follows: n=6- 10.25 - 22.55 GHz; n=6+ 14.35 - 26.65 GHz; n=10- 18.45 - 38.95 GHz and n=10+ 22.55 - 43.05 GHz.) When other bands are selected the external mixer circuit path is opened by coaxial switches in the RF Section.
- 6 Set Analyzer controls as follows:
 POWER ON
 BAND See step 5
 FINE TUNE Centered

- 7
- 8 Adjust Display Section for a convenient display. (WRITING SPEED—STD, PERSISTENCE—MIN, INTENSITY—approximately 12 o'clock.)
- 9 Adjust FREQUENCY control to position marker under signal of interest.
- 10 Set SCAN WIDTH to PER DIVISION and adjust FREQUENCY control to center signal on display.
- 11 Adjust LOG REF LEVEL for a convenient signal-to-noise ratio.
- 12 Adjust EXT MIXER BIAS for best signal trace.
- 13 Adjust BANDWIDTH, SCAN WIDTH PER DIVISION and SCAN TIME PER DIVISION to obtain best detail in region of interest.
- 14 Readjust EXT MIXER BIAS for maximum amplitude.

Figure 3-6. External Mixer (HP 11517A) Operating Instructions

SECTION IV PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. This section contains front panel checks and performance tests for the 8555A Spectrum Analyzer RF Section. Front panel checks for routine inspection are given in Table 4-1. Procedures for verifying that the instrument meets specifications are given in paragraphs 4-20 through 4-26.

4-3. Perform tests in procedural order, with the test equipment called for, or with its equivalent. During any performance test, all shields and attaching hardware must be in place; the RF and IF sections must be installed in the display section.

4-4. EQUIPMENT REQUIRED

4-5. Test equipment and test accessories for performance (P), adjustment (A) and troubleshooting (T) are listed in Tables 1-4 and 1-5. Critical specifications and/or required features, for the test equipment and accessories are contained in the test equipment and test accessories tables.

4-6. FRONT PANEL CHECKS

4-7. Before proceeding to the performance tests, the instrument must be adjusted and all controls set as specified in the preset adjustment instructions in paragraphs 4-8 through 4-18. After the instrument controls are preset, proceed with the front panel checks and adjustments. The instrument should perform as called out in the check and adjustment procedures before going on to the performance tests (paragraphs 4-20 through 4-26).

4-8. Preset Adjustments

a. Turn the analyzer on and preset INTENSITY control to approximately 1 o'clock. While the analyzer is warming up, make the following control settings:

BAND01–2.05 GHz
 FREQUENCY 50 MHz
 FINE TUNE Centered
 BANDWIDTH 100 kHz
 SCAN WIDTH PER DIVISION
 SCAN WIDTH PER DIVISION 10 MHz
 INPUT ATTENUATION 10 dB
 TUNING STABILIZER ON
 SIGNAL IDENTIFIER OFF
 BASE LINE CLIPPER CCW
 SCAN TIME PER DIVISION .. 5 MILLISECONDS

LOG/LINEAR LOG
 LOG REF LEVEL 0 dBm
 LOG REF LEVEL Vernier 0
 VIDEO FILTER 10 kHz
 SCAN MODE INT
 SCAN TRIGGER LINE

b. Connect CAL OUTPUT to RF INPUT using a BNC-to-type N cable. The analyzer display should be similar to Figure 4-1. Adjust FREQUENCY control to align the LO feedthrough signal on the left (-3) graticule of the CRT.

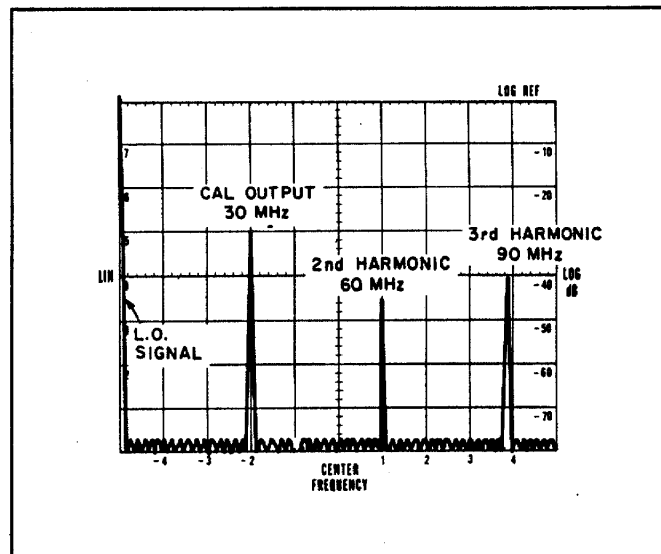


Figure 4-1. CRT Display, 0 to 100 MHz

4-9. Display Adjustments

- a. Set LOG REF LEVEL max ccw.
- b. Set SCAN TIME PER DIVISION to 10 SECONDS and adjust FOCUS and ASTIGMATISM for smallest round spot possible.
- c. Reset SCAN TIME PER DIVISION to 10 MILLISECONDS. Adjust TRACE ALIGN so that the horizontal base line CRT trace is exactly parallel to the horizontal graticule lines.

4-10. RF and IF Section Adjustments

a. Adjust VERTICAL POSITION so that the horizontal base line CRT trace is exactly on the bottom horizontal graticule line of the CRT.

b. Set **FREQUENCY** to position the LO feedthrough signal on the -3 graticule line. Curser should indicate approximately 30 MHz on the frequency scale.

c. Adjust **HORIZONTAL POSITION** so display is centered on the CRT. Adjust **HORIZONTAL GAIN** until the displayed scan trace is exactly ten divisions wide. Some interaction between **HORIZONTAL POSITION** and **GAIN** adjustments may occur, requiring slight readjustment of the controls.

d. Set **LOG REF LEVEL** to 0 dBm. The amplitude of the center frequency signal (30 MHz) should be approximately -30 dBm. The amplitudes of the individual signals may be slightly different.

NOTE

The other signals on the display are the first LO feedthrough (zero frequency) at the -3 graticule and the second harmonic of the 30 MHz calibrator signal at the +3 graticule.

e. Adjust **FREQUENCY** control to center 30 MHz calibrator signal, if necessary. Reduce **SCAN WIDTH PER DIVISION** to 10 kHz. Use **FINE TUNE** to center the signal on the display. With the **TUNING STABILIZER** set to ON (paragraph 4-8a) the analyzer's First LO is automatically locked to a crystal oscillator reference for the blue color-coded **SCAN WIDTH** positions. The **FREQUENCY** control should not be used to fine tune the analyzer; frequency would tune in 1 MHz steps.

f. Reduce **BANDWIDTH** to 10 kHz keeping the 30 MHz signal centered on the display with the **FINE TUNE** control, if necessary.

g. Adjust the **LOG REF LEVEL** controls so the maximum signal amplitude is exactly on the -70 dB graticule line. (Adjust **AMPL CAL** signal level if necessary.) Rotate **LOG REF LEVEL** control seven steps in the clockwise direction. The amplitude of 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 the **LOG REF** (top) graticule line.

i. Repeat steps g and h to obtain optimum adjustment of **VERTICAL GAIN** (increments as close to one division per 10 dB step as possible).

4-11. Ampl Cal Adjustment

a. Set the **LOG REF LEVEL** controls to -30 dBm (-30 and 0 on vernier).

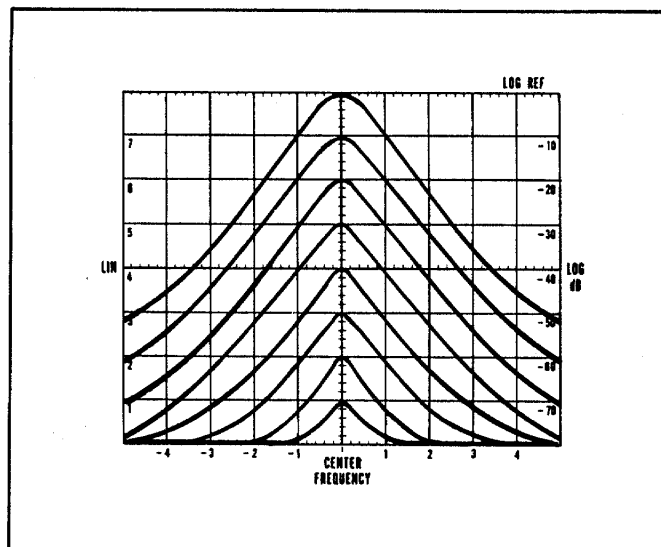


Figure 4-2. Vertical Gain Adjustment

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.

4-12. AMPL CAL CHECK FOR LINEAR SENSITIVITY ACCURACY

4-13. 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 **LINEAR SENSITIVITY** to 1 mV/DIV (1 mV x 1). Set the **LOG/LINEAR** switch to **LINEAR**. Since the -30 dBm calibrator output is equal to approximately 7.1 mV (across 50 ohms) the CRT deflection should be approximately 7.1 divisions.

b. Adjust **AMPL CAL** on the 8555A for approximately 7.1 division 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 of the **LOG** calibration.)

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

4-14. FRONT PANEL CHECKS

a. Perform the Preset Adjustments, Display Adjustments and the RF and IF Adjustments (paragraphs 4-8 through 4-13) prior to performing the Front Panel Checks listed in Table 4-1.

b. With the analyzer controls as they were at the completion of the adjustment procedures, perform the following steps.

1. Set LOG/LINEAR switch to LOG.
2. Set LOG REF LEVEL to -10 dBm.

c. Perform Table 4-1 Front Panel Checks.

4-15. PERFORMANCE TESTS

4-16. The performance test given in this section are suitable for incoming inspection, troubleshooting, or preventive maintenance. During any performance test, all shields and connecting hardware must be in place and the RF section and IF section must be installed in the display section. The tests are designed to verify published instrument specifications. Perform the tests in the order given, and record data on test card (Table 4-4). and/or in the data spaces provided in each test.

4-17. The tests are arranged in the following order:

| Paragraph | Test Description |
|-----------|-----------------------------------|
| 4-20 | Scan Accuracy (Linearity) |
| 4-21 | Frequency Response |
| 4-22 | Sensitivity (Average Noise Level) |
| 4-23 | Noise Sidebands |
| 4-24 | Residual FM |
| 4-25 | Tuning Dial Accuracy |
| 4-26 | Residual Responses |

4-18. Each test is arranged so that the specification is written as it appears in the Table of Specifications in Section I. Next, a description of the test and any special instructions or problem areas are included. Each test that requires test equipment has a test setup drawing and a list of required equipment. Step 1 of each procedure gives control settings required for that particular test.

4-19. Required minimum specifications for test equipment are detailed in Table 1-4 in Section I. If substitute test equipment is used, it must meet the specifications listed in order to performance-test the analyzer.

Table 4-1. Front Panel Checks

| Function | Procedure | Result |
|---------------------------------|---|---|
| Base Line Clipper | 1. Turn BASE LINE CLIPPER cw. | 1. At least the bottom two divisions should be blank. |
| Scan | 2. Return clipper to ccw. | |
| | 3. SCAN TIME PER DIVISION across its range. | 3. Scan should occur in all positions. |
| Scan Width | 4. Set to 20 MILLISECONDS. | |
| | 5. Turn SCAN WIDTH PER DIVISION to 10 MHz. | 5. 30 MHz signal and second harmonic visible. DISPLAY UNCAL light is lit. |
| | 6. Center CAL OUTPUT signal on display and set BANDWIDTH to 300 kHz. | 6. DISPLAY UNCAL light is extinguished. |
| | 7. Reduce SCAN WIDTH PER DIVISION to 100 kHz; use FINE TUNE to center display. | 7. Signal remains on-screen, centered. |
| Tuning Stabilization | 8. Carefully turn FREQUENCY. | 8. Signal jumps to left or right hand off of the CRT (± 1 MHz). This corresponds to the 1 MHz oscillator in the automatic tuning stabilizer circuit. |
| | 9. Turn TUNING STABILIZER to OFF; use FREQUENCY to center display. | 9. Signal should jump ≤ 1 division when TUNING STABILIZER is turned off. |
| | 10. Turn TUNING STABILIZER on, use FINE TUNE to center display. | 10. Signal should jump ≤ 1 division. |
| Bandwidth & Display Uncal Light | 11. Reduce BANDWIDTH and SCAN TIME PER DIVISION using FINE TUNE to center display. | 11. Display should be stable and viewable so long as DISPLAY UNCAL is unlit. |
| Signal Identifier | 12. Return BANDWIDTH to 10 kHz; SCAN WIDTH PER DIVISION to 100 kHz; and SCAN TIME PER DIVISION to 20 MILLISECONDS. Set SIGNAL IDENTIFIER to ON. | 12. The 30 MHz calibrator signal is displaced 2 divisions to the left and reduced approximately 5 dB on alternate scan traces. |
| | 13. Turn SIGNAL IDENTIFIER off. Set BANDWIDTH to 300 kHz and SCAN TIME PER DIVISION to 2 MILLISECONDS. | 13. Analyzer displays the 30 MHz calibrator signal. |
| Calibration | 14. Lit index light on LOG REF LEVEL control corresponds to top line of graticule; with input attenuation at 10 dB and LOG REF LEVEL at -10 dBm, signal level is -30 dBm. | 14. Calibrator signal is at -30 dBm level (two divisions down from the top of graticule). |
| Gain Vernier | 15. Turn LOG REF LEVEL Vernier cw. | 15. Signal level increases by the amount marked on vernier dial. |
| Attenuators | 16. Turn INPUT ATTENUATION and LOG REF LEVEL in 10 dB steps. | 16. Signal increases or decreases one vertical division per 10 dB step. |

PERFORMANCE TESTS

4-20. Scan Accuracy

SPECIFICATION: Frequency error between two points on the display is less than 10% of the indicated separation.

DESCRIPTION: Wide scan widths are checked using a comb generator directly. Narrow scan widths are checked using a comb generator modulated by an audio oscillator. Comb generator frequency components are aligned opposite graticule lines, and the amount of error is measured.

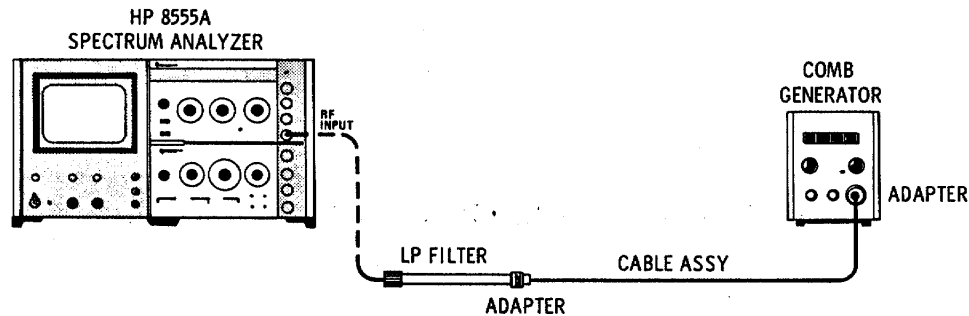


Figure 4-3. Scan Width Accuracy Test Setup

EQUIPMENT:

| | | |
|------------------|-------|-----------|
| COMB GENERATOR | ..... | HP 8406A |
| AUDIO OSCILLATOR | ..... | HP 200CD |
| LP FILTER | ..... | HP 360C |
| CABLE ASSEMBLY | ..... | HP 10503A |
| CABLE ASSEMBLY | ..... | HP 11001A |
| ADAPTER (2) | ..... | UG-201A/U |

1. Connect the test setup in Figure 4-3 and make the following control settings:

ANALYZER:

| | | |
|-------------------------|-------|-----------------|
| FREQUENCY | ..... | 1.4 GHz |
| BANDWIDTH | ..... | 300 kHz |
| SCAN WIDTH | ..... | PER DIVISION |
| SCAN WIDTH PER DIVISION | ..... | 100 MHz |
| INPUT ATTENUATION | ..... | 0 dB |
| SCAN TIME PER DIVISION | ..... | 10 MILLISECONDS |
| LOG/LINEAR | ..... | LOG |
| LOG REF LEVEL | ..... | -20 dBm |
| VIDEO FILTER | ..... | OFF |
| SCAN MODE | ..... | INT |
| SCAN TRIGGER | ..... | AUTO |
| BAND | ..... | .01-2.05 GHz |

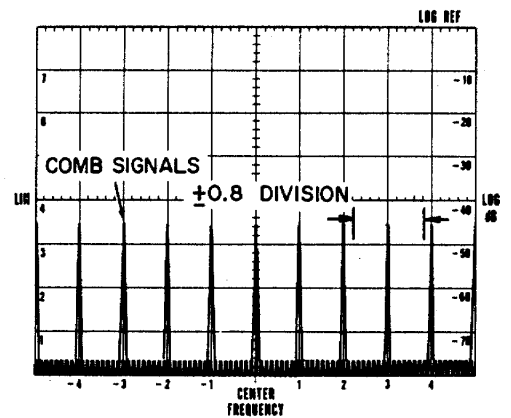


Figure 4-4. Scan Width Accuracy Measurement

2. Set comb generator for a 100 MHz comb. A comb signal occurs every 100 MHz on the CRT display (see Figure 4-4). Tune FREQUENCY and FINE TUNE to line up a comb signal with the far left graticule line.

PERFORMANCE TESTS

4-20. Scan Accuracy (cont'd)

- 3. Measure the amount of error in divisions that the comb signal deviates from the +3 graticule line. The comb signal should occur on the +3 line ± 0.8 division.

+2.2 ____ +3.8 div

- 4. Repeat steps 2 and 3 with SCAN WIDTH PER DIVISION set to 10 MHz and a comb frequency of 10 MHz.

+2.2 ____ +3.8 div

- 5. Repeat steps 2 and 3 with SCAN WIDTH PER DIVISION set to 1 MHz, BANDWIDTH at 10 kHz, SCAN TIME PER DIVISION to 20 MILLISECONDS, and a comb frequency of 1 MHz.

+2.2 ____ +3.8 div

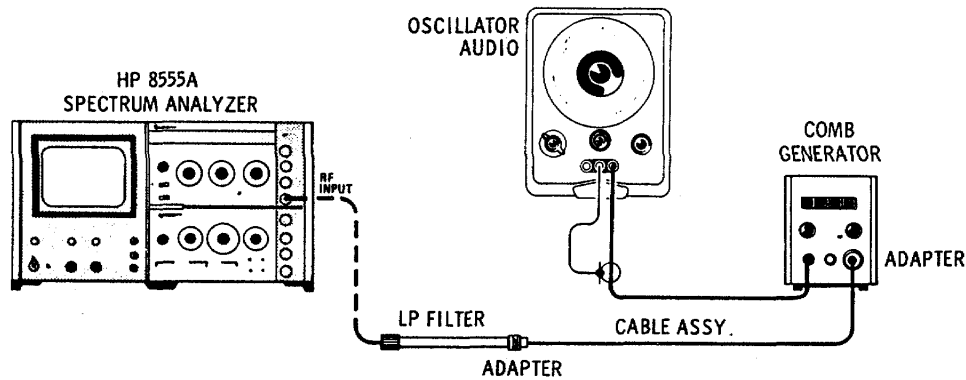


Figure 4-5. Scan Width Accuracy Test Setup

- 6. To test the 50 kHz SCAN WIDTH PER DIVISION setting, connect the test setup shown in Figure 4-5. Set controls as follows:

ANALYZER:

| | | |
|-------------------------|-------|-----------------|
| BANDWIDTH | ..... | 3 kHz |
| SCAN TIME PER DIVISION | ..... | 10 MILLISECONDS |
| SCAN WIDTH PER DIVISION | ..... | 50 kHz |
| TUNING STABILIZER | ..... | OFF |

- 7. Set audio oscillator output frequency for 50 kHz and comb generator for 10 MHz comb. Maximize the comb signal amplitudes using the comb generator and audio oscillator output amplitude controls.
- 8. With controls set as in step 6 above, a comb signal occurs every 50 kHz on the display. Turn FINE TUNE to line up a comb signal with the far left graticule line.

PERFORMANCE TESTS

4-20. Scan Accuracy (cont'd)

9. Measure the amount of error, in divisions, that the comb signal deviates from the +3 graticule line. The comb signal should occur on the +3 line ± 0.8 division.

+2.2 _____ +3.8 div

10. Repeat steps 6 through 9 with TUNING STABILIZER on.

4-21. Frequency Response

SPECIFICATION: With 10 dB input attenuator setting:

| Frequency Range (GHz) | Mixing Mode (n) | Frequency Response (dB max) |
|-----------------------|-----------------|-----------------------------|
| 0.01-2.05 | 1- | ± 1.0 |
| 1.50-3.55 | 1- | ± 1.0 |
| 2.07-6.15 | 2- | ± 1.25 |
| 2.60-4.65 | 1+ | ± 1.0 |
| 4.11-6.15 | 1+ | ± 1.0 |
| 4.13-10.25 | 3- | ± 1.5 |
| 6.17-10.25 | 2+ | ± 1.5 |
| 6.19-14.35 | 4- | ± 2.0 |
| 8.23-14.35 | 3+ | ± 2.0 |
| 10.29-18.00 | 4+ | ± 2.0 |

DESCRIPTION: A leveled signal source is applied to the input of the spectrum analyzer. As the source is tuned across each band of the analyzer, the analyzer CRT is observed for amplitude variations versus frequency.

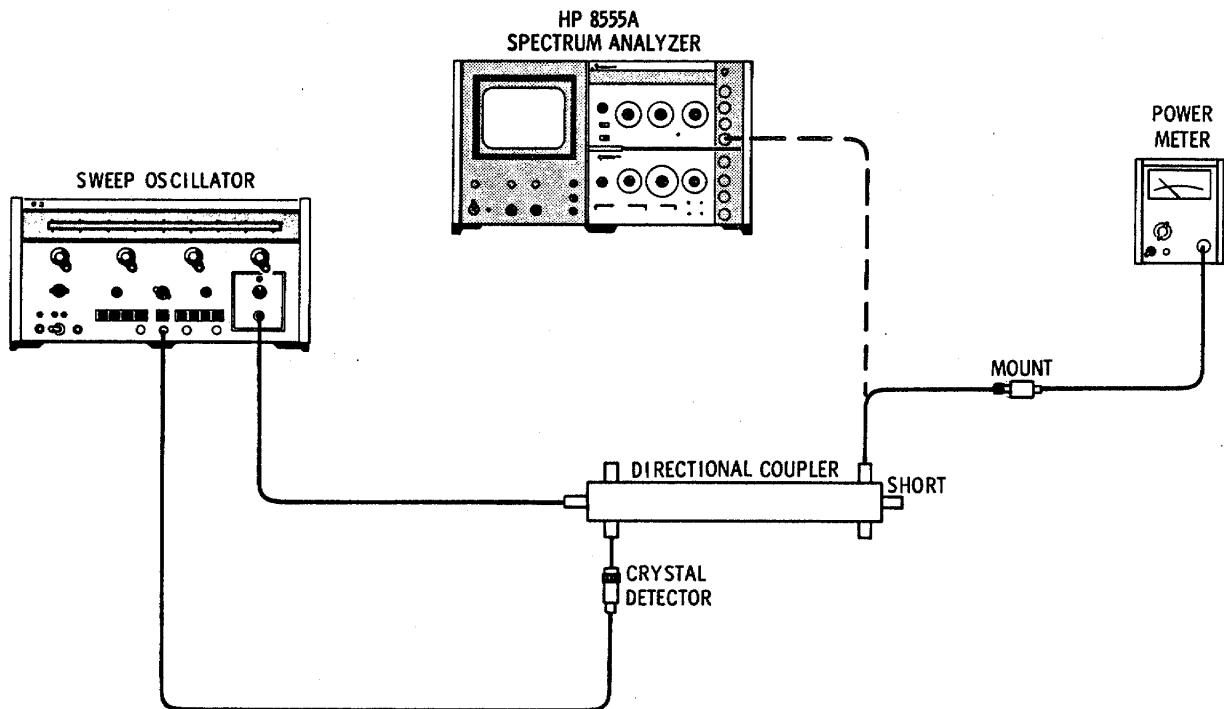


Figure 4-6. Frequency Response Test Setup, 0.1 to 2.05 GHz

PERFORMANCE TESTS

4-21. Frequency Response (cont'd)

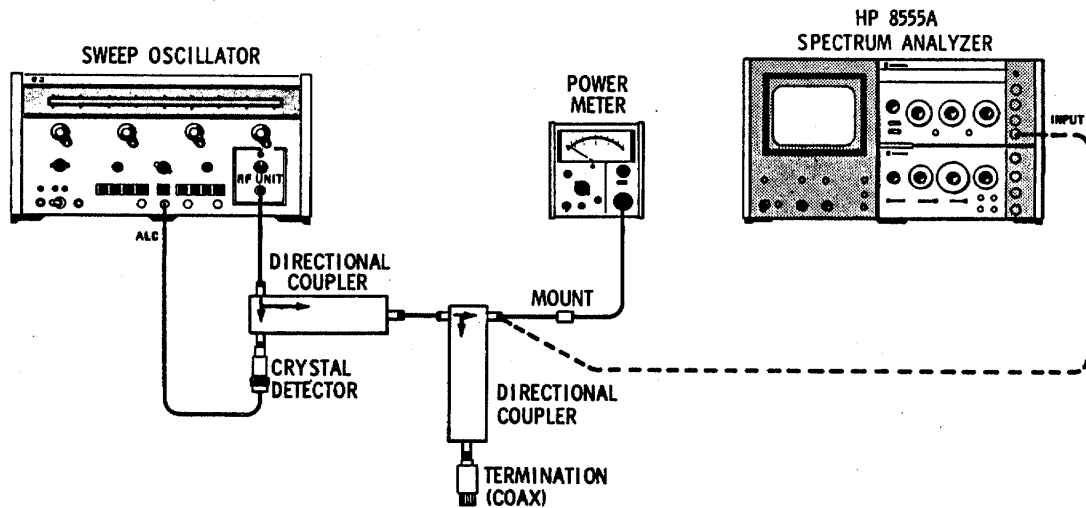


Figure 4-7. Frequency Response Test Setup, 1.5 to 18 GHz

EQUIPMENT:

| | |
|--------------------------|-----------|
| SWEEP OSCILLATOR | HP 8690B |
| RF UNIT | HP 8699B |
| RF UNIT | HP 8693B |
| RF UNIT | HP 8694B |
| RF UNIT | HP 8695B |
| DUAL DIRECTIONAL COUPLER | HP 778D |
| DIRECTIONAL COUPLER (2) | HP 779D |
| CRYSTAL DETECTOR | HP 423A |
| POWER METER | HP 432A |
| THERMISTOR MOUNT | HP 8478B |
| OPTION 012 LOAD | HP 909A |
| TYPE N SHORT | HP 11512A |

1. Make the following analyzer control settings:

ANALYZER:

| | |
|------------|---------------|
| BAND | 0.01-2.05 GHz |
| FREQUENCY | 1 GHz |
| BANDWIDTH | 300 kHz |
| SCAN WIDTH | PER DIVISION |

PERFORMANCE TESTS

4-21. Frequency Response (cont'd)

SCAN WIDTH PER DIVISION 200 MHz
 INPUT ATTENUATION 10 dB
 SIGNAL IDENTIFIER OFF
 SCAN TIME PER DIVISION 10 MILLISECONDS
 LOG/LINEAR LOG
 LOG REF LEVEL -10 dBm
 VIDEO FILTER OFF
 SCAN MODE INT
 SCAN TRIGGER LINE

2. Connect the test setup shown in Figure 4-6 with the power meter connected at the output with the 8699B RF Unit installed in the Mainframe. Level the sweeper between 0.1 and 2.05 GHz for -10 to -20 dBm reading on the power meter.
3. With the sweeper set for CW operation, tune the sweeper between 0.1 and 2.05 GHz and note any amplitude variations as observed on the power meter. Any error must be subtracted from the frequency response measurements in the subsequent steps.
4. Connect the leveled output of the sweeper to the analyzer INPUT and tune the sweeper from 0.1 to 2.05 GHz. Amplitude variations should not exceed 0.2 divisions (± 1.0 dB).

_____ 0.2 div

NOTE

The LINEAR display mode may be used to expand the vertical sensitivity if desired. Amplitude variations expressed in dB would then be equal to $20 \log V_1/V_2$ (where V_1/V_2 = amplitude variation units in volts).

5. Repeat steps 1 through 4 using the appropriate sweeper RF Unit and test setup, Figure 4-6 or 4-7 to check the remaining frequency bands of the analyzer. Adjust the analyzer FREQUENCY control and BAND to correspond to the frequency range being checked. The frequency response for each band should be within the limits tabulated below.

Table 4-2. Frequency Response

| Frequency Range (GHz) | Mixing Mode (n) | IF Frequency (MHz) | Frequency Response (dB max.) |
|-----------------------|-----------------|--------------------|------------------------------|
| 0.01— 2.05 | 1- | 2050 | ± 1.0 |
| 1.50— 3.55 | 1- | 550 | ± 1.0 |
| 2.07— 6.15 | 2- | 2050 | ± 1.25 |
| 2.60— 4.65 | 1+ | 550 | ± 1.0 |
| 4.11— 6.15 | 1+ | 2050 | ± 1.0 |
| 4-13—10.25 | 3- | 2050 | ± 1.5 |
| 6.17—10.25 | 2+ | 2050 | ± 1.5 |
| 6.19—14.35 | 4- | 2050 | ± 2.0 |
| 8.23—14.35 | 3+ | 2050 | ± 2.0 |
| 10.29—18.00 | 4+ | 2050 | ± 2.0 |

PERFORMANCE TESTS

4-22. Sensitivity

SPECIFICATION: Average noise level in a 1 kHz IF bandwidth with internal coaxial mixer:

| | |
|-----------------|----------|
| .01—2.05 GHz | -115 dBm |
| 1.50—3.55 GHz | -117 dBm |
| 2.07—6.15 GHz | -108 dBm |
| 2.60—4.65 GHz | -117 dBm |
| 4.11—6.15 GHz | -115 dBm |
| 4.13—10.25 GHz | -103 dBm |
| 6.17—10.25 GHz | -105 dBm |
| 6.19—14.35 GHz | - 95 dBm |
| 8.23—14.35 GHz | -100 dBm |
| 10.29—18.45 GHz | - 90 dBm |

DESCRIPTION: Sensitivity is checked by observing the average noise power level of the analyzer using the analyzer's amplitude calibration and no input signal. The test is made using the 10 kHz IF bandwidth so that efficient use of the 100 Hz VIDEO FILTER is achieved. A 10 dB correction must then be made to give the equivalent 1 kHz bandwidth noise power level referred to the analyzer INPUT.

1. Terminate the analyzer INPUT in 50 ohms.
2. Make the following analyzer control settings:

| | |
|------------------------|-----------------|
| BAND | 1.50—3.55 GHz |
| FREQUENCY | 1.5 GHz |
| TUNING STABILIZER | OFF |
| SIGNAL IDENTIFIER | OFF |
| BANDWIDTH | 10 kHz |
| SCAN WIDTH | ZERO |
| INPUT ATTENUATION | 0 dB |
| BASE LINE CLIPPER | ccw |
| SCAN TIME PER DIVISION | 20 MILLISECONDS |
| LOG/LINEAR | LOG |
| LOG REF LEVEL | -50 dBm |
| LOG REF LEVEL Vernier | 0 |
| VIDEO FILTER | 100 Hz |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |
3. Tune FREQUENCY control across each band and note the average noise power level on the CRT display. The noise level should be less than the limits indicated in Table 4-3 for the appropriate BAND.

Table 4-3. Frequency Sensitivity, 10 kHz Bandwidth

| BAND (GHz) | BANDWIDTH | Average Noise Level (dBm) |
|-------------|-----------|---------------------------|
| 1.50—3.55 | 10 kHz | _____ -107 |
| 2.60—4.65 | 10 kHz | _____ -107 |
| .01—2.05 | 10 kHz | _____ -105 |
| 4.11—6.15 | 10 kHz | _____ -105 |
| 2.07—6.15 | 10 kHz | _____ - 98 |
| 6.17—10.25 | 10 kHz | _____ - 95 |
| 4.13—10.25 | 10 kHz | _____ - 93 |
| 8.23—14.35 | 10 kHz | _____ - 90 |
| 6.19—14.35 | 10 kHz | _____ - 85 |
| 10.29—18.45 | 10 kHz | _____ - 80 |

PERFORMANCE TESTS

4-23. Noise Sidebands

SPECIFICATION: For fundamental mixing. More than 70 dB below CW signal, 50 kHz or more away from signal, with 1 kHz IF bandwidth and 100 Hz video filter.

DESCRIPTION: A stable CW signal is applied to the spectrum analyzer and displayed on the CRT. The amplitude of the noise associated sidebands and unwanted responses close to the signal are measured.

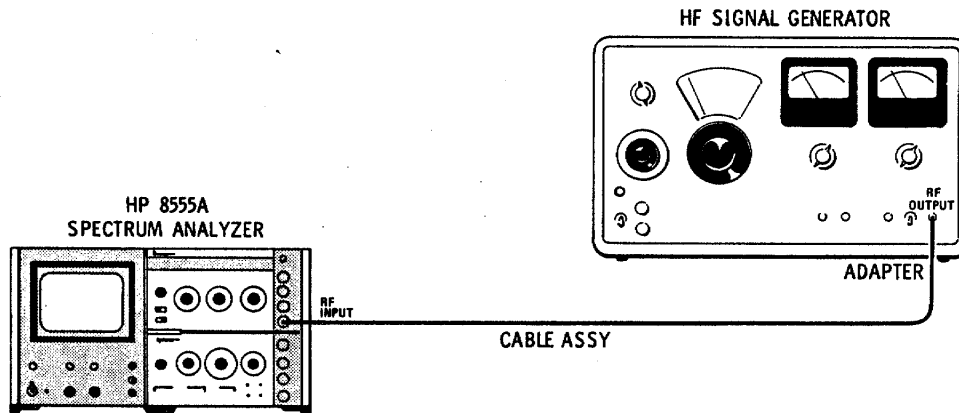


Figure 4-8. Noise Sideband Test Setup

1. Connect the signal generator RF OUTPUT to the analyzer INPUT. (See Figure 4-8). Set the generator output frequency to 30 MHz at -20 dBm.
2. Make the following control settings:

ANALYZER:

| | |
|-------------------------|-----------------|
| BAND | 0.1—2.05 GHz |
| FREQUENCY | 30 MHz |
| TUNING STABILIZER | ON |
| SIGNAL IDENTIFIER | OFF |
| BANDWIDTH | 100 kHz |
| SCAN WIDTH | PER DIVISION |
| SCAN WIDTH PER DIVISION | 5 MHz |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| INPUT ATTENUATION | 10 dB |
| LOG/LINEAR | LOG |
| LOG REF LEVEL | -20 dBm |
| VIDEO FILTER | OFF |
| SCAN MODE | INT |
| SCAN TRIGGER | LINE |

3. Tune the analyzer FREQUENCY to center the 30 MHz signal, and if necessary, adjust the generator level so that the signal amplitude peaks at the top graticule line.
4. Keeping the display centered, reduce the SCAN WIDTH PER DIVISION to 20 kHz. Reduce BANDWIDTH to 1 kHz, SCAN TIME PER DIVISION to 0.2 SECONDS, and VIDEO FILTER to 100 Hz.
5. Observe the noise level two and one-half divisions or greater away from the signal (50 kHz). The average noise level should be at least 70 dB below the CW signal level.

70 dB _____

PERFORMANCE TESTS

4-24. Residual FM

SPECIFICATION: Total Analyzer Residual FM (Fundamental Mixing)

| | |
|--------------|--------------|
| Stabilized | Unstabilized |
| <100 Hz | <10 kHz |
| peak-to-peak | peak-to-peak |

DESCRIPTION: The linear portion of the analyzer IF filter skirt is used to slope detect low-order residual FM. The analyzer is stabilized, and the detected FM is displayed in the time domain.

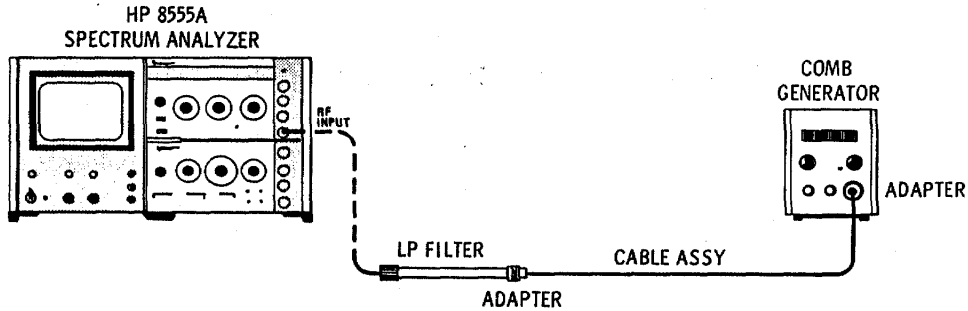


Figure 4-9. Residual FM Test Setup

EQUIPMENT:

| | |
|-----------------|---------------|
| COMB GENERATOR | HP 8406A |
| CABLE ASSEMBLY | HP 10503A |
| ADAPTER | UG-201A/U (2) |
| LOW PASS FILTER | HP 360C |

1. Set the comb generator for a 100 MHz comb and connect the test setup shown in Figure 4-9. Set the analyzer controls as follows:

| | |
|-------------------------|-----------------|
| BAND | .01—2.05 GHz |
| FREQUENCY | 100 MHz |
| BANDWIDTH | 30 kHz |
| SCAN WIDTH | PER DIVISION |
| SCAN WIDTH PER DIVISION | 1 MHz |
| INPUT ATTENUATION | 10 dB |
| TUNING STABILIZER | ON |
| SIGNAL IDENTIFIER | OFF |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| LOG/LINEAR | LOG |
| LOG REF LEVEL | -30 dBm |
| VIDEO FILTER | 100 Hz |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |
2. Center the 100 MHz signal on the display and reduce SCAN WIDTH PER DIVISION to 2 kHz and BANDWIDTH to 1 kHz.
3. Switch LOG/LINEAR to LINEAR and adjust sensitivity for a full eight division display.

PERFORMANCE TESTS

4-24. Residual FM (cont'd)

4. Refer to Figure 4-10. Tune FINE TUNE so that the upward slope of the display intersects the CENTER FREQUENCY graticule line one division from the top.
5. Note where the slope intersects the middle horizontal graticule line:
Horizontal Displacement: _____ divisions
6. Use the horizontal displacement to calculate demodulation sensitivity.

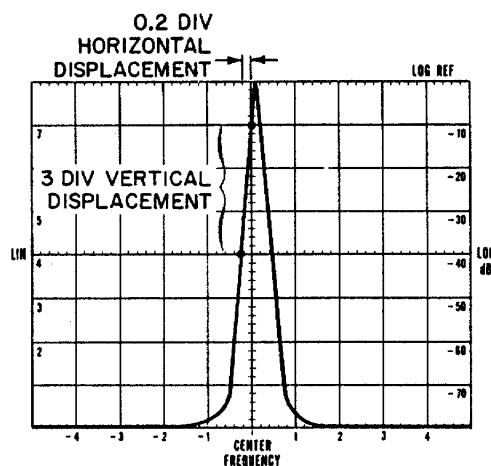


Figure 4-10. Demodulation Sensitivity Measurement

- a. Convert the horizontal displacement (divisions) into Hertz.

Example: (2 kHz SCAN WIDTH) x (0.2 div) = 400 Hz.

- b. Calculate demodulation sensitivity by dividing the vertical displacement in divisions into the horizontal displacement in Hz:

Example: $\frac{400 \text{ Hz}}{3 \text{ divisions}} = 133 \text{ Hz/div}$

7. Turn SCAN WIDTH to ZERO scan. Set FINE TUNE for a response level within the calibrated three division range (one division from the top to the center horizontal graticule line).
8. Measure the peak-to-peak deviation, and multiply it by the demodulation sensitivity obtained in step 6b above.

Example: 0.5 div p-p signal deviation x 133 Hz/div = 66.5 Hz Residual FM

_____ Hz peak-to-peak

4-25. Dial Accuracy

SPECIFICATION: ±15 MHz on fundamental mixing.

DESCRIPTION: Center frequency accuracy is verified by displaying test signals of known frequency accuracy. Test signals are the fundamental and harmonics of a 100 MHz comb generator.

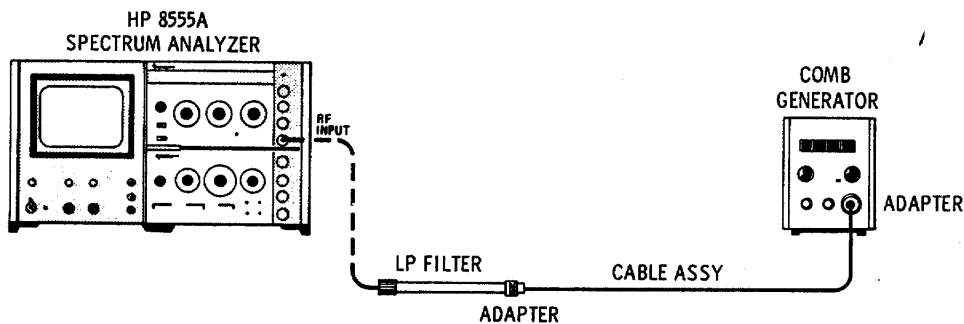


Figure 4-11. Dial Accuracy Test Setup

PERFORMANCE TESTS

4-25. Dial Accuracy (cont'd)

EQUIPMENT:

| | |
|----------------|-----------|
| COMB GENERATOR | HP 8406A |
| LP FILTER | HP 360C |
| CABLE ASSEMBLY | HP 10503A |
| ADAPTER (2) | UG-201A/U |

1. Connect the equipment as shown in Figure 4-11. Make the following control settings:

ANALYZER:

| | |
|-------------------------|-----------------|
| BAND | .01-2.05 GHz |
| FREQUENCY | 100 MHz |
| BANDWIDTH | 30 kHz |
| SCAN WIDTH | PER DIVISION |
| SCAN WIDTH PER DIVISION | 10 MHz |
| INPUT ATTENUATION | 20 dB |
| SCAN TIME PER DIVISION | 20 MILLISECONDS |
| LOG/LINEAR | LOG |
| LOG REF LEVEL | -10 dBm |
| VIDEO FILTER | OFF |
| SCAN MODE | INT |
| SCAN TRIGGER | LINE |

2. Set comb generator for 100 MHz comb and tune analyzer FREQUENCY to 100 MHz; a comb signal should be displayed ± 1.5 division of center graticule line.

3. Tune FREQUENCY to various dial calibration points to verify accuracy.

| | | | |
|-------------|---------------------|-------------|---------------------|
| a. 200 MHz | -1.5 _____ +1.5 div | f. 1200 MHz | -1.5 _____ +1.5 div |
| b. 400 MHz | -1.5 _____ +1.5 div | g. 1400 MHz | -1.5 _____ +1.5 div |
| c. 600 MHz | -1.5 _____ +1.5 div | h. 1600 MHz | -1.5 _____ +1.5 div |
| d. 800 MHz | -1.5 _____ +1.5 div | i. 1800 MHz | -1.5 _____ +1.5 div |
| e. 1000 MHz | -1.5 _____ +1.5 div | j. 2000 MHz | -1.5 _____ +1.5 div |

PERFORMANCE TESTS

26. Residual Responses

SPECIFICATION: Referred to signal level at input mixer on fundamental mixing: <-90 dBm

DESCRIPTION: Signals present on the display with no input to the analyzer are residual responses. To check for residual responses a reference is selected so that -90 dBm is easily determined. The first LO is swept through its entire range while observing the display for any responses.

EQUIPMENT:

50Ω TERMINATION HP 909A

- 1. Set the analyzer controls as follows and terminate INPUT with 50Ω.

BAND 01-2.05 GHz
FREQUENCY Low end stop
SCAN WIDTH FULL
INPUT ATTENUATION 0 dB
SCAN TIME PER DIVISION 10 SECONDS
LOG/LINEAR LOG
LOG REF LEVEL -60 dBm
LOG REF LEVEL Vernier 0
VIDEO FILTER 100 Hz
SCAN MODE INT
SCAN TRIGGER AUTO

- 2. Observe the display as the analyzer scans its full range. No responses should occur above -90 dBm.

Residual Responses: _____-90 dBm.

Table 4-4. Performance Test Card

| Para. No. | Test Description | Measurement Unit | Min. | Actual | Max. |
|---------------|---|------------------|------------|------------|------|
| 4-20 | Scan Accuracy | | | | |
| | 100 MHz PER DIVISION (800 MHz) | divisions | -0.8 | _____ | +0.8 |
| | 10 MHz PER DIVISION (80 MHz) | divisions | -0.8 | _____ | +0.8 |
| | 1 MHz PER DIVISION (8 MHz) | divisions | -0.8 | _____ | +0.8 |
| | 50 kHz PER DIVISION (400 kHz) | divisions | -0.8 | _____ | +0.8 |
| 4-21 | Frequency Response | | | | |
| | Frequency Range (GHz) | Mixing Mode (n) | | | |
| | 0.01 — 2.05 | 1- | dB | -1 _____ | +1 |
| | 1.50 — 3.55 | 1- | dB | -1 _____ | +1 |
| | 2.07 — 6.15 | 2- | dB | -1 _____ | +1 |
| | 2.60 — 4.65 | 1+ | dB | -1 _____ | +1 |
| | 4.11 — 6.15 | 1+ | dB | -1 _____ | +1 |
| | 4.13 — 10.25 | 3- | dB | -1.5 _____ | +1.5 |
| | 6.17 — 10.25 | 2+ | dB | -1.5 _____ | +1.5 |
| | 6.19 — 14.35 | 4- | dB | -2 _____ | +2 |
| 8.23 — 14.35 | 3+ | dB | -2 _____ | +2 | |
| 10.29 — 18.00 | 4+ | dB | -2.5 _____ | +2.5 | |
| 4-22 | Frequency Sensitivity (10 kHz Bandwidth) | | | | |
| | BAND (GHz) | BANDWIDTH | | | |
| | 1.50 — 3.55 | 10 kHz | dBm | -107 _____ | |
| | 2.60 — 4.65 | 10 kHz | dBm | -107 _____ | |
| | 0.01 — 2.05 | 10 kHz | dBm | -105 _____ | |
| | 4.11 — 6.15 | 10 kHz | dBm | -105 _____ | |
| | 2.07 — 6.15 | 10 kHz | dBm | - 98 _____ | |
| | 6.17 — 10.25 | 10 kHz | dBm | - 95 _____ | |
| | 4.13 — 10.25 | 10 kHz | dBm | - 93 _____ | |
| | 8.23 — 14.35 | 10 kHz | dBm | - 90 _____ | |
| 6.19 — 14.35 | 10 kHz | dBm | - 85 _____ | | |
| 10.29 — 18.45 | 10 kHz | dBm | - 80 _____ | | |
| 4-23 | Noise Sidebands Average noise level below CW signal 50 kHz away, fundamental mixing, 1 kHz IF bandwidth, 100 Hz video filter. | dB | 70 | _____ | |
| 4-24 | Residual FM | | | | |
| | Stabilized | Hz | | _____ | 100 |
| | Unstabilized | kHz | | _____ | 10 |
| 4-25 | Dial Accuracy Fundamental mixing | MHz | - 15 | _____ | +15 |
| 4-26 | Residual Responses Fundamental mixing | dBm | | _____ | -90 |

SECTION V ADJUSTMENTS

5-1. INTRODUCTION

5-2. This section describes adjustments required to return the analyzer RF Section to peak operating condition when repairs are required. Included in this section are test setups, checks and adjustment procedures. A test card for recording data is included at the back of this section. Adjustment location photographs are contained in foldouts in Section VIII of this manual.

5-3. The adjustment procedures are arranged in numerical order. For best results, this order should be followed. Record data, taken during adjustments, in the spaces provided or in the data test card at the end of this section. Comparison of initial data with data taken during periodic adjustments assists in preventive maintenance and troubleshooting.

5-4. EQUIPMENT REQUIRED

5-5. Tables 1-4 and 1-5 contain a tabular list of test equipment and test accessories required in the adjustment procedures. In addition, the tables contain the required minimum specifications and a suggested manufacturers model number.

5-6. In addition to the test equipment and test accessories in Tables 1-4 and 1-5, a Display Section and an IF Section are required. When the RF and IF sections are removed from the Display Section, install 50-ohm termination AT4 on rear of RF Section. Perform the Display Section and IF Section adjustments prior to performing the RF Section adjustments.

5-7. **Pozidriv Screwdrivers.** Many screws in the instrument appear to be Phillips, but are not. The equipment required table gives the name and number of the Pozidriv screwdrivers designed to fit these screws. To avoid damage to the screw slots, the Pozidriv screwdrivers should be used.

5-8. **Slug Tuning Tool.** A modified hollow-handle 5/16-inch nut driver (HP 08555-20121) that will accept a modified No.10 Allen driver (HP 08555-20121) should be used when tuning the slugs in the second converter.

5-9. **Blade Tuning Tools.** 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.

5-10. **HP 08555-60077 Service Kit.** The HP 08555-60077 Service Kit is an accessory item available from Hewlett-Packard for use in maintaining both the RF and IF Sections of the spectrum analyzer. Some adjustment can be made without this kit by removing the top cover from both the RF Section and the Display Section. This procedure exposes dangerous potentials in the Display Section chassis and should not be used unless absolutely necessary. Adjustments that are possible without the service kit are preceded by a warning to install a cover over the Display Section with a cutout above the RF Section. These adjustments can and should be performed with the analyzer plug-ins installed on extender cables provided in the service kit. The kit can be obtained by contacting the nearest Hewlett-Packard Sales and Service Office. A list of HP field offices is included at the back of this manual.

5-11. Table 1-5, Accessories, contains a detailed description of the contents of the service kit. Any item in the kit may be ordered separately if desired. In the case of the 11592-60015 Extender Cable Assembly, the wiring is especially critical and fabrication should not be attempted in the field. Other items in the kit may be built in the field if desired.

5-12. **Extender Cable Installation.** 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 latches on each side of the RF Section. Unlock latches and firmly pull the two sections apart. 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 and separate the sections. Remove top and bottom covers from the RF Section.

5-13. Place the plate end of the HP 11592-60015 Extender Cable Assembly in the Display Section and press firmly into place so that the plugs make contact. The plate and plugs cannot be installed upside down as the plate has two holes corresponding to the two guide rods in the mainframe.

5-14. 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 HP 11592-60016 Interconnection Cable Assembly between the RF and IF Sections. The connectors on the cable are keyed by the shape of the plug and the arrangement of the pins. Press the connectors firmly together and extend the instruments as far apart as the cable will allow without putting stress on the connectors. Remove Dummy Load Assembly AT4 from rear panel of Display Section and install at P4 on rear of RF Section.

5-15. FACTORY SELECTED COMPONENTS

5-16. Table 8-1 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

5-17. RELATED ADJUSTMENTS

5-18. The following sets of adjustments are directly related. When one adjustment in a set is made, the others in that set should be checked.

5-19. **Display Section Adjustments.** Refer to the Display Section Operating and Service Manual.

5-20. **IF Section Adjustments.** Refer to the IF Section Operating and Service Manual.

5-21. **RF Section Adjustments.** Perform the Display Section and IF Section adjustments prior to performing the following RF Section adjustments

ADJUSTMENTS

5-22. Input Operating Voltages, Check and Adjustment

REFERENCE: Schematic 9, Display Section and IF Section Operating and Service Manuals.

DESCRIPTION: Dc operating voltages for the RF Section are obtained from the Display Section, the IF Section and from a dual power supply in the RF Section. The Display Section provides +100 Vdc, -100 Vdc and -12.6 Vdc; the IF Section provides -10 Vdc and the RF Section provides the +20 Vdc and +10 Vdc operating voltages. The Tuning Stabilizer Control Assy A5 uses all the above voltages and provides a convenient location for measurement (see Service Sheet 9). If the plug-ins are installed on extender cables, voltage test points are accessible on the A10 Interconnect board. Remove bottom cover from RF Section for access.

EQUIPMENT:

- HP 3440A Digital Voltmeter w/HP 3443A Auto Range Unit
- HP 11003A Test Leads
- HP 5060-0256 Extender Board
- Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install plug-ins on extender cables or install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. With analyzer power off, remove top cover from RF Section and install Tuning Stabilizer Control Assy A5 on extender board.
3. Apply power to analyzer, measure and record the dc voltages.

| Location | Normal | Actual |
|-----------|-----------|--------|
| A5 Pin 1 | +100 ±1% | _____ |
| A5 Pin E | -100 ±1% | _____ |
| A5 Pin 10 | -12.6 ±1% | _____ |
| A5 Pin L | -10 ±.01V | _____ |
| A5 Pin D | +20 ±.01V | _____ |
| A5 Pin H | +10 ±.02V | _____ |
| A4 Pin A | -31 ±1.5V | _____ |

4. If the +100, -100 or -12.6 Vdc sources are out of tolerance, refer to Display Section Operating and Service Manual for both sequence of adjustment and adjustment procedure.
5. If the -10 Vdc source is out of tolerance, refer to the IF Section Operating and Service Manual for adjustment procedure.
6. If the +20 and/or +10 Vdc sources are out of tolerance, refer to +20/+10 volt check and adjustment procedure, paragraph 5-23.

ADJUSTMENTS

5-23. +20/+10 Volt Power Supply Check and Adjustment

REFERENCE: Schematic 15.

DESCRIPTION: The +20-volt power supply is adjusted for correct output; while the +10-volt power supply is checked for correct output. A voltage divider connected to the +20-volt source provides the reference for the +10-volt source.

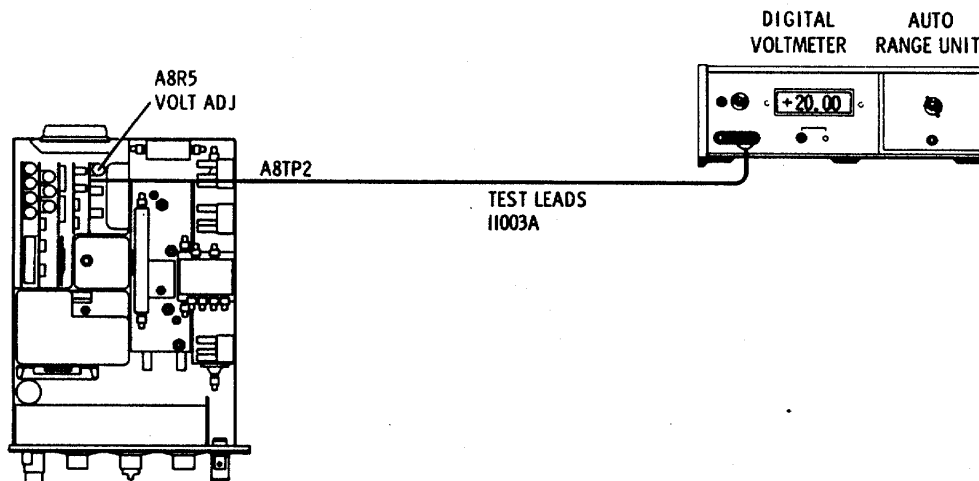


Figure 5-1. +20/+10 Volt Power Supply Check and Adjustment Test Setup

EQUIPMENT:

- HP 3440A Digital Voltmeter with 3443A Auto Range Unit
- HP 11003A Test Leads
- Modified Display Section Cover, see "Warning"

WARNING

During the following tests dangerous potentials up to 7000 volts dc are present on exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. Connect digital voltmeter test leads to A8TP2 and chassis ground.
3. Adjust A8R5 VOLT ADJ for an output of $+20 \pm .01$ Vdc.

_____ $+20 \pm .01$ Vdc

4. Connect test leads to A8TP1 and chassis ground.
5. Check for an output level of $+10 \pm .02$ Vdc.

_____ $+10 \pm .02$ Vdc

ADJUSTMENTS

5-24. YIG Driver Adjustments

REFERENCE: Schematic 7.

DESCRIPTION: The upper and lower voltage limits of the FREQUENCY control tuning voltage are adjusted for a precise input to the YIG driver circuit. The upper limit corresponds to 2.0 GHz on the n=1-Frequency Scale; with the lower limit corresponding to 0 GHz. The YIG driver circuit is adjusted to produce an oscillator frequency of 4.1 GHz for the upper voltage limit and a 2.05 GHz frequency for the lower voltage limit. The dial accuracy is then checked in 100 MHz increments. During all FREQUENCY control adjustments, approach all dial settings clockwise.

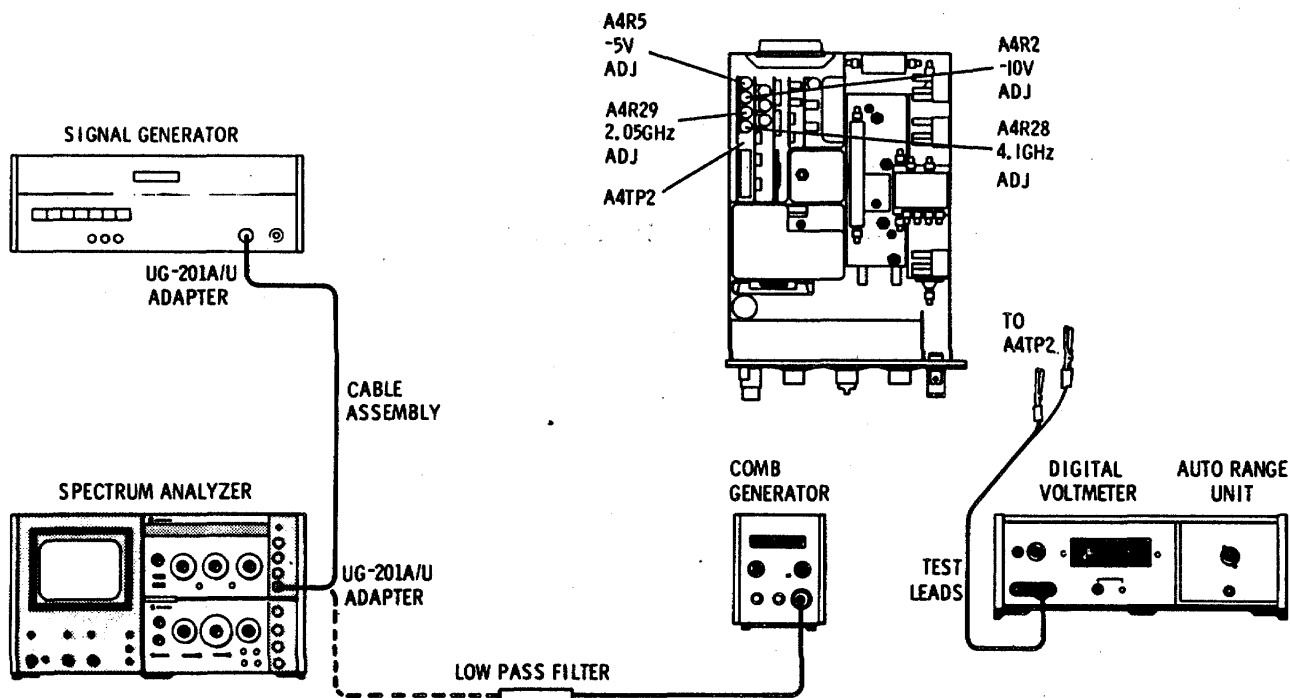


Figure 5-2. YIG Driver Adjustments

EQUIPMENT:

- HP 3440A Digital Voltmeter w/HP 3443A Auto Range Unit
- HP 8616A Signal Generator
- HP 8406A Comb Generator
- HP 11003A Test Leads
- HP 10503A Cable Assembly
- HP 360C 2 GHz Low-Pass Filter
- Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

ADJUSTMENTS

5-24. YIG Driver Adjustments (cont'd)

1. Install plug-ins on extender cables or install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. Remove top cover from RF Section and connect digital voltmeter to test point A4TP2.
3. Set analyzer controls as follows:

| | |
|-------------------------|------------------|
| BAND | n=1- 2.05 GHz IF |
| SCAN WIDTH | ZERO |
| SCAN WIDTH PER DIVISION | 2 MHz |
| BANDWIDTH | 100 kHz |
| FINE TUNE | Centered |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| INPUT ATTENUATION | 10 dB |
| POWER | ON |

NOTE

Allow sufficient time for instrument to warm up and stabilize. When making FREQUENCY control adjustments approach all dial settings clockwise. Avoid parallax error when reading dial frequency.

4. Connect the comb generator to RF Section INPUT through the low pass filter. Set comb generator for 100 MHz comb at maximum output level.
5. Set FREQUENCY control to 2.0 GHz.
6. Adjust A4R2, -10V adj. for a DVM reading of $-9.878 \pm .005$ Vdc. (-9.878 Vdc at 2.0 GHz corresponds to -10.0 Vdc at 2.05 GHz.)
7. Set SCAN WIDTH to FULL and adjust A4R28, 4.1 GHz adj., to dip the 2 GHz comb line (20th comb line) at the frequency marker.
8. Set SCAN WIDTH to PER DIVISION and readjust A4R28, 4.1 GHz adj., to center the 2 GHz comb line within ± 1 division of the CENTER FREQUENCY graticule line.
9. Replace the comb generator input with the signal generator tuned to 2.0 GHz to ensure that comb signal used was the 2.0 GHz comb line.
10. Replace the signal generator with the comb generator and record the displacement of the comb line from center frequency.

Center Frequency \pm _____ div
11. Set SCAN WIDTH to ZERO, tune FREQUENCY to 0.0 GHz. See note above.
12. Adjust A4R5, -5V adj., for $-5.000 \pm .005$ Vdc at A4TP2.
13. Switch SCAN WIDTH to FULL momentarily (to reset the YIG hysteresis) and then set to PER DIVISION.
14. Adjust A4R29, 2.05 GHz adj, to center the LO feedthrough on screen within ± 1 division. Record displacement from center frequency.

Center Frequency \pm _____ div

ADJUSTMENTS

5-24. YIG Driver Adjustments (cont'd)

- 15. Repeat steps 5 through 14. However, when setting the frequency — this time use the voltage at A4TP2 as an indicator of frequency setting. If the dial indication is not correct, re-adjust the appropriate voltage adjust potentiometer to correct dial indication. If more than a slight correction is needed, repeat the procedure twice to ensure proper alignment.
- 16. Set SCAN WIDTH PER DIVISION to 5 MHz and tune FREQUENCY control from 0 to 2 GHz in 100 MHz steps. Approach all dial settings clockwise and avoid parallax error. Note and record deviation of comb signal from center frequency at each 100 MHz step.

Maximum deviation ± 3 div (15 MHz) _____

- 17. Set SCAN WIDTH PER DIVISION to 1 MHz and recheck deviation at 1 GHz.

Maximum deviation ± 3 div (3 MHz) _____

- 18. If deviation at 1 GHz exceeds 3 MHz, the FREQUENCY control potentiometer can be padded to improve linearity. If the 1 GHz comb signal is high (to the right of center) connect resistor between pins 1 and 2 of the potentiometer. If low (to left of center) connect resistor between pins 2 and 3.
- 19. Install a 1% metal film 1/4-watt resistor, selected from the chart below, between the pins indicated in step 18.

| Deviation MHz | Resistor Value |
|---------------|----------------|
| 3 | 422K |
| 4 | 316K |
| 5 | 261K |
| 6 | 215K |
| 7 | 178K |
| 8 | 162K |
| 10 | 133K |
| 12 | 110K |
| 14 | 90.9K |
| 16 | 82.5K |
| 18 | 68.1K |
| 20 | 61.9K |

- 20. Repeat steps 16 and 17.
- 21. Mark schematic diagram Service Sheet 7 showing location and value of resistor installed. Number resistor A1A4R4.

ADJUSTMENTS

5-25. 2nd LO (1500 MHz) Check and Adjustment

REFERENCE: Schematic 3.

DESCRIPTION: The second local oscillator is checked for a center frequency of 1500 MHz \pm 100 kHz. The power output level is checked and adjusted, if necessary. If the power output level is adjusted, the frequency is rechecked and adjusted if necessary.

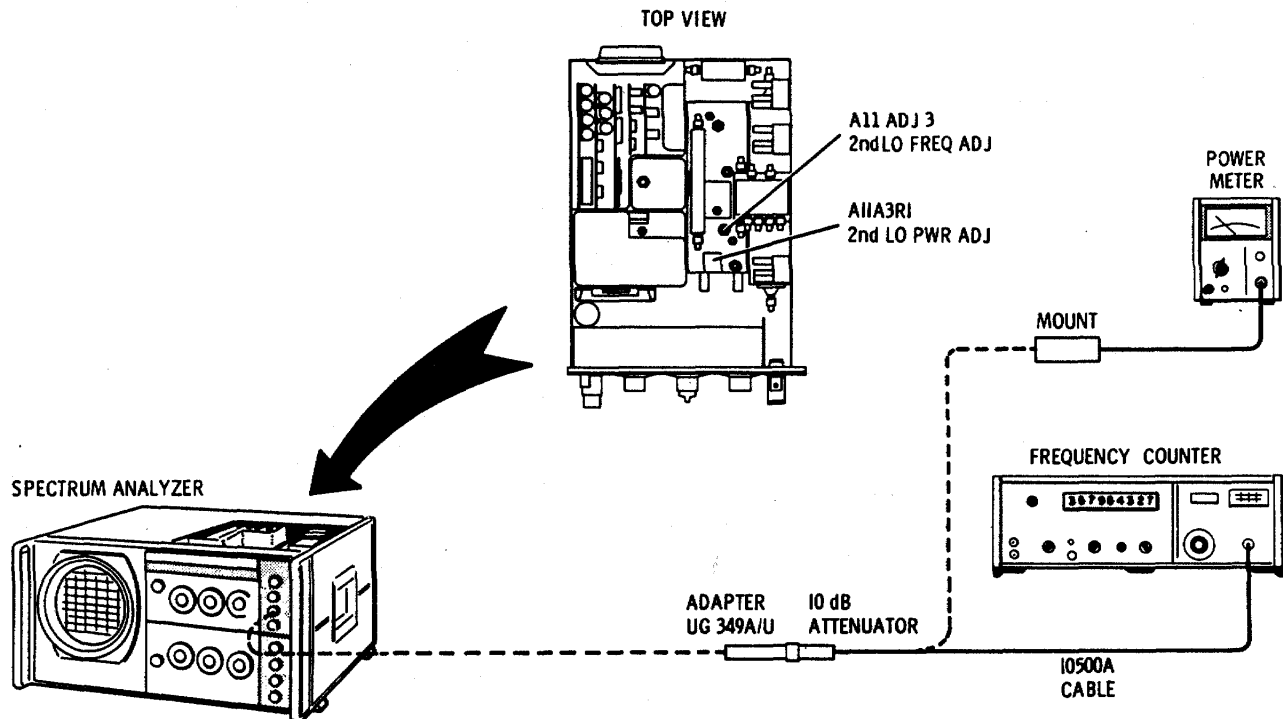


Figure 5-3. 2nd LO Frequency and Power Level Adjustment

EQUIPMENT:

HP 5245L Frequency Counter w/5257A Transfer Oscillator
 HP 432A Power Meter w/8478B Thermistor Mount
 HP 8491A/B 10 dB Attenuator
 UG 349A/U Adapter
 Slug Tuning Tool (see paragraph 5-8)
 Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install plug-ins on extender cables or install a cover on the Display Section with a cutout above the analyzer plug-ins.
2. Apply power to analyzer and allow at least two hours for stabilization.
3. Connect the 10 dB attenuator to SECOND LO OUTPUT using the UG 349A/U adapter.

ADJUSTMENTS

5-25. 2nd LO (1500 MHz) Check and Adjustment (cont'd)

4. Select n=1- 2.05 GHz IF band and connect test setup as shown in figure below.
5. Measure 2nd LO frequency. If necessary, adjust LO tuning slug A11 ADJ 3 for a frequency of 1500 MHz \pm 100 kHz.

1,499,900 _____ 1,500,100 kHz
6. Disconnect cable to transfer oscillator at 10 dB attenuator. Connect power meter thermistor mount to 10 dB attenuator and measure power output level for indication of -3 to +1 dBm. If necessary, adjust A11A3R1 (2ND LO PWR ADJ) for a level of +9 \pm 2 dBm.

+7 _____ +11 dBm
7. If A11A3R1 is adjusted, recheck 2nd LO frequency, step 5 above.

5-26. 1.5 GHz Notch Filter and 2.05 GHz Low Pass Filter Check

REFERENCE: Schematic 3.

DESCRIPTION: The notch filter and low pass filter are checked by disconnecting the semi-rigid coax cables at K1J1 and K3J1, inserting a signal at K3J1 and measuring the signal output at K1J1. The 2nd LO signal is inserted and the output monitored on a power meter. A11 ADJ 4 is adjusted for minimum power output. The 1st LO signal is inserted and the output monitored with the power meter as the YIG oscillator is tuned from 2.05 to 4.1 GHz.

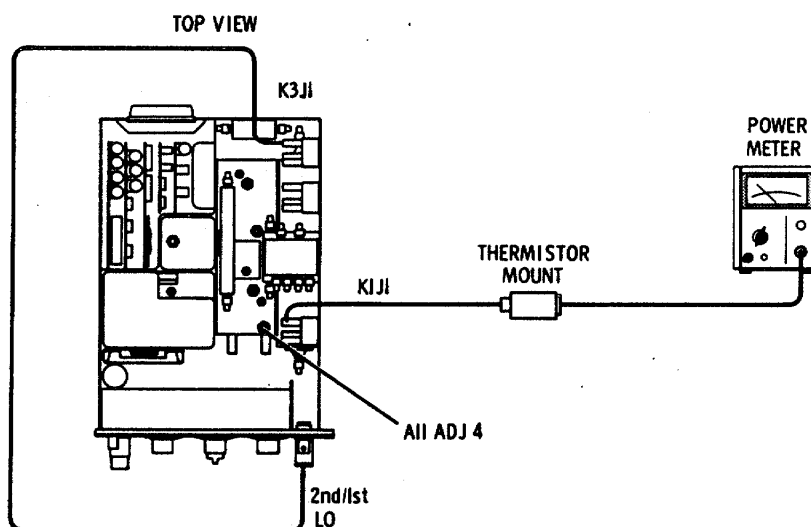


Figure 5-4. 1.5 GHz Notch Filter and 2.05 GHz Low Pass Filter Check and Adjustment Procedure

ADJUSTMENTS

5-26. 1.5 GHz Notch Filter and 2.05 GHz Low Pass Filter Check (cont'd)

EQUIPMENT:

HP 432A Power Meter
 HP 8478B Thermistor Mount
 HP 11592-60001 Test Cable
 HP 11592-60003 Test Cable Selectro female to Selectro male
 HP 1250-1153 Adapter Type N Jack to SMA plug
 Tuning Wrench (see paragraph 5-8)
 Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install plug-ins on extender cables or install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. Disconnect Cable W13 at K3J1 and W8 at K1J1.
3. Connect a test cable between SECOND LO OUTPUT and K3J1.
4. Connect a test cable between K1J1 and power meter thermistor mount.
5. Select n=1- 2.05 GHz IF band; apply power to analyzer and allow sufficient time for instrument to warm up and stabilize.
6. Tune A11 ADJ 4 for minimum power indication on power meter.
7. Remove test cable from SECOND LO OUTPUT and connect to FIRST LO OUTPUT.
8. Tune FREQUENCY control from 0 to 2.05 GHz (oscillator signal through notch and low pass filter tunes 2.05 to 4.1 GHz).
9. Note frequency roll-off as YIG oscillator frequency is increased.
10. Insertion loss through the relays and filters can be determined by checking the loss of the test setup and comparing the difference. Disconnect the test cables from K1J1 and K3J1. Connect the test cables together with an adapter. Tune YIG oscillator throughout its range noting signal level on power meter. Compare with power level obtained in step 9 above. Insertion loss of the low pass filter should be less than 1 dB at 500 and 2050 MHz; equal to or greater than 50 dB above 2450 MHz.

5-27. 2nd Converter 2.05 GHz Bandpass Adjustment

REFERENCE: Schematic 3.

DESCRIPTION: The 2.05 GHz IF bandpass cavities in the second converter are tuned for peak indication using the analyzer as a test setup. The calibrator signal is connected to the RF Section INPUT and the analyzer tuned to display the 30 MHz signal on the center of the CRT. With the analyzer operating in the linear mode, the cavities are alternately adjusted for maximum indication on the CRT. The cavities are then detuned approximately one-half dB on the high side (slugs turned clockwise) to improve flatness at the low end of the analyzer's frequency range (10 MHz).

ADJUSTMENTS

5-27. 2nd Converter 2.05 GHz Bandpass Adjustment (cont'd)

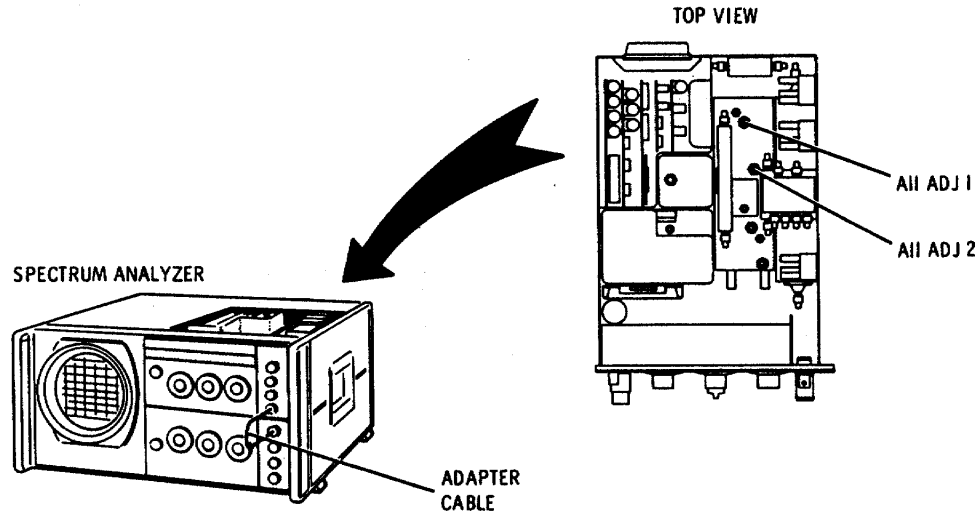


Figure 5-5. 2nd Converter 2.05 GHz IF Bandpass Adjustment

EQUIPMENT:

- HP 10503A Cable Assembly
- UG 201A/U Adapter
- Slug Tuning Tool (see paragraph 5-8)
- Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install plug-ins on extender cables or install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. Set analyzer controls as follows:

| | |
|-------------------------|---------------------------|
| FREQUENCY | 30 MHz (n=1- 2.05 GHz IF) |
| BANDWIDTH | 300 kHz |
| SCAN WIDTH PER DIVISION | 1 MHz |
| INPUT ATTENUATION | 10 dB |
| SCAN TIME PER DIVISION | 2 MILLISECONDS |
| LINEAR SENSITIVITY | 1 mV/DIV |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |
3. Allow at least 1 hour of instrument warmup or operating time before adjusting tuning slugs in second converter.
4. Connect CAL OUTPUT to INPUT and tune FREQUENCY to center 30 MHz signal on display.
5. Adjust LINEAR SENSITIVITY controls to peak signal at approximately the LIN 7 graticule line to establish a reference point.
6. Alternately adjust A11 ADJ 1 and ADJ 2 for a maximum indication on the CRT. Adjust LINEAR SENSITIVITY controls to keep signal level at the LIN 7 graticule line.
7. When a maximum indication has been obtained, tune each adjustment clockwise reducing signal level by approximately 0.2 division. (This reduces instrument sensitivity slightly, but improves flatness at the instrument's lower frequency limits.)

ADJUSTMENTS

5-28. 500 MHz Local Oscillator and Driver Check and Adjustment

REFERENCE: Schematic 4

DESCRIPTION: The 500 MHz local oscillator (3rd LO) is checked for a center frequency of 500 MHz \pm 50 kHz at power output of at least +1 dBm. The 500 MHz LO drive circuit, that provides the frequency shift for signal identification, is checked and adjusted to provide a two-division shift on each side of the LO center frequency. A2A4C4 FREQUENCY ADJ sets the LO center frequency. A2A2R5 FREQ SENSITIVITY ADJ determines the frequency shift, around the LO center frequency, in the signal identification operating mode. A2A2R13 FREQ LINEARITY ADJ and Factory Selected Resistor A2A2R16 determines the linear operating point and frequency of the 500 MHz LO. Perform the horizontal scan check (see IF Section Operating and Service Manual) and check output from Signal Identifier Attenuator (Service Sheet 6) prior to adjusting the 500 MHz LO or LO driver components. Allow at least a half-hour period for the oscillator to warm up and stabilize before making adjustments. Perform a center frequency check, a frequency shift check and a power output check prior to adjusting components.

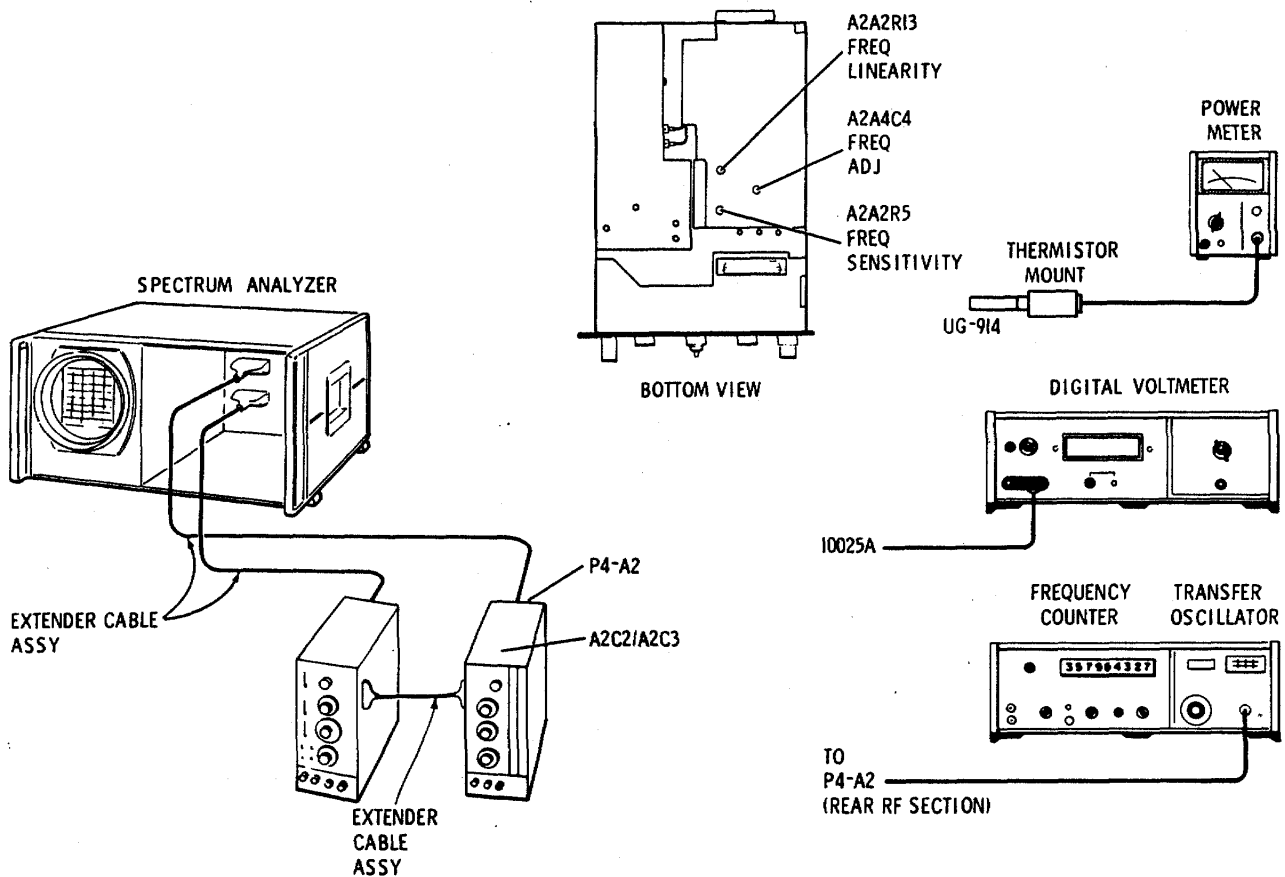


Figure 5-6. 500 MHz LO and LO Driver Adjustment Test Setup

ADJUSTMENTS

5-28. 500 MHz Local Oscillator Check and Adjustment (cont'd)

EQUIPMENT:

HP 5245L Frequency Counter w/5257A Plug-in
 HP 11592-60015 Extender Cable Assy
 HP 11592-60016 RF to IF Section Interconnection Cable
 HP 11592-60013 R & P Connector to BNC Male Test Cable
 HP 1250-0080 Adapter BNC to BNC (UG 914/U)
 HP 432A Power Meter with 8478B Thermistor Mount
 HP 3440A Digital Voltmeter with HP 3443A Auto Range Unit

NOTE

The accuracy of the signal identifier frequency shift circuitry also is dependent on the accuracy of the IF Section scan width circuitry. Perform horizontal scan check (IF Section) prior to adjusting the 500 MHz LO drive components.

1. Remove RF and IF Section plug-ins from Display Section.
2. Separate RF Section from IF Section and remove bottom cover from RF Section.
3. Connect RF Section to IF Section with interconnection cable
4. Connect RF and IF Sections to Display Section with extender cable.
5. Apply power to analyzer and allow instrument to warm up and stabilize.
6. Remove AT4 Termination from P4 (or rear of Display Section) and connect 3rd LO output (P4-A2) to Frequency Counter using 11592-60013 cable.
7. Measure and record 3rd LO frequency with SIGNAL IDENTIFIER at OFF and adjust A2A4C4 FREQUENCY ADJ to $500 \pm .05$ MHz.

$500 \pm .05$ MHz _____
8. Set SCAN WIDTH to 1 MHz PER DIVISION, SIGNAL IDENTIFIER to ON and adjust BANDWIDTH and VIDEO FILTER so that the DISPLAY UNCAL lamp is out.
9. Adjust SCAN TIME PER DIVISION and Frequency Counter to provide a complete count of both the center frequency and the shifted frequency.
10. Select n=1- 2.05 GHz IF Frequency Band. Note and record frequency shift from center frequency.

2 MHz \pm 100 kHz _____
11. Select n=1+ 2.05 GHz IF Frequency Band. Note and record frequency shift from center frequency.

2 MHz \pm 100 kHz _____
12. Switch SIGNAL IDENTIFIER to OFF. Connect Power Meter to 3rd LO Output. Measure and record power output level.

$\geq +1$ dBm _____
13. If power output is incorrect, check dc input voltages, -10 ± 0.1 at A2C3 and $+20 \pm 0.1$ Vdc at A2C2.
14. If the frequency shift (steps 10 and 11 above) is incorrect, set SIGNAL IDENTIFIER to ON and check input signal from signal identifier attenuator for an input level of $+9.9 \pm 0.1$ Vdc on the n=1- band and -9.9 ± 0.1 Vdc on the n=1+ band.

ADJUSTMENTS

5-28. 500 MHz Local Oscillator Check and Adjustment (cont'd)

15. If the frequency shift recorded in step 10 is different from that recorded in step 11, adjust **FREQ LINEARITY A2A2R13** for equal shift on each side of center frequency while switching between $n=1+$ and $n=1-$ bands. Check and adjust **FREQ ADJ A2A4C4** if necessary, after each adjustment of **A2A2R13**.
16. Adjust **FREQ SENS ADJ A2A2R5** if necessary, for a $2\text{ MHz} \pm 100\text{ kHz}$ shift on each side of center frequency while switching between $n=1+$ and $n=1-$ bands.
17. Repeat steps 15 and 16 as necessary. Note and record results in steps 7, 10, 11, and 12.

5-29. 550 MHz Bandpass Filter and 50 MHz Filter Adjustment

REFERENCE: Schematic 4.

DESCRIPTION: With a signal applied to the analyzer INPUT, the 550 MHz bandpass filter and the 50 MHz filter are tuned for maximum output as observed on the CRT display. Prior to adjusting the filters, perform the 500 MHz LO check, Paragraph 5-28.

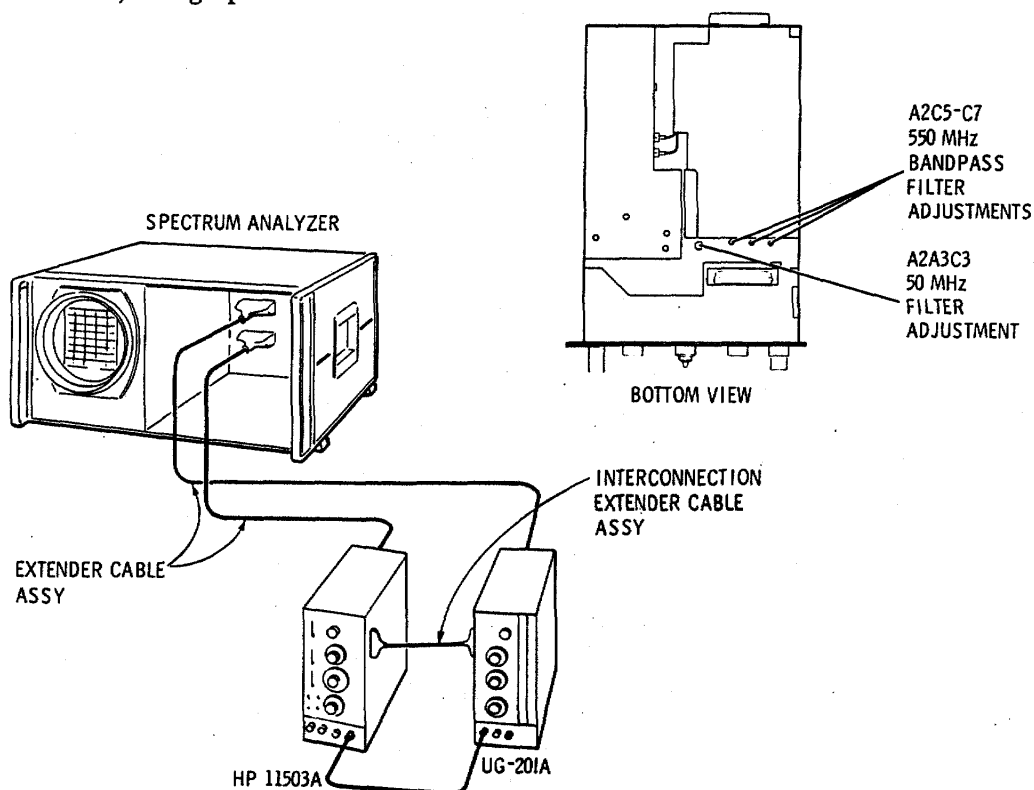


Figure 5-7. 550 MHz Bandpass Filter and 50 MHz Filter Adjustment Test Setup

ADJUSTMENTS

5-29. 550 MHz Bandpass Filter and 50 MHz Filter Adjustment (cont'd)

EQUIPMENT:

- HP 11592-60015 Extender Cable Assembly
- HP 11592-60016 RF to IF Section Interconnect Cable
- HP 11503A Cable Assembly
- UG 201A/U Adapter
- Tuning Tools, No. 6 Allen Driver and Non-metallic screwdriver.

1. Remove RF and IF Section plug-ins from Display Section.
2. Separate RF Section from IF Section and remove bottom cover from RF Section.
3. Connect RF Section to IF Section with interconnection cable.
4. Connect RF and IF Sections to Display Section with extender cable.
5. Apply power to analyzer and allow instrument to warm up and stabilize. Connect CAL OUTPUT to INPUT.
6. Set analyzer controls as follows:

| | |
|-------------------------|------------------|
| Frequency Band | n=1- 2.05 GHz IF |
| FREQUENCY | 30 MHz |
| BANDWIDTH | 100 kHz |
| SCAN WIDTH PER DIVISION | 100 kHz |
| INPUT ATTENUATION | 10 dB |
| TUNING STABILIZER | ON |
| SIGNAL IDENTIFIER | OFF |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| LOG/LINEAR | LINEAR |
| LINEAR SENSITIVITY | 1 mV/DIV |
| VIDEO FILTER | OFF |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |

7. Install Termination AT4 at P4 on rear of RF Section.
8. Tune FREQUENCY control to center 30 MHz signal on CRT display.
9. Adjust the three bandpass filter screws A2C5, C6 and C7 and the 50 MHz filter A2A3C3 for maximum signal indication on the CRT.
10. Repeat adjustments two or three times to obtain maximum signal indication.
11. Reinstall plug-ins and perform AMPL CAL procedure (see Section III).

ADJUSTMENTS

5-30. 50 MHz Amplifier Check and Adjustment

REFERENCE: Schematic 5.

DESCRIPTION: The variable gain of the 50 MHz amplifier determines the absolute accuracy of the analyzer's amplitude calibration. Perform the adjustments in the order given and repeat adjustments at least one time. There are three fixed and one variable gain control steps applied to the amplifier. The fixed steps consist of the following: 5 dB gain on all bands except $n=1^*$ 550 MHz IF Band. 15 dB gain on $n=3, 4, 6,$ and 10 bands. Signal identifier attenuation (approximately 5 dB) on alternate scans. The variable gain step is controlled by Factory Selected resistors that match the amplifier gain to the mixer diode in the first converter. During adjustment of the 15 dB gain step the variable gain is removed by lifting resistors on the Input Mixer Gain Compensation Network A16. The variable gain step is adjusted by applying a fixed current and adjusting for a fixed gain. The 5 dB gain step is adjusted by applying a known level input signal on the $n=1-$ 2.05 GHz IF Band and then switching to the $n=1^*$ 550 MHz IF Band and adjusting 1^* LOW (A2A5R25) to provide the same signal level indication.

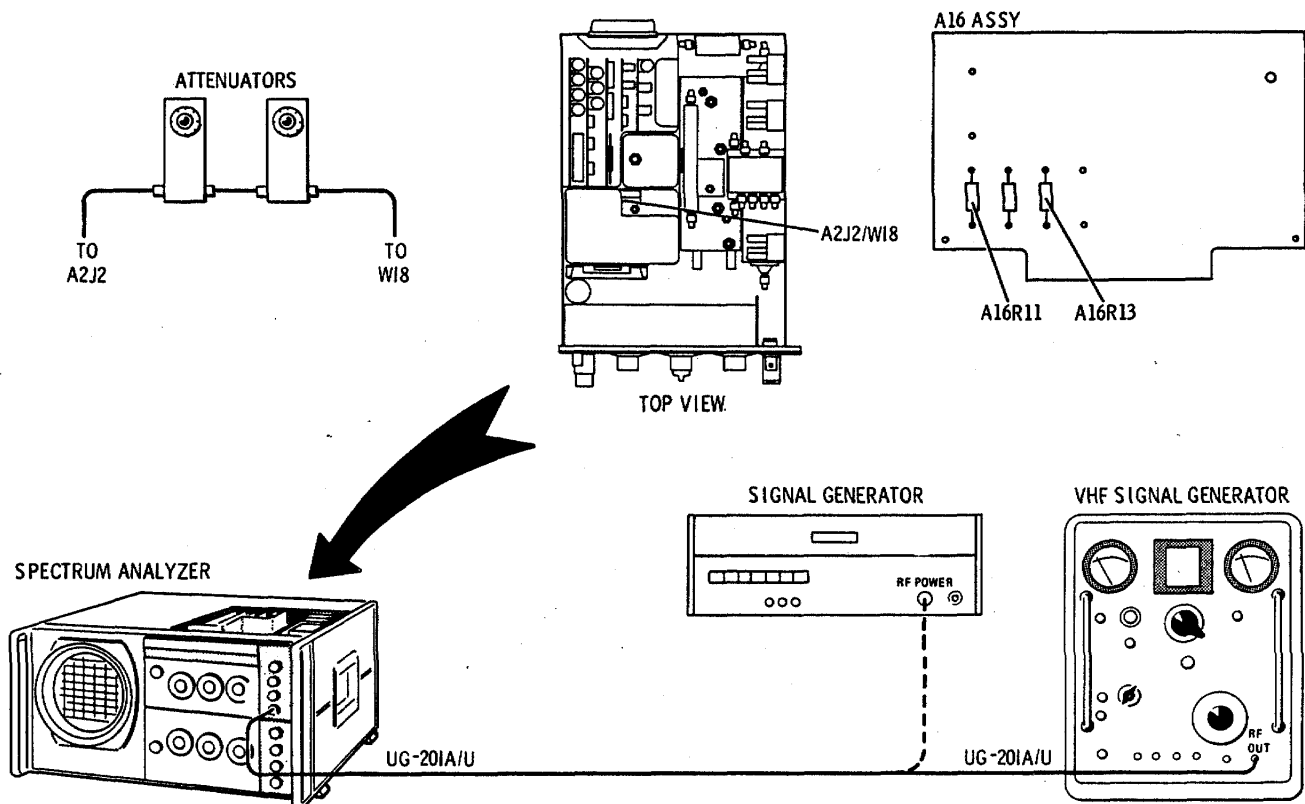


Figure 5-8. 50 MHz Amplifier Check and Adjustment Test Setup

EQUIPMENT:

- HP 608 VHF Signal Generator
- HP 8614A/B Signal Generator
- HP 355C VHF Attenuator
- HP 355D VHF Attenuator
- HP 10503A Cable Assembly (2)
- UG 201A/U Adapter (2)
- HP 11592-60001 Test Cable
- HP 1250-0831 SMA to BNC Adapter
- HP 0757-0199 Resistor 21.5K 1% 1/4 W

* "Starred" values indicate Frequency Switch positions involving a 550 MHz IF.

ADJUSTMENTS

5-30. 50 MHz Amplifier Check and Adjustment (cont'd)

EQUIPMENT: (cont'd)

HP 0757-1094 Resistor 1.47K 1% 1/4 W

Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

1. Install plug-ins on extender cables or install a cover over the display section with a cutout above the analyzer plug-ins.
2. Disconnect Cable W18 (Green) from A2J2. Install attenuators connected in series between A2J2 and Cable W18.
3. Remove Band Buffer Assy A6 and unsolder one end of Resistors A16R11 and A16R13 (A16 board mounted on A6 assembly). Reinstall band buffer board.
4. Adjust attenuators for 15 dB attenuation of 50 MHz output.
5. Connect a -15 dBm 30 MHz signal to RF Section INPUT.
6. Set analyzer controls as follows:

| | |
|-----------------------------------|------------------|
| BAND | n=1- 2.05 GHz IF |
| FREQUENCY | 30 MHz |
| BANDWIDTH | 100 kHz |
| SCAN WIDTH PER DIVISION | 0.5 MHz |
| INPUT ATTENUATION | 30 dB |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| LOG/LINEAR | LINEAR |
| LINEAR SENSITIVITY | max CCW |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |

7. Tune FREQUENCY controls to center 30 MHz signal on display CRT.
8. Select n=3- Band.
9. Adjust LINEAR SENSITIVITY controls to set signal amplitude at the LOG REF graticule line. (Adjust AMPL CAL control if necessary.)
10. Adjust A2A5C2 and A2A5C12 for maximum signal level.
11. Reset signal to LOG REF graticule with LINEAR SENSITIVITY controls.
12. Switch to n=1- 2.05 GHz IF Band.
13. Set attenuators in 50 MHz output to 0 dB.
14. Adjust A2A5R22 to set signal level at LOG REF graticule line.
15. Set INPUT ATTENUATION to 10 dB. Set LINEAR SENSITIVITY to 10 mV/DIV vernier control to 0.5 (on blue scale).

ADJUSTMENTS

5-30. 50 MHz Amplifier Check and Adjustment (cont'd)

16. Reconnect resistor A16R11.
17. Adjust A2A5R4 for 37.0 mV (LOG REF level graticule is 40 mV).
18. Readjust A2A5C2 for maximum signal level and readjust A2A5R4 for 37.0 mV.
19. Unsolder resistor A16R11 again.
20. Set attenuators in 50 MHz output to 15 dB.
21. Set signal level to LOG REF graticule line with LINEAR SENSITIVITY vernier control.
22. Connect a 21.5K ohm and 1.47K ohm resistor in series and install between A2C8 and A2C9 (-12.6V 97 wire and 934 wire input to pin diode A2A5CR1).
23. Set attenuator in 50 MHz output to 0 dB.
24. Adjust A2A5C8 to set signal level at LOG REF graticule line.
25. Remove resistors connected in step 22.
26. Reconnect resistors A16R11 and A16R13.
27. Set LINEAR SENSITIVITY controls to 10 mV/DIV and to 0.5 (blue scales).
28. Center AMPL CAL potentiometer and adjust A2A5R4 for 37 mV. Adjust A2A5C2 for maximum and readjust A2A5R4 for 37 mV.
29. Remove attenuator in 50 MHz output and connect W18 Cable to A2J2.
30. Adjust A2A5C12 for maximum signal level.
31. Adjust AMPL CAL for 40 mV.
32. Disconnect the 30 MHz -15 dBm signal from RF Section INPUT and connect a 1.6 GHz -15 dBm signal.
33. Connect a 1.6 GHz signal to RF Section INPUT and tune FREQUENCY to 1.6 GHz n=1- 2.05 GHz IF Band.
34. Adjust input signal level to set signal amplitude at LOG REF graticule line.
35. Switch to n=1-* 550 MHz IF Band and tune FREQUENCY to 1.6 GHz.
36. Adjust A2A5R25 (1-* LOW) to set signal amplitude at LOG REF graticule line.
37. Unless adjustments were very minor (less than 3 mV on linear scale) repeat adjustments starting with step 2.

NOTE

The factory selected resistors in the Input Mixer Gain Compensation Network A16 are selected to match the mixer diode in the First Converter Assembly A12. Procedures for field selection and replacement are *not* given and are *not* recommended.

ADJUSTMENTS

5-31. Tuning Stabilizer Control Adjustments

REFERENCE: Schematic 9.

DESCRIPTION: The FET OFFSET A5R55 is adjusted to provide a zero level output to the tuning stabilizer with a zero level input from the fine tune and scan width amplifier A5U1 (with the analyzer unstabilized). The TICKLER SWEEP A5R48 is adjusted to align a 1 MHz comb signal on the -5 and +5 graticule lines (analyzer in the 100 kHz PER DIVISION SCAN WIDTH and unstabilized). The analyzer is then stabilized and the VCXO SWEEP A5R58 is adjusted to provide the same sweep display as the TICKLER SWEEP adjustment in the unstabilized mode. The adjustments are then rechecked for interaction.

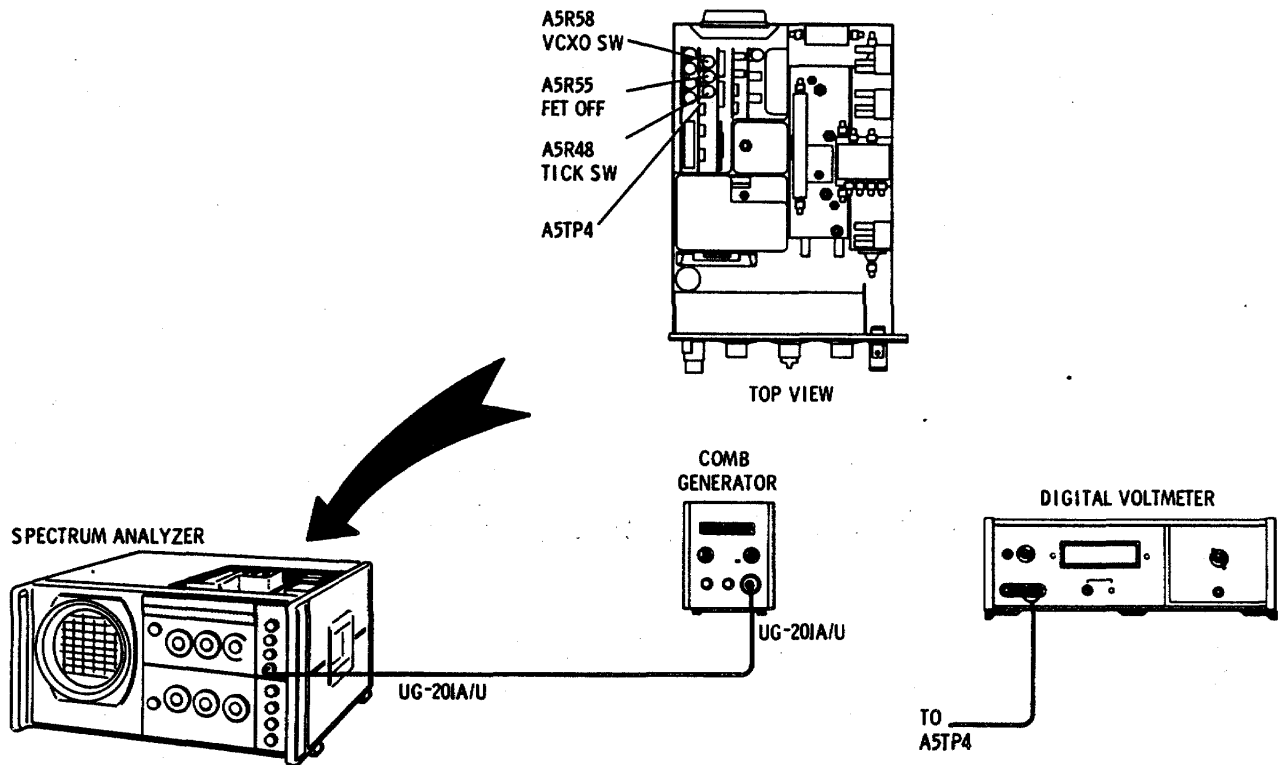


Figure 5-9. Tuning Stabilizer Control Adjustment Test Setup

EQUIPMENT:

- HP 5060-0256 Extender Board
- HP 3440A Digital Voltmeter w/HP 3443A Auto Range Unit
- HP 8406A Comb Generator
- HP 10503A Cable Assembly
- UG 201A/U Adapter (2)
- Modified Display Section Cover, see "Warning"

WARNING

The following steps apply dangerous potentials up to 7000 volts dc to exposed terminals and wiring in the Display Section chassis. Exercise extreme caution when working inside this chassis.

ADJUSTMENTS

5-31. Tuning Stabilizer Control Adjustments (cont'd)

1. Install plug-ins on extender cables or install a cover over the Display Section with a cutout above the analyzer plug-ins.
2. Select $n=1$ - 2.05 GHz IF band; apply power to analyzer and allow sufficient time (at least 30 minutes) for instrument to warm up and stabilize.
3. Set analyzer controls as follows:

| | |
|-----------------------------------|----------------|
| SCAN WIDTH PER DIVISION | 100 kHz |
| SCAN WIDTH | ZERO |
| FREQUENCY | 10 MHz |
| BANDWIDTH | 10 kHz |
| INPUT ATTENUATION | 10 dB |
| SCAN TIME PER DIVISION | 5 MILLISECONDS |
| LOG REF LEVEL | -10 dBm |
| LOG/LINEAR | LOG |
| VIDEO FILTER | OFF |
| SCAN MODE | INT |
| SCAN TRIGGER | LINE |
| TUNING STABILIZER | OFF |

4. Connect Digital Voltmeter to A5 TP4 and adjust FINE TUNE control for $0.0 \pm 0.1V$ indication on voltmeter.
5. Connect Digital Voltmeter to A5 TP9 and adjust FET OFFSET for $0.0 \pm 0.1 V$.
6. Set SCAN WIDTH to PER DIVISION and connect a 1 MHz comb signal to .01 – 18 GHz INPUT.
7. Adjust TICKLER SWEEP A5R48 to align the comb signals on the -5 and +5 graticule lines. Use FINE TUNE control to shift signals on the display.
8. Set TUNING STABILIZER switch to ON and adjust VCXO SWEEP A5R58 to provide the same display as in step 7 above.
9. Repeat steps 4 through 8 to check for interaction between adjustments.

5-32. Tuning Stabilizer VCXO Adjustments

REFERENCE: Schematic 10.

DESCRIPTION:

NOTE

Do *not* make VCXO adjustments unless required. Perform steps 1 through 9 before making adjustments. Normal component replacement should not affect alignment. Perform Tuning Stabilizer Control Adjustments prior to performing VCXO adjustments.

ADJUSTMENTS

5-32. Tuning Stabilizer VCXO Adjustments (cont'd)

After the Tuning Stabilizer Control Adjustments (Paragraph 5-31) have been performed, the VCXO is checked for linearity. With the YIG oscillator locked to the 2050th harmonic of the VCXO, the YIG oscillator is driven with sweep to cause it's frequency to sweep 1 MHz. The VCXO is driven with sweep to cause the frequency of its 2050th harmonic to sweep 1 MHz. If the two oscillators behaved perfectly, there would be no error signal out of the discriminator (A14C4). If the error signal is within limits, no adjustment of the VCXO circuits is required. If the error signal is out of limits perform the adjustments in the order given. A14A2C3 and A14A2C16 interact, small adjustments should be made and the TUNING STABILIZER switched "OFF" and then "ON" after each adjustment to remove the dc component introduced by the adjustment. C16 is adjusted to produce the best horizontal straight line and C3 is adjusted to remove curvature in the line.

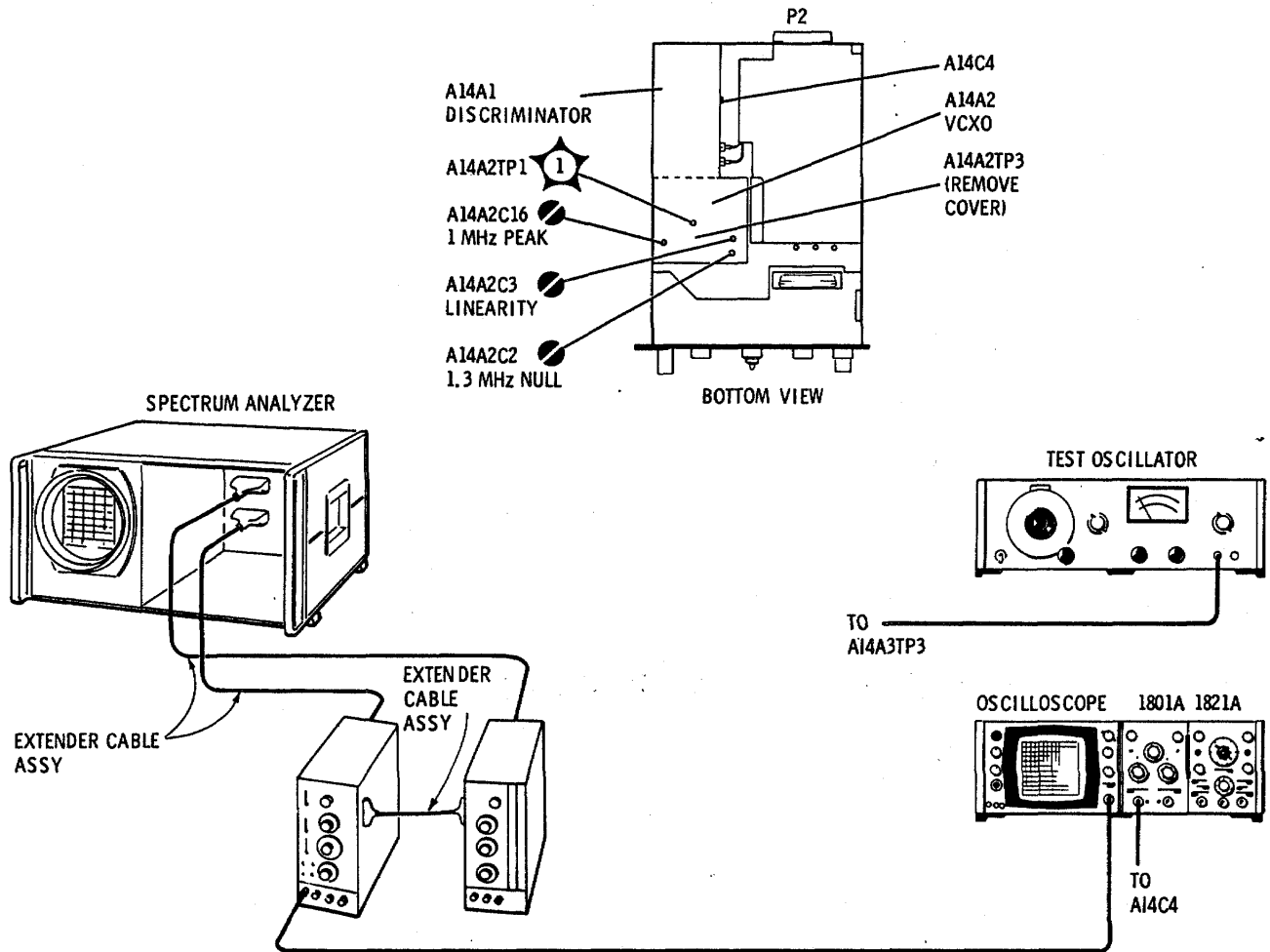


Figure 5-10. Tuning Stabilizer VCXO Adjustment Test Setup

EQUIPMENT:

- HP 180A Oscilloscope w/HP 1801A/HP 1821A Plug-ins
- HP 652A Test Oscillator
- HP 08555-60077 Service Kit
- HP 10503A Cable Assembly

ADJUSTMENTS

5-32. Tuning Stabilizer VCXO Adjustments (cont'd)

1. Remove Plug-ins from Display Section and remove bottom cover from RF Section.
2. Connect Plug-ins to Display Section using extender cables.
3. Connect IF Section SCAN IN/OUT to external horizontal input of oscilloscope.
4. Connect oscilloscope vertical input to discriminator output error signal at A14C4 (958 wire).
5. Set oscilloscope vertical sensitivity to 10 mV/DIV, dc coupled. (Straight through probe.)
6. Set analyzer controls as follows:

| | | |
|-------------------------|-------|----------------|
| BAND | ..... | .01 — 2.05 GHz |
| FREQUENCY | ..... | 0 MHz |
| SCAN WIDTH | ..... | PER DIVISION |
| SCAN WIDTH PER DIVISION | ..... | 100 kHz |
| FINE TUNE | ..... | Centered |
| TUNING STABILIZER | ..... | ON |
| SCAN TIME PER DIVISION | ..... | 5 MILLISECONDS |
| SCAN TRIGGER | ..... | LINE |
7. Switch TUNING STABILIZER "OFF" and "ON" to remove dc component on error signal. Center trace on oscilloscope with position control.
8. The line on the oscilloscope, representing the error signal must have a maximum slope of \pm one-half division per division to satisfy the \pm 10 percent scan accuracy. (The horizontal sensitivity is 100 kHz/DIV and the vertical sensitivity is 20 kHz/DIV.)
9. Adjust FINE TUNE control over its three turn range while observing the oscilloscope display. The slope must stay under \pm one-half division per division.
10. If the slope is out of tolerance, disconnect the SCAN IN/OUT from the oscilloscope horizontal external input, set SCAN WIDTH to ZERO and TUNING STABILIZER to "OFF".
11. Remove A14A2 cover plate for access to test points.
12. Center A14A2C3.
13. Connect a 1.3 MHz, 3-volt peak-to-peak signal from test oscillator to A14A2TP3. (Use straight through oscilloscope probe with ground clip connected to RF Section chassis.)
14. Connect oscilloscope to A14A2TP1 using X10 probe.
15. Adjust A14A2C2 with insulated tuning tool for minimum 1.3 MHz signal at TP1.
16. Disconnect 1.3 MHz signal from TP3 and move oscilloscope probe to TP2.
17. Adjust A14A2C16 for maximum 1 MHz signal at TP2.

ADJUSTMENTS

5-32. Tuning Stabilizer VCXO Adjustments (cont'd)

18. Repeat steps 3 through 9 above.
19. If the error slope is out of tolerance (steps 8 and 9) adjust A14A2C3 and C16 for VCXO linearity. Adjust C16 for best horizontal straight line and C3 to remove curvature in line. Adjust each in small steps and switch TUNING STABILIZER "OFF" and "ON" after each adjustment.
20. Recheck FINE TUNE control over its three turn range. If the slope does not exceed ± 0.5 division per division no further adjustment is necessary.
21. Repeat steps 19 and 20 as required.
22. Check Tuning Stabilizer Control Adjustments, paragraph 5-31, and if adjustments are made repeat steps 3 through 9 above to check VCXO linearity.

ADJUSTMENTS

5-33. Analogic Test and Adjustment

REFERENCE: Schematic 13 and IF Section Operating and Service Manual.

DESCRIPTION: Perform the display calibration check below. If adjustment is required refer to IF Section Operating and Service Manual for adjustment procedure. When performing the display calibration check, if 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 SCAN WIDTH PER DIVISION control is switched one position counterclockwise.

Table 5-1. Analogic Display Calibration Check

| VIDEO FILTER | SCAN TIME PER DIVISION | BANDWIDTH | SCAN WIDTH PER DIVISION | SCAN WIDTH | DISPLAY UNCAL LIGHT |
|--------------|------------------------|-----------|-------------------------|--------------|---------------------|
| OFF | 5 MILLISECONDS | 300 kHz | 200 MHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 300 kHz | 100 MHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 100 kHz | 100 MHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 100 kHz | 20 MHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 30 kHz | 20 MHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 30 kHz | 2 MHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 10 kHz | 2 MHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 10 kHz | 0.2 MHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 3 kHz | 0.2 MHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 3 kHz | 20 kHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 1 kHz | 20 kHz | PER DIVISION | ON |
| OFF | 5 MILLISECONDS | 1 kHz | 2 kHz | PER DIVISION | OFF |
| OFF | 5 MILLISECONDS | 0.3 kHz | 2 kHz | PER DIVISION | ON |
| OFF | 50 MILLISECONDS | 0.3 kHz | 2 kHz | PER DIVISION | OFF |
| OFF | 50 MILLISECONDS | 0.1 kHz | 2 kHz | PER DIVISION | ON |
| OFF | 0.2 SECOND | 0.1 kHz | 2 kHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 300 kHz | 200 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 100 kHz | 200 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 100 kHz | 50 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 30 kHz | 50 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 30 kHz | 20 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 10 kHz | 20 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 10 kHz | 5 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 3 kHz | 5 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 3 kHz | 1 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 1 kHz | 1 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 1 kHz | 0.2 MHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 0.3 kHz | 0.2 MHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 0.3 kHz | 50 kHz | PER DIVISION | OFF |
| 100 Hz | 5 SECONDS | 0.1 kHz | 50 kHz | PER DIVISION | ON |
| 100 Hz | 5 SECONDS | 0.1 kHz | 10 kHz | PER DIVISION | OFF |
| 100 Hz | 2 SECONDS | - | - | FULL | ON |
| 100 Hz | 5 SECONDS | - | - | FULL | OFF |
| 100 Hz | 5 MILLISECONDS | A11 | A11 | ZERO | OFF |
| OFF | 5 MILLISECONDS | - | - | FULL | ON |
| OFF | 10 MILLISECONDS | - | - | FULL | OFF |

Table 5-2. Check and Adjustment Test Card

| Hewlett-Packard Model 8555A RF Section Instrument's Serial No.: 8555A: - 8552_: - | | Tests Performed by _____ Date _____ | | | |
|--|--|--|---------|--------|---------|
| Para. No. | Test Description | Measurement Unit | Min. | Actual | Max. |
| 5-22 | Input Operating Voltages | | | | |
| | +100 Vdc supply | Vdc | + 99 | _____ | +101 |
| | -100 Vdc supply | Vdc | - 99 | _____ | - 101 |
| | -12.6 Vdc supply | Vdc | - 12.48 | _____ | - 12.72 |
| | - 10 Vdc supply | Vdc | - 9.99 | _____ | - 10.01 |
| | +20 Vdc supply | Vdc | +19.99 | _____ | +20.01 |
| | +10 Vdc supply | Vdc | + 9.98 | _____ | +10.02 |
| 5-23 | +20/+10 Volt Check and Adj | | | | |
| | + 20 Volt supply | Vdc | +19.99 | _____ | +20.01 |
| | + 10 Volt supply | Vdc | + 9.99 | _____ | +10.01 |
| 5-24 | YIG Driver Adjustments | | | | |
| | 4.1 GHz Adjustment | divisions | - 1 | _____ | +1 |
| | 2.05 GHz Adjustment | divisions | - 1 | _____ | +1 |
| | 100 MHz Steps | divisions | - 3 | _____ | +3 |
| | 1 GHz Check | divisions | - 3 | _____ | +3 |
| 5-25 | 2nd LO Check and Adjustment | | | | |
| | 1500 MHz LO Frequency | MHz | 1,499.9 | _____ | 1,500.1 |
| | 1500 MHz LO Power Output | dBm | + 7 | _____ | + 11 |
| 5-28 | 500 MHz LO Check and Adjustment | | | | |
| | 500 MHz LO Frequency | MHz | 499.95 | _____ | 500.05 |
| | 500 MHz LO Power Output | dBm | + 1 | _____ | |

SECTION VI REPLACEABLE PARTS

6-1. This section contains information relative to ordering replacement parts and assemblies.

6-2. Table 6-1 provides an index of reference designations and abbreviations used in the preparation of manuals by Hewlett-Packard.

6-3. Table 6-2 provides component description, part numbers, and other required ordering information.

6-4. Table 6-3 provides code number identification of manufacturers.

Table 6-1. Reference Designators and Abbreviations used in Parts List

| REFERENCE DESIGNATORS | | | |
|--|---|--|--|
| <p>A = assembly B = motor BT = battery C = capacitor CP = coupler CR = diode DL = delay line DS = device signaling (lamp) E = misc electronic part</p> | <p>F = fuse FL = Filter J = jack K = relay L = inductor LS = loud speaker M = meter MK = microphone MP = mechanical part</p> | <p>P = plug Q = transistor R = resistor RT = thermistor S = switch T = transformer TB = terminal board TP = test point U = integrated circuit</p> | <p>V = vacuum tube, neon bulb, photocell, etc. VR = voltage regulator W = cable X = socket Y = crystal Z = tuned cavity, network</p> |
| ABBREVIATIONS | | | |
| <p>A = amperes AFC = automatic frequency control AMPL = amplifier BFO = beat frequency oscillator BE CU = beryllium copper BH = binder head BP = bandpass BRS = brass BWO = backward wave oscillator CCW = counterclockwise CER = ceramic CMO = cabinet mount only COEF = coefficient COM = common COMP = composition COMPL = complete CONN = connector CP = cadmium plate CRT = cathode-ray tube CW = clockwise DEPC = deposited carbon DR = drive ELECT = electrolytic ENCAP = encapsulated EXT = external F = farads FH = flat head FIL H = Fillister head FXD = fixed G = giga (10⁹) GE = germanium GL = glass GRD = ground(ed)</p> | <p>H = henries HDW = hardware HEX = hexagonal HG = mercury HR = hour(s) Hz = Hertz IF = intermediate freq IMPG = impregnated INCD = incandescent INCL = include(s) INS = insulation(ed) INT = internal K = kilo = 1000 LH = left hand LIN = linear taper LK WASH = lock washer LOG = logarithmic taper LPF = low pass filter M = milli = 10⁻³ MEG = meg = 10⁶ MET FLM = metal film MET OX = metallic oxide MFR = manufacturer MHZ = mega Hertz MINAT = miniature MOM = momentary MOS = metallized substrate MTG = mounting MY = "mylar" N = nano (10⁻⁹) N/C = normally closed NE = neon NI PL = nickel plate</p> | <p>N/O = normally open NOM = nominal NPO = negative positive zero (zero temperature coefficient) NPN = negative-positive-negative NRFR = not recommended for field replacement NSR = not separately replaceable OBD = order by description OH = oval head OX = oxide P = peak PC = printed circuit PF = picofarads = 10⁻¹² farads PH BRZ = phosphor bronze PHL = Phillips PIV = peak inverse voltage PNP = positive-negative-positive P/O = part of POLY = polystyrene PORC = porcelain POS = position(s) POT = potentiometer PP = peak-to-peak PT = point PWV = peak working voltage RECT = rectifier RF = radio frequency RH = round head or right hand</p> | <p>RMO = rack mount only RMS = root-mean square RWV = reverse working voltage S-B = slow-blow SCR = screw SE = selenium SECT = section(s) SEMICON = semiconductor SI = silicon SIL = silver SL = slide SPG = spring SPL = special SST = Stainless steel SR = split ring STL = steel TA = tantalum TD = time delay TGL = toggle THD = thread TI = titanium TOL = tolerance TRIM = trimmer TWT = traveling wave tube μ = micro = 10⁻⁶ VAR = variable VDCW = dc working volts W/ = with W = watts WIV = working inverse voltage WW = wirewound W/O = without</p> |

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|---------------------|
| A1 | 08555-60002 | 1 | PANEL ASSY, FRONT (NOT USEABLE ON INSTRUMENTS CARRYING PREFIXES 1343A AND ABOVE) | 28480 | 08555-60002 |
| | 08555-60125 | 1 | PANEL ASSY, FRONT (MINT GRAY) | 28480 | 08555-60125 |
| A1MP1 | 0370-0102 | 1 | KNOB:RED BAR 0.125" SHAFT 0.500"DIA (SCAN WIDTH) | 28480 | 0370-0102 |
| A1MP2 | 0370-0114 | 1 | KNOB:RED W/ARROW 5/8" OD 1/8" SHAFT (FINE TUNE) | 28480 | 0370-0114 |
| A1MP3 | 0370-0116 | 1 | KNOB:BLACK ROUND(FREQUENCY) (FREQUENCY) | 28480 | 0370-0116 |
| A1MP4 | 08555-00009 | 1 | DIAL/KNOB (SCAN WIDTH) | 28480 | 08555-00009 |
| A1MP5 | 08555-00010 | 1 | DIAL/KNOB (INPUT ATTENUATION) | 28480 | 08555-00010 |
| A1MP6 | 08555-00011 | 1 | DIAL/KNOB (BANDWIDTH) | 28480 | 08555-00011 |
| A1MP7 | 0510-0028 | 3 | RETAINER, RING, .375 DIA, CAD PLT STL | 07953 | 5100-37-MF |
| A1MP8 | 0510-0035 | 4 | RETAINER, RING, .375 DIA, CAD PLT STL (EXT BOW) | 07953 | 5101-37-MF |
| A1MP9 | 1410-0112 | 2 | BUSHING; PANEL; 5/16-32 THD BRASS | 28480 | 1410-0112 |
| A1MP10 | 5020-0446 | 2 | NUT:HEX | 28480 | 5020-0446 |
| A1MP11 | 08555-00006 | 1 | PANEL, FRONT (LITE GRAY) | 28480 | 08555-00006 |
| A1MP12 | 08555-00043 | 2 | PANEL, FRONT (MINT GRAY) | 28480 | 08555-00043 |
| | 08555-00007 | 1 | PANEL, SUB | 28480 | 08555-00007 |
| A1MP13 | 08555-20024 | 1 | BUSHING, TUNING SHAFT | 28480 | 08555-20024 |
| A1MP14 | 08555-60026 | 1 | WIRING HARNESS | 28480 | 08555-60026 |
| A1P1- | | 2 | NOT ASSIGNED | | |
| A1P5 | | | | | |
| A1P6 | 1251-3479 | 1 | CONNECTOR; 62-CONT; FEM; RECTANGULAR | 00779 | 204506-1 |
| A1P6 | 1251-3481 | 62 | CONTACT; CONN; FOR USE WITH RECTANGULAR | 00779 | 204351-2 |
| | 08555-00039 | 1 | CONNECTOR HANDLE | 28480 | 08555-00039 |
| | 0360-0060 | 1 | TERMINAL, SLDR LUG, 5/16 SCR, .328/.094 | 73734 | 118060 |
| A1R1 | 2100-2066 | 1 | RESISTOR-VAR 2K 20% CC (EXT MIXER BIAS) | 01121 | TYPE W |
| A1R2 | 2100-2488 | 1 | RESISTOR-VAR 10K 20% CC (AMPL CAL) | 71450 | SERIES 300 |
| A1S1 | 3101-1560 | 2 | SWITCH; SL; DPDT NS; 1A 125VAC (SIGNAL IDENTIFIER) | 28480 | 3101-1560 |
| A1S2 | 3101-1560 | | SWITCH; SL; DPDT NS; 1A 125VAC (TUNING STABILIZER) | 28480 | 3101-1560 |
| A1A1 | 08555-60009 | 1 | SWITCH ASSY, BANDWIDTH | 28480 | 08555-60009 |
| A1A1CR1 | 1901-0040 | 48 | DIODE-SWITCHING 2NS .30V 50MA | 28480 | 1901-0040 |
| A1A1R1 | 0757-0346 | 7 | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A1A1R2 | 0757-0401 | 8 | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A1A1R3 | 0757-0462 | 2 | RESISTOR 75K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7502-F |
| A1A1R4 | 0698-3161 | | RESISTOR 38.3K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3832-F |
| A1A1R5 | 0698-4534 | 3 | RESISTOR 309K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3093-F |
| A1A1R6 | 0698-4521 | 3 | RESISTOR 154K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1543-F |
| A1A1R7 | 0698-4534 | | RESISTOR 309K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3093-F |
| A1A1R8 | 0698-4521 | | RESISTOR 154K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1543-F |
| A1A1R9 | 0698-4534 | | RESISTOR 309K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3093-F |
| A1A1R10 | 0698-4521 | | RESISTOR 154K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1543-F |
| A1A1R11 | 0757-0420 | 1 | RESISTOR 750 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-751-F |
| A1A1S1 | 3100-2677 | 1 | SWITCH:ROTARY, SINGLE INDEX | 28480 | 3100-2677 |
| A1A2 | 08555-60010 | 1 | SWITCH ASSY, SCAN WIDTH | 28480 | 08555-60010 |
| A1A2R1 | 0698-3430 | 1 | RESISTOR 21.5 OHM 1% .125W F TUBULAR | 03888 | PHE55-1/8-T0-21R5-F |
| A1A2R2 | 0698-4376 | 1 | RESISTOR 32.4 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-32R4-F |
| A1A2R3 | 0698-4383 | 1 | RESISTOR 53.6 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-53R6-F |
| A1A2R4 | 0698-4405 | 1 | RESISTOR 107 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-107R-F |
| A1A2R5 | 0698-6137 | 1 | RESISTOR 328 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-328R-F |
| A1A2R6 | 0757-0417 | 1 | RESISTOR 562 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-562R-F |
| A1A2R7 | 0698-4469 | 1 | RESISTOR 1.15K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1151-F |
| A1A2R8 | 0698-3496 | 1 | RESISTOR 3.57K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-357R-F |
| A1A2R9 | 0698-3279 | 1 | RESISTOR 4.99K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4991-F |
| A1A2R10 | 0698-4055 | 2 | RESISTOR 1K .25% .125W F TUBULAR | 03888 | PHE55-1/8-T0-1001-C |
| A1A2R11 | 0698-7794 | 1 | RESISTOR 10K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1002-C |
| A1A2R12 | 0698-7795 | 2 | RESISTOR 1.236K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1236R-C |
| A1A2R13 | 0698-7793 | 1 | RESISTOR 9.9K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-9901-C |
| A1A2R14 | 0698-7792 | 1 | RESISTOR 1.1K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1101-C |
| A1A2R15 | 0698-7800 | 1 | RESISTOR 8K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-8001-C |
| A1A2R16 | 0698-7799 | 1 | RESISTOR 2K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-2001-C |
| A1A2R17 | 0698-7795 | | RESISTOR 1.236K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1236R-C |
| A1A2R18 | 0757-0349 | 1 | RESISTOR 22.6K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-2262-F |
| A1A2R19 | 0698-4205 | 1 | RESISTOR 21K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2102-F |
| A1A2R20 | | | NOT ASSIGNED | | |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|---------------------|
| A1A2R21 | 0698-4510 | 1 | RESISTOR 84.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T)-8452-F |
| A1A2R22 | 0698-3490 | 1 | RESISTOR 66K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-6602-F |
| A1A2R23 | 0698-3260 | 11 | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R24 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R25 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R26 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R27 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R28 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R29 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R30 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R31 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R32 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A1A2R33 | 0698-3162 | 5 | RESISTOR 46.4K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4642-F |
| A1A2R34 | 0698-3162 | | RESISTOR 46.4K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4642-F |
| A1A2R35 | 0698-0077 | 2 | RESISTOR 93.1K 1% .125W F TUBULAR | 03888 | PME55-1/8-T0-9312-F |
| A1A2R36 | 0698-0077 | | RESISTOR 93.1K 1% .125W F TUBULAR | 03888 | PME55-1/8-T0-9312-F |
| A1A2S1 | 3100-2696 | 1 | SWITCH:ROTARY SPEC. CIRCUITRY | 28480 | 3100-2696 |
| A1A3 | 08555-60011 | 1 | SWITCH ASSY, INPUT ATTENUATION | 28480 | 08555-60011 |
| A1A3R1 | 0698-3400 | 1 | RESISTOR 147 OHM 1% .5W F TUBULAR | 19701 | MF7C1/2-T0-147R-F |
| A1A3S1 | 3100-2670 | 1 | SWITCH:ROTARY, SINGLE INDEX | 28480 | 3100-2670 |
| A1A4 | 08555-60001 | 1 | TUNING HEAD ASSY (LITE GRAY) | 28480 | 08555-60001 |
| | 08555-60101 | 1 | TUNING HEAD ASSY (MINT GRAY) (SEE SERVICE SHEET 17 FOR [PB]) | 28480 | 08555-60101 |
| A1A4MP1 | 0510-0028 | | RETAINER, RING, .375 DIA, CAD PLT STL | 07953 | 5100-37-MF |
| A1A4MP2 | 0510-0035 | | RETAINER, RING, .375 DIA, CAD PLT STL | 07953 | 5101-37-MF |
| A1A4MP3 | 0510-0052 | 1 | RETAINER, RING, .125 DIA, CAD PLT STL | 97464 | 7100-12-CD |
| A1A4MP4 | 0510-0082 | 1 | RETAINER, RING, .125 DIA, BE CU | 97464 | 3100-12-BC |
| A1A4MP5 | 0510-1140 | 1 | RETAINER, RING; .312 DIA; CAD PLT STL | 28480 | 0510-1140 |
| A1A4MP6 | 1410-0226 | 1 | BALL BEARING:STL 0.09375" DIA | 00000 | 0BD |
| A1A4MP7 | 1430-0739 | 1 | GEAR-NITER:48 DIAMETRICAL PITCH | 28480 | 1430-0739 |
| A1A4MP8 | 1460-0036 | 1 | SPRING CPRSN-CYL .197-OD .281-LG MUM | 28480 | 1460-0036 |
| A1A4MP10 | 1460-1212 | 1 | SPRING EXT-LOOPS .062-OD .266-LG MUM | 28480 | 1460-1212 |
| A1A4MP11 | 1460-0083 | 1 | PIN:DOMELL STL 0.120" X 1-1/4" LG | 00000 | 0BD |
| A1A4MP12 | 1460-1213 | 1 | SPRING CPRSN-CYL .088-OD .33-LG MUM | 28480 | 1460-1213 |
| A1A4MP13 | 1480-0336 | 1 | PIN GROOVE:0.093" DIA | 73957 | GP24-093X750-16 |
| A1A4MP14 | | | SEE A1A4R3. | | |
| A1A4MP15 | | | SEE A1A4R1. | | |
| A1A4MP16 | | | SEE A1A4R2. | | |
| A1A4MP17 | 3050-0153 | 1 | WASHER-FL MTLN NO. 1/4 .26 IN O .625 | 28480 | 3050-0153 |
| A1A4MP18 | 2190-0368 | 1 | WASHER-FL MTLN NO. 5 .13 IN O .235 IN | 28480 | 2190-0368 |
| A1A4MP19 | 08555-20029 | 1 | LABEL, IDENTIFICATION | 28480 | 08555-20029 |
| A1A4MP20 | 08555-20030 | 1 | LABEL, IDENTIFICATION | 28480 | 08555-20030 |
| A1A4MP21 | 08555-20031 | 1 | LABEL, IDENTIFICATION | 28480 | 08555-20031 |
| A1A4MP22 | 2190-0926 | 1 | WASHER; DOME PL PRPHY; DOME PL PRPHY; 5 | 78189 | 3502-05-21-0541 |
| A1A4MP23 | 08555-00003 | 1 | COVER PLATE | 28480 | 08555-00003 |
| A1A4MP24 | 08555-00004 | 1 | LEAF SPRING, CAM DRIVE | 28480 | 08555-00004 |
| A1A4MP25 | 08555-20003 | 1 | SHAFT, MAIN | 28480 | 08555-20003 |
| A1A4MP26 | 08555-20005 | 1 | GEAR, CLUTCH AND DIAL | 28480 | 08555-20005 |
| A1A4MP27 | 08555-20095 | 1 | CLUTCH, PINION ASSY | 28480 | 08555-20095 |
| A1A4MP28 | | | NOT ASSIGNED | | |
| A1A4MP29 | 08555-20096 | 1 | GEAR, PINION ASSY | 28480 | 08555-20096 |
| A1A4MP30 | | | NOT ASSIGNED | | |
| A1A4MP31 | 08555-20011 | 1 | BEARING, REAR | 28480 | 08555-20011 |
| A1A4MP32 | 08555-20012 | 1 | BEARING, SUPPORT FRONT | 28480 | 08555-20012 |
| A1A4MP33 | 08555-20013 | 1 | CONE DRIVE | 28480 | 08555-20013 |
| A1A4MP34 | 08555-20014 | 1 | PULLEY, IDLER | 28480 | 08555-20014 |
| A1A4MP35 | 08555-20015 | 1 | PLATE, MOUNTING | 28480 | 08555-20015 |
| A1A4MP36 | 08555-20016 | 1 | LOWER EXTRUSION | 28480 | 08555-20016 |
| A1A4MP37 | 08555-20017 | 1 | UPPER EXTRUSION (LITE GRAY) | 28480 | 08555-20017 |
| | 08555-20100 | 1 | UPPER EXTRUSION (MINT GRAY) | 28480 | 08555-20100 |
| A1A4MP38 | 08555-20018 | 1 | SHAFT, FINE TUNE | 28480 | 08555-20018 |
| A1A4MP39 | 08555-20020 | 1 | PINION, 30 TEETH | 28480 | 08555-20020 |
| A1A4MP40 | 08555-20021 | 1 | WINDOW, DIAL | 28480 | 08555-20021 |
| A1A4MP41 | 08555-20025 | 1 | PIN, CAM DRIVE | 28480 | 08555-20025 |
| A1A4MP42 | 08555-20026 | 1 | TRIM, EXTRUSION | 28480 | 08555-20026 |
| A1A4MP43 | 08555-20032 | 1 | DRUM, DIAL | 28480 | 08555-20032 |
| A1A4MP44 | 08555-40003 | 1 | SPROCKET, 16 TEETH DRIVE | 28480 | 08555-40003 |
| A1A4MP45 | 08555-40005 | 1 | CAM, 14 POSITION DRIVE | 28480 | 08555-40005 |
| A1A4MP46 | 08555-40006 | 1 | LEVER BAND SWITCH | 28480 | 08555-40006 |
| A1A4MP47 | 08555-40007 | 1 | PLATE, LEVER (BLACK) | 28480 | 08555-40007 |
| A1A4MP47 | 08555-40014 | 1 | PLATE, LEVER (OLIVE BLACK) | 28480 | 08555-40014 |
| A1A4MP48 | 08555-40008 | 1 | CAP END | 28480 | 08555-40008 |
| A1A4MP49 | | | NOT ASSIGNED | | |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|-------------------|
| A1A4MP50 | | | SEE A1A4S1. | | |
| A1A4MP51 | 0350-0049 | 1 | DTAL AND CURSOR | 28480 | 0350-0049 |
| A1A4MP52 | 2200-0143 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0143 |
| A1A4MP53 | 2200-0107 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0107 |
| A1A4MP54 | 2200-0145 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0145 |
| A1A4MP55 | 2200-0121 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0121 |
| A1A4MP56 | 0520-0169 | 1 | SCREW-MACH 2-56 82 DEG FL HD POZI REC | 28480 | 0520-0169 |
| A1A4MP57 | 0610-0001 | 1 | NUT-HEX-DBL CHAM 2-56-THD .062-THK .188 | 28480 | 0610-0001 |
| A1A4MP58 | 2190-0019 | 1 | WASHER-LK HLCL NO. 4 .115 IN D .226 IN | 28480 | 2190-0019 |
| A1A4MP59 | 2200-0140 | 1 | SCREW-MACH 4-40 100 DEG FL HD POZI REC | 28480 | 2200-0140 |
| A1A4MP60 | 2200-0103 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0103 |
| A1A4MP61 | 3030-0007 | 1 | SCREW-SET 4-40 SMALL CUP PT HEX REC ALY | 28480 | 3030-0007 |
| A1A4MP62 | 08555-00020 | 1 | RETAINER, WINDOW | 28480 | 08555-00020 |
| A1A4MP63 | 3050-0029 | 1 | WASHER-FL MTLCL .378 IN D .5 IN D | 28480 | 3050-0029 |
| A1A4MP9 | 1460-1206 | 1 | SPRING: TORSION | 28480 | 1460-1206 |
| A1A4R1 | 2100-2984 | 1 | RESISTOR; VAR; CONT; PREC; 5K 10% CP (FREQUENCY) | 28480 | 2100-2984 |
| A1A4R2 | 2100-2992 | 1 | RESISTOR-VAR PREC 10K 3% WM (FINE TUNE) | 28480 | 2100-2992 |
| A1A4R3 | 2100-2485 | 1 | RESISTOR; VAR; CONT; PREC; 5K 3% WM (2:1 GAIN CONTROL) | 28480 | 2100-2485 |
| | | | FACTORY SELECTED PART | | |
| A1A4S1 | 08555-60050 | 1 | SWITCH ASSY, BAND | 28480 | 08555-60050 |
| A2 | 08555-60007 | 1 | THIRD CONVERTER ASSY | 28480 | 08555-60007 |
| A2C1 | 0160-0345 | 1 | CAPACITOR-FXD 1000PF +100-0% 500WVDC CER | 01121 | FB28-102M |
| A2C2 | 0160-2437 | 15 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C3 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C4 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C5 | 3030-0382 | 5 | SCREW-SET 6-32 SMALL CUP PT HEX REC ALY | 28480 | 3030-0382 |
| A2C5 | 3030-0382 | 1 | SCREW-SET 6-32 SMALL CUP PT HEX REC ALY | 28480 | 3030-0382 |
| A2C6 | 3030-0382 | 1 | SCREW-SET 6-32 SMALL CUP PT HEX REC ALY | 28480 | 3030-0382 |
| A2C6 | 3030-0382 | 1 | SCREW-SET 6-32 SMALL CUP PT HEX REC ALY | 28480 | 3030-0382 |
| A2C7 | 3030-0382 | 1 | SCREW-SET 6-32 SMALL CUP PT HEX REC ALY | 28480 | 3030-0382 |
| A2C8 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C9 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C10 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C11 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C12 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2C13 | 0160-2437 | 1 | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-2437 |
| A2J1 | | | (SEE A2A1J1 (550 MHZ INPUT) | | |
| A2J2 | 1250-0829 | 6 | CONNECTOR-COAX; SMC; 50 OHM MALE (50 MHZ OUTPUT) TO AUXILIARY "B" | 98291 | 50-045-4610 |
| A2J3 | 1250-0828 | 1 | CONNECTOR-COAX; SMC; 50 OHM MALE (500 MHZ OUTPUT) | 2K497 | 701891 |
| A2J4 | 1250-0829 | 1 | CONNECTOR-COAX; SMC; 50 OHM MALE (50 MHZ OUTPUT) | 98291 | 50-045-4610 |
| A2L1 | 08555-80004 | 2 | COIL FILTER, #1 | 28480 | 08555-80004 |
| A2L1 | 08554-20038 | 3 | CONTACT, FILTER | 28480 | 08554-20038 |
| A2L2 | 08555-80005 | 1 | COIL FILTER, #2 | 28480 | 08555-80005 |
| A2L2 | 08554-20038 | 1 | CONTACT, FILTER | 28480 | 08554-20038 |
| A2L3 | 08555-80004 | 1 | COIL FILTER, #1 | 28480 | 08555-80004 |
| A2L3 | 08554-20038 | 1 | CONTACT, FILTER | 28480 | 08554-20038 |
| A2MP1 | 08555-00015 | 1 | COVER, 500 MHZ OSCILLATOR | 28480 | 08555-00015 |
| A2MP2 | 08555-00037 | 1 | COVER, 50 MHZ AMPLIFIER | 28480 | 08555-00037 |
| A2MP3 | 08555-20043 | 1 | HOUSING, THIRD CONVERTER | 28480 | 08555-20043 |
| A2MP4 | 08555-20044 | 1 | HOUSING, 50 MHZ AMPLIFIER | 28480 | 08555-20044 |
| A2MP5 | 08554-60017 | 1 | COUPLING, 500 MHZ | 28480 | 08554-60017 |
| A2MP6 | 08555-00014 | 1 | COUPLING LOOP, THIRD LOW | 28480 | 08555-00014 |
| A2R1 | 0698-7200 | 1 | RESISTOR 31.6 OHM 2% .05W F TUBULAR | 24546 | C3-1/8-T00-31R6-G |
| | | | A2 HARDWARE | | |
| | 0624-0206 | 1 | SCREW-TPG 6-32 PAN | 28480 | 0624-0206 |
| | 0624-0209 | 1 | SCREW-TPG 6-32 PAN | 28480 | 0624-0209 |
| | 0624-0078 | 2 | SCREW-TPG 6-32 PAN | 28480 | 0624-0078 |
| | 0624-0262 | 1 | SCREW-TPG 6-32 PAN | 28480 | 0624-0262 |
| | 0624-0271 | 1 | SCREW-TPG 6-32 PAN HD POZI REC STL | 28480 | 0624-0271 |
| | 2190-0124 | 1 | WASHER-LK INTL T NO. 10 .195 IN D .311 | 24931 | LW101-30 |
| | 2200-0139 | 2 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0139 |
| | 2260-0002 | 1 | NUT-HEX-DBL CHAM 4-40-THD .062-THK .188 | 28480 | 2260-0002 |
| | 2580-0002 | 1 | NUT-HEX-DBL CHAM 8-32-THD .085-THK .25 | 28480 | 2580-0002 |
| | 2950-0078 | 1 | NUT-HEX-DBL CHAM 10-32-THD .067-THK .25 | 24931 | HN100-11 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|---------------------|
| | 08554-60017 | 2 | COUPLING, 500 MHZ | 28480 | 08554-60017 |
| | 08555-00014 | 2 | COUPLING LCOP, YHIRD LOW | 28480 | 08555-00014 |
| A2A1 | 08554-60009 | 1 | AMPLIFIER ASSY, 550 MHZ | 28480 | 08554-60009 |
| A2A1C1 | | | NOT ASSIGNED | | |
| A2A1C2 | 0160-2248 | 1 | CAPACITOR-FXD 4.3PF +-0.25PF 500WVDC CER | 28480 | 0160-2248 |
| A2A1C3 | 0150-0093 | 1 | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0150-0093 |
| A2A1C4 | 0160-2246 | 1 | CAPACITOR-FXD 24PF +-5% 500WVDC CER 0+ | 28480 | 0160-2246 |
| A2A1C5 | 0160-2247 | 3 | CAPACITOR-FXD 3.9PF +-0.25PF 500WVDC CER | 28480 | 0160-2247 |
| A2A1J1 | 1250-1220 | 1 | CONNECTOR-COAX; SMC; 50 OHM MALE (550 MHZ INPUT) | 98291 | 50-351-0109 |
| A2A1O1 | 1853-0020 | 17 | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A2A1O2 | 1854-0292 | 1 | TRANSISTOR NPN SI TO-72 PD=200MW | 28480 | 1854-0292 |
| A2A1R1 | 0698-3155 | 8 | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A2A1R2 | 0757-0443 | 3 | RESISTOR 11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1102-F |
| A2A1R3 | 0698-3155 | 4 | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A2A1R4 | 0757-0280 | 17 | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A2A1R5 | 0757-0416 | 2 | RESISTOR 511 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-511R-F |
| | 2190-0326 | 1 | WASHER-FL NM .115 IN D .188 IN D | 28480 | 2190-0326 |
| A2A2 | 08555-60118 | 1 | BOARD ASSY, LOW OSCILLATOR DRIVE | 28480 | 08555-60118 |
| A2A2C1 | 0180-2249 | 1 | CAPACITOR-FXD; 47UF+-10% 20VDC TA-SOL ID | 56289 | 1500476X9020R2 |
| A2A2C2 | 0180-2267 | 1 | CAPACITOR-FXD; 100UF+-10% 10VDC TA | 56289 | 1500107X9010R2 |
| A2A2CR1 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A2A2CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A2A2CR3 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A2A2Q1 | 1854-0071 | 27 | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A2A2Q2 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A2A2R1 | 0757-0444 | 5 | RESISTOR 12.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1212-F |
| A2A2R2 | 0698-3440 | 2 | RESISTOR 196 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-196R-F |
| A2A2R3 | 0757-0439 | 4 | RESISTOR 6.81K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6811-F |
| A2A2R4 | 0757-0289 | 1 | RESISTOR 13.3K 1% .125W F TUBULAR | 30983 | MF4C1/8-T0-1332-F |
| A2A2R5 | 2100-1776 | 3 | RESISTOR; VAR; TRMR; 10KOHM 5% WW | GB027 | CT-100-4 |
| A2A2R6 | 0698-7260 | 1 | RESISTOR 10K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-1002-G |
| A2A2R7 | 0698-7262 | 1 | RESISTOR 12.1K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-1212-G |
| A2A2R8 | 0698-7250 | 1 | RESISTOR 3.83K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-3831-G |
| A2A2R9 | 0698-7249 | 1 | RESISTOR 3.48K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-3481-G |
| A2A2R10 | 0698-7279 | 1 | RESISTOR 61.9K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-6192-G |
| A2A2R11 | 0698-7266 | 1 | RESISTOR 17.8K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-1782-G |
| A2A2R12 | 0698-7252 | 1 | RESISTOR 4.64K 2% .05W F TUBULAR | 24546 | C3-1/8-T0-4641-G |
| A2A2R13 | 2100-1776 | | RESISTOR; VAR; TRMR; 10KOHM 5% WW | GB027 | CT-100-4 |
| A2A2R14 | 0698-3440 | | RESISTOR 196 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-196R-F |
| A2A2R15 | 0698-3136 | 3 | RESISTOR 17.8K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1782-F |
| A2A2R16 | 0757-0123 | 5 | RESISTOR 34.8K 1% .125W F TUBULAR | 24546 | C5-1/4-T0-3482-F |
| A2A2R17 | 0757-0440 | 4 | RESISTOR 7.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7501-F |
| A2A2R18 | 0698-3449 | 2 | RESISTOR 28.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2872-F |
| A2A2R19 | 0757-0439 | | RESISTOR 6.81K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6811-F |
| A2A2U1 | 1826-0013 | 18 | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A2A2U2 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| | 0300-0059 | 4 | STANDOFF, 0.25" | 28480 | 0300-0059 |
| A2A3 | 08555-60064 | 1 | BOARD ASSY, 550/50 MHZ MIXER | 28480 | 08555-60064 |
| A2A3C1 | 0160-3067 | 2 | CAPACITOR-FXD 200PF +-5% 300WVDC MICA | 28480 | 0160-3067 |
| A2A3C2 | 0160-3070 | 1 | CAPACITOR-FXD 100PF +-5% 300WVDC MICA | 28480 | 0160-3070 |
| A2A3C3 | 0121-0046 | 2 | CAPACITOR; VAR; TRMR; CER; 9/35PF | 73899 | DV11P5350 |
| A2A3C4 | 0160-3067 | | CAPACITOR-FXD 200PF +-5% 300WVDC MICA | 28480 | 0160-3067 |
| A2A3E1 | 10514C | 1 | MIXER | 28480 | 10514C |
| A2A3L1 | 08555-80003 | 1 | MIXER COIL ASSY, 3-CONTACT | 28480 | 08555-80003 |
| A2A4 | 08554-60006 | 1 | LOCAL OSCILLATOR ASSY, 500 MHZ | 28480 | 08554-60006 |
| A2A4C1 | 0160-2357 | 3 | CAPACITOR-FXD 1000PF +80-20% 500WVDC CER | 28480 | 0160-2357 |
| A2A4C2 | 0160-2357 | | CAPACITOR-FXD 1000PF +80-20% 500WVDC CER | 28480 | 0160-2357 |
| A2A4C3 | 0160-2247 | | CAPACITOR-FXD 3.9PF +-0.25PF 500WVDC CER | 28480 | 0160-2247 |
| A2A4C4 | 0121-0414 | 1 | CAPACITOR; VAR; TRMR; AIR; 1.9/8.5PF | 74970 | 189-253-5, MODIFIED |
| A2A4C5 | 0160-2246 | 1 | CAPACITOR-FXD 3.6PF +-0.25PF 500WVDC CER | 28480 | 0160-2246 |
| A2A4C6 | 0160-2357 | | CAPACITOR-FXD 1000PF +80-20% 500WVDC CER | 28480 | 0160-2357 |
| A2A4CR1 | 0122-0072 | 1 | DIO-VVC 2.2PF 5% C3/C25=4500000 MIN | 04713 | 881058 |
| A2A4L1 | 08554-00007 | 1 | INDUCTOR, 500 MHZ OSCILLATOR | 28480 | 08554-00007 |
| A2A4L2 | 9140-0158 | 1 | COIL, FXD, MOLDED RF CHOKE, LUM 10% | 24226 | 10/101 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|-------------------|
| A2A4MP1 | 08554-20016 | 1 | INDUCTOR MOUNTING, 500 MHZ OSCILLATOR | 28480 | 08554-20016 |
| A2A4MP2 | 0340-0030 | 1 | | 28480 | 0340-0030 |
| A2A4MP3 | 0340-0037 | 2 | TERMINAL; SLDR STUD; .098 SHK DIA | 28480 | 0340-0037 |
| A2A4Q1 | 1854-0323 | 2 | TRANSISTOR NPN 2N2857 SI TO-72 PD=200MW | 02735 | 2N2857 |
| | 1205-0031 | 2 | THERMAL-LINK; SGL; TO-36 PKG | 28480 | 1205-0031 |
| A2A4Q2 | 1854-0323 | | TRANSISTOR NPN 2N2857 SI TO-72 PD=200MW | 02735 | 2N2857 |
| | 1205-0031 | | THERMAL-LINK; SGL; TO-36 PKG | 28480 | 1205-0031 |
| A2A4R1 | 0698-3447 | 2 | RESISTOR 422 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-422R-F |
| A2A4R2 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A2A4R3 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A2A4R4 | 0698-7188 | 2 | RESISTOR 10 OHM 2% .05W F TUBULAR | 24546 | C3-1/8-T00-10R-G |
| A2A4R5 | 0698-7188 | | RESISTOR 10 OHM 2% .05W F TUBULAR | 24546 | C3-1/8-T00-10R-G |
| A2A5 | 08555-60060 | 1 | BOARD ASSY, 50 MHZ AMPLIFIER | 28480 | 08555-60060 |
| A2A5C1 | 0160-2262 | 1 | CAPACITOR-FXD 16PF +-5% 500WVDC CER 0+ | 28480 | 0160-2262 |
| A2A5C2 | 0121-0046 | | CAPACITOR; VAR; TRMR; CER; 9/35PF | 73899 | DV11PS350 |
| A2A5C3 | 0160-3456 | 15 | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C4 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C5 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C6 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C7 | 0160-2247 | | CAPACITOR-FXD 3.9PF +-25PF 500WVDC CER | 28480 | 0160-2247 |
| A2A5C8 | 0121-0060 | 2 | CAPACITOR; VAR; TRMR; CER; 2/8PF | 73899 | DV11PS8A |
| A2A5C9 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C10 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C11 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C12 | 0121-0060 | | CAPACITOR; VAR; TRMR; CER; 2/8PF | 73899 | DV11PS8A |
| A2A5C13 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C14 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C15 | 0160-2253 | 1 | CAPACITOR-FXD 6.8PF +-25PF 500WVDC CER | 28480 | 0160-2253 |
| A2A5C16 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5C17 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000WVDC CER | 28480 | 0160-3456 |
| A2A5CR1 | 1901-0639 | 3 | DIODE-PIN 110V | 28480 | 1901-0639 |
| A2A5CR2 | 1901-0639 | | DIODE-PIN 110V | 28480 | 1901-0639 |
| A2A5CR3 | 1901-0639 | | DIODE-PIN 110V | 28480 | 1901-0639 |
| A2A5CR4 | 1901-0025 | 4 | DIODE-GEN PRP 100V 200MA | 28480 | 1901-0025 |
| A2A5L1 | 9100-1611 | 1 | COIL; FXD; MOLDED RF CHOKE; .22UH 20% | 24226 | 15/220 |
| A2A5L2 | 9140-0111 | 1 | COIL; FXD; MOLDED RF CHOKE; 3.3UH 10% | 24226 | 15/331 |
| A2A5L3 | 9100-1614 | 1 | COIL; FXD; MOLDED RF CHOKE; .82UH 10% | 24226 | 15/820 |
| A2A5L4 | 9140-0121 | 1 | COIL; FXD; MOLDED RF CHOKE; 1.8UH 10% | 24226 | 15X181 |
| A2A5L5 | 9140-0112 | 2 | COIL; FXD; MOLDED RF CHOKE; 4.7UH 10% | 24226 | 15/471 |
| A2A5L6 | 9140-0094 | 1 | COIL; FXD; MOLDED RF CHOKE; .68UH 10% | 24226 | 15/680 |
| A2A5L7 | 9140-0112 | | COIL; FXD; MOLDED RF CHOKE; 4.7UH 10% | 24226 | 15/471 |
| A2A5O1 | 1855-0020 | 4 | TRANSISTOR; J-FET N-CHAN, D-MODE SI | 28480 | 1855-0020 |
| A2A5O2 | 1854-0345 | 4 | TRANSISTOR NPN 2N5179 SI PD=200MW | 04713 | 2N5179 |
| A2A5O3 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI PD=200MW | 04713 | 2N5179 |
| A2A5O4 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI PD=200MW | 04713 | 2N5179 |
| A2A5O5 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI PD=200MW | 04713 | 2N5179 |
| A2A5R1 | 0698-3156 | 6 | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A2A5R2 | 0757-0394 | 2 | RESISTOR 51.1 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-51R1-F |
| A2A5R3 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A2A5R4 | 2100-1984 | 1 | RESISTOR; VAR; TRMR; 100 OHM 10% C | 30983 | ET50M101 |
| A2A5R5 | 0757-0274 | 1 | RESISTOR 1.21K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1213-F |
| A2A5R6 | 0757-0279 | 5 | RESISTOR 3.16K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-3161-F |
| A2A5R7 | 0698-3155 | | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A2A5R8 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A2A5R9 | 0698-0084 | 4 | RESISTOR 2.15K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2151-F |
| A2A5R10 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A2A5R11 | 0698-3457 | 2 | RESISTOR 316K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3163-F |
| A2A5R12 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A2A5R13 | 0698-0084 | | RESISTOR 2.15K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2151-F |
| A2A5R14 | 0757-0294 | 1 | RESISTOR 17.8 OHM 1% .125W F TUBULAR | 30983 | MF4C1/8-T0-17R8-F |
| A2A5R15 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A2A5R16 | 0757-0394 | | RESISTOR 51.1 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-51R1-F |
| A2A5R17 | 0698-3153 | 2 | RESISTOR 3.83K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3831-F |
| A2A5R18 | 0698-0084 | | RESISTOR 2.15K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2151-F |
| A2A5R19* | 0698-3435 | 1 | RESISTOR 38.3 OHM 1% .125W F TUBULAR FACTORY SELECTED PART | 16299 | C4-1/8-T0-38R3-F |
| A2A5R20 | 0698-3450 | 1 | RESISTOR 42.2K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4222-F |
| A2A5R21 | 0698-3155 | | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A2A5R22 | 2100-1777 | 2 | RESISTOR; VAR; TRMR; 20KOHM 5% WM | GB027 | CT-100-4 |
| A2A5R23 | 0757-0462 | | RESISTOR 75K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7502-F |
| A2A5R24 | 0757-0458 | 8 | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A2A5R25 | 2100-1777 | | RESISTOR; VAR; TRMR; 20KOHM 5% WM | GB027 | CT-100-4 |
| A2A5R26 | 0698-0084 | | RESISTOR 2.15K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2151-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|----------------------------|-------------------------------------|-----|---|-------------------------|--|
| A2A5Z1 A2A5Z2 A2A5Z3 | 9170-0029 9170-0029 9170-0029 | 5 | CORE, MAG, SHIELDING BEAD, .138 OD .047 CORE, MAG, SHIELDING BEAD, .138 OD .047 CORE, MAG, SHIELDING BEAD, .138 OD .047 | 02114 02114 02114 | 56-590-65A2/4A 56-590-65A2/4A 56-590-65A2/4A |
| A3 | 08555-60081 | 1 | YIG OSCILLATOR ASSY | 28480 | 08555-60081 |
| A3AT1 | 08554-60058 | 1 | ATTENUATOR, 2 DB | 28480 | 08554-60058 |
| A3CP1 | 1250-1249 | 1 | ADAPTER-COAX; RIGHT ANGLE SMA | 98291 | 50-678-0000-31 |
| A3P1 | 1251-2583 | 1 | CONNECTOR STRIP:MALE | 28480 | 1251-2583 |
| A4 | 08555-60053 | 1 | BOARD ASSY, YIG DRIVER | 28480 | 08555-60053 |
| A4C1 | 0180-0116 | 3 | CAPACITOR-FXD; 6.8UF±10% 35VDC TA | 56289 | 1500685X903582 |
| A4C2 | 0180-2144 | 1 | CAPACITOR-FXD; 200UF+75-10% 25VDC AL | 56289 | 30D207G0250H9 |
| A4C3 | 0180-2210 | 1 | CAPACITOR-FXD; 2UF+50-10% 150VDC AL | 56289 | 30D205F150B82 |
| A4C4 | | | NOT ASSIGNED | | |
| A4C5 | 0160-0174 | 1 | CAPACITOR-FXD .47UF +80-20% 25MVDC CER | 28480 | 0160-0174 |
| A4CR1 | 1902-0680 | 2 | DIODE; ZENER; 6.2V VZ; .25W MAX PD | 03877 | 1N827 |
| A4CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A4CR3 | 1902-0556 | 1 | DIODE; ZENER; 20V VZ; 1W MAX PD | 04713 | SZ 11213-227 |
| A4CR4 | 1902-3290 | 1 | DIODE-ZNR 31.6V 5% DO-7 PD=.4W | 04713 | SZ 10939-326 |
| A4CR5 | 1902-3048 | 1 | DIODE-ZNR 34.8V 5% DO-7 PD=.4W TC= | 04713 | SZ 10939-50 |
| A4CR6 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A4CR7 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A4CR8 | 1902-3301 | 1 | DIODE-ZNR 34.8V 5% DO-7 PD=.4W | 04713 | SZ 10939-338 |
| A4HP1 | 08555-00040 | 1 | HEAT SINK, YIG DRIVER | 28480 | 08555-00040 |
| A4P1 | 0360-0124 | 1 | TERMINAL .040 | 28480 | 0360-0124 |
| A4Q1 | 1853-0050 | 1 | TRANSISTOR PNP SI CHIP TO-18 PD=360MW | 28480 | 1853-0050 |
| A4Q2 | 1853-0038 | 1 | TRANSISTOR PNP SI CHIP TO-39 PD=1W | 28480 | 1853-0038 |
| A4Q3 | 1854-0216 | 1 | TRANSISTOR NPN 2N3441 SI PD=25W | 02735 | 2N3441 |
| A4Q3 | 0340-0162 | | INSULATOR; XSTR; TO- 66; .02 THK | 28480 | 0340-0162 |
| A4Q4 | 1853-0052 | 1 | TRANSISTOR PNP 2N3740 SI CHIP PD=25W | 04713 | 2N3740 |
| A4Q4 | 0340-0162 | | INSULATOR; XSTR; TO- 66; .02 THK | 28480 | 0340-0162 |
| A4R1 | 0811-2881 | 1 | RESISTOR 3.16K .1% .062W PWM TUBULAR | 54294 | PC8-1/16-E-3161-B |
| A4R2 | 2100-1757 | 3 | RESISTOR-VAR TRMR 500 OHM 5% WM TOP ADJ | GB027 | CT-106-4 |
| A4R3 | 0811-2879 | 1 | RESISTOR 4.64K .1% .062W PWM TUBULAR | 14140 | 1350-1/16-E-4641-B |
| A4R4 | 0757-1094 | 1 | RESISTOR 1.47K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1471-F |
| A4R5 | 2100-1757 | 1 | RESISTOR-VAR TRMR 500 OHM 5% WM TOP ADJ | GB027 | CT-106-4 |
| A4R6 | 0698-3447 | | RESISTOR 422 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-422R-F |
| A4R7 | 0757-0467 | 2 | RESISTOR 121K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1213-F |
| A4R8 | 0698-7798 | 1 | RESISTOR 5.25K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-5251-C |
| A4R9 | 0698-7797 | 1 | RESISTOR 7.68K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-7681-C |
| A4R10 | 0698-0085 | 1 | RESISTOR 2.61K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2611-F |
| A4R11 | 0683-6245 | 2 | RESISTOR 620K 5% .25W CC TUBULAR | 01121 | CB6245 |
| A4R12 | 0683-6245 | | RESISTOR 620K 5% .25W CC TUBULAR | 01121 | CB6245 |
| A4R13 | 0698-3162 | | RESISTOR 46.4K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4642-F |
| A4R14 | 0698-3162 | | RESISTOR 46.4K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4642-F |
| A4R15 | 0683-1055 | 4 | RESISTOR 1M 5% .25W CC TUBULAR | 01121 | CB1055 |
| A4R16 | 0757-0442 | 25 | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A4R17 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A4R18 | 0698-3156 | | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A4R19 | 0757-0438 | 9 | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A4R20 | 0811-3031 | 1 | RESISTOR 5K .01% .031W PWM TUBULAR | 14140 | 1350-1/32-D-5001-T |
| A4R21 | 0811-2693 | 1 | RESISTOR 10K .01% .031W PWM TUBULAR | 14140 | 1350-1/32-D-1002-T |
| A4R22 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A4R23 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A4R24 | 0698-7791 | 1 | RESISTOR 117K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1173-F |
| A4R25 | 0698-6822 | 1 | RESISTOR 26.1K .25% .125W F TUBULAR | 19701 | MF4C1/8-T0-2612-C |
| A4R26 | 0698-7796 | 1 | RESISTOR 14.7K .25% .125W F TUBULAR | 30983 | MF4C1/8-T0-1472-C |
| A4R27 | 0811-2896 | 1 | RESISTOR 1.78K .1% .062W PWM TUBULAR | 14140 | 1350-1/16-L3-1781-B |
| A4R28 | 2100-1757 | | RESISTOR-VAR TRMR 500 OHM 5% WM TOP ADJ | GB027 | CT-106-4 |
| A4R29 | 2100-1762 | 2 | RESISTOR; VAR; TRMR; 20KOHM 5% WM | GB027 | CT-106-4 |
| A4R30* | 0698-3161 | 2 | RESISTOR 38.3K 1% .125W F TUBULAR FACTORY SELECTED PART | 16299 | C4-1/8-T0-3832-F |
| A4R31* | 0698-3157 | 12 | RESISTOR 19.6K 1% .125W F TUBULAR FACTORY SELECTED PART | 16299 | C4-1/8-T0-1962-F |
| A4R32 | 0757-0464 | 1 | RESISTOR 90.9K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-9092-F |
| A4R33 | 0811-2895 | 1 | RESISTOR 422 OHM .1% .062W PWM TUBULAR | 14140 | 1350-1/16-L3-422R-B |
| A4R34 | 0757-0309 | 1 | RESISTOR 61.9K 1% .5W F TUBULAR | 30983 | MF7C1/2-T0-6192-F |
| A4R35 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A4R36 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A4R37 | 0698-3441 | 1 | RESISTOR 215 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-215R-F |
| A4R38 | 0698-3453 | 2 | RESISTOR 196K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1963-F |
| A4R39 | 0811-2880 | 1 | RESISTOR 150 OHM 1% 12W PW CHASSIS | 15915 | TM10. |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|------------------------|----------------|-----|--|----------|-------------------|
| A4R40 | 0757-0839 | 1 | RESISTOR 10K 1% .5W F TUBULAR | 30983 | MF7C1/2-T0-1002-F |
| A4R41 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A4R42 | 0698-3390 | 1 | RESISTOR 19.6 OHM 1% .5W F TUBULAR | 19701 | MF7C1/2-T0-19R6-F |
| A4R43 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A4R44 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A4R45 | 0698-3156 | | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A4R46 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A4TP1 | 0360-1514 | 35 | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP2 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP3 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP4 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP5 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP6 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP7 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4TP8 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A4U1 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4U2 | 1821-0001 | 4 | IC LIN CA3046 TRANSISTOR ARRAY | 02735 | CA3046 |
| A4U3 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4U4 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4U5 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4U6 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4U7 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A4 MISCELLANEOUS PARTS | | | | | |
| | 0520-0129 | 1 | SCREW-MACH 2-56 PAN HD POZI REC SST-300 | 28480 | 0520-0129 |
| | 0520-0164 | 1 | SCREW-MACH 2-56 82 DEG FL HD POZI REC | 28480 | 0520-0164 |
| | 0610-0001 | 2 | NUT-HEX-DBL CHAM 2-56-THD .062-THK .188 | 28480 | 0610-0001 |
| | 2190-0003 | 2 | WASHER-LK HLCL NO. 4 .115 IN D .253 IN | 28480 | 2190-0003 |
| | 2190-0004 | 2 | WASHER-LK INTL T NO. 4 .115 IN D .27 | 78189 | SF 1904-00 |
| | 2190-0014 | 2 | WASHER-LK INTL T NO. 2 .089 IN D .185 | 78189 | 1902-00 |
| | 2200-0145 | 3 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0145 |
| | 2260-0001 | 2 | NUT-HEX-DBL CHAM 4-40-THD .094-THK .25 | 28480 | 2260-0001 |
| A5 | 08555-60052 | 1 | BOARD ASSY, STABILIZER CONTROL | 28480 | 08555-60052 |
| A5C1 | 0160-0158 | 1 | CAPACITOR-FXD 5600PF +-10% 200VDC POLYE NOT ASSIGNED | 56289 | 292P56292 |
| A5C2 | | | | | |
| A5C3 | 0160-0157 | 1 | CAPACITOR-FXD 4700PF +-10% 200VDC POLYE | 56289 | 292P47292 |
| A5C4 | 0180-0291 | 3 | CAPACITOR-FXD: 1UF+-10% 35VDC TA-SOLID | 56289 | 1500105X9035A2 |
| A5C5 | 0180-1743 | 5 | CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID | 56289 | 1500104X9035A2 |
| A5C6 | 0180-1743 | | CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID | 56289 | 1500104X9035A2 |
| A5C7 | 0180-1743 | | CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID | 56289 | 1500104X9035A2 |
| A5C8 | 0180-1743 | | CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID | 56289 | 1500104X9035A2 |
| A5C9 | 0160-3473 | 1 | CAPACITOR-FXD .039UF +-5% 100VDC TFE | 01884 | AF9A1839J |
| A5C10 | 0180-0197 | 14 | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A5C11 | 0180-0229 | 3 | CAPACITOR-FXD: 33UF+-10% 10VDC TA-SOLID | 56289 | 1500336X9010B2 |
| A5C12 | 0160-3094 | 2 | CAPACITOR-FXD .1UF +-10% 100VDC CER | 28480 | 0160-3094 |
| A5C13 | 0160-3459 | 2 | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A5CR1 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR3 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR4 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR5 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR6 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR7 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR8 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5CR9 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A5K1 | 0490-0782 | 1 | RELAY; REED; 1A .1A 250V CONT; 9V COIL | 28480 | 0490-0782 |
| A5L1 | 9140-0137 | 5 | COIL; FXD; MOLDED RF CHOKE; 1MH 5% | 24226 | 19/104 |
| A5MP1 | 0340-0037 | | TERMINAL; SLDR STUD; .098 SHK DIA | 28480 | 0340-0037 |
| A5MP2 | 0340-0039 | 1 | TERMINAL BUSHING - TEFLON; MOUNTS IN | 28480 | 0340-0039 |
| A5Q1 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q2 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q3 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q4 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q5 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q6 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q7 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q8 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q9 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q10 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--------------------------------------|----------|---------------------|
| A5Q11 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q12 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q13 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q14 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A5Q15 | 1855-0098 | 1 | TRANSISTOR: MOSFET P-CHAN, E-MODE SI | 28480 | 1855-0098 |
| | 1200-0173 | 5 | INSULATOR, XSTR, TO- 5, .075 THK | 28480 | 1200-0173 |
| A5Q16 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A5Q17 | 1855-0020 | | TRANSISTOR: J-FET N-CHAN, D-MODE SI | 28480 | 1855-0020 |
| A5Q18 | 1855-0020 | | TRANSISTOR: J-FET N-CHAN, D-MODE SI | 28480 | 1855-0020 |
| A5R1 | 0757-0465 | 10 | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-TJ-1003-F |
| A5R2 | 0698-3136 | | RESISTOR 17.8K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1782-F |
| A5R3 | 0698-3457 | | RESISTOR 316K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3163-F |
| A5R4 | 0683-4735 | 19 | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R5 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R6 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R7 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R8 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R9 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R10 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R11 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R12 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R13 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R14 | 0683-4745 | 11 | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R15 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R16 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R17 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R18 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R19 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R20 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R21 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R22 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R23 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R24 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R25 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R26 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R27 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R28 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R29 | 0683-4745 | | RESISTOR 470K 5% .25W CC TUBULAR | 01121 | CB4745 |
| A5R30 | 0683-2245 | 1 | RESISTOR 220K 5% .25W CC TUBULAR | 01121 | CB2245 |
| A5R31 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R32 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R33 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R34 | 0683-4735 | | RESISTOR 47K 5% .25W CC TUBULAR | 01121 | CB4735 |
| A5R35 | 0683-1035 | 2 | RESISTOR 10K 5% .25W CC TUBULAR | 01121 | CB1035 |
| A5R36 | 0683-1035 | | RESISTOR 10K 5% .25W CC TUBULAR | 01121 | CB1035 |
| A5R37 | 0698-3136 | | RESISTOR 17.8K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1782-F |
| A5R38 | 0698-3558 | 2 | RESISTOR 4.02K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4021-F |
| A5R39 | | | NOT ASSIGNED | | |
| A5R40 | 0698-3156 | | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A5R41 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A5R42 | 0757-0440 | | RESISTOR 7.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7501-F |
| A5R43 | 0757-0367 | 1 | RESISTOR 100K 1% .5W F TUBULAR | 30983 | MF7C1/2-T0-1003-F |
| A5R44 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A5R45 | 0757-0853 | 1 | RESISTOR 51.1K 1% .5W F TUBULAR | 30983 | MF7C1/2-T0-5112-F |
| A5R46 | 0683-9145 | 1 | RESISTOR 910K 5% .25W CC TUBULAR | 01121 | CB9145 |
| A5R47 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A5R48 | 2100-1755 | 1 | RESISTOR; VAR; TRMR; 100 OHM 5% WW | GB027 | CT-106-4 |
| A5R49 | 0698-3438 | 1 | RESISTOR 147 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-147R-F |
| A5R50 | 0757-0441 | 1 | RESISTOR 8.25K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-8251-F |
| A5R51 | 0757-0279 | | RESISTOR 3.16K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-3161-F |
| A5R52 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A5R53 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A5R54 | 0757-0123 | | RESISTOR 34.8K 1% .125W F TUBULAR | 24546 | C5-1/4-T0-3482-F |
| A5R55 | 2100-1762 | | RESISTOR; VAR; TRMR; 20KOHM 5% WW | GB027 | CT-106-4 |
| A5R56 | 0683-1055 | | RESISTOR 1M 5% .25W CC TUBULAR | 01121 | CB1055 |
| A5R57 | 0683-1055 | | RESISTOR 1M 5% .25W CC TUBULAR | 01121 | CB1055 |
| A5R58 | 2100-1760 | 1 | RESISTOR; VAR; TRMR; 5KOHM 5% WW | GB027 | CT-106-4 |
| A5R59 | 0757-0461 | 2 | RESISTOR 68.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6812-F |
| A5R60 | 0698-4055 | | RESISTOR 1K .25% .125W F TUBULAR | 03888 | PME55-1/8-T0-1001-C |
| A5R61 | | | NOT ASSIGNED | | |
| A5R62 | 0757-0443 | | RESISTOR 11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1102-F |
| A5R63 | 0757-0440 | | RESISTOR 7.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7501-F |
| A5R64 | 0757-0123 | | RESISTOR 34.8K 1% .125W F TUBULAR | 24546 | C5-1/4-T0-3482-F |
| A5R65 | 0698-3459 | 2 | RESISTOR 383K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3833-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|-------------------|
| A5R66 | 0683-1555 | 1 | RESISTOR 1.5M 5% .25W CC TUBULAR | 01121 | CB1555 |
| A5TP1 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP2 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP3 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP4 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP5 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP6 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP7 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP8 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5TP9 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A5U1 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A5U2 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A5U3 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A5U4 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A5U5 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A5Z1 | 9170-0029 | | CORE, MAG, SHIELDING BEAD, .138 OD .047 | 02114 | 56-590-65A2/4A |
| A6 | 08555-60051 | 1 | BCARD ASSY, BAND BUFFER | 28480 | 08555-60051 |
| A6C1 | 0180-0197 | | CAPACITOR-FXD; 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A6C2 | 0160-2055 | 11 | CAPACITOR-FXD .01UF +80-20% 100MVDC CER | 28480 | 0160-2055 |
| A6CR1 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR3 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR4 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR5 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR6 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6CR7 | 1902-0048 | 1 | DIODE-ZNR 6.81V 5% DO-7 PD=.4W | 28480 | 1902-0048 |
| A6CR8 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A6L1 | 9140-0210 | 6 | COIL; FXD; MOLDED RF CHOKE; 100UH 5% COIL; FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A6MP1 | 1205-0011 | 1 | HEAT-DISSIPATOR; SGL; TO-5 PKG | 28480 | 1205-0011 |
| A6MP2 | 1200-0173 | | INSULATOR; XSTR; TO-5; .075 THK | 28480 | 1200-0173 |
| A6MP3 | 0340-0794 | 1 | INSULATOR; XSTR; TRANSISTOR; .335 ID (INSULATOR FOR A6U1). | 28480 | 0340-0794 |
| A6Q1 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q2 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q3 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q4 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q5 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q6 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A6Q7 | 1854-0039 | 2 | TRANSISTOR NPN 2N3053 SI PD=1W | 04713 | 2N3053 |
| A6R1 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6R2 | 0698-4473 | 2 | RESISTOR 8.06K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-8061-F |
| A6R3 | 0757-0123 | | RESISTOR 34.8K 1% .125W F TUBULAR | 24546 | C5-1/4-T0-3482-F |
| A6R4 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6R5 | 0698-4473 | | RESISTOR 8.06K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-8061-F |
| A6R6 | 0757-0123 | | RESISTOR 34.8K 1% .125W F TUBULAR | 24546 | C5-1/4-T0-3482-F |
| A6R7 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6R8 | 0698-3558 | | RESISTOR 4.02K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4021-F |
| A6R9 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A6R10 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6R11 | 0757-0439 | | RESISTOR 6.81K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6811-F |
| A6R12 | 0698-8056 | 1 | RESISTOR 1.6K 1% .125W F TUBULAR | 30983 | MF4C1/8-T0-1601-F |
| A6R13 | 0757-0444 | | RESISTOR 12.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1212-F |
| A6R14 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6R15 | 0757-0343 | 1 | RESISTOR 301K 1% .25W F TUBULAR | 24546 | C5-1/4-T0-3013-F |
| A6R16 | 0757-0283 | 1 | RESISTOR 2K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-2001-F |
| A6R17 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A6R18 | | | NOT ASSIGNED | | |
| A6R19 | 0698-3160 | 3 | RESISTOR 31.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3162-F |
| A6R20 | 0757-0460 | 1 | RESISTOR 61.9K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6192-F |
| A6R21 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R22 | 0698-3159 | 2 | RESISTOR 26.1K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2612-F |
| A6R23 | 0757-0444 | | RESISTOR 12.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1212-F |
| A6R24 | 0757-0443 | | RESISTOR 11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1102-F |
| A6R25 | 0757-0199 | 2 | RESISTOR 21.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-2152-F |
| A6R26 | 0757-0461 | | RESISTOR 68.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6812-F |
| A6R27 | 0757-0444 | | RESISTOR 12.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1212-F |
| A6R28 | 0698-3159 | | RESISTOR 26.1K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2612-F |
| A6R29 | 0757-0199 | | RESISTOR 21.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-2152-F |
| A6R30 | 0757-0421 | 1 | RESISTOR 825 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-825R-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|-------------------|
| A6R31 | 0757-0288 | 1 | RESISTOR 9.09K 1% .125W F TUBULAR | 30983 | MF4C1/8-T0-9091-F |
| A6R32 | 0698-3151 | 3 | RESISTOR 2.87K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2871-F |
| A6R33 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A6R34 | 0757-0346 | | RESISTOR 10 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-10R0-F |
| A6R35 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R36 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R37 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R38 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R39 | 0757-0458 | | RESISTOR 51.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5112-F |
| A6R40 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A6TP1 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A6U1 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A6U2 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A6U3 | 1820-0195 | 3 | IC DGTL N8T80A GATE | 18324 | N8T80A |
| A6U4 | 1820-0121 | 1 | IC DGTL N8T90A INVERTER | 18324 | N8T90A |
| A6U5 | 1820-0195 | | IC DGTL N8T80A GATE | 18324 | N8T80A |
| A6U6 | 1820-0535 | 2 | IC DGTL SN75 451BP DRIVER | 01295 | SN75451BP |
| A6U7 | 1820-0535 | | IC DGTL SN75 451BP DRIVER | 01295 | SN75451BP |
| A6U8 | 1820-0195 | | IC DGTL N8T80A GATE | 18324 | N8T80A |
| A6U9 | 1820-0141 | 1 | IC;DGTL;GATE | 04713 | MC3001P |
| A6U10 | 1820-0174 | 1 | IC DGTL SN74 04 N INVERTER | 01295 | SN7404N |
| A6U11 | 1821-0001 | | IC LIN CA3046 TRANSISTOR ARRAY | 02735 | CA3046 |
| A6XA16 | 1251-2624 | 1 | CONNECTOR, PC EDGE, 15-CONT, RTANG DP | 05574 | 000200-0070 |
| | | | A6 MISCELLANEOUS | | |
| | 08555-20023 | 1 | GROMMET, BOARD | 28480 | 08555-20023 |
| A7 | 08555-60054 | 1 | BOARD ASSY, SIGNAL ID ATTENUATOR | 28480 | 08555-60054 |
| A7C1 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000VDC CER | 28480 | 0160-3456 |
| A7C2 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000VDC CER | 28480 | 0160-3456 |
| A7C3 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 1000VDC CER | 28480 | 0160-3456 |
| A7C4 | 0180-0197 | | CAPACITOR-FXD; 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A7C5 | 0180-1735 | 2 | CAPACITOR-FXD; .22UF+-10% 35VDC TA | 56289 | 1500224X9035A2 |
| A7C6 | 0180-1735 | | CAPACITOR-FXD; .22UF+-10% 35VDC TA | 56289 | 1500224X9035A2 |
| A7CR1 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR3 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR4 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR5 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR6 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR7 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR8 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A7CR9 | 1901-0159 | 3 | DIODE-PNR RECT 400V 750MA | 04713 | SR1358-4 |
| A7MP1 | 1200-0173 | | INSULATOR, XSTR, T0- 5, .075 THK | 28480 | 1200-0173 |
| A7O1 | 1854-0072 | 3 | TRANSISTOR NPN 2N3054 SI PD=25W | 02735 | 2N3054 |
| A7O2 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A7O3 | 1854-0039 | | TRANSISTOR NPN 2N3053 SI PD=1W | 04713 | 2N3053 |
| A7O4 | 1200-0173 | | INSULATOR, XSTR, T0- 5, .075 THK | 28480 | 1200-0173 |
| A7O4 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A7O5 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A7O6 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A7O7 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A7O8 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A7O9 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A7R1 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R2 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R3 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R4 | 0698-0083 | 4 | RESISTOR 1.96K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1961-F |
| A7R5 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A7R6 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R7 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A7R8 | 0698-3455 | 1 | RESISTOR 261K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2613-F |
| A7R9 | 0698-3453 | | RESISTOR 196K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1963-F |
| A7R10 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R11 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R12 | 0698-3154 | 3 | RESISTOR 4.22K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4221-F |
| A7R13 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R14 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A7R15 | 0757-0467 | | RESISTOR 121K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1213-F |
| A7R16 | 0698-3459 | | RESISTOR 383K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-3833-F |
| A7R17 | 0698-3260 | | RESISTOR 464K 1% .125W F TUBULAR | 19701 | MF4C1/8-T0-4643-F |
| A7R18 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A7R19 | 0757-0465 | | RESISTOR 100K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1003-F |
| A7R20 | 0698-3449 | | RESISTOR 28.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2872-F |

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 |
|-----------------------|----------------|-----|--|----------|-------------------|
| A7R21 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A7R22 | 0698-3151 | | RESISTOR 2.87K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2871-F |
| A7TP1 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A7TP2 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A7TP3 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A7TP4 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A7TP5 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A7TP6 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A8 | 08555-60055 | 1 | BOARD ASSY, +10+20 REGULATOR | 28480 | 08555-60755 |
| A8C1 | 0180-0116 | | CAPACITOR-FXD: 6.8UF+-10% 35VDC TA | 56289 | 1500685X903582 |
| A8C2 | 0180-0229 | | CAPACITOR-FXD: 33UF+-10% 10VDC TA-SOLID | 56289 | 1500336X901082 |
| A8C3 | 0180-0116 | | CAPACITOR-FXD: 6.8UF+-10% 35VDC TA | 56289 | 1500685X903582 |
| A8C4 | | | ** SEE SECTION VII | | |
| A8C4 | 0180-0228 | 3 | CAPACITOR-FXD: 22UF+-10% 15VDC TA-SOLID | 56289 | 1500226X901582 |
| A8CR1 | 1902-0680 | | DIODE; ZENER; 6.2V VZ; .25W MAX PD | 03877 | 1N827 |
| A8CR2 | 1901-0025 | | DIODE-GEN PRP 100V 200MA | 28480 | 1901-0025 |
| A8CR3 | 1902-0244 | 2 | DIODE; ZENER; 30.1V VZ; 1W MAX PD | 04713 | SZ11213-278 |
| A8CR4 | 1901-0025 | | DIODE-GEN PRP 100V 200MA | 28480 | 1901-0025 |
| A8CR5 | 1902-0202 | 1 | DIODE; ZENER; 15V VZ; 1W MAX PD | 04713 | SZ11213-191 |
| A8CR6 | 1902-3182 | 2 | DIODE-ZNR 12.1V 5% DO-7 PD=.4W | 04713 | SZ 10939-206 |
| A8CR7 | 1884-0073 | 2 | THYRISTOR; SCR | 28480 | 1884-0073 |
| A8CR8 | 1902-3256 | 1 | DIODE-ZNR 23.7V 5% DO-7 PD=.4W | 04713 | SZ 10939-290 |
| A8CR9 | 1884-0073 | | THYRISTOR; SCR | 28480 | 1884-0073 |
| A8L1 | 08555-80002 | 1 | FILTER COIL, POWER SUPPLY ASSY | 28480 | 08555-80002 |
| A8O1 | 1854-0072 | | TRANSISTOR NPN 2N3054 SI PD=25W | 02735 | 2N3054 |
| | 0340-0162 | 4 | INSULATOR; XSTR; TO-66; .02 THK | 28480 | 0340-0162 |
| | 08555-00038 | 2 | HEAT SINK, POWER SUPPLY | 28480 | 08555-00038 |
| A8O2 | 1854-0072 | | TRANSISTOR NPN 2N3054 SI PD=25W | 02735 | 2N3054 |
| | 0340-0162 | | INSULATOR; XSTR; TO-66; .02 THK | 28480 | 0340-0162 |
| | 08555-00038 | | HEAT SINK, POWER SUPPLY | 28480 | 08555-00038 |
| A8R1 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A8R2 | 0757-0278 | 1 | RESISTOR 1.78K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1781-F |
| A8R3 | 0811-2817 | 2 | RESISTOR 2.7 OHM 5% .5W PM TUBULAR | 00213 | 1050 S, |
| A8R4 | 0757-0447 | 1 | RESISTOR 16.2K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1622-F |
| A8R5 | 2100-1758 | 1 | RESISTOR; VAR; TRMR; 1KOHM 5% WW | 68027 | CT-106-4 |
| A8R6 | 0698-4470 | 1 | RESISTOR 6.98K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6981-F |
| A8R7 | 0811-0919 | 2 | RESISTOR 10K .1% .062W PWM TUBULAR | 20940 | 415-1/16-E-1002-B |
| A8R8 | 0811-0919 | | RESISTOR 10K .1% .062W PWM TUBULAR | 20940 | 415-1/16-E-1002-B |
| A8R9 | 0811-2817 | | RESISTOR 2.7 OHM 5% .5W PM TUBULAR | 00213 | 1050 S, |
| A8R10 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A8R11 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A8R12 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A8TP1 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A8TP2 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A8TP3 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A8U1 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A8U2 | 1826-0013 | | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| | | | A8 MISCELLANEOUS PARTS | | |
| | 2190-0003 | | WASHER-LK HLCL NO. 4 .115 IN D .253 IN | 28480 | 2190-0003 |
| | 2190-0004 | | WASHER-LK INTL T NO. 4 .115 IN D .27 | 78189 | SF 1904-00 |
| | 2190-0014 | | WASHER-LK INTL T NO. 2 .089 IN D .185 | 78189 | 1902-00 |
| | 2200-0145 | | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0145 |
| | 2260-0001 | | NUT-HEX-DBL CHAN 4-40-THD .094-THK .25 | 28480 | 2260-0001 |
| A9 | 08555-60005 | 1 | SWITCHING REGULATOR ASSY | 28480 | 08555-60005 |
| | 08555-60080 | | REBUILT 08555-60005, REQUIRES EXCHANGE | 28480 | 08555-60080 |
| A9C1 | 0160-2049 | 2 | CAPACITOR-FXD 5000PF +80-20% 500WVDC CER | 28480 | 0160-2049 |
| A9C2 | 0160-2049 | | CAPACITOR-FXD 5000PF +80-20% 500WVDC CER | 28480 | 0160-2049 |
| A9MP1 | 08555-00041 | 1 | CAN, SWITCHING REGULATOR | 28480 | 08555-00041 |
| A9A1 | 08555-60098 | 1 | BOARD ASSY, SWITCHING REGULATOR | 28480 | 08555-60098 |
| A9A1C1 | 0160-3459 | | CAPACITOR-FXD .02UF +-20% 100WVDC CER | 28480 | 0160-3459 |
| A9A1C2 | 0160-0298 | 1 | CAPACITOR-FXD 1500PF +-10% 200WVDC POLYE | 56289 | 292P15292 |
| A9A1C3 | 0160-3456 | | CAPACITOR-FXD 1000PF +-10% 100WVDC CER | 28480 | 0160-3456 |
| A9A1C4 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0160-2055 |
| A9A1C5 | 0180-2211 | 2 | CAPACITOR-FXD: 5UF+50-10% 150VDC AL | 56289 | 300505F150CC2 |
| A9A1C6 | 0180-2211 | | CAPACITOR-FXD: 5UF+50-10% 150VDC AL | 56289 | 300505F150CC2 |
| A9A1C7 | 0180-1819 | 1 | CAPACITOR-FXD: 100UF+75-10% 50VDC AL | 56289 | 300107G0500H2 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|------------------|
| A9A1CR1 | 1901-0050 | 1 | DIODE-SWITCHING 2NS 80V 200MA | 28480 | 1901-0050 |
| A9A1CR2 | 1902-0244 | | DIODE; ZENER; 30.1V VZ; 1W MAX PD | 04713 | SZ11213-278 |
| A9A1CR3 | 1901-1067 | 2 | DIODE-SWITCHING 60NS 125V 175MA | 28480 | 1901-1067 |
| A9A1CR4 | 1901-1067 | | DIODE-SWITCHING 60NS 125V 175MA | 28480 | 1901-1067 |
| A9A1L1 | 9140-0210 | | COIL; FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A9A1L2 | 9143-0210 | | COIL; FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A9A1L3 | 9100-1618 | 1 | COIL; FXD; MOLDED RF CHOKE; 5.6UH 10% | 24226 | 15/561 |
| A9A1MP1 | 1200-0173 | | INSULATOR, XSTR, TO- 5, .075 THK | 28480 | 1200-0173 |
| A9A1MP2 | 1205-0033 | 1 | HEAT-DISSIPATOR; SGL; TO-5 PKG | 28480 | 1205-0033 |
| A9A1Q1 | 1854-0C71 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A9A1Q2 | 1853-0308 | 1 | TRANSISTOR PNP SI CHIP TO-39 PD=5W | 28480 | 1853-0308 |
| A9A1Q3 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A9A1R1 | 0698-3499 | 1 | RESISTOR 40.2K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4022-F |
| A9A1R2 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A9A1R3 | 0757-0279 | | RESISTOR 3.16K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-3161-F |
| A9A1R4 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A9A1R5 | 0698-3160 | | RESISTOR 31.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3162-F |
| A9A1R6 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A9A1R7 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A9A1R8 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A9A1R9 | 0698-3160 | | RESISTOR 31.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3162-F |
| A9A1R10 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A9A1R11 | 0757-0279 | | RESISTOR 3.16K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-3161-F |
| A9A1R12 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A9A1R13 | 0698-3444 | 1 | RESISTOR 316 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-316R-F |
| A9A1R14 | 0811-2816 | 1 | RESISTOR 1.8 OHM 5% .5W PW TUBULAR | 00213 | 1050 S |
| A9A1R15 | 0757-0180 | 1 | RESISTOR 31.6 OHM 1% .125W F TUBULAR | 24546 | C5-1/4-T0-316R-F |
| A9A1R16 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A9A1T1 | 08555-80007 | 1 | TRANSFORMER, SWITCH REGULATOR ASSY | 28480 | 08555-80007 |
| A9A1U1 | 1821-0001 | | IC LIN CA3046 TRANSISTOR ARRAY | 02735 | CA3046 |
| | 0380-0342 | 1 | STANDOFF-RVT-ON KNRL .125-LG 6-32-THD | 28480 | 0380-0342 |
| A1A3 | 5086-7162 | 1 | S-BAND SAMPLER, 2-4 GHZ | 28480 | 5086-7162 |
| A10 | 08555-60063 | 1 | BOARD ASSY, INTERCONNECT | 28480 | 08555-60063 |
| A10XA1- | | | NOT ASSIGNED | | |
| A10XA3 | | | CONNECTOR; PC EDGE; 10-CONT; DIP SOLDER | 71785 | 252-10-30-300 |
| A10XA4 | 1251-2034 | 2 | CONNECTOR; PC EDGE; 10-CONT; DIP SOLDER | 71785 | 252-10-30-300 |
| A10XA5 | 1251-2034 | | CONNECTOR; PC EDGE; 10-CONT; DIP SOLDER | 71785 | 252-10-30-300 |
| A10XA6 | 1251-1626 | 1 | CONNECTOR; PC EDGE; 12-CONT; DIP SOLDER | 71785 | 252-12-30-300 |
| A10XA7 | 1251-0472 | 2 | CONNECTOR; PC EDGE; 6-CONT; DIP SOLDER | 71785 | 252-06-30-300 |
| A10XA8 | 1251-0472 | | CONNECTOR; PC EDGE; 6-CONT; DIP SOLDER | 71785 | 252-06-30-300 |
| A11 | 08555-60006 | 1 | SECOND CONVERTER ASSY | 28480 | 08555-60006 |
| | | | SEE SERVICE SHEET 18 FOR IPB. | | |
| | 08555-60071 | | RESTORED EXCHANGE ASSY | 28480 | 08555-60071 |
| A11C1 | 0160-3036 | 2 | CAPACITOR-FXD 5000PF +80-20% 203WVDC CER | 28480 | 0160-3036 |
| A11C2 | 0160-3036 | | CAPACITOR-FXD 5000PF +80-20% 200WVDC CER | 28480 | 0160-3036 |
| A11FL1 | 08555-20065 | 1 | LINE SLOT FILTER | 28480 | 08555-20065 |
| A11J1 | 1250-0829 | | CONNECTOR-COAX; SMC; 50 OHM MALE | 98291 | 50-045-4610 |
| A11J2 | 1250-0829 | | CONNECTOR-COAX; SMC; 50 OHM MALE | 98291 | 50-045-4610 |
| A11J3 | 1250-0829 | | CONNECTOR-COAX; SMC; 50 OHM MALE | 98291 | 50-045-4610 |
| A11MP1 | 0516-0005 | 1 | SCREW-MACH 0-80 PAN HD SLT REC SST-300 | 28480 | 0516-0005 |
| A11MP2 | 2200-0111 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0111 |
| A11MP3 | 2200-0117 | 1 | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0117 |
| A11MP4 | 2200-0172 | 1 | SCREW-MACH 4-40 82 DEG FL HD POZI REC | 28480 | 2200-0172 |
| A11MP5 | 2360-0117 | 1 | SCREW-MACH 6-32 PAN HD POZI REC SST-300 | 28480 | 2360-0117 |
| A11MP6 | 2200-0140 | | SCREW-MACH 4-40 100 DEG FL HD POZI REC | 28480 | 2200-0140 |
| A11MP7 | 2740-0001 | 1 | NUT-HEX-DBL CHAM 10-32-THD .109-THK | 28480 | 2740-0001 |
| A11MP8 | 3030-0151 | 1 | SCREW-SKT HD CAP 4-40 HD HEX REC ALY | 04866 | M60HS440-12CR |
| A11MP9 | 3030-0397 | 1 | SCREW-SET 10-32 | 28480 | 3030-0397 |
| A11MP10 | 08555-00033 | 1 | INPUT-OUTPUT LOOP | 28480 | 08555-00033 |
| A11MP11 | 08555-20002 | 1 | SUPPORT, SLOT FILTER | 28480 | 08555-20002 |
| A11MP12 | 08555-20019 | 1 | SCREW, TUNING | 28480 | 08555-20019 |
| A11MP13 | 08555-20040 | 1 | CAP, OUTER ELEMENT | 28480 | 08555-20040 |
| A11MP14 | 08555-20041 | 1 | CAP, INNER ELEMENT | 28480 | 08555-20041 |
| A11MP15 | 08555-20042 | 1 | CAP, DIELECTRIC | 28480 | 08555-20042 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|------------------|
| A11MP16 | 08555-2J046 | 1 | COVER, PLATE, SECOND CONVERTER | 28480 | 08555-20046 |
| A11MP17 | 08555-20035 | 1 | CAVITY BLOCK, SECOND CONVERTER | 28480 | 08555-20035 |
| A11A1 | 08555-60068 | 1 | OSCILLATOR ASSY, 1.5 GHZ | 28480 | 08555-60068 |
| A11A1C1 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1L1 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1MP1 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1O1 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1O2 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1R1 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1R2 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A1R3 | | | PART OF A11A1, NOT SEPARATELY REPLACEABLE | | |
| A11A2 | 08555-60069 | 1 | SECOND MIXER/OUTPUT ASSY | 28480 | 08555-60069 |
| | 08555-03031 | 1 | LID, RESONATOR HOUSING | 28480 | 08555-00031 |
| | 08555-20036 | 1 | RESONATOR HOUSING | 28480 | 08555-20036 |
| | 1251-1556 | 1 | CONNECTOR: 1-CONT SKT .04 DIA | 28480 | 1251-1556 |
| | 0520-0128 | 1 | SCREW-MACH 2-56 PAN HD POZI REC SST-300 | 28480 | 0520-0128 |
| A11A2C1 | 0160-2327 | 1 | CAPACITOR-FXD 1000PF +-20% 100MVDC CER | 28480 | 0160-2327 |
| A11A2C2 | 0160-3550 | 1 | CAPACITOR-FXD 15PF +-10% 250MVDC MICA | 72982 | 2930-000-150K |
| A11A2C3 | 0160-3551 | 1 | CAPACITOR-FXD 33PF +-10% 250MVDC MICA | 72982 | 2930-000-330K |
| A11A2CR1 | 1901-0633 | 1 | DIODE-SCHOTTKY | 28480 | 1901-0633 |
| A11A2J1 | | | NOT ASSIGNED | | |
| A11A2J2 | 1250-0829 | | CONNECTOR-COAX; SMC; 50 OHM MALE | 98291 | 50-045-4610 |
| A11A2L1 | 9100-2254 | 1 | COIL; FXD; MOLDED RF CHOKE; .39UH 10% | 24226 | 10/390 |
| A11A2R1 | 0698-7233 | 1 | RESISTOR 750 OHM 2% .05W F TUBULAR | 24546 | C3-1/8-T0-750R-G |
| A11A3 | 08555-60062 | 1 | BOARD ASSY, SECOND CONVERTER FILTER | 28480 | 08555-60062 |
| A11A3C1 | 0180-0228 | | CAPACITOR-FXD; 22UF+-10% 15VDC TA-SOLID | 56289 | 1500226 X901582 |
| A11A3C2 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100MVDC CER | 28480 | 0160-2055 |
| A11A3C3 | 0180-0228 | | CAPACITOR-FXD; 22UF+-10% 15VDC TA-SOLID | 56289 | 1500226 X901582 |
| A11A3C4 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100MVDC CER | 28480 | 0160-2055 |
| A11A3MP1 | 0380-0059 | 1 | SPACER-RVT-ON KNRL .25-LG .152-ID .25-OD | 28480 | 0380-0059 |
| A11A3Q1 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A11A3Q2 | 1853-0020 | | TRANSISTOR PNP SI CHIP PD=300MW | 28480 | 1853-0020 |
| A11A3Q3 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A11A3Q4 | 1854-0071 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A11A3R1 | 2100-1776 | | RESISTOR; VAR; TRMR; 10KOHM 5% WW | 68027 | CT-100-4 |
| A11A3R2 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A11A3R3 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A11A3R4 | 0698-0083 | | RESISTOR 1.96K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1961-F |
| A12 | 08555-60070 | 1 | FIRST CONVERTER REPLACEMENT ASSY INCLUDES FIRST CONVERTER A12 AND MIXER COMPENSATION ASSY A16. A16 COMPONENTS ARE FACTORY SELECTED TO MATCH A12 ASSY. FIRST CONVERTER ASSY A12 FACTORY REPAIRABLE. | 28480 | 08555-60070 |
| | 08555-60072 | 1 | REBUILT EXCHANGE ASSY, INCL A12 & A16. | 28480 | 08555-60072 |
| A13 | 08555-60029 | 1 | ATTENUATOR ASSY THIS ASSY IS A SEALED UNIT. FACTORY REPAIR ONLY | 28480 | 08555-60029 |
| | 08555-60073 | | REBUILT EXCHANGE ASSY | 28480 | 08555-60073 |
| A14 | 08555-60008 | 1 | TUNING STABILIZER ASSY | 28480 | 08555-60008 |
| A14C1 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14C2 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14C3 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14C4 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14C5 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14C6 | 0160-2437 | | CAPACITOR-FXD 5000PF +80-20% 200MVDC CER | 28480 | 0160-2437 |
| A14MP1 | 0330-0178 | 1 | GASKET-SAMPLER 0.030" THICK | 07700 | 0330-0178 |
| A14MP2 | 08555-00012 | 1 | COVER, DISCRIMINATOR | 28480 | 08555-00012 |
| A14MP3 | 08555-00013 | 1 | COVER PLATES, AMPL VAR CRYSTAL OSC. | 28480 | 08555-00013 |
| A14MP4 | 08555-20045 | 1 | HOUSING, TUNING STABILIZER | 28480 | 08555-20045 |
| A14W1 | 08555-60018 | 2 | CABLE ASSY, PULSE AMPLIFIER | 28480 | 08555-60018 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-------------------------|----------------|-------------------------------------|---|------------------|------------------|
| A14 MISCELLANEOUS PARTS | | | | | |
| A14A1 | 0624-0078 | 3 | SCREW-TPG 6-32 PAN | 28480 | 0624-0078 |
| | 2200-0139 | | SCREW-MACH 4-40 PAN HD POZI REC SST-300 | 28480 | 2200-0139 |
| | 2200-0140 | | SCREW-MACH 4-40 100 DEG FL HD POZI REC | 28480 | 2200-0140 |
| | 6960-0059 | | PLUG, HOLE, ROUND HD, .187 DIA NYLON | 02768 | 207-120551-00 |
| | 08555-60057 | | BOARD ASSY, STABILIZER DISCRIMINATOR | 28480 | 08555-60057 |
| A14A1C1 | 0160-2055 | 1 | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0160-2055 |
| A14A1C2 | 0180-0197 | | CAPACITOR-FXC: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C3 | 0180-1743 | | CAPACITOR-FXD: .1UF+-10% 35VDC TA-SOLID | 56289 | 150D104X9035A2 |
| A14A1C4 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C5 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C6 | 0160-3533 | 2 | CAPACITOR-FXD 470PF +-5% 100WVDC MICA | 28480 | 0160-3533 |
| A14A1C7 | 0160-3533 | | CAPACITOR-FXD 470PF +-5% 100WVDC MICA | 28480 | 0160-3533 |
| A14A1C8 | 0160-3538 | | CAPACITOR-FXD 750PF +-5% 100WVDC MICA | 28480 | 0160-3538 |
| A14A1C9 | 0160-3538 | | CAPACITOR-FXD 750PF +-5% 100WVDC MICA | 28480 | 0160-3538 |
| A14A1C10 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C11 | 0160-2221 | 1 | CAPACITOR-FXD 1300PF +-5% 300WVDC MICA FACTORY SELECTED PART | 28480 | 0160-2221 |
| A14A1C13 | 0180-0197 | 1 | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C14 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0160-2055 |
| A14A1C15 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0160-2055 |
| A14A1C16 | 0160-2055 | 1 | CAPACITOR-FXD .01UF +80-20% 100WVDC CER | 28480 | 0160-2055 |
| A14A1C17 | 0160-2453 | | CAPACITOR-FXD .22UF +-10% 80WVDC POLYE | 84411 | HEW-238T |
| A14A1C18 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C19 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1C20 | 0180-0197 | | CAPACITOR-FXD: 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14A1CR1 | 1901-0518 | | 2 | DIODE-SCHOTTKY | 28480 | 1901-0518 |
| A14A1CR2 | 1901-0518 | DIODE-SCHOTTKY | | 28480 | 1901-0518 |
| A14A1CR3 | 1902-3104 | 1 | DIODE-ZNR 5.62V 5% DO-7 PD=.4W | 04713 | SZ 10939-110 |
| A14A1CR4 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A14A1L1 | 9100-1646 | 2 | COIL: FXD; MOLDED RF CHOKE; 430UH 5% | 24226 | 19/433 |
| A14A1L2 | 9100-1647 | | COIL: FXD; MOLDED RF CHOKE; 470UH 5% | 24226 | 19/473 |
| A14A1L3 | 9100-1646 | 1 | COIL: FXD; MOLDED RF CHOKE; 430UH 5% | 24226 | 19/433 |
| A14A1L4 | 9100-1644 | | COIL: FXD; MOLDED RF CHOKE; 330UH 5% | 24226 | 19/333 |
| A14A1L5 | 9140-0210 | | COIL: FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A14A1L6 | 9140-0210 | | COIL: FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A14A1L7 | 9140-0210 | | COIL: FXD; MOLDED RF CHOKE; 100UH 5% | 24226 | 15/103 |
| A14A1O1 | 1855-0081 | 1 | TRANSISTOR: J-FET N-CHAN, 0-MODE SI | 01295 | 2N5245 |
| A14A1O2 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A14A1O3 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A14A1O4 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A14A1O5 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A14A1O6 | 1854-0019 | 3 | TRANSISTOR NPN SI TO-18 PD=360MH | 28480 | 1854-0019 |
| A14A1O7 | 1854-0019 | | TRANSISTOR NPN SI TO-18 PD=360MH | 28480 | 1854-0019 |
| A14A1O8 | 1853-0034 | 2 | TRANSISTOR PNP SI CHIP TO-18 PD=360MH | 28480 | 1853-0034 |
| A14A1O9 | 1853-0034 | | TRANSISTOR PNP SI CHIP TO-18 PD=360MH | 28480 | 1853-0034 |
| A14A1O10 | 1854-0045 | 1 | TRANSISTOR NPN SI TO-18 PD=500MH | 28480 | 1854-0045 |
| A14A1R1 | 0683-1055 | 1 | RESISTOR 1M 5% .25W CC TUBULAR | 01121 | C81055 |
| A14A1R2 | 0698-3162 | | RESISTOR 46.4K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4642-F |
| A14A1R3 | 0698-3152 | | RESISTOR 3.48K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3481-F |
| A14A1R4 | 0698-3150 | | RESISTOR 2.37K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2371-F |
| A14A1R5 | 0698-3157 | | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A14A1R6 | 0757-0280 | 1 | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A14A1R7 | 0757-0405 | | RESISTOR 162 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-162R-F |
| A14A1R8 | 0698-0083 | | RESISTOR 1.96K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1961-F |
| A14A1R9 | 0757-0424 | | RESISTOR 1.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1101-F |
| A14A1R10 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A14A1R11 | 0698-3157 | 1 | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A14A1R12 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A14A1R13 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A14A1R14* | 0698-3434 | | RESISTOR 34.8 OHM 1% .125W F TUBULAR FACTORY SELECTED PART | 16299 | C4-1/8-T0-3488-F |
| A14A1R15 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A14A1R16 | 0757-0401 | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F | |
| A14A1R17 | 0698-3155 | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F | |
| A14A1R18 | 0698-3155 | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F | |
| A14A1R19 | 0698-3157 | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F | |
| A14A1R20 | 0698-3157 | 1 | RESISTOR 19.6K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1962-F |
| A14A1R21 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A14A1R22 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A14A1R23 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A14A1R24 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|--------------------|
| A1441R25 | 0757-0439 | | RESISTOR 6.81K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-6811-F |
| A1441R26 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A1441R27 | 0698-3154 | | RESISTOR 4.22K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4221-F |
| A1441R28 | 0757-0442 | | ** SEE SECTION VII RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A1441R29 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A1441R30 | 0757-0442 | | RESISTOR 10K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1002-F |
| A1441R31 | 0757-0401 | | RESISTOR 100 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-101-F |
| A1441R32 | 0698-3155 | | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A1441TP1 | 0360-1514 | | TERMINAL; SLD R STUD | 28480 | 0360-1514 |
| A1441TP2 | 0360-1514 | | TERMINAL; SLD R STUD | 28480 | 0360-1514 |
| A1441TP3 | 0360-1514 | | TERMINAL; SLD R STUD | 28480 | 0360-1514 |
| A1441TP4 | 0360-1514 | | TERMINAL; SLD R STUD | 28480 | 0360-1514 |
| A1441U1 | 1821-0001 | | IC LIN CA3046 TRANSISTOR ARRAY | 02735 | CA3046 |
| A1441U2 | 1820-0327 | 1 | IC DGLT SNT4 O1 N GATE | 01295 | SNT401N |
| A1442 | 08555-60099 | 1 | BOARD ASSY, VARIABLE CRYSTAL OSCILLATOR | 28480 | 08555-60099 |
| A1442C1 | 0160-3094 | | CAPACITOR-FXD .1UF +-10% 100VDC CER | 28480 | 0160-3094 |
| A1442C2 | 0121-0452 | 1 | CAPACITOR; VAR; TRMR; AIR; 1.3/5.4PF | 74970 | 187-0103-005 |
| A1442C3 | 0121-0451 | 1 | CAPACITOR; VAR; TRMR; AIR; 1.7/11PF | 74970 | 187-0106-005 |
| A1442C4 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A1442C5 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A1442C6 | | | NOT ASSIGNED | | |
| A1442C7 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A1442C8 | 0160-0134 | 1 | CAPACITOR-FXD 220PF +-5% 300VDC MICA | 28480 | 0160-0134 |
| A1442C9 | 0160-2204 | 1 | CAPACITOR-FXD 100PF +-5% 300VDC MICA | 28480 | 0160-2204 |
| A1442C10 | 0140-0198 | 1 | CAPACITOR-FXD 200PF +-5% 300VDC MICA | 72136 | DML5F201J0300WVICR |
| A1442C11 | 0180-0197 | | CAPACITOR-FXD; 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A1442C12 | 0180-0197 | | CAPACITOR-FXD; 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A1442C13 | 0180-0291 | | CAPACITOR-FXD; 1UF+-10% 35VDC TA-SOLID | 56289 | 1500105X9035A2 |
| A1442C14 | 0180-0291 | | CAPACITOR-FXD; 1UF+-10% 35VDC TA-SOLID | 56289 | 1500105X9035A2 |
| A1442C15 | 0180-0197 | | CAPACITOR-FXD; 2.2UF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A1442C16 | 0131-0004 | 1 | CAPACITOR; VAR; TRMR; MICA; 16/150PF | 72136 | T51410-9 |
| A1442C17 | 0180-0229 | | CAPACITOR-FXD; 33UF+-10% 10VDC TA-SOLID | 56289 | 1500336X901082 |
| A1442CR1 | 0122-0221 | 4 | DIO-VVC 100PF 10% C4/C25=2000000 MIN | 04713 | SMV315-221 |
| A1442CR2 | 0122-0221 | | DIO-VVC 100PF 10% C4/C25=2000000 MIN | 04713 | SMV315-221 |
| A1442CR3 | 0122-0221 | | DIO-VVC 100PF 10% C4/C25=2000000 MIN | 04713 | SMV315-221 |
| A1442CR4 | 0122-0221 | | DIO-VVC 100PF 10% C4/C25=2000000 MIN | 04713 | SMV315-221 |
| A1442CR5 | 1901-0040 | | DIOE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A1442CR6 | 1901-0040 | | DIOE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A1442CR7 | 1901-0040 | | DIOE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A1442CR8 | 1901-0025 | | DIOE-GEN PRP 100V 200MA | 28480 | 1901-0025 |
| A1442CR9 | 1901-0040 | | DIOE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A1442L1 | 9100-1656 | 1 | COIL; FXD; MOLDED RF CHOKE; 1.3MH 5% | 24226 | 22/134 |
| A1442L2 | 9100-3156 | 1 | DIO:47 UH 5% | 28480 | 9100-3156 |
| A1442L3 | 9140-0137 | | COIL; FXD; MOLDED RF CHOKE; 1MH 5% | 24226 | 19/104 |
| A1442L4 | 9140-0137 | | COIL; FXD; MOLDED RF CHOKE; 1MH 5% | 24226 | 19/104 |
| A1442L5 | 9140-0137 | | COIL; FXD; MOLDED RF CHOKE; 1MH 5% | 24226 | 19/104 |
| A1442L6 | 9140-0137 | | COIL; FXD; MOLDED RF CHOKE; 1MH 5% | 24226 | 19/104 |
| A1442O1 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A1442O2 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A1442O3 | 1854-0071 | | TRANSISTOR NPN SI PD=300MHZ FT=200MHZ | 28480 | 1854-0071 |
| A1442O4 | 1855-0020 | | TRANSISTOR; J-FET N-CHAN, D-MODE SI | 28480 | 1855-0020 |
| A1442O5 | 1854-0019 | | TRANSISTOR NPN SI TO-18 PD=360MH | 28480 | 1854-0019 |
| A1442O6 | 1853-0010 | 1 | TRANSISTOR PNP SI CHIP TO-18 PD=360MH | 28480 | 1853-0010 |
| A1442O7 | 1854-0332 | 1 | TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ | 28480 | 1854-0332 |
| A1442R1 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A1442R2 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A1442R3 | 0698-3247 | 1 | RESISTOR 4.53K .25% .125W F TUBULAR | 19701 | MF4C1/8-T2-4531-C |
| A1442R4 | 0698-7828 | 1 | RESISTOR 4.37K .25% .125W F TUBULAR | 30983 | MF52C1/4-T0-4371-C |
| A1442R5 | 0757-0428 | 2 | RESISTOR 1.62K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1621-F |
| A1442R6 | 0757-0428 | | RESISTOR 1.62K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1621-F |
| A1442R7 | 0698-3155 | | RESISTOR 4.64K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4641-F |
| A1442R8 | | | NOT ASSIGNED | | |
| A1442R9 | 0698-3153 | | RESISTOR 3.83K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-3831-F |
| A1442R10 | 0757-0440 | | RESISTOR 7.5K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-7501-F |
| A1442R11 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A1442R12 | 0757-0438 | | RESISTOR 5.11K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5111-F |
| A1442R13 | | | NOT ASSIGNED | | |
| A1442R14 | | | NOT ASSIGNED | | |
| A1442R15 | 0698-3151 | | RESISTOR 2.87K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2871-F |
| A1442R16 | 0757-0280 | | RESISTOR 1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1001-F |
| A1442R17 | 0698-0083 | | RESISTOR 1.96K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1961-F |
| A1442R18 | 0683-1005 | 1 | RESISTOR 10 OHM 5% .25W CC TUBULAR | 01121 | C81005 |
| A1442R19 | 0757-0459 | 1 | RESISTOR 56.2K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-5622-F |
| A1442R20 | 0698-3408 | 1 | RESISTOR 2.15K 1% .5W F TUBULAR | 19701 | MF7C1/2-T0-2151-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|------------------|
| A14A2R21 | 0757-0279 | 1 | RESISTOR 3.16K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-3161-F |
| A14A2R22 | 0757-0411 | | RESISTOR 332 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-332R-F |
| A14A2R23 | 0698-3156 | | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A14A2R24 | 0757-0444 | | RESISTOR 12.1K 1% .125W F TUBULAR | 24546 | C4-1/8-T0-1212-F |
| A14A2R25 | 0757-0416 | | RESISTOR 511 OHM 1% .125W F TUBULAR | 24546 | C4-1/8-T0-511R-F |
| A14A2R26 | 0698-3156 | 1 | RESISTOR 14.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-1472-F |
| A14A2R27 | 2100-1618 | | RESISTOR; VAR; TRMR; 1MOHM 20% C | 32997 | 3329H-1-105 |
| A14A2RT1 | 0837-0075 | 1 | THERMISTOR, NEG TC, 500 OHM DISC | 83186 | 25E12 |
| A14A2TP1 | 0360-1514 | 1 | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A14A2TP2 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A14A2TP3 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A14A2TP4 | 0360-1514 | | TERMINAL; SLDR STUD | 28480 | 0360-1514 |
| A14A2U1 | 1826-0013 | 1 | IC LIN AMPLIFIER | 28480 | 1826-0013 |
| A14A2W1 | 08555-60018 | 1 | CABLE ASSY, PULSE AMPLIFIER | 28480 | 08555-60018 |
| | 1250-1227 | | CONNECTOR-COAX; SMA; 50 OHM MALE | 28480 | 1250-1227 |
| | 8120-0229 | | CABLE, COAX, 50 OHM, .11 OD, 24AWG | 97145 | M15109 |
| A14A2XY1 | 1200-0770 | 1 | SOCKET, ELEC, XTAL 2-CONT HC-6/U PKG | 91506 | 8000-AG-26 |
| A14A2Y1 | 0410-0013 | 1 | CRYSTAL; QUARTZ 1MHZ | 28480 | 0410-0013 |
| A14A2Z1 | 9170-0029 | 1 | CORE, MAG, SHIELDING BEAD, .138 OD .047 | 02114 | 56-590-65A2/4A |
| A14A3 | 5086-7162 | | S-BAND SAMPLER:2-4 GHZ | 28480 | 5086-7162 |
| A15 | | | NOT ASSIGNED | | |
| A16 | | | SEE FIRST CONVERTER REPL. ASSY A12. | | |
| A16CR1 | 1901-0040 | 1 | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR2 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR3 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR4 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR5 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR6 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR7 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR8 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR9 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR10 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR11 | 1901-0040 | 1 | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR12 | 1901-0040 | | DIODE-SWITCHING 2NS 30V 50MA | 28480 | 1901-0040 |
| A16CR13 | 1902-3149 | | DIODE-ZNR 9.09V 5% DO-7 PD=.4W | 04713 | SZ 10939-170 |
| A16CR14 | 1902-3182 | | DIODE-ZNR 12.1V 5% DO-7 PD=.4W | 04713 | SZ 10939-206 |
| A16R1 | | | FACTORY SELECTED PART | | |
| A16R2 | | | FACTORY SELECTED PART | | |
| A16R3 | | | FACTORY SELECTED PART | | |
| A16R4 | | | FACTORY SELECTED PART | | |
| A16R5 | | | FACTORY SELECTED PART | | |
| A16R6 | | | FACTORY SELECTED PART | | |
| A16R7 | | | FACTORY SELECTED PART | | |
| A16R8 | | | FACTORY SELECTED PART | | |
| A16R9 | | | FACTORY SELECTED PART | | |
| A16R10 | | | FACTORY SELECTED PART | | |
| A16R11 | 0698-3158 | 2 | RESISTOR 23.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2372-F |
| A16R12 | | | FACTORY SELECTED PART | | |
| A16R13 | | | FACTORY SELECTED PART | | |
| A16R14 | | | FACTORY SELECTED PART | | |
| A16R15 | | | FACTORY SELECTED PART | | |
| A16R16 | | | FACTORY SELECTED PART | | |
| A16R17 | | | FACTORY SELECTED PART | | |
| A16R18 | | | FACTORY SELECTED PART | | |
| A16R19 | 0698-3158 | 1 | RESISTOR 23.7K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-2372-F |
| A16R20 | | | FACTORY SELECTED PART | | |
| A16R21 | | 1 | FACTORY SELECTED PART | | |
| A16R22 | | | FACTORY SELECTED PART | | |
| A16R23 | | | FACTORY SELECTED PART | | |
| A16R24 | 0698-0082 | | RESISTOR 464 OHM 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4640-F |
| A16R25 | 0698-3154 | | RESISTOR 4.22K 1% .125W F TUBULAR | 16299 | C4-1/8-T0-4221-F |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|---|----------------|-----|--|----------|-----------------|
| CHASSIS PARTS | | | | | |
| FOR CHASSIS SHEET METAL PARTS. SEE FIGURE 6-1 FOR I.P.B. | | | | | |
| AT1 | 11593A | 3 | TERMINATION, 50-OHM | 28480 | 11593A |
| AT2 | 11593A | | TERMINATION, 50-OHM | 28480 | 11593A |
| AT3 | 11593A | | TERMINATION, 50-OHM | 28480 | 11593A |
| AT4 | 08553-60122 | 1 | LOAD ASSY, 50-OHM | 28480 | 08553-60122 |
| AT5 | 0960-0084 | 2 | ISOLATOR:2-PORT 2-4 GHZ | 28480 | 0960-0084 |
| AT6 | 0960-0084 | | ISOLATOR:2-PORT 2-4 GHZ | 28480 | 0960-0084 |
| CR1 | 1901-0159 | | DIODE-PWR RECT 400V 750MA | 04713 | SRI358-4 |
| CR2 | 1901-0159 | | DIODE-PWR RECT 400V 750MA | 04713 | SRI358-4 |
| DS1 | 2140-0259 | 1 | LAMP, INCAND, BULB T-1, 12V | 71744 | CM32 |
| | 1450-0153 | 1 | LIGHT; IND; LAMPHOLDER | 08717 | 1025-R BODY |
| | 1450-0371 | 1 | LIGHT; IND; LENS CAP; AMB TL LENS | 08717 | 102-A-STD LENS |
| FL1 | | | SEE A11FL1. | | |
| FL2 | 0960-0085 | 1 | FILTER:LOW PASS 550 & 2050 MHZ | 28480 | 0960-0085 |
| J1 | 1250-0914 | 1 | BODY:RF CONNECTOR (TYPE N) | 90949 | 131-150 |
| J1 | 1250-0909 | 1 | BODY:FEMALE, RF CONNECTOR(APC-7,OPT 001) | 90949 | 131-1057 |
| J1 | 1250-0915 | 1 | CONTACT:RF CONNECTOR (TYPE N) STANDARD | 71785 | 131-149 |
| J1 | 1250-0816 | 1 | PIN,FEMALE,RF CONNECTOR(APC-7,OPT 001) | 02660 | 131-1054 |
| J1 | 5040-0306 | 1 | INSULATOR | 28480 | 5040-0306 |
| J1 | 08555-20093 | 1 | CONTACT, JACK | 28480 | 08555-20093 |
| J1 | 08555-20094 | 1 | BODY, BULKHEAD | 28480 | 08555-20094 |
| J1 | 2190-0104 | 1 | WASHER, LOCK 0.0439" ID | 78189 | 1922-04 |
| J1 | 2950-0132 | 1 | NUT, HEX 7/16-28 | 73734 | 76500NP |
| J1 | 08761-2027 | 1 | INSULATOR | 28480 | 08761-2027 |
| J2 | | | NOT ASSIGNED | | |
| J5 | | | CONNECTOR: 62-CONT; MALE; RECTANGULAR | 00779 | 204507-1 |
| J6 | 1251-3478 | 1 | CONTACT; CONN; FOR USE WITH RECTANGULAR | 00779 | 204370-5 |
| J6 | 1251-3480 | 1 | CONTACT; CONN; FOR USE WITH RECTANGULAR | 00779 | 204370-5 |
| K1 | 3106-0009 | 3 | SWITCH, COAXIAL SPDT | 74868 | 315-10053-2 |
| K2 | 3106-0009 | | SWITCH, COAXIAL SPDT | 74868 | 315-10053-2 |
| K3 | 3106-0009 | | SWITCH, COAXIAL SPDT | 74868 | 315-10053-2 |
| FOR CHASSIS SHEET METAL PARTS. SEE FIGURE 6-1 FOR I.P.B. | | | | | |
| P1 | | | NOT ASSIGNED | | |
| P2 | 1251-0055 | 1 | CONNECTOR, 24-CONT, MALE, BLUE RIBBON | 71785 | 26-4100-24P |
| P3 | 1251-2081 | 1 | CONNECTOR, 43-CONT, MALE, D SERIES | 71785 | DDM-43W2-P |
| P4 | 1251-2366 | 1 | CONNECTOR, 8-CONT, D SERIES | 71785 | DCM-8W8S |
| P5 | 1251-1286 | 1 | CONNECTOR, 17-CONT, FEM, D SERIES | 71785 | DCM-17W5S |
| P6 | | | SEE A1P6. | | |
| W1 | 08555-20076 | 1 | CABLE ASSY, RF INPUT TO A13J1 | 28480 | 08555-20076 |
| W2 | 08555-20075 | 1 | CABLE ASSY,A13J2 TO A12J1. | 28480 | 08555-20075 |
| W3 | 08555-20078 | 1 | CABLE ASSY, EXT MIXER TO A12J2. | 28480 | 08555-20078 |
| W4 | 08555-20105 | 1 | CABLE ASSY | 28480 | 08555-20105 |
| W5 | 08555-20089 | 1 | CABLE ASSY, A12J4 TO A76J1. | 28480 | 08555-20089 |
| W6 | 08555-20079 | 1 | CABLE ASSY, A12J3 TO A75J1. | 28480 | 08555-20079 |
| W7 | 08555-20080 | 1 | CABLE ASSY, A75J2 TO K1J2. | 28480 | 08555-20080 |
| W8 | 08555-20082 | 1 | CABLE ASSY, A12J6 TO K1J1 | 28480 | 08555-20082 |
| W9 | 08555-20081 | 1 | CABLE ASSY, K1J3 TO FL1J1. | 28480 | 08555-20081 |
| W10 | 08555-20077 | 1 | CABLE ASSY, FL1J2 TO FL2J1. | 28480 | 08555-20077 |
| W11 | 08555-20086 | 1 | CABLE ASSY, FL2J2 TO K3J3. | 28480 | 08555-20086 |
| W12 | 08555-20083 | 1 | CABLE ASSY, K3J2 TO K2J2. | 28480 | 08555-20083 |
| W13 | 08555-20087 | 1 | CABLE ASSY, K3J1 TO A11J1. | 28480 | 08555-20087 |
| W14 | 08555-20085 | 1 | CABLE ASSY, A11J4 TO K2J1. | 28480 | 08555-20085 |
| W15 | 08555-20092 | 1 | CABLE ASSY,A11J3 TO SECOND LO OUTPUT. | 28480 | 08555-20092 |
| W16 | 08555-60067 | 1 | CABLE ASSY, K2J3 TO A2J1. | 28480 | 08555-60067 |
| W17 | 08555-60016 | 1 | CABLE ASSY, A2J3 TO P4. | 28480 | 08555-60016 |
| W18 | 08555-60013 | 1 | CABLE ASSY, A2J2 TO P3. | 28480 | 08555-60013 |
| W19 | 08555-20090 | 1 | CABLE ASSY, A76J2 TO A14A3J1. | 28480 | 08555-20090 |
| W20 | 08555-20091 | 1 | CABLE ASSY,A14A3J2 TO FIRST LO OUTPUT. | 28480 | 08555-20091 |
| W21 | 08555-60096 | 1 | CABLE ASSY,BLANKING P3-13 TO P4-A7. | 28480 | 08555-60096 |
| W22 | 08555-60015 | 1 | CABLE ASSY,P3-A2 TO P4-A4. | 28480 | 08555-60015 |
| W23 | 08555-60014 | 1 | CABLE ASSY, P3-A1 TO P4-A3. | 28480 | 08555-60014 |
| W24 | 08555-60066 | 1 | CABLE ASSY, A2J4 TO P5-A2. | 28480 | 08555-60066 |
| W25 | 08555-60022 | 2 | CABLE ASSY, A10-968 TO P5-A3. | 28480 | 08555-60022 |
| W26 | 08555-60022 | | CABLE ASSY, A10-968 TO P4-A5. | 28480 | 08555-60022 |
| W27 | 08555-60024 | 1 | CABLE ASSY, A10-968 TO P4-A6. | 28480 | 08555-60024 |
| W28 | 08555-60023 | 1 | CABLE ASSY, A10-925 TO P5-A4. | 28480 | 08555-60023 |
| W29 | | | WIRE:24-AWG, WHITE (4.5") | | |
| W29 | 1200-0063 | 1 | LUG:CRIMP | 28480 | 1200-0063 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|---------------------------------|----------------------------|-----|--|----------------|----------------------------|
| XA1 XA2 XA3 | 1251-2581 | 1 | NOT ASSIGNED NOT ASSIGNED HOUSING STRIP:9 MALE CONTACT (MATES WITH 1251-2583). | 71468 | CTA4-1P-9 |
| XA3 | 1251-2570 | 1 | CONTACT, CONN, U/W MICRO SER, MALE | 71468 | 031-9540-000 |
| XA4 XA5 XA6 XA7 XA8 | | | SEE A10XA4 THRU XA8. SEE A10XA4 THRU XA8. SEE A10XA4 THRU XA8. SEE A10XA4 THRU XA8. SEE A10XA4 THRU XA8. | | |
| | 08555-00043 08555-00044 | 1 | MISCELLANEOUS PARTS PANEL, FRONT (MINT GRAY) PLATE, CONNECTOR (OLIVE BLACK) | 28480 28480 | 08555-00043 08555-00044 |

See introduction to this section for ordering information

Table 6-2. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---------------------------------------|----------|-----------------|
| CHASSIS PARTS | | | | | |
| MP1 | 08555-00024 | 1 | GUSSET, LEFT | 28480 | 08555-00024 |
| MP2 | 08555-00022 | 1 | PANEL, REAR | 28480 | 08555-00022 |
| MP2A | 08555-00022 | 1 | SHIELD, CONNECTOR | 28480 | 08555-00022 |
| MP3 | 08555-00018 | 1 | SUPPORT, FIRST CONVERTER | 28480 | 08555-00018 |
| MP4 | 08555-00023 | 1 | GUSSET, RIGHT | 28480 | 08555-00023 |
| MP5 | 08555-00016 | 1 | COVER, TOP | 28480 | 08555-00016 |
| MP6 | 08555-00017 | 1 | COVER, BOTTOM | 28480 | 08555-00017 |
| MP6A | 5040-0274 | 1 | FOOT, PLUG-IN | 28480 | 5040-0274 |
| MP7 | 08555-20001 | 1 | PLATE, CONNECTOR | 28480 | 08555-20001 |
| MP8 | 08555-00019 | 1 | DECK, MAIN | 28480 | 08555-00019 |
| MP9 | 08555-20027 | 4 | SPACER, YIG COVER | 28480 | 08555-20027 |
| MP10 | 08555-00025 | 1 | COVER, YIG | 28480 | 08555-00025 |
| MP11 | 08555-00042 | 1 | BASE, YIG | 28480 | 08555-00042 |
| MP12 | 08555-60012 | 1 | YOKE, ASSY | 28480 | 08555-60012 |
| | 0510-0045 | 6 | RETAINER, RING, .188 DIA, CAD PLT STL | 97464 | 1000-18-ST-CD |
| | 1460-1205 | 2 | SPRING, TORSION | 28480 | 1460-1205 |
| | 3C50-0032 | 2 | WASHER-FL MTLG NO. 10 .189 IN D .312 | 28480 | 3050-0032 |
| | 08555-00026 | 1 | YOKE | 28480 | 08555-00026 |
| | 08555-00027 | 1 | LATCH, RIGHT | 28480 | 08555-00027 |
| | 08555-00028 | 1 | LATCH, LEFT | 28480 | 08555-00028 |
| MP13 | 08555-00029 | 1 | STIFFENER, BRACKET | 28480 | 08555-00029 |
| MP13A | 0400-0018 | 4 | GROMMET, CHANNEL U-SHAPED | 95987 | MG-101 |
| MP14 | 08555-00021 | 1 | SHIELD, BOARD | 28480 | 08555-00021 |

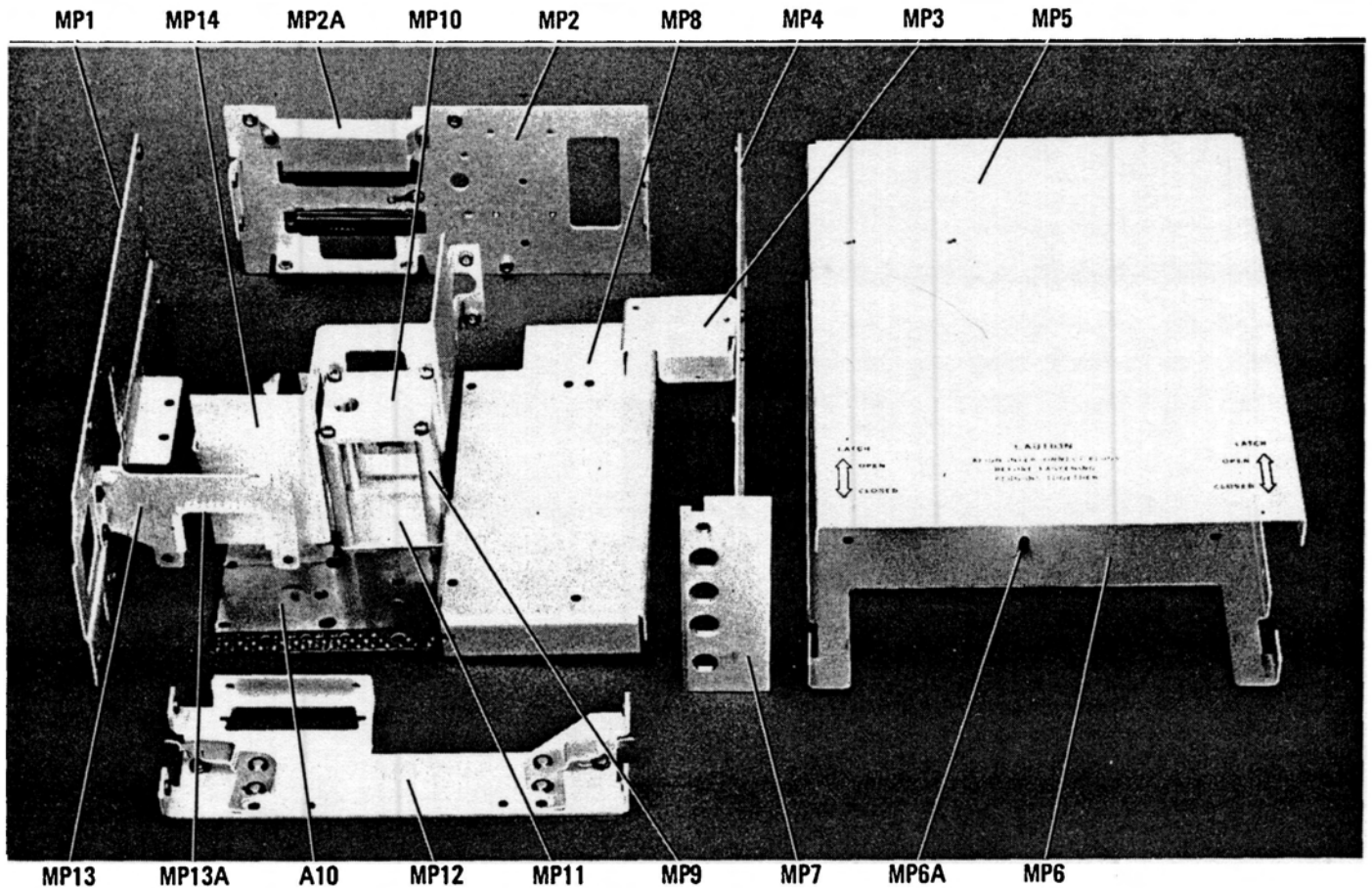


Figure 6-1. Chassis Sheetmetal Illustrated Parts Breakdown

Table 6-4. Code List of Manufactures

| Mfr Code | Manufacturer Name | Address | Zip Code |
|----------|-------------------------------------|------------------------|----------|
| 68027 | NEOHM | ENGLAND | |
| 00000 | U.S.A. COMMON | ANY SUPPLIER OF U.S.A. | |
| 00213 | SAGE ELECTRONICS CORP | ROCHESTER NY | 14610 |
| 00779 | AMP INC | HARRISBURG PA | 17105 |
| 01121 | ALLEN BRADLEY CO | MILWAUKEE WI | 53212 |
| 01295 | TEXAS INSTR INC SEMICOND CMPNT DIV | DALLAS TX | 75231 |
| 01884 | SPRAGUE ELECTRIC DEARBORN ELEK DIV | LONGWOOD FL | 32750 |
| 02114 | FERROXCUBE CORP | SAUGERTIES NY | 12477 |
| 02660 | BUNKER RAMO CORP AMPHENOL CONN DIV | BROADVILLE IL | 60153 |
| 02735 | RCA CORP SOLID STATE DIV | SOMMERVILLE NJ | 08876 |
| 02768 | ILLINOIS TOOL WORKS INC FASTEX DIV | DES PLAINES IL | 60016 |
| 03877 | TRANSITRON ELECTRONIC CORP | WAKEFIELD MA | 01880 |
| 03888 | PYROFILM CORP | WHIPPANY NJ | 07981 |
| 04713 | MOTOROLA SEMICONDUCTOR PRODUCTS | PHOENIX AZ | 85008 |
| 04866 | NYLOK-DETROIT CORP | TROY MI | 48084 |
| 05574 | VIKING INDUSTRIES INC | CHATSWORTH CA | 91311 |
| 07145 | TIMES WIRE & CABLE DIV INTL SILVER | WALLINGFORD CT | 06492 |
| 07700 | TECHNICAL WIRE PRODUCTS INC | CRANFORD NJ | 07016 |
| 07953 | SALTER GEORGE A | EAGLEVILLE PA | 19408 |
| 08717 | SLOAN CO THE | SUN VALLEY CA | 91352 |
| 14140 | EDISON ELEK DIV MCGRAW-EDISON | MANCHESTER NH | 03130 |
| 15915 | TEPRO OF FLORIDA INC | DUNEDIN FL | 33528 |
| 16299 | CORNING GL WK ELEK CMPNT DIV | RALEIGH NC | 27604 |
| 18324 | SIGNETICS CORP | SUNNYVALE CA | 94086 |
| 19701 | HEPCO/ELECTRA CORP | MINERAL WELLS TX | 76067 |
| 2K497 | CABLEWAVE SYSTEMS INC | NORTH HAVEN CT | 06473 |
| 20940 | MICRO-OHM CORP | EL MONTE CA | 91731 |
| 24226 | GOWANDA ELECTRONICS CORP | GOWANDA NY | 14070 |
| 24546 | CORNING GLASS WORKS | BRADFORD PA | 16701 |
| 24931 | SPECIALTY CONNECTOR CO INC | INDIANAPOLIS IN | 46227 |
| 28480 | HEWLETT-PACKARD CO CORPORATE HQ | PALO ALTO CA | 94304 |
| 30983 | HEPCO/ELECTRA CORP | SAN DIEGO CA | 92121 |
| 32997 | BOURNS INC TRIMPOT PROD DIV | RIVERSIDE CA | 92507 |
| 54294 | CUTLER-HAMMER-INC SMALLCROSS MFG CO | SELMA NC | 27576 |
| 56289 | SPRAGUE ELECTRIC CO | NORTH ADAMS MA | 01247 |
| 71450 | CTS CORP | ELKHART IN | 46514 |
| 71468 | ITT CANNON ELECTRIC CO | SANTA ANA CA | 92702 |
| 71744 | CHICAGO MINIATURE LAMP WORKS | CHICAGO IL | 60640 |
| 71785 | TRW ELEK COMPONENTS CINCH DIV | ELK GROVE VILLAGE IL | 60007 |
| 72136 | ELECTRO MOTIVE MFG CO INC | WILLIMANTIC CT | 06226 |
| 72982 | ERIE TECHNOLOGICAL PRODUCTS INC | ERIE PA | 16512 |
| 73734 | FEDERAL SCREW PRODUCTS CO | CHICAGO IL | 60618 |
| 73899 | J F D ELECTRONICS CORP | BROOKLYN NY | 11219 |
| 73957 | GROOV-PIN CORP | RIDGEFIELD NJ | 07657 |
| 74970 | JOHNSON E F CO | WASECA MN | 56093 |
| 78189 | ILLINOIS TOOL WORKS INC SHAKEPROOF | ELGIN IL | 60126 |
| 83186 | VICTORY ENGINEERING CORP | SPRINGFIELD NJ | 07081 |
| 84411 | TRW CAPACITOR DIV | OGALLALA NE | 69153 |
| 9D949 | AMPHENOL SALES DIV OF BUNKER-RAMO | HAZELWOOD MO | 63042 |
| 91506 | AUGAT INC | ATTLEBORO MA | 02703 |
| 97464 | INDUSTRIAL RETAINING RING CO | IRVINGTON NJ | 07111 |
| 98291 | SEAELECTRO CORP | MAHARONECK NJ | 10544 |
| 28480 | HEWLETT-PACKARD CO CORPORATE HQ | PALO ALTO CA | 94304 |
| 95987 | WECKESSER CO INC | CHICAGO IL | 60641 |
| 97464 | INDUSTRIAL RETAINING RING CO | IRVINGTON NJ | 07111 |

SECTION VII MANUAL CHANGES

7-1. INTRODUCTION

7-2. 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.

ber. 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 below, it may be documented in a yellow MANUAL CHANGES supplement. 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 Number | Make Manual Changes |
|------------------------------|---------------------|
| 1429A | A |
| 1416A | A,B |
| 1343A03186 thru 1343A Prefix | A - C |
| 1343A02986 thru 1343A03185 | A - D |
| 1326A | A - E |
| 1325A | A - F |
| 1311A | A - G |
| 1232A01936 thru 1232A Prefix | A - H |
| 1232A to 01935 | A - I |
| 1219A | A - J |
| 1203A | A - K |

| Serial Prefix or Number | Make Manual Changes |
|-------------------------|-------------------------|
| 1143A | A - L |
| 1138A | A - M, and N |
| 1116A00560 to 00760 | A - M, O (N deleted) |
| 1116A to 00560 | A - M, O, P |
| 1114A | A - M, O - Q |
| 1043A00261 to 00335 | A - M, O - R |
| 1043A00161 to 00260 | A - M, O - S |
| 1043A to 00160 | A - M, O - T |
| 987-00120 to 00140 | A - M, O - U |
| 987- to 00120 | A - M, O - V |

7-5. MANUAL CHANGE INSTRUCTIONS

CHANGE A

Page 6-5, Table 6-2:

Delete all items from A2A2C1 through A2A2U2.

Add the following items:

| | |
|---------|--|
| A2A2C1 | HP Part No. 0180-0058, C: FXD AL ELECT 50 UF +75-10% 25 VDCW |
| A2A2C2 | HP Part No. 0180-0197, C: FXD ELECT 2.2 UF 10% 20 VDCW |
| A2A2C3 | HP Part No. 0170-0066, C: FXD MY 0.027 UF 10% 200 VDCW |
| A2A2C4 | HP Part No. 0180-0197, C: FXD ELECT 2.2 UF 10% 20 VDCW |
| A2A2CR1 | HP Part No. 1901-0025, DIODE: SILICON 100 MA/1V |
| A2A201 | HP Part No. 1853-0020, TSTR: SI PNP (SELECTED FROM 2N3702) |
| A2A202 | HP Part No. 1853-0020, TSTR: SI PNP (SELECTED FROM 2N3702) |
| A2A203 | HP Part No. 1854-0071, TSTR: SI NPN (SELECTED FROM 2N3704) |
| A2A204 | HP Part No. 1854-0071, TSTR: SI NPN (SELECTED FROM 2N3704) |
| A2A2R1 | HP Part No. 0757-0442, R: FXD MET FLM 10.0K OHM 1% 1/8W |
| A2A2R2 | HP Part No. 0757-0346, R: FXD MET FLM 10 OHM 1% 1/8W |
| A2A2R3 | HP Part No. 0757-0464, R: FXD MET FLM 90.9K OHM 1% 1/8W |
| A2A2R4 | HP Part No. 0757-0459, R: FXD MET FLM 56.2K OHM 1%, 1/8W |
| A2A2R5 | HP Part No. 2100-1775, R: VAR WW 5K OHM 5% TYPE H 1W |
| A2A2R6 | HP Part No. 0698-7267, R: FXD MET FLM 19.6K OHM 2% 1/8W |
| A2A2R7 | HP Part No. 0698-7248, R: FXD FLM 3.16K OHM 2% 1/8W |
| A2A2R8 | HP Part No. 0698-7245, R: FXD MET FLM 2.3K OHM 2% 1/8W |
| A2A2R9 | HP Part No. 0698-7195, R: FXD MET FLM 19.6 OHM 2% 1/8W |
| A2A2R10 | HP Part No. 0698-7253, R: FXD MET FLM 5.11K OHM 2% 1/8W |
| A2A2R11 | HP Part No. 0698-7247, R: FXD FLM 2.87K OHM 2% 1/8W |
| A2A2R12 | HP Part No. 0698-7240, R: FXD MET FLM 1.47K OHM 2% 1/8W |
| A2A2R13 | HP Part No. 2100-1774, R: VAR WW 2K OHM 5% TYPE H 1W |
| A2A2R14 | HP Part No. 0698-7240, R: FXD MET FLM 1.47K OHM 1% 1/8W |
| A2A2R15 | HP Part No. 0757-0420, R: FXD MET FLM 750 OHM 1% 1/8W |
| A2A2R16 | HP Part No. 0757-0420, R: FXD MET FLM 750 OHM 1% 1/8W |
| A2A2R16 | FACTORY SELECTED PART |

Page 8-20, Service Sheet 4:

Delete paragraphs **1** and **2**Add paragraphs **1** and **2** as follows:**1** 500 MHz LO Drive A2A2

The 500 MHz LO Driver sets the collector voltage and emitter currents for transistors in the 500 MHz LO. In all operating modes the collector voltage is set by a factory selected resistor A2A2R16 to a fixed level. In all modes, except Signal Identifier, the emitter current is set to a fixed level by the frequency linearity adjustment resistor A2A2R13. In the Signal Identifier operating mode, a voltage is applied to the 500 MHz LO Driver on alternate sweep scans. The input voltage level in the range of .02 and 10.0 volts, is determined by the signal identifier attenuator on the SCAN WIDTH PER DIVISION switch. (See Service Sheet 6.) This voltage will be positive if the BAND is set to a n- Band and will be negative if set to a n+ Band. The LO driver converts the change in voltage level to a change in emitter current to the transistors in the 500 MHz LO. The change in emitter current results in a frequency shift.

CHANGE A (cont'd)

2 500 MHz LO A2A4

The 500 MHz LO is a two-transistor oscillator that normally operates at a fixed frequency. In the Signal Identifier operating mode, the frequency of the LO is shifted on alternate scans by changing the transistor emitter currents. The amount of shift will be twice the setting of the SCAN WIDTH PER DIVISION switch (i.e., between 4 kHz and 2 MHz).

Note: The Signal Identifier mode is disabled above switch settings of 1 MHz. The oscillator shift will be positive for n+ Bands and negative for n- Bands. The LO output is coupled to the 550/50 MHz mixer and to the rear panel as a test point or for use with auxiliary equipment.

Delete paragraph **1**

Add paragraph **1** as follows:

1 500 MHz LO DRIVE A2A2 TROUBLESHOOTING PROCEDURE

Remove bottom section of third converter from the RF Section chassis (see third converter removal and replacement procedure, Service Sheet 18). Connect +20 volts to A2C1/C2 and -10 volts to A2C3 from dual power supply. Measure current drawn from power supply. Approximately 28 mA should be drawn from the 20 volt source and 16 mA from the 10 volt source.

Connect a -10 volt source to test point A2A2TPA (Signal Identifier Input) and measure voltage at A2A2TPB. Voltage level should be approximately +8.6 Vdc. Connect a +10 volt source to A2C4 and repeat measurement. Voltage level should be approximately +5.4 Vdc. (Zero volts input produce approximately +7V.)

Perform voltage measurements as listed below:

Unit of measurement: Vdc; tolerance ±0.1 Vdc.

| | Emitter | Base | Collector |
|--------|---------|-------|-----------|
| A2A2Q1 | +0.6 | 0 | -9.2 |
| A2A2Q2 | +0.6 | 0 | -9.9 |
| A2A2Q3 | -9.9 | -9.2 | -5.8 |
| A2A2Q4 | +19.0 | +19.6 | +20.0 |

Delete Figure 8-23, 500 MHz LO Drive Assembly A2A2.

Add the Figure 8-23, 500 MHz LO Drive Assembly A2A2 shown here as Figure 7-1.

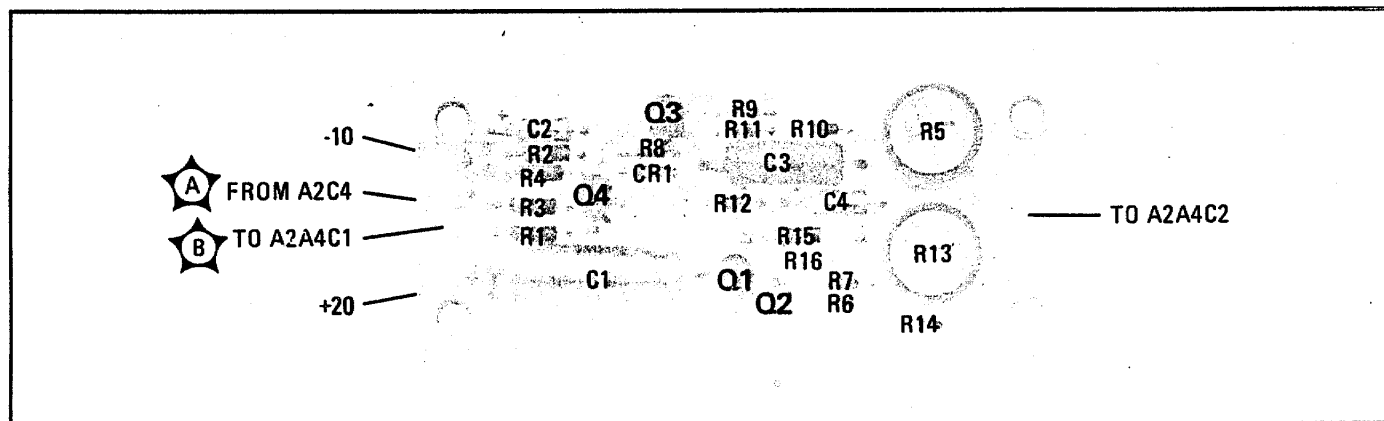


Figure 7-1. 500 MHz LO Drive Assembly A2A2 (P/O Change A)

CHANGE A (cont'd)

Page 8-21, Service Sheet 4:

Delete Figure 8-24. 500 MHz LO Assembly A2A4.

Add the Figure 8-24. 500 MHz LO Assembly A2A4 shown here as Figure 7-2.

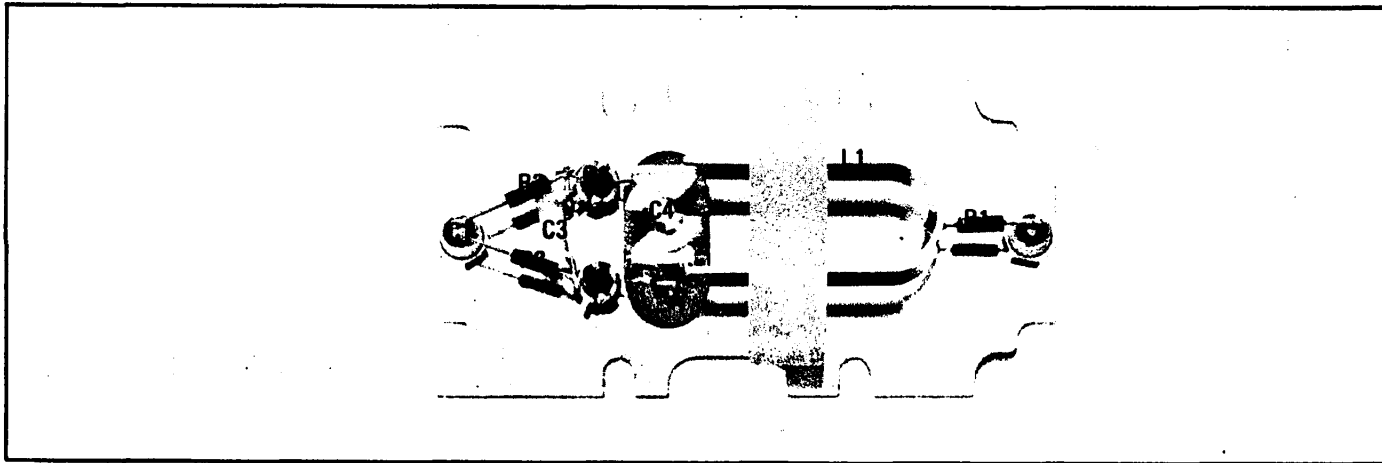
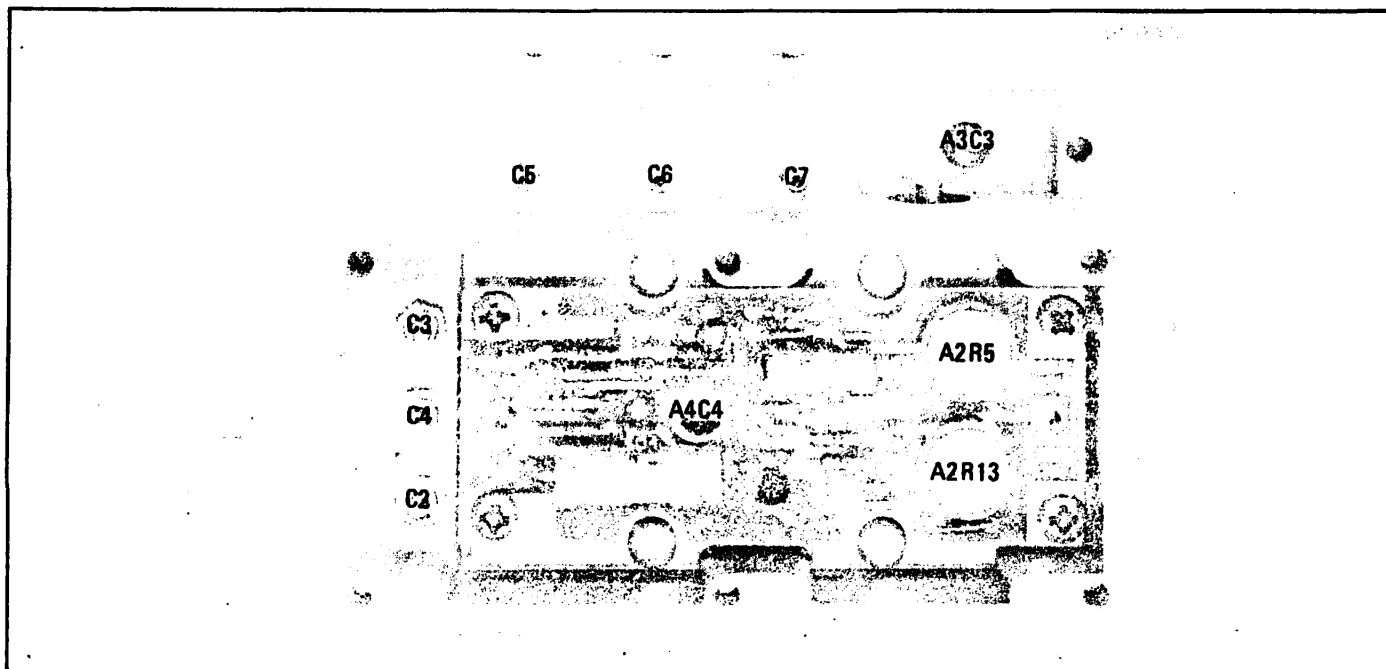


Figure 7-2. 500 MHz LO Assembly A2A4 (P/O Change A)

Delete Figure 8-27. Third Converter Assembly A2, Bottom View.

Add the Figure 8-27. Third Converter Assembly A2, Bottom View, shown here as Figure 7-3.



*Figure 7-3. Third Converter Assembly A2, Bottom View
(P/O Change A)*

CHANGE A (cont'd)

Page 8-21, Service Sheet 4:

Delete Figure 8-24. 500 MHz LO Assembly A2A4.

Add the Figure 8-24. 500 MHz LO Assembly A2A4 shown here as Figure 7-2.

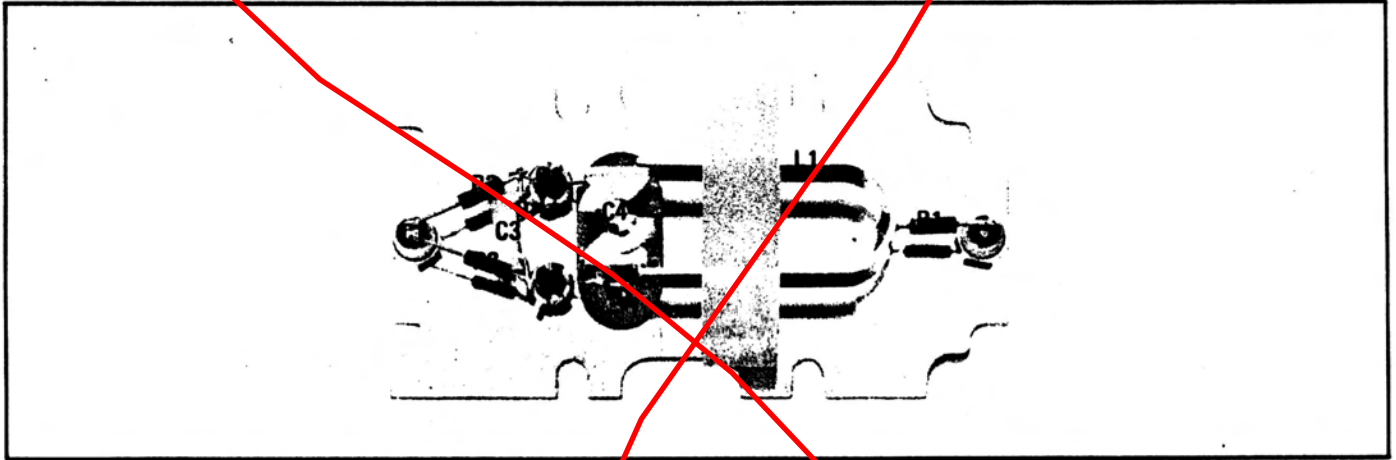


Figure 7-2. 500 MHz LO Assembly A2A4 (P/O Change A)

Delete Figure 8-27. Third Converter Assembly A2, Bottom View.

Add the Figure 8-27. Third Converter Assembly A2, Bottom View, shown here as Figure 7-3.

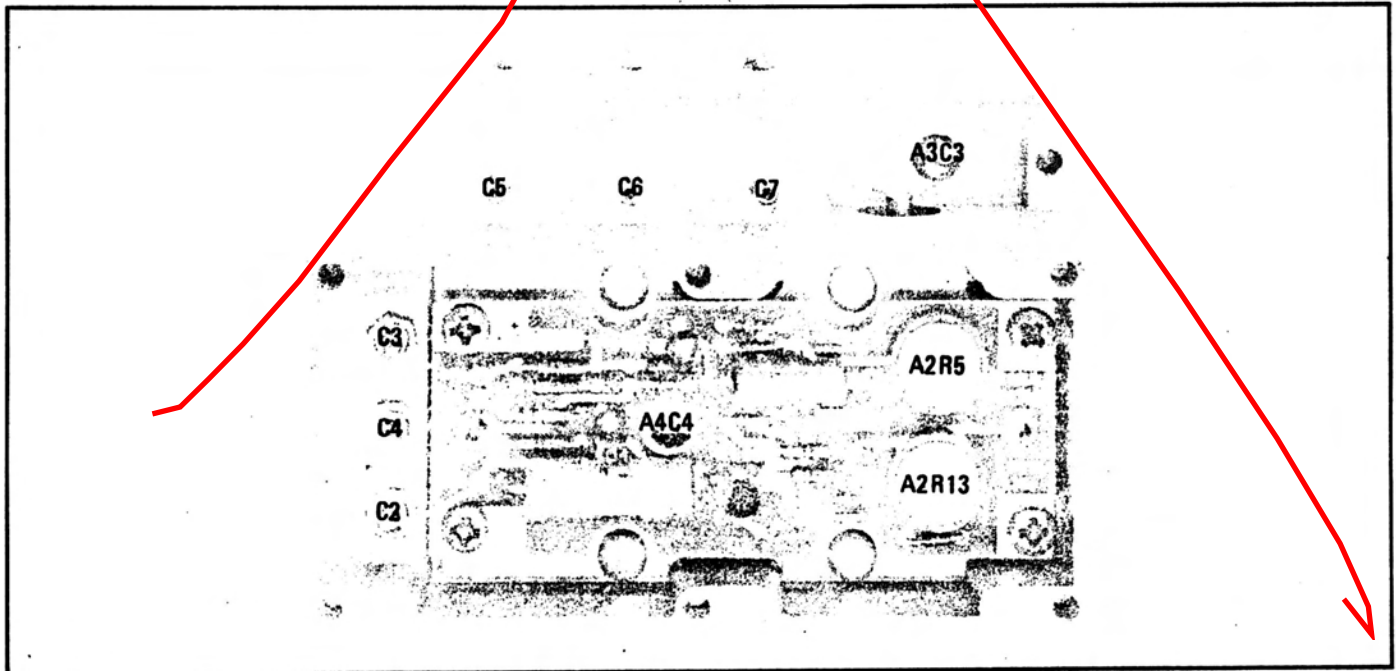


Figure 7-3. Third Converter Assembly A2, Bottom View (P/O Change A)

CHANGE A (cont'd)

Page 8-21 (cont'd)

Delete Assemblies A2A2 and A2A4 of Schematic Diagram Figure 8-28, Third Converter.

Add schematic of Assemblies A2A2 and A2A4 of Figure 8-28, Third Converter, shown here as Figure 7-4.

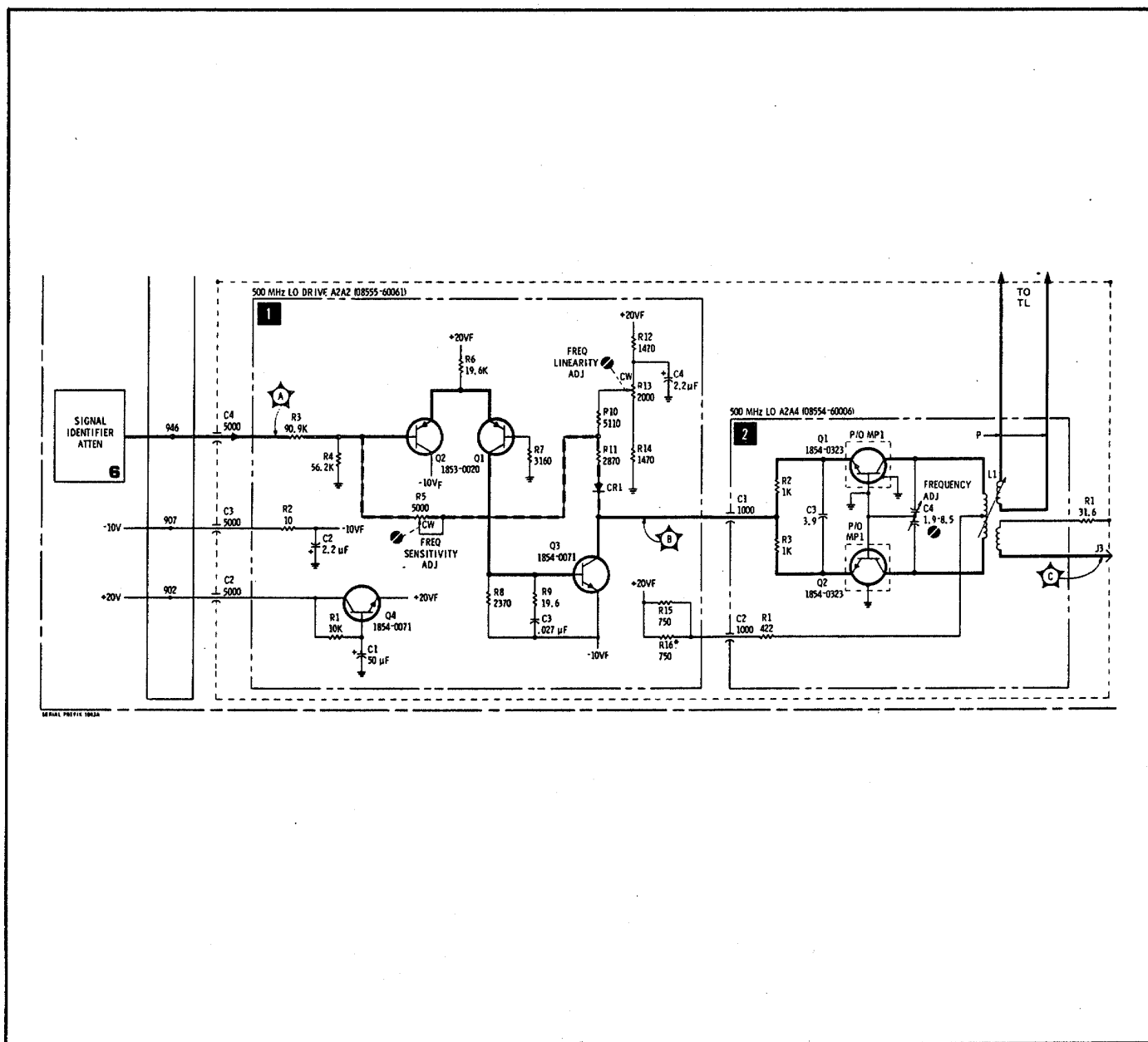


Figure 7-4. P/O Service Sheet 4, Figure 8-28, Third Converter (P/O Change A)

CHANGE B

Page 6-12, Table 6-2:

- Delete A11A1C1*, 0160-4052, C: FXD 0.6 PF
- A11A1C1, 0160-3549, C: FXD 0.5 PF
- A11A1C1, 0160-3536, C: FXD 0.4 PF
- Add A11A1C1, 0160-3636, C: FXD 0.4 PF

Page 6-13, Table 6-2:

- Delete A11A1Q1 and Q2, type 35824A, TRANSISTOR, NPN.
- Add A11A1Q1 and Q2, type 1854-0292, TRANSISTOR, NPN.

Page 8-19, Service Sheet 3:

- Change A11A1Q1 and Q2 from type 35824A to type 1854-0292.
- Change A11A1C1* from 0.6 PF to 0.4 PF.
- Delete NOTE 2.

CHANGE C

Page 6-16, Table 6-2:

- Add A16CR11 and A16CR12, 1901-0040, DIODE: SIL 30 MA 30 VDCW, 07263, FDG1088.
- Add A16CR13, 1902-3149, DIODE: ZEN 9.09V 28480, 1902-3149.
- Add A16CR14, 1902-3182, DIODE: ZEN 12.1V 28480, 1902-3182.
- Add A16R24*, 0698-0082, R: FXD 464 OHM 1% 1/8W FACTORY SELECTED PART.
- Add A16R25, 0698-3154, R: FXD 4.22K OHM 1% 1/8W FACTORY SELECTED PART.

Page 8-2, Table 8-1:

- Add A16R24; Input Mixer Bias; $n=1^{\pm}$, 3^{\pm} Bias Compensation.
- Add A16R25; Input Mixer Bias; $n=4^{\pm}$ Bias Compensation.

Page 8-17, Figure 8-17, Service Sheet 2:

Change components as shown in the following partial schematic (Figure 7-5):

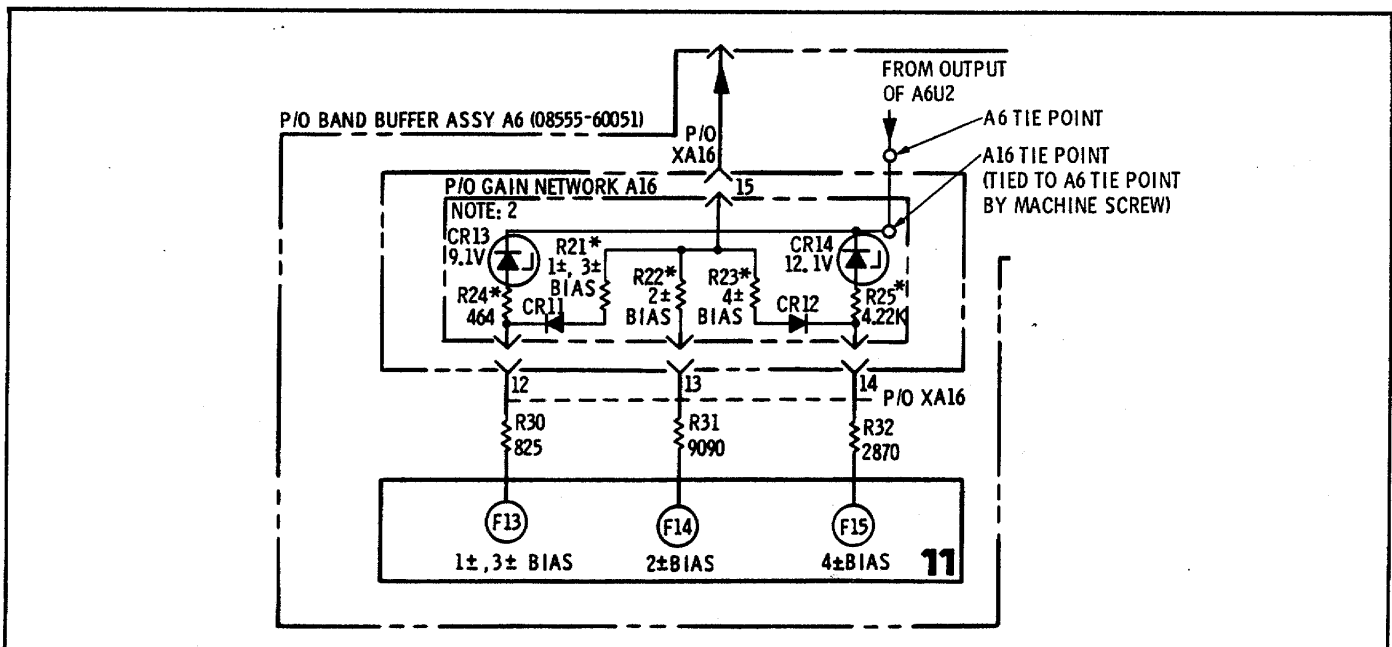


Figure 7-5. Partial Schematic of Figure 8-17 (P/O Change C)

CHANGE C (cont'd)

Page 8-27, Figure 8-41, Service Sheet 7:

Change signal path from A4U7 to AUXILIARY "B" as in the partial schematic shown as Figure 7-6.

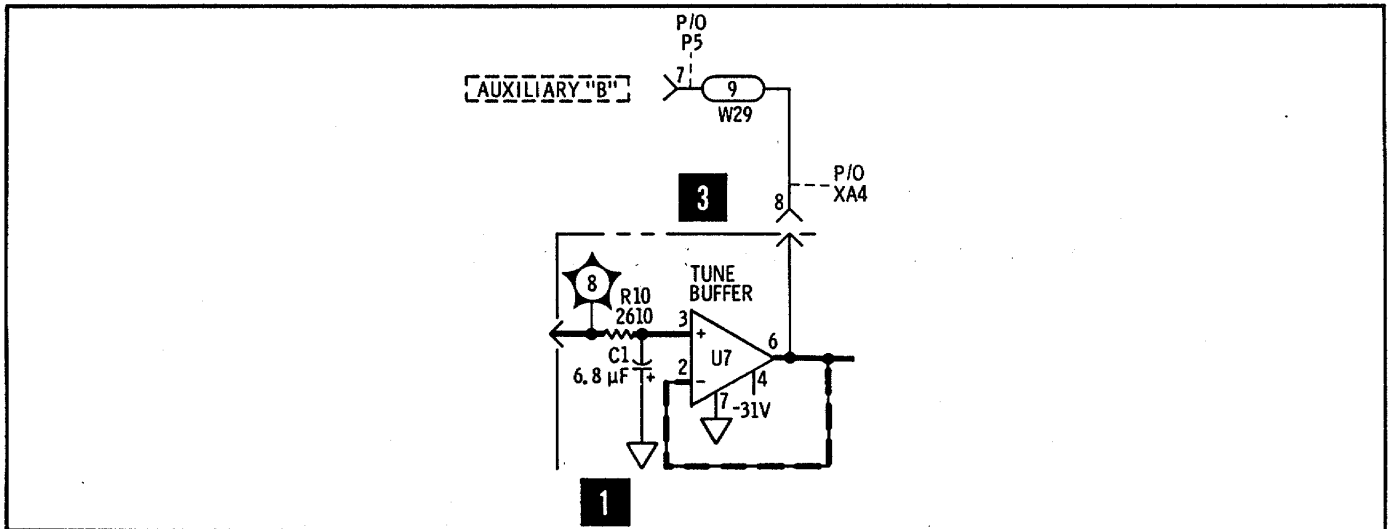


Figure 7-6. Partial Schematic of Figure 8-41 (P/O Change C)

CHANGE D

Page 6-6, Table 6-2:

Change A2A5R19 to 0757-0394, R: FXD MET FLM 51.1 OHM 1% 1/8 W, 28480, 0757-0394.

Page 8-2, Table 8-1:

Delete A2A5R19, 50 MHz Ampl., 50 MHz ampl. gain.

Page 8-23, Figure 8-34, Service Sheet 5:

Change A2A5R19* to A2A5R19, 51.1 OHM.

CHANGE E

Page 6-2, Table 6-2:

Change 2nd A1 to 08555-60100, PANEL ASSY; FRONT (MINT GREY) 28480, 08555-60100.

Change A1P6 (first entry) to 1251-2567, Qty 1, CONNECTOR: R&P for 69 FEMALE CONTACT, 71468, 2DC79SF0.

Change A1P6 (second entry) to 1251-2569, Qty 64, CONTACT: R&P CONNECTOR, FEMALE, 71468, 030-9542-001.

Add A1A2R20, 0757-0279, 6, R: FXD MET FLM 3.16K OHM 1% 1/8W, 28480, 0757-0279.

Page 6-7, Table 6-2:

Change A5C3 to 0160-0153, C: FXD MY 0.001 UF ±10% 200 WVDC, 56289, L92P10292-PTS.

Page 6-17, Table 6-2:

Change J6 (first entry) to 1251-2568, Qty 1, BODY: R&P, FOR 70: MALE CONTACT.

Change J6 (second entry) to 1251-2570, Qty 71, CONTACT: R&P CONNECTOR, MALE, 71468, 031-9540-000.

Page 6-18, Table 6-2:

Change W21 to HP Part No. 08555-60019.

Add W21C1, 0160-3451, 1, C: FXD CER 0.01 UF +80-20%, 100 VDCW, 56289, CO238101F103ZS25-CDH.

CHANGE E (cont'd)

Page 8-17, Figure 8-17, Service Sheet 2:

Change A1P6 pin numbers (four locations) in accordance with partial schematic shown here as Figure 7-7.

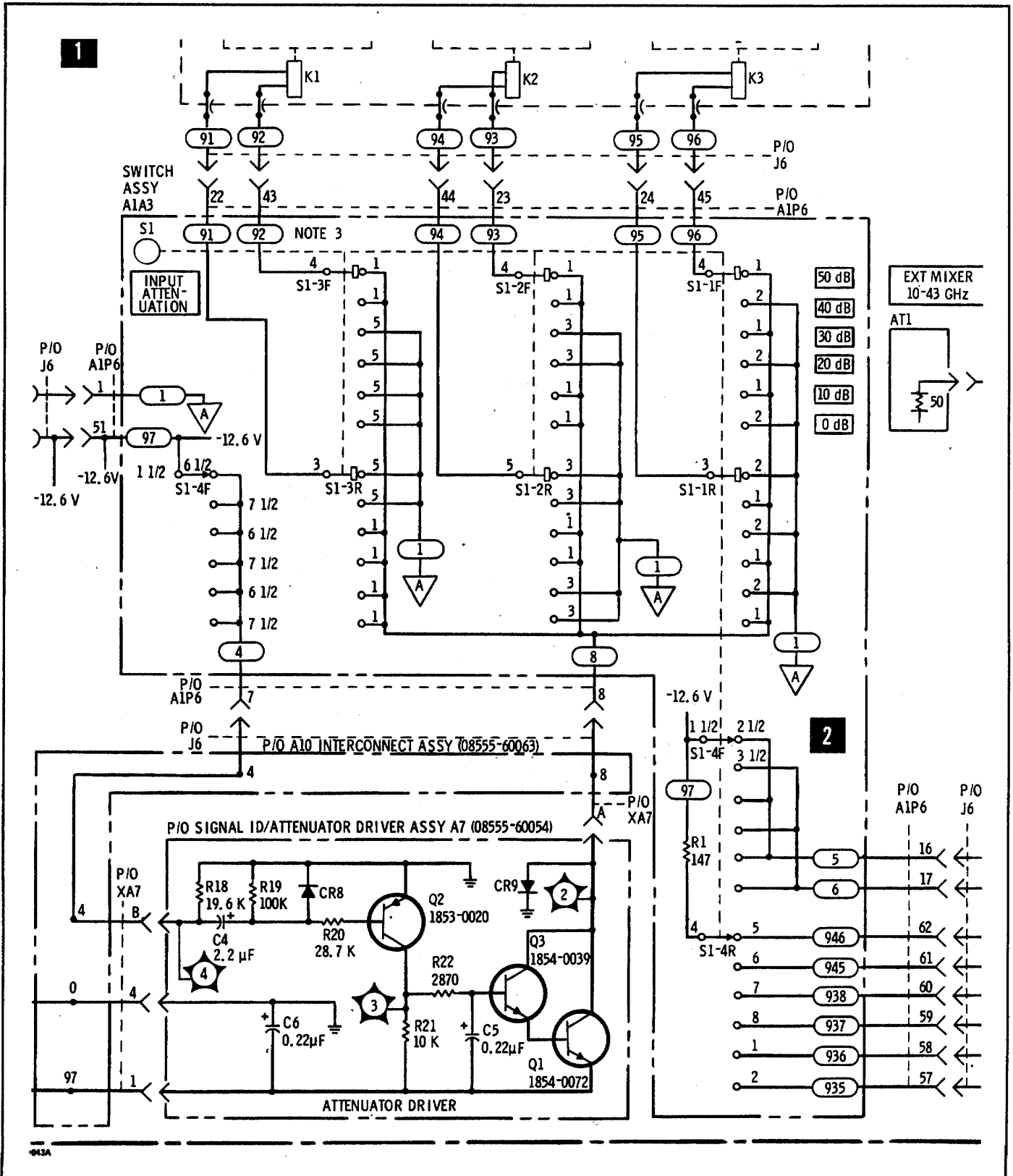


Figure 7-7. Partial Schematic of Figure 8-17 Showing A1P6 Pin Changes (P/O Change E)

CHANGE E (cont'd)

Page 8-31, Figure 8-52, Service Sheet 9:

Change the following pin numbers on A1P6 (lower left-hand corner of schematic):

Pin 52 to pin 67

Pin 55 to pin 70

Pin 31 to pin 39

Pin 9 to pin 13.

Change A5C3 to 1000.

Page 8-33, Figure 8-55, Service Sheet 10:

Change A1P6 pin 8 to pin 12 (left-hand side of schematic).

Page 8-35, Figure 8-58, Service Sheet 11:

Change the following pin numbers on A1P6 (left-hand side of schematic):

Pin 10 to pin 14

Pin 11 to pin 15

Pin 12 to pin 16

Pin 13 to pin 17

Pin 14 to pin 18

Page 8-37, Figure 8-61, Service Sheet 12:

Change A1P6 pin 29 to pin 37.

Page 8-38, Troubleshooting Procedure, Service Sheet 13:

Change pin 52 to pin 67 and pin 20 to pin 25 in first line of step 1-a.

Change pin 52 to pin 67 and pin 19 to pin 24 in first line of step 1-b.

Change pin 52 to pin 67 and pin 20 to pin 25 in first line of step 1-d.

Change pin 52 to pin 67 in first line of step 1-e.

Change pin 20 to pin 25 (appears twice) and pin 19 to pin 24 in second line of step 1-e.

Change pin 52 to pin 67 and pin 21 to pin 26 in second line of step 2-a.

Add Step 2-b.

2-b. With the switches set as in 2-a, measure the resistance between A1P6-67 (907 wire) and A1P6-5 (967 wire). (ZERO scan signal for use by external equipment.)

Resistance should be approximately 3160 ohms (A1A2R20), in the FULL scan and PER DIVISION modes and infinity in ZERO scan mode.

Pages 8-25, 8-37 and 8-38, Figures 8-37, 8-60, and 8-63:

Add R20 on middle switch assembly as shown in Figure 7-8.

CHANGE E (cont'd)

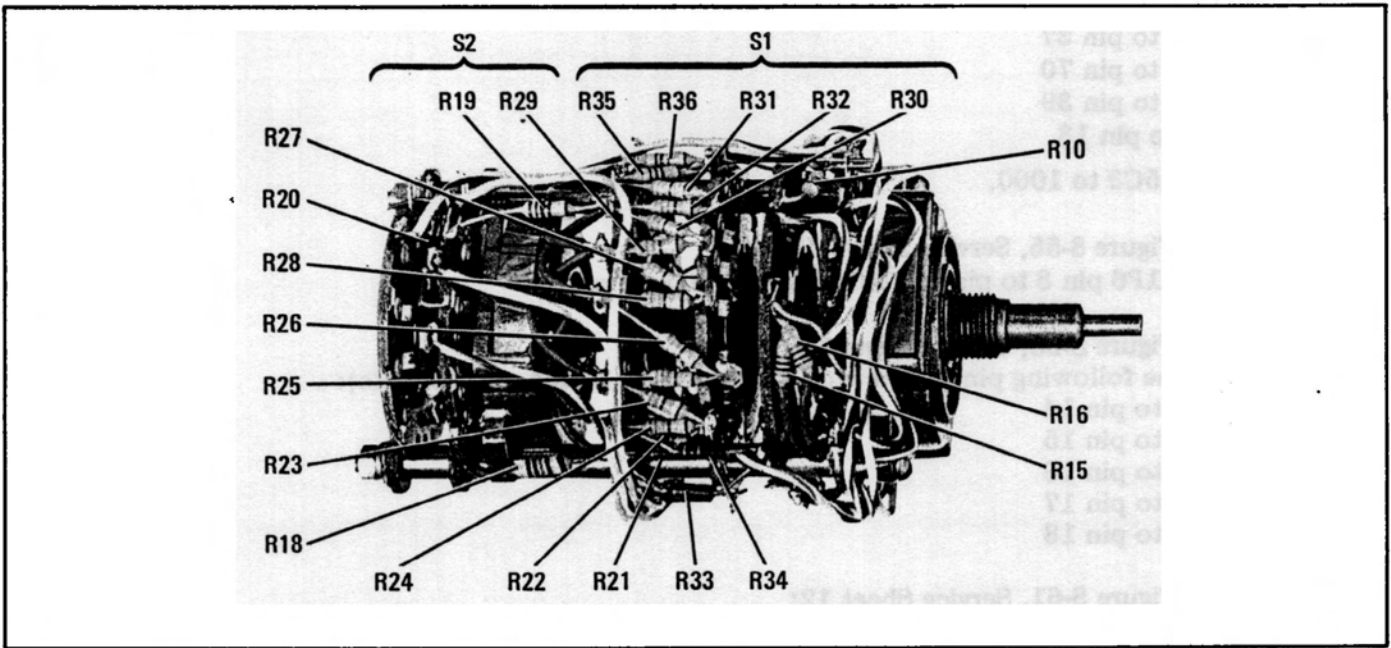


Figure 7-8. Position of R20, Figures 8-37, 8-60, and 8-63(P/O Change E)

Page 8-39, Figure 8-65, Service Sheet 13:

Change A1P6 pin 52 to pin 67 (upper left-hand corner of schematic).

Add resistor A1A2R20 and Zero Scan Signal line (967) between shield of cable W21 and (958) line as shown in heavy lines in the partial schematic, Figure 7-9.

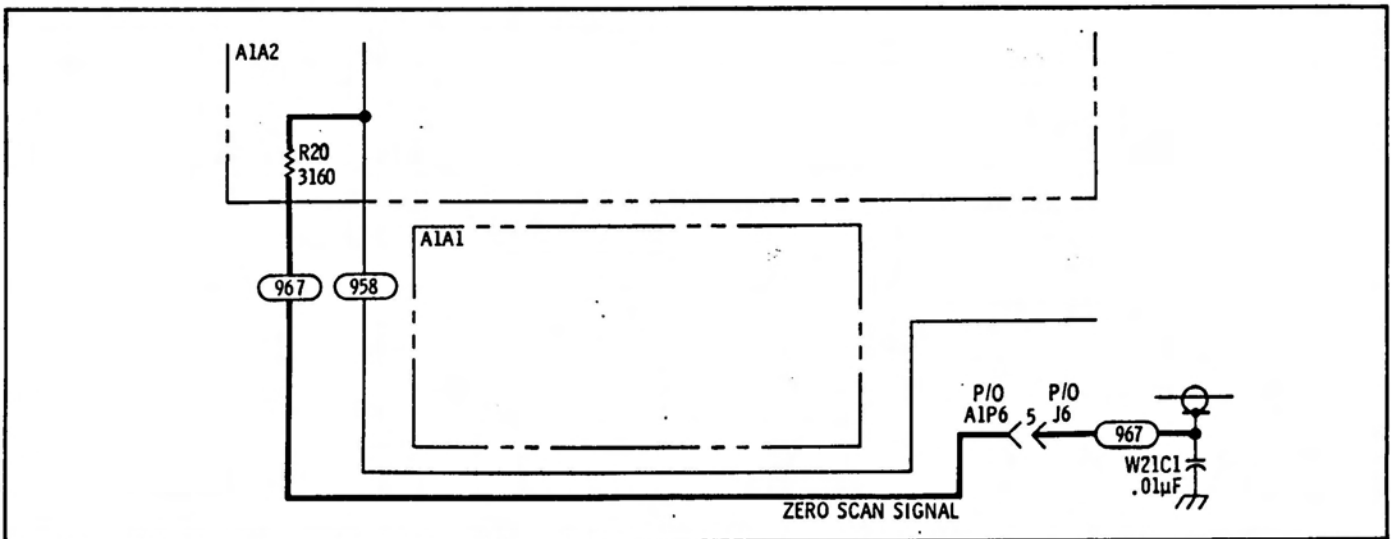


Figure 7-9. Partial Schematic of Figure 8-65, Zero Scan Signal Line to A1A2 (P/O Change E)

Change A1P6 pin 19 to pin 24, pin 20 to pin 25, and pin 21 to pin 26 (right-hand side of schematic).

CHANGE E (cont'd)

Page 8-40, Troubleshooting Procedure, Service Sheet 14:

Change pin 51 to pin 66 and pin 42 to pin 53 in first paragraph of Test Procedures.

Change the following pin numbers in second paragraph of Test Procedures:

- Pin 51 to pin 66 (two entries)
- Pin 42 to pin 53 (two entries)
- Pin 41 to pin 52
- Pin 40 to pin 51
- Pin 39 to pin 50
- Pin 38 to pin 49
- Pin 37 to pin 48
- Pin 36 to pin 47

Change the following pin numbers in third paragraph of Test Procedures:

- Pin 51 to pin 66 (two entries)
- Pin 36 to pin 47
- Pin 37 to pin 48
- Pin 38 to pin 49
- Pin 40 to pin 51
- Pin 41 to pin 52

Change pins 53 and 18 to pins 68 and 23 in fourth paragraph of Test Procedures.

Page 8-41, Figure 8-67, Service Sheet 14:

Change A1P6 pin 51 to pin 66 (left-hand side of schematic).

Change the pin numbers of A1P6 on right-hand side of schematic as follows:

- Pin 36 to pin 47
- Pin 37 to pin 48
- Pin 38 to pin 49
- Pin 39 to pin 50
- Pin 40 to pin 51
- Pin 41 to pin 52
- Pin 42 to pin 53
- Pin 18 to pin 23
- Pin 53 to pin 68

Page 8-44, Tables 8-5 and 8-6, Service Sheet 16:

Replace with new Tables 7-2 and 7-3 supplied in this Manual Changes Supplement.

Page 8-45, Figure 8-73, Service Sheet 16:

Change pin location diagram of CONNECTOR J6/A1P6 to diagram of Figure 7-10 in this Manual Change Supplement.

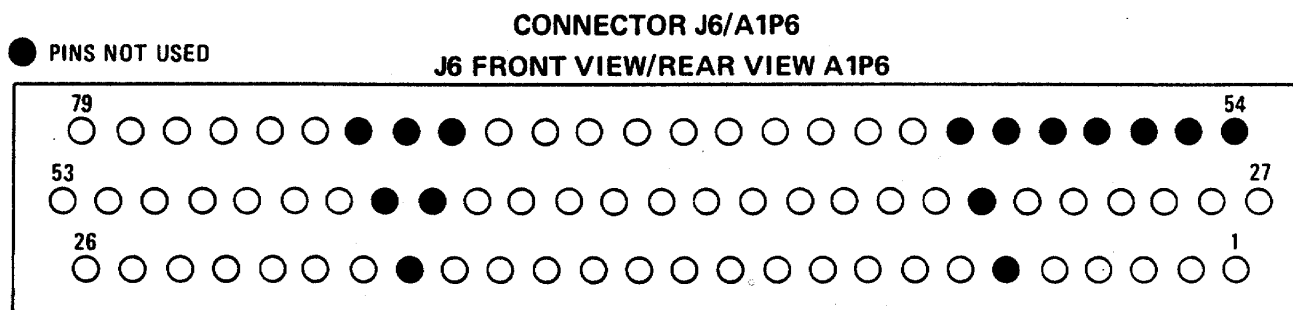


Figure 7-10. Connector Pin Location Diagram of Figure 8-72 (P/O Change E)

SERVICE SHEET 16

Table 7-2. RF Section Chassis Wiring from Connector J6 (P/O Change E)

| From J6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|-----------------------|-------------------------------------|--------------|------------------|
| 1 | 1 | -12.6V Ground Return | P2-8 | 2 |
| 2 | 903 | VCXO Sweep Input | A14C6 | 10 |
| 3 | 908 | External Mixer Bias | A12 | 2 |
| 4 | 946 | Signal Identifier Attenuator Output | A10-946 | 6 |
| 5 | 967 | Zero Scan Signal | P4-A7 shield | 13 |
| 6 | | Open | | |
| 7 | 4 | Attenuator Driver Trigger | A10-4 | 2 |
| 8 | 8 | Attenuator Driver Output | A10-8 | 2 |
| 9 | 95 | Noise Filter Control | A10-95 | 7 |
| 10 | 98 | Noise Filter Control | A10-98 | 7 |
| 11 | 901 | Frequency Tune Pot. Output | A10-901 | 7 |
| 12 | 904 | VCXO Sweep Driver Output | A10-904 | 10 |
| 13 | 906 | Fine Tune Pot. Output | A10-906 | 9 |
| 14 | 914 | A Bit Band Code | A10-914 | 11 |
| 15 | 915 | B Bit Band Code | A10-915 | 11 |
| 16 | 916 | C Bit Band Code | A10-916 | 11 |
| 17 | 917 | D Bit Band Code | A10-917 | 11 |
| 18 | 918 | E Bit Band Code | A10-918 | 6/11 |
| 19 | | Open | | |
| 20 | 3 | -5 to +5V Sweep Ramp | P3-6 | 7/8 |
| 21 | 5 | Linear Gain Compensation Control | P3-7 | 2 |
| 22 | 6 | Linear Gain Compensation Control | P3-8 | 2 |
| 23 | 96 | Ampl. Cal Adjustment | P3-29 | 14 |
| 24 | 956 | Video Filter Analogic Line | P3-38 | 13 |
| 25 | 957 | Normal Analogic Line | P3-30 | 13 |
| 26 | 958 | Analogic -10V Line to IF Section | P3-39 | 13 |
| 27 | 91 | Attenuator Switching Voltage 40 dB | A13 | 2 |
| 28 | 92 | Attenuator Switching Voltage 40 dB | A13 | 2 |
| 29 | 93 | Attenuator Switching Voltage 20 dB | A13 | 2 |
| 30 | 94 | Attenuator Switching Voltage 20 dB | A13 | 2 |
| 31 | 95 | Attenuator Switching Voltage 10 dB | A13 | 2 |
| 32 | 96 | Attenuator Switching Voltage 10 dB | A13 | 2 |
| 33 | | Open | | |
| 34 | 923 | Frequency Tune Pot. -15.2 Volts | A10-923 | 7 |
| 35 | 924 | Frequency Tune Pot. - 7.3 Volts | A10-924 | 7 |
| 36 | 925 | Per Division Sweep Input | A10-925 | 6/8 |
| 37 | 926 | 1/n Atten. Sweep Output | A10-926 | 12 |
| 38 | 927 | YIG Driver Sweep Input | A10-927 | 7 |
| 39 | 928 | Scan Atten. (Narrow Scan Output) | A10-928 | 9/12 |
| 40 | 934 | Sweep Buffer Output | A10-934 | 7 |
| 41 | 935 | Sweep plus Tune Ampl Input | A10-935 | 7 |
| 42 | 936 | Sweep plus Tune Signal | A10-936 | 7 |
| 43 | 937 | Full Scan Sweep Signal | A10-937 | 7 |
| 44 | 938 | Signal Identifier Enable | A10-938 | 6 |
| 45 | | Open | | |
| 46 | | Open | | |
| 47 | 913 | 0.1 kHz Bandwidth Control | P3-2 | 14 |
| 48 | 914 | 0.3 kHz Bandwidth Control | P3-3 | 14 |
| 49 | 915 | 1 kHz Bandwidth Control | P3-4 | 14 |
| 50 | 916 | 10 kHz Bandwidth Control | P3-25 | 14 |
| 51 | 917 | 30 kHz Bandwidth Control | P3-26 | 14 |
| 52 | 918 | 100 kHz Bandwidth Control | P3-27 | 14 |
| 53 | 923 | 300 kHz Bandwidth Control | P3-28 | 14 |
| 54-60 | | Open | | |

SERVICE SHEET 16 (cont'd)

Table 7-2. RF Section Chassis Wiring from Connector J6 (P/O Change E) (cont'd)

| From P6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|-----------------|-----------------|------------------------------------|---------|---------------|
| 61 | 945 | Signal Identifier Attenuator Input | A10-945 | 6 |
| 62 | 948 | Tuning Stabilizer Enable | A10-948 | 8 |
| 63 | 968 | Sweep Plus Tune or Full Scan | A10-968 | 7 |
| 64 | 978 | Full Scan Frequency Marker | A10-978 | 7 |
| 65 | | Open | | |
| 66 | 97 | -12.6 V Supply | P2-21 | 2 |
| 67 | 907 | -10V Supply | A10-907 | 9 |
| 68 | 902 | +20V Supply | A10-902 | 14 |
| 69 | 912 | +10V Supply | A10-912 | 2 |
| 70 | 0 | Ground Return | A10-0 | 9 |
| 71 | | Open | | |
| 72 | | Open | | |
| 73 | | Open | | |
| 74 | 935 | Log Rel Level Lamp No. 1 | P3-33 | 2 |
| 75 | 936 | Log Ref Level Lamp No. 2 | P3-34 | 2 |
| 76 | 937 | Log REf Level Lamp No. 3 | P3-35 | 2 |
| 77 | 938 | Log Ref Level Lamp No. 4 | P3-9 | 2 |
| 78 | 945 | Log Ref Level Lamp No. 5 | P3-10 | 2 |
| 79 | 946 | Log Ref Level Lamp No. 6 | P3-11 | 2 |

Table 7-3. Tuning Head Wiring from Connector A1P6 (P/O Change E)

| From P6 Pin | Wire Color Code | Function | To | Service Sheet |
|-------------|-----------------|-------------------------------------|-------------|---------------|
| 1 | 1 | -12.6V Ground Return | A1A3S1-3R5 | 2 |
| 2 | 903 | VCXO Sweep Input | A1A4R3 | 10 |
| 3 | 908 | External Mixer Bias | A1A1CR1 | 2 |
| 4 | 946 | Signal Identifier Attenuator Output | A1A2S1-3R17 | 6 |
| 5 | 967 | Zero Scan Signal | A1A2S2 | 13 |
| 6 | | Open | | |
| 7 | 4 | Attenuator Driver Trigger | A1A3S1-4F6½ | 2 |
| 8 | 8 | Attenuator Driver Output | A1A3S1-3R1 | 2 |
| 9 | 95 | Noise Filter Control | A1A2S2-1R8½ | 7 |
| 10 | 98 | Noise Filter Control | A1A2S2-1R7½ | 7 |
| 11 | 901 | Frequency Tune Pot. Output | A1A4R1 | 7 |
| 12 | 904 | VCXO Sweep Driver Output | A1A4R3 | 10 |
| 13 | 906 | Fine Tune Pot. Output | A1A4R2 | 9 |
| 14 | 914 | A Bit Band Code | A1A4S1A | 11 |
| 15 | 915 | B Bit Band Code | A1A4S1B | 11 |
| 16 | 916 | C Bit Band Code | A1A4S1C | 11 |
| 17 | 917 | D Bit Band Code | A1A4S1D | 11 |
| 18 | 918 | E Bit Band Code | A1A4S1E | 6/11 |
| 19 | | Open | | |
| 20 | 3 | -5 to +5V Sweep Ramp | A1A2S2-2F7 | 7/8 |
| 21 | 5 | Linear Gain Compensation Control | A1A3S1-4F1½ | 2 |
| 22 | 6 | Linear Gain Compensation Control | A1A3S1-4F3½ | 2 |
| 23 | 96 | Ampl Cal Adjustment | A1R2 | 14 |
| 24 | 956 | Video Filter Analogic Line | A1A2S2 | 13 |
| 25 | 957 | Normal Filter Analogic Line | A1A2S1 | 13 |
| 26 | 958 | Analogic -10V Line to IF Section | A1A2S1-1F9 | 13 |
| 27 | 91 | Attenuator Switching Voltage, 40 dB | A1A3S1-3R3 | 2 |
| 28 | 92 | Attenuator Switching Voltage, 40 dB | A1A3S1-3F4 | 2 |
| 29 | 93 | Attenuator Switching Voltage, 20 dB | A1A3S1-2F4 | 2 |
| 30 | 94 | Attenuator Switching Voltage, 20 dB | A1A3S1-2R5 | 2 |

SERVICE SHEET 16 (cont'd)

Table 7-3. Tuning Head Wiring from Connector A1P6 (P/O Change E) (cont'd)

| From P6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|--------------------|-------------------------------------|--------------|------------------|
| 31 | 95 | Attenuator Switching Voltage, 10 dB | A1A3S1-1R3 | 2 |
| 32 | 96 | Attenuator Switching Voltage, 10 dB | A1A3S1-1F4 | 2 |
| 33 | | Open | | |
| 34 | 92 | Frequency Tune Pot. -15.2 Volts | A1A4R1 | |
| 35 | 924 | Frequency Tune Pot. - 7.3 Volts | A1A4R1 | 7 |
| 36 | 925 | Per Division Sweep Input | A1A2S2-2F8 | 6/8 |
| 37 | 926 | 1/n Atten. Sweep Output | A1A2S1-2F2 | 12 |
| 38 | 927 | YIG Driver Sweep Input | A1A2S2-2F9 | 7 |
| 39 | 928 | Scan Atten (Narrow Scan Output) | A1A2S1-1R17 | 9/12 |
| 40 | 934 | Sweep Buffer Output | A1A2S2-2F4 | 7 |
| 41 | 935 | Sweep plus Tune Ampl Input | A1A2S2-2F3 | 7 |
| 42 | 936 | Sweep plus Tune Signal | A1A2S2-1R1½ | 7 |
| 43 | 937 | Full Scan Sweep Signal | A1A2S1-1R3½ | 7 |
| 44 | 938 | Signal Identifier Enable | A1A2S1-4R17 | 6 |
| 45 | | Open | | |
| 46 | | Open | | |
| 47 | 913 | 0.1 kHz Bandwidth Control | A1A1S1-1R1 | 14 |
| 48 | 914 | 0.3 kHz Bandwidth Control | A1A1S1-1R2 | 14 |
| 49 | 915 | 1 kHz Bandwidth Control | A1A1S1-1R3 | 14 |
| 50 | 916 | 10 kHz Bandwidth Control | A1A1S1-1F5 | 14 |
| 51 | 917 | 30 kHz Bandwidth Control | A1A1S1-1F6 | 14 |
| 52 | 918 | 100 kHz Bandwidth Control | A1A1S1-1F7 | 14 |
| 53 | 923 | 300 kHz Bandwidth Control | A1A1S1-1F8 | 14 |
| 54-60 | | Open | | |
| 61 | 945 | Signal Identifier Attenuator Input | A1A2S1-3R8 | 6 |
| 62 | 948 | Tuning Stabilizer Enable | A1A2S2-1R11½ | 8 |
| 63 | 968 | Sweep Plus Tune or Full Scan | A1A2S2-1R2½ | 7 |
| 64 | 978 | Full Scan Frequency Marker | A1A2S2-2F12 | 7 |
| 65 | | Open | | |
| 66 | 97 | -12.6V Supply | A1A3S1-4F1½ | 2 |
| 67 | 907 | -10V Supply | A1 | 9 |
| 68 | 902 | +20V Supply | A1R3 | 14 |
| 69 | 912 | +10V Supply | A1A1R11 | 2 |
| 70 | 0 | Ground Return | A1 | 9 |
| 71 | | Open | | |
| 72 | | Open | | |
| 73 | | Open | | |
| 74 | 935 | Log Rel Level Lamp. No. 1 | A1A3S1-4R2 | 2 |
| 75 | 936 | Log Ref Level Lamp No. 2 | A1A3S1-4R1 | 2 |
| 76 | 937 | Log Ref Level Lamp No. 3 | A1A3S1-4R8 | 2 |
| 77 | 938 | Log Ref Level Lamp. No. 4 | A1A3S1-4R7 | 2 |
| 78 | 945 | Log Ref Level Lamp No. 5 | A1A3S1-4R6 | 2 |
| 79 | 946 | Log Ref Level Lamp No. 6 | A1A3S1-4R5 | 2 |

CHANGE F

Page 6-5, Table 6-2:

Change A2A5C8 and A2A5C12 to 0121-0452, C: VAR AIR 1.3—5.4 pF 250 VDCW.

Page 6-6, Table 6-2:

Change A2A5R21 to 0698-3157, R: FXD MET FLM 19.6K OHM 1% 1/8W.

Change A2A5L3 to 9100-1615, COIL/CHOKE FXD 1.20 UH.

Page 6-7, Table 6-2:

Change A4R20 to 0811-0445, R: FXD WW 5000 OHM 0.1% 1/16W.

Change A4R21 to 0811-0919, R: FXD WW 10K OHM 0.1% 1/16W.

Page 6-15, Table 6-2:

Delete A14A2R26.

Delete A14A2R27.

Page 8-23, Figure 8-34, Service Sheet 5:

Change A2A5C8 and A2A5C12 to 1.3—5.4 pF.

Change A2A5R21 to 19.6K Ohms.

Change A2A5L3 to 1.2 μ H.

Page 8-33, Figure 8-55, Service Sheet 10:

Delete AL4A2R26 and AJ4A2R27 and connecting wires.

CHANGE G

Page 6-9, Table 6-2:

Change A5R52 to 0757-0442, R: FXD MET FLM, 10.0K OHM 1% 1/8W.

Change A5R54 and A5R64 to 0757-0442, R: FXD MET FLM 10.0K 1% 1/8W.

Page 6-15, Table 6-2:

Add A14A2L7, 9140-0137, COIL: FXD RF 1000 UN 5%, 28480, 9140-0137.

Delete A14A2R25.

Page 8-31, Figure 8-52:

Change A5R52 to 10K.

Change A5R54 and A5R64 to 10K.

Page 8-33, Figure 8-55:

Change resistor A14A2R25 to COIL A14A2L7 1 mH.

CHANGE H

Page 6-6, Table 6-2:

Delete A4P1.

Page 6-18, Table 6-2:

Delete W29.

Delete W29J1.

Page 8-27, Figure 8-41, Service Sheet 7:

Delete AUXILIARY "B" circuit to conform with Figure 7-11 of this Manual Correction, and change five pin numbers shown on left half of partial diagram.

CHANGE H (cont'd)

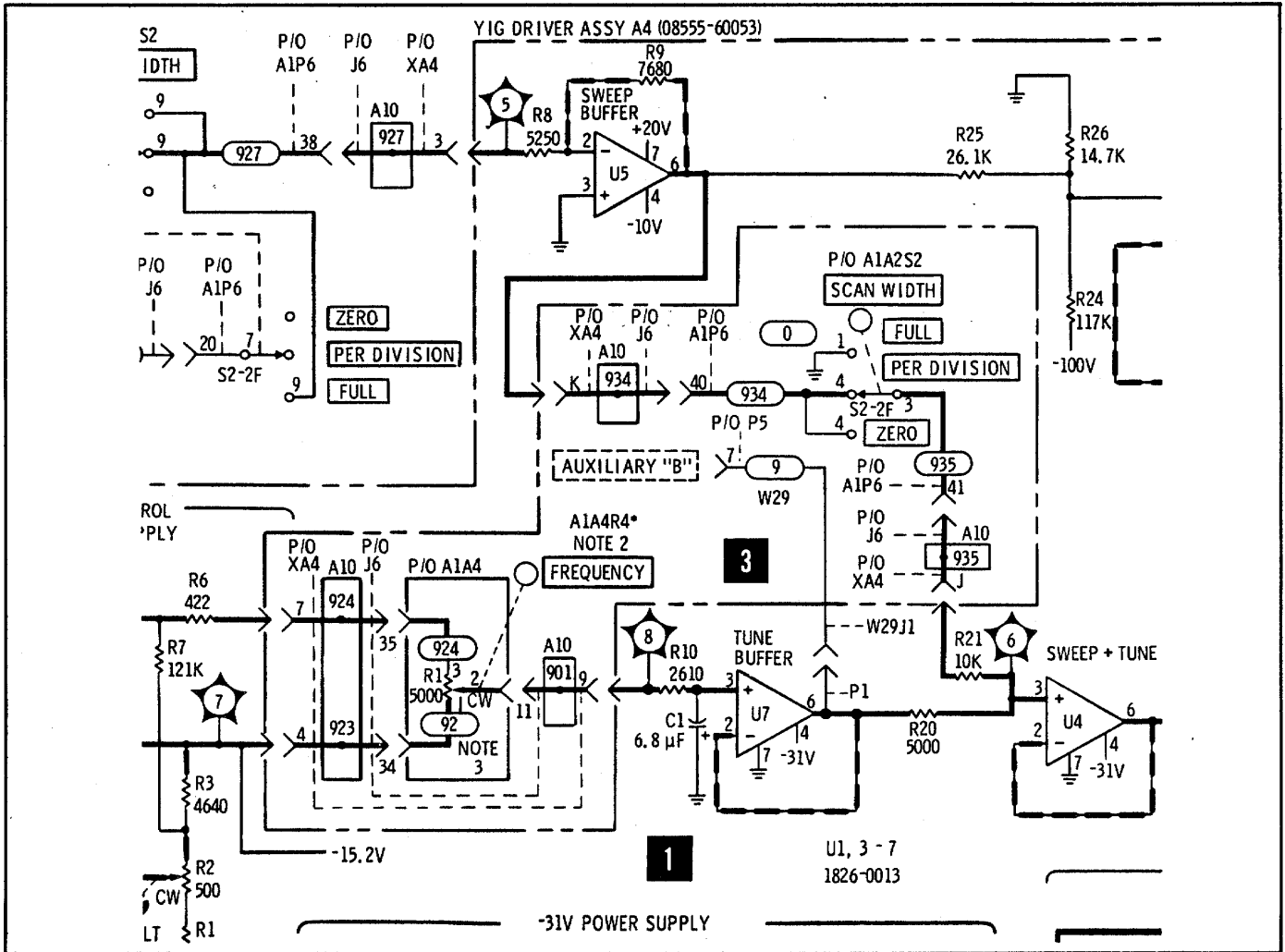


Figure 7-11. Partial Diagram of Figure 8-41, YIG Driver and Oscillator (P/O Change H)

Page 8-45, Figure 8-74, Service Sheet 16:

Replace appropriate portion of schematic with attached partial schematic shown in Figure 7-12.

CHANGE I

Page 6-6, Table 6-2:

Change A2A5L6 to 9100-1614, COIL/CHOKE: 0.82 UH 10%, 28480.

Page 8-23, Figure 8-34, Service Sheet 5:

Change A2A5L6 to 0.82 μ H.

CHANGE J

Page 6-14, Table 6-2:

Change A14A2C1 to 0180-1743, C: FXD ELECT 0.1 UF 10% 35 VDCW, 56289, 1500104X9035A2.

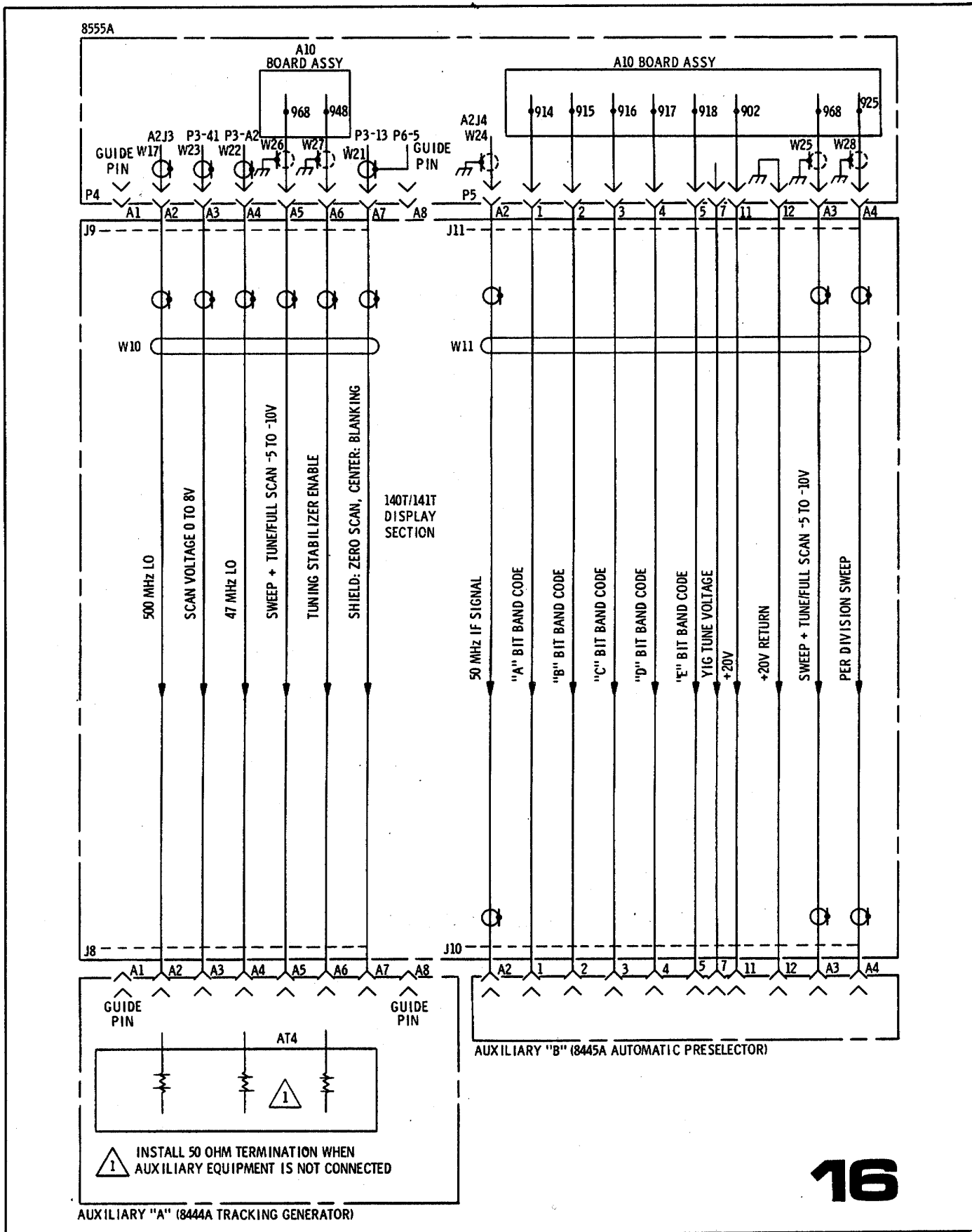


Figure 7-12. Part of Figure 8-74, RF/IF Section Interconnection Diagram (P/O Change H)

CHANGE K

Page 6-9, Table 6-2:
Delete A6MP3.

Page 6-12, Table 6-2:
Change A11A1C1 to 0160-3636, C: FXD PORC 0.4+/.01 PF 500 VDCW.

Page 8-2, Table 8-1:
Delete A11A1C1.

Page 8-19, Figure 8-21, Service Sheet 3:
Change A11A1C1* to read "C1 0.4."

CHANGE L

RF INPUT connector J1 parts were as listed below:
J1MP4 was 08555-20047.
J1MP5 was 08555-20048
J1MP8 was 08555-20049.

Above items obsoleted. Not separately replaceable. Replace with parts listed in Table 6-2. See Service Sheet 2 for IPB.

Table 6-2, change to read:
A8C4 0180-0016 C: FXD 6.8 UF 35 VDCW.

Figure 8-72, change A8C4 to indicate 6.8 UF.

CHANGE M

Delete Figures 8-60 and 8-61.

Use Figures 7-13 and 7-14 for Scan Width Switch Assembly A1A2, Component Location and Schematic Diagram.

CHANGE N

Table 6-2, change to read:
A14A1R27 0757-0438 R: FXD MET FLM 5110 OHMS 1% 1/8W.

Figure 8-52, change A14A1R27 to indicate 5110 OHMS.

CHANGE O

Table 6-2:
Add A4C4 0160-3277 C: FXD CER 0.01 UF 20% 50 VDCW.
Delete A4R46 0757-0346 R: FXD MET FLM 10 OHM 1% 1/8W.

Figure 8-41:
Add A4C4 across A4CR6.
Delete A4R46 in base circuit of A4Q2.

CHANGE P

Page 1-4, Table 1-1; Page 4-7, Para. 4-21; Page 4-9, Table 4-2: ABSOLUTE CALIBRATION ACCURACY, Frequency Response, for frequency ranges listed below.

| | | | |
|-------------|----|------|------|
| 2.07 — 6.15 | 2- | 2050 | ±1.0 |
| 10.29—18.00 | 4+ | 2050 | ±2.5 |

Table 6-2, change following parts to read:

| | | |
|---------|-------------|----------------------------------|
| A4C3 | 0180-0049 | C: FXD CER 0.01 UF 20% 50 VDCW |
| A4R34 | 0764-0006 | R: FXD MET OX 18K 5% 2W |
| A4R36 | 0757-0401 | R: FXD MET FLM 100 OHM 1% 1/8W |
| A4R40 | 0698-3348 | R: FXD MET FLM 4.64K OHM 1% 1/2W |
| A4R41 | 0757-0401 | R: FXD MET FLM 100 OHM 1% 1/8W |
| A9A1 | 08555-60056 | BOARD ASSY: SWITCHING REGULATOR |
| A9A1CR1 | 1901-0040 | DIODE: SILICON 30 MA 30WV |
| A9A1Q2 | 1853-0038 | TSTR: SI PNP |
| A9A1Q3 | 1853-0038 | TSTR: SI PNP |
| A9A1R15 | 0698-3438 | R: FXD COMP 2.7 OHM 5% 1/4W |

Add: A9A1R17 0683-0275 R: FXD COMP 2.7 OHM 5% 1/4W

Delete: A9A1MP1 1200-0173 PAD: TRANSISTOR MOUNTING
A9A1MP2 1205-0033 HEAT SINK: TRANSISTOR

Page 8-40, change component values in 31V power supply circuit as indicated below:

| | |
|-------|---------------------------|
| A4C3 | from 2 UF to 20 UF |
| A4R34 | from 61.9K OHM to 18K OHM |
| A4R36 | from 5110 OHM to 100 OHM |
| A4R40 | from 10K OHM to 4640 OHM |
| A4R41 | from 1000 OHM to 100 OHM |

Figure 8-70, delete and replace with Figure 7-15, Switching Regulator Board Assembly A9A1 (08555-60056) (CHANGE P).

Figure 8-72, replace left side of schematic with Figure 7-16, Switching Regulator Schematic Diagram (08555-60056) (CHANGE P).

CHANGE Q

Table 6-2, change following parts to read:

| | | |
|----------|-------------|-------------------------------------|
| A14A2 | 08555-60058 | BOARD ASSY: VAR. CRYSTAL OSCILLATOR |
| A14A2R6 | 0757-0278 | R: FXD MET FLM 1.78K OHM 1% 1/8W |
| A14A2R20 | 0698-3409 | R: FXD MET FLM 2.37K OHM 1% 1/2W |

Table 6-2, delete following parts:

A14A2CR9, A14A2R22, A14A2R23, A14A2R24 and A14A2RT1.

Figure 8-53, delete and replace with Figure 7-17. Tuning Stabilizer VCXO Assembly A14A2 (08555-60058) (CHANGE Q).

Figure 8-55, delete and replace with Figure 7-18, Tuning Stabilizer, VCXO Pulse Ampl Assy A14A2 (CHANGE Q).

CHANGE R

Table 6-2, delete:

A6CR8 1901-0040 DIODE: SILICON 30 MA 30WV 07263 FDG1088.

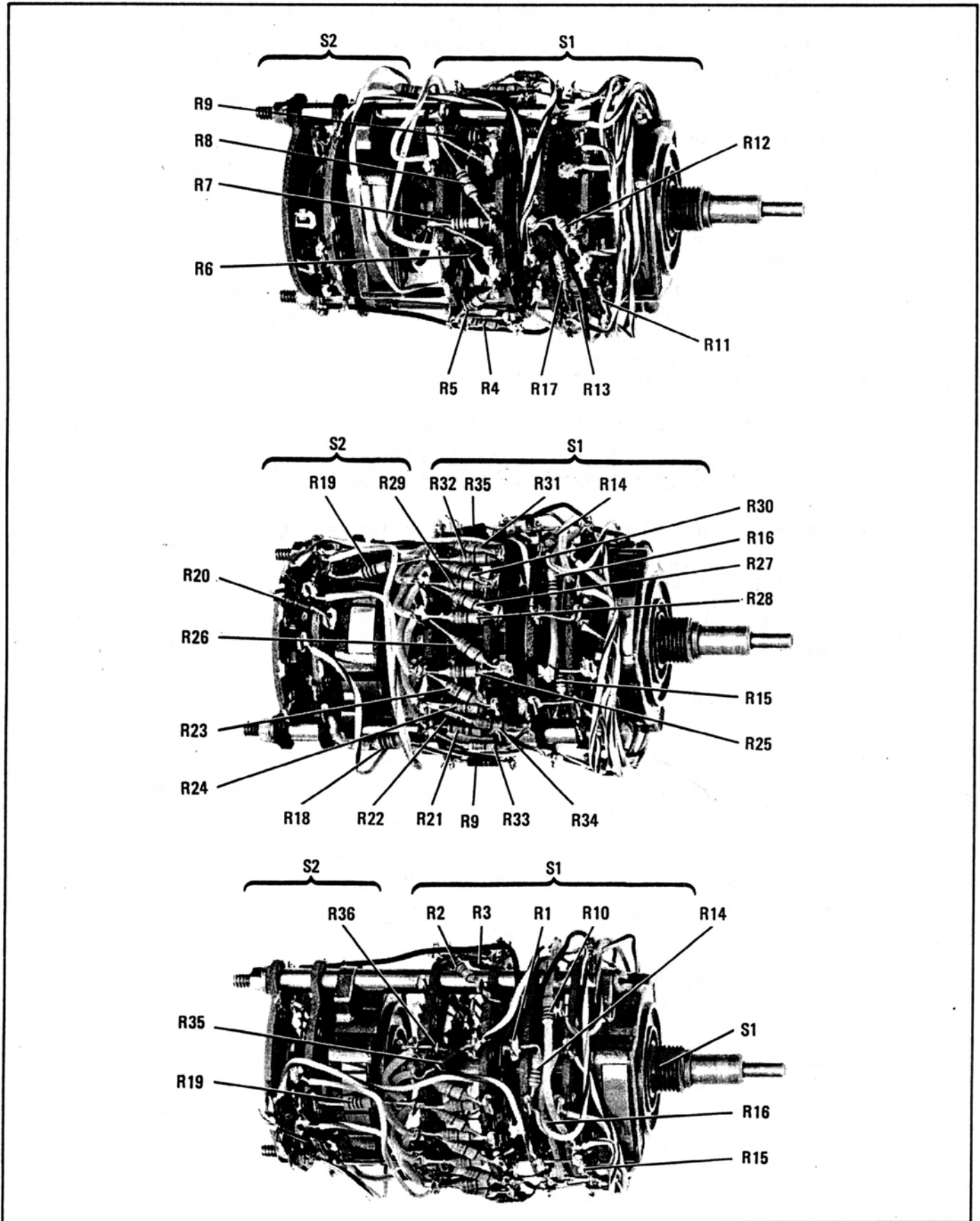


Figure 7-13. Scan Width Switch Assembly, A1A2, Figure 8-60 (Change M)

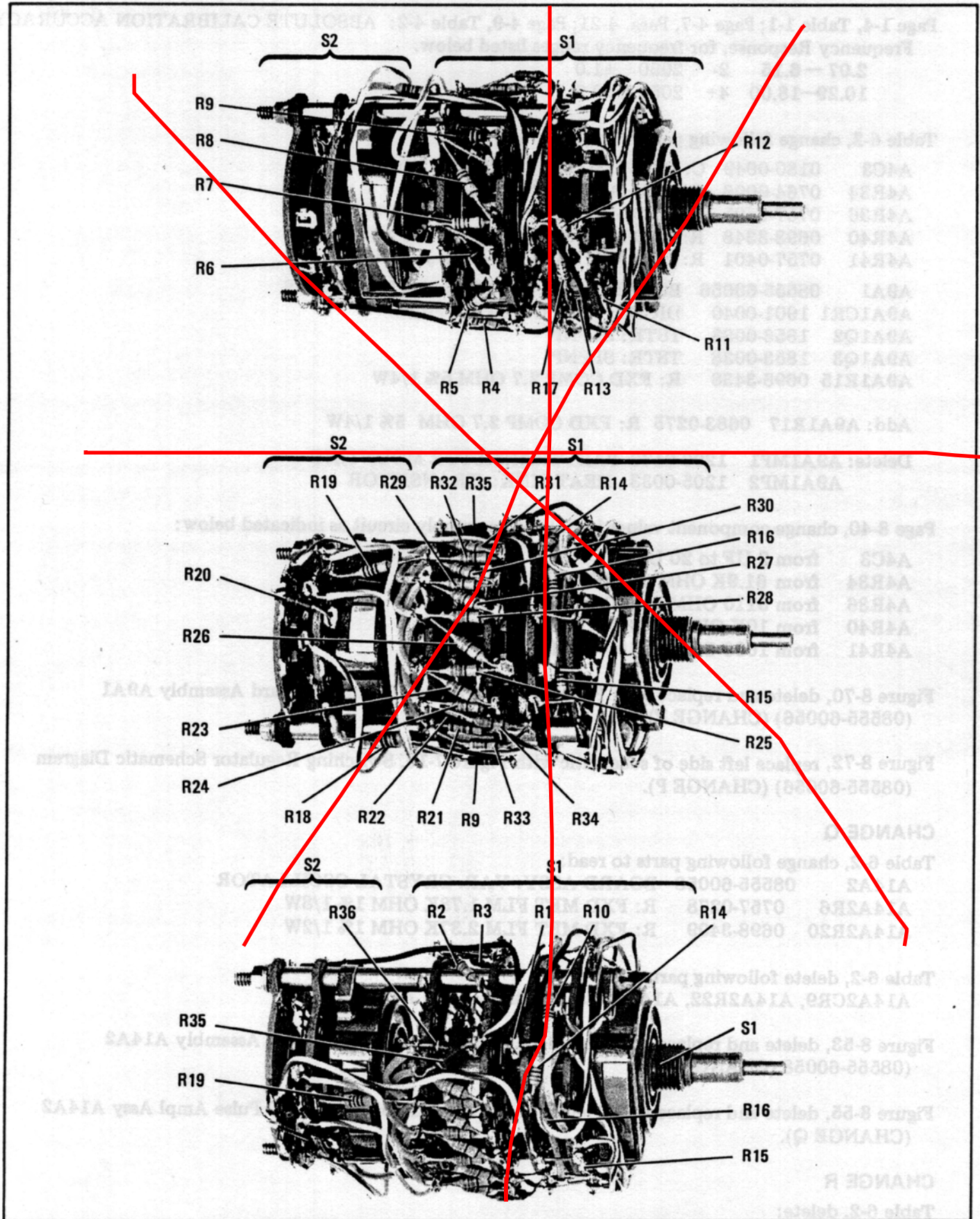


Figure 7-13. Scan Width Switch Assembly, A1A2, Figure 8-60 (Change M)

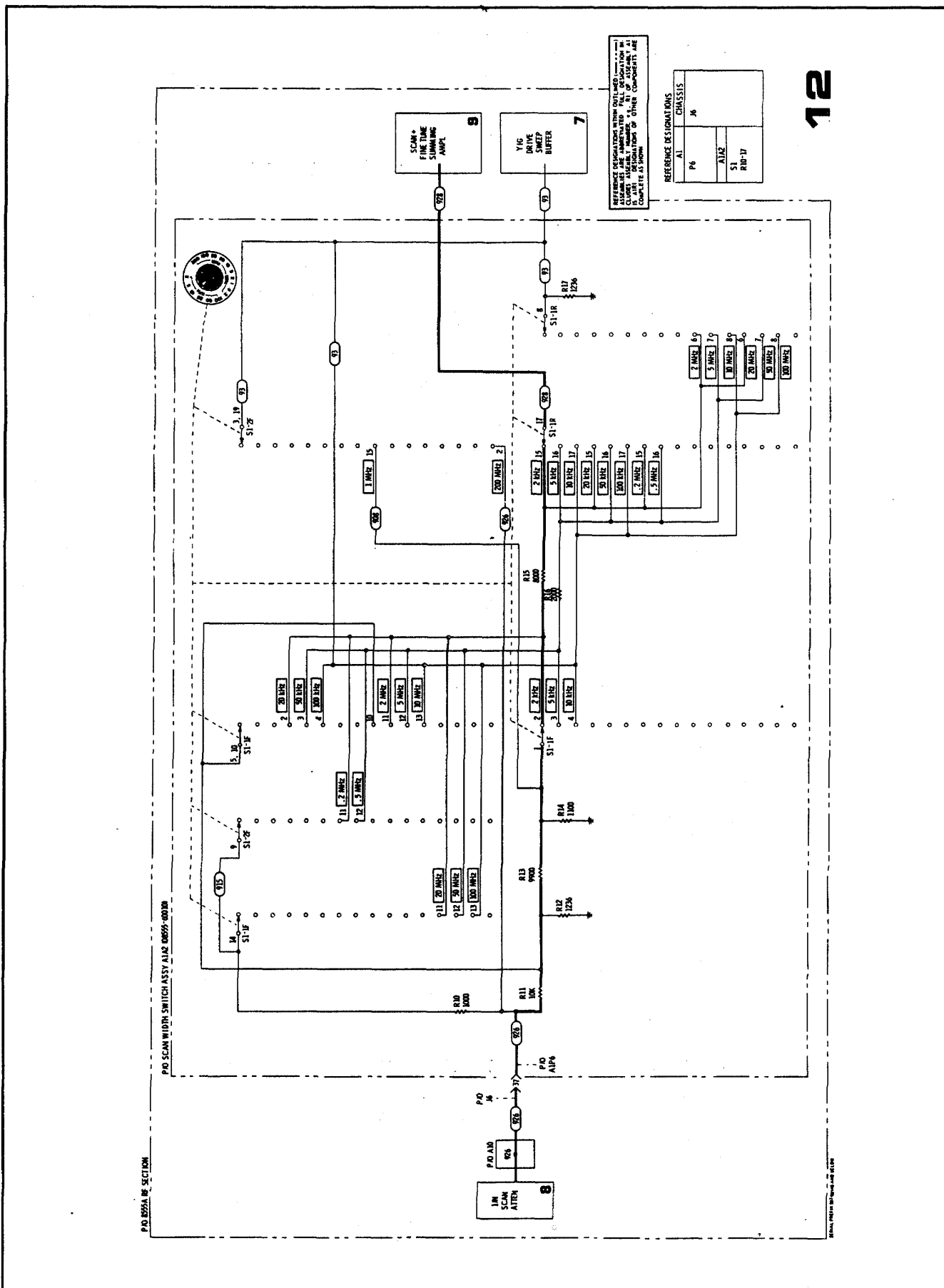


Figure 7-14. Scan Width Switch Assembly A1A2, Schematic Diagram, Figure 8-61, (Change M)

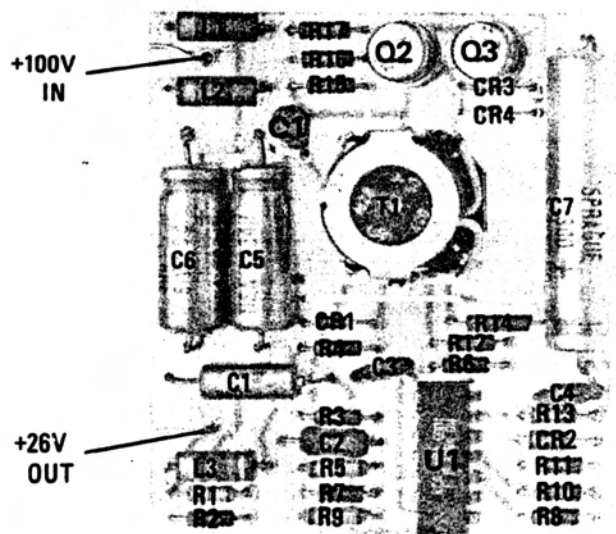


Figure 7-15. Switching Regulator Board Assembly A9A1 (08555-60056), Figure 8-70 (Change P)

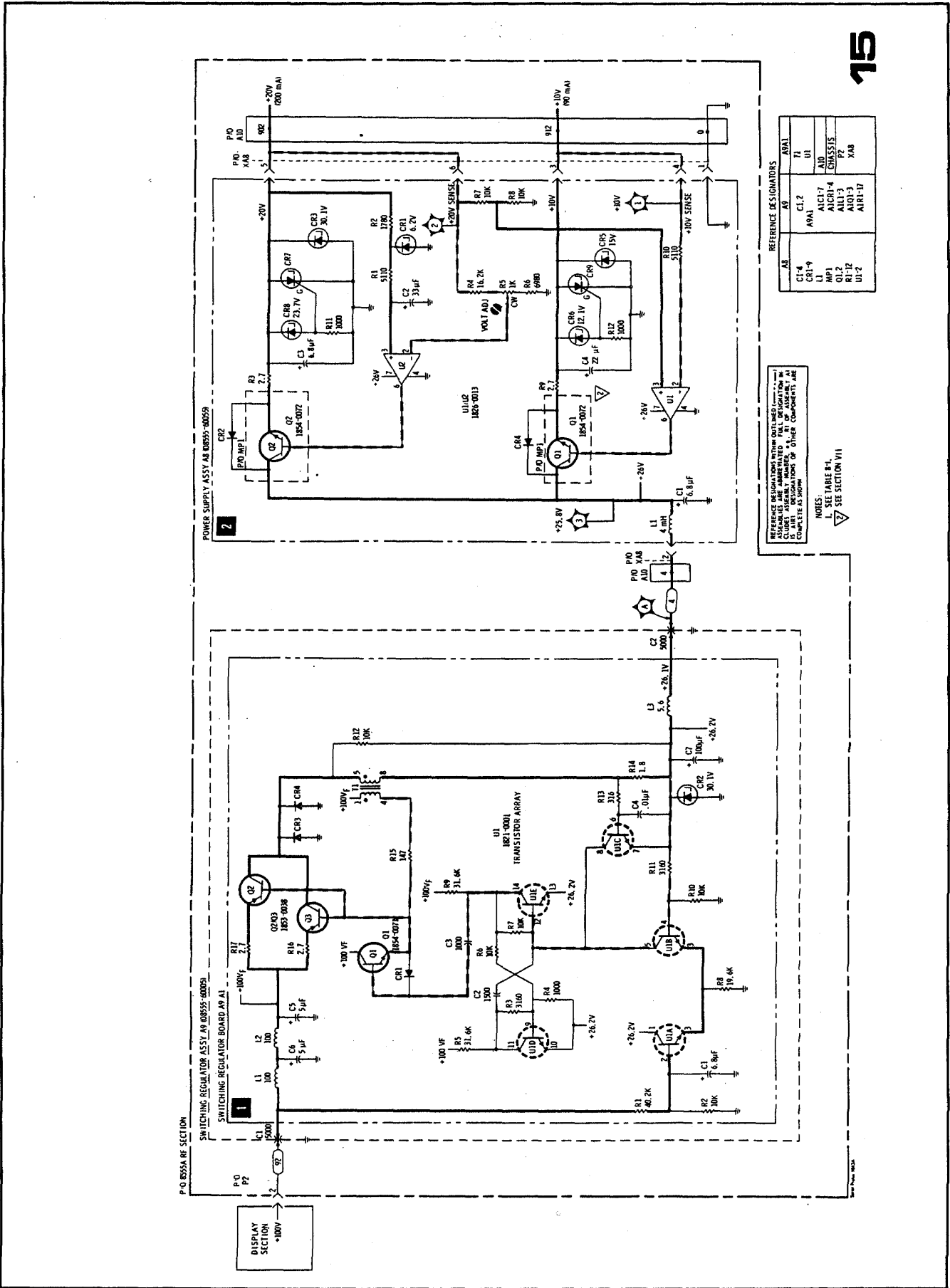


Figure 7-16. Switching Regulator Schematic Diagram (08555-60056), Figure 8-72 (Change P)

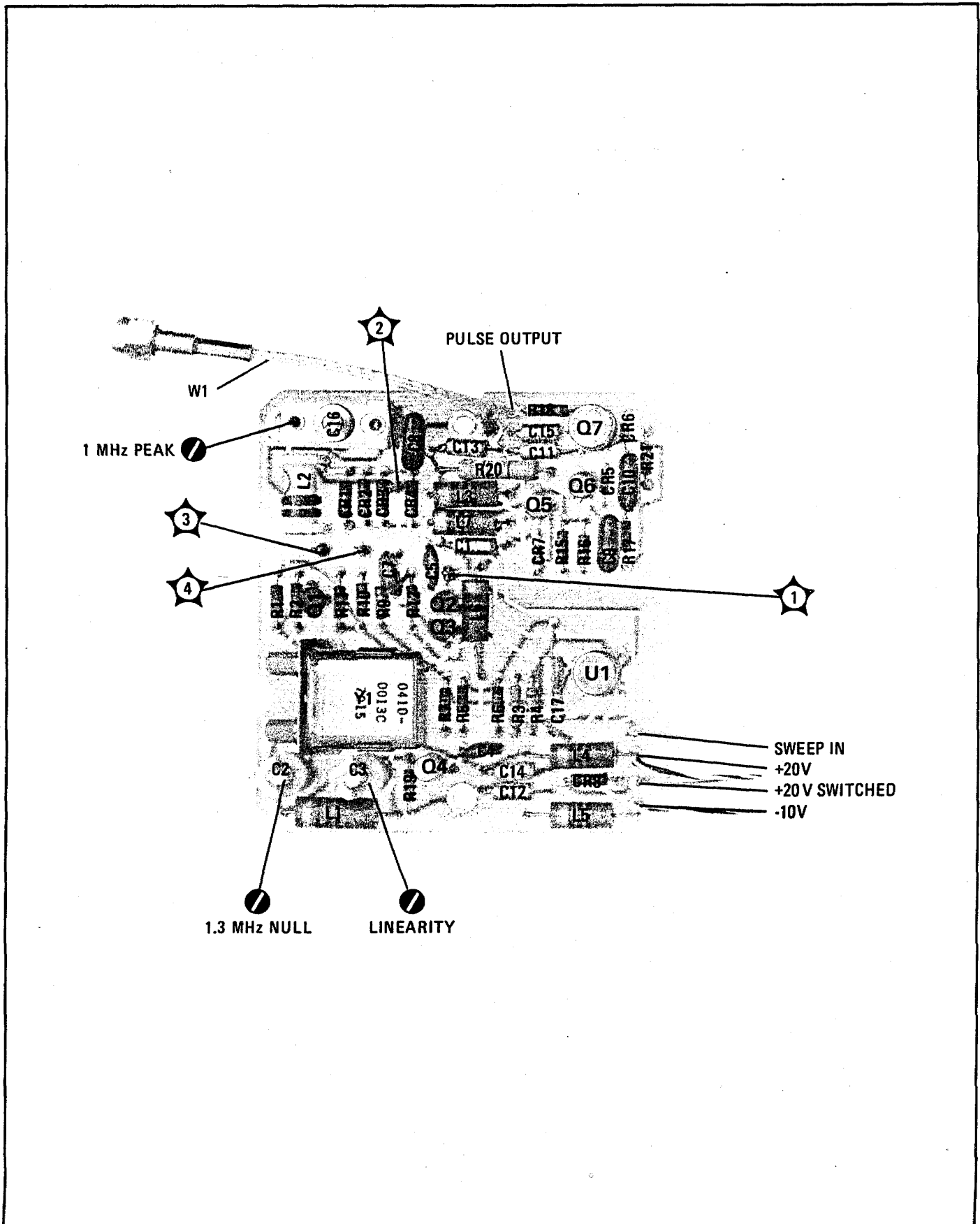


Figure 7-17. Tuning Stabilizer VCXO Assembly A14A2 (08555-60058), Figure 8-53, (Change Q)

CHANGE R (cont'd)

Table 6-2, change following parts to read:

| | | |
|-------|-----------|----------------------------------|
| A6R11 | 0757-0447 | R: FXD MET FLM 16.2K OHM 1% 1/8W |
| A6R12 | 0757-0428 | R: FXD MET FLM 1.62K OHM 1% 1/8W |
| A6R13 | 0698-3449 | R: FXD MET FLM 28.7K OHM 1% 1/8W |
| A6R15 | 0757-0288 | R: FXD MET FLM 9.09K OHM 1% 1/8W |

Figure 8-45, Band Buffer Assy A6:

Delete diode A6CR6.

Change value of following components to read as follows:

A6R11 to 16.2K
 A6R12 to 1.62K
 A6R13 to 28.7K
 A6R15 to 9.09K

CHANGE S

Table 1-1, change noise sideband specification to read:

Noise Sidebands: For fundamental mixing. More than 70 dB below CW signal, 30 kHz or more away from signal, with 1 kHz IF bandwidth and 100 Hz video filter.

Paragraph 4-23, change to read:

Specification: For fundamental mixing. More than 70 dB below CW signal, 30 kHz or more away from signal, with 1 kHz IF bandwidth and 100 Hz video filter.

4. Keeping the display centered, reduce the SCAN WIDTH PER DIVISION to 10 kHz. Reduce BANDWIDTH to 1 kHz. SCAN TIME PER DIVISION to 0.2 SECONDS, and VIDEO FILTER to 100 Hz.
5. Observe the noise level three divisions or greater away from the signal (30 kHz). The average noise level should be at least 70 dB below the CW signal level.

Table 6-2, change the following components to read:

| | | |
|---------|-------------|------------------------------------|
| A9A1CR3 | 1901-0050 | DIODE: SI 200 MA AT 1V |
| A9A1CR4 | 1901-0050 | DIODE: SI 200 MA AT 1V |
| A9A1T1 | 08555-80001 | TRANSFORMER: SWITCH REGULATOR ASSY |

CHANGE T

Table 6-2, change to read:

| | | |
|--------|-----------|----------------------------------|
| A9A1C2 | 0160-0155 | C: FXD MY 3300 PF 10% 200 VDCW |
| A9A1C3 | 0160-3457 | C: FXD CER 20000 PF 10% 250 VDCW |

Figure 8-72, change the following components to read:

A9A1C2 to 3300 and A9A1C3 to 2000.

CHANGE U

Table 6-2, delete: A14A2Z1 9170-0029 CORE: FERRITE-BEAD.

Figure 8-55, delete ferrite bead symbol and Z1 from gate lead of A14A2Q4.

CHANGE V

Table 6-2:

| | | | |
|--------|-------|-------------|--|
| Delete | A3 | 08555-60081 | OSCILLATOR ASSY: YIG 2.0 — 4.0 GHz |
| | | 08555-60082 | REBUILT EXCHANGE ASSY, INCL. YIG OSCILLATOR, ATTENUATOR AND ADAPTER |
| | A3AT1 | 08554-60058 | ATTENUATOR: FXD 2 dB |
| | A3CP1 | 1250-1249 | ADAPTER: COAXIAL RIGHT ANGLE |
| | W4 | 08555-20105 | CABLE ASSY: A3AT1 to A12J5 |
| Add | A3 | 1820-0401 | OSCILLATOR ASSY: YIG 2.0 — 4.0 GHz |
| | W4 | 08555-20888 | CABLE ASSY: A3J1 to A12J5 |

Figure 8-41:

Replace top right section of figure with Figure 7-19.

NOTE

1820-0401 *not* active for replacement. Orders for 1820-0401 filled with 08555-60082 and 08555-20105. Includes YIG oscillator, attenuator, adapter and cable assembly.

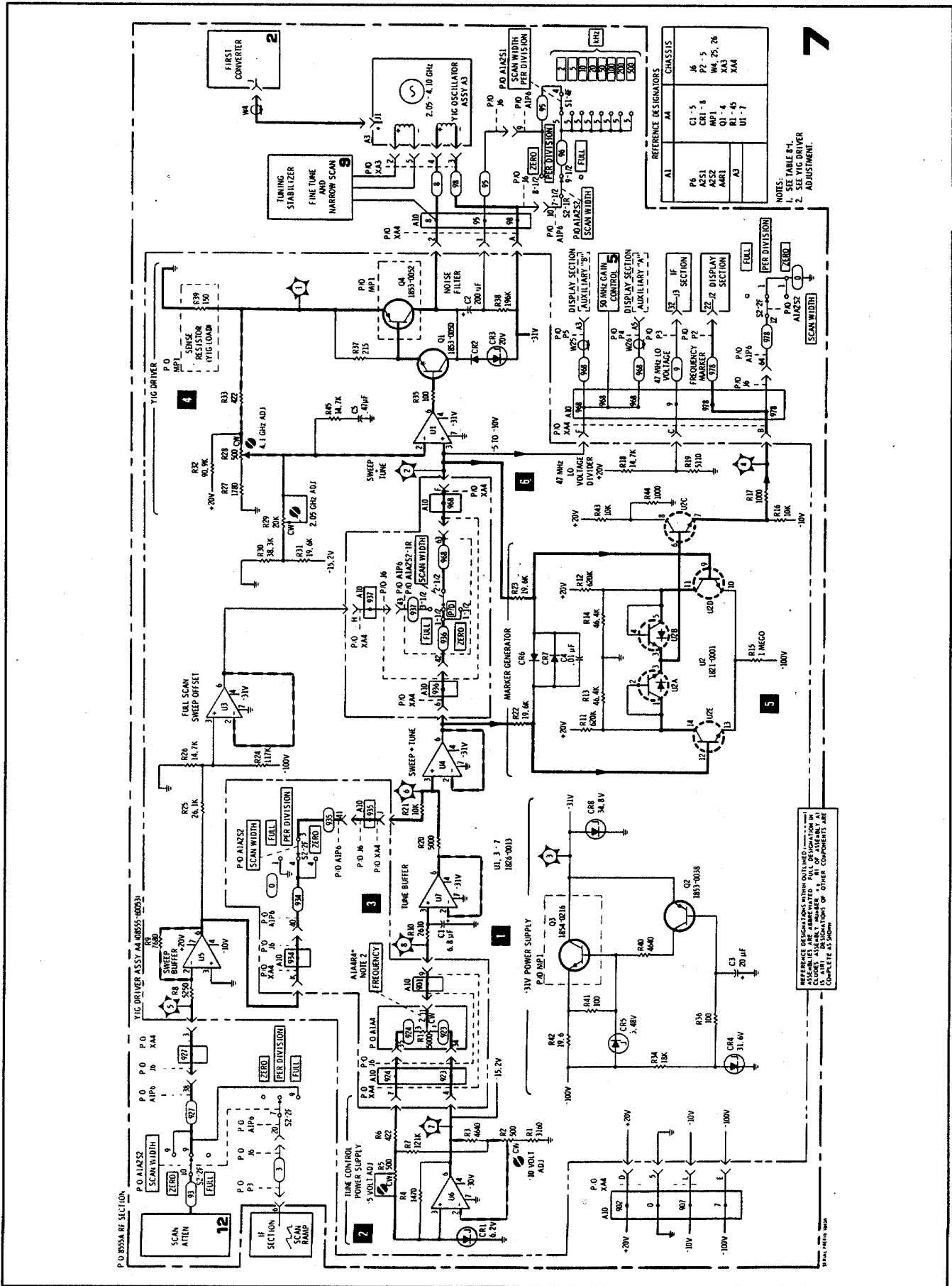


Figure 7-19. YIG Driver and Oscillator, Figure 8-41 (Change V)

7-6. INSTRUMENT CHANGES BY COMPONENT

Table 7-4. Summary of Instrument Changes

| Manual Changes | Assembly Numbers | | | | | | | | | | | | |
|----------------|-----------------------|--------------------------------|----|--------------------------------|-------------------|-----|----|--|-----------------------|---|--|------|---------|
| | A1 | A2 | A3 | A4 | A5 | A6 | A8 | A9 | A11 | A14 | A16 | W | Chassis |
| A | | A11 A2A2 A11 A2A4 | | | | | | | | | | | |
| B | | | | | | | | | A1C1* A1Q1 A1Q2 | | | | |
| C | | | | | | | | | | | CR11 CR12 CR13 CR14 R24 R25 | | |
| D | | A5R19 | | | | | | | | | | | |
| E | R20 C3 P6 J6 | | | | C3 | | | | | | | 21C1 | |
| F | | A5C8 A5C12 A5R21 A5L3 | | R20 R21 | | | | | | A2R26 A2R27 | | | |
| G | | | | | R52 R54 R64 | | | | | A2L7 A2R25 | | | |
| H | | | | P1 | | | | | | | 29J1 | | |
| I | | A5L6 | | | | | | | | | | | |
| J | | | | | | | | | | A2C1 | | | |
| K | | | | | | MP3 | | | A1C1 | | | | |
| L | | | | | | | C4 | | | | | | J1 |
| M | A2* | | | | | | | | | | | | |
| N | | | | | | | | | | A1R27 | | | |
| O | | | | C4 R46 | | | | | | | | | |
| P | | | | C3 R34 R36 R40 R41 | | | | A1CR1 A1Q2 A1Q3 A1R15 A1R16 A1R17 A1MP1 A1MP2 | | | | | |
| Q | | | | | | | | | | A2 A2R6 A2R20 A2CR9 A2R22 A2R23 A2R24 | | | |

Table 7-4. Summary of Instrument Changes (2 of 2)

| Manual Changes | Assembly Numbers | | | | | | | | | | | | |
|-----------------------------------|------------------|----|------------------------|----|----|--|----|------------------------|-----|--------------|-----|---|---------|
| | A1 | A2 | A3 | A4 | A5 | A6 | A8 | A9 | A11 | A14 | A16 | W | Chassis |
| R | | | | | | CR6 CR8 R11 R12 R13 R15 | | | | | | | |
| S | | | | | | | | A1CR3 A1CR4 A1T1 | | | | | |
| T | | | | | | | | A1C2 A1C3 | | | | | |
| U | | | | | | | | | | A2Z1 A2Q4 | | | |
| V | | | A3 AT1 CP1 W4 | | | | | | | | | | |
| *New parts preferred replacement. | | | | | | | | | | | | | |

7-7. INSTRUMENT IMPROVEMENT MODIFICATIONS**7-8. Production Memo, 8555A-1-72****HP MODEL 8555A SPECTRUM ANALYZER RF SECTION****A9 POWER SUPPLY SWITCHING REGULATOR PROBLEMS**

A9 power supply switching regulators of the 8555A Spectrum Analyzer RF Section have undergone several changes to improve reliability. A rebuilt exchange assembly is available which contains all the latest assembly A9 circuit revisions.

If a failure does occur in the A9 assembly on any 8555A, the unit may be repaired under warranty by following the recommended repair strategy outlined below.

On 8555A units, serial prefixes 1043A and below:

Replace the entire 08555-60005 A9 assembly with an exchange unit, HP Part No. 08555-60080.

On 8555A units, serial prefixes 1114A and 1116A:

Replace the entire 08555-60005 A9 assembly with an exchange unit, HP Part No. 08555-60080.

or

Replace

A9A1CR3 and 4 with 1901-1067

A9A1Q1 with 1854-0071

A9A1Q2 with 1853-0308

A9A1U1 with 1821-0001

A9A1T1 with 08555-80007.

On 8555A units, serial prefix 1138A:

50 kHz spurious sidebands may be eliminated by replacing A9A1C2 with .0015 μ F 0160-0298 and by replacing A9A1C3 with 1000 pF 0160-3456.

Repairs to any 08555-60005 assembly may be made using the 08555-60080 rebuilt exchange assembly. The rebuilt A9 08555-60080 assembly contains the 08555-60098 A9A1 sub-assembly. Refer to Figure 7-20 for component locations.

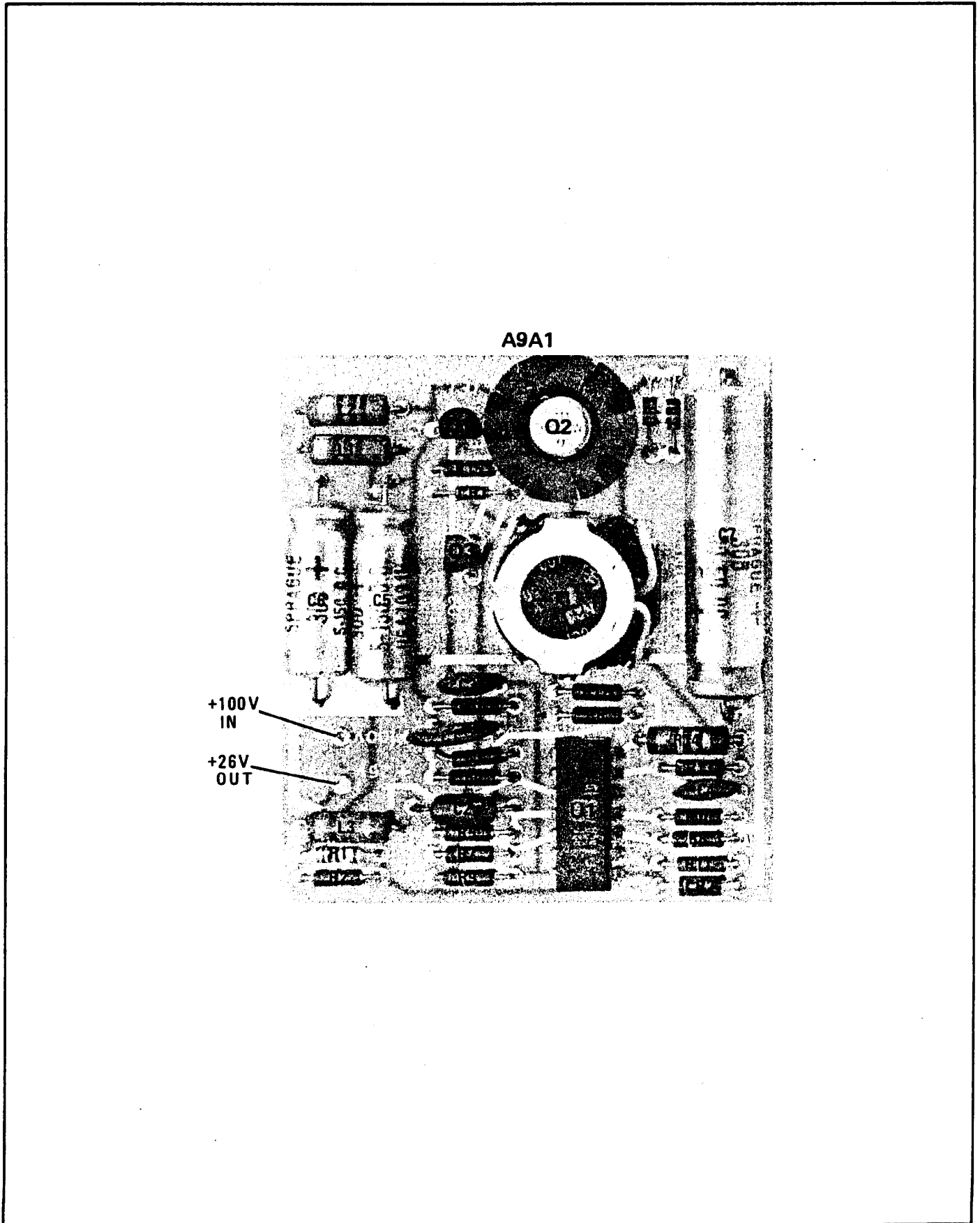


Figure 7-20. Switching Regulator Board Assembly A9A1 (08555-60098)

7-9. Service Note, 8555A-1**HP MODEL 8555A SPECTRUM ANALYZER, RF SECTION****Serials Prefixed 1232A and Below****PRESELECTOR DPM MODIFICATION**

HP 8555A RF Sections with serials listed above, require a circuit wiring modification before proper operation of the HP Model 8445B Option 003 Preselector can be achieved. The digital readout driver in the 8445B requires an input signal from the A4 YIG Driver Assembly in the 8555A.

This modification consists of adding a jumper wire on the plug-in A4 assembly plus adding a wire between the A4 output connector and the rear panel P5 Auxiliary "B" connector.

PROCEDURE

1. Remove top and bottom covers from the 8555A.
2. Remove the A4, A5, and A6 board assemblies so that A4 can be modified and easy access to connector P5 can be obtained.
3. Connect an insulated 3 inch jumper wire between A4U7 pin 6 and pin 8 on the A4 board connector. Refer to Figure 7-21.
4. Connect an insulated 4-inch wire between A10XA4 pin 8 (on interconnect board) and rear panel Preselector connector P5 pin 7. Refer to Figure 7-22.
5. This completes the modification. Replace all board assemblies and top and bottom covers.

ELECTRICAL CHECK

1. With 8555A installed into Display Section, turn on power.
2. Center LO feedthru signal on CRT display.
3. With a dc voltmeter measure the voltage at AUXILIARY "B" on rear panel connector P5 pin 7. Voltage should be $-7.50 \pm 0.05V$.
4. With frequency dial at 4100 MHz on the LO scale, voltage at P5-7 should be $-15.00 \pm 0.05V$.

Change your Operating and Service Manual per the partial schematic of the A4 assembly shown in Figure 7-23.

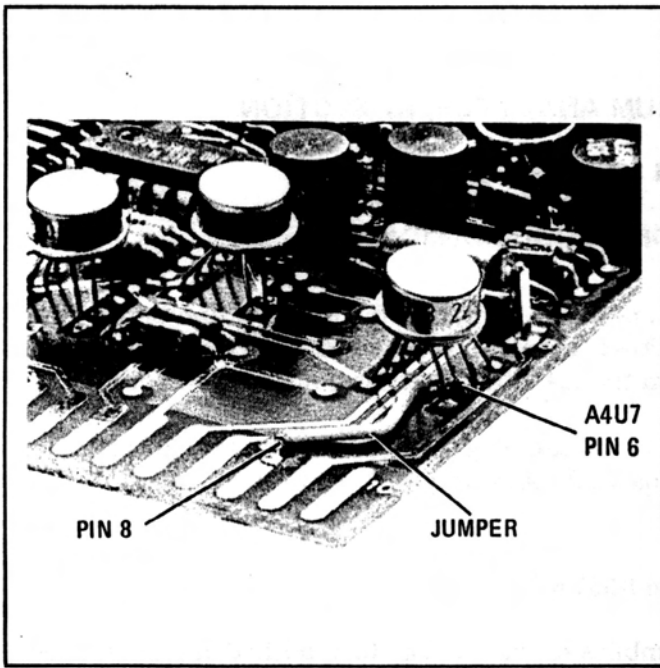


Figure 7-21. Modified A4 Board

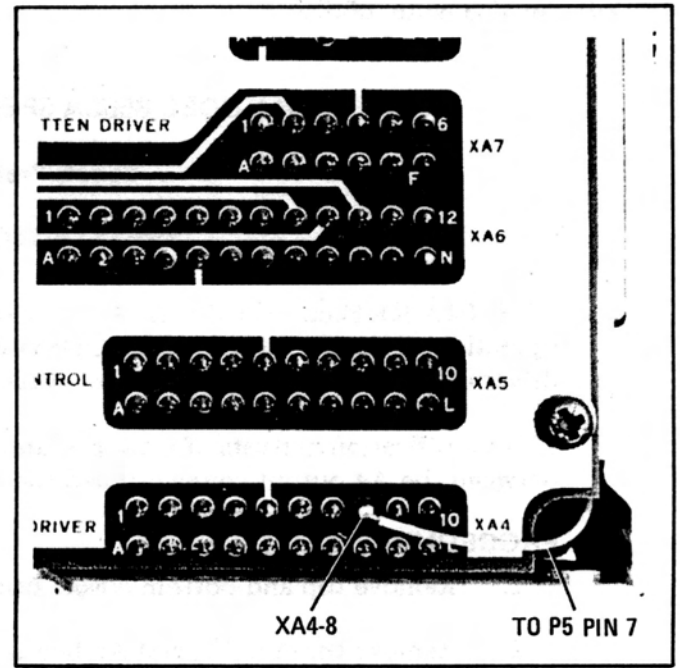


Figure 7-22. Connection to A10XA4-8

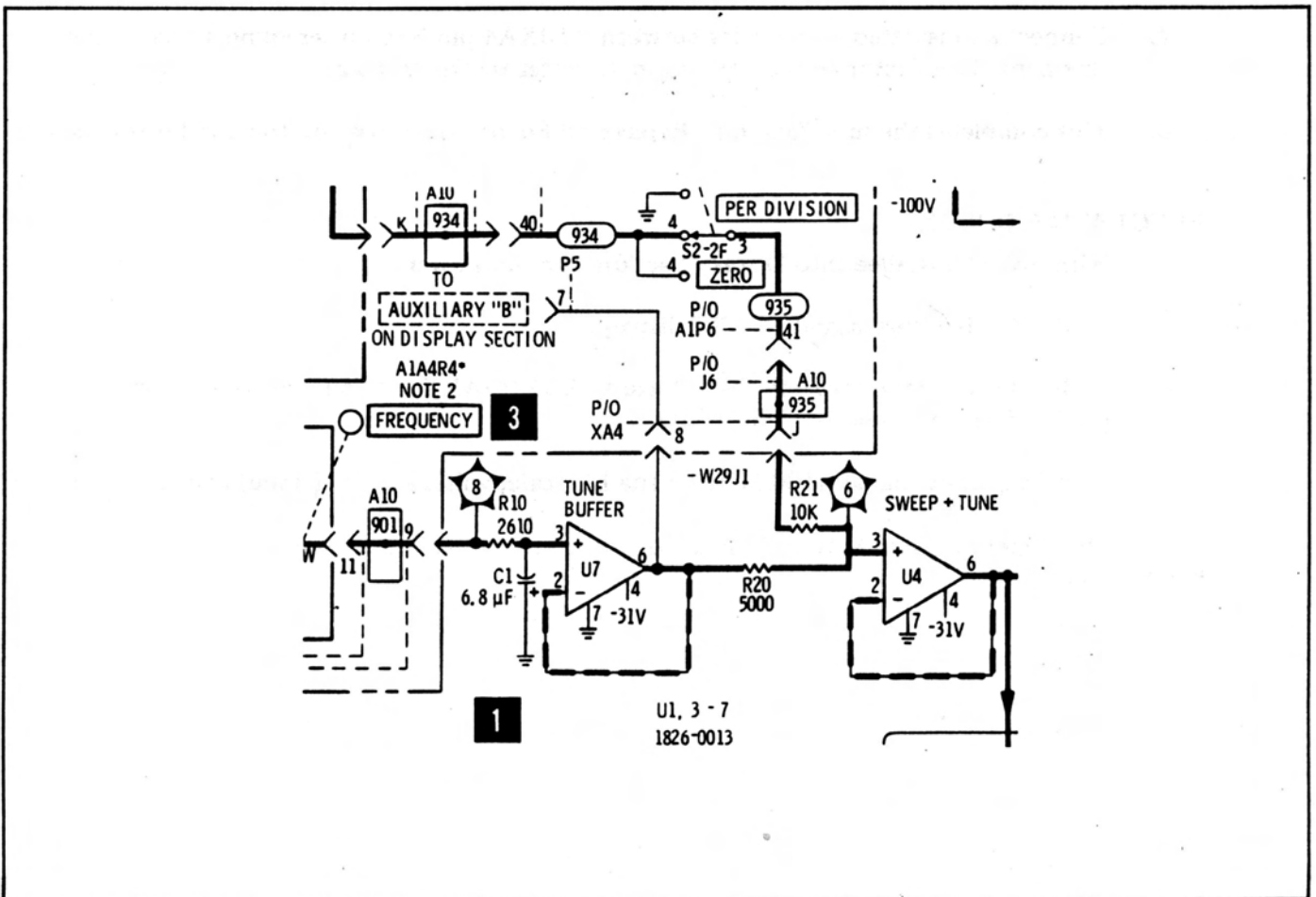


Figure 7-23. Partial Schematic of Modified A4 Assembly

SECTION VIII

SERVICE

8-1. INTRODUCTION

8-2. This section provides instructions for troubleshooting and repair of the HP 8555A Spectrum Analyzer RF Section.

8-3. PRINCIPLES OF OPERATION

8-4. Information relative to the principles of operation appears on the foldout pages opposing the Block Diagram, Service Sheet 1. Theory of operation appears on the foldout pages opposing each of the foldout schematic diagrams. The schematic diagram circuits are referenced to the theory of operation text by block numbers.

8-5. RECOMMENDED TEST EQUIPMENT

8-6. Test equipment and accessories required to maintain the Spectrum Analyzer RF Section are listed in Tables 1-4 and 1-5. If the equipment listed is not available, equipment that meets the required specifications may be substituted.

8-7. TROUBLESHOOTING

8-8. Troubleshooting procedures are divided into two maintenance levels in this manual. The first, a troubleshooting tree, is designed to isolate the cause of a malfunction to a circuit or assembly. In this procedure, maximum use is made of the front panel controls, indicators and the analyzer's operating capability to isolate the malfunction to the defective circuit.

8-9. The second maintenance level 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 pages facing the schematic diagrams. The test procedures are referenced to the schematic diagrams by block numbers.

8-10. After the cause of a malfunction has been found and remedied in any circuit containing adjustable components, the applicable procedure specified in Section V of this manual should be performed. After repairs and/or adjustments have been made, the applicable procedure specified in Section IV of this manual should be performed.

8-11. REPAIR

8-12. Factory Repaired Exchange Modules. Factory repaired exchange modules are available for modules that are not field-repairable. In addition, repaired exchange modules are available for major sub-assemblies as an alternate method of repair. The factory repaired modules are available at a considerable savings in cost over the cost of a new module.

8-13. These exchange modules should be ordered from the nearest Hewlett-Packard Sales/Service office using the part numbers in the replaceable parts table in Section VI of this manual.

8-14. Service Kit. A service kit, HP Part Number 08555-60077, is available as an aid in maintaining the 8555/8552 Spectrum Analyzer. This kit is described in Table 1-5.

8-15. Factory Selected Components. Some component values are selected at the time of final checkout at the factory. Usually these values are not extremely critical; they are selected to provide optimum compatibility with associated components. These components, which are identified on the schematics with an asterisk, are listed in Table 8-1. The recommended procedure for replacing a factory-selected component is as follows:

a. Try the original value, then perform the test specified in Section V of this manual for the circuit being repaired.

b. If the specified test cannot be satisfactorily performed, try the typical value shown in the parts list and repeat the test.

c. If the test results are still not satisfactory, substitute various values until the desired result is obtained.

8-16. Adjustable Components. Adjustable components, other than front panel operating controls, are listed in Table 8-2. Adjustment procedures for these components are contained in Section V of this manual.

8-17. Servicing Aids on Printed Circuit Boards. Servicing aids on printed circuit boards include test

Table 8-1. Factory Selected Components

| Designation | Circuit | Purpose |
|-------------|------------------|------------------------------|
| A2A2R16 | 500 MHz LO Drive | Oscillator collector voltage |
| A4R30, 31 | YIG Driver | YIG Oscillator sensitivity |
| A11A1C1 | Second LO | Stability with turn-on |
| A14A1C12 | Discriminator | Discriminator frequency |
| A14A1R14 | Discriminator | Discriminator gain |
| A16R1 | Input Mixer Gain | n=1-High Gain |
| A16R2 | Input Mixer Gain | n=2-High Gain |
| A16R3 | Input Mixer Gain | n=3-High Gain |
| A16R4 | Input Mixer Gain | n=4-High Gain |
| A16R5 | Input Mixer Gain | n=1+High Gain |
| A16R6 | Input Mixer Gain | n=2+High Gain |
| A16R7 | Input Mixer Gain | n=3+High Gain |
| A16R8 | Input Mixer Gain | n=4+High Gain |
| A16R9 | Input Mixer Gain | n=1-(550 MHz IF) High Gain |
| A16R10 | Input Mixer Gain | n=1+(550 MHz IF) High Gain |
| A16R12 | Input Mixer Gain | n=2-Low Gain |
| A16R13 | Input Mixer Gain | n=3-Low Gain |
| A16R14 | Input Mixer Gain | n=4-Low Gain |
| A16R15 | Input Mixer Gain | n=1+Low Gain |
| A16R16 | Input Mixer Gain | n=2+Low Gain |
| A16R17 | Input Mixer Gain | n=3+Low Gain |
| A16R18 | Input Mixer Gain | n=4+Low Gain |
| A16R20 | Input Mixer Gain | n=1+(550 MHz IF) Low Gain |
| A16R21 | Input Mixer Bias | n=1±, 3± |
| A16R22 | Input Mixer Bias | n=2± Bias |
| A16R23 | Input Mixer Bias | n=4± Bias |
| A16R24 | Input Mixer Bias | n=1±, 3± Bias Compensation |
| A16R25 | Input Mixer Bias | n=4± Bias Compensation |

Table 8-2. Adjustable Components

| Designation | Circuit | Purpose |
|-------------|-------------------|------------------------------|
| A1R1 | External Mixer | External mixer bias |
| A1R2 | Calibration | RF to IF Section matching |
| A1A4R1 | YIG Driver | FREQUENCY Control |
| A1A4R2 | Tuning Stabilizer | FINE TUNE Control |
| A1A4R3 | Tuning Stabilizer | 2:1 Gain Control |
| A2C5 | 550 MHz IF | Bandpass Filter Adj. |
| A2C6 | 550 MHz IF | Bandpass Filter Adj. |
| A2C7 | 550 MHz IF | Bandpass Filter Adj. |
| A2A2R5 | 500 MHz LO Drive | Frequency Sensitivity |
| A2A2R13 | 500 MHz LO Drive | Frequency Linearity |
| A2A3C3 | 550/50 MHz Mixer | 50 MHz Filter |
| A2A4C4 | 500 MHz LO | Frequency adjustment |
| A2A4L1 | 500 MHz LO | Output coupling |
| A2A5C2 | 50 MHz Ampl. | Input impedance matching |
| A2A5C8 | 50 MHz Ampl. | Pin attenuator adjustment |
| A2A5C12 | 50 MHz Ampl. | Output impedance matching |
| A2A5R4 | 50 MHz Ampl. | n=1-Low gain adjustment |
| A2A5R19 | 50 MHz Ampl. | 50 MHz ampl. gain |
| A2A5R22 | 50 MHz Ampl. | 15 dB gain step adjustment |
| A2A5R25 | 50 MHz Ampl. | n=1-*Low (550 MHz IF) adj. |
| A4R2 | YIG Driver | -10 Volt adjustment |
| A4R5 | YIG Driver | -5 Volt adjustment |
| A4R28 | YIG Driver | 4.1 GHz YIG Osc. adjustment |
| A4R29 | YIG Driver | 2.05 GHz YIG Osc. adjustment |
| A5R48 | Tuning Stabilizer | Tickler sweep adjustment |
| A5R55 | Tuning Stabilizer | FET offset adjustment |

Table 8-2. Adjustable Components (cont'd)

| Designation | Circuit | Purpose |
|-------------|----------------------|----------------------------|
| A5R58 | Tuning Stabilizer | VCXO sweep adjustment |
| A8R5 | Power Supply | +20 and +10 V adjustment |
| A11 ADJ 1 | 2.05 GHz IF | Bandpass filter adjustment |
| A11 ADJ 2 | 2.05 GHz IF | Bandpass filter adjustment |
| A11 ADJ 3 | 1.5 GHz LO | Frequency adjustment |
| A11 ADJ 4 | 1.5 GHz Notch Filter | 1.5 GHz trap |
| A11A3R1 | 2nd LO Voltage Flt. | 2nd LO power adjustment |
| A14A2C2 | VCXO Driver | 1.3 MHz Null adjustment |
| A14A2C3 | VCXO Driver | VCXO Linearity adjustment |
| A14A2C16 | VCXO Driver | 1 MHz Peak adjustment |

points, transistor designations, adjustment callouts and assembly part numbers with alpha-numerical revision information.

8-18. Part Location Aids. The location of chassis mounted parts and major assemblies are shown in Figure 8-10. In addition, a location diagram with coaxial cable interconnection information is contained on the bottom of the RF Section Top Cover.

8-19. The location of individual components mounted on printed circuit boards or assemblies are shown on the appropriate schematic. The part reference designator is the assembly designation plus the part designation. (Example: A1R1 is R1 on the A1 assembly.) For specific component description and ordering information refer to the replaceable parts table in Section VI.

8-20. Diagram Notes. Table 8-3, Schematic Diagram Notes, provides information relative to symbols and values shown on schematic diagrams.

8-21. GENERAL SERVICE HINTS

8-22. The etched circuit boards used in Hewlett-Packard equipment are the plated-through type consisting of metallic conductors bonded to both sides of an insulating material. The circuit boards can be either a single layer or multi-layer board. The metallic conductors are extended through the component holes or interconnect holes by a plating process. Soldering can be performed on either side of the board with equally good results. Table 8-4 lists recommended tools and materials for use in repairing etched circuit boards. Following are recommendations and precautions pertinent to 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 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.

8-23. Component Replacement. The following procedures are recommended when component replacement is necessary:

a. Remove defective component from board.

b. If component was unsoldered, remove solder from mounting holes with a suction device or a wooden toothpick.

c. Shape leads of replacement component to match mounting hole spacing.

d. Insert component leads into mounting holes and position component as original was positioned. Do not force leads into mounting holes; sharp lead ends may damage the plated-through conductor.

NOTE

Although not recommended when both sides of the circuit board are accessible, 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.

Table 8-3. Schematic Diagram Notes

SCHEMATIC DIAGRAM NOTES

Refer to USAS Y32.2-1967


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


P/O Part of.

***** Asterisk on component 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 designations.


 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.

 Numbered test point. Measurement terminal provided.

 Lettered test point. No measurement terminal provided.

 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.

n=1±* n = harmonic number
 1 = 1st LO fundamental
 ± = 1st LO above or below 1st IF
 * = 550 MHz 1st IF

 Chassis ground

 Assembly ground

Wrap leads of replacement component one turn around original leads. Solder wrapped connection and clip off excess lead.

8-24. GENERAL SERVICE INFORMATION

8-25. Transistors and diodes are used throughout the RF Section in circuit configurations such as delay circuits, trigger circuits, switches, oscillators and various types of amplifiers. Basic transistor operation is shown in the following pages.

8-26. Transistor In-Circuit Testing. The common causes of transistor failure are internal short circuits and open circuits. In transistor circuit testing, the most important consideration is the transistor base-to-emitter junction. The base emitter junction in a transistor is comparable to the control grid-cathode relationship in a vacuum tube. The base emitter junction is essentially a solid-state diode; for the transistor to conduct, this diode must be forward biased. As with simple diodes, the forward-bias polarity is determined by the materials forming the junction. Transistor symbols on schematic diagrams reveal the bias polarity required to forward-bias the base-emitter junction. The B part of Figure 8-1 shows transistor symbols with the terminals labeled. The other two columns compare

the biasing required to cause conduction and cut-off in NPN and PNP transistors. If the transistor base-emitter junction is forward biased, the transistor conducts. However, if the base-emitter junction is reverse-biased, the transistor is cut off (open). The voltage drop across a forward-biased, emitter-base junction varies with transistor collector current. For example, a germanium transistor has a typical forward-bias, base-emitter voltage of 0.2–0.3 volt when collector current is 1–10 mA, and 0.4–0.5 volt when collector current is 10–100 mA. In contrast, forward-bias voltage for silicon transistor is about twice that for germanium types; about 0.5–0.6 volt when collector current is low, and about 0.8–0.9 volt when collector current is high.

8-27. Figure 8-1, Part A, shows simplified versions of the three basic transistor circuits and gives the characteristics of each. When examining a transistor stage, first determine if the emitter-base junction is biased for conduction (forward-biased) by measuring the voltage difference between emitter and base. When using an electronic voltmeter, do not measure directly between emitter and base; there may be sufficient loop current between the voltmeter leads to damage the transistor. Instead, measure each voltage separately with respect to a common point (e.g., chassis). If the emitter-base

Table 8-4. Etched Circuit Soldering Equipment

| Item | Use | Specification | Item Recommended |
|--------------------|---|---|--|
| Soldering tool | Soldering Unsoldering | Wattage rating: 47½ – 56½ Tip Temp: 850–900 degrees | Ungar No. 776 handle with *Ungar No. 4037 Heating Unit |
| Soldering* Tip | Soldering Unsoldering | *Shape: pointed | *Ungar No. PL111 |
| De-soldering aid | To remove molten solder from connection | Suction device | Soldapult by Edsyn Co., Arleta, California |
| Resin (flux) | Remove excess flux from soldered area before application of protective coating. | Must not dissolve etched circuit base board material or conductor bonding agent | Freon, Aceton, Lacquer Thinner, Isopropyl Alcohol (100% dry) |
| 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 | Krylon ** No. 1302 Humiseal Protective Coating, Type 1B12 by Columbia Technical Corporation, Woodside 77, New York |

*For working on etched 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 inch chisel tip.

**Krylon, Inc., Norristown, Pennsylvania

junction is forward-biased, check for amplifier action by short-circuiting base to emitter while observing collector voltage. The short circuit eliminates base-emitter bias and should cause the transistor to stop conducting (cut off). Collector voltage should then change and approach the supply voltage. Any difference is due to leakage current through the transistor and, in general, the smaller this current, the better the transistor. If the collector voltage does not change, the transistor has either an emitter-collector short circuit or emitter-base open circuit.

8-28. Field Effect Transistor (FET). Field effect transistors (see Figure 8-2) have three terminals: source, drain and gate, which correspond in function to emitter, collector, and base of junction transistors. Source and drain leads are attached to the same block (channel) of N or P semiconductor material. A band of oppositely doped material around the channel (between the source and drain leads) is connected to the gate lead.

8-29. In normal FET operation, the gate-source voltage reverse-biases the PN junction, causing an electric field that creates a depletion region in the source-drain channel. In the depletion region the number of available current carriers is reduced as the reverse biasing voltage increases, making source-drain current a function of gate-source voltage. With the input (gate-source) circuit reverse-biased, the FET presents a high impedance to its signal sources (as compared with the low impedance of the forward-biased junction transistor

base-emitter circuit). Because there is no input current, FET's have less noise than junction transistors. Figure 8-2 shows the schematic symbol and biasing for N channel and P channel field effect transistors.

8-30. Transistor and Diode Markings. Figure 8-3 illustrates examples of diode and transistor marking methods. In addition, the emitter lead for bipolar transistors and each lead for field effect transistors is identified on the printed circuit boards.

8-31. INTEGRATED CIRCUITS AND SYMBOLS

8-32. The following paragraphs and illustrations provide basic information about integrated circuits and symbols. While a complete treatment of the subject is not within the scope of this manual, it is believed that this material will help the technician experienced with discrete devices. Typical integrated circuit packaging is illustrated in Figure 8-4.

8-33. Logic Circuits and Symbols. The Logic circuits discussed are digital in nature: their outputs are always in one of two possible states, a "1" or "0". These two states are also referred to as being either high (H) or low (L). The high and low states are relative; low must be less positive (more negative) than high, both states may be positive or negative, or high may be positive and low negative. In positive logic the more positive (H) state is a logical "1" and the more negative (L) state is a logical "0". In negative logic the more negative (L)

| A. Amplifier Characteristics | | | |
|------------------------------|---------------|----------------|--------------------|
| | | | |
| CHARACTERISTIC | COMMON BASE | COMMON EMITTER | COMMON COLLECTOR |
| Input Impedance | 30Ω - 50Ω | 500Ω - 1500Ω | 20KΩ - 500KΩ |
| Output Impedance | 300KΩ - 500KΩ | 30KΩ - 50KΩ | 50Ω - 1000Ω |
| Voltage Gain | 500 - 1500 | 300 - 1000 | < 1 |
| Current Gain | < 1 | 25 - 50 | 25 - 50 |
| Power Gain | 20 dB - 30 dB | 25 dB - 40 dB | 10 dB - 20 dB |
| | | | (Emitter Follower) |

| B. Transistor Biasing | | |
|-------------------------------------|--------|------------|
| TYPE | CUTOFF | CONDUCTION |
| NPN COLLECTOR BASE EMITTER | | |
| PNP COLLECTOR BASE EMITTER | | |

Figure 8-1. Transistor Operation

| A. FET Amplifier Characteristics | | |
|----------------------------------|---------------|--------------------------------|
| | | |
| CHARACTERISTIC | COMMON SOURCE | COMMON DRAIN (Source Follower) |
| Input Impedance | 1MΩ-15MΩ | 1MΩ-15MΩ |
| Output Impedance | 5KΩ-100KΩ | 1KΩ-10KΩ |
| Voltage Gain | 10-200 | <1 |
| Power Gain | 60 dB-100 dB | 40 dB-80 dB |

| B. FET Biasing | | |
|----------------|--|--|
| N-CHANNEL | | |
| P-CHANNEL | | |

Figure 8-2. Field Effect Transistor Operation

FIELD EFFECT TRANSISTORS

METAL CASE BLACK EPOXY (PLASTIC) METAL CASE

BI-POLAR TRANSISTORS

BLACK EPOXY (PLASTIC) TRANSISTORS

METAL CASE TRANSISTORS

DIODES

DIODE SYMBOL

ANODE → | ← CATHODE

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

state is a logical "1" and the more positive (H) state is a logical "0".

8-34. Two of the basic "building blocks" of logic circuits are the AND and OR gates. The symbols and truth tables for basic AND and OR gates are shown in Figure 8-5.

8-35. **Basic AND Gate (Positive logic).** The basic AND gate is a circuit which produces an output "1" when, and only when, a "1" is applied to all inputs. As shown in Figure 8-5, terminal X will be high only when terminals A and B are both high. The dot (•) shown in the AND gate is the logic term for AND. The term for a simple two input AND gate is $X = A \cdot B$ (X equals A and B). AND gates may be designed to have as many inputs as required to fill a specific requirement.

8-26. **Basic OR Gate (Positive Logic).** The basic OR gate is a circuit which produces a "1" output when any one, or all of the inputs are in a "1" state. As shown in Figure 8-5, terminal X will be high when either terminal A or terminal B, or both are high. The + shown in the OR gate symbol is the logic term for OR. The term for a simple two input OR gate is $X = A + B$ (X equals A or B). OR gates may be designed to have as many inputs as required for specific needs.

8-37. The symbols for AND and OR gates differ in that AND gate symbols have a flat input side and a rounded output side while OR gate symbols have a concave input side and a pointed output side.

8-38. **Truth Tables.** Truth tables provide a means of presenting the output state of logic devices for any set of inputs in tabular form. Truth tables contain one column for each of the inputs and a column for the output. In basic truth tables the column notations are usually H or L. (for high and low) or, for binary notation, "1" or "0". More complex truth tables use other terms which will be explained where these tables appear in the text.

8-39. **Logic Inversion.** Adding inversion to AND and OR gates changes their characteristics. Inversion is usually accomplished by adding an inverter stage (common emitter) in front of an input or after an output. A circle added to the input or output leads indicates the portion of the circuit in which the inversion takes place. The simplest of these devices are AND and OR gates in which the output is inverted. These gates are called NAND (for Not AND) and NOR (for Not OR). Basic NAND and NOR gates are shown in Figure 8-6. When all inputs and outputs of an AND gate are inverted, it functions as an OR gate. When all inputs and outputs of an OR gate are inverted, it

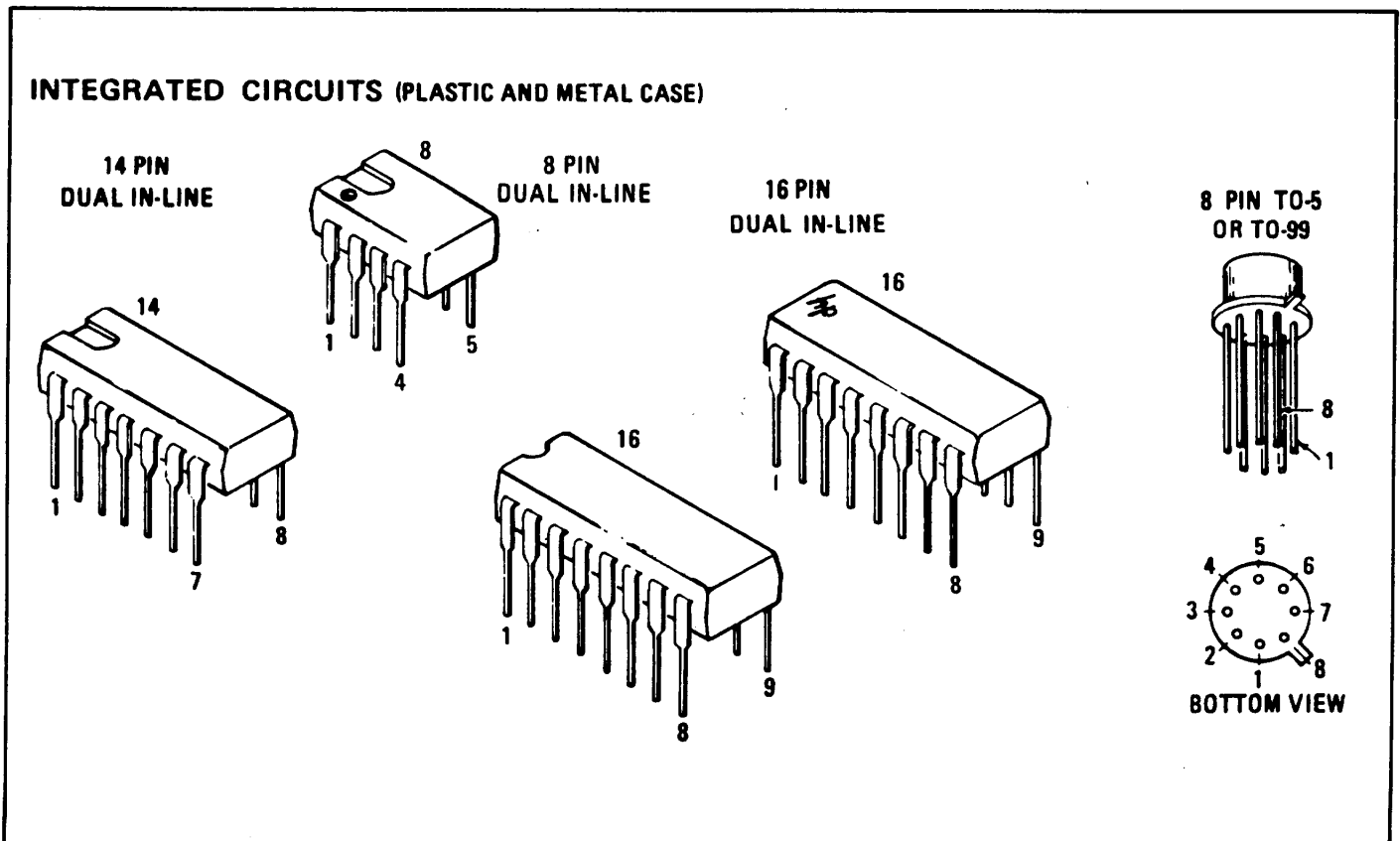


Figure 8-4. Integrated Circuit Packaging

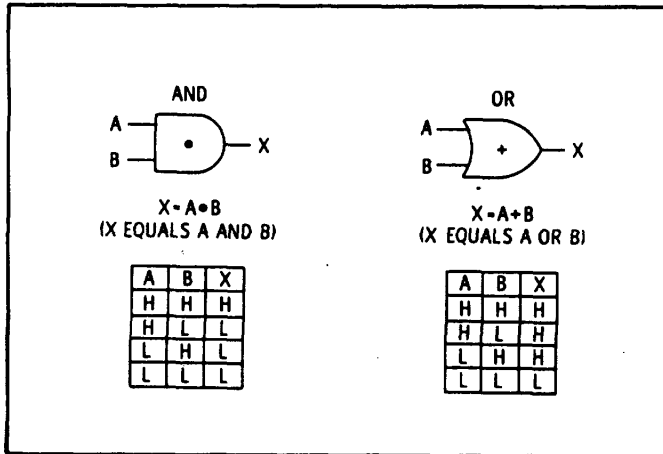


Figure 8-5. Basic AND and OR Gates

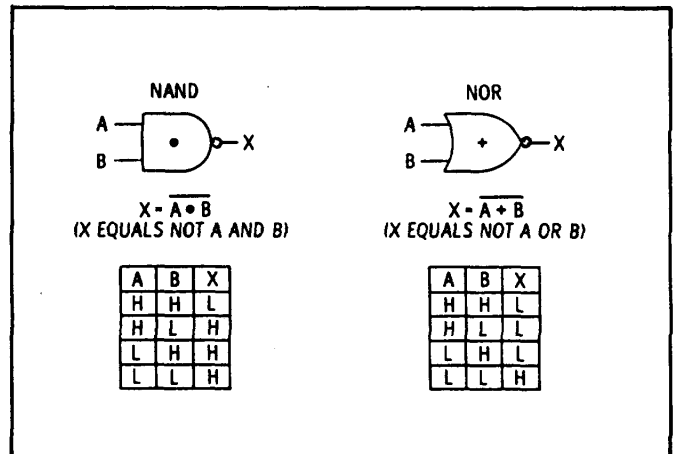


Figure 8-6. Basic NAND and NOR Gates

functions as an AND gate. Figure 8-7 provides information relative to various gate inversion functions.

8-40. Operational Amplifier Circuits and Symbols. Operational amplifiers are used in the RF Section to provide such functions as summing amplifiers, offset amplifiers, buffers and power supplies. The particular function is determined by the external circuit connections. Equivalent circuit and logic diagrams for type 741 operational amplifiers are contained in Figure 8-8. Circuit A is a non-inverting buffer amplifier with a gain of 1. Circuit B is a non-inverting amplifier with gain determined by the resistance of R1 and R2. Circuit C is an inverting amplifier with gain determined by R1 and R2, with the input impedance determined by R2. Circuit D contains the functional circuitry and pin

connection information along with an operational amplifier review.

NOTE

In circuit D it is assumed that the amplifier has high gain, low output impedance and high input impedance.

8-41. Operational Amplifier Troubleshooting Procedure. Measure and record the voltage level at both the - (inverting) terminal pin 2 and the + (non-inverting) terminal pin 3. The level should not differ by more than $\cong 10$ mV. If the voltage level is not within $\cong 10$ mV, check the external circuitry and components. If the external circuitry (input signal, operating voltages, feedback resistors) is normal, replace the operational amplifier.

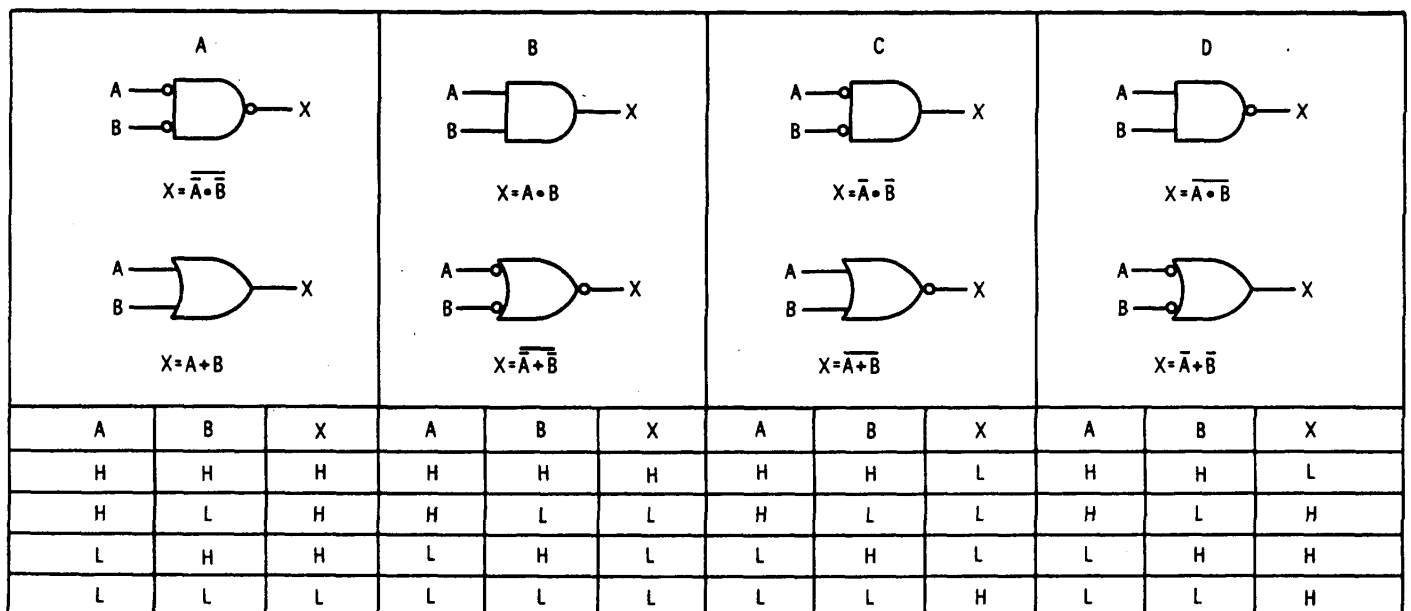


Figure 8-7. Logic Comparison Diagrams

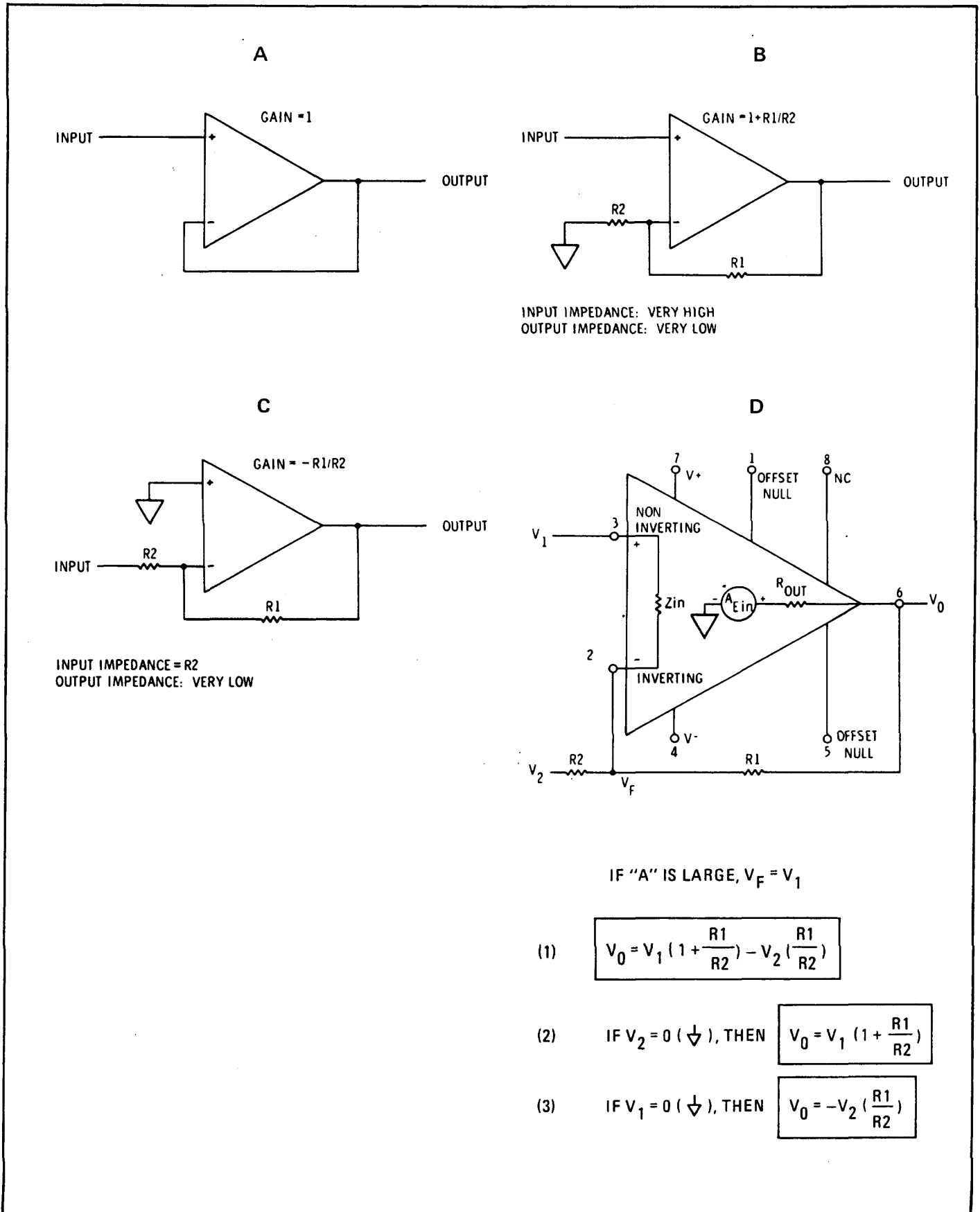


Figure 8-8. Operational Amplifier Equivalent Circuit

For a given VCXO sweep, the YIG oscillator will sweep twice as much on the 4100th harmonic number as it would on the 2050th harmonic. Therefore, to maintain calibrated scan widths when locked, sweep to the VCXO is controlled by a variable resistor (2:1 Gain Control) which is ganged to the main tune (FREQUENCY) control.

11 BAND CODE SWITCH LOGIC

Band code switching logic is used in the RF Section to automatically switch various control functions. A shaft encoder switch on the frequency scale drum provides position indicating signals to a logic decoding circuit. The logic decoding section decodes the position indicating signals and generates control function signals. The band code signals control bias to the first mixer, relay control for the internal/external mixer relay, control for the second converter bypass relays, gain control for the 50 MHz amplifier, attenuation control for the 1/n attenuator, and + or - harmonic indication for the signal identifier circuit. Band code signals are also available at rear panel connector P5 for use with external equipment.

12 SCAN ATTENUATOR AND SCAN WIDTH PER DIVISION SWITCHING

The scan attenuator functions as a precision voltage divider to determine the scan width per division. The SCAN WIDTH PER DIVISION switch selects the precision resistors and routes the attenuated sweep ramp to either the YIG driver circuit (block 7) or to the tuning stabilizer circuit (block 9). For scan widths greater than 500 kHz per division the sweep ramp is applied through the YIG driver circuit to the main coil in the YIG oscillator. For scan widths of 500 kHz per division or less, the attenuated sweep ramp is applied through the tuning stabilizer circuit to the YIG oscillator tickler coil.

13 ANALOGIC

The analogic circuit functions as an analog computer and monitors the position of the SCAN WIDTH and BANDWIDTH switches in the RF Section and the SCAN TIME PER DIVISION and VIDEO FILTER switches in the IF Section. When the switches are set to any combination of positions that would cause more than 0.5 dB amplitude error due to excessive sweep rate, the analogic circuit lights the DISPLAY UNCAL lamp. There is no actual connection between the analogic circuit and the signal processing circuits.

14 BANDWIDTH SWITCHING AND AMPL CAL

The mechanical switching for the bandwidth of the 3 MHz IF in the IF Section is accomplished in the RF Section. The BANDWIDTH switch delivers voltages to the IF Section for diode switching of the selected bandwidth. The AMPL CAL circuit controls the gain of a 3 MHz calibration amplifier in the IF Section to correct for variations between different RF and IF Sections.

15 RF SECTION POWER SUPPLY

A switching regulator and dual power supply provides the +10 and +20 volt source for the RF Section. Voltages other than the +10 and +20 volts are obtained from power supplies in the IF Section and/or the Display Section. The switching regulator converts +100 Vdc to approximately +26 volts. The dual power supply converts the +26 Vdc to +10 and +20 volts in conventional series regulator feedback circuits.

FIGURE 8-9A

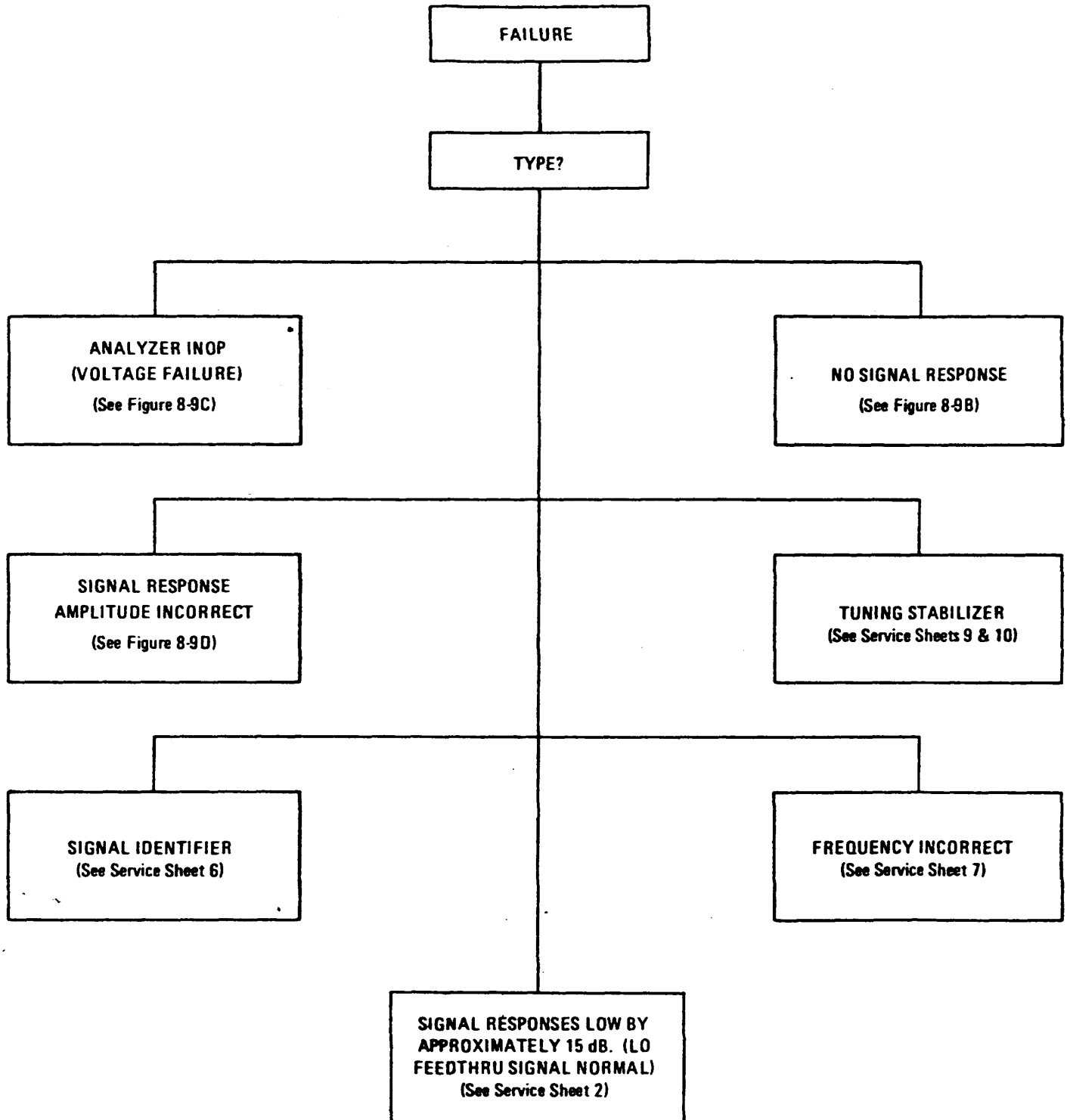
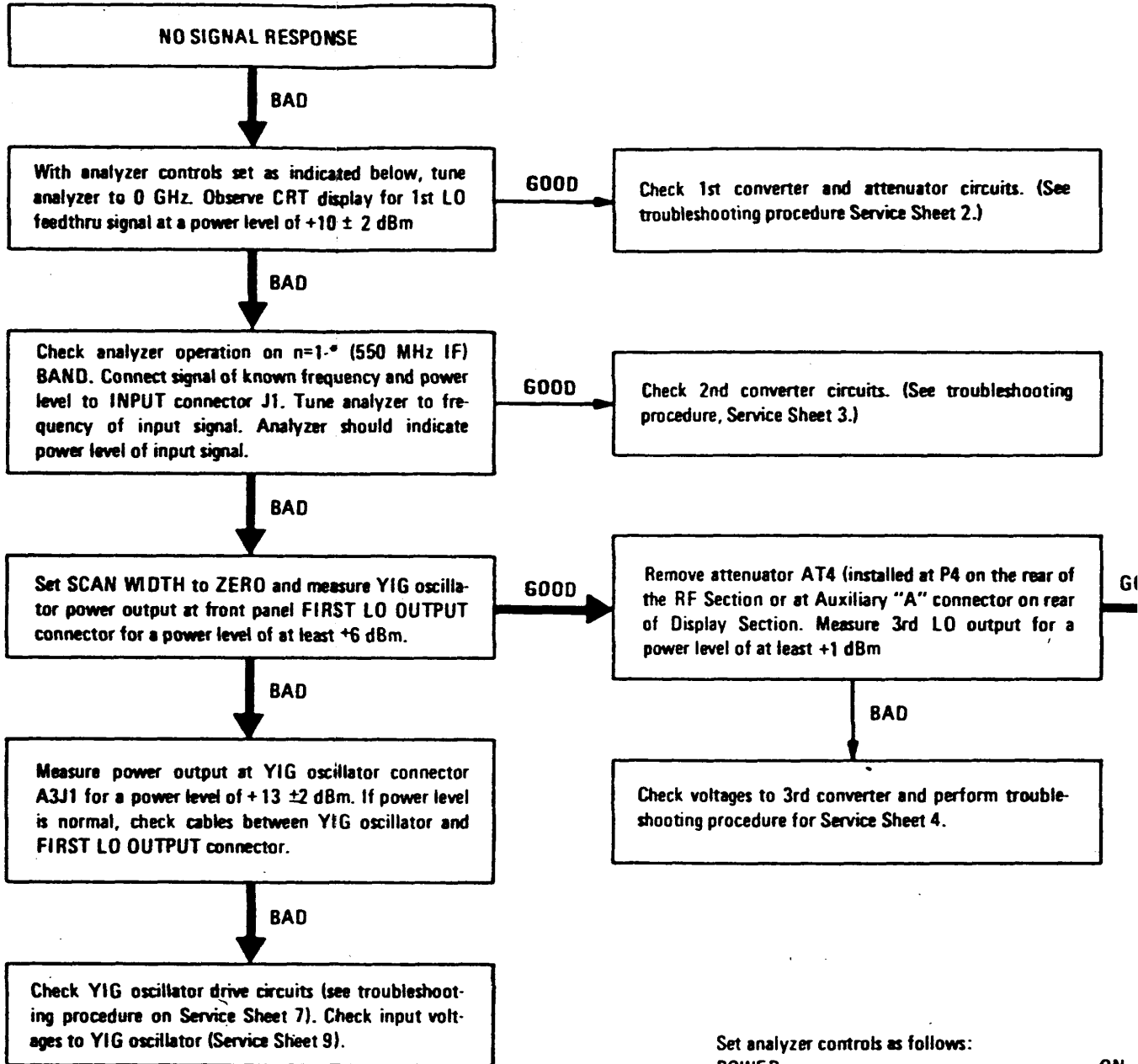


FIGURE 8-9B



Set analyzer controls as follows:

| | |
|-------------------------------|---------|
| POWER | ON |
| BAND | 0-2.05 |
| TUNING STABILIZER | OFF |
| SIGNAL IDENTIFIER | OFF |
| BANDWIDTH | 300 kHz |
| SCAN WIDTH PER DIVISION | 20 MHz |
| INPUT ATTENUATION | 10 dB |
| BASE LINE CLIPPER | CCW |
| SCAN TIME PER DIVISION | 20 mS |
| LOG REF LEVEL | +10 dBm |
| VIDEO FILTER | 10 kHz |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |

Adjust INTENSITY for a base line trace without blooming.

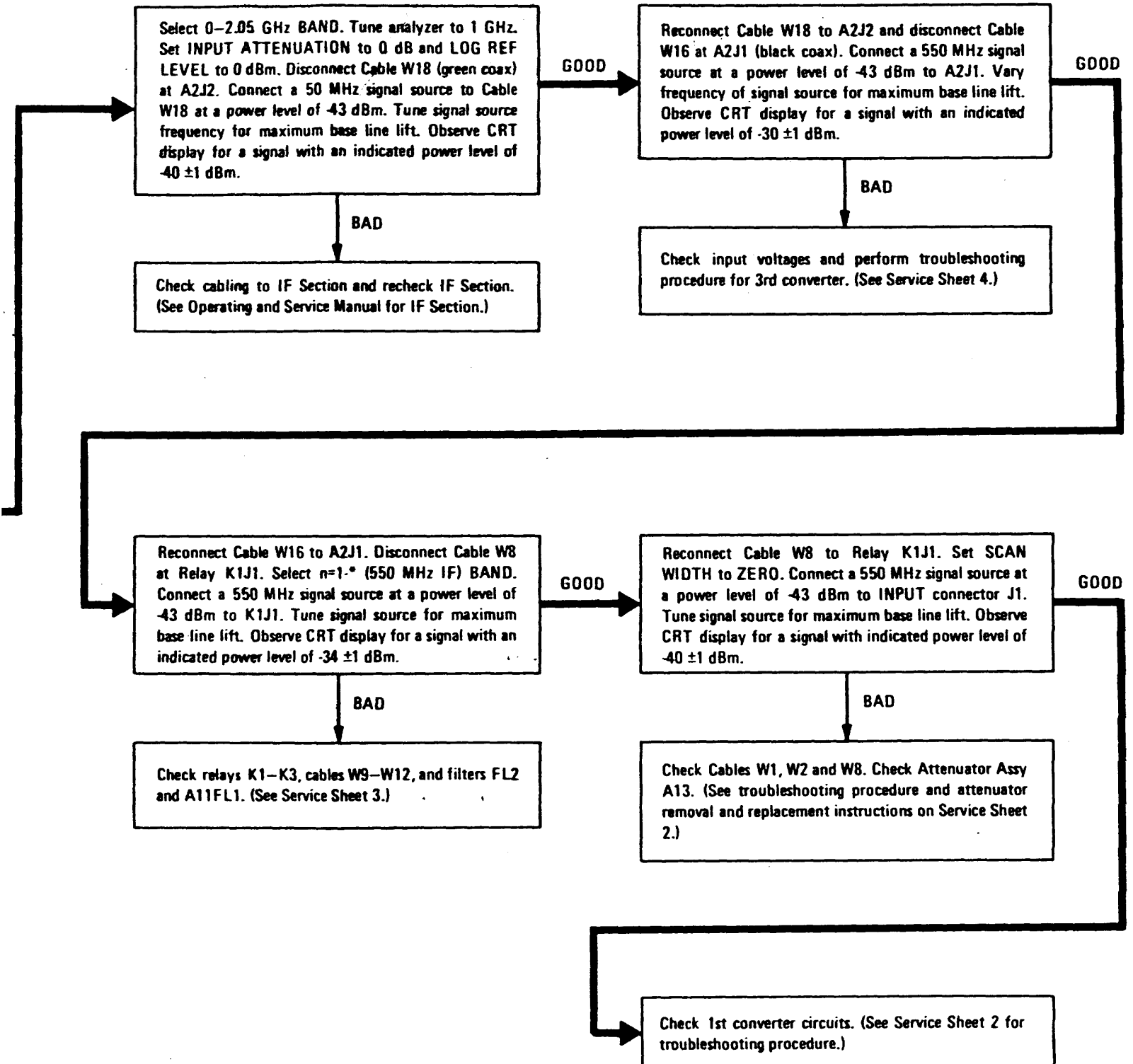


Figure 8-9.. 8555A RF Section Troubleshooting Tree (1 of 2)

FIGURE 8-9C

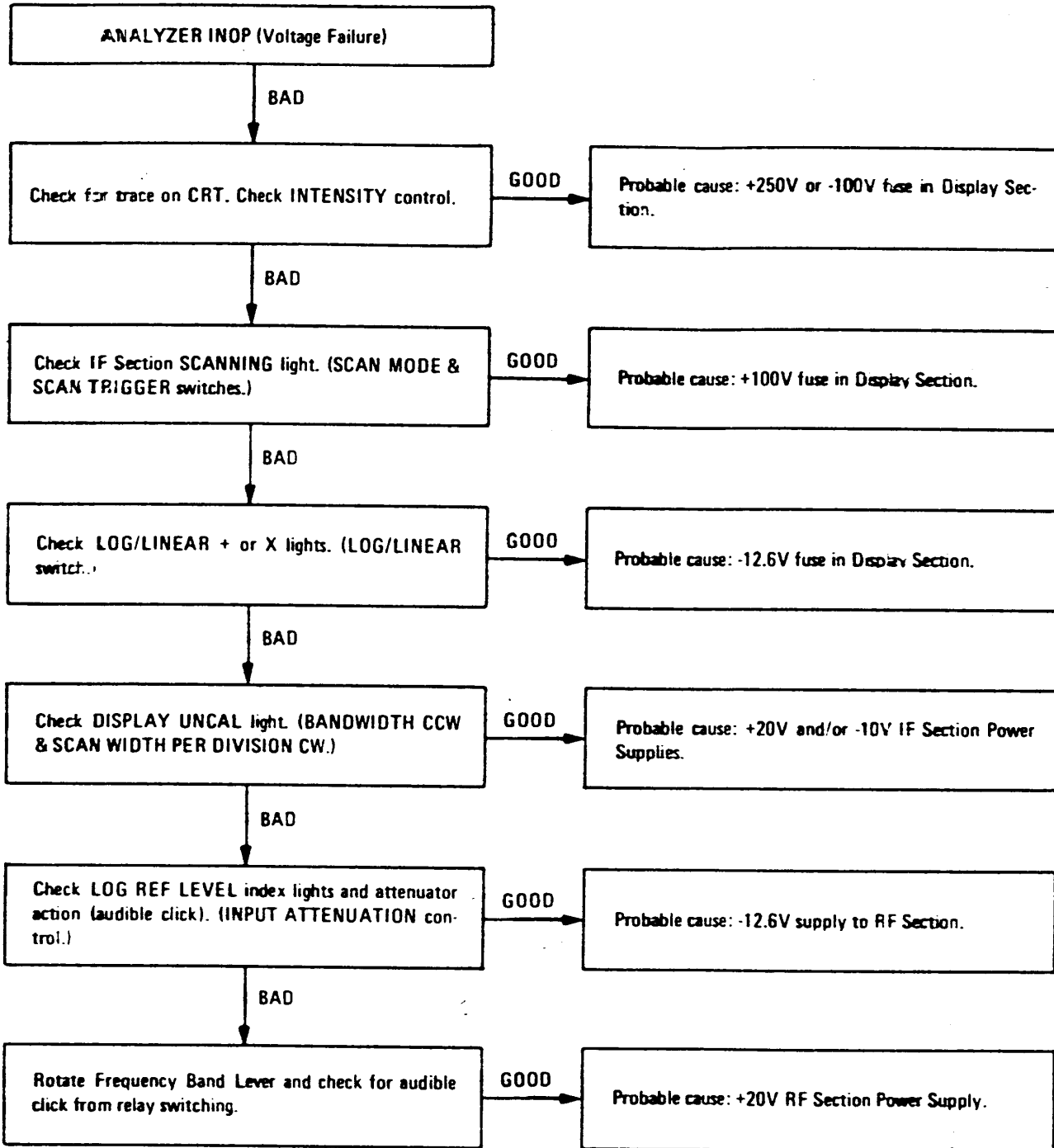
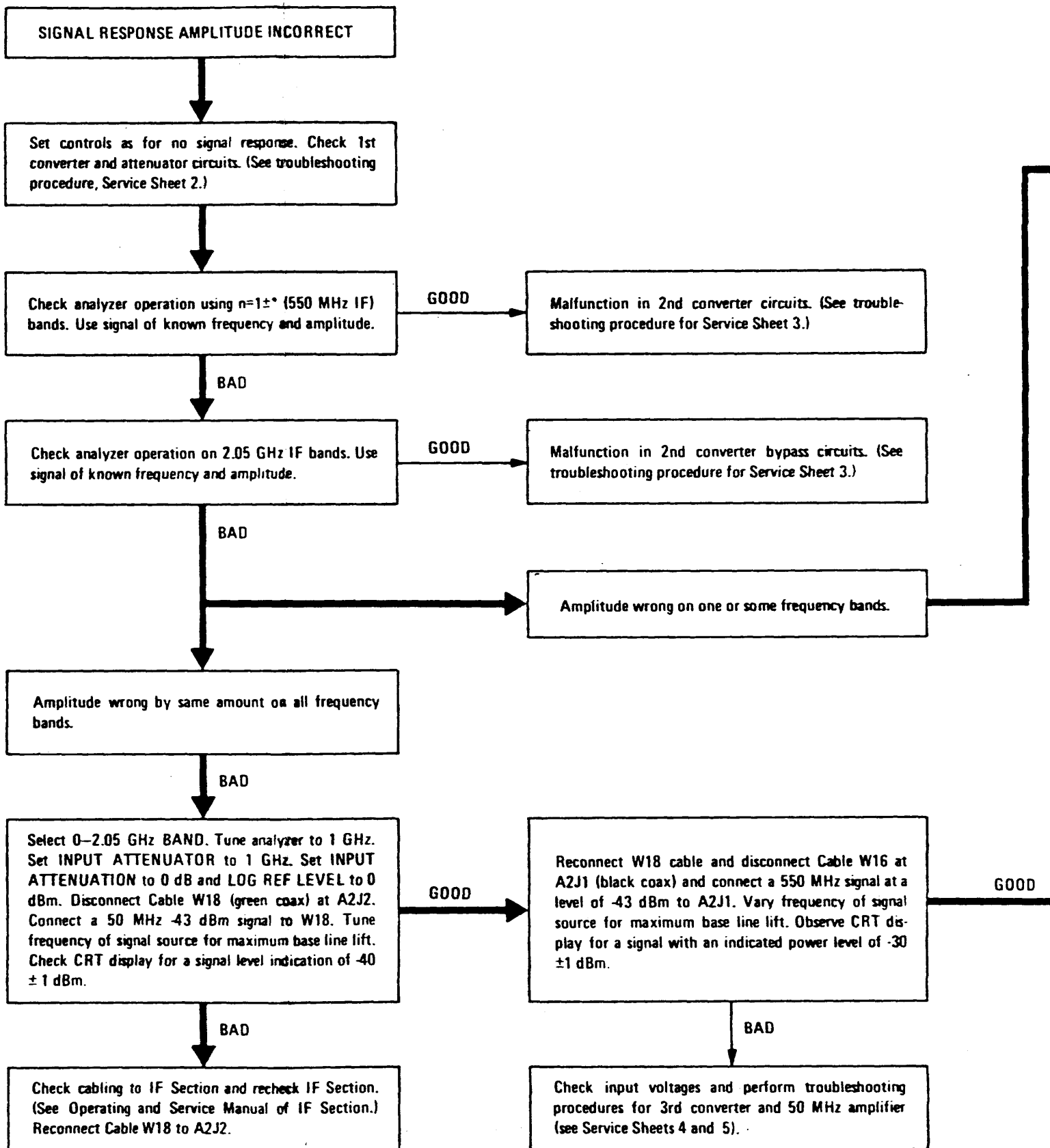


FIGURE 8-9D



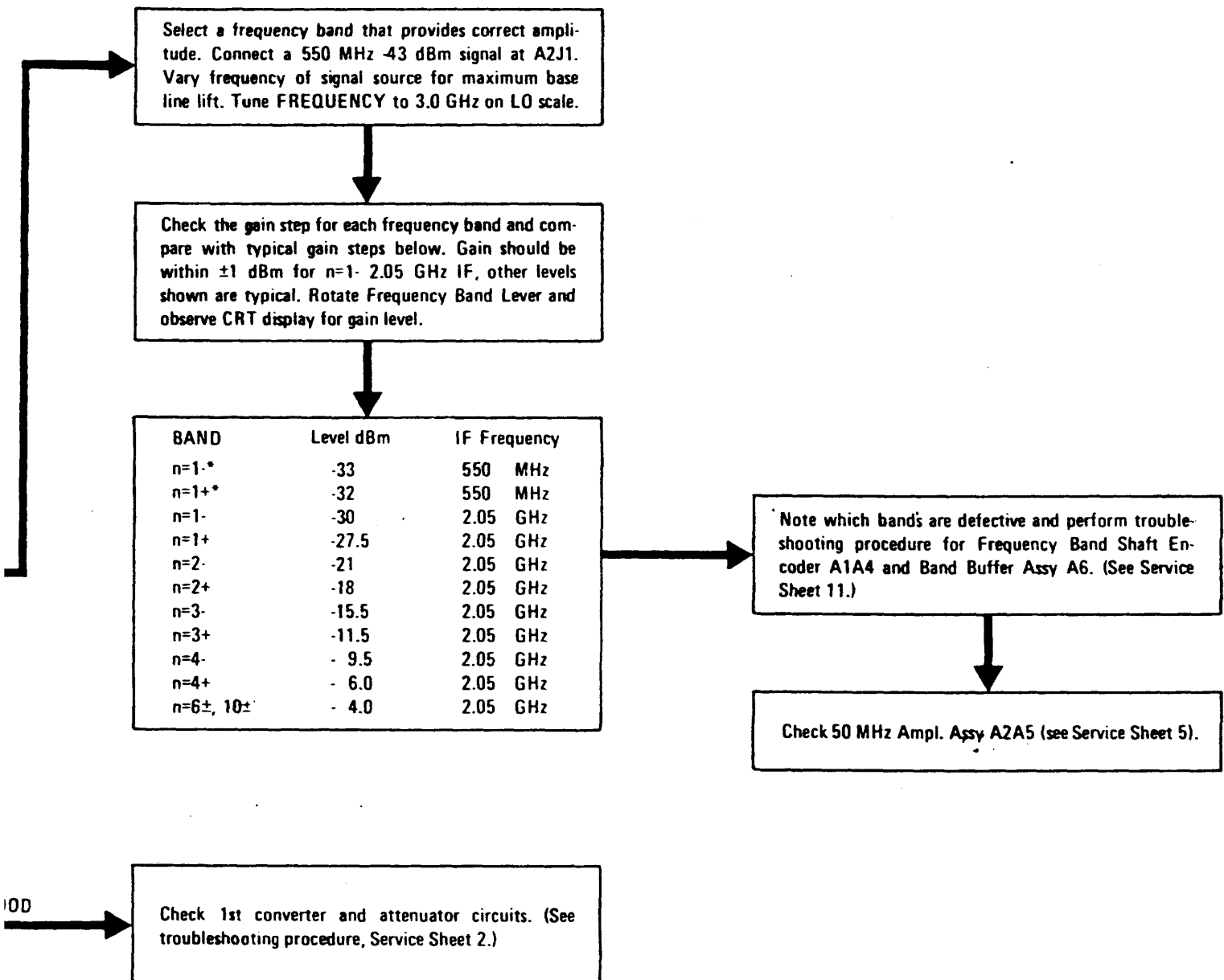
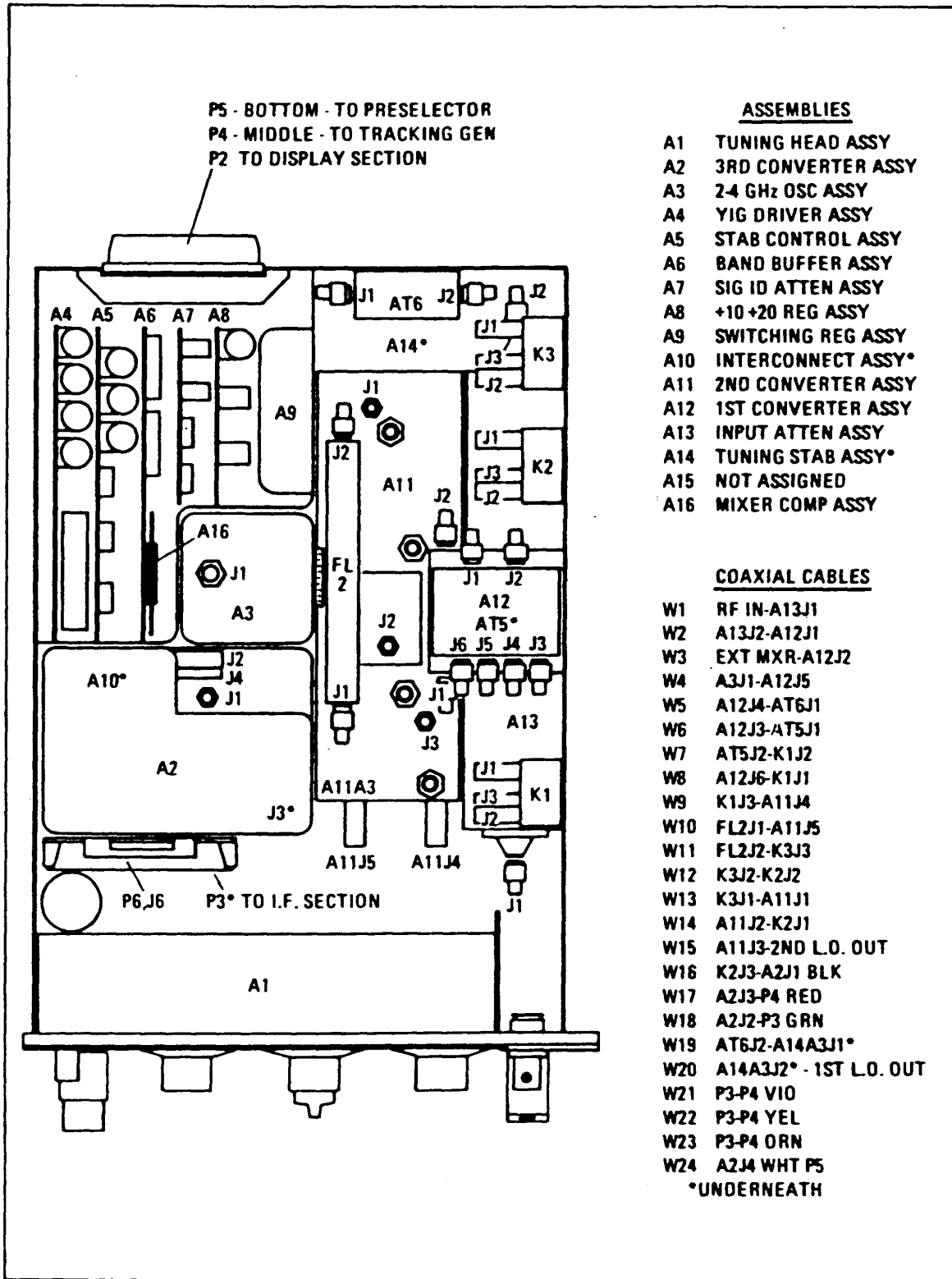


Figure 8-9. 8555A RF Section Troubleshooting Tree (2 of 2)



P5 - BOTTOM - TO PRESELECTOR
 P4 - MIDDLE - TO TRACKING GEN
 P2 TO DISPLAY SECTION

ASSEMBLIES

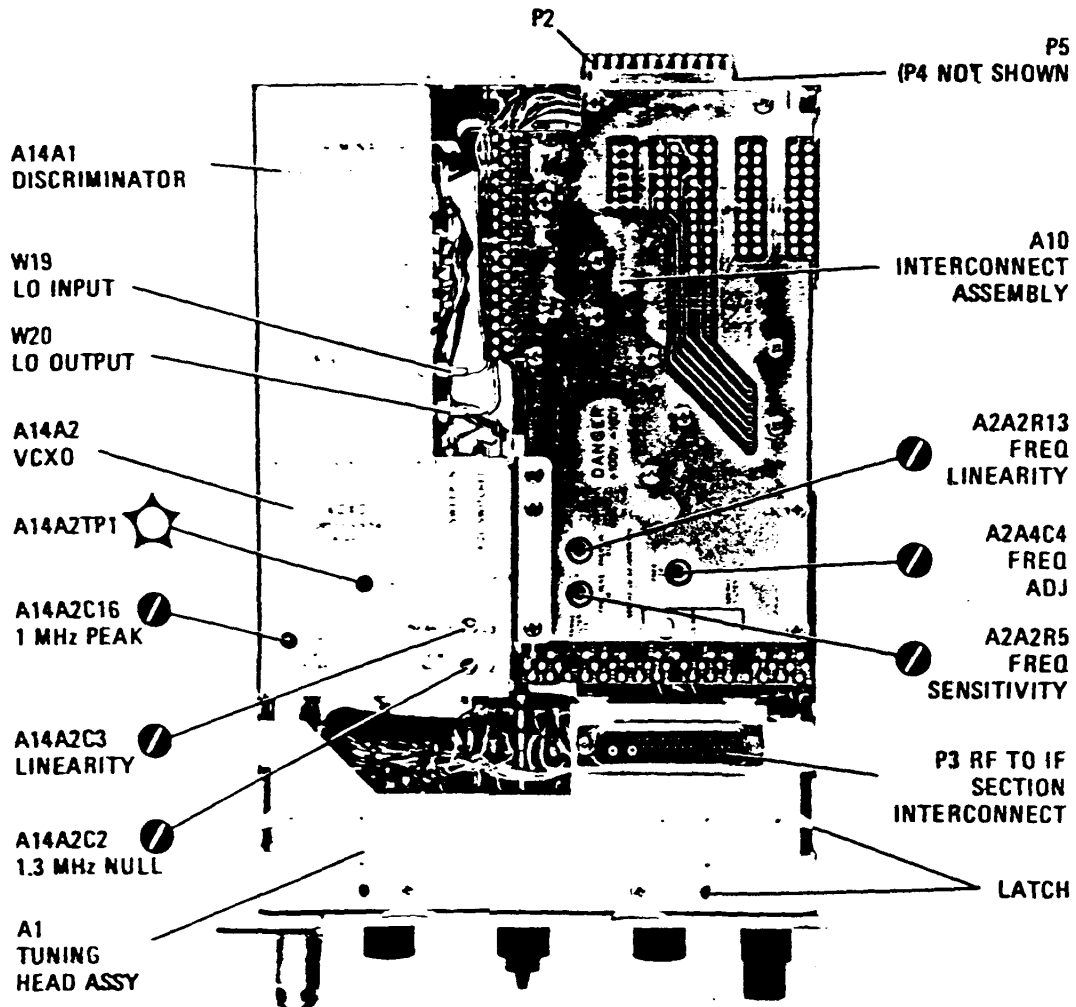
- A1 TUNING HEAD ASSY
- A2 3RD CONVERTER ASSY
- A3 2-4 GHz OSC ASSY
- A4 YIG DRIVER ASSY
- A5 STAB CONTROL ASSY
- A6 BAND BUFFER ASSY
- A7 SIG ID ATTEN ASSY
- A8 +10 +20 REG ASSY
- A9 SWITCHING REG ASSY
- A10 INTERCONNECT ASSY*
- A11 2ND CONVERTER ASSY
- A12 1ST CONVERTER ASSY
- A13 INPUT ATTEN ASSY
- A14 TUNING STAB ASSY*
- A15 NOT ASSIGNED
- A16 MIXER COMP ASSY

COAXIAL CABLES

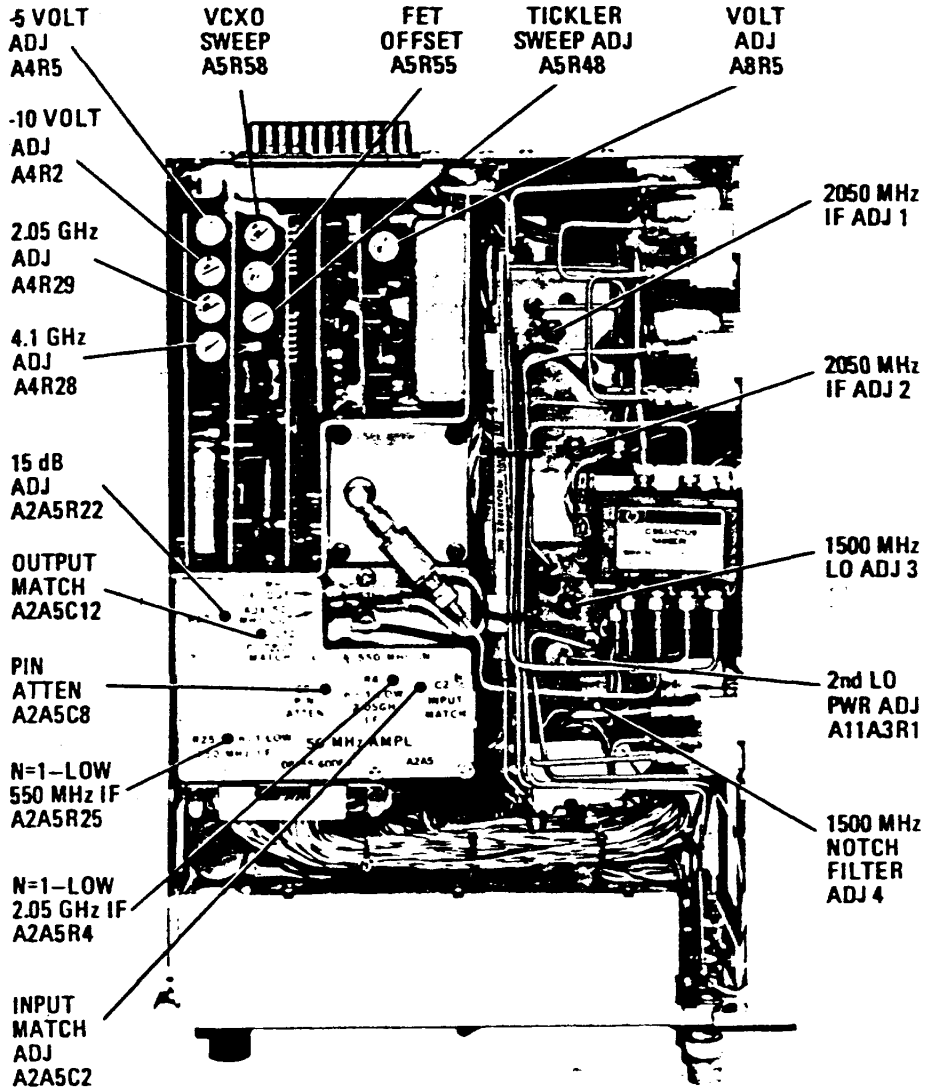
- W1 RF IN-A13J1
 - W2 A13J2-A12J1
 - W3 EXT MXR-A12J2
 - W4 A3J1-A12J5
 - W5 A12J4-AT6J1
 - W6 A12J3-AT5J1
 - W7 AT5J2-K1J2
 - W8 A12J6-K1J1
 - W9 K1J3-A11J4
 - W10 FL2J1-A11J5
 - W11 FL2J2-K3J3
 - W12 K3J2-K2J2
 - W13 K3J1-A11J1
 - W14 A11J2-K2J1
 - W15 A11J3-2ND L.O. OUT
 - W16 K2J3-A2J1 BLK
 - W17 A2J3-P4 RED
 - W18 A2J2-P3 GRN
 - W19 AT6J2-A14A3J1*
 - W20 A14A3J2* - 1ST L.O. OUT
 - W21 P3-P4 VIO
 - W22 P3-P4 YEL
 - W23 P3-P4 ORN
 - W24 A2J4 WHT P5
- *UNDERNEATH

INTERNAL
 VIEWS

BOTTOM VIEW



TOP VIEW-ADJUSTMENT LOCATIONS



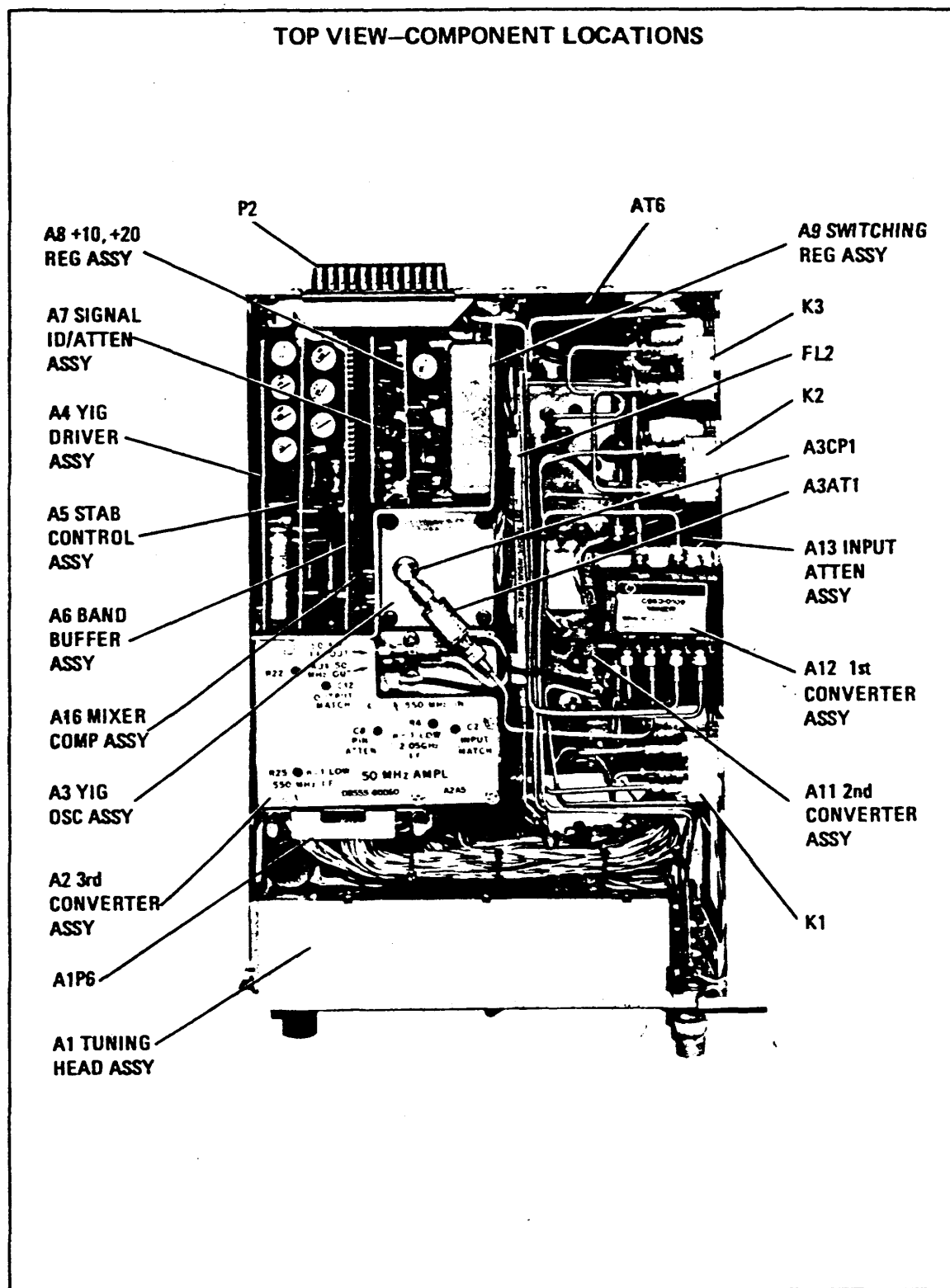
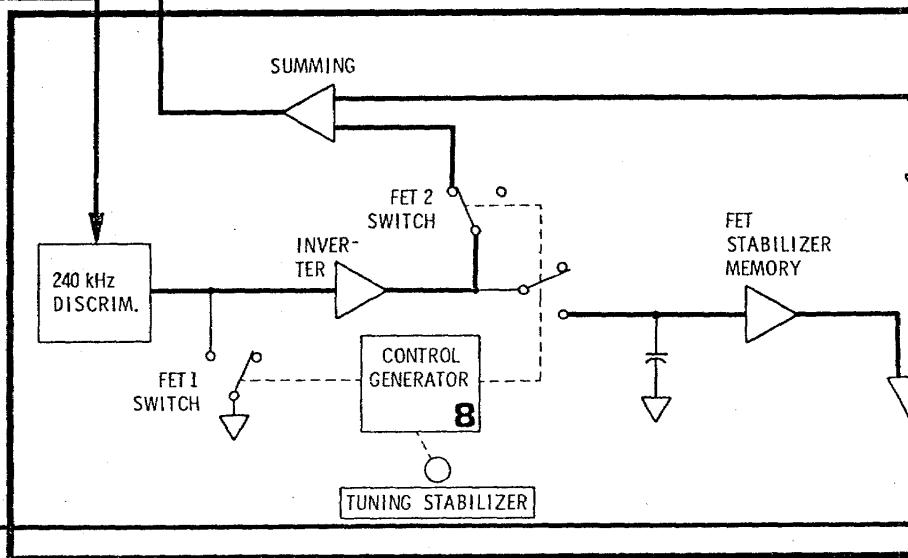
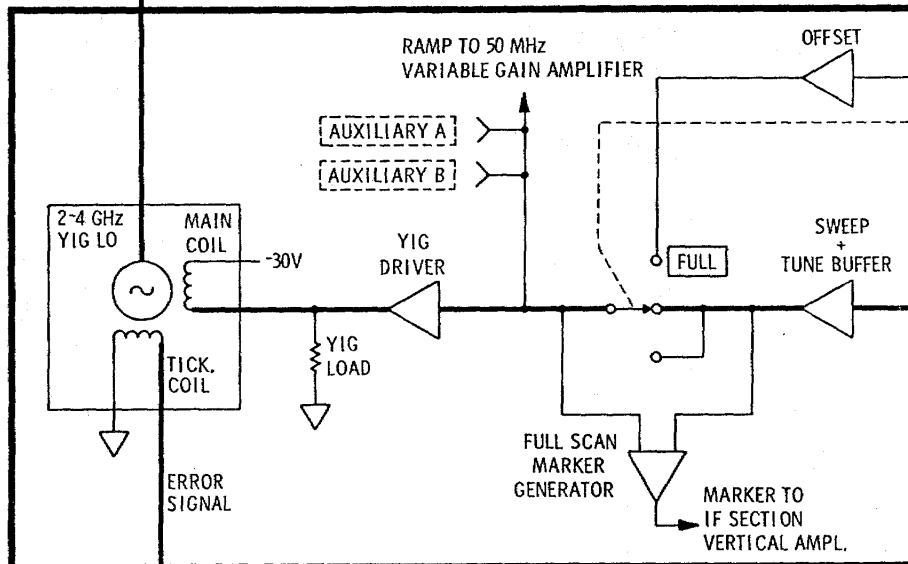
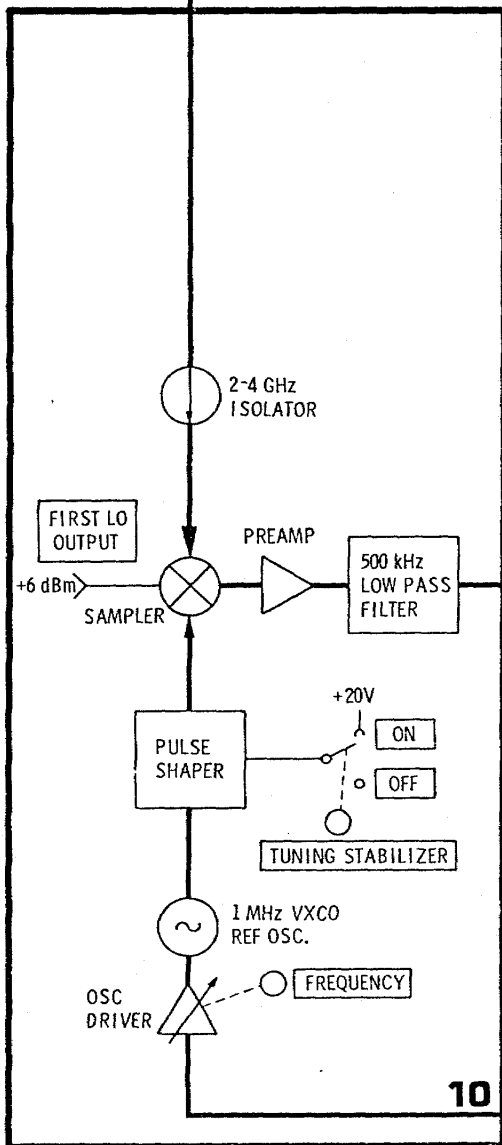
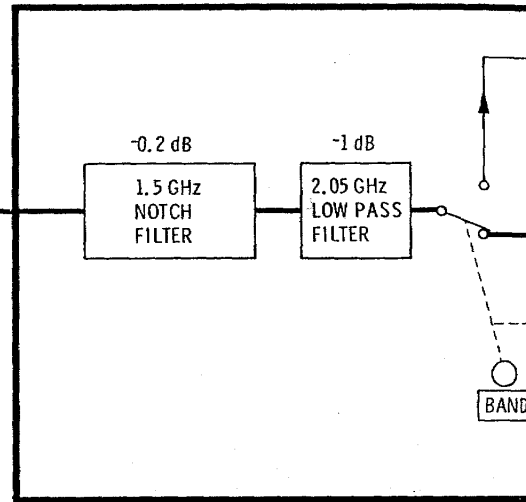
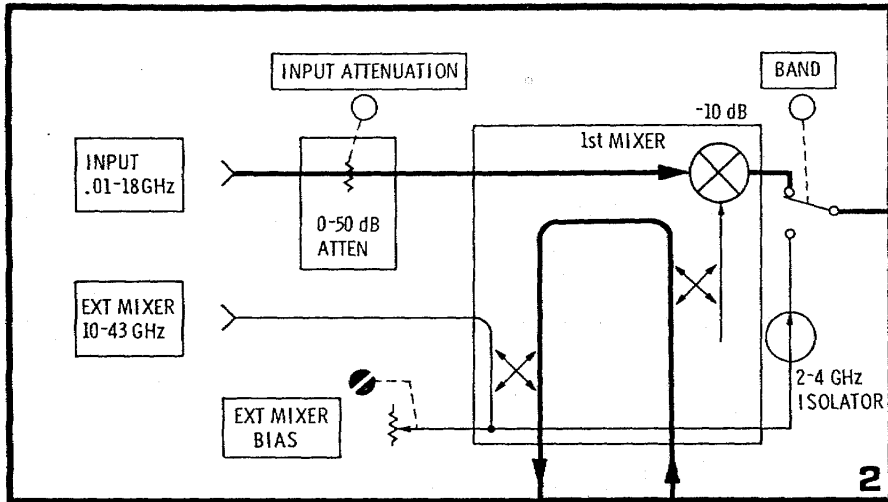
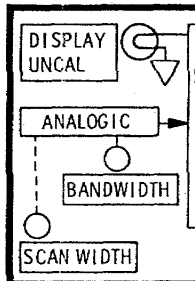
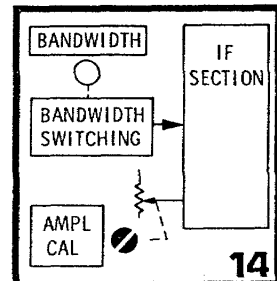
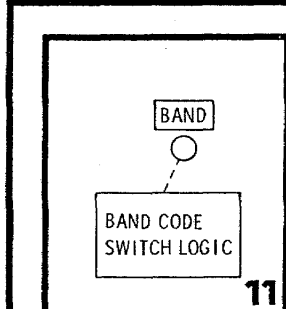
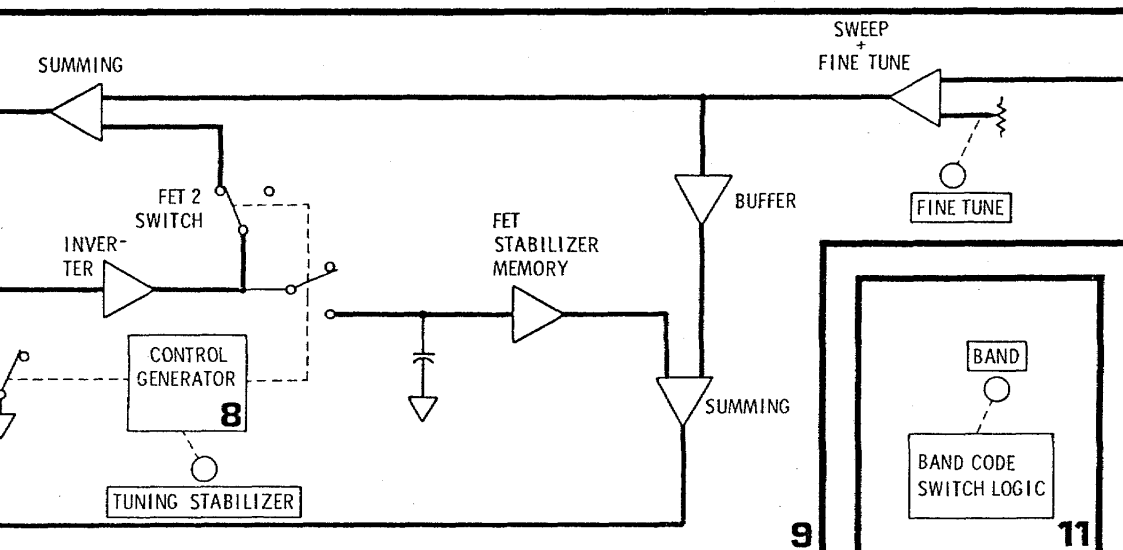
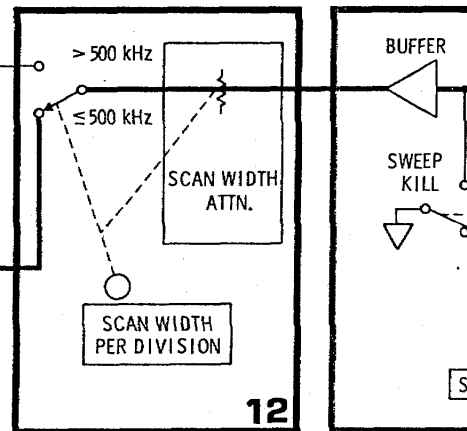
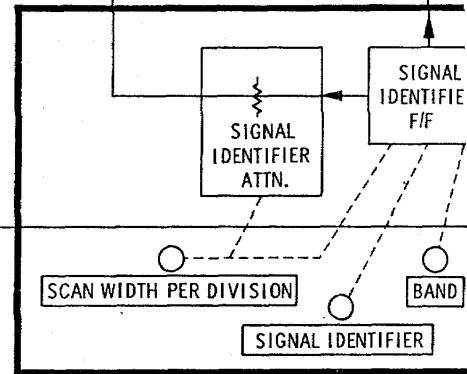
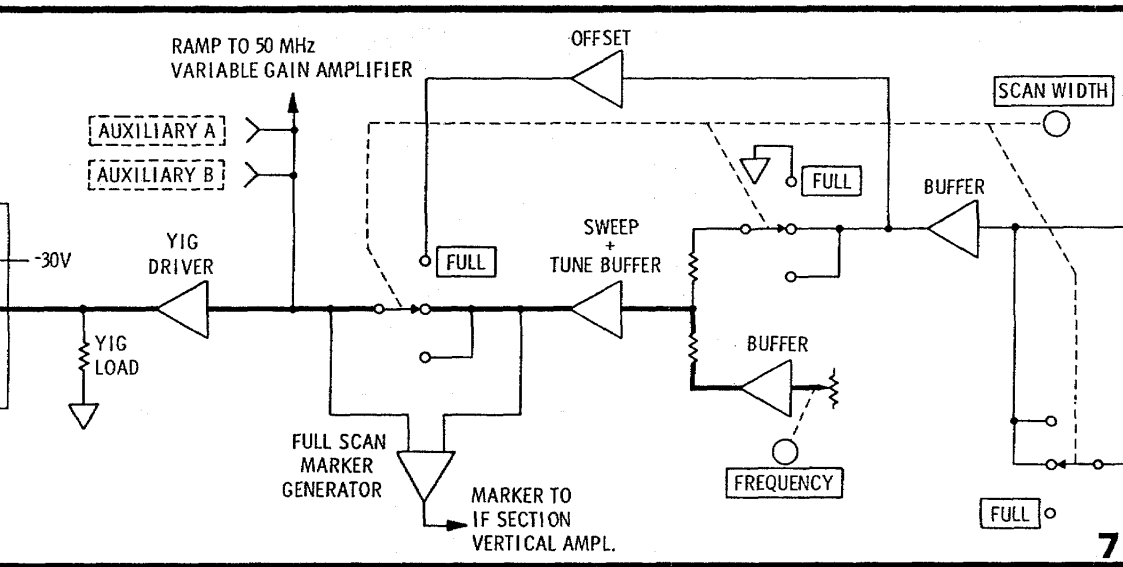
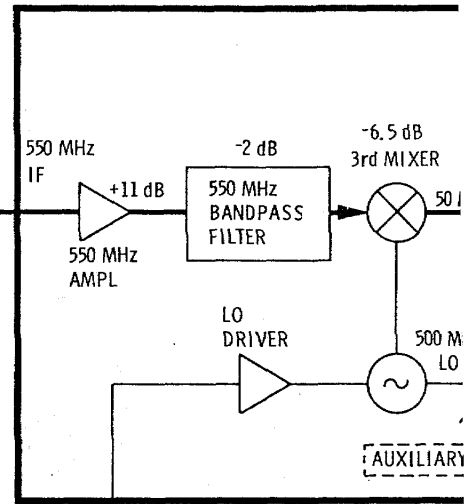
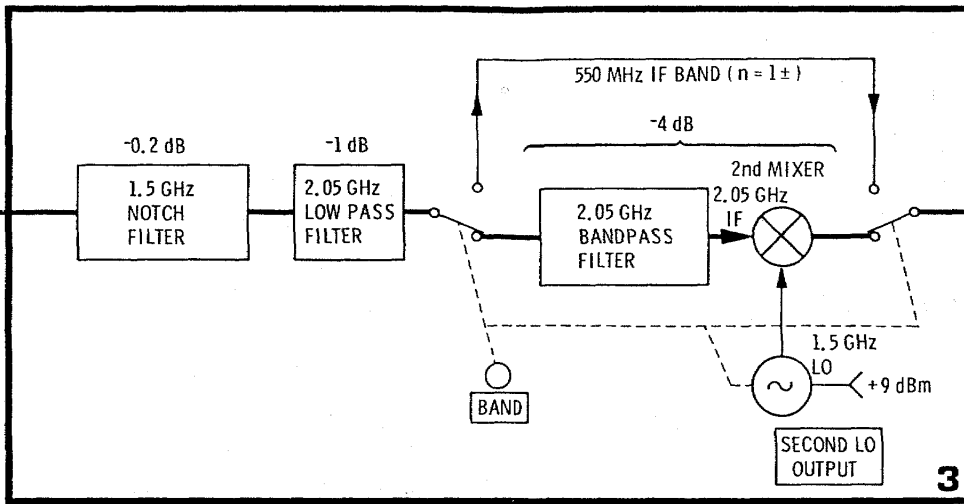
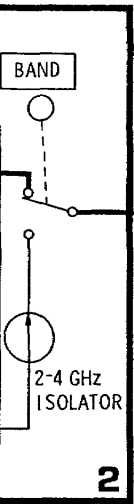


Figure 8-10. 8555A RF Section Top and Bottom Internal Views





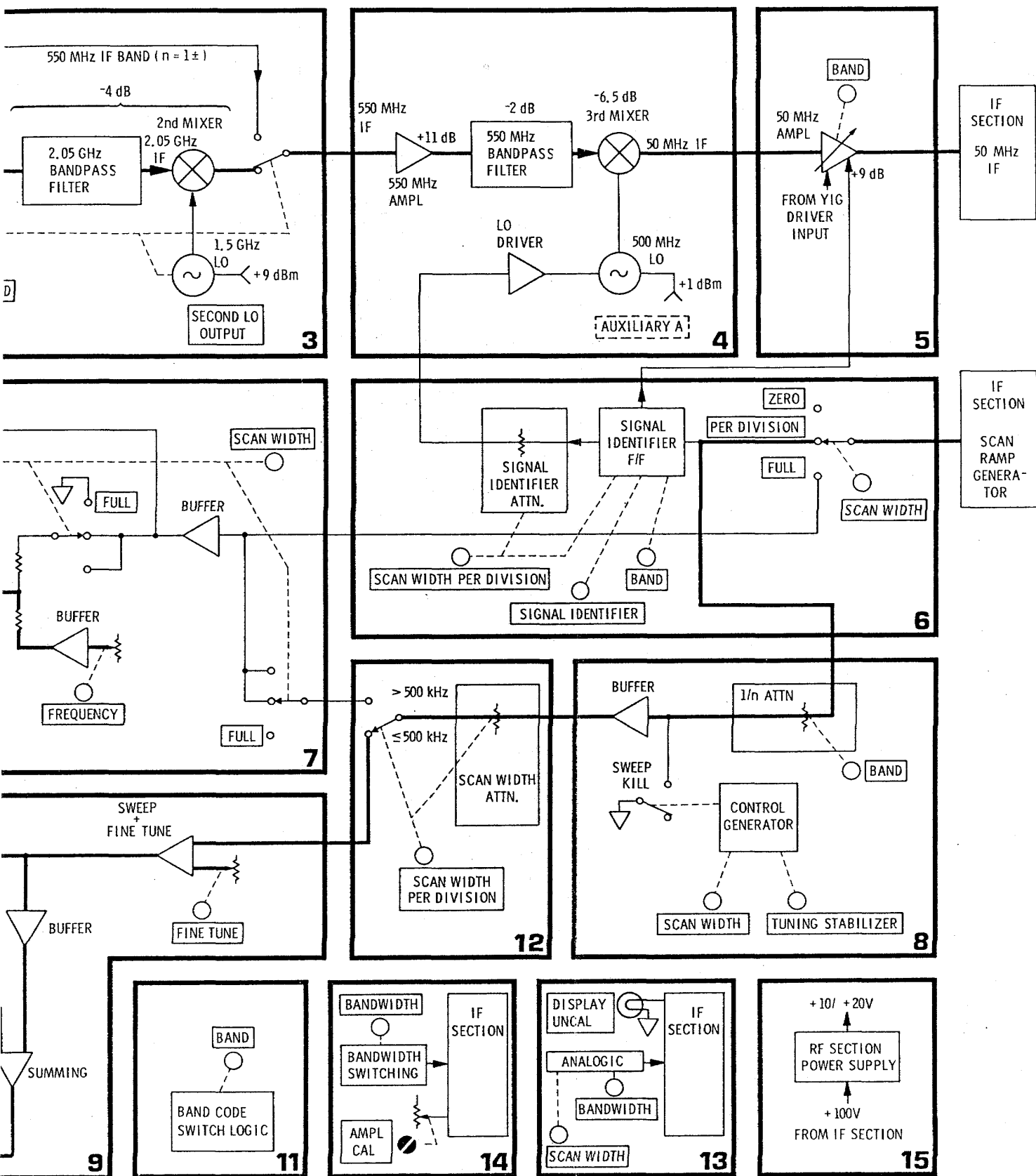


Figure 8-11. 8555A RF Section Block Diagram

SERVICE SHEET 2

THEORY OF OPERATION

Service Sheet 2 contains the schematic diagram for Attenuator A13, the First Converter A12 and their associated switching and control circuitry. Both the attenuator and first converter are sealed assemblies and are not field-repairable. Elaborate test equipment and microcircuit rework techniques are required to repair these units. (See Section VI for Exchange part numbers.) Replacement of the First Converter Assy A12 requires replacement of Gain Network Assy A16. Resistors in the gain network are factory-selected, to correct for gain variations in the first converter assembly, to maintain instrument absolute amplitude calibration accuracy. The repaired replacement First Converter A12 and matched Gain Network Assy A16 are shipped together under the same part number.

1 ATTENUATOR

The programmable Attenuator Assy A13 consists of three attenuation elements that can be inserted or removed from the signal line by latching polarized solenoids. The three elements have attenuations of 10, 20, and 40 dB over the frequency range from DC to 18 GHz.

The INPUT ATTENUATION switch controls the attenuator to provide 0 to 50 dB attenuation in 10 dB steps. A -12 volt, 150 millisecond pulse is generated by the attenuator driver circuit each time the INPUT ATTENUATION control is switched and also when the instrument is initially switched on. The pulse is applied to all three solenoids, with polarity determined by attenuator switch wafers A1A3S1-1, S1-2 and S1-3.

The trigger input at A7TP4, on the attenuator driver circuit, is normally connected to -12.6 volts through S1-4F. When the instrument is initially switched on, this -12.6 volts, through C4, biases Q2 "on". C4 will charge through R19 and when it reaches 12V, in about 150 milliseconds, Q2 will be biased "off". Q2 controls the Darlington Pair Q3 and Q1. When Q2 is "on", Q3 and Q1 will also be "on". When Q2 is "off" Q3 and Q1 will also be "off". Thus a -12 volt, 150 millisecond pulse is produced at the output at TP2. Diode CR9 prevents a large voltage from being developed at TP2 when Q3 and Q1 are turned "off". When the INPUT ATTENUATION control is switched, the -12.6 volt input to the attenuator driver will be momentarily interrupted by switch wafer S1-4F as it goes between positions. This will reset the attenuator driver by discharging C4 through R18 and CR8. When the switch wafer reaches a position, the -12.6 volts again trigger the attenuator driver and the above action is repeated.

Wide contacts on the polarity switching wafers S1-1, S1-2 and S1-3 ensure that circuit path for the attenuator solenoids is completed before this pulse is applied.

2 LINEAR SCALE SWITCH

Contacts on switch wafer S1-4F control the linear scale factor amplifier in the analyzer's IF Section when the analyzer is operated in the LINEAR mode. Refer to the appropriate 8552 IF Section Operating and Service Manual for circuit description. Contacts on switch wafer S1-4R control voltage to the LOG REF LEVEL/LINEAR SENSITIVITY index lights in the analyzer's IF Section. The selected light, DS1 through DS6, is controlled by the

SERVICE SHEET 2 (cont'd)

position of the INPUT ATTENUATION control. (See IF Section Operating and Service Manual.)

3 FIRST CONVERTER

First Converter Assy A12 is a sealed microcircuit assembly that is factory repairable. The converter mixes the input signals with the output of the YIG-tuned oscillator and provides an output to the 2.05 GHz or 550 MHz IF. Overall conversion loss of the converter is approximately 10 dB on fundamental mixing modes. The output of the YIG-tuned oscillator is coupled into both the internal mixer and the transmission path for external mixers via internal directional couplers. In addition, the YIG-tuned oscillator signal to the tuning stabilization circuit is fed through the first converter. External mixer bias is supplied from a front panel EXT MIXER BIAS control, through the converter to the EXT MIXER connector. Internal mixer bias is supplied via the Band Buffer Assy A6 and Gain Network Assy A16. The bias resistors on the Gain Network are factory selected to match the characteristics of First Converter Assy A12. Both assemblies are supplied under one part number (see Section VI). In addition to mixer bias, the converter requires both a -10 and +10 volt source for operation.

4 INTERNAL/EXTERNAL MIXING SELECTION

Coax Switch K1, controlled by a relay driver, (Service Sheet 11) switches the converter output from the internal mixing path to the external mixing path when $n=6\pm$ or $n=10\pm$ frequency bands are selected. Isolator AT5 buffers the unity reflection coefficient of the second converter at the first LO frequencies (2.06 to 4.1 GHz).

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the 1st converter or attenuator circuits, the INPUT ATTENUATION control should be used to help isolate the malfunction. The attenuator should change the displayed signal in 10 dB steps. With each change in INPUT ATTENUATION, the relays inside the attenuator housing are triggered and produce an audible click. If trouble is suspected in the attenuator or switching circuits, proceed with steps 1 and 2 below. If a malfunction is suspected in the converter circuits, proceed with step 3 below.

EQUIPMENT REQUIRED

| | |
|-------------------------|---------------------|
| Oscilloscope | HP 180A/1801A/1821A |
| Volt-Ohm-Ammeter | HP 412A |
| BNC Plug to Type N jack | UG 349 B/U |
| Power Meter | HP 432A |
| Thermistor Mount | HP 8478B |

1 ATTENUATOR

Connect an input signal to the analyzer and check for a CRT response. If there is a response (other than LO feedthru) rotate INPUT ATTENUATION control and check for a 10 dB change in response level with each step of the INPUT ATTENUATION control. If there is no change in response level, listen for an audible click when the control is changed. If there is no audible sound, check

SERVICE SHEET 2 (cont'd)

output of the attenuator driver at A7 TP2. Install A7 assembly, using an extender board and connect oscilloscope test probe to A7 TP2. Switch INPUT ATTENUATION control and check for a -12 volt, 150 millisecond pulse, at A7 TP2. Switch the INPUT ATTENUATION control through its range while observing the oscilloscope for a pulse at each change in position. If the switching voltage is present at A7 TP2, check for both switching voltage and ground return at each input to the relays in the attenuator assembly. If switching voltage is not present at A7 TP2, check the input to the relay driver at A7 TP4. If the input is correct, check the relay driver circuit.

NOTE

The input attenuator is *not* field-repairable. Factory repaired exchange assemblies are available. See Section VI for HP Part Number.

2 LINEAR SCALE SWITCH

To locate a malfunction in the index light selection or amplifier compensation wiring and switching circuitry, perform a point-to-point circuit check. See schematic diagram and also the interconnecting wiring information on Service Sheet 16.

3 FIRST CONVERTER

When a malfunction has been isolated to the input mixer, use the partial schematic below to confirm mixer failure. Check diode bias on the $n=1$ through $n=4$ bands. Typical voltages as follows: $n=1$ and 3, -3.8 volts; $n=2$, -1.3 volts; $n=4$, -2.4 volts. The exact bias voltage is factory determined for each diode. The converter transistor can be checked by comparing the collector and emitter current. Disconnect the -10 volt lead at the emitter bias terminal and measure emitter current with a milliammeter such as the HP 412A. Connect -10 volt lead and repeat measurement procedure at the +10 volt terminal. The emitter current should be 18.5 mA $\pm 20\%$. The collector current should be not more than 10% less than the emitter current. To check the mixer diode, turn instrument power off, disconnect diode bias lead and check front to back ratio of diode circuit. Set HP 412A to 1K ohm position, connect red (+) lead to diode bias pin and black (-) lead to emitter bias pin. Reading should be greater than 10 megohms. Less than 10 megohms indicates a shorted diode. Reverse leads, reading should be between 1K and 10K. (Infinity indicates open diode). (See 1st Converter replacement procedure below.) Measure the YIG oscillator power output at the EXT MIXER port on the front panel, using the HP 432A Power Meter and a HP 8478B Thermistor Mount. Typical power level should be between 0 and +5 dBm.

ATTENUATOR REMOVAL AND REPLACEMENT

See Service Sheet 18

FIRST CONVERTER REMOVAL AND REPLACEMENT

See Service Sheet 18.

SERVICE SHEET 2 (cont'd)

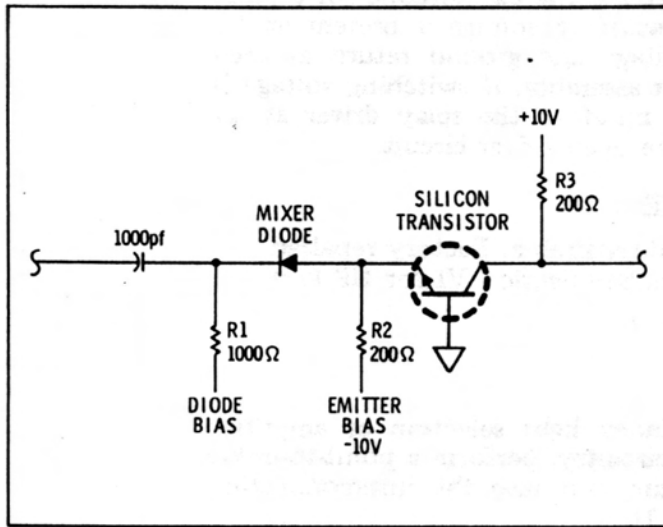


Figure 8-12. First Converter Assy, Simplified Schematic

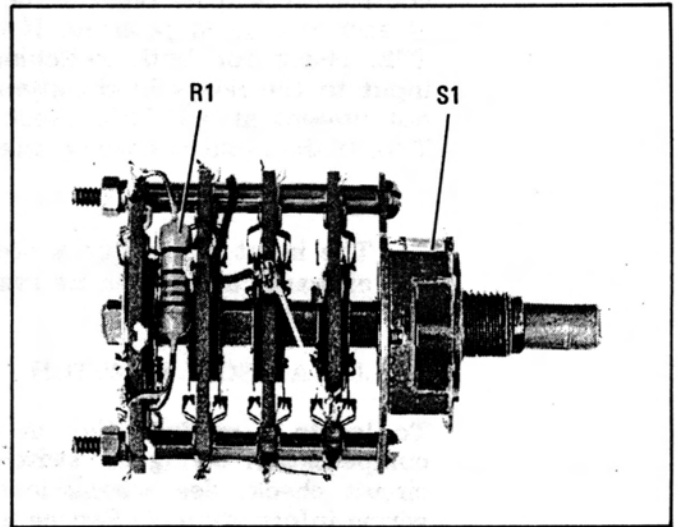


Figure 8-13. Switch Assembly A1A3

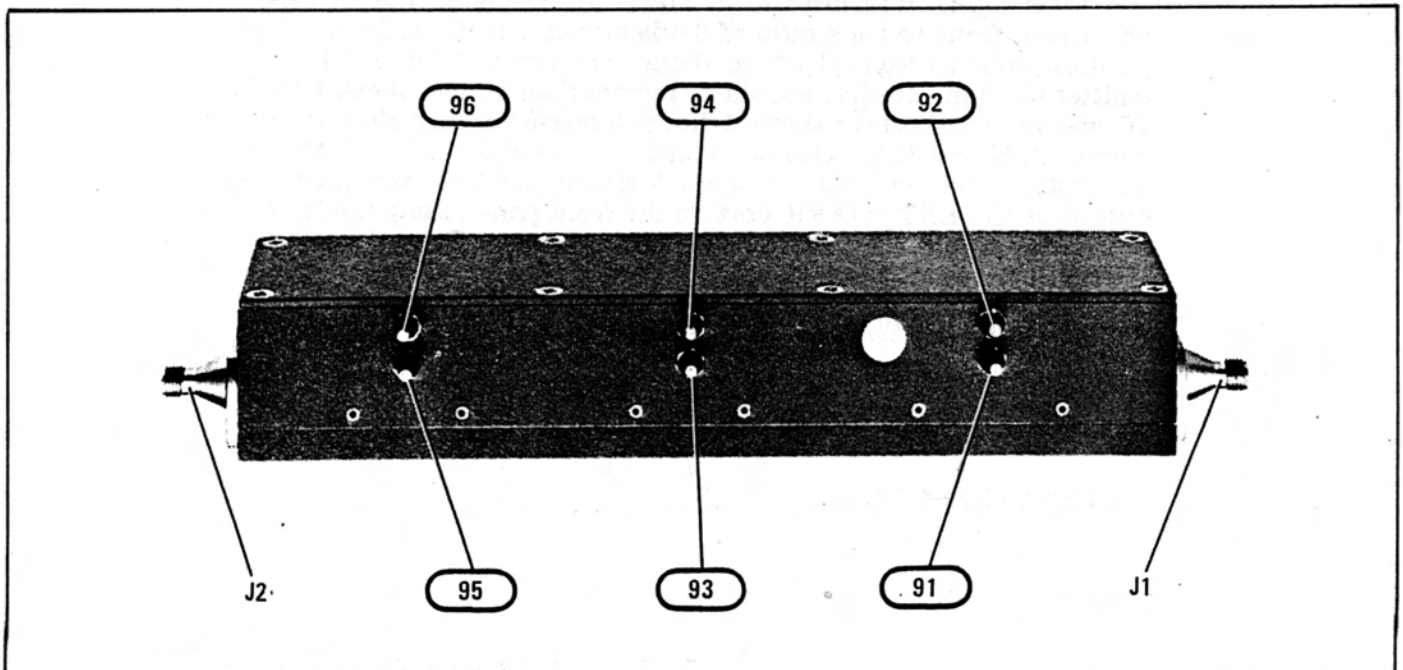


Figure 8-14. Attenuator Assembly A13

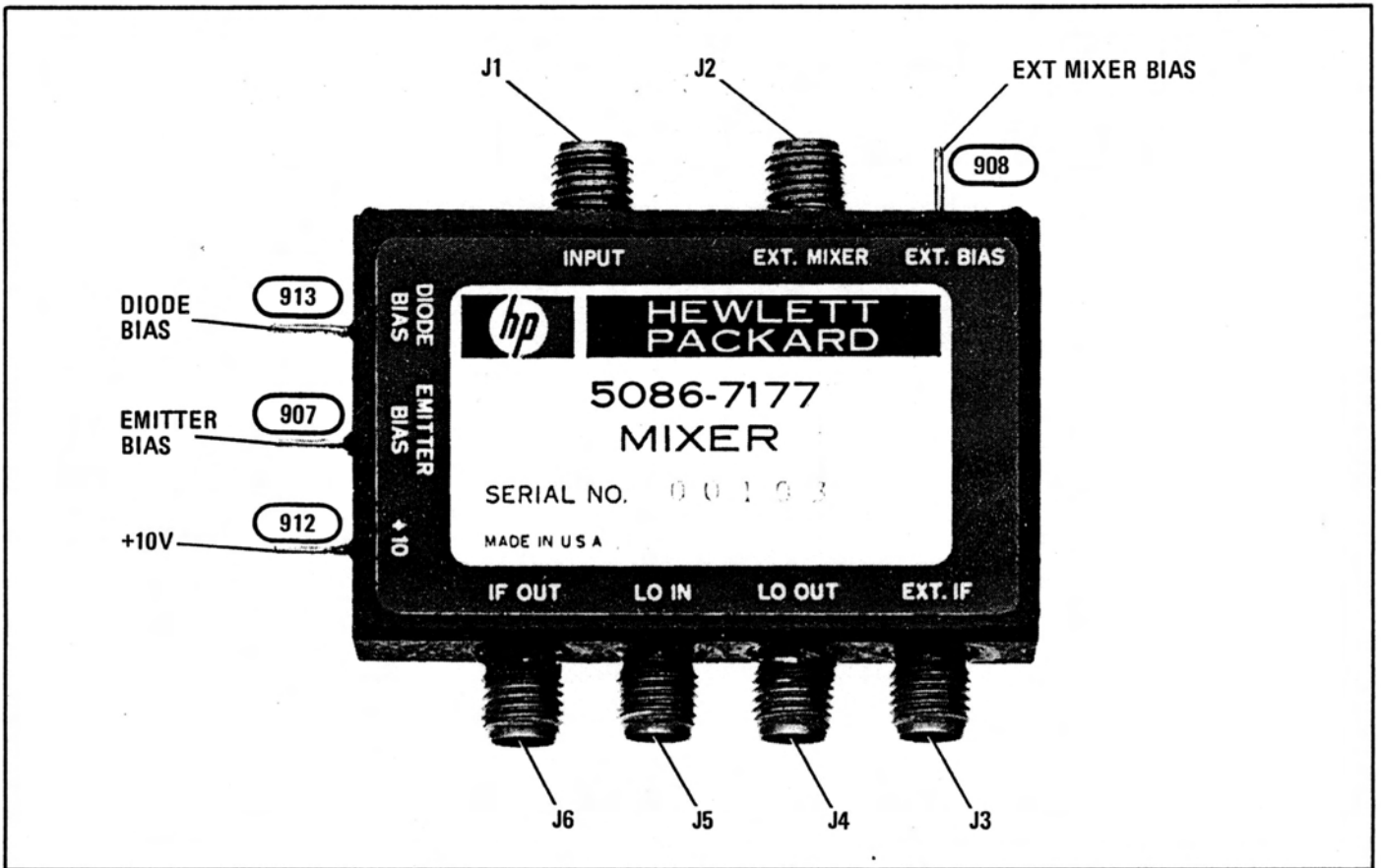


Figure 8-15. First Converter Assembly A12

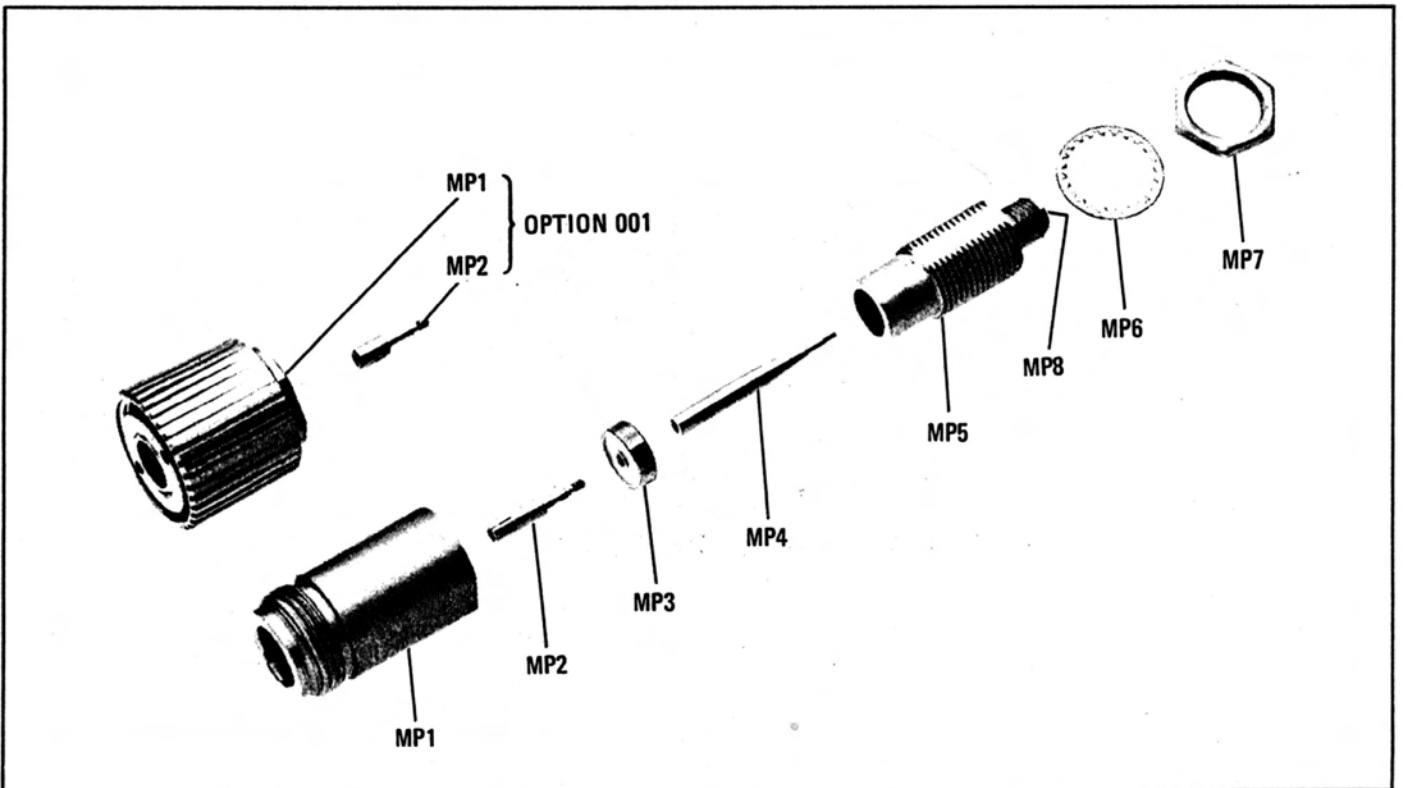
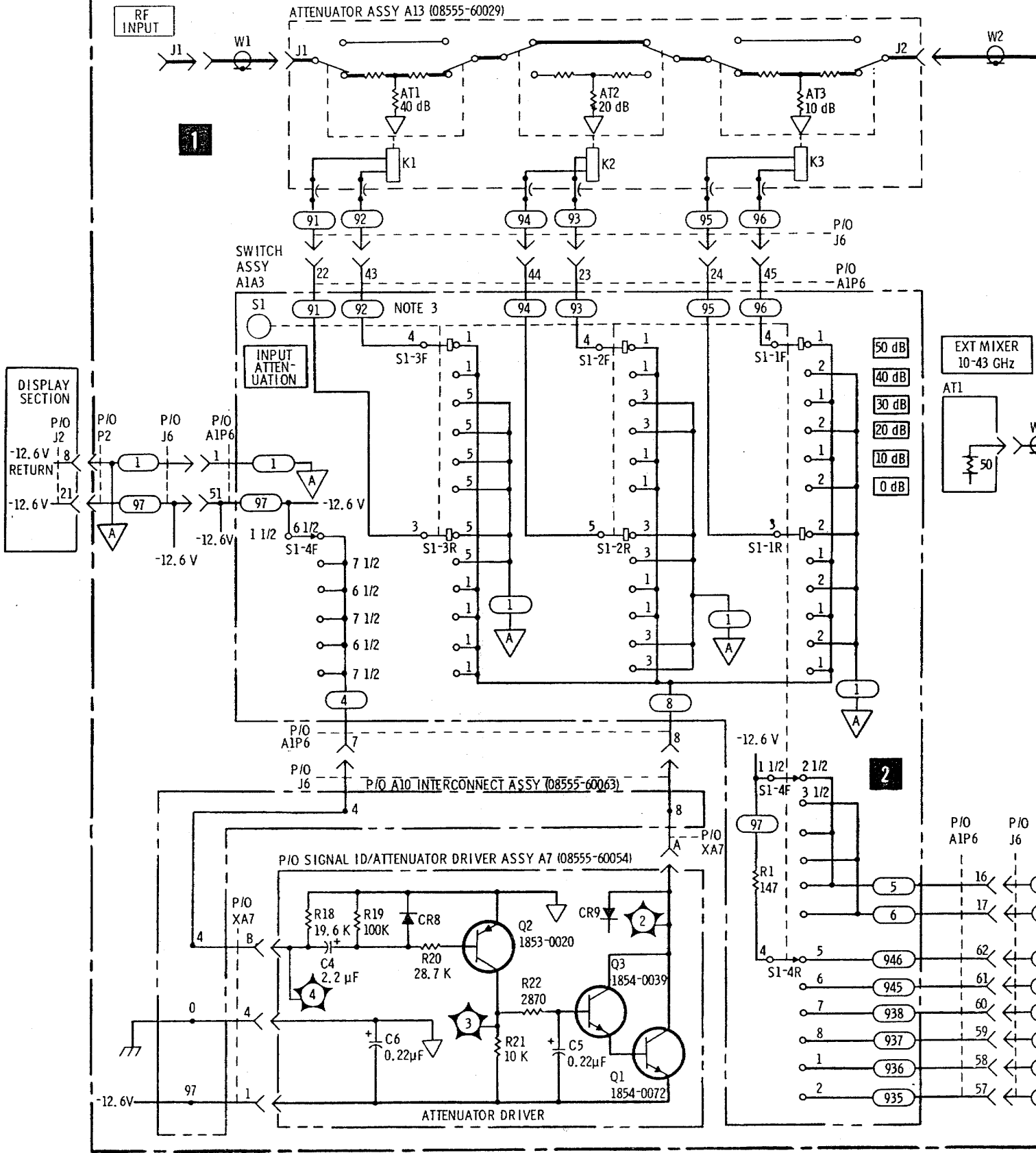
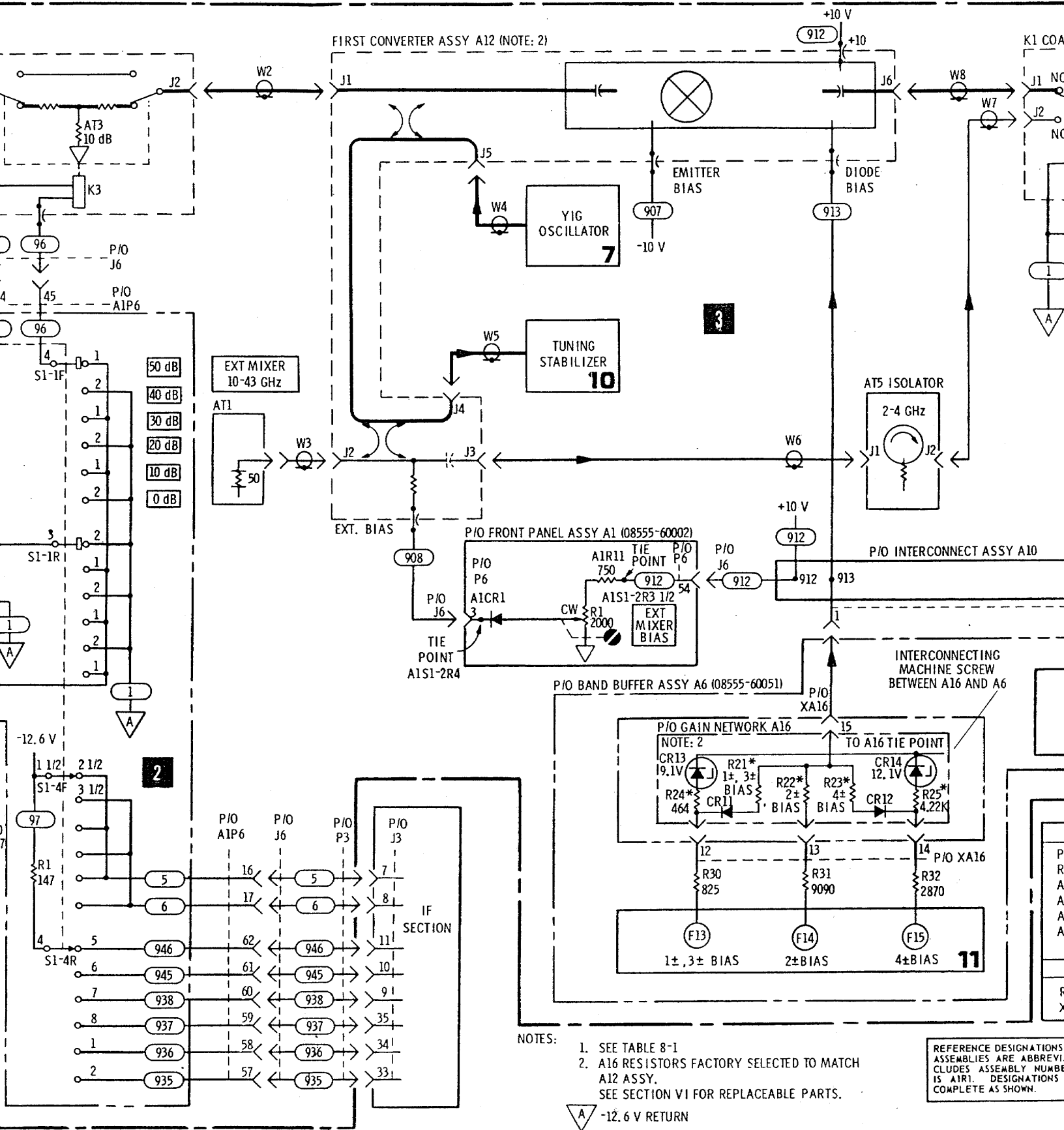


Figure 8-16. INPUT Connector J1 Exploded View





NOTES:

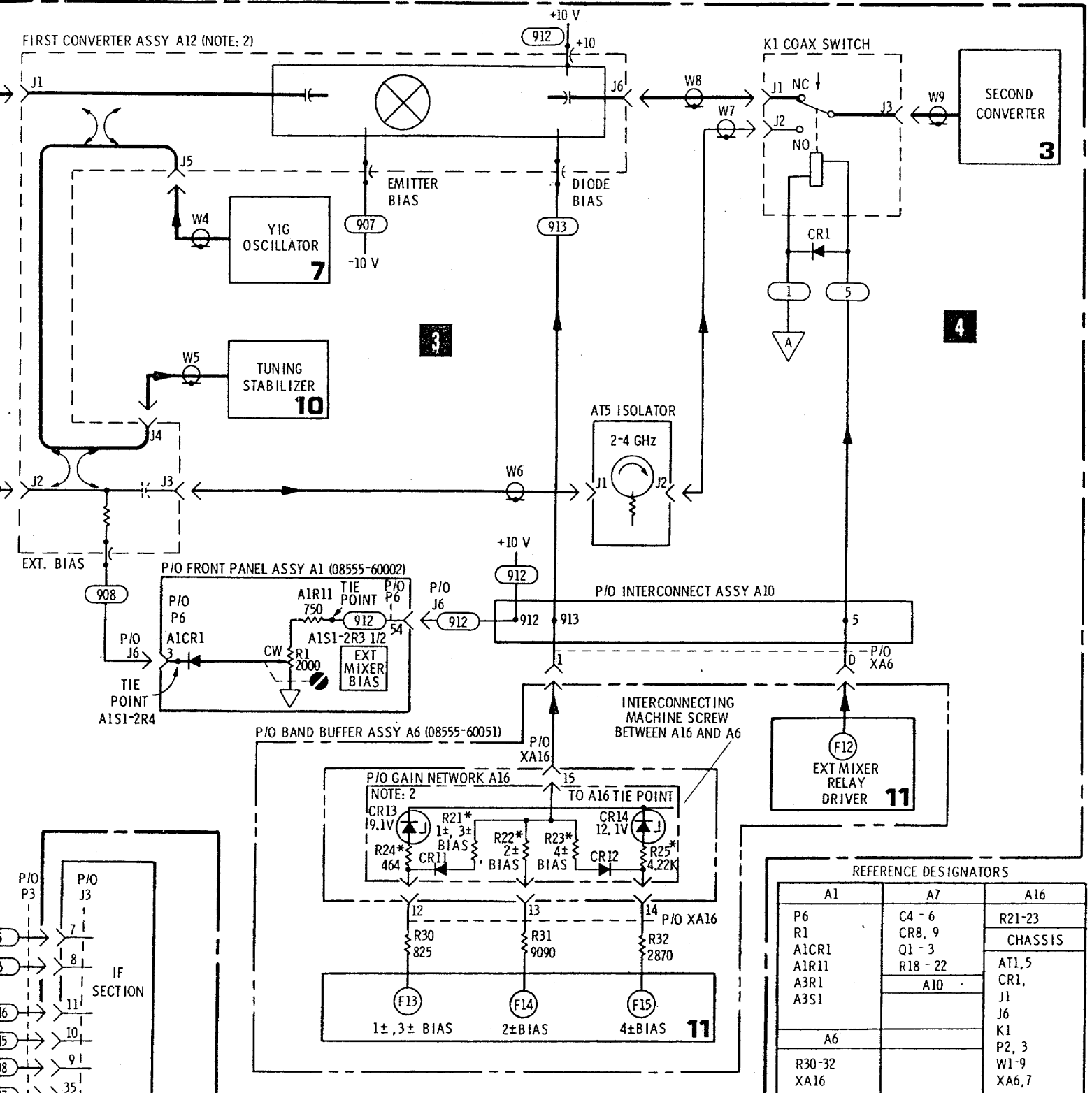
1. SEE TABLE 8-1
2. A16 RESISTORS FACTORY SELECTED TO MATCH A12 ASSY. SEE SECTION VI FOR REPLACEABLE PARTS.

A -12.6 V RETURN

3. CONTACTS S1-1, S1-2 AND S1-3 MAKE BEFORE AND BREAK AFTER CONTACTS ON S1-4.

REFERENCE DESIGNATIONS ASSEMBLIES ARE ABBREVIATED. INCLUDES ASSEMBLY NUMBER IS AIRL. DESIGNATIONS COMPLETE AS SHOWN.

Figure 8-17. Input Attenuator and First Converter Assembly



- NOTES:
- SEE TABLE 8-1
 - A16 RESISTORS FACTORY SELECTED TO MATCH A12 ASSY. SEE SECTION VI FOR REPLACEABLE PARTS.
 - CONTACTS S1-1, S1-2 AND S1-3 MAKE BEFORE AND BREAK AFTER CONTACTS ON S1-4.

REFERENCE DESIGNATIONS WITHIN OUTLINED (---) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER. *±, R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

A -12.6 V RETURN

Figure 8-17. Input Attenuator and 1st Converter Schematic Diagram

2

SERVICE SHEET 3

Service Sheet 3 contains the schematic diagrams for the Second Converter Assy A11, the 2.05 GHz Low Pass Filter FL2 and the IF switching relays K2 and K3. The second converter consists of a casting containing three cavities, a two-transistor 1.5 GHz oscillator, a single diode second mixer, a 550 MHz output circuit, and a 1.5 GHz notch filter. In addition, a voltage filter and control board, mounted on the outside of the casting, is part of the second converter (see Section VI for replaceable parts and Service Sheet 18 for an illustrated parts breakdown of the second converter).

1 NOTCH AND LOWPASS FILTERS

1.5 GHz notch filter and 2.05 GHz low pass filter. The 1.5 GHz notch filter consists of a quarter-wave directional coupler, short circuited at one end of the auxiliary line and capacitively loaded at the other. The notch filter attenuates the 1.5 GHz oscillator signal, on the main line, to prevent it from mixing in the first converter circuits. The 2.05 GHz low pass filter is a non-adjustable sealed multi-pole filter connected in the circuit between the notch filter and the coax switch K3. The low pass filter provides attenuation of signals above 2.05 GHz.

2 IF SWITCHING

Coax Switches K2 and K3. K2 and K3 provide switching to bypass the second converter when the $n=1$ 550 MHz IF bands are selected. The switches are controlled by the F11 function from the Band Buffer Assy A6 (see Service Sheet 11).

3 VOLTAGE FILTER AND CONTROL

Second Converter Voltage Filter Assy A11A3. The voltage filter is mounted on and connected to the second converter via feedthru capacitors A11C1, A11C2 and a ground connecting mounting screw. The voltage filter provides a voltage switching circuit for removal of the -10 volt supply to the 1.5 GHz oscillator when the $n=1$ 550 MHz IF bands are selected. A11A3Q4 provides filtering of the +10 volt supply. A11Q1 through Q3 and associated components, provide filtering, switching and level control of the -10 volt supply. A11A3R1, 2nd LO power adjustment, sets the voltage level of the -10 volt supply to the 1.5 GHz oscillator. A11A3Q1 is turned "on" by the F11 function (see step 2 above) grounding the base of A11A3Q2 and removing the oscillator emitter bias.

4 SECOND CONVERTER

Second Converter LO Mixer and If. The second converter LO is a two transistor oscillator whose frequency is determined by radial cavities. Voltage to the oscillator is filtered and controlled by the voltage filter assy (see block 3). The second mixer is a single Schottky diode located between the oscillator cavity and the second 2.05 GHz IF cavity. The IF filter consists of two radial cavities that function to provide a two-pole Butterworth response. Both IF and 2nd LO cavities are adjustable by tuning slugs. The output of the second mixer is coupled through a 550 MHz bandpass filter consisting of A11A2C1, C2 and L2. R1 provides bias for the second converter.

SERVICE SHEET 3 (cont'd)

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the Second Converter circuits or to isolate a malfunction in the Second Converter circuits, maximum use should be made of the instruments operating capabilities to localize the failure. The $n=1\pm 550$ MHz IF bands bypass all of the Second Converter circuits except the 1.5 GHz Notch Filter. In addition, the second LO output is available at the front panel and can be used as a test signal.

CAUTION

Before connecting the SECOND LO OUTPUT to the analyzer's INPUT, set INPUT ATTENUATION to at least 20 dB. The output level at the SECOND LO OUTPUT is typically +9 dBm.

When operating on the $n=1\pm 550$ MHz IF bands, the second LO is disabled. The disabling circuit can be bypassed by grounding the base of A11A3Q1. The oscillator output can then be observed at 1.5 GHz on the $n=1- 550$ MHz IF band.

EQUIPMENT REQUIRED

| | |
|----------------------|----------------|
| UHF Signal Generator | HP 612A |
| Signal Generator | HP 8614A |
| Digital Voltmeter | HP 3440A/3443A |
| Cable Assembly | HP 11592-60001 |
| Adapter | UG 201A/U |
| Adapter | HP 1250-1200 |
| Cable Assembly | HP 10503A |
| Adapter | HP 1250-0827 |

1 NOTCH AND LOW PASS FILTERS

Operation abnormal on both 550 MHz and 2.05 GHz IF bands. Set controls as follows:

| | |
|------------------------|--------------------|
| BAND | $n=1- 2.05$ GHz IF |
| BANDWIDTH | 300 kHz |
| SCAN WIDTH | ZERO |
| INPUT ATTENUATION | 0 dB |
| SCAN TIME PER DIVISION | 10 MILLISECONDS |
| LOG REF LEVEL | -20 dBm |
| LOG/LINEAR | LOG |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |

Connect a -60 dBm 2.05 GHz signal at J1 of Coax Switch K1. Fine tune signal source to peak signal on CRT display. Normal indication for a correctly operating system should be a signal level of approximately -50 dBm (-60 dBm input, +10 dB gain for 1st converter bypass.) If operation is abnormal, connect -60 dBm signal at J1 of Low Pass Filter FL2 and to J3 of Coax Switch K3. Negligible loss in signal level should occur in either the low pass or notch filters.

A1A3, A6, A7, A12, A13, A16
Input Attenuator and 1st Converter
◀ SERVICE SHEET 2

SERVICE SHEET 3 (cont'd)

2 IF SWITCHING

Coax Switches K2 and K3 can be visually observed and checked for correct operation using the signal insertion procedure in step 1 above. K2 and K3 should energize on the $n=1 \pm 550$ MHz IF bands.

3 VOLTAGE FILTER AND CONTROL

Check the voltage level at - (negative) terminal on A11A3 while switching between the 550 MHz IF and 2.05 GHz IF bands. The voltage level should switch from approximately -9.2 volts to about 0 volts when the 550 MHz IF bands are selected. The actual voltage level depends on the setting of A11A3R1. If the voltage does not switch, check the F11 function signal from Band Buffer Assembly A6.

4 SECOND CONVERTER

The 1.5 GHz oscillator can be checked for output level and approximate frequency (with analyzer operating normally on the 550 MHz IF bands) by applying a ground to the base of A11A3Q1 to enable the -10 volt supply, and observing the oscillator output on the $n=1$ - 550 MHz IF band. If the oscillator functions correctly and there is no 550 MHz output from the Second Converter (with a 2.05 GHz input signal) check the Second Mixer and Output Assy A11A2. The mixer and output assembly can be removed from the converter assembly without removing the converter from the chassis. Refer to Service Sheet 18 for removal and replacement instructions. Note installation of the mixer diode. The diode leads from the coupling loops to the oscillator and IF cavities. One diode lead is soldered to feedback capacitor A11A2C1, the other lead is installed in a clip type socket. To install a new diode, form leads to the dimensions shown below. It may be necessary to trim the end of the diode lead that mounts in the clip to ensure that the diode mounts parallel with the block.

REMOVAL AND REPLACEMENT PROCEDURE

See Service Sheet 18.

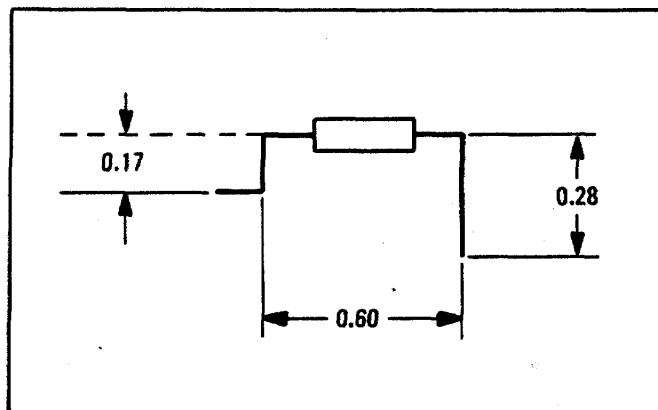


Figure 8-18. Second Mixer Diode Forming Dimensions in Inches

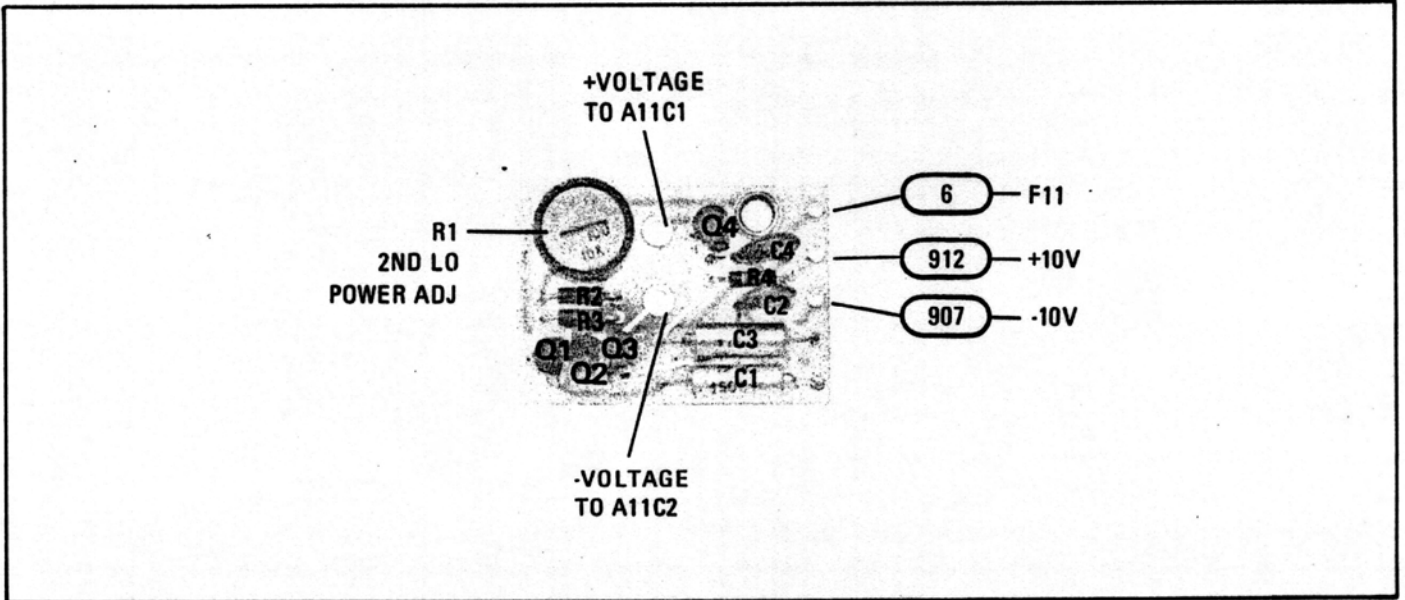


Figure 8-19. Second Converter Voltage Filter A11A3

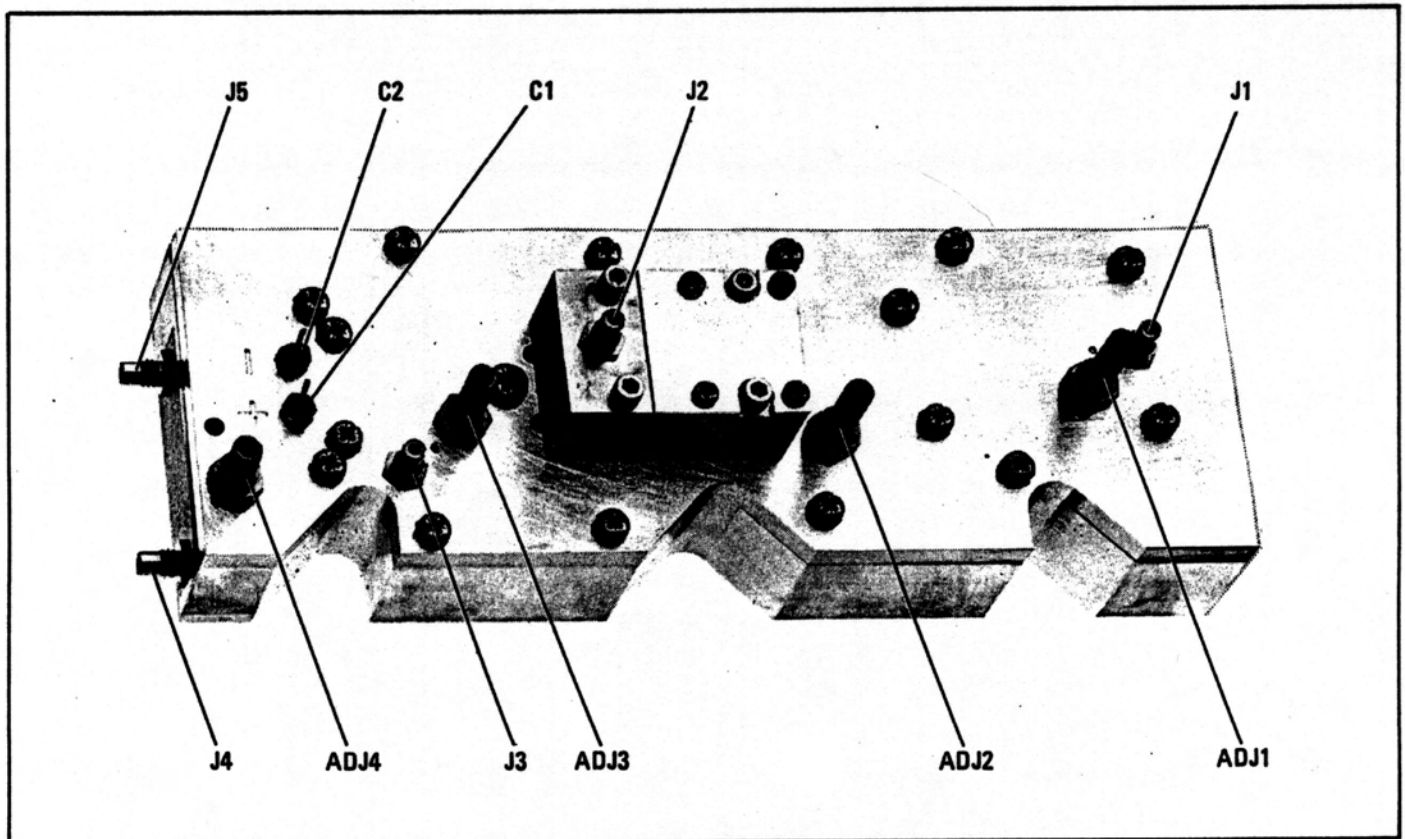
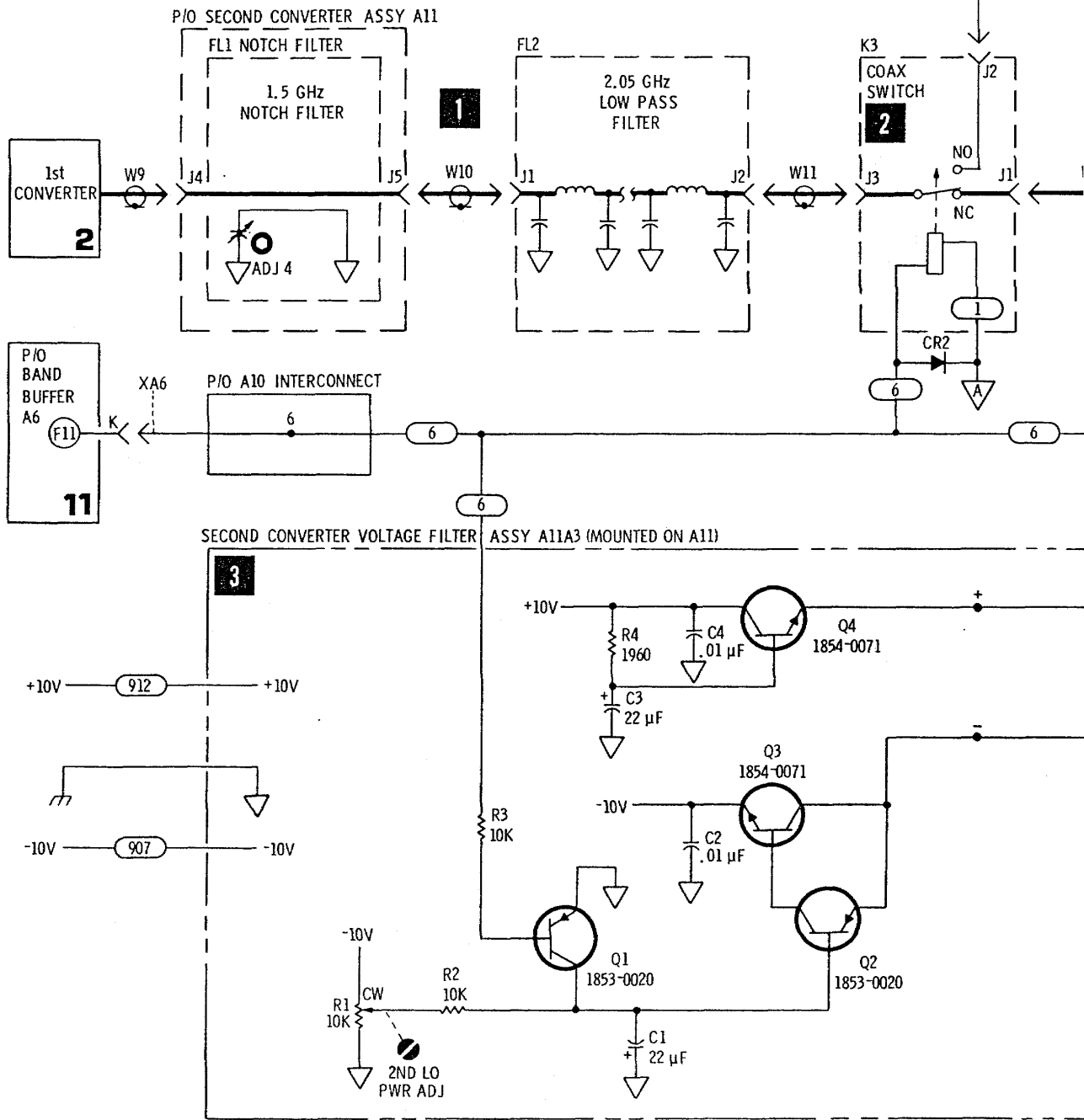
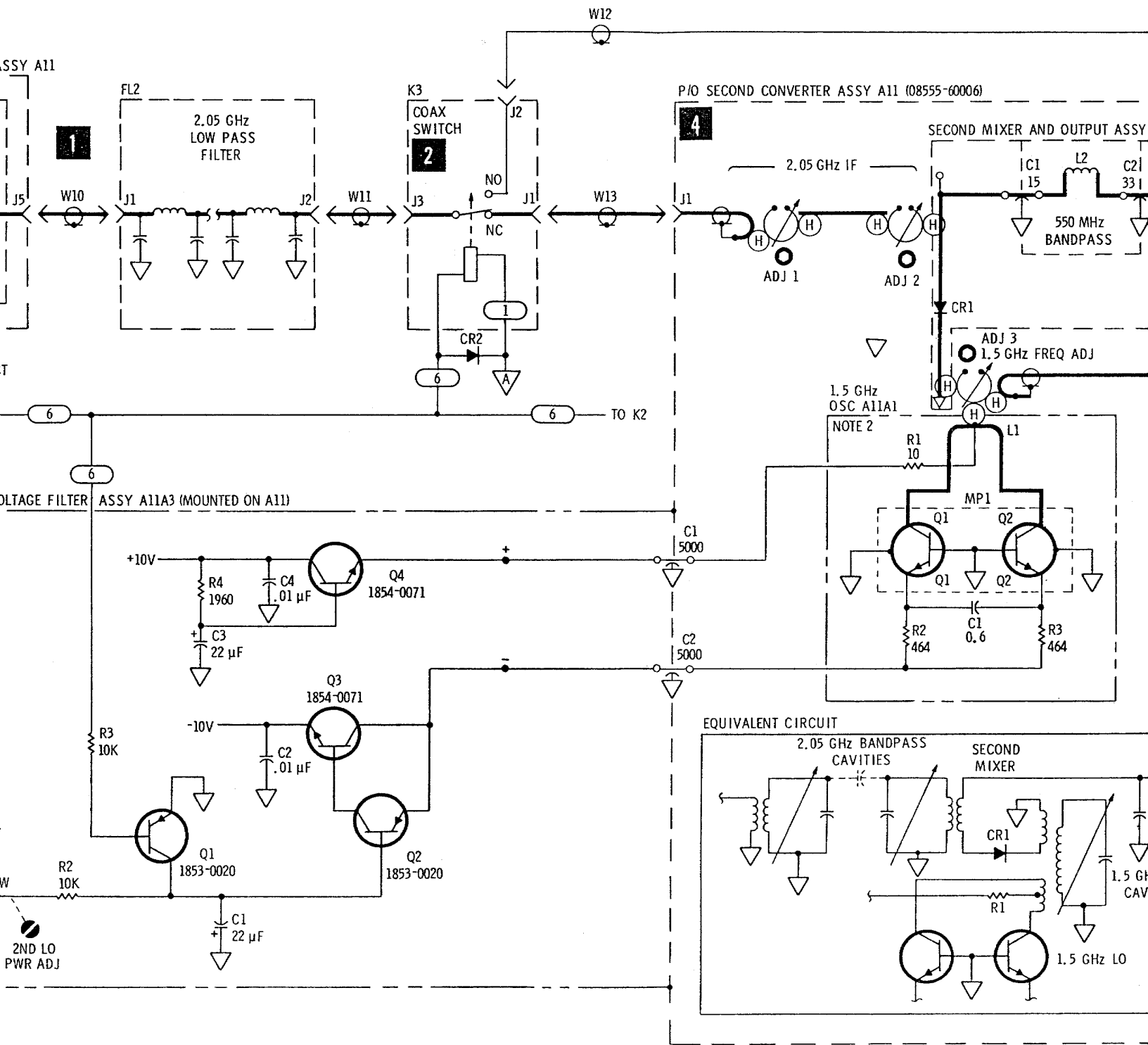
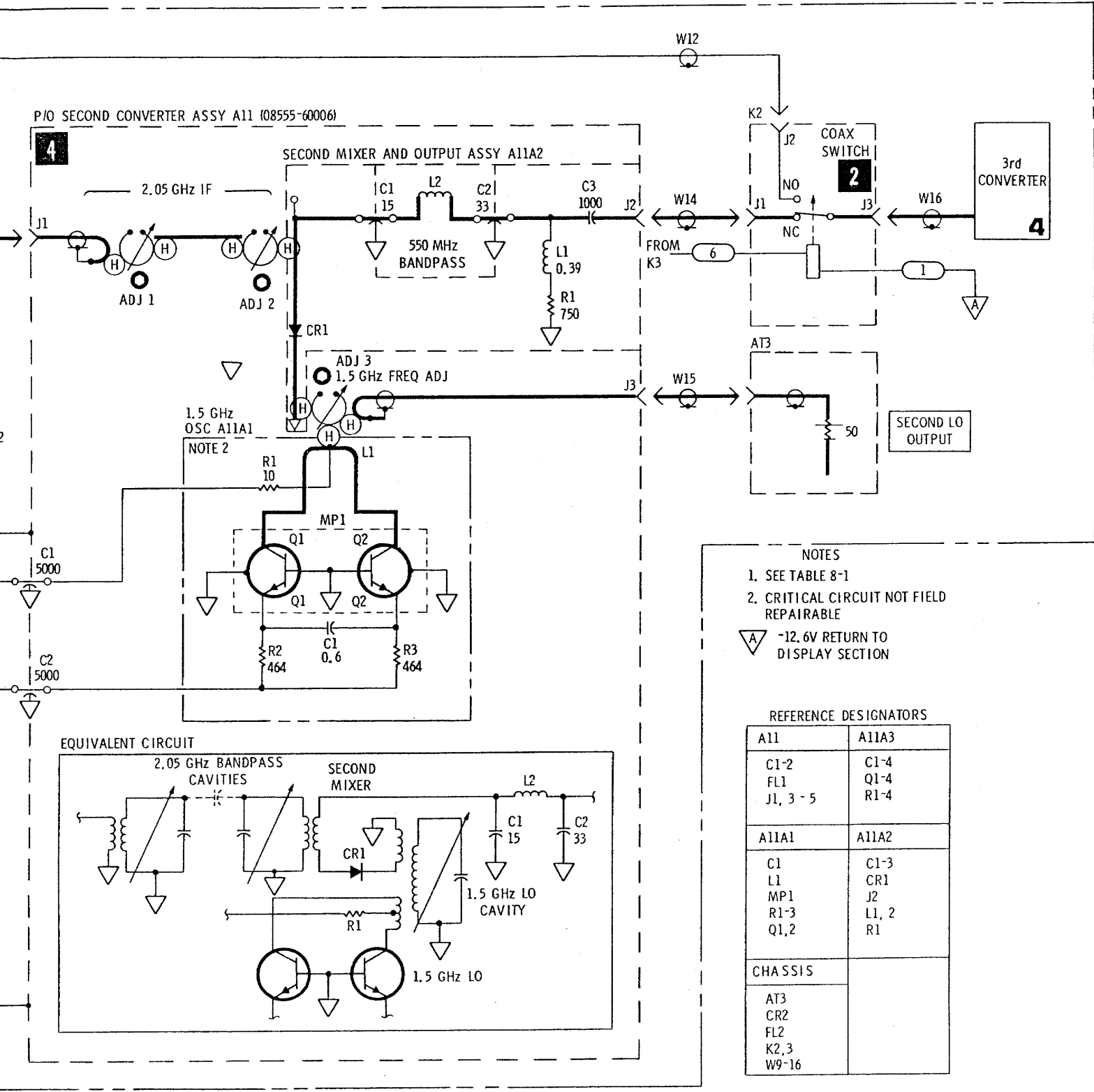


Figure 8-20. Second Converter Assembly A11 (Voltage Filter A11A3 Removed)







NOTES

- 1. SEE TABLE 8-1
- 2. CRITICAL CIRCUIT NOT FIELD REPAIRABLE
- ⚡ -12.6V RETURN TO DISPLAY SECTION

REFERENCE DESIGNATORS

| | | | |
|---------|------|-------|-------|
| A11 | | A11A3 | |
| C1-2 | FL1 | C1-4 | Q1-4 |
| J1, 3-5 | | R1-4 | |
| A11A1 | | A11A2 | |
| C1 | L1 | C1-3 | CR1 |
| MP1 | R1-3 | J2 | L1, 2 |
| Q1,2 | | R1 | |
| CHASSIS | | | |
| AT3 | | | |
| CR2 | | | |
| FL2 | | | |
| K2,3 | | | |
| W9-16 | | | |

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 8-21. Second Converter

SERVICE SHEET 4

THEORY OF OPERATION

Service Sheet 4 contains the schematic diagram for the Third Converter Assy A2, except for the 50 MHz Amplifier which is contained in Service Sheet 5. The third converter consists of a 550 MHz Amplifier, a 500 MHz LO and LO Drive Assy, a 550 to 50 MHz Mixer, a 50 MHz Variable Gain Amplifier and a 550 MHz Bandpass Filter. Each subassembly, in the converter, is mounted in separate shielded compartments, except for the 500 MHz LO and LO driver which are mounted in the same compartment.

1 500 MHz LO Drive A2A2

The 500 MHz LO Driver determines the voltage applied across the voltage-variable capacitor A2A4CR1 which can tune the frequency of the 500 MHz LO circuit. Except in Signal Identifier mode, the A2A4CR1 tuning voltage is set to a fixed level by the frequency linearity adjustment resistor A2A2R13. In the Signal Identifier operating mode, a voltage is applied to the 500 MHz LO Driver on alternate sweep scans. The input voltage level in the range of .02 and 10.0 volts, is determined by the signal identifier attenuator on the SCAN WIDTH PER DIVISION switch. (See Service Sheet 6.) This voltage will be positive if the BAND is set to a n- Band and will be negative if set to a n+ Band. The LO Driver converts the change in voltage to the required voltage across A2A4CR1 to shift the frequency of the 500 MHz LO to produce a signal shift of 2 cm on the CRT.

2 500 MHz LO A2A4

The 500 MHz LO is a two-transistor oscillator that normally operates at a fixed frequency. In the Signal Identifier operating mode, the frequency of the LO is shifted on alternate scans by shifting the bias on the voltage-variable capacitor A2A4CR1. The amount of shift will be twice the setting of the SCAN WIDTH PER DIVISION switch (i.e., between 4 kHz and 2 MHz). Note: the Signal Identifier mode is disabled above switch settings of 1 MHz. The oscillator shift will be positive for n+ Bands and negative for n- Bands. The LO output is coupled to the 550/50 MHz mixer and to the rear panel as a test point or for use with auxiliary equipment.

3 550 MHz Amplifier A2A1

The 550 MHz amplifier is a two-transistor amplifier which provides approximately 11 dB of gain. The amplifier input is from the second converter for all 2.05 GHz IF bands and from the first converter on the two 550 MHz IF bands. Transistor Q2 provides the amplification with Q1 providing active bias. Input impedance matching is provided by a stripline and T-match. The amplifier output is coupled by a twisted-pair wire to the 550 MHz Bandpass Filter.

4 550 MHz Bandpass Filter

The 550 MHz Bandpass Filter consists of three helical inductors and three screws that function as capacitors. Together they provide a Butterworth type filter with a 3 dB bandwidth of 8 MHz. Filter loss is approximately 2.5 dB.

5 550/50 MHz Mixer A2A3

The 550/50 MHz mixer consists of a standard HP 10514C Mixer (A2A3E1) and a 50 MHz bandpass filter. The mixer is a double-balance or ring modulator type and is a sealed non-repairable item. The 50 MHz filter attenuates the higher order outputs from the mixer.

SERVICE SHEET 4 (cont'd)

TROUBLESHOOTING PROCEDURE

See Overall Third Converter Test Procedure below. When a malfunction has been isolated to the 500 MHz LO or LO Driver or is suspected in the 550 MHz amplifier, bandpass filter or 550/50 MHz mixer, the top housing containing the 50 MHz amplifier may be removed to gain access to the circuit boards and the bandpass filter. (See Figure 8-22.) Refer to Service Sheet 18 for converter removal and replacement procedure.

EQUIPMENT REQUIRED

| | |
|---------------------------------------|----------------|
| VHF Signal Generator | HP 608D/E/F |
| UHF Signal Generator | HP 612A |
| Digital Voltmeter | HP 3440A/3444A |
| Vector Voltmeter | HP 8405A |
| Dual DC Power Supply | HP 6205B |
| Cable Assembly | HP 11592-60001 |
| Frequency Counter/Transfer Oscillator | HP 5245L/5257A |
| Service Kit | HP 08555-60077 |

OVERALL THIRD CONVERTER TROUBLESHOOTING PROCEDURE

(Service Sheets 4 and 5)

It is assumed that 550 MHz input at A2J1 is good and the 50 MHz output at A2J4 is bad. (Arrived from Figure 8-9 Troubleshooting Trees.) If signal level is 3 to 5 dB low check 550 MHz and 50 MHz filter adjustments before performing the troubleshooting procedure. A2C5, C6, C7 and A2A3C3 are adjusted for peak signal indication. Install analyzer plug-ins on extender cables. Check input voltages at third converter feedthru capacitors.

Voltage measurement conditions:

n=1- 2.05 GHz IF Band, SIGNAL IDENTIFIER OFF, SCAN WIDTH ZERO, no signal input.

(Available through hole in left side gusset.)

| Wire Color Code | Capacitor | Voltage |
|-----------------|-----------|-----------|
| 902 | A2C1/C2 | +20 Vdc |
| 907 | A2C3 | -10 Vdc |
| 946 | A2C4 | 0 |
| 97. | A2C8 | -12.6 Vdc |
| 934 | A2C9 | - 0.6 Vdc |
| 947 | A2C10 | -0.77 Vdc |
| 935 | A2C11 | -12.4 Vdc |
| 936 | A2C12 | -0.56 Vdc |

Check third LO output for both frequency and power level at A2J3 or at rear panel connector P4-A2. The output should be 500 MHz \pm 50 kHz at a power level of at least +1 dBm. If the oscillator is off frequency see 500 MHz LO Check and Adjustment Procedure, Section V. If there is no oscillator signal or if power output is low, see troubleshooting procedure for 500 MHz LO Drive and LO (blocks 1 and 2 below). If the LO output is correct remove cover from 50 MHz Amplifier A2A5 and inject a 50 MHz -40 dBm level signal at IN terminal near A2A5C2. Set analyzer controls as follows: n=1- 2.05

SERVICE SHEET 4 (cont'd)

GHz IF Band, BANDWIDTH 300 kHz, SCAN WIDTH ZERO, INPUT ATTENUATION 0 dB, SCAN TIME 10 MILLISECONDS, LOG REF LEVEL 10 dBm, SIGNAL IDENTIFIER OFF, SCAN MODE INT, and SCAN TRIGGER AUTO.

Adjust frequency of 50 MHz signal for maximum base line lift. The CRT display should indicate a signal level of approximately -30 dBm. If signal level is not correct see 50 MHz amplifier troubleshooting procedure on Service Sheet 5. If signal level is correct the malfunction is in the 550 MHz amplifier, bandpass filter or the 550/50 MHz mixer. (See blocks 3 and 4 below.)

1 500 MHz LO DRIVE A2A2 TROUBLESHOOTING PROCEDURE

Remove bottom section of third converter from the RF Section chassis (see third converter removal and replacement procedure, Service Sheet 18). Connect +20 volts to A2C1/C2 and -10 volts to A2C3 from dual power supply. Measure current drawn from power supply. Approximately 28 mA should be drawn from the 20 volt source and 16 mA from the 10 volt source.

Connect a -10 volt source to test point A2A2TPA (Signal Identifier Input) and measure voltage at A2A2TPB. Voltage level should be approximately +8.6 Vdc. Connect a +10 volt source to A2C4 and repeat measurement. Voltage level should be approximately +5.4 Vdc. (Zero volts input produce approximately +7V.)

2 500 MHz LOCAL OSCILLATOR TROUBLESHOOTING PROCEDURE

If the voltage levels in step 1 are correct and there is no output from the 500 MHz LO, remove the 500 MHz LO Drive A2A2 to gain access to the 500 MHz LO. Disconnect A2A2 from A2A4 at feedthru capacitors A2A4C1 and A2A4C2. Remove the four screws and lift the A2A2 assembly aside. Check transistors A2A4Q1/Q2 and their associated components.

3 550 MHz AMPLIFIER TROUBLESHOOTING PROCEDURE

Connect a 550 MHz signal from the 612 Signal Generator to A2J1. Connect the 8405A Vector Voltmeter probe to test point F and set signal generator output level for an indication of -40 dBm on the vector voltmeter. Measure signal level at test point D. Signal level should indicate amplifier gain of +11 ±2 dB. If the amplifier has no gain or low gain, check transistors A2A1Q1/Q2. Typical voltage measurements with no input signal given below.

SERVICE SHEET 4 (cont'd)

| | Emitter | Base | Collector |
|--------|-----------|-----------|-----------|
| A2A1Q1 | +14.6 Vdc | +14.0 Vdc | +1.3 Vdc |
| A2A1Q2 | 0 | + 0.8 Vdc | +4.4 Vdc |

4 550 MHZ BANDPASS FILTER AND 550/50 MHZ MIXER

Filter loss should be 2.25 ± 0.5 dB. A quick check of the filter can be made by removing the -10 volt source to the 500 MHz LO, covering the filter cavities with a metal plate and comparing the input signal level to the filter with the output level. Measure signal level with Vector Voltmeter at A2A1 TP D and at pins X and X' on A2A3E1. This arrangement should indicate a filter loss of approximately 6 dB. Reconnect the -10 volt source to the 500 MHz LO and measure LO input signal level to mixer E1 at pins L and L'. Signal level should be approximately +10 dBm. If both the LO and 550 MHz signals to the mixer are correct, mixer E1, is probably defective. If replaced, perform Third Converter Adjustments in Section V.

REMOVAL AND REPLACEMENT PROCEDURE

See Service Sheet 18.

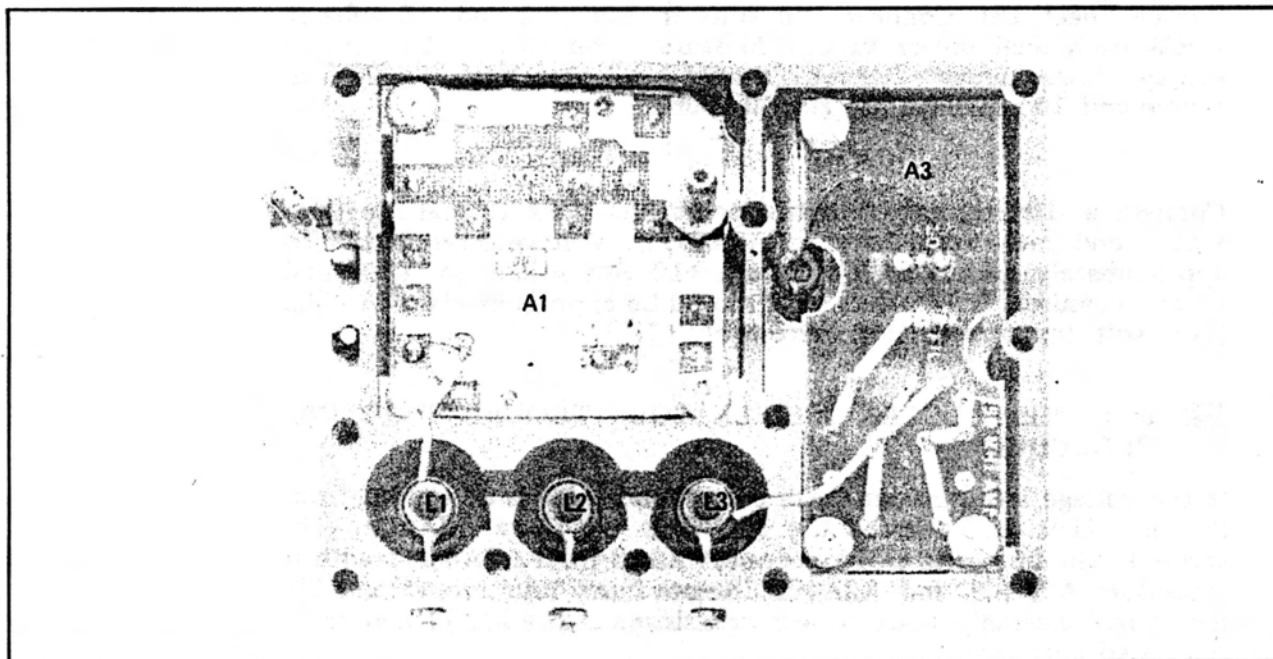


Figure 8-22. Third Converter Assembly A2 Top View (50 MHz Ampl Removed)

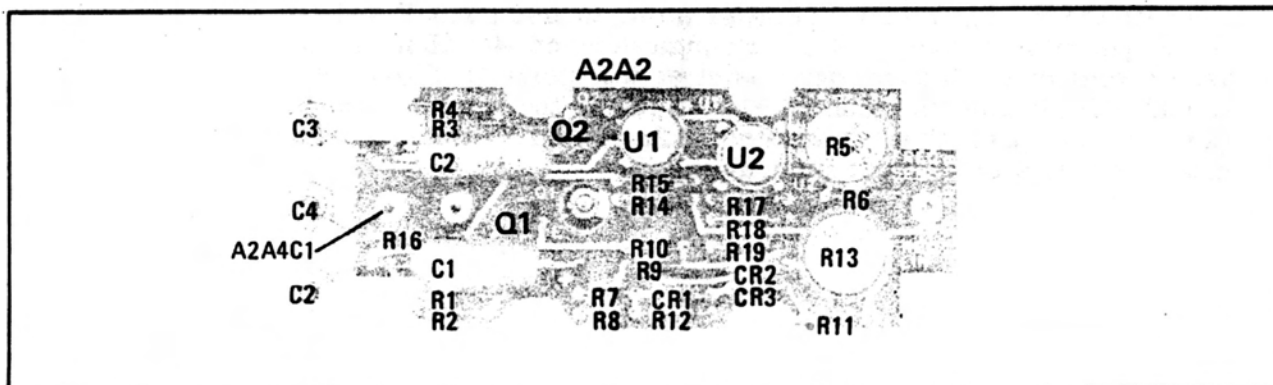


Figure 8-23. 500 MHz LO Drive Assembly A2A2

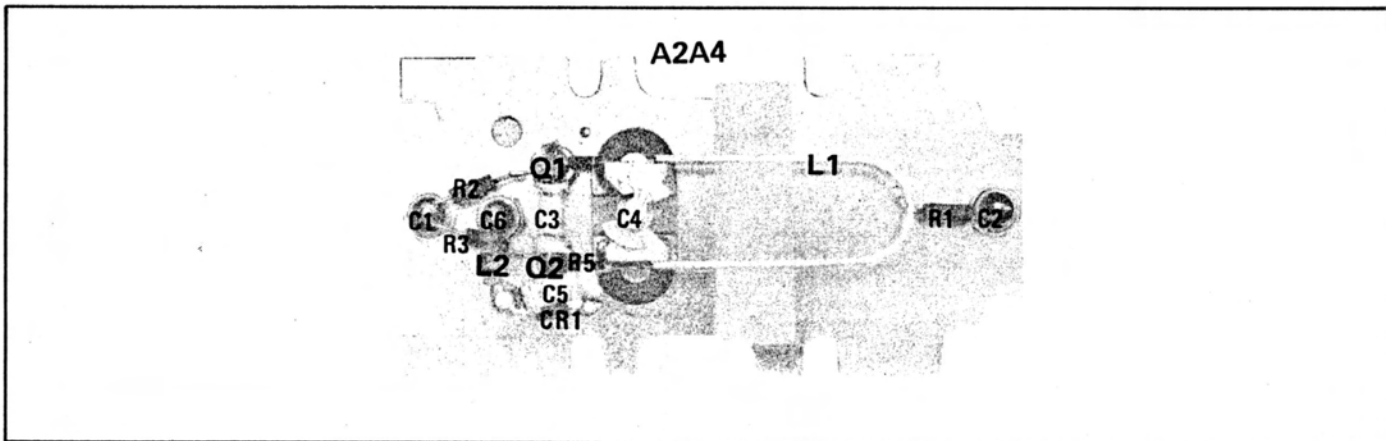


Figure 8-24. 500 MHz LO Assembly A2A4

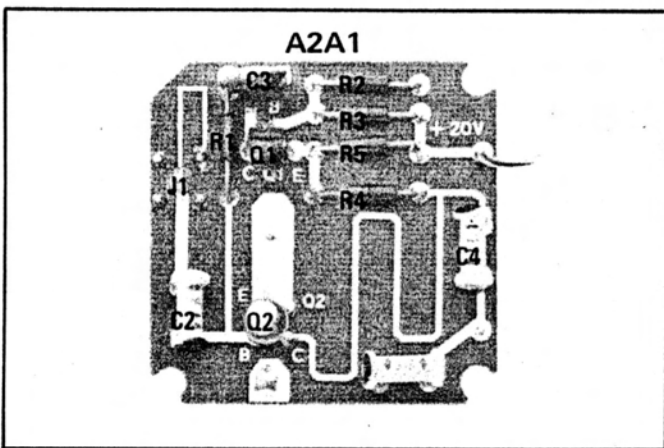


Figure 8-25. 550 MHz Ampl. Assembly A2A1

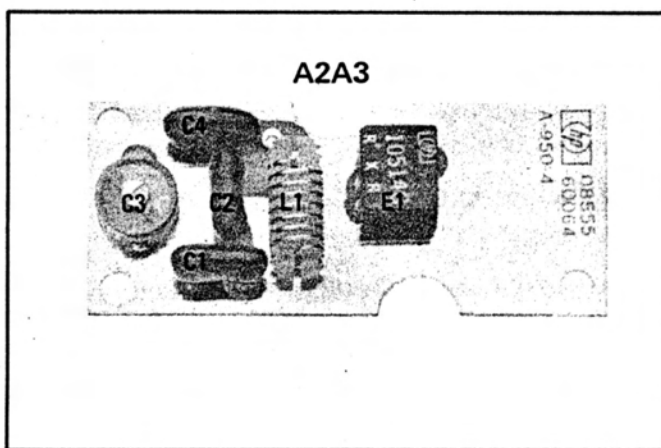


Figure 8-26. 550/50 MHz Mixer Assembly A2A3

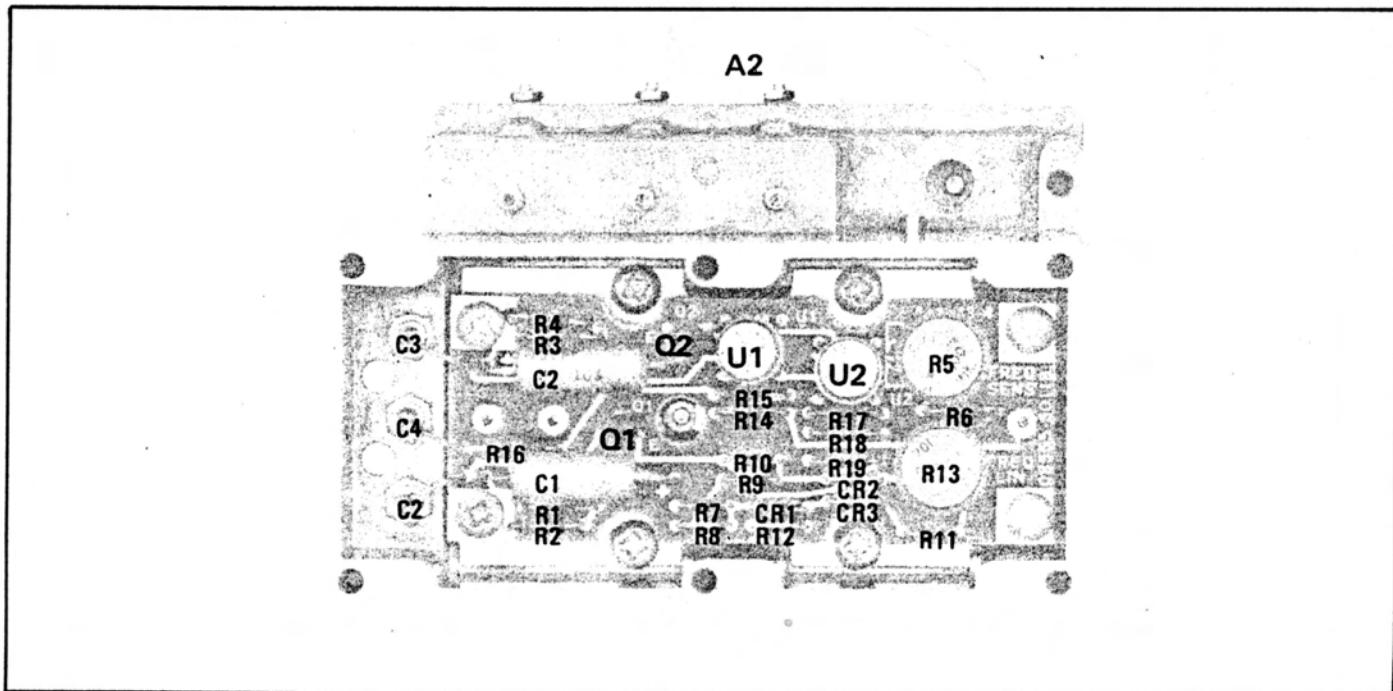
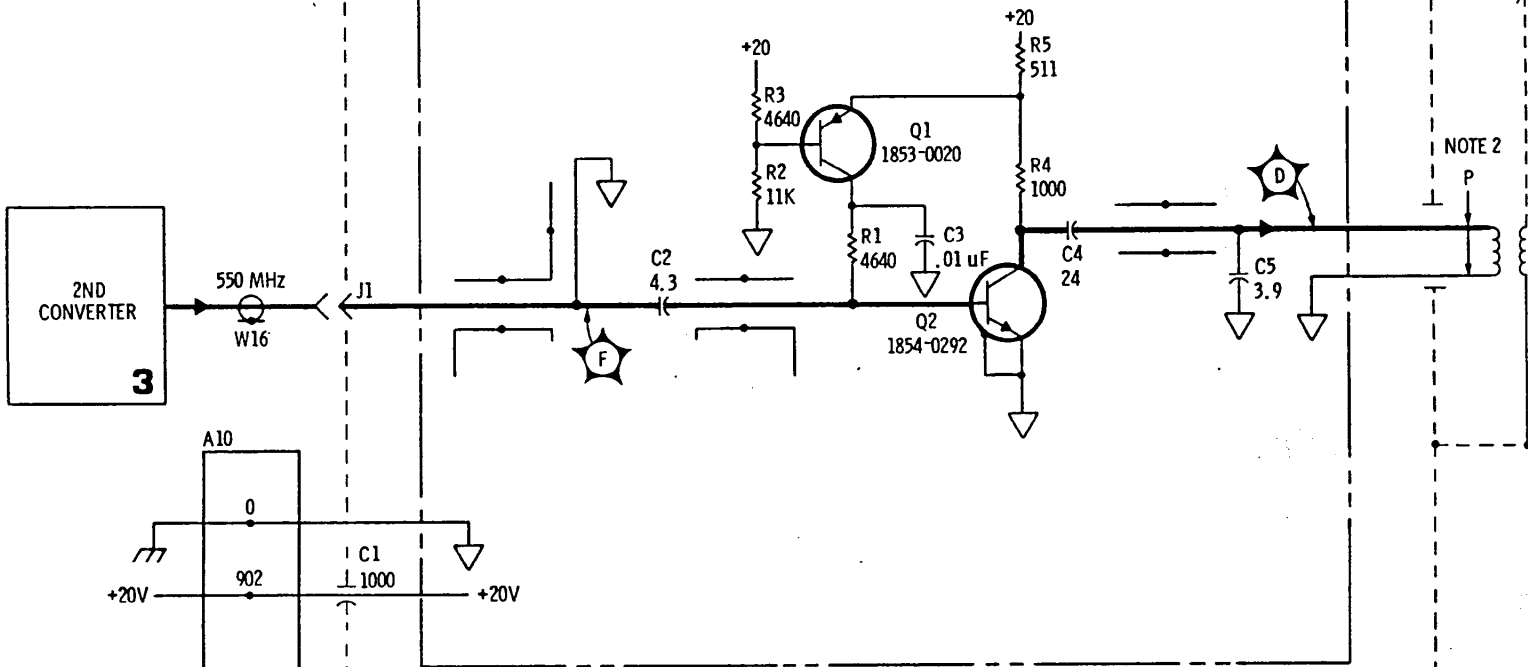


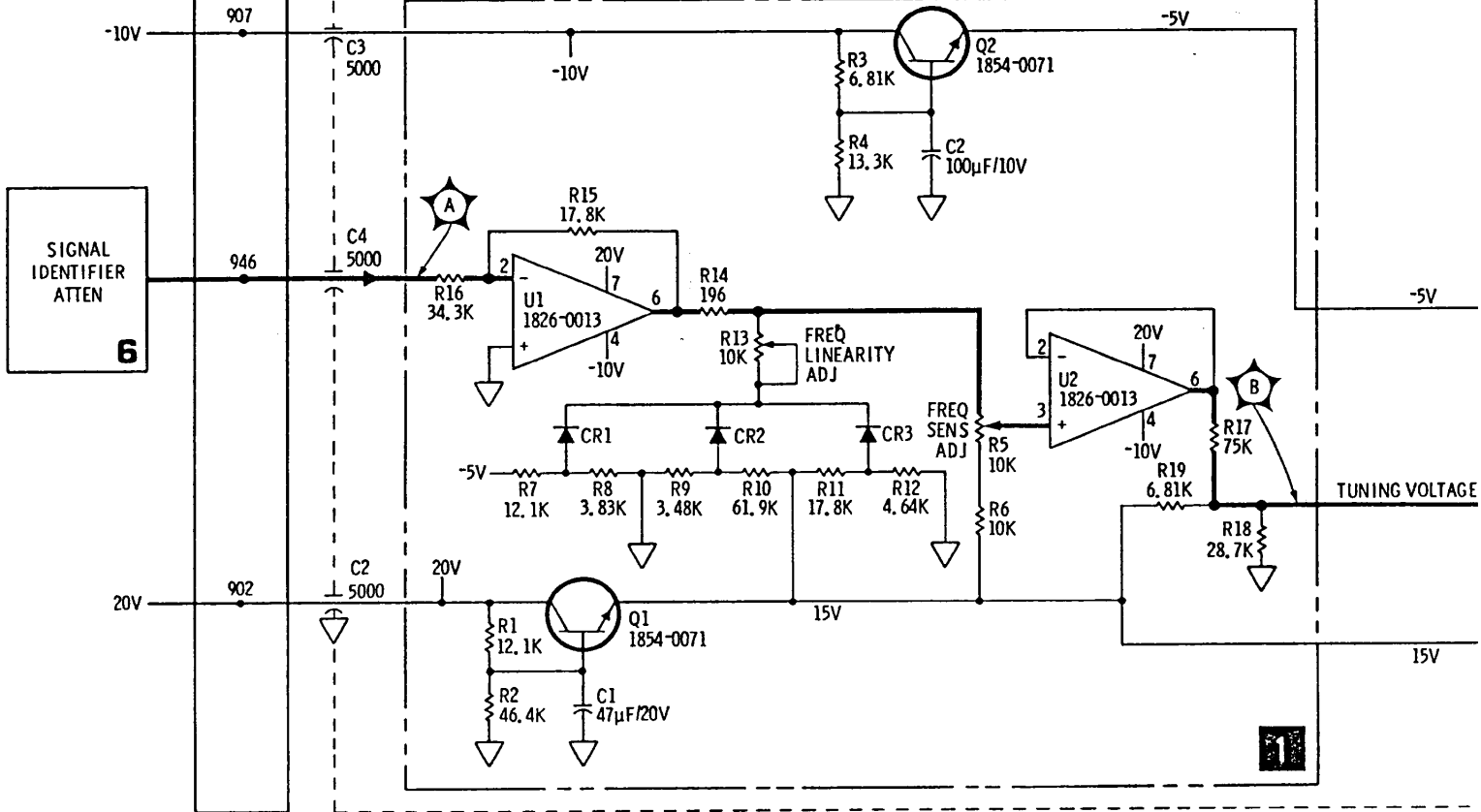
Figure 8-27. Third Converter Assembly A2, Bottom View

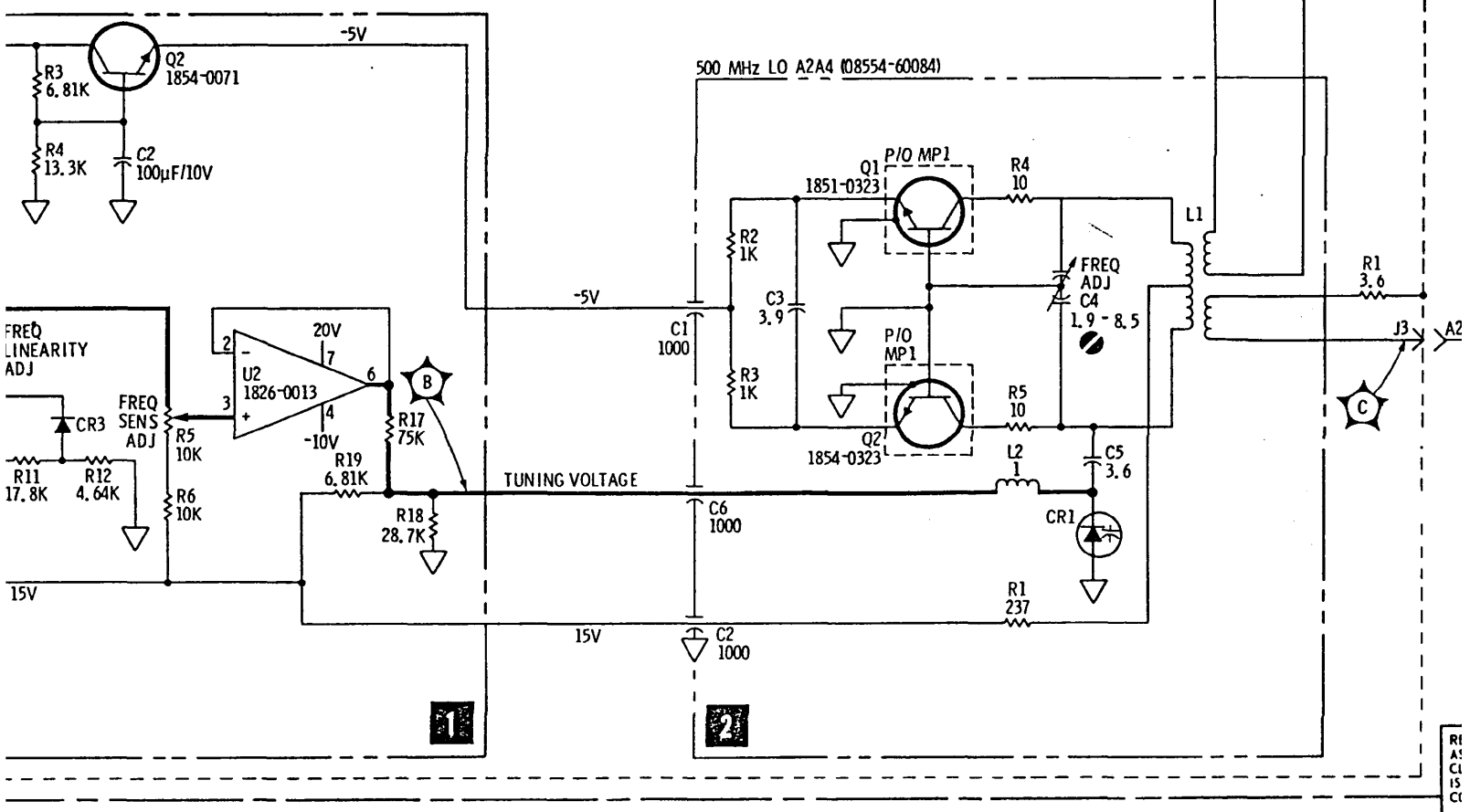
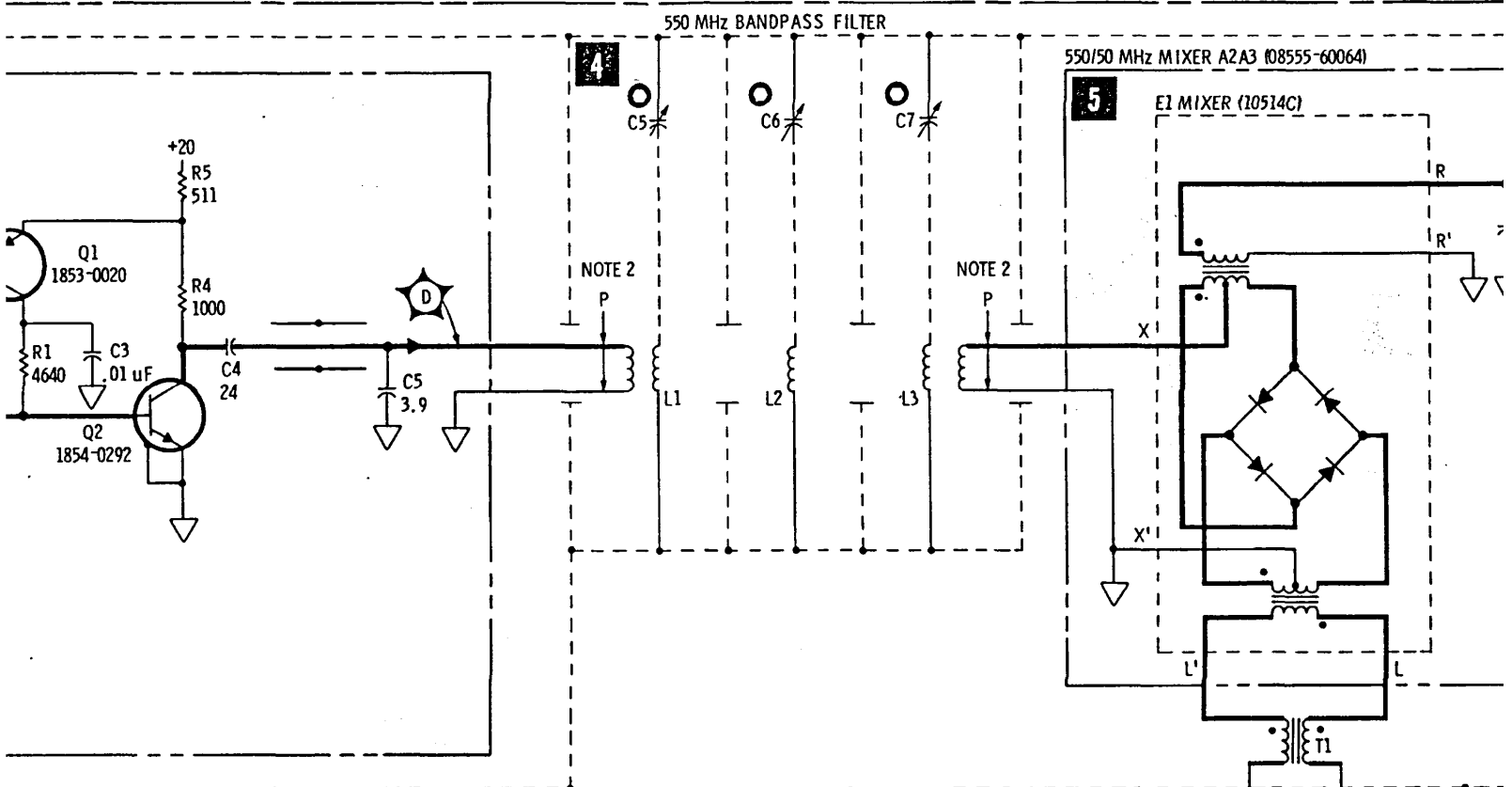
3RD CONVERTER ASSY A2 (08555-60007)

550 MHz AMPL A2A1 (08554-60009)

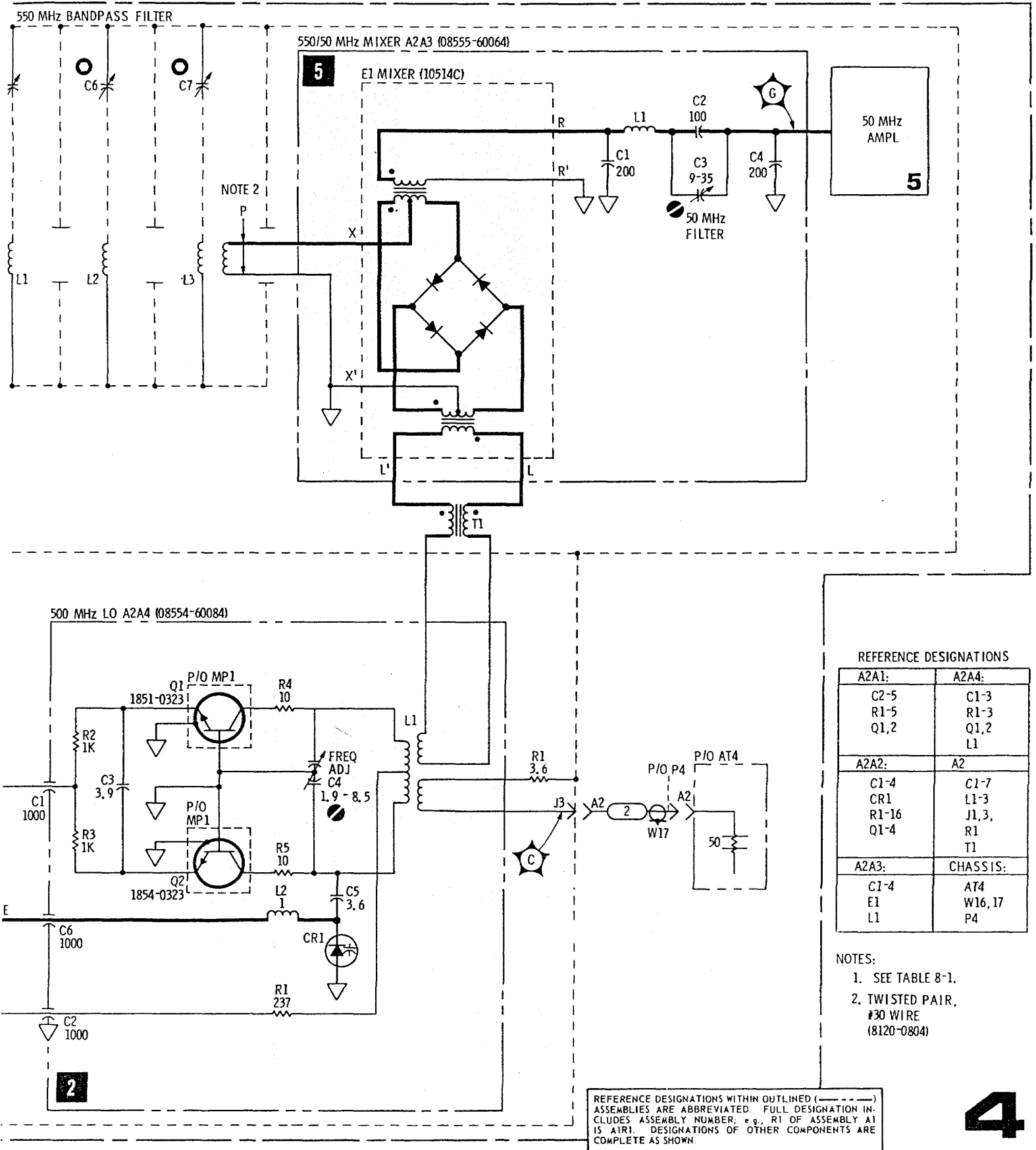


500 MHz LO DRIVE A2A2 (08555-60118)





RI
A1
CI
15
CT



4

Figure 8-28. Third Converter

SERVICE SHEET 5

THEORY OF OPERATION

Service Sheet 5 contains the schematic diagram for the 50 MHz variable gain amplifier, the input mixer gain compensation network and the gain network driving circuits. The amplifier gain is controlled to provide a constant output level to the IF Section on all internal mixing bands (.01 to 18 GHz). The amplifier compensates for losses in the 1st, 2nd and 3rd converters to maintain the overall gain of the RF Section at -3 dB. Maximum amplifier gain is provided on external mixing bands (n=6 and n=10) with minimum gain provided on the 550 MHz IF bands (n=1±*). Amplifier gain is controlled in steps over a range of approximately 28 dB. Additionally, variable gain is provided by the sweep and tune voltages for all internal mixing bands. The controlled gain of the amplifier is varied by changing current through PIN diodes which function as current controlled resistors.

1 50 MHz AMPLIFIER

Transistors A2A5Q1 and Q2 form a cascade amplifier. Amplifier gain is adjusted by A2A5R4 1-low, 2.05 GHz IF adjustment. For adjustment, see 50 MHz Amplifier Adjustment Procedure in Section V.

2 MIXER PIN DIODE

PIN Diode A2A5CR1 functions as a current controlled attenuator to match the 50 MHz amplifier with the input mixer diode in the 1st converter. Current through the diode is controlled by the Input Mixer Gain Compensation Network A16, gain control function signals F1 through F10 and the sweep plus tune voltage from A6U2. A2A5C8 provides a fixed adjustment level for the PIN diode attenuator. Emitter followers A2A5Q3 and Q4 provide circuit isolation.

3 SIGNAL IDENTIFIER PIN DIODE

PIN Diode A2A5CR2 functions as a current controlled attenuator to reduce the amplifier gain by approximately 5 dB on alternate sweep scans. Current through the diode is switched by voltage from the Signal Identifier (see Service Sheet 6).

4 50 MHz STEP GAIN AMPLIFIER

Transistor A2A5Q5 and associated components form a 50 MHz amplifier whose gain is controlled in steps by current changes through PIN diode A2A5CR3. Amplifier gain is controlled by changing emitter degeneration. The amplifier stage has three controlled gain levels. On the n=1± 550 MHz IF bands the gain level is set by A2A5R25. On the n=1 and n=2 (2.05 MHz IF bands) the F17 function signal, from the Band Buffer Assy A6, reverse biases diode A2A5CR4 to remove the gain level set by A2A5R25. On the n=3, 4, 6 and 10 bands the F16 function signal is applied through A2A5R26 and A2A5L7 to increase current through the PIN diode. Note that as current through PIN diode A2A5CR3 increases, degeneration is decreased and gain is increased. Functionally, the circuit operates to decrease amplifier gain by 5 dB on the n=1± 550 MHz IF bands, removes the 5 dB decrease in gain on the n=1± and n=2± 2.05 GHz IF bands and adds 15 dB gain on the n=3± through the n=10± bands.

5 SWEEP PLUS TUNE AMPLIFIER

A6U2 provides gain compensation for each internal mixing band. As the YIG oscillator is tuned from the low to high end of its range, the amplifier produces a positive-going ramp that is combined with the voltage developed across the selected resistors in the gain compensation network to reduce the attenuation through PIN diode A2A5CR1. This effectively increases the gain in the 50 MHz amplifier. The operational amplifier input depends on the position of the SCAN WIDTH control and/or FREQUENCY control. In FULL scan the input is a -5 to -10 volt ramp. In PER DIVISION scan the FREQUENCY control sets the level while the position of the PER DIVISION control determines the amount of sweep. In ZERO scan the

SERVICE SHEET 5 (cont'd)

input is a voltage level determined by the position of the FREQUENCY control. The input to the operational amplifier is combined with an offset voltage (+10 volts through A6R20), amplified and inverted. A -5 to -10 volt input results in a 0 to +8 volt output. Amplifier gain is determined by resistors A6R21 and A6R19.

6 INPUT MIXER GAIN COMPENSATION NETWORK A16

Factory selected resistors in the gain network control the amount of attenuation by PIN diode A2A5CR1 (see 2 above). Resistor values are selected to match the input mixer diode in the 1st Converter Assy A12. Resistive sticks selected by function control signals (F1 through F10) from the Band Buffer (Service Sheet 11) determine the current through the PIN diode attenuator. Resistors A16R1-R10 set the gain at the high end of each band while A16R11-R20 set the gain at the low end. The active function signal has a voltage level of -12 volts which is applied to low end gain resistors. The voltage applied to the high end gain resistors depends on the SCAN WIDTH operating mode (see 5 above). The two voltages are summed in the resistor sticks to determine the attenuation current through A2A5CR1.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to or to isolate a malfunction in the 50 MHz amplifier, sweep plus tune amplifier or the input mixer gain compensation network, the front panel controls should be used to obtain as much information as possible. When this information is obtained, or if not obtainable, proceed with the numbered troubleshooting procedure below.

Front Panel Control Checks; set controls as follows:

| | | |
|------------------------|-------|---------------------|
| POWER | ..... | ON |
| BAND | ..... | n=10+ |
| FREQUENCY | ..... | high end of band |
| SCAN WIDTH | ..... | FULL |
| INPUT ATTENUATION | ..... | 10 dB |
| BASE LINE CLIPPER | ..... | max CCW |
| VIDEO FILTER | ..... | 100 kHz |
| SCAN MODE | ..... | INT |
| SCAN TRIGGER | ..... | LINE |
| LOG/LINEAR | ..... | LOG |
| SCAN TIME | ..... | 10 MILLISECONDS |
| LOG REF LEVEL Controls | ..... | Center trace on CRT |

Disregard DISPLAY UNCAL light during this check. Compare change in display trace with the figure below as the Frequency Band Lever is positioned to select each frequency band. There should be no change in level for frequency bands n=10± through n=6±. Selection of the n=4+ band should tilt the trace with a reduction in gain on the low frequency end and an increase in gain on the high frequency end. The tilt and change in gain is a combination of the sweep plus tune amplifier output and the mixer gain compensation network. Select bands n=4- through n=3- and compare with figure. Gain reduction determined by resistors in network. Select band n=2+; signal F16 goes inactive dropping the 15 dB gain step. However, the attenuation through PIN diode A2A5CR1 is reduced by approximately 11 dB by the resistive network and the trace is reduced by approximately 4 dB. Select bands n=2- through n=1-. The trace should drop by the approximate amounts indicated in the figure. Select n=±* bands (550 MHz IF). Function signal F17 goes inactive decreasing gain by 5 dB. However, this decrease in gain is offset by conversion loss in the 2nd converter which is bypassed on the n=1±* bands. Switch SIGNAL IDENTIFIER to ON and select 1 MHz PER DIVISION SCAN WIDTH. Two traces should appear on the display with approximately 5 dB difference in

SERVICE SHEET 5 (cont'd)

level. Both the tilt and change in gain levels are matched to the first converter. Use the figure below as a guide only.

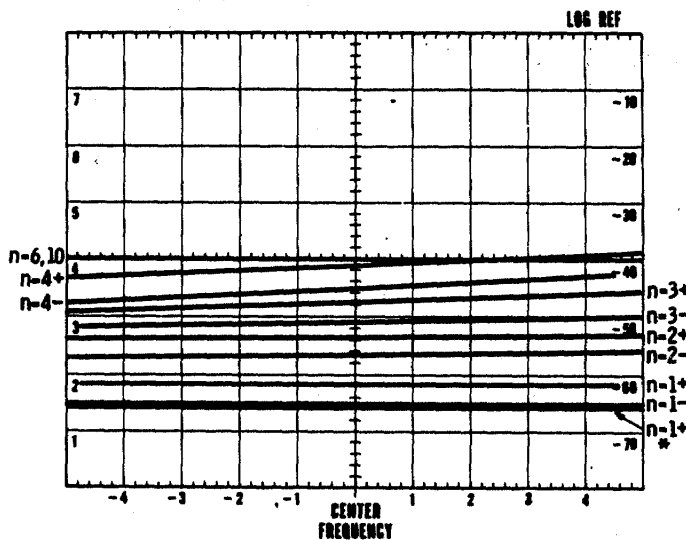


Figure 8-29. CRT Display, Gain Change Base Line Lift

EQUIPMENT REQUIRED

Digital Voltmeter
 HP 3440A/3444A
 Oscilloscope
 .. HP 180A/1801A/1821A

1 50 MHz AMPLIFIER

Remove top cover from 3rd converter to gain access to the 50 MHz amplifier. Check the +20 and -12.6 volt inputs to the amplifier. Check the input amplifier by making dc voltage measurements of A2A5Q1 and Q2. Compare with typical values shown below.

50 MHz Amplifier A2A5 Voltage Measurements

Unit of Measurement Vdc; tolerance ± 0.1 Vdc;

Conditions: n=1- 2.05 GHz IF Band, SIGNAL IDENTIFIER OFF, SCAN WIDTH ZERO, no signal input.

| | Source | Gate | Drain |
|-------------------|-----------|--------|-----------|
| A2A5Q1 | +2.8 | 0 | +10.06 |
| | Emitter. | Base | Collector |
| A2A5Q2 | +10.84 | +11.56 | +20.0 |
| A2A5Q3 | +10.76 | +11.5 | +19.9 |
| A2A5Q4 | +10.0 | +10.76 | +19.9 |
| A2A5Q5 | + 9.28 | +10.0 | +19.9 |
| A2C9 (VAR GAIN) | -0.6 | | |
| A2C10 (SIG IDENT) | ± 0.7 | | |
| A2C11 (+5 dB) | -12.4 | | |
| A2C12 (+15 dB) | -0.56 | | |

2 MIXER PIN DIODE

Check dc voltage levels for emitter followers A2A5Q3 and Q4. With analyzer controls set as indicated for the front panel checks, switch between bands n=4 and n=6. Observe CRT trace for a change from a level trace on the n=6 to a tilted trace on the n=4 band. Observe CRT trace for a change in level between bands n=4 and n=6. If no change in either tilt or level, check front to back ratio of PIN diode A2A5CR1. If no tilt (and PIN diode checks good), see 5 below. If no change in tilt and level (and PIN diode checks good), see 6 below.

A2A1, A2A2, A2A3, A2A4
 Third Converter

◀ SERVICE SHEET 4

SERVICE SHEET 5 (cont'd)

3 SIGNAL IDENTIFIER PIN DIODE

With the analyzer operating in the signal identifier mode (SIGNAL IDENTIFIER Switch ON and SCAN WIDTH PER DIVISION set to 1 MHz or less) check voltage level at anode of A2A5CR2. Voltage level should alternate between +0.70 and -0.75 volts (approximately) for normal operation. Check front to back ratio of diode if voltage is abnormal. Signal level is attenuated by the positive voltage level. The higher the positive voltage level the greater the attenuation. When checking attenuation, measure signal attenuation, not the amount of base line shift.

4 50 MHz STEP GAIN AMPLIFIER

Check dc voltage level at cathode of PIN diode A2A5CR3. With analyzer controls set as indicated for the front panel check above, switch between bands and check voltage level. Typical levels are as follows: bands n=10, n=6, n=4 and n=3, -1.02 volts; bands n=2 and n=1, -0.54 volts; band n=1*, -0.52 volts.

5 SWEEP PLUS TUNE AMPLIFIER

The sweep plus tune amplifier A6U2 can be isolated from the following circuitry by disconnecting

at the tie point between the A6 and A16 circuit boards. With the analyzer operating in full scan, compare the output voltage with the input signal. A -5 to -10 volt input ramp should produce a 0 to +8 volt output ramp. A6R21 divided by A6R19 determines amplifier gain. Voltage offset by +5 volts through A6R20.

6 INPUT MIXER GAIN COMPENSATION NETWORK

When a malfunction has been isolated to the Input Mixer Gain Compensation Network A16, remove the assembly and perform a point-to-point check of the resistive stick and diode associated with the defective band. Use markings on factory selected resistors to determine value. Replace defective resistors with resistors of the same value as the markings on the defective resistors. Perform the amplitude accuracy performance test in Section IV. The A16 assembly is matched with the First Converter Assembly A12. If one assembly is defective and cannot be repaired in the field both assemblies must be replaced (see Replaceable Parts Section VI).

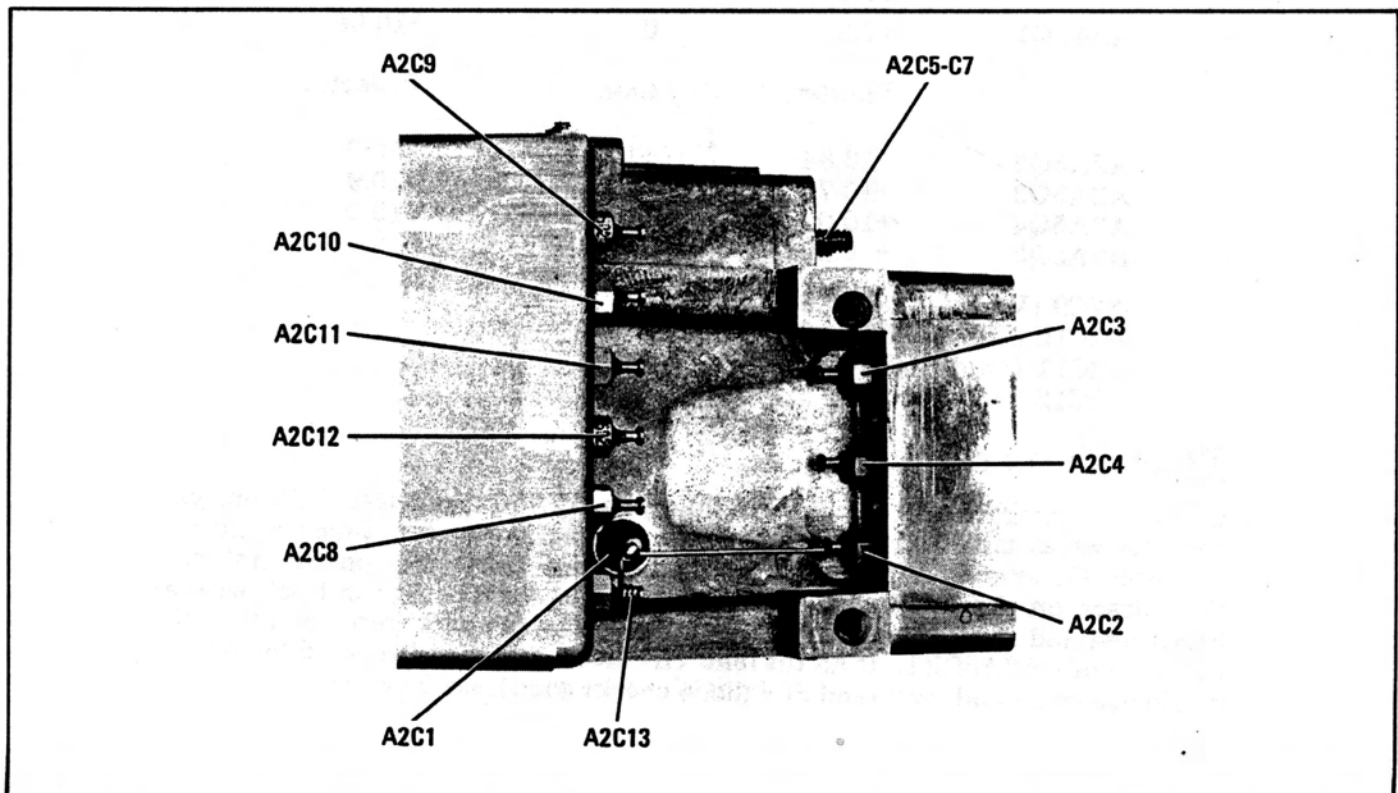


Figure 8-30. Third Converter Assembly, Side View

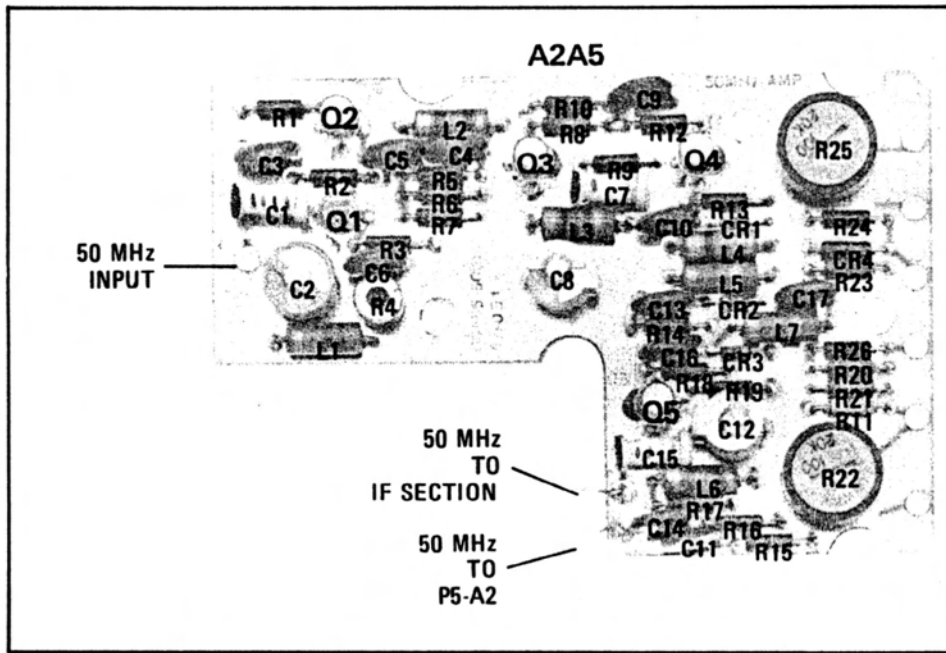


Figure 8-31. 50 MHz Ampl. Assembly, A2A5

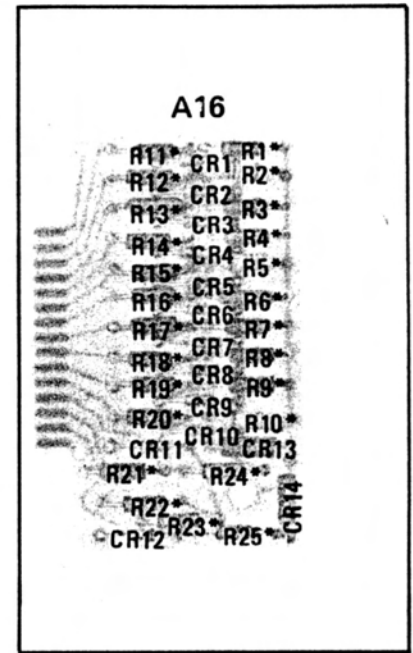


Figure 8-32. Input Mixer Network A16

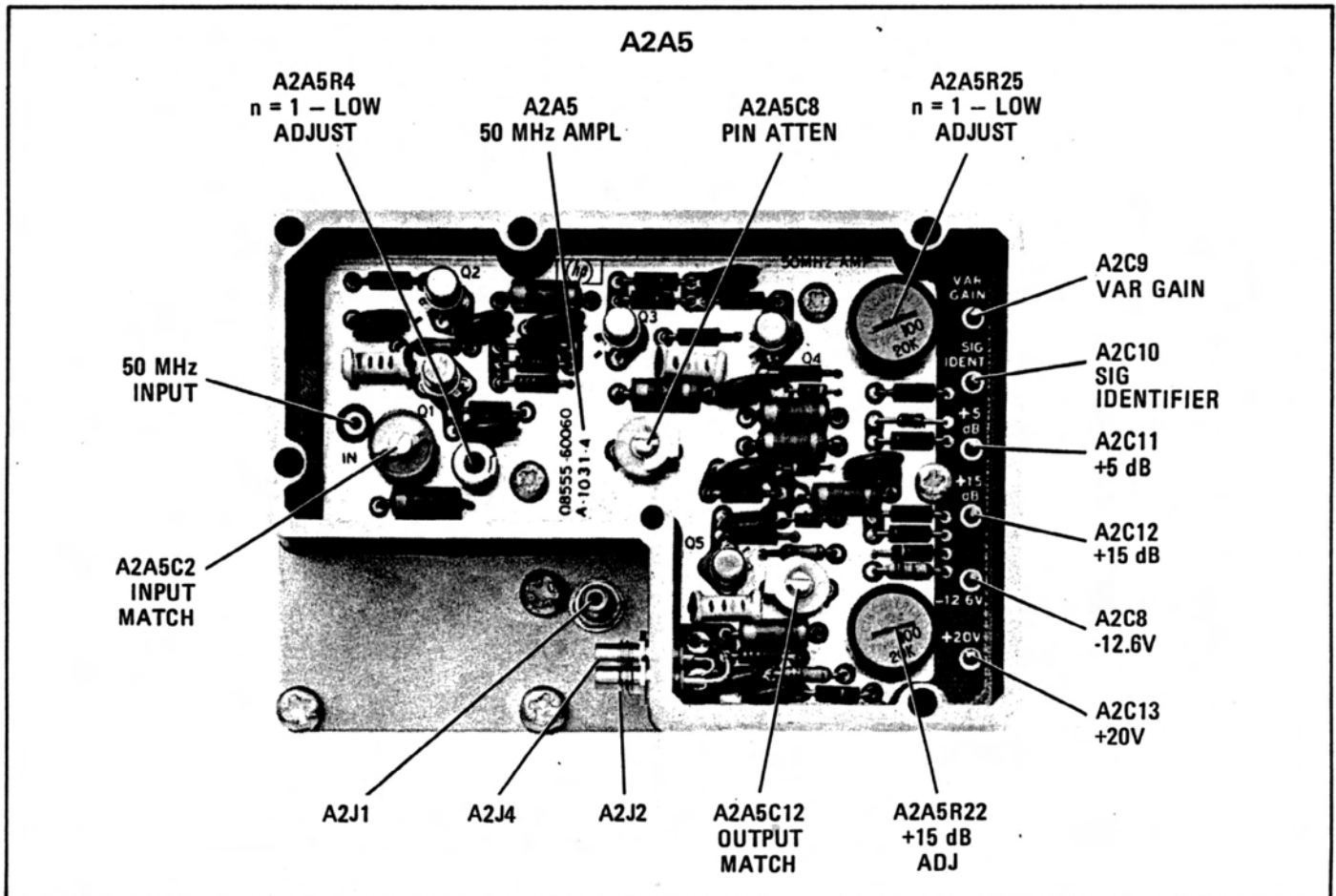
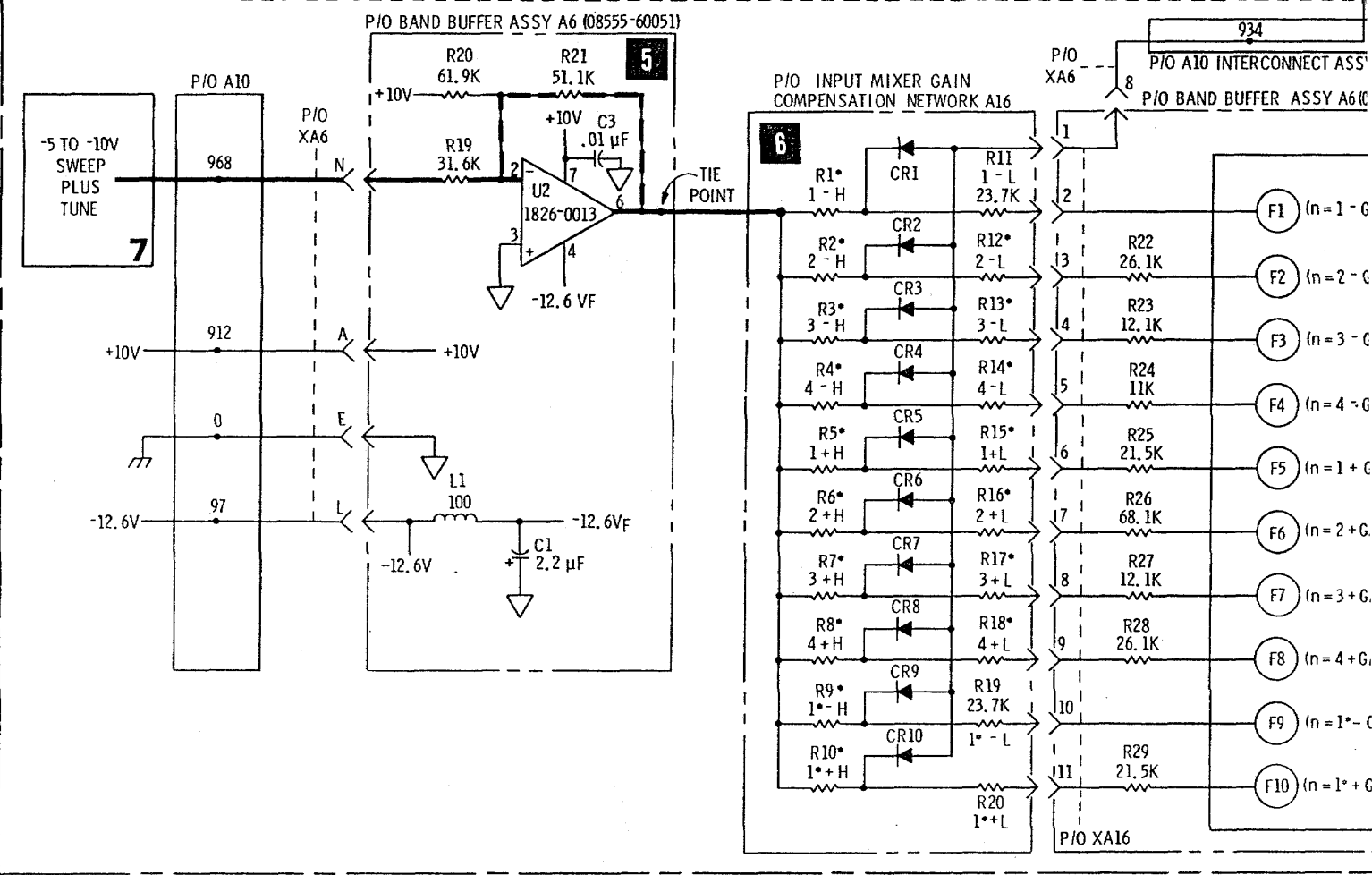
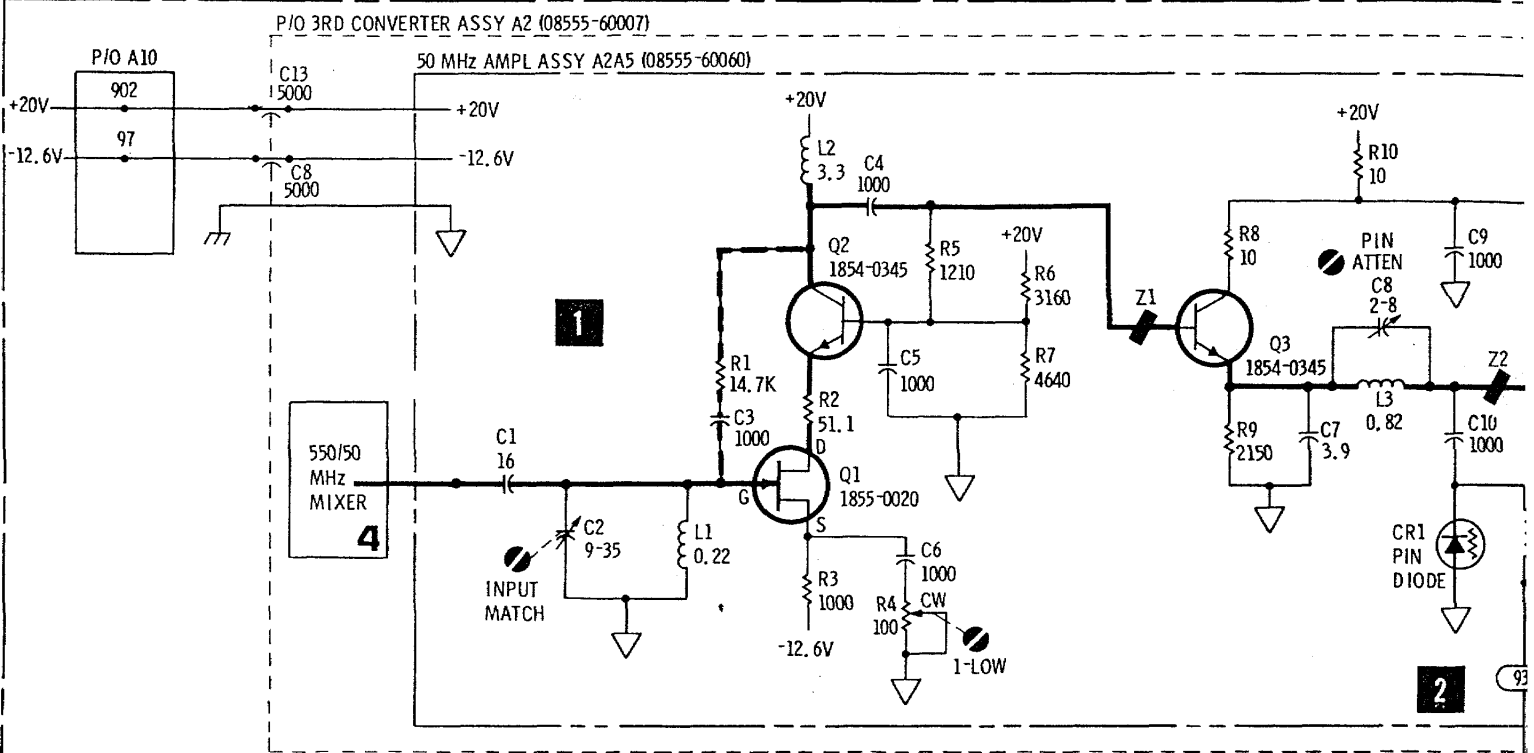
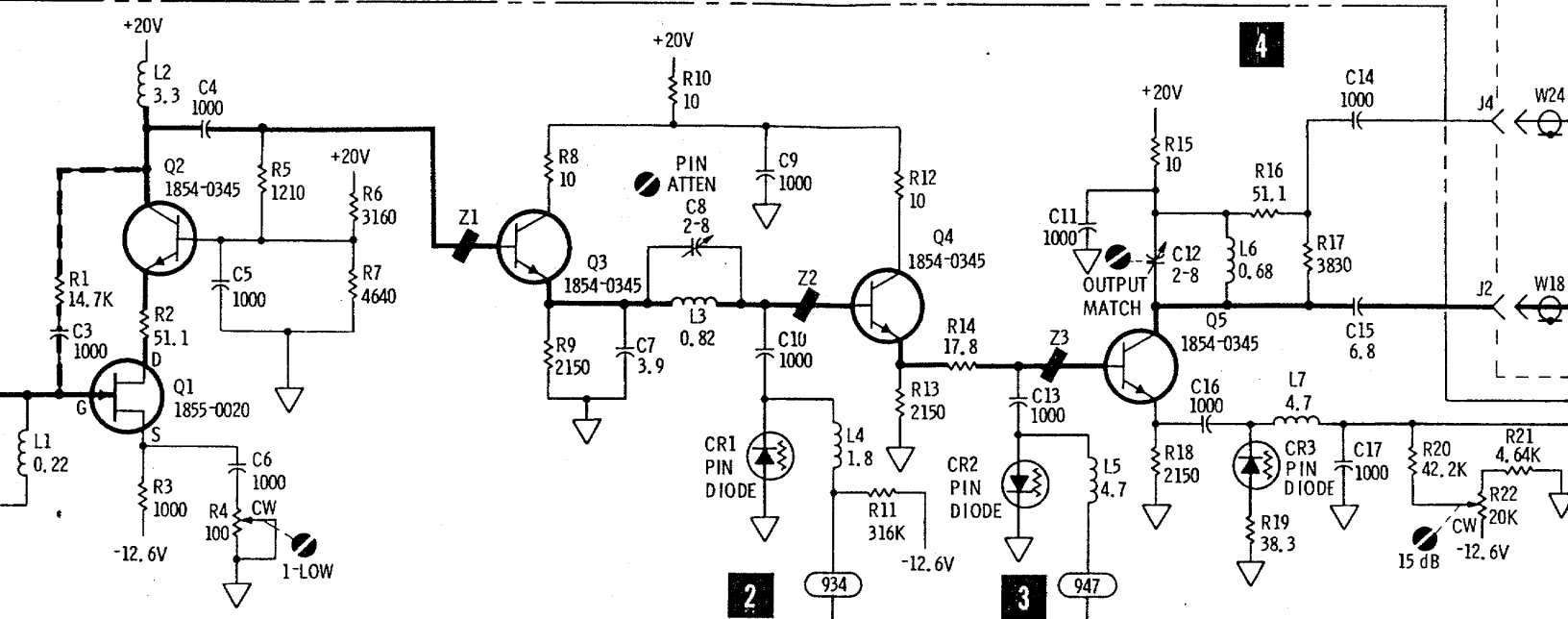


Figure 8-33. 50 MHz Ampl. in Third Converter Casting

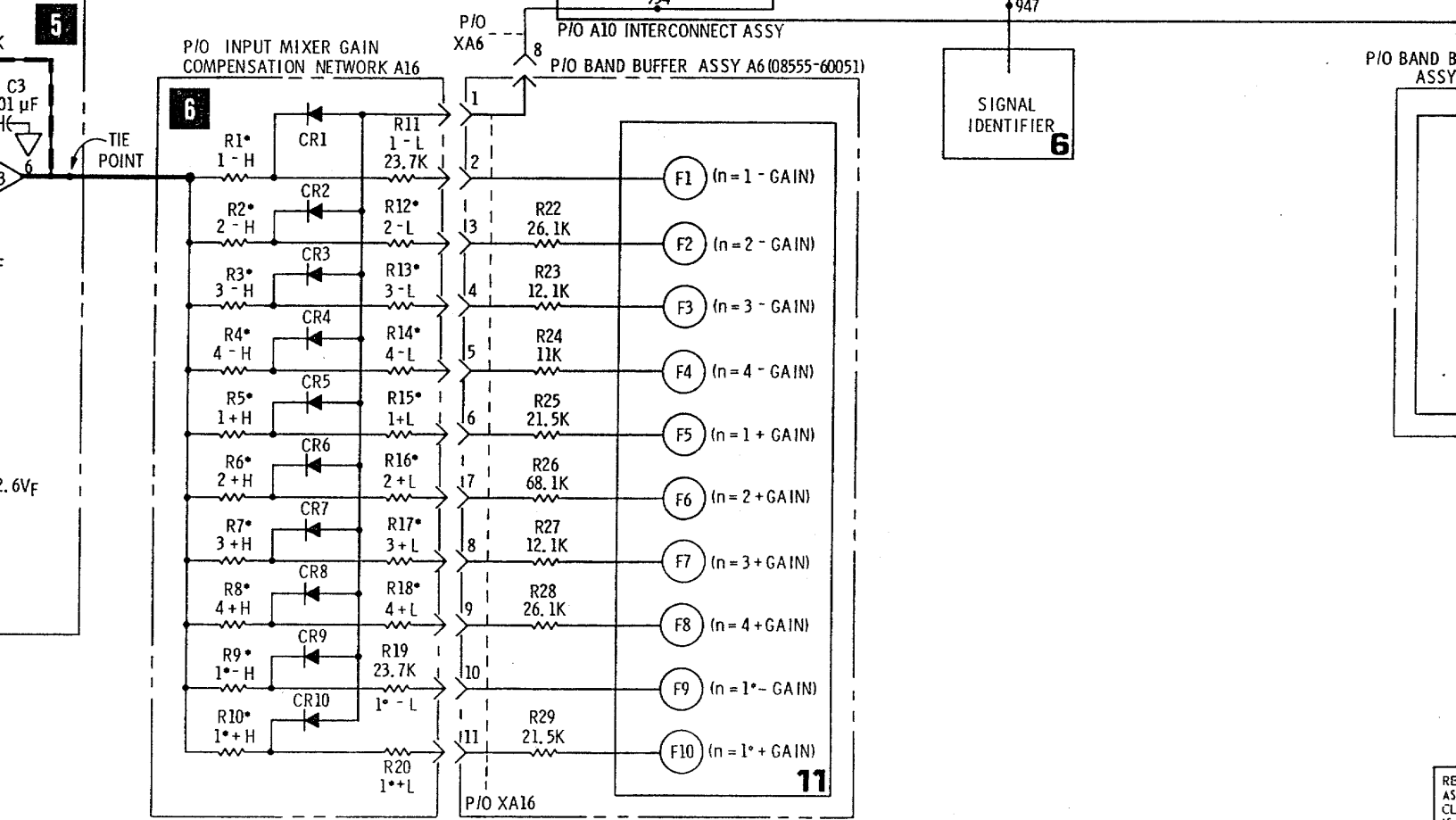
P/O 8555A RF SECTION



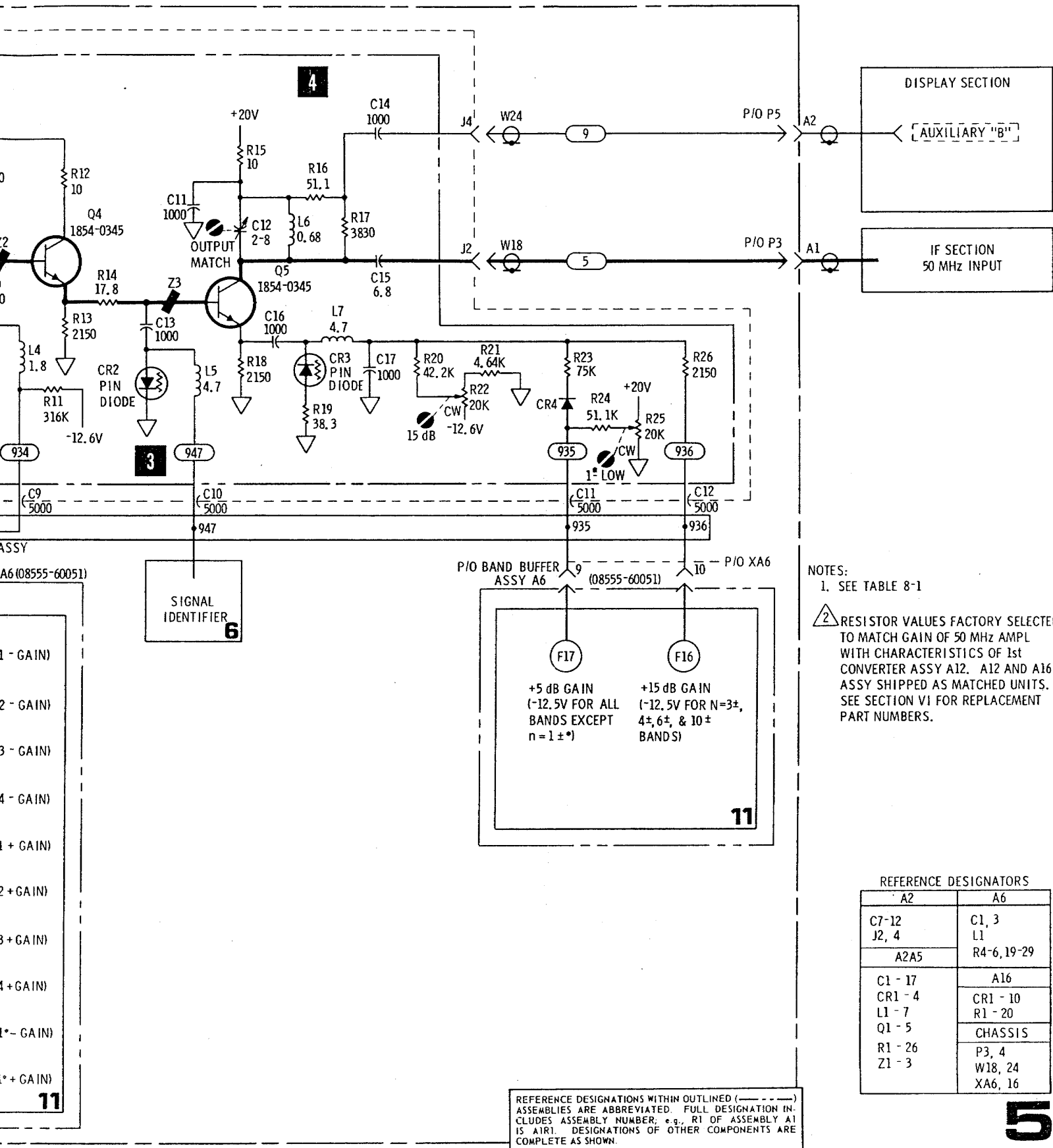
8555-60060)



8555-60051)



Fig



- NOTES:
- SEE TABLE 8-1
 - RESISTOR VALUES FACTORY SELECTED TO MATCH GAIN OF 50 MHz AMPL WITH CHARACTERISTICS OF 1st CONVERTER ASSY A12. A12 AND A16 ASSY SHIPPED AS MATCHED UNITS. SEE SECTION VI FOR REPLACEMENT PART NUMBERS.

REFERENCE DESIGNATORS

| A2 | A6 |
|---|--|
| C7-12 J2, 4 | C1, 3 L1 |
| A2A5 | R4-6, 19-29 |
| C1 - 17 CR1 - 4 L1 - 7 Q1 - 5 R1 - 26 Z1 - 3 | A16 CR1 - 10 R1 - 20 CHASSIS P3, 4 W18, 24 XA6, 16 |

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 8-34. 50 MHz Ampl and Input Mixer Gain Comp Network

SERVICE SHEET 6

THEORY OF OPERATION

Service Sheet 6 contains the schematic diagram for the Signal Identifier circuitry. The Signal Identifier provides a method of determining the mixing mode (harmonic number and sign) of the First Converter which is producing a given signal on the CRT display, so that the Frequency Scale can be set to the correct range. The signal identifier circuit is enabled when the SIGNAL IDENTIFIER switch is ON and the SCAN WIDTH PER DIVISION is 1 MHz or less.

The HP 8555A is a harmonic mixing analyzer, with the mixing equation for the first conversion being:

$$F_{sig} = nFLO \pm IF$$

where F_{sig} = signal frequency
 n = harmonic number
 FLO = LO fundamental frequency
 IF = frequency of first IF

The first LO frequency, FLO, has a range of 2.05 to 4.10 GHz. The harmonic number, sign, and the first IF frequency are indicated on the Frequency Scale. The mixing modes are as follows: $n=1-$, $n=1+$ for the 550 MHz IF and $n=1-$, $1+$, $2-$, $2+$, $3-$, $3+$, $4-$, $4+$, $6-$, $6+$, $10-$, and $10+$ for the 2.05 GHz IF. Note: there is no Frequency Scale provided for the $n=5\pm$, $7\pm$, $8\pm$ or $9\pm$ mixing modes.

When an unknown signal is observed on the CRT, its frequency cannot be determined until the mixing mode is known. The mode indicated on the Frequency Scale is not necessarily the mode resulting in the displayed signal. Likewise, the frequency indicated on the dial is not correct unless the mixing mode is correct.

With the Signal Identifier enabled, the displayed signal will be shifted in frequency on alternate scans. The shifted signal is reduced in amplitude by about 5 dB to distinguish it from the unshifted signal. When the Frequency Scale is set to the correct mixing mode for that particular signal, the shifted signal will be two divisions to the left of the unshifted signal.

The Signal Identifier circuit shifts the Third LO, on alternate scans, by an amount equal to twice the setting of the SCAN WIDTH PER DIVISION switch. The direction of shift is determined by the sign of the band range selected. The amount and direction the displayed signal shifts on the CRT will depend on the mixing mode for that signal and the position of the BAND switch. The Signal Identifier functions by checking for the correct observed scan width and the correct direction of shift. With a $n=1$ BAND selected, the SCAN WIDTH PER DIVISION indicates the scan width per division observed on the CRT display for a $n=1$ mode signal. However, a $n=2$ mode signal will have an observed scan width of twice what the SCAN WIDTH PER DIVISION switch indicates as the sweep of the 2nd harmonic is twice that of the fundamental. When the $n=2$ BAND is selected the observed scan width for a $n=2$ mode signal will be correct. The Band Switch controls the $1/n$ attenuator circuit (SS9) which divides the sweep voltage going to the YIG driver assembly by the n number on the Frequency Scale. If the shifted signal is displayed by something other than two divisions, the Frequency Scale is set to the wrong harmonic number for that signal. If the shifted signal is displaced by two divisions, but in the wrong direction, the harmonic number is correct, but the sign is wrong.

I PULSE GENERATOR

Transistors A7Q5 and Q6 function as a pulse generator (see timing diagram below). When the -5 to +5 volt sweep input goes more positive than 0.6 volt Q6 is turned "on" causing Q5 to turn "off". During retrace, when sweep input goes less positive than 0.6 volt, Q6 is turned "off" causing Q5 to turn "on" and a negative-going pulse is applied at the junction of CR1 and CR2. As a result, during each retrace, a negative-going pulse is applied to trigger the bistable switch.

SERVICE SHEET 6 (cont'd)

2 BISTABLE SWITCH

Transistors Q4 and Q7 with their associated components, function as a complementary-symmetry bistable switch. Both transistors are either "on" or both are "off". When the output of one is high, the output of the other is low. The circuit is enabled when the SIGNAL IDENTIFIER switch A1S1 is in the ON position and the SCAN WIDTH PER DIVISION switch A1A2S1 is in the 1 MHz or below positions. The circuit is disabled, by +10 volts being applied to the base of Q4, when the SIGNAL IDENTIFIER switch is in the OFF position or when the SCAN WIDTH PER DIVISION switch is set to 2 MHz or above. When the bistable switch is enabled, the output of the pulse generator alternately triggers the switch. The switch output at the collector of Q7 is applied to the base of Q9. The switch output at the collector of Q4 is applied to the base of Q8 and to the 50 MHz Amplifier (Service Sheet 5). The output to the 50 MHz amplifier attenuates the amplifier gain by approximately 5 dB. As a result the shifted signal on the CRT display is reduced in amplitude.

3 POLARITY SWITCH

Transistors Q8 and Q9 form a polarity switch controlled by the "E" bit band code from the BAND switch A1A4S1. The output polarity switch selects either a 0 to +10 volt or a 0 to -10 volt output on alternate scans. On the n- modes, Q8 is biased "off" from the -100 volt source and Q9 turned "on" on alternate scans by the output from the bistable switch. When one of the n+ modes are selected, the +20 volt "E" bit biases Q9 "off" and allows Q8 to be turned "on" on alternate scans by the bistable switch. The output from the polarity switch is applied through a precision attenuator, on the SCAN WIDTH PER DIVISION switch A1A2S1, to the Third Converter Assy A2.

4 ATTENUATOR

Resistors R1 through R9, mounted on the SCAN WIDTH PER DIVISION switch, form an attenuator. The resistors attenuate the output voltage from the polarity switch to maintain the 3rd LO shift at twice the setting of the SCAN WIDTH PER DIVISION switch as it is reduced from 1 MHz to 2 kHz. Typical voltage levels are given below. These voltages will change to 0 volts on alternate scans.

TROUBLESHOOTING PROCEDURE

Troubleshoot the Signal Identifier, Attenuator Driver and attenuator circuit using the voltage tables and timing diagram.

EQUIPMENT REQUIRED

Oscilloscope HP 180A/1801A/1821A
Digital Voltmeter HP 3440A/3443A
Service Kit HP 08555-60077

| SCAN WIDTH PER DIVISION | n- Modes | n+ Modes |
|----------------------------|----------|----------|
| 1 MHz | +9.93V | -9.93V |
| 0.5 MHz | +5.17V | -5.17V |
| 0.2 MHz | +2.03V | -2.03V |
| 100 kHz | +1.00V | -1.00V |
| 50 kHz | +486mV | -486mV |
| 20 kHz | +193mV | -193mV |
| 10 kHz | + 97mV | - 97mV |
| 5 kHz | + 49mV | - 49mV |
| 2 kHz | + 19.6mV | - 19.6mV |

A2A5, A6, A16

50 MHz Ampl and Input Mixer Gain Comp Network

◀ SERVICE SHEET 5

SERVICE SHEET 6 (cont'd)

A7 Signal Identifier Voltage Measurements

Conditions: SIGNAL IDENTIFIER OFF, SCAN WIDTH ZERO, n=1- BAND, typical voltage levels.

| Test Point | Voltage |
|------------|------------|
| TP1 | +10.0 Vdc |
| TP5 | -0.76 Vdc |
| TP6 | 0 Vdc |
| TP7 | 0 Vdc |
| A7Q4b | +10.0 Vdc |
| A7Q4c | -0.76 Vdc |
| A7Q5c | 0 Vdc |
| A7Q6c | +0.60 Vdc |
| A7Q7b | -0.35 Vdc |
| A7Q7c | +10.0 Vdc |
| A7Q8b | -10.48 Vdc |
| A7Q9b | + 9.8 Vdc |
| A7Q8b* | -10.42 Vdc |
| A7Q9b* | +10.5 Vdc |

*n=1 + BAND

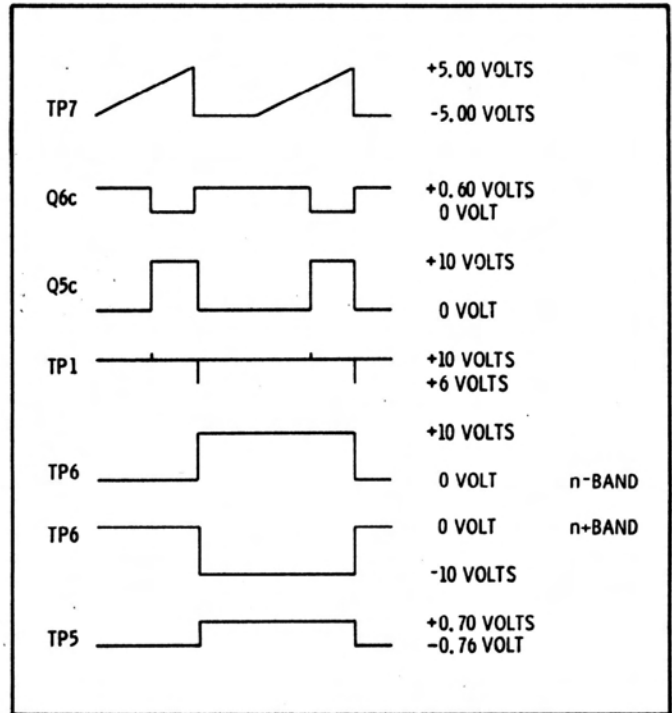


Figure 8-35. Signal Identifier Timing Diagram

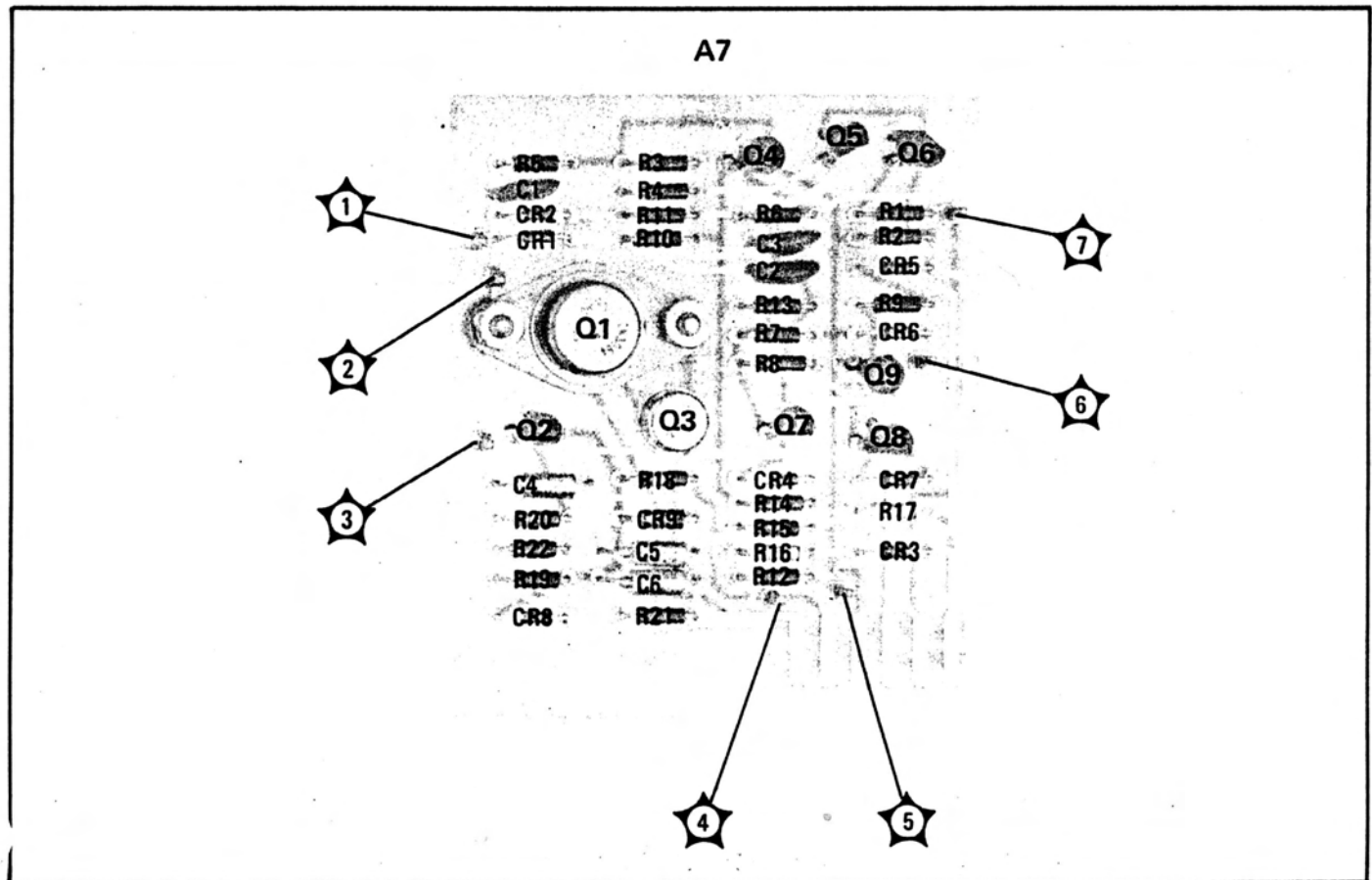


Figure 8-36. Signal Identifier and Attenuator Driver Assembly A7

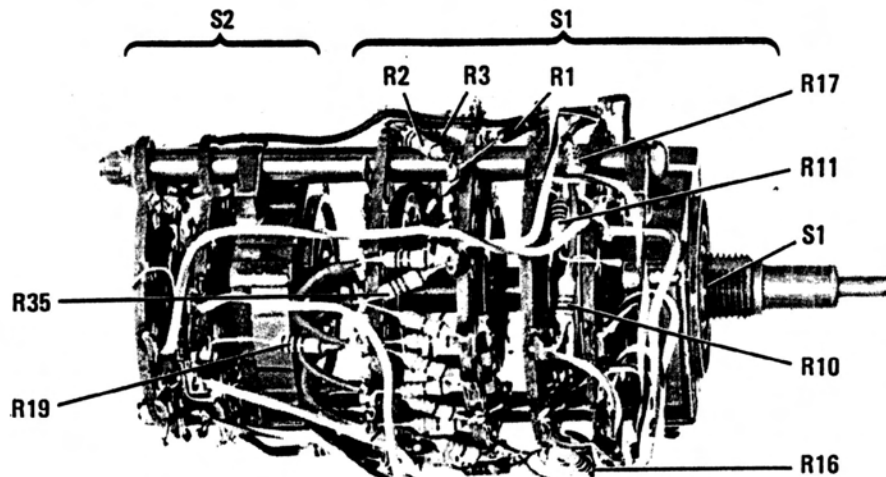
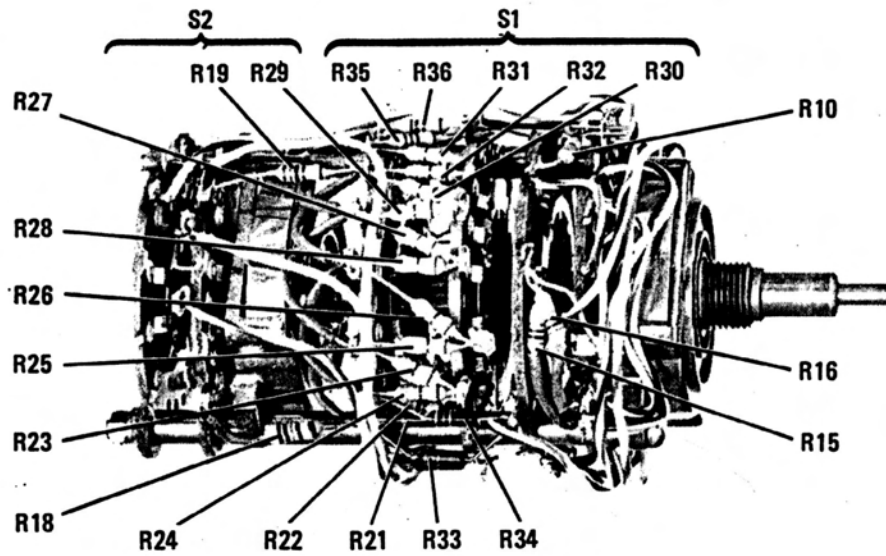
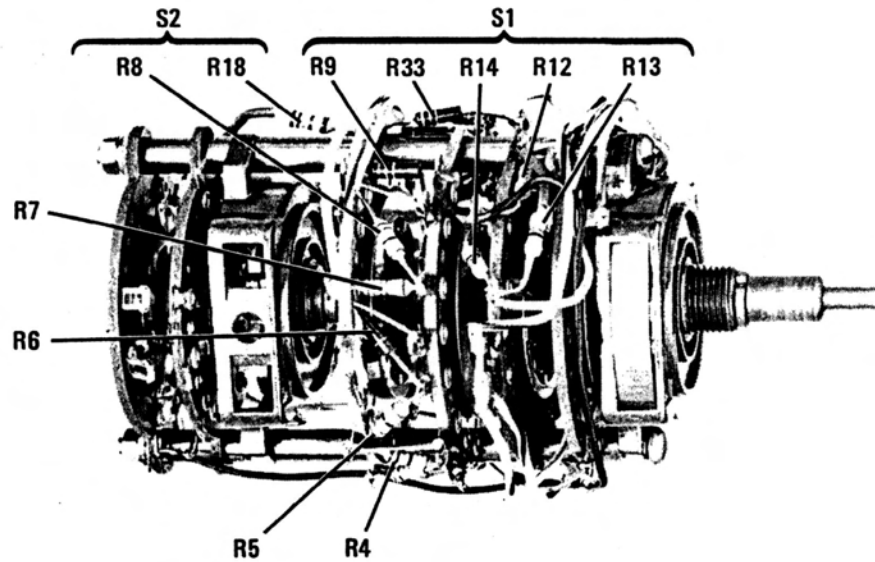
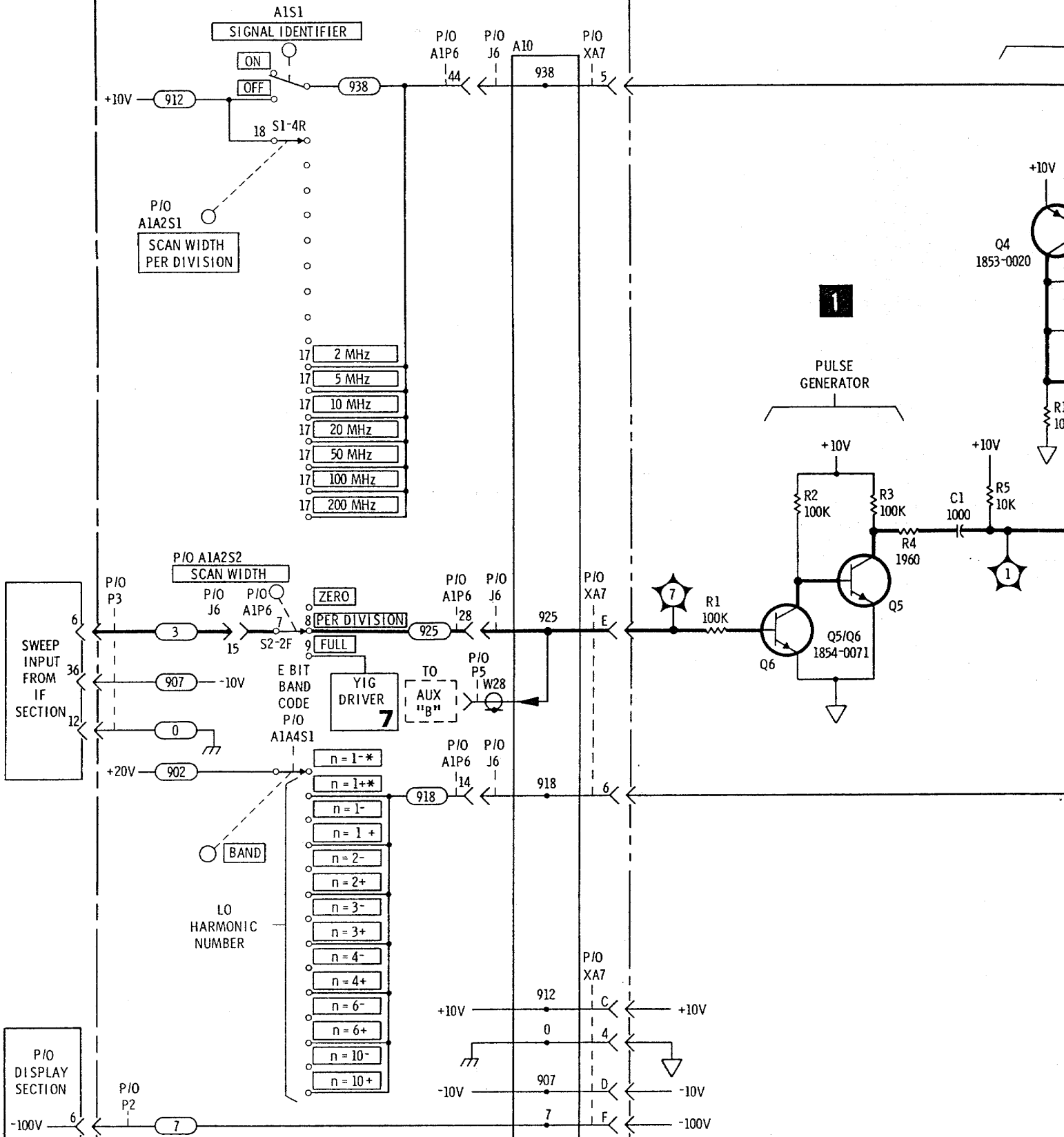


Figure 8-37. Scan Width Switch Assembly A1A2

P/O 8555A RF SECTION

P/O SIGNAL IDENTIFIER AND ATTENUATOR DRIVER ASSY A7 (08555-6054)

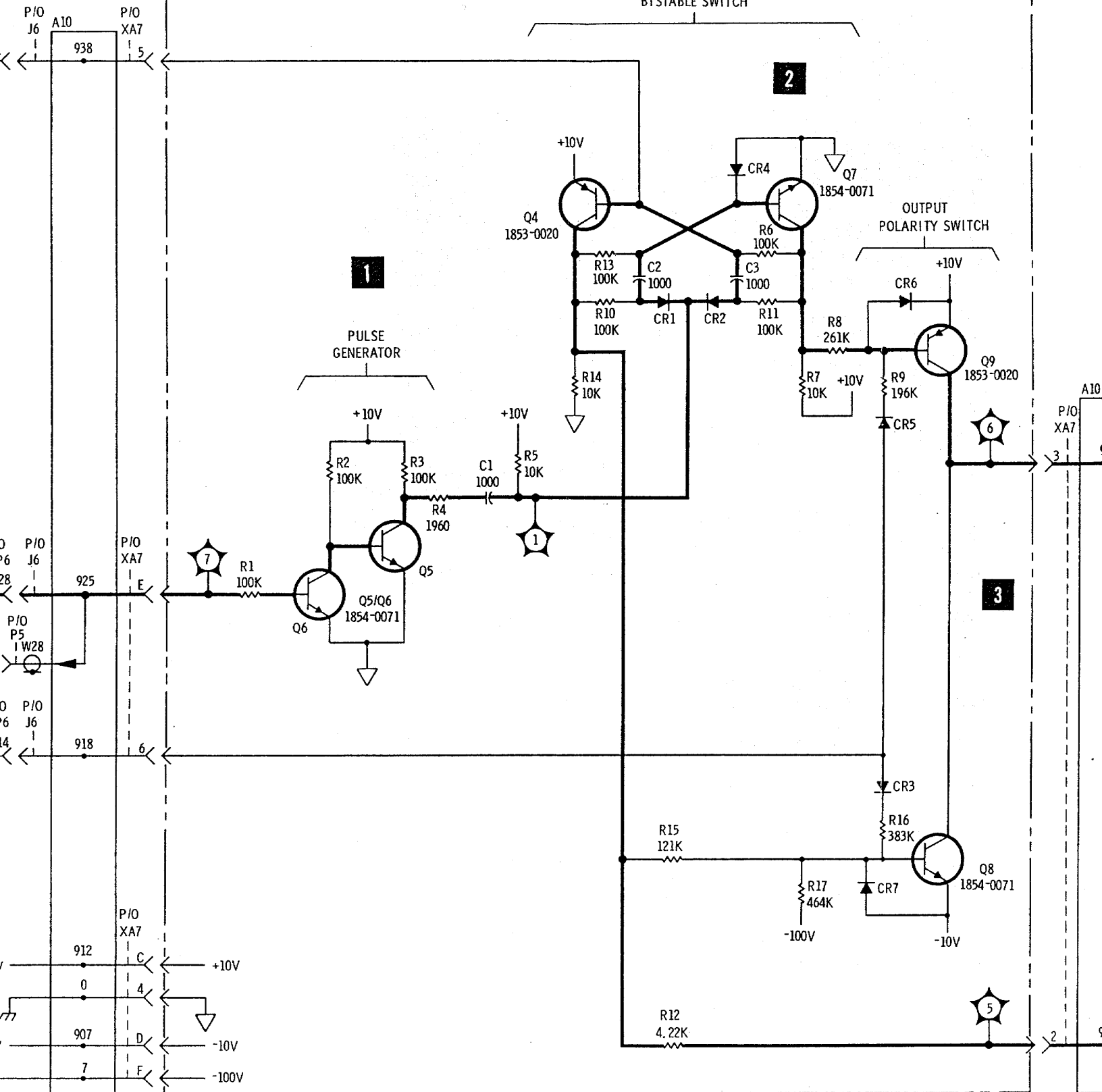


REFERENCE DESIGNATIONS WITHIN OUTLINED (---) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

SERIAL PREFIX 1043A

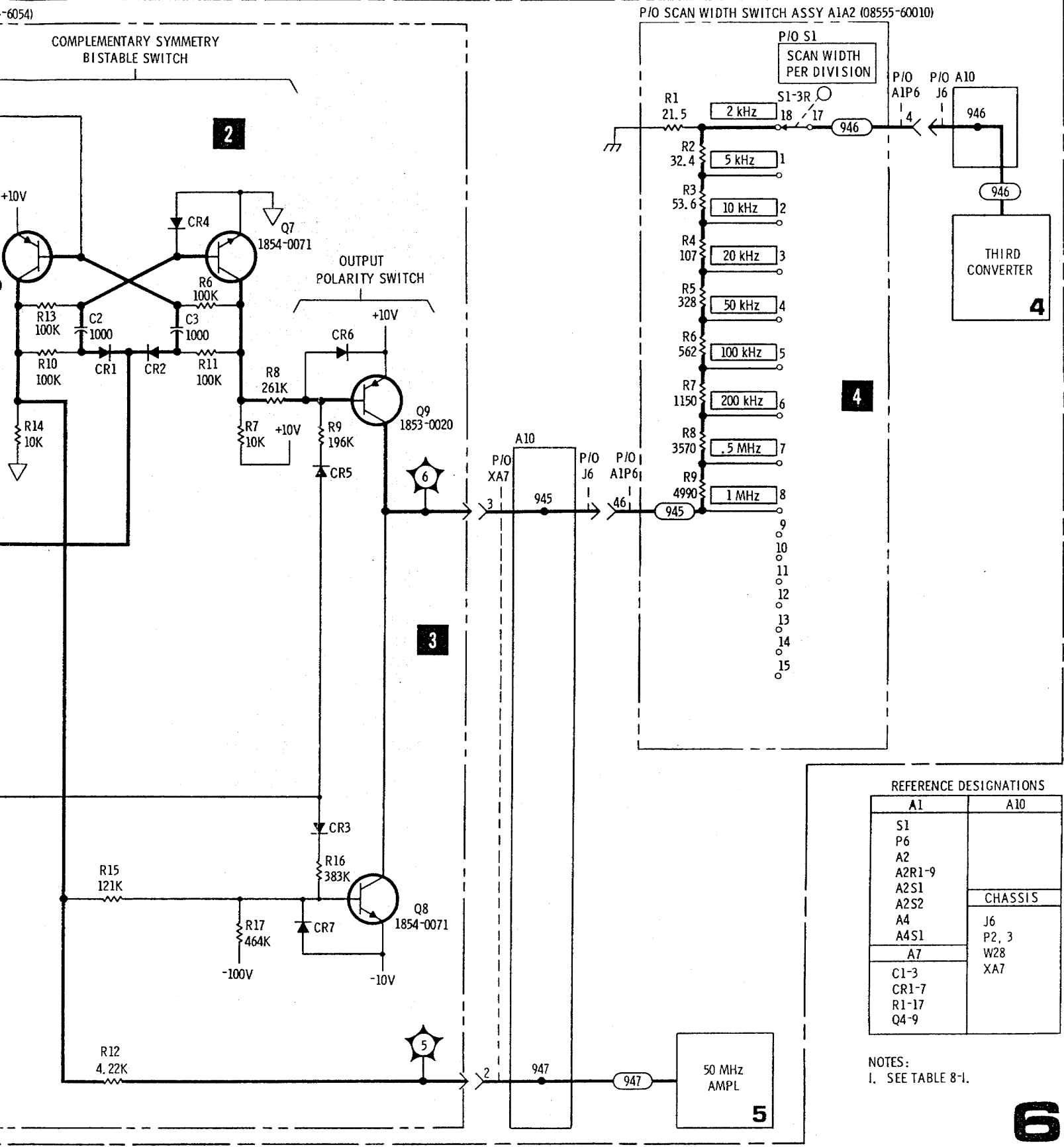
P/O SIGNAL IDENTIFIER AND ATTENUATOR DRIVER ASSY A7 (08555-6054)

COMPLEMENTARY SYMMETRY
BISTABLE SWITCH



ION IN-
BLY A1
TS ARE

-6054)



6

Figure 8-38. Signal Identifier

SERVICE SHEET 7

THEORY OF OPERATION

Service Sheet 7 contains the schematic diagram for the YIG Driver Assembly A4 and the associated sections of the Scan Switch A1A2S2. The YIG oscillator, which is the 1st LO, is tuned over the frequency range of 2.05 to 4.10 GHz by the YIG driver assembly. Tuning is accomplished by the drive controlling the current in the main coil of the YIG oscillator.

For ZERO SCAN WIDTH and SCAN WIDTH PER DIVISION of less than 1 MHz, only the voltage from the FREQUENCY control determines the current in the main coil. For these narrow scan widths, sweep is added to the FINE TUNE voltage to control the current in the tickler coil of the YIG oscillator (see Service Sheet 9). For SCAN WIDTH PER DIVISION of 1 MHz and above, sweep is added to the FREQUENCY control voltage to control the current in the YIG oscillator main coil.

In the FULL SCAN WIDTH mode, an offset sweep voltage controls the current to sweep the YIG oscillator from 2.05 to 4.05 GHz. Also, in the FULL SCAN WIDTH mode, a frequency marker signal is generated and supplied to the IF Section. This signal results in an inverted vee marker appearing on the CRT display at the frequency to which the FREQUENCY control is set.

A precise voltage, in the range of -5.00 to -10.00 volts, that is representative of the YIG oscillator frequency is supplied to the 50 MHz Gain Control circuitry (Service Sheet 5) and is also provided for use by external equipment (Service Sheet 16).

1 -31 VOLT POWER SUPPLY

Breakdown diode A4CR4 provides the reference voltage for the supply, with current obtained from the -100V supply through resistor R34. The reference voltage is filtered at the base of Q2 by R36 and C3. Transistors Q2 and Q3 are connected in a bootstrap pair configuration with Q2 providing the control and Q3 carrying most of the current load. The transistor pair functions like a single high current, high voltage PNP transistor with high beta. The emitter voltage of Q2, and the supply output, will be 0.6 volt more positive than the voltage at the base of Q2.

Current limiting is provided by CR5 and R42, and will occur for a current which produces about a 2.9 volt drop across R42. Any further increase in current and voltage drop across R42 would reduce the base-emitter bias of Q3; as the base is prevented from going any more positive by CR5. This reduces the conduction of Q3 which will prevent the current from increasing. Breakdown diode CR8 provides overvoltage protection for the circuits powered from the -31 volt supply. CR8 is normally turned off, but a failure in the supply causing a high voltage will cause the diode to conduct and prevent the output voltage from rising above approximately -34.8 volts. In limiting the voltage, excessive current will probably destroy the diode (short) and the -100 volt fuse in the Display Section.

2 TUNE CONTROL POWER SUPPLY

Operational Amplifier A4U6 is connected as a negative feedback regulating power supply. The supply provides two voltage levels, approximately -7.1 and -15.2 volts, to the FREQUENCY control potentiometer. These levels give the control a tuning range of -7.5 to -15 volts. In the power supply circuit, CR1 driven by the output voltage, sets the reference level at the non-inverting input of U6. Negative feedback, from the divider stick R1, R2 and R3, is applied to the inverting input of U6. The power supply output voltage at TP 7 is

SERVICE SHEET 7 (cont'd)

controlled by R2. (Note: the -5 volt adj and -10 volt adj associated with R2 and R5 refer to voltage levels measured at TP 2, *not* at TP7.) R5 sets the voltage level at the opposite end of the potentiometer from the -15.2 volt supply end. R7 reduces the interaction of the -5 volt adjustment (R5) on the -10 volt adjustment (R2). In some instruments a factory-selected resistor is added across one side of the FREQUENCY potentiometer A1A4R1. This resistor (A1A4R4) is selected to improve the linearity of the FREQUENCY potentiometer. (See YIG Driver Adjustment Procedure in Section V.)

3 SWEEP PLUS TUNE AMPLIFIERS AND CONTROL

Operational amplifier U7 provides unity gain buffering of the tune voltage from the wiper arm of the FREQUENCY control. Filtering of this tune voltage is provided by C1 and R10. The output of the tune buffer U7 is reduced by one-third by R20 and R21 and applied to the unity gain Sweep Plus Tune Amplifier U4. In both FULL and ZERO scan modes, and for PER DIVISION scans of less than 1 MHz, only tuning voltage is applied to U4. In the PER DIVISION and FULL scan modes, Sweep Buffer U5 inverts the input scan ramp and provides a gain of 1.463. In the PER DIVISION mode, the output from U5 is reduced by two-thirds and combined with the tuning voltage in summing resistors R20 and R21 and applied to U4. In the PER DIVISION and ZERO scan modes the output from the Sweep Plus Tune Amplifier U4 is applied to the YIG Driver Amplifier U1. In PER DIVISION scan of less than 1 MHz PER DIVISION and in ZERO scan mode there is no input to Sweep Buffer U5. (See Service Sheet 12.) (The sweep ramp for narrow scan widths is combined with the FINE TUNE voltage and applied to the YIG oscillator tickler coil, Service Sheet 9.) To maintain SCAN WIDTH PER DIVISION calibration on harmonic mixing modes, the sweep ramp from the IF Section is attenuated by the 1/n attenuator before going to the scan attenuator. (See Service Sheet 8.) In FULL scan mode, the output of the Sweep Buffer U5 is reduced by two-thirds and offset by R24, R25 and R26 and applied to the unity gain full scan sweep offset amplifier U3. The output of amplifier U3 is a negative going ramp of -5.000 to -9.878 volts. This ramp is applied to the YIG driver U1.

4 YIG DRIVER

The YIG driver consists of operational amplifier U1, transistors Q1, Q4 and their associated components. The input voltage to the YIG driver is a precise voltage with a level dependent on the mode of operation. In ZERO scan mode the level is between -5.000 and -10.000 volts with the level determined by the position of the FREQUENCY control (for a YIG oscillator frequency of 2.05 to 4.10 GHz). In the PER DIVISION scan mode (SCAN WIDTH PER DIVISION of 1 MHz and above) the sweep ramp from the Scan Attenuator, which has a maximum peak-to-peak level of 4.85 volts, is summed with the FREQUENCY control voltage level which has a level of -5.000 to -10.000 volts. In FULL scan mode only the -5.000 to -9.878 volt sweep ramp is applied to the YIG driver. The Sweep-Plus-Tune voltage is also applied to the Marker Generator, the 50 MHz Gain Control circuitry, and to a connector on the rear panel of the Display Section for use by external equipment. Adjustments in the YIG driver circuit correct for variations in current sensitivity of the YIG coil from unit to unit. Transistors Q1 and Q4 are connected in a darlington configuration and provide the current to drive the YIG coil. Current in the YIG coil is sensed at resistor R39 and applied as a negative feedback voltage to U1. The 4.1 GHz adjustment R28 is set to provide a YIG frequency of 4.1 GHz with -10.000 volts at TP2 and the 2.05 GHz adjustment R29 is set to provide a YIG frequency of 2.05 GHz with -5.000 volts at TP2. The circuit is arranged such that the 2.05 GHz adjustment will have little effect on the 4.10 GHz adjustment. (Refer to YIG Driver Adjustment Procedure in Section V.) C2 is a

SERVICE SHEET 7 (cont'd)

noise filter, switched in for SCAN WIDTH PER DIVISION of less than 1 MHz, when the main YIG coil is not being swept. Diodes CR2 and CR3 provide fly-back voltage limiting for transistors Q1 and Q2.

5 MARKER GENERATOR

In FULL scan mode, the marker generator is enabled and an inverted vee marker appears on the CRT at a position corresponding to the frequency to which the FREQUENCY control is set. The marker generator circuit compares the tune voltage from the FREQUENCY control with the FULL scan ramp. When the two voltages are equal, a negative-going marker signal is generated and applied to the deflection amplifier in the IF Section. A4U2 is an integrated circuit transistor array with five transistors, U2A through U2E. U2A and U2B are connected as diodes. U2D and U2E function as a comparator circuit with R15 providing a constant current source. When the input voltages to the bases of transistors U2D and U2E are not equal one transistor will be "on" while the other will be "off". The voltage at the collector of the "off" transistor will bias U2C "on" through either U2A or U2B. When the input voltages are equal, both transistors conduct, no current will flow through U2A or U2B resulting in U2C biased "off." This causes a negative pulse to be generated at TP 4.

6 47 MHz LO CONTROL

Resistors A4R18 and R19 form a resistive voltage divider for the 47 MHz LO in the IF Section. This voltage sets the 47 MHz LO to a fixed frequency. (See IF Section Operating and Service Manual.)

TROUBLESHOOTING PROCEDURE

When troubleshooting the YIG Driver Assembly A4, use the analyzer's operating controls and display to assist in isolating the malfunction to a functional circuit. If there is no output from the YIG oscillator, check the voltage at A4TP3 for a level of -31 ± 1.5 volts. If there is an output from the YIG oscillator, compare the display produced in FULL scan with the display produced in 200 MHz PER DIVISION scan. There should be no difference in the CRT display other than the frequency marker in the FULL scan mode. See Paragraph 8-41 for operational amplifier troubleshooting procedures.

EQUIPMENT REQUIRED

| | |
|------------------------------------|---------------------|
| Digital Voltmeter | HP 3440A/3443A |
| Oscilloscope | HP 180A/1801A/1821A |
| Frequency Comb Generator | HP 8406A |
| Service Kit | 08555-60077 |

Install the YIG Driver Assembly A4 on an extender board and check the -31 volt supply at test point A4TP3. If the output is correct, perform the YIG Driver Test Point Voltage Measurements listed below. Use Transistor Voltage Measurements to check Q1-Q4 and the transistors in U2. When the malfunction has been isolated and corrected, perform YIG Driver Adjustments (see Section V).

SERVICE SHEET 7 (cont'd)

A4 YIG Driver Transistor Voltage Measurements:

Conditions: n=1- Band, SCAN WIDTH ZERO, FREQUENCY 1 GHz; unit of measurement, Vdc.

| | Emitter | Base | Collector |
|-------|---------|--------|-----------|
| A4Q1 | -11.0 | -11.6 | -28.0 |
| A4Q2 | -31.0 | -31.6 | -67.0 |
| A4Q3 | -98.2 | -97.8 | -31.0 |
| A4Q4 | -10.5 | -11.0 | -28.0 |
| A4U2A | - 0.40 | - 0.55 | - 0.55 |
| A4U2B | - 0.40 | - 0.55 | - 0.55 |
| A4U2C | - 0.92 | - 0.40 | + 1.82 |
| A4U2D | - 8.1 | - 7.5 | - 0.55 |
| A4U2E | - 8.1 | - 7.5 | - 0.55 |

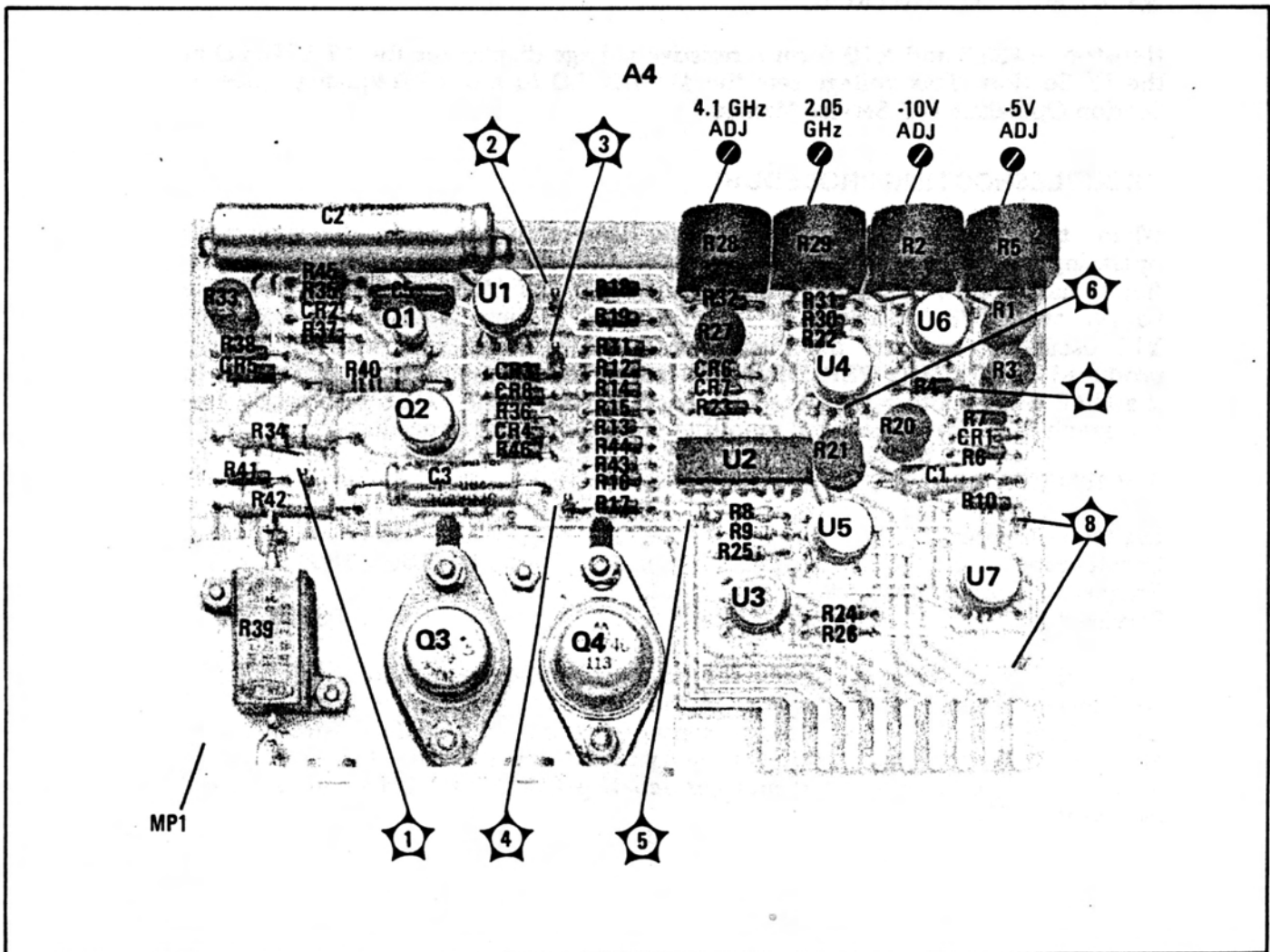


Figure 8-39. YIG Driver Assembly A4

A4 Yig Driver Test Point Voltage Measurements:

Conditions: n=1- Band, SCAN WIDTH and FREQUENCY as specified; unit of measurement, Vdc unless otherwise specified.

| Test Point | Voltage | Remarks |
|------------|--|--|
| A4TP | - 7.0 Vdc -10.5 Vdc -14.0 Vdc 7V inverted ramp centered on -10.5 Vdc | 0 GHz, ZERO SCAN WIDTH 1 GHz, ZERO SCAN WIDTH 2 GHz, ZERO SCAN WIDTH FULL SCAN or 200 MHz PER DIVISION with FREQUENCY control at 1 GHz. |
| A4TP2 | -5.00 Vdc -7.44 Vdc -9.88 Vdc 7.85V inverted ramp centered on -7.44 Vdc | 0 GHz, ZERO SCAN WIDTH 1 GHz, ZERO SCAN WIDTH 2 GHz, ZERO SCAN WIDTH FULL SCAN or 200 MHz PER DIVISION with FREQUENCY control at 1 GHz. |
| A4TP3 | -31.0 Vdc | ±1.5V |
| A4TP4 | 0 | ZERO or PER DIVISION |

| Test Point | Voltage | Remarks |
|------------|---|--|
| A4TP4 | -0.2 Vdc w/ -2V pulses | FULL SCAN WIDTH |
| A4TP5 | Ramp -5.0 to +5.0 Vdc 0 | PER DIVISION or FULL SCAN ZERO SCAN WIDTH |
| A4TP6 | -5.00 Vdc -7.44 Vdc -9.44 Vdc 4.85V Vdc inverted ramp centered on -7.44 Vdc 0V | 0 GHz, ZERO SCAN WIDTH 1 GHz, ZERO SCAN WIDTH 2 GHz, ZERO SCAN WIDTH 200 MHz PER DIVISION SCAN, FREQUENCY 1 GHz FULL SCAN WIDTH |
| A4TP7 | -15.2 Vdc | |
| A4TP8 | -7.50 Vdc -11.16 Vdc -14.83 Vdc | 0 GHz, ZERO SCAN WIDTH 1 GHz, ZERO SCAN WIDTH 2 GHz, ZERO SCAN WIDTH |

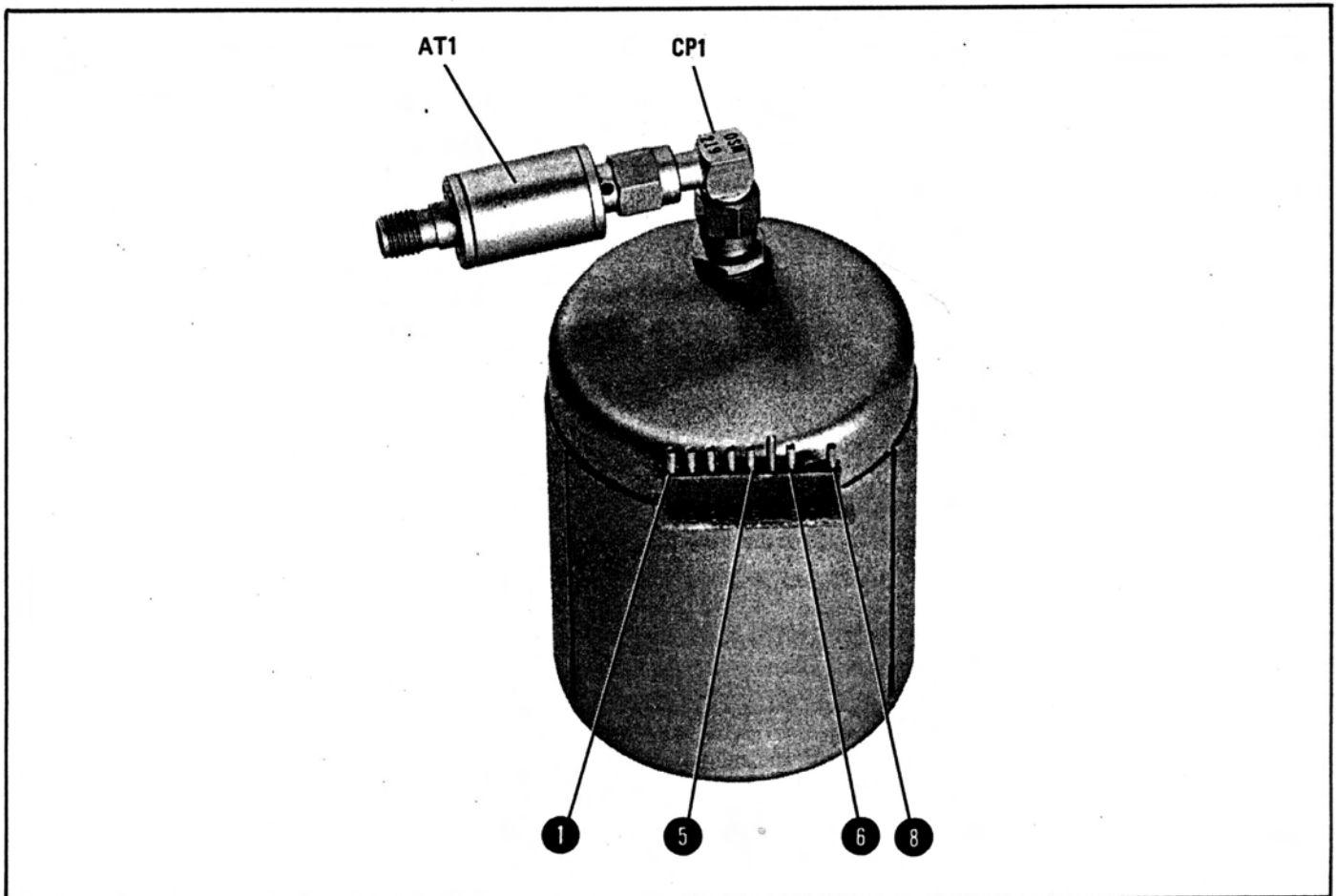
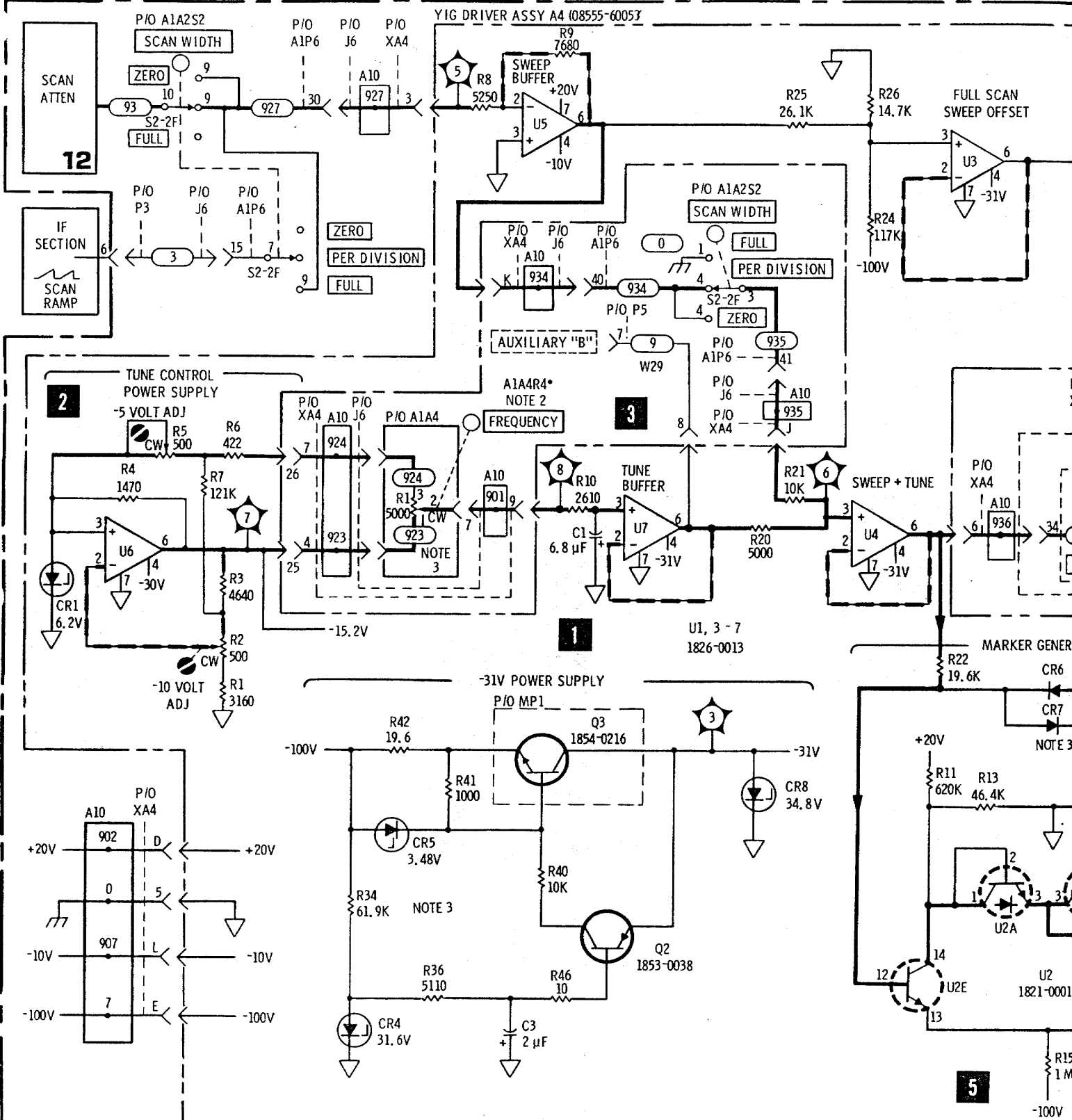
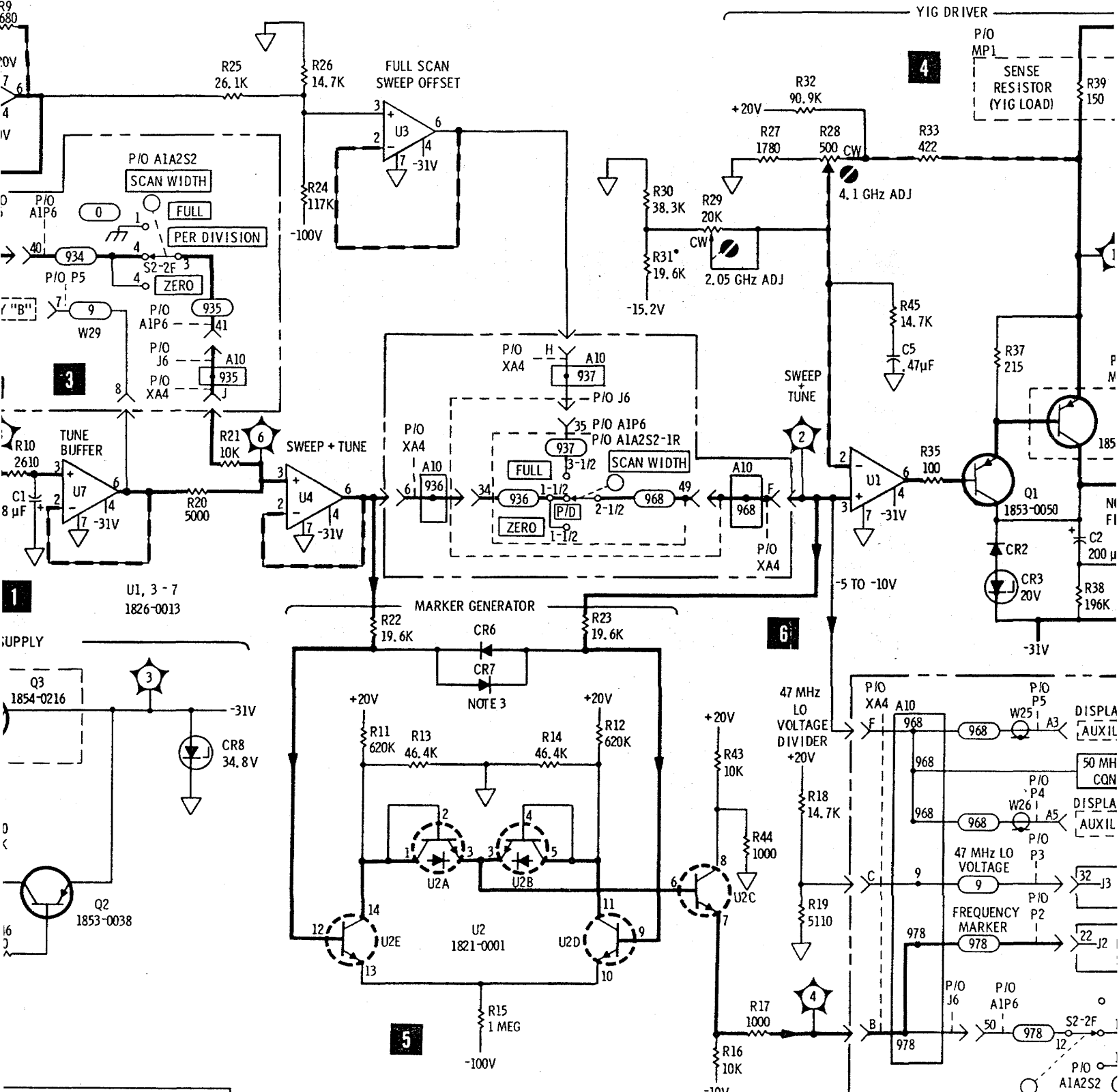


Figure 8-40. YIG Oscillator Assembly A3

P/O 8555A RF SECTION



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.



DESIGNATIONS WITHIN OUTLINED (---) ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1. DESIGNATIONS OF OTHER COMPONENTS ARE SHOWN.

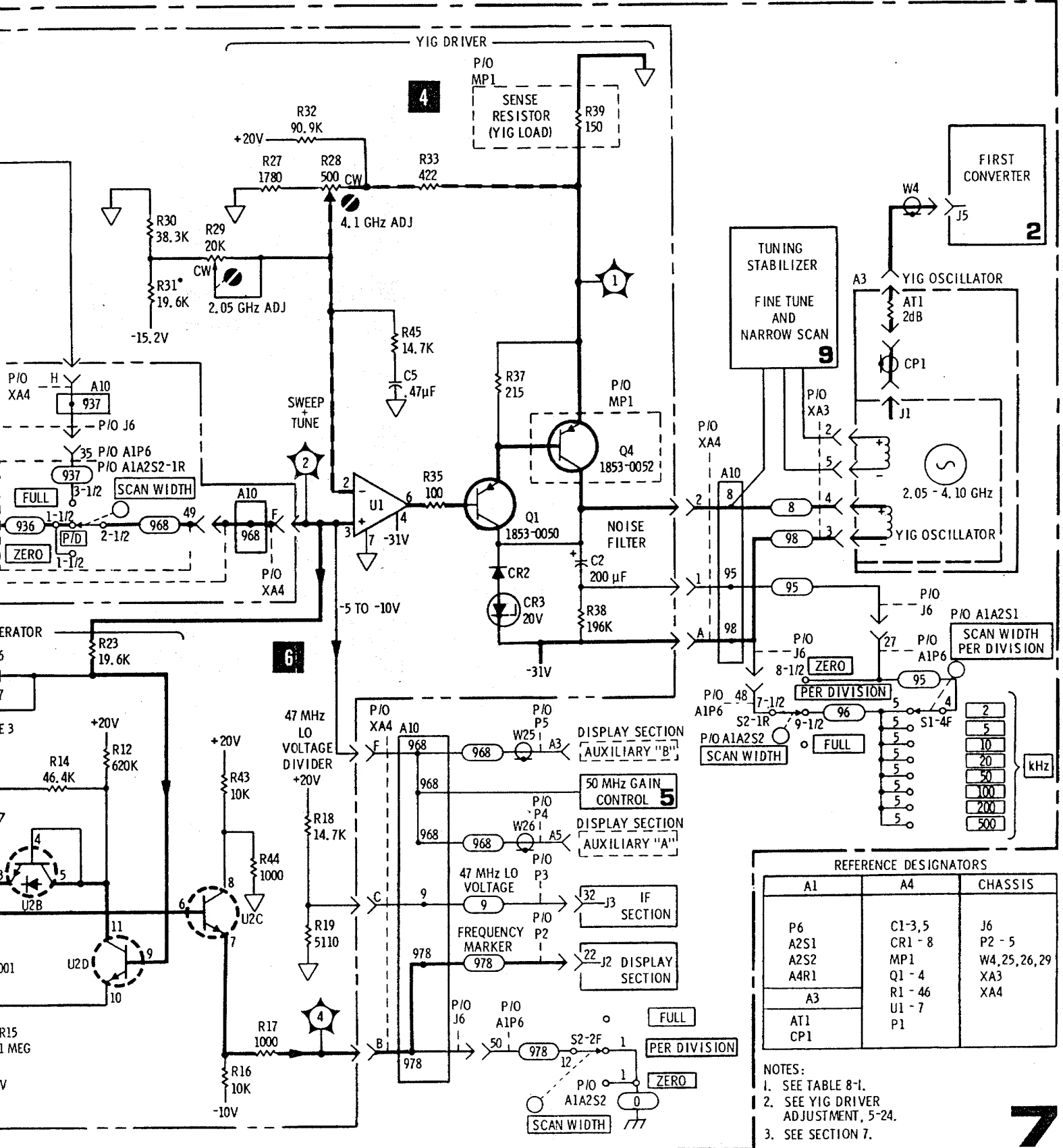


Figure 8-41. YIG Driver and Oscillator

SERVICE SHEET 8

THEORY OF OPERATION

Service Sheet 8 contains the schematic diagram for the tuning stabilizer control generator and for the 1/n sweep attenuator. The control generator provides the time sequence and switching for the tuning stabilizer circuitry. (See Service Sheet 9.) The 1/n attenuator reduces the sweep signal from the IF Section, to maintain scan width calibration on harmonic mixing modes.

1 SWITCH CONTROL

Tuning stabilization is initiated by three series-connected switches supplying +20 volts to the tuning stabilizer control generator. These switches are TUNING STABILIZER switch A1S2, SCAN WIDTH PER DIVISION switch A1A2S1 and SCAN WIDTH switch A1A2S2. The SCAN WIDTH PER DIVISION switch must be in one of the blue color-coded positions (100 kHz or below) and the SCAN WIDTH switch in ZERO or PER DIVISION before the +20 volts can be routed from the TUNING STABILIZER switch to initiate tuning stabilization. This +20 volt source is routed to the VCXO (voltage-controlled crystal oscillator) pulse amplifier (Service Sheet 10) and to the Auxiliary "A" connector P4 pin A6 on the rear panel of the Display Section.

2 CONTROL GENERATOR

The tuning stabilizer circuitry shown on Service Sheet 8 functions as a control generator to provide timing and switching control to FET 1 and FET 2 switches and memory storage relay (Service Sheet 9). In addition, a sweep kill signal is provided to the 1/n attenuator circuit (Service Sheet 8). When the +20 volts is applied to the control generator a series of timing pulses are generated to trigger events necessary to accomplish stabilization lock. These pulses are over in 300 mS. The +20 volts charges A5C8 through A5R18 turning "on" A5Q9 20 msec after the three switches are closed. A5Q9 turns "on" A5Q4 which then charges A5C4 through A5R14, turning "on" A5Q8 200 msec later. This action continues through A5Q7, A5Q6 terminating in A5Q5. The chart below is a timing diagram for control generator. The steps generated at A5Q1 through A5Q5 produce the four functions at the bottom of the chart.

At time T_0 +20 volts is applied to the VCXO pulse amplifier and to the control generator. The +20 volts to the control generator triggers the sweep kill driver A5Q13 and Q14 applying a sweep kill signal (+10 volts) to A6Q5. The sweep kill signal removes the sweep from the YIG oscillator during stabilization cycle.

At time T_1 , A5Q4 is turned "on" supplying a start signal for delay 2 and a turn "off" signal to FET 1 switch driver A5Q11. A5Q11 is turned "off" supplying a negative turn "off" signal to FET 1 switch.

Time T_2 references the end of delay 2 when A5Q8 is turned "on" which in turn triggers A5Q3 "on" to start delay 3 and trigger relay driver A5Q12. A5Q12 is turned "off" removing the ground return for relay A5K1.

Time T_3 references the end of delay 3 when A5Q7 and Q2 are turned "on". When A5Q2 turns "on", FET 1 switch driver is triggered and delay 4 starts. A5Q10 is turned "off" turning A5Q11 "on" and applying a turn "on" signal to FET 1 switch.

Time T_4 references the end of delay 4 when A5Q6 is turned "on". When A5Q6 is turned "on" FET 1 switch driver is triggered to turn FET 1 switch "off" and FET 2 switch driver A5Q1 is triggered "on". When A5Q1 turns "on", FET 2 switch is turned "on" and delay 5 starts.

SERVICE SHEET 8 (cont'd)

Time T_5 references the end of delay 5 when A5Q5 is turned "on". When A5Q5 is turned "on" the sweep kill driver, A5Q13 and Q14 is triggered to remove the sweep kill signal to A6Q5. The control generator timing ends with the removal of the sweep kill signal.

3 1/n ATTENUATOR

The 1/n attenuator circuit attenuates the sweep input from the IF Section to maintain per division sweep calibration on harmonic mixing modes. The attenuator reduces the sweep voltage by the factor of 1/n. For example, on the n=2 bands, the -5 to +5 input sweep voltage is reduced to a -2.5 to +2.5 sweep output voltage. Resistive voltage dividers A6R5, R8, R12 and R16 are selectively shunted to ground by transistor switches A6Q1 through A6Q4. The transistor switches are controlled by the +20 volt band code from the frequency band shaft encoder (see Service Sheet 11).

On the n=1 bands, all switches are off. Band code bit "D" is applied on the n=1 550 MHz IF bands, but has no effect since A6Q4 requires both band code bits "C" and "D" before switching action occurs.

On the n=2 bands, A6Q1 is switched "on".

On the n=3 bands A6Q2 is switched "on." On the n=4 bands both A6Q1 and Q2 are switched "on."

On the n=6 bands A6Q3 is switched "on".

On the n=10 bands both A6Q3 and Q4 are switched "on".

4 SWEEP KILL

When tuning stabilization is initiated a +10-volt signal from the control generator is applied to the sweep kill switch A6Q5. This switch prevents the sweep from driving the YIG oscillator while the tuning stabilizer is accomplishing the steps necessary for stabilization. Sweep is grounded from time T_0 to time T_5 (see timing diagram chart). The output of the 1/n attenuator is applied through operational amplifier A6U1 to the scan attenuator (see Service Sheet 12).

TROUBLESHOOTING PROCEDURE

1 2 CONTROL GENERATOR AND SWITCHING

When a malfunction has been isolated to or to isolate a malfunction in the control generator, perform the following procedure. Remove power from the analyzer and install the Tuning Stabilizer Control Assy A5 on an extender board.

EQUIPMENT REQUIRED

| | |
|-----------------------------|---------------------|
| Digital Voltmeter | HP 3440A/3444A |
| Extender Board | HP 5060-0258 |
| Extender Board | HP 5060-0256 |
| Oscilloscope | HP 180A/1801A/1821A |

Connect digital voltmeter or oscilloscope to XA5-pin 2 on the extender board. Apply power and check switching action of A1S2, A1A2S1 and A1A2S2. When all three switches are closed, the voltage level at pin 2 should shift from approximately -8 to +20 volts. Rotate the SCAN WIDTH PER DIVISION switch through the 100 to 2 kHz positions. The +20 volt level

SERVICE SHEET 8 (cont'd)

should remain steady. The contacts on switch wafer A1A2S1-4R do not break between these positions.

To check for proper operation of the control generator, the voltage waveforms on Figure 8-41 should be observed with an oscilloscope. Set SCAN WIDTH PER DIVISION to 100 kHz; connect oscilloscope to test points indicated in the figure. Trigger the control generator by switching the TUNING STABILIZER "OFF" and then "ON" when checking each waveform. The voltage chart below provides the final (control generator sequence steps completed) transistor voltages for all transistors with the TUNING STABILIZER switch "ON".

3 1/n ATTENUATOR TROUBLESHOOTING

With the test setup as for step 1 above, install Band Buffer Assy A6 on extender board. Connect oscilloscope to A6TP1. Set SCAN WIDTH to PER DIVISION and SCAN TIME PER DIVISION to 1 MILLISECOND. Set SCAN MODE to INT and SCAN TRIGGER to LINE. Adjust oscilloscope for a convenient display. The display should be a sawtooth signal with a ramp of -5 to +5 volts on the n=1 bands. The amplitude should be reduced by 1/n \pm 2% when the bands are switched. Rotate the BAND switch lever from n=1 through n=10 BANDS while noting the attenuation of sweep on each harmonic mixing mode. The transistors should switch "on" in the following sequence:

A6Q1 on n=2 bands, A6Q2 on n=3 bands, A6Q1 and Q2 on n=4 bands, A6Q3 on n=6 bands and A6Q3 and Q4 on n=10 bands.

Check input band code and switching action of any malfunctioning circuit.

4 SWEEP KILL TROUBLESHOOTING

With test setup as in step 3 above, set BAND switch lever to select n=1 BAND 2.05 GHz IF and SCAN WIDTH PER DIVISION to 100 kHz. Switch TUNING STABILIZER "ON". The sweep signal should momentarily go to zero and return (sweep is removed by the sweep kill circuitry during stabilization period, approximately 300 milliseconds).

Final Value Control Generator Voltages

Conditions: SCAN WIDTH 100 kHz PER DIVISION
TUNING STABILIZER ON, Unit of Measurement Vdc
Tolerance +0.1V unless otherwise indicated.

| Test point | Emitter | Base | Collector |
|------------|------------|----------------|-----------------|
| A5Q1 | +10 Supply | +9.35 | +9.9 |
| A5Q2 | +10 Supply | +9.35 | +9.9 |
| A5Q3 | +10 Supply | +9.35 | +9.9 |
| A5Q4 | +10 Supply | +9.35 | +9.9 |
| A5Q5 | Ground | +0.65 | +0.1 |
| A5Q6 | Ground | +0.65 | +0.1 |
| A5Q7 | Ground | +0.65 | +0.1 |
| A5Q8 | Ground | +0.65 | +0.1 |
| A5Q9 | Ground | +0.65 | +0.1 |
| A5Q10 | +10 Supply | +9.4 | +9.9 |
| A5Q11 | +10 Supply | +9.9 | -9.9 |
| A5Q12 | Ground | -0.3 \pm 0.2 | -12.6 \pm 0.3 |
| A5Q13 | +10 Supply | +9.35 | +9.9 |
| A5Q14 | +10 Supply | +9.9 | -9.9 |

A3, A4

YIG Driver and Oscillator

◀ SERVICE SHEET 7

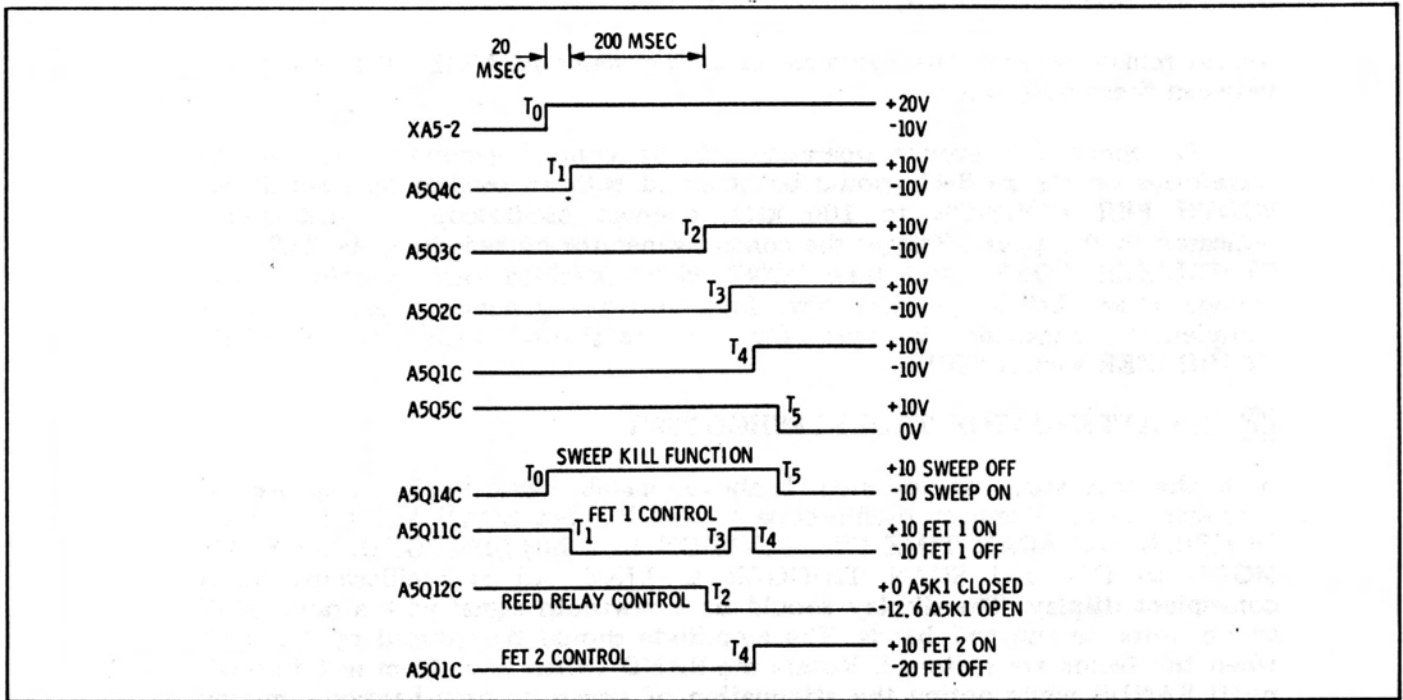


Figure 8-42. Control Generator Timing Diagram

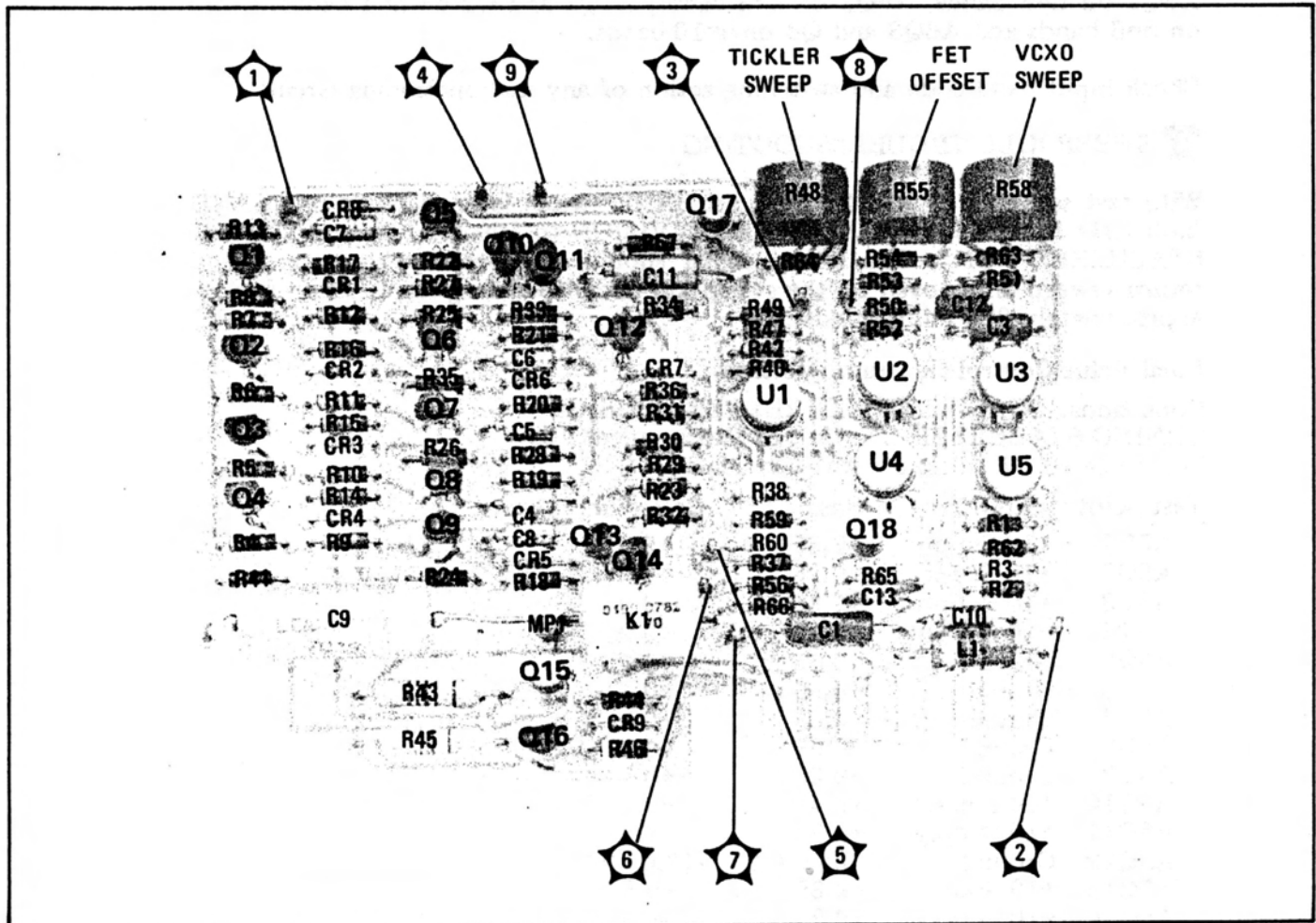


Figure 8-43. Tuning Stabilizer Control Assembly A5

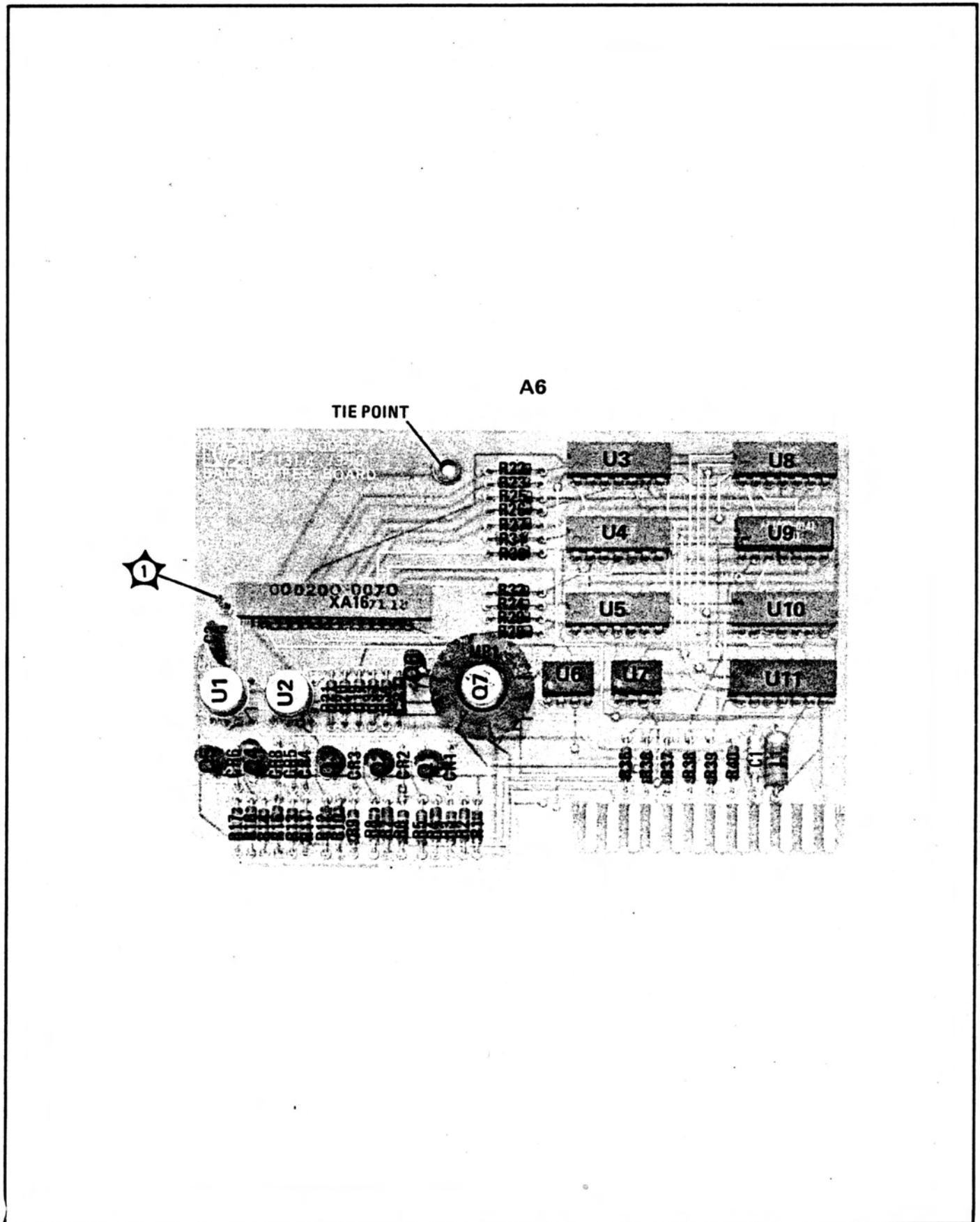
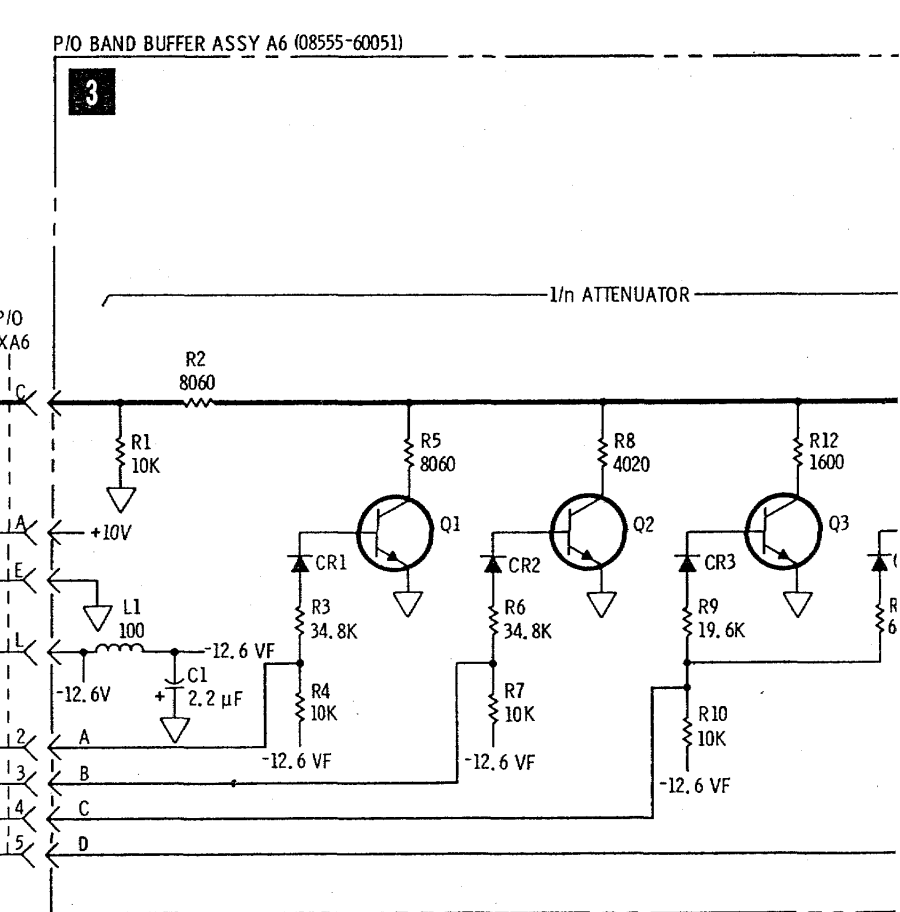
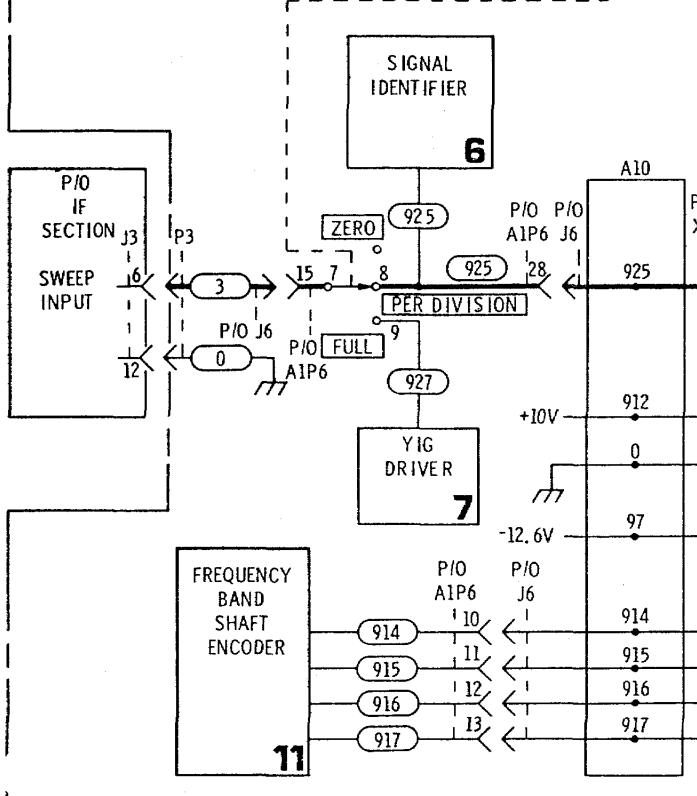
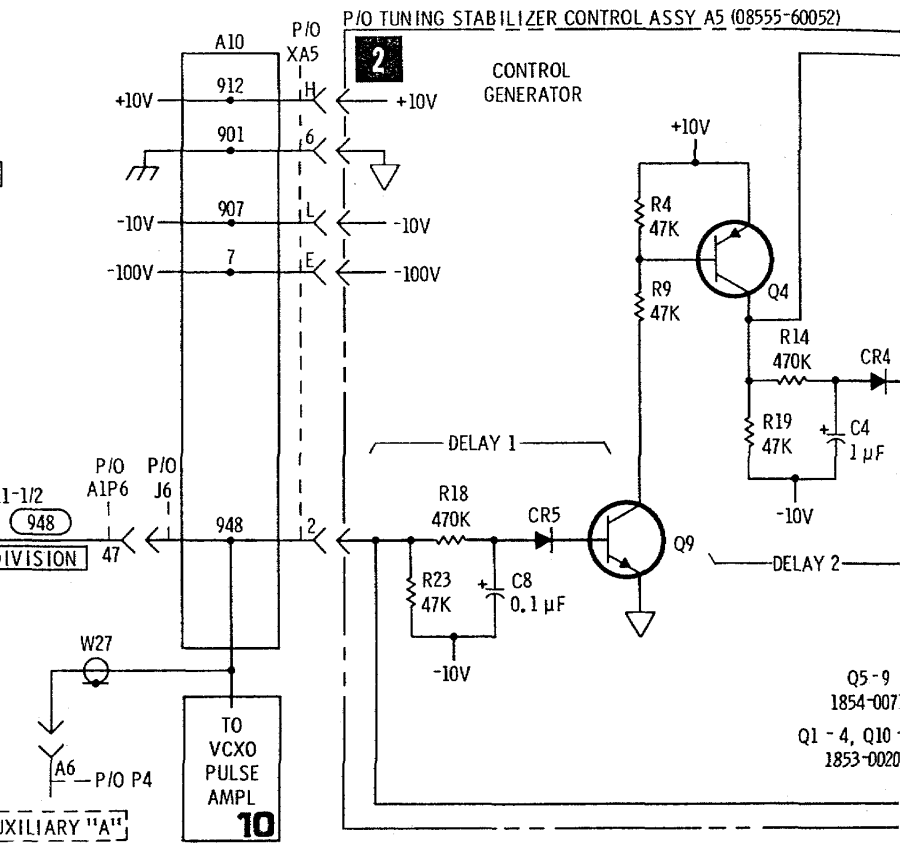
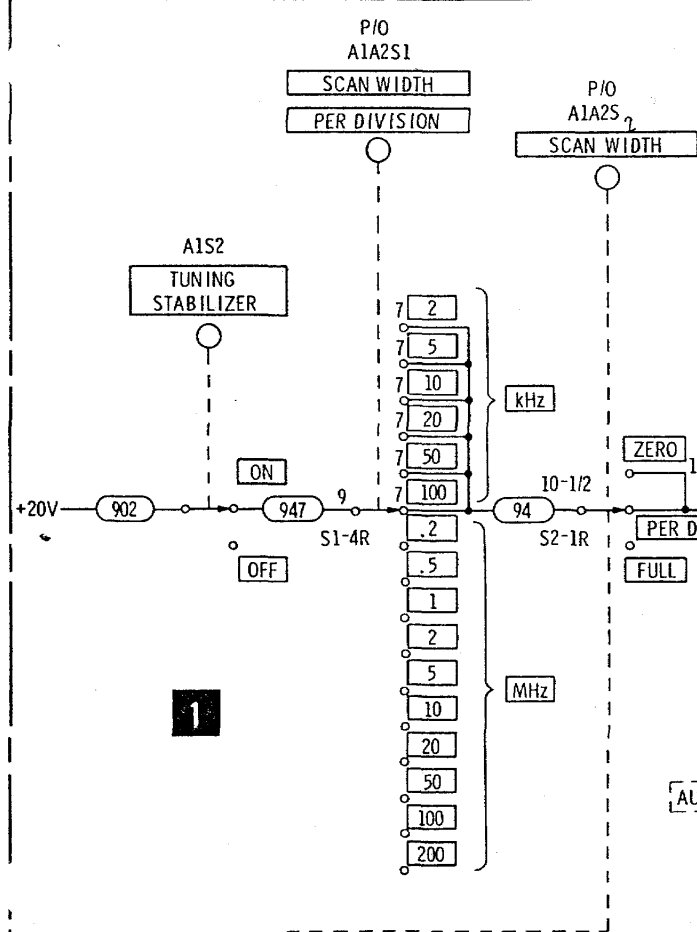
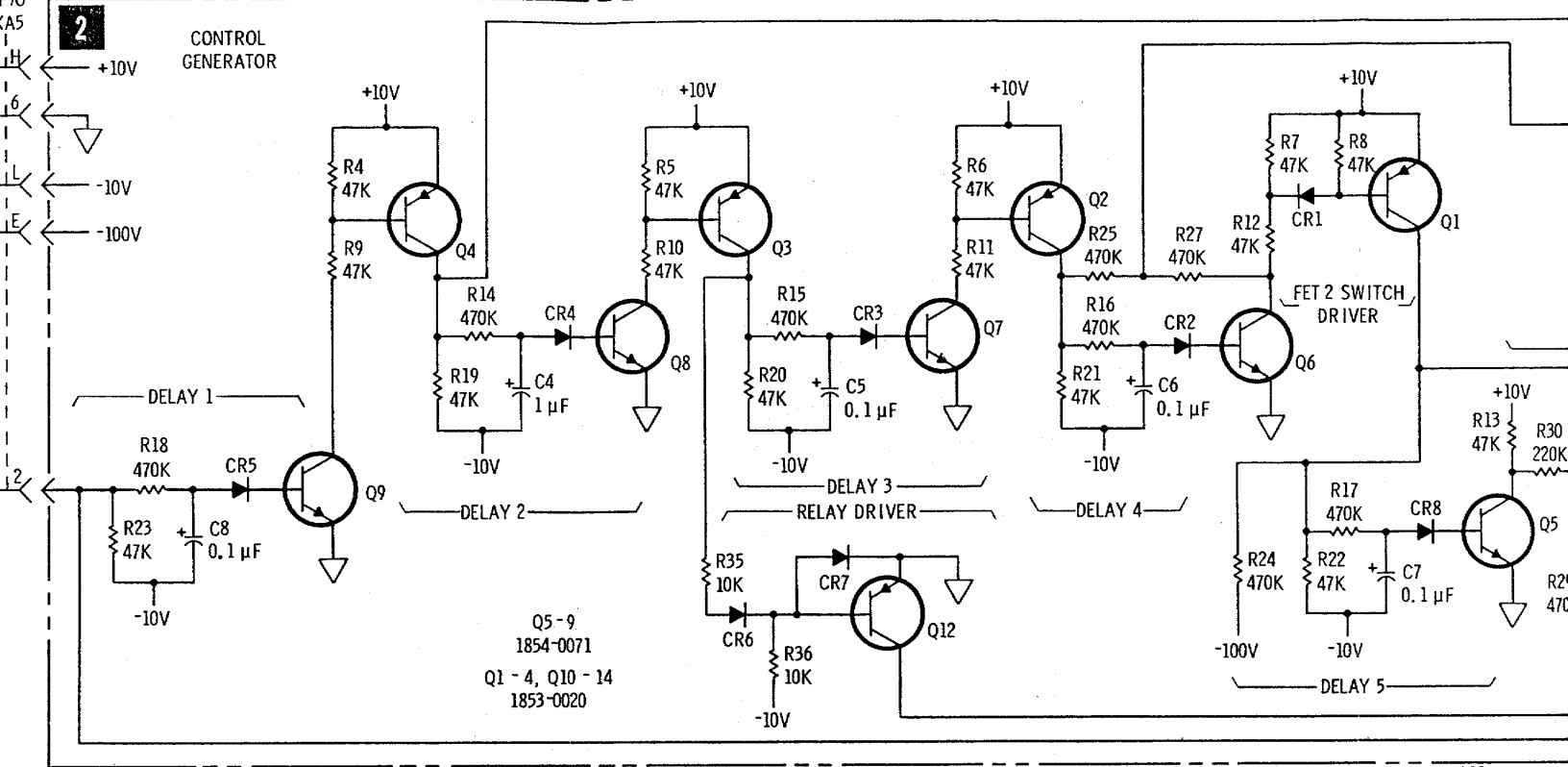


Figure 8-44. Band Buffer Assy A6 with Mixer Gain Network A16

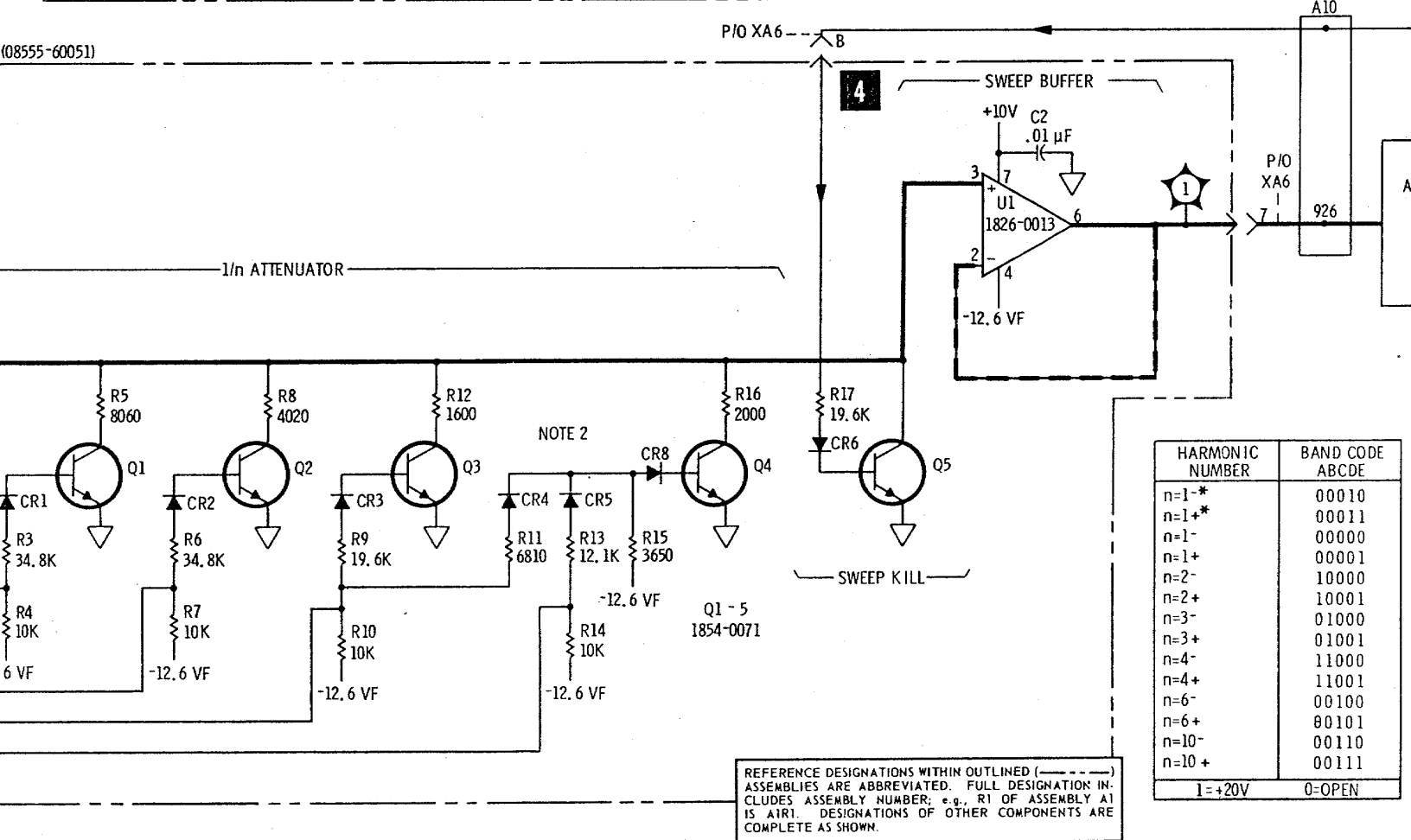
P/O 8555A RF SECTION



P/O TUNING STABILIZER CONTROL ASSY A5 (08555-60052)

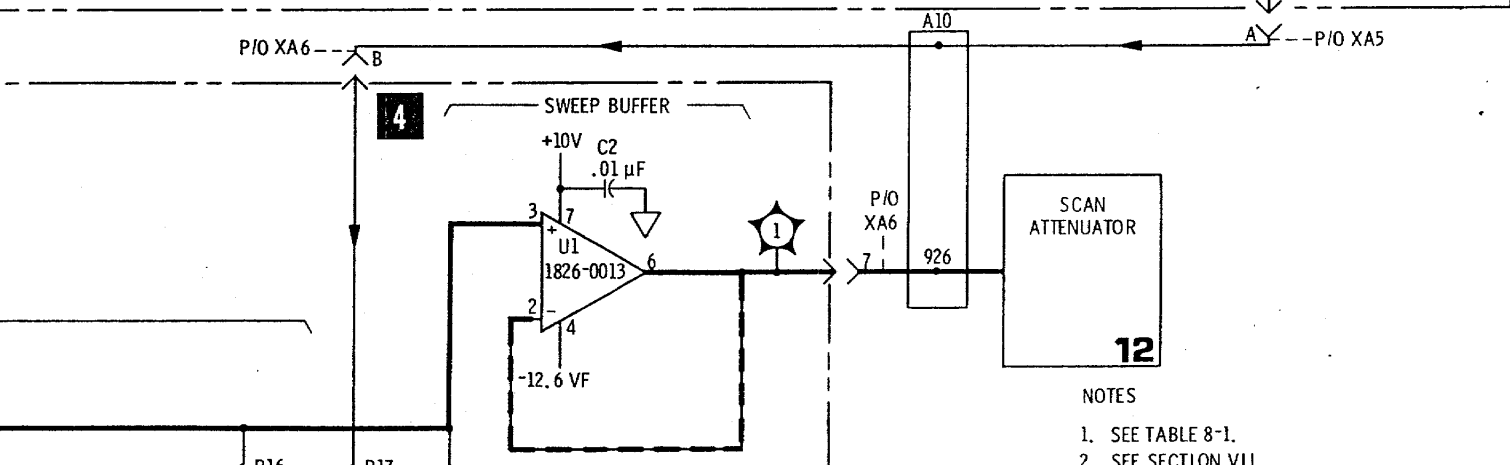
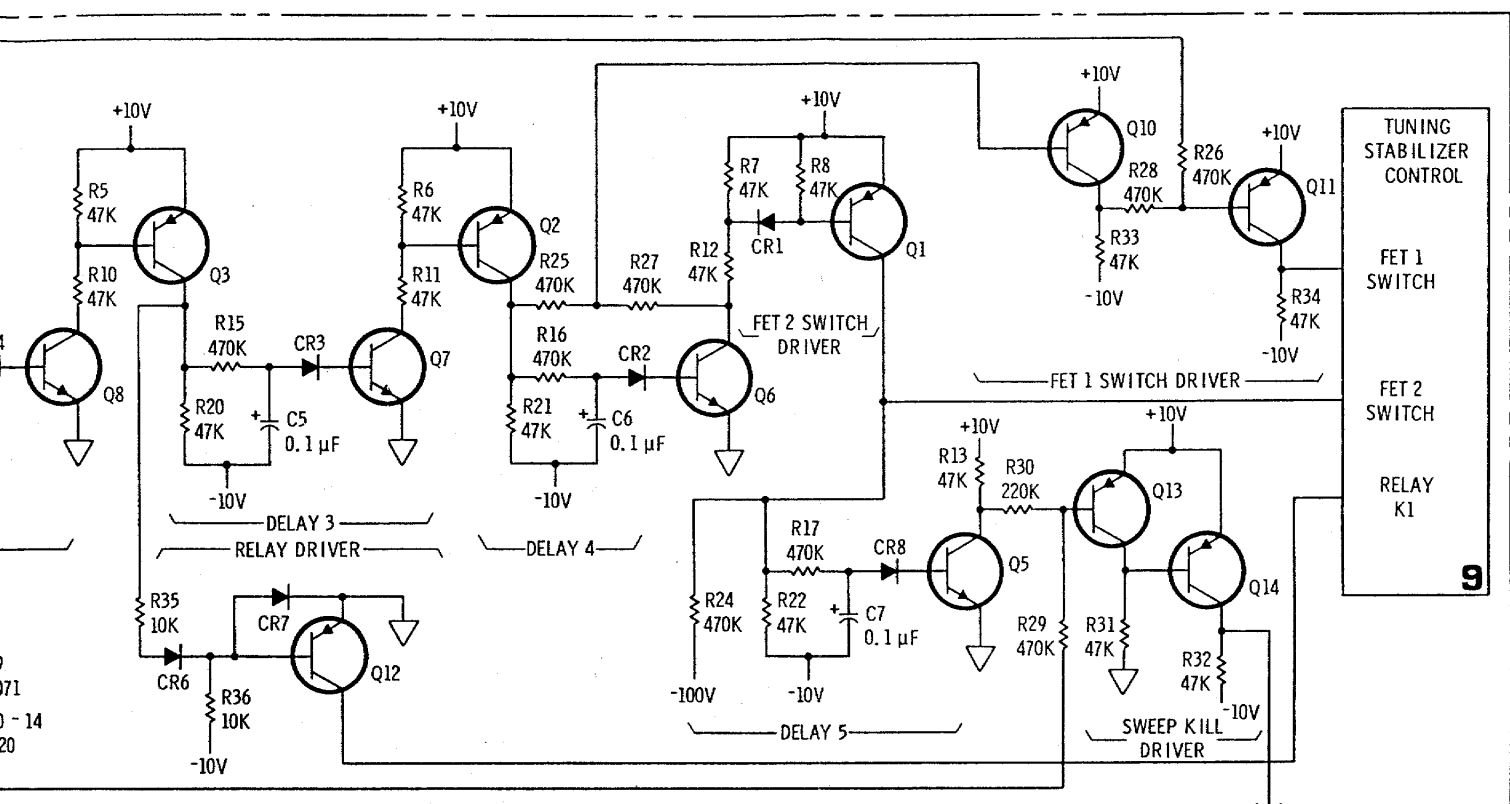


(08555-60051)



| HARMONIC NUMBER | BAND CODE ABCDE |
|--------------------|-----------------|
| n=1-* | 00010 |
| n=1+* | 00011 |
| n=1- | 00000 |
| n=1+ | 00001 |
| n=2- | 10000 |
| n=2+ | 10001 |
| n=3- | 01000 |
| n=3+ | 01001 |
| n=4- | 11000 |
| n=4+ | 11001 |
| n=6- | 00100 |
| n=6+ | 00101 |
| n=10- | 00110 |
| n=10+ | 00111 |
| 1=+20V 0=OPEN | |

Figure 8-45. C



- NOTES
 1. SEE TABLE 8-1.
 2. SEE SECTION VII

| HARMONIC NUMBER | BAND CODE ABCDE |
|-----------------|-----------------|
| n=1-* | 00010 |
| n=1+* | 00011 |
| n=1- | 00000 |
| n=1+ | 00001 |
| n=2- | 10000 |
| n=2+ | 10001 |
| n=3- | 01000 |
| n=3+ | 01001 |
| n=4- | 11000 |
| n=4+ | 11001 |
| n=6- | 00100 |
| n=6+ | 00101 |
| n=10- | 00110 |
| n=10+ | 00111 |

1 = +20V 0 = OPEN

| REFERENCE DESIGNATION | |
|-----------------------|---------|
| A1 | A6 |
| P6 | U1 |
| S2 | |
| A2S1 | |
| A2S2 | A10 |
| A5 | CHASSIS |
| C4 - 8 | P3 |
| CR1 - 8 | J6 |
| Q1 - 14 | XA5, 6 |
| R4 - 36 | |
| A6 | |
| C1, 2 | |
| CR1 - 6, 8 | |
| L1 | |
| Q1 - 5 | |
| R1 - 17 | |

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 8-45. Control Generator and 1/n Attenuator



SERVICE SHEETS 9 & 10

THEORY OF OPERATION TUNING STABILIZER AFC LOOPS

Service Sheets 9 and 10 contain the schematic diagram for the tuning stabilizer circuits, except for control circuits contained in Service Sheet 8.

The tuning stabilizer system locks the 1st LO (YIG oscillator) to a harmonic of a 1 MHz crystal oscillator to reduce the residual FM of the 1st LO. Stabilized operation is permitted for scan widths of 100 kHz per division or less (1 MHz total scan width).

Figure 8-46 is a simplified diagram of the tuning stabilizer system. The lock loop can be considered as an IF type AFC system. The sampler functions as a mixer with the 1st LO signal as one input and the harmonic of the 1 MHz oscillator as the other input. The 2050 harmonics between 2.05 and 4.1 GHz are mixed with the 1st LO signal in the sampler. The sampler output contains the difference and sum frequencies of the two inputs. The output is filtered by a 500 kHz low pass filter so only the difference between the LO signal and the nearest 1 MHz harmonic need be considered. The 1st LO signal can never be more than 500 kHz away from one of the harmonic pulses so there will always be an output from the filter. The output from the filter is applied to a discriminator which produces an output voltage related to frequency. (See discriminator block in simplified schematic, Figure 8-46.)

The error signal from the discriminator is fed through a compensation amplifier and combined with the sweep plus FINE TUNE signal. This signal is then applied to the YIG oscillator causing the frequency to change to produce a near zero error signal. This means that the YIG oscillator frequency will differ from a 1 MHz harmonic by approximately 240 kHz. The word approximately is used because this is an AFC with finite loop-gain of 1000. When lock is accomplished, if the YIG oscillator has to move 100 kHz to get to a lock point, the discriminator has to provide an error voltage to do this and the difference frequency will differ from 240 kHz by 100 Hz.

To achieve initial lock, the YIG oscillator is not, actually, moved to a lock point. Instead, a lock point is brought to the YIG oscillator frequency. This is done to avoid a center frequency shift in the display when the tuning stabilizer circuit is actuated. This is accomplished by initially reversing the AFC roles of the 1 MHz oscillator and the YIG oscillator.

The error signal is initially fed back to the frequency control circuitry of the 1 MHz voltage controlled crystal oscillator (VCXO). The frequency of the VCXO is shifted to bring a lock point to the YIG oscillator (see Figure 8-46). In this connection, the YIG, rather than the VCXO, is functioning as the reference. After a fixed time, the error signal is switched from the VCXO to the YIG oscillator; locking the YIG oscillator to the stable VCXO. The error signal which moved a lock point to the YIG oscillator frequency is stored on a sample and hold circuit (A5C9).

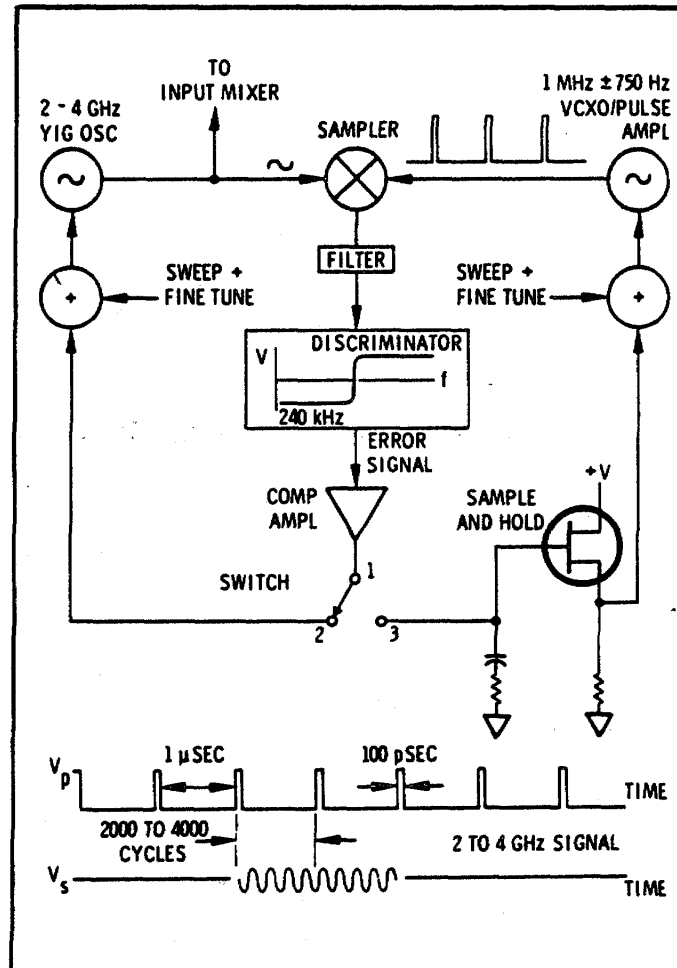


Figure 8-46. Discriminator Block Schematic

SERVICE SHEETS 9 & 10 (cont'd)

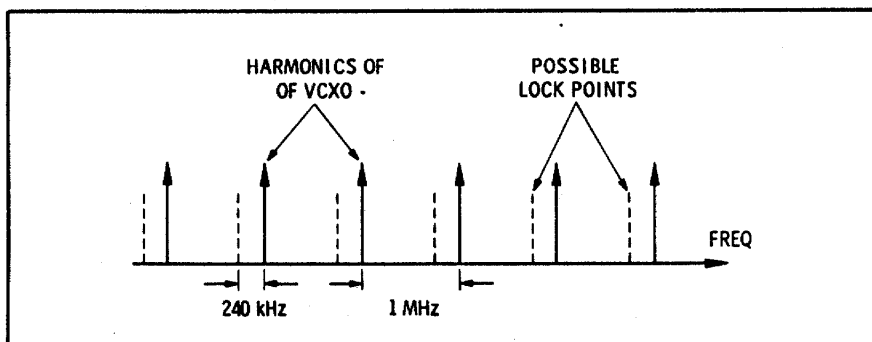


Figure 8-47. VCXO Harmonics and Lock Points

1 THEORY OF OPERATION, TUNING STABILIZER CONTROL

The tuning stabilizer control generator (Service Sheet 8) provides the properly timed commands to accomplish the tuning stabilizer switching.

At time T_0 the stabilization process begins with closure of all three of the necessary switches. (See Service Sheet 8.) At this instant, sweep is shut off and the 1 MHz pulse amplifier (Service Sheet 10) is turned on.

At time T_1 , FET1 (A5Q18), (Service Sheet 9) which has been "on" shorting the error signal to ground, is turned "off". The error signal is allowed to pass through the closed contacts of A5K1, through the sample and hold circuit to the VCXO. This signal then causes the VCXO to shift frequency to move a harmonic lock point to the YIG oscillator.

At time T_2 , the reed relay A5K1 opens leaving the error signal, at time T_2 stored on A5C9.

At time T_3 FET1 (A5Q18) is turned "on" again to discharge A14A1C17 and A5C1.

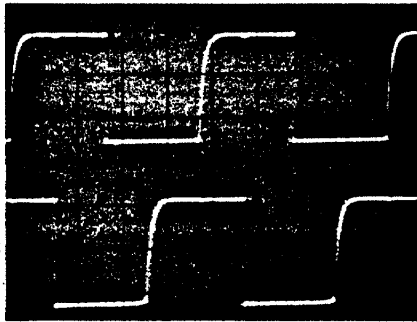
At time T_4 FET1 is turned "off" and FET2 (A5Q17) is turned "on" routing the error signal to the YIG oscillator tickler coil.

At time T_5 , sweep is turned on and the instrument functions in the stabilized mode.

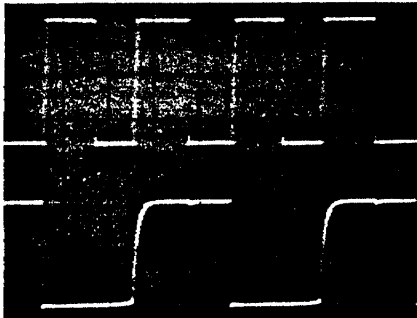
2 A14A1Q4 and Q5 are emitter followers, connected to terminate the 500 kHz filter in 1000 ohms and to provide a low output impedance to drive the series resonant circuit. A14A1L4, C11 and C12 form a series resonant circuit whose "Q" is determined predominantly by A14A1R14 and the resistance of inductor A14A1L4. A14A1C12 and R14 are factory selected components whose values are selected to set the frequency and "Q" of the 240 kHz resonator.

2-a. A14A1U1 is a transistor array consisting of five identical transistors in a 14-pin integrated circuit package. Four of the transistors in A14A1U1 combined with A14A1Q6 and Q7 make up two independent differential comparators. The differential comparators convert the sine wave input into a squarewave output. The phase difference between the two squarewaves is a function of the input frequency. The outputs are nearly in phase at low frequencies, 90 degrees out of phase at 240 kHz (see waveforms below), and nearly out of phase at 500 kHz.

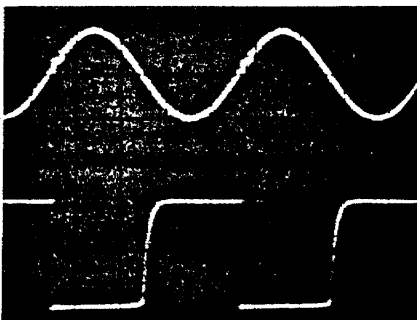
SERVICE SHEETS 9 & 10 (cont'd)



- A A14A1Q7C
Volts/Div: 2
Time/Div: 1 μ sec
- B A14A1Q6C
Volts/Div: 2
Time/Div: 1 μ sec



- A A14A1TP3
Volts/Div: 2
Time/Div: 1 μ sec
- B A14A1Q6C
Volts/Div: 2
Time/Div: 1 μ sec



- A A14A1TP1
Volts/Div: 0.1
Time/Div: 1 μ sec
- B A14A1Q6C
Volts/Div: 2
Time/Div: 1 μ sec

2-b. A14A1U2 is an integrated circuit quadruple NAND gate connected as an EXCLUSIVE OR circuit. Its output is high when the two inputs are different and low when they are the same. (Compare output waveform at TP3 with input waveforms.) The output of the EXCLUSIVE OR circuit has a dc component with an average value that is a function of frequency. The output of the EXCLUSIVE OR circuit is applied through A14A1Q8, Q9 and associated circuitry where the signal is buffered, offset and filtered. The error output signal is a dc voltage related to frequency as indicated in Figure 8-48.

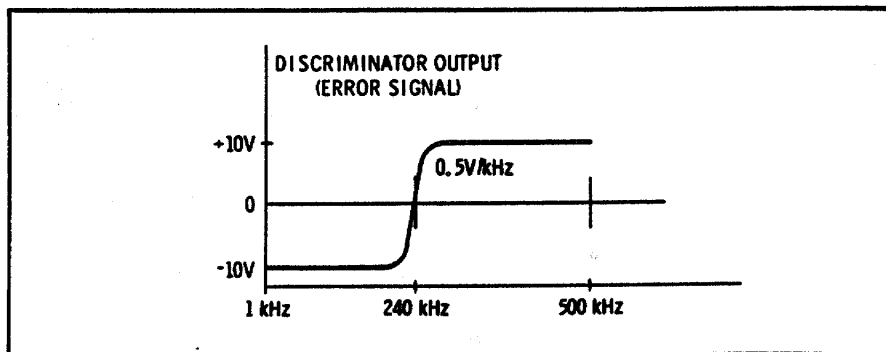


Figure 8-48. Discriminator Output Error Signal

SERVICE SHEETS 9 & 10 (cont'd)

1 TUNING STABILIZER CONTROL TROUBLESHOOTING (See Service Sheet 8 also).

When a malfunction has been isolated or to isolate a malfunction in the Tuning Stabilizer Control Assy A5, perform the troubleshooting procedure in Service Sheet 8 prior to troubleshooting the circuitry in Service Sheet 9. If malfunction was isolated to the Tuning Stabilizer Assy A14, proceed to step 2. Separate RF and IF Sections, remove 8555A bottom cover so tuning stabilizer casting A14 is exposed. Disconnect the error signal output of this casting (958 wire at A14C4). Connect the RF Section to the IF Section and Display Section with extender cables. Install Tuning Stabilizer Control Assy A5 on an extender board.

EQUIPMENT REQUIRED

| | |
|-----------------------------|---------------------|
| Digital Voltmeter | HP 3440A/3444A |
| Oscilloscope | HP 180A/1801A/1821A |
| Extender Board | HP 5060-0256 |
| Power Supply | HP 6205B |
| Test Oscillator | HP 652A |
| Service Kit | HP 08555-60077 |
| Volt-Ohm-Ammeter | HP 412A |

1. Set analyzer controls as follows:

| | |
|----------------------------------|----------------------|
| BAND | n=1- 2.05 GHz IF |
| BANDWIDTH | 30 kHz |
| SCAN WIDTH | 0.5 MHz PER DIVISION |
| INPUT ATTENUATION | 20 dB |
| SCAN TIME PER DIVISION | 1 MILLISECONDS |
| LOG REF LEVEL | +10 dBm |
| LOG/LINEAR | LOG |
| SCAN MODE | INT |
| SCAN TRIGGER | AUTO |
| FREQUENCY | 1.5 GHz |
| FINE TUNE | Centered |
| TUNING STABILIZER | OFF |

1-a. Check input sweep signal from scan width voltage divider Service Sheet 12. With INPUT ATTENUATION set to 20 dB, connect the SECOND LO OUTPUT to INPUT. Tune FREQUENCY control to center signal on CRT display. Check operational amplifiers A5U1 and U2 by checking for normal operation of the FINE TUNE control and the SIGNAL IDENTIFIER system. (FINE TUNE control has a tuning range of over 1 MHz and SIGNAL IDENTIFIER provides a two-division displacement on alternate sweep scans.) If either or both are incorrect, check input-versus-output of A5U1 and U2.

1-b. With controls set as indicated above, connect oscilloscope to A5TP4. The signal at the test point should be a negative-going ramp of approximately 10 volts around a level set by the FINE TUNE control. Vary FINE TUNE control and check for a shift of at least two volts change in the dc level.

1-c. Check for a positive-going ramp at A5TP3 of approximately 9.5 volts and at A5TP8 for approximately 8.5 volts. Check for a negative-going ramp of approximately 9.5 volts at A5TP9. Set SIGNAL IDENTIFIER to OFF.

SERVICE SHEETS 9 & 10 (cont'd)

1-d. SAMPLE AND HOLD TEST

Set TUNING STABILIZER to ON; SCAN WIDTH to ZERO SCAN; SCAN WIDTH PER DIVISION to 100 kHz. With the error output wire (958) disconnected at A14C4, connect oscilloscope to A5TP4 and adjust FINE TUNE control for zero volts at test point. Connect oscilloscope to A5TP9. Voltage should be 0 ± 0.1 volt. If voltage exceeds magnitude of 0.1 volt, adjust FET OFFSET A5R55 to zero voltage at A5TP9. Connect a +0.316 volt dc level signal at A5TP2. The voltage at A5TP9 should not change, indicating relay A5K1 is open. Set TUNING STABILIZER switch to OFF. The voltage level at A5TP9 should change to -1 ± 0.25 Vdc. Set TUNING STABILIZER switch to ON. The voltage at A5TP9 should not change, indicating proper operation of the sample and hold circuit.

2 DISCRIMINATOR TEST AND TROUBLESHOOTING

Separate RF Section from IF Section, remove bottom cover and cover from Discriminator Assy A14A1. Connect RF Section to IF Section and to Display Section using extender cables. Disconnect 958 wire from A14C4. Set TUNING STABILIZER switch to OFF.

2-a. Connect a 13 mV peak-to-peak signal at a frequency of 10 to 700 kHz from Test Point A (Service Sheet 10) to chassis ground. Note: it is not necessary to disconnect the sampler.

2-b. Vary frequency of oscillator while observing the discriminator output at A14C4 (Service Sheet 9). The discriminator output should vary as shown in Figure 8-47. If correct output is not obtained, perform the following tests:

Connect oscilloscope to A14A1TP1. The signal should be a sinusoid 0.15 to 0.3 volt peak-to-peak for frequencies between 1 and 500 kHz. The voltage level should decrease rapidly as the frequency is increased above 500 kHz. Observe signal at collectors of A14A1Q6 and Q7 with a dual channel oscilloscope. The signal should be a 0 to 5 volt squarewave. As the oscillator frequency is varied the phase relationship of the squarewaves should vary as follows: at low frequency the squarewaves should be almost in phase, at 240 kHz they should be approximately 90 degrees out of phase, at frequencies approaching 500 kHz they should be nearly out of phase.

A5, A6

Control Generator and 1/n Attenuator

◀ SERVICE SHEET 8

SERVICE SHEET 9 & 10 (cont'd)

A5 Tuning Stabilizer Control Voltage Measurements

Conditions: SCAN WIDTH 100 kHz PER DIVISION, TUNING STABILIZER ON, FINE TUNE Centered (-5 Vdc at TP6), n=1- BAND, FREQUENCY 1 GHz, SCAN TIME PER DIVISION 5 SECONDS.

| Test Point | Voltage | Remarks |
|------------|--------------------|---|
| TP1 | +2.5 Vdc nominal | Unstablized |
| TP1 | +1.5 to +3.5 Vdc | Stabilized, goes negative with increase in frequency, goes positive with decrease in frequency. |
| TP2 | 0 Vdc nominal | |
| TP3 | -5.5 to -3.8 Vdc | |
| TP4 | +0.93 to -1.03 Vdc | |
| TP5 | -0.25 to +0.25 Vdc | |
| TP6 | 0 to -10 Vdc | FINE TUNE CW to CCW |
| TP7 | 0 Vdc nominal | Level goes positive with increase in frequency and negative with decrease. |
| TP8 | 1.6 Volt | Positive going ramp. |
| TP9 | 1.8 Volt | Negative going ramp. |

Transistor voltage measurements, unstabilized, ZERO SCAN.

| | Emitter | Base | Collector |
|-------|-----------|-----------|-----------|
| A5Q16 | -8.67 Vdc | -8.2 Vdc | 0 |
| | Drain | Source | Gate |
| A5Q15 | -8.67 Vdc | +2.55 Vdc | 0 |
| A5Q17 | 0 | 0 | -5.7 Vdc |
| A5Q18 | 0 | 0 | +0.5 Vdc |

A14A1 Discriminator Voltage Measurements

Conditions: SCAN WIDTH 100 kHz PER DIVISION, TUNING STABILIZER ON, FINE TUNE Centered, FREQUENCY 1 GHz, n=1- BAND, SCAN TIME 2 MILLISECONDS PER DIVISION, Typical Vdc levels indicated.

| | Emitter | Base | Collector |
|---------|---------|-------|-----------|
| A14A1Q4 | -1.55 | -0.98 | 0 |
| Q5 | -2.17 | -1.55 | 0 |
| Q6 | 0 | +0.2 | +1.7 |
| Q7 | 0 | +0.2 | +1.7 |
| Q8 | +9.87 | +9.98 | -0.26 |
| Q9 | +9.87 | +10.0 | +0.30 |
| Q10 | +5.0 | +5.66 | +9.96 |
| U1A | -0.3 | 0 | +9.96 |
| U1B | -0.3 | 0 | +0.2 |
| U1C | -0.7 | 0 | +9.96 |
| U1D | -0.7 | 0 | +0.2 |

TP 1 0.2 volt peak-to-peak 240 kHz sine wave

TP 3 +2.8 volt level, 5.6 volt peak-to-peak 480 kHz square wave

A14C4 (Error out signal) 0 Vdc nominal.

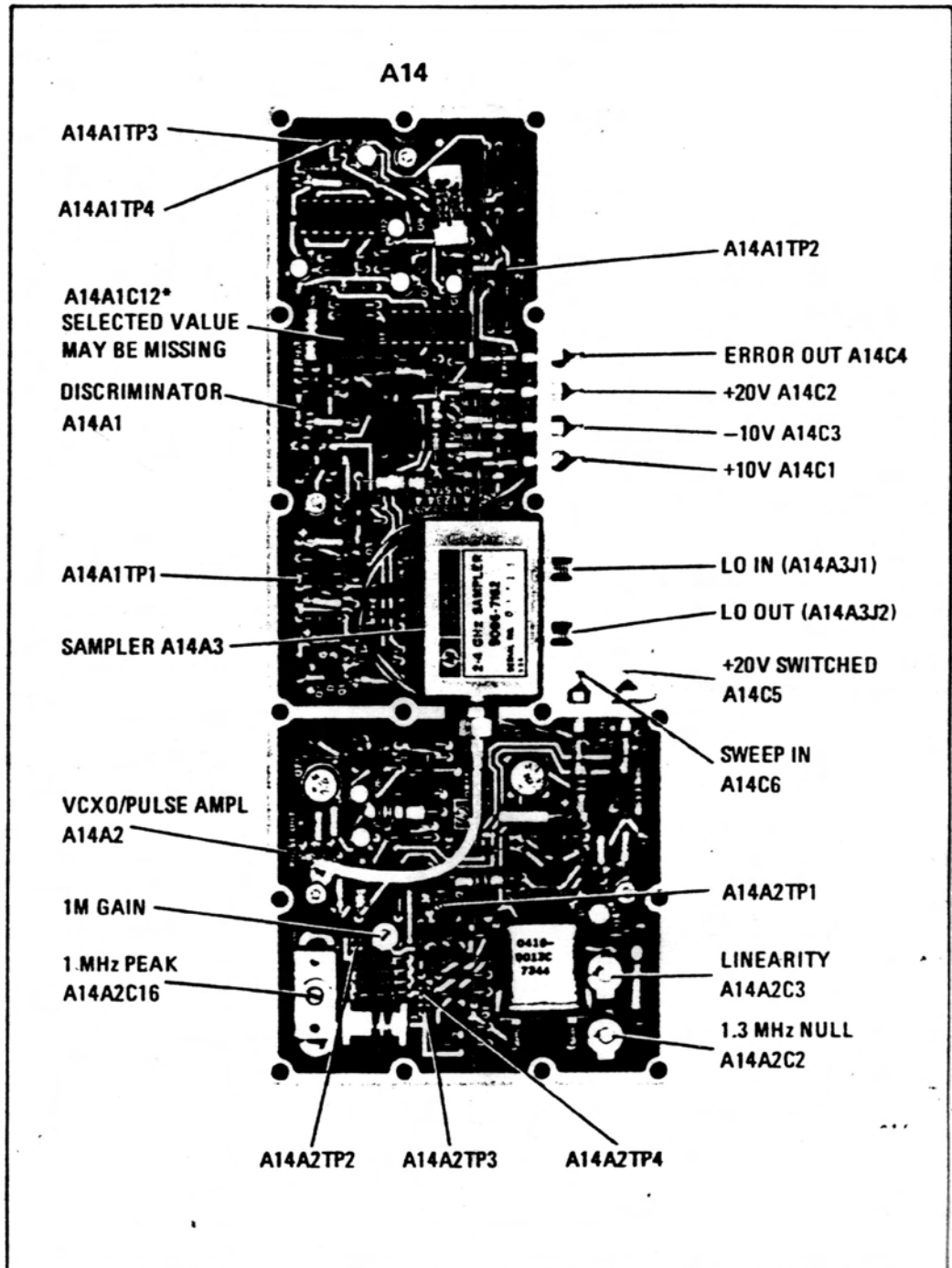


Figure 8-49. Tuning Stabilizer Assembly A14

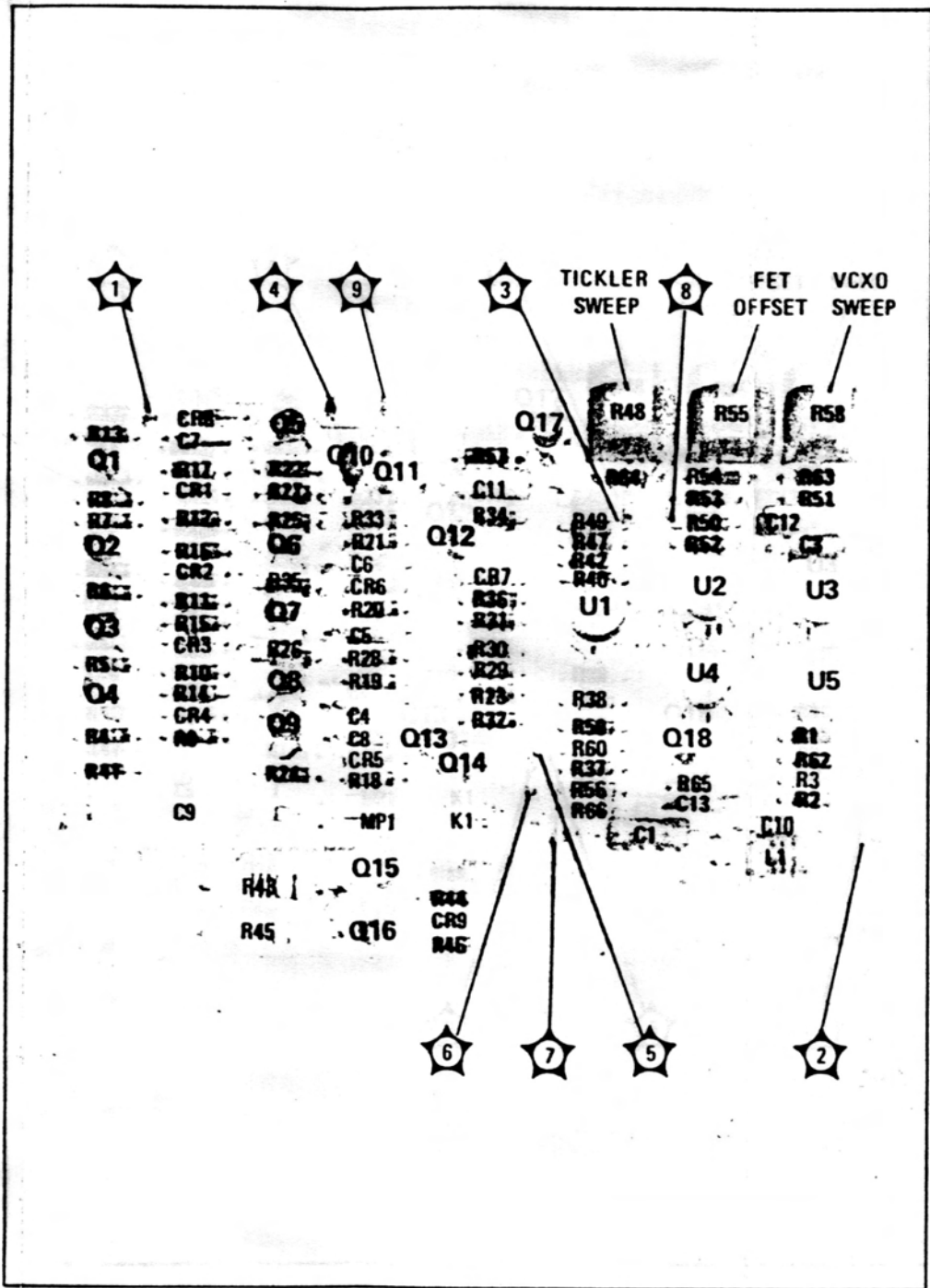


Figure 8-50. Tuning Stabilizer Control Assembly A5

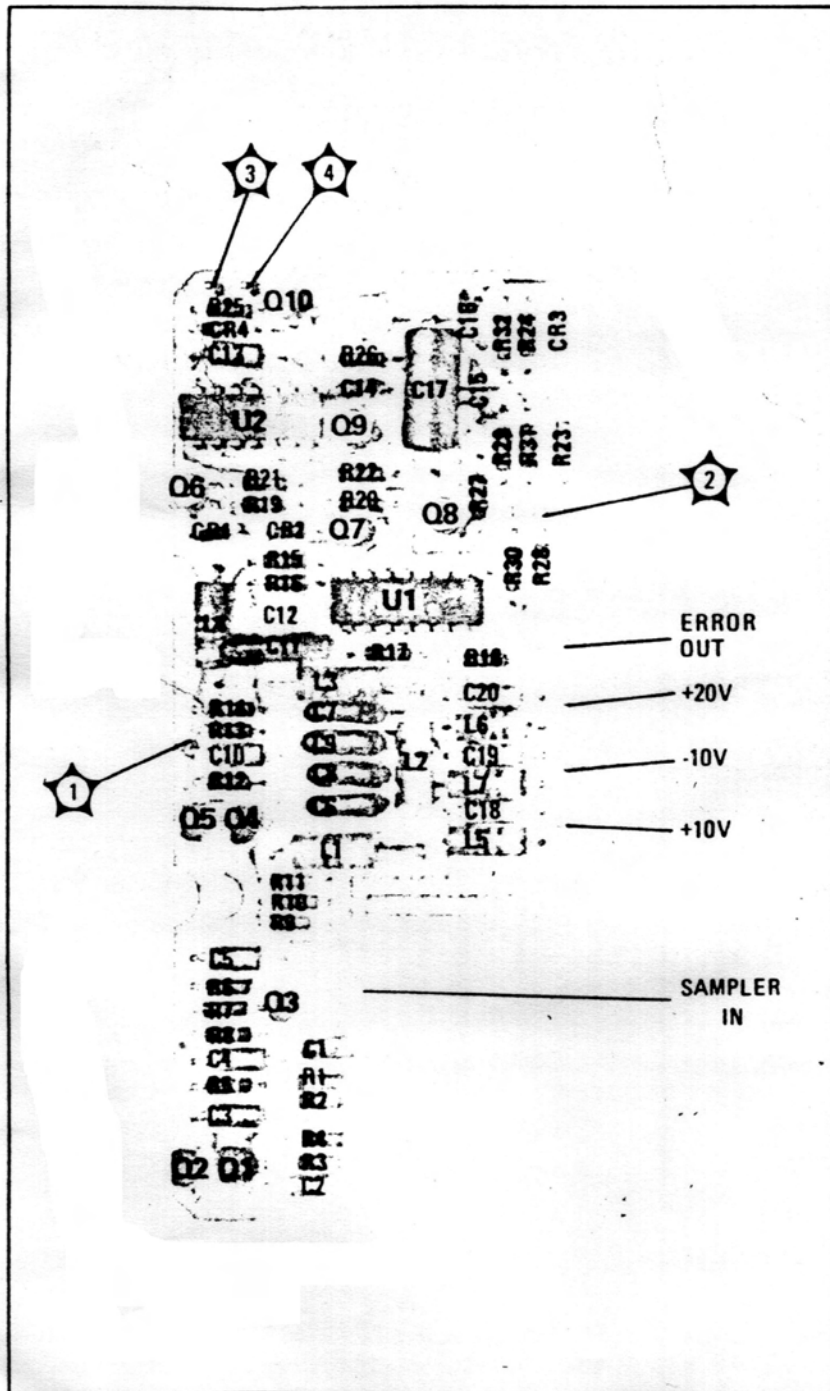
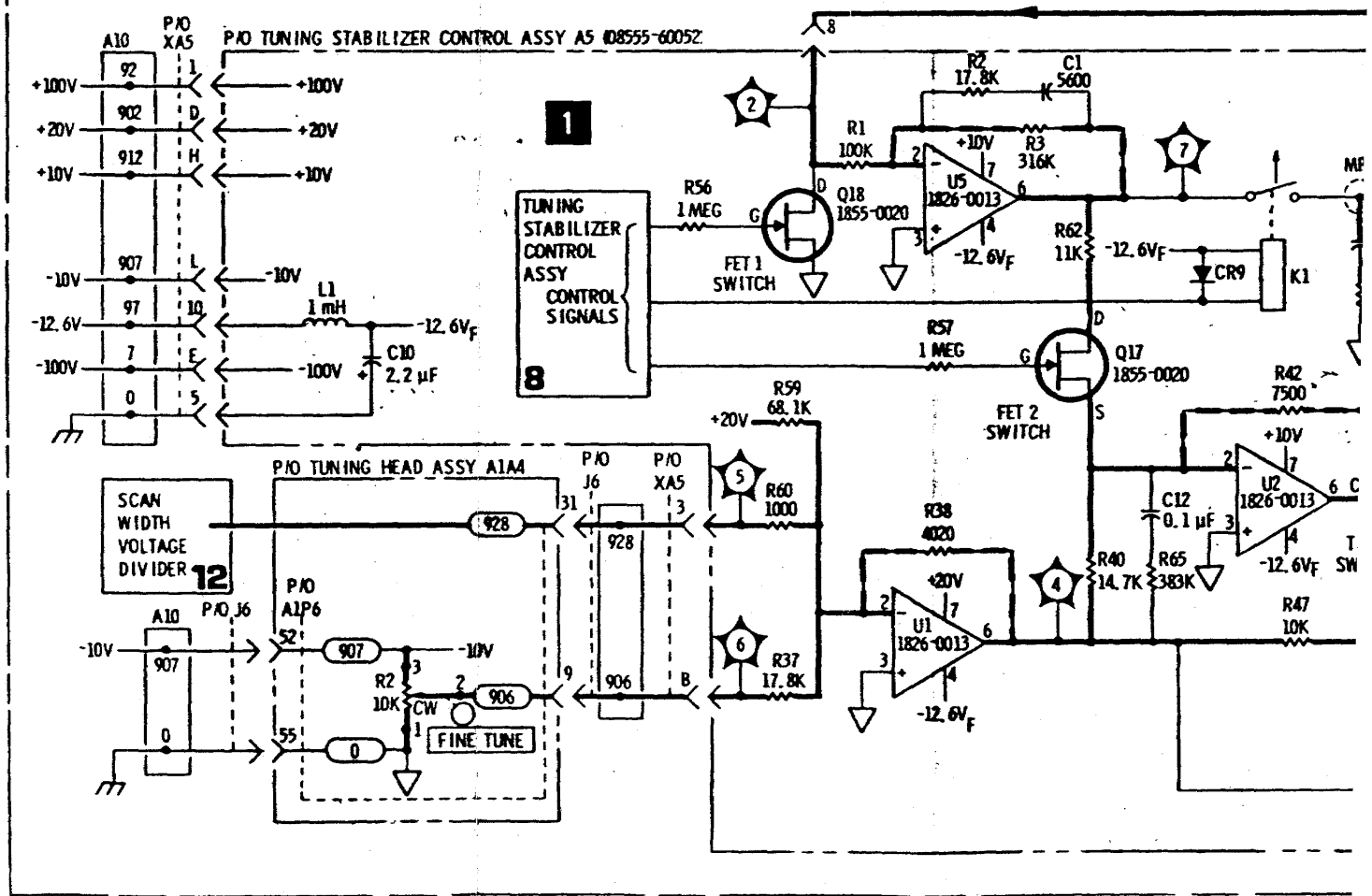
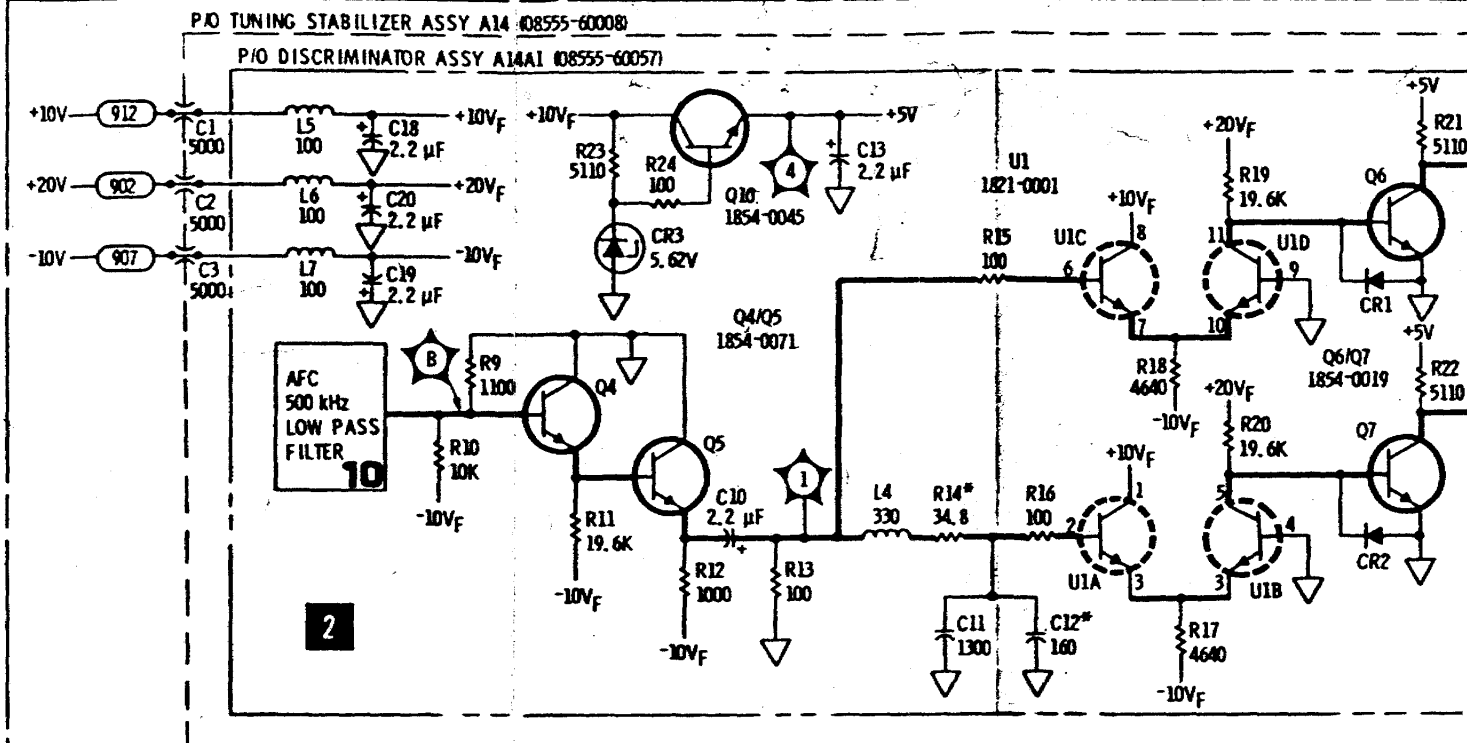


Figure 8-51. Discriminator Assembly A14A1

P/O B555A RF SECTION



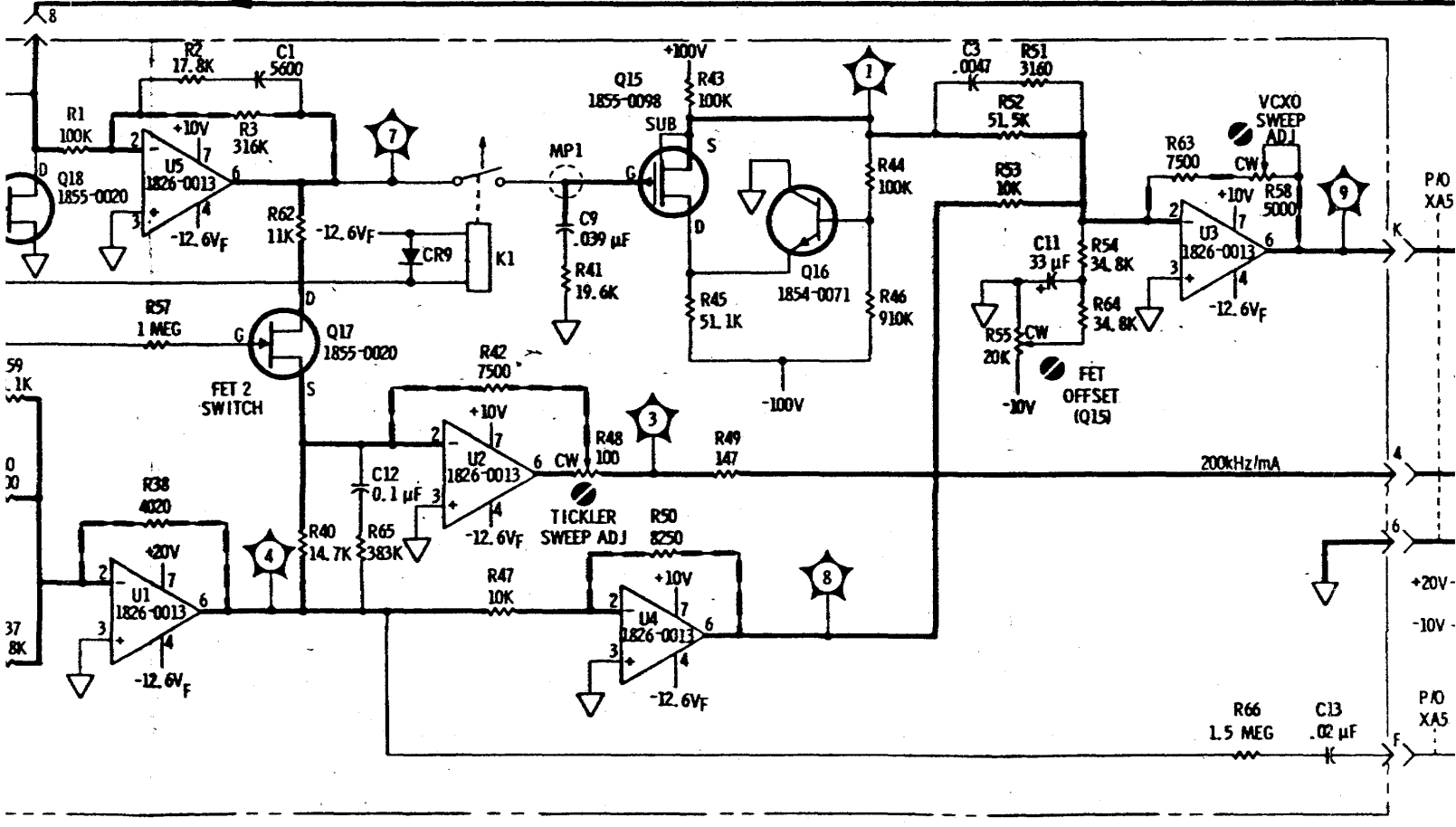
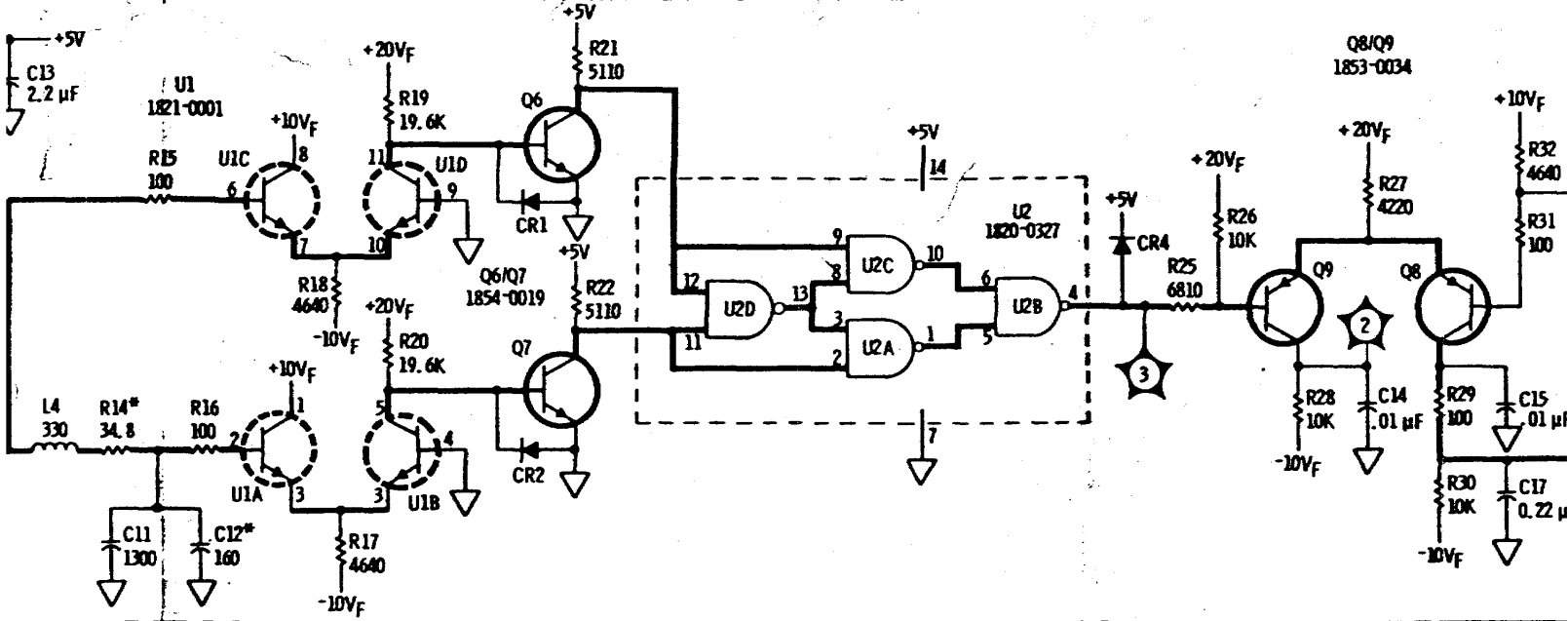


Figure 8-52. Tuning Stabiliz

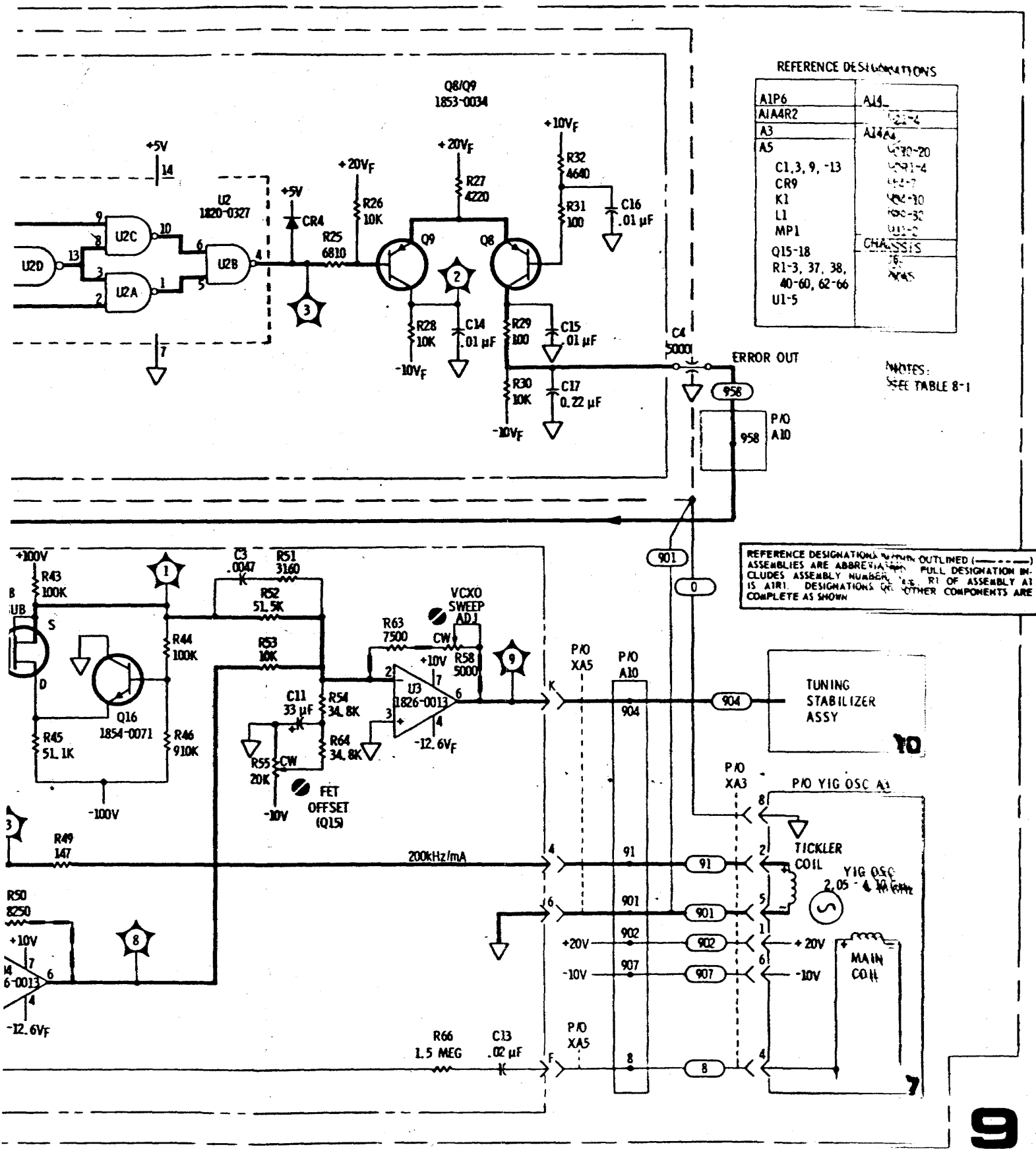


Figure 8-52. Tuning Stabilizer Control Assy A5 and Discriminator Assy A14A1

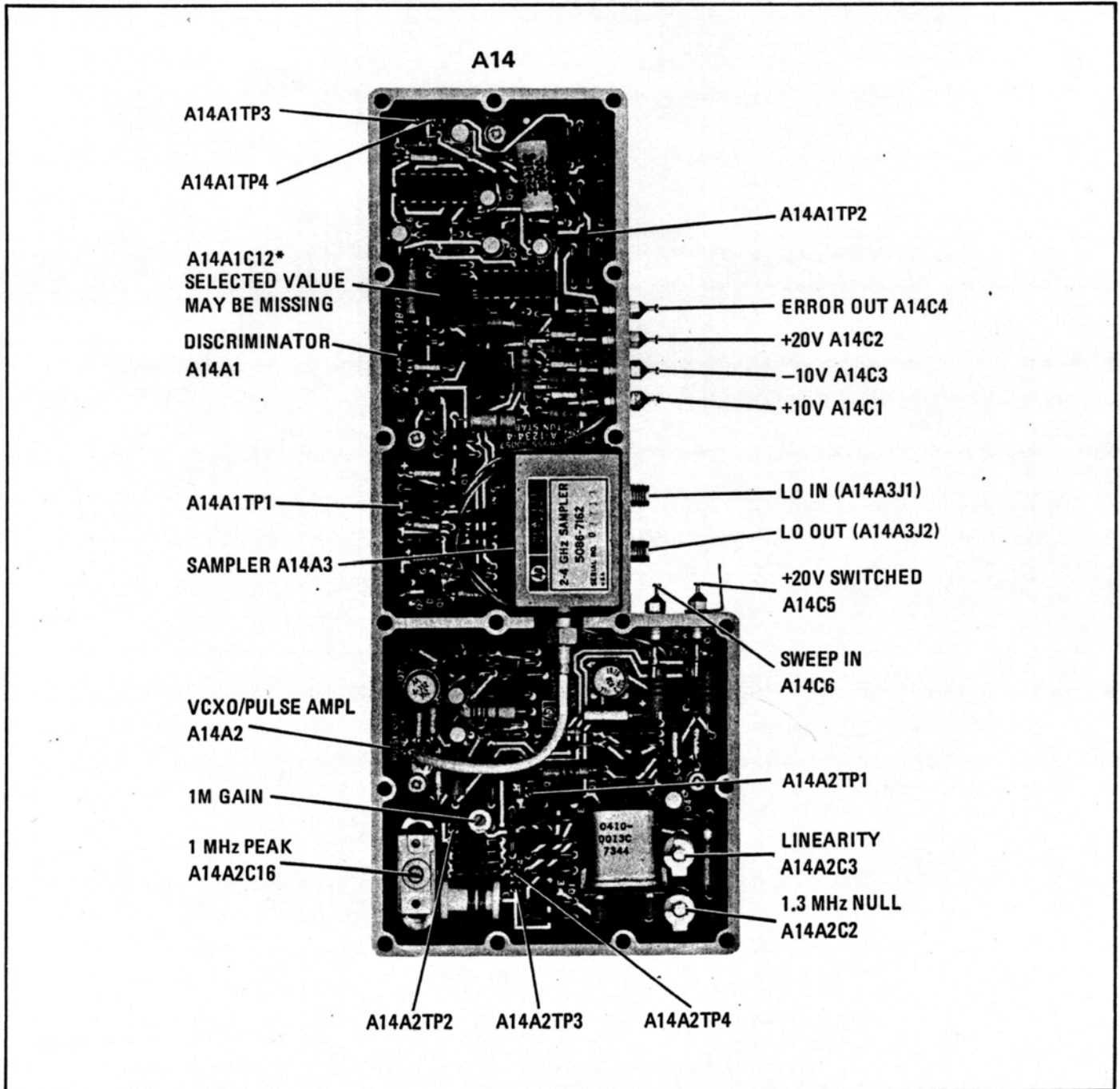
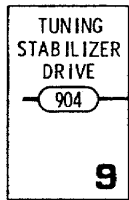
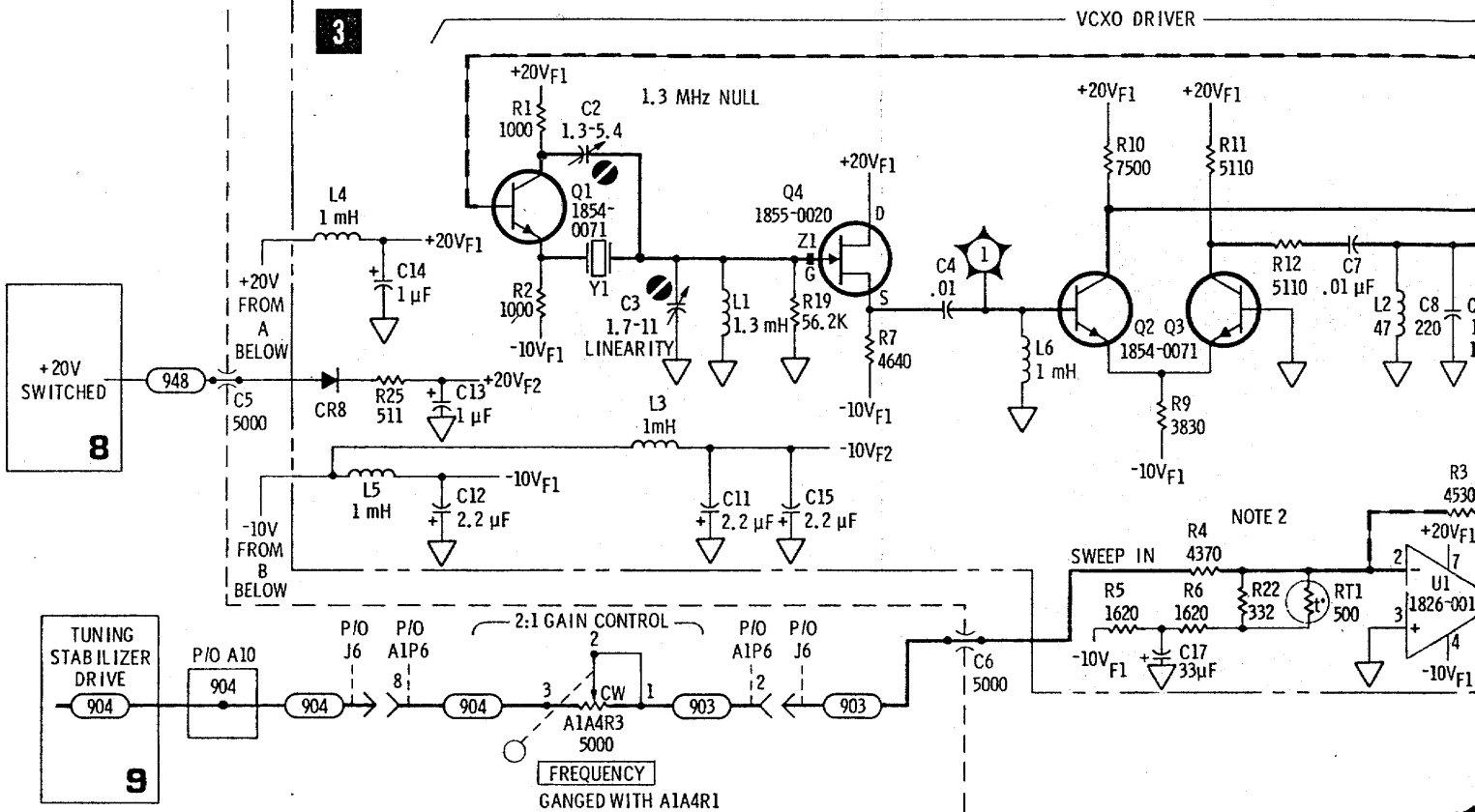


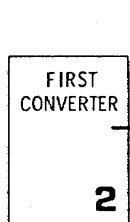
Figure 8-54. Tuning Stabilizer Assembly A14

P/O TUNING STABILIZER ASSY A14 (08555-60008)

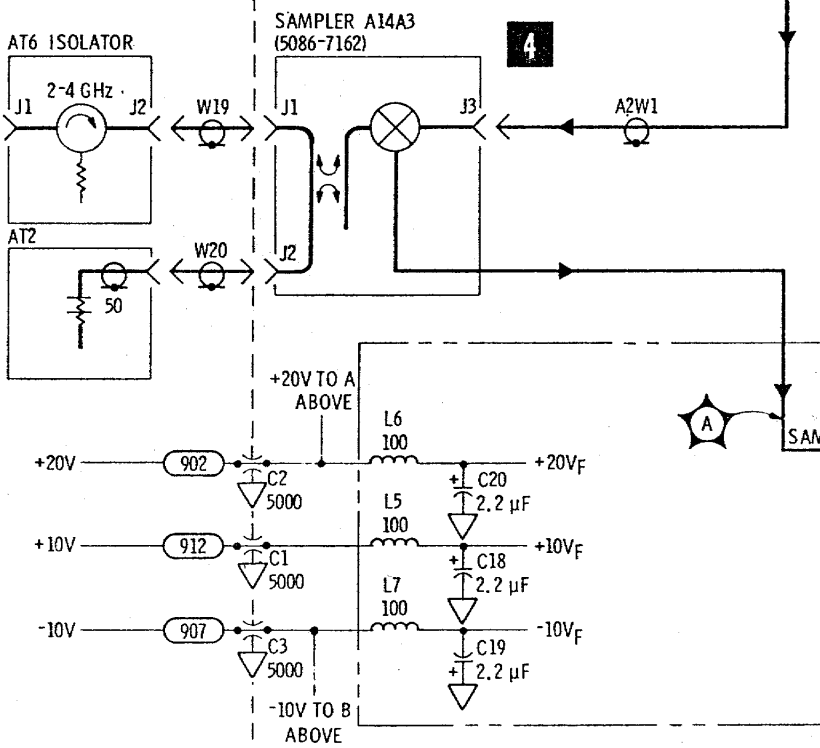
TUNE STAB VCXO/PULSE AMPL ASSY A14A2 (08555-60099)



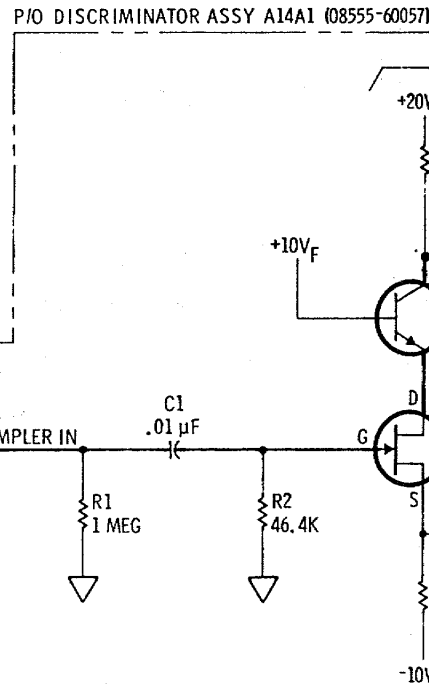
FREQUENCY GANGED WITH A1A4R1



FIRST LO OUTPUT



SERIAL PREFIX 1143A



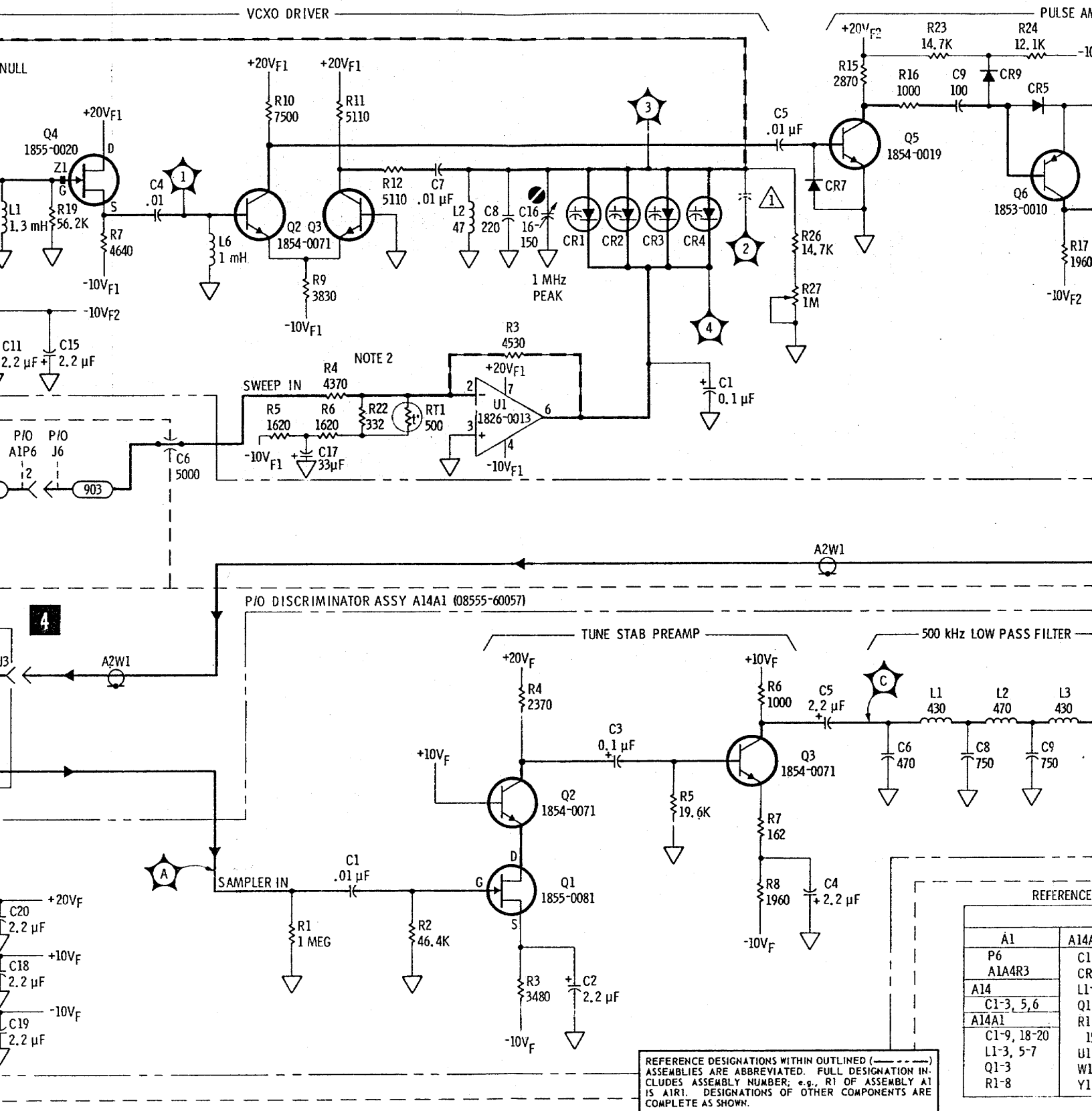
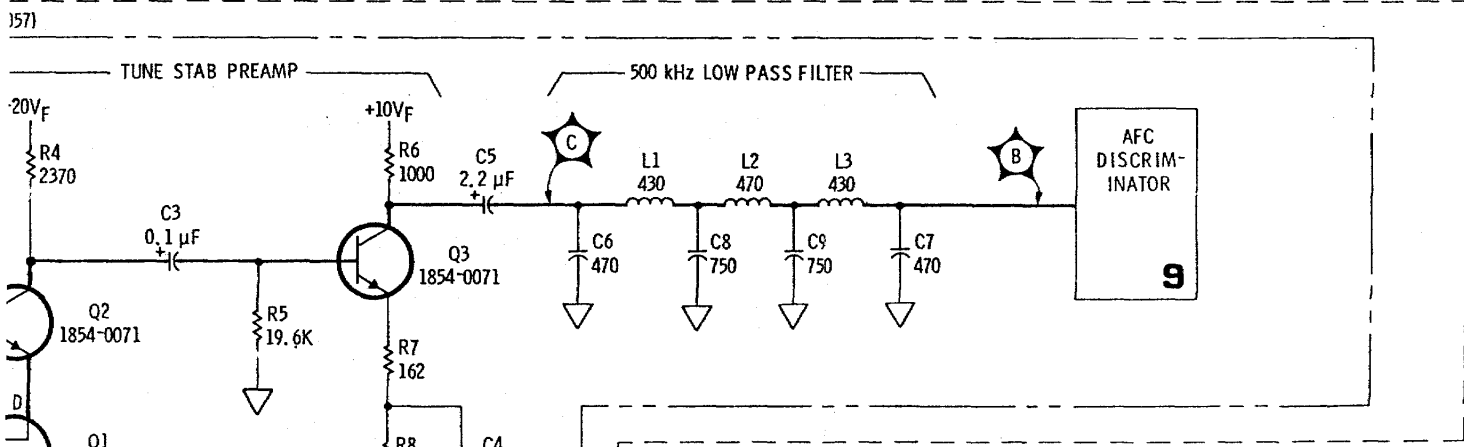
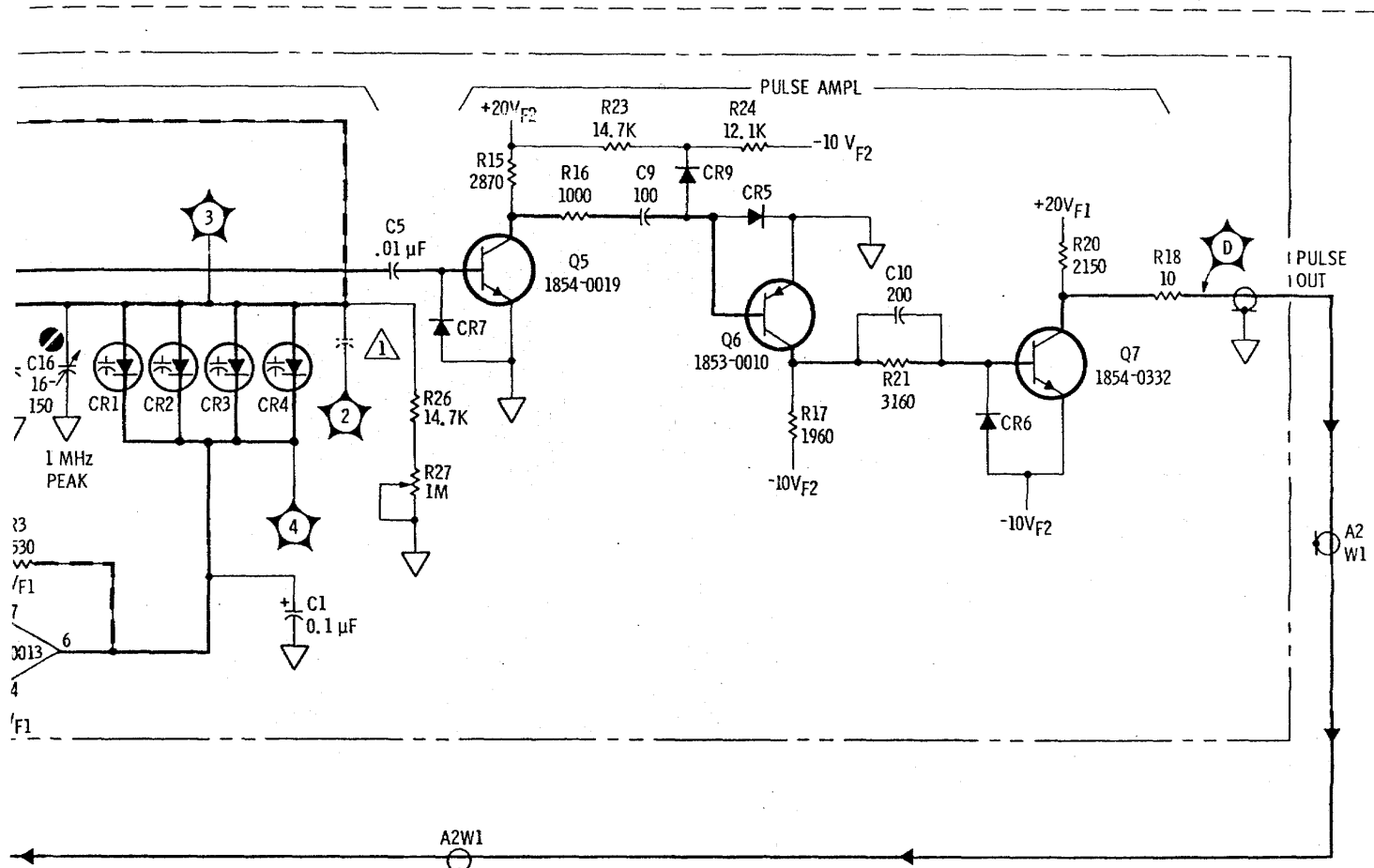


Figure 8-55. T



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.

| 8555A | | |
|-------------|------------|------------|
| A1 | A14A2 | A14A3 |
| P6 | C1-5, 7-17 | J1-3 |
| A1A4R3 | CR1-8 | CHASSIS |
| A14 | L1-7 | AT2,6 |
| C1-3, 5,6 | Q1-7 | J6 |
| A14A1 | R1-7, 9-12 | W5, 19, 20 |
| C1-9, 18-20 | 15-21 | |
| L1-3, 5-7 | U1 | |
| Q1-3 | W1 | |
| R1-8 | Y1, Z1 | |

- NOTES
- SEE TABLE 8-1.
1. TEST POINT 2. COUPLED VIA TRACE CAPACITANCE.
2. SEE SECTION VII

10

Figure 8-55. Tuning Stabilizer VCXO/Pulse Ampl Assy A14A2, Discriminator A14A1, and Sampler Assy A14A5

SERVICE SHEET 11

THEORY OF OPERATION

Service Sheet 11 contains the schematic diagram for the band code switch logic circuitry which consists of an encoder, a driver, a decoder and a logic power supply. The circuitry provides control of bias current to the diode in the first converter; gain control to the 50 MHz variable gain amplifier; and switching control for IF and external mixer relays and the 1.5 GHz oscillator. In addition, binary band code information is supplied to the 1/n attenuator and to a plug on the rear panel to provide band code information for use by external equipment.

1 FREQUENCY BAND SHAFT ENCODER

Switch A1A4S1 on the end of the frequency scale drum performs the encoding function which provides the five bit binary code. The switch is controlled by the front panel BAND lever. The encoder output is shown in the harmonic number band code chart on the schematic diagram.

2 DECODER DRIVER

A6U11 is an integrated circuit transistor array with five transistors, U11A through U11E. Each transistor is a driver for one of the band code bits. A positive voltage from the shaft encoder biases a driver "on" and results in a negative voltage being applied to the decoder circuitry (approximately -12.6 volts). An open circuit from the shaft encoder biases a decoder driver "off". In the "off" condition the collector of the decoder driver is pulled negative (approximately -11 volts in a no-load condition) by the decoder logic voltages.

3 LOGIC POWER SUPPLY

Breakdown diode CR7 establishes the reference voltage on the base of transistor Q6. Q6 and Q7 form a Darlington pair, with the output voltage at the emitter of Q7 being about one volt more negative than the base voltage of Q6. The output, approximately -7.0V, is applied to the Vdc pins and the -12.6V is applied to the ground pins of the logic modules. This results in a positive 5.6V supply for the decoder logic.

4 DECODER LOGIC

Integrated circuits U3 through U10 decode and provide the frequency scale position information from the shaft encoder and provide control signals, F1 through F17, to control instrument operation. The control signals provide either -12.6 volts or an open circuit. Signals F1 through F10 are applied to the Input Mixer Gain Compensation, Network A16, to set the gain of the 50 MHz variable gain amplifier for each of the bands. Signals F13 through F15 are applied to the same resistor network and control the bias current for the diode in the first converter. Signal F13 sets the bias for bands $n=1$ and $n=3$, F14 sets the bias for band $n=2$ and F15 sets the bias for the $n=4$ band. (See Service Sheets 2 and 5.) Signals F16 and F17 control gain steps of 5 and 15 dB in the 50 MHz variable gain amplifier. The 5 dB step (F17) is activated for all bands except the $n=1 \pm 550$ MHz IF bands. The 15 dB step (F16) is activated for the $n=3 \pm$ through $n=10 \pm$ bands. Signal F11 is -12.6 volts on the $n=1 \pm 550$ MHz IF bands and controls IF switching relays K2 and K3 and also removes voltage from the 1.5 GHz oscillator (see Service Sheet 3). Signal F12 controls the external mixer relay K1 and is -12.6 volts on the $n=6 \pm$ and $n=10 \pm$ bands.

The decoder functions as negative logic with "1" = -12.6 volts, (the activating state) and "0" = a voltage more positive than the -12.6 volts. The output signals F1 through F16 all come from logic elements that have open collector outputs. In the "1" state the logic circuit will supply -12.6 volts for activating the function controlled by that "F" signal. In the "0" state the output of the logic circuit will be open and the voltage will depend on the connected circuitry and can vary from about -11 volts to a positive voltage.

SERVICE SHEET 11 (cont'd)

The following charts provide logic level information for integrated circuits A6U3 through A6U10. "1" = -12 volt with "0" = a more positive level.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the band code switch logic circuitry or to isolate a malfunction in the circuitry, perform the following procedure. Remove power from the analyzer and install Band Buffer Assy A6 on an extender board.

EQUIPMENT REQUIRED

Digital Voltmeter HP 3440A/3444A
Extender Board HP 5060-0258
Logic Clip HP 10528A

1 FREQUENCY SHAFT ENCODER TROUBLESHOOTING

1-a. Connect the digital voltmeter test leads to pin 2 on the extender board (XA6-2) and chassis ground. Apply power to the analyzer and press Band Switch Lever to rotate the frequency band shaft encoder through each band. Check for +20-volts on bands n=2+, 2-, 4+ and 4-. If voltage is not present, check at A1A4S1 A (printed circuit switch on right end of frequency scale drum).

1-b. In the same manner, check for +20 volts at XA6 pins 3, 4, 5 and 6. Voltage should be present as shown in the harmonic number band code chart on the schematic diagram.

2 DECODER DRIVER TROUBLESHOOTING

Check decoder driver A6U11. The collector voltage will vary from a nominal value of -12.4 volts, transistor "on" (+20 volts on XA6 pins from shaft encoder) to approximately -11 volts with the transistor "off". Check the collector voltage of each transistor in A6U11 in both "on" and "off" conditions. A defective decoder logic module will normally pull the collector voltage of the associated driver transistor toward the -7.0 volt logic power supply output when the driver transistor is in the "off" condition.

3 LOGIC POWER SUPPLY TROUBLESHOOTING

Check logic power supply transistors A6Q6, A6Q7 and associated components.

4 DECODER LOGIC TROUBLESHOOTING

4-a. Decoder logic modules A11U3, U4, U5, U8, U9 and U10 can be checked for proper operation using HP 10528A Logic Clip providing the CAUTIONS listed in Logic Clip Manual are followed. Before connecting the Logic Clip, check to ensure that the module pins are not shorted to ground or to the +20 volt source. Check suspected modules for proper operation using charts in Theory of Operation.

SERVICE SHEET 11 (cont'd)

NOTE

When using the Logic Clip a Logic "0" is indicated by a lighted diode and a Logic "1" is indicated by unlighted diode. With -12.6 volts applied to the normal ground pins and -7.0 volts applied the VCC pins, the modules are performing as if connected to a +5.6 volt source.

4-b. Check decoder logic modules A6U6 and A6U7 (relay driver modules) for proper operation using a voltmeter or oscilloscope. Check module operation against the charts in Theory of Operation. For example, with 12.4 volts applied to pins 2 and 7 of A6U7; -7.0 at pins 1 and 8; pin 6 floating (approximately -11 volts) the output at pin 5 should be a logic "1" -12.4 volts. The output at pin 4 should be a logic "0" or zero volts. Check A6U6 in a similar manner.

NOTE

The output from the A6U6 and A6U7 modules are either 0 or -12. The output from modules A6U3 — U5 and U8 — U10 are at -12 when active and at a floating voltage level when not active.

REPAIR INSTRUCTIONS

The A16 Gain Network is mounted on the A6 Band Buffer Assy. This network is factory-selected to match the mixer in the First Converter Assy A12 and should remain with the converter. If the A6 assembly is replaced, remove the A16 assembly and install on new A6 assembly. The A6 printed circuit board contains multi-layer circuit traces. Use extreme care when replacing components.

See Figure 8-4 for pin numbering of logic modules.

SERVICE SHEET 11 (cont'd)

| Logic Module A6U3 Pin Numbers | | | | | | | | | | | | | | Logic Module A6U4 Pin Numbers | | | | | | | | | | | | | | | |
|-------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|-------------------------------|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| n=10+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=10+ | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=10- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=10- | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=6+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=6+ | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=6- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=6- | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=4+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=4+ | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=4- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=4- | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=3+ | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | n=3+ | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=3- | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | n=3- | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=2+ | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | n=2+ | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| n=2- | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | n=2- | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| n=1+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=1+ | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| n=1- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=1- | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| n=1* | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=1* | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=1+ | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=1+ | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| n=1* | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=1* | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |

| Logic Module A6U5 Pin Numbers | | | | | | | | | | | | | | Logic Module A6U6 Pin Numbers | | | | | | | | | |
|-------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|-------------------------------|-------|---|---|---|---|---|---|---|---|
| BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| n=10+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=10+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=10- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=10- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=6+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=6+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=6- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=6- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=4+ | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | n=4+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=4- | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | n=4- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=3+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=3+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=3- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=3- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=2+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=2+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=2- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=2- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=1+ | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | n=1+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=1- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | n=1- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| n=1* | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | n=1* | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| n=1+ | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | n=1+ | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| n=1* | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | n=1* | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |

SERVICE SHEET 11 (cont'd)

| Logic Module A6U7 Pin Numbers | | | | | | | | | Logic Module A6U8 Pin Numbers | | | | | | | | | | | | | | |
|-------------------------------|---|---|---|---|---|---|---|---|-------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| n=10+ | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | n=10+ | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| n=10- | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | n=10- | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| n=6+ | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | n=6+ | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| n=6- | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | n=6- | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| n=4+ | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | n=4+ | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| n=4- | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | n=4- | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| n=3+ | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | n=3+ | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| n=3- | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | n=3- | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| n=2+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=2+ | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| n=2- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=2- | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| n=1+ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=1+ | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| n=1- | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=1- | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| n=1* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=1* | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| n=1‡ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | n=1‡ | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |

| Logic Module A6U9 Pin Numbers | | | | | | | | | | | | | | Logic Module A6U10 Pin Numbers | | | | | | | | | | | | | | | |
|-------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|--------------------------------|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | BAND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| n=10+ | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=10+ | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=10- | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=10- | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=6+ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=6+ | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=6- | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=6- | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=4+ | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | n=4+ | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=4- | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | n=4- | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=3+ | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | n=3+ | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=3- | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | n=3- | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=2+ | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | n=2+ | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=2- | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | n=2- | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=1+ | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=1+ | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| n=1- | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=1- | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| n=1* | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=1* | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| n=1‡ | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | n=1‡ | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |

Figure 8-56. Logic State Versus Harmonic Band Number

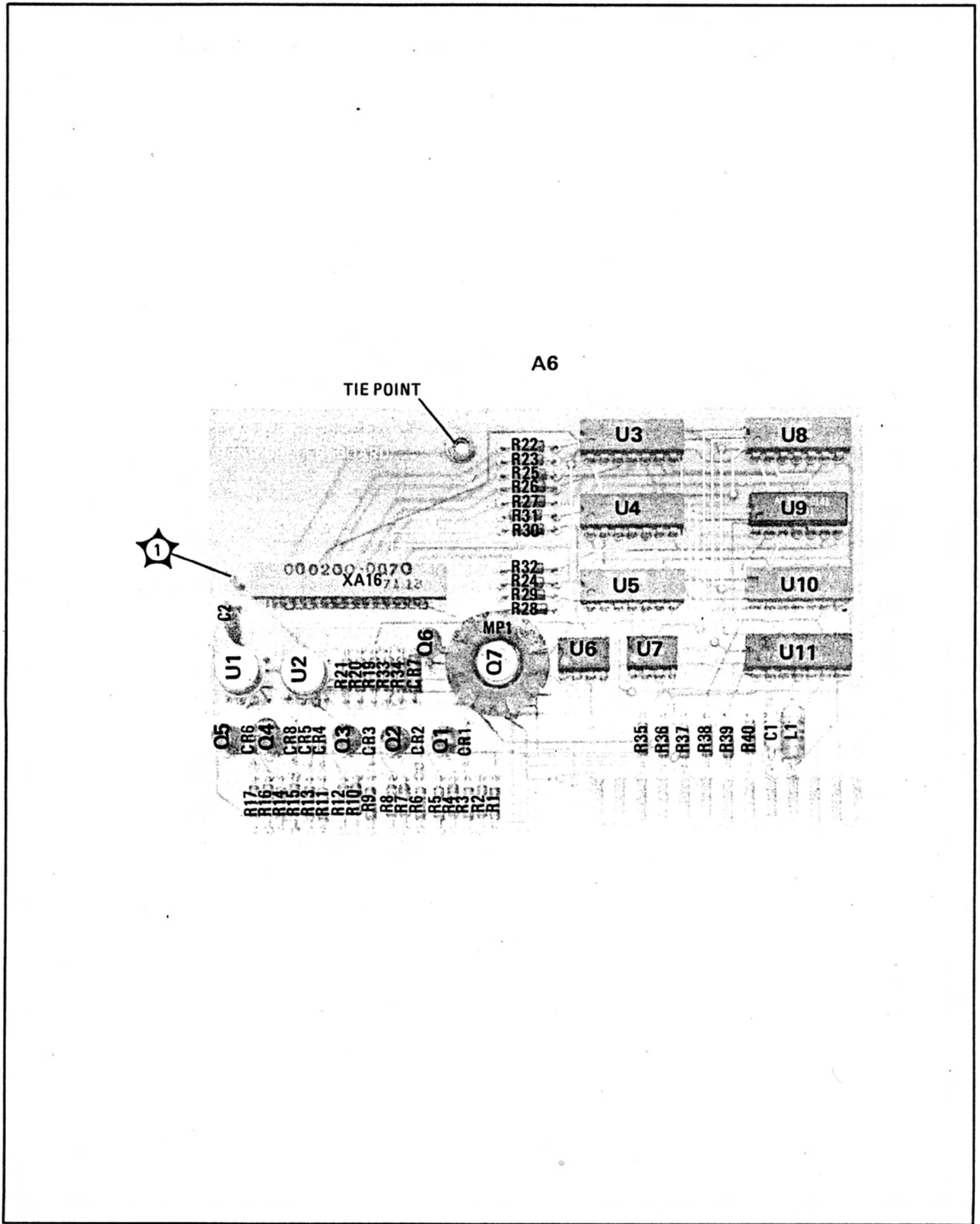
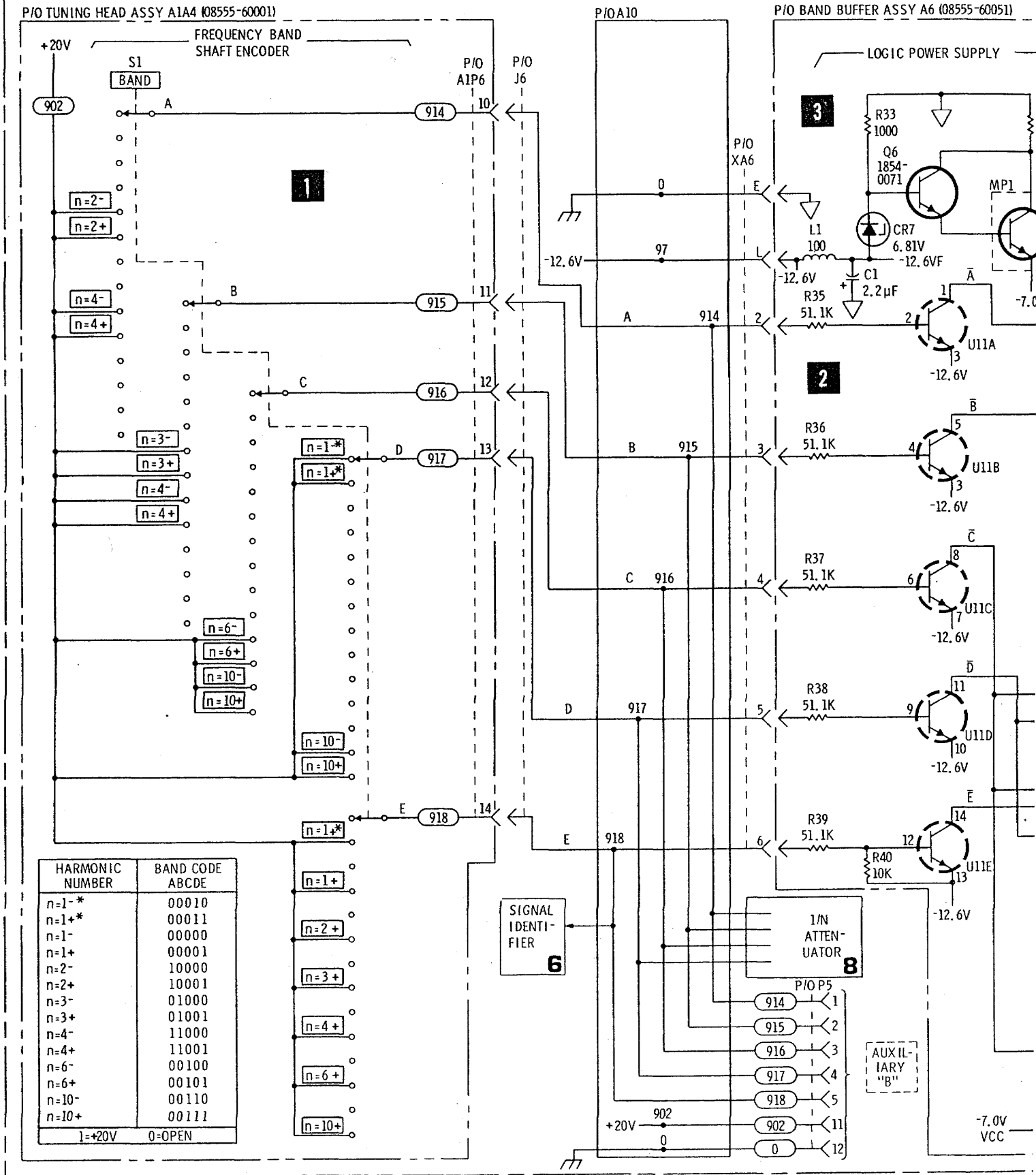
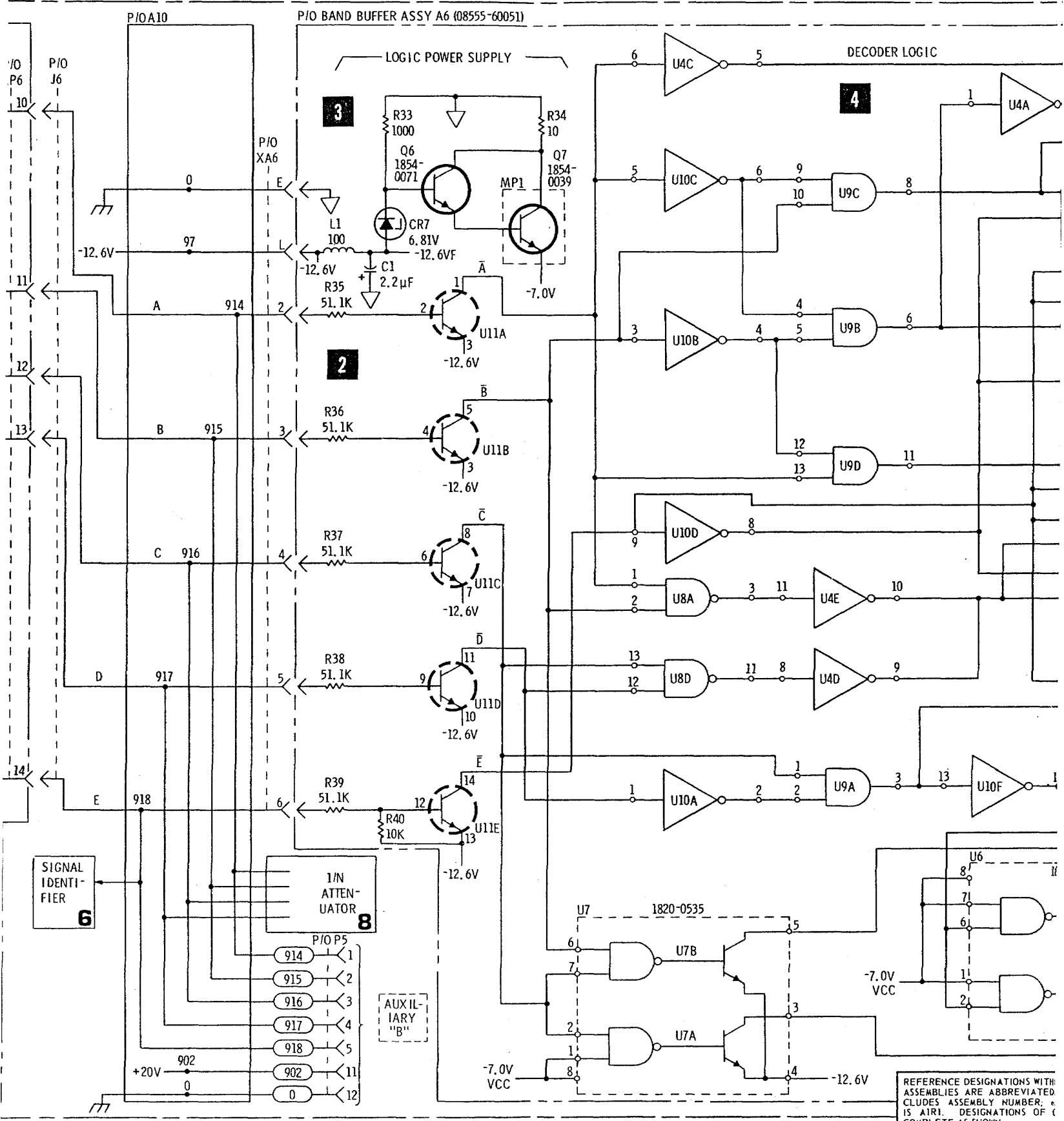


Figure 8-57. Band Buffer Assembly A6



| HARMONIC NUMBER | BAND CODE ABCDE |
|-----------------|-----------------|
| n=1-* | 00010 |
| n=1+* | 00011 |
| n=1- | 00000 |
| n=1+ | 00001 |
| n=2- | 10000 |
| n=2+ | 10001 |
| n=3- | 01000 |
| n=3+ | 01001 |
| n=4- | 11000 |
| n=4+ | 11001 |
| n=6- | 00100 |
| n=6+ | 00101 |
| n=10- | 00110 |
| n=10+ | 00111 |
| 1=+20V 0=OPEN | |

AUXILIARY "B"



REFERENCE DESIGNATIONS WITH ASSEMBLIES ARE ABBREVIATED. CLUDE ASSEMBLY NUMBER; IS AIR1. DESIGNATIONS OF COMPLETE AS SHOWN.

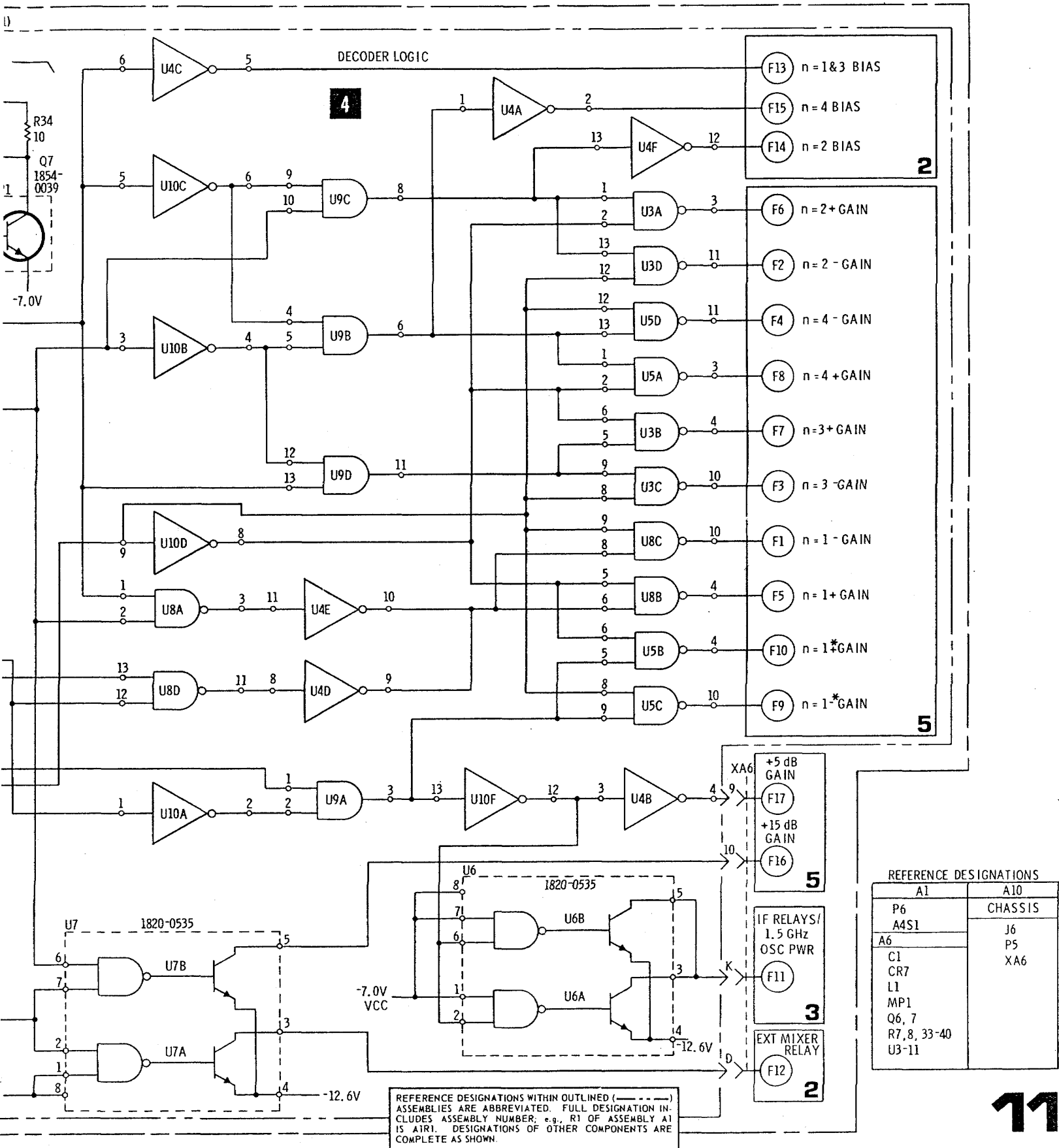


Figure 8-58. Band Code Switch Logic, Schematic Diagram

SERVICE SHEET 12

THEORY OF OPERATION

SCAN WIDTH ATTENUATOR

Service Sheet 12 contains the schematic diagram for that part of the SCAN WIDTH switch which functions as a precision resistive voltage divider to determine the scan width per division. For narrow scan widths (2 kHz to 500 kHz, PER DIVISION) the sweep ramp from the 1/n attenuator is attenuated and applied to the tuning stabilizer circuits where it is combined with the voltage from the FINE TUNE control. The narrow sweep plus fine tune voltage from the tuning stabilizer circuits is applied to the YIG oscillator tickler coil (see Service Sheet 9). For wide scan widths (1 MHz to 200 MHz, PER DIVISION) the sweep ramp is attenuated and applied to the YIG driver circuits where it is combined with the voltage from the FREQUENCY control. This sweep plus tune signal voltage is applied to the main coil of the YIG oscillator (see Service Sheet 7). The attenuation factor for each position of the SCAN WIDTH switch is contained in the Simplified Scan Width Voltage Divider Circuit.

TROUBLESHOOTING PROCEDURE

SCAN WIDTH ATTENUATOR

There are no active components in the voltage divider circuit. The sweep voltage from the IF Section can be used to check the divider circuitry. With the n=1 BAND selected and SCAN MODE set to SINGLE, -5.00 volts is applied to the input of the scan width attenuator. This voltage is available for measurement at the SCAN IN/OUT connector on the IF Section and can be traced through the switching and 1/n attenuator circuitry on Service Sheet 8 to the circuitry shown on Service Sheet 12. The attenuator output on the 93 wire can be measured at A5TP5 and the 938 wire can be measured at A4TP5. Use a digital voltmeter such as the HP 3440/3443 to measure the attenuator output. The chart associated with the simplified schematic contains the voltage level for each position of the SCAN WIDTH PER DIVISION switch. Connector A1P6 can be removed to isolate the voltage divider from the active circuits and an ohmmeter used for point-to-point measurements. For narrow sweep widths, 500 kHz or less, connect between A1P6 pin 37 and pin 39. For wide sweep widths connect between pins 37 and 38. Use the simplified circuit diagram to assist in checking the series resistance between the pins of A1P6 and to chassis ground. (See connector illustration facing Service Sheet 16.)

EQUIPMENT REQUIRED

| | |
|-------------------|----------------|
| Volt-Ohm-Ammeter | HP 412A |
| Digital Voltmeter | HP 3440A/3443A |
| Service Kit | HP 08555-60077 |

TEST PROCEDURE

Perform the troubleshooting procedure listed above and compare voltages with those listed in schematic diagram chart. Perform a point-to-point check to isolate to the component level.

A1A4, A6, A10

Band Code Switch Logic

◀ SERVICE SHEET 11

SERVICE SHEET 12 (cont'd)

| SCAN WIDTH | S1 | S2 | S3 | Attenuation Factor | Output Voltage * | |
|------------|----|----|----|----------------------|------------------|---|
| 200 MHz | - | 1 | - | $E_o = E_{in}$ | -5.00 Vdc | } 93 wire to YIG Driver Sweep Buffer A5TP5 |
| 100 MHz | 1 | 2 | - | $E_o = E_{in}/2$ | -2.50 Vdc | |
| 50 MHz | 1 | 3 | - | $E_o = E_{in}/4$ | -1.25 Vdc | |
| 20 MHz | 1 | 4 | - | $E_o = 0.1 E_{in}$ | -500 mVdc | |
| 10 MHz | 2 | 2 | - | $E_o = .05 E_{in}$ | -250 mVdc | |
| 5 MHz | 2 | 3 | - | $E_o = .025 E_{in}$ | -125 mVdc | |
| 2 MHz | 2 | 4 | - | $E_o = .01 E_{in}$ | - 50 mVdc | |
| 1 MHz | 3 | 2 | - | $E_o = .005 E_{in}$ | - 25 mVdc | |
| 500 kHz | 1 | 5 | 2 | $E_o = E_{in}/4$ | -1.25 Vdc | } 938 wire to Scan + Fine Tune Summing Ampl. A4TP5 |
| 200 kHz | 1 | 5 | 3 | $E_o = 0.1 E_{in}$ | -500 mVdc | |
| 100 kHz | 2 | 5 | 1 | $E_o = .05 E_{in}$ | -250 mVdc | |
| 50 kHz | 2 | 5 | 2 | $E_o = .025 E_{in}$ | -125 mVdc | |
| 20 kHz | 2 | 5 | 3 | $E_o = .01 E_{in}$ | - 50 mVdc | |
| 10 kHz | 3 | 5 | 1 | $E_o = .005 E_{in}$ | - 25 mVdc | |
| 5 kHz | 3 | 5 | 2 | $E_o = .0025 E_{in}$ | - 12.5 mVdc | |
| 2 kHz | 3 | 5 | 3 | $E_o = .001 E_{in}$ | - 5 mVdc | |

*See Troubleshooting Procedure for measurement conditions.

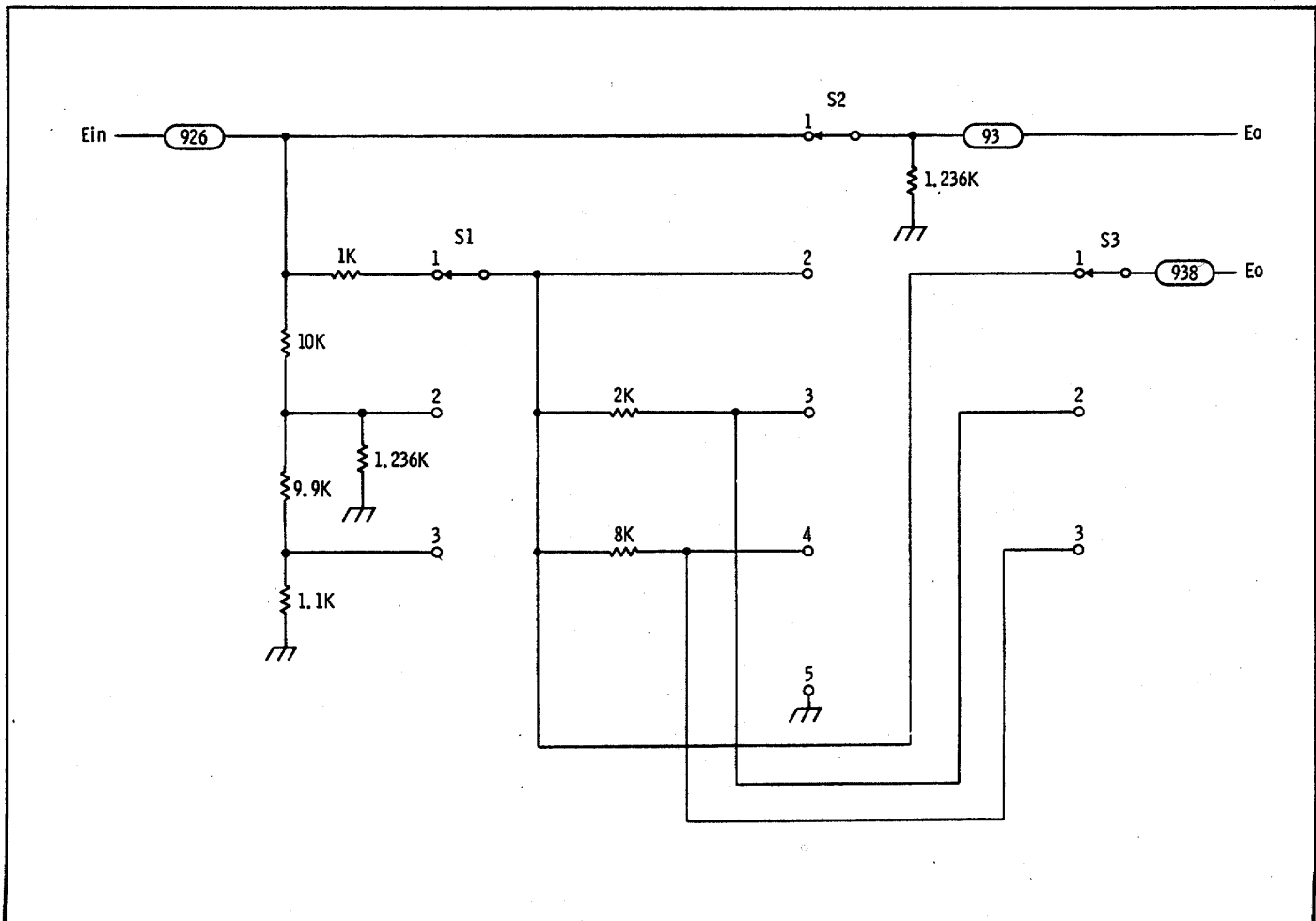


Figure 8-59. Simplified Scan Width Circuit

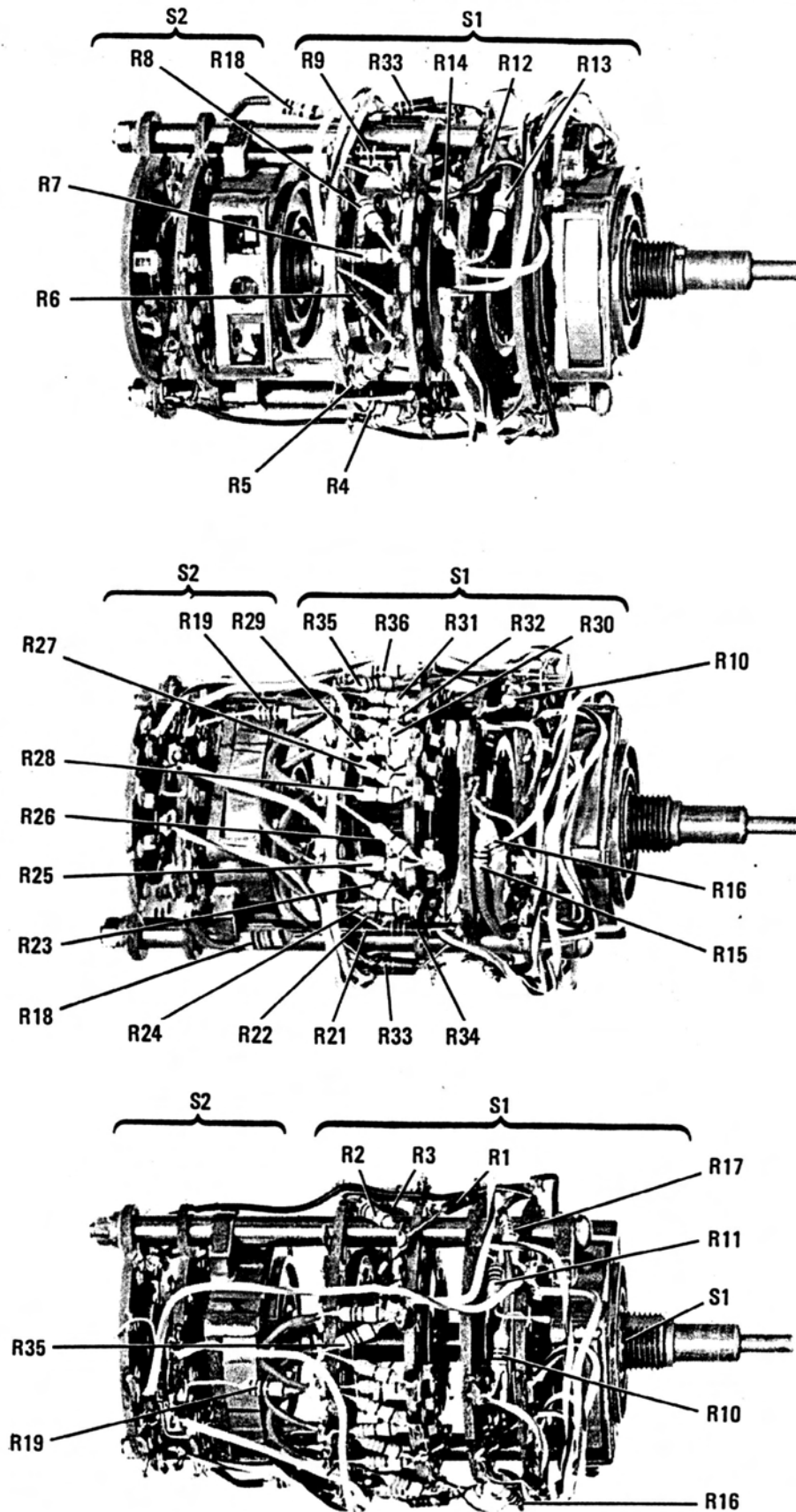
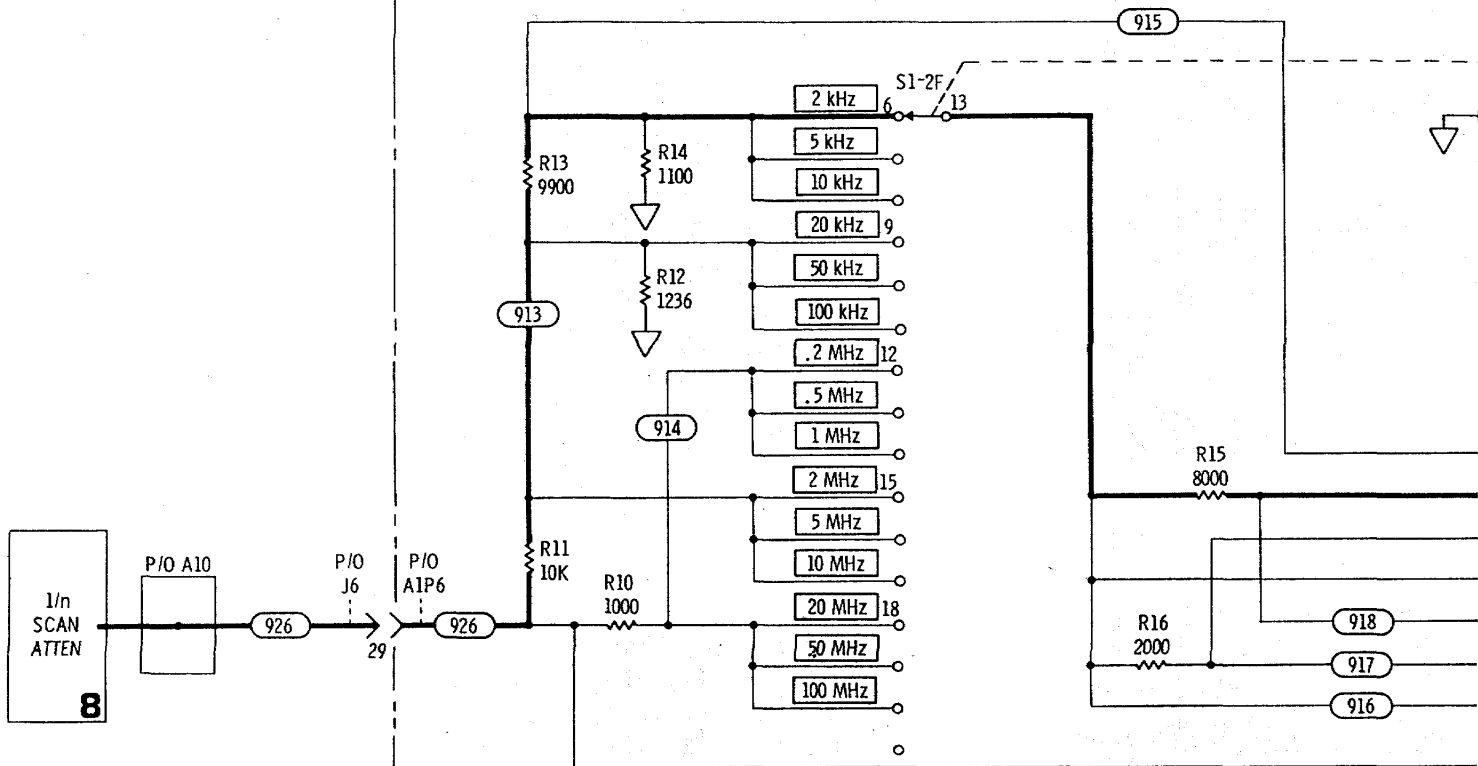
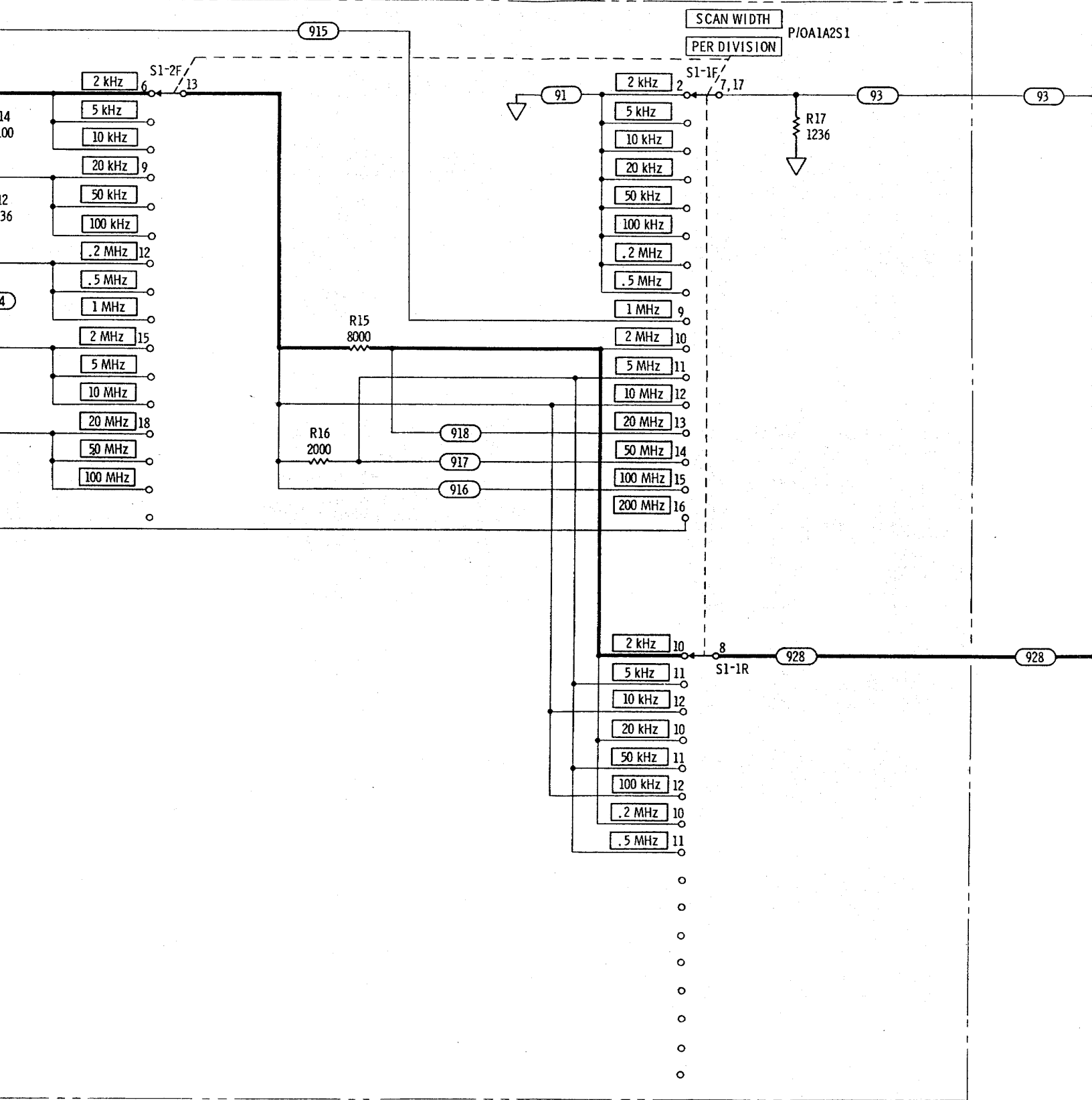
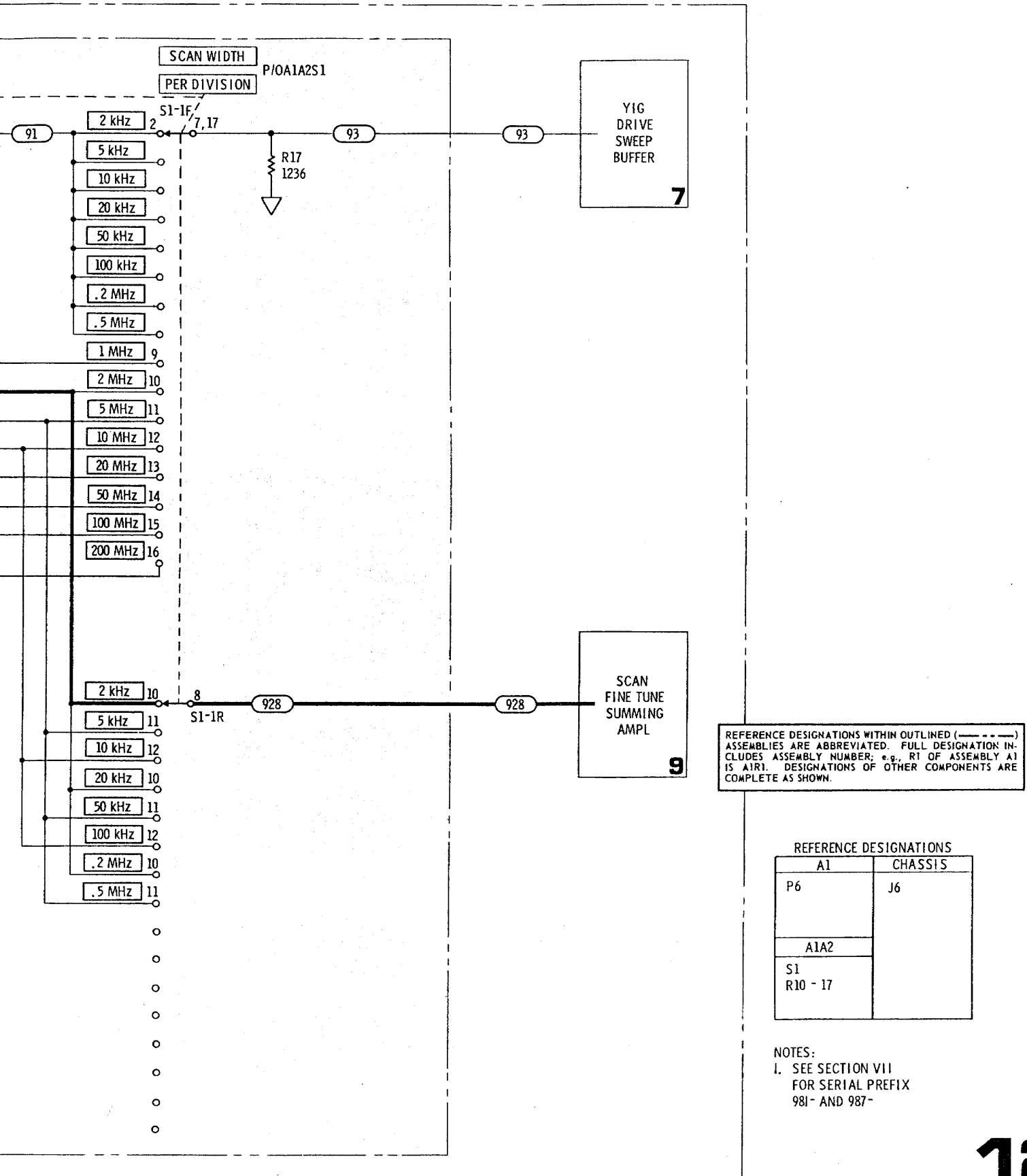


Figure 8-60. Scan Width Switch Assembly A1A2

P/O SCAN WIDTH SWITCH ASSY A1A2 (08555-60010)







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 | |
|------------------------|---------|
| A1 | CHASSIS |
| P6 | J6 |
| A1A2 | |
| S1 R10 - 17 | |

NOTES:
 1. SEE SECTION VII FOR SERIAL PREFIX 981- AND 987-

Figure 8-61. Scan Width Switch Assembly A1A2

SERVICE SHEET 13

THEORY OF OPERATION

I ANALOGIC

Service Sheet 13 contains the schematic diagram for the RF Section Analogic circuit. Refer to the IF Section Operating and Service Manual for the balance of the Analogic circuit.

The Analogic circuit is basically a small analog computer which uses resistor networks to weight the SCAN WIDTH and BANDWIDTH switches in the RF Section and the SCAN TIME PER DIVISION and VIDEO FILTER switches in the IF Section. When the switches are set to any combination of positions which do not permit accurate amplitude calibration of the analyzer (i.e., the amplitude error due to excessive sweep rate might be larger than 0.5 dB), the DISPLAY UNCAL lamp is caused to illuminate. The light will be on when the BANDWIDTH is too narrow or the SCAN WIDTH PER DIVISION is too wide for the position of the VIDEO FILTER and SCAN TIME switches. The Analogic circuit generates a simulated signal according to the position of the switches and has no actual connection to the analyzer signal processing circuits.

The switch wafers associated with the Analogic circuit controls which resistors are connected in parallel between the -10 Vdc supply and each of the two input lines of the Analogic threshold and light driver circuits in the IF Section. The normal analogic line (957 wire) is responsible for enabling the threshold and light driver circuit with the VIDEO FILTER OFF. When the VIDEO FILTER is ON, the video filter analogic line (956 wire) has control. At any time that the total resistance between the -10 Vdc supply and either input line is below a set value, the current will be sufficient to enable the threshold and light driver circuit, causing the DISPLAY UNCAL light to illuminate.

In the SCAN WIDTH PER DIVISION mode the resistive networks for the BANDWIDTH and SCAN WIDTH PER DIVISION switches are connected in parallel (along with the VIDEO FILTER and SCAN TIME PER DIVISION resistive networks in the IF Section). With a BANDWIDTH switch setting of 300 kHz and a SCAN WIDTH PER DIVISION switch setting of 2 kHz only resistors R21 and R22 are connected in parallel with the resistive networks in the IF Section. (See Simplified RF Section Analogic Circuit.) As the SCAN WIDTH PER DIVISION switch is increased to 200 MHz PER DIVISION or the BANDWIDTH switch is decreased to 0.1 kHz additional resistors are switched in the circuit.

In the FULL scan mode of operation, only resistors R18 and R19 are in parallel with the resistive networks in the IF Section.

In the ZERO scan mode, only the resistive network associated with the VIDEO FILTER (IF Section) is connected into the Analogic circuit. This by itself cannot turn on the DISPLAY UNCAL lamp.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the RF Section Analogic circuit or to isolate a malfunction in the RF Section Analogic circuit, perform the following procedure. Remove power from the analyzer and disconnect A1P6 from J6. This isolates the BANDWIDTH and SCAN WIDTH switches from the rest of the analogic circuitry.

EQUIPMENT REQUIRED

Digital Voltmeter HP 3440A/3444A

I ANALOGIC TROUBLESHOOTING

1-a. Connect the digital voltmeter test leads to A1P6 pin 52 (907 -10 Vdc) and pin 20 (957 analogic line). (See connector illustrations facing Service Sheet 16.) Set digital

SERVICE SHEET 13 (cont'd)

voltmeter FUNCTION to OHMS and RANGE to 100K. Set RF SECTION SCAN WIDTH to PER DIVISION, SCAN WIDTH PER DIVISION to 2 kHz and BANDWIDTH to 300 kHz. Rotate SCAN WIDTH PER DIVISION switch from 2 kHz through 200 MHz and compare with resistance given in the table below. Readings should be within 5% of the values shown.

1-b. Connect the digital voltmeter between A1P6, pin 52 and pin 19 (956 analogic line). Rotate SCAN WIDTH PER DIVISION switch from 200 MHz back to 2 kHz.

1-c. Rotate BANDWIDTH switch from 300 kHz through 0.1 kHz and compare with resistance given in the table.

1-d. Connect digital voltmeter test leads between A1P6, pin 52 and pin 20. Rotate BANDWIDTH switch from 0.1 kHz to 300 kHz and compare with resistance table.

1-e. Rotate SCAN WIDTH to FULL scan. Check resistance between A1P6, pin 52 and pin 20 (same connection as step 1-d). Move test lead from pin 20 to pin 19 to complete the comparison with the values shown in the table. Readings taken should be within 5% of the values shown.

1-f. If resistance values are incorrect, use the simplified analogic circuit to help determine which resistors or wafer contacts could be defective. Check individual resistors and switch wafers. See component location illustrations.

2 SWITCH TROUBLESHOOTING

2-a. With SCAN WIDTH switch in the PER DIVISION and in FULL scan modes, measure resistance between A1P6, pin 52 (907 wire) and A1P6, pin 21 (958 wire), to check the -10 Vdc supply to the IF Section analogic. Resistance should be 0 ohms. In ZERO scan, resistance should be infinity.

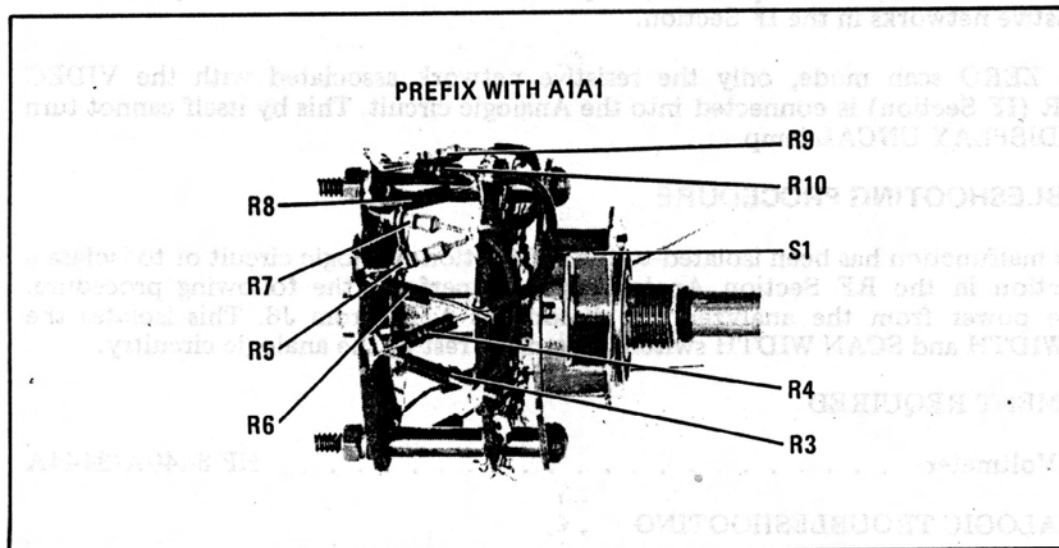


Figure 8-62. Bandwidth Switch Assembly A1A1

SERVICE SHEET 13 (cont'd)

| SCAN WIDTH PER DIVISION (a) | (907 Wire, A1P6-67) | (907 Wire, A1P6-67) |
|--------------------------------|---------------------------|---------------------------|
| | to (957 Wire, A1P6-25) | to (956 Wire, A1P6-24) |
| 2 kHz | 41.5K | 44.3K |
| 5 kHz | 36.5K | 39 K |
| 10 kHz | 32.7K | 35 K |
| 20 kHz | 29.8K | 31.8K |
| 50 kHz | 27.5K | 29.2K |
| 100 kHz | 25.5K | 27.2K |
| .2 MHz | 23.9K | 25.4K |
| .5 MHz | 22.5K | 23.9K |
| 1 MHz | 21.4K | 22.6K |
| 2 MHz | 20.3K | 21.5K |
| 5 MHz | 19.4K | 20.5K |
| 10 MHz | 18.6K | 19.7K |
| 20 MHz | 17.9K | 18.9K |
| 50 MHz | 17.3K | 18.2K |
| 100 MHz | 16.7K | 17.6K |
| 200 MHz | 16.2K | 17.1K |

BANDWIDTH (b)

| | | |
|---------|-------|-------|
| 300 kHz | 41.4K | 44.3K |
| 100 kHz | 31.1K | 35.2K |
| 30 kHz | 25.1K | 29.9K |
| 10 kHz | 21.1K | 26.5K |
| 3 kHz | 18.3K | 23.9K |
| 1 kHz | 16.3K | 22.1K |
| .3 kHz | 14.7K | 20.8K |
| .1 kHz | 13.5K | 19.7K |

SCAN WIDTH

| | | |
|------|-------|-------|
| FULL | 14.3K | 14.9K |
|------|-------|-------|

- (a) BANDWIDTH at 300 kHz.
 (b) SCAN WIDTH at 2 kHz PER DIVISION

Simplified Diagram Switching Logic

| SCAN WIDTH PER DIVISION | Switches Closed | BANDWIDTH Switch | Switches Closed |
|-------------------------|------------------|---------------------|--------------------|
| 2 kHz | None | | |
| 5 kHz | 1 | | |
| 10 kHz | 1, 2 | 0.1 kHz | 1, 2, 3, 4 |
| 20 kHz | 1, 2, 3 | 0.3 kHz | 1, 2, 3 |
| 50 kHz | 1, 2, 3, 4 | 1 kHz | 1, 2 |
| 100 kHz | 7 | 3 kHz | 1 |
| 0.2 MHz | 1, 7 | 10 kHz | 2, 3, 4 |
| 0.5 MHz | 1, 2, 7 | 30 kHz | 2, 3 |
| 1 MHz | 1, 2, 3, 7 | 100 kHz | 2 |
| 2 MHz | 1, 2, 3, 4, 7 | 300 kHz | None |
| 5 MHz | 6 | | |
| 10 MHz | 1, 6 | | |
| 20 MHz | 1, 2, 6 | | |
| 50 MHz | 1, 2, 3, 6 | | |
| 100 MHz | 1, 2, 3, 4, 6 | | |
| 200 MHz | 1, 2, 3, 4, 5, 6 | | |

A1A2

Scan Width Switch Assembly

← SERVICE SHEET 12

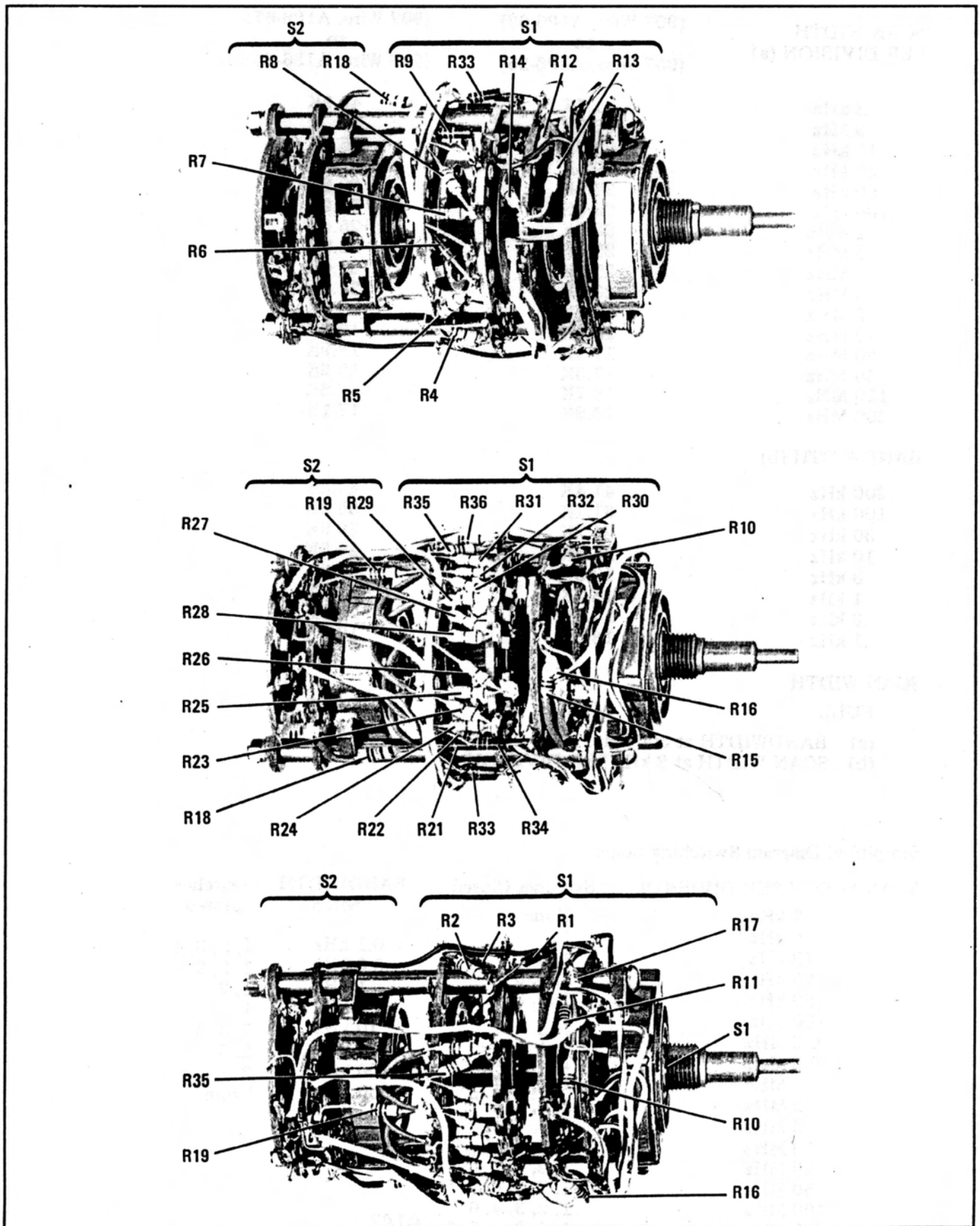


Figure 8-63. Scan Width Switch Assembly A1A2

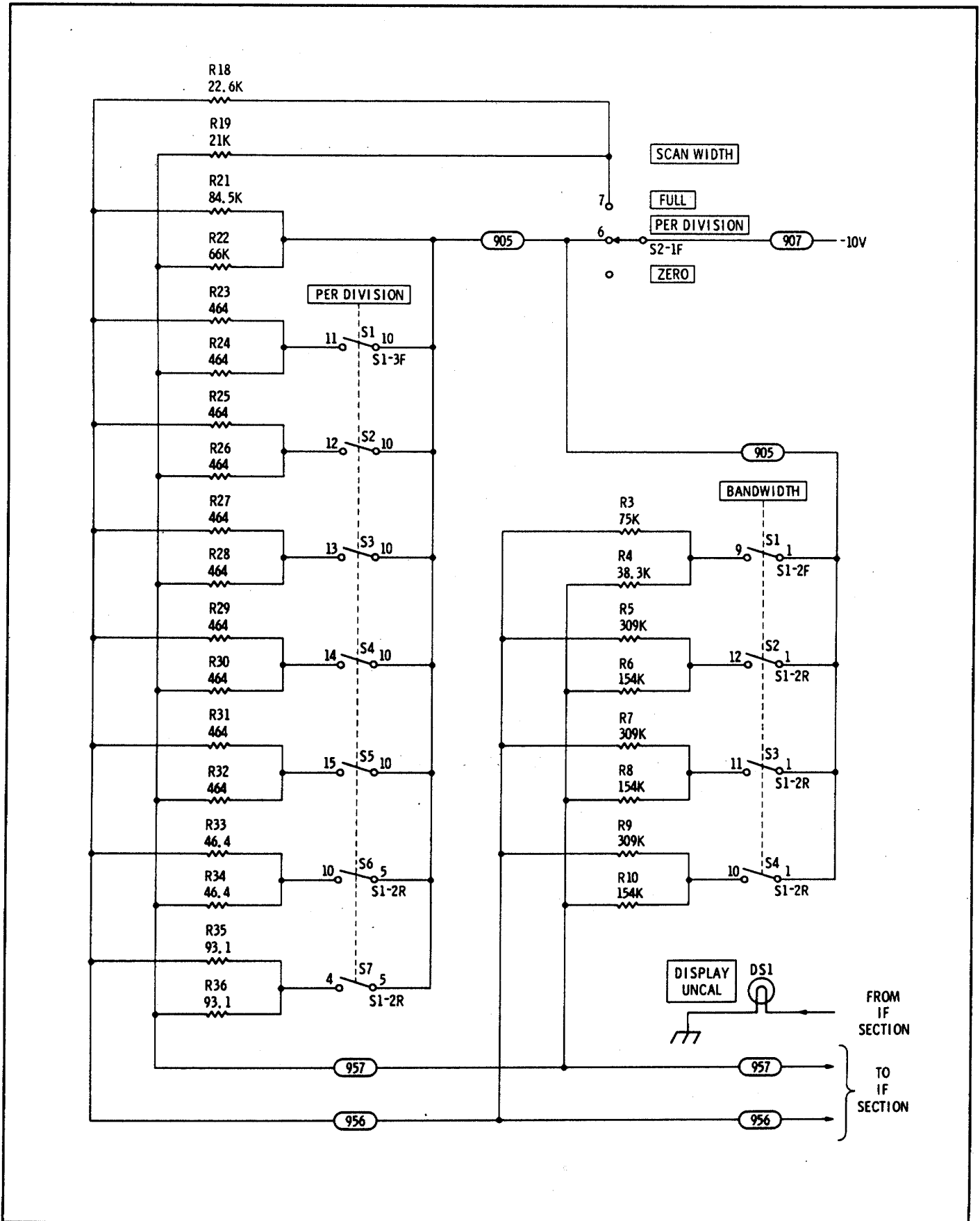
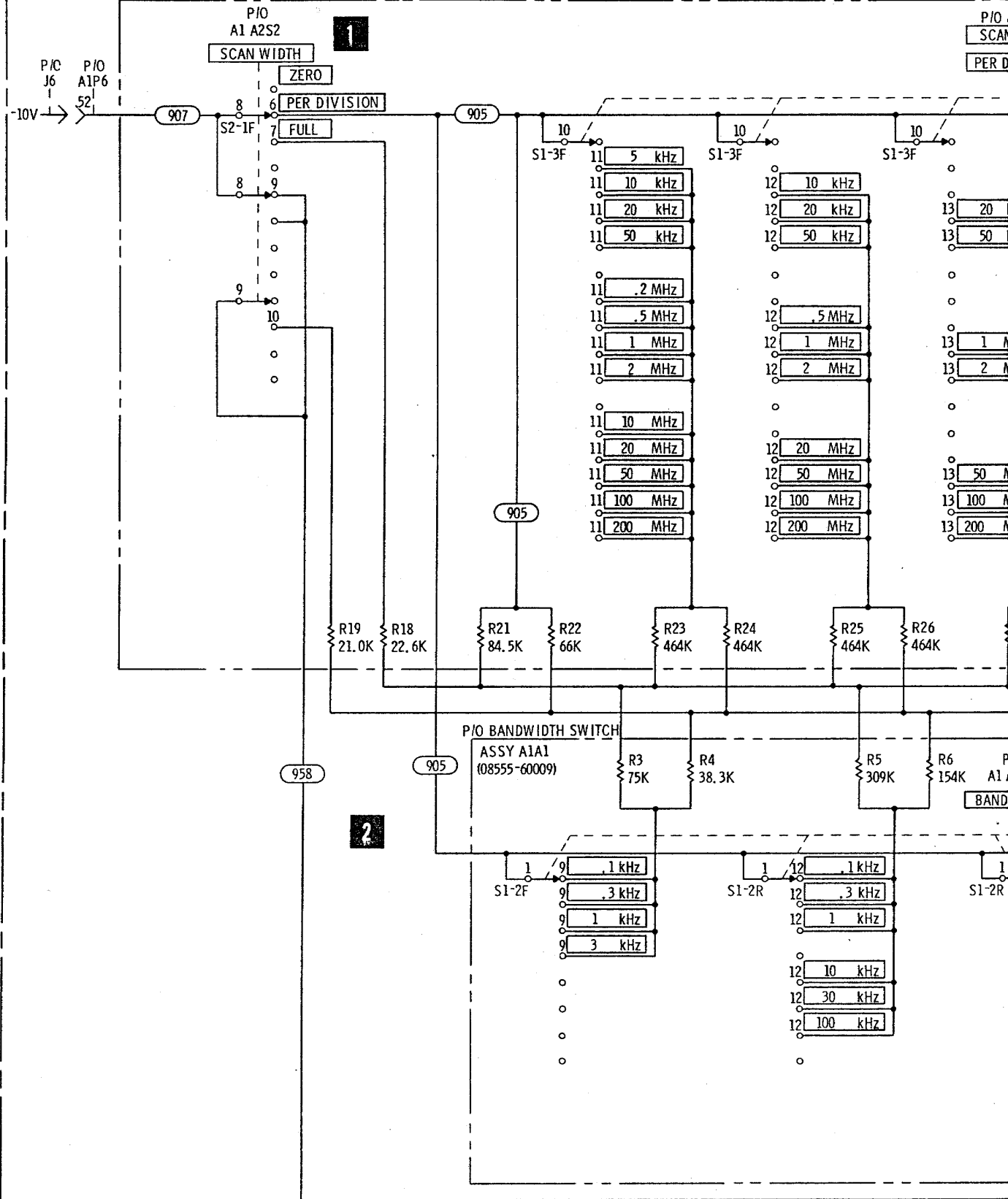


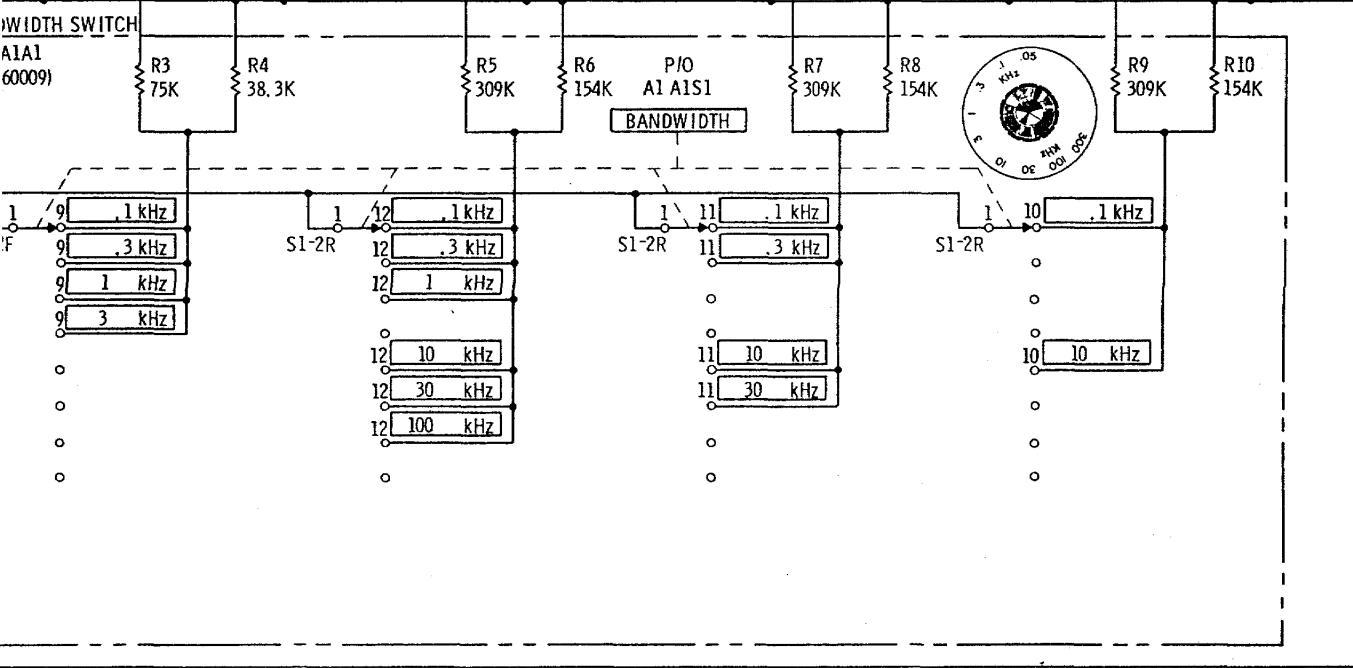
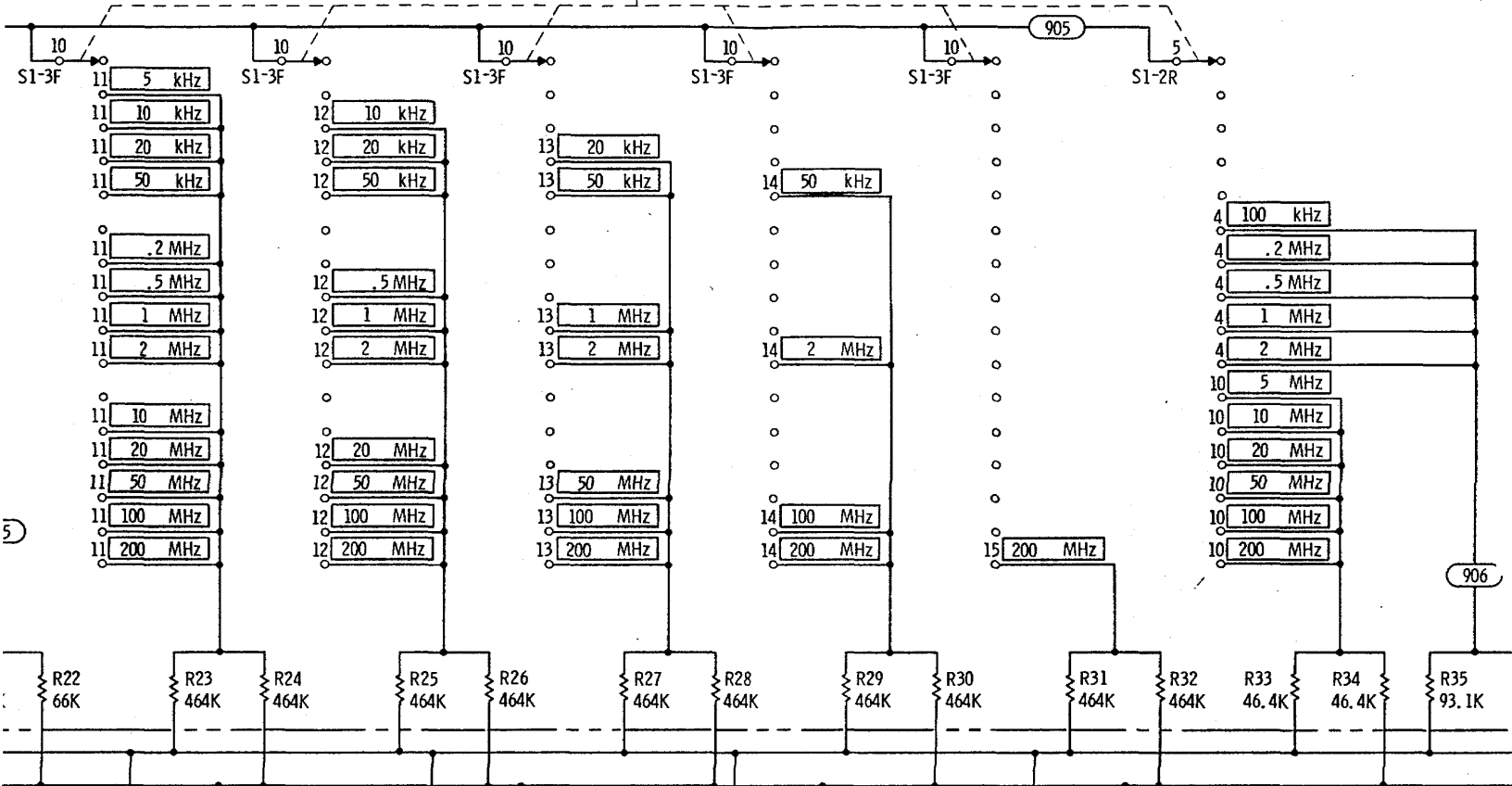
Figure 8-64. Simplified RF Section Analogic Circuit Diagram

P/O 8555A RF SECTION

P/O SCAN WIDTH SWITCH ASSY A1A2 (08555-60010)



P/O A1 A2S1
SCAN WIDTH
PER DIVISION



ANALOGIC VOLTAGE TO
IF SECTION SCAN TIME SWITCH

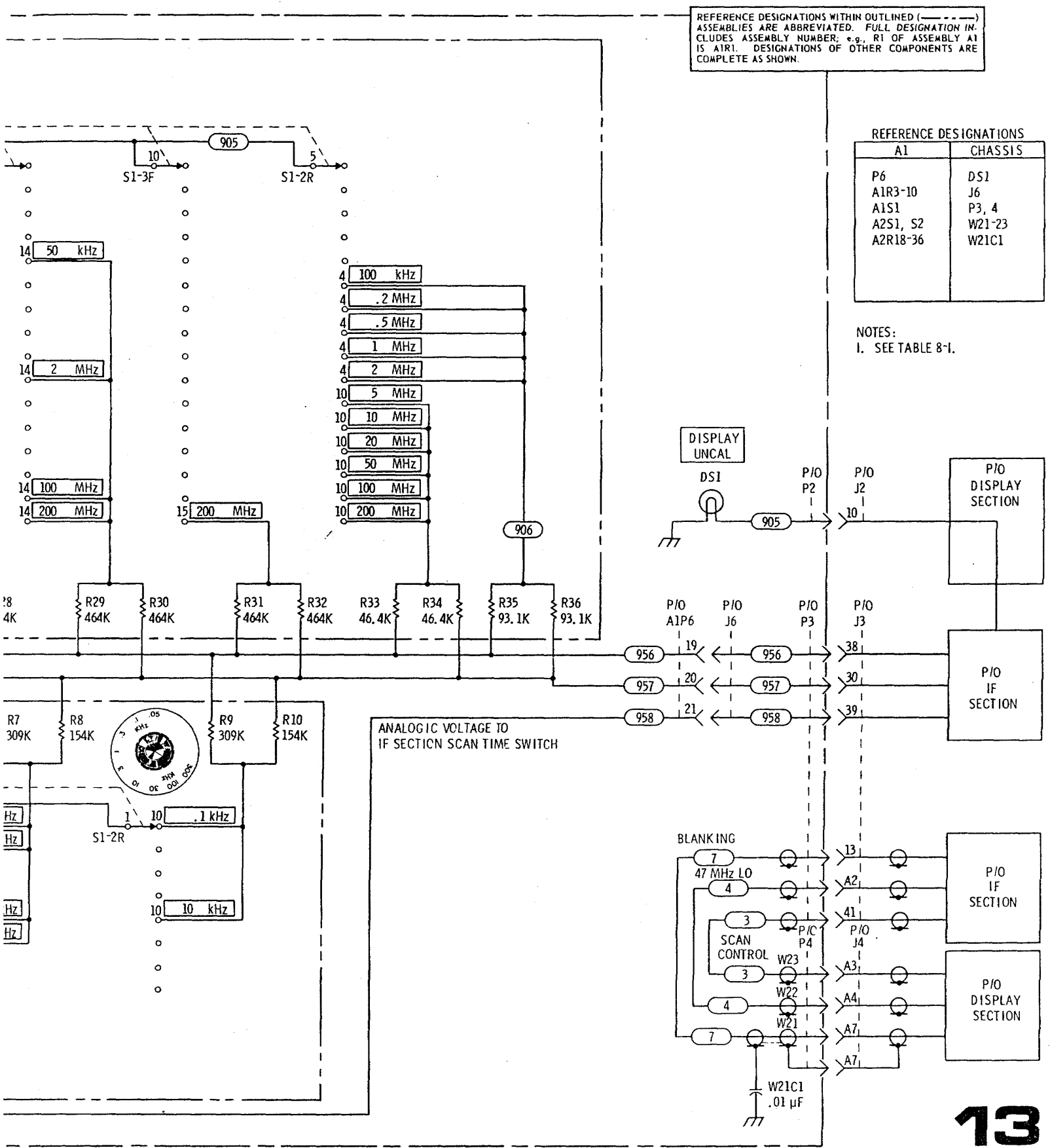


Figure 8-65. RF Section Analogic

SERVICE SHEET 14

THEORY OF OPERATION

Service Sheet 14 contains the schematic diagram for the BANDWIDTH switching, which determines the bandwidth of the 3 MHz IF in the IF Section. The AMPL CAL circuit is also contained on the schematic.

The RF Section contains only the voltage switching circuitry for the IF Section. Actual bandwidth switching is accomplished in the IF Section with diode switches.

1 P/O SCAN WIDTH SWITCH

The switch section shown provides -12.6 volts to the Bandwidth Switch Assembly for use in selecting the desired bandwidths when the analyzer is operated in the ZERO or PER DIVISION modes. In the FULL scan mode this switch removes the -12.6 volts from the Bandwidth Switch and connects it directly to the 923 control line to select the 300 kHz bandwidth.

2 P/O BANDWIDTH SWITCH

This portion of the BANDWIDTH switch provides negative and/or positive voltages from the RF Section to the IF Section bandwidth switching circuitry. The switching provides +20 volts to the 0.1, 0.3, 1, 30 and 100 kHz control lines except for the control line of the bandwidth selected. The selected bandwidth control line has -12.6 volts applied. (See IF Section Operating and Service Manual for the 3 MHz bandwidth switching.)

3 AMPLITUDE CALIBRATION CIRCUIT

The amplitude calibration circuit controls the gain of the 3 MHz calibration amplifier in the IF Section. Resistor A1R2 is an operator adjustment (front panel screwdriver adjustment) to compensate for overall gain variations between RF and IF Sections. The circuit is adjusted to provide absolute amplitude calibration of the displayed signal. See IF Section Operating and Service Manual (3 MHz Amplifier Assy) for the balance of the circuitry.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the RF Section or to isolate a switching or wiring malfunction in the RF Section, perform the following procedure. Remove power from the analyzer and disconnect A1P6 from J6. This isolates the BANDWIDTH switch, the SCAN WIDTH switch, and the AMPL CAL circuitry from the chassis wiring.

EQUIPMENT REQUIRED

Digital Voltmeter HP 3440A/3444A

TEST PROCEDURES

1. Connect the digital voltmeter test leads to A1P6, pin 66 (97, -12.6 Vdc line and pin 53 (923, 300 kHz line). (See illustrations facing Service Sheet 16 for connector pin locations and wire color codes.) Set digital voltmeter FUNCTION to OHMS and RANGE to 1000.

SERVICE SHEET 14 (cont'd)

Set analyzer SCAN WIDTH to FULL and BANDWIDTH to 300 kHz. Resistance should be 0 ohms. Set SCAN WIDTH to ZERO. Resistance between A1P6, pin 51 and pin 42 should be 10 ohms (A1A1R1). Switch SCAN WIDTH to PER DIVISION, resistance should remain 10 ohms. Check each of the other bandwidth switching lines by checking between A1P6, pin 51, and pins 42, 41, 40, 39, 38, 37, and 36. Note there is no 3 kHz switching line (see schematic diagram).

Connect meter leads to A1P6, pin 51 and pin 36 (0.1 kHz bandwidth selection line). Resistance should be 100 ohms for all positions of the BANDWIDTH switch except 0.1 kHz. Measure resistance between pin 51 and pins 37, 38, 40, and 41. Resistance should be 100 ohms for all positions of the BANDWIDTH except that position associated with the selection under test.

Check the AMPL CAL line by measuring resistance between A1P6, pins 53 and 18. Actual value will depend on setting of AMPL CAL potentiometer.

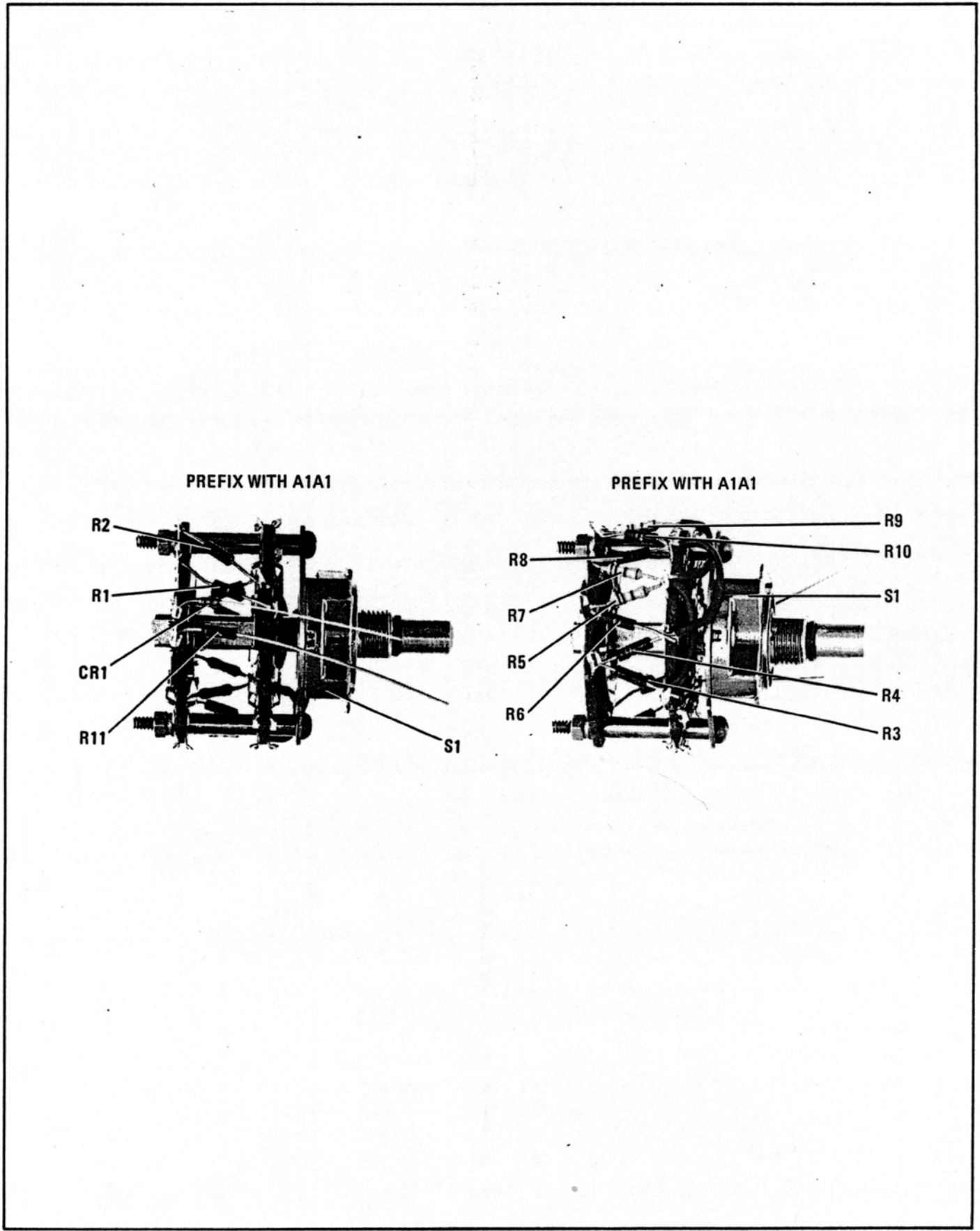
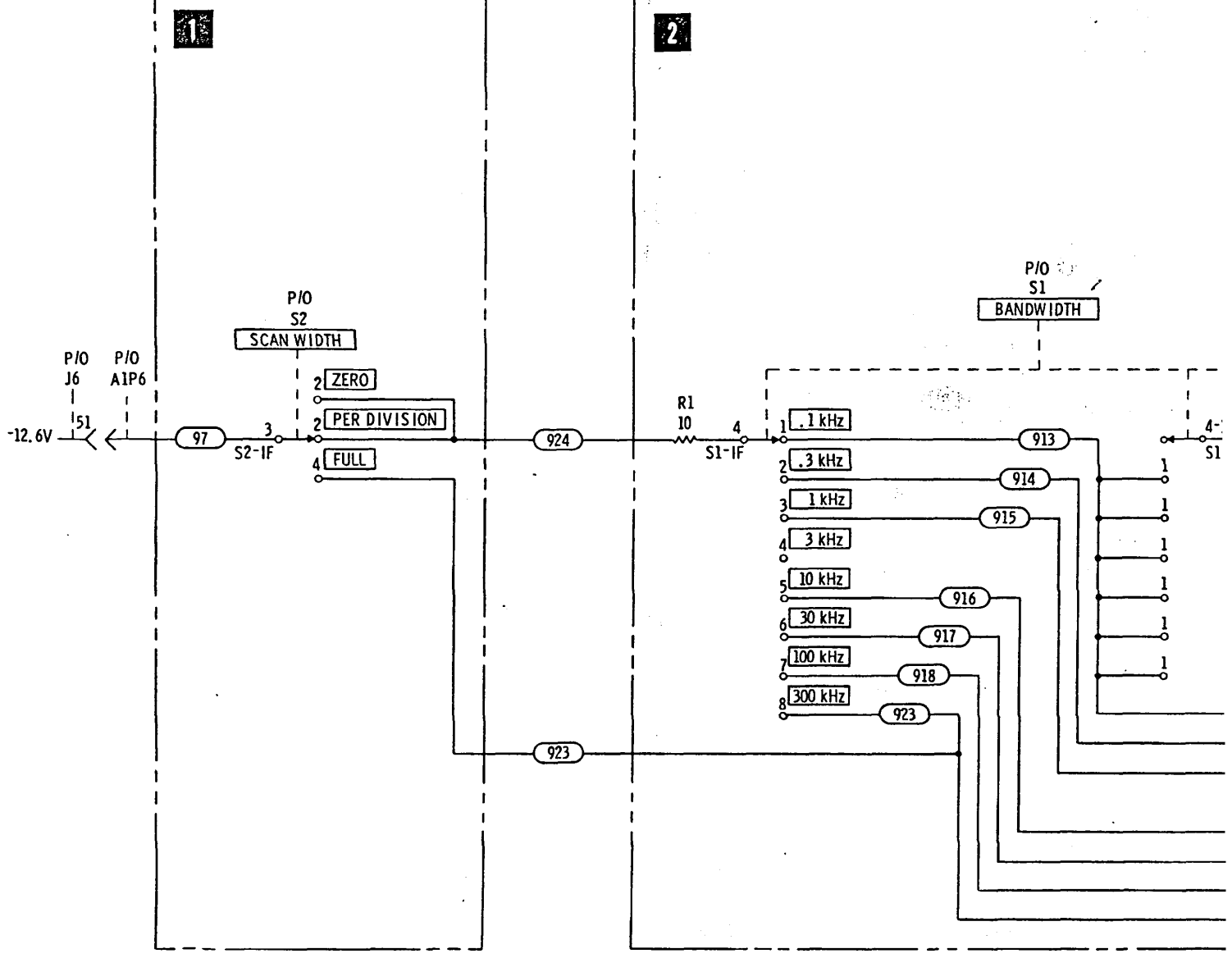


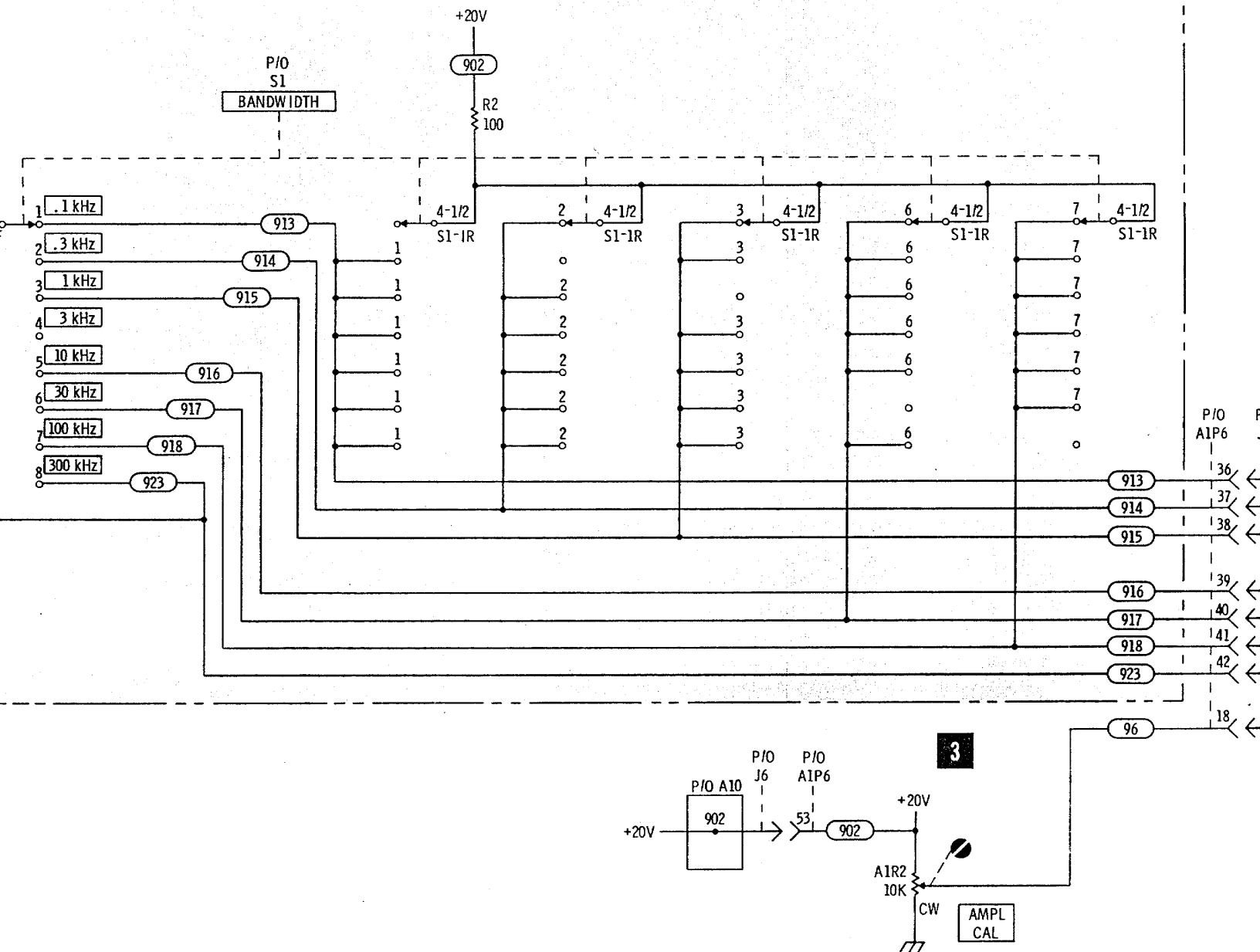
Figure 8-66. Bandwidth Switch Assembly A1A1

P/O 8555A RF SECTION

P/O SCAN WIDTH SW ASSY A1A2 (08555-60010)

P/O BANDWIDTH SW ASSY A1A1 (08555-60009)





REFERENCE DESIGNATIONS WITH
ASSEMBLIES ARE ABBREVIATED.
INCLUDES ASSEMBLY NUMBER; *
IS A1R1. DESIGNATIONS OF C
COMPLETE AS SHOWN.

Figure 8

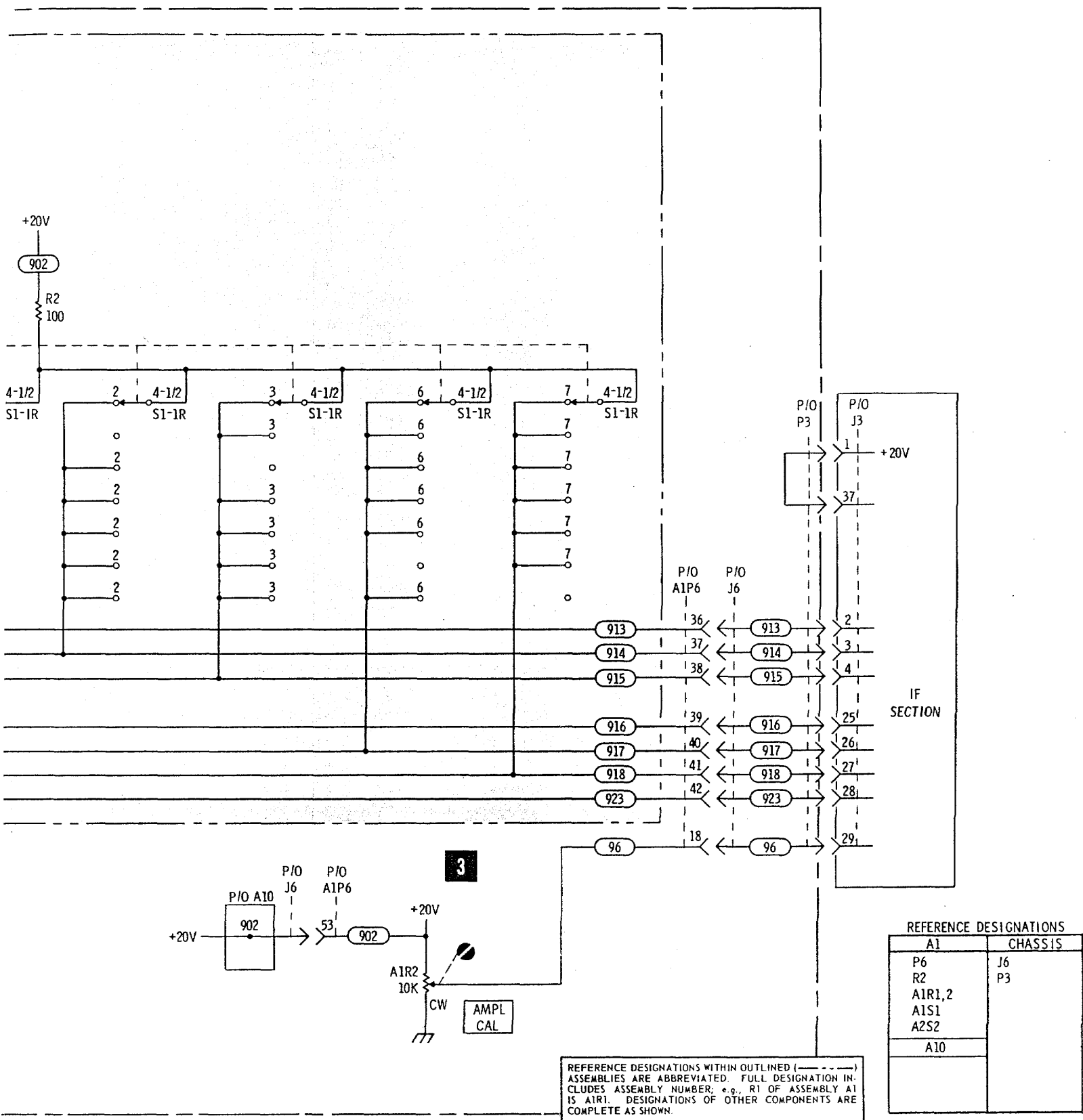


Figure 8-67. Bandwidth Switching and Ampl Cal

SERVICE SHEET 15

THEORY OF OPERATION

Service Sheet 15 contains the schematic diagram for the Switching Regulator Assy A9 and the +10, +20 Volt Regulator Assy A8. The +100 volt supply, from the Display Section, is converted to approximately +26 volts by the switching regulator. A switching regulator is used as it is much more efficient than a conventional series regulator when there is a large difference between input and output voltages. (In this case power consumption is approximately 22 watts less than it would have been if a conventional series regulator had been used.)

The +20 volt switching regulator output is not used directly to power any circuits in the instruments, but is reduced to +20 and +10 volts by conventional series voltage regulators. These "post" regulators provide better regulation and lower ripple than obtainable from the switching regulator.

1 SWITCHING REGULATOR

A simplified switching regulator circuit is shown below. When switch S is closed, capacitor C is charged through inductor L, toward the input voltage level. However, before C reaches the input level, S is opened. When S is opened, diode D provides a path for current which had been established in L. By operating S at a fast rate the voltage pulses at the switch are filtered by L and C and the average voltage level of the pulses is developed across the load. The average voltage level is dependent on the ratio of the "on" to "off" time of switch S.

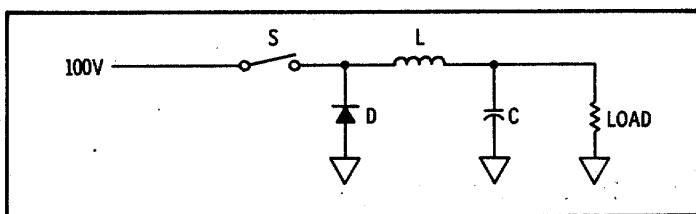


Figure 8-68. Switching Regulator Simplified Diagram

Transistor A9A1Q2 (Figure 8-72) functions as the regulator switch. The transistor is switched "on" and "off" completely rather than functioning as a variable resistor series pass element. Operating in this manner the efficiency of the regulator approaches 100%. Transformer T1 functions both as an

inductor and a transformer. Winding 5 and 8 act as an inductor (L) and capacitor C7 is the output capacitor (C). Winding 1 and 4 provides regenerative (positive) feedback to the bases of the switching transistors. This ensures rapid and complete switching action. Diodes CR3 and CR4 provide a path for current flowing in the inductor when the switching transistors are turned "off". Transistors U1D and U1E and their associated circuitry form an astable multivibrator that controls the switching transistors (U1 is an integrated circuit transistor array, consisting of five identical transistors). The multivibrator operates at a switching rate of about 100 kHz to provide positive and negative pulses to trigger the switching transistors. Negative pulses are coupled through C3 and CR1 to the transistor bases; while positive pulses are coupled through C3 and amplified by Q1.

Timing of the multivibrator is modified by the comparison amplifier U1A-U1B and/or current limit sense transistor U1C. The reference for the comparison amplifier is established at the base of U1A. If the output voltage is too high, conduction by transistor U1B will delay generation of a "turn-on" pulse and reduce the length of the pulse by means of the current limit sense transistor U1C. During initial "turn-on", the current limit circuit is active and allows capacitor C7 to charge in a series of steps.

2 +10, +20 VOLT REGULATOR ASSEMBLY A8

The +10 and +20 Volt regulators are series voltage regulation circuits, employing negative feedback to keep the output voltages constant. The +26 volts from the

SERVICE SHEET 15 (cont'd)

switching regulator is filtered by A8L1 and C1, to reduce the 100 kHz ripple, before being applied to the regulator circuits.

2-a. +20 VOLT REGULATOR

Transistor Q2 is the series regulator and functions as a variable resistance in series with the output. The conduction of this transistor is controlled by operational amplifier U2.

A fixed reference voltage from breakdown diode CR1 is filtered by R1 and C2 and applied to pin 3 of U2. The voltage from an adjustable voltage divider, on the +20 volt sense line, is applied to pin 2 with the voltage adjust potentiometer R5 controlling the output voltage.

Operational amplifier U2 functions as a comparison and control amplifier. U2 will control the conduction of Q2 such that the voltage at pin 2 is kept within a few microvolts of that at pin 3 (there will be an additional few millivolts difference in these voltages due to offset voltage error). This action will keep the output voltage essentially constant.

When the current requirements of the external circuitry increases, the output voltage will decrease and cause a reduction of the voltage at pin 2 of U2. This will cause an increase in the voltage at pin 6 of U2, Q2 will conduct more heavily and the output voltage will increase to very near the original level. Due to the large gain of U2, only a very small voltage decrease at pin 2 is necessary to greatly increase conduction of Q2.

R3 and C3 roll off the frequency response of the feedback loop to prevent the circuit from oscillating.

Over current protection is provided by the current limiter in the Switching Regulator Assembly A9.

Overvoltage protection for both the regulator and external circuits is provided by a "Crowbar" circuit. SCR CR7 will short the output of the regulator to ground if the output voltage should rise to approximately 24.2 volts. At this voltage CR8 will conduct current into the gate of the SCR turning it on. The SCR will remain in conduction until power to the regulator is removed. R11 prevents the SCR from being turned on by leakage currents in CR8. Diode CR3 prevents a negative voltage from being developed across the +20 volt line if a negative supply should short to the line.

2-b. +10 VOLT REGULATOR

The operation of the +10 volt regulator circuit is identical to that of the +20 volt regulator; except for the circuitry on the inputs of the operational amplifier. The reference voltage at pin 3 of U1 is obtained by the R7 and R8 voltage divider from the +20 volt sense line. The voltage at pin 2 of U1 is obtained directly from the +10 volt sense line, not through a voltage divider. The voltage adjust potentiometer R5 sets the +20 volt output which then sets the +10 volt output by establishing a +10 volt reference at pin 2 of U1.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the switching regulator and +10/+20 power supply circuitry or to isolate a malfunction in the circuitry, perform the following procedure. Remove power from analyzer and install the +10/+20 volt Power Supply Assy A8 on an extender board.

SERVICE SHEET 15 (cont'd)

EQUIPMENT REQUIRED

Digital Voltmeter HP 3440A/3444A
Oscilloscope HP 180A/1801A/1821A
83 Ohm Load (100 ohm and 500 ohm 20 watt resistor connected in parallel) . . .
Power Supply HP 6205B

1 SWITCHING REGULATOR TROUBLESHOOTING

1-a. A malfunction in the switching regulator will normally blow the +100 volt fuse in the Display Section power supply. To isolate the malfunction to the switching regulator, remove the +10/+20 volt power supply and measure the open circuit voltage at A9C2. Open circuit voltage should be +30 ±1.5 volts. If correct voltage is observed, connect a resistive load between A9C2 and chassis ground. Check voltage under load. Typical output level under normal load should be +26 ±1 volt. If correct voltage is obtained under load, proceed to test procedure 2.

1-b. If normal voltages were not obtained in step 1-a, remove power from analyzer and remove switching regulator from chassis (see removal procedure). Connect the HP 6205B Power Supply to provide +100 volts to the switching regulator. Connect the 83-ohm load across the regulator output. Check output voltage; typically +26 ±1 volt.

1-c. If there is no output (step 1-b) check diodes A9A1CR2 through CR4 and transistors Q2 and Q3 for shorts. If the output voltage is low or high check transistor array A9A1U1.

1-d. Use the typical voltage levels and waveforms below to isolate to the component level if system operation is marginal. Voltages and waveforms are for a normal system operating under normal load conditions.

2 +10, +20V POWER SUPPLY TROUBLESHOOTING

2-a. Install Power Supply Assy A8 on extender board. Note: Power Supply Assy secured to Interconnect Assy A10 with two screws. With power remove check resistance at A8 pins 5 and 3 to chassis ground. Typical values, pin 5 to chassis 750 ohms, pin 3 to chassis 2.2K ohms. Typical values from XA8 pin 5 to chassis 810 ohms and pin 3 to chassis 2.3K ohms with power supply assy removed from chassis. Install power supply on extender board, apply power and check voltage level at test points 1 and 2.

20b. The voltage regulators function as a "closed loop". Generally, malfunction of almost any component may affect dc levels at all points in the circuit. Likewise a malfunction in either supply could affect the other. The +10 volt supply can be isolated from the +20 volt supply by removing one end of resistor A8R7. The +20 volt supply can then be checked independently.

2-c. 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.

2-d. The HP 3440/3443A should be used to check for the presence or absence of dc levels. The HP 412A should be used for point-to-point resistance measurements.

2-e. After repairs have been accomplished, perform the power supply adjustment procedure in Section V. Secure the power supply to the interconnect assembly with the two screws removed in step 2-a above.

A1A1, A1A2

Bandwidth Switching and Ampl Cal

◀ SERVICE SHEET 14

SERVICE SHEET 15 (cont'd)

A9 Switching Regulator Voltage Measurements

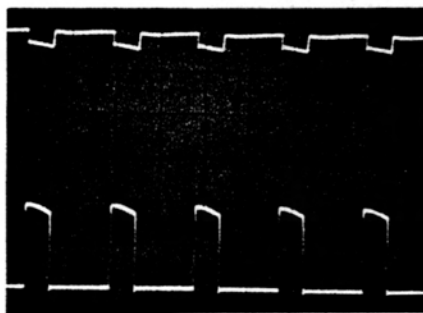
Conditions: Switching Regulator removed from RF Section. +100 volts applied A9C1, 83-ohm load connected across output. (A 100-ohm and 500-ohm 20-watt resistor connected in parallel, provide a load equivalent to a normal supply load.) Typical Vdc levels indicated.

| | | | | | | | | |
|--------|-------|--------|-------|--------|--------|--------|--------|--------|
| TPA | | +26.15 | | | | | | |
| A9A1U1 | Pin 1 | +26.25 | Pin 5 | +26.60 | Pin 9 | +27.0 | Pin 13 | +26.25 |
| | Pin 2 | +19.96 | Pin 6 | +26.83 | Pin 10 | +26.25 | Pin 14 | +30.66 |
| | Pin 3 | +19.30 | Pin 7 | +26.25 | Pin 11 | +27.85 | | |
| | Pin 4 | +19.96 | Pin 8 | +26.60 | Pin 12 | +26.60 | | |

| | Emitter | Base | Collector |
|--------|---------|-------|-----------|
| A9A1Q1 | +99.2 | +99.4 | +99.3 |
| A9A1Q2 | +99.2 | +99.2 | +26.96 |

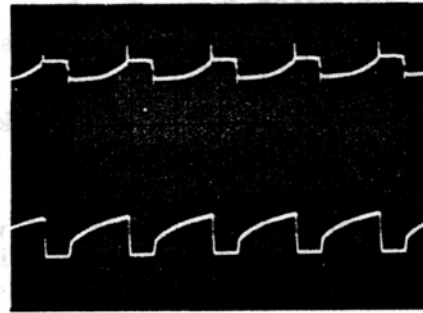
Waveforms: A9 Switching Regulator

Conditions: Same as for voltage measurements



A B

A9A1Q1 Emitter A9A1Q2 Collector
 Volts/Div: 10 Volts/Div: 50
 Time/Div: 5 μsec Time/Div: 5 μsec



A B

A9A1U1E Base U1E Collector
 Volts/Div: 2 Volts/Div: 10
 Time/Div: 5 μsec Time/Div: 5 μsec

REMOVAL AND REPLACEMENT PROCEDURES

See Service Sheet 18.

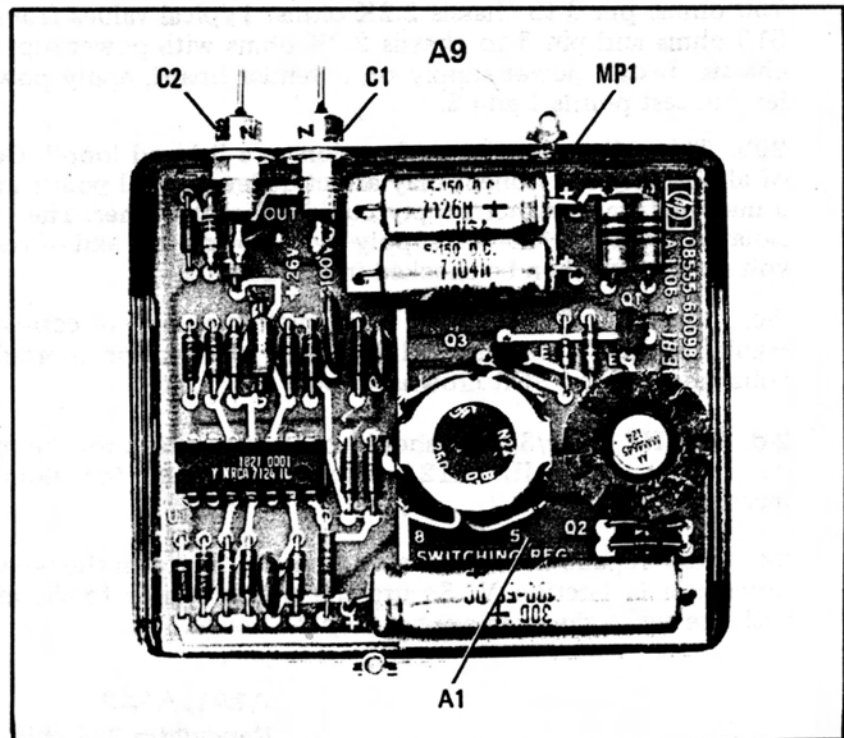


Figure 8-69. Switching Regulator Assembly A9

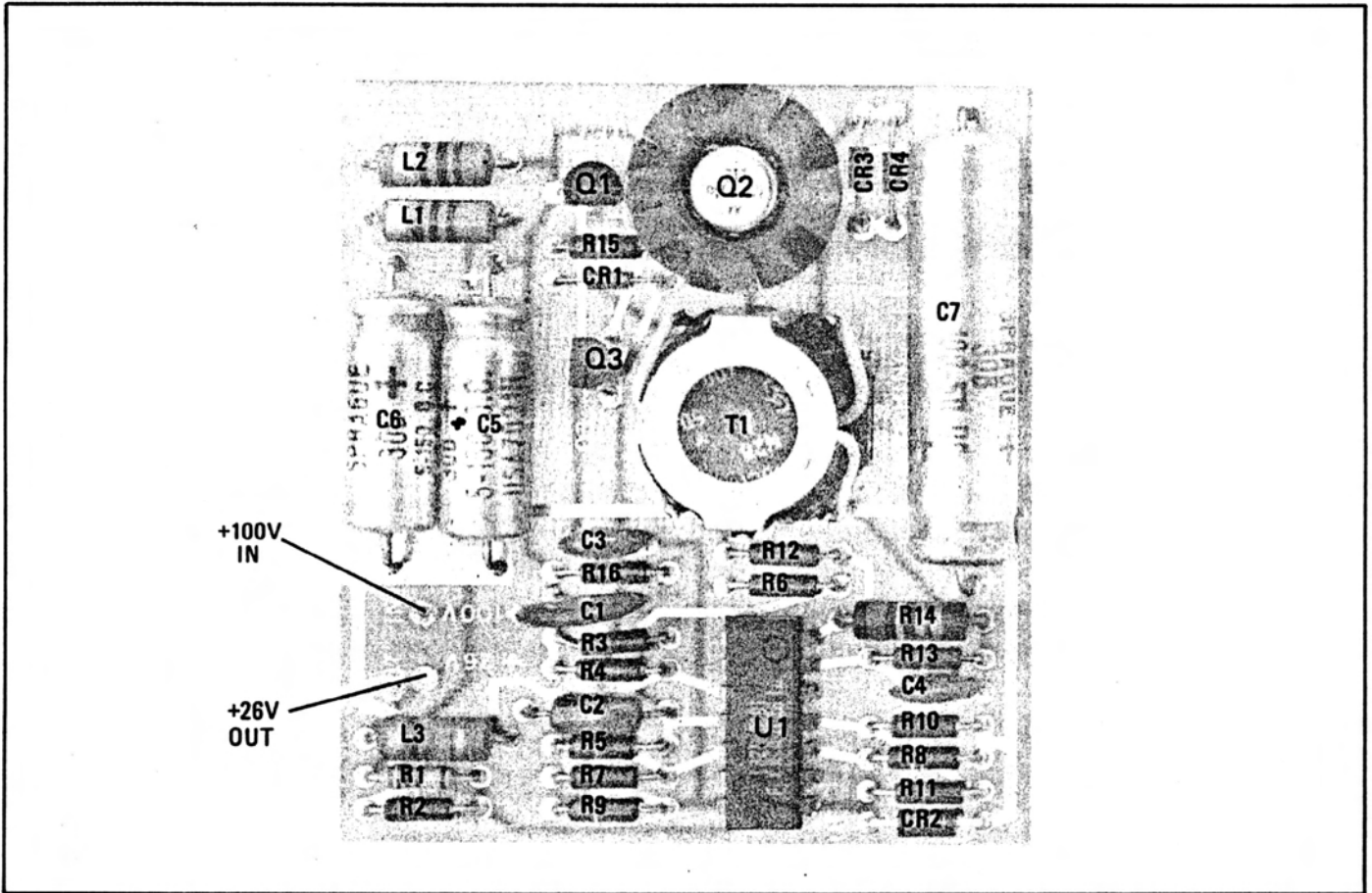


Figure 8-70. Switching Regulator Board Assembly A9A1

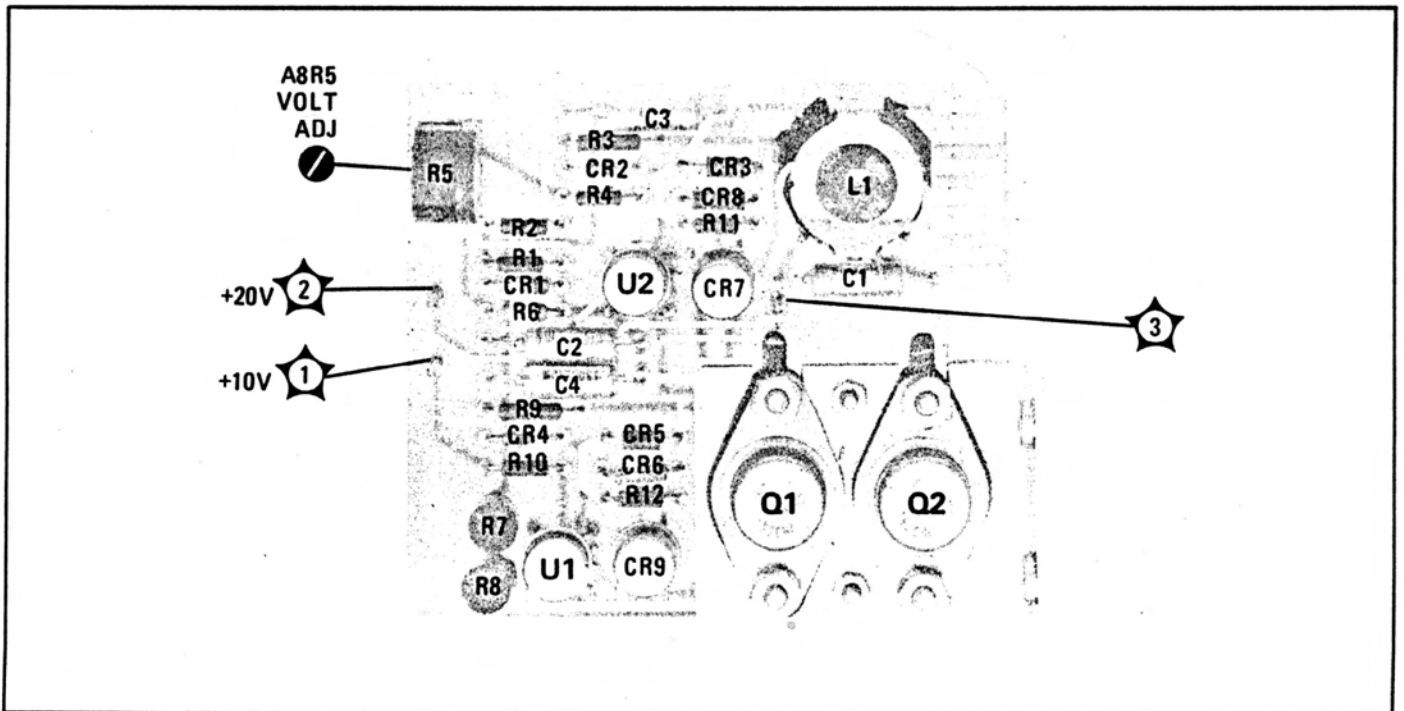
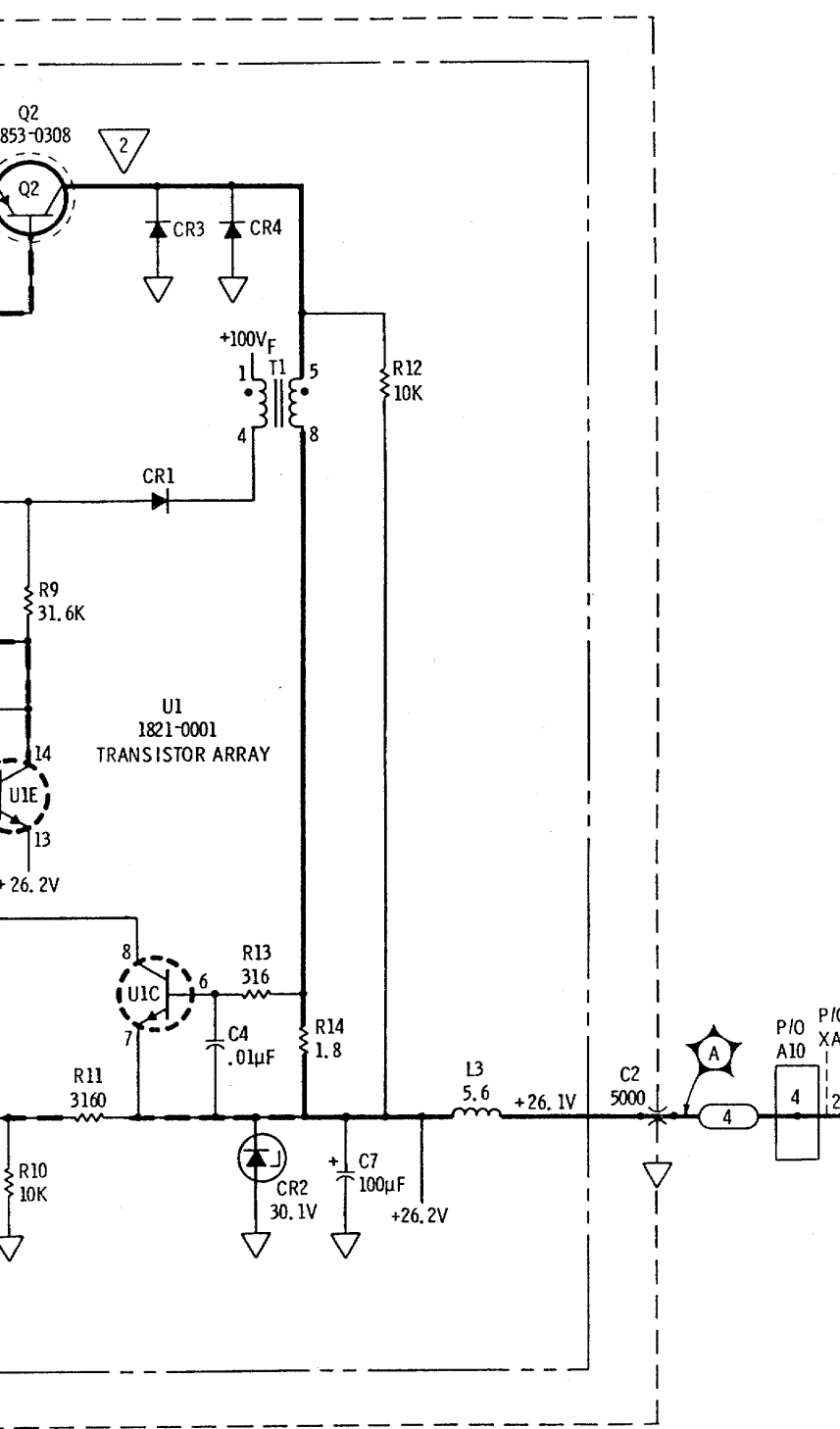
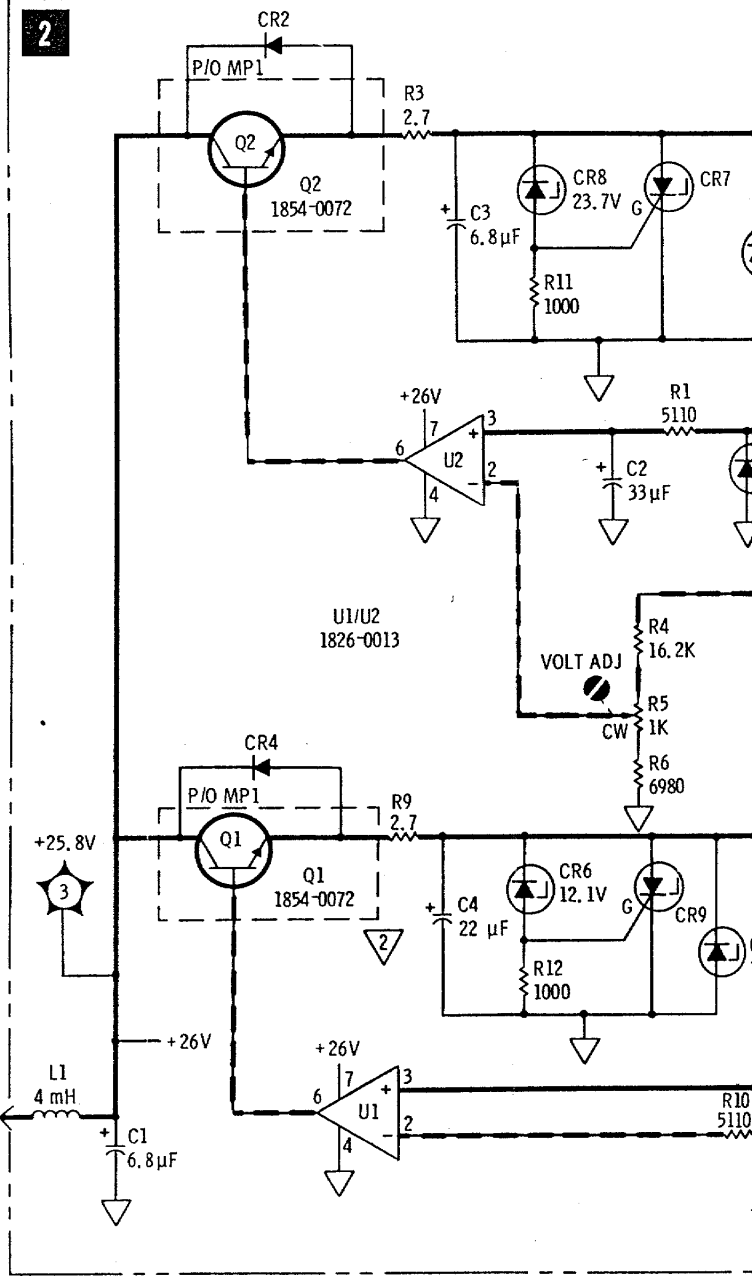


Figure 8-71. +10/+20 Volt Power Supply Assembly A8



POWER SUPPLY ASSY A8 (08555-60055)



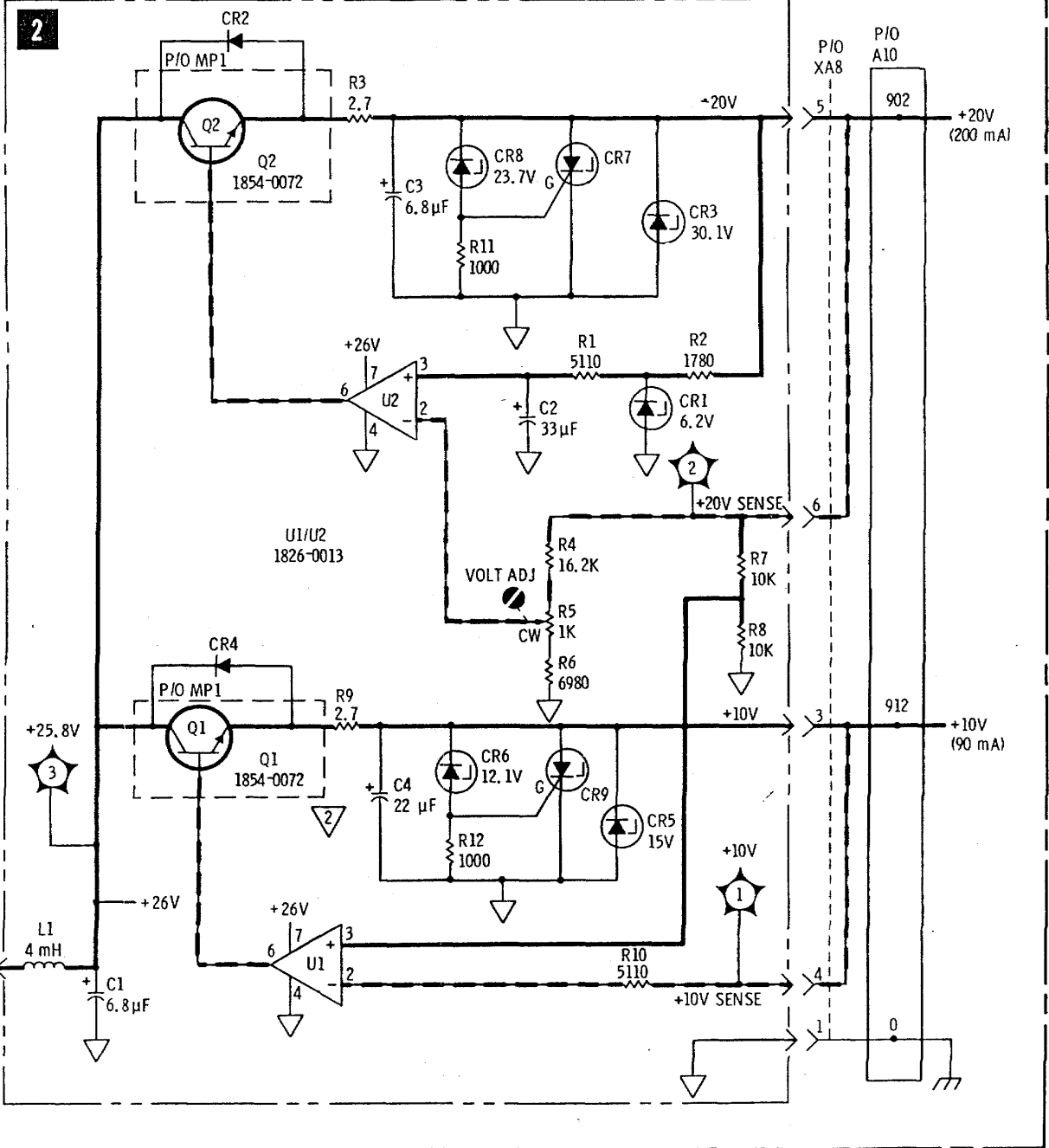
REFERENCE DESIGNATIONS WITHIN OUTLINED (---) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER, e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

- NOTES:
 1. SEE TABLE 8-1.
 2. SEE SECTION VII

| A8 | |
|-------|--|
| C1-4 | |
| CR1-9 | |
| L1 | |
| MP1 | |
| Q1,2 | |
| R1-12 | |
| U1-2 | |

Figure 8-72. Switching P

POWER SUPPLY ASSY A8 (08555-60055)



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.

- NOTES:
 1. SEE TABLE 8-1.
 2. SEE SECTION VII

REFERENCE DESIGNATORS

| A8 | A9 | A9A1 |
|-------|---------|---------|
| C1-4 | C1,2 | T1 |
| CR1-9 | A9A1 | U1 |
| L1 | A1C1-7 | A10 |
| MP1 | A1CR1-4 | CHASSIS |
| Q1,2 | A1I1-3 | P2 |
| R1-12 | A1Q1-3 | XA8 |
| U1-2 | A1R1-17 | |

Figure 8-72. Switching Regulator and +10/+20 Volt Power Supply

SERVICE SHEET 16

Table 8-5. RF Section Chassis Wiring from Connector J6 (1 of 2)

| From J6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|-----------------------|-------------------------------------|---------|------------------|
| 1 | 1 | -12.6V Ground Return | P2-8 | 2 |
| 2 | 903 | VCXO Sweep Input | A14C6 | 10 |
| 3 | 908 | External Mixer Bias | A12 | 2 |
| 4 | 946 | Signal Identifier Attenuator Output | A10-946 | 6 |
| 5 | 4 | Attenuator Driver Trigger | A10-4 | 2 |
| 6 | 8 | Attenuator Driver Output | A10-8 | 2 |
| 7 | 901 | Frequency Tun Pot. Output | A10-901 | 7 |
| 8 | 904 | VCXO Sweep Driver Output | A10-904 | 10 |
| 9 | 906 | Fine Tune Pot. Output | A10-906 | 9 |
| 10 | 914 | A Bit Band Code | A10-914 | 11 |
| 11 | 915 | B Bit Band Code | A10-915 | 11 |
| 12 | 916 | C Bit Band Code | A10-916 | 11 |
| 13 | 917 | D Bit Band Code | A10-917 | 11 |
| 14 | 918 | E Bit Band Code | A10-918 | 6/11 |
| 15 | 3 | -5 to +5V Sweep Ramp | P3-6 | 7/8 |
| 16 | 5 | Linear Gain Compensation Control | P3-7 | 2 |
| 17 | 6 | Linear Gain Compensation Control | P3-8 | 2 |
| 18 | 96 | Ampl. Cal Adjustment | P3-29 | 14 |
| 19 | 956 | Video Filter Analogic Line | P3-38 | 13 |
| 20 | 957 | Normal Analogic Line | P3-30 | 13 |
| 21 | 958 | Analogic -10V Line to IF Section | P3-39 | 13 |
| 22 | 91 | Attenuator Switching Voltage 40 dB | A13 | 2 |
| 23 | 93 | Attenuator Switching Voltage 20 dB | A13 | 2 |
| 24 | 95 | Attenuator Switching Voltage 10 dB | A13 | 2 |
| 25 | 923 | Frequency Tune Pot. -15.2 Volts | A10-923 | 7 |
| 26 | 924 | Frequency Tune Pot. -7.3 Volts | A10-924 | 7 |
| 27 | 95 | Noise Filter Control | A10-95 | 7 |
| 28 | 925 | Per Division Sweep Input | A10-925 | 6/8 |
| 29 | 926 | 1/n Atten. Sweep Output | A10-926 | 12 |
| 30 | 927 | YIG Driver Sweep Input | A10-927 | 7 |
| 31 | 928 | Scan Atten. (Narrow Scan Output) | A10-928 | 9/12 |
| 32 | 934 | Sweep Buffer Output | A10-934 | 7 |
| 33 | 935 | Sweep plus Tune Ampl Input | A10-935 | 7 |
| 34 | 936 | Sweep plus Tune Signal | A10-936 | 7 |
| 35 | 937 | Full Scan Sweep Signal | A10-937 | 7 |
| 36 | 913 | 0.1 kHz Bandwidth Control | P3-2 | 14 |
| 37 | 914 | 0.3 kHz Bandwidth Control | P3-3 | 14 |
| 38 | 915 | 1 kHz Bandwidth Control | P3-4 | 14 |
| 39 | 916 | 10 kHz Bandwidth Control | P3-25 | 14 |
| 40 | 917 | 30 kHz Bandwidth Control | P3-26 | 14 |
| 41 | 918 | 100 kHz Bandwidth Control | P3-27 | 14 |
| 42 | 923 | 300 kHz Bandwidth Control | P3-28 | 14 |
| 43 | 92 | Attenuator Switching Voltage 40 dB | A13 | 2 |
| 44 | 94 | Attenuator Switching Voltage 20 dB | A13 | 2 |
| 45 | 96 | Attenuator Switching Voltage 10 dB | A13 | 2 |
| 46 | 945 | Signal Identifier Attenuator Input | A10-945 | 6 |
| 47 | 948 | Tuning Stabilizer Enable | A10-948 | 8 |

SERVICE SHEET 16 (Cont'd)

Table 8-5. RF Section Chassis Wiring from Connector J2 (2 of 2)

| From J6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|-----------------------|------------------------------|---------|------------------|
| 48 | 98 | Noise Filter Control | A10-98 | 7 |
| 49 | 968 | Sweep Plus Tune or Full Scan | A10-968 | 7 |
| 50 | 978 | Full Scan Frequency Marker | A10-978 | 7 |
| 51 | 97 | -12.6V Supply | P2-21 | 2 |
| 52 | 907 | -10V Supply | A10-907 | 9 |
| 53 | 902 | +20V Supply | A10-902 | 14 |
| 54 | 912 | +10V Supply | A10-912 | 2 |
| 55 | 0 | Ground Return | A10-0 | 9 |
| 56 | 938 | Signal Identifier Enable | A10-938 | 6 |
| 57 | 935 | Log Ref Level Lamp No. 1 | P3-33 | 2 |
| 58 | 936 | Log Ref Level Lamp No. 2 | P3-34 | 2 |
| 59 | 937 | Log Ref Level Lamp No. 3 | P3-35 | 2 |
| 60 | 938 | Log Ref Level Lamp No. 4 | P3-9 | 2 |
| 61 | 945 | Log Ref Level Lamp No. 5 | P3-10 | 2 |
| 62 | 946 | Log Ref Level Lamp No. 6 | P3-11 | 2 |

Table 8-6. Tuning Head Wiring from Connector A1P6 (1 of 2)

| From J6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|-----------------------|-------------------------------------|--------------------|------------------|
| 1 | 1 | -12.6V Ground Return | A1A3S1-3R5 | 2 |
| 2 | 903 | VCXO Sweep Input | A1A4R3 | 10 |
| 3 | 908 | External Mixer Bias | A1A1CR1 | 2 |
| 4 | 946 | Signal Identifier Attenuator Output | A1A2S1- 3R17 | 6 |
| 5 | 4 | Attenuator Driver Trigger | A1A3S1- 4F6 1/2 | 2 |
| 6 | 8 | Attenuator Driver Output | A1A3S1- 3R1 | 2 |
| 7 | 901 | Frequency Tune Pot. Output | A1A4R1 | 7 |
| 8 | 904 | VCXO Sweep Driver Output | A1A4R3 | 10 |
| 9 | 906 | Fine Tune Pot. Output | A1A4R2 | 9 |
| 10 | 914 | A Bit Band Code | A1A4S1A | 11 |
| 11 | 915 | B Bit Band Code | A1A4S1B | 11 |
| 12 | 916 | C Bit Band Code | A1A4S1C | 11 |
| 13 | 917 | D Bit Band Code | A1A4S1D | 11 |
| 14 | 918 | E Bit Band Code | A1A4S1E | 6/11 |
| 15 | 3 | -5 to +5V Sweep Ramp | A1A2S2-F7 | 7/8 |
| 16 | 5 | Linear Gain Compensation Control | A1A3S1- 4F1 1/2 | 2 |
| 17 | 6 | Linear Gain Compensation Control | A1A3S1- 4F2 1/2 | 2 |
| 18 | 96 | Ampl Cal Adjustment | A1R2 | 14 |
| 19 | 956 | Video Filter Analogic Line | A1A2S2 | 13 |

SERVICE SHEET 16 (Cont'd)

Table 8-6. Tuning Head Wiring From Connector A1P6 (2 of 2)

| From P6 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|-----------------------|-------------------------------------|-----------------|------------------|
| 20 | 957 | Normal Filter Analogic Line | A1A2S1 | 13 |
| 21 | 958 | Analogic -10V Line to IF Section | A1A2S1-1F9 | 13 |
| 22 | 91 | Attenuator Switching Voltage, 40 dB | A1A3S1-3R3 | 2 |
| 23 | 93 | Attenuator Switching Voltage, 20 dB | A1A3S1-2F4 | 2 |
| 24 | 95 | Attenuator Switching Voltage, 10 dB | A1A3S1-1R3 | 2 |
| 25 | 923 | Frequency Tune Pot. -15.2 Volts | A1A4R1 | 7 |
| 26 | 924 | Frequency Tune Pot. -7.3 Volts | A1A4R1 | 7 |
| 27 | 95 | Noise Filter Control | A1A2S2-1R8 1/2 | 7 |
| 28 | 925 | Per Division Sweep Input | A1A2S2-2F8 | 6/8 |
| 29 | 926 | 1/n Atten. Sweep Output | A1A2S1-2F2 | 12 |
| 30 | 927 | YIG Driver Sweep Input | A1A2S2-2F9 | 7 |
| 31 | 928 | Scan Atten (Narrow Scan Output) | A1A2S1-1R17 | 9/12 |
| 32 | 934 | Sweep Buffer Output | A1A2S2-2F4 | 7 |
| 33 | 935 | Sweep plus Tune Ampl Input | A1A2S2-2F3 | 7 |
| 34 | 936 | Sweep plus Tune Signal | A1A2S2-1R1 1/2 | 7 |
| 35 | 937 | Full Scan Sweep Signal | A1A2S1-1R3 1/2 | 7 |
| 36 | 913 | 0.1 kHz Bandwidth Control. | A1A1S1-1R1 | 14 |
| 37 | 914 | 0.3 kHz Bandwidth Control | A1A1S1-1R2 | 14 |
| 38 | 915 | 1 kHz Bandwidth Control | A1A1S1-1R3 | 14 |
| 39 | 916 | 10 kHz Bandwidth Control | A1A1S1-1F5 | 14 |
| 40 | 917 | 30 kHz Bandwidth Control | A1A1S1-1F6 | 14 |
| 41 | 918 | 100 kHz Bandwidth Control | A1A1S1-1F7 | 14 |
| 42 | 923 | 300 kHz Bandwidth Control | A1A1S1-1F8 | 14 |
| 43 | 92 | Attenuator Switching Voltage, 40 dB | A1A3S1-3F4 | 2 |
| 44 | 94 | Attenuator Switching Voltage, 20 dB | A1A3S1-2R5 | 2 |
| 45 | 96 | Attenuator Switching Voltage, 10 dB | A1A3S1-1F4 | 2 |
| 46 | 945 | Signal Identifier Attenuator Input | A1A2S1-3R8 | 6 |
| 47 | 948 | Tuning Stabilizer Enable | A1A2S2-1R11 1/2 | 8 |
| 48 | 98 | Noise Filter Control | A1A2S2-1R7 1/2 | 7 |
| 49 | 968 | Sweep Plus Tune or Full Scan | A1A2S2-1R2 1/2 | 7 |
| 50 | 978 | Full Scan Frequency Marker | A1A2S2-2F12 | 7 |
| 51 | 97 | -12.6V Supply | A1A3S1-4F1 1/2 | 2 |
| 52 | 907 | -10V Supply | A1 | 9 |
| 53 | 902 | +20V Supply | A1R3 | 14 |
| 54 | 912 | +10V Supply | A1A1R11 | 2 |
| 55 | 0 | Ground Return | A1 | 9 |
| 56 | 938 | Signal Identifier Enable | A1A2S1-4R17 | 6 |
| 57 | 935 | Log Rel Level Lamp No. 1 | A1A3S1-4R2 | 2 |
| 58 | 936 | Log Ref Level Lamp No. 2 | A1A3S1-4R1 | 2 |
| 59 | 937 | Log Ref Level Lamp No. 3 | A1A3S1-4R8 | 2 |
| 60 | 938 | Log Ref Level Lamp No. 4 | A1A3S1-4R7 | 2 |
| 61 | 945 | Log Ref Level Lamp No. 5 | A1A3S1-4R6 | 2 |
| 62 | 946 | Log Ref Level Lamp No. 6 | A1A3S1-4R5 | 2 |

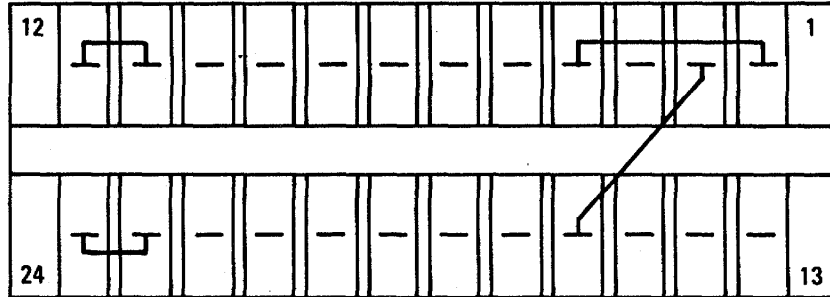
A8, A9A1
Switching Regulator and
+10/+20 Volt Power Supplies
◀ SERVICE SHEET 15

SERVICE SHEET 16 (cont'd)

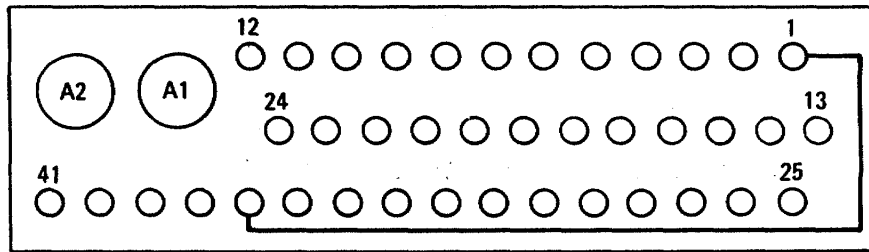
Table 8-7. RF Section Wiring from Connector P3

| From P3 Pin No. | Wire Color Code | Function | To | Service Sheet |
|--------------------|--------------------|-----------------------------------|------------|------------------|
| 1 | 902 | +20V (from pin 37) | P3-37 | 14 |
| 2 | 913 | 0.1 kHz Bandwidth Control | P6-47 | 14 |
| 3 | 914 | 0.3 kHz Bandwidth Control | P6-48 | 14 |
| 4 | 915 | 1 kHz Bandwidth Control | P6-49 | 14 |
| 5 | | Open | | |
| 6 | 3 | -5 to +5V Sweep Ramp | P6-20 | 8 |
| 7 | 5 | Linear Compensation Control | P6-21 | 2 |
| 8 | 6 | Linear Compensation Control | P6-22 | 2 |
| 9 | 938 | Log Ref Level Lamp No. 4 | P6-77 | 2 |
| 10 | 945 | Log Ref Level Lamp No. 5 | P6-78 | 2 |
| 11 | 946 | Log Ref Level Lamp No. 6 | P6-79 | 2 |
| 12 | 0 | Ground Return | Ground Lug | 8 |
| 13 | 7 | Blanking Signal (coax cable) | P4-A7 | 13 |
| 14-24 | | Open | | |
| 25 | 916 | 10 kHz Bandwidth Control | P6-50 | 14 |
| 26 | 917 | 30 kHz Bandwidth Control | P6-51 | 14 |
| 27 | 918 | 100 kHz Bandwidth Control | P6-52 | 14 |
| 28 | 923 | 300 kHz Bandwidth Control | P6-53 | 14 |
| 29 | 96 | Ampl Cal Adjustment | P6-23 | 14 |
| 30 | 957 | Normal Analogic Line | P6-25 | 13 |
| 31 | | Open | | |
| 32 | 9 | 47 MHz LO Voltage (Fixed) | A10-9 | 7 |
| 33 | 935 | Log Ref Level Lamp No. 1 | P6-74 | 2 |
| 34 | 936 | Log Ref Level Lamp No. 2 | P6-75 | 2 |
| 35 | 937 | Log Ref Level Lamp No. 3 | P6-76 | 2 |
| 36 | 907 | -10V Supply | A10-907 | 6 |
| 37 | 902 | +20V (to pin 1) | P3-1 | 14 |
| 38 | 956 | Video Filter Analogic Line | P6-24 | 13 |
| 39 | 958 | -10V Line to IF Section | P6-26 | 13 |
| 40 | | Open | | |
| 41 | 3 | Scan Voltage 0 to 8V (coax cable) | P4-A3 | 13 |
| A1 | 5 | 50 MHz IF Signal (coax cable) | A2-J2 | 5 |
| A2 | 4 | 47 MHz LO Signal (coax cable) | P4-A4 | 13 |

**CONNECTOR P2
REAR VIEW**



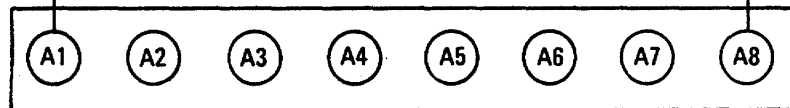
**CONNECTOR P3
REAR VIEW**



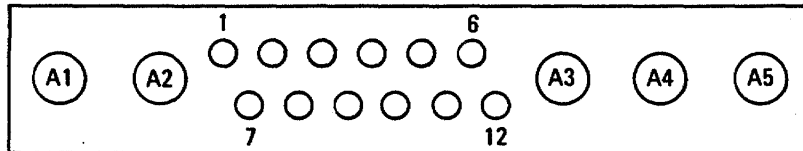
GUIDE
PIN

**CONNECTOR P4
REAR VIEW**

GUIDE
PIN



**CONNECTOR P5
REAR VIEW**



**CONNECTOR J6/A1P6
J6 FRONT VIEW/A1P6 REAR VIEW**

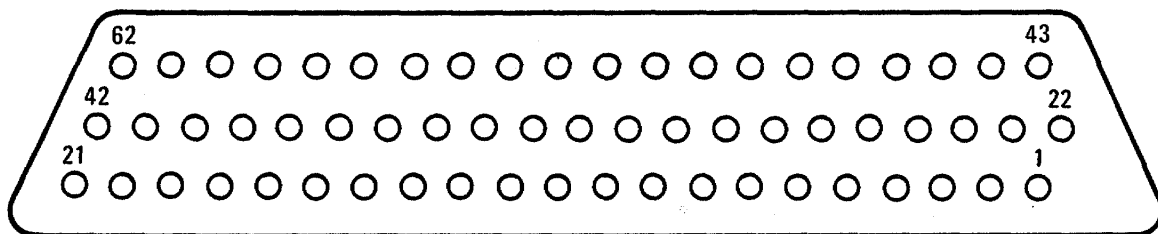
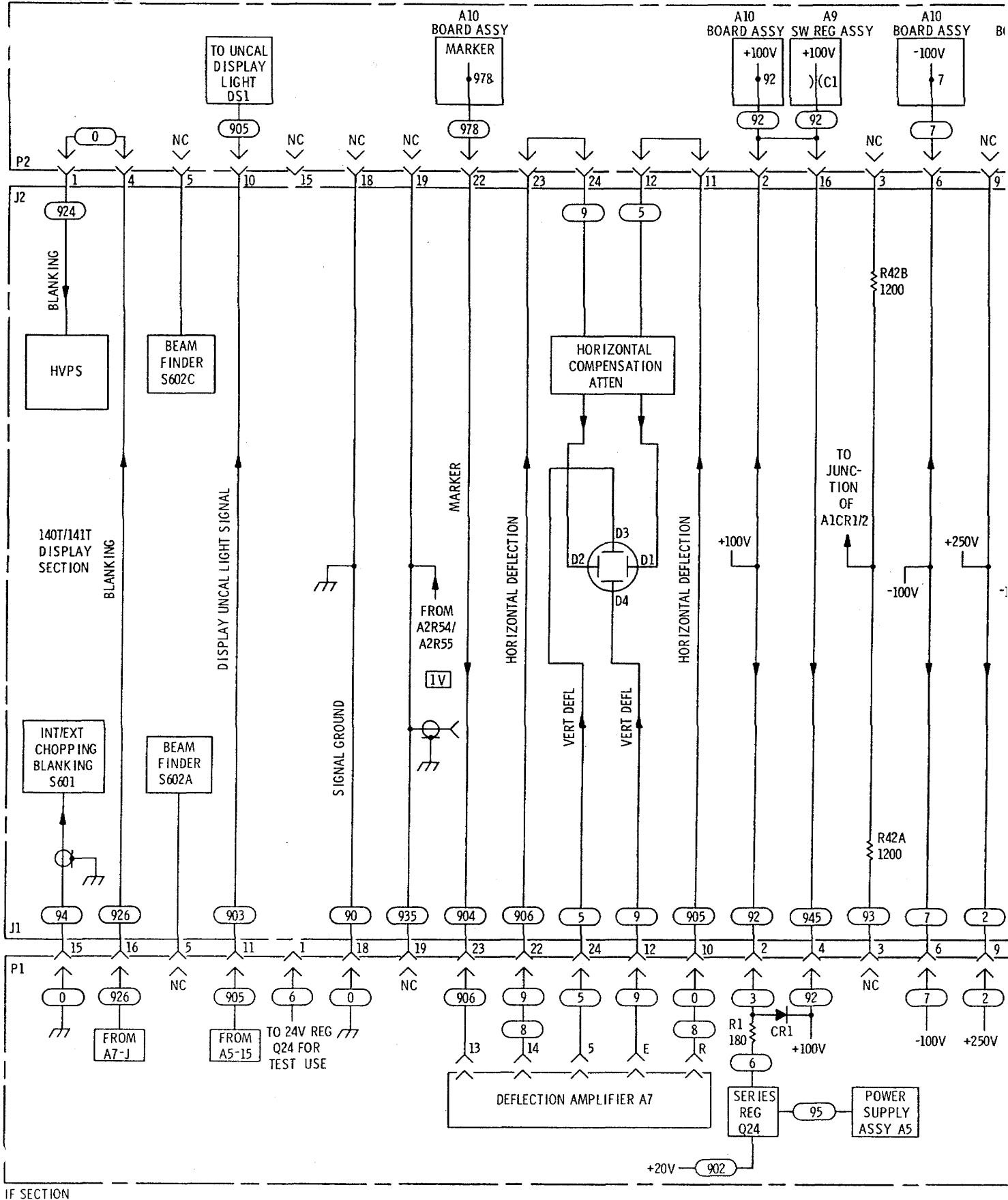
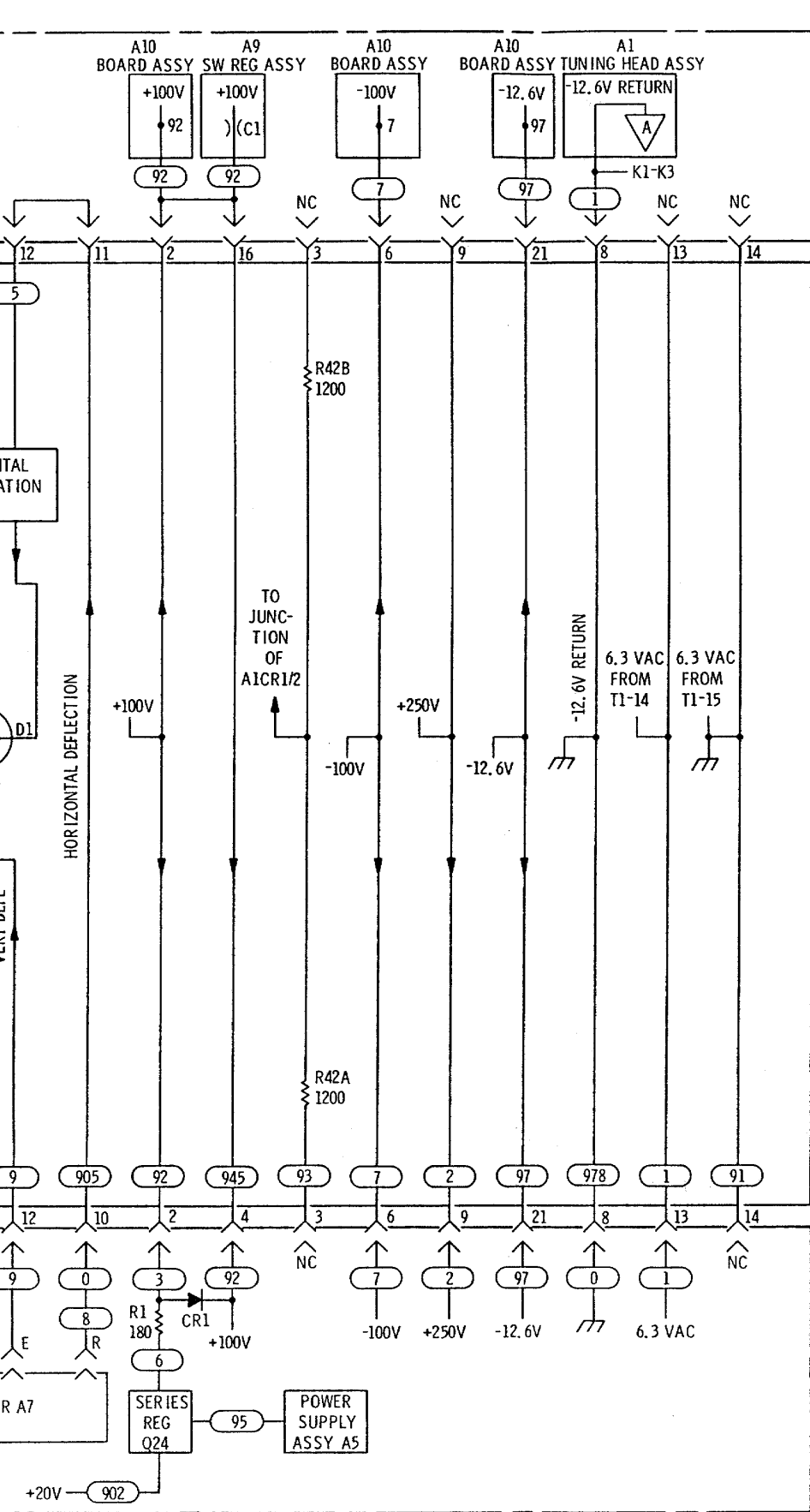


Figure 8-73. Connector Pin Location Diagram

8555A CONNECTIONS



IF SECTION



8555A

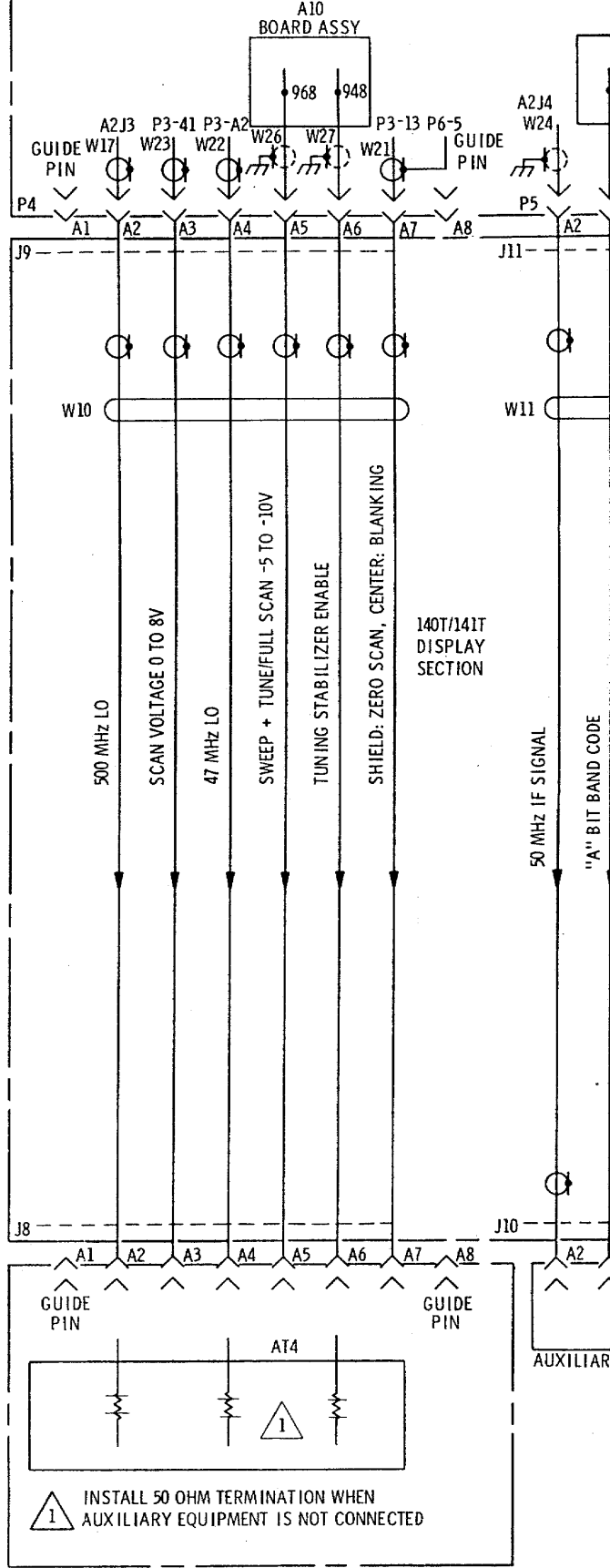
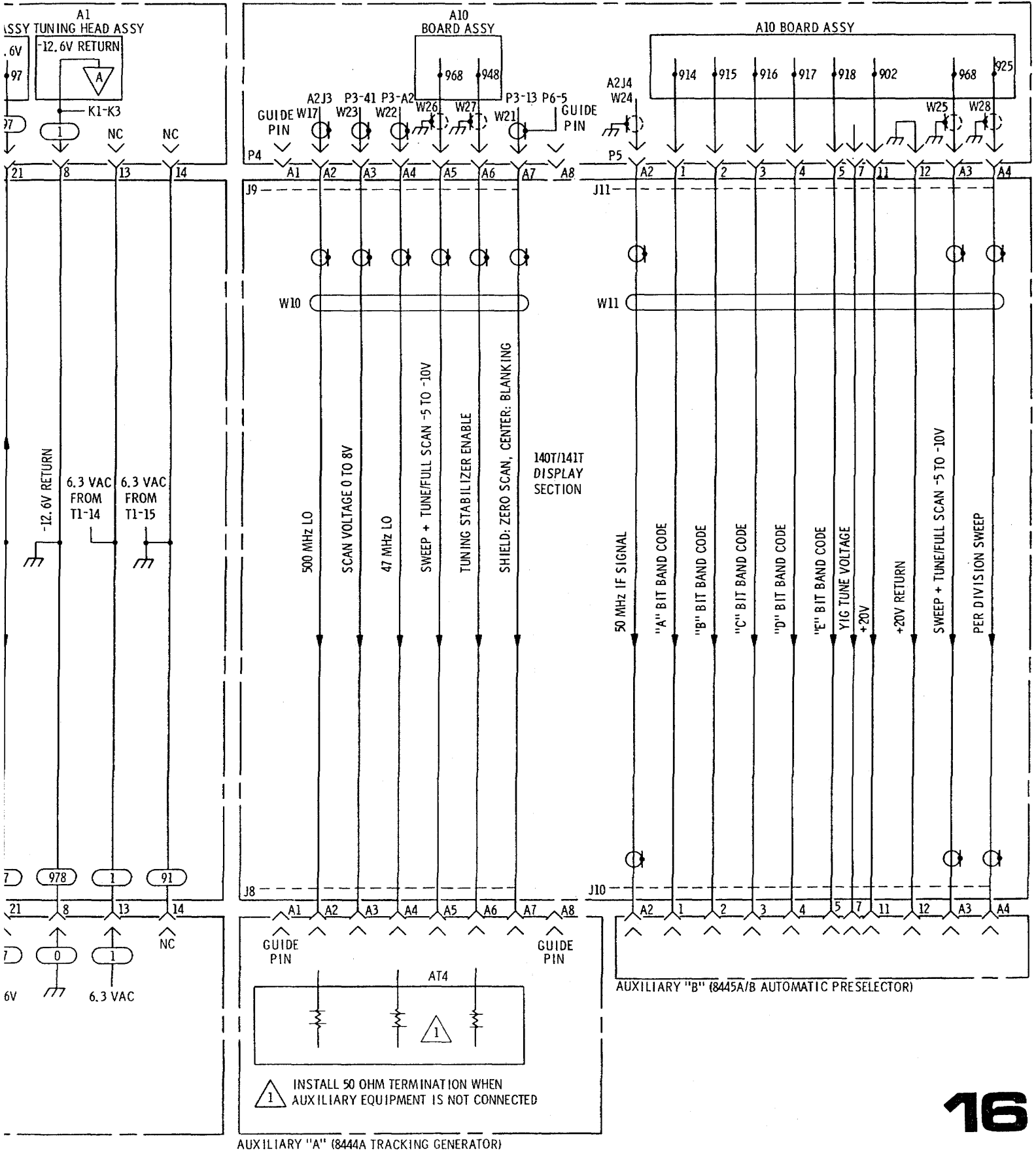


Figure 8-7-

8555A



16

Figure 8-74. RF/IF Section Interconnection Diagram

SERVICE SHEET 17
 (cont'd)

| Ref Desig. | Index No. | Description | HP Part No. |
|------------|-----------|--|-------------|
| A1A4MP1 | 1 | RING: RETAINING FOR 0.375" DIA SHAFT | 0510-0028 |
| A1A4MP2 | 2 | RING: RETAINING FOR 0.375" DIA SHAFT | 0510-0035 |
| A1A4MP3 | 3 | RING: RETAINING FOR 0.125" DIA SHAFT | 0510-0052 |
| A1A4MP4 | 4 | RING: RETAINING FOR 0.125" DIA SHAFT | 0510-0082 |
| A1A4MP5 | 5 | RING: RETAINING FOR 0.312" DIA SHAFT | 0510-1140 |
| A1A4MP6 | 6 | BALL BEARING: STL 0.09375" DIA | 1410-0226 |
| A1A4MP7 | 7 | GEAR MITER: 48 DIAMETERICAL PITCH | 1430-0739 |
| A1A4MP8 | 8 | SPRING: COMPRESSION | 1460-0036 |
| A1A4MP9 | 9 | SPRING: TORSION | 1460-1206 |
| A1A4MP10 | 10 | SPRING: EXTENSION 0.062" OD | 1460-1212 |
| A1A4MP11 | 11 | PIN: DOWELL STL 0.120" X 1-1/4" LG | 1480-0083 |
| A1A4MP12 | 12 | SPRING: COMPRESSION 0.088" OD | 1460-1213 |
| A1A4MP13 | 13 | PIN GROOVE: 0.093" DIA | 1480-0336 |
| A1A4R3 | 14 | R: VAR WW 5K OHM 3% LIN 1.5W | 2100-2485 |
| A1A4R1 | 15 | R: VAR WW 15K OHM, 10% LIN 1 W | 2100-2984 |
| A1A4R2 | 16 | R: VAR WW 10K OHM, 5% LIN 1 W | 2100-2992 |
| A1A4MP17 | 17 | WASHER: FLAT BRS 0.005 SHIM | 3050-0153 |
| A1A4MP18 | 18 | WASHER: FLAT 0.130" ID | 2190-0368 |
| A1A4MP19 | 19 | LABEL: IDENTIFICATION | 08555-20029 |
| A1A4MP20 | 20 | LABEL: IDENTIFICATION | 08555-20030 |
| A1A4MP21 | 21 | LABEL: IDENTIFICATION | 08555-20031 |
| A1A4MP22 | 22 | WASHER: LOCK | 2190-0926 |
| A1A4MP23 | 23 | COVER PLATE | 08555-00003 |
| A1A4MP24 | 24 | LEAF SPRING: CAM DRIVE | 08555-00004 |
| A1A4MP25 | 25 | SHAFT: MAIN | 08555-20003 |
| A1A4MP26 | 26 | GEAR: CLUTCH AND DIAL | 08555-20005 |
| A1A4MP27 | 27 | CLUTCH: PINION ASSY | 08555-20095 |
| A1A4MP28 | 28 | NOT ASSIGNED | |
| A1A4MP29 | 29 | GEAR: PINION ASSY | 08555-20096 |
| A1A4MP30 | 30 | NOT ASSIGNED | |
| A1A4MP31 | 31 | BEARING: REAR | 08555-20011 |
| A1A4MP32 | 32 | BEARING: SUPPORT FRONT | 08555-20012 |
| A1A4MP33 | 33 | CONE DRIVE | 08555-20013 |
| A1A4MP34 | 34 | PULLEY: IDLER | 08555-20014 |
| A1A4MP35 | 35 | PLATE: MOUNTING | 08555-20015 |
| A1A4MP36 | 36 | LOWER EXTRUSION | 08555-20016 |
| A1A4MP37 | 37 | UPPER EXTRUSION (LIGHT GRAY) | 08555-20017 |
| A1A4MP38 | 38 | SHAFT: FINE TUNE | 08555-20018 |
| A1A4MP39 | 39 | PINION: 30 T | 08555-20020 |
| A1A4MP40 | 40 | WINDOW: DIAL | 08555-20021 |
| A1A4MP41 | 41 | PIN: CAM DRIVE | 08555-20025 |
| A1A4MP42 | 42 | TRIM: EXTRUSION | 08555-20026 |
| A1A4MP43 | 43 | DRUM: DIAL | 08555-20032 |
| A1A4MP44 | 44 | SPROCKET: 16T DRIVE | 08555-40003 |
| A1A4MP45 | 45 | CAM: 14 POSITION DRIVE | 08555-40005 |
| A1A4MP46 | 46 | LEVER: BAND SWITCH | 08555-40006 |
| A1A4MP47 | 47 | PLATE: LEVER (OLIVE BLACK) | 08555-40014 |
| A1A4MP48 | 48 | CAP END | 08555-40008 |
| A1A4MP49 | 49 | NOT ASSIGNED | |
| A1A4S1 | 50 | SWITCH ASSY, BAND | 08555-60050 |
| A1A4MP51 | 51 | DIAL CURSOR/BELT ASSY | 0350-0049 |
| A1A4MP52 | 52 | SCREW: PAN HD POZI DR 4-40 x 0.375" | 2200-0143 |
| A1A4MP53 | 53 | SCREW: POZI DR 4-40 x 3.8" W/LOCK | 2200-0107 |
| A1A4MP54 | 54 | SCREW: PAN HD POZI DR 4-40 x 0.438" | 2200-0145 |
| A1A4MP55 | 55 | SCREW: PAN HD POZI DR 4-40 x 1-125" LG | 2200-0121 |
| A1A4MP56 | 56 | SCREW: FLAT HD POZI DR 2-56x0.625" LG | 0520-0169 |
| A1A4MP57 | 57 | NUT: HEX 2-56 x 0.188" | 0160-0001 |
| A1A4MP58 | 58 | WASHER: LOCK BRONZE FOR NO.4 HDW | 2190-0019 |
| A1A4MP59 | 59 | SCREW: FLAT HD POZI DR 4-40x0.250" LG | 2200-0140 |
| A1A4MP60 | 60 | SCREW: SST PHH POZI DR 4-40x1/4" W/LK | 2200-0103 |
| A1A4MP61 | 61 | SCREW: SET SST 4-40 x 1/8" | 3030-0007 |
| A1A4MP62 | 62 | RETAINER: WINDOW | 08555-00020 |
| A1A4MP63 | 63 | (See Note) WASHER FLAT 0.378 ID | 3050-0029 |

| Ref Des. | Item No. | Description | HP Part No. |
|----------|----------|---|-------------|
| A11C1 | 1 | C: FXD CER 5000 PF 80-20% 200 VDCW | 0160-3036 |
| A11C2 | 1 | C: FXD CER 5000 PF 80-20% 200 VDCW | 0160-3036 |
| A11MP1 | 2 | SCREW: PAN HD SLOT DR 0-80 x 0.88" LG | 0516-0005 |
| A11J1 | 3 | CONNECTOR: RF 50-OHM SCREW ON TYPE | 1250-0829 |
| A11J2 | M | SEE A11A2J2 | |
| A11J3 | 3 | CONNECTOR: RF 50-OHM SCREW ON TYPE | 1250-0829 |
| A11J4 | 3 | CONNECTOR: RF 50-OHM SCREW ON TYPE | 1250-0829 |
| A11J5 | 3 | CONNECTOR: RF 50 OHM SCREW ON TYPE | 1250-0829 |
| A11MP2 | 4 | SCREW: PAN HD POZI DR 4-40 x 0.500" LG | 2200-0111 |
| A11MP3 | 5 | SCREW: SST PAN HAD POZI DR 4-40 x 0.875" LG | 2200-0117 |
| A11MP6 | 6 | SCREW: FLAT HAD POZI DR 4-40 x 0.250" LG | 2200-0140 |
| A11MP4 | 7 | SCREW: FLAT HD POZI DR 4-40 x 0.875" LG | 2200-0172 |
| A11MP5 | 8 | SCREW: PAN HD POZI DR 6-32 x 3/8 W/LK | 2360-0117 |
| A11MP7 | 9 | NUT: HEX STL 10-32 x 3/8 | 2740-0003 |
| A11MP8 | 10 | SCREW: SOCKET CAP 4-40 THREAD | 3030-0151 |
| A11MP9 | 11 | SCREW: SET 10-32 UNF-2A THREAD | 3030-0397 |
| A11MP10 | 12 | INPUT-OUTPUT LOOP | 08555-00033 |
| A11MP11 | 13 | SUPPORT: SLOT FILTER | 08555-20002 |
| A11MP12 | 14 | SCREW: TUNING | 08555-20019 |
| A11MP17 | 15 | CAVITY BLOCK: SECOND CONVERTER | 08555-20035 |
| A11MP13 | 16 | CAP: OUTER ELEMENT | 08555-20040 |
| A11MP14 | 17 | CAP: INNER ELEMENT | 08555-20041 |
| A11MP15 | 18 | CAP: DIELECTRIC | 08555-20042 |
| A11MP16 | 19 | COVER: PLATE SECOND CONVERTER | 08555-20046 |
| A11FL1 | 20 | LINE SLOT FILTER | 08555-20065 |
| A11A3 | 21 | BOARD ASSY: SECOND CONVERTER FILTER | 08555-60062 |
| A11A1 | 22 | OSCILLATOR ASSY: 1.5 GHz | 08555-60068 |
| A11A2 | 23 | SECOND MIXER: OUTPUT ASSY | 08555-60069 |
| A11A1C1 | A | C: FXD CER 0.4 PF 0.1% 500 VDCW | 0160-3636 |
| A11A1R2 | B | R: FXD MET FLM 464 OHM 1% 1/8W | 0698-0082 |
| A11A1R3 | B | R: FXD MET FLM 464 OHM 1% 1/8W | 0698-0082 |
| A11A1R1 | C | R: FXD MET FLM 10 OHM 1% 1/8W | 0757-0346 |
| A11A1Q1 | D | TSTR: SI NPN | 1854-0292 |
| A11A1Q2 | D | TSTR: SI NPN | 1854-0292 |
| A11A1MP1 | E | HOLDER: TRANSISTOR | 08555-20038 |
| A11A1L1 | F | COUPLING: SECOND LO LOOP | 08555-00012 |
| A11A2C1 | G | C: FXD CER 1000 PF 20% 100 VDCW | 0160-2327 |
| A11A2C2 | H | C: FXD MICA 15 PF 10% 250 VDCW | 0160-3550 |
| A11A2C3 | J | C: FXD MICA 33 PF 10% 250 VDCW | 0160-3551 |
| A11A2MP4 | K | SCREW: PAN HD POZI DR 2-56 x 0.250" LG | 0520-0128 |
| A11A2R1 | L | R: FXD FLM 750 OHM 2% 1/8W | 0698-7233 |
| A11A2J2 | M | CONNECTOR: RF 50-OHM SCREW ON TYPE | 1250-0829 |
| A11A2MP3 | N | CONNECTOR: SINGLE CONTACT | 1251-1556 |
| A11A2CR1 | O | DIODE: HOT CARRIER | 1901-0633 |
| A11A2L1 | P | COIL/CHOKE 0.39 UH 10% | 9100-2254 |
| A11A2MP1 | R | LID: RESONATOR HOUSING | 08555-00031 |
| A11A2MP2 | S | RESONATOR HOUSING | 08555-20036 |

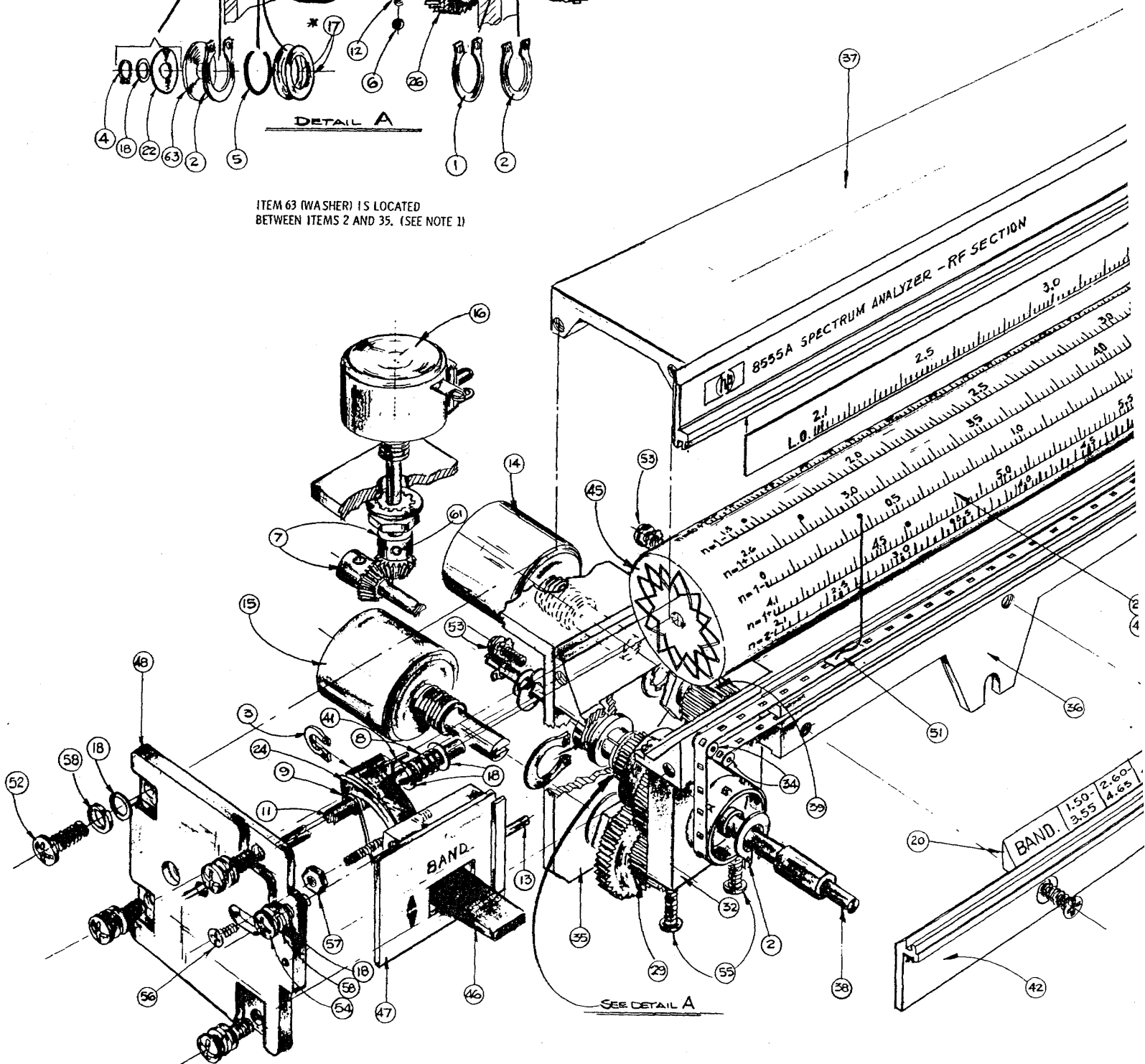
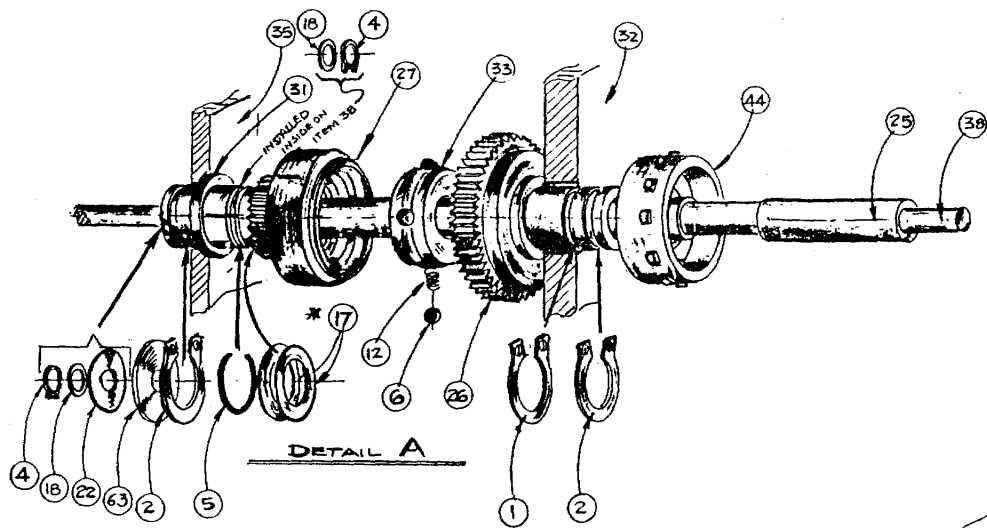
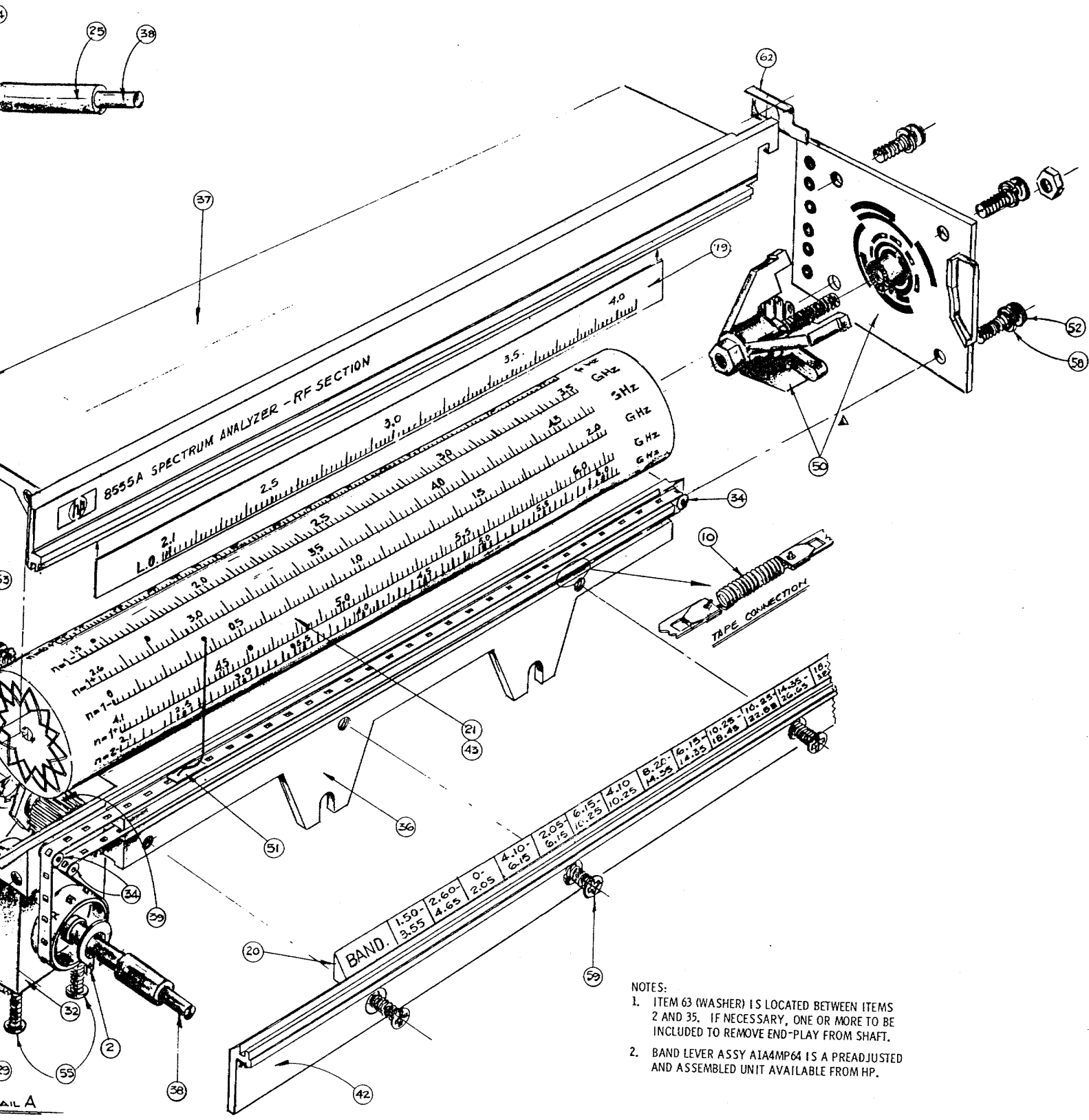
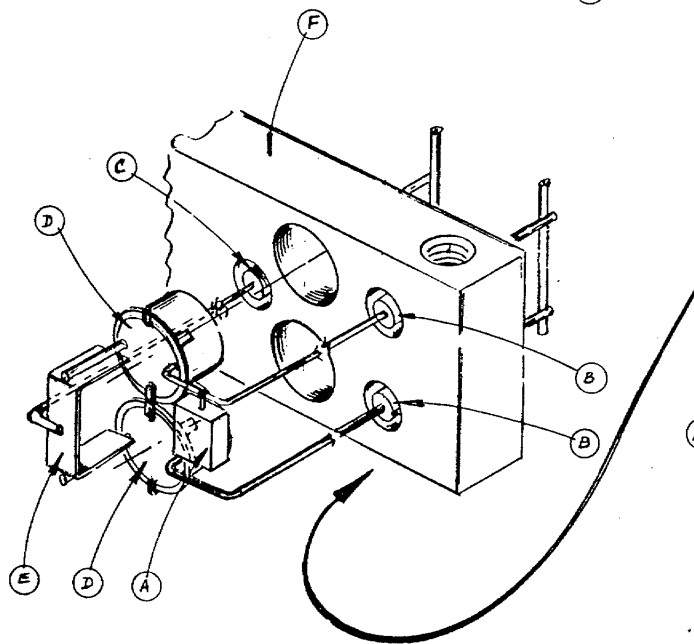


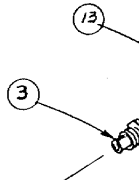
Figure 8-75. Tuning Head Assy A1A4, Illustrated Parts Breakdown



- NOTES:
1. ITEM 63 (WASHER) IS LOCATED BETWEEN ITEMS 2 AND 35. IF NECESSARY, ONE OR MORE TO BE INCLUDED TO REMOVE END-PLAY FROM SHAFT.
 2. BAND LEVER ASSY A1A4MP64 IS A PREADJUSTED AND ASSEMBLED UNIT AVAILABLE FROM HP.



17 (22) OSC. ASS'Y 1.5 GHz



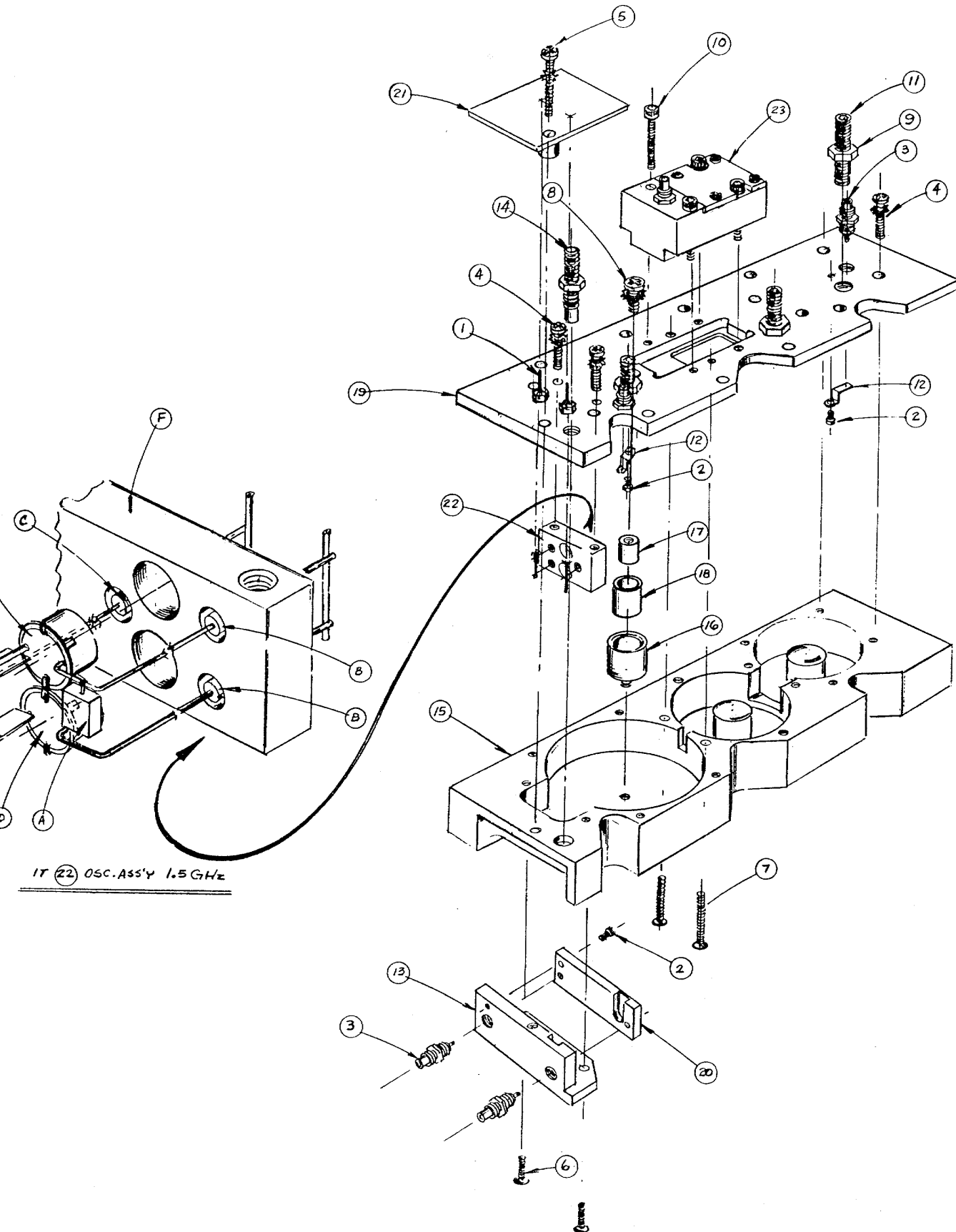


Figure 8-76. Second Converter

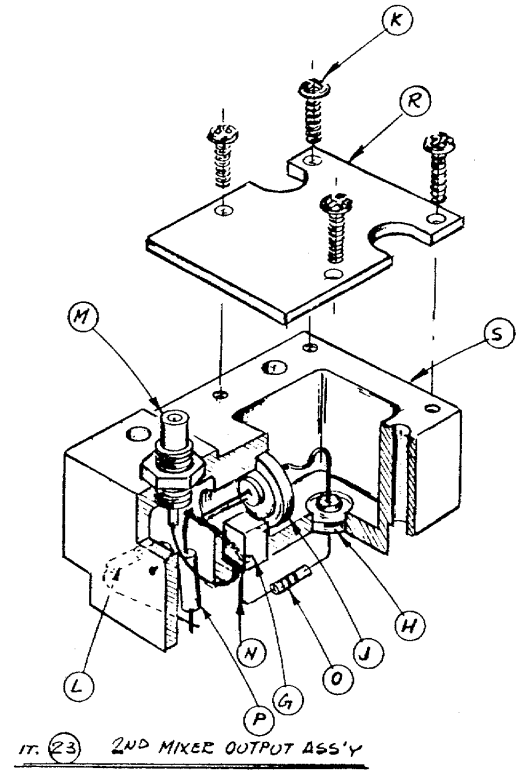
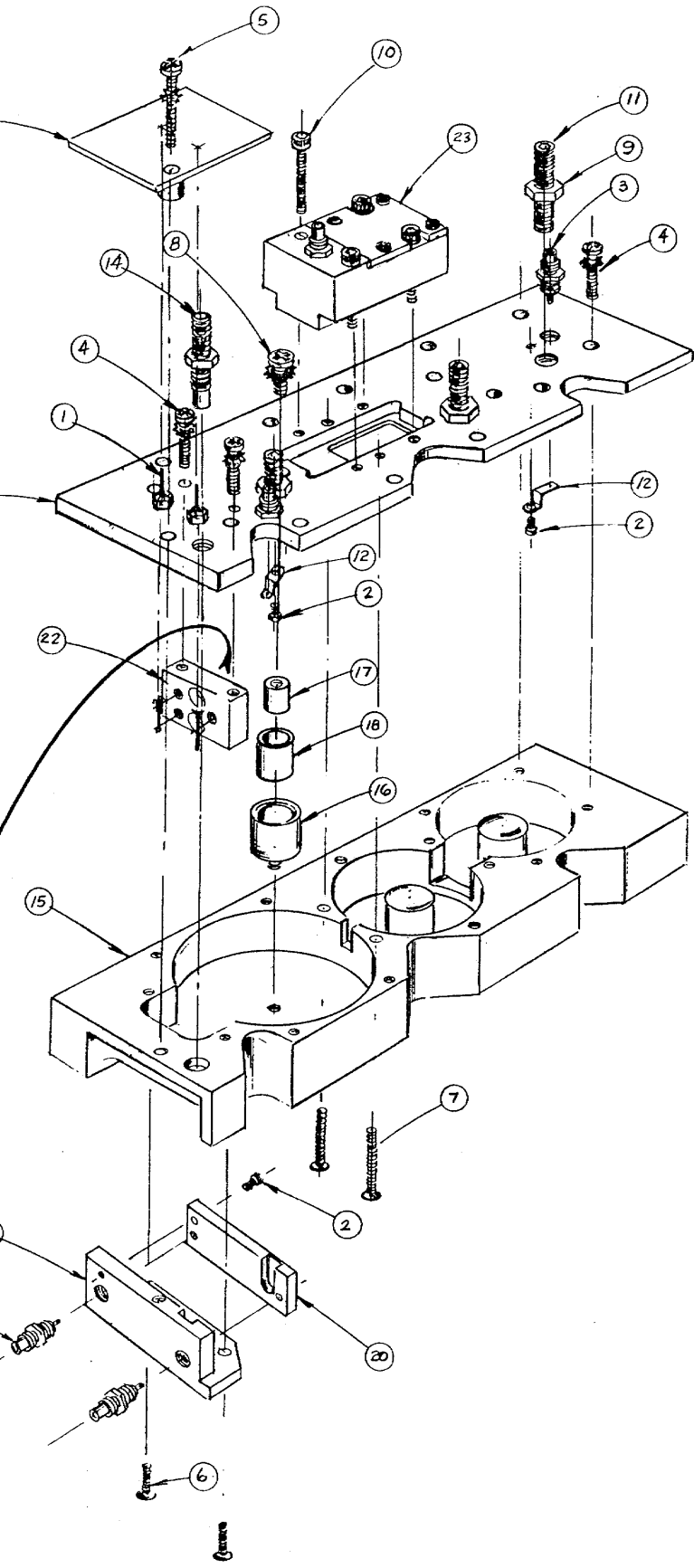


Figure 8-76. Second Converter Casting, Illustrated Parts Breakdown

SERVICE SHEET 18

REMOVAL AND REPLACEMENT INSTRUCTIONS

CAUTION

While working with and around the semi-rigid coaxial cables in the RF Section, do *not* bend the cables more than necessary. Do *not* torque the RF connectors to more than 2 *inch-pounds*. Be especially careful when working on the connectors on the first converter.

INPUT ATTENUATOR A13 REMOVAL AND REPLACEMENT PROCEDURE

1. Remove top cover (MP5) by removing six flat head screws.
2. Remove bottom cover (MP6) by removing four flat head screws.
3. Remove Front Panel Assy A1. The front panel assy is secured to the left side gusset (MP1) near the top front corner by one flat head screw and to the yoke assy (MP12) by two flat head screws. Disconnect front panel connector plug A1P6. Lift the front panel assy straight up while pulling out on the left side gusset.
4. Remove the right side gusset (MP4) by removing all the screws on the outside. There are six No. 4 flat head, five No. 4 pan head, two No. 6 pan head, and six No. 6 flat head screws securing the gusset.
5. Disconnect the LO OUT cable from the Tuning Stabilizer Assy A14 (Cable W20 at A14J2). Disconnect the LO IN cable from the tuning stabilizer (Cable W19 at A14J1).
6. Remove one pan head screw securing the tuning stabilizer casting to the front of the main deck (MP8). Remove one pan head screw securing the tuning stabilizer casting to the rear panel (MP2).
7. Remove two pan head screws securing the attenuator to the main deck (MP8).

CAUTION

Be especially careful not to bend or damage the cables and connectors in the following steps.

8. Disconnect the cable from the attenuator input (W1 at A13J1). Disconnect the cable from the attenuator output (W2 at A13J2).
9. Slide the attenuator out the right side of the instrument.
10. Unsolder and remove the six wires connected to the attenuator. Note orientation of attenuator and wires.
11. Place the replacement attenuator in the same position as in step 10 and solder the six wires removed in step 10. (See Figure 8-14.)
12. Slide attenuator into position. Care *must* be taken to position the wires going to the attenuator so that the wires are *not* pinched between the attenuator and the second converter housing.
13. Complete the installation by reversing the procedures in steps 1 through 8. In steps 4 and 6 do not tighten the screws until all the screws are in place.

NOTE

Do not remove First Converter until replacement units are on hand. See steps 15 and 16 below.

SERVICE SHEET 18 (cont'd)

FIRST CONVERTER A12 REMOVAL AND REPLACEMENT PROCEDURE

1. Remove top cover (MP5) by removing six flat head screws.
2. Cut the two tie wraps securing Filter FL2 to the semi-rigid coaxial cables.
3. Unsolder the wires from the first converter.
 - a. 908 wire from EXT BIAS terminal
 - b. 913 wire from DIODE BIAS terminal
 - c. Two 907 wires from EMITTER BIAS terminal
 - d. Two 912 wires from +10 terminal
4. Remove the two pan head screws securing the first converter support (MP3) to the right side gusset (MP4).

CAUTION

Be especially careful not to bend or damage cables and connectors in the following steps.

5. Disconnect EXT IF Cable W6 from first converter connector A12J3. Disconnect Cable W6 from Isolator AT5 and remove cable.
6. Disconnect the LO OUT Cable W4 from the first converter connector A12J4.
7. Disconnect LO IN Cable W4 from first converter connector A12J5.
8. Disconnect IF OUT Cable W8 from the first converter connector A12J6. Disconnect the other end of Cable W8 from Relay K1J1 and remove cable.
9. Disconnect EXT MIXER Cable W3 from first converter connector A12J2.
10. Disconnect INPUT Cable W2 from first converter connector A12J1.
11. Remove first converter and converter support from the RF Section.
12. Remove the three flat head screws securing the first converter to the support.
13. Remove Band Buffer Board Assy A6.
14. Remove the Input Mixer Gain Compensation Network Assy A16 from the band buffer board by removing one screw and pulling the gain network assy out.
15. Package both First Converter Assy A12 and Input Mixer Gain Compensation Network Assy A16 in the reusable container in which the replacement assemblies were shipped.
16. Return defective units for factory repair and credit.
17. Replace the two units by reversing the procedure in steps 1 through 14.

NOTE

See Second Converter Mixer and Output Assy A11A2 Removal and Replacement Procedure.

SECOND CONVERTER A11 REMOVAL AND REPLACEMENT PROCEDURE

1. Remove top cover (MP5) by removing six flat head screws.
2. Remove bottom cover (MP6) by removing four flat head screws.

SERVICE SHEET 18 (cont'd)

3. Remove Front Panel Assy A1. The front panel assy is secured to the left side gusset (MP1) near the top front corner by one flat head screw and to the yoke assy (MP12) by two flat head screws. Disconnect front panel connector plug A1P6. Lift the front panel assy straight up while pulling out on the left side gusset.
4. Loosen the LO IN Cable W4 at the first converter connector A12J5. Disconnect the other end of this cable from the YIG oscillator connector A3J1. Lift the end of the cable removed from A3J1 up above the first converter and disconnect the cable from the first converter.
5. Disconnect Cable W12 from Relay K2J2 and Relay K3J2. (Cable W12 removed for access to K2J3 connector.) Disconnect the black flexible Cable W16 from Relay K2J3.
6. Remove three pan head screws securing Isolator AT6 to rear panel (MP2). Remove one pan head screw securing Tuning Stabilizer Assy A12 to rear panel.
7. Remove three pan head screws securing bottom flange of main deck (MP8) to the Interconnect Board A10.
8. Remove two flat head screws securing right side gusset (MP4) to yoke assy (MP12). Remove two flat head screws securing right side gusset to rear panel.
9. Carefully separate the right side of the RF Section from the left side.
10. Disconnect LO OUT Cable W20 from the tuning stabilizer connector A14J2. Disconnect LO IN Cable W19 from connector A14J1.
11. Loosen Cable W9 at Relay K1J3. Disconnect Cable W9 (input to Notch Filter A11FL1) from A11J4. Disconnect Cable W10 Notch Filter A11FL1 output from A11J5.
12. Disconnect the three cables from the top of the second converter. (Cable W15 from A11J3, Cable 14 from A11J2 and Cable W13 from A11J1.)
13. Remove one pan head screw securing the tuning stabilizer assy to the front of the main deck (MP8). Remove two pan head screws securing tuning stabilizer to the right side gusset. Pull the tuning stabilizer out and position it out of the way.
14. Remove the main deck (MP8) by removing the five flat head screws securing it to the attenuator and the second converter.
15. Carefully remove the second converter assy.
16. To replace the second converter, reverse the above procedure. Be careful not to pinch wires between the various assemblies.

SECOND CONVERTER MIXER AND OUTPUT ASSY A11A2 REMOVAL AND REPLACEMENT PROCEDURE

NOTE

The Mixer and Output Assy A11A2 can be removed without having to remove the second Converter Assy A11 (see Figure 8-76).

1. Remove the top cover (MP5) by removing six flat head screws.
2. Cut the two tie wraps securing Filter FL2 to the semi-rigid coaxial cables.

SERVICE SHEET 18 (cont'd)

3. Loosen the LO IN Cable W4 at the first converter connector A12J5. Disconnect the other end of Cable W4 from YIG oscillator connector A3J1. Lift the end of the cable removed from A3J1 up above the first converter and disconnect the cable from the first converter.
4. Disconnect the EXT MIXER Cable W3 from the first converter connector A12J2.
5. Disconnect Cable W14 from the second mixer and output assy connector A11J2. Disconnect the other end of Cable W14 from relay connector K2J1.
6. Position the wires going to the first converter out of the way of the second mixer and output assy.

CAUTION

Use care in removing the second mixer and output assy to avoid damaging the diode mounted on the bottom of the assy. Do not force the assy.

7. Remove the four socket cap screws from the assy. Lift the unit straight up until it touches the first converter, then rotate it so the RF connector A11J2 turns and faces toward the rear of the instrument. Carefully lift the assy up and out of the instrument.
8. To replace the second converter mixer and output assy, reverse the above procedure.

THIRD CONVERTER A2 REMOVAL AND REPLACEMENT PROCEDURE

1. Remove top cover (MP5) by removing six flat head screws.
2. Remove bottom cover (MP6) by removing four flat head screws.
3. Remove the top cover of the third converter by removing six pan head screws.
4. Disconnect the three coaxial cables from the top of the third converter; Cable W18 from A2J2, Cable W24 from A2J4, and Cable W16 from A2J1.
5. Remove nut and washer securing connector A2J1 to third converter casting.
6. Remove the three pan head screws near A2J1.
7. Unsolder the +20 volt jumper wire between A2C1 and A2C13. (Available through hole in left side gusset.)
8. Unsolder the input wire to the 50 MHz Amplifier Board A2A5. This wire comes from underneath the board to the pad marked "IN" near input match capacitor A2A5C2.
9. Remove the two side and four bottom screws securing the third converter casting to the left side gusset and the Interconnect Board A10.
10. The top casting, containing the 50 MHz amplifier, can be lifted up and tilted out of the way.
11. With the top casting tilted out of the way, the 550 MHz Amplifier A2A1 and the 550/50 MHz Mixer A2A3 are exposed. (See Figure 8-22.)
12. Unsolder the three wires going to feedthru capacitors A2C2, A2C3, and A2C4.
13. Lift the third converter straight up and remove the red cable W17 from connector A2J3.
14. The converter can be lifted out and away from the chassis.
15. To remove the top casting, disconnect the wires at feedthru capacitors A2C8, A2C9, A2C10, A2C11, and A2C12.

SERVICE SHEET 18 (cont'd)

16. Remove bottom cover by removing two screws to gain access to the 500 MHz LO Drive A2A2 and the 500 MHz LO A2A4.
17. Reverse the above steps to replace the third converter.

SWITCHING REGULATOR A9 REMOVAL & REPLACEMENT PROCEDURE

1. Push wiring harness away from the two nuts that secure the switching regulator to the board shield (MP14) and remove the nuts with an open end wrench.
2. Remove the two screws securing the +10, +20 Regulator Assy A8 to the Interconnect Board A10. Remove the +10, +20 regulator board.
3. Lift the Switching Regulator Assy A9 out and disconnect the two wires. The yellow (4) wire from the +26V output and the White-Red (92) wire from the +100V input.
4. To replace the switching regulator reverse the above procedure. When installing the nuts in step 1, it is easiest to install the lower nut from the bottom of the RF Section.

TUNING STABILIZER A14 REMOVAL & REPLACEMENT PROCEDURE

1. Remove top cover (MP5) by removing six flat head screws.
2. Remove bottom cover (MP6) by removing four flat head screws.
3. Remove Front Panel Assy A1. The front panel is secured to the left side gusset (MP1) near the top front corner by one flat head screw and to the yoke assy (MP12) by two flat head screws. Disconnect the front panel connector plug (A1P6). Lift the front panel assy straight up while pulling out on the left side gusset.
4. Disconnect the LO OUT Cable W20 from A14J2. Disconnect the LO IN Cable W19 from A14J1.
5. Unsolder the wires going to feedthru capacitors on the tuning stabilizer. (ERROR OUT 958 wire, +20 902 wire, -10 907 wires (2), +10 912 wire, SWEEP IN 903 wire, +20 SWITCHED 948 wire, and GND LUG 901 and 0 wires.)
6. Remove one pan head screw securing the tuning stabilizer casting to the front of main deck (MP8).
7. Remove one pan head screw securing tuning stabilizer casting to rear panel (MP2).
8. Remove two pan head screws securing tuning stabilizer casting to right side gusset (MP4).
9. To replace the tuning stabilizer reverse the above procedure.

APPENDIX A OPTION 002 MODEL 8555A SPECTRUM ANALYZER RF SECTION

A-1. INTRODUCTION

A-2. This supplement is intended to be used with the Hewlett-Packard Model 8555A Spectrum Analyzer RF Section Operating and Service Manual (the part number of the manual is listed on the front cover. When used with the manual, it provides documentation for Model 8555A RF Sections with Option 002.

A-3. DESCRIPTION

A-4. Option 002 for the Model 8555A is a limiter that is installed between the RF Section's INPUT port and the input attenuator. The limiter protects the analyzer's input circuitry (especially the diodes in the first mixer) from inadvertent overloading.

A-5. Limiting action begins at signal levels of approximately 5 milliwatts; with applied signal levels of 1 watt CW (+30 dBm) or 75 watts pulse peak (0.001 duty cycle), the output from the limiter is below 100 mV. VSWR is less than 2.0:1 with applied signal levels below approximately +7 dBm. VSWR above approximately +7 dBm is unpredictable since the limiter effects its limiting by reflecting some of the applied signal.

A-6. With the limiter option, the analyzer maintains its absolute amplitude calibration from 0.1–12.4 GHz. The analyzer's distortion performance is not degraded for input signals \leq -40 dBm.

A-7. MANUAL CHANGES TO INCORPORATE OPTION

A-8. Make the following changes to the operating and service manual whose part number is listed on the front cover of this supplement.

Page 1-4, Table 1-1:

Under "ABSOLUTE CALIBRATION ACCURACY", change to read as follows:

Frequency Response: With 10 dB input attenuator setting:

| Frequency Range (GHz) | Mixing Mode (n) | IF Freq. (MHz) | Frequency Response (dB Max.) |
|-----------------------|-----------------|----------------|------------------------------|
| 0.1 — 2.05 | 1- | 2050 | ± 1.5 |
| 1.50 — 3.55 | 1- | 550 | ± 1.5 |
| 2.07 — 6.15 | 2- | 2050 | ± 1.8 |
| 2.60 — 4.65 | 1+ | 550 | ± 1.5 |
| 4.11 — 6.15 | 1+ | 2050 | ± 1.5 |
| 4.13 — 10.25 | 3- | 2050 | ± 2.0 |
| 6.17 — 10.25 | 2+ | 2050 | ± 2.0 |
| 6.19 — 12.4 | 4- | 2050 | ± 2.0 |
| 8.23 — 12.4 | 3+ | 2050 | ± 2.5 |
| 10.29 — 12.4 | 4+ | 2050 | ± 2.5 |
| 12.4 — 18.0 | 4+ | 2050 | See Typical Response |

Under "INPUT SPECIFICATIONS", change to read as follows:

Reflection Coefficient: < 0.33 (2.0 VSWR).

Maximum Input Level: Continuous, 1 watt (+30 dBm).

Pulse, 75 watts peak, pulse width $\leq 1 \mu s$, 0.001 duty cycle.

Limiting threshold, 5 mW.

Page 3-1, paragraphs 3-11 through 3-13:

Under paragraph 3-11, add the following:

3-11A. Option 002 instruments are shipped with a diode limiter installed between the INPUT port and the input attenuator. The limiter protects the attenuator and the mixer diodes from inadvertent overloads. Maximum input level with the limiter is 1 watt continuous (+30 dBm) or 75 watts peak.

Under the caution in paragraph 3-12, add the following:

With the limiter (Option 002), do not exceed 1 watt continuous (+30 dBm) or 75 watts pulse peak (0.001 duty cycle).

Under paragraph 3-13, add the following:

3-13A. With the limiter (Option 002), the analyzer will provide absolute calibration with signal levels up to -10 dBm incident on the INPUT port. The input signal should be below -40 dBm for distortion measurements because above that level the limiter generates harmonics that are visible on the display. An external attenuator can be used to reduce input signals so that they are below -40 dBm. However, when the analyzer is used with a Model 8445 Preselector, signals that are above 1.8 GHz and are separated by >70 MHz can be inserted with levels up to -10 dBm with no measureable distortion.

Page 3-5, Figure 3-1:

Change item 15 to read as follows:

15 INPUT ATTENUATION: attenuates input signal from 0 to 50 dB in 10 dB steps. Maximum input signal for 1 dB signal compression is as follows:

| Input Signal | INPUT ATTENUATION |
|--------------|-------------------|
| 5 mW | ≥ 20 dB |
| 1 mW | 10 dB |
| 0.1 mW | 0 dB |

CAUTION

Maximum input level is 1 watt (+30 dBm) continuous or 75 watts pulse peak (0.001 duty cycle).

To CAUTION in item 20, add "With limiter (Option 002), maximum input signal should be 1 watt (+30 dBm) continuous or 75 watts pulse peak (0.001 duty cycle)."

Page 3-9, Figure 3-3:

Add the following:

NOTE

To adjust vertical position and gain, use a 100 MHz, -30 dBm (±0.3 dB) signal from an external source and calibrate at 100 MHz. If an external source is not available and the analyzer's 30 MHz calibration signal is used, set the signal level on the display for -31.5 dBm or 5.95 mV: (the Option 002 limiter has approximately 1.5 dB of insertion loss at 30 MHz).

Page 3-11, Figure 3-4:

To CAUTION in item 3 add, "With limiter (Option 002), maximum input signal should be 1 watt (+30 dBm) continuous or 75 watts pulse peak (0.001 duty cycle)."

Page 4-1, paragraph 4-6:

Add the following:

NOTE

The Option 002 limiter has approximately 1.5 dB of insertion loss at 30 MHz. So use the procedure given in Figure 3-3 (page 3-9) and calibrate the analyzer using a 100 MHz, -30 dBm (± 0.3 dB) signal. When performing the checks given below, do *not* adjust VERTICAL GAIN and AMPL CAL; the 30 MHz, -30 dBm signal from the analyzer's calibrator will appear on the display as approximately -31.5 dBm (5.95 mV).

Pages 4-7 and 4-9, paragraph 4-21:

Change "SPECIFICATION" to read as follows:

SPECIFICATION: With 10 dB input attenuator setting.

| Frequency Range (GHz) | Mixing Mode (n) | Frequency Response (dB max) |
|-----------------------|-----------------|-----------------------------|
| 0.1 — 2.05 | 1— | 1.5 |
| 1.50 — 3.55 | 1— | 1.5 |
| 2.07 — 6.15 | 2— | 1.8 |
| 2.60 — 4.65 | 1+ | 1.5 |
| 4.11 — 6.15 | 1+ | 1.5 |
| 4.13 — 10.25 | 3— | 2.0 |
| 6.17 — 10.25 | 2+ | 2.0 |
| 6.19 — 12.4 | 4— | 2.5 |
| 8.23 — 12.4 | 3+ | 2.5 |
| 10.29 — 12.4 | 4+ | 2.5 |
| 12.4 — 18.0 | 4+ | See Typical Response |

Change last sentence in step 4 to "Amplitude variations should not exceed 0.3 divisions (± 1.5 dB).

—————0.3 div"

Change Table 4-2 to read as follows:

Table A-1. Frequency Response for Option 002

| Frequency Range (GHz) | Mixing Mode (n) | IF Frequency (MHz) | Frequency Response (dB Max) |
|-----------------------|-----------------|--------------------|-----------------------------|
| 0.1 — 2.05 | 1— | 2050 | 1.5 |
| 1.50 — 3.55 | 1— | 550 | 1.5 |
| 2.07 — 6.15 | 2— | 2050 | 1.8 |
| 2.60 — 4.65 | 1+ | 550 | 1.5 |
| 4.11 — 6.15 | 1+ | 2050 | 1.5 |
| 4.13 — 10.25 | 3— | 2050 | 2.0 |
| 6.17 — 10.25 | 2+ | 2050 | 2.0 |
| 6.19 — 12.4 | 4— | 2050 | 2.5 |
| 8.23 — 12.4 | 3+ | 2050 | 2.5 |
| 10.29 — 12.4 | 4+ | 2050 | 2.5 |
| 12.4 — 18.0 | 4+ | 2050 | See Typical Response |

Page 4-16, Table 4-4:

Change list for paragraph 4-21 to read as follows:

| Paragraph No. | Test Description | Measurement Unit | Min. | Actual | Max. |
|---------------|-----------------------|------------------|------|------------|------------|
| 4-21. | Frequency Response | | | | |
| | Frequency Range (GHz) | Mixing Mode (n) | | | |
| | 0.1 — 2.05 | 1— | dB | —1.5 | _____ +1.5 |
| | 1.50 — 3.55 | 1— | dB | —1.5 | _____ +1.5 |
| | 2.07 — 6.15 | 2— | dB | —1.8 | _____ +1.8 |
| | 2.60 — 4.65 | 1+ | dB | —1.5 | _____ +1.5 |
| | 4.11 — 6.15 | 1+ | dB | —1.5 | _____ +1.5 |
| | 4.13 — 10.25 | 3— | dB | —2.0 | _____ +2.0 |
| | 6.17 — 10.25 | 2+ | dB | —2.0 | _____ +2.0 |
| | 6.19 — 12.4 | 4— | dB | —2.5 | _____ +2.5 |
| | 8.23 — 12.4 | 3+ | dB | —2.5 | _____ +2.5 |
| 10.29 — 12.4 | 4+ | dB | —2.5 | _____ +2.5 | |

Page 6-2, Table 6-2:

Change to read as follows:

Change A1 to 08555-60119 PANEL ASSY: FRONT (OPT. 002) 28480 08555-60119 for instruments with Serial Prefix 1326A and below.

Change A1 to 08555-60126 PANEL ASSY: FRONT (OPT. 002) 28480 08555-60126 for instruments with Serial Prefix 1343A and above.

Change A1MP5 to 08553-0014 DIAL/KNOB (INPUT ATTENUATION) 28480 08553-0014.

Change A1MP11 to 08555-0054 PANEL: FRONT (OPT. 002) 28480 08555-00054.

Pages 6-17 and 6-8, Table 6-2:

Change W1 to 08555-20112 CABLE ASSY: RF INPUT TO LIMITER 28480 08555-20112.

Add W29 08555-20113 CABLE ASSY: LIMITER TO ATTENUATOR 28480 08555-20113.

Add E1 1250-0523 CAP: SHORTING 28480 1250-0523.

Change MP15 to 08555-0052 PLATE: CONNECTOR (OPT. 002) 28480 08555-00052.

Add U1 5086-7087 LIMITER 28480 5086-7087.

Page 8-13, Figure 8-10:

Replace top internal view with attached figure.

Pages 8-14 and 8-15, Service Sheet 1:

To the test, item **2**, add the following:

On instruments with Option 002, there is a limiter between the INPUT port and the input attenuator. The limiter protects the attenuator and the first mixer from inadvertent overloads.

TOP INTERNAL VIEW, OPTION 002

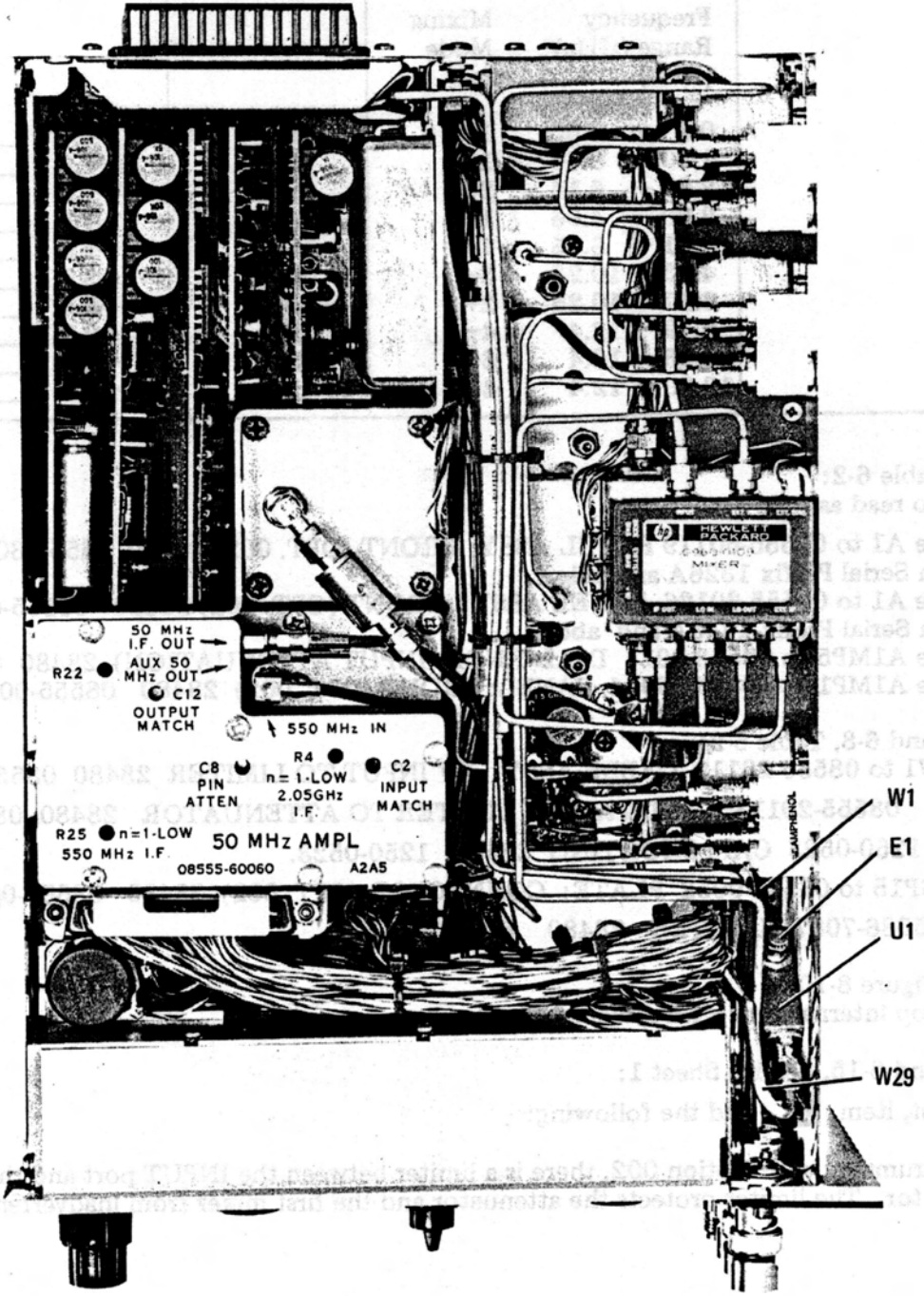
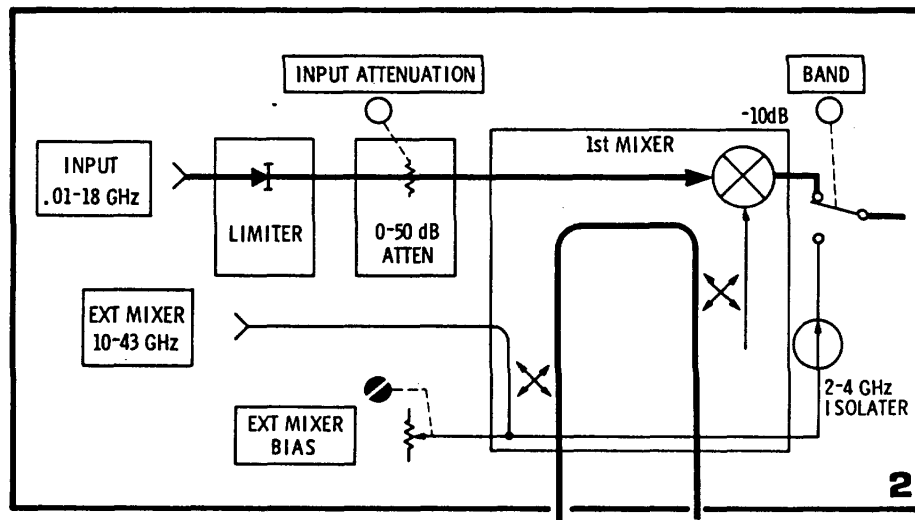


Figure A-3. 8555A RF Section, Top and Bottom Internal Views (Option 002)

To Figure 8-11, add the following:



Pages 8-16 and 8-17, Service Sheet 2:

Under "THEORY OF OPERATION", item **1**, add the following:

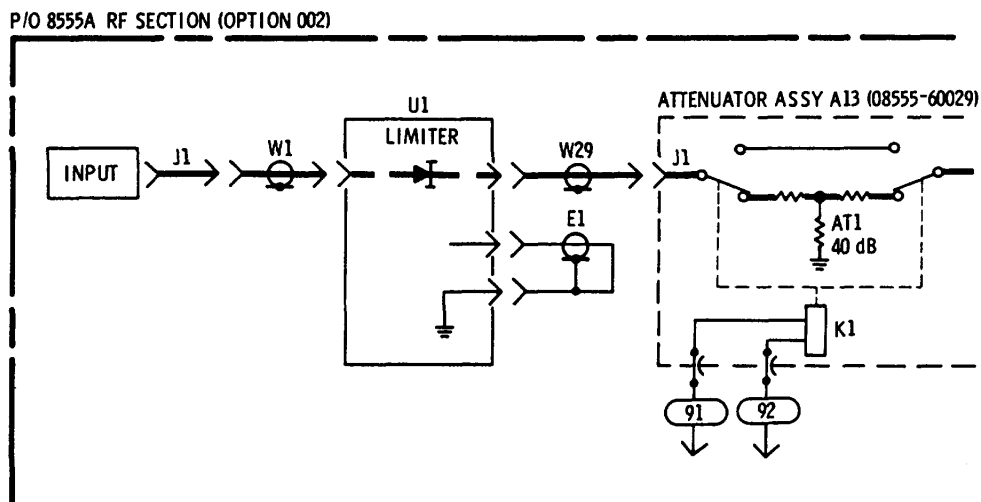
On instruments with Option 002, there is a limiter between the INPUT port and the input attenuator. The limiter's frequency range is 0.1 to 12.4 GHz; it consists of two oxide passivated silicon PIN diodes which are functionally integrated into 50-ohm coaxial transmission line. The limiter's diodes are *not* field replaceable. Limiting depends upon input power and the limiting threshold is about 5 mW.

Under "TROUBLESHOOTING PROCEDURE", item **1**, add the following:

Failure of the limiter supplied with Option 002 will cause one or more of the following:

1. excessive VSWR (for Option 002)
2. excessive distortion
3. signal level appearing on display either low or nonexistent.

To Figure 8-17, replace appropriate portion of schematic with the following:



Page 1-5, Table 1-2 (cont'd):

Spurious Responses due to Third Order Intermodulation Distortion: < -70 dB with -50 dBm incident on INPUT port and signal separation > 1 MHz.

Add the following:

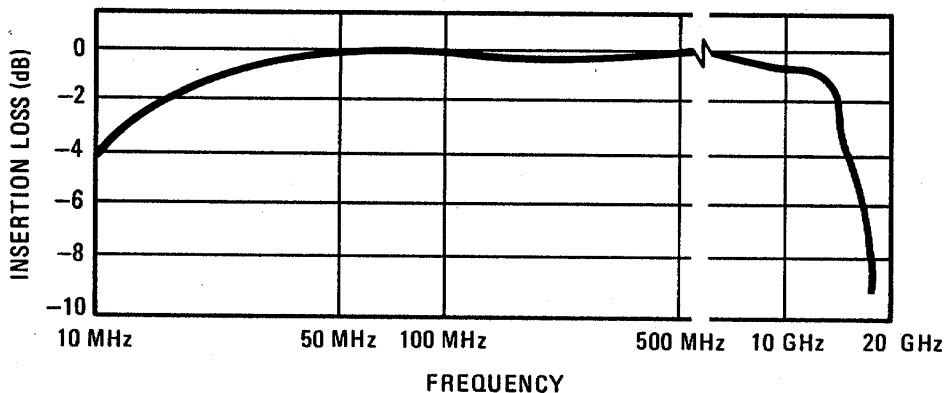


Figure A-1. Frequency Response for Option 002

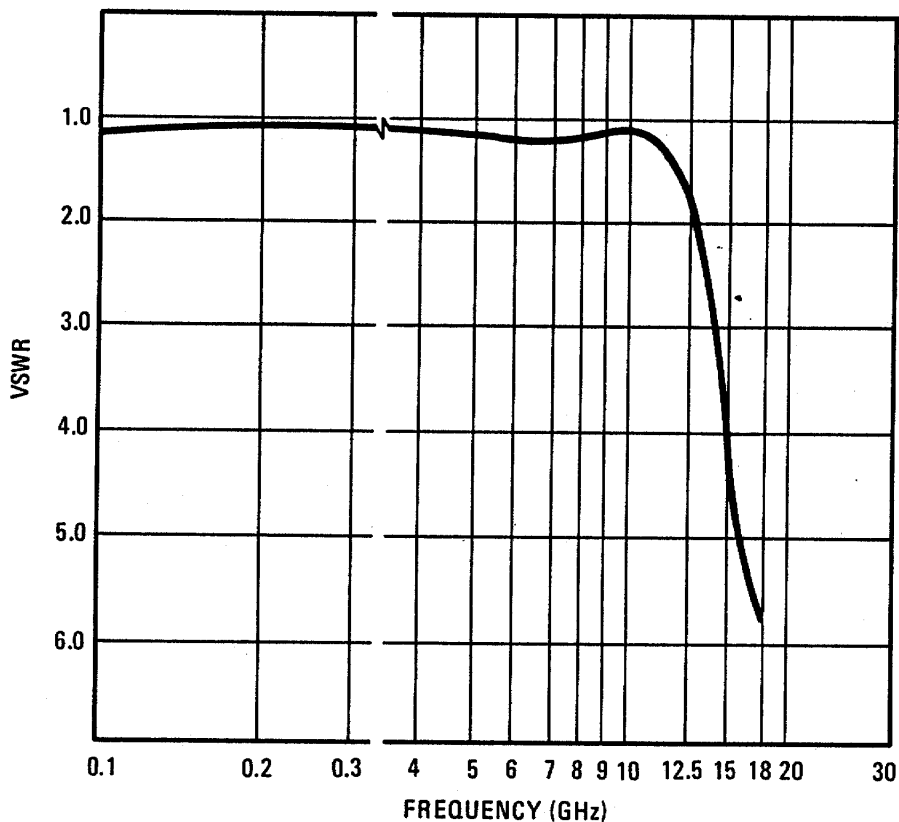


Figure A-2. Typical VSWR Versus Frequency for Option 002

NOTE

The analyzer's absolute amplitude calibration is retained with the Option 002 because the effect of the limiter's insertion loss is calibrated out from 0.1 to 12.4 GHz.

MANUAL IDENTIFICATION

Model Number: 8555A
 Date Printed: August 1974
 Part Number: 08555-90027
 Manual Changes: 08555-90068

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections

Make all appropriate serial number related changes indicated in the tables below.

| Serial Prefix or Number | Make Manual Changes |
|---------------------------------|---------------------|
| 1441A | 1 |
| 1450A thru 1450A04735 | 1,2 |
| 1509A thru 1509A04835 | 1-3 |
| 1509A4836A thru 1509A prefix | 1-4 |
| 1526A | 1-5 |
| 1528A thru 1528A05285 | 1-6 |
| 1528A05286 thru 1528A05435 | 1-7 |
| 1528A05436 thru 1528A prefix | 1-8 |
| 1545A | 1-9 |
| 1619A | 1-10 |
| 1631A | 1-11 |
| 1642A | 1-12 |
| 1713A | 1-13 |
| 1724A | 1-14 |

| Serial Prefix or Number | Make Manual Changes |
|-------------------------|---------------------|
| 1831A | 1-15 |
| 1937A | 1-16 |
| 2005A | 1-17 |
| 2028A, 2111A | 1-18 |
| 2209A | 1-19 |
| 2338A | 1-20 |
| 2414A | 1-21 |
| ▶ 2414A13874 | 1-22 |
| | |
| | |
| | |
| | |
| | |
| | |

▶ NEW ITEM

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

Manual Changes Print Date: 20 May 1988
 Manual Changes Part Number: 08555-90068



ERRATA

Inside Front Cover:

Replace information regarding SAFETY, CERTIFICATION, and WARRANTY AND ASSISTANCE with new information included in this Manual Changes supplement

Title Page, SERIAL NUMBER:

Add serial number prefix 1434A after 1429A.

Page 1-1, GENERAL INFORMATION:

Add paragraph 1-A, included in this Manual Changes supplement, preceding paragraph 1-1.

Page 1-4, Table 1-1:

Replace Sensitivity specification with P/O Table 1-1 included in this Manual Changes supplement.

► Under FREQUENCY ACCURACY change Scan Accuracy as follows: insert "Scanwidths .2 MHz and wider" at the beginning of the entry.

► Page 1-4, Table 1-1:

Under RESOLUTION, delete Bandwidth Selectivity and specifications.

► Page 1-5, Table 1-1:

In the ABSOLUTE CALIBRATION ACCURACY section, delete the sentence that reads "Input RF Attenuator: Frequency response typically ± 0.6 dB from 10 MHz to 18 GHz."

► Page 1-5, Table 1-1:

In the ABSOLUTE CALIBRATION ACCURACY section, delete the sentence that reads "IF gain variation with different bandwidth settings (at 20 deg. C) Log ± 0.5 dB. Linear: $\pm 5.8\%$ ".

► Page 1-5, Table 1-1:

In the ABSOLUTE CALIBRATION ACCURACY section, delete "Log Reference Level" and "Log Reference Level Vernier" specifications.

Under INPUT SPECIFICATIONS, change maximum input level table as follows:

Change VOLTS heading to indicate addition of footnote 3 (VOLTS_{2,3})

Add footnote 3 as follows: "Do not exceed ± 1 Vdc for instruments with Option 002 or damage to internal limiter will occur."

► Under ABSOLUTE CALIBRATION ACCURACY change Amplitude Display to "Log $\pm .35$ dB/dB but typically not more than"

► Under SCAN TIME SPECIFICATIONS change Scan Time Accuracy to "0.1 ms/div to 20 ms/div, $\pm 15\%$, 50 ms/div to 10 sec/div, $\pm 25\%$ ".

►Page 1-6, Table 1-2:

Under AMPLITUDE CHARACTERISTICS:

ADD, "IF gain variation with different bandwidth settings: (at 20 deg. C).

Log: ± 0.5 dB. Linear: $\pm 5.8\%$ ".

ADD "Log Reference Level Accurate to ± 0.2 dB ($\pm 2.3\%$ Linear Sensitivity)."

"Log Reference Level Vernier: Accurate to ± 0.1 dB (1.2% in 0, -6, and -12 dB positions; otherwise, ± 0.25 dB ($\pm 2.8\%$)."

►Page 1-6, Table 1-2:

Under RESOLUTION, after first paragraph

ADD the following specifications table:

Bandwidth Selectivity:

| IF Bandwidth | 60 dB/3 dB Bandwidth Ratio | |
|-------------------|----------------------------|-------|
| | 8552A | 8552B |
| 10 kHz - 300 kHz | 20:1 | 20:1 |
| 1 kHz - 3 kHz | 20:1 | 11:1 |
| 0.1 kHz - 0.3 kHz | 25:1 | 11:1 |

►Page 1-6, Table 1-2:

Under FREQUENCY DRIFT, following Stabilization Range:

ADD, "Scanwidth Accuracy: 100 kHz/div to 2K Hz/div $\pm 10\%$."

Page 1-10, Table 1-5:

Change Service Kit to Service Accessories.

Page 1-11, Table 1-5:

Change Service Kit in Item column to Service Accessories.

Change fourth entry to read: "Extender Board Assy, 6 pins, 12 conductors, for plug-in circuit boards."

Change fifth entry to read: "Extender Board Assy, 12 pins, 24 conductors, for plug-in circuit boards."

Page 1-11, Figure 1-6:

In figure title, change "Service Kit" to "Service Accessories".

Page 1-13, Table 1-5:

Change Tuning Tool Kit, Slug, Suggested Model, to: "HP 08555-60107".

Page 2-2, Paragraph 2-20:

Replace step j with the following step:

- j. Push in the front panel latch. Ensure that the latch lever is securely locked (the finger of the lever's notched right end should be locked behind the side frame rib). If it is not, apply pressure to the front panels of the plug-ins until the latch is locked. The assembly is now securely installed.

Page 4-1, Paragraph 4-8, Step b:

Change "left (-3) graticule" to "left (-5) graticule".

Page 4-16, Table 4-4:

In paragraph 4-21, change the tolerance for the 2.07-6.15 GHz Frequency Range to ± 1.25 dB.

In paragraph 4-21, change the tolerance for the 10.29-18.00 GHz Frequency Range to ± 2.0 dB.

Page 5-10, Paragraph 5-26:

Change last line in step 10 to read: "Insertion loss of the low pass filter, notch filter, K1, and K3 combined should be less than 3 dB at 2050 MHz; equal to or greater than 50 dB above 2450 MHz."

Page 6-2, Table 6-2:

Delete the entry for 08555-00006.

Add between entries for A1MP11 and A1MP12: HP Part Number 08555-00044, Check Digit 4, PLATE, CONNECTOR (OLIVE BLACK).

Delete the entry for 08555-00039.

Page 6-4, Table 6-2:

Add A1A4MP64, HP Part Number 08555-60130, Check Digit 5, BAND LEVER ASSY.

Change A1A4R2 to HP Part Number 2100-3417, Check Digit 5.

Add A2MP7, HP Part Number 8160-0420, Check Digit 6, RFI GASKET, 3RD CONVERTER.

Page 6-5, Table 6-2:

► Change A2A1Q2 to HP Part Number 1854-0686, Check Digit 0, X-N A400 72.

Change A2A2Q1 to HP Part Number 1854-0882, Check Digit 8, TRANSISTOR NPN SI TO-18 PD-360MW. (Recommended replacement.)

Change A2A2R5 to HP Part Number 2100-1777, Check Digit 6, RESISTOR: VAR TRMR 20K OHM 5%.

Change A2A2R6 to HP Part Number 0757-0438, Check Digit 3, RESISTOR FXD 5.11K 1% .12W F TUBULAR.

► Change A2A2U1 and A2A2U2 to HP Part Number 1826-1058, Check Digit 3.

► Change A2A3 to HP Part Number 08555-60169, Check Digit 0.

Add NOTE as follows:

NOTE

If either A2A2R5 or A2A2R6 requires replacing, replace both of them.

Change A2A2R13 to HP Part Number 2100-1775, Check Digit 4, RESISTOR: VAR: TRMR 5K OHM 5% WW.

Change A2A2R15 to HP Part Number 0698-3158, Check Digit 4, RESISTOR 23.7K OHM 1% .125W F TUBULAR (FACTORY-SELECTED PART).

Add an asterisk (*) to A2A2R15 (to indicate it is a factory-selected part).

Add A2A2R20, HP Part Number 0757-0346, Check Digit 2, RESISTOR 10 OHM 1% .12W.

Change A2A4 to HP Part Number 08555-60151, Check Digit 9, LO AND DRIVE BD ASSYS (REPLACEMENT KIT).

Change the entries for all components of A2A4 except A2A4CR1 to read: NOT SEPARATELY REPLACEABLE.

Change A2A4C1, C2, and C6 to HP Part Number 0160-5842, Check Digit 8, CAPACITOR 1000PF 500V CER.

Change A2A4C5 to HP Part Number 0610-2247, Check Digit 1, CAPACITOR-FXD 3.9PF +- .25PF 500WVDC CER.

Change A2A4CR1 to HP Part Number 0122-0085, Check Digit 1, DIODE-VVC 2.2PF 7%.

Page 6-6, Table 6-2:

Change the entries for all components of A2A4 to read: NOT SEPARATELY REPLACEABLE.

Change HP Part Number 1205-0031 to 1205-0580, Check Digit 8, THERMAL-LINK; TO-18 PKG.

Page 6-7, Table 6-2:

► Change A4Q1 to HP Part Number 1853-0451, Check Digit 5, TRANSISTOR PNP SI TO-18. (RECOMMENDED REPLACEMENT)

Change A4Q3 to HP Part Number 0340-1150, Check Digit 5, INSULATOR:TSTR.

Change A4Q4 to HP Part Number 0340-1150, Check Digit 5, INSULATOR:TSTR.

Page 6-8, Table 6-2:

Change A4U1, U3, U4, U5, U6, and U7 to HP Part Number 1826-1058, Check Digit 3, IC LIN AMPLIFIER.

Page 6-9, Table 6-2:

Change A5R42 to HP Part Number 0698-3155, Check Digit 1, RESISTOR 4.64K 1% .125W F TUBULAR.

Change A5R46 to HP Part Number 0698-8961, Check Digit 7, 909K 1% .125W.

Change A5R49 to HP Part Number 0757-0397, Check Digit 3, RESISTOR 68.1 OHM 1% .125W F TUBULAR.

Page 6-10, Table 6-2:

► Change A6Q7 to HP Part Number 1854-0637, Check Digit 1, TRANSISTOR NPN 2N2219A SI PD-1W (RECOMMENDED REPLACEMENT).

Change A5U1 through A5U5 to HP Part Number 1826-1058, Check Digit 3, IC LIN AMPLIFIER.

Page 6-11, Table 6-2:

Change A6U1 and A6U2 to HP Part Number 1826-1058, Check Digit 3, IC LIN AMPLIFIER.

Change A6U9 to HP Part Number 1820-1201, Check Digit 6, IC:DGTL:GATE.

Change A7CR9 to HP Part Number 1901-0743, Check Digit 1, DIODE-RECT 400V 1A. (RECOMMENDED REPLACEMENT).

Page 6-12, Table 6-2:

Add A8CR10, HP Part Number 1901-3224, Check Digit 9, DIODE ZENER SI 17.8V 5% 0.4W.

Under A8Q1 and A8Q2, change INSULATOR:TSTR to HP Part Number 0340-1150, Check Digit 5.

Change A8U1 and A8U2 to HP Part Number 1826-1058, Check Digit 3, IC LIN AMPLIFIER.

Page 6-14, Table 6-2:

Change A11A2CR1 to HP Part Number 1901-0951, Check Digit 3.

Change A11A2R1 to HP Part Number 0698-7229, Check Digit 8, RESISTOR 511 OHM
1 $\frac{1}{2}$.05W F TUBULAR.

Change A11A3Q3 and A11A3Q4 to HP Part Number 1854-0404, Check Digit 0,
TRANSISTOR NPN SI TO-18 PD=360MW. (Recommended replacement.)

►Change A11A3C2 to HP Part Number 0160-4535, Check Digit 4, CAPACITOR-FXD:CER
1UF 50V.

►Change A14 to HP Part Number 08565-60124 Check Digit 9.

►Add A14C7 HP Part Number 0160-0970, Check Digit 3, CAPACITOR-FXD PE .47 UF 80V.

Page 6-15, Table 6-2:

►Change A14A1C11 to HP Part Number 0160-2220, Check Digit 0, CAPACITOR-FXD
1200PF +-5 $\frac{1}{2}$ 300WVDC MICA.

►Add A14A1C12*, HP Part Number 0140-0216, Check Digit 8, CAPACITOR-FXD 120PF
300V MICA.

Change A14A1L4 to HP Part Number 9140-0318, Check Digit 0, COIL: FXD: MOLDED
RF CHOKE: 338 UH 5 $\frac{1}{2}$.

Change A14A1Q2 through A14A1Q5 to HP Part Number 1854-0882, Check Digit 3,
TRANSISTOR NPN SI TO-18 PD=360MW. (Recommended replacement.)

Page 6-16, Table 6-2:

►Change A14A2C4 to HP Part Number 0160-4299, Check Digit 7, CAPACITOR-FXD
2200PF.

Change A14A2C8 to A14A2C8*, HP Part Number 0160-5114, Check Digit 7,
CAPACITOR-FXD 240PF +-5 $\frac{1}{2}$ 300WVDC GLS.

Change A14A2L6 to HP Part Number 9100-1648, Check Digit 7, COIL: FXD 560 UH
5 $\frac{1}{2}$.

Change A14A2Q1 through A14A2Q3 to HP Part Number 1854-0882, Check Digit 8,
TRANSISTOR NPN SI TO-18 PD=360MW. (Recommended replacement.)

Page 6-17, Table 6-2:

Change A16CR13 to A16CR14 and change A16CR14 to A16CR13.

Page 6-18, Table 6-2:

Change CR1 and CR2 to HP Part Number 1901-0743, Check Digit 1, DIODE RECT
400V 1A. (Recommended replacement.)

Change J1:

first and second entries to J1MP1

third and fourth entries to J1MP2

fifth entry to J1MP3

sixth entry to J1MP4

seventh entry to J1MP5

eighth entry to J1MP6

ninth entry to J1MP7

tenth entry to J1MP8

Change W29 (second entry) to W29J1.

Page 7-1:

At top left side of page, change 8552A to 8555A.

Page 7-1, table 7-1:

Add the following before 1429A:

1434A A1

Page 7-2, MANUAL CHANGE INSTRUCTIONS:

Add CHANGE A1 before CHANGE A as follows:

CHANGE A1

Page 6-4, Table 6-2:

Change A1A4R2 to HP Part Number 2100-2992, Check Digit 9.

Page 6-9, Table 6-2:

Change A5R42 to HP Part Number 0757-0040, Check Digit 3, RESISTOR 7.5K 1% .125W F TUBULAR.

Change A5R49 to HP Part Number 0698-3438, Check Digit 3, RESISTOR 147 OHM 1% .125W F TUBULAR.

Page 6-12, Table 6-2:

Delete A8CR10.

Page 6-16, Table 6-2:

Change A14A2C16 to HP Part Number 0121-0046, Check Digit 2, CAPACITOR:
VAR: TRMR CER 9-35PF.

Page 8-31, Figure 8-52, SERVICE SHEET 9:

Change A5R42 to 7500.

Change A5R49 to 147.

Page 8-43, Figure 8-72, SERVICE SHEET 15:

Delete A8CR10.

(End of CHANGE A1)

Page 8-1, Paragraph 8-14:

Change first line to read as follows:

"8-14. Service Accessories. A Service Accessories Kit, HP Part Number ... "

Page 8-2, Table 8-1:

Add A2A5R19, 50 MHz Ampl., 50 MHz ampl. gain.

Page 8-2, Table 8-2:

Delete A2A5R19, 50 MHz Ampl., 50 MHz ampl. gain.

Page 8-13, Figure 8-10:

Under COAXIAL CABLES, change W4 to A3AT1-A12J5.

Page 8-16, Paragraph 3, SERVICE SHEET 2:

Between title and text of paragraph 3, add the following caution:

CAUTION

An antistatic work station should be incorporated when working with the FIRST CONVERTER. If no electrostatic discharge (ESD) precautions are observed, do not attempt the following measurements.

Page 8-17, Figure 8-17:

On P/O GAIN NETWORK A16 schematic:

Change A16CR13 to 12.1V and A16CR14 to 9.1V.

Reverse locations of A16R21* and A16CR11.

►Change A1 to HP Part Number 08555-60125.

Page 8-19, Figure 8-21, SERVICE SHEET 3:

Change value of A11A2R1 to 511 (ohms).

►Change value of A11A3C2 to 1UF.

Page 8-21, Figure 8-28, SERVICE SHEET 4:

Change R1 value to 31.6.

►Figure 8-28:

Change A2A1Q2 to HP Part Number 1854-0686, Check Digit 0.

Change A2A3 to HP Part Number 08555-60169, Check Digit 0.

On 500 MHz LO DRIVE A2A2 schematic:

Change value of A2A2R15 to 23.7K, and place an asterisk (*) next to it to show it is a factory-selected part (i.e., the value given is the most commonly used value).

Change value of A2A2R13 to 5K.

Change A2A2R16 value to 34.8K.

Change A2A2Q1 to HP Part Number 1854-0882.

Change A2A2Q2 to HP Part Number 1853-0020, PNP, and reverse the direction of the arrow in the symbol for Q2.

►Change A2A2U1 and A2A2U2 to HP Part Number 1826-1058.

Add the following schematic note:

3. A2A4CR1 IS THE ONLY FIELD REPLACEABLE COMPONENT OF THE A2A4 ASSEMBLY.

On 500 MHz LO A2A4 schematic:

Change value of A2A4C5 to 3.9 (picofarads).

Change the value of A2A4R2 to 1.47K.

Change the value of A2A4R3 to 1.47K.

Page 8-21, Figure 8-28:

At the left side of 500 MHz LO Drive A2A2 circuit, show a 10-ohm resistor, R20, in series between feed-through capacitor C2 and the Q1-collector/R1 junction.

Page 8-23, Figure 8-34, SERVICE SHEET 5:

Change A2A5R19 to A2A5R19*.

Change A6U2 to 1826-1058.

Page 8-25, Figure 8-38:

Change A1P6 pin 44 to pin 56.

Page 8-26, Figure 8-39:

Change lower test point 8 to test point 9.

Page 8-27, Figure 8-41:

Add test point 9 at junction of A4U7 pin 6 and A4R20.

Change A4Q1 to HP Part Number 1853-0451.

Change A4U1 and A4U3 through A4U7 to 1826-1058.

Page 8-28, Figure 8-42:

Change lower voltage of A5Q1C waveform to -20V.

Page 8-29, Figure 8-45:

Change A6U1 to 1826-1058.

Page 8-31, Figure 8-52, SERVICE SHEET 9:

Change the value of A5R42 to 4640.

Change the value of A5R46 to 909K. (Recommended replacement.)

Change the value of A5R49 to 68.1.

Change A5U1 through A5U5 to 1826-1058.

Change value of A14A1L4 to 338 (microhenries).

Change value of A14A1C11 to 1200 (picofarads).

►Figure 8-49,

Add A14C7 from A14C4 to the Ground Terminal under A14C1.

►Figure 8-52,

Change A14 to HP Part Number 08565-60124, Check Digit 9.

Add A14C7, .47UF Capacitor, from the "ERROR OUT" side of A14C4 to GND.

Page 8-32, SERVICE SHEET 10:

Under A14A1 Discriminator Voltage Measurement, change A14A2Q1, A14A2Q2, and A14A2Q3 to A14A1Q1, A14A1Q2, and A14A1Q3 respectively.

Page 8-33, Figure 8-55, SERVICE SHEET 10:

Change the value of A14A2C4 to .0022. (Recommended replacement.)

Change the value of A15A2L6 to 560. (Recommended replacement.)

Page 8-35, Figure 8-58, SERVICE SHEET 11:

►Change A6Q7 to HP Part Number 1854-0637. Check Digit 1.

Page 8-37, Figure 8-61:

Change YIG DRIVE SWEEP BUFFER Service Sheet 7 to P/O SCAN WIDTH SWITCH ASSY Service Sheet 7.

Page 8-40, TEST PROCEDURES, SERVICE SHEET 14:

Change first line of paragraph 1 to read as follows:

1. Connect the digital voltmeter test leads to A1P6, pin 53 ((97), -12.6VDC line) and pin 42 ((923), 300 kHz line).

Page 8-43, Figure 8-72, SERVICE SHEET 15:

Change Figure 8-72 as shown in partial schematic P/O Figure 8-72 (ERRATA) included in this Manual Changes supplement.

Change A8U1 and U2 to 1826-1058..

Page 8-46:

Change description for ALA4R1 to R:VAR WW 5K OHM, 10% LIN 1W.

Change ALA4R2 to HP Part Number 2100-3417, Check Digit 5.

Add ALA4MP64,-, (See Note) BAND LEVER ASSY, 08555-60130.

Change ALA4MP57 to HP Part Number 0610-0001, Check Digit 6.

Page 8-46, Figure 8-75, SERVICE SHEET 17:

Add NOTE at left side of list as follows:

NOTE

Items 21, 43, and 45, collectively, make up the Tuning Head Dial Drum Subassembly. This subassembly can be ordered under HP Part Number 08555-60150, Check Digit 9.

Page 8-46, Figure 8-75, Parts List:

Delete items ALA4MP26, 27, and 33.

Add the following:

HP Part Number 08565-20116, Check Digit 5, CLUTCH-PINION ASSEMBLY.

▶HP Part Number 08565-20117, Check Digit 6, DRIVE COLLAR.

▶HP Part Number 08565-20118, Check Digit 7, CLUTCH GEAR.

▶HP Part Number 08565-20119, Check Digit 8, CLUTCH PLATE.

Page 8-47, Figure 8-76, Parts List:

Change A1A2CR1 to HP Part Number 1901-0951, Check Digit 3.

Page A-1, Appendix A:

Add the following between paragraphs A4 and A5.

CAUTION

The maximum allowable dc input level for Option 002 instruments is +1V. Do not exceed this level or damage to the internal limiter will occur.

In the Frequency Response Table, change the frequency response of the 6.19 to 12.4 GHz range to +-2.5 dB.

Page A-5:

Change third paragraph to read:

Page 6-18, Table 6-2:

▶Add U1, HP Part Number 5086-7087, Check Digit 4 LIMITER.

Change W1 to HP Part Number 08555-20112, Check Digit 9, CABLE ASSY: RF INPUT TO LIMITER.

Change W29 to HP Part Number 08555-20113, Check Digit 0, CABLE ASSY: LIMITER TO ATTENUATOR.

Page 6-19, Table 6-2, MISCELLANEOUS PARTS:

►Change 08555-00044 to 08555-00052, Check Digit 4 PLATE: CONNECTOR (OPTION 002).

Page A-6, Figure A-3:

Replace Figure A-3 with Figure A-3 of this Manual Changes supplement.

Page A-7:

Replace figure at bottom of page A-7 with P/O Figure 8-17 (ERRATA) included in this Manual Changes supplement.

CHANGE 1

Page 6-2, Table 6-2:

Change A1MP5 to HP Part Number 08555-00057, Check Digit 9.

Add A1MP15, HP Part Number 08555-40015, Check Digit 3, LOCKOUT, ATTEN.

►Page 6-3, Table 6-2:

Change A1A4MP48 to HP Part Number 08555-20123, Check Digit 2.

CHANGE 2

Page 1-4, Table 1-1, FREQUENCY RANGE:

Change Full Scan, Scan Width, last sentence to read as follows: "Scan Width = n x 2050 MHz, where n is the mixing mode; e.g., for n=2, scan width is 4.1 GHz."

Page 6-7, Table 6-2:

Change A4R24 to HP Part Number 0698-8533, Check Digit 9, RESISTOR 121K .25% .125W F TUBULAR.

Change A4R26 to HP Part Number 0698-8534, Check Digit 0, RESISTOR 15.6K .25% .125W F TUBULAR.

Page 8-27, Figure 8-41, SERVICE SHEET 7:

Change R24 to 121K.

Change R26 to 15.6K.

CHANGE 3

Page 6-9, Table 6-2:

Change A5R37 to HP Part Number 0698-3157, Check Digit 3, RESISTOR 19.6K 1% .125W F TUBULAR.

Change A5R59 to HP Part Number 0757-0464, Check Digit 5, RESISTOR 90.9K 1% .125W F TUBULAR.

Page 6-16, Table 6-2:

Change A14A2C8 to HP Part Number 0140-0199, Check Digit 6, CAPACITOR-FXD, 240PF +-5% 300WVDC MICA.

Change A14A2C16 to HP Part Number 0121-0451, Check Digit 3, CAPACITOR-VAR, TRMR, AIR, 1.7/11PF.

Add A14A2C18, HP Part Number 0160-2202, Check Digit 8, CAPACITOR-FXD, 75PF +-5%

Page 8-31, Figure 8-49, SERVICE SHEET 9:

Replace Figure 8-49 with Figure 8-49 (CHANGE 3) included in this Manual Changes supplement.

Page 8-31, Figure 8-52, SERVICE SHEET 9:

Change A5R37 to 19.6K.

Change A5R59 to 90.9K.

Page 8-32, Figure 8-53, SERVICE SHEET 10:

Replace Figure 8-53 with Figure 8-53 (CHANGE 3) included in this Manual Changes supplement.

Page 8-33, Figure 8-54, SERVICE SHEET 10:

Replace Figure 8-54 with Figure 8-54 (CHANGE 3) included in this Manual Changes supplement.

Page 8-33, Figure 8-55, SERVICE SHEET 10:

Change A14A2C8 to 240.

Change A14A2C16 to 1.7-11.

Add A14A2C18, 75 PF, in parallel with A14A2C16.

CHANGE 4

Page 6-2, Table 6-2:

Change A1MP4 to HP Part Number 08555-00059, Check Digit 1.

Change A1MP5 to HP Part Number 08555-00061, Check Digit 5.

Change A1MP6 to HP Part Number 08555-00060, Check Digit 4.

Page A-5, under Page 6-2, Table 6-2:

Change A1MP5 to HP Part Number 08553-00133, Check Digit 0.

CHANGE 5

Page 5-14, Paragraph 5-28:

Add the following after Step 17:

18.A Set scan width to 100 kHz/ON.

18.B Set 8552A/B LOG-LINEAR switch to LINEAR.

19. Set 8555A SIG ID Switch to ON.

20. Adjust 8552A/B LOG REF LEVEL-LINEAR SENSITIVITY control/s for full screen display.

21. Adjust A7R23 SIG ID ADJ for signal ID level of 4.5 divisions.

Page 6-12, Table 6-2:

Add A7R23, HP Part Number 2100-2514, Check Digit 1, RESISTOR, VAR TRMR 20K 10% C SIDE ADJ.

Page 8-25, Figure 8-38, SERVICE SHEET 6:

Change as shown in partial schematic, P/O Figure 8-38 (CHANGE 6).

CHANGE 6

Page 6-5, Table 6-2:

Change A2A2U1 and A2A2U2 to HP Part Number 1826-0261, Check Digit 8, IC LIN AMPLIFIER.

Page 6-17, Table 6-2:

Change A14A2U1 to HP Part Number 1826-0261, Check Digit 8, IC LIN AMPLIFIER.

Page 8-21, Figure 8-28, SERVICE SHEET 4:

Change A2A2U1 and A2A2U2 to 1826-0261.

Page 8-33, Figure 8-55, SERVICE SHEET 10:

Change A14A2U1 to 1826-0261.

CHANGE 7

Page 6-3, Table 6-2:

Change A1A4MP7 to HP Part Number 1430-0713, Check Digit 6, gear-miter; 48 diametrical pitch. Changes gear to brass.

CHANGE 8

Page 6-5, Table 6-2:

Change A2A3E1 to HP Part Number 0955-0075, Check Digit 4, Mixer.

CHANGE 9

Page 6-17, Table 6-2:

Change A14A2R26 to A14A2R26*, FACTORY SELECTED PART.

▶Delete A14A2R26 HP Part Number 0698-3156. Check Digit 2.

Change A14A2R27 to HP Part Number 2100-2650, Check Digit 6, RESISTOR: VAR: 200K 10%.

Page 8-2, Table 8-1:

Add the following after A14A1R14: A14A2R26, VCXO Driver, VCXO Linearity.

Page 8-33, Figure 8-55 - TUNE STAB VCXO/PULSE AMPL ASSY A14A2, VCXO DRIVER

Change R26 to R26*.

Delete 14.7K.

Change R27 to 200K.

NOTE

A14A2R27 is a FACTORY ADJUSTMENT ONLY! It has been preset for optimum performance. DO NOT ADJUST!

CHANGE 10

Page 6-9, Table 6-2:

Change A5R35 to HP Part Number 0757-0288, Check Digit 1, RESISTOR 9.09K 1% .25W.

Change A5R36 to HP Part Number 0757-0442, Check Digit 9, RESISTOR 10K 1% .25W.

Page 8-29, Figure 8-45, SERVICE SHEET 8:

Change A5R35 value to 9.09K.

CHANGE 11

Page 6-7, Table 6-2:

Change A3AT1 to HP Part Number 08554-60071, Check Digit 2, ATTENUATOR: 3 dB.

Page 8-27, Figure 8-41:

Change A3AT1 to 3 dB.

CHANGE 12

Page 1-5, Table 1-1, INPUT SPECIFICATIONS:

Change Reflection Coefficient specification to read:

Reflection Coefficient. (Typical): For input RF attenuator settings ≥ 10 dB.

0.01-7.5 GHz <0.13 (1.3 SWR)

7.5-18 GHz <0.23 (1.6 SWR)

CHANGE 13

Page 1-4, Table 1-1:

Change FREQUENCY ACCURACY, Noise Sidebands, specification to read: "Noise Sidebands: For fundamental mixing. More than 70 dB below CW signal, 30 kHz or more away from signal, with 1 kHz IF bandwidth and 100 Hz video filter."

Page 6-7, Table 6-2:

Change A4R18 to HP Part Number 0757-0123, Check Digit 3, 34.8K OHM.

Page 8-27, Figure 8-41, SERVICE SHEET 7:

Change A4R18 value to 34.8K.

Page 8-44, Table 8-7, SERVICE SHEET 16:

Change P3 Pin 5 and P3 Pin 31 entries as shown in P/O Table 8-7 (CHANGE 13) included in this Manual Changes supplement.

CHANGE 14

Page 6-3, Table 6-2:

Add A1A4C1, C2, C3, C4 and C5, HP Part Number 0160-0573, Check Digit 2, CAPACITOR-FXD 4700PF 20% WVDC CER.

Page 8-35, Figure 8-58, SERVICE SHEET 11:

Change Figure 8-58 as shown in partial schematic, P/O Figure 8-58.

Page 8-46, Figure 8-75, SERVICE SHEET 7:

Change Figure 8-75.

Add A1A4C1, C2, C3, C4 and C5, HP Part Number 0160-0573, Check Digit 2,
CAPACITOR-FXD 4700PF 20% WVDC CER.

CHANGE 15

Page 6-17, Table 6-2:

Change A14A2R27 to HP Part Number 0757-0199, Check Digit 3, RESISTOR 21.5K 1%
.125W (FACTORY SELECTED PART; TYPICAL VALUE SHOWN).

Page 8-31, Figure 8-49, SERVICE SHEET 9:

Replace Figure 8-49 with Figure 8-49 (CHANGE 15) included in this Manual
Changes supplement.

Page 8-32, Figure 8-53, SERVICE SHEET 10:

Replace Figure 8-53 with Figure 8-53 (CHANGE 15) included in this Manual
Changes supplement.

Page 8-33, Figure 8-54, SERVICE SHEET 10:

Replace Figure 8-54 with Figure 8-54 (CHANGE 15) included in this Manual
Changes supplement.

Page 8-33, Figure 8-55, SERVICE SHEET 10:

Change A14A2R27 to a fixed 21.5K ohm resistor.

Change the reference designator for A14A2R27 to R27* (factory select part).

CHANGE 16

Page 6-16, Table 6-2:

Change A14A2C10 to HP Part Number 0160-2204, Check Digit 0, CAPACITOR-FXD
100PF +-5% 300WVDC MICA.

Page 6-17, Table 6-2:

Change A14A2R21 to HP Part Number 0757-0444, Check Digit 1, RESISTOR 12.1K 1%
.125W F TUBULAR.

Change A14A2U1 to HP Part Number 5180-2315, Check Digit 1.

Page 8-33, Figure 8-55, SERVICE SHEET 10:

►Change part number of A14A2U1 to 5180-2315.

Change value of A14A2R21 to 12.1K.

CHANGE 17

Page 6-10, Table 6-2:

Change A6CR7 to HP Part Number 1901-0049, Check Digit 0, DIODE-SWITCHING
6.19V 5% DO-7 PD=.4W.

Page 8-34, THEORY OF OPERATION, SERVICE SHEET 11:

Change last two sentences under LOGIC POWER SUPPLY description to read: "The output, approximately -7.6V, is applied to the VDC pins and the -12.6V is applied to the ground pins of the logic modules. This results in a positive 5.0V supply for the decoder logic."

Page 8-35, Figure 8-58, SERVICE SHEET 11:

Change value of A6CR7 to 6.19V.

Change voltage level at A6Q7 emitter to -7.6V.

Change voltage level at A6U7 pins 1 and 8 to -7.6V.

Change voltage level at A6U6 pins 1 and 8 to -7.6V.

CHANGE 18

Page 6-10, Table 6-2:

Change A6 to HP Part Number 08555-60152, Check Digit 1.

Page 6-11, Table 6-2:

Change A6U3, A6U5, and A6U8 to HP Part Number 1820-1417, Check Digit 6, IC GATE TTL LS NAND QUAD 2-INPUT.

Change A6U4 to HP Part Number 1820-0471, Check Digit 0, IC INV TTL HEX 1-INP.

Page 8-23, Figure 8-34, SERVICE SHEET 5:

Change part number of BAND BUFFER ASSY A6 to 08555-60152 (3 places).

Page 8-29, Figure 8-45, SERVICE SHEET 8:

Change part number of BAND BUFFER ASSY A6 to 08555-60152.

Page 8-35, Figure 8-58, SERVICE SHEET 11:

Change part number of BAND BUFFER ASSY A6 to 08555-60152.

Change pin numbers on Decoder Logic elements U4C, U4D, U3B, U3C, U5B, U5C, U8B, and U8C as shown in partial schematic P/O Figure 8-58 in this Manual Changes supplement.

CHANGE 19

Page 6-12, Table 6-2:

Change A8 to HP Part Number 08555-60153, Check Digit 2.

Add A8C5, HP Part Number 0160-2055, Check Digit 9, CAPACITOR-FXD: .01UF +80-20% 100WVDC CER.

Change A8R9 to HP Part Number 0811-1083, Check Digit 2, RESISTOR 6.8 OHMS 1% .125W WW.

Add A8R13, HP Part Number 0698-8812, Check Digit 7, RESISTOR 1.0 OHM 1% .125W.

Page 6-12, Table 6-2:

Under A8Q1 and A8Q2, change HP Part Number of INSULATOR: XSTR to 0340-0416, Check Digit 4.

Page 8-43, Figure 8-72:

Change part number of Power Supply Assembly A8 to 08555-60153.

In block 2 (A8) add a .01 uF capacitor, C5, between the +10V output (top of CR5) and circuit ground. Add a 1.0 ohm resistor, R13, between the bottom of C4 and circuit ground.

Change R9 in block 2 to 6.8 ohms.

CHANGE 20

Page 6-7, Table 6-2:

Change A3AT1 to HP Part Number 0955-0114, Check Digit 2, ATTENUATOR-COAXIAL
ATTEN: 3DB+-0.3DB.

Page 6-18, Table 6-2:

Change W4 to HP Part Number 08555-20136, Check Digit 7, CABLE-ASSY PAD-MXR.

CHANGE 21

Page 6-3:

Change ALA4 to HP Part Number 08555-60089, Check Digit 3, TUNING HEAD ASSY
(LITE GRAY).

Delete ALA4MP13.

Change ALA4MP8 to HP Part Number 08555-2012, Check Digit 8, CAP END.

►Page 6-4:

Change ALA4MP64 to HP Part Number 08555-60158, Check Digit 7, BAND LEVER ASSY-
REPLACEMENT KIT.

Page 8-46, Figure 8-75:

Replace P/O Figure 8-75 with P/O Figure 8-75. Tuning Head Assy ALA4,
Illustrated Parts Breakdown (CHANGE 21) included in this Manual Changes
supplement.

Delete ALA4MP13.

Change ALA4MP8 to HP Part Number 08555-20123.

►Change ALA4MP46 to HP Part Number 08555-60159, LEVER ASSY: REPLACEMENT: BAND
LEVER.

►Change ALA4MP64 to HP Part Number 08555-60158, REPLACEMENT KIT: BAND LEVER.

CHANGE 22

Page 6-10:

Change A5U2 to HP Part Number 1826-1058, Check Digit 3, IC OPO2C M OPAMP.

1-A. SAFETY CONSIDERATIONS

Safety Symbols



Instruction manual symbol: the apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.



Indicates dangerous voltages.



Earth terminal (sometimes used in manual to indicate circuit connected to grounded chassis).

WARNING

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

CAUTION

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

Operation

CAUTION

BEFORE APPLYING POWER make sure the instrument's ac input is set for the available ac line voltage, that the correct fuse is installed, and that all normal safety precautions have been taken.

Service

The information, cautions, and warnings in this manual must be followed to ensure safe operation and to keep the instrument safe. **SERVICE AND ADJUSTMENTS SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.**

Adjustment or repair of the opened instrument with the

ac power connected should be avoided as much as possible and, when unavoidable, should be performed only by a skilled person who knows the hazard involved.

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

Make sure only fuses of the required current rating and type (normal blow, time delay, etc.) are used for replacement. Fuse requirements are indicated on the instrument's rear panel. Do not use repaired fuses or short-circuit fuse holders.

Whenever it is likely that the protection has been impaired, make the instrument inoperative and secure it against any unintended operation.

WARNING

If this instrument is to be energized through an auto-transformer (for voltage reduction), make sure the common terminal is connected to the earthed pole of the power source.

BEFORE SWITCHING ON THE INSTRUMENT, the protective earth terminal of the instrument must be connected to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with protective earth contact. The protection action must not be negated by using an extension cord (power cable) without a protective grounding conductor. Grounding one conductor of a two-conductor outlet is not sufficient protection.

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal is likely to make this instrument dangerous. Intentional interruption of the earth ground is prohibited. Whenever it is likely that the protection has been impaired, the instrument must be secured against any unintended operation.

Servicing this instrument often requires that you work with the instrument's protective covers removed and with ac power connected. Be very careful; the energy at many points in the instrument may, if contacted, cause personal injury.

P/O Table 1-1. 8555A/8552A/8552B Specifications (ERRATA)

Sensitivity:

With INTERNAL Coaxial Mixer

Average Noise Level: Specified for 1 kHz bandwidth. Using lower bandwidths will improve average noise level; e.g., use of 100 Hz bandwidth will improve noise level in the 1.5 to 3.55 GHz frequency range from -117 dBm to -127 dBm max.

| Frequency Range (GHz) | Mixing Mode (n) | IF Freq. (MHz) | Average Noise Level (dBm max.) |
|-----------------------|-----------------|----------------|--------------------------------|
| 0.01 - 2.05 | 1- | 2050 | -115 |
| 1.50 - 3.55 | 1- | 550 | -117 |
| 2.07 - 6.15 | 2- | 2050 | -108 |
| 2.60 - 4.65 | 1+ | 550 | -117 |
| 4.11 - 6.15 | 1+ | 2050 | -115 |
| 4.13 - 10.25 | 3- | 2050 | -103 |
| 6.17 - 10.25 | 2+ | 2050 | -105 |
| 6.19 - 14.35 | 4- | 2050 | -95 |
| 8.23 - 14.35 | 3+ | 2050 | -100 |
| 10.29 - 18.00 | 4+ | 2050 | -90 |

With 11517A EXTERNAL Waveguide Mixer and Appropriate Waveguide Tapers

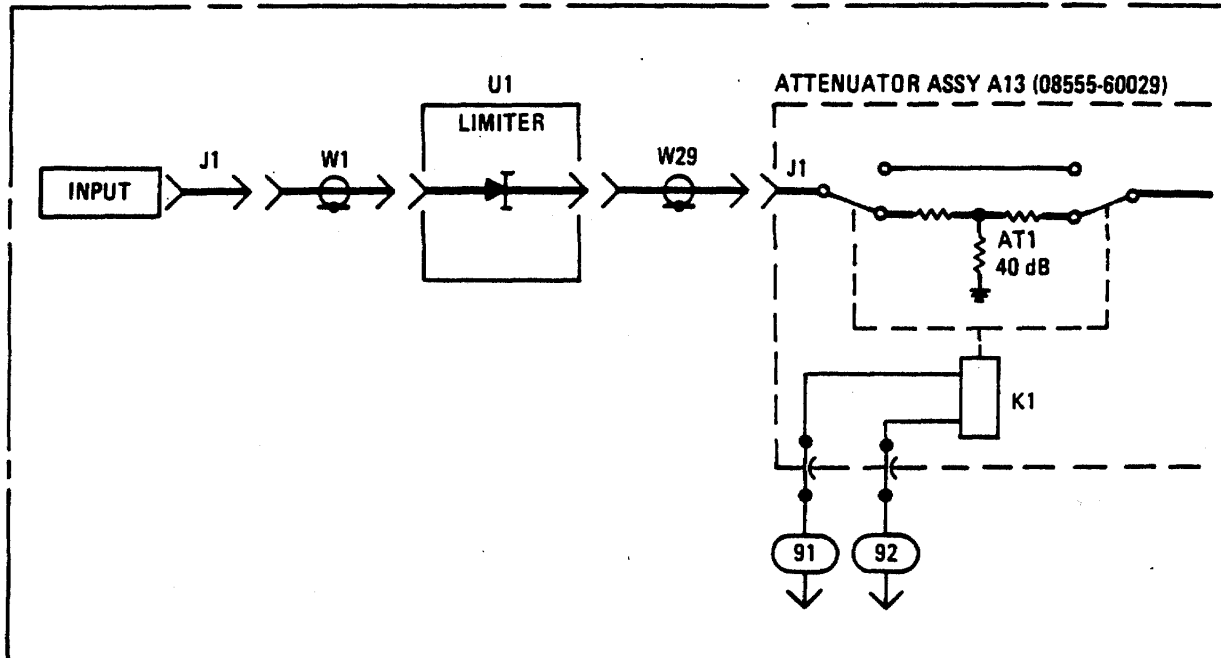
Average Noise Level: 10 kHz bandwidth (typical).

| | | | |
|---------------|-----|------|-----|
| 10.31 - 22.55 | 6- | 2050 | -90 |
| 14.41 - 26.65 | 6+ | 2050 | -85 |
| 18.55 - 38.95 | 10- | 2050 | -85 |
| 22.65 - 43.05 | 10+ | 2050 | -75 |

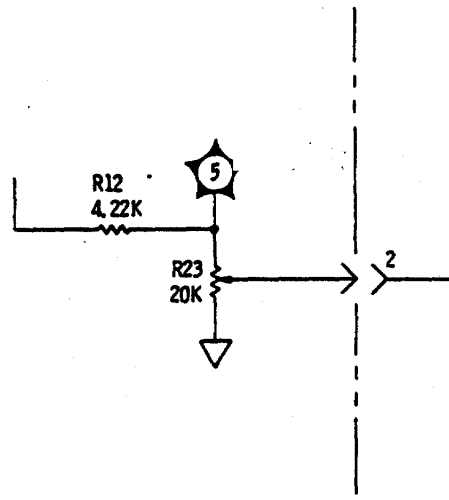
P/O Table 8-7. RF Section Wiring from Connector P3 (CHANGE 13)

| P3 Pin No. | Wire Color Code | Function | To | Service Sheet |
|------------|-----------------|---------------|------------|---------------|
| 5 | 0 | Ground Return | Ground Lug | Not Shown |
| 31 | 0 | Ground Return | Ground Lug | Not Shown |

P/O 8555A RF SECTION (OPTION 002)



P/O Figure 8-17. Input Attenuator and 1st Converter Schematic Diagram (ERRATA)



P/O Figure 8-38. Signal Identifier (CHANGE 5)

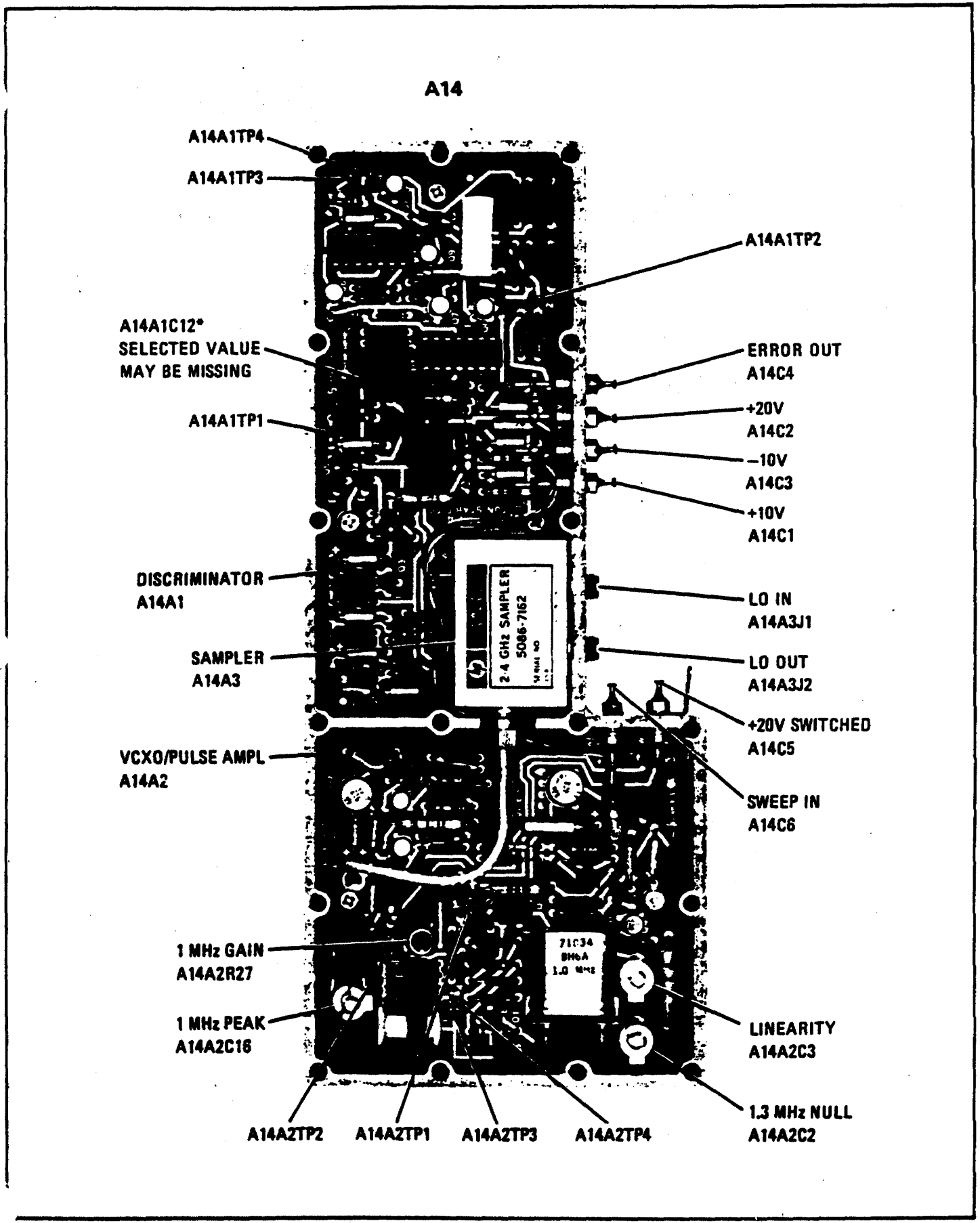


Figure 8-49. Tuning Stabilizer Assembly A14 (CHANGE 3)
 Figure 8-54. Tuning Stabilizer Assembly A14 (CHANGE 3)

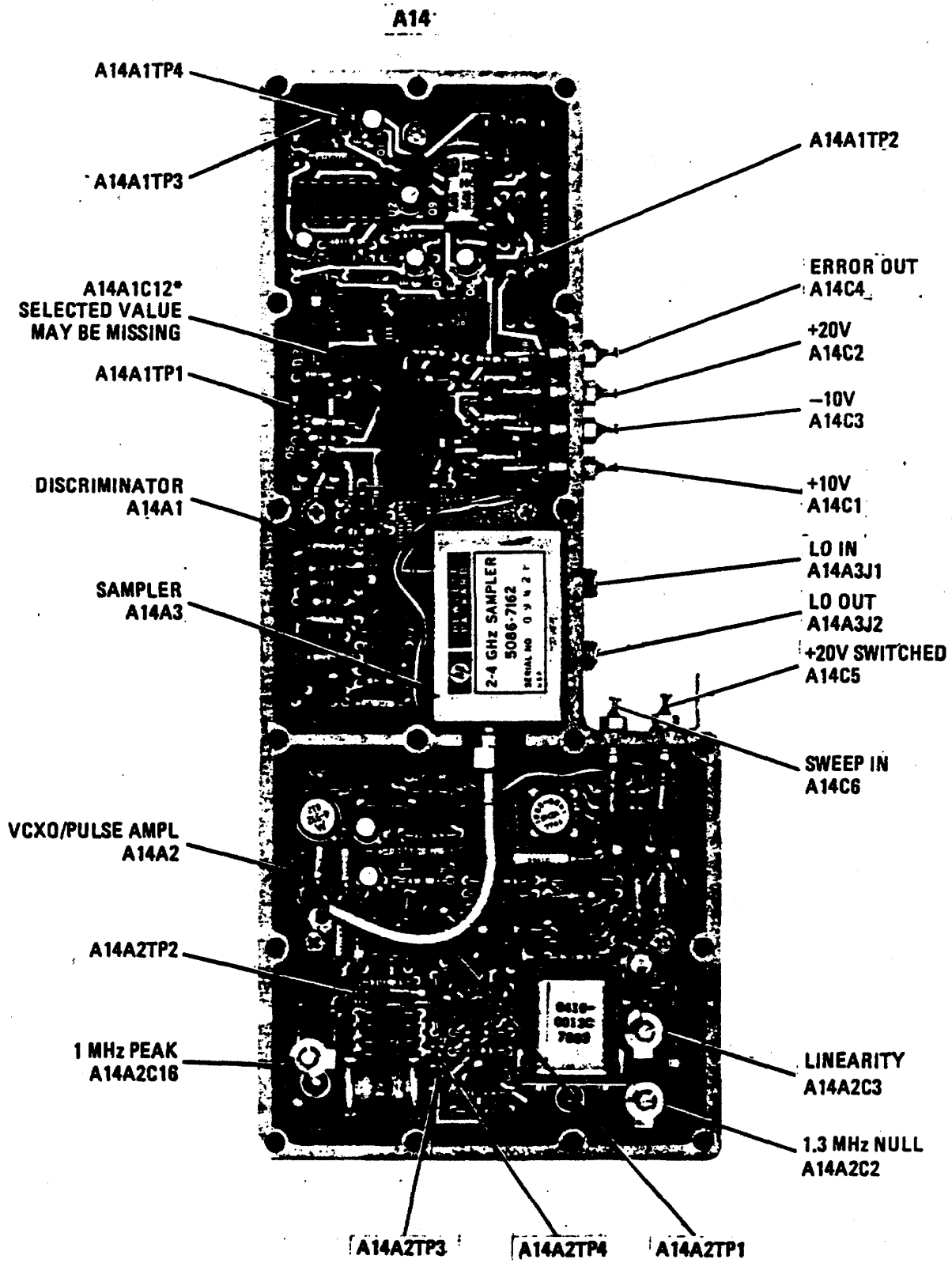


Figure 8-49. Tuning Stabilizer Assembly A14 (CHANGE 15)
 Figure 8-54. Tuning Stabilizer Assembly A14 (CHANGE 15)

A14A2

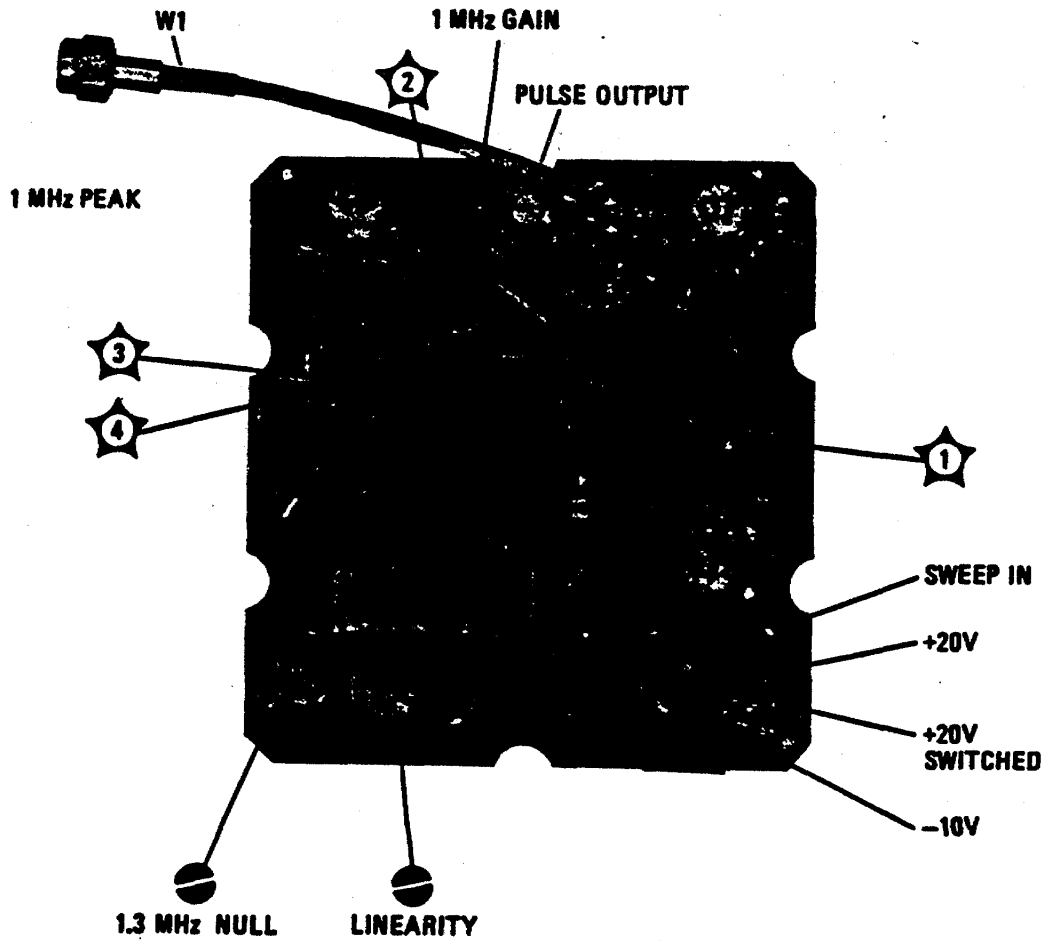


Figure 8-53. Tuning Stabilizer VCXO Assembly A14A2 (CHANGE 3)

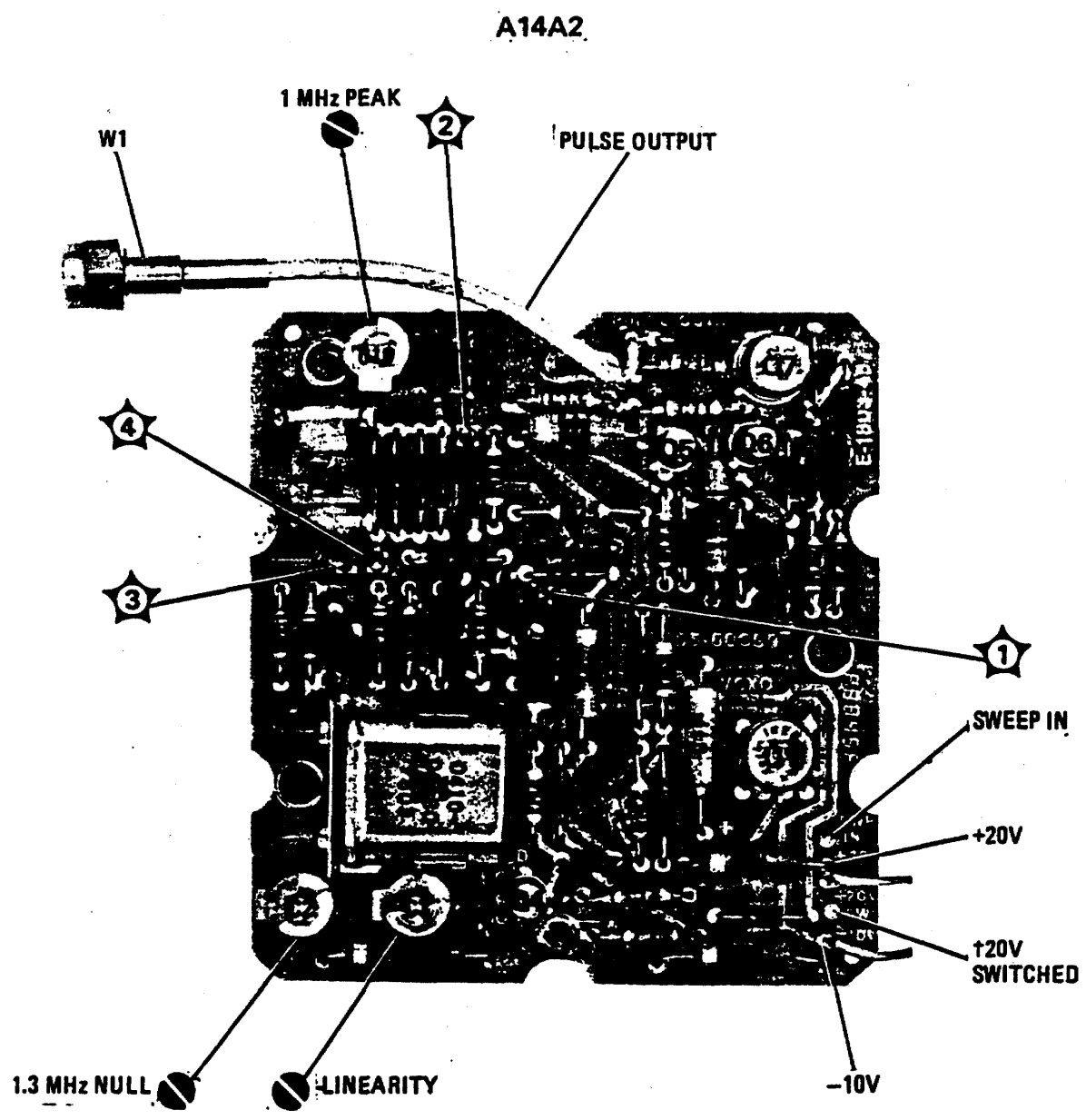
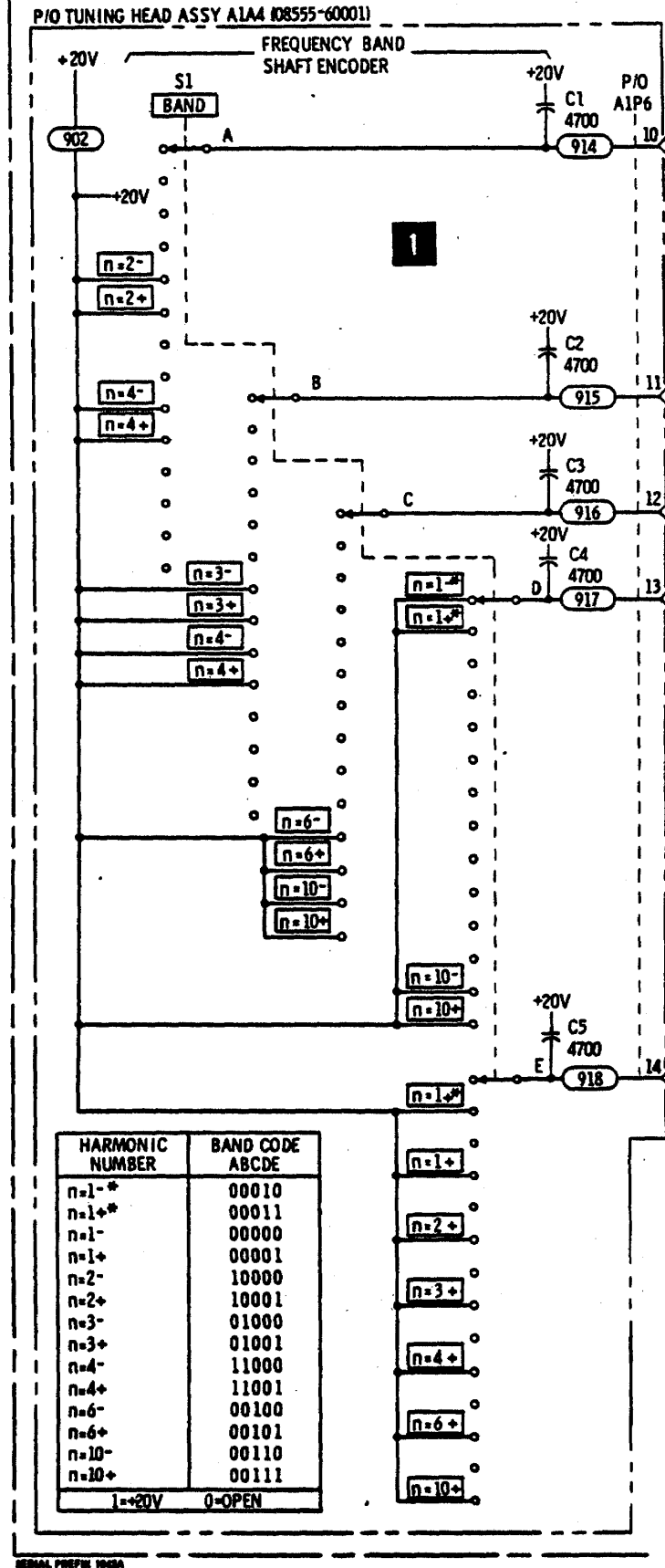


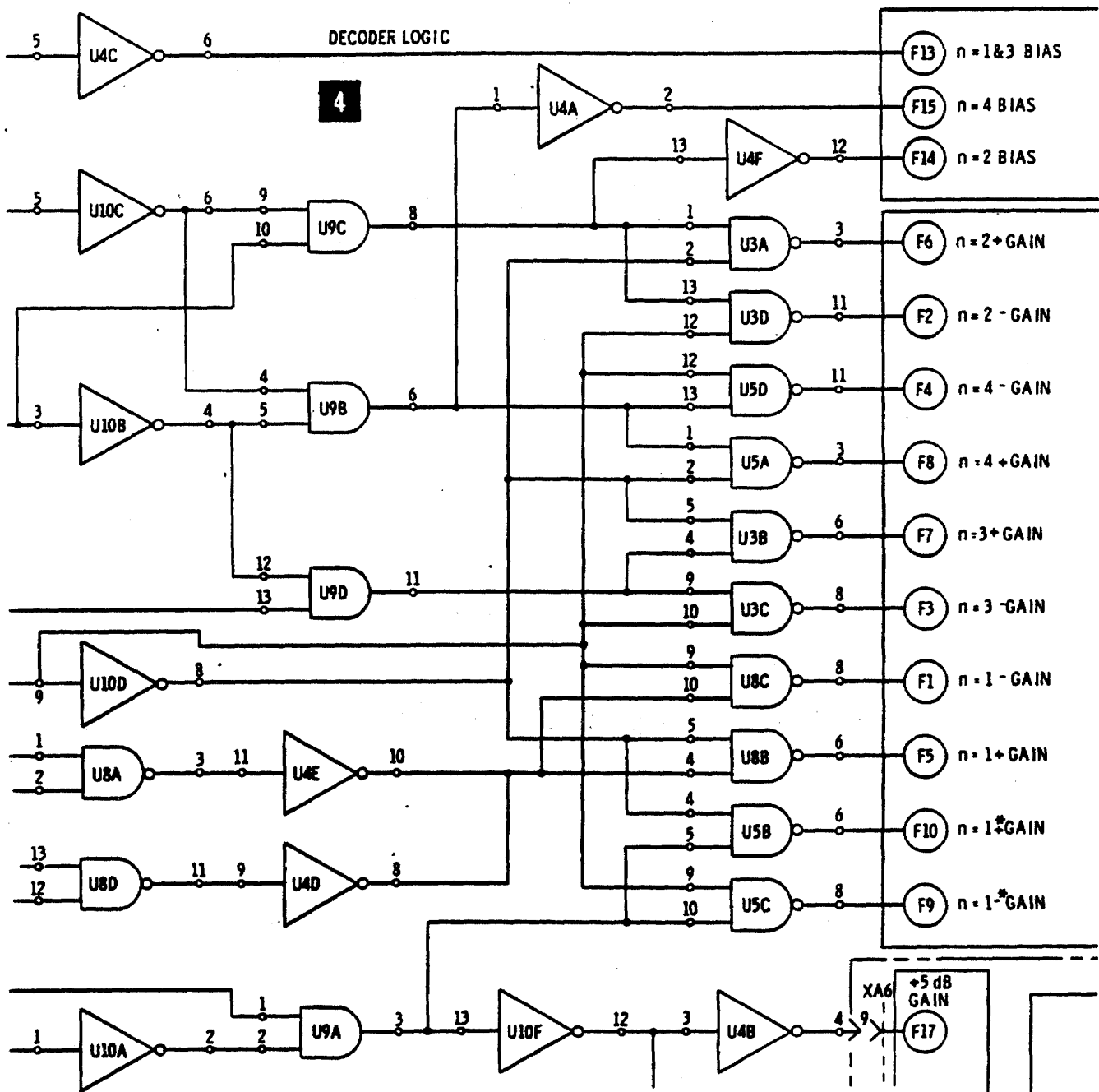
Figure 8-53. Tuning Stabilizer VCXO Assembly A14A2 (CHANGE 15)

P/O 8555A RF SECTION

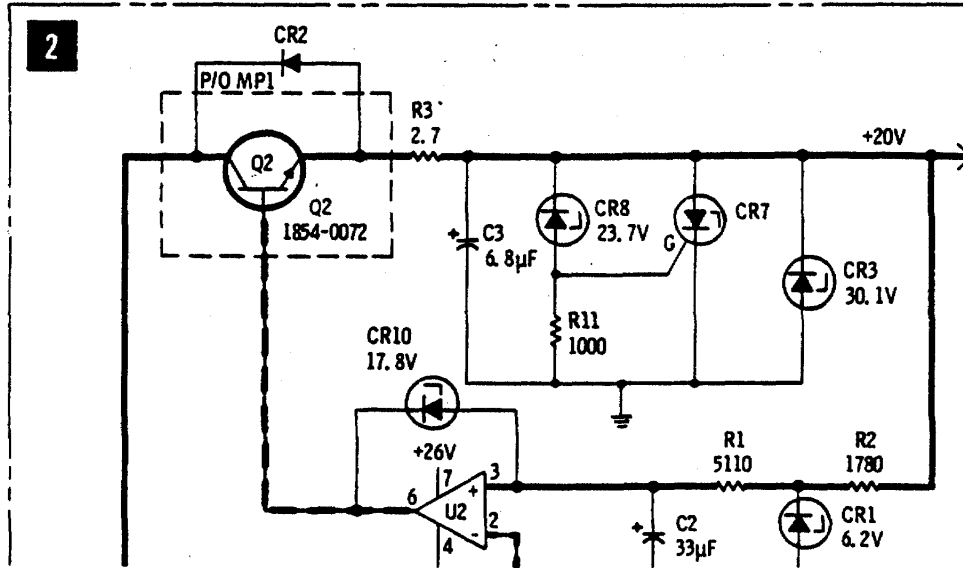


SERIAL PREFIX 1002A

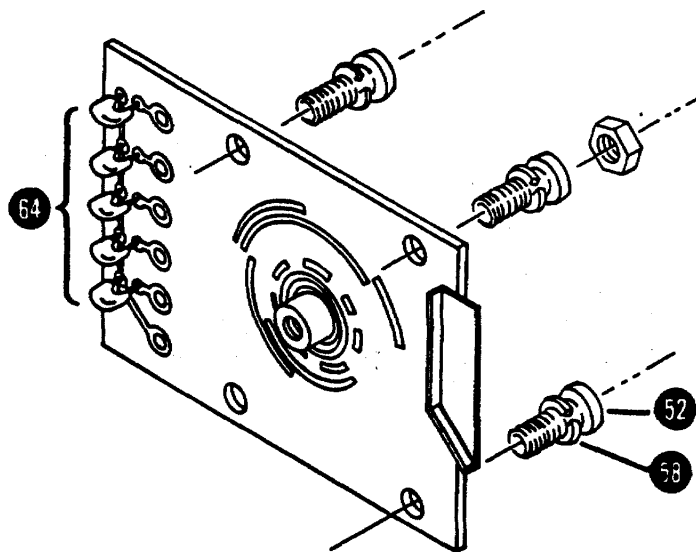
P/O Figure 8-58. Band Code Switch Logic, Schematic Diagram (CHANGE 1-4)



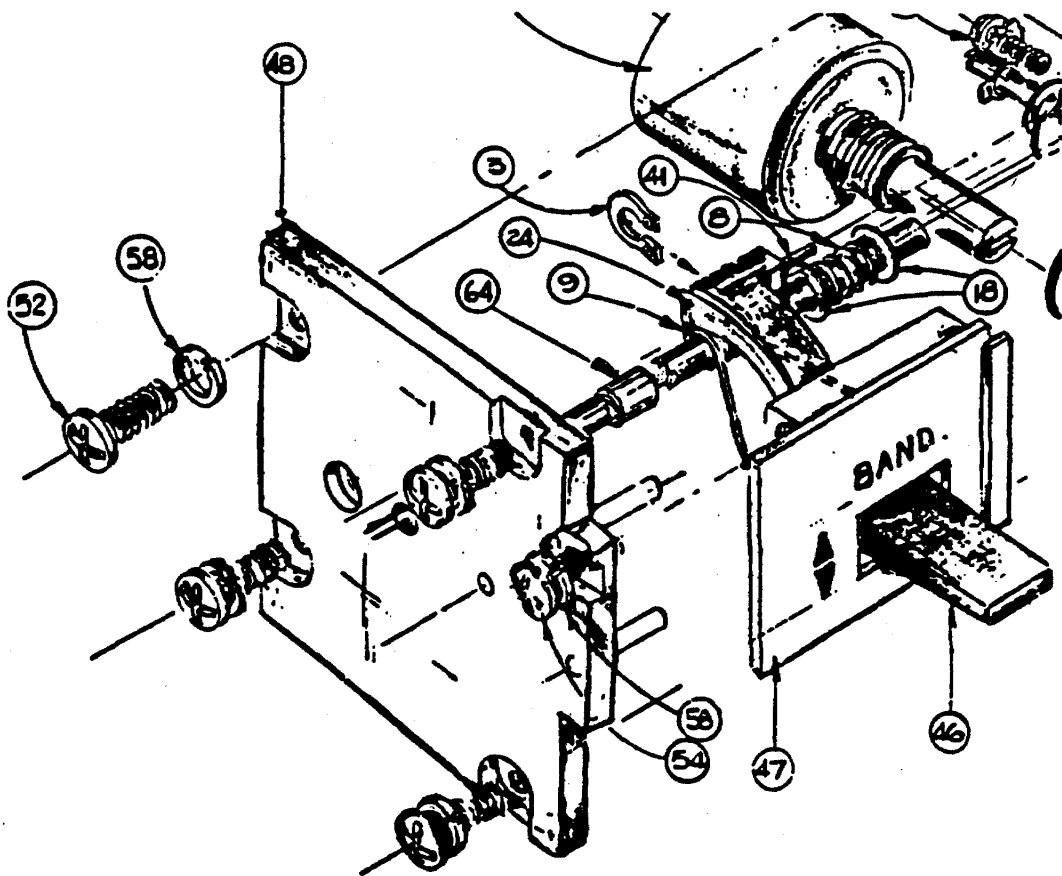
P/O Figure 8-58. Band Code Switch Logic, Partial Schematic Diagram (CHANGE 18)



P/O Figure 8-72. Switching Regulator and +10/+20 Volt Power Supply (ERRATA)



P/O Figure 8-75. Tuning Head Assembly A1A4, Illustrated Parts Breakdown (CHANGE 14)



P/O FIGURE 8-75. TUNING HEAD ASSY A1A4, ILLUSTRATED PARTS BREAKDOWN (CHANGE 21)

TOP INTERNAL VIEW, OPTION 002

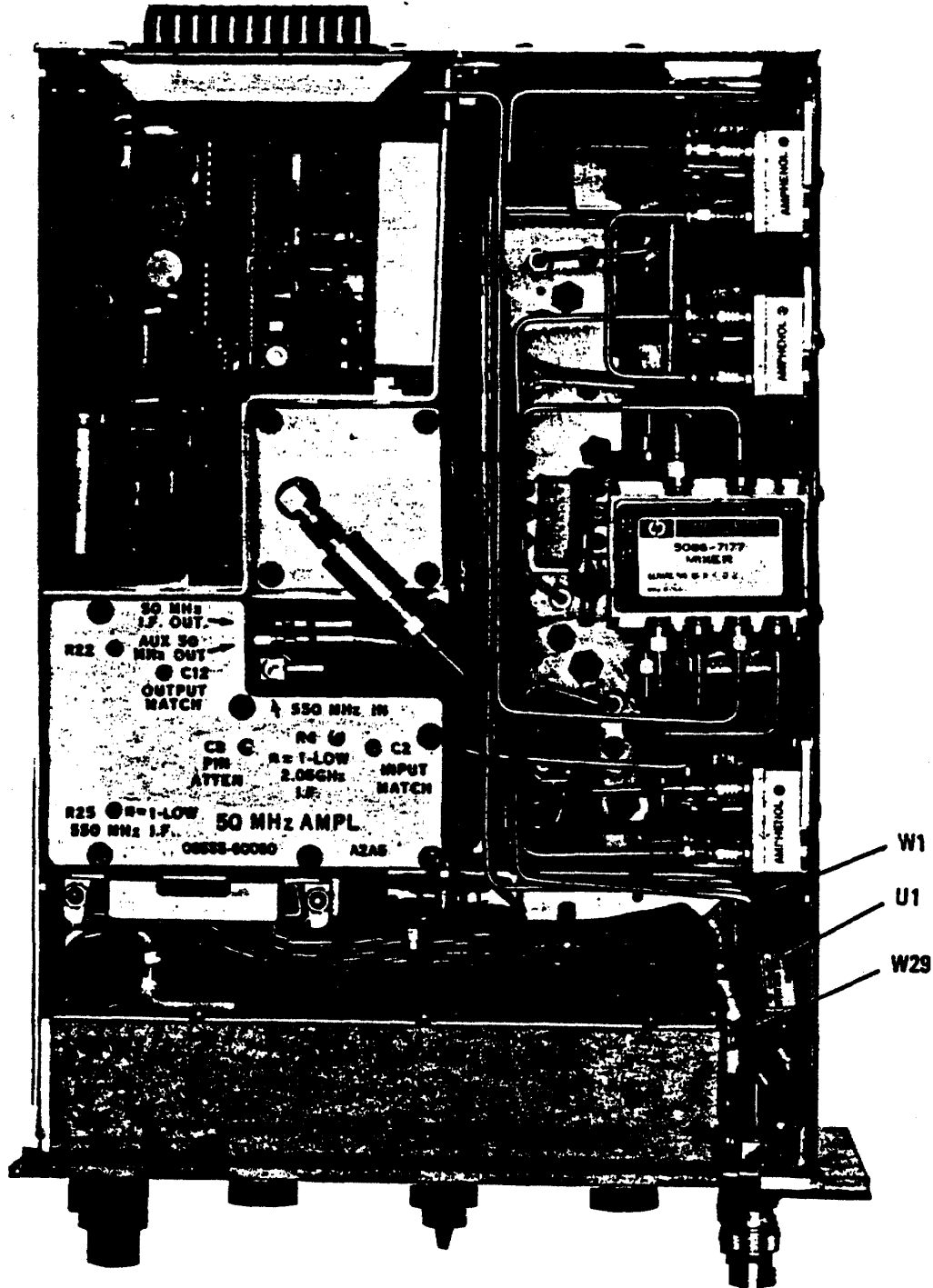


Figure A-3. 8555A RF Section, Top Internal View (Option 002) (ERRATA)