

## Errata

**Title & Document Type:** 8620C Sweep Oscillator Operating and Service Manual

**Manual Part Number:** 08620-90034

**Revision Date:** October 1975

### About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

### HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, life sciences, and chemical analysis businesses are now part of Agilent Technologies. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A. We have made no changes to this manual copy.

### Support for Your Product

Agilent no longer sells or supports this product. You will find any other available product information on the Agilent Test & Measurement website:

[www.agilent.com](http://www.agilent.com)

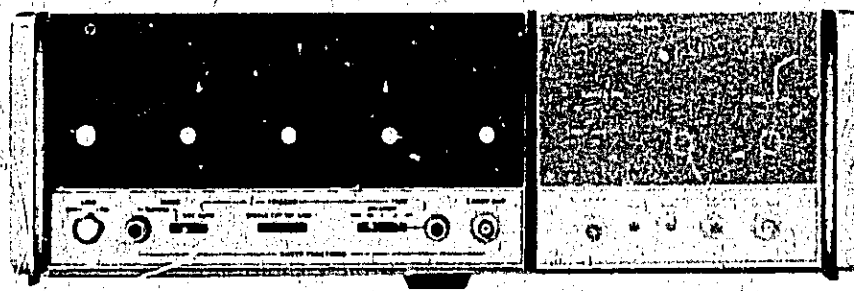
Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.



**Agilent Technologies**

# 8620C SWEEP OSCILLATOR

**PRELIMINARY  
MANUAL**  
SEE INSIDE COVER FOR MAILER



## **SAFETY**

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

## **CERTIFICATION**

*Hewlett-Packard Company certifies that this instrument met its published specifications at the time of shipment from the factory. Hewlett-Packard Company further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.*

## **WARRANTY AND ASSISTANCE**

*This Hewlett-Packard product is warranted against defects in materials and workmanship for a period of one year from the date of shipment. Hewlett-Packard will, at its option, repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. Repairs necessitated by misuse of the product are not covered by this warranty. **NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HEWLETT-PACKARD IS NOT LIABLE FOR CONSEQUENTIAL DAMAGES.***

*If this product is sold as a part of a Hewlett-Packard integrated instrument system, the above warranty shall not be applicable, and this product shall be covered only by the system warranty.*

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

*For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.*

HEWLETT  PACKARD

OPERATING AND SERVICE MANUAL

**8620C**  
**SWEEP OSCILLATOR**  
**INCLUDES OPTION 001**

**SERIAL NUMBERS**

This manual applies directly to HP Model 8620C Sweep Oscillator with serial prefix number 1537A.

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

© Copyright

HEWLETT-PACKARD COMPANY

1975

1400 FOUNTAIN GROVE PARKWAY, SANTA ROSA, CALIFORNIA 95404, U.S.A.

MANUAL PART NO. 08620-90034  
MICROFICHE Part No. 08620-90035

Printed: OCTOBER 1975

CONTENTS

Section	Page	Section	Page
<b>I GENERAL INFORMATION</b>	1-1	3-11. Computer or Calculator Programming	3-1
1-1. Introduction	1-1	3-14. Hewlett-Packard Interface Bus (HP-IB)	3-1
1-5. Specifications	1-1	3-16. Manual Remote Programming	3-1
1-7. Safety Considerations	1-1	3-18. Operator's Maintenance	3-2
1-8. General	1-1	3-20. Fuses	3-2
1-10. Operation	1-1	3-22. Air Filter	3-2
1-12. Service	1-1	3-24. Lamp Replacement	3-2
1-17. Instruments Covered by Manual	1-2	3-26. Frequency Scale Installation	3-2
1-22. Description	1-2		
1-25. Full Sweep Mode	1-2	<b>IV PERFORMANCE TESTS</b>	4-1
1-27. Marker Sweep Mode	1-3	4-1. Introduction	4-1
1-29. $\Delta F$ Sweep Mode	1-3	4-3. Equipment Required	4-1
1-31. CW Mode	1-3	4-5. Test Results	4-1
1-33. Options	1-3	4-7. Full Sweep Test	4-1
1-37. Accessories Supplied	1-3	4-8. Marker Sweep Test	4-2
1-39. Accessory Kit	1-3	4-9. CW Operation Test	4-2
1-41. Equipment Required but not Supplied	1-3	4-10. CW Vernier Test	4-3
1-43. Equipment Available	1-3	4-11. $\Delta F$ Sweep Test	4-4
1-44. Service Accessory Kit	1-3	4-12. Sweep Time Adjust and Stop Sweep Test (HP Model 86290A Only)	4-4
1-46. Model 8410B/8411A Network Analyzer	1-3	4-13. Amplitude Modulation Test	4-8
1-48. Power Meters and Crystal Detectors	1-4	4-14. Blanking Outputs Test	4-9
1-50. Recommended Test Equipment	1-3	4-15. Triggered Sweep Test	4-12
		4-16. Frequency Markers Test	4-13
<b>II INSTALLATION</b>	2-1	4-17. Digital-to-Analog Converter Test (Option 001)	4-15
2-1. Introduction	2-1		
2-3. Initial Inspection	2-1	<b>V. ADJUSTMENTS</b>	5-1
2-5. Preparation for Use	2-1	5-1. Introduction	5-1
2-6. Power Requirements	2-1	5-3. Equipment Required	5-1
2-8. Line Voltage Selection	2-1	5-5. Safety Considerations	5-1
2-10. Power Cable	2-1	5-11. Related Adjustments	5-1
2-12. Interconnections	2-1	5-13. Adjustment Locations	5-1
2-14. Mating Connectors	2-1	5-15. Power Supply Adjustments	5-5
2-16. Operating Environment	2-2	5-16. Fan Adjustments	5-6
2-20. Cooling	2-2	5-17. 1 kHz Modulation Adjustment	5-7
2-22. Bench Operation	2-2	5-18. Sweep Generator Board Adjustments	5-8
2-24. Rack Mounting	2-3	5-19. Full Sweep Adjustment	5-9
2-26. Frequency Scale Installation	2-3	5-20. Start Marker/Stop Marker Adjustment	5-10
2-28. Storage and Shipment	2-3	5-21. Marker Sweep Adjustment	5-11
2-29. Environment	2-3	5-22. CW/CW Marker Adjustment	5-11
2-31. Packaging	2-3	5-23. CW Vernier Adjustment	5-12
		5-24. $\Delta F$ Adjustment	5-12
<b>III OPERATION</b>		5-25. Digital-to-Analog Converter Adjustment (Option 001 Only)	5-12
3-1. Introduction	3-1	5-26. Mechanical Zero Adjustment	5-14
3-3. Panel Features	3-1		
3-5. Operator's Check	3-1		
3-7. Operating Instructions	3-1		
3-9. Remote Programming	3-1		

CONTENTS (Cont'd)

Section	Page	Section	Page
<b>VI REPLACEABLE PARTS</b> . . . . .	6-1	<b>VIII SERVICE</b> . . . . .	8-1
6-1. Introduction . . . . .	6-1	8-1. Introduction . . . . .	8-1
6-3. Abbreviations . . . . .	6-1	8-3. Principles of Operation . . . . .	8-1
6-5. Replaceable Parts List . . . . .	6-1	8-5. Troubleshooting . . . . .	8-1
6-8. Ordering Instructions . . . . .	6-1	8-9. Safety Considerations . . . . .	8-1
		8-15. Assembly Service Sheets . . . . .	8-2
		8-17. Recommended Test Equipment . . . . .	8-2
		8-19. Repair . . . . .	8-2
		8-20. Service Accessory Kit . . . . .	8-2
		8-22. Cleaning Switches . . . . .	8-2
<b>VII MANUAL CHANGES</b> . . . . .	7-1	8-25. Front Panel Disassembly . . . . .	8-2
7-1. Introduction . . . . .	7-1	8-30. Restringing Pointer Belts . . . . .	8-3

ILLUSTRATIONS

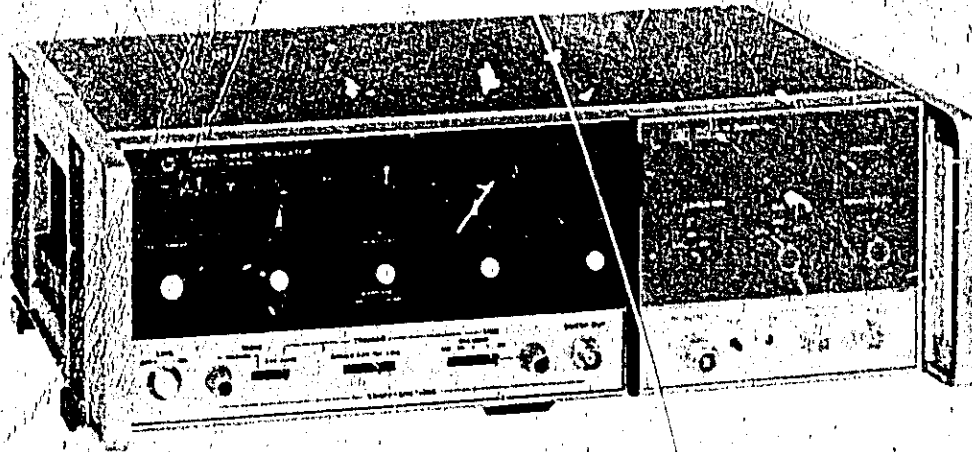
Figure	Page	Figure	Page
1-1. Model 8620C Sweep Oscillator with Accessories Supplied . . . . .	1-0	4-10. Negative and Positive Blanking Test Setup . . . . .	4-11
1-2. Serial Number Plate . . . . .	1-2	4-11. Negative Blanking at J5 Compared in Time to Sweep Output at J1 . . . . .	4-12
1-3. Service Accessory Kit, HP Part No. 08620-60124 . . . . .	1-8	4-12. Positive Blanking at J8 Compared in Time to Sweep Outputs at J1 . . . . .	4-12
2-1. Line Voltage Selection . . . . .	2-2	4-13. Triggered Sweep Test Setup . . . . .	4-12
2-2. Main Plugs Available on HP Power Cables and Cable Part Numbers . . . . .	2-2	4-14. Frequency Markers Test Setup . . . . .	4-13
2-3. Preparation for Rack Mounting . . . . .	2-3	4-15. Typical Display with Amplitude Markers . . . . .	4-14
3-1. Front Panel Controls, Connectors and Indicators . . . . .	3-2	4-16. Typical Display with Intensity Markers . . . . .	4-14
3-2. Rear Panel Controls and Connectors . . . . .	3-5	4-17. Digital-to-Analog Converter Test Setup . . . . .	4-15
3-3. Operator's Check . . . . .	3-7	5-1. Location of Test Points . . . . .	5-2
3-4. Full Sweep Mode . . . . .	3-10	5-2. Location of Adjustments . . . . .	5-3
3-5. Marker Sweep Mode . . . . .	3-12	5-3. Adjustment Test Setup . . . . .	5-5
3-6. CW Operating Mode . . . . .	3-14	5-4. Oscilloscope Display of Fan Waveforms . . . . .	5-7
3-7. $\Delta F$ Sweep Mode . . . . .	3-16	5-5. Oscilloscope Display of Waveform Symmetry . . . . .	5-9
3-8. Lamp Replacement . . . . .	3-22	5-6. Mechanical Zero Adjustment Locations . . . . .	5-15
4-1. CW Vernier Test Setup . . . . .	4-3	6-1. Front Panel Assembly, Parts Locations . . . . .	6-16
4-2. $\Delta F$ Sweep Test Setup . . . . .	4-4	6-2. Cabinet Parts . . . . .	6-18
4-3. Sweep Time Adjust and Stop Sweep Test Setup . . . . .	4-7	8-1. Removing Hinged Front Panel Assembly from Mainframe . . . . .	8-4
4-4. Sequential Sweep Ramp Compared in Time to Negative Blanking . . . . .	4-7	8-2. Removing Dial Frame From Front Panel . . . . .	8-4
4-5. Amplitude Modulation Test Setup . . . . .	4-8	8-3. Removal and Disassembly of A9 Switch Assy and A10 Front Interconnect Assy . . . . .	8-5
4-6. Display Blanking and RF Blanking Test Setup . . . . .	4-9	8-4. Location of Pointer Belts . . . . .	8-5
4-7. Typical Display with No Blanking . . . . .	4-10	8-5. Pointer Belt Restringing Diagrams . . . . .	8-6
4-8. Typical Display with RF Blanking . . . . .	4-10	8-6. W2 Flexible Cable Assembly . . . . .	8-8
4-9. Typical Display with Display Blanking . . . . .	4-10	8-7. General Information on Schematic Diagrams . . . . .	8-9
		8-8. Schematic Diagram Notes . . . . .	8-10

ILLUSTRATIONS (Cont'd)

Figure	Page	Figure	Page
8-9. P/O A1 Sweep Generator Assembly, Component Locations . . . . .	8-13	8-23. A7 Operations Control Assembly, Component Locations . . . . .	8-27
8-10. A1 Sweep Generator Assembly Schematic . . . . .	8-13	8-24. A7 Operations Control Assembly, Schematic . . . . .	8-27
8-11. P/O A1 Sweep Generator Assembly, Component Locations . . . . .	8-15	8-25. A8 Rectifier Assembly, Component Locations . . . . .	8-29
8-12. A1 Sweep Generator Assembly, Schematic . . . . .	8-15	8-26. A8 Rectifier Assembly, Schematic . . . . .	8-29
8-13. A2 Frequency Control Assembly, Component Locations . . . . .	8-17	8-27. A9 Switch Assembly, Component Locations . . . . .	8-31
8-14. A2 Frequency Control Assembly, Schematic . . . . .	8-17	8-28. A9 Switch and A10 Front Interconnect, Schematic . . . . .	8-31
8-15. A3 Logic Assembly, Component Locations . . . . .	8-19	8-29. A10 Front Interconnect Assembly, Component Locations . . . . .	8-33
8-16. A3 Logic Assembly, Schematic . . . . .	8-19	8-30. A9 Switch and A10 Front Interconnect Assembly, Schematic . . . . .	8-33
8-17. A4 +20V and +5V Regulator Assembly, Component Locations . . . . .	8-21	8-31. A11 Master Board, Component Locations . . . . .	8-35
8-18. A4 +20V and +5V Regulator Assembly, Schematic . . . . .	8-21	8-32. Rear Panel Wiring Diagram . . . . .	8-35
8-19. A5 -10V and -40V Regulator Assembly, Component Locations . . . . .	8-23	8-33. Locations of Adjustments . . . . .	8-37
8-20. A5 -10V and -40V Regulator Assembly, Schematic . . . . .	8-23	8-34. Top View, Major Assembly and Component Locations . . . . .	8-37
8-21. A6 BCD Programming Assembly, Component Locations (Option 001) . . . . .	8-25	8-35. Bottom View, Major Assembly and Component Locations . . . . .	8-37
8-22. A6 BCD Programming Assembly, Schematic (Option 001) . . . . .	8-25		

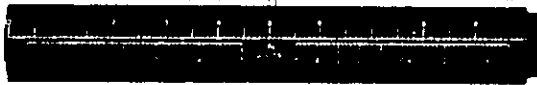
TABLES

Table	Page	Table	Page
1-1. Specifications . . . . .	1-4	4-1. BCD Inputs and Corresponding Frequency Outputs . . . . .	4-16
1-2. Oscillator Modules . . . . .	1-6	5-1. Controls Listed in Adjustment Sequence . . . . .	5-4
1-3. RF Plug-in Units . . . . .	1-6	6-1. Reference Designations and Abbreviations . . . . .	6-2
1-4. Recommended Test Equipment . . . . .	1-7	6-2. Replaceable Parts . . . . .	6-4
2-1. Model 8620C Mating Connectors . . . . .	2-4	6-3. Code List of Manufacturers . . . . .	6-15
3-1. Remote Programming Using Standard 8620C . . . . .	3-18	8-1. Service Sheet Cross-Reference . . . . .	8-3
3-2. Remote Programming Using 8620C Option 001 . . . . .	3-20	8-2. Interface Connector J6 Signals or Voltages . . . . .	8-7

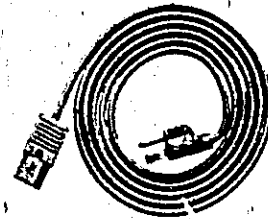


HP 8620C

CALIBRATION SCALE  
08620-00021



POWER CABLE\*



ACCESSORY KIT  
08620-60123



RACK MOUNTING KIT  
5060-8740



\*Power cable/plug supplied depends on country of destination. Refer to Figure 2-2 for part number information.

Figure 1-1. Model 8620C Sweep Oscillator with Accessories Supplied



## SECTION I GENERAL INFORMATION

### 1-1. INTRODUCTION

1-2. This Operating and Service manual contains information required to install, operate, test, adjust, and service the Hewlett-Packard Model 8620C Sweep Oscillator mainframe. (See Figure 1-1.) An electronically-tuned sweep signal source is made up either by the combination of the Model 8620C and an RF Plug-in (HP Models 86200 series, see Table 1-3), or the combination of the Model 8620C with an RF Section (Model 8621A or 8621B) and appropriate oscillator modules (HP Models 86300 series, see Table 1-2). Operating and Service information for the RF Plug-ins, RF Sections, and oscillator modules is contained in separate manuals.

1-3. This 8620C Preliminary Manual is supplied to permit earliest possible delivery of the instrument. The information is, as complete as possible at this time. To receive a copy of the Final Operating and Service Manual when it is available, use the Instruction Manual Request form at the front of this manual.

1-4. 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.

### 1-5. SPECIFICATIONS

1-6. Listed in Table 1-1 are the instrument specifications. These specifications are the performance standards, or limits against which the instrument may be tested.

### 1-7. SAFETY CONSIDERATIONS

#### 1-8. General

1-9. This is a Safety Class I instrument under the International Electrotechnical Commission (IEC). This instrument has been designed and tested according to IEC Publication 348, "Safety Requirements for Electronic Measuring Apparatus," and has been supplied in safe condition.

#### 1-10. Operation

1-11. 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 (See Figure 2-1.)

#### 1-12. Service

1-13. Although the instrument has been designed in accordance with international safety standards, 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.

1-14. Adjustment or repair of the opened instrument with the ac power connected should be avoided as much as possible and, when required, should be performed only by skilled persons who are aware of the hazard involved.

1-15. Capacitors inside the instrument may still be charged even though the instrument has been disconnected from its source of supply.

1-16. Whenever it is likely that the protection has been impaired, make the instrument inoperative and secure it against any unintended operation.

### WARNING

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal could make this instrument dangerous. Intentional interruption of the earth ground is prohibited.

Servicing this instrument often requires working on the unit with the protective covers removed and with ac power connected. Caution is required since contact with either the ac or dc voltages at many points could cause personal injury.

**CAUTION**

**BEFORE SWITCHING ON THIS INSTRUMENT**, make sure that all devices connected to the instrument are connected to the protective earth ground. The power plug shall only be inserted in an ac power outlet provided with a protective earth terminal. This protection must not be negated by using an extension cord (power cable) without a protective grounding conductor.

**1-17. INSTRUMENTS COVERED BY MANUAL**

1-18. Attached to the instrument is a serial number plate (Figure 1-2). The serial number is in two parts. The first four digits and the letter are the serial number prefix; the last five digits are the suffix. The prefix is the same for all identical instruments; it changes only when a change is made to the instrument. The suffix, however, is assigned sequentially and is different for each instrument. The contents of this manual apply to instruments with the serial number prefix(es) listed under SERIAL NUMBERS on the title page.

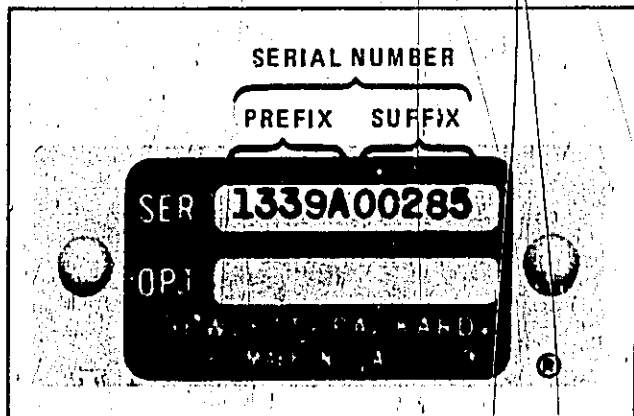


Figure 1-2. Serial Number Plate

1-19. An instrument manufactured after the printing of this manual may have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates the instrument is different from those described in this manual. The manual for this newer instrument is accompanied by a yellow Manual Changes supplement. This supplement contains "change information" that explains how to adapt the manual to the newer instrument.

1-20. 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 identified with this manual's print date and part number, both of which appear on the manual's title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-21. For information concerning a serial number prefix that is not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

**1-22. DESCRIPTION**

1-23. The Hewlett-Packard Model 8620C Sweep Oscillator, together with either an RF Section and plug-in oscillator modules, or RF plug-in drawers, forms a completely solid-state self-contained multi-band sweep signal source. The Model 8620C is designed for use with network analyzer systems such as the 8410B/8411A to provide a complete microwave measurement system. Other systems can also be built, using the Model 8620C as a swept signal source.

1-24. The front panel is designed for simplicity and ease of operation. It is hinged to the mainframe to facilitate changing of the frequency dial. Pressing a mode control selects the mode and causes the lamp in the control to light providing a positive identification of the mode selected.

**1-25. Full Sweep Mode**

1-26. Full Sweep mode is selected automatically when the mainframe is turned on. In this mode, three markers are available for frequency identification. One marker is adjusted by the CW MARKER control. When  $\Delta F$  Sweep is selected, this CW Marker setting becomes the center frequency of the  $\Delta F$  Sweep. The other two markers are adjusted by the START MARKER and STOP MARKER controls. The position of these two markers becomes the start/stop frequencies of the sweep when MARKER SWEEP mode is selected. These two markers are also available on the  $\Delta F$  Sweep and again become the start/stop frequencies of the sweep when MARKER SWEEP is selected.

**1-27. Marker Sweep Mode**

1-28. When Marker Sweep mode is selected, one marker is available (controlled by CW MARKER) and its position identifies the center frequency of the  $\Delta F$  Sweep. The Marker Sweep start/stop frequencies are determined by the position of the start and stop markers on the trace in Full Sweep or  $\Delta F$  Sweep modes.

**1-29.  $\Delta F$  Sweep Mode**

1-30. When  $\Delta F$  Sweep mode is selected, the CW mode is also selected and the center frequency is adjusted by the CW MARKER control. The  $\Delta I$  control selects the deviation from the CW frequency. Start and stop markers are available in  $\Delta F$  Sweep and become the start/stop frequencies of the Marker Sweep.

**1-31. CW Mode**

1-32. A single-frequency RF output is selected in CW operation. The frequency is selected by adjusting the CW MARKER control. Pressing the CW VERNIER control provides a vernier function for precise frequency adjustment around the CW setting.

**1-33. OPTIONS**

1-34. Option 001 provides remote frequency programming. The frequency may be selected at 10,000 points through each band by a 16-line BCD input.

1-35. Option 011 provides the HP-IB capability for remote programming. It provides remote programming of mode, band, frequency, and a remote marker. Frequency may be selected at 10,000 points through each band.

1-36. For maximum utility in automatic systems the 8620C is programmable through a rear panel fifty-pin connector. Frequency can be digitally programmed for 10,000 points across each band with the addition of one of the optional plug-in printed circuit boards.

**1-37. ACCESSORIES SUPPLIED**

1-38. Figure 1-1 shows the HP Model 8620C Sweep Oscillator mainframe and accessories supplied. The accessories consist of a 0 - 10V Calibration scale (HP Part No. 08620-00021) that pro-

vides convenient scale notations to assist in calibration, a power cable (see Figure 2-2 for HP Part Number) to be connected between the power line module and front panel LINE switch, rack mounting kit (HP Part No. 5060-8740), and the accessory kit (HP Part No. 08620-60123). The power cable and rack mounting kit are described in Section II, Installation. (See Figures 2-2 and 2-3.)

**1-39. ACCESSORY KIT**

1-40. The accessory kit (shown in Figure 1-1) contains a reversing extender board, two three-amp fuses, and a fifty-pin connector. The reversing extender board permits all the necessary interconnections to be made between the Model 8620C mainframe and the plug-in board assembly being serviced. The two three-amp fuses are spares for the A4 and A5 Regulator Assemblies. The fifty-pin connector plugs into the rear-panel PROGRAMMING connector.

**1-41. EQUIPMENT REQUIRED BUT NOT SUPPLIED**

1-42. To have a complete operating unit, the Model 8620C Sweep Oscillator mainframe must have an RF Plug-in installed. The plug-in may either be an HP Model 8621B RF Section with appropriate oscillator module(s) installed (Table 1-2) or an 86200 series plug-in (Table 1-3).

**1-43. EQUIPMENT AVAILABLE****1-44. Service Accessory Kit**

1-45. A service accessory kit containing a plug-in extender cable, extender boards, adjustment tools, and RF service cables may be obtained from Hewlett-Packard by ordering Service Accessory Kit Part No. 08620-60124. This is supplied for convenience in aligning and troubleshooting the mainframe, the RF Section and oscillator modules, and the RF Plug-in units. Parts contained in the service accessory kit are listed in Figure 1-3.

**1-46. Model 8410B/8411A Network Analyzer**

1-47. The Model 8620C Sweeper is compatible with the Hewlett-Packard Model 8410B Network Analyzer System. The combination of the Model 8410B Network Analyzer, the Model 8411A Frequency Converter, and an appropriate display plug-in forms a phasemeter and a ratiometer for

direct phase and amplitude ratio measurement on RF voltages. These measurements can be made on single frequencies and on swept frequencies from 100 MHz to 18 GHz. Some plug-ins are capable of multi-octave sweeps in this range.

#### 1-48. Power Meters and Crystal Detectors

1-49. Depending on the RF section used, the RF output can be externally leveled using power

meters or crystal detectors. Refer to the Operating and Service Manual of the RF Plug-in used for detailed information on leveling systems that may be used with the 8620C/RF Plug-in combination.

#### 1-50. RECOMMENDED TEST EQUIPMENT

1-51. Equipment required to maintain the Model 8620C is listed in Table 1-4. Other equipment may be substituted if it meets or exceeds the critical specifications listed in the table.

Table 1-1. Specifications (1 of 2)

### SPECIFICATIONS 8620C SWEEP OSCILLATOR (with RF Units and Drawer Installed)

#### FREQUENCY

**Frequency Range:** Determined by band select lever and RF Plug-in installed.

**Frequency Linearity:** Refer to RF unit specifications.

#### SWEEP FUNCTIONS

**FULL Sweep:** Sweeps the full band as determined by plug-in and band select lever.

**MARKER Sweep:** Sweeps from START MARKER to STOP MARKER frequency settings.

**Range:** Both settings continuously and independently adjustable over the entire frequency range; can be set to sweep either up or down in frequency.

**End-point Accuracy:** Refer to RF unit specifications, same as frequency accuracy.

**$\Delta F$  Sweep:** Sweeps symmetrically upward in frequency, centered on CW setting. CW Vernier can be activated for fine control of center frequency.

**Width:** Continuously adjustable and calibrated from zero to 1%, zero to 10%, or zero to 100% of usable frequency band as selected with front-panel switch. Scale calibrated directly in MHz.

**Width Accuracy:**  $\pm 1\%$  of maximum  $\Delta F$  plus  $\pm 2\%$  of  $\Delta F$  being swept.

**Center-Frequency Accuracy:** Refer to RF unit specifications, same as frequency accuracy.

**Frequency Markers:** Three constant-width frequency markers are fully calibrated and independently adjustable over the entire range in FULL SWEEP; the markers are controlled by the START MARKER, STOP MARKER, and CW MARKER controls. In  $\Delta F$  Sweep, Start and Stop Markers are available; in MARKER SWEEP, the CW Marker is available. Front panel switch provides for selection of either amplitude or intensity markers (amplitude modulating the RF output or Z-axis modulating the CRT display).

**Accuracy:** Refer to RF unit specifications, same as frequency accuracy.

**Resolution:** Better than 0.25% of RF unit bandwidth.

**Marker Output:** Rectangular pulse, typically -5 volts peak, available from Z-axis BNC connector on rear panel. Source impedance, approximately 1000 ohms.

**CW Operation:** Single-frequency RF output, adjusted by CW Marker control and activated by pressing pushbutton in CW MARKER control.

**CW Vernier:** Calibrated directly in MHz about CW setting. CW Vernier activated by pressing pushbutton in CW VERNIER control. Zero to  $\pm 0.5\%$  or zero to  $\pm 5\%$  of full bandwidth, selectable with front panel switch.

**Accuracy:** Refer to RF unit specifications, same as frequency accuracy.

Table 1-1. Specificati (2 of 2)

**Preset Frequencies:** START MARKER, STOP MARKER, and  $\Delta F$  end points in MANUAL and CW MARKER frequency, can be used as preset CW frequencies.

### SWEEP MODES

**Auto:** Sweep recurs automatically.

**Manual:** Front-panel control provides continuous manual adjustment of frequency between end frequencies set in any of the above sweep functions.

**External:** Sweep is controlled by external signal applied to programming connector. Zero volts at start of sweep increasing linearly to approximately +10V at end of sweep.

**Line:** Sweep can be synchronized with ac power line.

**Internal:** Sweep is controlled by internally generated trigger.

**External Trigger:** Sweep is actuated by external trigger signal applied to rear-panel EXT TRIGGER BNC connector. Trigger signal must be greater than +2 Vdc, wider than 0.5  $\mu$ sec, and not greater than 1 MHz in frequency.

**Single:** Activated by front-panel switch.

**Sweep Time:** Continuously adjustable in four decade ranges typically 0.01 to 100 seconds.

**Sweep Output:** Direct-coupled sawtooth, zero to approximately +10V, concurrent with swept RF output. Zero volts at start of sweep, approximately +10V at end of sweep regardless of sweep width or direction. In CW mode, dc output is proportional to frequency.

### MODULATION

**Internal AM:** Square-wave modulation on all sweep times (internally adjusted from 950 to 1050 Hz). On/Off ratio, refer to RF unit specifications.

**External AM:** Refer to RF unit specifications.

**External FM:** Refer to RF unit specifications.

**Phase-Lock:** Refer to RF unit specifications.

### GENERAL

**RF Blanking:** With RF blanking switch enabled, RF is automatically turned off during retrace, and

turned on after completion of retrace. On automatic sweeps, RF is on long enough before sweep starts to stabilize external circuits and equipment whose response is compatible with the selected sweep rate.

**Display and Negative Blanking Outputs:** Direct-coupled rectangular pulses of approximately +5V (Display Blanking) and approximately -5V (Negative Blanking) into 2500 ohms available at rear panel Z-AXIS/MKR/PEN LIFT and NEGATIVE BLANKING connectors, respectively. Both pulses coincident with RF Blanking.

**Pen Lift:** For use with X-Y graphic recorders having positive power supplies only. Pen lift terminals available at programming connector or Z AXIS/MKR/PEN LIFT rear-panel connector. Available only on slowest sweep speed.

**Furnished:** 229 cm (7.5-foot) power cable with NEMA plug, rack-mounting kit, and accessory kit.

**Power:** 100, 120, 220, and 240 Vac +5% - 10%, 50 to 400 Hz. Approximately 140 watts.

**Dimensions:** 425 mm wide, 132.6 mm high, 33.7 mm deep (16 1/4" x 5-1/8" x 1 3/4").

**Weight (not including RF unit):** Net, 11.1 kg (24 lb). Shipping, 13.4 kg (30 lb).

### OPTION 001 AND 011 REMOTE FREQUENCY PROGRAMMING

#### Functions:

**Band:** Manual enable or remote control of four bands.

**Mode:** Seven modes, including digital-frequency control in three modes, with resolution of 10,000 points across FULL band or between START MARKER and STOP MARKER as set by front-panel controls, or across  $\Delta F$  as set by front-panel  $\Delta F$  and CW controls; or selection of any of four analog sweep functions:  $\Delta F$  or MARKER sweep with end points set by appropriate front-panel controls, CW as set by CW MARKER control, or FULL sweep of band selected.

**Marker:** With analog sweeps (FULL,  $\Delta F$ , or MARKER SWEEP), a programmable marker is available in either amplitude or intensity as selected with front-panel switch.

Table 1-2. Oscillator Modules\*

Model Number	Description	Frequency Ranges
86320B	RF Heterodyne Module	0.1 - 2.0 GHz
86330A	Oscillator Module	1.8 - 4.2 GHz
86330B	Oscillator Module	1.8 - 4.2 GHz
86331A	Oscillator Module	1.7 - 4.3 GHz
86331B	Oscillator Module	1.7 - 4.3 GHz
86341A	Oscillator Module	3.2 - 6.5 GHz
86341B	Oscillator Module	3.2 - 6.5 GHz
86342A	Oscillator Module	5.9 - 9.0 GHz
86350A	Oscillator Module	8.0 - 12.4 GHz
86351A	Oscillator Module	10.7 - 11.7 GHz
86352A	Oscillator Module	8.5 - 10.5 GHz

\* Must be installed in an 8621A or 8621B RF Section.

Table 1-3. RF Plug-in Units

Model Number	Frequency Ranges
86210A	3 - 350 MHz
86220A	10 - 1300 MHz
86222A/B	10 MHz - 2.4 GHz
86230A	2 - 4 GHz
86230B	1.8 - 4.2 GHz
86241A	3.2 - 6.5 GHz
86242A	5.9 - 9.0 GHz
86250A	8.0 - 12.4 GHz
86250B	8.0 - 12.4 GHz
86260A	12.4 - 18.0 GHz
86290A	2.0 - 18.0 GHz

Table 1-4. Recommended Test Equipment

Instrument	Critical Specifications	Recommended Model	Use*
Oscilloscope with Dual-Trace Vertical Amplifier and 10:1 probes	Oscilloscope: Variable persistence Vertical Amplifier: Dual Trace with 10:1 probes Bandwidth: 20 MHz minimum Vertical Sensitivity: 5 mV/Div Horizontal Sweep Rate: 7 $\mu$ s/Div minimum	HP 181A/1801A/1820C	P,A,T
DC Digital Voltmeter	Accuracy: 0.004% Input Impedance: 10 megohms minimum	HP 3462A	P,A,T
Ohmmeter	Accuracy: 5% Range: 10 ohms to 10 megohms	HP 427A	T
Pulse Generator	Amplitude: 2 volts positive pulse Pulse Width: 0.5 $\mu$ s Repetition Rate: 1 MHz	HP 8002A	P
36-Pin Service Board**		HP 08620-60037	P,A,T
50-Pin Service Board**		HP 08620-60125	P,A,T
Extender Cable**		HP 08620-60032	P
Adjustment Tool**		HP 8830-0024	A
Allen Wrench	Right Angle, No. 6	HP 5020-0289	A
<p>* P = Performance Test, A = Adjustment, T = Troubleshooting  ** These parts are included in Service Accessory Kit No. 08620-60124 (Figure 1-3)</p>			

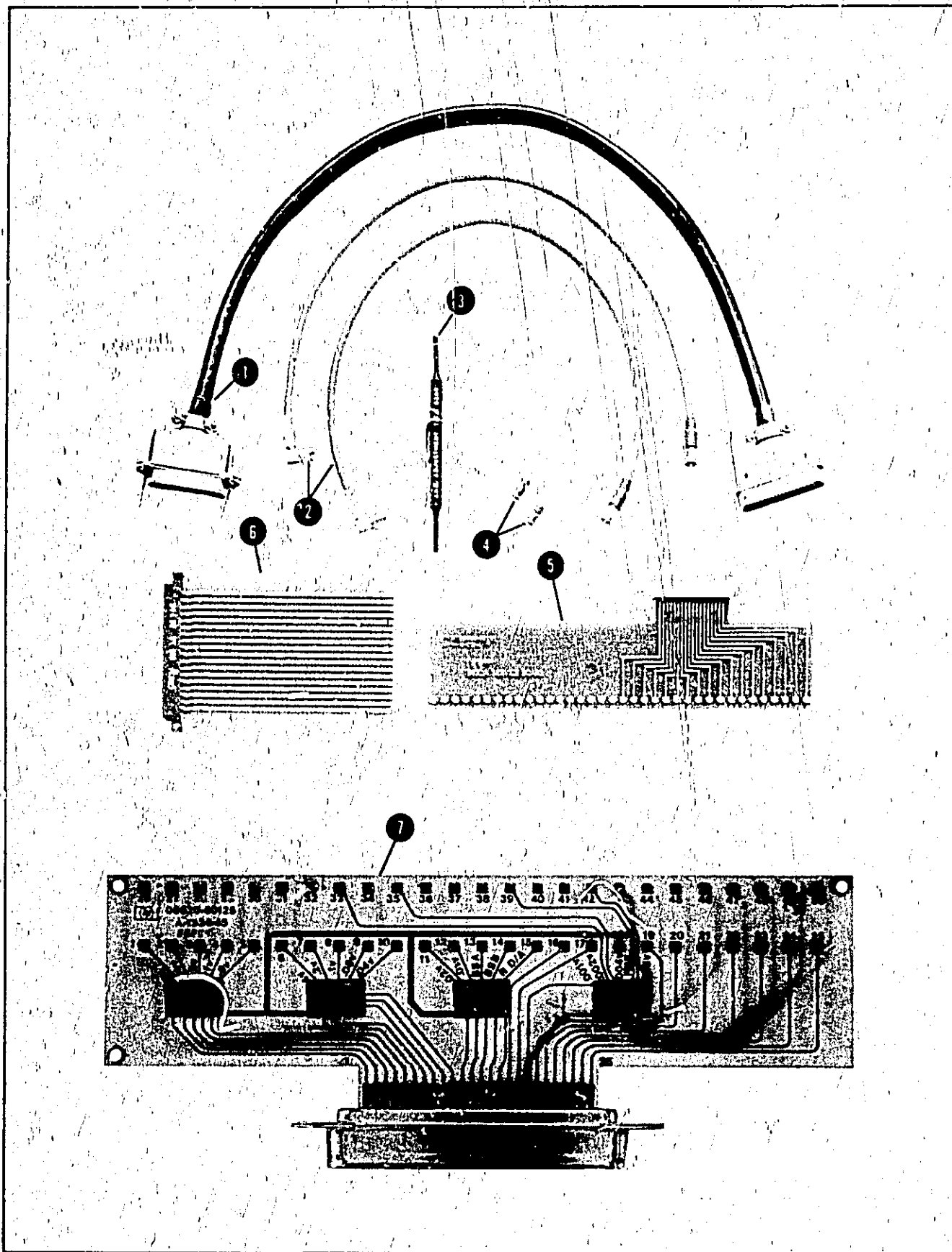


Figure 1-3. Service Accessory Kit, HP Part No. 08620-60124 (1 of 2)



Item	Name	Part No.	Use
1	Extender Cable	08620-60032	Moves RF Plug-in outside mainframe for alignment or service.
2	RF Service Cable (2 each)	8120-1578	Allows troubleshooting RF circuits. Also extends Heterodyne Module away from RF Section for servicing
3	Adjustment Tool	8830-0024	Fits miniature adjustment slot on potentiometers.
4	RF Connector, straight adapter, SMA jack to SMA jack (2 each)	1250-1158	Adapts RF Service cables from plug to jack.
5	36-Pin Service Board	08620-60037	Allows probing RF Section interface connector during performance tests or troubleshooting.
6	18-Pin Extender Board	5060-2041	Extends mainframe boards for troubleshooting.
7	50-Pin Service Board	08620-60125	Allows probing rear-panel programming connector during performance tests or troubleshooting.

Figure 1-3. Service Accessory Kit, HP Part No. 08620-60124 (2 of 2)

# INSTALLATION

## SECTION II INSTALLATION

### 2-1. INTRODUCTION

2-2. This section provides installation instructions for the Model 8620C Sweep Oscillator and its accessories. This section also includes information about initial inspection and damage claims, preparation for using the Sweep Oscillator, and packaging, storage and shipment.

### 2-3. INITIAL INSPECTION

2-4. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The contents of the shipment should be as shown in Figure 1-1, and procedures for checking electrical operation are given in Section IV. If the contents are incomplete, if there is mechanical damage or defect, or if main functions of the Sweeper do not pass the operator's checks, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for carrier's inspection. The HP office will arrange for repair or replacement without waiting for claim settlement.

### 2-5. PREPARATION FOR USE

#### 2-6. Power Requirements

2-7. The Model 8620C requires a power source of 100, 120, 220, or 240 Vac, +5% -10%, 50 to 400 Hz single phase. Power consumption is approximately 140 watts with RF Section and oscillator module(s) installed.

#### 2-8. Line Voltage Selection

#### CAUTION

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

2-9. Figure 2-1 provides instructions for line voltage and fuse selection. The line voltage selection card and the proper fuse are factory installed for 120 Vac operation.

#### 2-10. Power Cable

2-11. In accordance with international safety standards this instrument is equipped with a three-wire power cable. When connected to an appropriate power line outlet, this cable grounds the instrument cabinet. Figure 2-2 shows the styles of mains plugs available on power cables supplied with HP instruments. The numbers under the plugs are part numbers for complete power cables. The types of power cable/plug shipped depends on the country of destination.

#### WARNING

**BEFORE SWITCHING ON THIS INSTRUMENT**, the instrument's protective earth terminals 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 (ground).

#### 2-12. Interconnections

2-13. For the Model 8620C Sweep Oscillator to operate, an RF Plug-in (86260A, 86222A, 86290A etc.) or an 8621A or B RF Section with an oscillator module installed, must be plugged into the 8620C mainframe. See Tables 1-2 and 1-3 for list of Oscillator Modules and RF Plug-in units available.

#### 2-14. Mating Connectors

2-15. The mating connectors used in the HP Model 8620C Sweep Oscillator are shown in Table 2-1. This table identifies each connector and gives the HP Part Number and a part number of an alternate source.

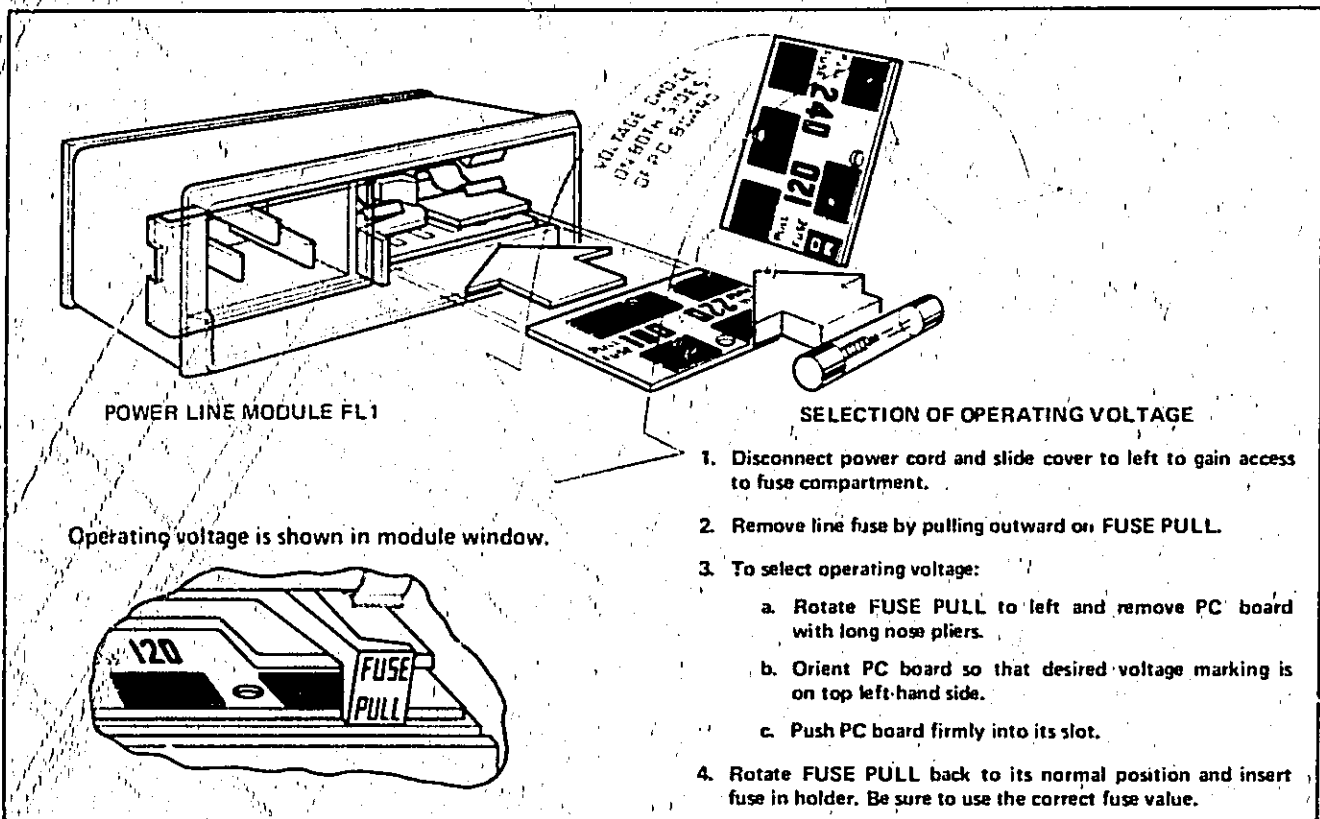


Figure 2-1. Line Voltage Selection

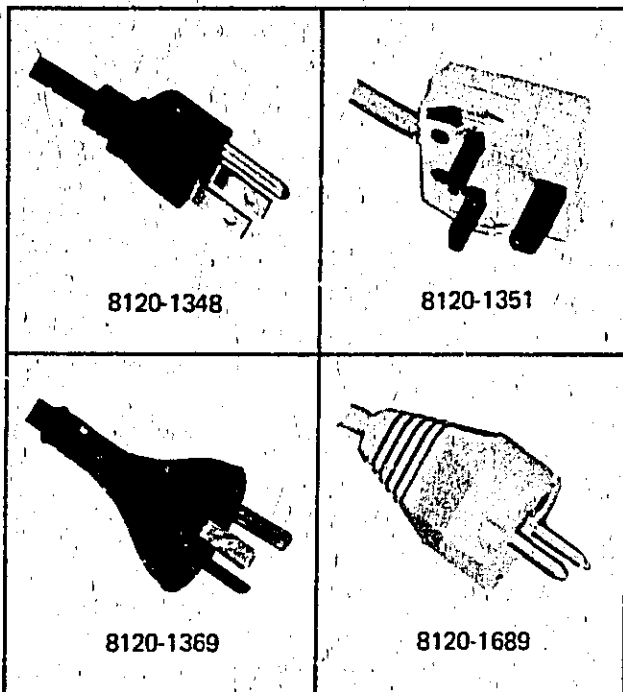


Figure 2-2. Main Plugs Available on HP Power Cables and Cable Part Numbers

**2-16. Operating Environment**

**2-17. Temperature.** The instrument may be operated in temperatures from 0°C to +55°C.

**2-18. Humidity.** The instrument may be operated in environments with humidity up to 95%. However, the instrument should be protected from temperature extremes which cause condensation within the instrument.

**2-19. Altitude.** The instrument may be operated at altitudes up to 25,000 feet.

**2-20. Cooling**

**2-21.** Clearances for ventilation should be three to four inches at the rear of the cabinet and two to three inches at the sides. The clearances provided by the plastic feet in bench stacking and the filler strips in rack mounting are adequate for the top and bottom cabinet surfaces.

**2-22. Bench Operation**

**2-23.** The instrument cabinet has plastic feet and a foldaway tilt stand for convenience in bench

operation. The tilt stand inclines the instrument for ease of operating. The plastic feet provide clearance for air circulation and make the instrument self-aligning when stacked on other Hewlett-Packard full rack-width modular instruments.

#### 2-24. Rack Mounting

2-25. The rack-mounting kit contains all hardware needed to adapt the instrument cabinet for installation in equipment racks having standard 19-inch spacing. Preparation for rack mounting is illustrated in Figure 2-3.

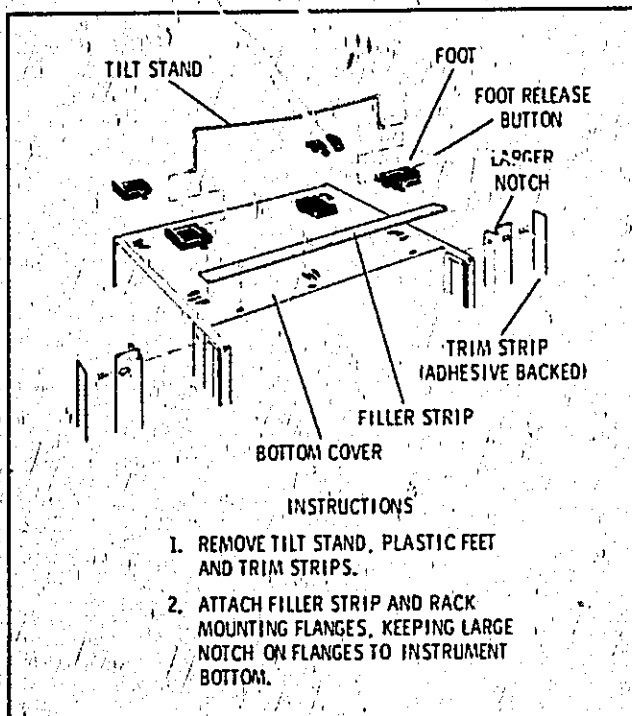


Figure 2-3. Preparation for Rack Mounting

#### 2-26. Frequency Scale Installation

2-27. To install frequency scale, proceed as follows:

a. Disengage mainframe front-panel latch handle and tilt front panel down.

b. Depress BAND Lever until desired drum position is accessible from inside mainframe.

#### NOTE

Drum positions 1 through 4 may be identified by tick marks (I, II, III, IIII) on left-hand side of drum.

c. If necessary to remove a frequency scale, exert a pressure OUTWARD, away from drum on right-hand edge of scale.

d. Insert frequency scale so key (1/2-inch protrusion) fits into notch on left-hand side of drum. Then exert inward pressure on right-hand edge of frequency scale to snap it in place.

#### CAUTION

To prevent damage to frequency pointers when bandswitch drum is rotated, make certain that frequency scale is firmly in place and flush with band drum edges.

e. Return front panel to upright position, and re-engage front-panel latch handle.

#### 2-28. STORAGE AND SHIPMENT

#### 2-29. Environment

2-30. The instrument may be stored or shipped in environments within the following limits:

Temperature:  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$

Humidity: Up to 95%

Altitude: Up to 25,000 feet

The instrument should also be protected from temperature extremes which cause condensation within the instrument.

#### 2-31. Packaging

2-32. **Original Packaging.** Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Also, mark the container FRAGILE to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

2-33. **Other Packaging.** The following general instructions should be used for re-packaging with commercially available materials.

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

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

c. Use enough shock-absorbing material (3-to-4-inch layer) around all sides of instrument to

provide firm cushion and prevent movement inside container. Protect control panel with cardboard.

d. Seal shipping container securely.

e. Mark shipping container FRAGILE to assure careful handling.

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

Table 2-1. Model 8620C Mating Connectors

Connector	Industry Identification	HP Part No.	Alternate Source
J1 SWEEP OUT	BNC	1250-0118	Amphenol 31-221-1022
J2 PROGRAMMING	Micro-Ribbon 50-Contact Rack and Panel Plug	1251-4222	
J3 EXT AM	BNC	1250-0118	Amphenol 31-221-1022
J4 EXT TRIGGER	BNC	1250-0118	Amphenol 31-221-1022
J5 NEGATIVE BLANKING	BNC	1250-0118	Amphenol 31-221-1022
J6 RF Plug-in Interface	Micro-Ribbon 36-Contact Rack and Panel Plug	1251-0484	Amphenol 57-20360-375
J7 Master Board Interface	Printed Circuit 88-Pin Connector (2' x 44)	1251-2447	Viking Ind. Inc. 2VM44/1JN5
W2J1 Master Board Interface	Printed Circuit 50-Pin Connector (2 x 25)	1251-2755	3M Company 3415-0000
J8 Z-AXIS/MKR/ PEN LIFT	BNC	1250-0118	Amphenol 31-221-1022
Front Interface	Ribbon-Cable 16-Pin Connectors (2)	1251-2615	Augat Inc., 2P16-1
J9 Fan Interface	Printed Circuit 12-Pin Connector (2 x 6)	1251-0198	TRW Components 251-06-30-261

# OPERATION

## SECTION III OPERATION

### 3-1. INTRODUCTION

3-2. This section explains the function of the controls and indicators of the Model 8620C Sweep Oscillator. It describes typical operating modes in a measurement system and covers the typical operator maintenance such as fuse and indicator lamp replacement and fan filter replacement.

### 3-3. PANEL FEATURES

3-4. Front and rear panel features are described in Figures 3-1 and 3-2. Description numbers match the numbers on the illustration.

### 3-5. OPERATOR'S CHECK

3-6. The operator's check (Figure 3-3) allows the operator to make a quick check of the main instrument functions prior to use. This check assumes that an RF Plug-in or an RF Section with oscillator module is installed in the mainframe. Incorrect indications may indicate troubles in either the mainframe or RF Plug-in. To determine if the mainframe is working correctly, check the 8620C using the performance test in Section IV.

### 3-7. OPERATING INSTRUCTIONS

3-8. Figures 3-4 thru 3-7 show general operating procedures with the 8620C connected in a typical measurement test setup. There are many other applications for the 8620C but the general operating procedure is the same.

### WARNING

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.

### 3-9. REMOTE PROGRAMMING

3-10. Remote programming control is applied through a rear-panel PROGRAMMING connector.

Tables 3-1 and 3-2 show the input commands and output signals for the programming connector and logic tables for the various commands. Table 3-1 applies to a standard 8620C and Table 3-2 applies when Option 001 is installed.

### 3-11. Computer or Calculator Programming

3-12. With the addition of Option 001 (digital-to-analog converter printed circuit board) the 8620C may be programmed remotely from a computer or calculator. A simulated sweep mode is provided by sequentially selecting up to 10,000 point frequencies for each band. Band switching, RF attenuation (with 8621B Option 010) and remote/manual operation may also be programmed from the computer.

3-13. The Option 001 BCD programming provides the same capabilities as the HP-IB Option with the exception that no digital marker is available in the programmed sweep modes.

### 3-14. Hewlett-Packard Interface Bus (HP-IB)

3-15. With the addition of Option 011, a capability is provided to control the sweeper directly via the HP Interface Bus. With Option 011 installed, any sweep function ( $\Delta F$ , FULL SWEEP, etc.) can be selected and the 8620C will sweep according to the front-panel frequency settings. This option provides a flexible, digital frequency programming with a resolution of 10,000 points per band or 10,000 points across the frequency range set by the front-panel controls. With this operation, a programmable digital marker is available.

### 3-16. Manual Remote Programming

3-17. A manual remote control system may be used where repetitive operations are performed. The standard 8620C (without Options) contains remote control circuits to select operating mode and frequency range. This mode can be calculator or computer controlled.



**3-18. OPERATOR'S MAINTENANCE**

3-19. Operator's maintenance consists of replacing defective fuses, indicator lamps, cleaning the air filter, and changing the frequency scales. These items are discussed in the following paragraphs.

**3-20. Fuses**

3-21. There are five fuses in the 8620C. The main ac line fuse is located at the back of the instrument next to the line cord jack. The ac line cord must be removed to gain access to the fuse compartment. The fuse may be removed by pulling the lever inside the fuse compartment. (See Figure 2-1.) For the 100 or 120 Vac supply source, use a 3 amp line fuse; for the 220 or 240 Vac supply, use a 1.5 amp line fuse. There are four other fuses inside the instrument. Access to these requires removing instrument top cover. These fuses are located on A4 and A5 printed circuit boards. They are mounted on two-pin connectors and can be removed by pulling them straight out from the board. See parts list in Section VI for fuse type and current rating.

**CAUTION**

Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of repaired fuses and other short-circuiting of fuse-holders must be avoided.

**3-22. Air Filter**

3-23. The fan has a filter attached from the outside for ease of cleaning or replacement. To service the filter, remove the four screws holding filter to rear panel and either replace it with the appropriate part listed in Section VI or clean it, using a solution of warm water and soap.

**3-24. Lamp Replacement**

3-25. The five front-panel lamps located in the mode selector pushbutton switches and the LINE lamp are replaceable from the front. (See Figure 3-8 for procedure.)

**3-26. Frequency Scale Installation**

3-27. See procedure in Paragraph 2-26.

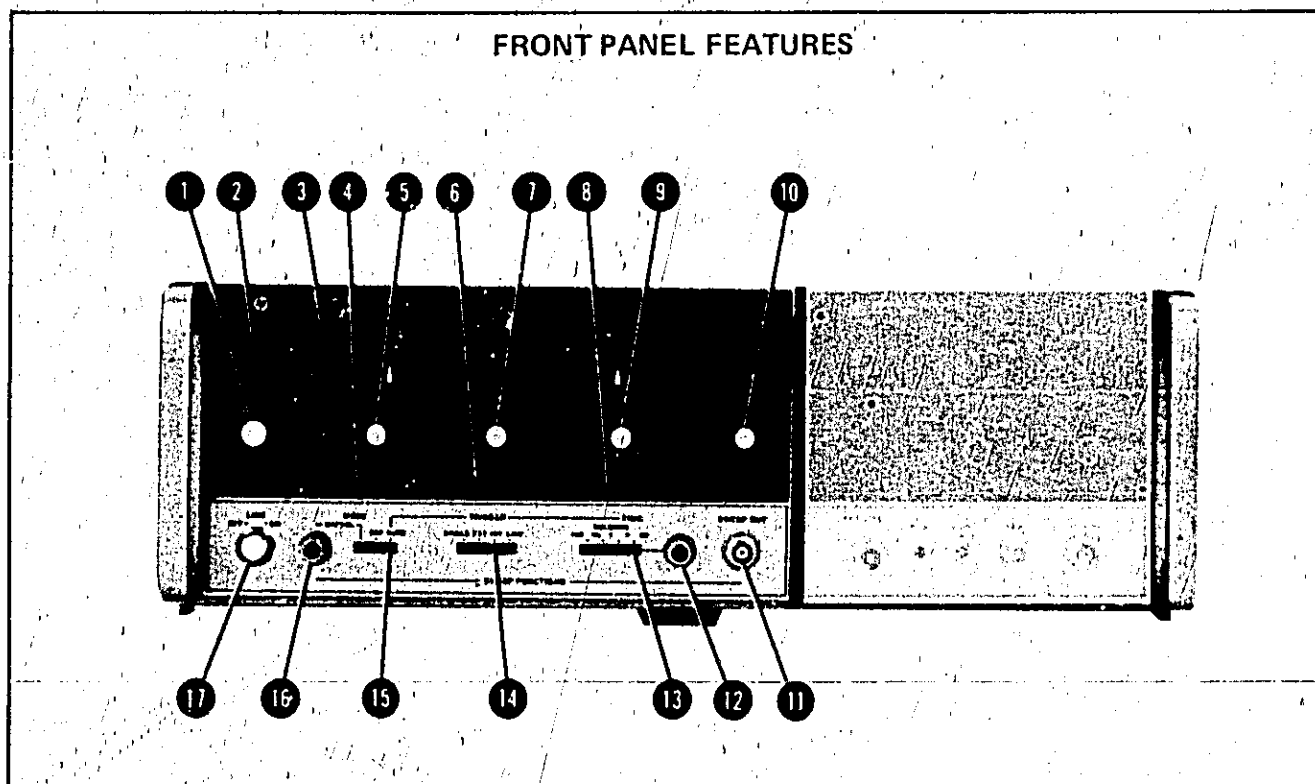


Figure 3-1. Front Panel Controls, Connectors and Indicators (1 of 3)

## FRONT PANEL FEATURES

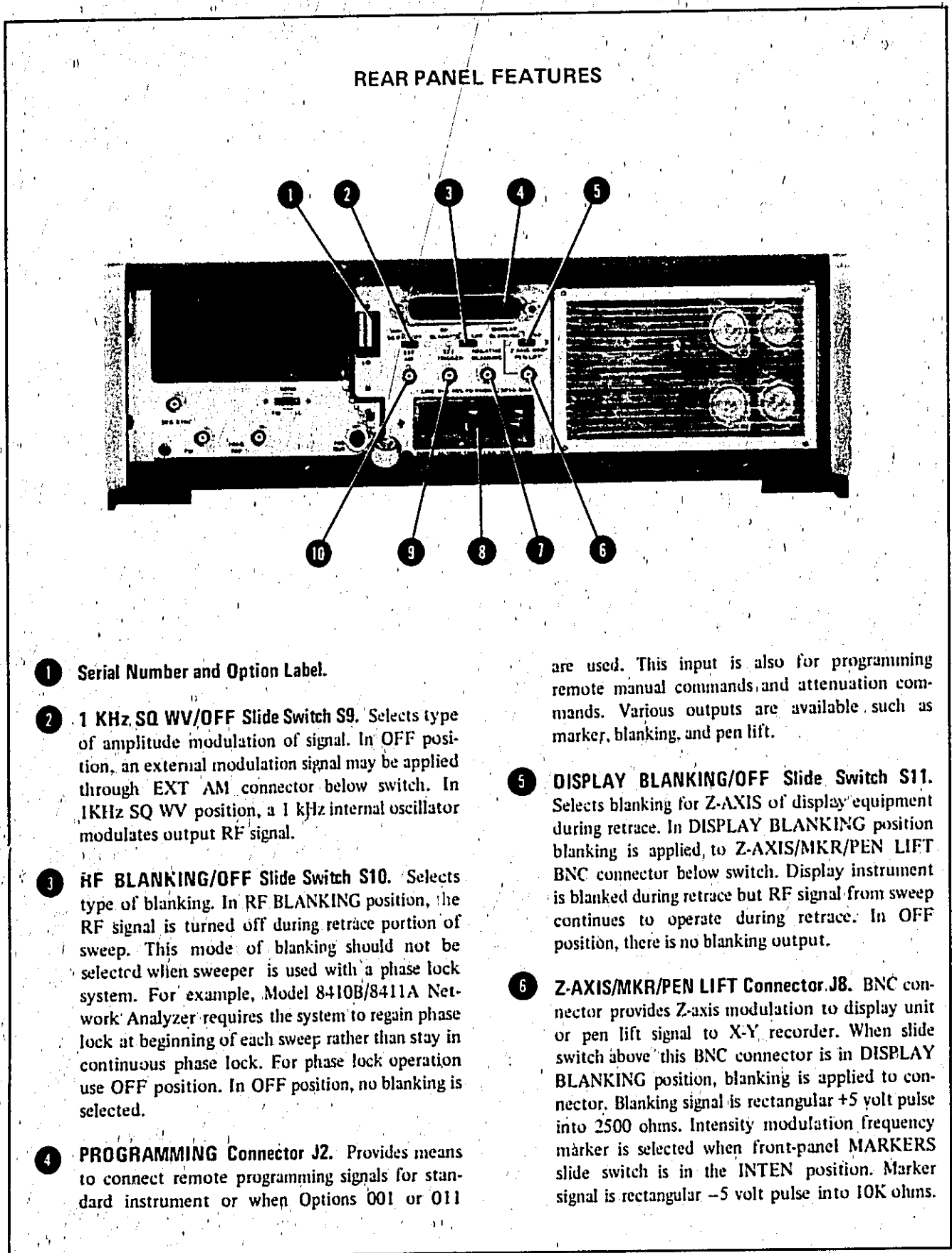
- 1 **START MARKER Control R2 and FULL SWEEP Pushbutton Switch S4.** Pressing pushbutton switch selects FULL SWEEP mode and FULL SWEEP lamp DS1 lights. Sweep covers full band of frequencies of scale from low to high frequency. Green START MARKER lettering over control is color coded to green start pointer on scale. In FULL SWEEP mode, START MARKER control adjusts only Start Marker position and not start frequency. Three markers are available on sweep: Start Marker at position of green pointer, CW Marker at position of white pointer, and Stop Marker at position of red pointer.
- 2 **BAND Switch S2/S3.** Depressing lever advances drum containing frequency scales. It also changes position-sensing switches to activate oscillator module in RF section.
- 3 **Frequency Scale Window.** The band selected is displayed at the window. Top scale has pointers for START MARKER (green), STOP MARKER (red), and CW MARKER (white) controls. Bottom left scale is  $\Delta F$  and bottom right scale is CW VERNIER. A calibration scale is included in one band position for ease of calibration, but is not essential to the calibration procedure. When an additional band is added to the RF drawer, a new scale may be installed by following procedure in Paragraph 2-26. Drum position may be identified by tick marks on left-hand side of drum. Position "I" of the BAND drum activates Heterodyne Module ("Position 1" in 8621A/B) and oscillator module installed in "Position 2" of 8621A/B or band 1 of 86290A. Position "II" of the BAND drum activates the oscillator installed in "Position 2" of 8621A/B or band 2 of 86290A. Position "III" activates oscillator installed in "Position 3" of 8621A/B or band 3 of 86290A. Position "III" activates circuits for use with the HP Model 86290A multi-octave sequential sweep band 4. Any BAND drum position will select an 86200 series plug-in.
- 4  **$\Delta F$  Multiplier Slide Switch A9S4.** Selects multiplier for  $\Delta F$  scale. When set to XI position,  $\Delta F$  scale setting is read directly and when set to X.1 or X10 positions,  $\Delta F$  scale setting is multiplied by either 0.1 or 10.
- 5  **$\Delta F$  Control R3 and Pushbutton Switch S5.** Pressing pushbutton lights both  $\Delta F$  DS2 and CW DS3 pushbuttons, indicating that center frequency is selected by CW MARKER control and deviation from CW frequency is selected by  $\Delta F$  control.  $\Delta F$  scale is short scale above  $\Delta F$  control. Start and Stop Markers are available on  $\Delta F$  sweep.
- 6 **MARKERS Slide Switch A9S5.** Selects marker modes: AMPL, OFF, INTEN. In AMPL position, frequency marker is modulated on RF sweep signal. In OFF position, no marker is present. In INTEN position a frequency marker is obtained by intensity modulating Z-axis of oscilloscope or other display instrument on which sweep trace is shown. Intensity modulation signal is available at rear-panel Z-AXIS/MKR/PEN LIFT output J8.
- 7 **CW MARKER Control R4 and CW Pushbutton Switch S6.** Pressing pushbutton switch selects CW mode and CW lamp DS3 lights. White CW MARKER lettering over control is color coded to white pointer on scale and indicates CW frequency. With FULL or MARKER SWEEP selected, a CW Marker is available and position of white pointer indicates frequency setting of CW Marker. CW light also comes on when  $\Delta F$  mode is selected, indicating CW MARKER control selects center frequency of  $\Delta F$  Sweep.
- 8 **CW VERNIER Multiplier Slide Switch A9S6.** Selects multiplier for CW vernier scale. In XI position scale is read directly and in X.1 position scale indication is multiplier by 0.1.
- 9 **CW VERNIER Control R5 and Pushbutton Switch S7.** Pressing pushbutton switch connects vernier function for CW or  $\Delta F$  modes. (DS4 lights.) Vernier control provides fine adjustment of frequencies about CW scale setting. Scale multiplier is controlled by slideswitch below pushbutton control.
- 10 **STOP MARKER Control R6 and MARKER SWEEP Pushbutton Switch S8.** Pressing pushbutton switch selects MARKER SWEEP mode and MARKER SWEEP lamp DS5 lights. Red STOP MARKER lettering over control is color coded to red stop pointer on scale. Sweep is between green START MARKER pointer and red STOP MARKER pointer. CW Marker is available on sweep.

Figure 3-1. Front Panel Controls, Connectors and Indicators (2 of 3)

## FRONT PANEL FEATURES

- 11 **SWEEP OUT BNC Connector, J1.** Output is linear ramp voltage from zero to 10 volts synchronous with F.F sweep signal. Output is available for all operating modes.
- 12 **TIME-SECONDS Vernier Control R8.** Allows sweep time to be adjusted through range selected at TIME-SECONDS slide switch.
- 13 **Sweep TIME-SECONDS Slide Switch A9S3.** Sets range of sweep time. Sweep time may be selected from >100 seconds per sweep (slide switch to left position and vernier control counterclockwise) to < 0.01 seconds per sweep (slide switch to right position and vernier control clockwise).
- 14 **Sweep TRIGGER Slide Switch A9S2.** Selects source of sweep-trigger pulse. Switch has spring return in SINGLE sweep mode position. Each time switch is pressed into SINGLE position, a single sweep is initiated; when released, switch returns to EXT. In EXT position, an external trigger pulse may be applied through rear-panel EXT TRIGGER connector. In INT position, sweep trigger pulse is derived from internal sweep oscillator and system is free running. In LINE position, sweep is triggered by power line sine wave peaks.
- 15 **Sweep MODE Slide Switch A9S1.** Selects source of sweep signal. In MANUAL position, the control at left of MODE switch controls sweep manually. In EXT position, an external sweep signal may be applied through rear-panel PROGRAMMING connector. In AUTO position, sweep signal is obtained from internal sweep oscillator, producing continuous sweep signal.
- 16 **MANUAL MODE Control R7.** Allows manual sweep of frequency range selected by FULL SWEEP and MARKER SWEEP controls or  $\Delta F$  control. Selects start frequency in full counterclockwise position; selects stop frequency in full clockwise position. No markers are available.
- 17 **LINE, OFF-ON Switch S1.** Pressing LINE switch applies power to sweeper and plug-ins, and switch illuminates DS6. Applying power to instrument always selects FULL SWEEP mode. Line on side of pushbutton indicates ON and OFF position.

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



- 1 **Serial Number and Option Label.**
- 2 **1 KHz SQ WV/OFF Slide Switch S9.** Selects type of amplitude modulation of signal. In OFF position, an external modulation signal may be applied through EXT AM connector below switch. In 1KHz SQ WV position, a 1 kHz internal oscillator modulates output RF signal.
- 3 **RF BLANKING/OFF Slide Switch S10.** Selects type of blanking. In RF BLANKING position, the RF signal is turned off during retrace portion of sweep. This mode of blanking should not be selected when sweeper is used with a phase lock system. For example, Model 8410B/8411A Network Analyzer requires the system to regain phase lock at beginning of each sweep rather than stay in continuous phase lock. For phase lock operation use OFF position. In OFF position, no blanking is selected.
- 4 **PROGRAMMING Connector J2.** Provides means to connect remote programming signals for standard instrument or when Options 001 or 011 are used. This input is also for programming remote manual commands and attenuation commands. Various outputs are available such as marker, blanking, and pen lift.
- 5 **DISPLAY BLANKING/OFF Slide Switch S11.** Selects blanking for Z-AXIS of display equipment during retrace. In DISPLAY BLANKING position blanking is applied, to Z-AXIS/MKR/PEN LIFT BNC connector below switch. Display instrument is blanked during retrace but RF signal from sweep continues to operate during retrace. In OFF position, there is no blanking output.
- 6 **Z-AXIS/MKR/PEN LIFT Connector JB.** BNC connector provides Z-axis modulation to display unit or pen lift signal to X-Y recorder. When slide switch above this BNC connector is in DISPLAY BLANKING position, blanking is applied to connector. Blanking signal is rectangular +5 volt pulse into 2500 ohms. Intensity modulation frequency marker is selected when front-panel MARKERS slide switch is in the INTEN position. Marker signal is rectangular -5 volt pulse into 10K ohms.

Figure 3-2. Rear Panel Controls and Connectors (1 of 2)

**REAR PANEL FEATURES**

- 7 **NEGATIVE BLANKING Connector J5.** BNC connector provides negative polarity blanking during retrace. Blanking signal is rectangular  $-5$  volt pulse into 2400 ohms.
- 8 **Power Line Module FL1 and Fuse F1.** Line Voltage Selector Card FL1TB1 allows selection of 100, 120, 220, or 240 Vac operation. Instructions for line voltage selection and changing fuses are in Figure 2-1.
- 9 **EXT TRIGGER Connector J4.** BNC connector to input external trigger pulse. This input is selected when the front panel TRIGGER slide switch is in EXT position. Trigger signal must be greater than  $+2$  Vdc, wider than  $0.5$   $\mu$ sec and not greater than 1 MHz in frequency.
- 10 **EXT AM Connector J3.** BNC connector to input external amplitude modulation signal. This input is selected when rear panel 1 KHz SQ WV slide switch is in OFF position.

*Figure 3-2. Rear Panel Controls and Connectors (2 of 2)*

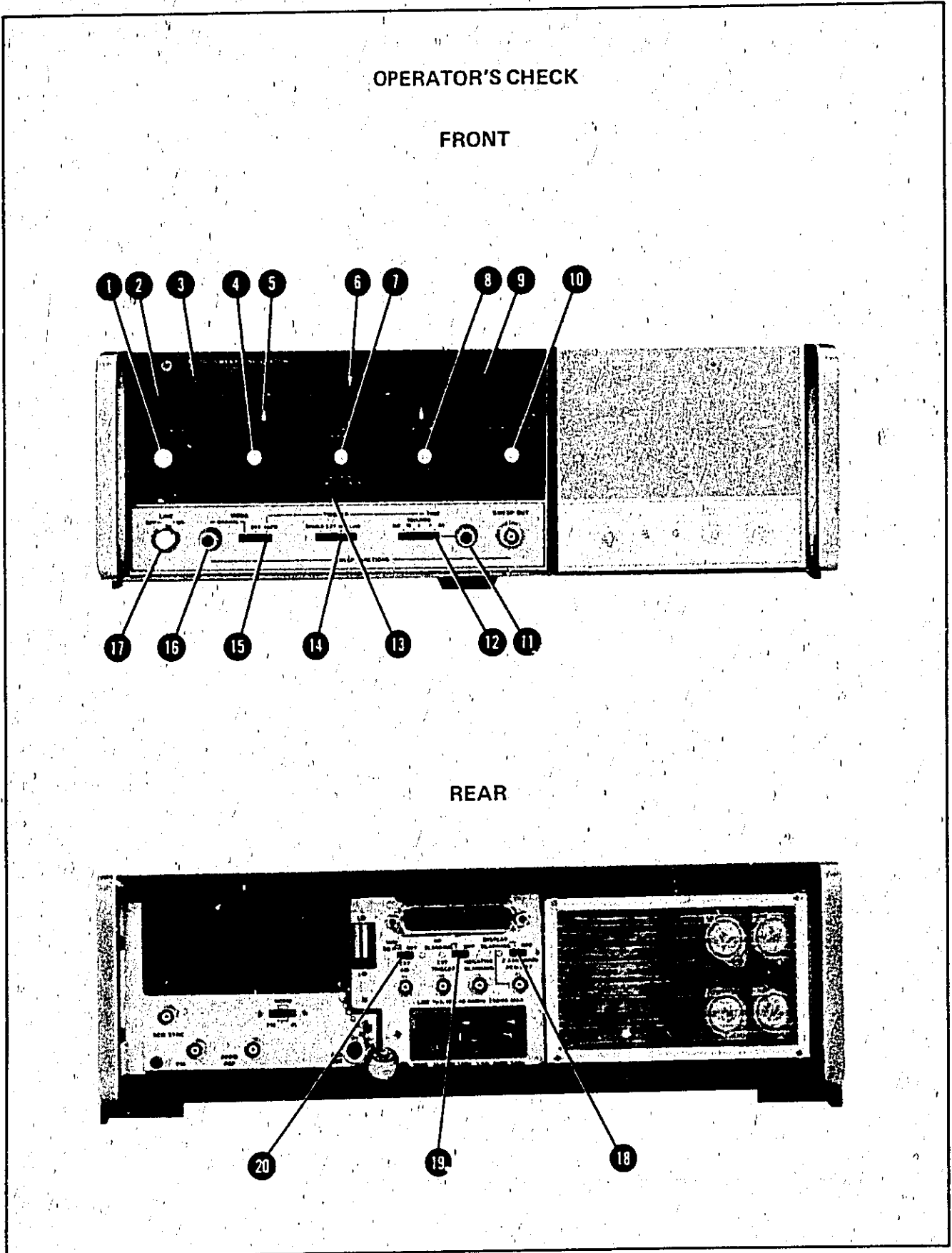
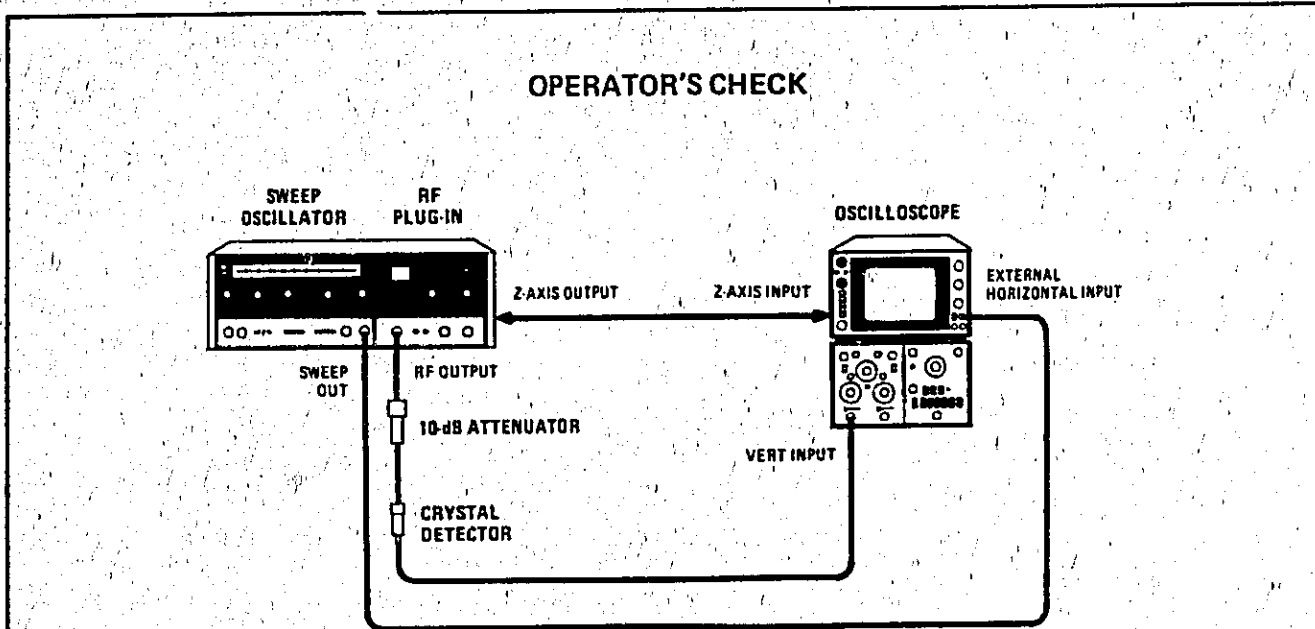


Figure 3-3. Operator's Check (1 of 3)



1. Connect equipment as shown in test setup.

**NOTE**

**BEFORE SWITCHING ON THIS INSTRUMENT**, ensure that the power transformer primary is matched to the available line voltage, the correct fuse is installed, and the safety precautions are taken. See Power Requirements, Line Voltage Selection, Power Cables, and associated warnings and cautions in Section II.

**CAUTION**

**BEFORE CONNECTING LINE POWER**, 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.)

2. Set 8620C controls as follows:

- BAND **2** ..... Depress to select frequency band
- START MARKER pointer **3** ..... Left-hand end mark on scale
- CW MARKER pointer **6** ..... Middle mark on scale
- STOP MARKER pointer **9** ..... Right-hand end mark on scale
- $\Delta$ F pointer **5** ..... Fully clockwise

Figure 3-3. Operator's Check (2 of 3)

CW VERNIER 8	.....	Center or 0
MARKERS 13	.....	AMPL
MODE 15	.....	AUTO
TRIGGER 14	.....	INT
TIME 12	.....	.1 - .01
TIME-SECONDS Vernier 11	.....	Clockwise
Rear Panel 1kHz SQ WV/OFF 20	.....	OFF
Rear Panel DISPLAY BLANKING/OFF 18	.....	DISPLAY BLANKING
Rear Panel RF BLANKING/OFF 19	.....	OFF

3. Press LINE pushbutton switch 17 to turn on instrument. The LINE and FULL SWEEP 1 pushbuttons should light.
4. Set controls on RF plug-in (8621A/B, 86290A, etc.) to obtain an RF signal output. Oscilloscope trace should show detected RF signal output below zero-volt reference. There should be no discontinuity in swept trace across band. Three markers should appear on sweep: Start Marker at position of green pointer 3, CW Marker at position of white pointer 6, and Stop Marker at position of red pointer 9.
5. Press MARKER SWEEP pushbutton 10. Pushbutton should light. CW Marker should appear at center of frequency indicated by white CW MARKER pointer 6. Sweep should begin at frequency setting of START MARKER pointer 3 and end at frequency setting of STOP MARKER pointer 9.
6. Set MODE switch 15 to MANUAL position and adjust Manual control 16. Trace dot should move across oscilloscope CRT. No markers are available in MANUAL mode.
7. Set MODE switch to AUTO.
8. Press CW pushbutton 7. Pushbutton should light and trace on oscilloscope should be a dot. Change frequency with CW MARKER control and dot should move across oscilloscope CRT.
9. Press CW VERNIER pushbutton 8 and pushbutton should light. Adjust CW VERNIER control and oscilloscope dot should move across CRT at a very slow rate and through narrow range. Press CW VERNIER pushbutton to disable CW VERNIER function.
10. Press ΔF pushbutton 4 and ΔF and CW pushbuttons should light. Sweep trace below zero volt reference should be displayed on oscilloscope CRT.

**NOTE**

In ΔF mode, two markers are available by adjusting the START and STOP MARKER controls.

Figure 3-3. Operator's Check (3 of 3)



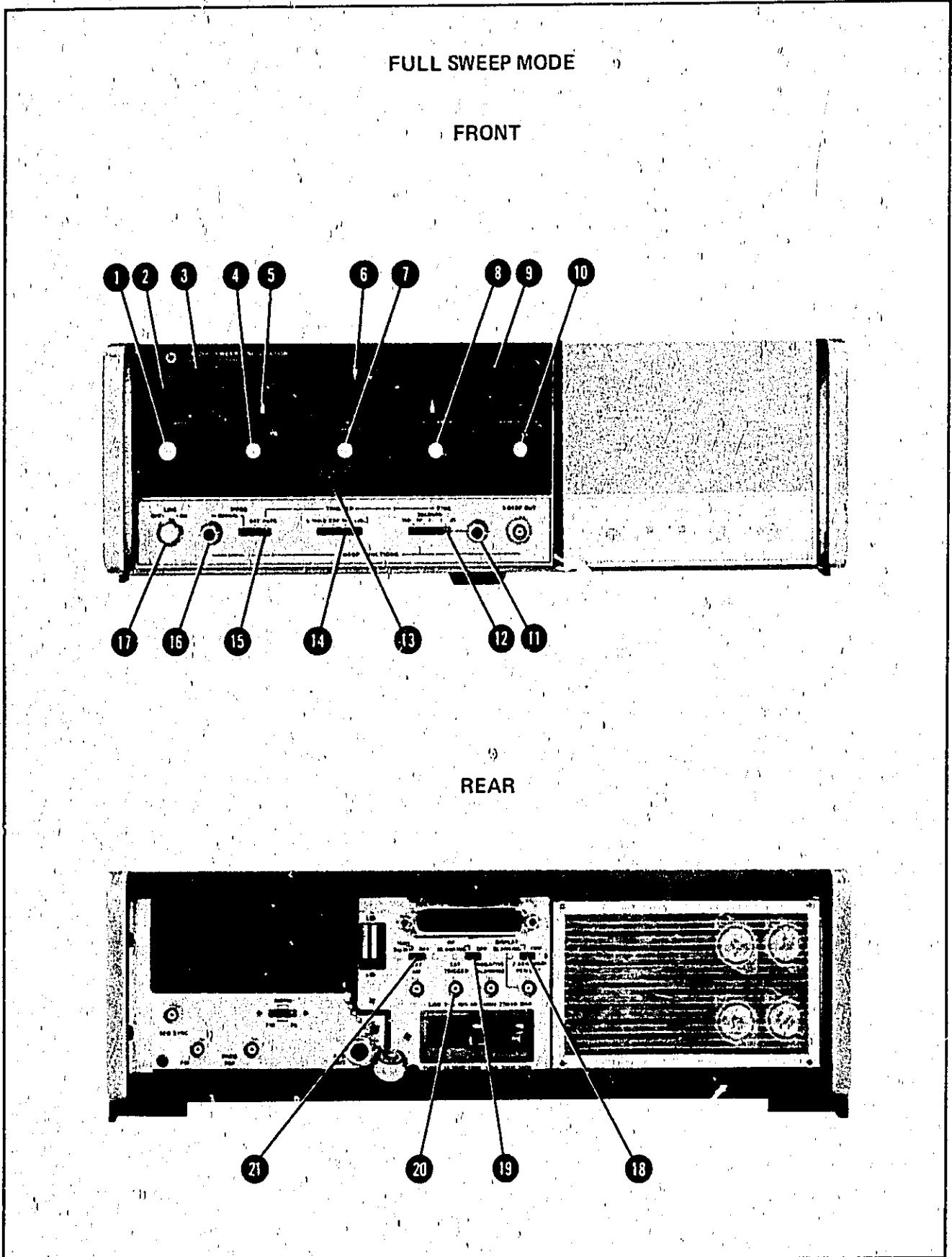


Figure 3-4. Full Sweep Mode (1 of 2)

## FULL SWEEP MODE

1. Connect sweep oscillator as shown in Figure 3-3 test setup.
2. Set 8620C controls as follows:
 

BAND 2	.....	Depress to select frequency band
START MARKER pointer 3	.....	Left-hand end mark on scale
CW MARKER pointer 6	.....	Middle mark on scale
STOP MARKER pointer 9	.....	Right-hand end mark on scale
$\Delta$ F pointer 5	.....	Fully clockwise
CW VERNIER 8	.....	Fully clockwise
MARKERS 13	.....	INTEN
MODE 15	.....	AUTO
TRIGGER 14	.....	INT
TIME 12	.....	.1 — .01
TIME-SECONDS Vernier 11	.....	..... Clockwise
Rear Panel 1kHz SQ WV/OFF 21	.....	..... OFF
Rear Panel RF BLANKING/OFF 19	.....	..... OFF
Rear Panel DISPLAY BLANKING/OFF 18	.....	..... DISPLAY BLANKING
3. Press LINE pushbutton switch 17 to turn on instrument. The LINE and FULL SWEEP pushbuttons should light indicating Full Sweep Mode is selected.
4. Set controls on RF plug-in (8621A/B, 86290A, etc.) to obtain an RF signal output. Oscilloscope trace should show detected RF signal output below zero-volt reference. There should be no discontinuity in swept trace across band. Three bright marker spots should appear on trace: Start Marker at position of green pointer 3, CW Marker at position of white pointer 6, and Stop Marker at position of red pointer 9. Set MARKERS switch 13 to AMPL to obtain amplitude markers on trace.
5. Sweep width is full band of frequencies of scale and cannot be changed.
6. Band may be swept manually by setting MODE switch 15 to MANUAL and adjusting MANUAL control 16 through its range. No markers are available in Manual mode.
7. Select SINGLE sweep as follows: Set MODE switch 15 to AUTO. Press TRIGGER switch 14 to SINGLE position and release. Repeat this to obtain each single sweep. External (EXT) trigger mode is available by setting MODE switch to EXT and applying external trigger pulse to rear panel EXT TRIGGER input 20. Sweep may be triggered from ac line by setting TRIGGER switch to LINE.

Figure 3-4. Full Sweep Mode (2 of 2)

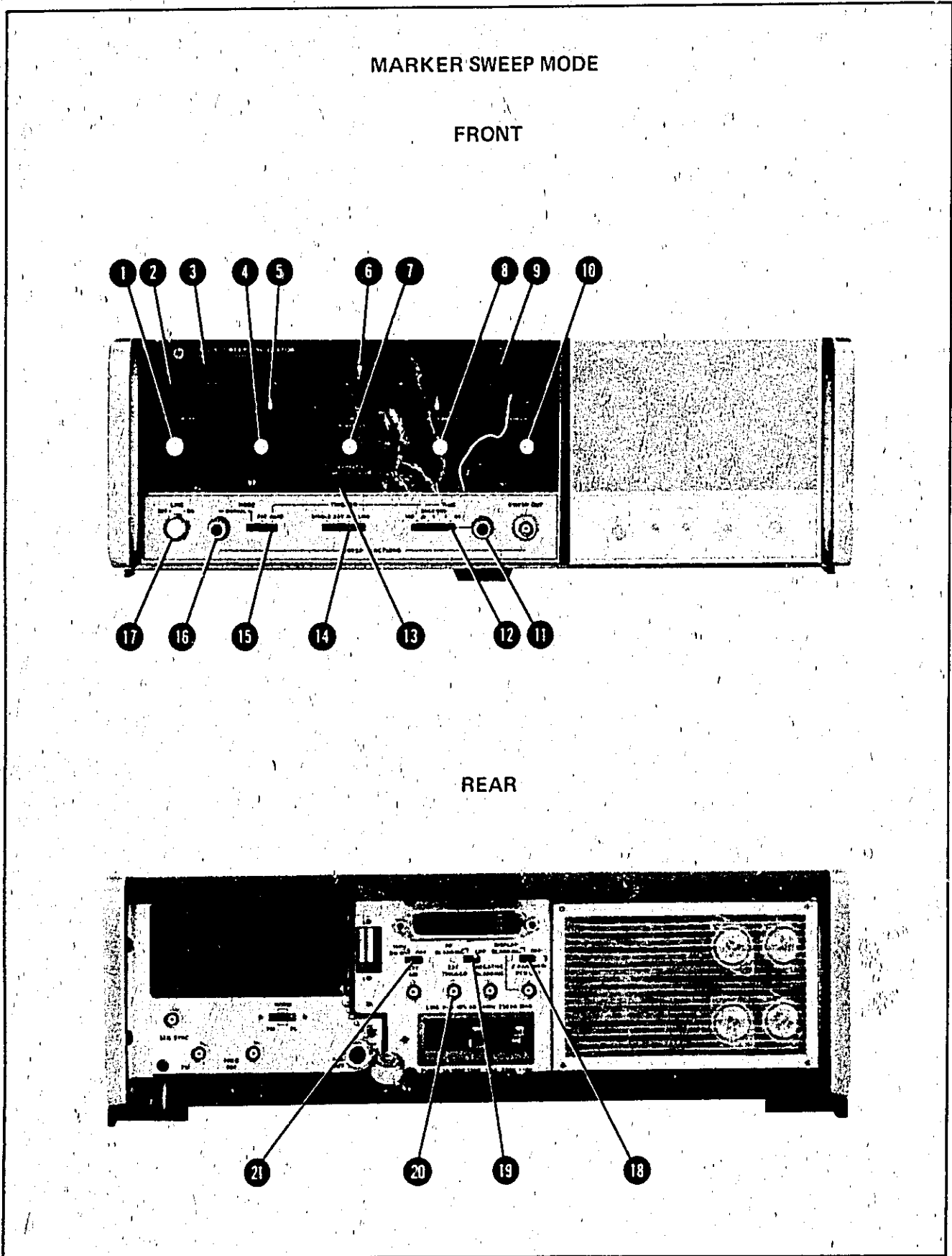


Figure 3-5. Marker Sweep Mode (1 of 2)

### MARKER SWEEP MODE

1. Connect sweep oscillator as shown in Figure 3-3 test setup.
2. Set 8620C controls as follows:
 

BAND 2	Depress to select frequency band
START MARKER pointer 3	Left-hand end mark on scale
CW MARKER pointer 6	Middle mark on scale
STOP MARKER pointer 9	Right-hand end mark on scale
$\Delta F$ pointer 5	Fully clockwise
CW VERNIER 8	Fully clockwise
MARKERS 13	INTEN
MODE 15	AUTO
TRIGGER 14	INT
TIME 12	.1 - .01
TIME-SECONDS Vernier 11	Clockwise
Rear Panel 1kHz SQ WV/OFF 21	OFF
Rear Panel RF BLANKING/OFF 19	OFF
Rear Panel DISPLAY BLANKING/OFF 18	DISPLAY BLANKING
3. Press LINE pushbutton switch 17 to turn on instrument. The LINE and FULL SWEEP pushbuttons should light indicating Full Sweep Mode is selected.
4. Press MARKER SWEEP pushbutton 10 and pushbutton should light.
5. Set controls on RF plug-in (8621A/B, 86290A, etc.) to obtain an RF signal output. Oscilloscope trace should show detected RF signal output below zero-volt reference. There should be no discontinuity in swept trace across band. Bright marker spot should be at middle of trace.
6. Sweep width is changed by START MARKER 3 and STOP MARKER 9 controls and marker position is changed by CW control 7.
7. Set MARKERS switch 13 to AMPL to obtain amplitude markers on trace.
8. Band may be swept manually by setting MODE switch 15 to MANUAL and adjusting MANUAL control 16 through its range. No markers are available in Manual mode.
9. Select SINGLE sweep as follows: Set MODE switch 15 to AUTO. Press TRIGGER switch 14 to SINGLE position and release. Repeat this to obtain each single sweep. External (EXT) trigger mode is available by setting MODE switch to EXT and applying external trigger pulse to rear panel EXT TRIGGER input 20. Sweep may be triggered from ac line by setting TRIGGER switch to LINE.

Figure 3-5. Marker Sweep Mode (2 of 2)

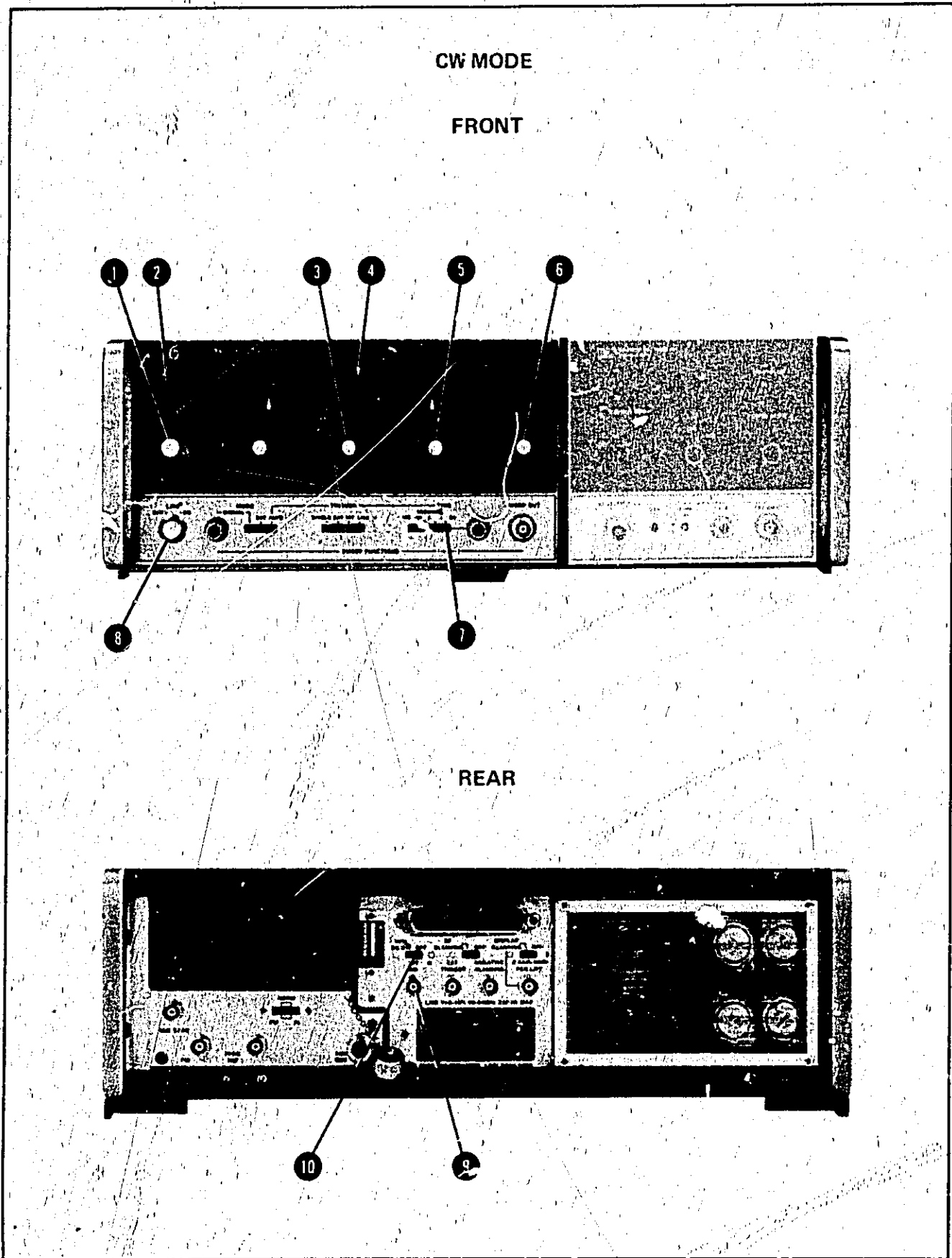


Figure 3-6. CW Operating Mode (1 of 2)

## CW MODE

1. Connect sweep oscillator and set 8620C controls as shown in Figure 3-3.
2. Press LINE pushbutton switch ⑧ to turn on instrument. The LINE and FULL SWEEP ① pushbuttons should light.
3. Depress BAND switch ② until correct band is displayed at window.
4. Press CW pushbutton ③. Pushbutton should light and trace on oscilloscope should be a dot. Change frequency with CW MARKER control and dot should move across oscilloscope CRT.
5. Rotate CW control ④ to set CW pointer ⑥ at selected frequency on scale.
6. If it is desired to modulate CW signal, set rear panel 1kHz SQ WV slide switch ⑩ to either OFF or 1kHz SQ WV position. In OFF position, a modulation signal may be applied from external source through rear panel EXT AM connector. In 1kHz SQ WV position, a 1 kHz internal oscillator modulates RF output signal.
7. To expand CW frequency dial, press CW VERNIER pushbutton switch ⑤. CW VERNIER control allows CW frequency to be changed by small amounts. Set X.1—X1 multiplier slide switch ⑦, located below CW VERNIER control, for bandsread desired.

*Figure 3-6. CW Operating Mode (2 of 2)*

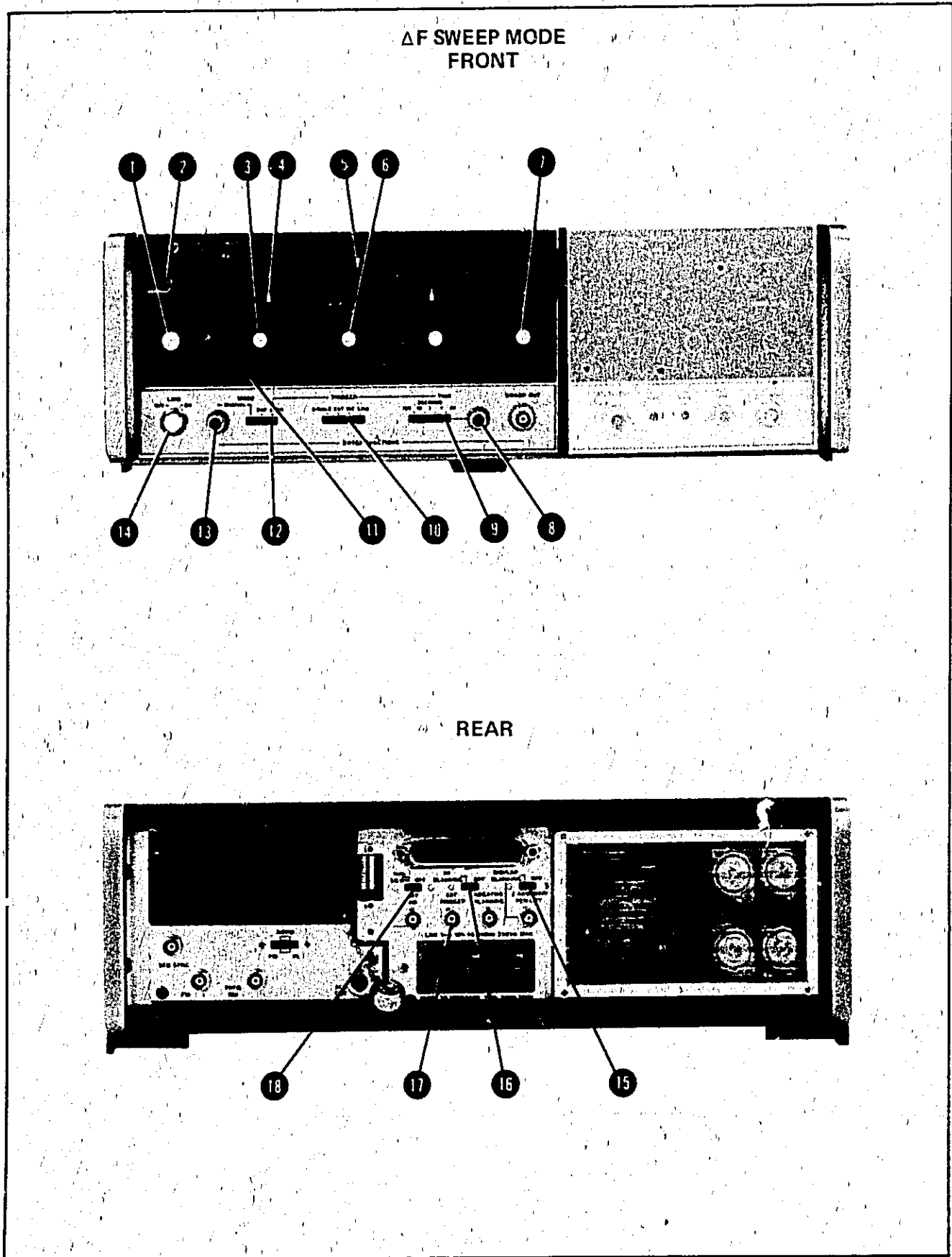


Figure 3-7.  $\Delta F$  Sweep Mode (1 of 2)

**ΔF SWEEP MODE**

1. Connect sweep oscillator as shown in Figure 3-3 Test setup.
2. Set 8620C controls as follows:
 

BAND ②	.....	Depress to select frequency band
CW MARKER pointer ⑤	.....	Selected ΔF center frequency
ΔF pointer ④	.....	Fully clockwise
MODE ⑫	.....	AUTO
TRIGGER ⑩	.....	INT
TIME ⑨	.....	.1 — .01
TIME-SECONDS Vernier ⑧	.....	Clockwise
Rear Panel 1kHz SQ WV/OFF ⑱	.....	OFF
Rear Panel RF BLANKING/OFF ⑰	.....	OFF
Rear Panel DISPLAY BLANKING/OFF ⑮	.....	DISPLAY BLANKING
3. Press LINE pushbutton switch ⑭ to turn on instrument. The LINE and FULL SWEEP pushbuttons should light.
4. Set controls on RF plug-in (8621A/B, 86290A, etc.) to obtain an RF signal output.
5. Press ΔF pushbutton switch ③ and both ΔF and CW ⑥ pushbuttons should light.
6. CW MARKER control ⑥ sets center frequency of sweep. START MARKER ① and STOP MARKER ⑦ controls adjust position of markers.
7. Set ΔF control ⑤ and ΔF multiplier slide switch ⑪ below ΔF control for selected deviation from center frequency. Trace should be displayed on oscilloscope across the swept band.
8. Band may be swept manually by setting MODE switch ⑫ to MANUAL and adjusting MANUAL control ⑬ through its range. No markers are available in MANUAL mode.
9. Select SINGLE sweep as follows: Set MODE switch ⑫ to AUTO. Press TRIGGER switch ⑩ to SINGLE position and release. Repeat this to obtain each single sweep. External (EXT) trigger mode is available by setting MODE switch to EXT and applying external trigger pulse to rear panel EXT TRIGGER input ⑰. Sweep may be triggered from ac line by setting TRIGGER switch to LINE.

Figure 3-7. ΔF Sweep Mode (2 of 2)



Table 3-1. Remote Programming Using Standard 8620C (1 of 2)

Programming Connector Input Commands and Output Signals			
Pin on J2*	Input Commands or Output Signals	Pin on J2*	Input Commands or Output Signals
13	Band Select	32	Marker Sweep Select
14	Band Select	34	Stop Sweep Pulse
16	Pen Lift Common	36	40 dB
17	Z Axis/Mkr/Pen Lift	37	20 dB
19	+20V	38	10 dB
20	+5V	39	Remote Band Enable
26	Sequential Sync	40	RF Blanking – Output
27	Marker	41	Remote Attn Enable – Input
28	External Sweep	43	Ground
29	ΔF Mode Select	44	-10V
30	CW Mode Select	45	-40V
31	Full Sweep Select		

\*Pins not shown are unused in this application.

**NOTE**

8621A/B Option 010 programmable 70 dB attenuator is required to accept RF attenuation control signals from J2 pins 36 through 38.

*RF Output Attenuation Programming*

RF Output Attenuation	10 dB line J2 Pin 38	20 dB line J2 Pin 37	40 dB line J2 Pin 36	REMOTE ATTN SELECT J2 Pin 41
0 dB	X	X	X	1
0 dB	0	0	0	0
10 dB	1	0	0	0
20 dB	0	1	0	0
30 dB	1	1	0	0
40 dB	0	0	1	0
50 dB	1	0	1	0
60 dB	0	1	1	0
70 dB	1	1	1	0

Table 3-1. Remote Programming Using Standard 8620C (2 of 2)

*Band Select Programming*

Band	A J2 Pin 13	B J2 Pin 14	Remote Band Select J2 Pin 39
X	X	X	1
1	1	1	0
2	1	0	0
3	0	0	0
4	0	1	0

*Manual Remote Mode Programming*

Mode Selected	J2 Pin 29	J2 Pin 30	J2 Pin 31	J2 Pin 32
FULL SWEEP	1	1	0	1
MARKER SWEEP	1	1	1	0
CW	1	0	1	1
$\Delta F$	0	1	1	1

**NOTE**

Each mode is selected by a momentary or steady state closure to ground (0).  
1 indicates no closure to ground. Ground is pin J2-43.

**NOTES**

1 = Open or  $\geq +2.0$  Vdc.

2 = Closure to ground (pin J2-43) or  $\leq +0.8$  Vdc.

Table 3-2. Remote Programming Using 8620C Option 001 (1 of 2)

Programming Connector Input Commands and Output Signals					
Pin on J2*	Input Commands or Output Signals		Pin on J2*	Input Commands or Output Signals	
1	BCD8, 8 Volts	} Frequency Voltage Units	26	Sequential Sync	} Outputs
2	BCD4, 4 Volts		27	Marker	
3	BCD2, 2 Volts		28	External Sweep	
4	BCD1, 1 Volt		29	ΔF Mode Select	
5	BCD8, 0.8 Volt	} Frequency Voltage Tenths	30	CW Mode Select	} Inputs
6	BCD4, 0.4 Volt		31	FULL SWEEP Mode Select	
7	BCD2, 0.2 Volt		32	MARKER SWEEP Mode Select	
8	BCD1, 0.1 Volt	} Inputs	33	BCD2, 0.002 Volt	
9	BCD8, 0.08 Volt		34	Stop Sweep Pulse	
10	BCD4, 0.04 Volt		35	BCD4, 0.004 Volt	
11	BCD2, 0.02 Volt		36	40 dB	} RF Attenuation
12	BCD1, 0.01 Volt	37	20 dB		
13	Band Select	38	10 dB		
14	Band Select	} Output	39	Remote Band Enable - Input	
15	Remote D/A Enable		40	RF Blanking - Output	
16	Pen Lift Common		41	Remote Attn Enable	} Inputs
17	Z Axis/Mkr/Pen Lift		42	BCD8, 0.008 Volt	
18	BCD1, 0.001 Volt - Input	} Outputs	43	Ground	
19	+20V		44	-10V	
20	+5V		45	-40V	

\* Pins not shown are unused in this application

NOTES

- 8620C Option 001 digital-to-analog converter is required to accept frequency control signals from J2 pins 1 thru 12, 18, 33, 35, and 42.
- 8621A/B Option 010 programmable 70 dB attenuator is required to accept RF attenuation control signals from J2 pins 36 thru 38.

Band Select Programming

Band	A J2 Pin 13	B J2 Pin 14	Remote Band Select J2 Pin 39
X	X	X	X
1	1	1	0
2	1	0	0
3	0	0	0
4	0	1	0

Table 3-2. Remote Programming Using 8620C Option 001 (2 of 2)

<i>RF Output Attenuation Programming</i>				
RF Output Attenuation	10 dB line J2 Pin 38	20 dB line J2 Pin 37	40 dB line J2 Pin 36	REMOTE ATTN SELECT J2 Pin 41
0 dB	X	X	X	1
0 dB	0	0	0	0
10 dB	1	0	0	0
20 dB	0	1	0	0
30 dB	1	1	0	0
40 dB	0	0	1	0
50 dB	1	0	1	0
60 dB	0	1	1	0
70 dB	1	1	1	0

*Manual Remote Programming*

Mode Selected	J2 Pin 29	J2 Pin 30	J2 Pin 31	J2 Pin 32
FULL SWEEP	1	1	0	1
MARKER SWEEP	1	1	1	0
CW	1	0	1	1
$\Delta F$	0	1	1	1

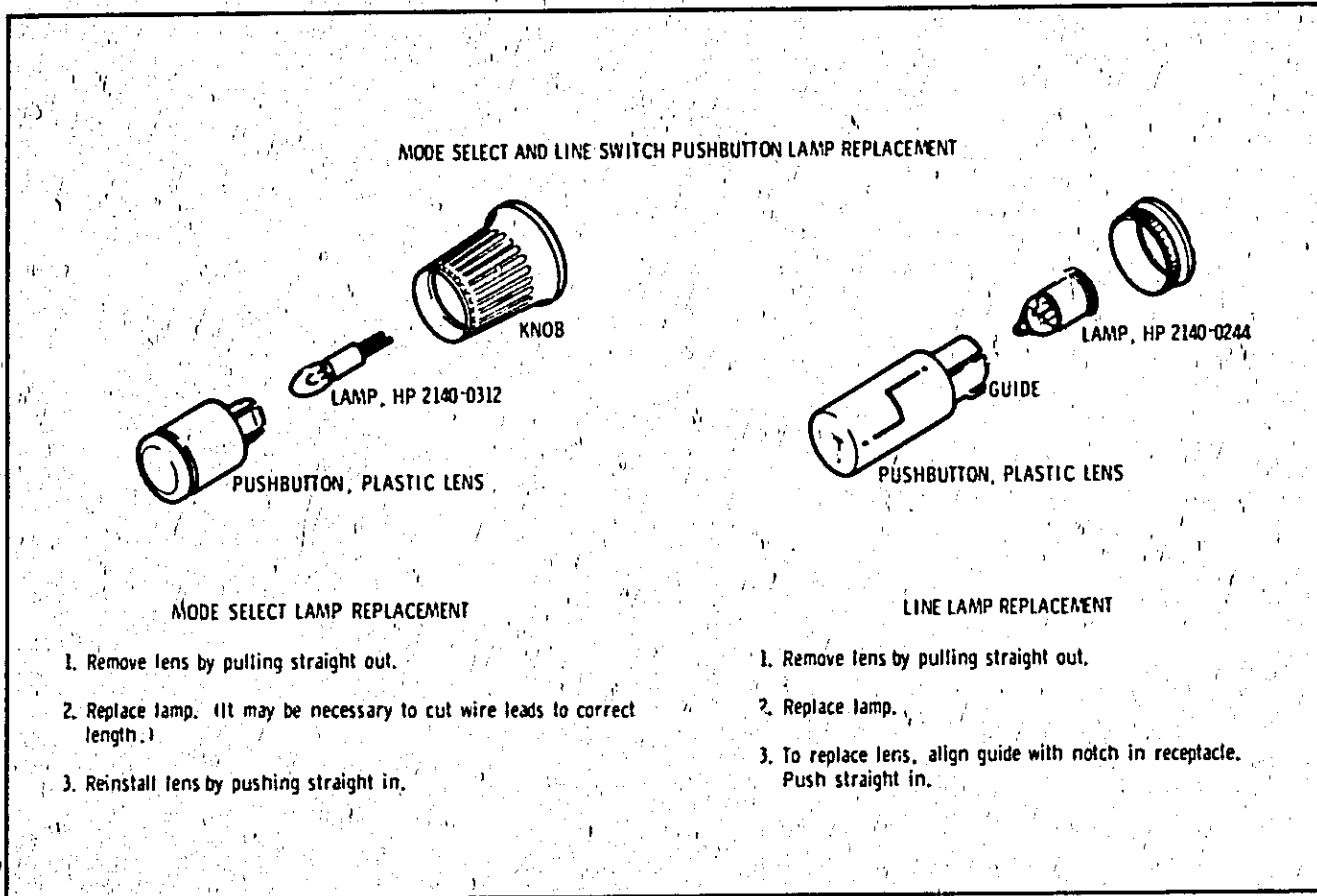
**NOTES**

1. Analog and digital sweep modes are available. The digital sweep mode is provided when the digital-to-analog converter is enabled.
2. The bandwidth is dependent upon the front-panel control when the digital-to-analog converter is enabled.
3. Each mode is selected by a momentary or steady state closure to ground (0). 1 indicates no closure to ground. Ground is pin J2-43.

**NOTES**

1 = Open or  $\geq +2.0$  Vdc.

2 = Closure to ground (pin J2-43) or  $\leq +0.8$  Vdc.



*Figure 3-8. Lamp Replacement*

# PERFORMANCE CHECK

## SECTION IV PERFORMANCE TESTS

### 4-1. INTRODUCTION

4-2. The procedures in this section test the electrical performance of the 8620C Sweep Oscillator/RF Unit combination. The performance standards are the specifications in Section I of the applicable RF Unit manual. All tests can be performed without access to the interior of the instruments.

### 4-3. EQUIPMENT REQUIRED

4-4. Equipment required for the performance tests is listed in the Recommended Test Equipment table in Section I of this manual and the applicable RF Unit manual. Any equipment that satisfies the critical specifications given in the tables may be substituted for the recommended model(s).

### 4-5. TEST RESULTS

4-6. If the 8620C Sweep Oscillator/RF Unit combination fails to meet performance test speci-

fications, and a circuit malfunction is not suspected, refer to 8620C Adjustments (Section V) in this manual. If, after 8620C Adjustments have been performed, the instrument combination still fails to meet specifications, refer to RF Unit Adjustments in the applicable RF Unit manual. If a circuit malfunction is suspected, refer to troubleshooting section of this manual or applicable RF Unit manual.

#### NOTE

To avoid parallax when setting a pointer to a graticule mark, view the pointer and scale directly from the front of the instrument panel.

#### NOTE

Press LINE pushbutton on 8620C to turn power ON and allow 30 minutes warm-up time.

## PERFORMANCE TESTS

### 4-7. FULL SWEEP TEST

#### SPECIFICATION:

Full Sweep: Sweeps the full band as determined by plug-in and band select lever. End-point Accuracy: Refer to RF Unit Specifications, same as frequency accuracy.

#### DESCRIPTION:

Full Sweep end-point accuracy is checked in FULL SWEEP using MANUAL mode.

#### EQUIPMENT:

Refer to RF Unit Frequency Range and Accuracy performance test.

#### PROCEDURE:

In FULL SWEEP, MANUAL mode, check low end and high end of band for end-point accuracy according to RF Unit performance test procedure for manual sweep accuracy; Frequency Range and Accuracy Test.

---

**PERFORMANCE TESTS**

---

**4-8. MARKER SWEEP TEST****SPECIFICATION:**

Marker Sweep: Sweeps from START MARKER to STOP MARKER frequency settings.

Range: Both settings continuously and independently adjustable over the entire frequency range; can be set to sweep either up or down in frequency.

End-Point Accuracy: Refer to RF Unit specifications, same as frequency accuracy.

**DESCRIPTION:**

Marker Sweep end-point accuracy is checked in MARKER SWEEP using MANUAL mode.

**EQUIPMENT:**

Refer to RF Unit Frequency Range and Accuracy performance test.

**PROCEDURE:**

In MARKER SWEEP, MANUAL mode, check low end and high end of band for end-point accuracy according to RF Unit performance test for manual sweep accuracy; Frequency Range and Accuracy Test.

---

**4-9. CW OPERATION TEST****SPECIFICATION:**

CW Operation: Single-frequency RF output. Adjusted with CW MARKER control and activated by pressing CW pushbutton.

Accuracy: Refer to RF Unit specifications, same as frequency accuracy.

**DESCRIPTION:**

Cw Frequency accuracy is checked in CW mode.

**EQUIPMENT:**

Refer to RF Unit Frequency Range and Accuracy performance test.

**PROCEDURE:**

In CW, check CW Frequency accuracy at low end, center, and high end of band according to RF Unit performance test for CW mode accuracy; Frequency Range and Accuracy Test.



## PERFORMANCE TESTS

## 4-10. CW VERNIER TEST

## SPECIFICATION:

CW Vernier: Calibrated directly in MHz about CW setting. CW Vernier activated by pressing pushbutton in CW VERNIER frequency control. Zero to  $\pm 0.5\%$  or  $\pm 5\%$  of full bandwidth, selectable with front panel switch.

Accuracy: Refer to RF Unit specifications, same as frequency accuracy.

## DESCRIPTION:

CW Vernier accuracy is checked at left-edge, then right-edge of scale in both X1 and X.1 multiplier positions with CW frequency control at center-scale mark.

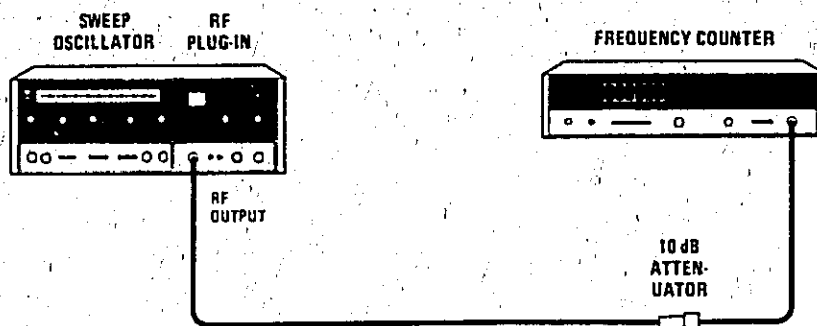


Figure 4-1. CW Vernier Test Setup

## EQUIPMENT:

Sweep Oscillator .....	HP 8620C
Frequency Counter .....	HP 5340A
10 dB Attenuator .....	HP 8491B, Option 010

## PROCEDURE:

- Connect equipment as shown in Figure 4-1.
- Press CW and CW Vernier pushbuttons.
- Set CW frequency control to center-scale mark and CW VERNIER Multiplier to X1. Set CW Vernier pointer to center-scale mark. Record frequency counter indication for use later.
- Set CW Vernier pointer to left-edge scale mark. Frequency indication should be lower than that recorded in step a by  $5\% \pm 0.3\%$  of full frequency range.
- Set CW Vernier pointer to right-edge scale mark. Frequency indication should be lower than that recorded in step a by  $5\% \pm 0.3\%$  of full frequency range.

**PERFORMANCE TESTS**

**4-10. CW VERNIER TEST (Cont'd)**

- f. Set CW Vernier Multiplier to X.1. Set CW Vernier pointer to center-scale mark and record frequency indication for use later.
- g. Set CW Vernier pointer to left-edge scale mark. Frequency should be lower than that recorded in step d by  $0.5\% \pm 0.05\%$  of full frequency range.
- h. Set CW Vernier pointer to right-edge scale mark. Frequency should be higher than that recorded in step d by  $0.5\% \pm 0.05\%$  of full frequency range.

**4-11. ΔF SWEEP TEST**

**SPECIFICATION:**

**ΔF Sweep:** Sweeps upward in frequency, centered on CW setting. CW Vernier can be activated for fine control of center frequency.

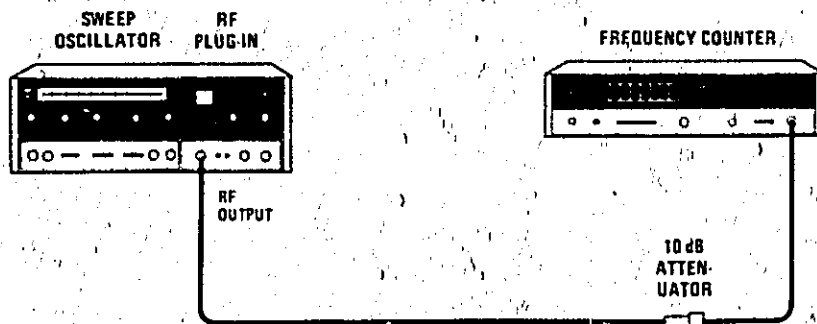
**Width:** Continuously adjustable and calibrated from zero to 1%, zero to 10%, or zero to 100% of usable frequency band as selected with front panel slide switch. Scale calibrated directly in MHz.

**Width Accuracy:**  $\pm 1\%$  of maximum ΔF plus  $\pm 2\%$  of ΔF being swept.

**Center Frequency Accuracy:** Refer to RF Unit specifications, same as frequency accuracy.

**DESCRIPTION:**

Accuracy of ΔF Sweep is checked, with maximum ΔF, in all multiplier positions by monitoring RF Output with frequency counter.



*Figure 4-2. ΔF Sweep Test Setup*

**EQUIPMENT:**

Sweep Oscillator .....	HP 8620C
Frequency Counter .....	HP 5340A
10 dB Attenuator .....	HP 8491B, Option 010

---

**PERFORMANCE TESTS**

---

**4-11.  $\Delta F$  SWEEP TEST (Cont'd)****PROCEDURE:**

- a. Connect equipment as shown in Figure 4-2.
- b. Set CW pointer to center-scale mark and adjust for center-scale frequency indication on frequency counter.

**NOTE**

Center-scale frequency can be determined by adding one-half of total bandwidth to the low-end frequency of the band.

**Example:**

86330B (1.8 — 4.2 GHz) RF Plug-in

Total bandwidth is range from 1.8 to 4.2 GHz or 2.4 GHz. Center-scale frequency, therefore, is 1.8 GHz + 1.2 GHz or 3.0 GHz for the 86330B.

- c. Press  $\Delta F$  pushbutton. Set  $\Delta F$  Multiplier to X10. Set  $\Delta F$  pointer to right-edge scale mark.
- d. Set sweep MODE to MANUAL, and MANUAL control fully clockwise.
- e. Frequency counter should read high-end frequency of band  $\pm 3\%$  of total bandwidth.

**NOTE**

The tolerance of  $\pm 3\%$  used is determined using specifications of Table 1-1 in this manual:  $\pm 1\%$  of maximum  $\Delta F \pm 2\%$  of  $\Delta F$  being swept. With  $\Delta F$  Multiplier in the X10 position and  $\Delta F$  pointer to right-edge scale mark, the total bandwidth is being swept. Therefore, the tolerance becomes  $\pm 3\%$  of the total bandwidth.

**Example:**

86330B (1.8 — 4.2 GHz) RF Plug-in

Total bandwidth is 2.4 GHz. Therefore, tolerance is  $\pm 3\%$  of 2.4 GHz, of  $\pm 72$  MHz. Frequency indication, then, would be 4.2 GHz  $\pm 72$  MHz for the 86330B.

- f. Set MANUAL control fully counterclockwise. Frequency counter should read low-frequency end of band  $\pm 3\%$  of total bandwidth.
- g. Set  $\Delta F$  Multiplier to X1. Adjust CW and CW Vernier controls for a convenient frequency counter indication. Record reading for use later.
- h. Set MANUAL control fully clockwise. Frequency counter indication should be higher than reading recorded in step g by  $10\% \pm 0.3\%$  of total bandwidth.

## PERFORMANCE TESTS

4-11.  $\Delta F$  SWEEP TEST (Cont'd)

## NOTE

The tolerance of  $\pm 0.3\%$  used is determined using specifications of Table 1-1 in this manual:  $\pm 1\%$  of maximum  $\Delta F \pm 2\%$  of  $\Delta F$  being swept. With  $\Delta F$  Multiplier in X1 position and  $\Delta F$  pointer to right-edge scale mark, maximum  $\Delta F$  and  $\Delta F$  being swept are both 10% (0.1) of total bandwidth. Therefore, the tolerance becomes  $\pm 3\%$  times the percent of band used (10%) or  $\pm 0.3\%$  of total bandwidth.

## Example:

86330B (1.8 — 4.2 GHz) RF Plug-in

Total bandwidth is 2.4 GHz. Therefore, 10% of total bandwidth is 0.24 GHz or 240 MHz. Tolerance is  $\pm 0.3\%$  of total bandwidth or  $\pm 7.2$  MHz. Frequency indication, then, would be 240 MHz  $\pm 7.2$  MHz higher than reading recorded in step g for the 86330B.

- i. Set MANUAL control fully counterclockwise. Set  $\Delta F$  Multiplier to X.1. Adjust CW and CW Vernier controls for a convenient frequency indication. Record reading for use later.
- j. Set MANUAL control fully clockwise. Frequency counter indication should be higher than reading recorded in step i by  $1.0\% \pm 0.03\%$  of total bandwidth.

## NOTE

The tolerance of  $\pm 0.03\%$  used is determined using specifications of Table 1-1 in this manual:  $\pm 1\%$  of maximum  $\Delta F \pm 2\%$  of  $\Delta F$  being swept. With  $\Delta F$  Multiplier in X.1 position and  $\Delta F$  pointer to right-edge scale mark, maximum  $\Delta F$  and  $\Delta F$  being swept are both 1.0% (0.01) of total bandwidth. Therefore, the tolerance becomes  $\pm 3\%$  times the percent of band used (1.0%) or  $\pm 0.03\%$  of total bandwidth.

## Example:

86330B (1.8 — 4.2 GHz) RF Plug-in

Total bandwidth is 2.4 GHz. Therefore, 1.0% of total bandwidth is 0.024 GHz or 24 MHz. Tolerance is  $\pm 0.03\%$  of total bandwidth or  $\pm 0.72$  MHz. Frequency indication would be 24 MHz  $\pm 0.72$  MHz higher than reading recorded in step i for the 86330B.

## 4-12. SWEEP TIME ADJUST AND STOP SWEEP TEST (HP Model 86290A ONLY)

## SPECIFICATION:

**Sweep Time Adjust:** Input to 8620C sweep circuits provided by wideband RF Plug-in to reduce the sweep time when sweeping full range.

**Stop Sweep Pulse:** Input to 8620C sweep circuits provided by wideband RF Plug-in to stop the sweep during the time RF Plug-in is changing bands to ensure full-range uninterrupted sweep.

## DESCRIPTION:

Sequential sweep ramp is displayed on oscilloscope and sweep time interval relationships are verified. Timing of stop sweep pulse is verified by time comparison of negative blanking output and sequential sweep ramp.

PERFORMANCE TESTS

4-12. SWEEP TIME ADJUST AND STOP SWEEP TEST (HP Model 86290A ONLY) (Cont'd)

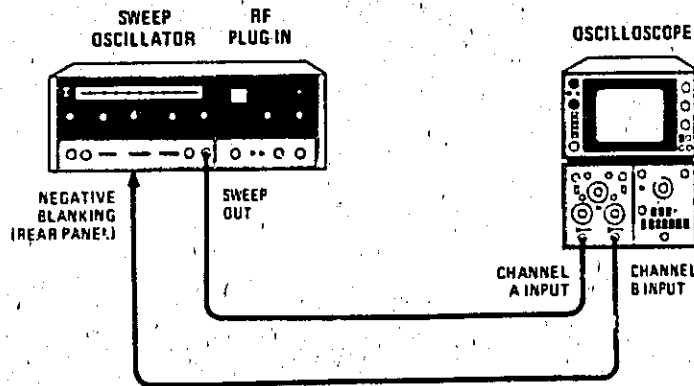


Figure 4-3. Sweep Time Adjust and Stop Sweep Test Setup

EQUIPMENT:

- Sweep Oscillator .....HP 8620C
- Oscilloscope; Variable Persistence .....HP 181A/1801A/1820C

PROCEDURE:

- a. Connect equipment as shown in Figure 4-3.
- b. Set DISPLAY BLANKING/OFF switch on 8620C rear panel to DISPLAY BLANKING.
- c. Set sweep TIME-SECONDS switch to .1-.01 and TIME vernier control fully clockwise. Select Band 4.
- d. Press FULL SWEEP pushbutton.
- e. Adjust oscilloscope Channel A and Channel B to display waveform as shown in Figure 4-4.
- f. Time (a) should be shorter than both times (c) and (e). Time (c) should be longer than both Times (a) and (e). Time (e) should be longer than Time (a) but shorter than Time (c).
- g. Time (d) should be longer than Time (b).
- h. Relationship of sequential sweep ramp (Channel A) and Negative Blanking waveform (Channel B) should be as shown in Figure 4-4.

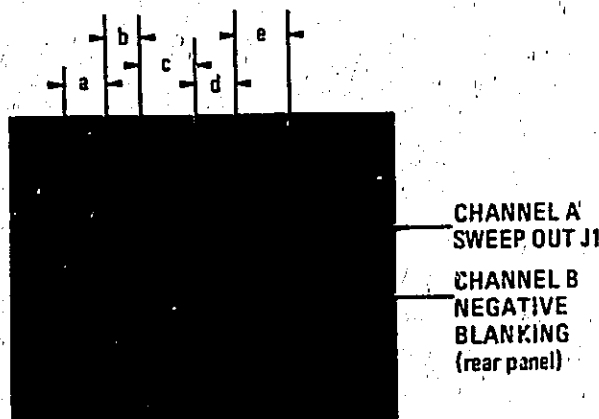


Figure 4-4. Sequential Sweep Ramp Compared in Time to Negative Blanking

## PERFORMANCE TESTS

## 4-13. AMPLITUDE MODULATION TEST

## SPECIFICATION:

Internal AM: Square-wave modulation on all sweep times (internally adjusted from 950 to 1050 Hz).

ON/OFF Ratio: Refer to RF Unit specifications.

## DESCRIPTION:

Internal 1 kHz modulation is selected and modulated RF output is monitored on frequency counter.

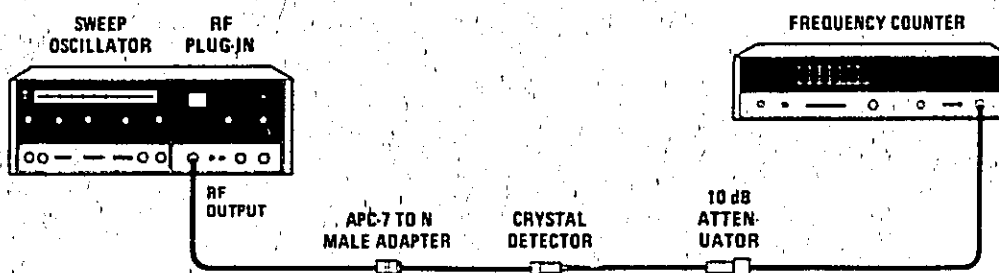


Figure 4-5. Amplitude Modulation Test Setup

## EQUIPMENT:

Sweep Oscillator .....	HP 8620C
APC-7 to N Male Adapter .....	HP 1250-0479
Crystal Detector .....	HP 423A or HP 8470A as required
10 dB Attenuator .....	HP 8491B, Option 010
Frequency Counter .....	HP 5340A

## PROCEDURE:

- Set POWER LEVEL control on RF Plug-in front panel fully counterclockwise.
- Connect equipment as shown in Figure 4-5.
- Set 1kHz SQ WV/OFF switch on 8620C rear panel to 1kHz SQ WV.
- Press CW pushbutton.
- Set frequency counter to read 1 kHz and rotate POWER LEVEL control clockwise until frequency counter indicates a frequency.

CAUTION

Care must be taken not to exceed the maximum power input limit of frequency counter.

PERFORMANCE TESTS

4-13. AMPLITUDE MODULATION TEST (Cont'd)

f. Frequency counter indication should be  $1.0 \text{ kHz} \pm 0.05 \text{ kHz}$ .

4-14. BLANKING OUTPUTS TEST

SPECIFICATION:

Blanking: With RF BLANKING/OFF switch set to RF BLANKING, RF is automatically turned off during retrace and turned on after completion of retrace. On automatic sweeps, RF is on long enough before sweep starts to stabilize external circuits and equipment whose response is compatible with the selected sweep rate,

Blanking Outputs: Rectangular pulse approximately +5V into 2500 ohms (coincident with RF blanking), available from rear-panel Z-AXIS/MKR/PEN, LIFT output jack. A negative rectangular pulse (approximately -5V into 2500 ohms) is available from rear-panel NEGATIVE BLANKING output jack.

DESCRIPTION:

Display Blanking and RF Blanking are checked by monitoring detected RF output on oscilloscope with either Display Blanking or RF Blanking. Negative Blanking and Positive Blanking are checked by time comparison of blanking waveform and sweep ramp.

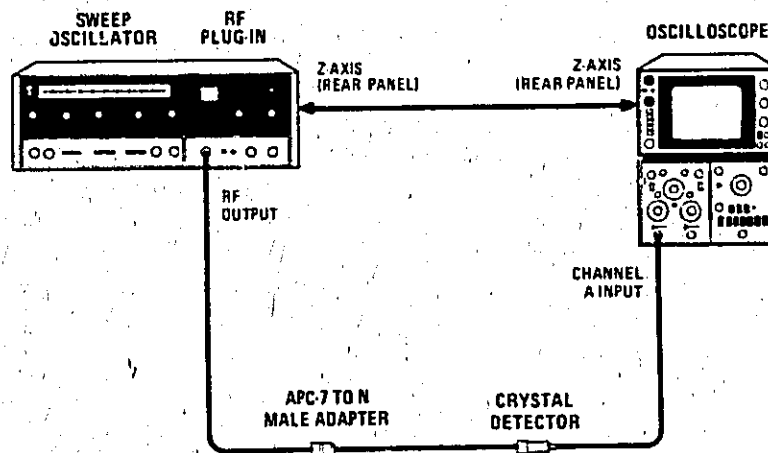


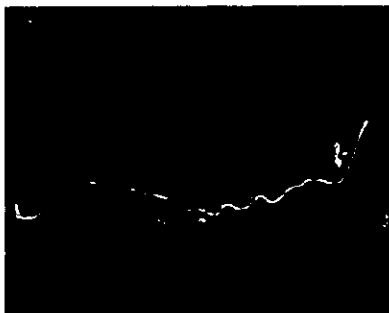
Figure 4-6. Display Blanking and RF Blanking Test Setup

EQUIPMENT:

Sweep Oscillator .....	HP 8620C
APC-7 to N Male Adapter .....	HP 1250-0479
Crystal Detector .....	HP 423A or HP 8470A as required
Oscilloscope; Variable Persistence .....	HP 181A/1801A/1820C

**PERFORMANCE TESTS****4-14. BLANKING OUTPUTS TEST (Cont'd)****PROCEDURE:***Display Blanking and RF Blanking*

- a. Set RF Plug-in POWER LEVEL control fully counterclockwise.
- b. Connect equipment as shown in Figure 4-6.
- c. Set TIME-SECONDS switch to .1 — 01 and TIME Vernier control fully clockwise.
- d. Press FULL SWEEP pushbutton.
- e. Set DISPLAY BLANKING/OFF switch on 8620C rear panel to OFF. Set RF BLANKING/OFF switch on 8620C rear panel to OFF.
- f. Adjust oscilloscope and RF Plug-in POWER LEVEL control for display similar to typical display shown in Figure 4-7.
- g. Set 8620C rear-panel RF BLANKING/OFF switch to RF BLANKING.
- h. Oscilloscope display should be similar to typical display shown in Figure 4-8.
- i. Set 8620C rear-panel DISPLAY BLANKING/OFF switch to DISPLAY BLANKING.
- j. Oscilloscope display should be similar to typical display shown in Figure 4-9.



*Figure 4-7. Typical Display  
with No Blanking*



*Figure 4-8. Typical Display  
with RF Blanking*



*Figure 4-9. Typical Display  
with Display Blanking*



## PERFORMANCE TESTS

## 4-14. BLANKING OUTPUTS TEST (Cont'd)

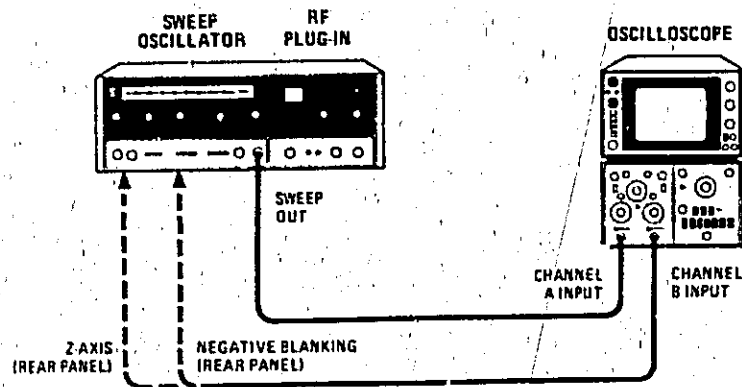


Figure 4-10. Negative and Positive Blanking Test Setup

## EQUIPMENT:

Sweep Oscillator ..... HP 8620C  
 Oscilloscope; Variable Persistence ..... HP 181A/1801A/1820C

*Negative and Positive Blanking*

- k. Connect equipment as shown in Figure 4-10. Verify oscilloscope Channel B connected to NEGATIVE BLANKING on 8620C rear panel.
- l. Set 8620C rear-panel NEGATIVE BLANKING/OFF switch to NEGATIVE BLANKING.
- m. Press FULL SWEEP pushbutton.
- n. Adjust oscilloscope to display waveforms as shown in Figure 4-11.
- o. Connect oscilloscope Channel B to 8620C rear-panel Z-AXIS/MKR/PEN LIFT connector.
- p. Set 8620C rear-panel DISPLAY BLANKING/OFF switch to DISPLAY BLANKING.
- q. Adjust oscilloscope to display waveforms as shown in Figure 4-12.

PERFORMANCE TESTS

4-14. BLANKING OUTPUTS TEST (Cont'd)

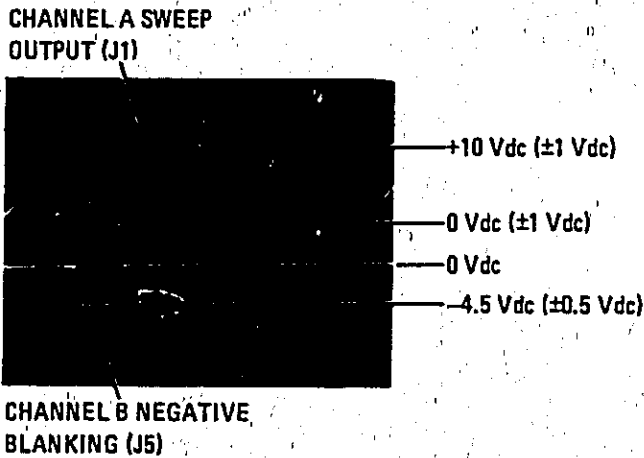


Figure 4-11. Negative Blanking at J5 Compared in Time to Sweep Output at J1.

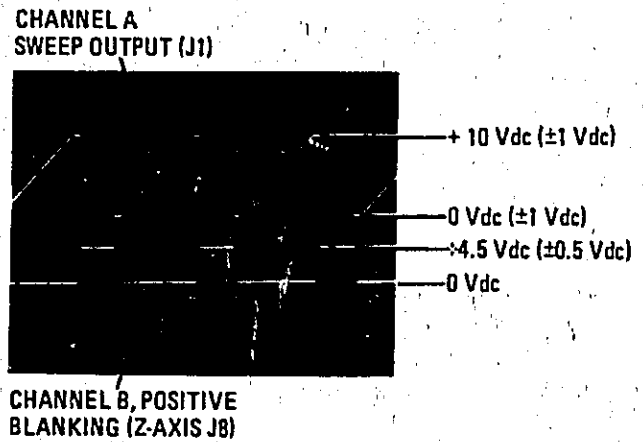


Figure 4-12. Positive Blanking at J8 Compared in Time to Sweep Outputs at J1

4-15. TRIGGERED SWEEP TEST

SPECIFICATION:

Triggered Sweep: Sweep is actuated by front panel slide switch, or by externally applied signal  $\geq +2$  volts peak,  $>0.5 \mu s$  pulse width, and  $<1.0$  MHz repetition rate. (Signal applied to rear-panel EXT TRIGGER input.)

DESCRIPTION:

START MARKER and STOP MARKER pointers are set to the two end points and band is swept with MANUAL control. The sweep is then triggered with SINGLE sweep TRIGGER switch on front panel. In EXT position of the TRIGGER switch, an external voltage is applied to the rear panel and a single sweep is triggered each time a voltage is applied.

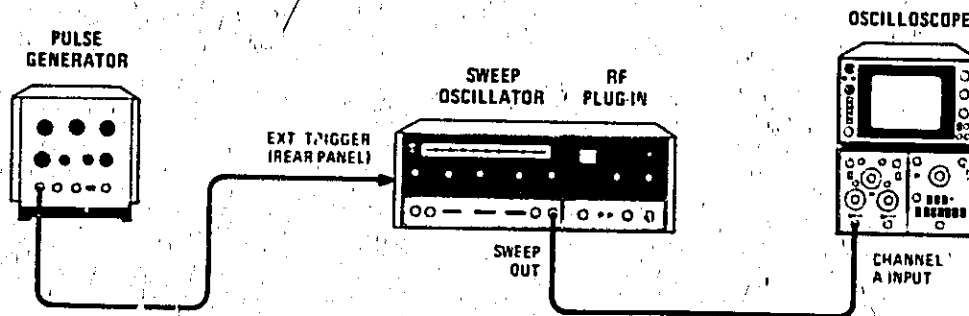


Figure 4-13. Triggered Sweep Test Setup

**PERFORMANCE TESTS**

**4-15. TRIGGERED SWEEP TEST (Cont'd)**

**EQUIPMENT:**

Pulse Generator.....	HP 8002A
Sweep Oscillator.....	HP 8620C
Oscilloscope; Variable Persistence.....	HP 181A/1801A/1820C

**PROCEDURE:**

- a. Connect equipment as shown in Figure 4-13.
- b. Press FULL SWEEP pushbutton.
- c. Set sweep MODE switch to AUTO, TIME-SECONDS switch to .1 - .01, and TIME Vernier fully clockwise.
- d. Set TRIGGER switch to SINGLE momentarily, then release. A single sweep should occur.
- e. Set TRIGGER switch to EXT. Adjust pulse generator for 2 volt positive pulse, pulse width of 0.5  $\mu$ s, and repetition rate of 1 MHz.
- f. Oscilloscope should display a continuous recurring trace.

**4-16. FREQUENCY MARKERS TEST**

**SPECIFICATION:**

Frequency Markers: Three constant-width frequency markers are fully calibrated and independently adjustable over the entire range in FULL SWEEP; the markers are controlled by the START MARKER, STOP MARKER, and CW MARKER controls. In  $\Delta F$  Sweep, Start and Stop Markers are available, in MARKER SWEEP, the CW Marker is available. Front panel switch provides for the selection of either amplitude or intensity markers (amplitude modulating the RF output or Z-axis modulating the CRT display).

**DESCRIPTION:**

Frequency markers are checked by displaying detected RF output on oscilloscope; first with amplitude markers, then intensity markers.

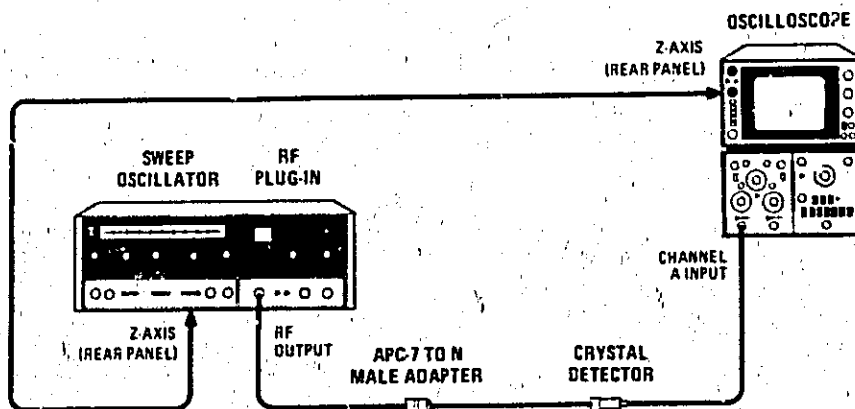


Figure 4-14. Frequency Markers Test Setup

## PERFORMANCE TESTS

## 4-16. FREQUENCY MARKERS TEST (Cont'd)

## EQUIPMENT:

Sweep Oscillator .....	HP 8620C
APC-7 to N Male Adapter .....	HP 1250-0479
Crystal Detector .....	HP 3470A
Oscilloscope; Variable Persistence .....	HP 181A/1801A/1820C

## PROCEDURE:

- a. Set RF Plug-in POWER LEVEL control fully counterclockwise.
- b. Connect equipment as shown in Figure 4-14.
- c. Set TIME-SECONDS switch to .1 — .01 and TIME Vernier fully clockwise.
- d. Set 8620C rear-panel DISPLAY BLANKING/OFF switch to DISPLAY BLANKING. Set 8620C rear-panel RF BLANKING/OFF switch to RF BLANKING.
- e. Set Start Marker (green pointer) to one-quarter scale, CW Marker (white pointer) to half-scale, and Stop Marker (red pointer) to three-quarter scale.
- f. Set 8620C front-panel MARKERS switch to AMPL.
- g. Press FULL SWEEP pushbutton.
- h. Adjust RF Plug-in POWER LEVEL control and oscilloscope controls for display similar to typical display shown in Figure 4-15.
- i. Set 8620C front-panel MARKERS switch to INTEN.
- j. Oscilloscope display should be similar to typical display shown in Figure 4-16.



Figure 4-15. Typical Display  
with Amplitude Markers



Figure 4-16. Typical Display  
with Intensity Markers

## PERFORMANCE TESTS

## 4-17. DIGITAL-TO-ANALOG CONVERTER TEST (OPTION 001)

## SPECIFICATION:

**Digital-to-Analog Converter:** In the Programmed Mode of operation, the D/A Converter uses digital intelligence inputs to develop analog tuning voltages for frequency tuning with resolution of 10,000 points across full band.

## DESCRIPTION:

Proper operation of the D/A Converter is verified by checking end-points (1 volt and +10 volt tuning voltages), then checking one-quarter scale, half-scale, and three-quarter scale frequency indications using digital inputs.

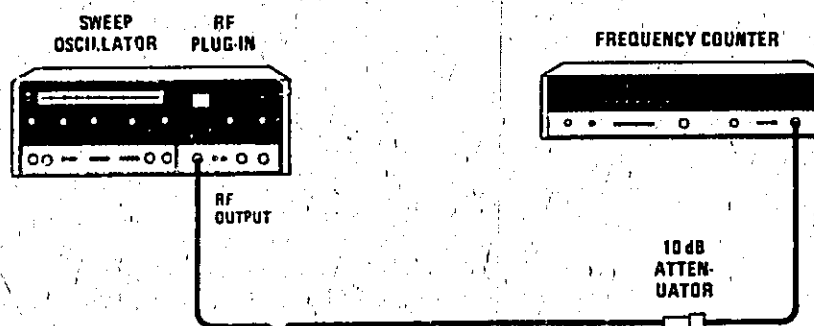


Figure 4-17. Digital-to-Analog Converter Test Setup

## EQUIPMENT:

Sweep Oscillator .....	HP 8620C
Frequency Counter .....	HP 5340A
10 dB Attenuator .....	HP 8491B, Option 010
50-pin Service Board .....	HP 08620-60125

## PROCEDURE:

- Set RF Plug-in POWER LEVEL control fully counterclockwise.
- Connect equipment as shown in Figure 4-17.
- Install 50-pin service board (HP Part No. 08620-60125) on 8620C rear-panel PROGRAMMING connector.
- Set remote D/A enable switch (R D/A) to GND. Set all BCD switches (8V, 4V, 2V, 1V, etc.) to GND.

## PERFORMANCE TESTS

## 4-17. DIGITAL-TO-ANALOG CONVERTER TEST (OPTION 001) (Cont'd)

- e. Press CW pushbutton.
- f. Adjust RF Plug-in POWER LEVEL control until frequency counter indicates a frequency.

<b>CAUTION</b>
----------------

Care must be taken not to exceed the maximum power input limit of frequency counter.

- g. Frequency counter should read low-end frequency of band being tested. Refer to RF Unit specifications for CW mode frequency accuracy.
- h. Set 8V and 2V BCD switches to OPEN.
- i. Frequency counter should read high-end frequency of band. Refer to RF Unit specifications for CW mode frequency accuracy.
- j. Set BCD switches to OPEN in order indicated in Table 4-1. For each step in the table, refer to RF Unit specifications for CW mode frequency accuracy.

Table 4-1. BCD Inputs and Corresponding Frequency Outputs

BCD Switches (OPEN)	Tuning Voltage	Frequency
1. 2V, .4V, .08V, .01V, .008V, .002V	2.5 Vdc	Determined by RF Plug-in sensitivity and frequency accuracy specifications.
2. 4V, 1V	5.0 Vdc	
3. 4V, 2V, 1V, .08V, .01V, .008V, .002V	7.5 Vdc	

# ADJUSTMENTS

## SECTION V ADJUSTMENTS

### 5-1. INTRODUCTION

5-2. This section provides adjustment procedures for the Model 8620C Sweep Oscillator mainframe. These procedures should not be performed as a routine maintenance procedure but should be used (1) after replacement of a part or component, (2) when the performance test shows that the specifications of Table 1-1 cannot be met, or (3) when instructed to do so in the troubleshooting chart in Section VIII. The test setup for the adjustment procedure is shown in Figure 5-3. Table 5-1 lists the adjustment controls and the function of each control.

### 5-3. EQUIPMENT REQUIRED

5-4. Table 1-4 lists the equipment required for the adjustment procedure. If the test equipment recommended is not available, other equipment may be used if its performance meets the "Critical Specifications" listed in the table.

### 5-5. SAFETY CONSIDERATIONS

5-6. Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition (see Sections II and III). Service and adjustments should be performed only by qualified service personnel.

#### WARNING

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.

5-7. Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when required, should be performed only by skilled persons who are aware of the hazard involved.

5-8. Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

5-9. 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 shortcircuiting of fuseholders must be avoided.

5-10. 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.

#### WARNING

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

### 5-11. RELATED ADJUSTMENTS

5-12. The +20-volt power supply regulator furnishes reference voltage to some of the other power supply regulators, therefore the +20-volt regulator must always be adjusted first. If the sequence in the procedure is followed, a minimum of interaction between controls is present.

### 5-13. ADJUSTMENT LOCATIONS

5-14. Figures 5-1 and 5-2 show the location of each test point and adjustment control for the Model 8620C Sweeper.



ADJUSTMENTS

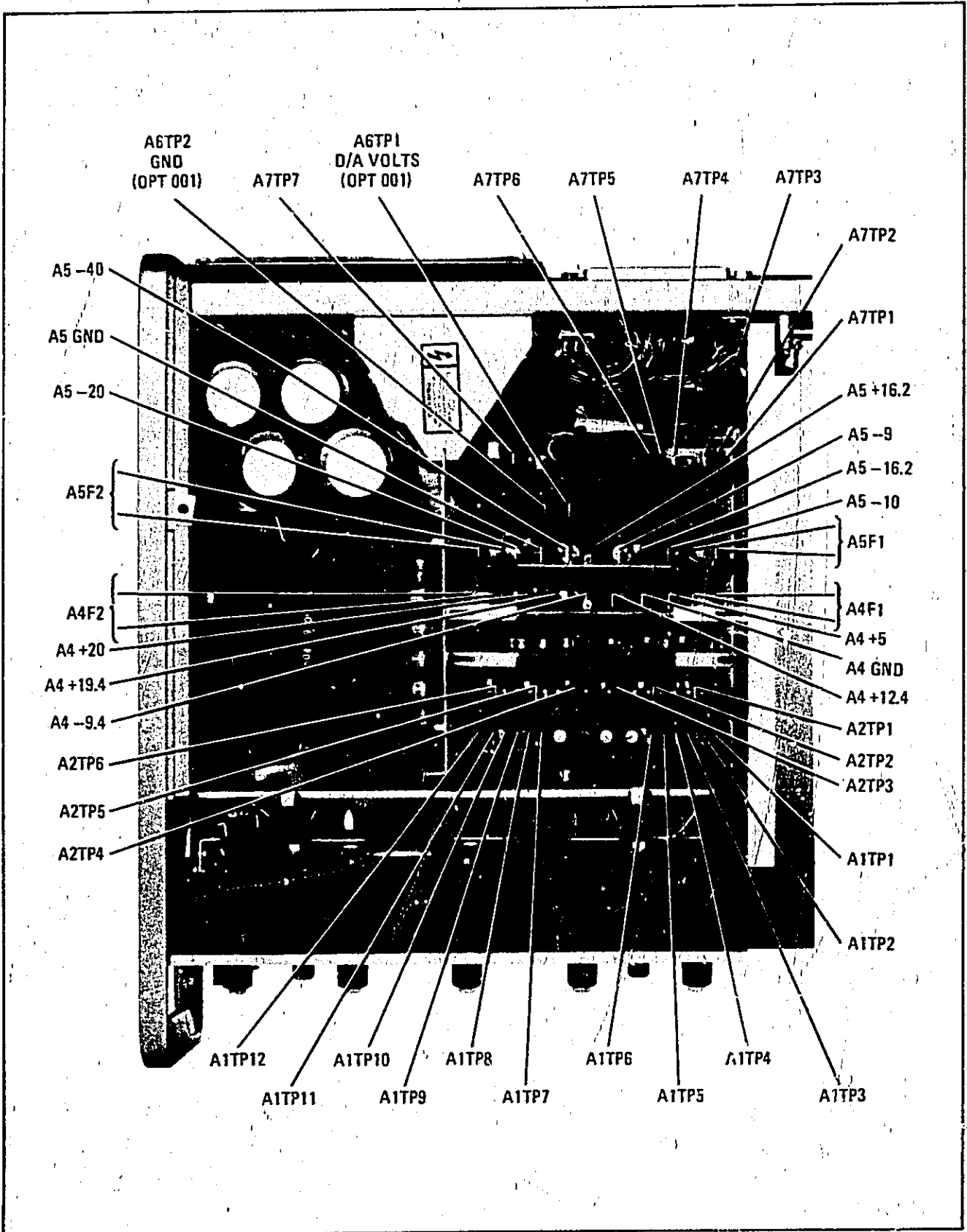


Figure 5-1. Location of Test Points

### ADJUSTMENTS

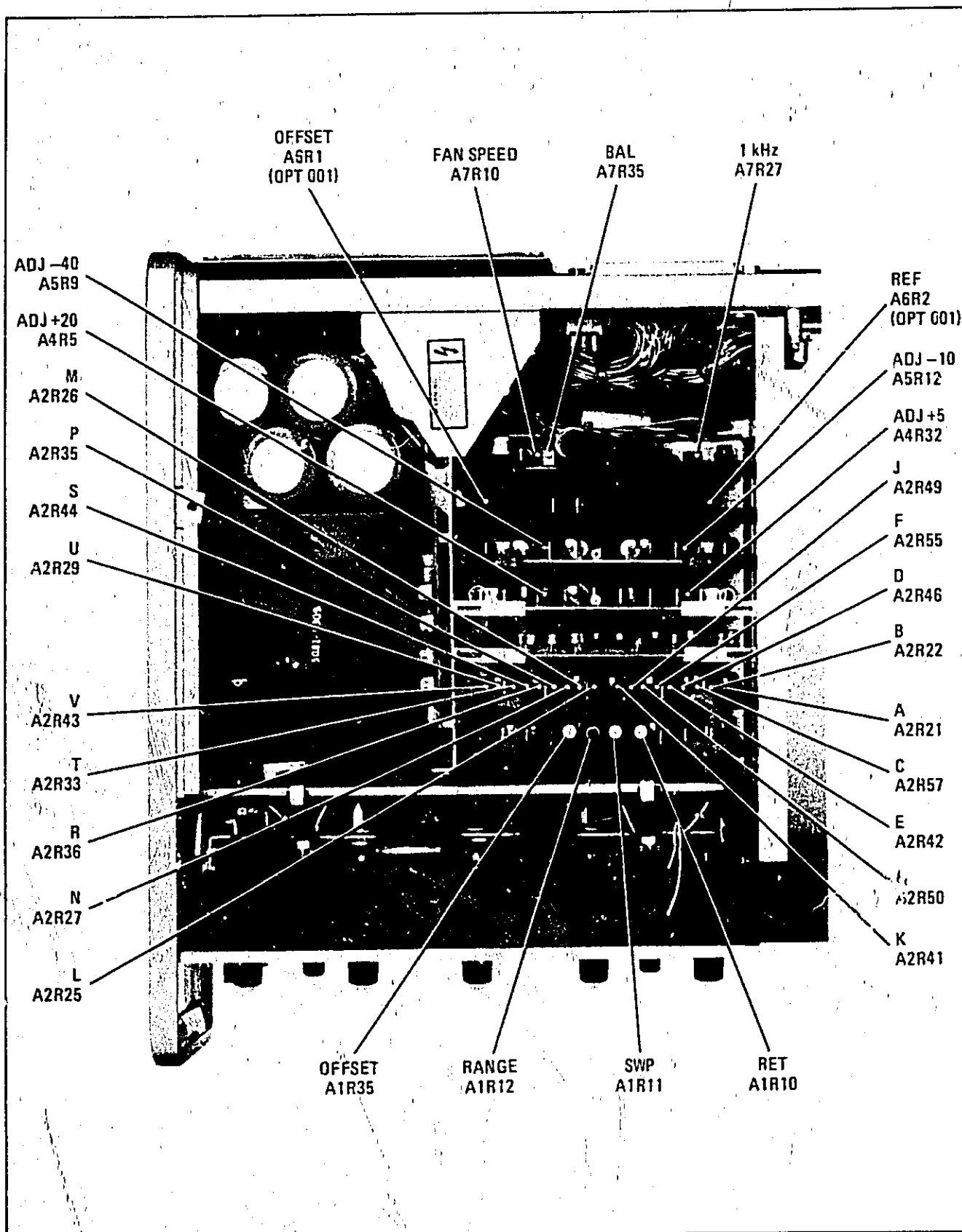


Figure 5-2. Location of Adjustments

Table 5-1. Controls Listed in Adjustment Sequence

Reference Designation	Adjustment Paragraph	Board Name	Common Name	Function Adjusted
A4R5	5-15	ADJ +20	+20V Adjust	Sets +20 Volt regulator
A5R9	5-15	ADJ -40	-40V Adjust	Sets -40 Volt regulator
A5R12	5-15	ADJ -10	-10V Adjust	Sets -10 Volt regulator
A4R32	5-15	ADJ +5	+5V Adjust	Sets +5 Volt regulator
A7R10	5-16	FAN SPEED	FAN SPEED	Sets fan speed to 3000 RPM (20 ms period)
A7R35	5-16	BAL	FAN BALANCE	Sets fan waveform symmetry
A7R27	5-17	1KHz	1 kHz Adjust	Sets internal modulation oscillator to 1 kHz (1 ms period)
A1R12	5-18	RANGE	SWEEP RANGE	Adjusts minimum sweep time at slowest sweep speed setting
A1R35	5-18	OFFSET	SWEEP SYM	Adjusts symmetry of sweep time to sweep return time
A1R11	5-18	SWP	SWEEP TIME	Adjusts sweep time
A1R10	5-18	RET	RETURN TIME	Adjusts sweep return time
A2R21	5-19	A	SWP 0V	Sets 0 Vdc for low end of sweep ramp
A2R22	5-19	B	SWP 10V	Sets +10 Vdc for high end of sweep ramp
A2R44	5-20	S	STOP MARK LO	Sets Stop Marker position at low frequency end of scale in FULL SWEEP
A2R35	5-20	P	STOP MARK HI	Sets Stop Marker position at high frequency end of scale in FULL SWEEP
A2R41	5-20	K	START MARK LO	Sets Start Marker position at low frequency end of scale in FULL SWEEP
A2R27	5-20	N	START MARK HI	Sets Start Marker position at high frequency end of scale in FULL SWEEP
A2R55	5-21	F	START FREQ LO	Sets Start Marker frequency at low end of scale in MARKER SWEEP
A2R26	5-21	M	START FREQ HI	Sets Start Marker frequency at high end of scale in MARKER SWEEP
A2R25	5-21	L	STOP FREQ LO	Sets Stop Marker frequency at low end of scale in MARKER SWEEP
A2R36	5-21	R	STOP FREQ HI	Sets Stop Marker frequency at high end of scale in MARKER SWEEP
A2R43	5-22	V	CW MARK LO	Sets CW Marker position at low frequency end of scale in FULL SWEEP
A2R33	5-22	T	CW MARK HI	Sets CW Marker position at high frequency end of scale in FULL SWEEP
A2R50	5-22	H	CW FREQ LO	Sets CW frequency at low end of scale
A2R29	5-22	U	CW FREQ HI	Sets CW frequency at high end of scale
A2R57	5-23	C	CWV CAL	Calibrates CW VERNIER control
A2R46	5-24	D	$\Delta F$ OFFSET	Adjusts $\Delta F$ offset amplifier symmetry
A2R49	5-24	J	$\Delta F$ SYM	Adjusts $\Delta F$ symmetry
A2R42	5-24	E	$\Delta F$ AMPLITUDE	Adjusts $\Delta F$ amplitude
<b>Option 001 Only</b>				
A6R1	5-25	OFFSET	DAC 0V	Adjusts for 0 Vdc at low frequency end
A6R2	5-25	REF	DAC 10V	Adjusts for +10 Vdc at high frequency end

## ADJUSTMENTS

## NOTE

Before performing any adjustments, allow 30 minutes warmup time for the instrument.

## NOTE

When a test point has a common connection with RF Section interface connector J6, the pin on J6 will be noted at the end of a sentence in parenthesis. This allows the use of the service board at J6 for faster connection to the desired test point.

## NOTE

Ground DVM to ground pin on board being probed or to 36-pin service board pin 10 (J6-10).

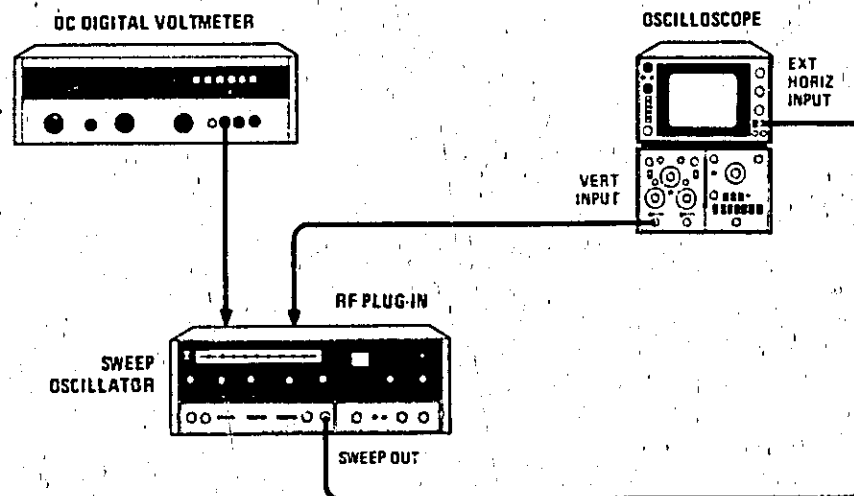


Figure 5-3. Adjustment Test Setup

### 5-15. POWER SUPPLY ADJUSTMENTS

#### REFERENCE:

Service Sheet 4, +20V and +5V REGULATOR ASSEMBLY; and Service Sheet 5, -10V and -40V REGULATOR ASSEMBLY.

#### DESCRIPTION:

The A4 and A5 Regulator Assemblies are adjusted to provide the proper dc voltages for the 8620C Sweep Oscillator and RF units connected in the mainframe. (See Figure 5-3 for test setup.)

## ADJUSTMENTS

**5-15. POWER SUPPLY ADJUSTMENTS (Cont'd)**

## EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A

## PROCEDURE:

*+20 Volt Supply*

- a. Connect digital voltmeter to +20 test point on A4 Assembly (J6-34), and connect ground lead to GND.
- b. Adjust +20 ADJ A4R5 for +20.000 Vdc  $\pm$  0.006 Vdc.

*-40 Volt Supply*

- c. Connect digital voltmeter to -40 test point on A5 Assembly (J6-29), and connect ground lead to GND.
- d. Adjust -40 ADJ A5R9 for -40.000 Vdc  $\pm$  0.020 Vdc.

*-10 Volt Supply*

- e. Connect digital voltmeter to -10 test point on A5 Assembly (J6-31), verify ground lead connected to GND.
- f. Adjust -10 ADJ A5R12 for -10.000 Vdc  $\pm$  0.004 Vdc.

*+5 Volt Supply*

- g. Connect digital voltmeter to +5 test point on A4 Assembly (J6-33), and connect ground lead to GND.
- h. Adjust +5 ADJ A4R32 for +5.000 Vdc  $\pm$  0.005 Vdc.

**5-16. FAN ADJUSTMENTS**

## REFERENCE:

Service Sheet 7, OPERATIONS CONTROL ASSEMBLY.

## DESCRIPTION:

Fan Speed and ON/OFF ratio are adjusted for maximum efficiency. (See Figure 5-3 for test setup.)

## EQUIPMENT

Oscilloscope (with 10:1 probes) ..... HP 181A/1801A/1820C

## PROCEDURE:

- a. Connect oscilloscope Channel A to test point 6 (Q5 collector) on A7 Assembly and oscilloscope Channel B to Q7 collector. Connect oscilloscope ground lead to test point 7.

## ADJUSTMENTS

## 5-16. FAN ADJUSTMENTS (Cont'd)

- b. Adjust FAN SPEED A7R10 for a 20 ms period on oscilloscope. This corresponds to 3000 RPM.
- c. Adjust BAL A7R35 to balance ON time of Channel A waveform to ON time of Channel B and OFF time of Channel A to OFF time of Channel B.

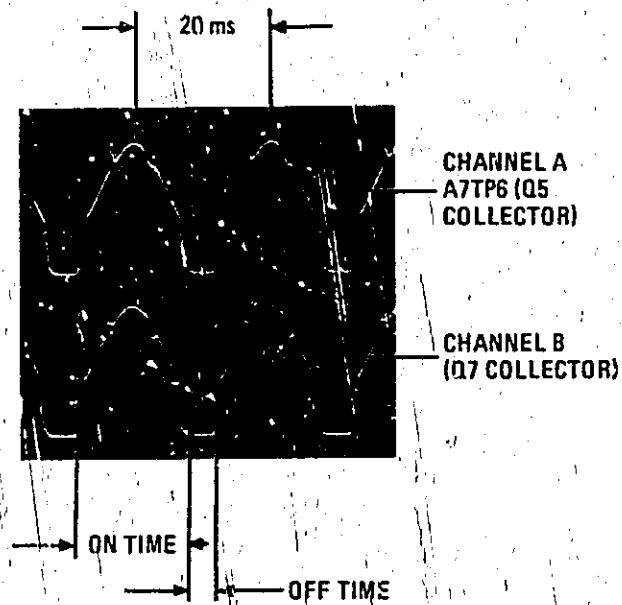


Figure 5-4. Oscilloscope Display of Fan Waveforms

## 5-17. 1 KHz MODULATION ADJUSTMENT

## REFERENCE:

Service Sheet 7, OPERATIONS CONTROL ASSEMBLY

## DESCRIPTION:

1 kHz Oscillator is adjusted for proper operating frequency. (See Figure 5-3 for test setup.)

## ADJUSTMENTS

## 5-17. 1 KHz MODULATION ADJUSTMENT (Cont'd)

## EQUIPMENT:

Oscilloscope (with 10:1 probe).....HP 181A/1801A/1820C

## PROCEDURE:

- a. Set rear panel 1kHz SQ WV/OFF slide switch to 1kHz SQ WV.
- b. Connect oscilloscope to test point 5 on A7 (J6-6), and connect oscilloscope ground lead to test point 7 (ground) on A7.
- c. Adjust 1 KHz A7R27 for 1 ms  $\pm$  0.05 ms period on oscilloscope. This corresponds to 1 kHz.

## 5-18. SWEEP GENERATOR BOARD ADJUSTMENTS

## REFERENCE:

Service Sheet 1, SWEEP GENERATOR ASSEMBLY.

## DESCRIPTION:

Set correct sweep time, sweep return time, symmetry, and range of RF Blanking signal. (See Figure 5-3 for test setup.)

## EQUIPMENT:

Oscilloscope .....HP 181A/1801A/1820C  
 10:1 Probe .....HP 10004B  
 1:1 Probe .....HP 10008B

## PROCEDURE:

- a. Connect oscilloscope VERTICAL input to A1TP9 (10:1 Probe), and ground lead to A1TP12.
- b. Connect oscilloscope EXT TRIGGER input to A1TP9 (1:1 Probe), and set oscilloscope trigger controls to EXT, NORM, and (–) SLOPE.
- c. Press FULL SWEEP pushbutton: pushbutton should light.
- d. Set 8620C Sweep MODE switch to AUTO.
- e. Set 8620C sweep TRIGGER switch to INT.

ADJUSTMENTS

5-18. SWEEP GENERATOR BOARD ADJUSTMENTS (Cont'd)

- f. Set 8620C sweep TIME-SECONDS switch to .1 — .01 and turn TIME vernier control fully clockwise.
- g. Adjust scope for display as shown in Figure 5-5.
- h. Set A1R12 RANGE and A1R35 OFFSET controls to center of range.
- i. Adjust A1R11 SWP control for  $t_1 = 10.8 \text{ msec} \pm 0.5 \text{ msec}$ . Adjust A1R10 RET control for  $t_2 = 5.4 \text{ msec} \pm 0.5 \text{ msec}$ .
- j. Set 8620C TIME vernier control fully counterclockwise. Connect a 19.6K 1% resistor between A1TP4 and A1TP12.
- k. Adjust oscilloscope sweep time so that  $t_2$  occupies 1.0 division of the display. Adjust A2R35 OFFSET control so that  $t_1$  occupies 6.5 divisions of the display. Symmetry is now set to 6.5:1.
- l. Remove 19.6K resistor. With oscilloscope sweep time in a calibrated mode, adjust A1R12 RANGE control for  $t_1 = 282 \text{ msec} \pm 5.0 \text{ msec}$ .
- m. Connect 19.6K resistor between A1TP4 and A1TP12. Verify symmetry between 6.5:0.7 and 6.5:1.3.
- n. Set 8620C TIME vernier control fully clockwise.  $t_1$  should be between 32.5ms and 37.5ms (19.6K resistor still connected); if not, select a new value between 51.1K and 110K for A1R3.

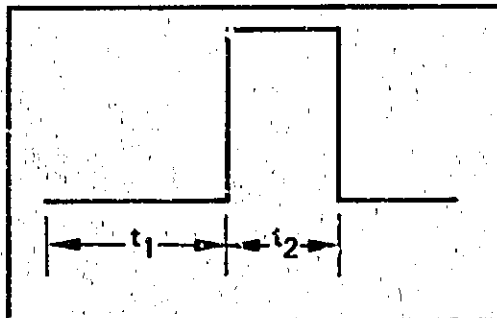


Figure 5-5. Oscilloscope Display of Waveform Symmetry

5-19. FULL SWEEP ADJUSTMENT

REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY.

DESCRIPTION:

Sets zero to +10 Volt sweep ramp.

EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A



## ADJUSTMENTS

**5-19. FULL SWEEP ADJUSTMENT (Cont'd)**

## PROCEDURE:

- a. Connect equipment as shown in Figure 5-3.
- b. Select calibration scale with band select switch.
- c. Press FULL SWEEP pushbutton. Set sweep MODE to MANUAL and MANUAL control fully counter-clockwise.
- d. Connect DVM input to A2TP3 and ground lead to GND on A4 board.
- e. Set adjustment A (SWP 0V) (A2R21) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- f. Turn MANUAL control fully clockwise. Set adjustment B (SWP 10V) (A2R22) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .

**5-20. START MARKER/STOP MARKER ADJUSTMENT**

## REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY.

## DESCRIPTION:

Sets correct voltages to calibrate STOP MARKER and START MARKER controls.

## EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A

## PROCEDURE:

- a. Set Stop Marker (red pointer) to 1 Volt mark on calibration scale. Connect DVM to A2TP2.
- b. Refer to paragraph 5-26 for mechanical zero of STOP MARKER control.
- c. Verify DVM connected to A2TP2. Set adjustment S (STOP MARK LO) (A2R44) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- d. Set Stop Marker to 10 Volt mark on calibration scale. Set adjustment P (STOP MARK HI) (A2R35) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .
- e. Connect DVM input to A2TP1. Set Start Marker to 0 Volt mark on calibration scale.
- f. Refer to paragraph 5-26 for mechanical zero of START MARKER control.
- g. Set adjustment K (START MARK LO) (A2R41) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- h. Set Start Marker to 10 Volt mark on calibration scale. Set adjustment N (START MARK HI) (A2R27) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .

## ADJUSTMENTS

**5-21. MARKER SWEEP ADJUSTMENT**

## REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY

## DESCRIPTION:

Sets correct voltages to calibrate MARKER SWEEP OPERATION.

## EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A

## PROCEDURE:

- a. Press MARKER SWEEP pushbutton. Set MANUAL control fully counterclockwise. Set STOP MARKER to 5 Volt mark on calibration scale.
- b. Connect DVM input to A2TP5. Set Start Marker to 0 volt mark on calibration scale. Set adjustment F (START FREQ LO) (A2R55) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- c. Set Start Marker to 10 Volt mark on calibration scale. Set adjustment M (START FREQ HI) (A2R26) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .
- d. Set Stop Marker to 0 Volt mark on calibration scale. Turn MANUAL control fully clockwise. Set adjustment L (STOP FREQ LO) (A2R25) for DVM indication of  $0.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .
- e. Set Stop Marker to 10 Volt mark on calibration scale. Set adjustment R (STOP FREQ HI) (A2R36) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .

**5-22. CW/CW MARKER ADJUSTMENT**

## REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY

## DESCRIPTION:

Sets correct voltages for calibration of CW frequency and CW MARKER control.

## EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A

## PROCEDURE:

- a. Press FULL SWEEP pushbutton. Connect DVM input to A2TP4.
- b. Set CW Marker (white pointer) to 0 Volt mark on calibration scale.
- c. Refer to paragraph 5-26 for mechanical zero of CW MARKER control.
- d. Set adjustment V (CW MARK LO) (A2R43) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .

## ADJUSTMENTS

**5-22. CW/CW MARKER ADJUSTMENT (Cont'd)**

- e. Set CW Marker to 10 Volt mark on calibration scale. Set adjustment T (CW MARK HI) (A2R33) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .
- f. Press CW pushbutton. Connect DVM input to A2TP5. Set CW Marker to 0 Volt mark on calibration scale. Set adjustment H (CW FREQ LO) (A2R50) for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- g. Set CW Marker to 10 volt mark on calibration scale. Set adjustment U (CW FREQ HI) (A2R29) for DVM indication of  $+10.000 \text{ Vdc} \pm 0.005 \text{ Vdc}$ .

**5-23. CW VERNIER ADJUSTMENT**

## REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY

## DESCRIPTION:

Sets correct voltages for calibration of CW VERNIER control.

## EQUIPMENT:

DC Digital Voltmeter (DVM) ..... HP 3462A

## PROCEDURE:

- a. Verify DVM connected to A2TP5. Set CW Marker to 0 Volt mark on calibration scale and adjust CW MARKER control for DVM indication of  $0.000 \text{ Vdc} \pm 0.001 \text{ Vdc}$ .
- b. Press CW VERNIER pushbutton. Set CW Vernier pointer to +5 Volt mark on calibration scale. Set CW VERNIER Multiplier to X1.
- c. Refer to paragraph 5-26 for mechanical zero of CW VERNIER control.
- d. Set CW Vernier pointer to +5 Volt mark on calibration scale. Verify DVM connected to A2TP5. DVM indication should be  $+0.500 \text{ Vdc} \pm 0.007 \text{ Vdc}$ . Record this reading.
- e. Set CW Vernier pointer to -5 Volt mark on calibration scale. Set adjustment C (CWV CAL) (A2R57) for DVM indication of same magnitude  $\pm 0.002 \text{ Vdc}$  as recorded in step (d) but of opposite polarity.
- f. Set CW Vernier pointer to 0 Volt mark on calibration scale. DVM indication should be  $0.000 \text{ Vdc} \pm 0.010 \text{ Vdc}$ .
- g. If test limit is not met in step (f), reset adjustment C. Recheck DVM indication at +5 Volt mark and -5 Volt mark for test limit.

**5-24. ΔF ADJUSTMENT**

## REFERENCE:

Service Sheet 2, FREQUENCY CONTROL ASSEMBLY

## ADJUSTMENTS

**5-24.  $\Delta F$  ADJUSTMENT (Cont'd)****DESCRIPTION:**

Sets correct voltages for calibration of  $\Delta F$  operation.

**EQUIPMENT:**

DC Digital Voltmeter (DVM) ..... HP 3462A

**PROCEDURE:**

- a. Connect DVM to A2TP5. Adjust CW and CW Vernier controls for DVM indication of +5.000 Vdc  $\pm$  0.001 Vdc.
- b. Press  $\Delta F$  pushbutton. Set  $\Delta F$  Multiplier to X10. Set  $\Delta F$  pointer to 0 Volt mark on calibration scale. Connect DVM to A2TP6.
- c. Refer to paragraph 5-26 for mechanical zero of  $\Delta F$  control.
- d. Connect DVM to A2TP3. Adjust MANUAL control for DVM indication of +5.000 Vdc  $\pm$  0.005 Vdc.
- e. Connect DVM input to A2TP6. Set adjustment D ( $\Delta F$  OFFSET) (A2R46) for DVM indication of 0.000 Vdc  $\pm$  0.001 Vdc.
- f. Connect DVM to A2TP5. Set  $\Delta F$  pointer to +5 Volt mark on calibration scale. While continually rotating MANUAL control between full clockwise and full counterclockwise positions, set adjustment J ( $\Delta F$  SYM) (A2R49) for symmetry.
- g. Rotate MANUAL control continually between full clockwise position and full counterclockwise position and set adjustment E ( $\Delta F$  AMPLITUDE) (A2R42) for 0.000 Vdc  $\pm$  0.001 Vdc at clockwise position and +10.000 Vdc  $\pm$  0.001 Vdc at counterclockwise position.

**5-25. DIGITAL-TO-ANALOG CONVERTER ADJUSTMENT (Option 001 Only)****REFERENCE:**

Service Sheet 6, DIGITAL-TO-ANALOG CONVERTER ASSEMBLY.

**DESCRIPTION:**

Sets calibration adjustment for A6 Assembly (refer to Figure 5-3 for test setup).

**EQUIPMENT:**

DC Digital Voltmeter (DVM) ..... HP 3462A

**PROCEDURE:**

- a. Connect DVM to 36-pin service board (HP Part No. 08620-60037) pin 1 (tuning voltage output) (J6-1) and connect ground lead to ground pin on service board (J6-10).
- b. Install 50-pin service board (HP Part No. 08620-60125) on rear-panel PROGRAMMING connector J2.

## ADJUSTMENTS

---

### 5-25. DIGITAL-TO-ANALOG CONVERTER ADJUSTMENT (Option 001 Only)

- c. Set remote D/A enable switch (R D/A) to GND. Set all BCD input switches (8V, 4V, 2V, 1V, etc.) to GND.
- d. Adjust OFFSET A6R1 for 0.0000 Vdc  $\pm$  0.0005 Vdc indication on DVM.
- e. Set 8V and 2V BCD switches to OPEN.
- f. Adjust REF A6R2 for +10.0000 Vdc  $\pm$  0.0005 Vdc indication on DVM.

### 5-26. MECHANICAL ZERO ADJUSTMENT

#### REFERENCE:

Figure 5-6. Mechanical Zero Adjustment Locations

#### DESCRIPTION:

Sets mechanical zero of START MARKER,  $\Delta F$ , CW MARKER, CW VERNIER, and STOP MARKER controls. One adjustment procedure is shown for all controls and the indications are the same for each control except for CW VERNIER. The CW VERNIER readings are shown in parentheses.

#### NOTE

This adjustment should be performed in conjunction with frequency or marker control adjustments. (Refer to paragraphs 5-19 through 5-24.)

#### PROCEDURE:

- a. Locate minimum resistance point of control by rotating control about 0 Volt scale mark (+5 Volt scale mark for CW VERNIER) while monitoring voltage reading on DVM. Minimum resistance point is indicated by minimum voltage reading on DVM. (CW VERNIER control is adjusted for a DVM reading of +0.500 Vdc  $\pm$  0.005 Vdc).
- b. Loosen set screws in shaft collar as shown in Figure 5-6 using a right-angle 4-spline (Bristol) wrench, (HP Part No. 8710-0055).
- c. Align pointer to 0 Volt scale mark (+5 Volt scale mark for CW VERNIER) by first setting pointer to left-edge stop then adjusting up-scale to 0 Volt scale mark (+5 Volt scale mark for CW VERNIER).
- d. Tighten set screws in shaft collar.
- e. Locate minimum resistance point of control and check alignment of pointer (adjust for +0.500 Vdc  $\pm$  0.005 Vdc for CW VERNIER). If pointer is not aligned to scale mark, loosen set screws in collar and realign pointer.
- f. Repeat this process until pointer is aligned to scale mark. Alignment is complete when DVM indicates minimum voltage (+0.500 Vdc  $\pm$  0.005 Vdc for CW VERNIER).

ADJUSTMENTS

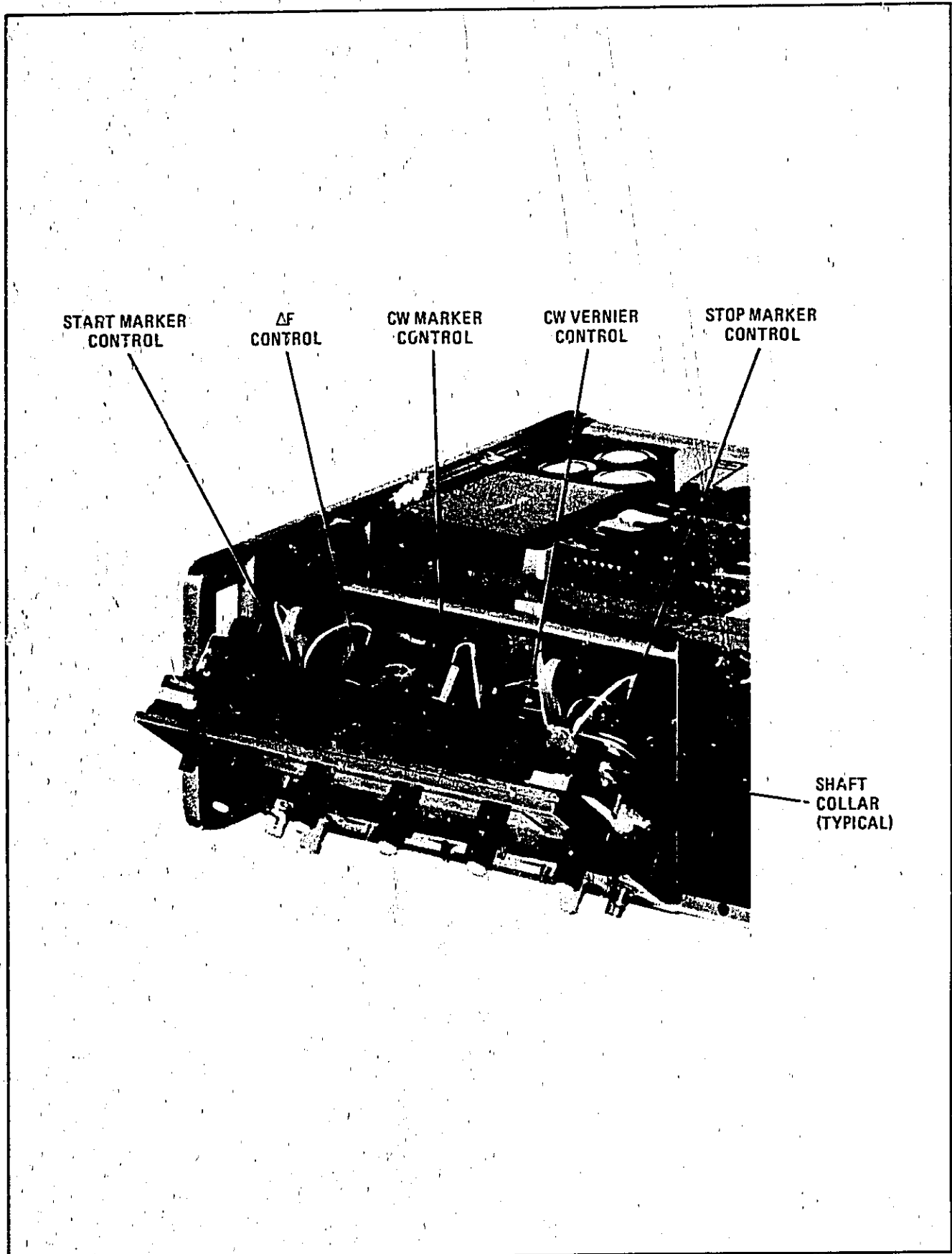


Figure 5-6. Mechanical Zero Adjustment Locations

# **PARTS LIST**

## SECTION VI REPLACEABLE PARTS

### 6-1. INTRODUCTION

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

### 6-3. ABBREVIATIONS

6-4. Table 6-1 lists abbreviations used in the parts list, schematics and throughout the manual. In some cases, two forms of the abbreviation are given; one uses all capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts list are always in capitals. However, in the schematics and other parts of the manual, other abbreviation forms are used with both lower case and upper case letters.

### 6-5. REPLACEABLE PARTS LIST

6-6. Table 6-2 is the list of replaceable parts and is organized as follows:

- a. Electrical assemblies and their components in alpha-numerical order by reference designation.
- b. Chassis-mounted parts in alpha-numeric order by reference designation.
- c. Miscellaneous parts.
- d. Illustrated parts breakdown, if appropriate.

6-7. The information given for each part consists of the following:

- a. The Hewlett-Packard part number.
- b. The total quantity (Qty) in the instrument.
- c. The description of the part.
- d. The typical manufacturer of the part in a five-digit code.
- e. Manufacturer code number for the part.

#### NOTE

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

### 6-8. ORDERING INSTRUCTIONS

6-9. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate quantity required, and address the order to the nearest Hewlett-Packard office.

6-10. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.



Table 6-1. Reference Designations and Abbreviations (1 of 2)

REFERENCE DESIGNATIONS

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

ABBREVIATIONS

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

NOTE

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

Table 6-1. Reference Designations and Abbreviations (2 of 2)

NOD . . . . . modulator	OD . . . . . outside diameter	PWV . . . . . peak working voltage	TD . . . . . time delay
MOM . . . . . momentary	OH . . . . . oval head	RC . . . . . resistance-capacitance	TERM . . . . . terminal
MOS . . . . . metal-oxide semiconductor	OP AMPL . . . . . operational amplifier	RECT . . . . . rectifier	TFT . . . . . thin-film transistor
ms . . . . . millisecond	OPT . . . . . option	REF . . . . . reference	TGL . . . . . toggle
MTG . . . . . mounting	OSC . . . . . oscillator	REG . . . . . regulated	THD . . . . . thread
MTR . . . . . meter (indicating device)	OX . . . . . oxide	REPL . . . . . replaceable	THRU . . . . . through
mV . . . . . millivolt	oz . . . . . ounce	RF . . . . . radio frequency	TI . . . . . titanium
mVac . . . . . millivolt, ac	Ω . . . . . ohm	RFI . . . . . radio frequency interference	TOL . . . . . tolerance
mVdc . . . . . millivolt, dc	P . . . . . peak (used in parts list)	RH . . . . . round head; right hand	TRIM . . . . . trimmer
mVpk . . . . . millivolt, peak	PAM . . . . . pulse-amplitude modulation	RLC . . . . . resistance-inductance-capacitance	TSTR . . . . . transistor
mVp-p . . . . . millivolt, peak-to-peak	PC . . . . . printed circuit	RMO . . . . . rack mount only	TTL . . . . . transistor-transistor logic
mVrms . . . . . millivolt, rms	PCM . . . . . pulse-code modulation; pulse-count modulation	RND . . . . . round	TV . . . . . television
mW . . . . . milliwatt	PDM . . . . . pulse-duration modulation	ROM . . . . . read-only memory	TVI . . . . . television interference
MUX . . . . . multiplex	pF . . . . . picofarad	R&P . . . . . rack and panel	TWT . . . . . traveling wave tube
MY . . . . . mylar	PH BRZ . . . . . phosphor bronze	RWV . . . . . reverse working voltage	U . . . . . micro (10 <sup>-6</sup> ) (used in parts list)
μA . . . . . microampere	PHL . . . . . Phillips	S . . . . . scattering parameter	UF . . . . . microfarad (used in parts list)
μF . . . . . microfarad	PIN . . . . . positive-intrinsic-negative	s . . . . . second (time)	UHF . . . . . ultrahigh frequency
μH . . . . . microhenry	PIV . . . . . peak inverse voltage	S-B . . . . . slow-blow (fuse) (used in parts list)	UNREG . . . . . unregulated
μmho . . . . . micromho	pk . . . . . peak	SCR . . . . . silicon controlled rectifier; screw	V . . . . . volt
μs . . . . . microsecond	PL . . . . . phase lock	SE . . . . . selenium	VA . . . . . voltampere
μV . . . . . microvolt	PLO . . . . . phase lock oscillator	SECT . . . . . sections	Vac . . . . . volts, ac
μVac . . . . . microvolt, ac	PM . . . . . phase modulation	SEMICON . . . . . semiconductor	VAR . . . . . variable
μVdc . . . . . microvolt, dc	PNP . . . . . positive-negative-positive	SHF . . . . . superhigh frequency	VCO . . . . . voltage-controlled oscillator
μVpk . . . . . microvolt, peak	P/O . . . . . part of	SI . . . . . silicon	Vdc . . . . . volts, dc
μVp-p . . . . . microvolt, peak-to-peak	POLY . . . . . polystyrene	SIL . . . . . silver	VDCW . . . . . volts, dc, working (used in parts list)
μVrms . . . . . microvolt, rms	PORC . . . . . porcelain	SL . . . . . slide	V(F) . . . . . volts, filtered
μW . . . . . microwatt	POS . . . . . positive; position(s) (used in parts list)	SNR . . . . . signal-to-noise ratio	VFO . . . . . variable-frequency oscillator
nA . . . . . nanampere	POSN . . . . . position	SPDT . . . . . single-pole, double-throw	VHF . . . . . very-high frequency
NC . . . . . no connection	POT . . . . . potentiometer	SPG . . . . . spring	Vpk . . . . . volts, peak
N/C . . . . . normally closed	p-p . . . . . peak-to-peak (used in parts list)	SR . . . . . split ring	Vp-p . . . . . volts, peak-to-peak
NE . . . . . neon	PPM . . . . . pulse-position modulation	SPST . . . . . single-pole, single-throw	Vrms . . . . . volts, rms
NEG . . . . . negative	PREAMPL . . . . . preamplifier	SSB . . . . . single sideband	VSWR . . . . . voltage standing wave ratio
nF . . . . . nanofarad	PRF . . . . . pulse-repetition frequency	SST . . . . . stainless steel	VTO . . . . . voltage-tuned oscillator
NI PL . . . . . nickel plate	PRR . . . . . pulse repetition rate	STI . . . . . steel	VTVM . . . . . vacuum-tube voltmeter
N/O . . . . . normally open	ps . . . . . picosecond	SQ . . . . . square	V(X) . . . . . volts, switched
NOM . . . . . nominal	PT . . . . . point	SWR . . . . . standing-wave ratio	W . . . . . watt
NORM . . . . . normal	PTM . . . . . pulse-time modulation	SYNC . . . . . synchronize	W/ . . . . . with
NPN . . . . . negative-positive-negative	PWM . . . . . pulse-width modulation	T . . . . . timed (slow-blow fuse)	WIV . . . . . working inverse voltage
NPO . . . . . negative-positive zero (zero temperature coefficient)		TA . . . . . tantalum	WW . . . . . wirewound
NRFR . . . . . not recommended for field replacement		TC . . . . . temperature compensating	W/O . . . . . without
NSR . . . . . not separately replaceable			YIG . . . . . yttrium-iron-garnet
ns . . . . . nanosecond			Z <sub>0</sub> . . . . . characteristic impedance
nW . . . . . nanowatt			
OBD . . . . . order by description			

NOTE

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

MULTIPLIERS

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

Table 6-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	06620-60111	1	BOARD ASSEMBLY, SWEEP OSCILLATOR	28480	06620-60111
A1C1, C2	0160-0572	1	CAPACITOR-FXD 2200PF +-20% 100VDC CER	28480	0160-0572
A1C3	0180-1735	1	CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	1509224X9035A2
A1C4	0160-3879	2	CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1C5	0160-3878	9	CAPACITOR-FXD 1000PF +-20% 100VDC CER	28480	0160-3878
A1C6	0160-3879		CAPACITOR-FXD .01UF +-20% 100VDC CER	28480	0160-3879
A1CR1	1901-0040	16	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR9	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR10	1910-0016	2	DIODE-GE 60V 60MA 1US DO-7	28480	1910-0016
A1CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR12	1901-0033	9	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A1CR13	1901-0159	9	DIODE-PNR RECT 400V 750MA DO-41	04713	5R1358-4
A1CR14	1910-0016		DIODE-GE 60V 60MA 1US DO-7	28480	1910-0016
A1CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR16	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR18	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR19	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1CR20	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A1MP1	4040-0749	2	EXTRACTOR-PC BD BRN POLYC .062-BD-TMNS	28480	4040-0749
A1MP2	4040-0749		EXTRACTOR-PC BD BRN POLYC .062-BD-TMNS	28480	4040-0749
A1MP3	1480-0073	14	PIN-DRIVE 0.250" LG	00000	DR0
A1MP4	1480-0073		PIN-DRIVE 0.250" LG	00000	DR0
A1Q1	1854-0404	35	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q4	1853-0050	6	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A1Q5	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q6	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q7	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q8	1855-0082	1	TRANSISTOR MOSFET P-CHAN D-NODE SI	28480	1855-0082
A1Q9	1855-0062	2	TRANSISTOR J-FET N-CHAN D-NODE SI	28480	1855-0062
A1Q10	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q11	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A1Q12	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q13	1854-0474	2	TRANSISTOR NPN SI PD=310MW FT=100MHZ	28480	1854-0474
A1Q14	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q15	1855-0062		TRANSISTOR J-FET N-CHAN D-NODE SI	28480	1855-0062
A1Q16	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q17	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A1Q18	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1Q19	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A1Q20	1854-0779	1	TRANSISTOR NPN 2N3439 SI TO-5 PD=1W	02735	2N3439
A1Q21	1854-0474		TRANSISTOR NPN SI PD=310MW FT=100MHZ	28480	1854-0474
A1Q22	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A1R1	0698-7236	7	RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1001-G
A1R2	0698-7262	1	RESISTOR 12.1K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1212-G
A1R3*	0757-0461	9	RESISTOR 68.1K 1% .125W F TC=0+-100 *FACTORY SELECTED PART	24546	C4-1/8-TO-6812-F
A1R4	0698-7275	1	RESISTOR 42.2K 2% .05W F TC=0+-100	24546	C3-1/8-TO-4222-G
A1R5	0698-7267	1	RESISTOR 19.6K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1962-G
A1R6	0698-7277	3	RESISTOR 51.1K 2% .05W F TC=0+-100	24546	C3-1/8-TO-5112-G
A1R7	0698-7260	13	RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1002-G
A1R8	0698-7272	3	RESISTOR 31.6K 2% .05W F TC=0+-100	24546	C3-1/8-TO-3162-G
A1R9	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1002-G
A1R10	2100-2517	2	RESISTOR-TMR 50K 10% C SIDE-ADJ 1-TURN	30983	ET50X503
A1R11	2100-2517		RESISTOR-TMR 50K 10% C SIDE-ADJ 1-TURN	30983	ET50X503
A1R12	2100-2520	1	RESISTOR-TMR 50 20% C SIDE-ADJ 1-TURN	30983	ET00X500
A1R13	0698-7247	2	RESISTOR 2.87K 2% .05W F TC=0+-100	24546	C3-1/8-TO-2871-G
A1R14	0698-7247		RESISTOR 2.87K 2% .05W F TC=0+-100	24546	C3-1/8-TO-2871-G
A1R15	0698-7243	5	RESISTOR 1.96K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1961-G
A1R16	0698-7263	2	RESISTOR 13.3K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1332-G
A1R17	0698-7277		RESISTOR 51.1K 2% .05W F TC=0+-100	24546	C3-1/8-TO-5112-G
A1R18	0698-7238	1	RESISTOR 1.21K 2% .05W F TC=0+-100	24546	C3-1/8-TO-1211-G
A1R19	0698-8362	4	RESISTOR 1K .1% .125W F TC=0+-25	24546	NE55

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
A1R20	0698-7260	3	RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R21	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R22	0683-1065		RESISTOR 10M 5% .25W FC TC=-900/+1100	01121	CB1065
A1R23	0683-1065		RESISTOR 10M 5% .25W FC TC=-900/+1100	01121	CB1065
A1R24	0698-7254		RESISTOR 5.62K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5621-G
A1R25	0698-7229	2	RESISTOR 511 2% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A1R26	0683-1065		RESISTOR 10M 5% .25W FC TC=-900/+1100	01121	CB1065
A1R27	0698-7236		RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R28	0698-6362		RESISTOR 1K .1% .125W F TC=0+-25	24546	NE55
A1R29	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R30	0698-6362	3	RESISTOR 1K .1% .125W F TC=0+-25	24546	NE55
A1R31	0698-7270		RESISTOR 26.1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-2612-G
A1R32	0698-7208		RESISTOR 68.1 2% .05W F TC=0+-100	24546	C3-1/8-T0-6812-G
A1R33	0698-7248		RESISTOR 3.16K 2% .05W F TC=0+-100	24546	C3-1/8-T0-3161-G
A1R34	0698-6362		RESISTOR 1K .1% .125W F TC=0+-25	24546	NE55
A1R35	2100-2516	1	RESISTOR-TMR 100K 10% C SIDE-ADJ 1-TURN	30983	ET50X104
A1R36	0698-7277		RESISTOR 51.1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A1R37	0698-7282		RESISTOR 82.5K 2% .05W F TC=0+-100	24546	C3-1/8-T0-8252-G
A1R38	0698-7244		RESISTOR 2.15K 2% .05W F TC=0+-100	24546	C3-1/8-T0-2151-U
A1R39	0698-7236		RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R40	0698-7207	1	RESISTOR 61.9 2% .05W F TC=0+-100	24546	C3-1/8-T0-6192-G
A1R41	0698-7243		RESISTOR 1.96K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A1R42	0698-7229		RESISTOR 511 2% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A1R43	0698-7243		RESISTOR 1.96K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A1R44	0698-7243		RESISTOR 1.96K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A1R45	0698-7284	3	RESISTOR 100K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1003-G
A1R46	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R47	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A1R48	0698-7272		RESISTOR 31.6K 2% .05W F TC=0+-100	24546	C3-1/8-T0-3162-G
A1R49	0698-7264		RESISTOR 14.7K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1472-G
A1R50	0698-7236	1	RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R51	0698-7257		RESISTOR 7.5K 2% .05W F TC=0+-100	24546	C3-1/8-T0-7501-G
A1R52	0698-7253		RESISTOR 5.11K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A1R53	0698-7232		RESISTOR 681 2% .05W F TC=0+-100	24546	C3-1/8-T0-681R-G
A1R54	0698-7272		RESISTOR 31.6K 2% .05W F TC=0+-100	24546	C3-1/8-T0-3162-G
A1R55	0698-7245	1	RESISTOR 2.37K 2% .05W F TC=0+-100	24546	C3-1/8-T0-2371-G
A1R56	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A1R57	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A1R58	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R59	0698-7258		RESISTOR 6.25K 2% .05W F TC=0+-100	24546	C3-1/8-T0-6251-G
A1R60	0698-7278	1	RESISTOR 56.2K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5622-G
A1R61	0698-7270		RESISTOR 26.1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-2612-G
A1R62	0698-7236		RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R63	0698-7236		RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R64	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R65	0698-7260	2	RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R66	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A1R67	0757-0419		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A1R68	0757-0289		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A1R69	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R70	0757-1094	3	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A1R71	0698-7284		RESISTOR 100K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1003-G
A1R72	0757-0258		RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A1R73	0698-7256		RESISTOR 6.81K 2% .05W F TC=0+-100	24546	C3-1/8-T0-6811-G
A1R74	0698-7264		RESISTOR 14.7K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1472-G
A1R75	0698-7284	1	RESISTOR 100K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1003-G
A1R76	0698-7270		RESISTOR 26.1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-2612-G
A1R77	0698-7264		RESISTOR 14.7K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1472-G
A1R78	0698-7256		RESISTOR 6.81K 2% .05W F TC=0+-100	24546	C3-1/8-T0-6811-G
A1R79	0698-7253		RESISTOR 5.11K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A1R80	0698-7236	1	RESISTOR 1K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A1R81	0698-7253		RESISTOR 5.11K 2% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A1R82	0698-7283		RESISTOR 13.3K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1332-G
A1R83	0698-7276		RESISTOR 46.4K 2% .05W F TC=0+-100	24546	C3-1/8-T0-4642-G
A1R84	0698-7243		RESISTOR 1.96K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A1U1	1826-0041	1	IC LM0042CM AMPL	27014	LM0042CM
A1U2	1826-0092	3	IC AMPL	28480	1826-0092
A1U3	1820-0076	1	IC:7TL DUAL J-K FLIP/FLOP	01295	SN7476
A1U4	1200-0507	7	SOCKET-IC 16-COMT DIP-SLDR-TERMS	06776	ICM-143-53W
	1826-0102	1	IC LM312M AMPL	27014	LM312M
A1U5	1826-0092	2	IC AMPL	28480	1826-0092
A1U6	1820-0054		IC:SN7400M	01295	SN7400M
A1U7	1200-0508		SOCKET-IC 14-COMT DIP-SLDR-TERMS	06776	ICM-143-53W
A1U7	1820-0411	1	IC MC 817P	04713	MC817P
	1200-C508		SOCKET-IC 14-COMT DIP-SLDR-TERMS.	06776	ICM-143-53W

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
A1U8	1821-0001 1200-C508	2	IC CA3046 XSTR ARRAY SOCKET-IC 14-COMT DIP-SLDR-TERMS	02735 06776	CA3046 ICN-143-53M
A1U9	1820-0054 1200-0508	1	IC 5N7400N SOCKET-IC 14-COMT DIP-SLDR-TERMS	01295 06776	5N7400N ICN-143-53M
A1U10	1820-0579 1200-0507	1	IC 5N74 123 N MV SOCKET-IC 16-COMT DIP-SLDR-TERMS	01295 06776	5N74123M ICN-163-53M
A1U11	1826-0092		IC, AMPL	28480	1826-0092
A1VR1	1902-3002	1	DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=-.074%	04713	SZ 10939-2
A1VR2	1902-0025	1	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=-.06%	04713	SZ 10939-182
A1VR3	1902-3082	4	DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=-.023%	04713	SZ 10939-86
A1VR4	1902-3082	1	DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=-.023%	04713	SZ 10939-86
A1VR5	1902-3203	1	DIODE-ZNR 14.7V 5% DO-7 PD=.4W TC=-.057%	04713	SZ 10939-230
A1VR6	1902-0041	1	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
			AI MISCELLANEOUS		
	1251-0600	48	CONTACT-CONN U/M POST TYPE MALE DPSLDR	25480	1251-0600
	8159-0005	4	WIPE 22AWG W PVC 1X22 80C	0C736	L-2007-1
A2	08620-60112	1	BOARD ASSEMBLY, FREQUENCY CONTROL	28480	08620-60112
A2C1	0180-1706	1	CAPACITOR-FXD: 100UF+-20% 25VDC TA-WET	56289	1090107X0025F2
A2C2	0180-1746	1	CAPACITOR-FXD: 150UF+-10% 20VDC TA-SOLID	56289	1500156X9020B2
A2C3	0160-0573	3	CAPACITOR-FXD 4700PF +-20% 100MVDC CER	28480	0160-0573
A2C4	0160-0573		CAPACITOR-FXD 4700PF +-20% 100MVDC CER	28480	0160-0573
A2K1	0490-0916	3	RELAY-REED 1A .5A 50V CONT 5V-COIL	28480	0490-0916
A2K2	0490-0916		RELAY-REED 1A .5A 50V CONT 5V-COIL	28480	0490-0916
A2K3	0490-0916		RELAY-REED 1A .5A 50V CONT 5V-COIL	28480	0490-0916
A2K4	0490-1013	8	RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K5	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K6	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K7	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K8	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K9	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2K10	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A2L1	9140-0137	2	COIL-FXD MOLOED RF CHOKE 1MH 5%	24226	19/104
A2HP1	4040-0750	2	EXTRACTOR-PC BD RED POLYC .062-80-TMKNS	28480	4040-0750
A2HP2	4040-0750		EXTRACTOR-PC BD RED POLYC .062-80-TMKNS	28480	4040-0750
A2HP3	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A2HP4	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A2Q1	1855-0020	5	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A2Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A2Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A2Q4	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A2Q5	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A2Q6	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A2Q7	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A2Q8	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A2R1	0698-3449	7	RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R2	0698-3159	6	RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A2R3	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R4	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R5	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A2R6	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R7	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R8	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A2R9	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R10	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R11	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R12	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R13	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R14	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R15	0757-0465	4	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A2R16	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R17	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A2R18	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R19	0757-0462	1	RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A2R20	0698-3162	1	RESISTOR 46.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4642-F
A2R21	2100-3103	10	RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R22	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R23	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PNE555
A2R24	0811-1185	1	RESISTOR 10K .01% .0125W PWM TC=0+-10	20940	140-1/20-1002-T
A2R25	2100-3154	8	RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102

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
A2R26	2100-3154		RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A2R27	2100-3154		RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A2R28	0811-1186	1	RESISTOR 20K .01% .0125W PWM TC=0+-10	20940	1409-1/20-0-1961-F
A2R29	2100-3123	1	RESISTOR-TMR 500 1% C SIDE-ADJ 17-TURN	32997	3006P-1-501
A2R30	0698-8045	5	RESISTOR 9.5K 1% .125W F TC=0+-25	19701	MF4C1/8-T9-9501-F
A2R31	0698-8045		RESISTOR 9.5K 1% .125W F TC=0+-25	19701	MF4C1/8-T9-9501-F
A2R32	0698-8045		RESISTOR 9.5K 1% .125W F TC=0+-25	19701	MF4C1/8-T9-9501-F
A2R33	2100-3095	3	RESISTOR-TMR 200 10% C SIDE-ADJ 17-TURN	32997	3006P-1-201
A2R34	0811-1197	1	RESISTOR 1.78K 1% .125W PWM TC=0+-10	20940	114-1/6-1781-F
A2R35	2100-3154		RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A2R36	2100-3154		RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A2R37	0698-8025	1	RESISTOR 1.91K .25% .125W F TC=0+-50	19701	MF4C1/8-T2-1911-C
A2R38	0811-2870	1	RESISTOR 1.96K 1% .05W PWM TC=0+-10	14140	1409-1/20-0-1961-F
A2R39	0698-8045		RESISTOR 9.5K 1% .125W F TC=0+-25	19701	MF4C1/8-T9-9501-F
A2R40	0698-8045		RESISTOR 9.5K 1% .125W F TC=0+-25	19701	MF4C1/8-T9-9501-F
A2R41	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R42	2100-3122	2	RESISTOR-TMR 100 10% C TOP-ADJ 15-TURN	32997	3006P-1-101
A2R43	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R44	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R45	0757-0418	1	RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A2R46	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R47	0811-1196	5	RESISTOR 5K .1% .062W PWM TC=0+-10	20940	114-1/16-5001-B
A2R48	0811-1196		RESISTOR 5K .1% .062W PWM TC=0+-10	20940	114-1/16-5001-B
A2R49	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R50	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R51	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A2R52	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PME555
A2R53	0811-1196		RESISTOR 5K .1% .062W PWM TC=0+-10	20940	114-1/16-5001-B
A2R54	0811-1196		RESISTOR 5K .1% .062W PWM TC=0+-10	20940	114-1/16-5001-B
A2R55	2100-3103		RESISTOR-TMR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A2R56	0757-0461		RESISTOR 68-1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R57	2100-3095		RESISTOR-TMR 200 10% C SIDE-ADJ 17-TURN	32997	3006P-1-201
A2P58	0698-3446	1	RESISTOR 383 1% .125W F TC=0+-100	16299	C4-1/8-T0-383R-F
A2U1	1826-0261	10	IC AMPL	28480	1826-0261
A2U2	1826-0261		IC AMPL	28480	1826-0261
A2U3	1826-0261		IC AMPL	28480	1826-0261
A2U4	1826-0261		IC AMPL	28480	1826-0261
A2U5	1826-0261		IC AMPL	28480	1826-0261
A2U6	1826-0261		IC AMPL	28480	1826-0261
A2U7	1826-0261		IC AMPL	28480	1826-0261
A2U8	1820-1197	3	IC SN74LS 00 N GATE	01295	SN74LS00M
A2VAL	1902-3082		DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=-.023K	04713	SZ 10939-86
			AZ MISCELLANEOUS		
	1251-0600		CONTACT-CONN U/M POST TYPE MALE DPSLDM	28480	1251-0600
A3	08620-60113	1	BOARD ASSEMBLY, LOGIC	28480	08620-60113
A3C1	0160-4084	2	CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A3C2	0160-4084		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A3C3	0180-2206	2	CAPACITOR-FXD 60UF+-10% 8VDC TA-SOLID	56289	1500606X9006B2
A3C4	0160-0573		CAPACITOR-FXD 4700PF +-20% 100WVDC CER	28480	0160-0573
A3C5	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C6	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C7	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C8	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C9	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C10	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C11	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3C12	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3CR1	1901-0050	21	DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A3CR2	1901-0050		DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A3CR3	1901-0050		DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A3CR4	1901-0050		DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A3CR5	1901-0050		DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A3K1	0490-1013		RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-1013
A3MP1	4040-0751	2	EXTRACTOR-PC 80 DRN POLYC .062-80-THKNS	28480	4040-0751
A3MP2	4040-0751		EXTRACTOR-PC 80 DRN POLYC .062-80-THKNS	28480	4040-0751
A3MP3	1480-0073		PIN-DRIVE 0.250" LG	00000	080
A3MP4	1480-0073		PIN-DRIVE 0.250" LG	00000	080
A3Q1	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3Q4	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3Q5	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404

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
A306	1853-0020	5	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A307	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A308	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A309	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3010	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3011	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A3012	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3013	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3014	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3015	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3016	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3017	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A3018	1855-0020		TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A3R1	0757-0194	7	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A3R2	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A3R3	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A3R4	0698-7260		RESISTOR 10K 2% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A3R5	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R6	0757-0442	27	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R7	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R8	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R9	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A3R10	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A3R11	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A3R12	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A3R13	0698-3159	RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F	
A3R14	0757-0461	RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F	
A3R15	0698-3260	RESISTOR 464K 1% .125W F TC=0+-100	03888	PHE555	
A3R16	0757-0459	2	RESISTOR 56.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A3R17	0698-3429		RESISTOR 19.6 1% .125W F TC=0+-100	03888	PHE55-1/8-T0-19R6-F
A3R18	0698-3429		RESISTOR 19.6 1% .125W F TC=0+-100	03888	PHE55-1/8-T0-19R6-F
A3R19	0698-3429		RESISTOR 19.6 1% .125W F TC=0+-100	03888	PHE55-1/8-T0-19R6-F
A3R20	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PHE555
A3R21	0757-0416	4	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A3R22	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R23	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A3R24	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R25	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R26	0757-0442	9	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R27	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R28	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R29	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R30	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R31	0698-0085	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F	
A3R32	0698-0085	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F	
A3R33	0698-0085	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F	
A3R34	0698-3157	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F	
A3R35	0757-0442	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F	
A3R36	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R37	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A3R38	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A3R39	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A3R40	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R41	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R42	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R43	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R44	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R45	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R46	0698-3157	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F	
A3R47	0757-0442	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F	
A3R48	0698-3157	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F	
A3R49	0757-0442	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F	
A3R50	0757-0442	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F	
A3R51	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R52	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R53	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R54	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A3R55	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R56	0757-0442	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R57	0698-3152		RESISTOR 3.48K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3481-F
A3R58	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R59	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A3R60	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R61	0698-3157	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F	
A3R62	0757-0442	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-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
A3U1	1820-1201 1200-0508	1	IC SN74LS 08 N GATE	01295	SN74LS08N
A3U2	1826-0026	6	SOCKET-IC 14-COMT DIP-SLDR-TERMS	06776	ICN-143-53M
A3U3	1826-0026		IC LM311H COMPTR	27014	LM311H
A3U4	1826-0026		IC LM311H COMPTR	27014	LM311H
A3U5	1820-0282	1	IC SN74 86 N GATE	01295	SN7486N
A3U6	1820-1212	2	IC SN74LS112 N FLIP-FLOP	01295	SN74LS112N
A3U7	1820-1212		IC SN74LS112 N FLIP-FLOP	01295	SN74LS112N
A3U8	1826-0026		IC LM311H COMPTR	27014	LM311H
A3U9	1826-0026		IC LM311H COMPTR	27014	LM311H
A3U10	1826-0026		IC LM311H COMPTR	27014	LM311H
A3U11	1820-1416	1	IC SN74LS 14 N SCHRITT	01295	SN74LS14N
A3U12	1820-1197		IC SN74LS 00 N GATE	01295	SN74LS00N
A3U13	1820-1197		IC SN74LS 00 N GATE	01295	SN74LS00N
A3V81	1902-0184	3	DIODE-ZNR 16.2V 5% DO-7 PD=.4W TC=+.0862	04713	SZ 10939-242
			A3 MISCELLANEOUS		
	8159-0005		WIRE 22AWG W PVC 1X22 80C	00735	L-2007-1
A4	08620-60114	1	BOARD ASSEMBLY, +5+20 REGULATOR	28480	08620-60114
A4C1	0160-0158	1	CAPACITOR-FXD 5600PF +-10% 200VDC POLYE	56289	292P56292
A4C2	0180-0235	3	CAPACITOR-FXD: 56JF+-20% 75VDC TA-MET	56289	1090566X0075T2
A4C3	0180-2486	3	CAPACITOR-FXD: 470UF+-20% 30VDC TA-MET	56289	1090477X0030T2
A4C4	0160-0301	2	CAPACITOR-FXD .012UF +-10% 200VDC POLYE	56289	292P12392
A4C5	0180-2208	1	CAPACITOR-FXD: 220UF+-10% 10VDC TA	56289	1500227X90L052
A4CR1	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR2	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR3	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR4	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A4CR5	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR6	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR7	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR8	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A4CR9	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR10	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A4CR11	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A4F1	2110-0332	5	FUSE 3A 125V .25X.27	71400	GMV 3
A4F2	2110-0332		FUSE 3A 125V .25X.27	71400	GMV 3
A4HP1	4040-0752	1	EXTRACTOR-PC 80 YEL POLYC .062-80-TMKNS	28480	4040-0752
A4HP2	4040-0752		EXTRACTOR-PC 80 YEL POLYC .062-80-TMKNS	28480	4040-0752
A4HP3	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A4HP4	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A4Q1	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A4Q2	1854-0071	5	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A4Q3	1854-0039	1	TRANSISTOR NPN 2N3053 SI TO-5 PD=1W	04713	2N3053
A4Q4	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A4Q5	1853-0038	3	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
A4Q6	1884-0012	5	THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A4Q7	1884-0012		THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A4R1	0812-0014	1	RESISTOR .5 32 5W PW TC=0+-90	01686	T5
A4R2	0698-0089	2	RESISTOR 1.78K 1% .5W F TC=0+-100	24546	NA6
A4R3	0698-3150	3	RESISTOR 2.37K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2371-F
A4R4	0698-8473	1	RESISTOR 3.358K 1% .1W F TC=0+-5	07716	MA45, T-16
A4R5	2100-3154		RESISTOR-TYRN 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-T-102
A4R6	0698-8476	1	RESISTOR 5.315K 1% .1W F TC=0+-5	07716	MA45, T-16
A4R7	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A4R8	0757-0419		RESISTOR 68K 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A4R9	0698-3153	1	RESISTOR 3.63K 1% .1W F TC=0+-100	16299	C4-1/8-T0-3631-F
A4R10	0757-0280	5	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R11	0757-0180	3	RESISTOR 31.6 1% .125W F TC=0+-100	24546	C5-1/4-T0-31R6-F
A4R12	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A4R13	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A4R14	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A4R15	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R16	0698-0082	2	RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-T0-4640-F
A4R17	0757-0278	2	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A4R18	0811-1661	1	RESISTOR .39 5% 2W PW TC=0+-800	75042	BMH2-39/100-J
A4R19	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A4R20	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-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
A4R21	0757-0200	1	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A4R22	0698-3460	1	RESISTOR 422K 1% .125W F TC=0+-100	03888	PME555
A4R23	0698-3454	2	RESISTOR 215K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2153-F
A4R24	0698-3447	5	RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A4R25	0757-0397	5	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A4R26	0757-0447	1	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A4R27	0698-3150	1	RESISTOR 2.37K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2371-F
A4R28	0757-0466	2	RESISTOR 110K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1103-F
A4R29	0698-3454	1	RESISTOR 215K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2153-F
A4R30	0757-0466	1	RESISTOR 110K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1103-F
A4R31	0757-0278	1	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A4R32	2100-3095	1	RESISTOR-TRMH 200 10% C SIDE-ADJ 17-TURN	32997	3006P-1-201
A4R33	0698-0083	1	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A4R34	0698-3447	1	RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A4R35	0757-0397	1	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A4U1	1821-0001	1	IC CA3046 XSTR ARRAY	02735	CA3046
A4U2	1826-0261	1	IC ANPL	28480	1826-0261
A4VR1	1902-3139	4	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A4VR2	1902-3139	1	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A4VR3	1902-0202	1	DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057%	28480	1902-0202
A4VR4	1902-0680	2	DIODE-ZNR 1N827 6.2V 5% DO-7 PD=.25W	03877	1N827
A4VR5	1902-0680	2	DIODE-ZNR 1N827 6.2V 5% DO-7 PD=.25W	03877	1N827
A4VR6	1902-3182	4	DIODE-ZNA 12.1V 5% DO-7 PD=.4W TC=+.064%	04713	SZ 10939-206
A4VR7	1902-3256	1	DIODE-ZNR 23.7V 5% DO-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A4VR8	1902-3182	1	DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	04713	SZ 10939-206
A4VR9	1902-0049	1	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
			44 MISCELLANEOUS		
A4U1	1251-0600	1	CONTACT-CONN U/W POST TYPE MALE DPSLDR	28480	1251-0600
A4U2	1251-2313	1	CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A5	08620-60115	1	BOARD ASSEMBLY, -10-40 REGULATOR	28480	08620-60115
A5C1	0160-0299	1	CAPACITOR-FXD 1800PF +-10% 200VDC POLYE	56289	292P18292
A5C2	0180-0235	1	CAPACITOR-FXD: 560UF+-20% 75VDC TA-WET	56289	1090566X007572
A5C3	0180-0235	1	CAPACITOR-FXD: 560UF+-20% 75VDC TA-WET	56289	1090566X007572
A5C4	0180-2208	1	LAPACITOR-FXD: 220UF +-10% 10VDC TA	56289	1500227X901052
A5C5	0180-2208	1	CAPACITOR-FXD: 220UF +-10% 10VDC TA	56289	1500227X901052
A5C6	0160-0153	1	CAPACITOR-FXD 1000PF +-10% 200VDC POLYE	56289	292P10292
A5C7	0160-0301	1	CAPACITOR-FXD .012UF +-10% 200VDC POLYE	56289	292P12392
A5CR1	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR2	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR3	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR4	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR5	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A5CR6	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A5CR7	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR8	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR9	1901-0050	1	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR10	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A5CR11	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A5CR12	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A5F1	2110-0332	1	FUSE 3A 125V .25X.27	71400	GMW 3
A5F2	2110-0332	1	FUSE 3A 125V .25X.27	71400	GMW 3
A5HP1	4040-0753	2	EXTRACTOR-PC BD GRN POLYC .062-BD-TMNS	28480	4040-0753
A5HP2	4040-0753	2	EXTRACTOR-PC BD GRN POLYC .062-BD-TMNS	28480	4040-0753
A5HP3	1480-0073	1	PIN:DRIVE 0.250" LG	00000	080
A5HP4	1480-0073	1	PIN:DRIVE 0.250" LG	00000	080
A5Q1	1853-0020	1	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A5Q2	1853-0020	1	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A5Q3	1853-0038	1	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
A5Q4	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A5Q5	1854-0022	1	TRANSISTOR NPN SI TO-39 PD=700MW	07263	517843
A5Q6	1853-0050	1	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A5Q7	1853-0038	1	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
A5Q8	1884-0012	1	THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A5Q9	1884-0012	1	THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A5R1	0811-1665	1	RESISTOR .02 5% 2W PW TC=0+-800	75042	8MH2-82/100-J
A5R2	0698-3150	1	RESISTOR 2.37K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2371-F
A5R3	0757-0288	1	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A5R4	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R5	0698-0089	1	RESISTOR 1.78K 1% .5W F TC=0+-100	24546	NA6

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
A5R6	0698-3406	1	RESISTOR 1.33K 1% .5W F TC=0+-100	24546	NA6
A5R7	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A5R8	0698-7842	1	RESISTOR, 26.1K OHM	19701	MFAC1/8-T0-2612-B
A5R9	2100-2154		RESISTOR-TYPR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A5R10	0698-6614	1	RESISTOR 7.5K 1% .125W F TC=0+-25	24546	NE55
A5R11	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5R12	2100-3122		RESISTOR-TYPR 100 10% C TOP-ADJ 15-TURN	32997	3006P-1-101
A5R13	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A5R14	0698-3346	1	RESISTOR 4.22K 1% .5W F TC=0+-100	24546	NA6
A5R15	0757-0180		RESISTOR 31.6 1% .125W F TC=0+-100	24546	C5-1/4-T0-3116-F
A5R16	0757-0180		RESISTOR 31.6 1% .125W F TC=0+-100	24546	C5-1/4-T0-3116-F
A5R17	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R18	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R19	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A5R20	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A5R21	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R22	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R23	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A5R24	0698-3440	1	RESISTOR 196 1% .125W F TC=0+-100	16299	C4-1/8-T0-196R-F
A5R25	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A5R26	0698-3154	3	RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A5R27	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5R28	0698-3631	1	RESISTOR 330 5% 2W NO TC=0+-200	24546	FP42-2-T00-330R-J
A5R29	0811-1659	1	RESISTOR .27 5% 2W PW TC=0+-800	75042	BMH2-27/100-J
A5R30	0698-3447	1	RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A5R31	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5R32	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A5R33	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5R34	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A5R35	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A5U1	1826-0261		IC AMPL	28480	1826-0261
A5U2	1826-0261		IC AMPL	28480	1826-0261
A5VR1	1902-3139		DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A5VR2	1902-3139		DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A5VR3	1902-3224	1	DIODE-ZNR 17.8V 5% DO-7 PD=.4W TC=+.067%	04713	SZ 10939-254
A5VR4	1902-0071	1	DIODE-ZNR 9V 5% DO-14 PD=.5W TC=+.001%	28480	1902-0071
A5VR5	1902-0184		DIODE-ZNR 16.2V 5% DO-7 PD=.4W TC=+.066%	04713	SZ 10939-242
A5VR6	1902-3345	1	DIODE-ZNR 51.1V 5% DO-7 PD=.4W TC=+.081%	04713	SZ 10939-386
A5VR7	1902-3182		DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	04713	SZ 10939-206
			A5 MISCELLANEOUS		
	1251-0600		CONTACT-CONN U/W POST TYPE MALE DPSLDR	28480	1251-0600
	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A6(OPTION 001)	08620-60116	1	BOARD ASSEMBLY, ECD PROGRAMMER	28480	08620-60116
A6CR1	1902-3082		DIODE-ZNR 4.64V 5% DO-7 PD=.4W TC=+.023%	04713	SZ 10939-86
A6MP1	4040-0754	2	EXTRACTOR-PC BD BLU POLYC .062-80-THKNS	28480	4040-0754
A6MP2	4040-0754		EXTRACTOR-PC BD BLU POLYC .062-80-THKNS	28480	4040-0754
A6MP3	1480-0073		PIN-DRIVE 0.250" LG	00000	080
A6MP4	1480-0073		PIN-DRIVE 0.250" LG	00000	080
A6R1	2100-3094	1	RESISTOR-TYPR 100K 10% C SIDE-ADJ	32997	3006P-1-104
A6R2	2100-3103		RESISTOR-TYPR 10K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-103
A6U1	0960-0447	1	IC DIGITAL, ANALOG CONVERTER	28480	0960-0447
A6U2	1820-0668	3	IC SN74 07 N BUFFER	01295	SN7407N
	1200-0508		SOCKET-IC 14-COMT DIP-SLDR-TERMS	06776	ICN-143-53M
A6U3	1820-0668		IC SN74 07 N BUFFER	01295	SN7407N
	1200-0508		SOCKET-IC 14-COMT DIP-SLDR-TERMS	06776	ICN-143-53M
A6U4	1820-0668		IC SN74 07 N BUFFER	01295	SN7407N
	1200-0508		SOCKET-IC 14-COMT DIP-SLDR-TERMS	06776	ICN-143-53M
			A6 MISCELLANEOUS		
	1251-0600		CONTACT-CONN U/W POST TYPE MALE DPSLDR	28480	1251-0600
	1251-1556	27	CONNECTOR-SGL CONT SKT .04-DIA	28480	1251-1556
A7	08620-60117	1	BOARD ASSEMBLY, OPERATOR CONTROL	28480	08620-60117
ATC1	0180-1715	1	CAPACITOR-FXD: 150UF+-10% 6VDC TA-SOLID	56289	1500157X9006R2
ATC2	0180-0094	1	CAPACITOR-FXD: 100UF+75-10% 25VDC AL	56289	300107023002
ATC3	0160-2055	5	CAPACITOR-FXD .01UF +80-20% 100MVDC CER	28480	0160-2055
ATC4	0160-2055		CAPACITOR-FXD .01UF +80-20% 100MVDC CER	28480	0160-2055
ATC5	0160-2055		CAPACITOR-FXD .01UF +80-20% 100MVDC CER	28480	0160-2055

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
A7C6	0160-2055	2	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A7C7	0180-2206		CAPACITOR-FXD: 60UF+-10% 6VDC TA-SOLID	56289	1500606X9006B2
A7C8	0180-0218		CAPACITOR-FXD: .15UF+-10% 35VDC TA	56289	1500154X9035A2
A7C9	0180-0218		CAPACITOR-FXD: .15UF+-10% 35VDC TA	56289	1500154X9035A2
A7C10	0160-2055		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A7CR1	1901-0033	2	DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7CR2	1901-0033		DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7CR3	1901-0033		DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7CR4	1901-0033		DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7CR5	1901-0033		DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7CR6	1901-0033	2	DIODE-GEN PRP 110V 200MA 00-7	28480	1901-0033
A7CP7	1901-0033		DIODE-GEN PRP 130V 200MA 00-7	28480	1901-0033
A7CR8	1901-0033		DIODE-GEN PRP 180V 200MA 00-7	28480	1901-0033
A7L1	9140-0137	1	COIL-FXD MOLDED RF CHOKER 1MH 5% 24226	197104	
A7HP1	4040-0755	2	EXTRACTOR-PC BD VIO POLYC .062-80-THKMS	28480	4040-0755
A7HP2	4040-0755		EXTRACTOR-PC BD VIO POLYC .062-80-THKMS	28480	4040-0755
A7HP3	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A7HP4	1480-0073		PIN:DRIVE 0.250" LG	00000	080
A7Q1	1854-0062	1	TRANSISTOR NPN 2N1701 SI TO-18 PD=25W	04713	2N3055
A7Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A7Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A7Q4	1854-0404	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A7Q5	1854-0013	4	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A7Q6	1854-0013		TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A7Q7	1854-0013		TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A7Q8	1854-0013		TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A7Q9	1853-0034	4	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A7Q10	1853-0034		TRANSISTOR PNP SI TO-18 PD=360 MW	28480	1853-0034
A7Q11	1853-0034	2	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A7Q12	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A7Q13	1853-0012	2	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A7Q14	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q15	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A7Q16	1854-0071	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q17	1853-0050	1	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A7Q18	188A-0012	1	THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A7R1	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R2	0698-3152		RESISTOR 3.48K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3481-F
A7R3	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A7R4	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A7R5	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R6	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R7	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A7R8	0757-0459		RESISTOR 56.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5622-F
A7R9	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	03888	PHE555
A7R10	2100-3109		RESISTOR-TMR 2K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-202
A7R11	0698-0084	1	RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A7R12	0698-3444		RESISTOR 316 1% .125W F TC=0+-100	16299	C4-1/8-T0-316R-F
A7R13	0698-3152		RESISTOR 3.48K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3481-F
A7R14	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A7R15	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A7R16	0757-0416	1	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A7R17	0698-9082		RESISTOR 464 1% .125W F TC=0+-100	16299	C4-1/8-T0-4640-F
A7R18	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A7R19	0757-0198		RESISTOR 100 1% .5W F TC=0+-100	19701	MF7C1/2-T0-101-F
A7R20	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R21	0698-3444	2	RESISTOR 316 1% .125W F TC=0+-100	16299	C4-1/8-T0-316R-F
A7R22	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R23	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R24	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R25	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R26	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A7R27	2100-3154		RESISTOR-TMR 1K 10% C SIDE-ADJ 17-TURN	32997	3006P-1-102
A7R28	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A7R29	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A7R30	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A7R31	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R32	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A7R33	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A7R34	0698-3434		RESISTOR 34.8 1% .125W F TC=0+-100	16299	C4-1/8-T0-348R-F
A7R35	2100-3164		RESISTOR-TMR 10 20% C SIDE-ADJ 17-TURN	32997	3006P-1-100
A7R36	0698-3434	1	RESISTOR 34.8 1% .125W F TC=0+-100	16299	C4-1/8-T0-348R-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
ATU1	1820-0616 1200-0507	1	IC MUXR SOCKET-IC 16-COMT DIP-SLDR-TERMS	07263 06776	9322DC ICN-163-53M
ATU2	1820-1216 1200-0507	1	IC SN74LS138 N DECODER SOCKET-IC 16-COMT DIP-SLDR-TERMS	01295 06776	SN74LS138N ICN-163-53M
ATU3	1820-1277 1200-0507	1	IC SN74LS192 N COUNTER SOCKET-IC 16-COMT DIP-SLDR-TERMS	01295 06776	SN74LS192M ICN-163-53M
ATU4	1820-0174	1	IC TTL MEX INVERTER	01295	SN7404M
ATU5	1858-0032	1	IC CA3146E XSTR ARRAY	02735	CA3146E ICN-143-53M
ATVR1	1902-0184		DIODE-ZNR 16-2V 5% DO-7 PD=.4W TC=+.064K	04713	SZ 10939-242
ATVR2	1902-3182		DIODE-ZNR 12-1V 5% CO-7 PD=.4W TC=+.064K	04713	SZ 10939-206
			A7 MISCELLANEOUS		
	1251-0600		CONTACT-CGNN U/W POST TYPE MALE DPSLDR	28480	1251-0600
A8	08620-60013	1	BOARD ASSEMBLY, RECTIFIER	28480	08620-60013
ABC1	0160-0931	2	CAPACITOR-FXD .047UF +-20% 1000VDC	84411	863UM473010W2
ABC2	0170-0040	1	CAPACITOR-FXD .047UF +-10% 200VDC POLYE	56289	292P47392
ABC3	0160-2118	2	CAPACITOR-FXD .18UF +-10% 200VDC POLYE	28480	0160-2118
ABC4	0160-2118	2	CAPACITOR-FXD .18UF +-10% 200VDC POLYE	28480	0160-2118
ABCR1	1901-0418	16	DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR2	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR3	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR4	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR5	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR6	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR7	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR8	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR9	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR10	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR11	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR12	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR13	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR14	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR15	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR16	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
ABCR17	1901-0025	2	DIODE-GEN PRP 170V 200MA DO-7	28480	1901-0025
ABCR18	1901-0025	2	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
AB01	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
ABR1	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
ABR2	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
ABR3	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
ABR4	0757-0199	1	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
ABR5	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
ABR6	0757-0443	1	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
ABR7	0757-0441		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A9	08620-60119	1	BOARD ASSEMBLY, SWITCH	28480	08620-60119
A9/A10	08620-60109		FRONT PANEL ASSEMBLY	28480	08620-60109
A10	08620-60120	1	BOARD ASSEMBLY, FRONT INTERFACE	28480	08620-60120
A10C1	0180-2141	2	CAPACITOR-FXD: 3.3UF+-10% 50VDC TA	56289	1500335X9050B2
A10C2	0180-2205	2	CAPACITOR-FXD: .33UF+-10% 35VDC TA	56289	1500334X9035A2
A10C3	0160-0163	1	CAPACITOR-FXD .033UF +-10% 200VDC POLYE	56289	292P33392
A10C4	0160-0155	1	CAPACITOR-FXD 3300PF +-10% 200VDC POLYE	56289	292P33292
A10C5	0180-2205	1	CAPACITOR-FXD: .33UF+-10% 35VDC TA	56289	1500334X9035A2
A10C6	0180-2186	1	CAPACITOR-FXD: 300UF+-20% 30VDC TA-NET	56289	1090307X0030W2
A10C7	0180-0234	1	CAPACITOR-FXD: 33UF+-20% 75VDC TA-NET	56289	1090336X0075F2
A10C8	0160-2141	1	CAPACITOR-FXD: 3.3UF+-10% 50VDC TA	56289	1500335X9050B2
A10CR1	1901-0050		DIODE-SWITCHING 80V 200MA ZNS DO-7	28480	1901-0050
A10R1	0757-0873	1	RESISTOR 1.62K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1624-F
A10R2	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A10R3	0698-6628	1	RESISTOR 500K .1% .125W F TC=0+-25	91637	MFF-1/8-T9-5003-B
A10R4	0698-8395	1	RESISTOR 50K .1% .25W F TC=0+-50	19701	MF52C1/4-T2-5002-B
A10R5	0811-1196		RESISTOR 5K .1% .062W PWN TC=0+-10	20940	114-1/16-5001-B
A10R6	0698-0056	1	RESISTOR 931K 1% .5W F TC=0+-100	24546	M46
A10R7	0698-3160	1	RESISTOR 31.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3162-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
A10XA9-1	08620-40013	2	CONNECTOR, PC SPACER	28480	08620-40013
A13XA9-2	08620-40013		CONNECTOR, PC SPACER	28480	08620-40013
A11	08620-60121	1	BOARD ASSEMBLY, MASTER	28480	08620-60121
A11C1	0180-0453	1	CAPACITOR-FXD; 87C0UF*75-10% 40VDC AL	28480	0180-0453
A11C2	0180-2603	1		28480	0180-2603
A11C3	0180-0452	1	CAPACITOR-FXD; 13000UF*75-10% 25VDC AL	28480	0180-0452
A11C4	0180-2604	1		28480	0180-2604
A11J1	1251-1968	1	CONNECTOR-PC EDGE 10-CONT/ROW 1-ROW	142	91-6910-1700-00
A11J2	1251-2314	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	05574	3VH10/LJVS/079
A11XA1	1251-2134	5	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-340
A11XA2	1251-2134		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-340
A11XA3	1251-2134		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-340
A11XA4	1251-1913	3	CONNECTOR-PC EDGE 18-CONT/ROW 1-ROW	90949	143-018-07-1158
A11XA5	1251-1913		CONNECTOR-PC EDGE 18-CONT/ROW 1-ROW	90949	143-018-07-1158
A11XA6	1251-2134		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-340
A11XA7	1251-2134		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-340
A11XA8	1251-1913		CONNECTOR-PC EDGE 18-CONT/ROW 1-ROW	90949	143-018-07-1158
			ALL MISCELLANEOUS		
	0380-0111	10	STANDOFF-RVT-ON .25LG 6-32TND .250D BR5	28480	0380-0111
B1	3160-0217	1	FAN BLADE .76-TPK 3-OD .079-ID	28480	3160-0217
B1	3140-0498	1	MOTOR, DC	28480	3140-0498
	1251-1115		KEY, POLARIZING	28480	1251-1115
C1	0160-0931		CAPACITOR-FXD .047UF +-20% 100GVDC	84411	663UM473010M2
D51	2140-0312	5	LAMP-INCAND T-1 BULB 5V	71744	CH7-7683A515
D52	2140-0312		LAMP-INCAND T-1 BULB 5V	71744	CH7-7683A515
D53	2140-0312		LAMP-INCAND T-1 BULB 5V	71744	CH7-7683A515
D54	2140-0312		LAMP-INCAND T-1 BULB 5V	71744	CH7-7683A515
D55	2140-0312		LAMP-INCAND T-1 BULB 5V	71744	CH7-7683A515
F1	2110-0003	1	FUSE 3A	71400	AGC-3
F1	2110-0093	1	FUSE 1.5A 250V	71400	AGC-1.5
F1	2110-0332		FUSE 3A 125V .25X.27	71400	GM 3
FL1	0960-0448	1	LINE MODULE FILTER	38480	0960-0448
J1	1251-0118	1	CONNECTOR 6-PIN M CIRC K	71468	MK-6-323
J2	1251-4222	1	CONNECTOR	28480	1251-4222
J2MP1	08620-00073	1	SHROUD, CONNECTOR	28480	08620-00073
J3	1250-0118	4	CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J4	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J5	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J6	1251-0484	1	CONNECTOR 36-PIN F MICRO RIBBON	71785	57-20360-375
J7	1251-2447	1	CONNECTOR-PC EDGE 44-CONT/ROW 2-ROWS	05574	3VH44/LJMS
J9MP1	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J9MP2	1251-0198	1	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	251-06-30-261
	5040-0327	1	MOTOR:CONNECTOR	28480	5040-0327
	2200-0109	2	SCREW-NACH 4-40 .438-IN-LG PAN-ND	28480	2200-0109
Q1	1853-0059	2	TRANSISTOR PNP 2N3791 SI 7-3 PD=150W	04713	2N3791
Q2	1854-0063	1	TRANSISTOR NPN 2N3055 SI 3-3 PD=115W	28480	1854-0063
Q3	1853-0059		TRANSISTOR PNP 2N3791 SI TO-3 PD=150W	04713	2N3791
Q4	1854-0080	1	TRANSISTOR NPN SI TO-3 PD=100W FT=3MHZ	28480	1854-0080
R1	0698-3449		RESISTOR 20.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
R2	2100-2867	2	RESISTOR-VAR PREC MW 5-TRN 10K 3%	28480	2100-2867
R3	2100-2865	2	RESISTOR-VAR PREC MW 3-TAN 1K 3%	28480	2100-2865
R4	2100-2866	1	RESISTOR-VAR PREC MW 5-TRN 2K 3%	28480	2100-2866
R5	2100-2865		RESISTOR-VAR PREC MW 3-TAN 1K 3%	28480	2100-2865
R6	2100-2867		RESISTOR-VAR PREC MW 5-TRN 10K 3%	28480	2100-2867
R7	2100-2937	2	RESISTOR-VAR CONTROL CC 1K 10% LIN	12697	382
R8	2100-2937		RESISTOR-VAR CONTROL CC 1K 10% LIN	12697	382
S1	3101-1395	1	SWITCH-PB DPDT DB ALYNG 10-5A 250VAC	00501	53-67280-121/A1M
S2	3101-0859	2	SWITCH:MICRO MINIATURE	28480	3101-0859
S3	3101-0859		SWITCH:MICRO MINIATURE	28480	3101-0859
S4	3101-1081	5	SWITCH-SENS SPOT SUBMIN .5A 30VDC	91929	115W23
S5	3101-1081		SWITCH-SENS SPOT SUBMIN .5A 30VDC	91929	115W23
S6	3101-1081		SWITCH-SENS SPOT SUBMIN .5A 30VDC	91929	115W23
S7	3101-1081		SWITCH-SENS SPOT SUBMIN .5A 30VDC	91929	115W23
S8	3101-1081		SWITCH-SENS SPOT SUBMIN .5A 30VDC	91929	115W23
T1	9100-3841	1		28480	9100-3841
W1	08620-60083	1	CABLE ASSEMBLY, POWER	28480	08620-60083
W2	08620-60085	1	CABLE ASSEMBLY, FLEX	28480	08620-60085
W3	8120-1348	1	CABLE ASSY 3-COND 18-AWG	28480	8120-1348
W4	08620-60105	1	WIRING HARNESS, FRONT	28480	08620-60105
W5	08620-60107	1	WIRING HARNESS, MOTOR	28480	08620-60107

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
MISCELLANEOUS PARTS					
	0360-0268	1	TERMINAL-LUG-SLDR 6 SCR .143/.093 ID	83330	1414-6
	0380-0921	2	STANDOFF-RND .45LG .086ID .31200 AL ALDM	28480	0380-0921
	C380-1036	2	SPACER-HEX .255LG 6-32TND .3124/F STL NI	28480	0380-1036
	0590-0053	4	NUT-SHEETMETAL-J 6-32-TND .5-WD STL	70553	C17859-632-240
	1200-0043	4	INSULATOR-XSTR T0-3 .02-TMK	76530	322047
	2360-0115	1	SCREW-MACH 6-32 .312-IN-LG PAN-HD	28480	2360-0115
	2420-0001	1	NUT-HEX-M/LKMR 6-32-TND .109-TMK	28480	2420-0001
	2510-0184	1	SCREW-MACH 8-32 .562-IN-LG 82 DEG FL-HD	28480	2510-0184
	7120-2359	1	SER PLY "SER OPT (ETC)"	28480	7120-2359
	9223-0040	4	POST-PAK POLYETH RND 10.75-LG 4-DIA	28480	9223-0040
	08620-00019	2	BRACKET, FAN	28480	08620-00019
	08620-00074	2	SHIELD, FAN BLADE	28480	08620-00074
	08620-20072	1	STRIP FILLER	28480	08620-20072
	08620-20122	1	BOARD, CONNECTOR	28480	08620-20122
	08620-60108	1	PANEL ASSEMBLY, REAR	28480	08620-60108
	08620-60109	2	PANEL ASSEMBLY, FRONT	28480	08620-60109
	08620-60123	1	ACCESSORY KIT	28480	08620-60123

Table 6-3. Code List of Manufacturers

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
00000	NO M/F DESCRIPTION FOR THIS MFG NUMBER		
00501	ILLUMINATED PRODUCTS INC	ANAHEIM CA	92803
00736	GETTIG ENGRG & MFG CO INC	SPRING HILLS PA	15875
00773	AMP INC	HARRISBURG PA	17105
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICONO CMPNT DIV	DALLAS TX	75231
01686	RCL ELECTRONICS INC	MANCHESTER NH	03102
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE NJ	08876
03877	TRANSITRON ELECTRONIC CORP	WAKEFIELD MA	01880
03888	PYROFILM CORP	WHIPPANY NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
05574	VIKING INDUSTRIES INC	CHATSWORTH CA	91311
06776	ROBINSON HUGENT INC	NEW ALBANY IN	47150
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
07716	TRW INC BURLINGTON DIV	BURLINGTON IA	52601
12697	CLAROSTAT MFG CO INC	DOVER NH	03820
14140	EDISON ELEK DIV MCGRAW-EDISON	MANCHESTER NH	03130
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
20940	MICRO-DHM CORP	EL MONTE CA	91731
24226	COMANDA ELECTRONICS CORP	COMANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
26742	METHODE ELECTRONICS INC	CHICAGO IL	60656
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
28480	HEWLETT-PACKARD CO CORPORATE HO	PALO ALTO CA	94304
30983	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BURNS INC TRIMPOT PRDO DIV	RIVERSIDE CA	92507
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST. LOUIS MO	63017
71468	ITT CANNON ELECTRIC CO	SANTA ANA CA	92772
71744	CHICAGO MINIATURE LAMP WORKS	CHICAGO IL	60640
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
76530	TRW ELEK CMPNT CINCH-NONMAGNCK DIV	CITY OF INDUSTRY CA	91747
78553	TINNEMAN PRODUCTS INC	CLEVELAND OH	44129
83330	SMITH HERRAN H INC	BROOKLYN NY	11207
84411	TRW CAPACITOR DIV	OGALLALA NE	69153
90949	AMPHENOL SALES DIV OF BUNKER-KAMO	HAZELWOOD MO	63042
91637	DAE ELECTRONICS INC	COLUMBUS NE	68601
91929	HONEYWELL INC MTRD SWITCH DIV	FREEDPORT IL	61032

See introduction to this section for ordering information

REPLACEABLE FRONT PANEL PARTS

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
1	08620-40006	1	WHEEL, RETAINING	28480	08620-40006
2	1480-0072	2	PIN, ROLL .062 DIA X .375" LG	72962	92-012-062-0375
3	08620-20067	2	ARM, LATCH	28480	08620-20067
4	0634-0227		SCREW, MACHINE PAN HD POZI DR. 4-40 THD	00000	OBD
5	2190-0019		WASHER, LOCK	00000	OBD
6	08620-00014	5	ARM, PIVOT	28480	08620-00014
7	08620-20021	1	SHAFT, DRUM	28480	08620-20021
8	08620-00017	1	BRACKET, MICROSWITCH, BAND	28480	08620-00017
9	08620-00017	2	SPRING, PUSHBUTTON	28480	08620-00017
10	2360-1022	5	SCREW, FH 6 - 32X 0.500" LG.	00000	OBD
11	08620-00015	1	BRACKET, LEFT HAND NOTCH	28480	08620-00015
12	08620-00058	1	HINGE	28480	08620-00058
13	08620-00016	1	BRACKET, RIGHT HAND NOTCH	28480	08620-00016
14	08620-00013	5	PLATE, NUT, SWITCH	28480	08620-00013
15	08620-20022	5	PLUNGER, PUSHBUTTON	28480	08620-20022
16	0520-0137	12	SCREW, MACHINE: 2-56 UNC-2A .75" PAN HD	00000	OBD
17	3050-0098	8	WASHER, FLAT 2.094 ID .25 OD	80120	AN960 C2
18	2190-0112	13	WASHER, LOCK HELICAL: 2.088 ID .175	00000	OBD
19	0520-0129	1	SCREW, MACHINE: 2-56 UNC-2A .312" PAN HD	00000	OBD
20	3050-0098		WASHER, FLAT 2.094 ID .25 OD	80120	AN960 C2
21	2190-0112		WASHER, LOCK HELICAL: 2.088 ID .175	00000	OBD
22	08620-20063	1	NUT, SPRING	28480	08620-20063
23	08620-20065	1	SPACER, SPRING	28480	08620-20065
24	1460-0534	1	SPRING, TORSION	28480	1460-0534
25	08620-40005	1	WHEEL, CAM	28480	08620-40005
26	2200-0105	2	SCREW, MACHINE: 4-40 UNC-2A .312" PAN HD	00000	OBD
27	08620-40004	1	FLIPPER, DRUM	28480	08620-40004
28	08620-20057	1	PIN, STEP	28480	08620-20057
29	1460-1163	1	SPRING, COMPRESSION	28480	1460-1163
30	0510-0082	1	RING, RETAINING .17" DIA BE CU	97454	J100-12-BC
31	0510-0055	5	RING, RETAINING	00000	OBD
32	08620-40008	1	WASHER, STOP, KEYS	28480	08620-40008
33	08620-40009	1	WASHER, STOP, UNKEYED	28480	08620-40009
34	3050-0127	5	WASHER, SPRING	00000	OBD
35	0520-0137		SCREW, MACHINE 2-56 UNC-2A .75" PAN HD	00000	OBD
36	3050-0098		WASHER, FLAT 2.094 ID .25 OD	80120	AN960 C2
37	2190-0112		WASHER, LOCK HELICAL 2.088 ID .175	00000	OBD
38	08620-60044	1	FULL SWP DRIVE BELT & POINTER REPL ASSY	28480	08620-60044
39	08620-60046	1	CW DRIVE BELT & POINTER REPL ASSY	28480	08620-60046
40	08620-60047	2	CW VERNIER DRIVE BELT & POINTER REPL ASSY	28480	08620-60047
41	08620-60045	1	MARKER SWP DRIVE BELT & POINTER REPL ASSY	28480	08620-60045
42	1450-0707	5	LAMPHOLDER	28480	1450-0707
43	08620-40012	3	SPROCKET, 10 TOOTH	28480	08620-40012
44	08620-20030	28	ROLLER, BELT	28480	08620-20030
45	08620-20025	5	SCREW, ADJUST	28480	08620-20025
46	08620-20031	5	ROLLER, ADJUSTING	28480	08620-20031
47	2190-0014	5	WASHER, LOCK	00000	OBD
48	0610-0001	5	NUT, HEX	00000	OBD
49	08620-40011	2	SPROCKET, 7 TOOTH	28480	08620-40011
50	08520-20017	1	FRAME, DIAL	28480	08620-20017
51	08620-60047	1	AF, DRIVE BELT & POINTER REPL ASSY	28480	08620-60047
52	08620-20122	1	BRACKET, PC BOARD	28480	08620-20122
53	08620-20071	1	FRAME, PANEL	28480	08620-20071
54	08620-20068	1	ROD, LATCH	28480	08620-20068
55	0510-0060	1	RING, RETAINING	00000	OBD
56	08620-00007	1	BRACKET, BOARDS	28480	08620-00007
57	08620-00020	1	GUARD, FAN	28480	08620-00020
58	08620-00059	1	HANDLE, LATCH	28480	08620-00059
59	2360-0195	1	SCREW, PAN HD POZI DR	00000	OBD
60	2190-0018	1	WASHER, LOCK	00000	OBD
61	3050-0066	1	WASHER, FLAT	00000	OBD
62	1460-0535	1	SPRING, LATCH HANDLE	28480	1460-0535
63	08620-20062	1	SCREW, LATCH BEARING	28480	08620-20062
64	08620-20061	1	BEARING, LATCH	28480	08620-20061
65	3030-0195	5	SCREW, SET	00000	OBD
66	08620-00021	1	SCALE, 0 - 10V CALIBRATE (P/O ACCESSORIES SUPPLIED)	28480	08620-00021
67	08620-20069	1	SUPPORT, LEFT, LATCH ROD	28480	08620-20069
68	08620-00061	1	PLATE, NUT, LEFT	28480	08620-00061
69	2360-0124	2	SCREW, NUT PLATE, LEFT	00000	OBD
70	2950-0001	4	NUT, HEX	00000	OBD
71	2190-0016	8	WASHER, LOCK, STAR	00000	OBD
72	0360-1190	4	LUG, GROUND	00000	OBD
73	0380-0093	4	STANDOFF, HEX	00000	OBD
74	08620-20070	1	SUPPORT, RIGHT, LATCH ROD	28480	08620-20070
75	08620-00062	1	PLATE, NUT, RIGHT	28480	08620-00062
76	2360-0211	2	SCREW, NUT PLATE, RIGHT	00000	OBD
77	08620-40010	5	KNOB, PUSHBUTTON, WHITE	28480	08620-40010
78	0370-1375	5	KNOB, ROUND, JADE GRAY (STD.)	28480	0370-1375
79	5040-0345	2	INSULATOR, CONNECTOR	28480	5040-0345
80	0370-1001	2	KNOB, RND, JADE GRAY FOR 0.125" DIA SHAFT	28480	0370-1001

Figure 6-1. Front Panel Assembly, Parts Locations (1 of 4)

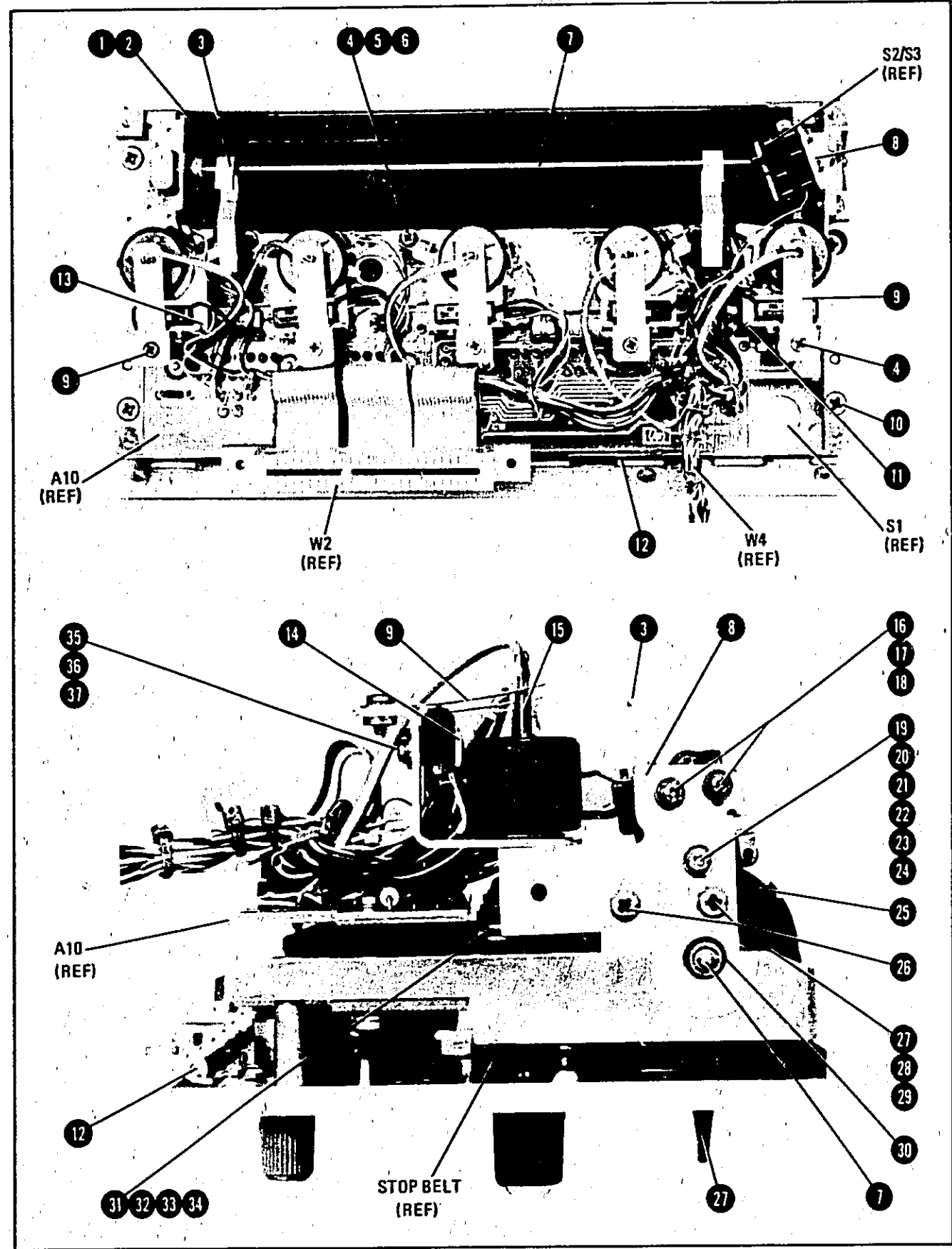


Figure 6-1. Front Panel Assembly, Parts Locations (2 of 4)

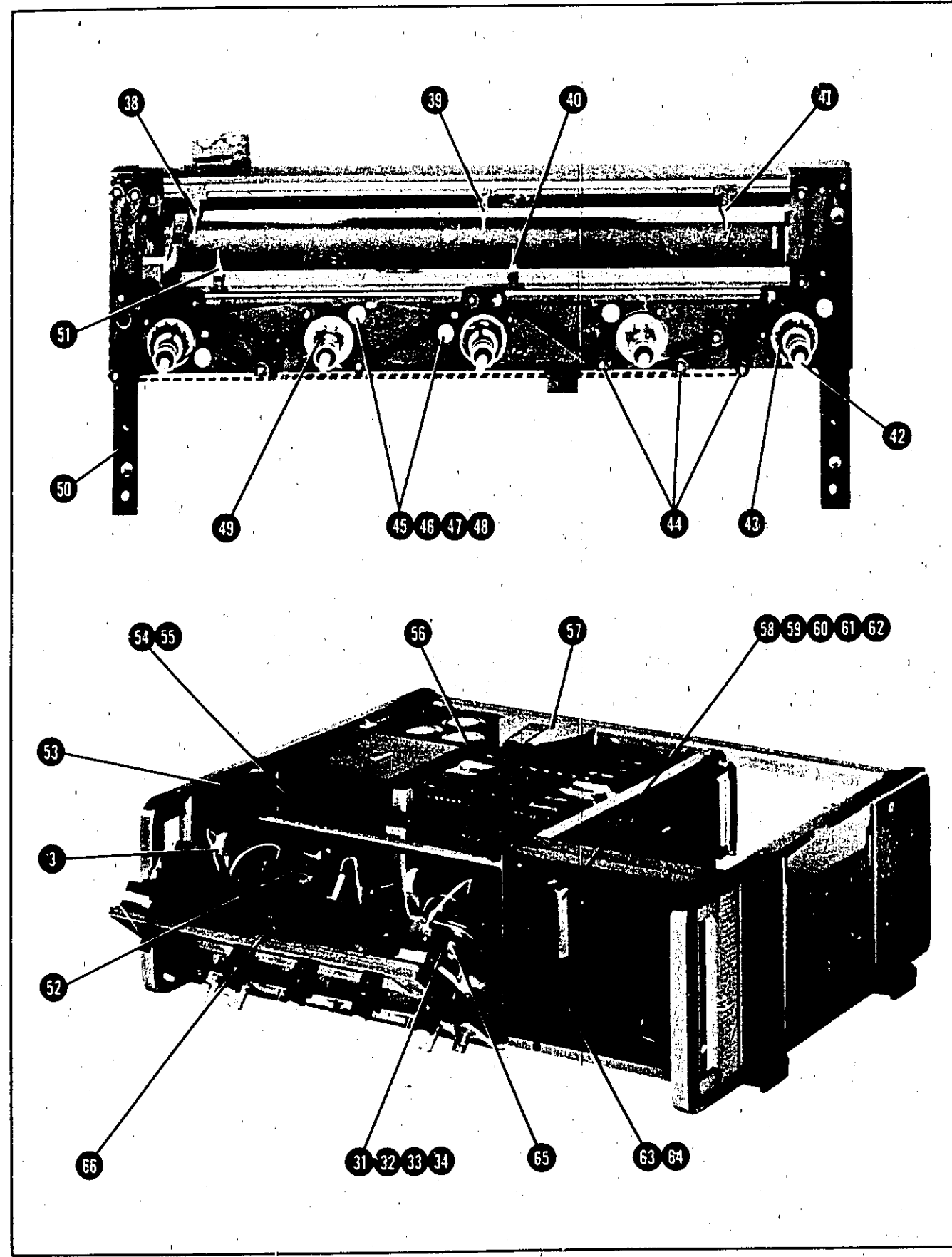


Figure 6-1. Front Panel Assembly, Parts Locations (3 of 4)

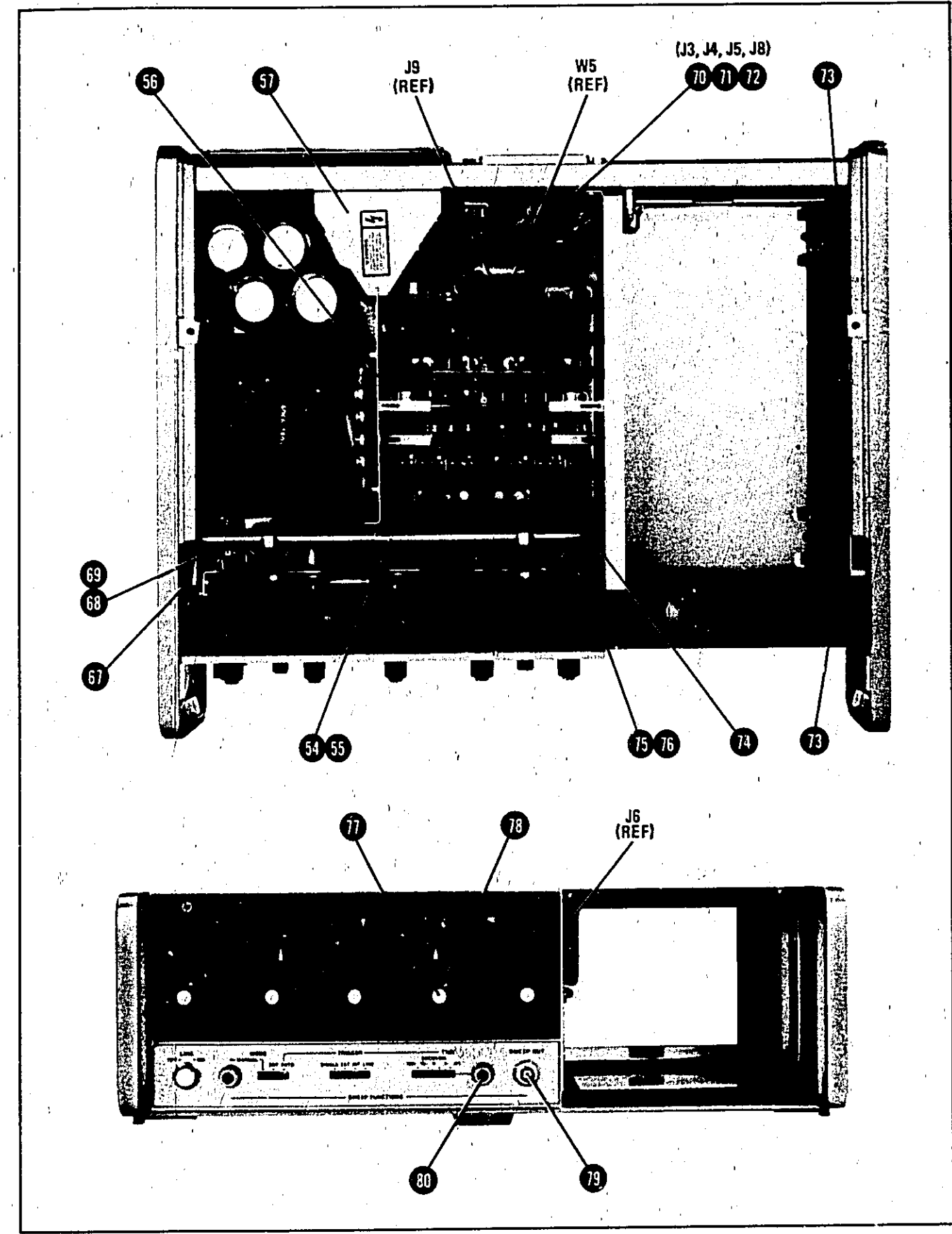
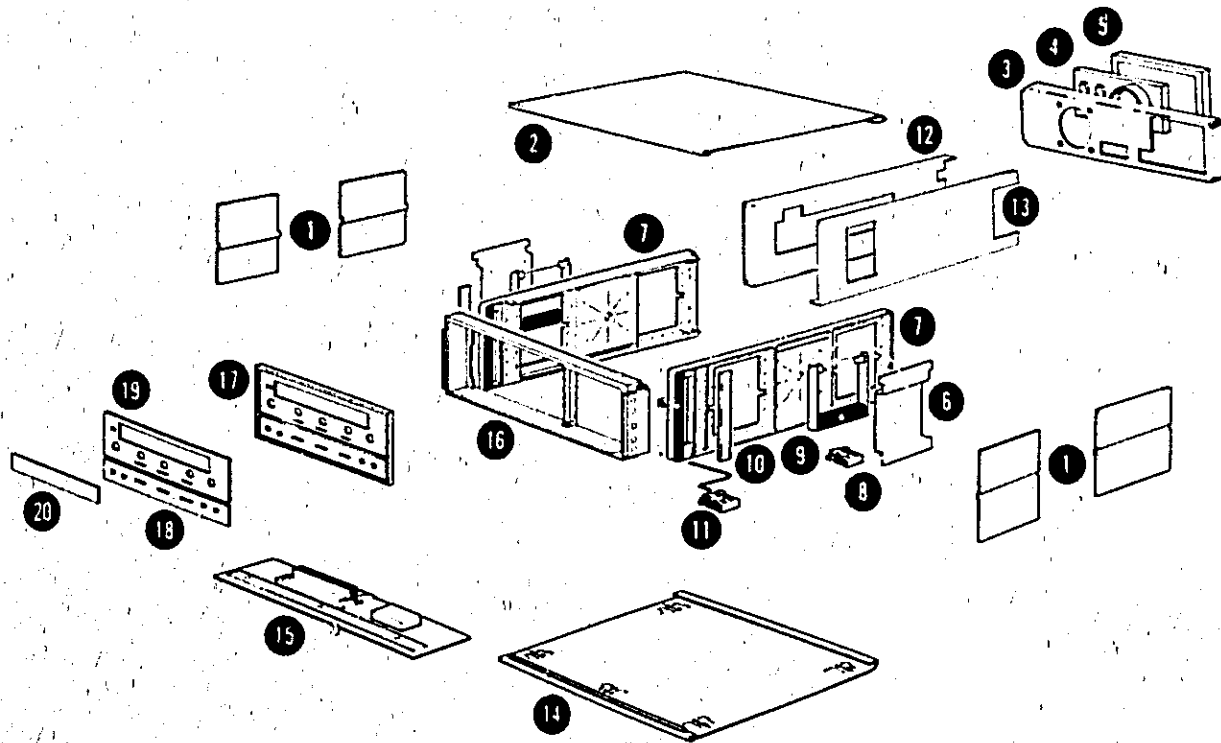


Figure 6-1. Front Panel Assembly, Parts Locations (4 of 4)



REPLACEABLE CABINET PARTS



Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr. Part Number
1	5000-8597	1	Cover: Rear	28480	5000-8597
1	5000-8599	1	Cover: Left Side, Front (Olive Gray, Std)	28480	5000-8599
1	5000-8701	1	Cover: Right Side, Rear (Olive Gray, Std)	28480	5000-8701
1	5000-8703	1	Cover: Right Side, Front (Olive Gray, Std)	28480	5000-8703
2	5060-0271	1	Cover Assy: Top (Olive Gray, Std)	28480	5060-0271
3	08620-00065	1	Panel, Rear	28480	08620-00065
4	08620-20016	1	Heat Sink, Transistor	28480	08620-20016
5	3150-0203	1	Filter-Cartridge Exp Al 3.6-W 6-L	28480	3150-0203
6	5060-8737	2	Retainer, 5H Handle Assembly	28480	5060-8737
7	08620-20001	2	Frame, Side	28480	08620-20001
8	5060-0767	5	Foot Assy: FM	28480	5060-0767
9	5060-0222	2	Handle Assy: 5H Side	28480	5060-0222
10	5000-0051	2	Trim, Strip	28480	5000-0051
11	1490-0030	1	Wireform .187-OD SST, Tilt Stand	28480	1490-0030
12	08620-00060	1	Support, Left	28480	08620-00060
13	08620-00051	1	Support, Right	28480	08620-00051
14	5060-0272	1	Cover Assy: Bottom (Olive Gray, Std)	28480	5060-0272
15	5060-8740	1	Rack Mount Kit, 5H	28480	5060-8740
16	08620-20071	1	Frame, Panel	28480	08620-20071
17	08620-20015	1	Sub-Panel, Front (Fig. 6-2)	28480	08620-20015
18	08620-00044	1	Panel, Front Lower (Fig. 6-2)	28480	08620-00044
19	08620-00064	1	Panel, Front Upper (Fig. 6-2)	28480	08620-00064
20	08620-20058	1	Window, Dial (Fig. 6-2)	28480	08620-20058

Figure 6-2. Cabinet Parts

**BACK DATING  
MANUAL  
CHANGES**

## **SECTION VII MANUAL CHANGES**

### **7-1. INTRODUCTION**

7-2. This section normally contains information for adapting this manual to instruments for which the content does not apply directly. Since this

manual does apply directly to instruments having serial numbers listed on the title page, no change information is given here. Refer to INSTRUMENTS COVERED BY MANUAL in Section I for additional important information about serial number coverage.

# SERVICE INFO

## SECTION VIII SERVICE

### 8-1. INTRODUCTION

8-2. This section provides instructions for troubleshooting and repairing the Model 8620C Sweep Oscillator mainframe. Schematic presentations in this manual show electrical circuit operation and are not intended to serve as wiring diagrams.

### 8-3. PRINCIPLES OF OPERATION

8-4. Detailed circuit description for each individual schematic diagram is provided with the final manual. (See paragraph 1-3.)

### 8-5. TROUBLESHOOTING

#### WARNING

With the top cover removed, terminals are exposed that may, if contacted, cause personal injury.

8-6. To assist in repair and troubleshooting, the signals and voltages to the mainframe/plug-in interface connector J6 are shown in Table 8-1. Figure 8-6 shows the interconnections for the flexible cable assembly W2. A complete troubleshooting procedure will be provided in a final manual.

8-7. Troubleshooting will be divided into two maintenance levels. The first level will isolate a trouble to a circuit or assembly using a troubleshooting flow diagram. The second level will isolate the trouble to the component using schematic diagrams and circuit descriptions. Some schematics in this manual contain waveforms and voltages for use during troubleshooting. The test conditions for waveforms and voltages are given in the Schematic Diagram Notes in Figure 8-8.

8-8. When troubleshooting a transistor stage, check for a forward bias condition of the base-emitter junction. If this condition exists, the next step is to remove this forward bias by shorting the base to the emitter and checking to see if the

collector voltage rises to the approximate level of the supply. The next check that can be made, if it is known that the transistor is not operating in a saturated condition, is to check for a voltage drop between emitter and collector. Obviously these serve only as quick checks and will help in getting started with the problem. When an operational amplifier is suspected of being bad, and since the inputs should not draw current, a test can be made by inserting some resistance in series with the input, and checking for a voltage drop across the resistor. If there is a voltage drop, the operational amplifier should be replaced.

### 8-9. SAFETY CONSIDERATIONS

8-10. Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition (see Sections II, III, and V). Service and adjustments should be performed only by qualified service personnel.

#### WARNING

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

8-11. Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when required, should be done only by skilled persons who are aware of the hazard involved.

8-12. Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

8-13. 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 fuseholders must be avoided.

8-14. Whenever it is likely that this protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

**WARNING**

The service information is often used with power supplied and protective covers removed from the instrument. Energy available at many points may, if contacted, result in personal injury.

**8-15. ASSEMBLY SERVICE SHEETS**

8-16. The schematics are arranged by service sheets. The service sheet numbers appear in the lower right-hand corner of the schematics (large number above assembly number). Included on the service sheet is the schematic and component locations. A list of service sheets cross-referenced to assemblies is given in Table 8-1.

**8-17. RECOMMENDED TEST EQUIPMENT**

8-18. Test equipment and accessories required to maintain the Model 8620C are listed in Table 1-4. If the equipment listed is not available, equipment that meets the minimum specification shown may be substituted.

**8-19. REPAIR**

**8-20. Service Accessory Kit**

8-21. A service accessory kit, HP Part No. 08620-60124 is available as an aid in maintaining the Model 8620C and its associated RF Plug-in and Oscillator Module. This kit is described in Figure 1-3.

**8-22. Cleaning Switches**

**CAUTION**

When cleaning board-mounted front-panel switches, do not allow the switch to slide out of guides. The switch is very difficult to properly assemble back into the guides.

8-23. Board-mounted switches on switch assembly A9 may be cleaned without disassembling the switch. Since the switch is assembled with great precision, disassembly of the switch should not be attempted.

**CAUTION**

Isopropyl alcohol will damage the pointer drive belts on the front panel. To clean the switches on A9, the switch board should be removed from the front panel to prevent inadvertent damage to the drive belts from alcohol.

8-24. The cleaning agent to be used on the switches is isopropyl alcohol, HP Part No. 8500-0755. Spray the solvent into the switch and slide the switch back and forth within the guides. Repeat this procedure several times, continue to slide the switch back and forth until the solvent is evaporated.

**8-25. Front Panel Disassembly**

8-26. To remove hinged front panel assembly from mainframe, perform the following:

a. Remove bottom cover, plastic filler strip, and five screws used to secure hinged front panel to mainframe (Figure 8-1).

b. Disconnect W2J1 from A11P1.

c. Remove front panel assembly through front frame opening.

8-27. To remove dial frame from front panel assembly, proceed as follows:

a. Remove all front-panel knobs with right-angle hex key .050 (HP Part No. 8710-0857).

b. Remove retaining nuts on MANUAL and TIME potentiometers and on the SWEEP OUT connector.

c. Remove five screws holding dial frame to front panel (Figure 8-2).

8-28. To remove A9/A10 switch/interconnect assembly, remove three screws holding the assembly to front panel (Figure 8-3).

8-29. To disassemble A9 switch assembly from A10 front interconnect, remove six bolts holding two boards together (Figure 8-3).

**8-30. Restraining Pointer Belts**

8-31. Use the following procedure to restring any of the pointer belts. (See Figures 8-4 and 8-5).

a. Remove front panel as described in Paragraphs 8-26 and 8-27.

b. Loosen adjustment idler shown on restringing diagram in Figure 8-5 for belt being replaced.

c. Turn drive sprocket fully counterclockwise.

d. For a FULL SWEEP, MARKER SWEEP, or CW belt:

1. Turn drive sprockets of two unbroken belts fully counterclockwise to move both pointers to left-hand edge of scale.

2. Place new belt in slot and move pointer to left edge of scale.

3. If it is a FULL SWEEP or MARKER SWEEP belt, line new belt pointer up with left-hand edge mark of scale so pointer covers end mark.

4. If it is a CW belt, line new belt pointer up so that it is offset to left about 1/64th of an inch from left-hand edge mark of scale.

5. Restring belt as shown in Figure 8-5 and tighten belt with adjustment idler.

6. Recheck belt pointer at fully counterclockwise position of drive sprocket. FULL SWEEP or MARKER SWEEP pointer should cover end mark on scale and CW pointer should be 1/64th of an inch to left of end mark.

e. For ΔF or CW VERNIER belt:

1. Place belt in slot and move left edge of pointer body 1/16th inch past edge of pointer guide slot.

2. Restring belt as shown in Figure 8-5 and tighten belt with adjustment idler.

3. Recheck that at fully counterclockwise position of drive sprocket, the left edge of pointer body goes approximately 1/16th inch beyond white metal guide.

f. Make adjustments in circuit that had belt restring, as outlined in Section V.

g. Reassemble front panel.

*Table 8-1. Service Sheet Cross-Reference*

Service Sheet	Assembly Numbers	Schematic	Component Locations
1	A1, A9, and A10	Figure 8-10 (1 of 2)	Figure 8-9
1	A1, A9, and A10	Figure 8-12 (2 of 2)	Figure 8-11
2	A2	Figure 8-14	Figure 8-13
3	A3	Figure 8-16	Figure 8-15
4	A4, A8, and A11	Figure 8-18	Figure 8-17
5	A5, A8, and A11	Figure 8-20	Figure 8-19
6	A6	Figure 8-22	Figure 8-21
7	A7 and A11	Figure 8-24	Figure 8-23
8	A1, A4, A5, A8, A9, A10, and A11	Figure 8-26	Figure 8-25
9	A9, A10, and A11	Figure 8-28 (1 of 2)	Figure 8-27 (A9 Assembly)
9	A9, A10 and A11	Figure 8-30 (2 of 2)	Figure 8-28 (A10 Assembly)

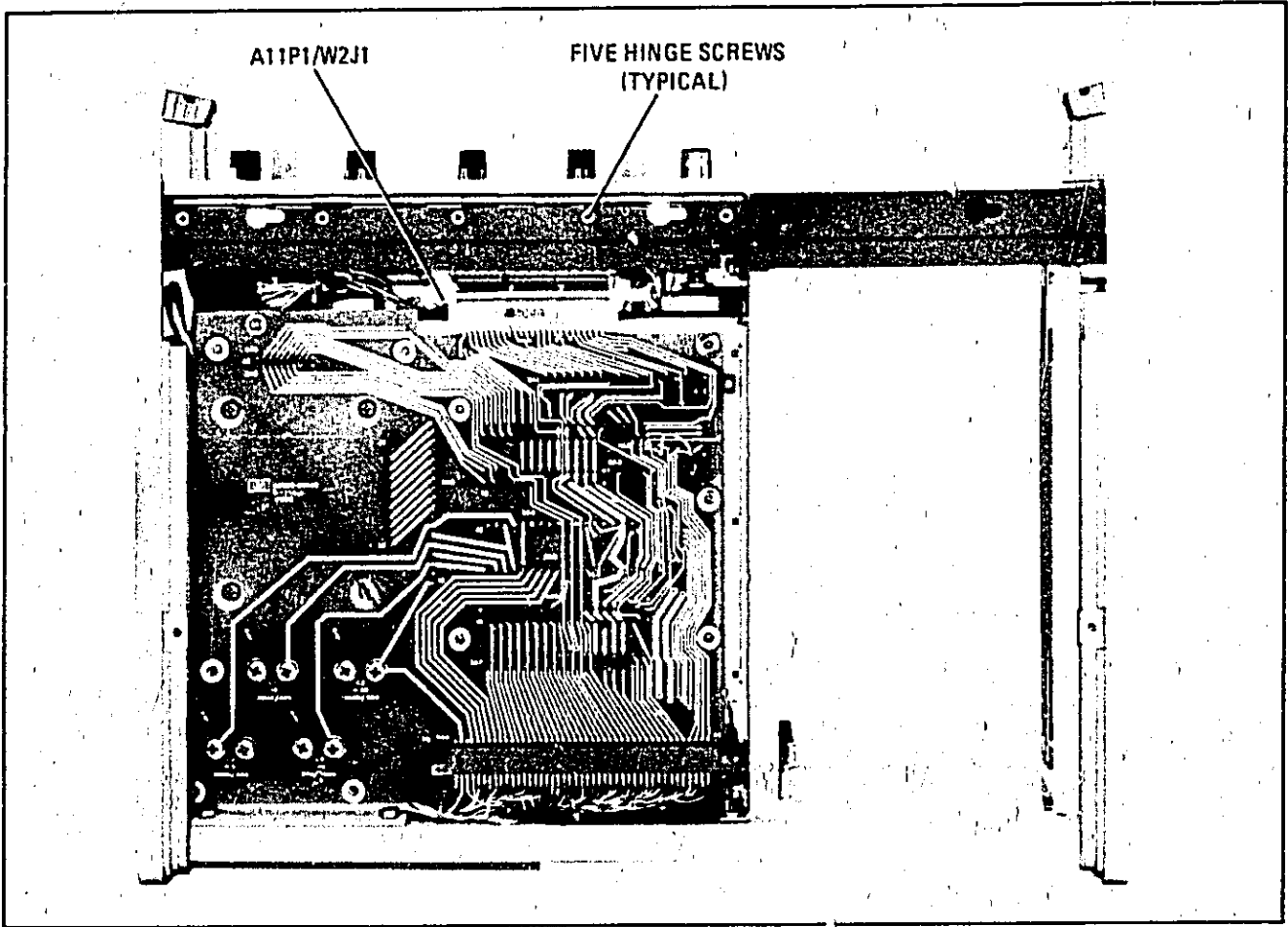


Figure 8-1. Removing Hinged Front Panel Assembly From Mainframe

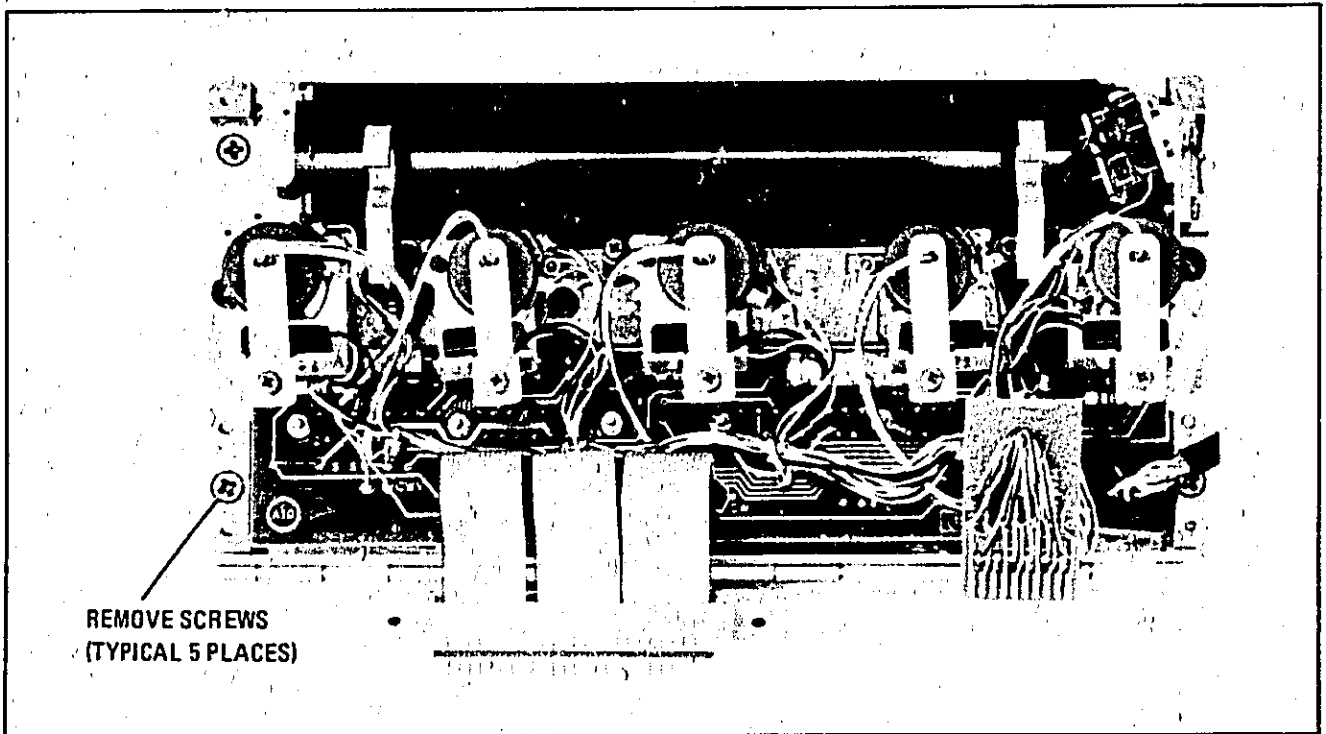


Figure 8-2. Removing Dial Frame From Front Panel



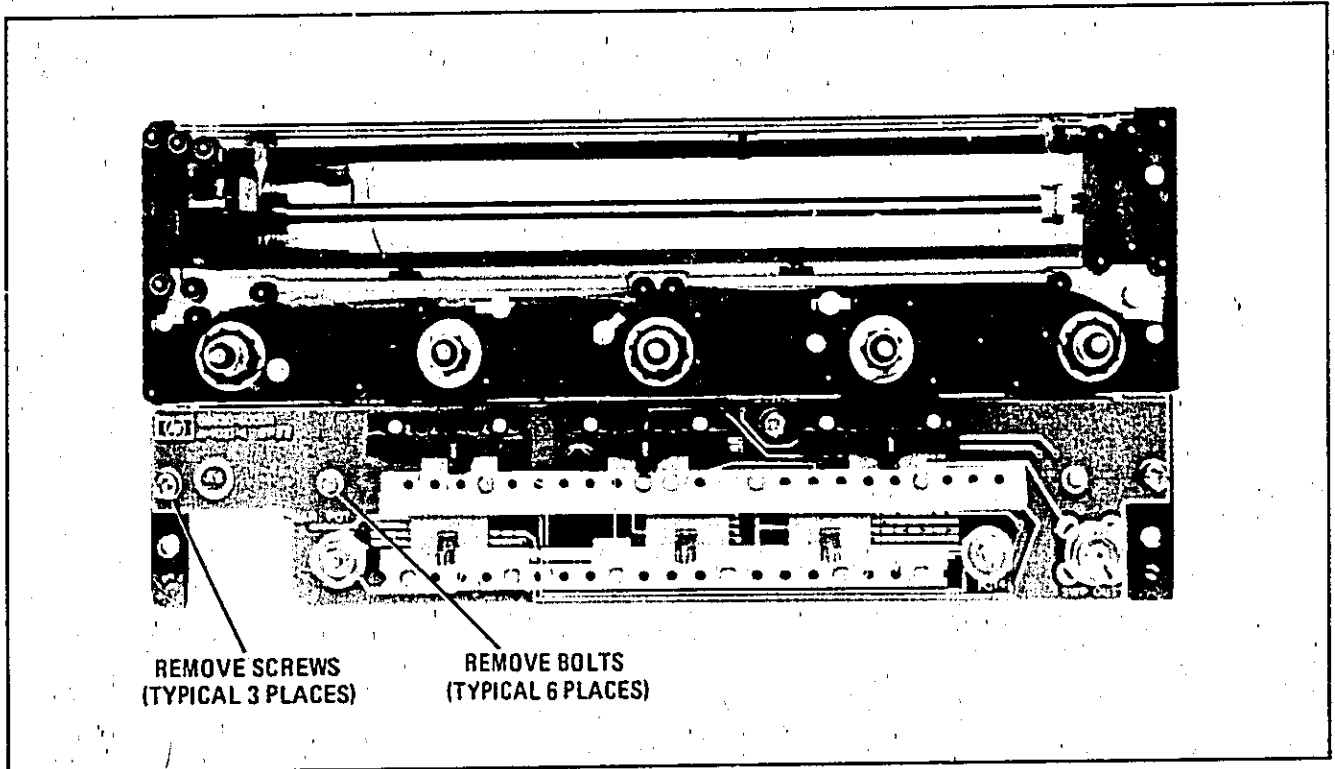


Figure 8-3. Removal and Disassembly of A9 Switch Assy and A10 Front Interconnect Assy

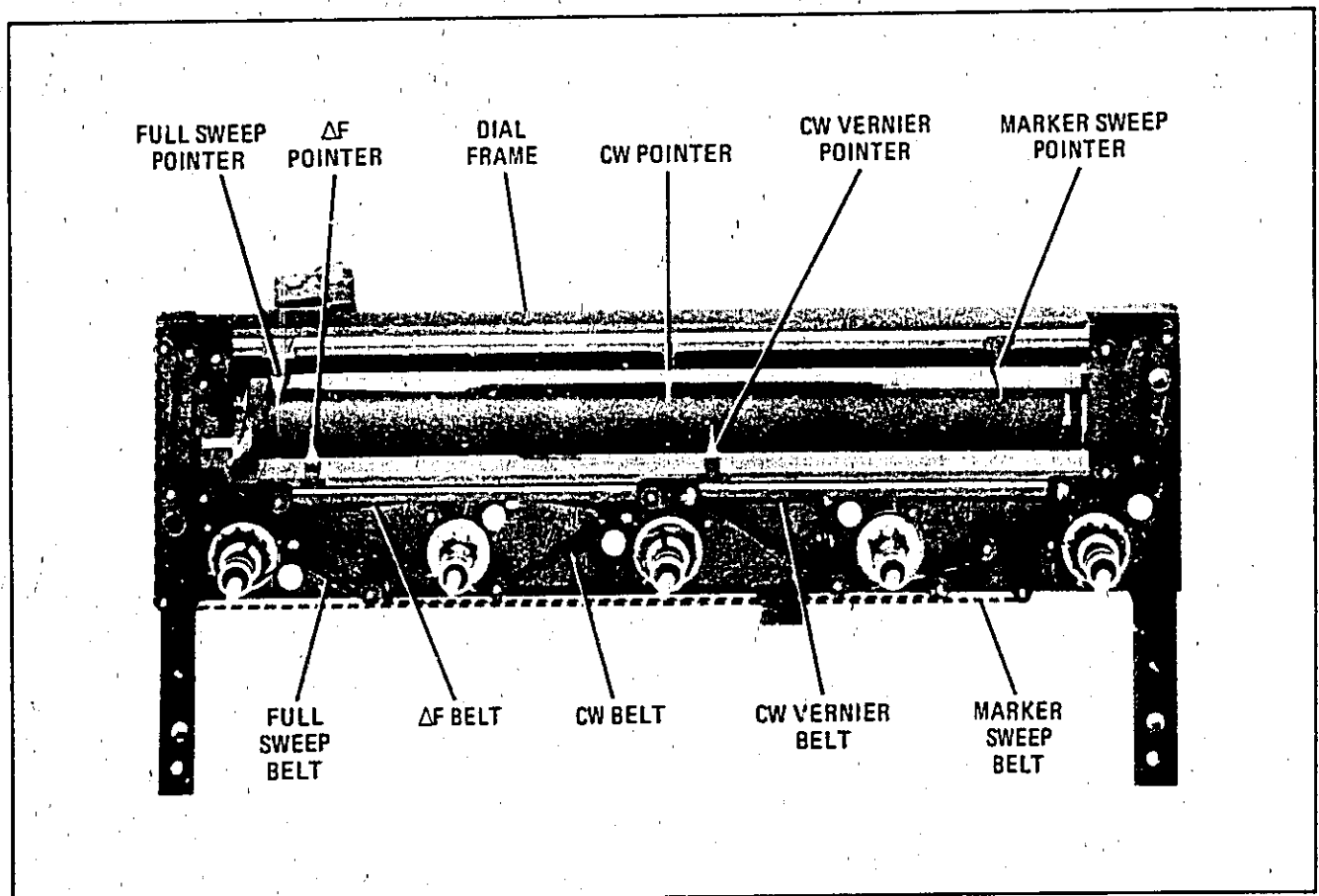


Figure 8-4. Location of Pointer Belts

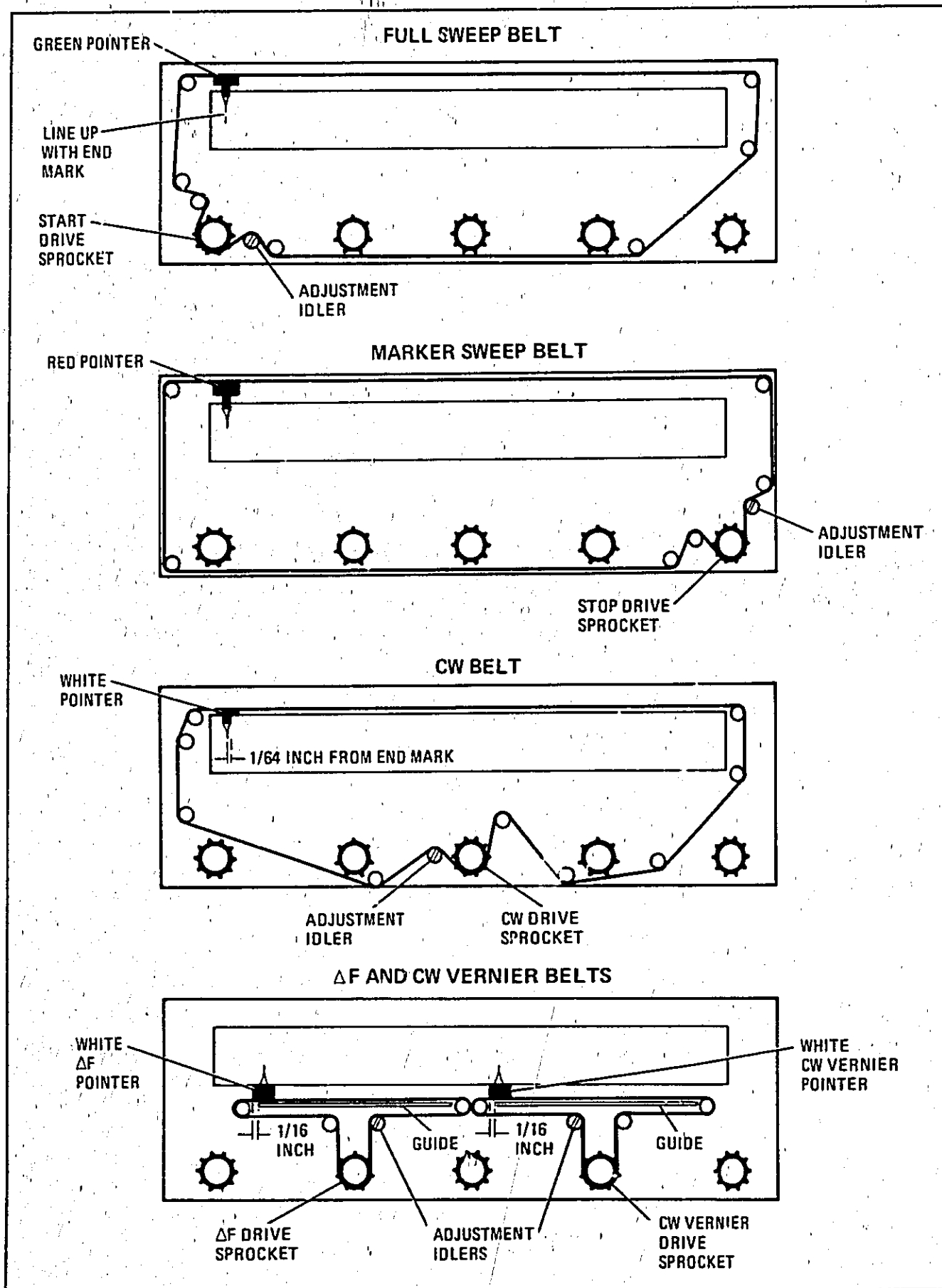


Figure 8-5. Pointer Belt Restringing Diagrams

Table 8-2. Interface Connector J6 Signals or Voltages

Pin on J6	Signal or Voltage
1	Tuning Voltage
2	CW and MANUAL Gate
3	RF BLANKING (Switched)
4	Fast Sweep Compensation Enable
5	Ext AM Modulation
6	1 kHz Internal Square Wave
7	NOT USED
8	NOT USED
9	+20V, Freq Reference
10	Ground, Freq Reference
11	-10V, Freq Reference
12	RF SW, POSITION 1 DRIVE to A7 RF SW DRIVER
13	RF SW, POSITION 1 COIL DRIVE
14	RF SW, POSITION 2 DRIVE to A7 RF SW DRIVER
15	RF SW, POSITION 2 COIL DRIVE
16	NOT USED
17	NOT USED
18	Sequential Sync
19	Remote Enable
20	Remote BCD 1, 10 dB
21	Remote BCD 2, 20 dB
22	Remote BCD 3, 40 dB
23	Sweep Out
24	RF BLANKING (Unswitched)
25	Band 2 Turn-On
26	Band 1 Turn-On
27	Band 4 Turn-On
28	Band 3 Turn-On
29	-40V "
30	-10V Unregulated
31	-10V
32	Ground, High Current
33	+5V
34	+20V
35	Ground, Low Current
36	RF Marker

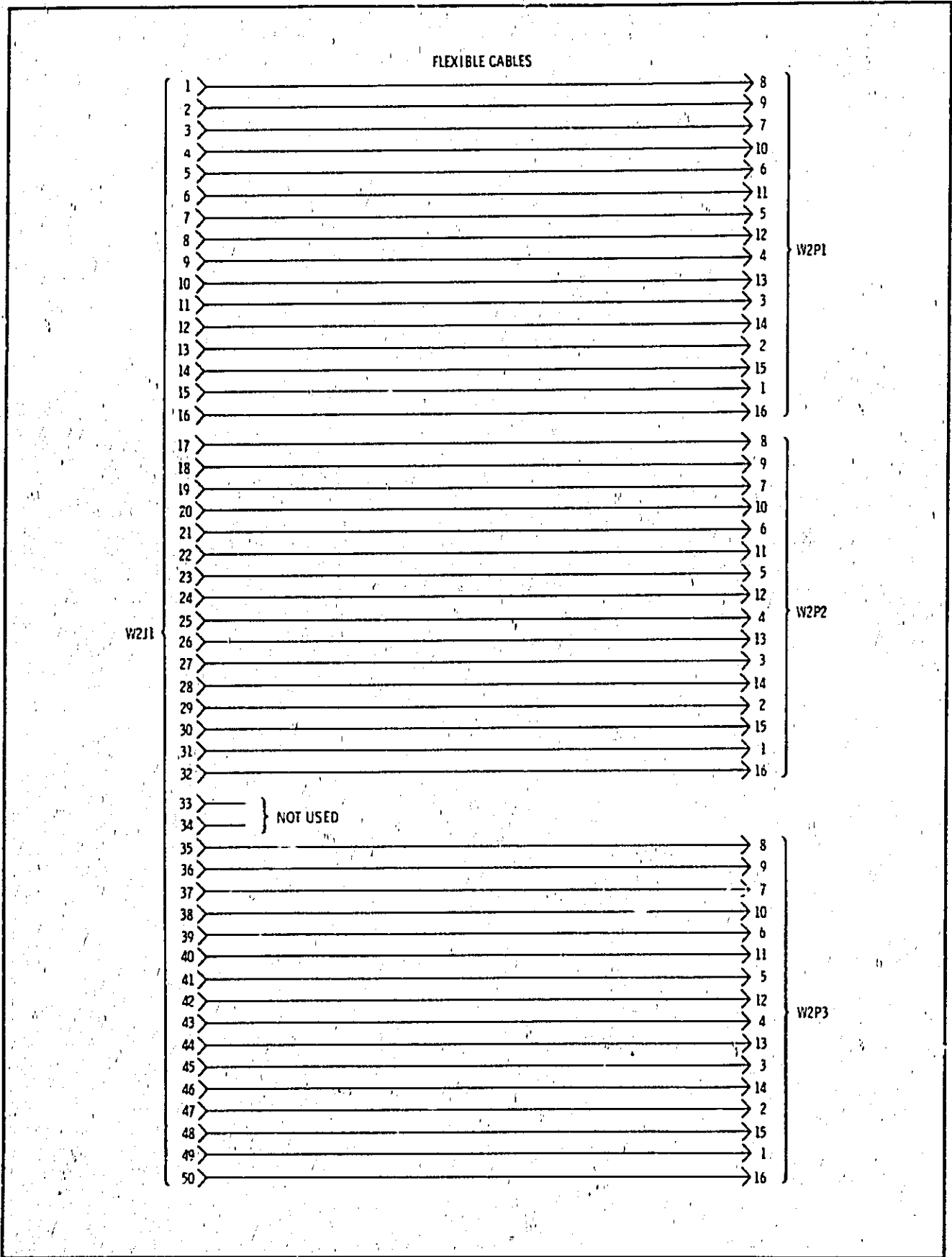


Figure 8-6. W2 Flexible Cable Assembly

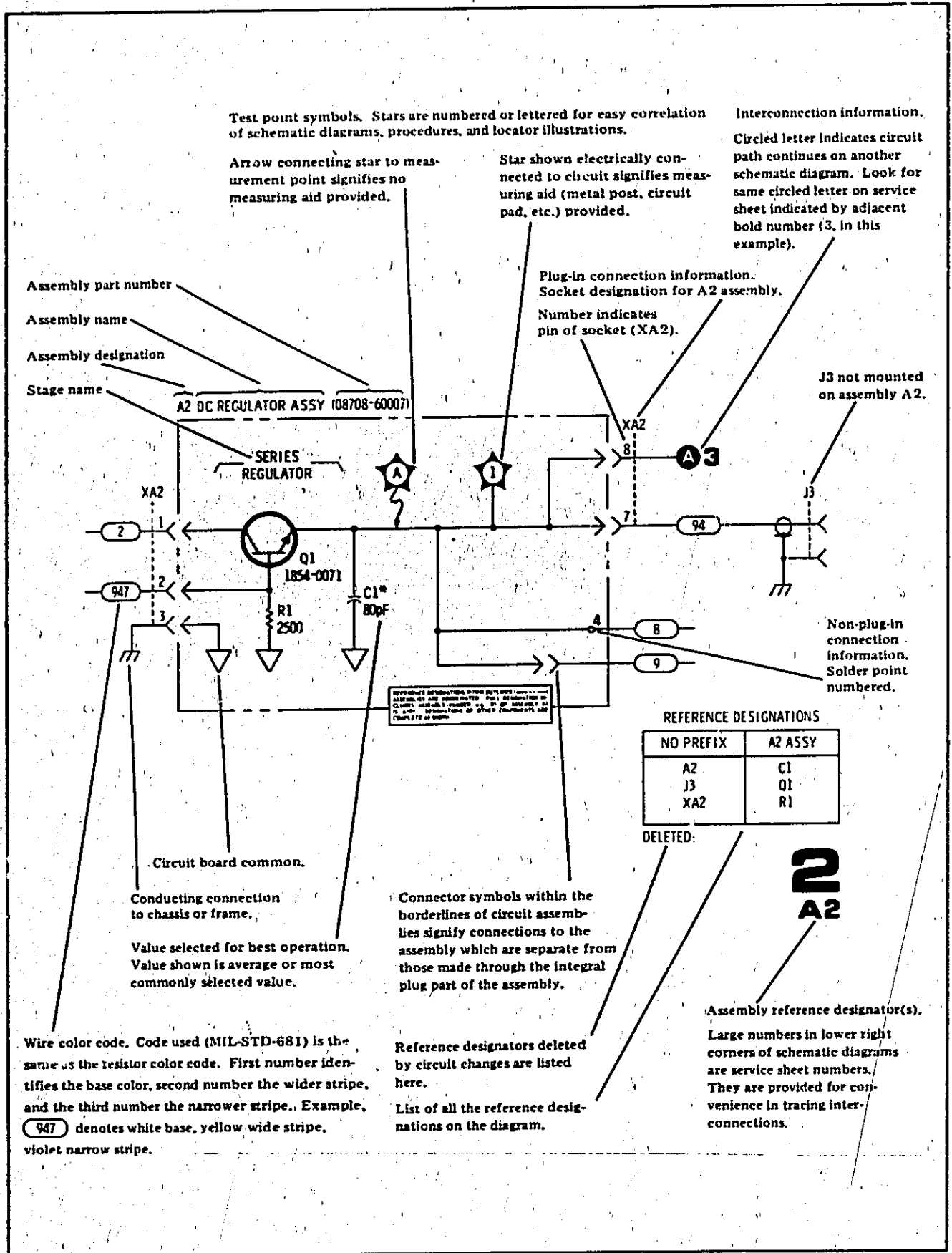


Figure 8-7. General Information on Schematic Diagrams

**SCHEMATIC DIAGRAM NOTES**

- R, L, C** Resistance is in ohms, inductance is in millihenries, capacitance is in microfarads, unless otherwise noted.
- P/O** Part of.
- \*** Asterisk denotes a factory-selected value. Value shown is typical.
- Panel control.
- ◐** Screwdriver adjustment.
- ▭** Encloses front panel designation.
- ▭** Encloses rear panel designation.
- Circuit assembly borderline.
- Other assembly borderline.
- Heavy line with arrows indicates path and direction of main signal.
- - - - - →** Heavy dashed line with arrows indicates path and direction of main feedback.
- CW** Wiper moves toward CW with clockwise rotation of control as viewed from shaft or knob.
- Encloses wire color code. Code used (MIL-STD-631) 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.
- 2A** Number = Service Sheet number for off-page connection.  
Letter = off-page connection.
- ⊕** Light-emitting diode (LED).
- ⊕** Breakdown diode.
- ⊕** PIN diode.
- ⊕** Field effect transistor (FET) with N-type base.

*Figure 8-8. Schematic Diagram Notes (1 of 3)*

**SCHEMATIC DIAGRAM NOTES (Cont'd)**



Field effect transistor (FET) with P-type base.



Operational amplifier (integrated circuit).



Test point location. Number denotes test point number.



Assembly ground.



Chassis ground.



Earth ground.



Common connection on same page.



Signal ground.



Indicates "WARNING: HAZARDOUS VOLTAGE."



Refers serviceman or operator to CAUTIONS in Operating and Service Manual.



Frequency Reference Ground



Denotes spring-loaded switch.

Figure 8-8. Schematic Diagram Notes (2 of 3)

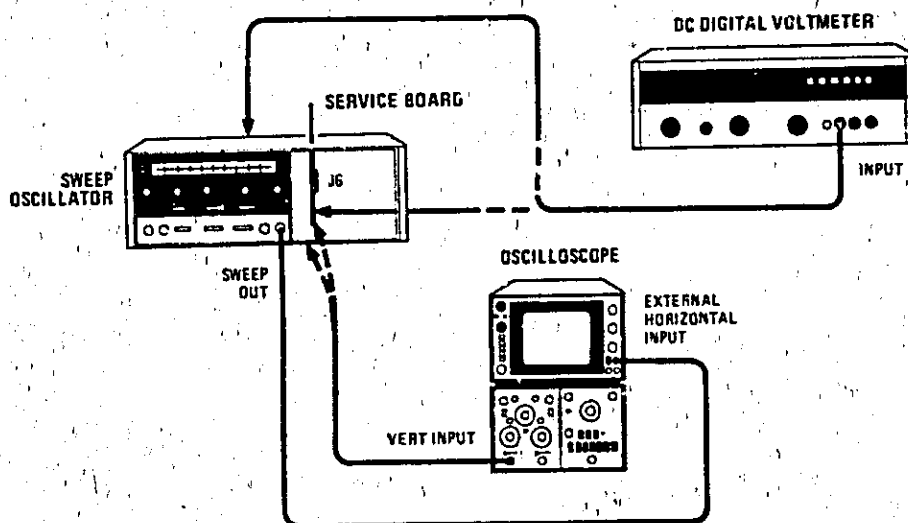
**SCHEMATIC DIAGRAM NOTES**

Voltages noted within circuits are  $\pm 10\%$  tolerance.

Conditions for waveforms and dc voltages on schematics are as follows:

- a. Place 8620C in FULL SWEEP mode of operation. (FULL SWEEP pushbutton pressed.)
- b. Connect equipment as shown in test setup below.
- c. Set controls on 8620C as follows:

START MARKER pointer	Scale graduation at left-hand edge
CW MARKER pointer	Center scale graduation
STOP MARKER pointer	Scale graduation at right-hand edge
MARKER	OFF
LINE	ON
MODE	AUTO
TRIGGER	INT
TIME/SECONDS	1 - .01
Sweep TIME Vernier	Fully clockwise
Rear Panel 1kHz SQ WV/OFF	OFF
Rear Panel DISPLAY BLANKING/OFF	OFF
Rear Panel RF BLANKING/OFF	OFF



*Test Setup for Waveforms and Voltages Shown on Diagrams*

**EQUIPMENT:**

Oscilloscope (with 10:1 probe)	HP 181A/1801A/1820C
Digital Voltmeter	HP 3462A
Extender Board	HP 5060-2041
35-Pin Service Board	HP 08620-60037

*Figure 8-8. Schematic Diagram Notes (3 of 3)*



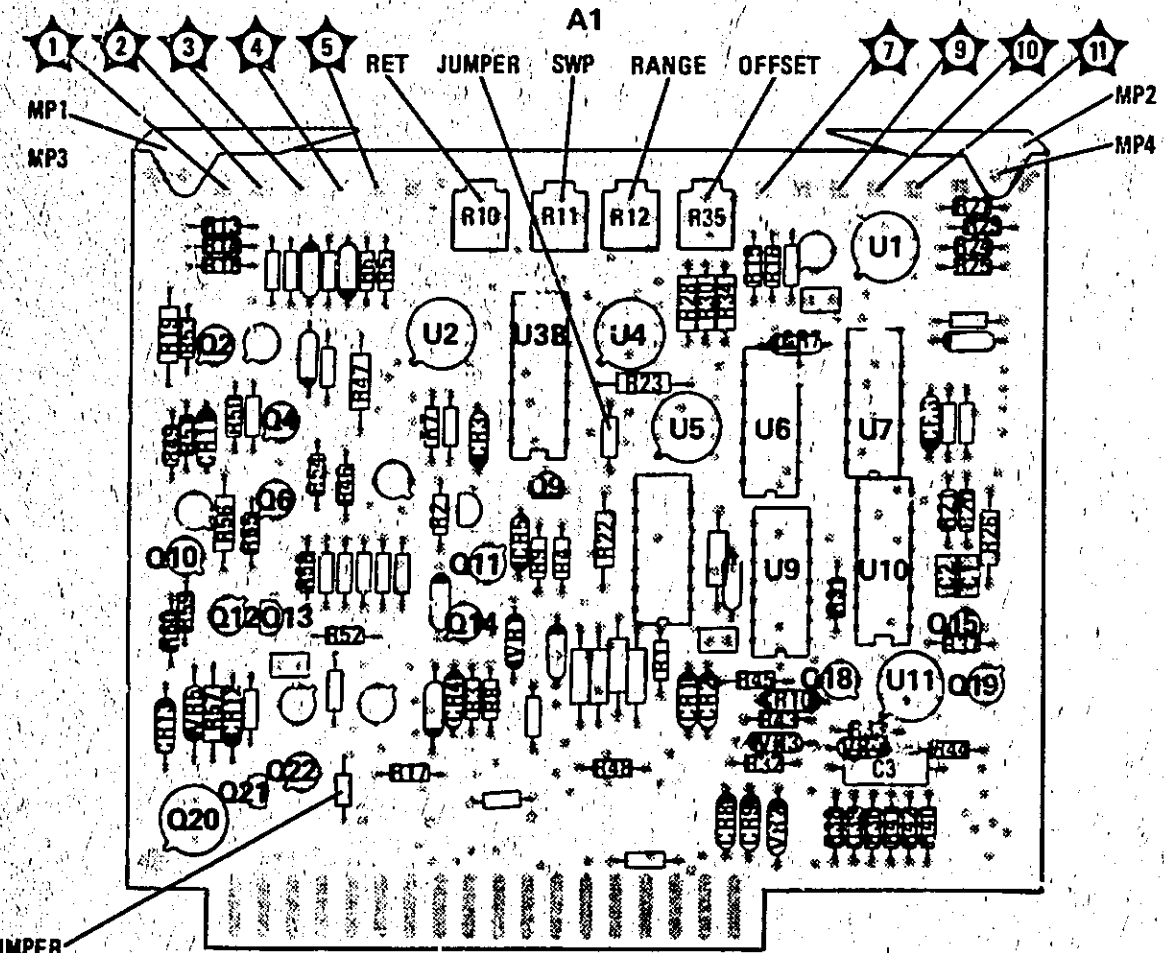


Figure 8-9. P/O A1 Sweep Generator Assembly, Component Locations

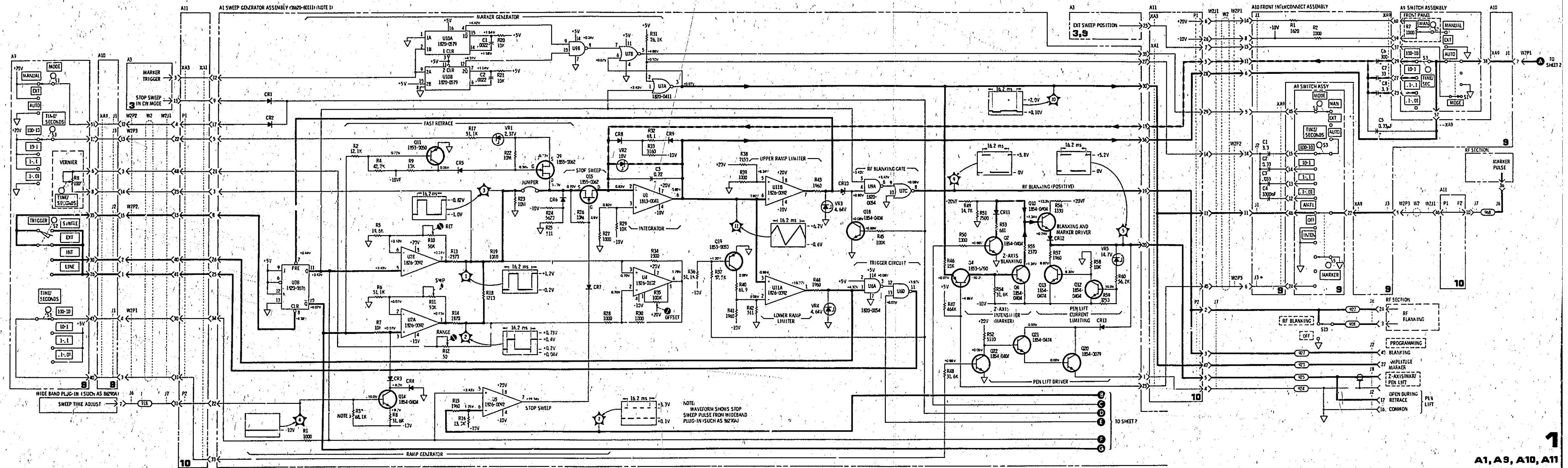


Figure 8-10. A1 Sweep Generator Assembly, Schematic (1 of 2)



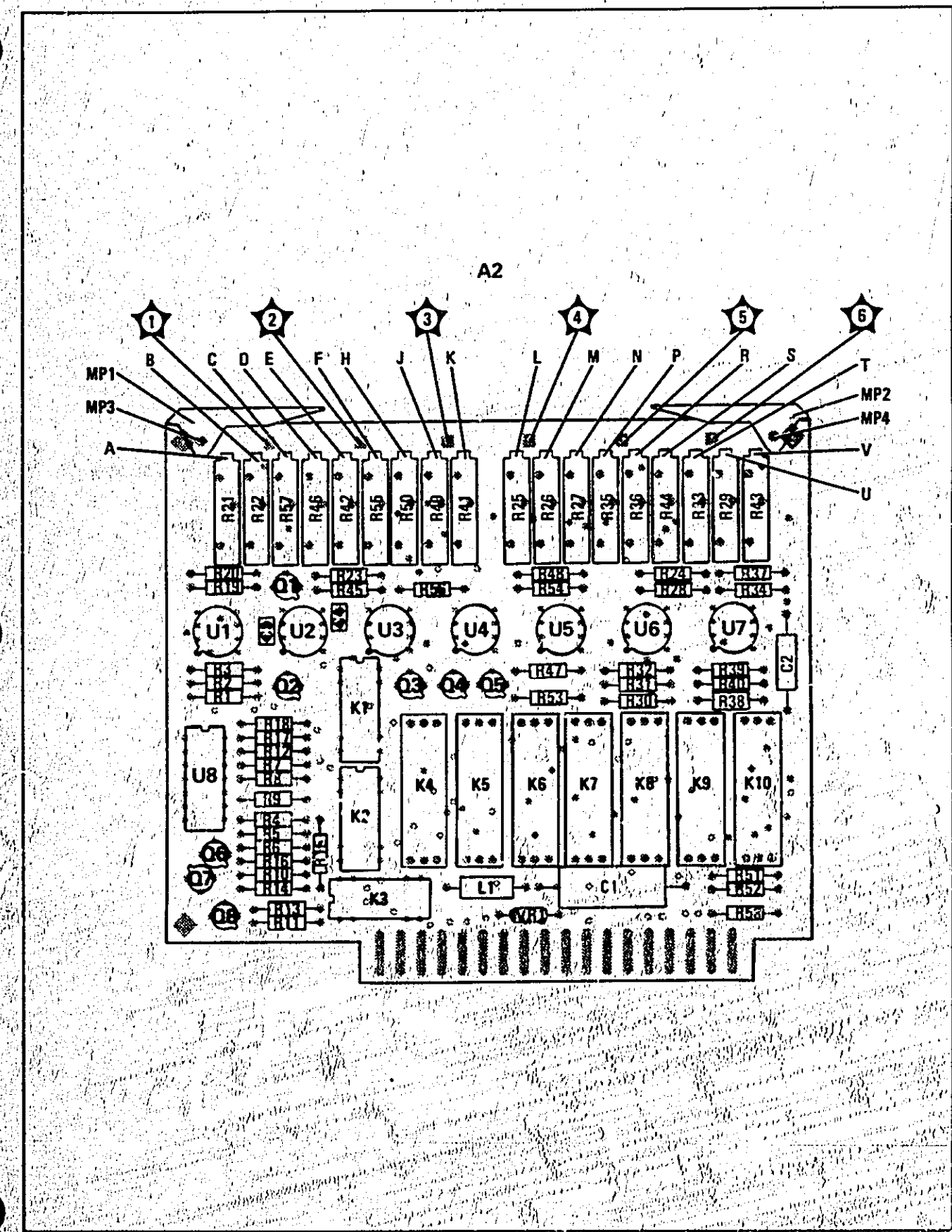


Figure 8-13. A2 Frequency Control Assembly, Component Locations

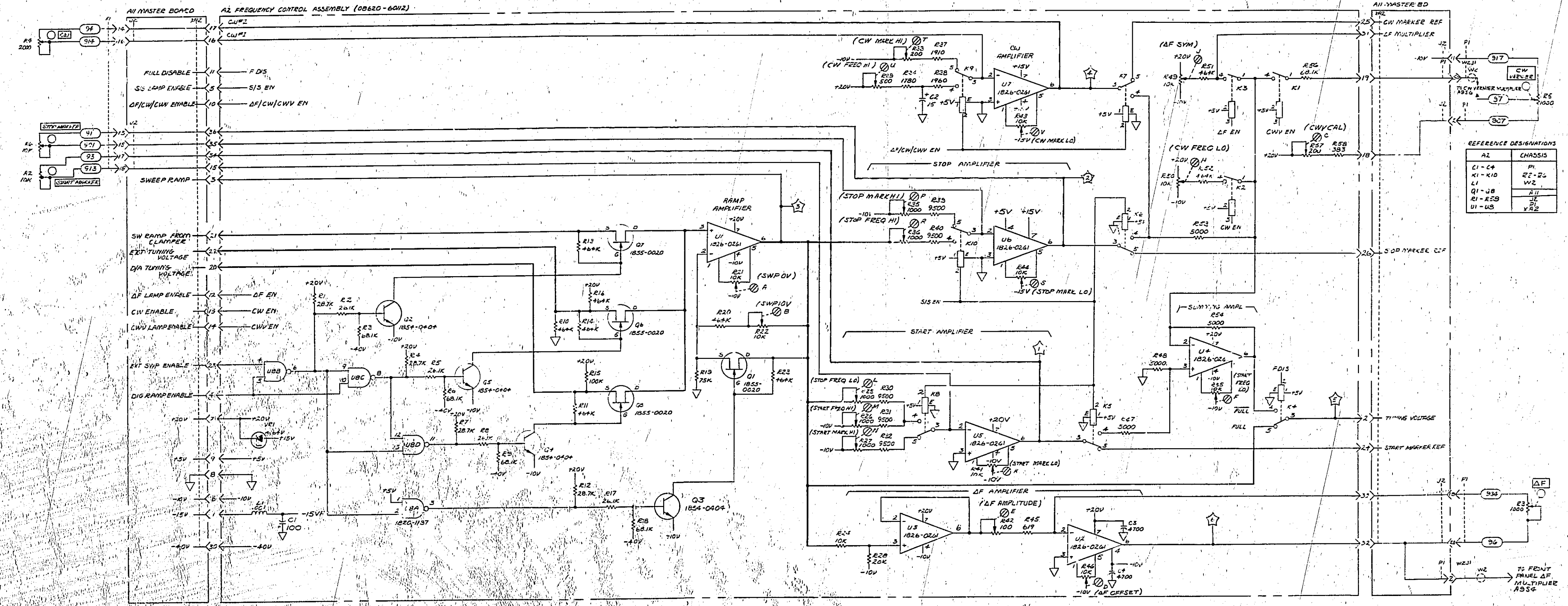


Figure 8-14. A2 Frequency Control Assembly, Schematic

**SERVICE INFO**

**CON'T**



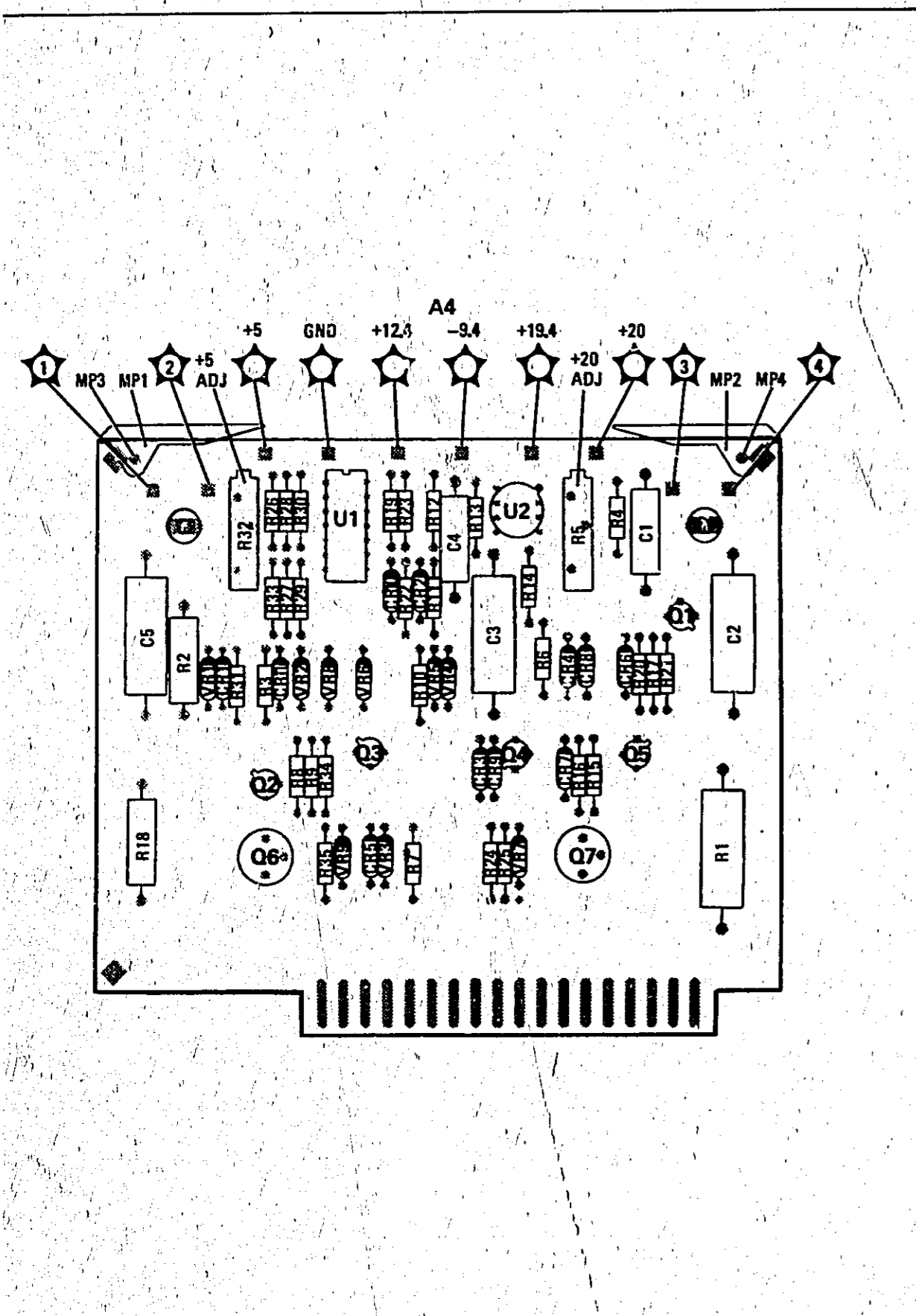


Figure 8-17. A4 +20V and +5V Regulator Assembly, Component Locations

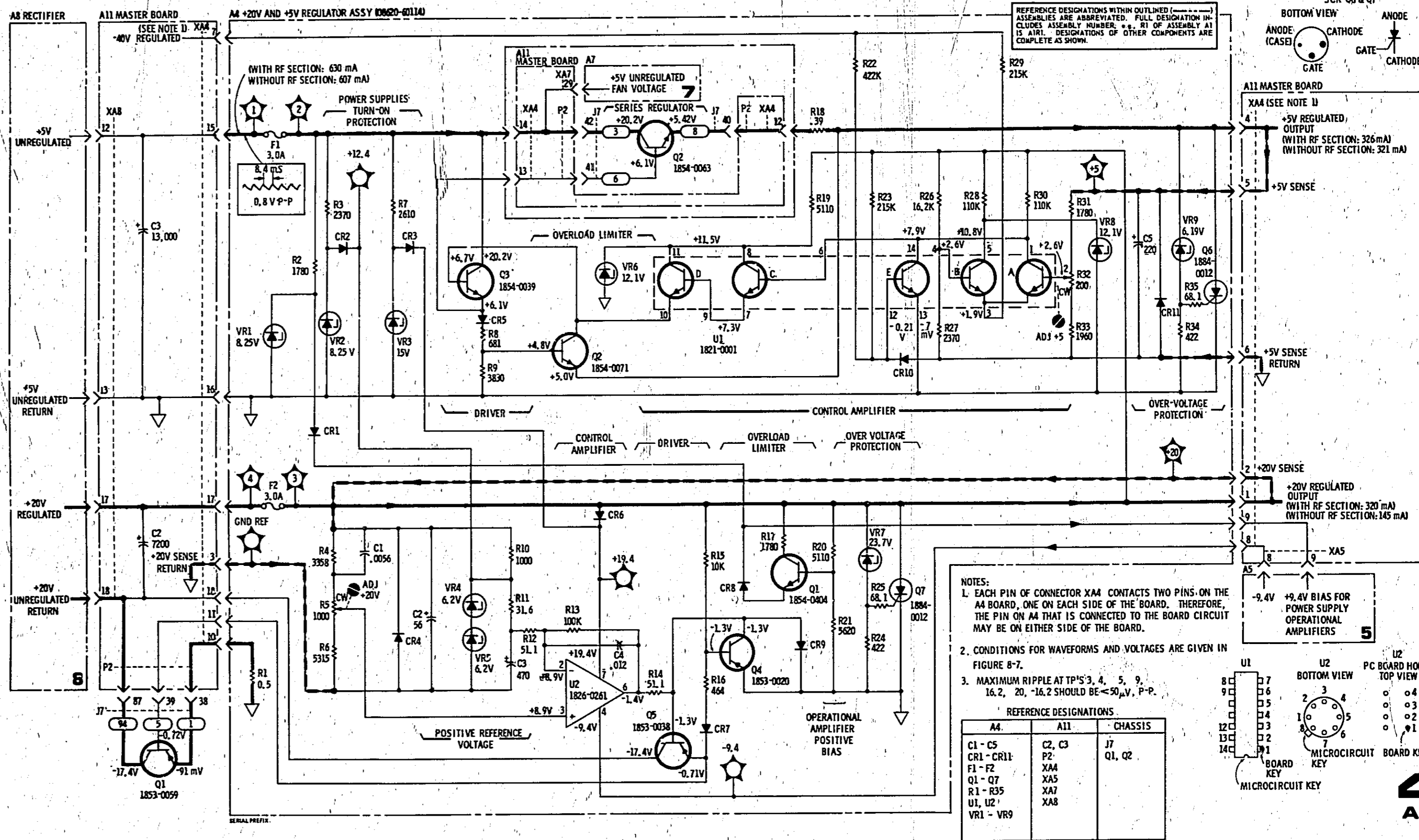
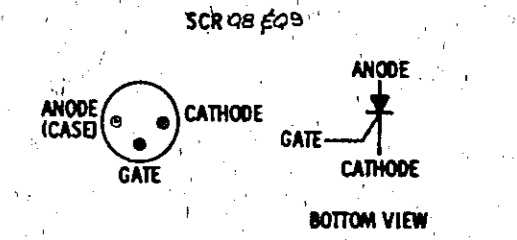
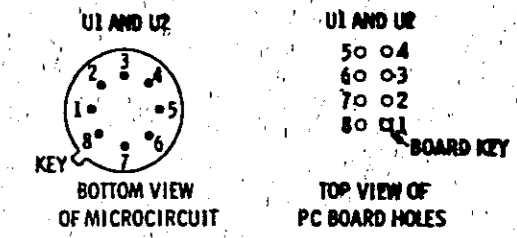
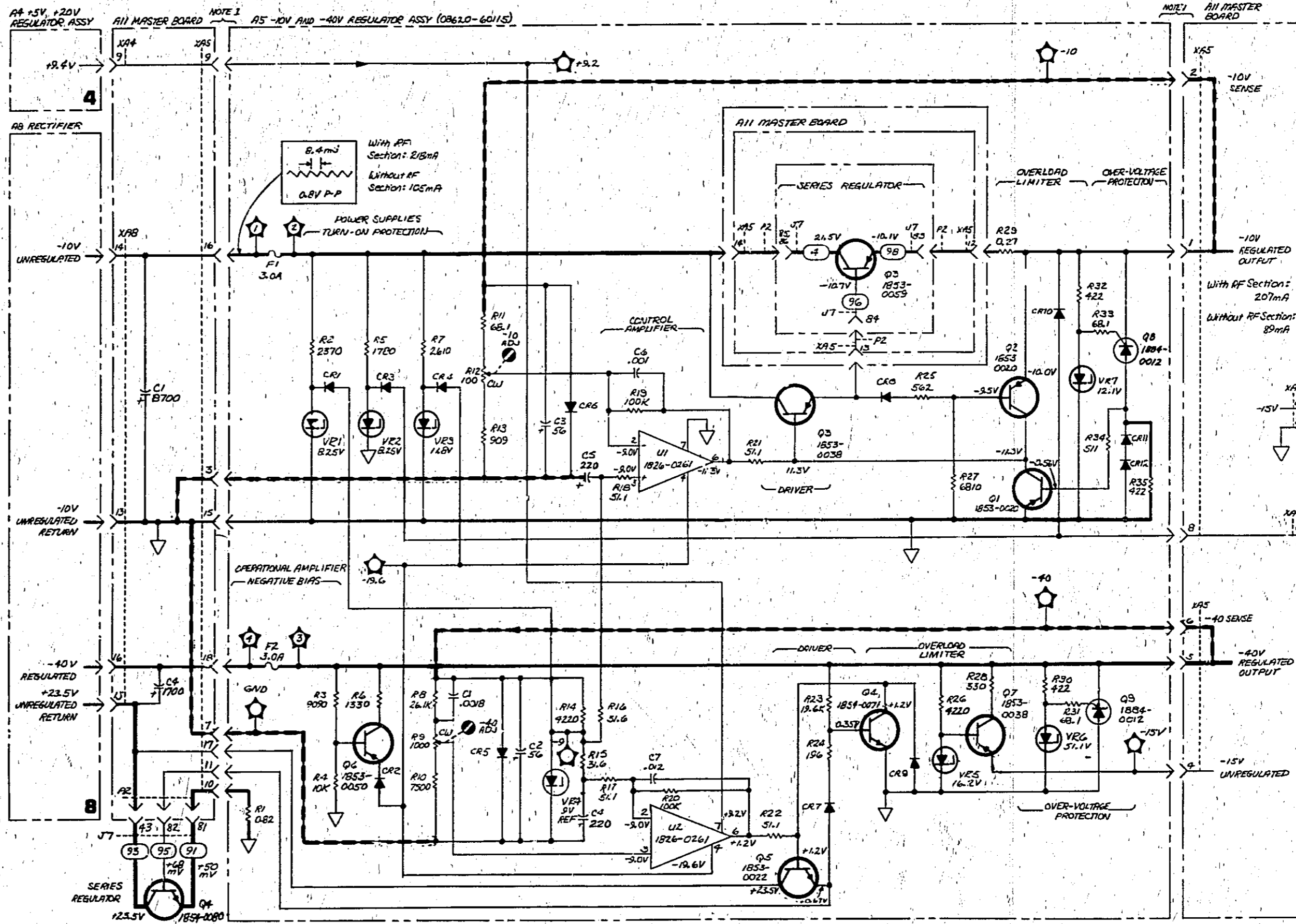
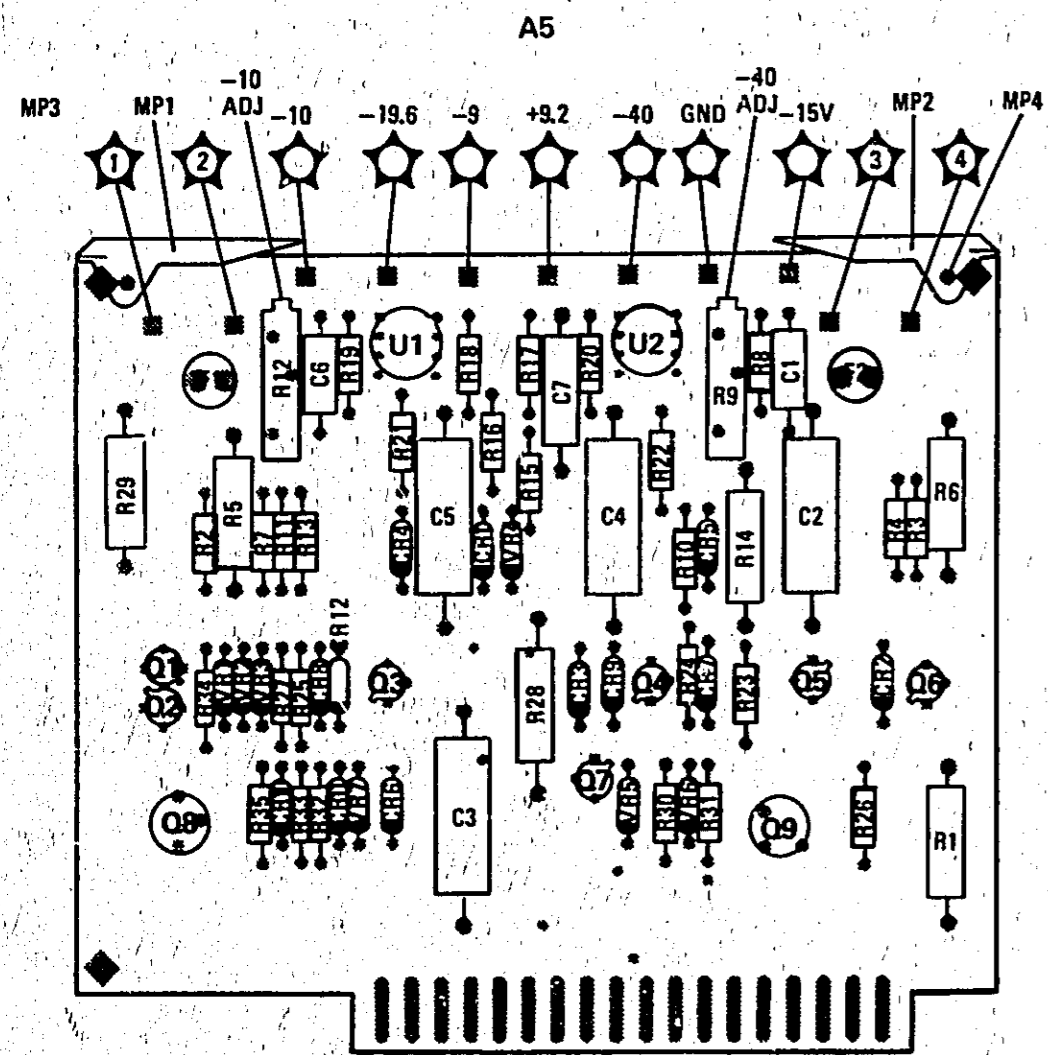


Figure 8-18. A4 +20V and +5V Regulator Assembly, Schematic



NOTE:

1. EACH PIN OF CONNECTOR XAS CONTACTS TWO PINS ON THE A5 BOARD, ONE ON EACH SIDE OF THE BOARD. THEREFORE, THE PIN ON A5 THAT IS CONNECTED TO THE BOARD CIRCUIT MAY BE ON EITHER SIDE OF THE BOARD. CONDITIONS FOR WAVEFORMS AND VOLTAGES ARE GIVEN IN FIGURE 8-7.
2. MAX RIPPLE AT TP 5 -9.4, -15, -10, -9, +9, 2 SHOULD BE  $>50\mu\text{V P-P}$ ;  $-40 <125\mu\text{V P-P}$ .

REFERENCE DESIGNATIONS

A5	A11	CHASSIS
C1-C7	C1, C4	J7
CR1-CR2		Q3, Q4
F1, F2		
Q1-Q9	P2	
R1-R35		
U1-U2	XA4	
VE1-VE7	XA5	

Figure 8-19. A5 -10V and -40V Regulator Assembly, Component Locations

Figure 8-20. A5 -10V and -40V Regulator Assembly, Schematic





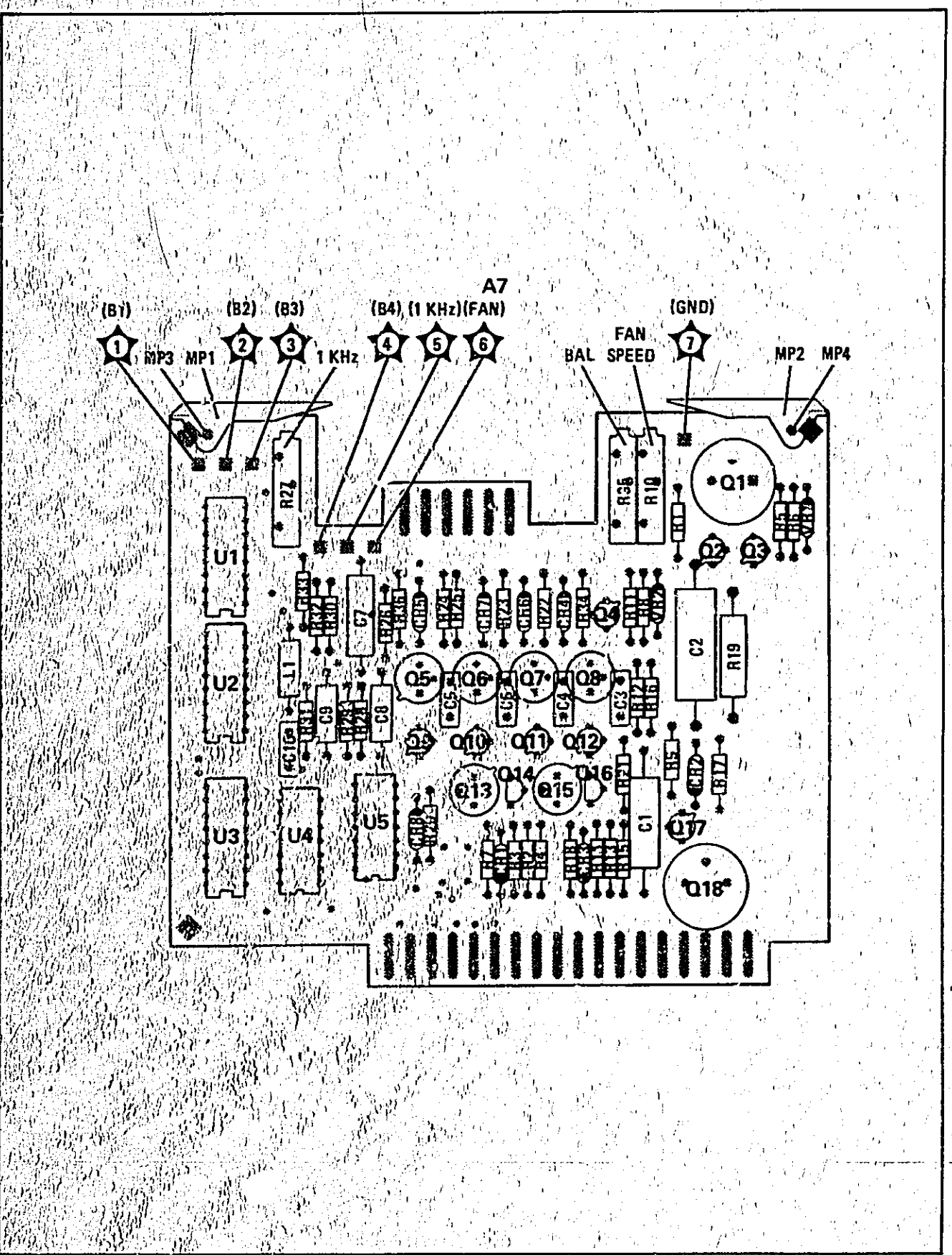
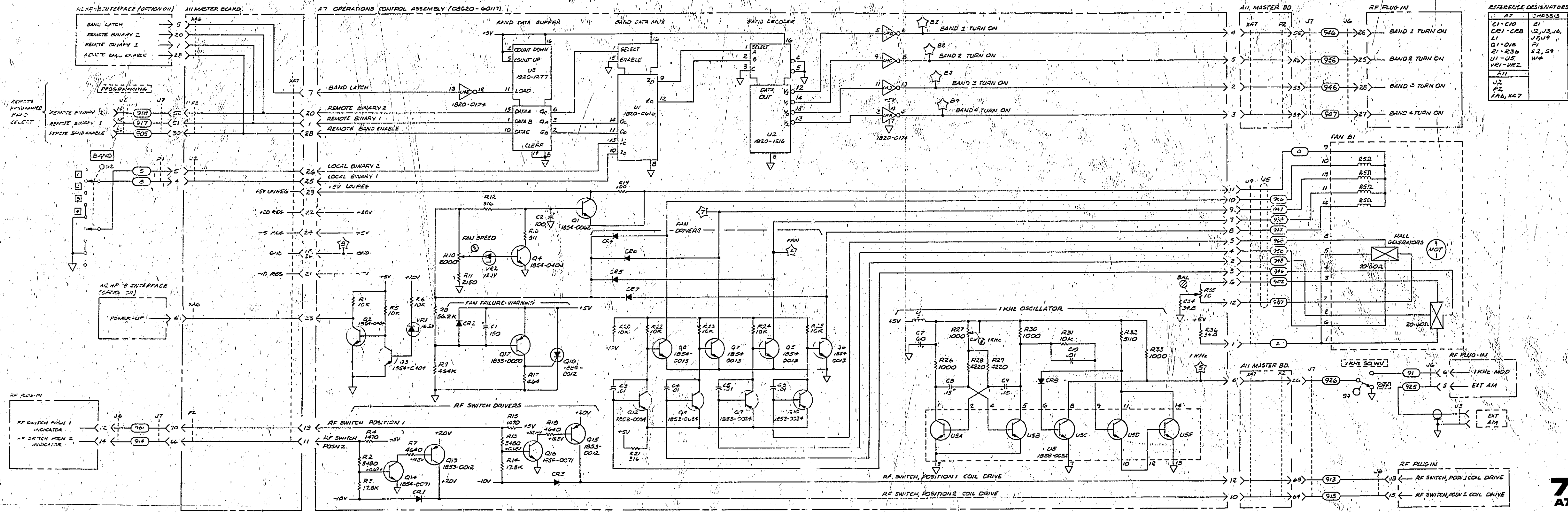


Figure 8-23. A7 Operations Control Assembly, Component Locations



REFERENCE DESIGNATORS

A7	CHASSIS
C1-C10	B1
D1-D3	J2, J3, J6, J7, J9
Q1-Q18	P1
R1-R33	S2, S9
U1-U5	W4
VR1-VR2	
A11	
J2	
P2	
AR6, XA7	

Figure 8-24. A7 Operations Control Assembly, Schematic



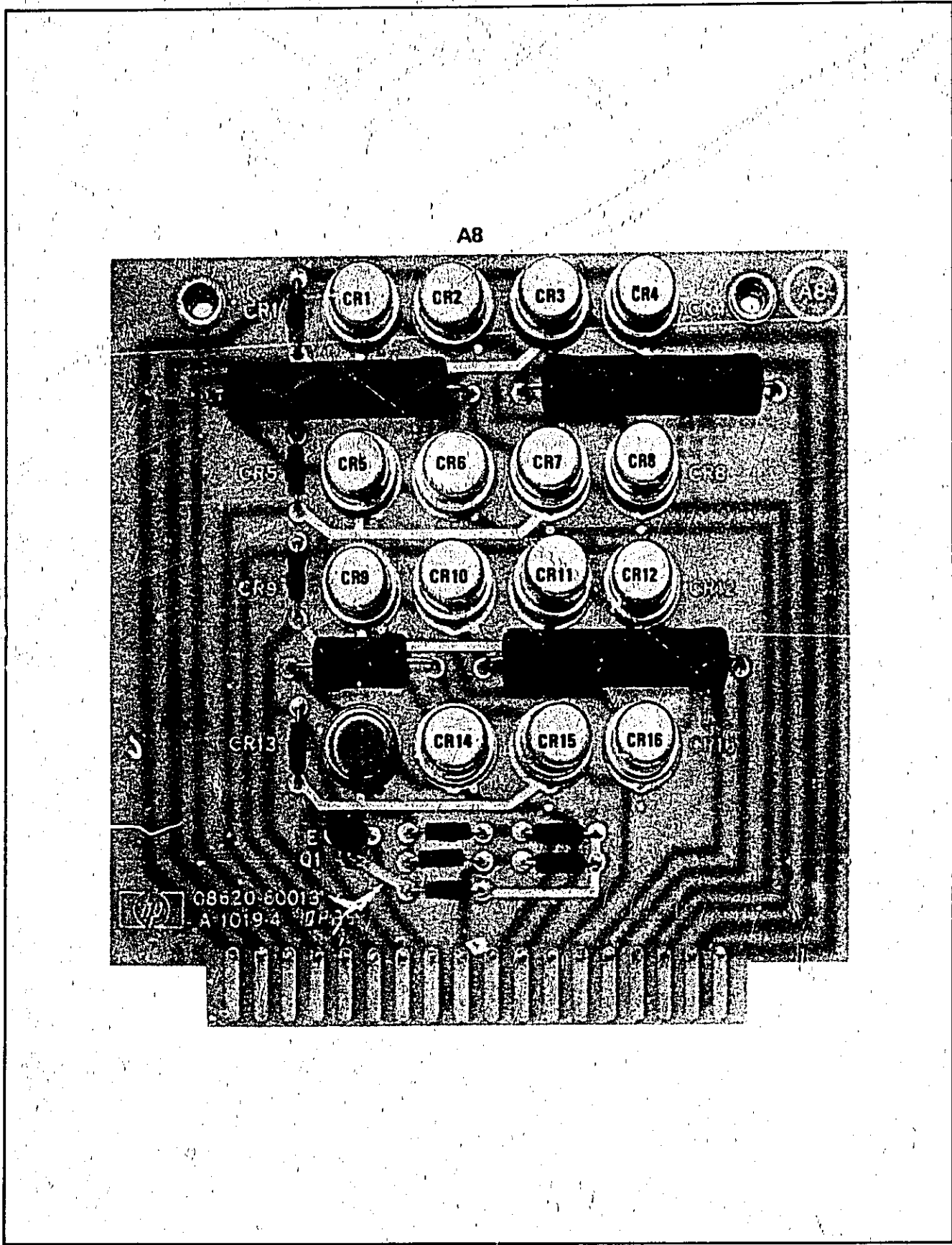


Figure 8-25. A8 Rectifier Assembly, Component Locations

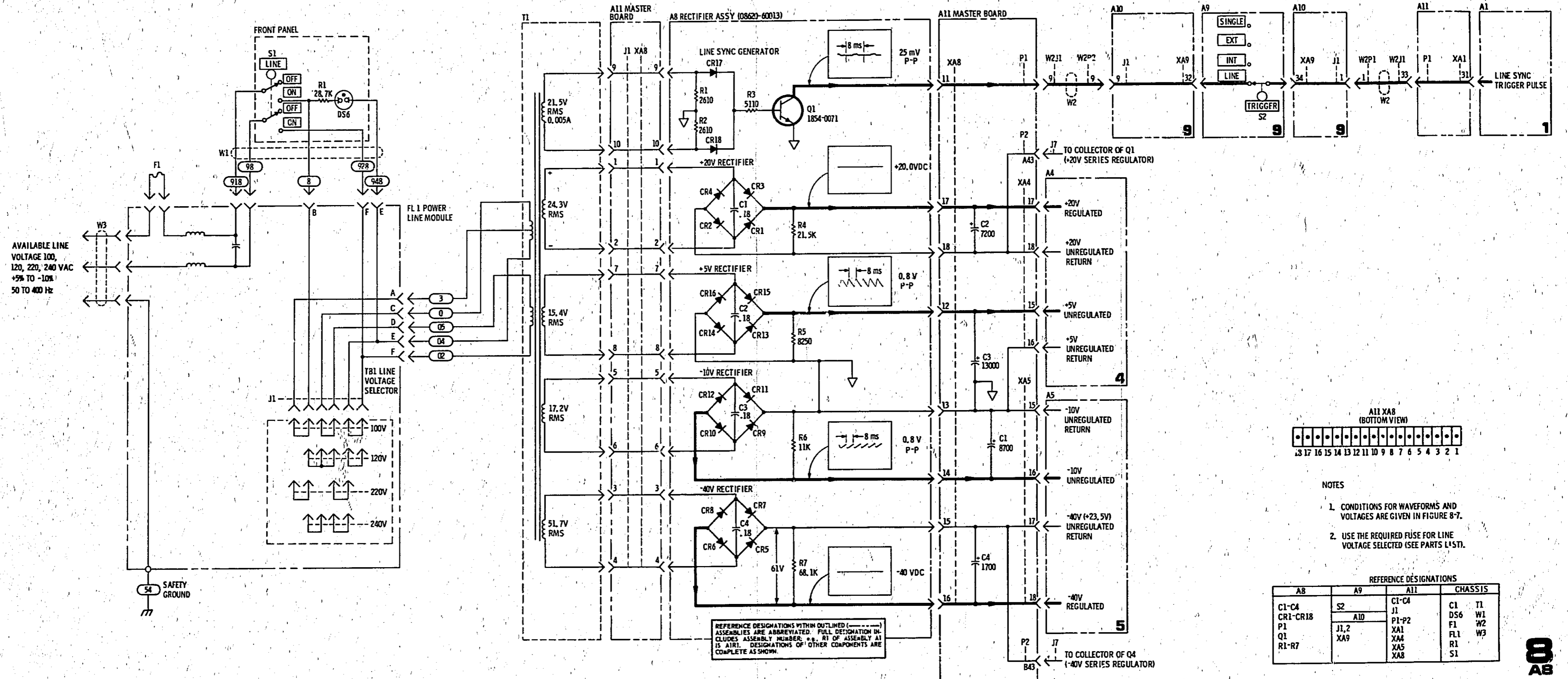


Figure 8-26. A8 Rectifier Assembly, Schematic

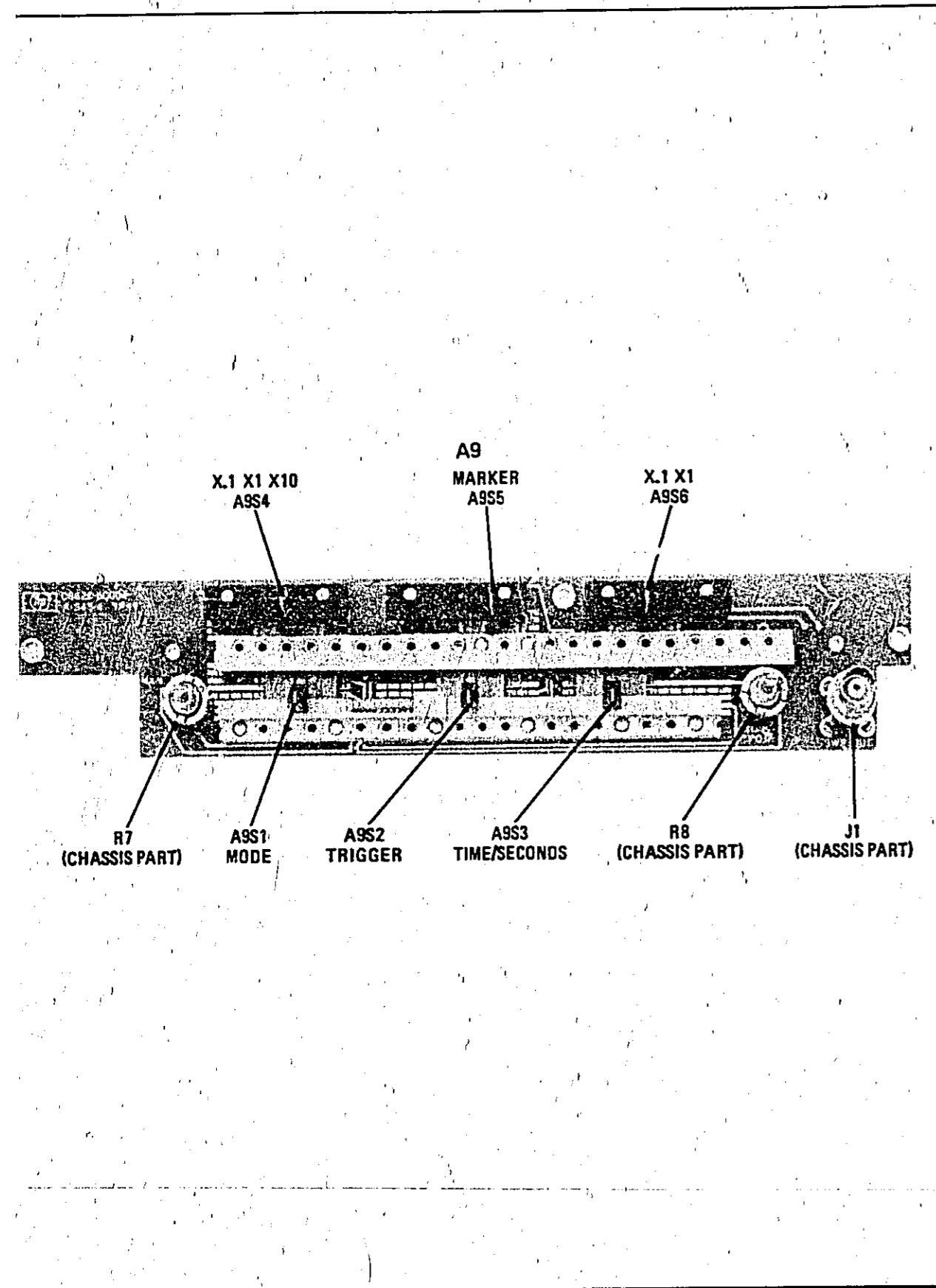
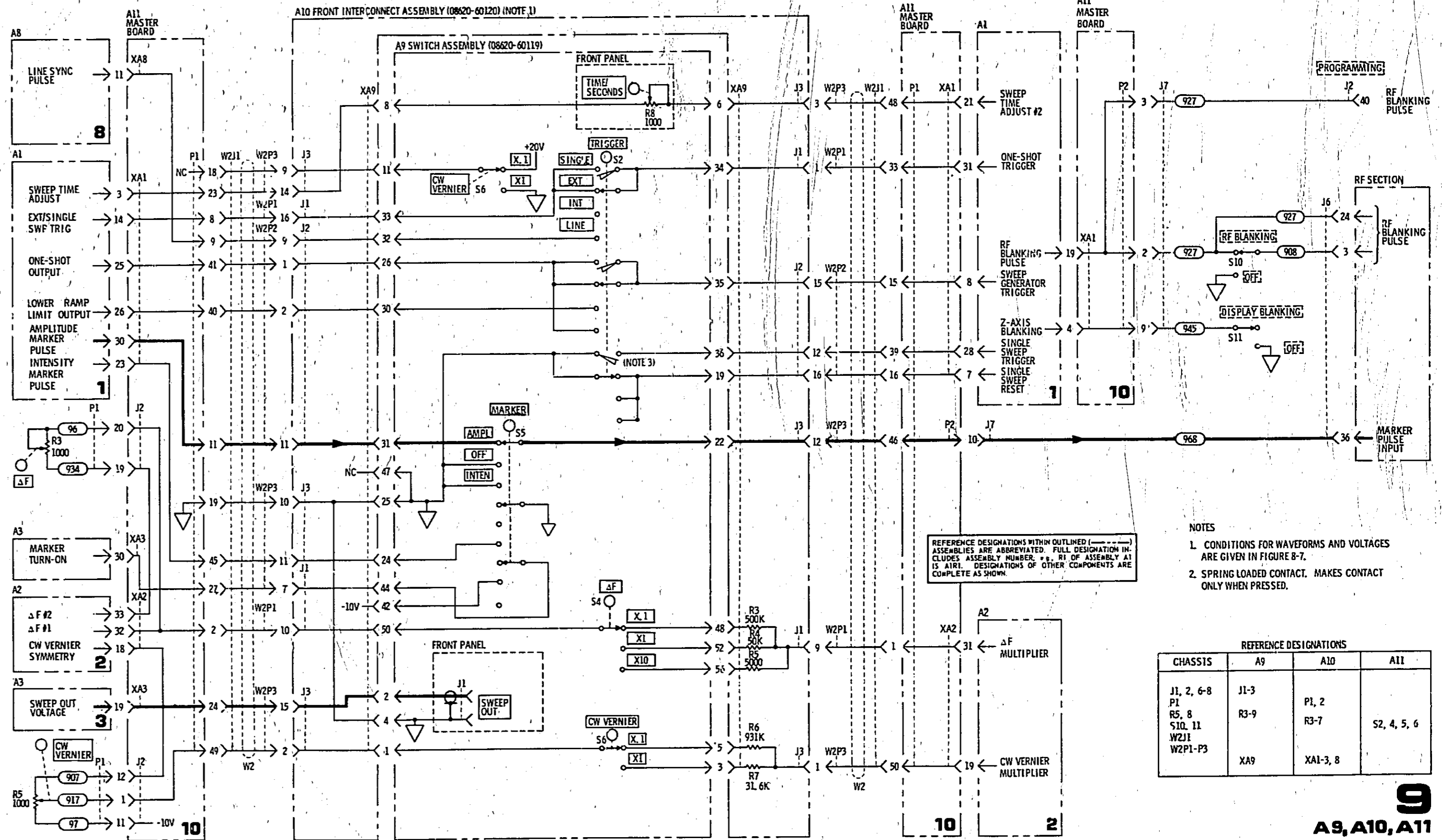


Figure 8-27. A9 Switch Assembly, Component Locations



REFERENCE DESIGNATIONS WITHIN OUTLINED ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER, P.C. RI OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

- NOTES
1. CONDITIONS FOR WAVEFORMS AND VOLTAGES ARE GIVEN IN FIGURE 8-7.
  2. SPRING LOADED CONTACT. MAKES CONTACT ONLY WHEN PRESSED.

REFERENCE DESIGNATIONS			
CHASSIS	A9	A10	A11
J1, 2, 6-8	J1-3	P1, 2	
P1	R3-9	R3-7	S2, 4, 5, 6
R5, 8			
S10, 11			
W2J1			
W2P1-P3	XA9	XA1-3, 8	

**9**  
A9, A10, A11

Figure 8-28. A9 Switch and A10 Front Interconnect Assembly, Schematic (1 of 2)

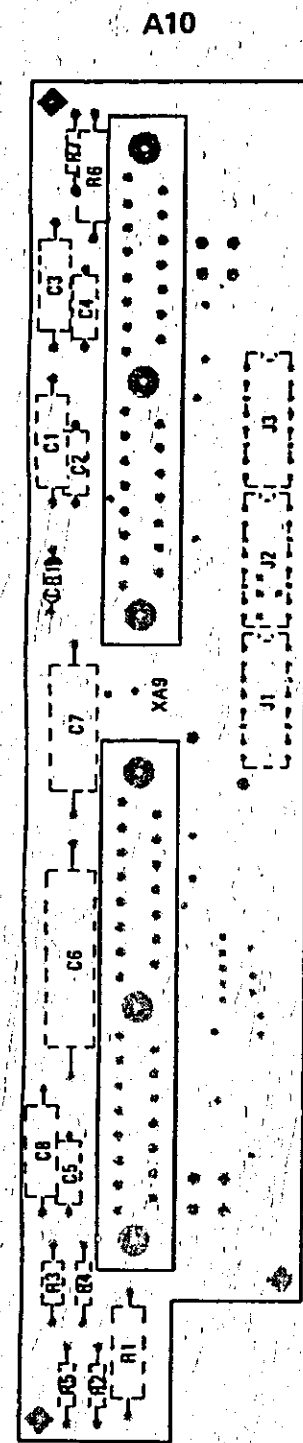


Figure 8-29. A10 Front Interconnect Assembly, Component Locations

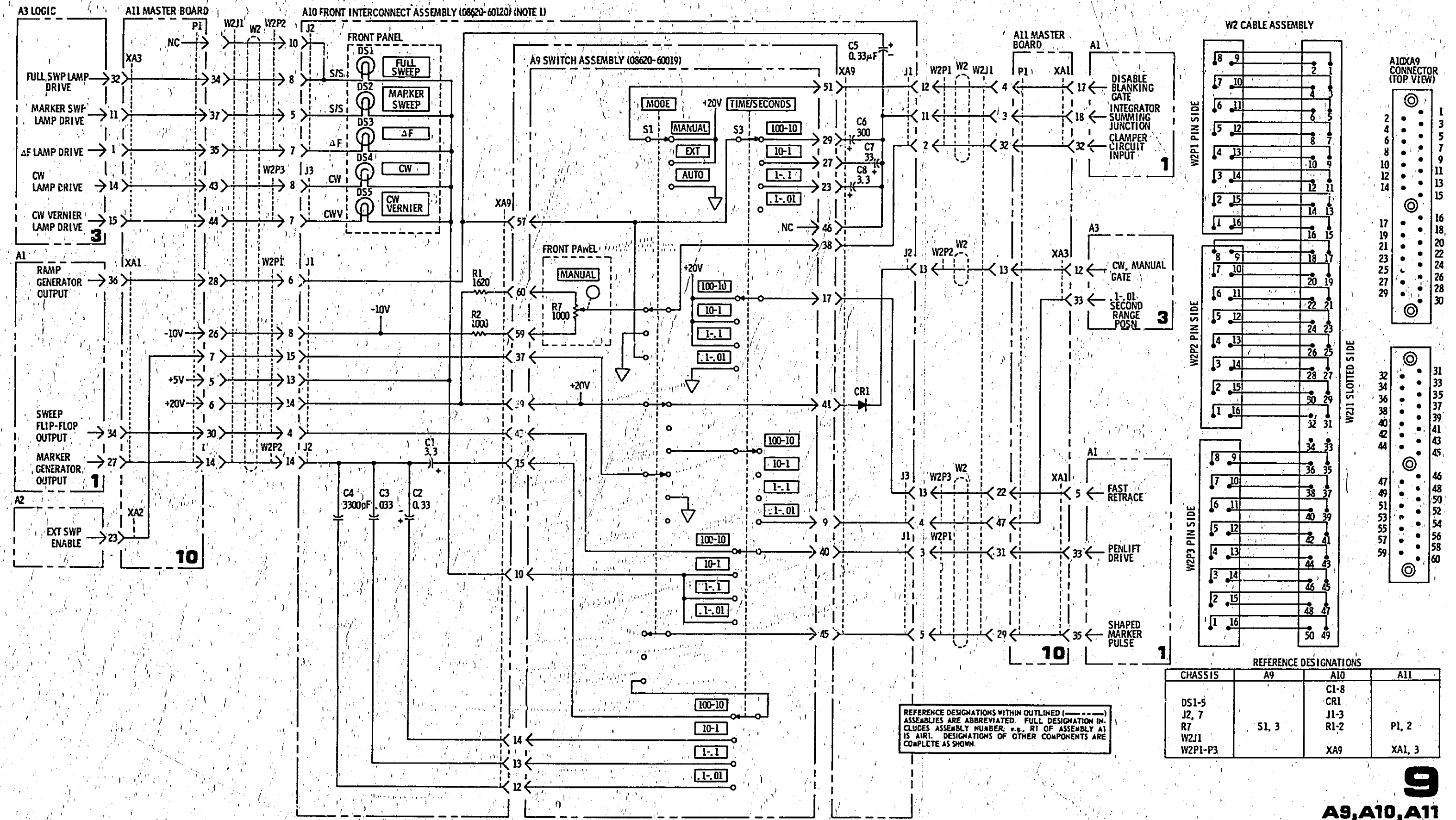


Figure 8-30. A9 Switch and A10 Front Interconnect Assembly, Schematic (2 of 2)

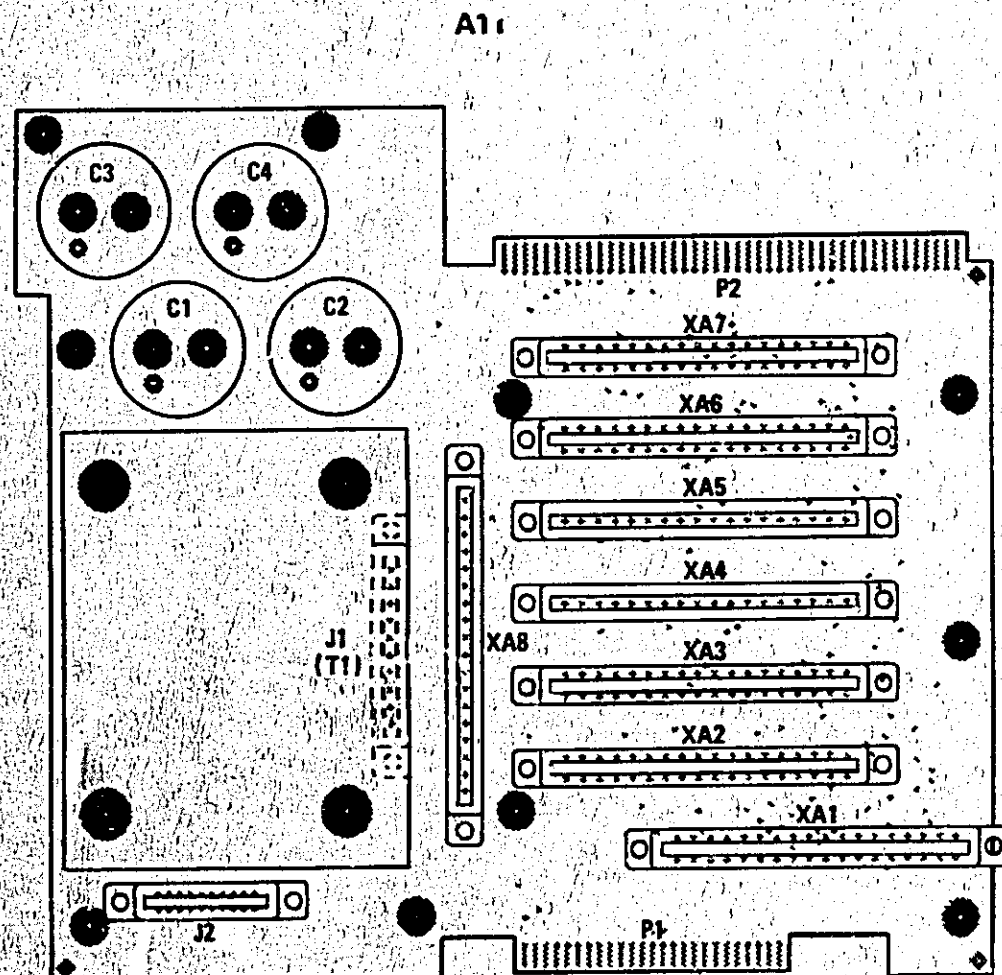


Figure 8-31. All Master Board, Component Locations

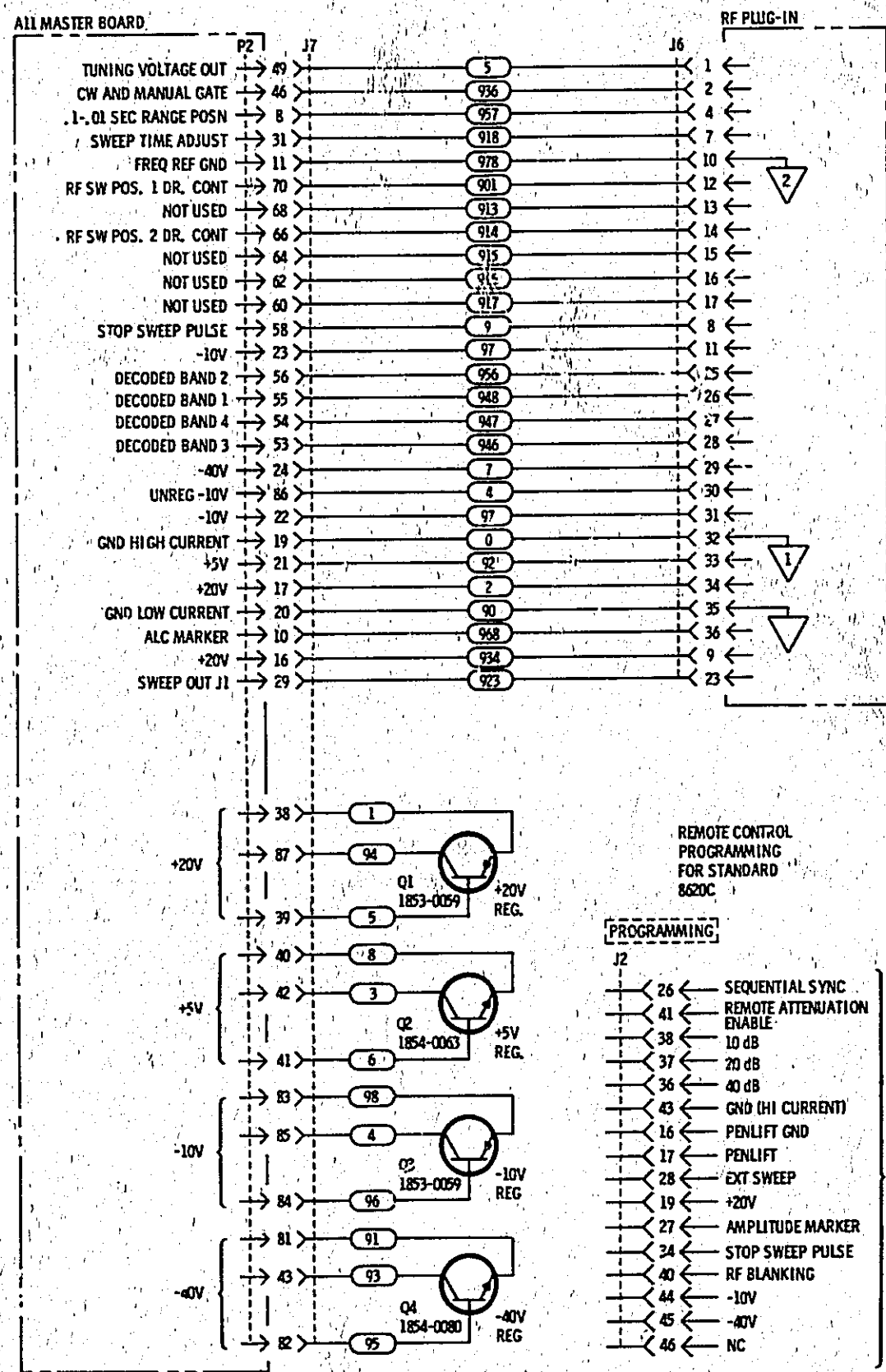
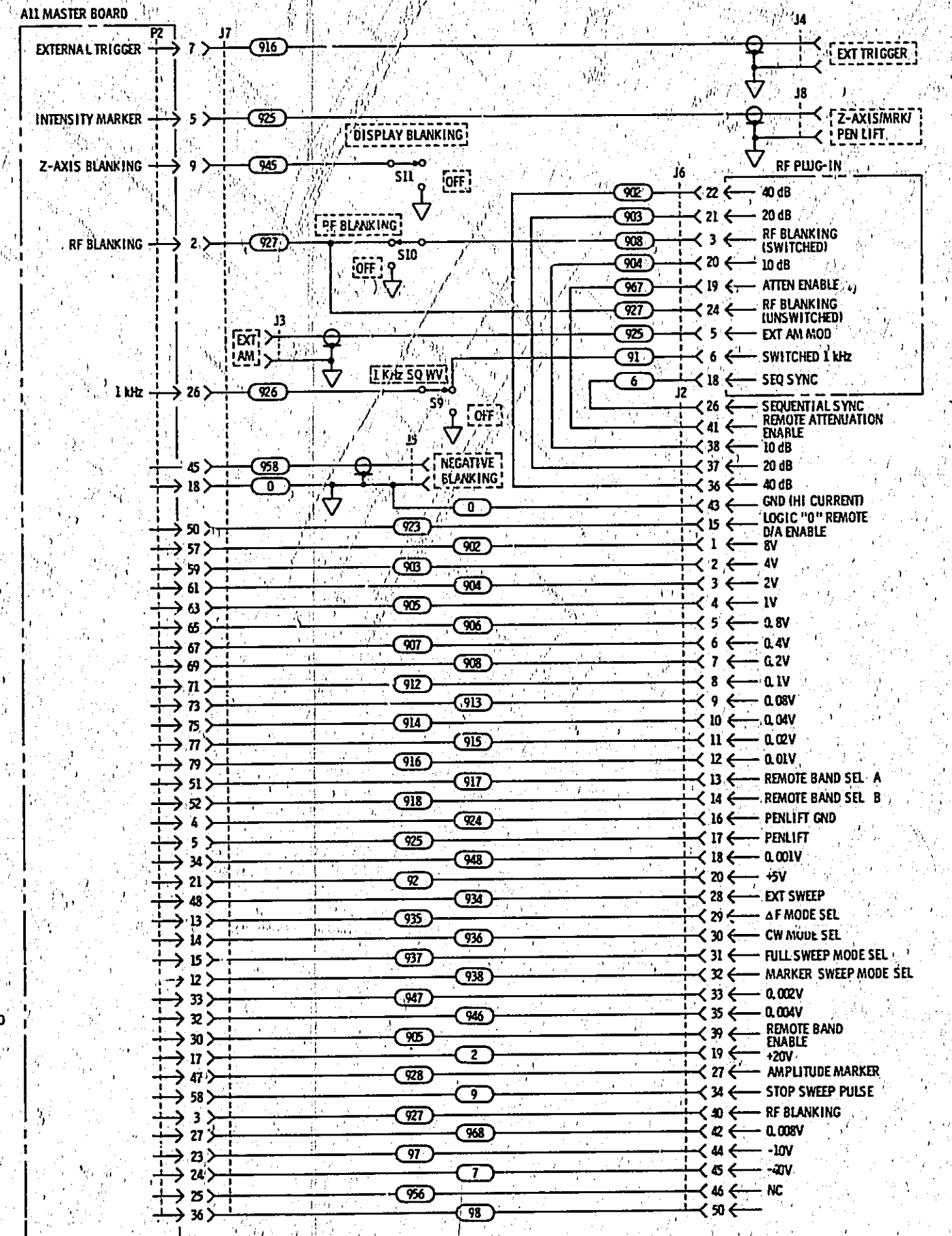


Figure 8-32. Rear Panel Wiring Diagram



PROGRAMMING  
REMOTE CONTROL PROGRAMMING FOR OPTION 001

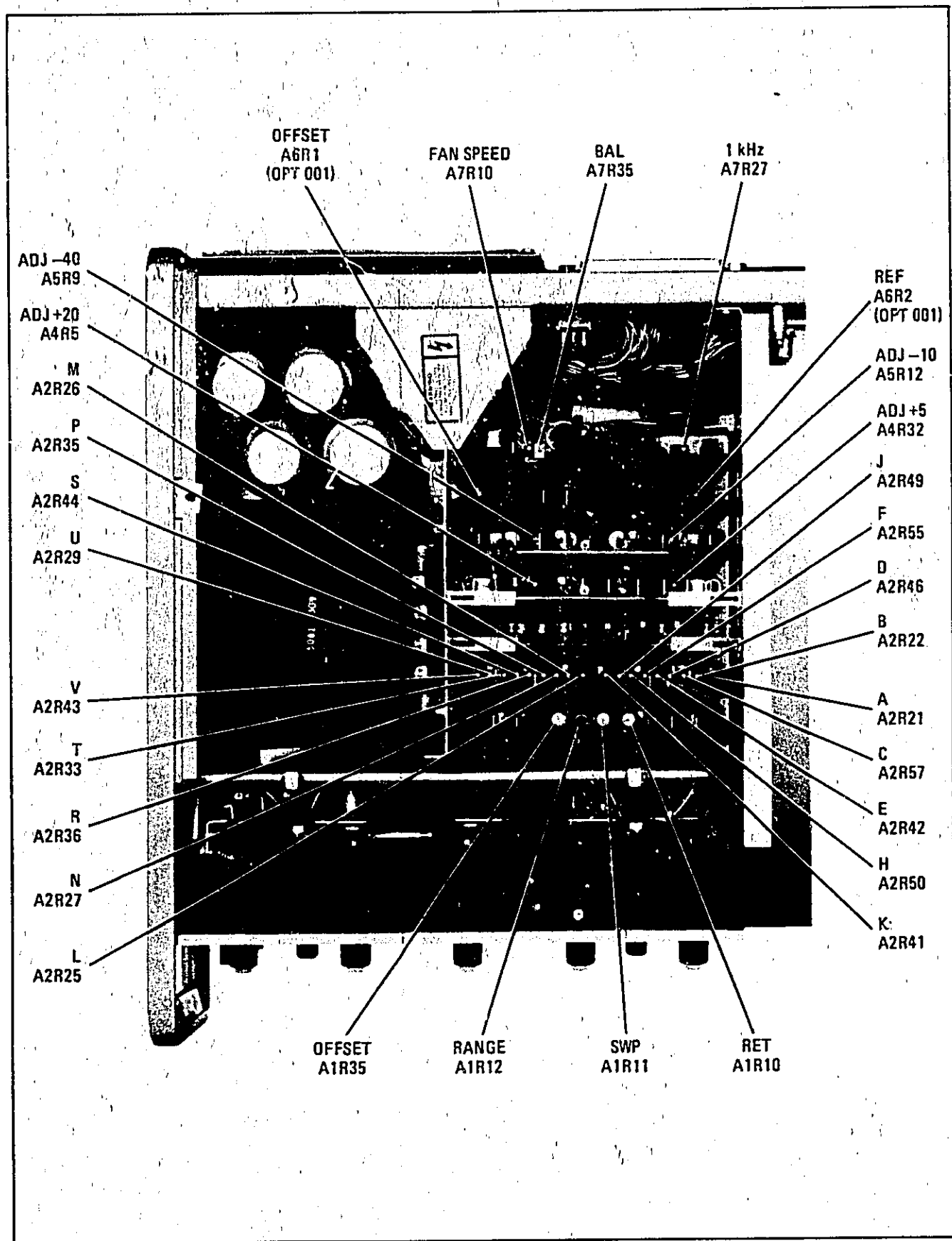


Figure 8-33. Locations of Adjustments

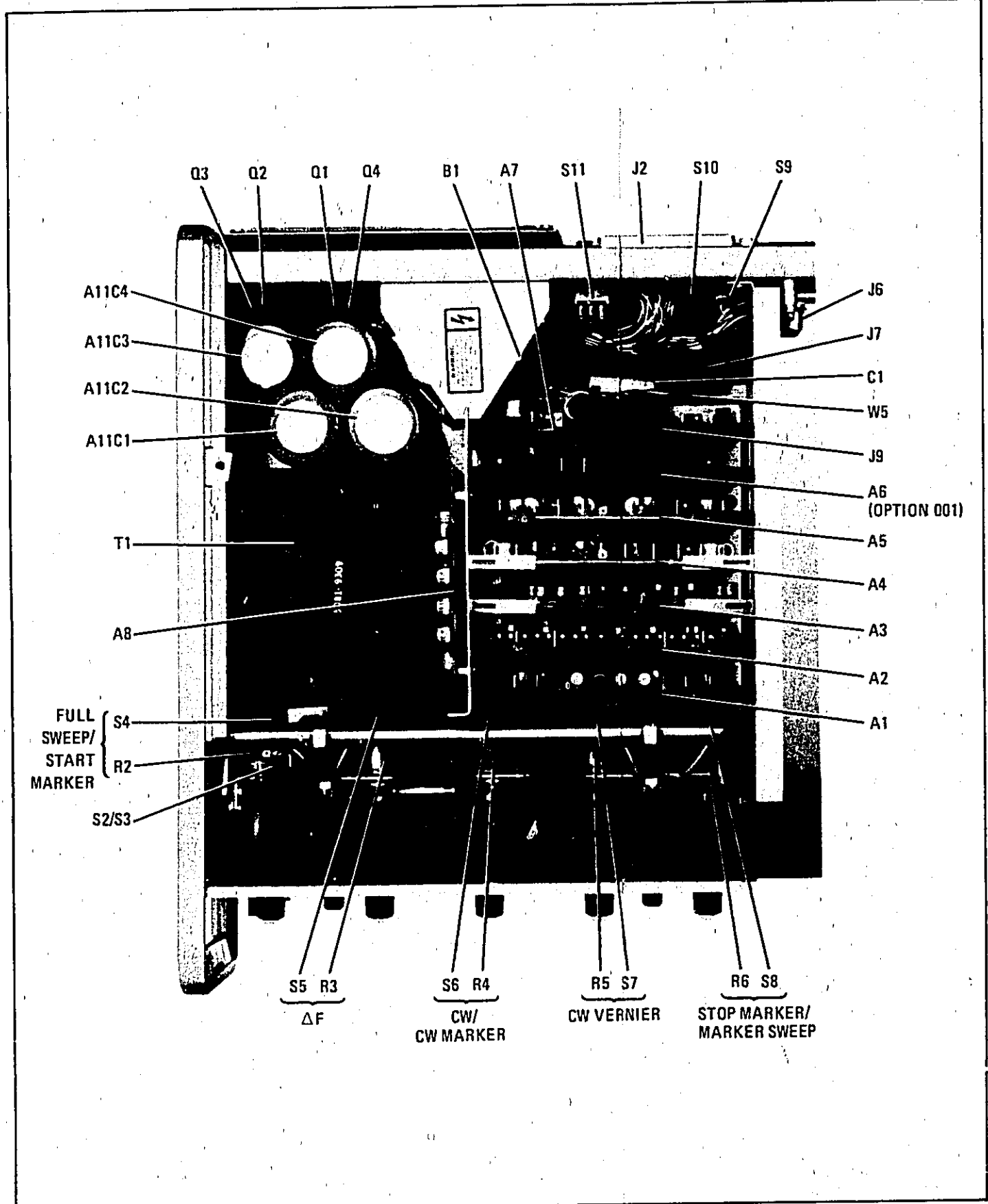


Figure 8-34. Top View, Major Assembly and Component Locations

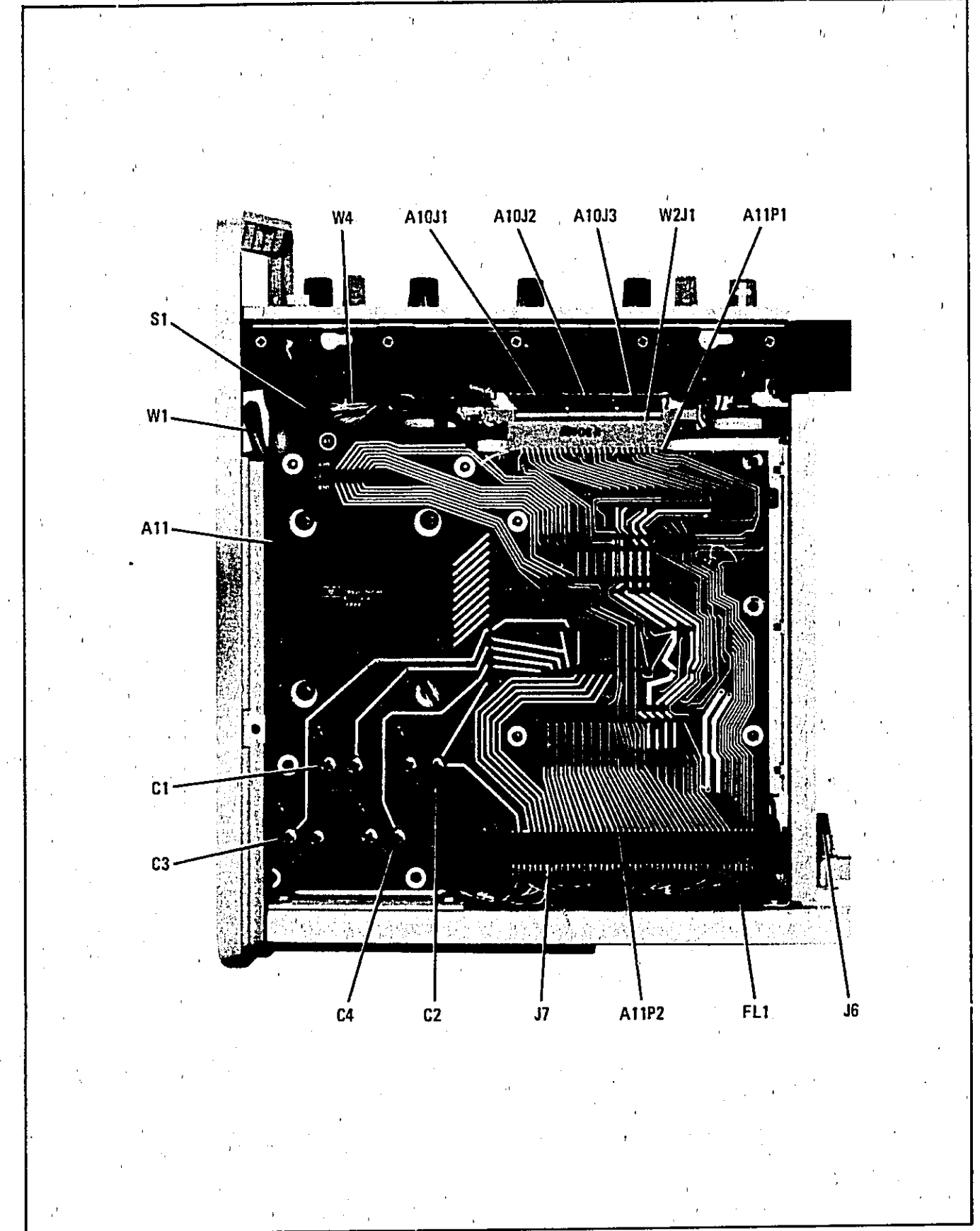


Figure 8-35. Bottom View, Major Assembly and Component Locations

# **MANUAL CHANGES**



# MANUAL CHANGES

## MANUAL IDENTIFICATION

Model Number: 8620C

Date Printed: September 1975

Part Number: 08620-90034

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	Serial Prefix or Number	Make Manual Changes
1542A00151 thru 1542A00310	1	1626A	1,2,3,4
1542A00311 thru 1542A00350	1,2	1641A	1-5
1604A	1,2,3	1645A	1-6
		1716A	1-7

► NEW ITEM

## ERRATA

Page 1-0, Figure 1-1:

Delete RACK MOUNTING KIT, 5060-8740

Page 1-3, Paragraph 1-38:

Delete all references to Rack Mounting Kit.

Page 1-3, Paragraph 1-43:

Add: "A Rack Mounting Kit is available to install the instrument in a 19-inch rack. Rack Mounting Kits may be obtained through your nearest Hewlett-Packard Office by ordering HP Part Number 5060-8740."

Page 1-8, Figure 1-3 (1 of 2):

Replace Figure 1-3 with Figure 1-3A in this change sheet.

Page 1-9, Figure 1-3 (2 of 2):

Delete items 2, 4, and 6 and renumber remaining items, 1 through 4.

Page 2-4, Table 2-1:

► Change J6 RF Plug-in Interface, HP Part Number to 1251-5046.

## 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.

11 AUGUST 1977

9 Pages

Printed in U.S.A.

HEWLETT  PACKARD

**ERRATA (Cont'd)**

## ▶ Page 6-8, Table 6-2:

Change A3R17 entry: "A3R17, 0698-3440, RESISTOR 196 1% .125 W, 03292, C4-1/8-TO-196R-F".

Change A3R19 entry: "A3R19, 0698-3440, RESISTOR 196 1% .125W, 03292, C4-1/8-TO-196R-F".

Change A3R27 entry: "A3R27, 0698-3453, RESISTOR 196K 1% .125W, 03292, C4-1/8-TO-1963-F".

Change A3R29 entry: "A3R27, 0698-3453, RESISTOR 196K 1% .125W, 03492, C4-1/8-TO-1963-F".

## Page 6-10, Table 6-2:

Change A4VR3 HP Part Number to 1902-3224 and Description to 17.8V.

## Page 6-14, Table 6-2:

Change B1, second entry, HP Part Number to 3140-0490.

Delete C1.

Add DS6, 2140-0244, LAMP: GLOW 95V.

## ▶ Change J6 HP Part Number to 1251-5046.

## ▶ Add J6 MP1, 08620-20144, PC BOARD: 36-PIN INTERCONNECT.

Add: S9, S10, S11, 3101-0070, SWITCH, SL, DPDT, NS, .5A 125V AC/DC 28480 3101-0070.

## ▶ Page 6-16, Figure 6-1:

Change item 50 HP Part Number to 08620-20105, FRAME: DIAL.

## Page 8-1, Paragraph 8-6:

In first line, change Table 8-1 to 8-2.

## Page 8-29, Figure 8-26:

Change A8C1 and A8C2 to .047.

**CHANGE 1**

## Page 5-2, Figure 5-1:

Change A7TP7 to A7TP8 (GND)

Add a new A7TP7 between BAL potentiometer A7R35 and J9.

## Page 5-6, Paragraph 5-16:

Change Procedure Step a to read: "Connect oscilloscope Channel A to A7TP6 (A7Q5 collector) and Channel B to A7TP7 (A7Q7 Collector). Connect oscilloscope ground lead to A7TP8.

## Page 5-7, Figure 5-4:

Change title on bottom waveform to: CHANNEL B A7TP7 (Q7 COLLECTOR).

## Page 8-27, Figure 8-23:

Replace Figure 8-23 with Figure 8-23 (Change 1) in this change sheet.

Change Test Point (GND) at XA7 pins 18, 36 to Test Point 8.

**CHANGE 2**

## Page 6-9, Table 6-2:

Delete HP Part Number 8159-0005 Wire. Installing this wire switches in the CW Filter in Remote D/A Tuning Mode.

## Page 6-11, Table 6-2:

Delete HP Part Number 1200-0508 Socket, IC for A6U2, U3, and U4.

## Page 6-14, Table 6-2:

Change J2MP1 to HP Part Number 08620-20082 Shroud, Connector.

**CHANGE 3**

Page 6-15, Table 6-2:

Add HP Part Number 0380-0643 Standoff, Hex Head, P/O 08620-60130 Connector/Adapter for Option 011.

**CHANGE 4**

Page 6-11, Table 6-2:

Change A7 HP Part Number to: 08620-60137

Page 6-12, Table 6-2:

Add: A7C11, 0180-0197, C: FXD 2.2 UF 20V.

Add: A7Q19, 1853-0034, TRANSISTOR.

Add: A7Q20, 1854-0404, TRANSISTOR.

Change: A7R8 to 0698-3450, RESISTOR 42.2K 1% .125W.

Change: A7R9 to 0698-3450, RESISTOR 42.2K 1% .125W.

Change: A7R10 to 2100-3154, RESISTOR: VARIABLE 1K OHM.

Change: A7R11 to 0757-0424, RESISTOR: FXD 1.1K OHM 1% .125W.

Change: A7R12 to 0757-0419, RESISTOR 681 1% .125W.

Change: A7R16 to 0757-0424, RESISTOR 1.1K 1% .125W.

Change: A7R17 to 0757-0438, RESISTOR 5.11K 1% .125W.

Add: A7R37, 0757-1094, RESISTOR 1.47K 1% .125W.

Add: A7R38, 0757-0438, RESISTOR 5.11K 1% .125W.

Add: A7R39, 0698-0084, RESISTOR 2.15K 1% .125W.

Page 8-27, SERVICE SHEET 7:

Replace Figure 8-23 with Figure 8-23 (CHANGE 4) of this Manual Changes.

Replace applicable part of Figure 8-24 with Figure 1 of this Manual Changes.

**CHANGE 5**

Page 6-4, Table 6-2:

Add A1C7, 0160-2055, CAPACITOR: FXD .01UF 100 VDC.

Page 8-13, Figure 8-9:

Replace Figure 8-9 with Figure 8-9 of this Manual Changes.

Page 8-15, Figure 8-11:

Replace Figure 8-11 with Figure 8-11 of this Manual Changes.

Page 8-15, Figure 8-12:

Add A1C7 as shown in partial schematic, Figure 2 of this Manual Changes.

**CHANGE 6**

Page 6-7, Table 6-2:

Change A3C5 to HP Part Number 0160-0575, C:FXD .047  $\mu$ F.Change A3C9 to HP Part Number 0160-0575, C:FXD .047  $\mu$ F.Change A3C10 to HP Part Number 0160-0575, C:FXD .047  $\mu$ F.Change A3C11 to HP Part Number 0160-0575, C:FXD .047  $\mu$ F.

Page 8-19/8-20, Figure 8-16, SERVICE SHEET 3:

Change A3C5, A3C9, A3C10 and A3C11 values to .047.

**CHANGE 7**

Page 6-11, Table 6-2:

Change A5R9 to HP Part Number to 2100-3109 and Description to 2K OHM.

Page 8-23, Figure 8-20, SERVICE SHEET 5:

Change A5R9 value to 2K.

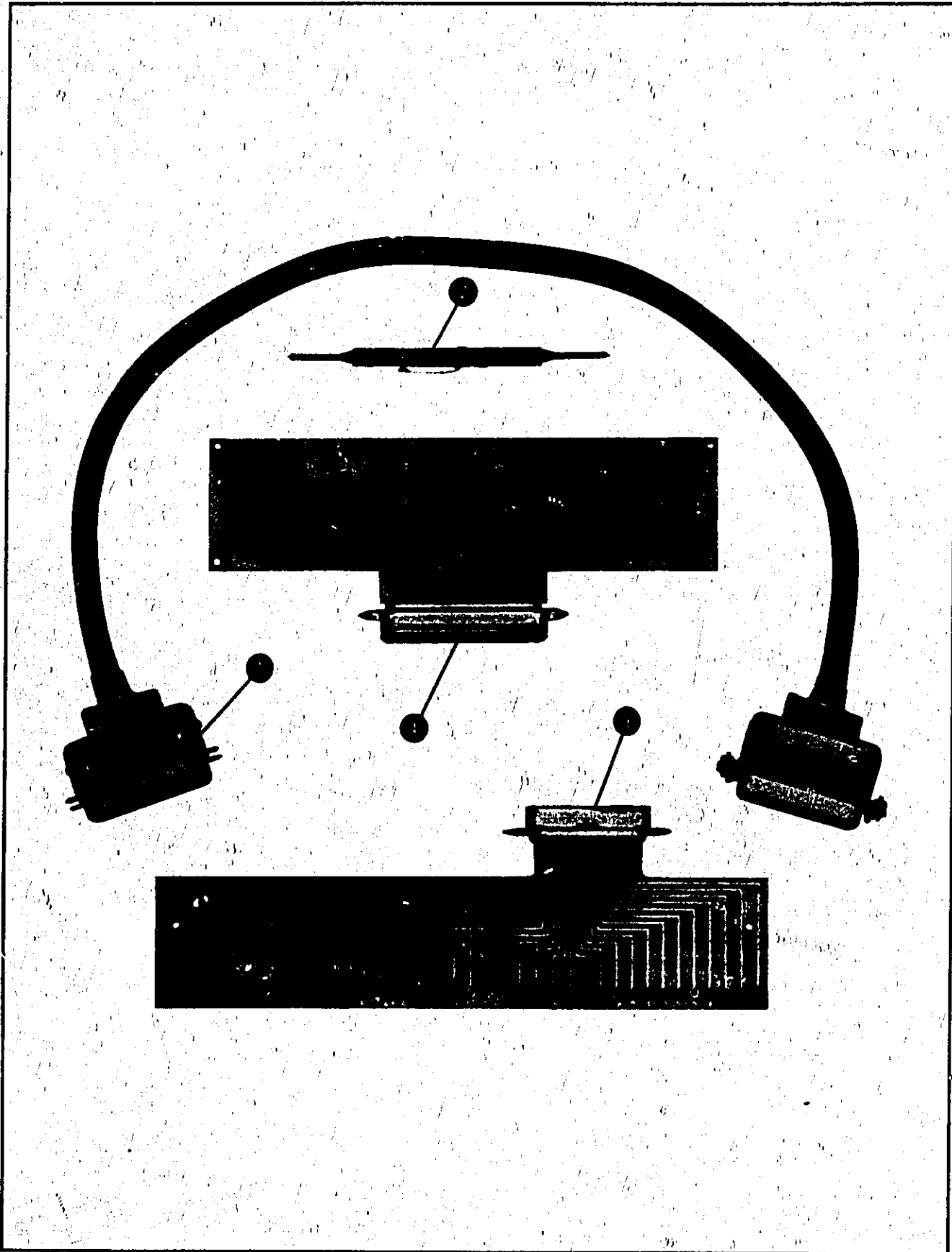


Figure 1-3A. Service Accessory Kit, HP Part No. 08620-60124

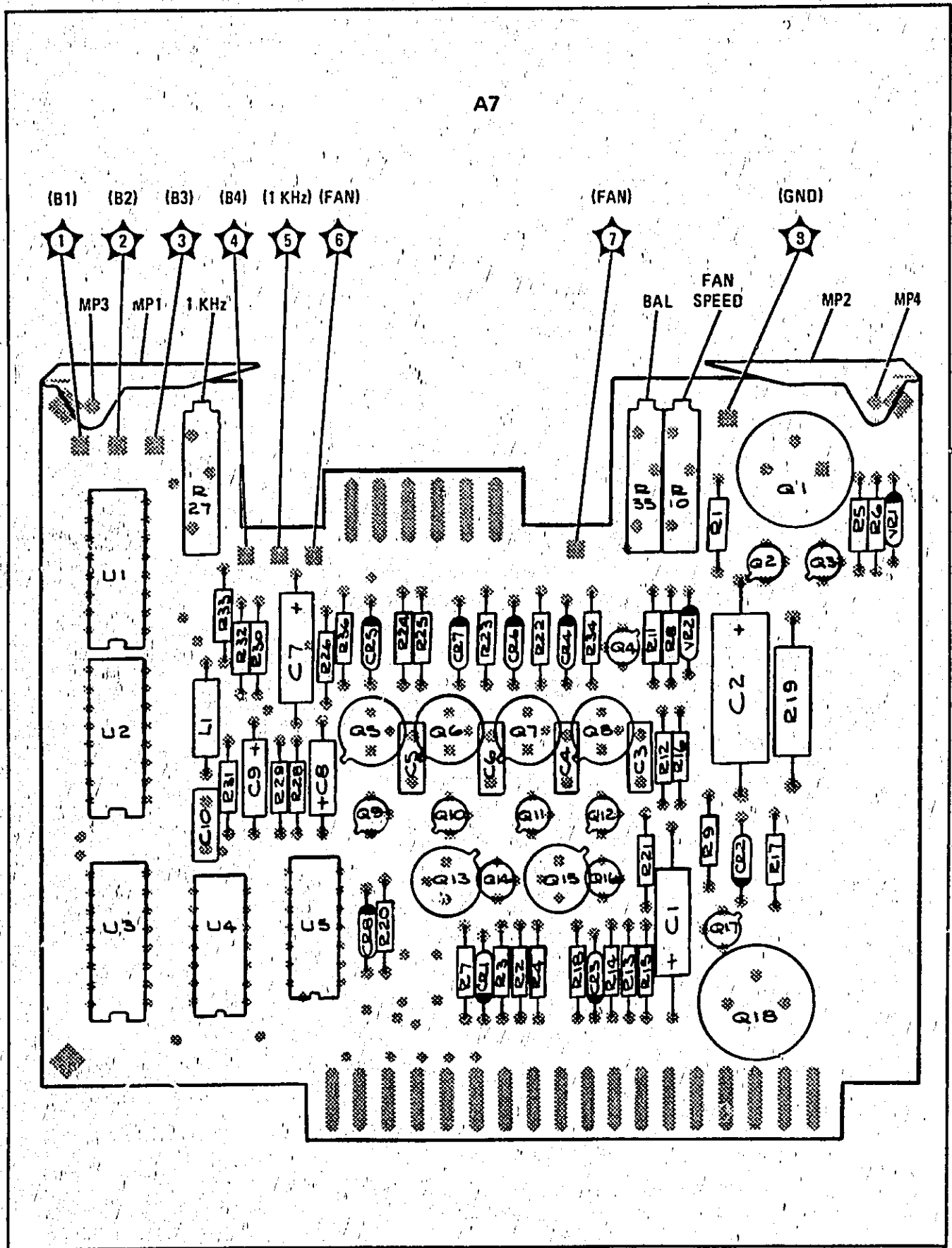


Figure 8-23. Operations Control Assembly, Component Locations (CHANGE 1)

A7

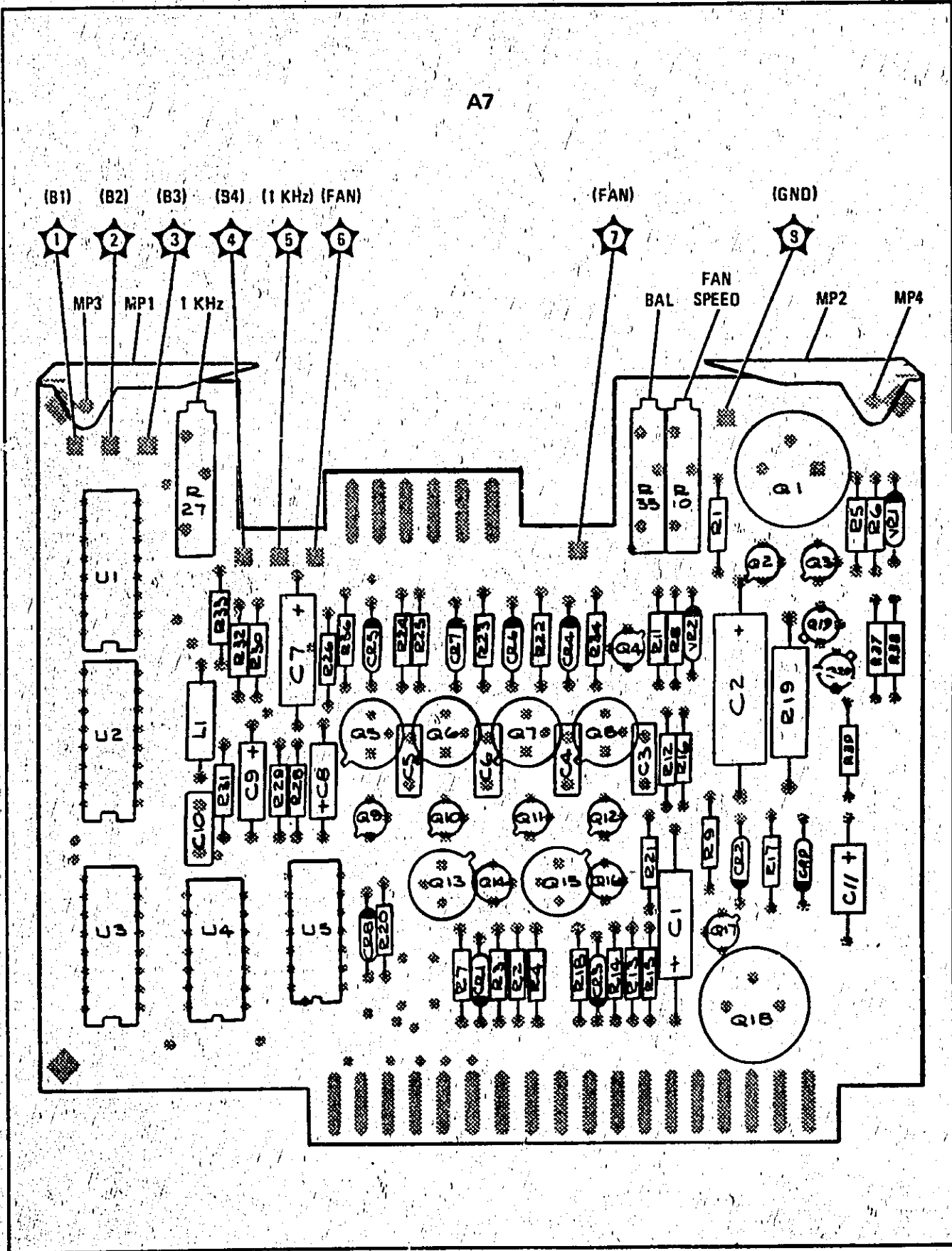


Figure 8-23. A7 Operations Control Assembly, Component Locations (CHANGE 4)

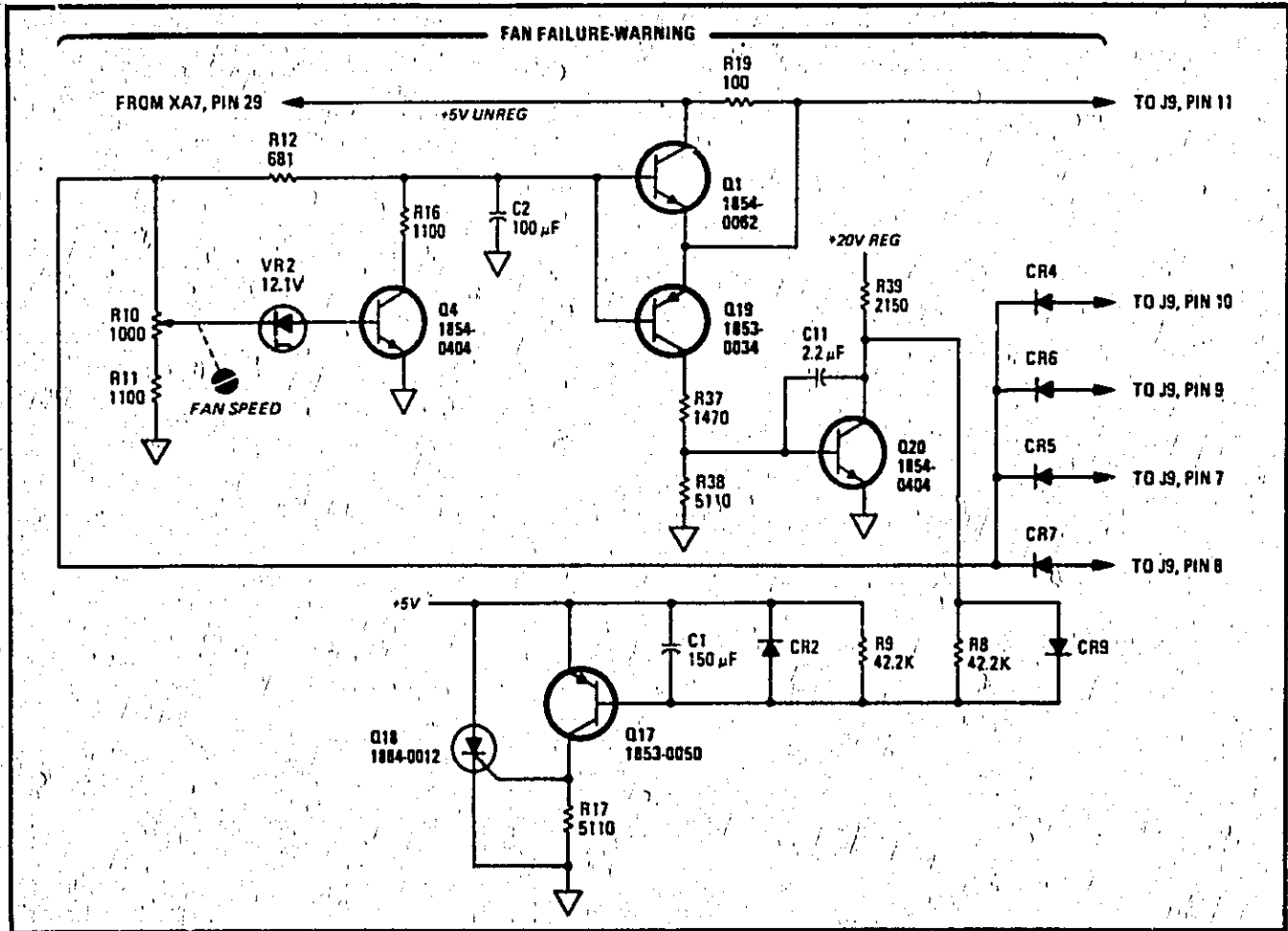


Figure 1. P/O Figure 8-24. A7 Operations Control Assembly, Schematic (CHANGE 4)

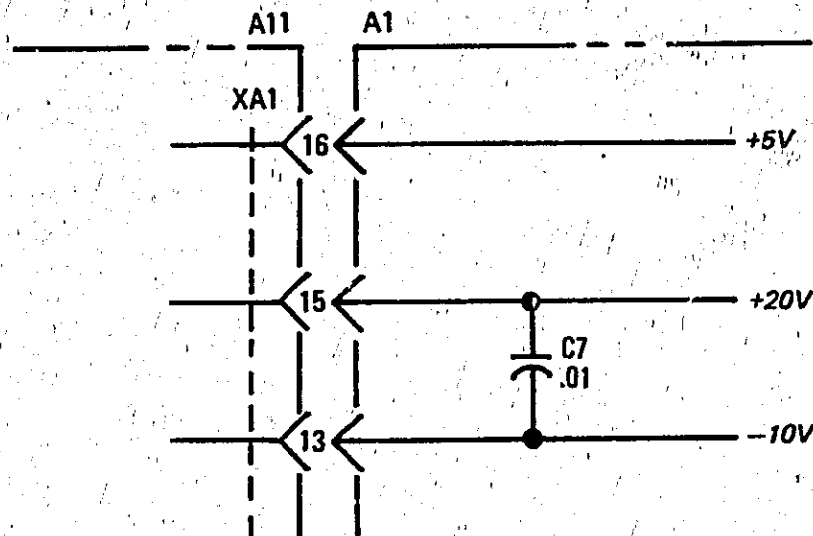


Figure 2. P/O Figure 8-12. A1 Sweep Generator Assembly, Schematic (2 of 2) (CHANGE 5)

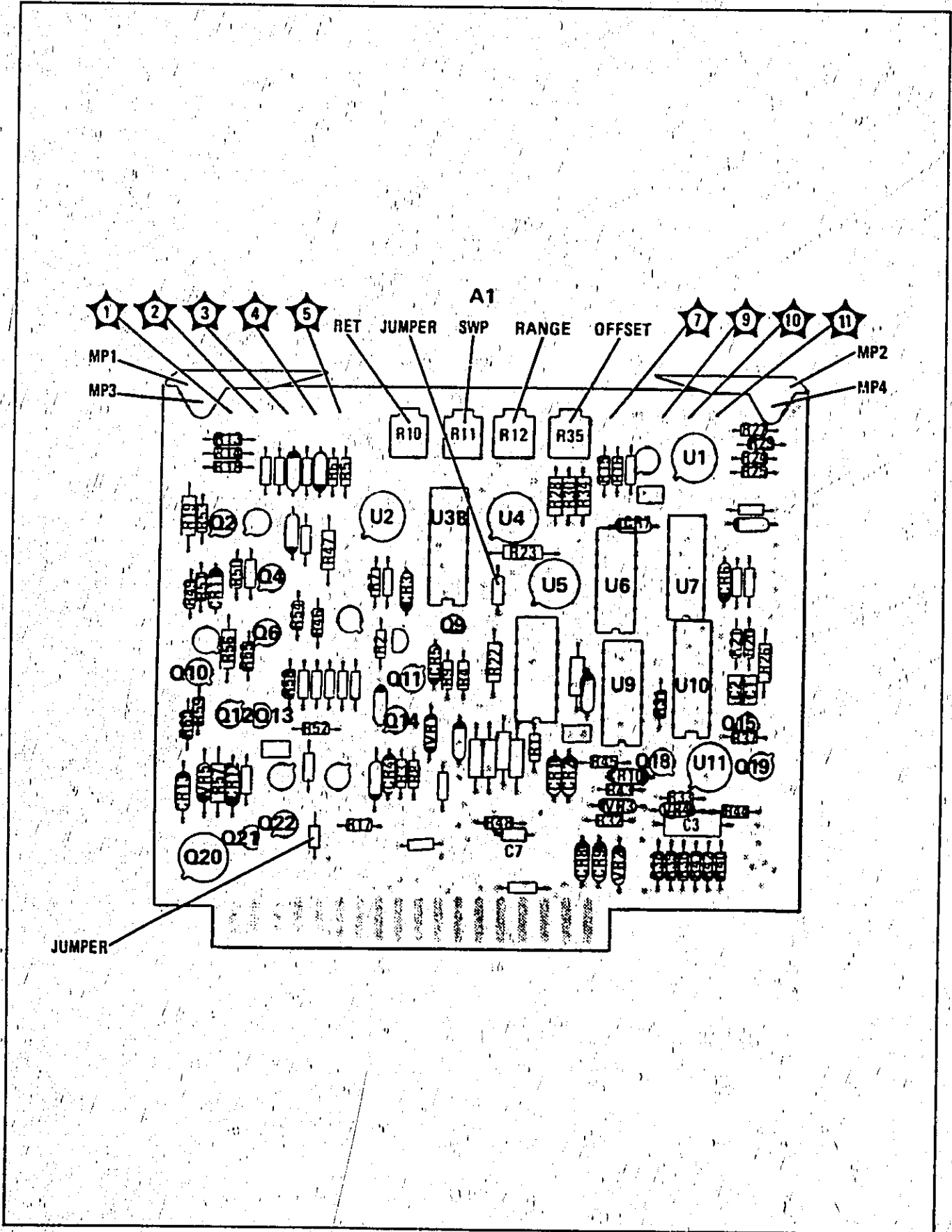


Figure 8-9. P/O A1 Sweep Generator Assembly, Component Locations (CHANGE 5)



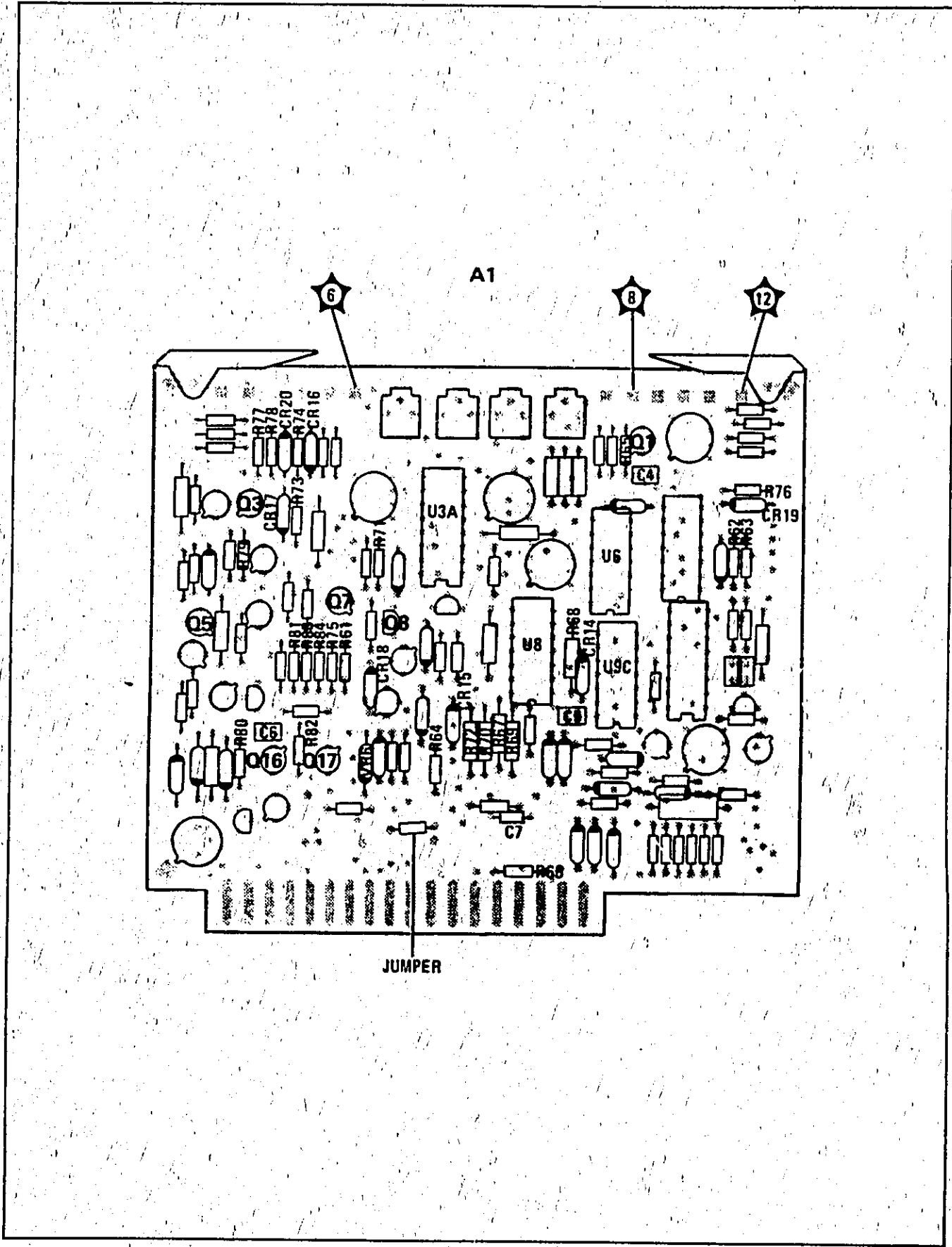


Figure 8-11. P/O A1 Sweep Generator Assembly, Component Locations (CHANGE 5)

## HP MANUAL CHANGES

MAKE ALL CORRECTIONS IN YOUR MANUAL ACCORDING TO ERRATA.

Check the following table for your instrument serial prefix and make any indicated changes to the manual:

\*New or revised items.

MANUAL TITLE: 8620C

MANUAL PRINTED: September, 1975.

MANUAL PART NO: 08620-90034

CHANGE DATE: 8th August 1977

SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE	SERIAL PREFIX	MAKE CHANGE
1602U	1	1708U	1-5		
1619U	1-2	1714U	1-6		
1619U-00376	1-3	1731U	1-7**		
1645U	1-4				

### ERRATA

Page 1-0, Figure 1-1  
Delete : RACK MOUNTING KIT, 5060-8740

Page 1-3, Paragraph 1-38:  
Delete : all references to Rack Mounting Kit.

Page 1-3, Paragraph 1-43:  
Add : "A Rack Mounting Kit is available to install the instrument in a 19 inch rack. Rack Mounting Kits may be obtained through your nearest Hewlett Packard Office by ordering HP Part Number 5060-8740".

Page 1-8, Figure 1-3 (1 of 2)  
Replace Figure 1-3 with Figure 1-3A in this change sheet.

Page 1-9, Figure 1-3 (2 of 2)  
Delete : items 2, 4, and 6 and renumber remaining items 1 through 4.

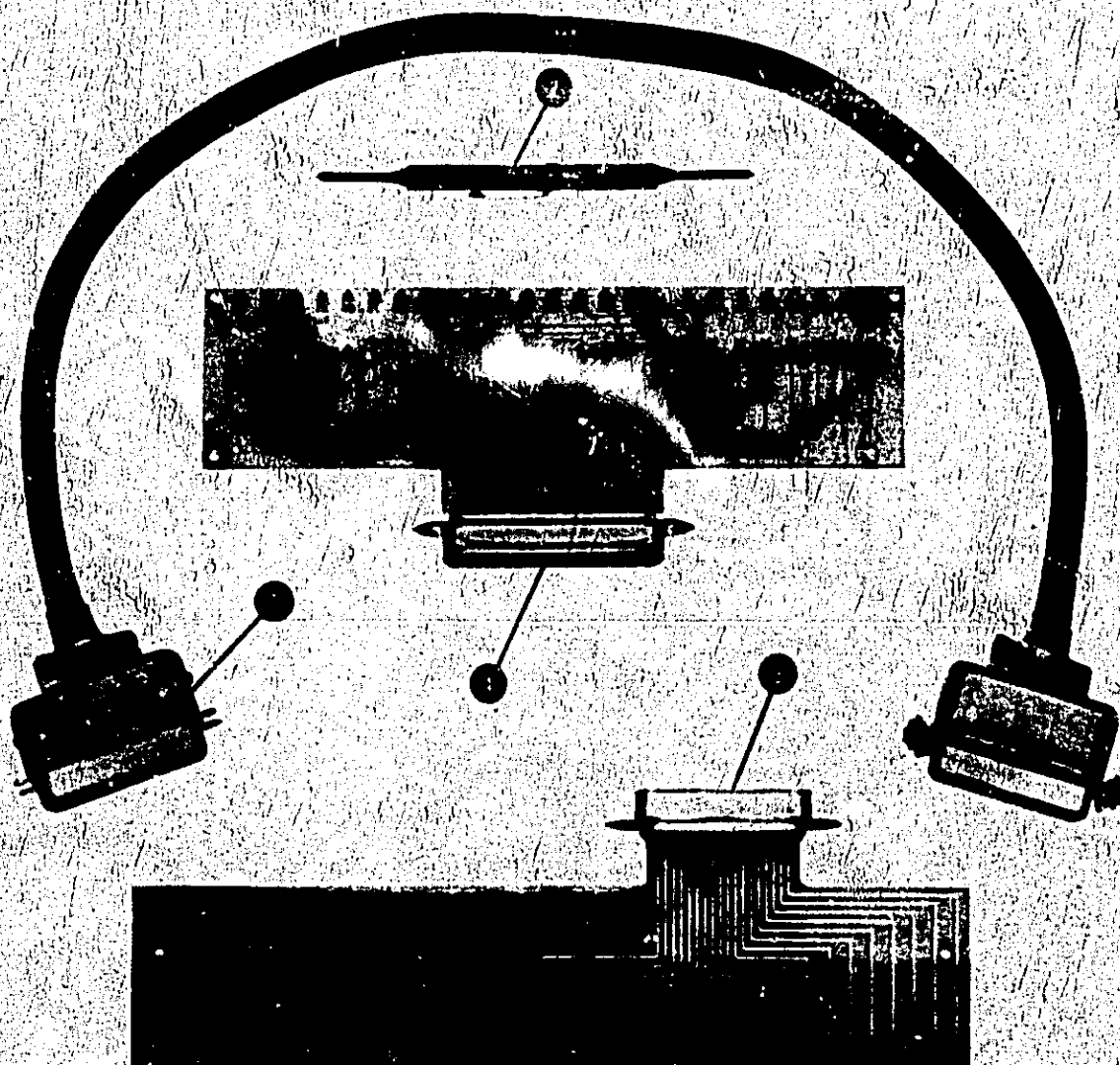
Page 6-7 Table 6-2  
Delete : A3C4

Page 6-14, Table 6-2  
Delete : C1.  
Add : S9, S10, S11 3101-0070 SWITCH SL, DPDT, NS, .5A 125VAC/DC 28480 3101-0070

Page 8-1, Paragraph 8-6:  
in first line change Table 8-1 to Table 8-2.

Page 8-19/8-20 Service Sheet 3  
Delete : A3C4 from Figure 8-15 and schematic diagram.

Page 8-29, Figure 8-26  
Change : A8C1 and A8C2 to .047.



*Figure 1-3A: Service Accessory Kit, HP Part No. 08620-60124*

**CHANGE 1**

Page 5-2 Figure 5-1

Change : A7TP7 to A7TP8 (GND)

Add : a new A7TP7 between BAL potentiometer A7R35 and J9.

Page 5-6, Paragraph 5-16

Change : Procedure step a to read: Connect oscilloscope Channel A to A7TP6 (A7Q5 collector) and Channel B to A7TP7 (A7Q7 collector). Connect oscilloscope ground lead to A7TP8.

Page 5-7 Figure 5-4

Change : title on bottom waveform to CHANNEL B A7TP7 (Q7 COLLECTOR)

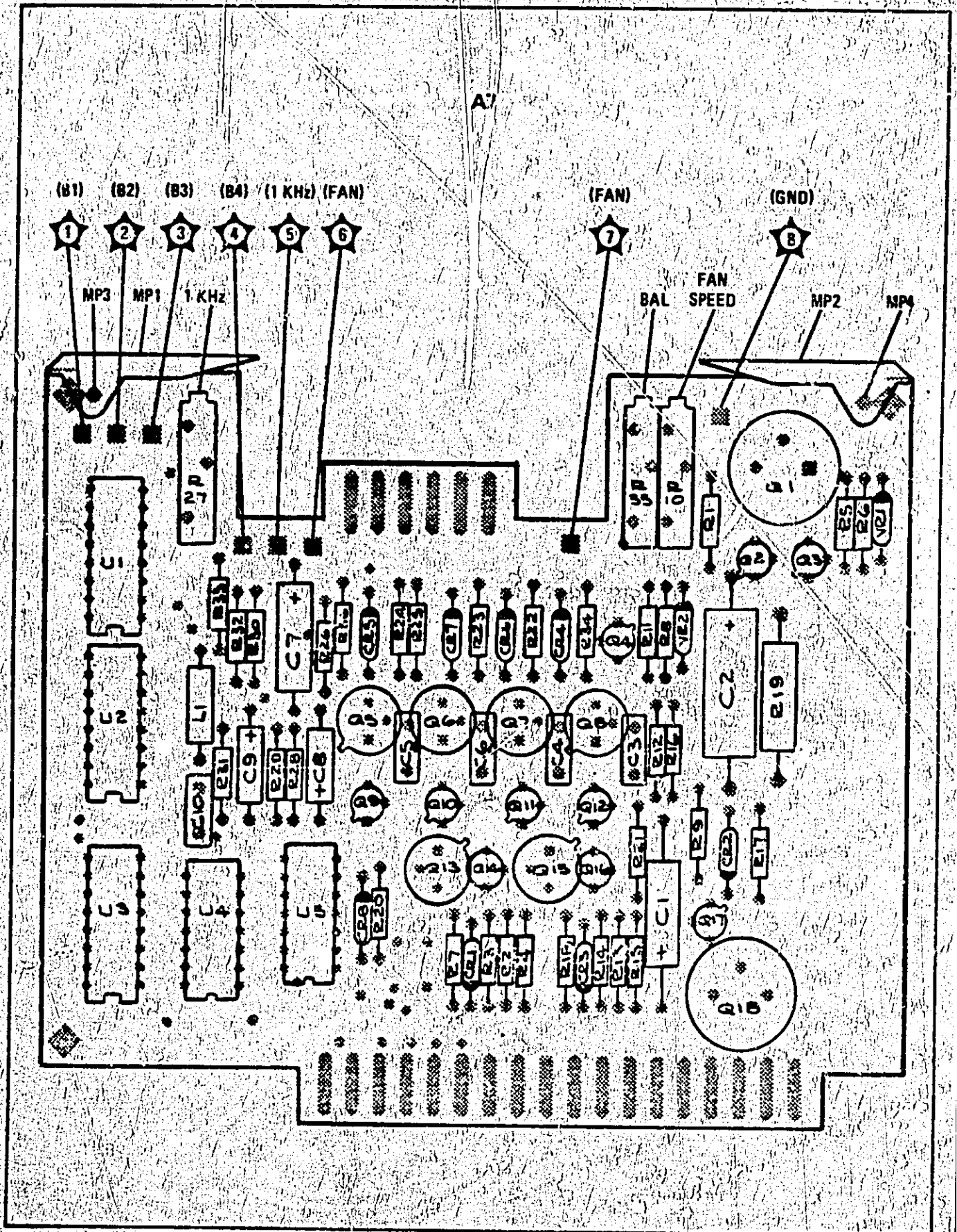


Figure 8-23. Operations Control Assembly, Component Locations (CHANGE 1)

Page 6-9 Table 6-2

Delete : HP Part Number 8159-0005 Wire. Installing this wire switches in the CW Filter in Remote D/A Tuning Mode.

Page 6-11 Table 6-2

Delete : HP Part Number 1200-0508 Socket I.C. for A6U2, U3 and U4.

Page 6-14 Table 6-2

Change : J2MP1 to HP Part Number 08620-20082 Shroud, Connector.

**CHANGE 2**

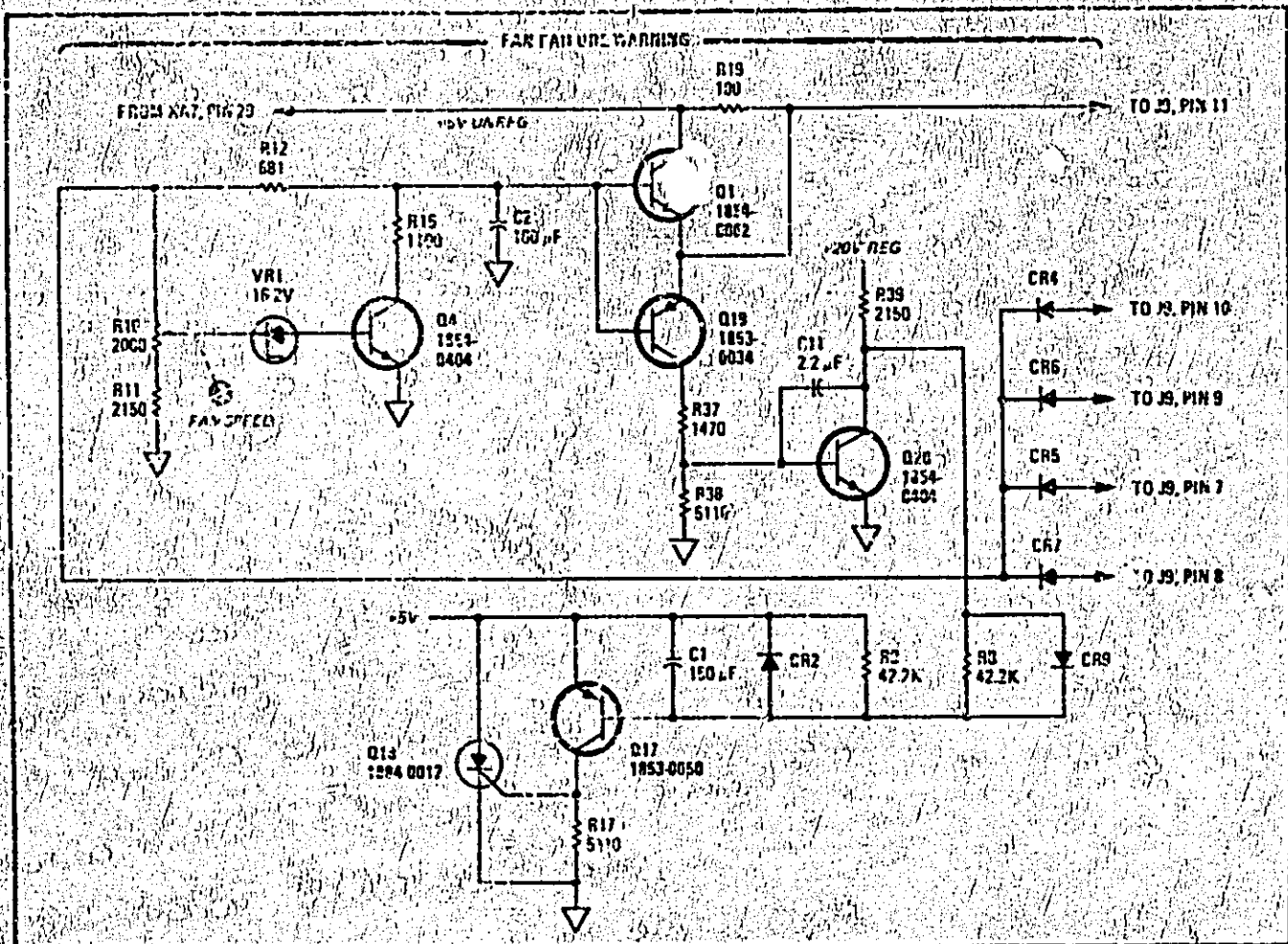
Page 6-12, Table 6-2:

- Add : A7C11, 0180-0197, C:FXD 2.2 UF 20V
- Add : A7Q19, 1853-0034, TRANSISTOR
- Add : A7Q20, 1854-0404, TRANSISTOR
- Change : A7R8 to 0698-3450, RESISTOR 42.2K 1% .125W
- Change : A7R9 to 0698-3450, RESISTOR 42.2K 1% .125W
- Change : A7R12 to 0757-0419, RESISTOR 681 1% .125W
- Change : A7R16 to 0757-0424, RESISTOR 1.1K 1% .125W
- Change : A7R17 to 0757-0438, RESISTOR 5.11K 1% .125W
- Add : A7R37, 0757-1094, RESISTOR 1.47K 1% .125W
- Add : A7R38, 0757-0438, RESISTOR 5.11K 1% .125W
- Add : A7R39, 0698-0084, RESISTOR 2.15K 1% .125W

Page 8-27, SERVICE SHEET 7:

Replace Figure 8-23 with Figure 8-23 (CHANGE 2) of this Manual Changes.

Replace applicable part of Figure 8-24 with Figure 1 of this Manual Changes.



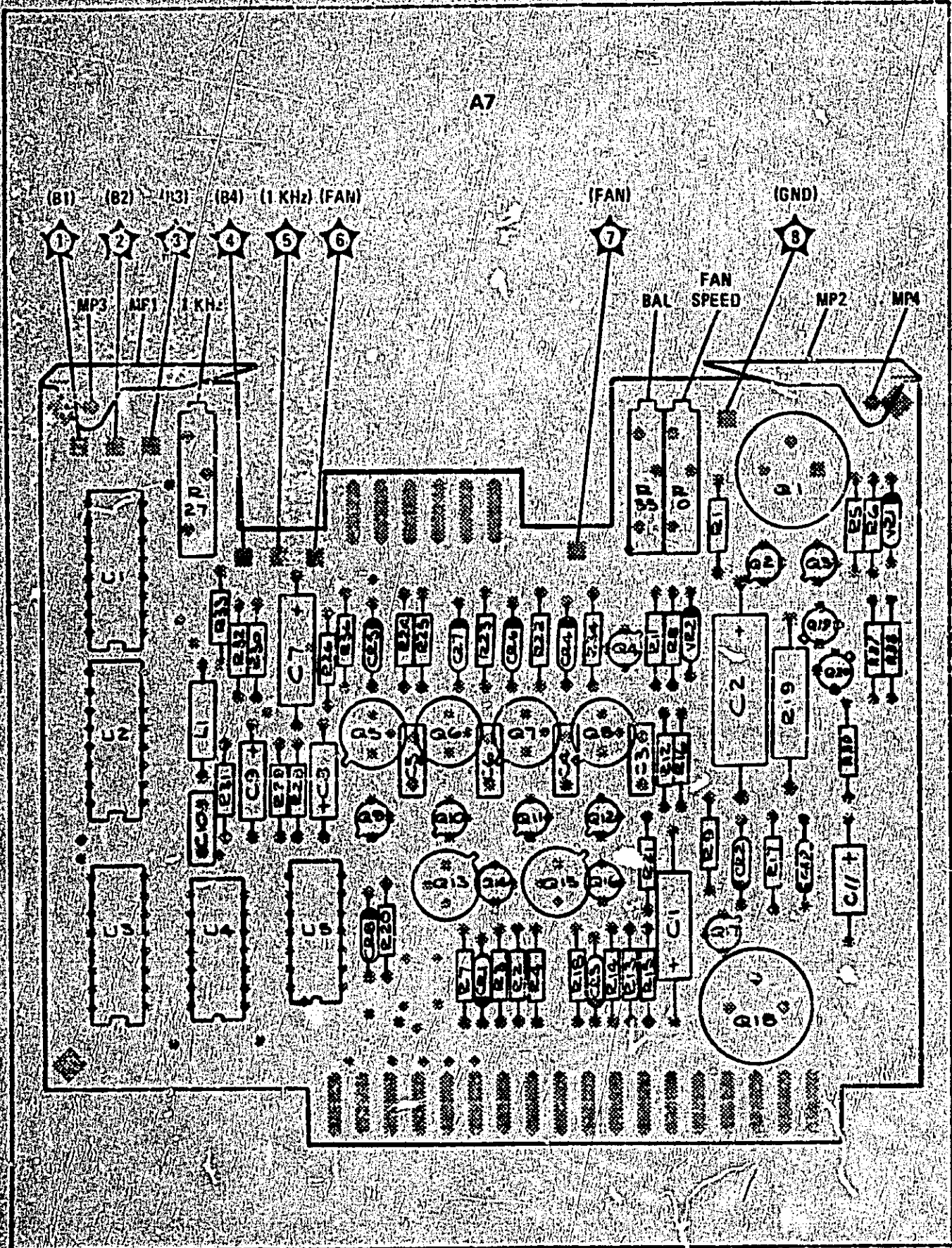


Figure 8-23. A7 Operations Control Assembly, Component Locations (CHANGE 2)

## CHANGE 2 (Cont'd)

Page 6-15 Table 6-2

Change : 08620-00074, Qty 2, Shield, Fan Blade to  
08620-00076, Qty 1, Shield, Fan Blade. Manufacturers Part Number 08620-00076

NOTE:- Parts 08620-00074 and 08620-00076 are directly interchangeable.

## CHANGE 3 Page 6-12 Table 6-2:

Change : A7R10 to 2100-3154 Resistor, Var 1K $\Omega$

Change : A7R11 to 0757-0424 Resistor, Fxd 1.1K 1% .125W

Page 8-27 Service Sheet 7:

Change : A7R10 to 1000 $\Omega$  and A7R11 to 1100 $\Omega$

## CHANGE 4 Page 6-4, Table 6-2

Add : A1C7, 0160-2055 CAPACITOR FXD, .01 $\mu$ F 100VDC

Page 6-7, Table 6-2

Change : A3C5, C9, C10 and C11 to 0160-0575 CAPACITOR, FXD .047 $\mu$ F

Page 6-15, Table 6-2

Add : HP Part Number 0380-0643 Standoff, Hex Head, P/O 08620-60130  
Connector/Adapter for Option 011

Page 8-13, Figure 8-9

Replace Figure 8-9 with Figure 8-9 of this Manual Change.

Page 8-15, Figure 8-11

Replace Figure 8-11 with Figure 8-11 of this Manual Change.

Page 8-15, Figure 8-12

Add : A1C7 as shown in the attached partial schematic.

Page 8-19/8-20, Figure 8-16

Change : C5, C9, C10, C11 to .047.

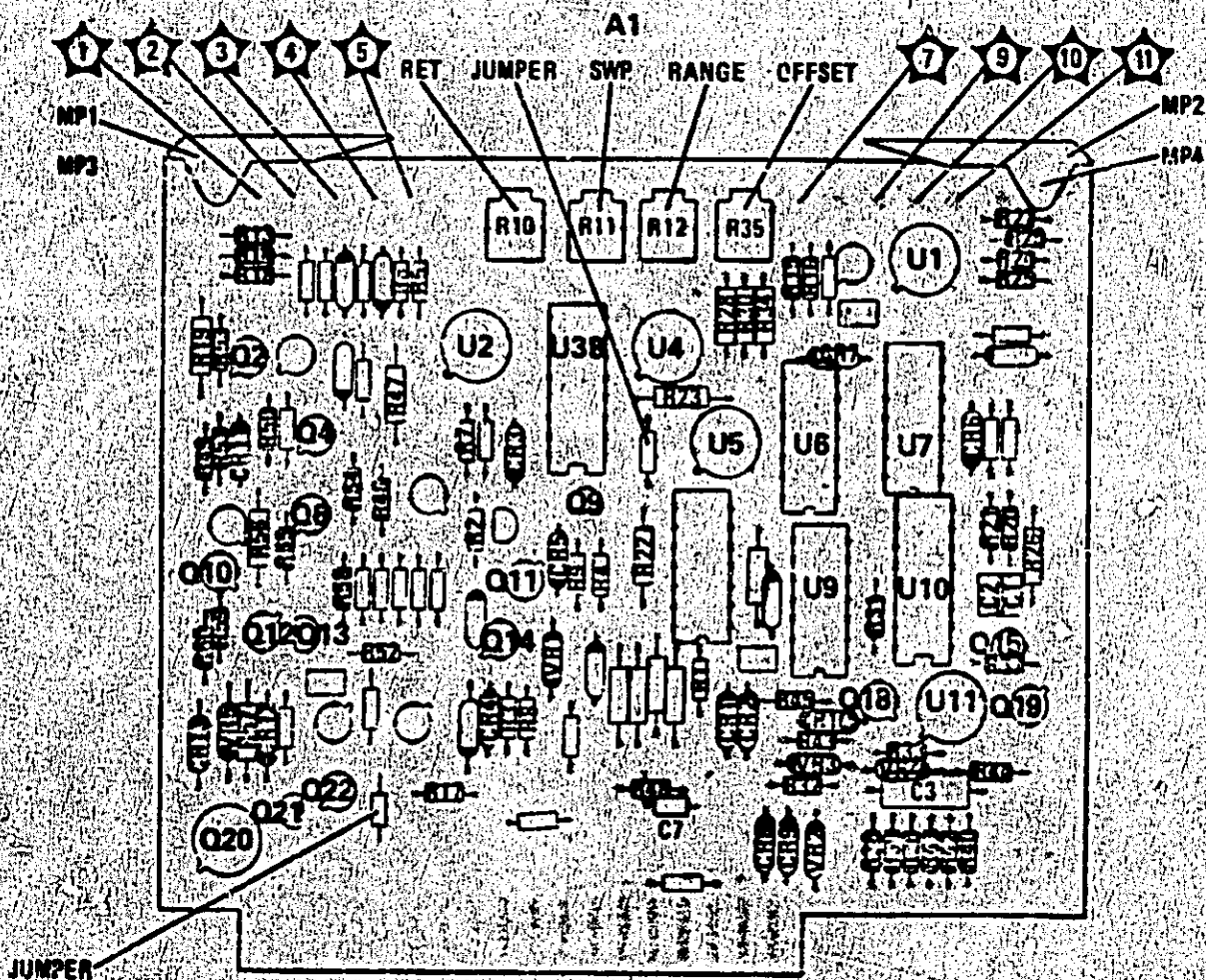


Figure 8-9 P/O A1 Sweep  
Generator Assembly (P/O Change 4)





**CHANGE 5**

Page 6-11, Table 6-2  
Change : A5R9 to 2100-3109 Res. Var 2K.

Page 8-23/8-24, Figure 8-20  
Change : A5R9 to 2000.

**CHANGE 6**

Page 6-14, Table 6-2  
Change : S1 to 3101-1957, SWITCH DPST.

**\*\*CHANGE 7\*\***

Page 6-8, Table 6-2  
Change : A3R17, R18 and R19 to 0698-3440 RESISTOR 196 1% .125W.  
Change : A3R27, R28 and R29 to 0698-3453 RESISTOR 196K 1% .125W.

Page 8-19/8-20, Figure 8-16 (Service Sheet 3)  
Change : R17, R18 and R19 to 196.  
Change : R27, R28 and R29 to 196K.