

## Errata

**Title & Document Type:** 86601A RF Section Operation and Technical Manual

**Manual Part Number:** N/A

**Revision Date:** October 1979

---

### 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, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

### 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.

### 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.tm.agilent.com](http://www.tm.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**

**TECHNICAL MANUAL**

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND  
GENERAL SUPPORT MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS)**

**FOR**

**PLUG-IN UNIT, RF SECTION  
HEWLETT-PACKARD MODEL 86601A  
(NSN 6625-00-005-1226)**

---

**HEADQUARTERS, DEPARTMENT OF THE ARMY  
OCTOBER 1979**

*This manual contains copyright material reproduced by permission of the Hewlett-Packard Company.*

TM 11-6425-2837-14&P-6

TECHNICAL MANUAL

No. 11-6425-2837-14&P-6

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 20315-5000

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE  
MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS  
FOR  
PLUG-IN UNIT, RF SECTION  
HEWLETT-PACKARD MODEL 86631A  
(NSN 6625-00-005-1226)**

**REPORTING OF ERRORS**

*You can improve this manual by recommending improvements using DA Form 2028-2 located in the back of the manual. Simply tear out the self-addressed form, fill it out as shown on the sample, fold it where shown, and drop it in the mail.*

*If there are no blank DA Forms 2028-2 in the back of your manual, use the standard DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to the Commander, US Army Communications and Electronics Material Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.*

*In either case a reply will be furnished direct to you.*

This manual is an authentication of the manufacturer's commercial literature which, through usage, has been found to cover the data required to operate and maintain this equipment. Since the manual was not prepared in accordance with military specifications, the format has not been structured to consider levels of maintenance.



# CONTENTS

| Section                                          | Page  | Section IV.                                            | Page |
|--------------------------------------------------|-------|--------------------------------------------------------|------|
| 0. INTRODUCTION . . . . .                        | 0 - 1 | 4-17 Signal-to-AM Noise Ratio . . . . .                | 4-9  |
| I. GENERAL INFORMATION . . . . .                 | 1-1   | 4-18 Broadcast FM . . . . .                            | 4-10 |
| 1-2. Introduction . . . . .                      | 1-1   | 4-19. Amplitude Modulation . . . . .                   | 4-10 |
| 1-6. Instruments Covered by Manual . . . . .     | 1-1   | 4-20. Amplitude Modulation: On/Off Ratio . . . . .     | 4-11 |
| 1-8. Description . . . . .                       | 1-1   | 4-21. Amplitude Modulation Carrier                     |      |
| 1-12. Options . . . . .                          | 1-1   | Envelope Distortion . . . . .                          | 4-12 |
| 1-13. Accessories Available . . . . .            | 1-2   | 4-23. Incidental Phase Modulation . . . . .            | 4-16 |
| 1-13. Test Equipment and Accessories . . . . .   | 1-2   | 4-23. Frequency Modulation . . . . .                   | 4-16 |
|                                                  |       | 4-24. Frequency Switching Time . . . . .               | 4-17 |
| II. INSTALLATION . . . . .                       | 2-1   | 4-25. Output Level Switching Time . . . . .            | 4-19 |
| 2-1. Initial Inspection . . . . .                | 2-1   | 4-26. Incidental AM . . . . .                          | 4-20 |
| 4-2. Mechanical Check . . . . .                  | 2-1   |                                                        |      |
| 2-5. Electrical Check . . . . .                  | 2-1   | V. ADJUSTMENTS . . . . .                               | 5-1  |
| 2-7. Checks for Damage . . . . .                 | 2-1   | 5-1. Introduction . . . . .                            | 5-1  |
| 2-10. Preparation for Use . . . . .              | 2-1   | 5-7. Recommended Test Equipment . . . . .              | 5-1  |
| 2-12. Power Requirements . . . . .               | 2-1   | 5-10. Service Kit . . . . .                            | 5-1  |
| 2-14. Operating Environment . . . . .            | 2-1   | 5-13. Checks and Adjustments . . . . .                 | 5-1  |
| 2-16. Storage and Shipment . . . . .             | 2-1   | 5-14. RF Output Meter Calibration . . . . .            | 5-2  |
| 2-18. Original Packaging . . . . .               | 2-1   | 5-15. Harmonic Distortion Checks                       |      |
| 2-23. Other Packaging Material . . . . .         | 2-1   | and Adjustments . . . . .                              | 5-4  |
|                                                  |       | 5-16. Amplitude Modulation Calibration . . . . .       | 5-6  |
| III. OPERATION . . . . .                         | 3-1   | 5-17. A12 Filter Assy Checks and Adjustments . . . . . | 5-9  |
| 3-1. Introduction . . . . .                      | 3-1   | 5-18. 480 MHz Active Filter Checks and                 |      |
| 3-4. Panel Features . . . . .                    | 3-1   | Adjustments . . . . .                                  | 5-10 |
| 3-6. Operating Principles . . . . .              | 3-1   |                                                        |      |
| 3-11. Operator's Checks . . . . .                | 3-1   | VI. REPLACEABLE PARTS . . . . .                        | 6-1  |
|                                                  |       | 6-1. Introduction . . . . .                            | 6-1  |
| IV. PERFORMANCE TESTS . . . . .                  | 4-1   | 6-6. Ordering Information . . . . .                    | 6-1  |
| 4-1. Introduction . . . . .                      | 4-1   |                                                        |      |
| 4-3. Purpose . . . . .                           | 4-1   | VII. MANUAL CHANGES . . . . .                          | 7-1  |
| 4-8. Performance Tests . . . . .                 | 4-1   | 7-1. Introduction . . . . .                            | 7-1  |
| 4-9. Frequency Range . . . . .                   | 4-1   | 7-5. Manual Change Instructions . . . . .              | 7-1  |
| 4-10. Frequency Accuracy and Stability . . . . . | 4-2   |                                                        |      |
| 4-11. Output Accuracy and Level . . . . .        | 4-2   | VIII. SERVICE . . . . .                                | 8-1  |
| 4-12. Output Flatness . . . . .                  | 4-3   | 8-1. Introduction . . . . .                            | 8-1  |
| 4-13. Impedance: 50 Ohms . . . . .               | 4-4   | 8-3. Principles of Operation . . . . .                 | 8-1  |
| 4-14. Harmonic Signals . . . . .                 | 4-5   | 8-10. Recommended Test Equipment . . . . .             | 8-1  |
| 4-15. Spurious Signals . . . . .                 | 4-6   | 8-12. Troubleshooting . . . . .                        | 8-1  |
| 4-15. Signal-to-Phase Noise Ratio . . . . .      | 4-7   | 8-17. Repair . . . . .                                 | 8-1  |

## ILLUSTRATIONS

| Figure                                                 | Page | Figure                                              | Page |
|--------------------------------------------------------|------|-----------------------------------------------------|------|
| 1-1. Model 86601A RF Section . . . . .                 | 1-0  | 4-2. Output Accuracy and Level Test Setup . . . . . | 4-2  |
| 1-2. Instrument Identification . . . . .               | 1-1  | 4-3. Output Flatness Test Setup . . . . .           | 4-3  |
| 1-3. 15 kHz Lowpass Filter . . . . .                   | 1-6  | 4-4. Impedance Test Setup . . . . .                 | 4-4  |
| 1-4. 100 kHz Lowpass Filter . . . . .                  | 1-6  | 4-5. Harmonic Signal Test Setup . . . . .           | 4-5  |
| 1-5. 40 dB Amplifier . . . . .                         | 1-6  | 4-6. Spurious Signal Test Setup . . . . .           | 4-6  |
| 3-1. Front and Rear Panel Controls, Indicators,        |      | 4-7. Signal-to-Phase Noise Test Setup. . . . .      | 4-8  |
| and Connectors . . . . .                               | 3-0  | 4-8. Signal-to-AM Noise Ratio Test Setup . . . . .  | 4-9  |
| 4-1. Frequency Range and Accuracy Test Setup . . . . . | 4-1  | 4-9. Amplitude Modulation Test Setup . . . . .      | 4-10 |



## ILLUSTRATIONS (cont'd)

| Figure                                                            | Page | Figure                                                    | Page |
|-------------------------------------------------------------------|------|-----------------------------------------------------------|------|
| 4-10. Amplitude Modulation ON/OFF Ratio Test Setup                | 4-12 | 8-4. Integrated Circuit Packaging                         | 8-6  |
| 4-11. Amplitude Modulation Carrier Envelope Distortion Test Setup | 4-13 | 8-5. Integrated Circuits used in Model 86601A             | 8-7  |
| 4-12. Incidental FM Test Setup                                    | 4-15 | 8-6. Chassis Mounted Parts and Assembly Locations         | 8-7  |
| 4-13. Frequency Modulation Test Setup                             | 4-16 | 8-7. Model 86601A Troubleshooting Tree                    | 8-8  |
| 4-14. Frequency Switching Time Test Setup                         | 4-18 | 8-8. Model 86601A w/cover Removed                         | 8-10 |
| 4-15. Output Level Switching Time Test Setup                      | 4-19 | 8-9. Mixer Schematic Diagram                              | 8-11 |
| 4-16. Incidental AM Test Setup                                    | 4-20 | 8-10. Mother Board Component Locations                    | 8-11 |
| 5-1. RF Output Meter Calibration Setup                            | 5-2  | 8-11. Input Connector                                     | 8-11 |
| 5-2. Amplitude Modulation Calibration Setup                       | 5-3  | 8-12. Model 86601A Block Diagram                          | 8-11 |
| 5-3. Harmonic Distortion Adjustment Setup                         | 5-4  | 8-13. 480 MHz Band Pass Filter Component Locations        | 8-12 |
| 5-4. A12A1 Filter Adjustment Setup                                | 5-6  | 8-14. Modulator Assembly Component Locations              | 8-13 |
| 5-5. Preliminary Adjustment Setup (450/460 Bandpass Filter)       | 5-9  | 8-15. Dual Filter Adjustment Locations                    | 8-13 |
| 5-6. Active Filter Adjustment Setup                               | 5-10 | 8-16. Modulator Assembly Component Locations              | 8-13 |
| 7-1. RF Output Meter Calibration Setup                            | 7-3  | 8-17. Filters, Mixers and Modulator Schematic             | 8-13 |
| 7-2. Partial Logic Schematic                                      | 7-5  | 8-18. Preamplifier Component Locations                    | 8-15 |
| 7-3. A5 Modulator Assembly 86601-60001                            | 7-5  | 8-19. Power Amplifier and AGC Component Locations         | 8-15 |
| 7-4. Modulator Assembly Component Locations                       | 7-7  | 8-20. Pre-Amp and PWR-Amp Schematic                       | 8-15 |
| 7-5. Reference Assembly                                           | 7-8  | 8-21. Front Panel Component Locations                     | 8-16 |
| 7-6. Reference Assembly Component Locations                       | 7-9  | 8-22. Feedback Amplifier Component Locations              | 8-17 |
| 7-7. Feedback Amplifier                                           | 7-10 | 8-23. Reference Assembly Component Locations              | 8-17 |
| 7-8. Feedback Amplifier Component Locations                       | 7-11 | 8-24. Feedback Amplifier and Reference Assembly Schematic | 8-17 |
| 8-1. Model 86601A Simplified Block Diagram                        | 8-0  | 8-25. Logic Assembly Component Locations                  | 8-19 |
| 8-2. Diagram of Module Exchange Program                           | 8-3  | 8-26. Logic and Driver Circuit Schematic                  | 8-19 |
| 8-3. Model 86601A with Circuit Board Extended for Maintenance     | 8-4  | 8-27. Attenuator Driver Component Locations               | 8-21 |
|                                                                   |      | 8-28. Attenuator Driver Schematic                         | 8-21 |

## TABLES

| Table                                                           | Page | Table                                                        | Page |
|-----------------------------------------------------------------|------|--------------------------------------------------------------|------|
| 1-1. Model 86601A Specifications                                | 1-2  | 6-3. Replaceable Parts                                       | 6-3  |
| 1-2. Test Equipment and Accessories List                        | 1-4  | 6-4. Manufacture's Code List                                 | 6-15 |
| 1-3. 40 dB Amplifier Specifications                             | 1-6  | 6-5. Part Number-National Stock Number Cross Reference Index | 6-16 |
| 4-1. Spurious checks                                            | 4-7  | 7-1. Manual Changes by Serial Number                         | 7-1  |
| 4-2. Carrier Envelope Distortion Test                           | 4-14 | 7-2. Assembly-Change Cross Reference Index                   | 7-4  |
| 4-3. Performance Test Record                                    | 4-22 | 8-1. Schematic Diagram Notes                                 | 8-5  |
| 5-1. Harmonic Distortion Level Checks                           | 5-5  | 8-2. Assembly Locations                                      | 8-7  |
| 6-1. Part Numbers for Assembly Exchange Orders                  | 6-1  | 8-3. 1 dB Attenuation Checks                                 | 8-16 |
| 6-2. Reference Designators and Abbreviations Used in Parts List | 6-2  | 8-4. Attenuator Driver Levels                                | 8-20 |

## APPENDICES

|                                       |     |                                                |     |
|---------------------------------------|-----|------------------------------------------------|-----|
| A. REFERENCES                         | A-1 | E. REPAIR PARTS AND SPECIAL TOOLS LISTS        | E-1 |
| B. COMPONENTS OF END ITEM LIST (NA)   |     | F. EXPENDABLE SUPPLIES AND MATERIALS LIST (NA) |     |
| C. ADDITIONAL AUTHORIZATION LIST (NA) |     |                                                |     |
| D. MAINTENANCE ALLOCATION             | D-1 |                                                |     |

## SECTION 0

### INTRODUCTION

#### 0-1. SCOPE

**This manual describes Plug-in Unit, Rf section, Hewlett-Packard Model 86601A and provides instructions for operation and maintenance.**

#### 0-2. INDEXES OF PUBLICATIONS

**a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.**

**b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.**

#### 0-3. MAINTENANCE FORMS, RECORDS, AND REPORTS

**a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those described by TM 38-750, The Army Maintenance Management System.**

**b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 4145.8.**

**c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment**

**Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C and DLAR 4500.15.**

#### 0-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

EIR can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or hit a better way to perform a procedure; just simply tell why the design is unfavorable or why a procedure is difficult. EIR may be submitted on SF 368 (Quality Deficiency Report). Mail direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. A reply will be furnished to you.

#### 0-5. ADMINISTRATIVE STORAGE

Administrative storage equipment issued to and used by Army activities shall be in accordance with paragraph 2-16.

#### 0-6. DESTRUCTION OF ARMY ELECTRONICS MATERIEL

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

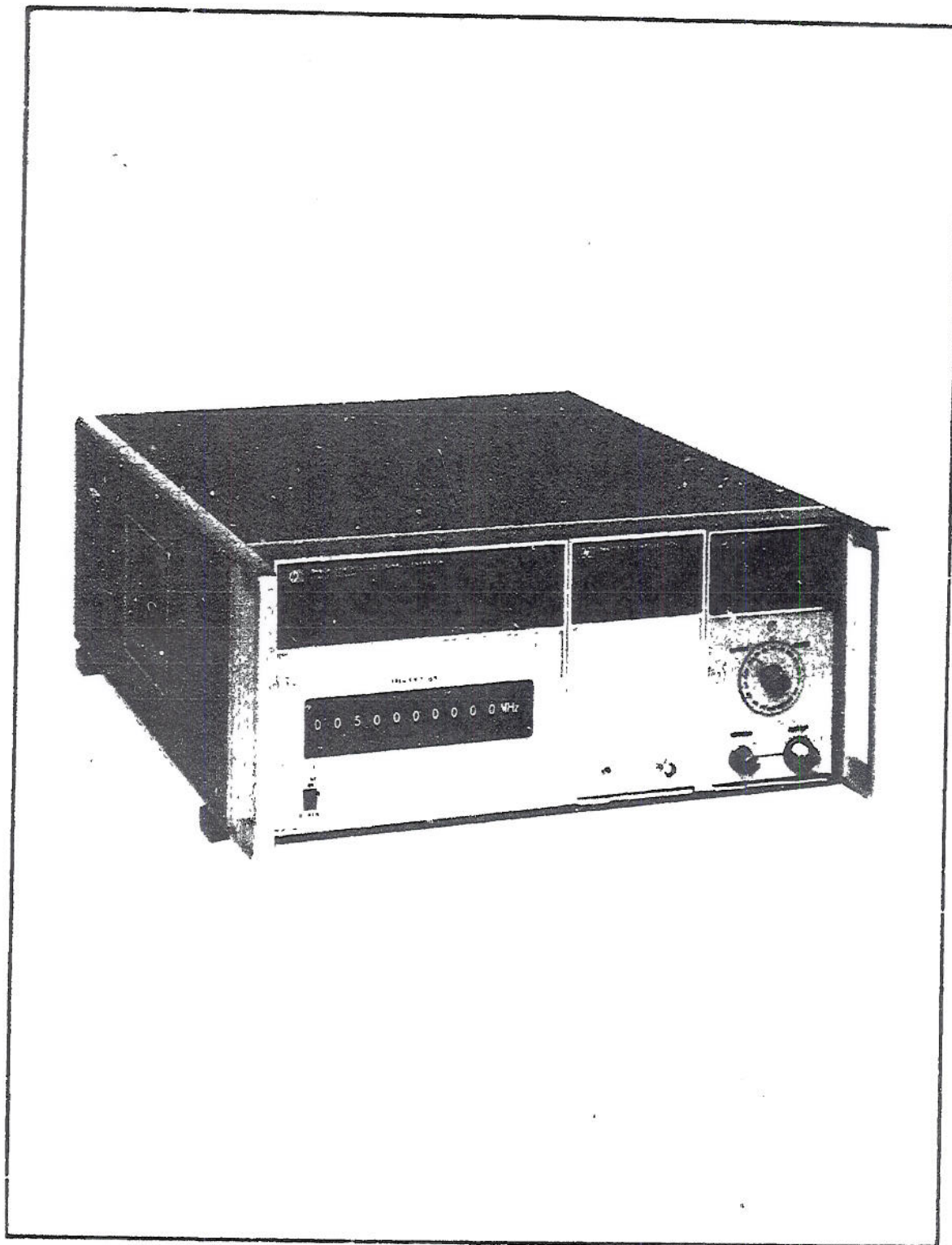


Figure 1-1. Model 88601A RF Section



## SECTION I

### GENERAL INFORMATION

#### 1-1. INTRODUCTION

1-2. The Hewlett-Packard Model 86601A RF Section is an rf output plug-in designed for use with the Hewlett-Packard Model 8660 Synthesized Signal Generator mainframes.

1-3. This manual contains all information required to install, operate, test, adjust, and service the HP Model 86601A. This section covers instrument identification, specifications and other basic information.

1-4. Figure 1-1 shows a front view of the HP Model 86601A installed in the HP Model 8660A mainframe ready for use.

1-5. The various sections of this manual provide information as follows:

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

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

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

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

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

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

g. SECTION VIII, SERVICE, includes all information required to service the instrument.

#### 1-6. INSTRUMENTS COVERED BY MANUAL

1-7. A ten-digit number (see Figure 1-2) is affixed to the rear panel of all Hewlett-Packard instruments. When the first five digits (serial prefix) of

your instrument matches serial prefix number 1335A, the contents of this manual applies directly to it. An instrument manufactured after the printing of this manual may have a different serial prefix number; if so, refer to Section VII and make the applicable manual changes.

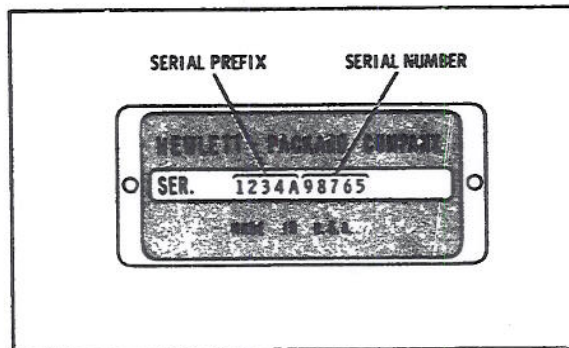


Figure 1-2. Instrument Identification

#### 1-8. DESCRIPTION

1-9. The HP Model 86601A RF Section output plug-in provides a .01 to 109.999999 MHz output when installed in one of the HP Model 8660 mainframes. The output frequency may be selected in increments as low as 1 Hz or 100 Hz depending on the mainframe used.

1-10. The only operator controls on the Model 86601A are the attenuator (OUTPUT RANGE and VERNIER) controls. These controls provide a means of setting the rf output at any level between -146 dBm and +13 dBm. In remote operation these controls are inhibited; attenuation is controlled by a remote programming device in 1 dB and 10 dB steps.

1-11. Complete specifications for the Model 86601A are provided in Table 1-1.

#### 1-12. OPTIONS

Option 001: No RF output attenuator. Output level adjustable from +13 to 0 dBm.

## 1-13. ACCESSORIES AVAILABLE

1-14. An extender cable, HP Part Number 11672-60001, is required to extend the plug-in for maintenance purposes. This extender cable is a part of the HP 11672A Service Kit, but may be ordered separately.

## 1-15. TEST EQUIPMENT AND ACCESSORIES

1-16. Table 1-2 lists the test equipment and accessories recommended to test, adjust and service the Model 86601A. Refer to the Maintenance Allocation Chart in the Appendix for the required test equipment.

Table 1-1. Model 86602A Specifications

**FREQUENCY CHARACTERISTICS****Frequency Range:**

0.01 to 109.999999 MHz. Selectable in 1 Hz or 100 Hz steps (depending on mainframe used).

**Frequency Accuracy and Stability:**

CW frequency accuracy and long term stability are determined by the reference oscillator in the 8660 mainframe or by an external reference if used.

**Switching Time:**

Less than 5 ms to be within 100 Hz of any new frequency selected. Less than 100 ms to be within 5 Hz of any new frequency selected. Maximum stepping rate: 1 ms per step.

**Harmonic Signals: (Output terminated in 50 Ohms)**

All harmonically related signals are at least 40 dB below the selected output signal.

**Spurious Signals:**

All nonharmonically related spurious signals are at least 80 dB below the selected output signal. Power line related spurious signals are at least 70 dB below the carrier.

**Signal-to-phase Noise Ratio:**

Greater than 50 dB in a 30 kHz band centered on the carrier excluding a 1 Hz band centered on the carrier.

**Residual FM:**

< 1 Hz rms in 2 kHz bandwidth centered on carrier.

**Signal-to-AM Noise Ratio:**

Greater than 70 dB in a 30 kHz band centered on the carrier, excluding a 1 Hz BW centered on the carrier.

**OUTPUT CHARACTERISTICS****Output Level:**

Continuously adjustable from +13 to -146 dBm (1.0 V to 0.01  $\mu$ Vrms) into 50-ohm resistive load; output attenuator calibrated in 10 dB steps from 1.0 V (+13 dBm) full scale to 0.03  $\mu$ V (-137 dBm) full scale; vernier provides continuous adjustment between attenuator ranges; output level indicated on output level meter calibrated in volts and dBm into 50 ohms.

**Output Accuracy: (Local and Remote Modes)**

$\pm 1$  dB from +13 dBm to -66 dBm.  $\pm 2$  dB from -67 dBm to -146 dBm.

**Flatness:** Output level variation with frequency is less than  $\pm 0.5$  dB across the entire frequency range.

**Output Level Switching Time.** Any level change may be accomplished in less than 50 ms. Any change to another level on the same attenuator range may be accomplished in 5 ms in Remote mode.

**Impedance:** 50 ohms. SWR less than 2.0 on +10 dBm (1.0 V) attenuator range, less than 1.3 on 0 dBm (0.3 V) range and below



Table 1-1. Model 86601A Specifications (Cont'd)

### MODULATION CHARACTERISTICS (With the Model 86632A AM/FM Modulation Section)

#### Amplitude Modulation:\*\*

Modulation Depth: 0 to 95% on all output ranges.

ON/OFF Ratio: At least 25 dB with output meter at 0 dB or above.

Carrier Envelope Distortion: (Modulating signal distortion < 0.3%). Less than 1% at 30% AM. Less than 3% at 70% AM. Less than 5% at 90% AM.

Incidental FM: Less than 0.2 radians peak at 30% AM.

Incidental FM:  $0.2 \times f_{mod}$ .

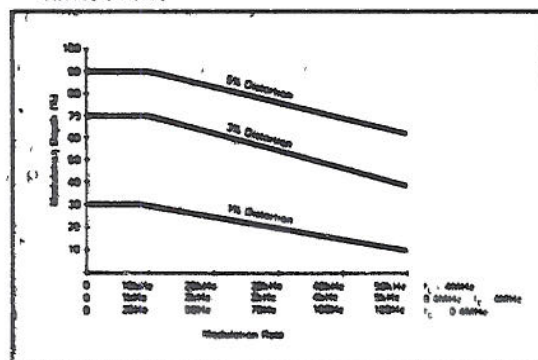
AM 3 dB Bandwidth:

| Center Frequency       | 0 to 30% AM | 70% AM | 90% AM |
|------------------------|-------------|--------|--------|
| $F_c < 0.4$ MHz        | 200 Hz      | 125 Hz | 100 Hz |
| $0.4 \leq F_c < 4$ MHz | 10 kHz      | 6 kHz  | 5 kHz  |
| $F_c \geq 4$ MHz       | 100 kHz     | 60 kHz | 50 kHz |

AM Distortion: (at 400 Hz and 1 kHz rates)

| Frequency Range | 30% | 70% | 90% |
|-----------------|-----|-----|-----|
| 0.4-110 MHz     | <1% | <3% | <5% |

Typical distortion for other conditions is shown in curves below.



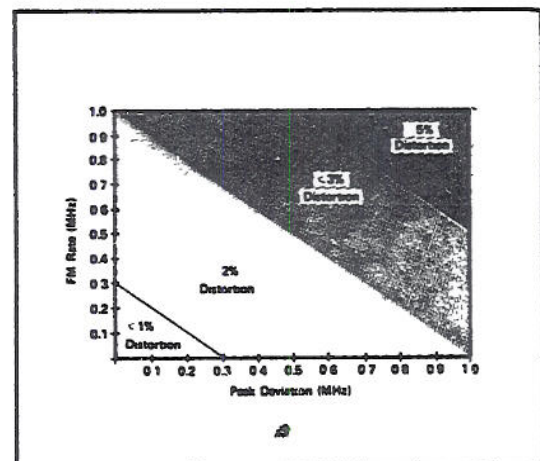
Typical 86601A AM distortion curves

#### Frequency Modulation:\*\*

Rate: DC to 1 MHz.

Maximum Deviation: 1 MHz.

Incidental AM: With 75 kHz peak deviation at 1 kHz rate, AM modulation sidebands are < -60 dB.



Typical 86601A FM distortion curves

#### GENERAL

##### Leakage:

Meets radiated and conducted limits of MIL-I-6181D.

Size: Plut-in to fit Model 8660 mainframe.

Weight: Net, 11 lbs (5 kg). Shipping 15 lbs (6.8 kg).

\*Uncalibrated amplitude modulation is also possible with the Model 86631A Auxiliary Section installed.

\*\*In the FM mode, carrier frequency stability is determined by a free-running modulation oscillator in the Model 86632 Modulation Section. The oscillator can be phase-locked momentarily to remove drift by depressing the Model 86632A CF CAL button. Oscillator drift is less than 5 kHz/day after warmup.



Table 1-2. Test and Equipment and Accessories List

| ITEM                                              | MINIMUM SPECIFICATIONS                                                    | SUGGESTED MODEL                                  | USE*    |
|---------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------|---------|
| Digital Voltmeter                                 | Accuracy: $\pm .2\%$<br>Range: .00 to 60 Volts                            | HP 3440A with<br>HP 3443A plug-in                | S       |
| AC Voltmeter                                      | 5 kHz to 500 kHz<br>1 mV to 10 Volts                                      | HP 403A                                          | P       |
| RF Millivoltmeter                                 | 1 MHz to 600 MHz<br>10 mV to 1 Volt                                       | HP 411A                                          | A       |
| High Frequency<br>dB Voltmeter                    | $\pm .2$ dB from 10 kHz to 500 kHz<br>+20 to -20 dB                       | HP 400GL                                         | A, P    |
| Vector Voltmeter                                  | $\pm .2$ dB from 1 MHz to 600 MHz<br>+10 to -50 dB                        | HP 8405A                                         | P, S    |
| Broadband Sampling<br>Voltmeter                   | $\pm 5\%$ from 100 kHz to 150 MHz<br>+20 to -20 dB                        | HP 3406A                                         | A, P    |
| Oscilloscope                                      | DC to 50 MHz, delayed sweep, time base 50 ns to 1 s                       | HP 180A with HP 1801A<br>and HP 1821A plug-ins   | P, S    |
| 10 $\div$ 1 divider probes<br>(two)               | 10:1 divider<br>10 Megohm<br>10 pF                                        | HP 10004                                         |         |
| Spectrum Analyzer                                 | $\pm .5$ dB from 10 kHz to 110 MHz<br>Measurement Accuracy $\pm 2$ dB     | HP 140S with HP 8553B<br>and HP 8552B plug-ins   | A, P    |
| Spectrum Analyzer                                 | $\pm 1$ dB from 1 MHz to 700 MHz<br>Measurement Accuracy $\pm 2$ dB       | HP 140S with HP 8554L<br>and HP 8552B plug-ins   | A, P, S |
| Tracking Generator<br>Spectrum Analyzer<br>System | $\pm 1.75$ dB from 1 MHz to 700 MHz<br>Measurement Accuracy $\pm 3.25$ dB | HP 8444A with HP 8554L<br>Spectrum Analyzer      | A, P    |
| Test Oscillator                                   | 10 Hz to 20 kHz<br>.1 V to 1 V                                            | HP 651B                                          | A, P    |
| Synthesized Signal<br>Generator                   | $\pm 1$ Hz from .01 MHz to 110 MHz<br>$\pm 2$ dB from +10 to -90 dBm      | HP 8660 with HP 86631A<br>and HP 86601A plug-ins | P       |
| Modulator Section                                 | 1 kHz FM with 1 MHz peak deviation                                        | HP 86632A                                        | P       |
| Electronic Counter/<br>Frequency Converter        | Range: 0-50 MHz; 0-500 MHz with the plug-in                               | HP 5245M with HP 5253B<br>plug-in                | A, P, S |
| Computing Counter                                 | 50 kHz to 50 MHz with a 1 ms count gate and<br>and external trigger       | HP 5360A with HP 5365A<br>plug-in                | P       |
| Wave Analyzer                                     | 20 Hz to 10 kHz                                                           | HP 302A                                          | P       |
| Crystal Detector                                  | 100 kHz to 10 MHz                                                         | HP 8471A                                         | P       |
| Power Supply                                      | 0-10 volts                                                                | HP 721                                           | P, S    |
| Marked Card<br>Programmer                         | Negative true output ground - true<br>+5 V - false                        | HP 3260A (only)<br>Opt 001                       | P, S    |
| Frequency Meter/<br>FM Discriminator              | 100 kHz to 10 MHz with 1 volt sensitivity                                 | HP 5210A                                         | P       |
| Variable Coaxial<br>Attenuator                    | Refer to calibration curve                                                | HP H38-355D (only)                               | A, P    |
| Double Balanced Mixer                             | 1 MHz to 110 MHz                                                          | HP 10614A                                        | P       |
| BNC Tee                                           |                                                                           | UG 274 B/U                                       | A, P, S |

\*USE - A = Adjustments; P = Performance Tests; S = Service

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

| ITEM                         | MINIMUM SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SUGGESTED MODEL                                                                                                                                                                                    | USE*    |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 50 Ohm Dummy Load            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | HP 1250-0207                                                                                                                                                                                       | A, P, S |
| Variable Phase Generator     | Distortion less than 3%<br>Range: 1 kHz to 20 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | HP 203A                                                                                                                                                                                            | P       |
| 15 kHz Lowpass Filters (two) | Special                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (see Figure 1-3)                                                                                                                                                                                   | P       |
| 100 kHz Lowpass Filter       | Special                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (see Figure 1-4)                                                                                                                                                                                   | P       |
| 40 dB Amplifier              | Special                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (see Figure 1-5)                                                                                                                                                                                   | P       |
| Service Kit                  | Consisting of:<br>Adapter: BNC female to OSM male<br>Adapter: BNC female, Sealectro female<br>Adapter: BNC female, Sealectro female<br>Adapter: Right angle OSM male/female<br>Sealectro jack (printed circuit mount)<br>Adapter: Sealectro Tee<br>Tool: Adjustment<br>Cable: Extender, 66 pin, gray<br>Cable: Extender, 42 pin, gray<br>Cable Assy: Sealectro male and female, 24 inches long, gray<br>Cable Assy: Sealectro male and female right angle connectors 24" long, red<br>Cable Assy: Sealectro right angle female, BNC male, 24" long, gray<br>Cable Assy: Sealectro male and female, 24" long, gray with blue stripe | HP 11672A<br>1250-1200<br>1250-1236<br>1250-1237<br>1250-1249<br>1250-1255<br>1250-1391<br>8830-0024<br>11672-60001<br>11672-60002<br><br>11672-60003<br>11672-60004<br>11672-60005<br>11672-60006 | A, S    |

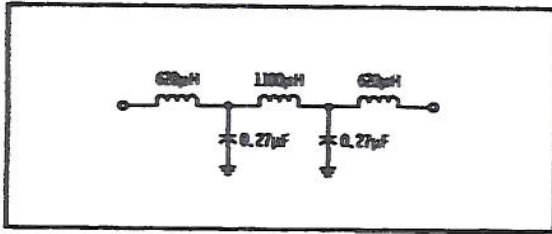


Figure 1-3. 15 kHz Lowpass Filter

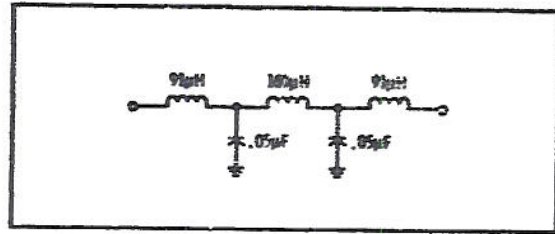


Figure 1-4. 100 kHz Lowpass Filter

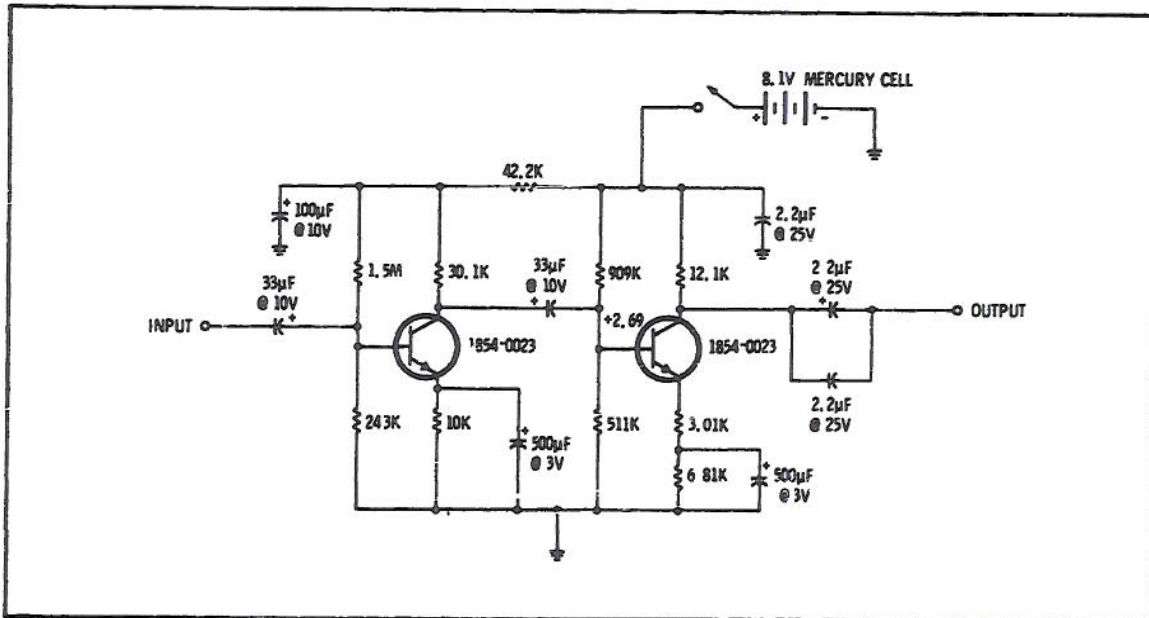


Figure 1-5. 40 dB Amplifier

Table 1-3. 40 dB Amplifier Specifications

|                  |                     |
|------------------|---------------------|
| Gain             | 44 dB at 25°C       |
| Bandwidth        | 100 kHz (3 dB down) |
| Noise Bandwidth  | 157 kHz             |
| Input Impedance  | 75 K                |
| Output Impedance | 12 K                |
| Current Drain    | 260 μA              |
| Output (Maximum) | 1V                  |
| Dynamic Range    | 66 dB               |



## SECTION II INSTALLATION

### 2-1. INITIAL INSPECTION

#### 2-2. Mechanical Check

2-3. If the shipping carton shows visible signs of damage when received, the carrier's agent should be present when the instrument is unpacked. If the agent is not present, retain the packaging material to aid in evaluating the cause of damage if the instrument is physically damaged or is not functioning properly.

2-4. Inspect the instrument for physical damage such as bent or broken parts and dents or scratches. If damage is found refer to paragraph 2-7 for recommended claim procedure. If the instrument appears to be free of damage, perform the electrical check (see paragraph 2-5). The packaging material should be retained for possible future use.

#### 2-5. Electrical Check

2-6. The electrical performance check consists of performing the performance test procedures in Section IV of this manual. These procedures enable the operator to determine that the instrument is, or is not, operating within the specifications listed in Table 1-1. The initial performance and accuracy of the instrument are certified as stated on the inside front cover of this manual. If the instrument does not operate as specified, refer to paragraph 2-7 for the recommended claim procedure.

### 2-7. Claim for Damage

2-8. If physical damage is found when the instrument is unpacked, notify the carrier and the nearest Hewlett-Packard Sales/Service office immediately. The HP Sales/Service office will arrange for repair or replacement without waiting for a claim to be settled with the carrier.

#### 2-9. Deleted.

### 2-10. Preparation for Use

2-11. There are no special requirements for preparation for use for the Model 86601A. Be sure that the main frame preparation for use requirements are met.

#### 2-12. Power Requirements

2-13. All power required for operation of the Model 86601A is furnished by the mainframe.

### 2-14. Operating Environment

2-15. Cooling air is provided by a fan in the mainframe. This assures that the ambient temperature of the instrument stays within reasonable temperature limits when the instrument is operated at room temperature, between 0 and 55 degrees C (32 to 131 degrees F).

### 2-16. Storage and Shipment

2-17 If the instrument is to be stored for an extended period of time it should be enclosed in a clean sealed enclosure.

### 2-18. Original Packaging

2-19. The same containers and materials used in factory packaging can be obtained through any Hewlett-Packard Sales/Service office 1

2-20. If the instrument is being returned to Hewlett-Packard for service attach a tag indicating the type of service required, return address, model number and full serial number. Also mark the container FRAGILE to assure careful handling.

2-21. In any correspondence refer to the instrument by model number and full serial number.

### 2-22. Other Packaging Material

2-23. The following general instructions should be followed when repackaging with commercially available materials :

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

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

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

d. Seal the shipping container securely and mark it FRAGILE to assure careful handling.

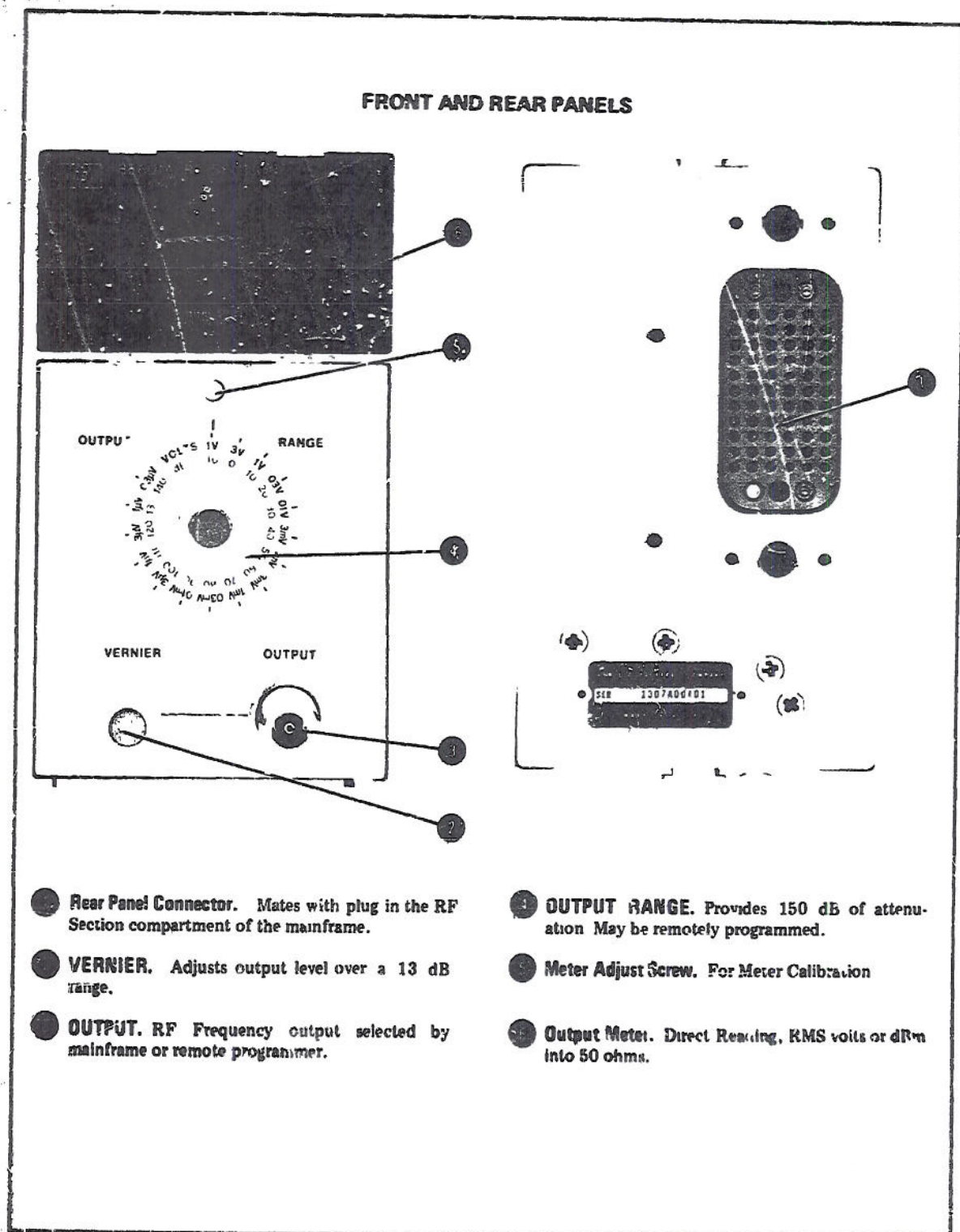


Figure 3-1. Front and Rear Panel Controls, Indicators and Connectors

### SECTION III

#### OPERATION

##### 3-1. INTRODUCTION

3-2. This section provides operating instructions for the Hewlett-Packard Model 86601A RF Section.

3-3. The Model 86601A was designed to accept the precise digitally controlled signals from the Model 8660 mainframe and convert them to the selected output frequency by means of mixing and filtering. It will be necessary to have the Operating Manuals for the mainframe and the modulation section (if used) to efficiently operate the instrument.

##### NOTE

If a modulation plug-in section is not used it will be necessary to have the Model 86631A Auxiliary Section in place in the modulation plug-in drawer.

##### 3-4. PANEL FEATURES

3-5. Front and rear panel controls, indicators and connectors of the Model 86601A are shown in Figure 3-1.

##### 3-6. OPERATING PRINCIPLES

3-7. The Model 86601A may be operated by front panel controls in the local mode or externally programmed in the remote mode.

##### NOTE

The remote mode is selected by the external programming device which places a ground on pin 5 of the blue ribbon connector (J3) on the rear panel of the Model 8660A/B mainframe.

3-8. The only operator controls on the Model 86601A are the attenuator controls. These controls enable the operator to set the output level at any point between -146 and +13 dBm.

3-9. The front panel attenuator controls are inhibited when the instrument is operated in the remote mode.

##### NOTE

Model 86601A Option 001 instruments do not include the 150 dB (10 dB steps) programmable attenuator.

3-10. In Option 001 instruments the output of the Model 86601A may be adjusted, in the local mode, from +13 to 0 dBm by means of the VERNIER control; in the remote mode the output may be reduced by 9 dB in 1 dB steps.

##### 3-11. OPERATOR'S CHECKS

3-12. During checkout at the factory the Model 86601A RF Section is adjusted for proper operation. No adjustment should be required when the instrument is received.

3-13. The Operator's Checks specified in Section III of the mainframe are adequate for checking the output frequency of the Model 86601A.

3-14. If a plug-in Modulation Section is being used, the checks specified in Section III of the Modulation Section Manual should also be performed.



## SECTION IV

### PERFORMANCE TESTS

#### 4-1. INTRODUCTION

4-2. This section provides instructions for performance testing the Model 86601A RF Section plug-in. It is assumed in all tests that the Model 86601A is interconnected with a mainframe that is known to be functioning properly.

#### 4-3. Purpose.

4-4. The performance test procedures are used to check instrument performance for incoming inspection and periodic evaluation. The tests are designed to verify published specifications for the instrument. Each test applies directly to a listed specification (see Table I-1).

4-5. Each performance test procedure begins by quoting the specification which it verifies. Next, a description of the test and any special instructions are listed.

4-6. Test Equipment Required The test equipment required for performance testing is listed in Table 1-2 and in the individual tests. Test instruments other than those listed may be used providing their performance equals or exceeds the specifications listed in Table 1-2.

4-7. Front Panel Checks and Adjustments. Refer to paragraph 3-11, Operator's Checks.

#### 4-8. PERFORMANCE TESTS

### PERFORMANCE TESTS

#### 4-9. FREQUENCY RANGE

**SPECIFICATION:** 0.01 to 109.999999 MHz selectable in 1 Hz steps (OPT 004 mainframes; 100 Hz steps).

**DESCRIPTION:** This test verifies the output frequency range of the Model 86601A RF Section plug-in.

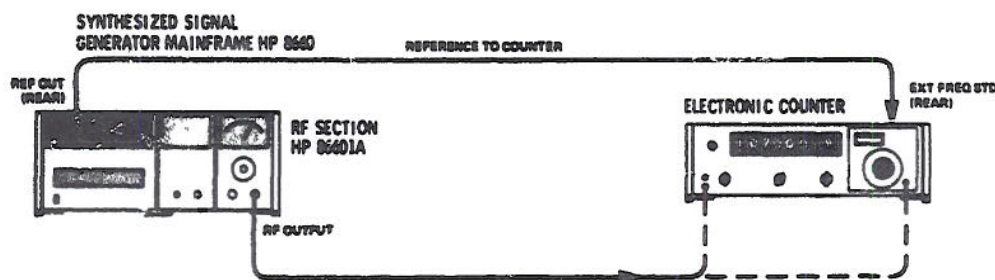


Figure 4-1. Frequency Range and Accuracy Test Setup

#### RECOMMENDED TEST EQUIPMENT:

Electronic Counter/Frequency Converter Plug-in . . . . . HP 5245M/5253B

#### PROCEDURE:

1. Connect the mainframe REFERENCE OUTPUT to the counter EXT STD FREQ input and set the counter mode switch to EXT STD.
2. Set the mainframe center frequency to 10.000 kHz and check the output frequency with the counter (Allow for the accuracy of the counter used, model recommended is specified at  $\pm 1$  count)

## PERFORMANCE TESTS

## 4-9. FREQUENCY RANGE (cont'd)

3. Set the center frequency to 109.99999 MHz (Opt. 004 mainframe set to 109.9999 MHz) at 0 dBm and check with the counter and the frequency converter plug-in.

## 4-10. FREQUENCY ACCURACY AND STABILITY

**SPECIFICATION:** CW frequency accuracy and long term stability are determined by the crystal oscillator in the mainframe or by an external reference standard.

## NOTE

If there is any reason to doubt the accuracy or stability of the internal crystal oscillator, refer to Section IV of the mainframe manual.

## 4-11. OUTPUT ACCURACY AND LEVEL

**SPECIFICATION:**  $\pm 1$  dB from +13 dBm to -66 dBm and  $\pm 2$  dB from -67 dBm to -146 dBm.  
Output Level: +13 dBm to -146 dBm into 50 ohms.

**DESCRIPTION:** This test checks output amplitude accuracy from +10 dBm to -70 dBm by comparing the internal attenuator to a precision external attenuator.

## NOTE

All sections of the internal programmable attenuator are checked separately. In addition, the 10 dB, 20 dB, and 40 dB sections are checked in all possible combinations. The sum of the inaccuracies of the -60 dBm and -70 dBm tests should not exceed  $\pm 2$  dBm.

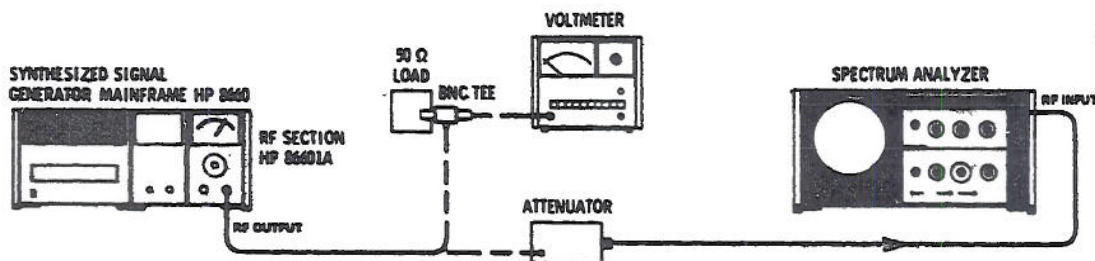


Figure 4-2. Output Accuracy and Level Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                                         |                     |
|-----------------------------------------|---------------------|
| Broadband Sampling Voltmeter            | HP 3406A            |
| 50 Ohm Termination                      | 1250-0207           |
| Variable Coaxial Attenuator (Precision) | HP H38-355D         |
| BNC Tee                                 | UG 274B/U           |
| Spectrum Analyzer                       | HP 8553B/8552B/1408 |

## PROCEDURE:

1. Set the Model 86601A OUTPUT RANGE and VERNIER to +10 dBm.
2. Set the mainframe center frequency to 30 MHz.

## PERFORMANCE TESTS

## 4-11. OUTPUT ACCURACY AND LEVEL (cont'd)

3. **Connect the rf output of the Model 86601A to the sampling voltmeter. Terminate with 50 ohms. The sampling voltmeter should indicate +10 dBm  $\pm$  1 dBm (if it does not, refer to paragraph 5-14 and calibrate the metering circuit). Change VERNIER in 1 dB increments and verify that the sampling voltmeter indicates the correct level  $\pm$  1 dB. Disconnect the sampling voltmeter.**
4. Set the external attenuator to 50 dB and connect it between the Model 86601A OUTPUT and the Spectrum Analyzer RF INPUT. Set the Model 86601A output level to +10 dBm.
5. Set a convenient reference level on the Spectrum Analyzer with the vertical scale (LOG 2 dB/Div).
6. Change the external attenuator to 70 dB and the Model 86601A OUTPUT RANGE to 0 dBm. The Spectrum Analyzer display should be within  $\pm$  1 dB of the established reference level.
7. Continue decreasing the attenuation of the external attenuator and the Model 86601A OUTPUT RANGE in 10 dB steps until the OUTPUT RANGE is set to -70 dBm and the external attenuator is set to 0 dB. The spectrum Analyzer display should remain within  $\pm$  1 dB for levels down to -70 dBm. These tests assure the specification of  $\pm$  2 dB from -67 dBm to -146 dBm.

## 4-12. OUTPUT FLATNESS

**SPECIFICATION:** Output flatness: Output level variations with frequency  $< \pm 0.5$  dBm across the frequency range.

**DESCRIPTION:** This test verifies flatness of the output signal from 10 kHz to 109.9 MHz.

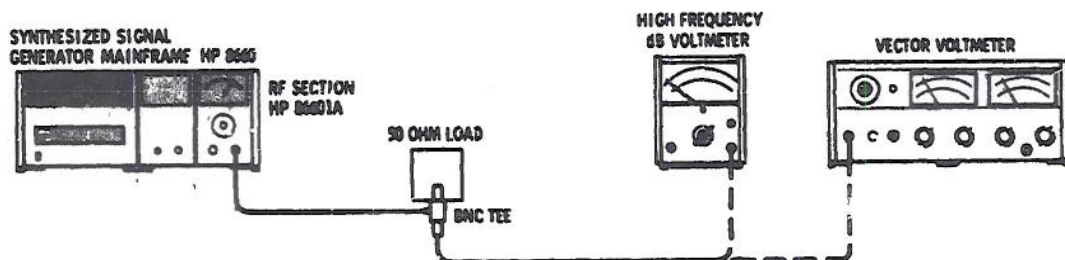


Figure 4-3. Output Flatness Test Setup

**RECOMMENDED TEST EQUIPMENT:**

|                             |              |
|-----------------------------|--------------|
| High Frequency dB Voltmeter | HP 400 GL    |
| Vector Voltmeter            | HP 8405A     |
| 50 Ohm Dummy Load           | HP 1250-0207 |
| BNC Tee                     | UG274B/U     |

**PROCEDURE:**

1. Set the mainframe center frequency to 10 kHz.
2. Set the Model 86601A OUTPUT RANGE and VERNIER for a front panel meter reading of +10 dBm.



## PERFORMANCE TESTS

## 4-12. OUTPUT FLATNESS (con'd)

3. **Connect the Model 86601A OUTPUT to the High Frequency dB Voltmeter through a BNC Tee terminated in 50 ohms.**
4. **Set the meter RANGE switch for a convenient mid-scale reading** on the High Frequency dB voltmeter.
5. **Change the mainframe center frequency to 50 kHz**, then 100 kHz, and finally 500 kHz. The level read on the High Frequency dB Voltmeter should remain within a  $\pm 0.5$  dB window.
6. **Disconnect the High Frequency dB Voltmeter and connect the Vector Voltmeter to the Model 86601A OUTPUT (terminated in 50 ohms).**
7. **Select a Vector Voltmeter range that will provide a convenient mid-scale reference with the mainframe center frequency set to 1 MHz.**
8. **Change the mainframe center frequency to 10 MHz, then 50 MHz, and finally 109.9 MHz.** The reference level indicated on the Vector Voltmeter should remain within the  $\pm 0.5$  dB window.

## 4-13. IMPEDANCE: 50 OHMS

SPECIFICATION: SWR less than 2:1 on +10 dBm output range; less than 1.3:1 on 0 dBm output range and below.

DESCRIPTION: The Model 86601A RF OUTPUT is measured with a voltmeter, first with no external load, then with a 50 ohm external dummy load. The source resistance  $R_S$  is determined and the SWR is calculated by dividing  $R_O$  by  $R_S$  (or  $R_S$  by  $R_O$  if  $R_O$  is  $< R_S$ ).

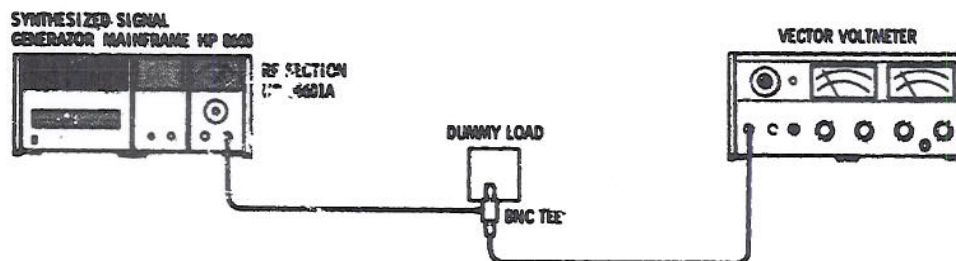


Figure 4-4. Impedance Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                   |              |
|-------------------|--------------|
| Vector Voltmeter  | HP 8405A     |
| 50 Ohm Dummy Load | HP 1250-0207 |
| BNC Tee           | UG 274 B/U   |

## PROCEDURE:

1. **Set the mainframe center frequency to 50 MHz. Set the Model 86601A OUTPUT RANGE to +10 dBm.**

## PERFORMANCE TESTS

## 4-13. IMPEDANCE: 50 OHMS (cont'd)

2. **Connect the Model 86601A OUTPUT to the Vector Voltmeter through a BNC Tee (unterminated).**

3. Record the RF output level.

$V_{OC}$  \_\_\_\_\_ mVrms

4. Terminate the BNC Tee 50 ohms.

5. Record the RF output level.

$V_1$  \_\_\_\_\_ mVrms

6. The Model 86601A source resistance is found by using the following formula:

$$R_s = \frac{R_o V_{OC}}{V_1} - R_o$$

$V_{OC}$  = 1st measurement (step 3)

$V_1$  = 2nd measurement (step 5)

$R_o$  = 50 ohm termination

7. Determine SWR.  $SWR = \frac{R_o}{R_s}$  or  $\frac{R_s}{R_o}$ . SWR should be  $< 2.0:1$ .

8. Record SWR

9. Reduce the Model 86601A OUTPUT RANGE to 0 dBm.

10. Repeat steps 2 through 8 at 0 dBm. SWR should be  $< 1.3:1$ .

11. Record SWR

## 4-14. HARMONIC SIGNALS

**SPECIFICATION:** With the Model 86601A terminated in 50 ohms all harmonically related signals are at least 40 dB below the selected frequency.

**DESCRIPTION:** This test checks second and third harmonics across the entire output frequency range of the Model 86601A.



Figure 4-5. Harmonic Signal Test Setup

## PERFORMANCE TESTS

## 4-14. HARMONIC SIGNALS (cont'd)

## RECOMMENDED TEST EQUIPMENT:

Spectrum Analyzer . . . . .

HP 8554L/8552B/140S

## PROCEDURE:

1. Set the Model 86601A OUTPUT RANGE to -10 dBm and set the VERNIER control to +3 dBm.
2. Connect the Model 8660A OUTPUT to the Spectrum Analyzer RF INPUT and set the Spectrum Analyzer INPUT ATTENUATION to 20 dB.
3. Check second and third harmonics at the following center frequencies: 10 kHz, 400 kHz, 4 MHz, 10 MHz, and 109.9 MHz. All harmonic signals should be more than 40 dB below the level of the fundamental frequencies.

## 4-15. SPURIOUS SIGNALS

SPECIFICATION: All nonharmonically related spurious signals are at least 80 dB below the selected output signal. Power line related spurious signals are at least 70 dB below the carrier.

DESCRIPTION: This test checks for common spurious signals by mixing the signal from the unit under test with a reference signal offset by 1 kHz. The Wave Analyzer measures common spurious signals generated in the unit under test.

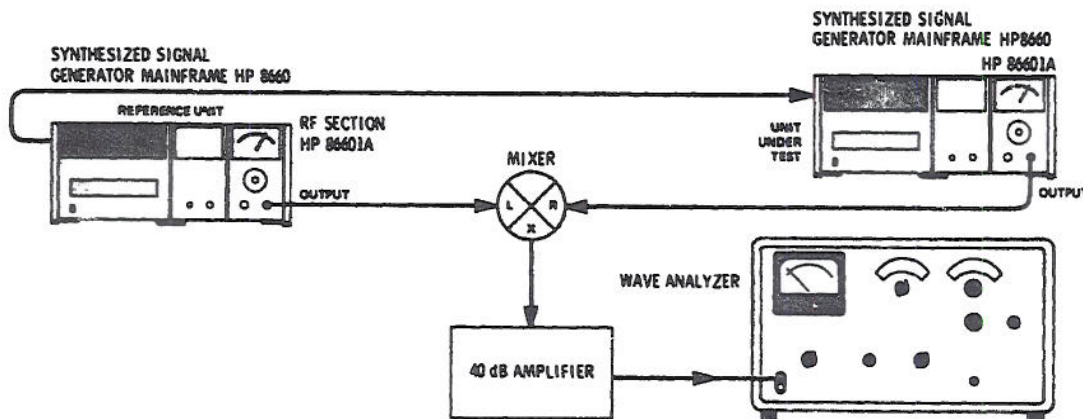


Figure 4-6. Spurious Signal Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Synthesized Signal Generator . . . . .               | HP 8660/86601A/86631A |
| Double Balanced Mixer . . . . .                      | HP 10514A             |
| Wave Analyzer . . . . .                              | HP 302A               |
| 40 dB Amplifier (special) see details in Figure 1-5. |                       |

## PROCEDURE:

1. Connect the rear panel REFERENCE OUTPUT from the reference unit to the rear panel REFERENCE INPUT of the unit under test and set the REFERENCE SELECTOR of the unit under test to EXT.



## PERFORMANCE TESTS

## 4-15. SPURIOUS SIGNALS (cont'd)

2. Connect the equipment as shown in Figure 4-6.
3. Set the reference unit center frequency to 50.001 MHz and the output level to +13 dBm.
4. Set the center frequency of the unit under test to 50 MHz and the output level to -87 dBm.
5. Set the Wave Analyzer; mode switch to NORMAL and scale value to RELATIVE.
6. Set the wave Analyzer to 1 kHz and adjust levels for a 0 dB reading on the scale.
7. Set the unit under test OUTPUT RANGE and VERNIER to -7 dBm.
8. Set the reference unit and the unit under test as shown in Table 4-1 and note that spurious levels are lower than -80 dB (0 dB on Wave Analyzer scale).
9. Corrected reading is -80 dB minus the Wave Analyzer meter reading.

Table 4-1. Spurious Signal Checks

| Unit Under Test<br>MHz | Reference Unit<br>MHz | Spurious Level |
|------------------------|-----------------------|----------------|
| 101                    | 47.001                | _____          |
| 109.99                 | 20.031                | _____          |
| 103.1                  | 81.401                | _____          |
| 29.595                 | 29.451                | _____          |
| 29.595                 | 29.801                | _____          |
| 29.595                 | 29.587                | _____          |

4-16. SIGNAL-TO-PHASE NOISE **RATIO**

**SPECIFICATION:** Lower than -50 dB in a 30 kHz band centered on the carrier excluding a 1 Hz band centered on the carrier.

**DESCRIPTION:** This test checks the signal-to-phase noise ratio across the Model 86601A output frequency range. The AC Voltmeter specified excludes 1 Hz.

## 4-10. SIGNAL-TO-PHASE NOISE RATIO

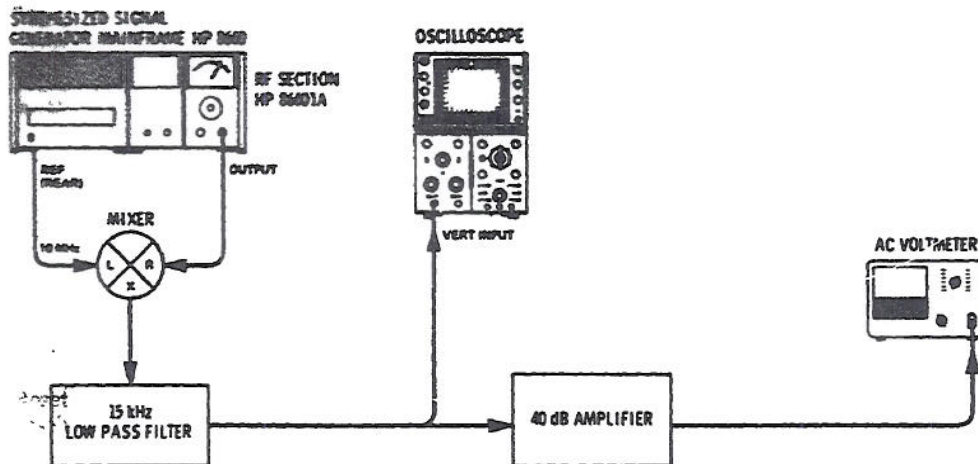


Figure 4-7. Signal-to-Phase Noise Test Setup

## RECOMMENDED TEST EQUIPMENT:

Oscilloscope  
 Double Balanced Mixer  
 AC Voltmeter  
 40 dB Amplifier (special) see details in Figure 1-5.  
 Low Pass Filter (special) see details in Figure 1-3.

HP 180A/1801A/1821A  
 HP 10514A  
 HP 403A

## PROCEDURE:

1. **Connect** the equipment as shown in Figure 4-7.
2. **Set the** mainframe center frequency to 10.001 MHz. Set the Model 86601A OUTPUT RANGE to -60 dBm and the VERNIER for a meter reading of +3 dBm.
3. Set the RF Voltmeter Function Switch to 1 CPS-1 MC and record the reading. \_\_\_\_\_ dB
4. Set the mainframe center frequency to 10.000100 MHz and the OUTPUT RANGE to -10 dBm.
5. Adjust the oscilloscope for an **eight-division amplitude display of the 100 Hz signal.**
6. **Set the mainframe center frequency to 10.0000001 MHz and note that the oscilloscope baseline alternately rises and falls over the eight-division display.**
7. **Reset the mainframe center frequency to 10.000000 MHz at a time that will cause the oscilloscope baseline trace to stop at the center graticule line.**
8. Repeat steps 6 and 7 until the oscilloscope baseline trace is stopped within  $\pm 1/10$  div. of the center graticule line.
9. **Read the noise level on the AC Voltmeter. Noise = -50 dB  $\pm$  the difference in meter readings. The meter reading should be lower than the reference established in step 3. (Example: Meter reading is 3 dB lower, noise is -53 dB.)**
10. **Noise should be lower than -50 dB. Record noise level.** \_\_\_\_\_ dB

## PERFORMANCE TESTS

## 4-17. SIGNAL-TO-AM NOISE RATIO

**SPECIFICATION:** Lower than -70 dB in a 30 kHz band centered on the carrier excluding a 1 Hz bandwidth centered on the carrier.

**DESCRIPTION:** This test checks AM noise across the Model 86601A frequency range. The AC voltmeter specified excludes 1 Hz.

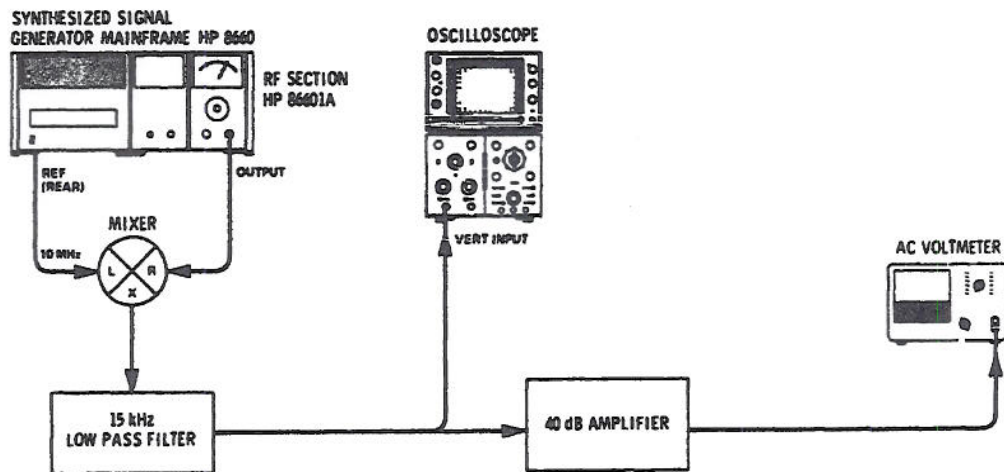


Figure 4-8. Signal-to-AM Noise Ratio Test Setup

## RECOMMENDED TEST EQUIPMENT

Oscilloscope  
 Double Balanced Mixer  
 AC Voltmeter  
 40 dB Amplifier (special); see details in **Figure 1-5**.  
 Low Pass Filter (special); see details in **Figure 1-3**.

HP 180A/1801A/1821A  
 HP10514A  
 HP 403A

## PROCEDURE:

1. Connect the equipment as shown in **Figure 4-8**.
2. Set the mainframe center frequency to 10.001000 MHz
3. Set the Model 86601A OUTPUT RANGE to -80 dBm and the VERNIER to +3 dBm
4. Set the AC Voltmeter range for an on-scale reading with the function switch set to 1 CPS 1 MC  
 Record the Meter Reading \_\_\_\_\_ dB
5. Set the mainframe center frequency to 10.000100 MHz and the OUTPUT RANGE to -10 dBm
6. Adjust the oscilloscope for an eight-division amplitude display of the 100 Hz signal
7. Set the mainframe center frequency to 10.000001 MHz and note that the oscilloscope baseline alternately rises and falls over the eight division display



## PERFORMANCE TESTS

## 4-17. SIGNAL-TO-AM NOISE RATION (cont'd)

- 8 . **Reset the mainframe center frequency to 10.000000 MHz** at a time that will cause the oscilloscope baseline trace to stop at the top graticule line of the CRT.
- 9 . **Repeat steps 7 and 8 until the oscilloscope baseline trace is stopped at the top graticule line  $\pm 1/10$  div.**
- 10 . **Read the noise level** on the AC Voltmeter. Noise = -70 dB  $\pm$  the difference in meter readings. The meter reading should be lower than the reference established in step 4. Example: Meter reading is 3 dB lower, noise level is -73 dB.
- 11 . **Noise** should be lower than -70 dB.

Record Noise Level

dB

## 4-18. RESIDUAL FM

SPECIFICATION: &lt;1 Hz rms in 2 kHz bandwidth centered on the carrier.

DESCRIPTION: Residual FM is checked indirectly in the checks for signal-to-phase noise across the Model 86601A frequency range.

## 4-19. AMPLITUDE MODULATION

SPECIFICATION: 0 to 95% on all output ranges (with Model 86632A or 86631A Modulation Section in place).

DESCRIPTION: This test checks AM frequency response with the mainframe center frequency set to 50 MHz, 3 MHz, and 300 kHz. AM rate is provided from a test oscillator and measured on a Spectrum Analyzer and Oscilloscope.

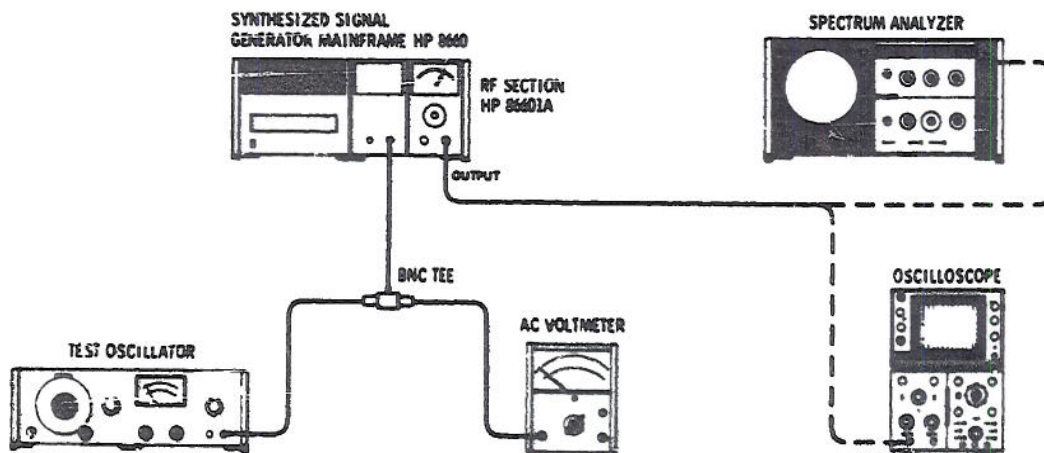


Figure 4-9. Amplitude Modulation Test Setup

## PERFORMANCE TESTS

## 4-19. AMPLITUDE MODULATION (cont'd)

## RECOMMENDED TEST EQUIPMENT:

Spectrum Analyzer  
 High Frequency dB Voltmeter  
 Oscilloscope  
 Test Oscillator  
 BNC Tee

HP 8553B/8552B/140S  
 HP 400 GL  
 HP 180A/1801A/1821A  
 HP 651B  
 UG 274 B/U

## PROCEDURE:

1. Connect the equipment as shown in Figure 4-9.
2. Set the Spectrum Analyzer as follows: INPUT ATTENUATION 30 dB, BANDWIDTH 1 kHz, SCAN WIDTH 10 kHz, CENTER FREQUENCY 50 MHz, LOG-LINEAR 2 dB/Div, SCAN TIME 20 mSec/Div and VIDEO FILTER to OFF.
3. Set the mainframe center frequency to 50 MHz and the Model 86601A output level to +3 dBm.
4. Set the Model 86631A AM switch to ON (if the Model 86632A is being used, set the MODE switch to AM and the SOURCE switch to EXTERNAL AC and AM to 50%).
5. Set the Test Oscillator output to 10 kHz at .5 Vrms as read on AC Voltmeter.
6. Adjust the spectrum analyzer until the carrier is at the top graticule line. Amplitude Modulation should be 50%  $\pm$  5% with sidebands down -12 dB  $\pm$  0.5 dB.
7. Adjust the Test Oscillator frequency from 10 Hz to 50 kHz. The AM % should be flat  $\pm$  4 dB from 10 Hz to 20 kHz and down 3 dB at about 50 kHz.
8. Set the mainframe center frequency to 3 MHz and analyzer scan width to 2 kHz. Adjust the Test Oscillator frequency from 10 Hz to 10 kHz. The side bands should be flat  $\pm$  2 dB to 2 kHz; down 2 dB at about 5 kHz; down 8 dB at about 10 kHz.
9. Set the mainframe center frequency to 300 kHz. Disconnect the rf OUTPUT from the Spectrum Analyzer and connect it to the Oscilloscope.
10. Set the Test Oscillator to 25 Hz and adjust the Oscilloscope for 3 division vertical display of the envelope only. Set the Test Oscillator frequency to 100 Hz. The Oscilloscope display should be  $>$  7 divisions.

## 4-20. AMPLITUDE MODULATION: ON/OFF RATIO

**SPECIFICATION:** At least 25 dB with output meter at 0 dBm or above.

**DESCRIPTION:** This test verifies the Amplitude Modulation ON/OFF ratio of the Model 86601. AM is shut off with a power supply and rf output level change is measured on an AC Voltmeter.

## PERFORMANCE TESTS

## 4-20. AMPLITUDE MODULATION: ON/OFF RATIO

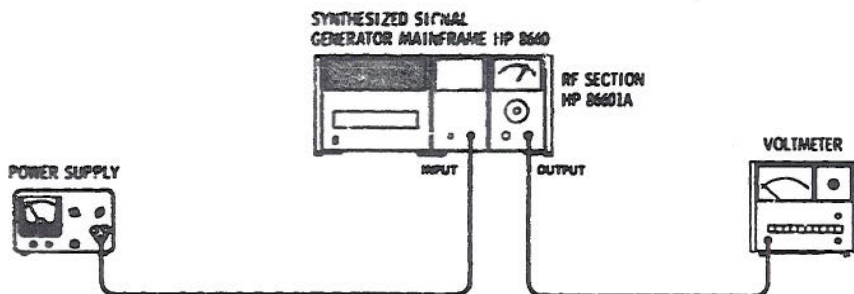


Figure 4-10. Amplitude Modulation ON/OFF Ratio Test Setup

**RECOMMENDED TEST EQUIPMENT:**

Broadband Sampling Voltmeter  
Power Supply

HP 8406A  
HP 721A

**PROCEDURE:**

1. Connect the equipment as shown in Figure 4-10 (with the Model 86631A AM switch off).
2. Set the power supply to +4 Vdc.
3. Set the mainframe center frequency to 50 MHz and output level of the Model 86601A to +13 dBm. Set a reference point on the Voltmeter.
4. Switch the Model 86631A AM switch to ON.
5. The Model 86601A output level should drop to <-12 dBm. (25 dB ON/OFF ratio).

4-21. **AMPLITUDE MODULATION CARRIER ENVELOPE DISTORTION**

**SPECIFICATION:** Envelope distortion should be less than 1% at 30% AM. Less than 3% at 70% AM. Less than 5% at 90% AM.

**DESCRIPTION:** Amplitude Modulation distortion is checked at 30%, 70% and 90%.



## PERFORMANCE TESTS

## 4-21. AMPLITUDE MODULATION CARRIER ENVELOPE DISTORTION (cont'd)

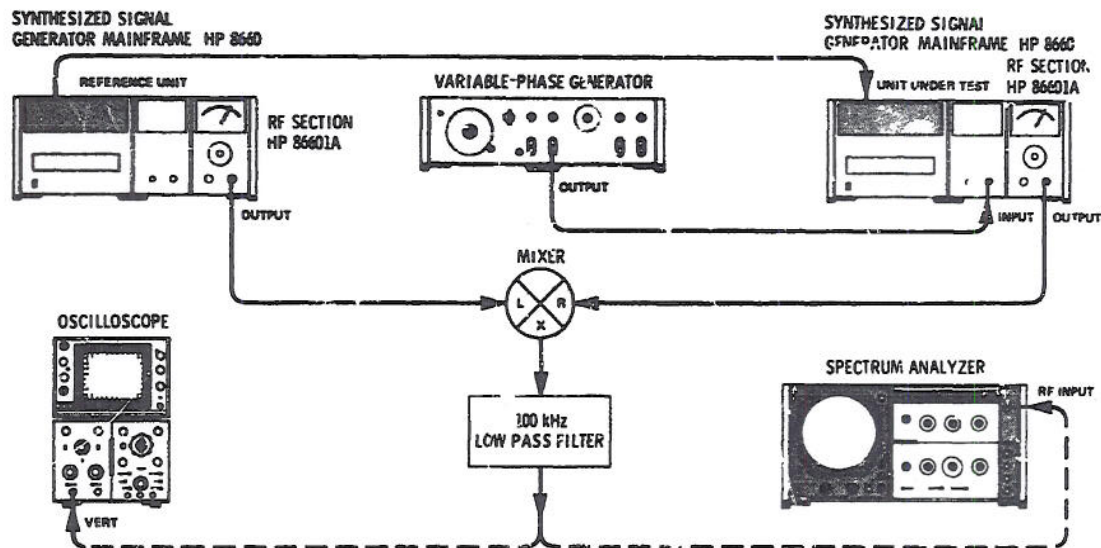


Figure 4-11. Amplitude Modulation Carrier Envelope Distortion Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                                                               |                          |
|---------------------------------------------------------------|--------------------------|
| Double Balanced Mixer                                         | HP 10514A                |
| Spectrum Analyzer                                             | HP 8553B/8552B/140S      |
| Synthesized Signal Generator                                  | HP 8660A/B/866C1A/86631A |
| Variable Phase Generator                                      |                          |
| Oscilloscope                                                  | HP 180A/1801A/1821A      |
| Low Pass Filter 100 kHz (special); see details in Figure 1-4. |                          |

## PROCEDURE:

1. Connect the equipment as shown in Figure 4-11.
2. Connect the rear panel **REFERENCE OUTPUT** from the reference unit to the rear panel **REFERENCE INPUT** of the unit under test and set the **REFERENCE SELECTOR** of the unit under test to **EXT**.
3. Set the mainframe center frequency of time unit under test to 109.9 MHz. Set the Model 86601A under test **OUTPUT RANGE** to -20 dBm and the **VERNIER** to +3 dBm.
4. Connect the Variable-Phase Generator output to the Model 86631A AM input. Set the Variable Phase Generator output to 10 kHz and place the Model 86631A AM switch in the **OFF** position.
5. Set the reference mainframe center frequency to 109.91 MHz and the Model 86601A output level to +13 dBm.
6. Set the DC Coupled Oscilloscope to .005 V/Div.
7. Set the Spectrum Analyzer controls as follows: **INPUT ATTENUATION** 40 dB, **SCAN WIDTH PER DIVISION** 10 kHz, **SCAN TIME PER DIVISION** 20 mSec, **BANDWIDTH** 1 kHz, **LOG SCALE** 10 dB/Div. Adjust vertical level until the 10 kHz signal is at the top graticule line of the Spectrum Analyzer. Set the Oscilloscope for 8 divisions of vertical deflection.

## PERFORMANCE TESTS

## 4-21. AMPLITUDE MODULATION CARRIER ENVELOPE DISTORTION (cont'd)

8. Set the reference unit mainframe center frequency to 109.900001 MHz and note that the Oscilloscope baseline alternately rises and falls over the 8-division display.
9. Reset the reference unit mainframe center frequency to 109.900000 MHz at a time that will cause the Oscilloscope baseline trace to stop at the top graticule line of the CRT.
10. Repeat steps 8 and 9 until the oscilloscope baseline trace is stopped at the top graticule line  $\pm 1/10$  div.
11. Set the Model 86631A EXTERNAL AM switch to ON and adjust the Variable Phase Generator output level until the 10 kHz signal on the Spectrum Analyzer is 10.5 dB below the reference level (30% AM).
12. Using the AM fundamental as a reference, measure the second, third and fourth harmonics on the spectrum analyzer. Use Table 4-2 to convert the dB measurements to power ratio. Add power ratios and convert the sum of the power ratios back to dB by using Table 4-2. Total should be  $> 40$  dB from the 30% reference level or about 1%.

Example:      Second Harmonic       $-45 \text{ dB} = .32$  }  
                  Third Harmonic       $-45 \text{ dB} = .31$  }  $= .73 = -41.5 \text{ dB}$   
                  Fourth Harmonic       $-50 \text{ dB} = .1$  }

13. Adjust the Variable Phase Generator until the 10 kHz fundamental is 3 dB below the reference (top graticule line) (70% AM). Using the 10 kHz fundamental as a reference, measure the second, third and fourth harmonics and use Table 4-2 as in step 10. Total harmonics should be  $> 30$  dB below the 70% reference level (3%).

Table 4-2. Carrier Envelope Distortion Test

| dB | Power Ratio $\times 10^{-4}$ | dB | Power Ratio $\times 10^{-4}$ |
|----|------------------------------|----|------------------------------|
| 20 | 100.00000                    | 46 | .25119                       |
| 21 | 79.43282                     | 47 | .19953                       |
| 22 | 63.09573                     | 48 | .15849                       |
| 23 | 50.11872                     | 49 | .12589                       |
| 24 | 39.81072                     | 50 | .10000                       |
| 25 | 31.62278                     | 51 | .07943                       |
| 26 | 25.11886                     | 52 | .06310                       |
| 27 | 19.95262                     | 53 | .05012                       |
| 28 | 15.84893                     | 54 | .03981                       |
| 29 | 12.58925                     | 55 | .03162                       |
| 30 | 10.00000                     | 56 | .02512                       |
| 31 | 7.94328                      | 57 | .01995                       |
| 32 | 6.30957                      | 58 | .01585                       |
| 33 | 5.01187                      | 59 | .01259                       |
| 34 | 3.98107                      | 60 | .01000                       |
| 35 | 3.16228                      | 61 | .00794                       |
| 36 | 2.51189                      | 62 | .00631                       |
| 37 | 1.99526                      | 63 | .00501                       |
| 38 | 1.58489                      | 64 | .00398                       |
| 39 | 1.25893                      | 65 | .00316                       |
| 40 | 1.00000                      | 66 | .00251                       |
| 41 | .79433                       | 67 | .00200                       |
| 42 | .63096                       | 68 | .00158                       |
| 43 | .50119                       | 69 | .00126                       |
| 44 | .39811                       | 70 | .00100                       |
| 45 | .31623                       | 71 | .00079                       |



## PERFORMANCE TESTS

## 4-21. AMPLITUDE MODULATION CARRIER ENVELOPE DISTORTION (cont'd)

14. Adjust the Variable Phase Generator until the 10 kHz fundamental is 1 dB below the reference (top graticule line) (90% AM). Measure the second, third, and fourth harmonics and use Table 4-2 as in step 10. Total harmonics should be >26 dB below the 90% reference level (5%).

## 4-22. INCIDENTAL PHASE MODULATION

SPECIFICATION: Less than 0.2 radians peak at 30% AM.

DESCRIPTION: This test checks the AM to PM ratio. AM is set to 30% Modulation with an external Test Oscillator. The ratio is measured with a Wave Analyzer.

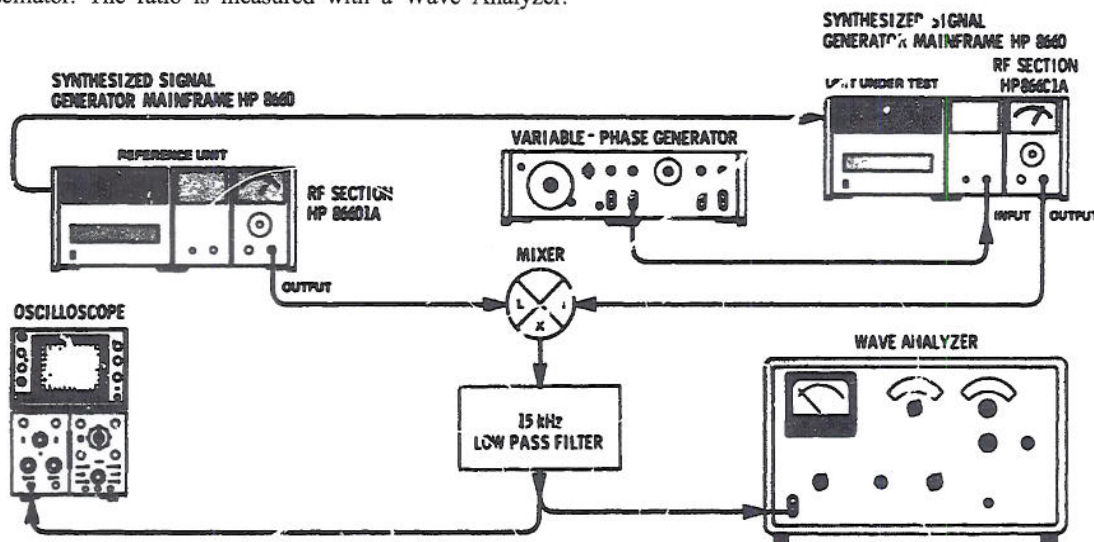


Figure 4-12. Incidental PM Test Setup

## RECOMMENDED TEST EQUIPMENT:

Synthesized Signal Generator

Oscilloscope

Test Oscillator

Wave Analyzer

Double Balanced Mixer

15 kHz Low Pass Filter (special); see details in Figure 1-3.

Variable Phase Generator

HP 8660A/B/86601A/86631A

HP 180A/1801A/1821A

HP 651B

HP 302A

HP 10514A

HP 203A

## PROCEDURE:

1. Connect the equipment as shown in Figure 4-12.
2. Connect the rear panel REFERENCE OUTPUT from the reference unit to the rear panel REFERENCE INPUT of the unit under test and set the REFERENCE SELECTOR switch on the unit under test to EXT.
3. Set the Oscilloscope to DC couple, .01 V/Div and 5 mSec/Div.
4. Set the center frequency of the unit under test to 50 MHz. Set the Model 86601A (unit under test) OUTPUT RANGE to -20 dBm and the VERNIER for a meter reading of +3 dBm.
5. Connect the Test Oscillator output to the Model 86631A INPUT. Set the Model 86631A EXTERNAL AM to OFF.
6. Set the Test Oscillator frequency to 1 kHz.



## PERFORMANCE TESTS

## 4-22. INCIDENTAL PHASE MODULATION (cont'd)

7. Set the reference unit mainframe center frequency to 50.000100 MHz at +3 dBm.
8. Adjust the Oscilloscope for an 8-division vertical display of the dc coupled 100 Hz signal.
9. Set the reference unit mainframe center frequency to 50.000000 MHz and note that the Oscilloscope baseline alternately rises and falls over the 8-division display.
10. Reset the reference unit mainframe center frequency to 50.000000 MHz at a time that will cause the Oscilloscope baseline trace to stop at the top graticule line of the CRT.
11. Repeat steps 9 and 10 until the oscilloscope baseline trace is stopped at the top graticule line  $\pm 1/10$  div.
12. Switch the unit under test Model 86631A EXTERNAL AM switch to ON and adjust the Test Oscillator for a 2.4 division deflection on the Oscilloscope (30% AM) with the Oscilloscope ac coupled. Reset Oscilloscope to dc coupled.
13. Set the Wave Analyzer near 1 kHz for a peak and set a convenient 0 dB reference in the relative mode (this is the AM level).
14. Switch the EXTERNAL AM switch on the Model 86631A to OFF.
15. Repeat steps 9 and 10 until oscilloscope baseline trace is stopped at center graticule line  $\pm 1/10$  div.
16. Switch the Model 86631A EXTERNAL AM switch to ON and take a reading from the Wave Analyzer for the PM level. The AM to PM ratio should be  $>5$  dB.

## 4-23. FREQUENCY MODULATION

SPECIFICATION: Rate DC to 1 MHz. Maximum deviation 1 MHz.

DESCRIPTION: This test checks FM distortion and the 1 MHz maximum deviation FM deviation is checked at 1 kHz rate. To check maximum deviation at the maximum rate requires special equipment.

## NOTE

This test is valid only when the Model 86632A Modulation Section is used.

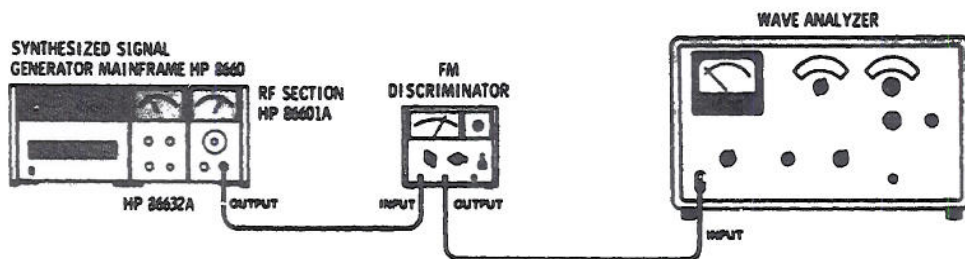


Figure 4-13. Frequency Modulation Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                                  |          |
|----------------------------------|----------|
| Frequency Meter/FM Discriminator | HP 5210A |
| Wave Analyzer                    | HP 302A  |

## PERFORMANCE TESTS

## 4-23. FREQUENCY MODULATION (cont'd)

## PROCEDURE:

1. Connect the equipment as shown in Figure 4-13.
2. Set the Model 86632A MODE switch to FM X10 and the SOURCE switch to INTERNAL 1000. Set the MODULATION LEVEL control for full scale meter deflection and depress the FM CF CAL.
3. Set the center frequency to 8.5 MHz and the Model 86601A output level to +13 dBm.
4. Calibrate the Frequency Meter/FM Discriminator.
5. Install a 20 kHz low pass filter in the Frequency Meter/FM Discriminator. (See the Service Manual for the Frequency Meter/FM discriminator for details.)
6. Set the Frequency Meter/FM Discriminator for 1 V input sensitivity and 10 MHz range.
7. Set the Wave Analyzer near 1 kHz and peak the reading (absolute). The Wave Analyzer meter should indicate 70.7 mVrms (1 MHz = 200 mV p-p or 70.7 mVrms). Set the Wave Analyzer to relative and adjust for a 0 dB reading.
8. Set the Wave Analyzer near 2 kHz (second harmonic). Note the reading in dB on the Wave Analyzer meter.  
dB
9. Set the Wave Analyzer near 3 kHz (third harmonic). Note the reading in dB on the Wave Analyzer meter.  
dB
10. Use Table 4-2, page 4-14, to obtain power ratios for the levels recorded in steps 8 and 9, then use Table 4-2 to find the dB level corresponding to the sum of the two ratios. This should be down 34 dB from the fundamental frequency level.  
Record this level                      dB

## 4-24. FREQUENCY SWITCHING TIME

SPECIFICATION: Less than 5 milliseconds to be within 100 Hz of any new frequency selected. Less than 100 milliseconds to be within 5 Hz of any new frequency selected. Maximum stepping rate: 1 millisecond per step.

DESCRIPTION: In this test the Synthesized Signal Generator is remotely programmed and the switching time is detected by a computing counter. The frequencies used in this procedure were selected for worst-case conditions.

#### 4-24. FREQUENCY SWITCHING TIME (cont'd)

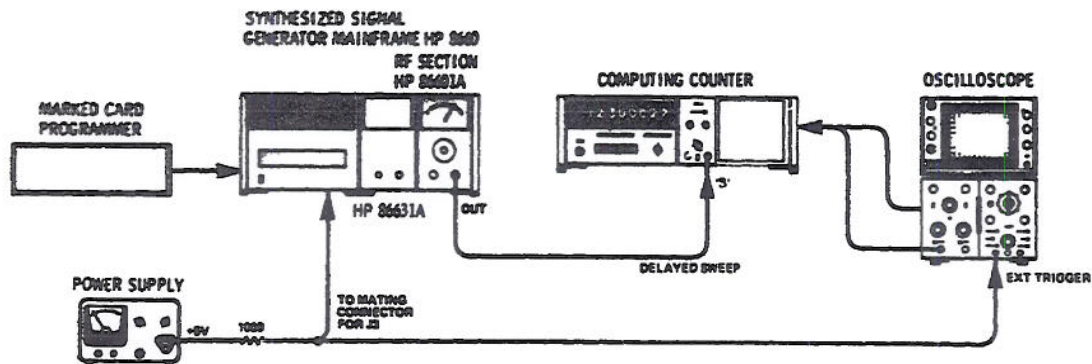


Figure 4-14. Frequency Switching Time Test Setup

DC Power Supply  
Computing Counter  
Marked Card Programmer  
Oscilloscope

HP 721A  
HP 5360A/5365A  
HP 3260A/OPT 001  
HP 180A/1801A/1822A

1. Connect the +5V from the DC Power Supply to pin 17 of the mating connector for J3 through a 1000 ohm resistor. Pin 17 (flag) of the Card Reader's output connector is also used to trigger the main input of the Oscilloscope.
2. Interconnect the Marked Card Programmer with J3 on the rear panel of the Synthesized Signal Generator.
3. Connect the Oscilloscope DELAYED SWEEP OUTPUT (rear panel connector) through a BNC Tee connector to the Oscilloscope vertical Channel A input and to the Ext. Time Measurement Input on the rear panel of the Computing Counter.
4. **Set the Computing Counter controls as follows: rear panel switch to TRIGGER, "B" Channel to X1 sensitivity, Module button depressed, display digits necessary for resolution, measurement time on 1 and counter gate time to 1 millisecond.**
5. **Program the Synthesized Signal Generator to 29.999999 MHz.**
6. **Set the Oscilloscope controls as follows: Trigger ACS EXT -10 - Slope, Trigger level at about 11:00 o'clock, Sweep Mode Auto, Delay Trigger AUTO, Main Sweep 1 mSec, Delay Sweep, .05  $\mu$ Sec, and Main sweep mode.**
7. **Set the start of the Oscilloscope trace at the first vertical CRT graticule line. Use the Oscilloscope delay control to set the delay spike 4.5 divisions from the CRT left graticule line.**
8. **Switch the Oscilloscope sweep mode from AUTO to NORMAL.**



## PERFORMANCE TESTS

## 4-24. FREQUENCY SWITCHING TIME (cont'd)

9. Program the Synthesized Signal Generator to 30.000000 MHz. The frequency read on the Computing Counter should be 30 MHz  $\pm$  100 Hz.
10. Program the Synthesized Signal Generator to 29.999999 MHz. The frequency read on the Computing Counter should again be within  $\pm$ 100 Hz of the programmed frequency.
11. Set the Oscilloscope normal sweep to 10 mSec and the delay sweep to 1 uSec.
12. Set the Oscilloscope sweep mode to auto and the delay control for a delay spike at the center vertical graticule line of the CRT.
13. Set the Oscilloscope main trigger to normal and the Computing Counter gate tune to 100 mSec.
14. Program the Synthesized Signal Generator to 30.000000 MHz. The frequency readout of the Computing Counter should be within  $\pm$ 5 Hz of the programmed frequency.
15. Program the Synthesized Signal Generator to 29.999999 MHz. The frequency readout of the Computing Counter should again be within  $\pm$ 5 Hz of the programmed frequency.

## 4-25. OUTPUT LEVEL SWITCHING TIME

SPECIFICATION: Any level change may be accomplished in less than 50 mSec. Any change to another level on the same attenuator range may be accomplished in 5 mSec in the remote mode.

DESCRIPTION: This test checks amplitude switching speeds in the remote mode with center frequencies of 100 kHz and 1 MHz. The Model 86601 rf output is detected and measured on an Oscilloscope.

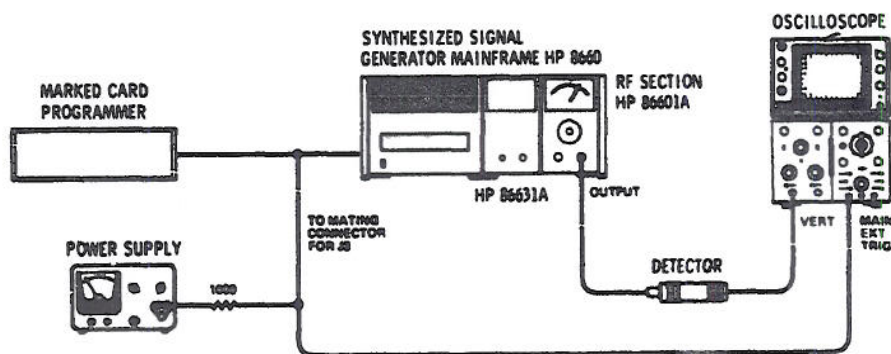


Figure 4-15. Output Level Switching Time Test Setup

## RECOMMENDED TEST EQUIPMENT:

|                        |                     |
|------------------------|---------------------|
| Marked Card Programmer | HP 3260A, Opt. 001  |
| Oscilloscope           | HP 180A/1801A/1822A |
| Crystal Detector       | HP 8471A            |

## PERFORMANCE TESTS

## 4-25. OUTPUT LEVEL SWITCHING TIME (cont'd)

## PROCEDURE:

1. Connect the equipment as shown in Figure 4-15. Note that the +5 V from the DC Power Supply is connected through a 1000 ohm resistor to pin 17 of the mating connector to J3 and to the External trigger input of the Oscilloscope.
2. Connect the Model 86601A rf output to the channel A input of the Oscilloscope through a Crystal Detector.
3. Set the Oscilloscope as follows: Main Time/Div 5 mSec. Vertical Input DC Coupled, .5V/Div, Normal Sweep, Ext Trigger  $\pm 10$ , - Slope, ASC, Trigger level about 11:00 o'clock.
4. Program the mainframe center frequency to 100 kHz. Program the Model 86601A attenuation to the following settings: 0 dB, -5 dB, -9 dB. Switching time should be <5 mSec.
5. Program attenuation to 0 dB, then to -20 dB. Switching time should be <50 mSec.
6. Repeat tests 4 and 5 with center frequency set to 1 MHz.

## 4-26. INCIDENTAL AM

SPECIFICATION: With 75 kHz peak deviation at a 1 kHz rate, AM modulation sidebands are down 60 dB from the fundamental.

DESCRIPTION: This test measures AM modulation with the unit under test FM modulated at 75 kHz peak deviation. A reference level is set on the Wave Analyzer with the two Synthesized Signal Generators offset by 1 kHz. The unit under test is then programmed to produce a 1 kHz frequency modulated signal with 75 kHz peak deviation.

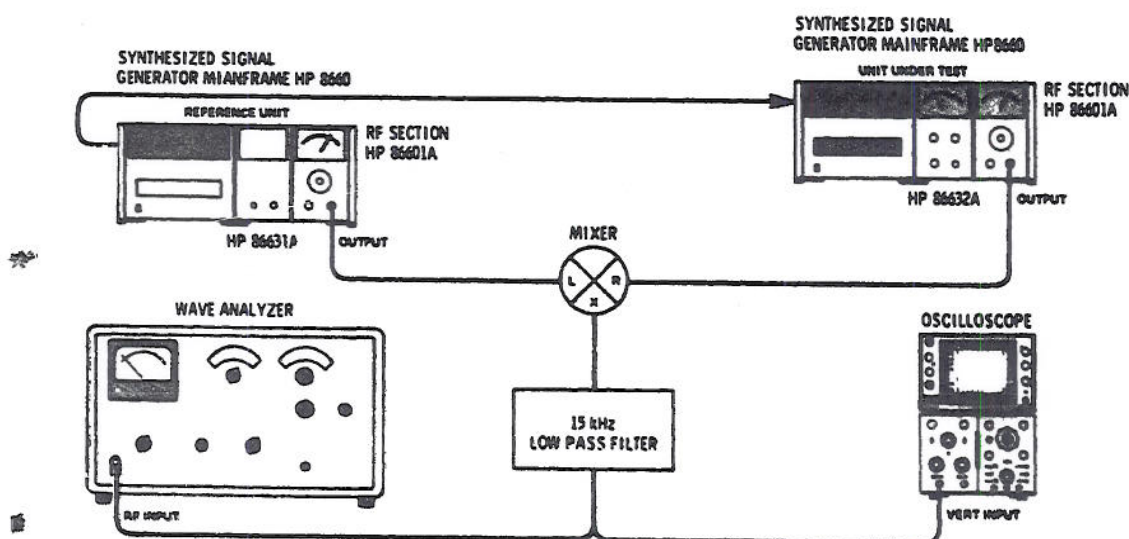


Figure 4-16. Incidental AM Test Setup

## 4-26. INCIDENTAL AM (cont'd)

### RECOMMENDED TEST EQUIPMENT

8660/86631A/86691A

HP 8663<sup>2A</sup>

HP180A/1801A/P821A

HP302A

HP 10514A

1. Connect equipment as shown in Figure 4-16.
2. Connect the rear panel REFERENCE OUTPUT from the reference unit to the rear panel REFERENCE INPUT of the unit under test and set the REFERENCE SELECTOR of the unit under test to EXT.
3. Set the unit under test center frequency to 50 MHz and the output level to -7 dBm.
4. Set the reference unit center frequency to 50.061 MHz and the output level to +13 dBm.
5. Set the wave Analyzer near 1 kHz and peak the meter, Set the Wave Analyzer meter level to 0 dB in the relative mode. Set the Oscilloscope for 8-division deflection.
6. Set the reference unit mainframe center frequency to 50.0000001 MHz and note that the Oscilloscope baseline alternately rises and falls over the 8 division display.
7. Reset the reference unit mainframe center frequency to 50.000000 MHz at a time that will cause the Oscilloscope baseline trace to stop at the top graticule line of the CRT.
8. Repeat steps 6 and 7 until the baseline stops on the top CRT graticule  $\pm 1/10$  div.
9. Set the Model 86632A Modulation Section to 1 kHz FM X1 and 75 kHz deviation (75% on the meter).
10. Note the Wave Analyzer reading. Should be  $>-60$  dB down from the reference level.

### Meter Reading

dB



Table 4-3. Performance Test Record

| Hewlett-Packard<br>Model 86601A<br>RF Section<br>Serial Number _____ |                                                                                                                                            | Tested By _____<br>Date _____ |  |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--|
| Paragraph Number                                                     | Test                                                                                                                                       |                               |  |
| 4-13                                                                 | <b>IMPEDANCE</b><br>Step 8      Record SWR _____<br>Step 11     Record SWR _____                                                           |                               |  |
| 4-15                                                                 | <b>SPURIOUS SIGNALS</b> Record Levels<br>101 MHz _____<br>109.99 MHz _____<br>103.1 MHz _____<br>25.595 MHz _____                          |                               |  |
| 4-16                                                                 | <b>SIGNAL TO PHASE NOISE RATIO</b><br>Step 3      Record Level _____ dB<br>Step 10     Record Level _____ dB                               |                               |  |
| 4-17                                                                 | <b>SIGNAL TO AM NOISE RATIO</b><br>Step 4      Record Level _____ dB<br>Step 11     Record Level _____ dB                                  |                               |  |
| 4-21                                                                 | <b>AMPLITUDE MODULATION CARRIER ENVELOPE DISTORTION</b><br>Step 12     Record Level _____ dB                                               |                               |  |
| 4-23                                                                 | <b>FREQUENCY MODULATION</b><br>Step 8      Record Level _____ dB<br>Step 9      Record Level _____ dB<br>Step 10     Record Level _____ dB |                               |  |
| 4-26                                                                 | <b>INCIDENTAL AM</b><br>Step 10     Record Level _____ dB                                                                                  |                               |  |
|                                                                      |                                                                                                                                            |                               |  |

## SECTION V ADJUSTMENTS

### 5-1. INTRODUCTION

5-2. This section describes adjustments and checks required to return the Model 86601A to peak operating capability when repairs have been made. Adjustment locations are identified pictorially on Section VIII foldout service sheets referred to in the individual tests.

5-3. If repairs to any filter have been made, it should be necessary to adjust only the circuit in which the component failure occurred.

5-4. If component failure occurs in any circuit other than the logic circuits, it will be necessary to recalibrate the RF output meter circuit (refer to paragraph 5-14).

5-5. If component failure occurs in A3 or A9, the AM input and AGC circuits must be readjusted (refer to paragraph 5-15).

5-6. If component failure occurs in the A6 pre-amplifier or the A2 Power amplifier (other than AGC), the harmonic levels should be readjusted (refer to paragraph 5-16).

### 5-7. RECOMMENDED TEST EQUIPMENT

5-8. Each adjustment procedure in this section contains a list of test equipment and accessories required to perform the procedure. Each test setup identifies test equipment and accessories by callouts.

5-9. Minimum specifications for test equipment used in the adjustment procedures are detailed in Table 1-2. Because the Model 86601A is an extremely accurate instrument, minimum specifications in Table 1-2 are particularly important in performing these adjustment procedures.

### 5-10. SERVICE KIT

5-11. The HP 11678A Service Kit is an accessory item available from Hewlett-Packard for use in maintaining the Model 66601A RF Section.

5-12. Table 1-2 contains a detailed description of the service kit. Any item in the kit may be ordered separately.

### NOTES

- a. The RF Section adjustments should be made with the Model 86601A installed in the mainframe with the cover removed whenever possible. It will be necessary to remove the mainframe top cover and the top guide rail for the Model 86601A. To make in-circuit adjustments for the 480 MHz Active bandpass filter or the dual filter (A12), it will be necessary to use the extender cable (1167260001) which is part of the service kit.
- b. A modulation section or an auxiliary section must be installed in the mainframe during these adjustments.
- c. All tests in which a counter is used should be made with the mainframe and the counter driven by a common frequency standard. If the Hewlett-Packard Model 5245M Electronic counter is used, the mainframe internal reference may be used as the common source.

### 5-13. CHECKS AND ADJUSTMENTS

## ADJUSTMENTS

## 5-14. RF OUTPUT METER CALIBRATION

**REFERENCE:** Service Sheet 3 and Figures 5-1 and 8-21 of this Manual Changes supplement.

**DESCRIPTION:** The rf output meter reading is adjusted at +3 and -7 dBm to ensure tracking across the range of the VERNIER control.

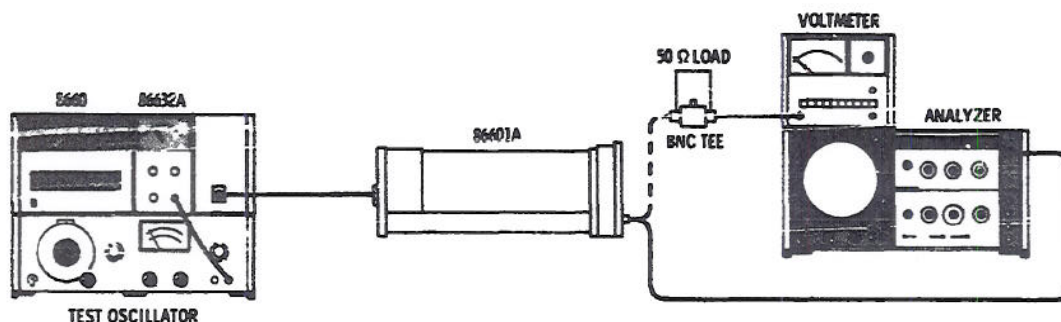


Figure 5-1. RF Output Meter Calibration Setup

## RECOMMENDED TEST EQUIPMENT:

|                              |                  |
|------------------------------|------------------|
| Test Oscillator              | HP 651B          |
| Broadband Sampling voltmeter | H 3406A          |
| BNC Tee Connector            | UG 274 B/U       |
| 50 ohm load                  | HP 1250-0207     |
| Extender Cable               | HP 11672-60001   |
| Spectrum Analyzer            | HP 140/8552/8553 |

## PROCEDURE:

1. Clean the Model 86601A meter face with anti-static **sc.** (Recommended: STATNUL manufactured by Weston Instruments Inc. Newark, NJ.)
2. Connect the equipment as shown in Figure 1.
3. Set the OUTPUT RANGE to +10 dBm and the VERNIER full CW. Set the mainframe center frequency to 10 MHz.
4. Set the REF ADJ (A9R2) for a +13.5 dBm reading on the voltmeter.
5. Set the Model 86601A VERNIER for a +13 dBm reading on the voltmeter. Adjust A9R32 for a +3 dBm reading on the 86601A meter (full scale).
6. Disconnect the output rf cable from the BNC Tee and connect it to the spectrum analyzer RF INPUT.



## ADJUSTMENTS

## 5-14. RF OUTPUT METER CALIBRATION (Cont')

7. Connect the Test Oscillator output to the Model 86632A input (10 kHz, 1V, verify level with the AC Voltmeter). Set the Model 86632A to AM, EXT, AC coupled and 50% modulation as indicated on the Model 86632A meter.
8. Set the spectrum analyzer so that the 10 MHz center frequency is at the top graticule line. Verify that the AM sidebands are -12 dB below the center frequency fundamental (50% modulation).
9. Adjust the Model 86601A VERNIER until the fundamental (10 MHz) is 10 dB below the reference setting. Adjust A1R34 DET for 50% modulation (AM sidebands down -12 dBm from the fundamental).
10. A9R32 and A2R34 interact. Repeat steps 5 through 9 until the modulation displayed on the spectrum analyzer remains at 50%.
11. Disconnect the Test Oscillator and set the Model 86632A to OFF. Disconnect the spectrum analyzer and connect the AC Voltmeter to the Model 86601A OUTPUT.
12. Set the 86601A to +13 dBm as measured by the voltmeter.
13. Adjust A9R32 as necessary for a Model 86601A meter reading of +3 dBm.
14. Turn the Model 86601A VERNIER control CCW until the AC voltmeter reads +3 dBm (10 dB less than step 12).
15. Adjust A9R34 for a Model 86601A meter reading of -7 dBm.
16. Repeat steps 11 through 15 until the Model 86601A meter tracks the AC voltmeter, (from +3 dBm to -7 dBm  $\pm$  25 dBm 86601A Meter).

## ADJUSTMENTS

## 5-15. HARMONIC DISTORTION CHECKS AND ADJUSTMENTS

REFERENCE: Service Sheet 3.

DESCRIPTION: This bias levels for the Preamplifier and the Power Amplifier are set to minimize distortion.

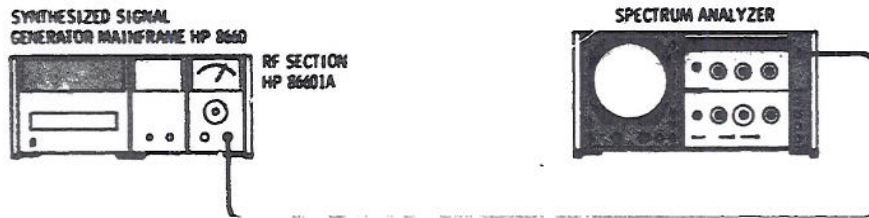


Figure 5-2. Harmonic Distortion Adjustment Setup

## RECOMMENDED TEST EQUIPMENT:

Spectrum Analyzer

HP 140/8554L/8552B

## PROCEDURE:

1. Connect the equipment as shown in Figure 5-3.
2. Set the mainframe center frequency to 60 MHz and the Model 86601A output amplitude to 0 dBm.
3. Set the Spectrum Analyzer controls as follows: CENTER FREQUENCY - 60 MHz, INPUT ATTENUATION - 20 dB, LOG REP LEVEL - 0 dBm, BANDWIDTH - 100 kHz, SCAN WIDTH PER DIVISION - 50 MHz, SCAN TIME PER DIVISION - 10 MILLISECONDS and LOG/LINEAR - LOG.
4. Adjust the preamplifier BIAS (A6R1) and the power amplifier BIAS (A2R6) until the second harmonic (120 MHz) is more than 50 dB down from the fundamental frequency.
5. Set the mainframe and the Spectrum Analyzer center frequency to 109 MHz.
6. Adjust the power amplifier BIAS (A1R6) until the second harmonic (218 MHz) is more than 44 dB down from the fundamental frequency.
7. Change the mainframe and the Spectrum Analyzer in 10 MHz steps from 100 MHz to 10 MHz, stopping at each step and checking the harmonic levels on the Spectrum Analyzer. All harmonic levels should be more than 40 dB below the amplitude of the fundamental frequencies.
8. Record the harmonic levels in Table 5-1.

## ADJUSTMENTS

## 5-15. HARMONIC DISTORTION CHECKS AND ADJUSTMENTS (Cont'd)

Table 5-1. Harmonic Distortion Level Checks

| Fundamental Frequencies | Harmonic Levels |       |        |
|-------------------------|-----------------|-------|--------|
|                         | Second          | Third | Fourth |
| 109 MHz                 |                 |       |        |
| 100 MHz                 |                 |       |        |
| 90 MHz                  |                 |       |        |
| 80 MHz                  |                 |       |        |
| 70 MHz                  |                 |       |        |
| 60 MHz                  |                 |       |        |
| 50 MHz                  |                 |       |        |
| 40 MHz                  |                 |       |        |
| 30 MHz                  |                 |       |        |
| 20 MHz                  |                 |       |        |
| 10 MHz                  |                 |       |        |

## 5-16. AMPLITUDE MODULATION CALIBRATION

REFERENCE: Service Sheets 3 and 4.

DESCRIPTION: The AM input and AGC circuits are properly adjusted to allow the use of any plug-in Modulation Section without recalibration.



## ADJUSTMENTS

## 5-16. AMPLITUDE MODULATION CALIBRATION (Cont'd)

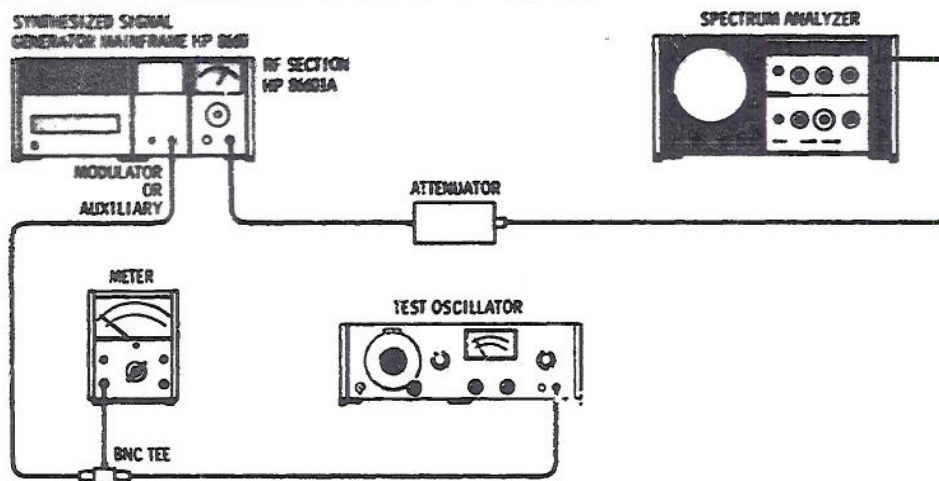


Figure 5-3. Amplitude Modulation Calibration Setup

## RECOMMENDED TEST EQUIPMENT:

Precision Attenuator  
 Test Oscillator  
 Spectrum Analyzer  
 High Frequency dB Voltmeter  
 BNC Tee Connector

HP H38-355D  
 HP 651B  
 HP 140/8553B/8552B  
 HP 400GL  
 UG 274B/U

## PROCEDURE:

Using the 86631A Auxiliary Section. (If the Model 86632A Modulation Section is used, use step 2-a instead of step 2.)

1. Connect the equipment as shown in Figure 5-2.
2. Monitor the output amplitude of the Test Oscillator with the High Frequency dB Voltmeter. Set the Test Oscillator frequency to 1 kHz and the output amplitude to 0.5 volts rms with the Model 86631 EXTERNAL AM switch to ON.
- 2-a. Set the Model 86632A to AM mode; source 1 kHz, internal modulation level for 50% AM on the 86632A meter.
3. Set the mainframe center frequency to 50 MHz, the Model 86601A output amplitude to +13 dBm and the Precision Attenuator to 20 dB.
4. Set the Spectrum Analyzer controls as follows: CENTER FREQUENCY — 50 MHz, INPUT ATTENUATION — 10 dB, LOG REF LEVEL — 0 dBm, LOG/LINEAR — 2 dB LOG, SCAN TIME PER DIVISION — .1 SECONDS, SCAN WIDTH PER DIVISION — .5 kHz, AND BANDWIDTH — .1 kHz.
5. Adjust the AM CAL control (A9R13) for sidebands 12 dB down from the center frequency amplitude (see typical waveform in Figure 5-2).

## ADJUSTMENTS

## 5-17. A12 FILTER ASSEMBLY CHECKS AND ADJUSTMENTS

REFERENCE: **Service Sheet 2.**

DESCRIPTION: The bandpass filters in the A12 assembly are adjusted for minimum insertion loss and maximum flatness over the specified bandwidth.

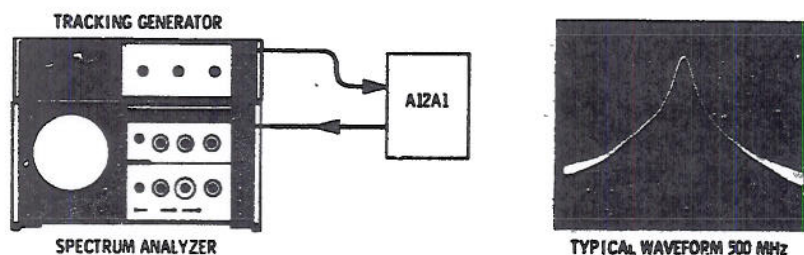


Figure 5-4. A12A1 Filter Adjustment Setup

## RECOMMENDED TEST EQUIPMENT:

Tracking Generator  
Spectrum Analyzer  
RF Millivoltmeter  
Electronic Counter  
BNC Tee Connector

HP 8444A  
HP 140/8554L/8552B  
HP 411A  
HP 5245M/5253B  
UG 274B/U

## PROCEDURE: 500 MHz Bandpass Filter A12A1

1. Remove the A12 Dual Filter assembly from the Model 86601A.
2. Connect the tracking Generator to the Spectrum Analyzer. (Refer to the Tracking Generator Operating and Service Manual for interconnections.)
3. Set the Spectrum Analyzer controls as follows: INPUT ATTENUATION - 20 dB, LOG/LINEAR - 10 dB LOG, LOG REF LEVEL - +10 dBm, SCAN WIDTH PER DIVISION -- 20 MHz, SCAN TIME PER DIVISION - 10 MILLISECONDS and BANDWIDTH - 300 kHz.
4. Connect the Tracking Generator RF OUTPUT to the Counter with the Spectrum Analyzer in the ZERO scan mode.
5. **Set the Spectrum Analyzer center frequency to 500 MHz as displayed on the Counter and disconnect the counter.**
6. **Set the Tracking Generator LEVEL to 0 dBm as a reference.**
7. **Connect the A12A1 filter to the equipment as shown in Figure 5-4**
8. **Change the Spectrum Analyzer SCAN WIDTH from ZERO to PER DIVISION.**
9. **Adjust A12A1C1 and A12A1C2 for minimum insertion loss and maximum flatness.**
10. **Record the insertion loss and flatness.**

Insertion Loss \_\_\_\_\_ dB  
Flatness (peak-to-peak) \_\_\_\_\_ dB

## ADJUSTMENTS

5-17. **A12 FILTER ASSEMBLY CHECKS AND ADJUSTMENTS (cont'd)**

11. **Disconnect the cables from the 500 MHz Bandpass Filter.**

**PROCEDURE: 450/460 Bandpass Filter A12A2**

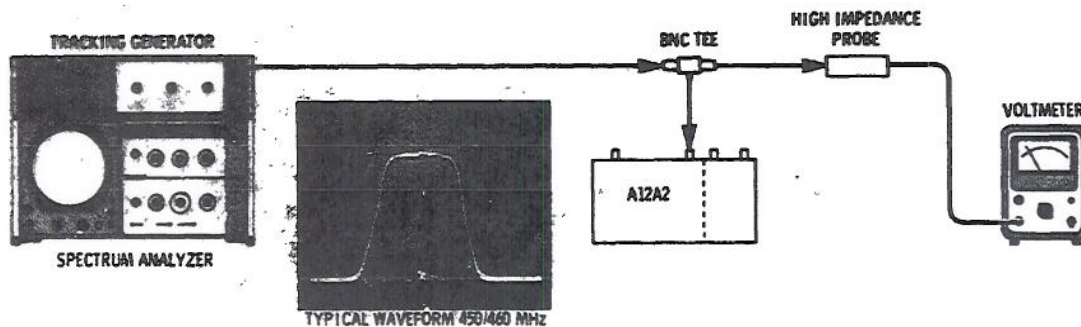


Figure 5-5. Preliminary Adjustment Setup (450/460 Bandpass Filter)

1. Remove the A12 Dual Filter assembly from the Model 86601A.
2. Connect the Tracking Generator to the Spectrum Analyzer. (Refer to the Tracking Generator Operating and Service Manual for interconnections.)
3. Set the Spectrum Analyzer as follows: INPUT ATTENUATION - 20 dB, LOG/LINEAR - 10 dB LOG, LOG REF LEVEL - 0 dBm, SCAN WIDTH PER DIVISION - 5 MHz, SCAN TIME PER DIVISION - 5 MILLISECONDS and BANDWIDTH - 300 kHz.
4. Connect the Tracking Generator RF OUTPUT to the Counter with the Spectrum Analyzer in the ZERO scan mode.
5. Set the Spectrum Analyzer center frequency to 455 MHz as displayed on the Counter and disconnect the Counter.
6. Set the Tracking Generator LEVEL to -14 dBm as a reference.
7. Connect the equipment together as shown in Figure 5-5.
8. Use a screwdriver to short the rotor of C2 to the casting. Adjust C1 for a maximum level on the Voltmeter.
9. Short C3 to the casting and adjust C2 for minimum reading on the Voltmeter.
10. **Short C4 to the casting and adjust C3 for maximum reading on the Voltmeter.**
11. **Short C5 to the casting and adjust C4 for minimum reading on the Voltmeter.**
12. **Short C6 to the casting and adjust C5 for maximum reading on the Voltmeter.**
13. **Short C7 to the casting and adjust C6 for minimum reading on the Voltmeter.**
14. **Adjust C7 for a maximum reading on the Voltmeter.**



## ADJUSTMENTS

## 5-17. A12 FILTER ASSEMBLY CHECKS AND ADJUSTMENTS (cont'd)

15. Disconnect the Tracking Generator, the Voltmeter and the BNC Tee Connector.

16. Connect the equipment shown in Figure 5-4.

17. Change the Spectrum Analyzer scan mode from ZERO scan to SCAN WIDTH PER DIVISION.

18. Adjust C1 and C7 for minimum insertion loss and maximum flatness. (Insertion loss is approximately 5 dB.)

19. Adjust C2 through C6 for optimum flatness and minimum insertion loss.

20. Record the ripple, insertion loss and roll-off.

|                |                           |          |
|----------------|---------------------------|----------|
| Ripple         | 2 dB maximum peak-to-peak | _____ dB |
| Insertion loss | 6 dB maximum              | _____ dB |
| Rolloff        | 55 dB down at 440 MHz     | - d B    |
|                | 55 down at 470 MHz        | _____ dB |

## 5-18. 480 MHz ACTIVE FILTER CHECKS AND ADJUSTMENTS

REFERENCE: Service Sheet 2.

DESCRIPTION: The 480 MHz bandpass filter in the A4 assembly is adjusted for maximum flatness and minimum insertion loss.

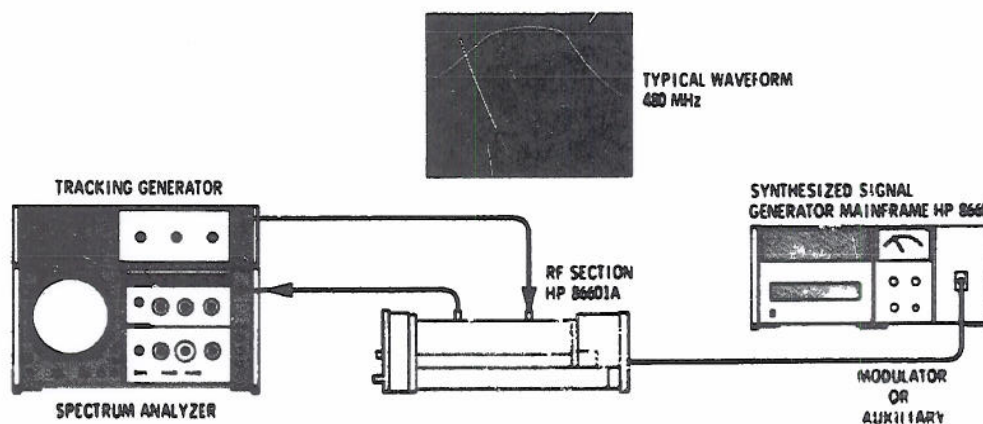


Figure 5-6. Active Filter Adjustment Setup

## RECOMMENDED TEST EQUIPMENT:

|                    |                    |
|--------------------|--------------------|
| Tracking Generator | HP 8444A           |
| Spectrum Analyzer  | HP 140/8554L/8552B |
| Electronic Counter | HP 5245M/5253B     |
| Extender Cable     | HP 11672-60001     |

## ADJUSTMENTS

## 5-19. 480 MHz ACTIVE FILTER CHECKS AND ADJUSTMENTS (cont'd)

**PROCEDURE:**

1. Remove the Model 86601A from the mainframe. Remove the cover and reconnect the Model 86601A with extender cable 11672-60001.
2. Connect the Tracking Generator to the Spectrum Analyzer. (Refer to the Tracking Generator Operating and Service Manual.)
3. Set the Spectrum Analyzer controls as follows: INPUT ATTENUATION - 20 dB, LOG REF LEVEL - +10 dBm, SCAN WIDTH PER DIVISION - 2 MHz, SCAN TIME PER DIVISION - 10 MILLISECONDS and BANDWIDTH - 300 kHz.
4. Connect the Tracking Generator RF OUTPUT to the Electronic Counter with the Spectrum Analyzer in the ZERO scan mode.
5. Set the Spectrum Analyzer frequency to 480 MHz as indicated by the Electronic Counter.
6. Set the Tracking Generator LEVEL to -14 dBm as a reference.
7. Connect the equipment as shown in Figure 5-6.
8. Adjust A4C1, 2, 3 and 4 for maximum output and maximum flatness across the bandwidth. At 480 MHz, gain should be greater than or equal to 17 dB. The response curve should rolloff to more than 3 dB down at 477 and 483 MHz.
9. Record the gain and rolloff.

Gain at 480 MHz \_\_\_\_\_ dB

Rolloff at 477 MHz \_\_\_\_\_ dB

Rolloff at 483 MHz \_\_\_\_\_ dB

## SECTION VI

### REPLACEABLE PARTS

#### 6-1. INTRODUCTION

6-2. Table 6-1 provides correct stock numbers for use when ordering assemblies on an exchange basis. These factory-repaired assemblies are available on an exchange-for-credit basis at a considerable savings cost.

6-3. Table 6-2 lists the meanings of the abbreviations and reference designations used in the table of replaceable parts.

6-4. Table 6-3 lists 86601A replaceable parts in alpha-numerical order of their reference designation.

6-5. Table 6-4 contains the names and addresses that correspond to the manufacturers' code numbers.

#### 6-6. ORDERING INFORMATION

6-7. To order a part listed in the replaceable parts table, note the Hewlett-Packard part number and then cross-reference that part number to the National Stock Number listed in table 6-5. Then order through normal ordering channels.

6-8. If the part number does not have a National Stock Number, then order through normal ordering channels using the Hewlett-Packard part number.

6-9. Refer to table 6-5 for part number to NSN cross-reference.

Table 6-1. Part Numbers for Assembly Exchange Orders

| Assembly                      | New Part No. | Exchange No. |
|-------------------------------|--------------|--------------|
| A2 Power Amplifier Assembly   | 86601-60018  | 86601-60107  |
| A3 Feedback Amplifier         | 86601-60065  | 86601-60115  |
| A4 Active Filter              | 86601-60023  | 86601-60110  |
| A5 Modulator Assembly         | 86601-60080  | 86601-60117  |
| A6 Preamplifier Assembly      | 86601-60017  | 86601-60106  |
| A8 Attenuator Driver Assembly | 86601-60006  | 86601-60102  |
| A9 Reference Assembly         | 86601-60063  | 86601-60113  |
| A10 Logic Assembly            | 86601-60118  | 86601-60119  |
| A12 Dual Filter               | 86601-60022  | 86601-60112  |
| A13 Programmable Attenuator   | 86601-60039  | 86601-60109  |
| A14 Low Pass Filter           | 86601-60021  | 86601-60111  |
| 420 600 MHz Low Pass Filter   | 86601-60066  | 86601-60116  |



Table 6-2. Reference Designators and Abbreviations Used in Parts List

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

Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                                          | Mfr Code | Mfr Part Number      |
|-----------------------|----------------|-----|------------------------------------------------------|----------|----------------------|
| A1                    |                |     | FRONT PANEL ASSEMBLY                                 |          |                      |
| A1C1                  | 0160-2437      | 6   | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C2                  | 0160-2437      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C3                  | 0160-2437      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C4                  | 0160-2437      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C5                  | 0160-2437      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C6                  | 0160-2437      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1C7                  | 0160-3744      | 2   | CIFXD CER 5000 PF +80-20% 200VDCW                    | 72982    | 2425-000-X5V-502P    |
| A1M1                  | 1120-0542      | 1   | METER 12-1/2", 1 MA (FOR STANDARD INSTRUMENT)        | 32171    | 820726               |
| A1M1                  | 1120-0542      | 1   | METER 12-1/2", 1 MA (FOR OPTION 001)                 | 28480    | 1120-0542            |
| A1MP1                 | 86601-20017    | 1   | MOUNTING FRONT                                       | 28480    | 86601-20017          |
| A1MP2                 | 86601-20069    | 1   | FRAME, FRONT PANEL                                   | 28480    | 86601-20069          |
| A1MP3                 | 86601-00034    | 1   | PANEL FRONT                                          | 28480    | 86601-00034          |
| A1MP3                 | 86601-00035    | 1   | (FOR STANDARD INSTRUMENT ONLY) PANEL FRONT (CPT 001) | 28480    | 86601-00035          |
| A1MP3                 | 86601-00036    | 1   | MOUNT METER                                          | 28480    | 86601-00036          |
| A1MP4                 | 86601-20070    | 1   | WINDOW                                               | 28480    | 86601-20070          |
| A1MP6                 | 86601-40018    | 1   | SCREW ADJ METER                                      | 28480    | 86601-40018          |
| A1R1                  | 2100-3113      | 1   | RIVAR COMP 2500 OHM 10% 10 CLOG 1/4W                 | 28480    | 2100-3113            |
| A1R2                  | 6690-3430      | 1   | RIFXD MET FLN 21.5 OHM 1% 1/8W                       | 28480    | 6690-3430            |
| A1S1                  | 3100-3022      | 1   | SWITCH ROTARY 2 SECTION 16 POSITION                  | 76054    | TYPE LK              |
| A2                    | 86601-60018    | 1   | POWER AMPLIFIER ASSY                                 | 28480    | 86601-60018          |
| A2C1                  | 0180-0197      | 21  | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C2                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C3                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C4                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C5                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C6                  | 0180-0197      | 1   | CIFXD CER 1000 PF 20% 100VDCW                        | 96733    | 01648102M            |
| A2C7                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C8                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C9                  | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C10                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C11                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C12                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C13                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C14                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C15                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C16                 | 0180-0197      |     | CIFXD ELECT 2.2 UF 10% 20VDCW                        | 56285    | 1500225X9020A2-DYS   |
| A2C17                 | 0180-2205      | 2   | CIFXD ELECT 0.33 UF 10% 35VDCW                       | 56285    | 1500225X9020A2-DYS   |
| A2C18                 | 0160-3446      | 2   | CIFXD CER 220 PF 10% 1KVDCW                          | 56285    | 00160102F221K525-COM |
| A2C19                 | 0180-2205      |     | CIFXD ELECT 0.33 UF 10% 35VDCW                       | 56285    | 1500225X9020A2-DYS   |
| A2C20                 | 0180-0058      | 4   | CIFXD AL ELECT 50 UF +75-10% 25VDCW                  | 56285    | 3005046025CC2-DSM    |
| A2C21                 | 0160-3449      | 2   | CIFXD CER 2000 PF 10% 250VDCW                        | 56285    | 00670251F202K525-COM |
| A2C22                 | 0160-3449      |     | CIFXD CER 2000 PF 10% 250VDCW                        | 56285    | 00670251F202K525-COM |
| A2C23                 | 0160-3446      |     | CIFXD CER 220 PF 10% 1KVDCW                          | 56285    | 00160102F221K525-COM |
| A2C24                 | 0160-3447      | 2   | CIFXD CER 470 PF 10% 100VDCW                         | 56285    | 00160102F471K525-COM |
| A2C25                 | 0160-3447      |     | CIFXD CER 470 PF 10% 100VDCW                         | 56285    | 00160102F471K525-COM |
| A2C26                 | 0160-3036      | 10  | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C27                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C28                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C29                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C30                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C31                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C32                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C33                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C34                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C35                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C36                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C37                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C38                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C39                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C40                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C41                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C42                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C43                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C44                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C45                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C46                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C47                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C48                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C49                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C50                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C51                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C52                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C53                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C54                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C55                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C56                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C57                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C58                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C59                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C60                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C61                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C62                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C63                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C64                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C65                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C66                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C67                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C68                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C69                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C70                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C71                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C72                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C73                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C74                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C75                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C76                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C77                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C78                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C79                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C80                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C81                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C82                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C83                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C84                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C85                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C86                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C87                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C88                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C89                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C90                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C91                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C92                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C93                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C94                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C95                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C96                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C97                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C98                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C99                 | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |
| A2C100                | 0160-3036      |     | CIFXD CER 5000 PF +80-20% 200VDCW                    | 28480    | 0160-3036            |

See Introduction to this section for ordering information.



Table 6-3. Replaceable Parts

| Reference Designation | Mfr Part Number | Qty | Description                         | Mfr Code | Mfr Part Number      |
|-----------------------|-----------------|-----|-------------------------------------|----------|----------------------|
| A202                  | 1053-0293       | 2   | TSTR:SI PNP                         | 60131    | 2N5583               |
| A203                  | 1054-0501       |     | TSTR:SI NPN                         | C4713    | 4N6023               |
| A204                  | 1054-0501       | 12  | TSTR:SI NPN                         | C4713    | 4N6023               |
| A205                  | 1053-0293       |     | TSTR:SI PNP                         | 60131    | 2N5583               |
| A206                  | 1053-0620       | 12  | TSTR:SI PNP/SELECTED FROM 2N37021   | 2840C    | 1053-0620            |
| A207                  | 1054-0671       |     | TSTR:SI NPN/SELECTED FROM 2N37041   | 2840C    | 1054-0671            |
| A208                  | 1054-0671       | 1   | TSTR:SI NPN/SELECTED FROM 2N37041   | 2840C    | 1054-0671            |
| A209                  | 1053-0620       |     | TSTR:SI PNP/SELECTED FROM 2N37021   | 2840C    | 1053-0620            |
| A210                  | 1053-0620       | 1   | TSTR:SI PNP/SELECTED FROM 2N37021   | 2840C    | 1053-0620            |
| A211                  | 1053-0620       |     | TSTR:SI PNP/SELECTED FROM 2N37021   | 2840C    | 1053-0620            |
| A212                  | 1054-0671       | 1   | TSTR:SI NPN/SELECTED FROM 2N37041   | 2840C    | 1054-0671            |
| A213                  | 1053-0620       |     | TSTR:SI PNP/SELECTED FROM 2N37021   | 2840C    | 1053-0620            |
| A2R1                  | 0757-0420       | 9   | RIFXD MET FLN 750 OHM 1% 1/8W       | 2848C    | 0757-0420            |
| A2R2                  | 0690-0082       |     | RIFXD MET FLN 464 OHM 1% 1/8W       | 2848C    | 0690-0082            |
| A2R3                  | 0764-0015       | 1   | RIFXD MET FLN 560 OHM 5% 2W         | 2848U    | 0764-0015            |
| A2R4                  | 0690-3637       |     | RIFXD MET GR 820 OHM 5% 2W          | 2848C    | 0690-3637            |
| A2R5                  | 0757-0402       | 1   | RIFXD MET FLN 110 OHM 1% 1/8W       | 2848C    | 0757-0402            |
| A2R6                  | 2100-1754       |     | RIVAR WM 50 OHM 5% TYPE V 1W        | 2848D    | 2100-1754            |
| A2R7                  | 0757-0316       | 3   | RIFXD MET FLN 42.2 OHM 1% 1/8W      | 2848C    | 0757-0316            |
| A2R8                  | 0757-0294       |     | RIFXD MET FLN 17.0 OHM 1% 1/8W      | 2848D    | 0757-0294            |
| A2R9                  | 0757-0294       | 1   | RIFXD MET FLN 17.0 OHM 1% 1/8W      | 2848D    | 0757-0294            |
| A2R10                 | 0757-0316       |     | RIFXD MET FLN 42.2 OHM 1% 1/8W      | 2848C    | 0757-0316            |
| A2R11                 | 0757-0399       | 1   | RIFXD MET FLN 82.5 OHM 1% 1/8W      | 2848D    | 0757-0399            |
| A2R12                 | 0757-0394       |     | RIFXD MET FLN 51.1 OHM 1% 1/8W      | 2848D    | 0757-0394            |
| A2R13                 | 0690-0085       | 3   | RIFXD MET FLN 2.61K OHM 1% 1/8W     | 2848C    | 0690-0085            |
| A2R14                 | 0757-0421       |     | RIFXD MET FLN 825 OHM 1% 1/8W       | 2848C    | 0757-0421            |
| A2R15                 | 0690-0085       | 8   | RIFXD MET FLN 2.61K OHM 1% 1/8W     | 2848C    | 0690-0085            |
| A2R16                 | 0757-0401       |     | RIFXD MET FLN 100 OHM 1% 1/8W       | 2848C    | 0757-0401            |
| A2R17                 | 0757-0401       | 1   | RIFXD MET FLN 100 OHM 1% 1/8W       | 2848C    | 0757-0401            |
| A2R18                 | 0757-0401       |     | RIFXD MET FLN 100 OHM 1% 1/8W       | 2848C    | 0757-0401            |
| A2R19                 | 0757-0438       | 9   | RIFXD MET FLN 5.11K OHM 1% 1/8W     | 2848C    | 0757-0438            |
| A2R20                 | 0757-0317       |     | RIFXD MET FLN 1.33K OHM 1% 1/8W     | 2848C    | 0757-0317            |
| A2R21                 | 0757-1094       | 2   | RIFXD MET FLN 1.47K OHM 1% 1/8W     | 2848C    | 0757-1094            |
| A2R22                 | 0757-0290       |     | RIFXD MET FLN 6.19K OHM 1% 1/8W     | 2848C    | 0757-0290            |
| A2R23                 | 0690-3158       | 2   | RIFXD MET FLN 23.7K OHM 1% 1/8W     | 2848C    | 0690-3158            |
| A2R24                 | 0690-3158       |     | RIFXD MET FLN 23.7K OHM 1% 1/8W     | 2848C    | 0690-3158            |
| A2R25                 | 0757-1094       | 1   | RIFXD MET FLN 1.47K OHM 1% 1/8W     | 2848C    | 0757-1094            |
| A2R26                 | 0757-0290       |     | RIFXD MET FLN 6.19K OHM 1% 1/8W     | 2848C    | 0757-0290            |
| A2R27                 | 0757-0465       | 1   | RIFXD MET FLN 100K OHM 1% 1/8W      | 2848C    | 0757-0465            |
| A2R28                 | 0757-0458       |     | RIFXD MET FLN 51.1K OHM 1% 1/8W     | 2848C    | 0757-0458            |
| A2R29                 | 0757-0442       | 4   | RIFXD MET FLN 10.0K OHM 1% 1/8W     | 2848C    | 0757-0442            |
| A2R30                 | 0757-0317       |     | RIFXD MET FLN 1.33K OHM 1% 1/8W     | 2848C    | 0757-0317            |
| A2R31                 | 0757-0401       | 15  | RIFXD MET FLN 100 OHM 1% 1/8W       | 2848C    | 0757-0401            |
| A2R32                 | 0690-0083       |     | RIFXD MET FLN 1.96K OHM 1% 1/8W     | 2848D    | 0690-0083            |
| A2R33                 | 0757-0401       | 1   | RIFXD MET FLN 100 OHM 1% 1/8W       | 2848C    | 0757-0401            |
| A2R34                 | 2100-1755       |     | RIVAR WM 100 OHM 5% TYPE V 1W       | 2848D    | 2100-1755            |
| A2R35                 | 0757-0438       | 1   | RIFXD MET FLN 5.11K OHM 1% 1/8W     | 2848D    | 0757-0438            |
| A2R36                 | 0757-0438       |     | RIFXD MET FLN 5.11K OHM 1% 1/8W     | 2848D    | 0757-0438            |
| A2R37                 | 0757-0438       | 1   | RIFXD MET FLN 5.11K OHM 1% 1/8W     | 2848D    | 0757-0438            |
| A2R38                 | 0757-0438       |     | RIFXD MET FLN 5.11K OHM 1% 1/8W     | 2848D    | 0757-0438            |
| A3                    | 86601-00065     | 1   | FEED BACK AMPLIFIER ASSY            | 2848C    | 86601-00065          |
| A3C1                  | 0160-2149       | 3   | CIFXD MICA 30 PF 5% 300VDCM         | 2848C    | 0160-2149            |
| A3C2                  | 0160-2452       |     | CIFXD DISC CER 0.02 UF 40V 100VDCM  | 40289    | 02038101M2J3M525-CUM |
| A3C3                  | 0160-2204       | 1   | CIFXD MICA 100PF 5%                 | 72136    | 40M15P1C1J3C         |
| A3C4                  | 0160-0190       |     | CIFXD MICA 200 PF 5%                | 72136    | 40M15P2J1J3C         |
| A3C5                  | 0.00-0058       | 1   | CIFXD AL ELECT 50 UF +75-10% 25VDCM | 50289    | 3C0926G025C2-D5M     |
| A3C6                  | 0160-0157       |     | CIFXD MY 0.0047 UF 10% 200VDCM      | 50289    | 192P47292-PT5        |
| A3C7                  | 0170-0040       | 1   | CIFXD MY 0.047 UF 10% 200VDCM       | 50289    | 192P47392-PT5        |
| A3C8                  | 0160-0197       |     | CIFXD ELECT 2.2 UF 10% 20VDCM       | 50289    | 19C0225R9C20A2-DVS   |
| A3C9                  | 0160-0058       | 1   | CIFXD AL ELECT 50 UF +75-10% 25VDCM | 50289    | 3A0560G025C2-D5M     |
| A3C10                 | 0160-3036       |     | CIFXD CER 5000 PF +80-20% 200VDCM   | 2848C    | 0160-3036            |
| A3C11                 | 0160-3036       | 1   | CIFXD CER 5000 PF +80-20% 200VDCM   | 2848C    | 0160-3036            |
| A3C12                 | 0160-3036       |     | CIFXD CER 5000 PF +80-20% 200VDCM   | 2848C    | 0160-3036            |
| A3C13                 | 0160-3036       | 1   | CIFXD CER 5000 PF +80-20% 200VDCM   | 2848C    | 0160-3036            |
| A3C14                 | 0160-3036       |     | CIFXD CER 5000 PF +80-20% 200VDCM   | 2848C    | 0160-3036            |
| A3C15                 | 0160-3744       | 1   | CIFXD CER 5000 PF +80-20% 200VDCM   | 72482    | 2425-03C-H5UW-1022   |
| A3C16                 | 1902-3036       |     | CIFXD CER 5000 PF +80-20% 200VDCM   | 72482    | 2425-03C-H5UW-1022   |
| A3C17                 | 1902-0040       | 3   | DIODE 1N4001 50V 1A                 | 04713    | 52179J9-10           |
| A3C18                 | 1910-0010       |     | DIODE 1N4001 50V 1A                 | 04713    | 52179J9-10           |
| A3J1                  | 1250-1194       | 6   | CONNECTOR 19P BULKHEAD RECEPTACLE   | 2848C    | 92-049-081C          |
| A3J2                  | 1250-1194       |     | CONNECTOR 19P BULKHEAD RECEPTACLE   | 2848C    | 92-049-081C          |

See introduction to this section for ordering information



Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                       | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|-----------------------------------|----------|-----------------|
| A3L1                  | 9140-C158      | 3   | COIL:FXD RF 1 UM 108              | 9980G    | 1025-20         |
| A3L2                  | 9140-0237      |     | COIL:FXD 200 UM 58                | 2848C    | 9140-0237       |
| A3L3                  | 9140-0237      |     | COIL:FXD 200 UM 58                | 2848C    | 9140-0237       |
| A3L4                  | 9140-0237      |     | COIL:FXD 200 UM 58                | 2848C    | 9140-0237       |
| A3MP1                 | 86601-60062    | 1   | BOARD ASSY:FEED BACK AMPLIFIER    | 2848C    | 86601-60062     |
| A3MP2                 | 86601-20066    | 1   | COVER:FEED BACK AMPLIFIER         | 2848C    | 86601-20066     |
| A3Q1                  | 1855-0020      | 3   | TSTR:SI FET M-CHANNEL             | 2848C    | 1855-0020       |
| A3Q2                  | 1853-0020      |     | TSTR:SI PNP(SELECTED FROM 2N3702) | 2848C    | 1853-0020       |
| A3Q3                  | 1853-0020      |     | TSTR:SI PNP(SELECTED FROM 2N3702) | 2848C    | 1853-0020       |
| A3Q4                  | 1854-0071      |     | TSTR:SI NPN(SELECTED FROM 2N3704) | 2848C    | 1854-0071       |
| A3Q5                  | 1854-0071      |     | TSTR:SI NPN(SELECTED FROM 2N3704) | 2848C    | 1854-0071       |
| A3Q6                  | 1855-0020      |     | TSTR:SI FET M-CHANNEL             | 2848C    | 1855-0020       |
| A3Q7                  | 1855-0020      |     | TSTR:SI FET M-CHANNEL             | 2848C    | 1855-0020       |
| A3Q8                  | 1854-0071      |     | TSTR:SI NPN(SELECTED FROM 2N3704) | 2848C    | 1854-0071       |
| A3Q9                  | 1853-0020      |     | TSTR:SI PNP(SELECTED FROM 2N3702) | 2848C    | 1853-0020       |
| A3R1                  | 0698-3157      | 1   | R:FXD MET FLN 19.6K OHM 1% 1/8W   | 2848C    | 0698-3157       |
| A3R2                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W   | 2848C    | 0757-0442       |
| A3R3                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W   | 2848C    | 0757-0442       |
| A3R4                  | 0698-0083      |     | R:FXD MET FLN 1.96K OHM 1% 1/8W   | 2848C    | 0698-0083       |
| A3R5                  | 0698-0083      |     | R:FXD MET FLN 1.96K OHM 1% 1/8W   | 2848C    | 0698-0083       |
| A3R6                  | 0698-0083      |     | R:FXD MET FLN 1.96K OHM 1% 1/8W   | 2848C    | 0698-0083       |
| A3R7                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W   | 2848C    | 0757-0442       |
| A3R8                  | 0757-0442      | 1   | R:FXD MET FLN 68.1K OHM 1% 1/8W   | 2848C    | 0757-0442       |
| A3R9                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W   | 2848C    | 0757-0442       |
| A3R10                 | 0757-0280      | 14  | R:FXD MET FLN 1K OHM 1% 1/8W      | 2848C    | 0757-0280       |
| A3R11                 | 0698-0083      |     | R:FXD MET FLN 1.96K OHM 1% 1/8W   | 2848C    | 0698-0083       |
| A3R12                 | 0757-0280      |     | R:FXD MET FLN 1K OHM 1% 1/8W      | 2848C    | 0757-0280       |
| A3R13                 | 0757-0438      |     | R:FXD MET FLN 5.11K OHM 1% 1/8W   | 2848C    | 0757-0438       |
| A3R14                 | 0698-3161      | 1   | R:FXD MET FLN 38.3K OHM 1% 1/8W   | 2848C    | 0698-3161       |
| A3R15                 | 0757-0438      |     | R:FXD MET FLN 5.11K OHM 1% 1/8W   | 2848C    | 0757-0438       |
| A3R16                 | 0698-3132      | 1   | R:FXD FLN 261 OHM 1% 1/8W         | 2848C    | 0698-3132       |
| A3R17                 | 0698-0085      |     | R:FXD MET FLN 2.61K OHM 1% 1/8W   | 2848C    | 0698-0085       |
| A3R18                 | 0757-0447      | 1   | R:FXD MET FLN 16.2K OHM 1% 1/8W   | 2848C    | 0757-0447       |
| A3R19                 | 0757-0401      |     | R:FXD MET FLN 100 OHM 1% 1/8W     | 2848C    | 0757-0401       |
| A3R20                 | 0757-0438      |     | R:FXD MET FLN 5.11K OHM 1% 1/8W   | 2848C    | 0757-0438       |
| A3R21                 | 0698-3159      | 1   | R:FXD MET FLN 26.1K OHM 1% 1/8W   | 2848C    | 0698-3159       |
| A3U1                  | 1020-0476      | 1   | IC:OP AMP. HI-SPEED               | 0720J    | U5F7715353      |
| A4                    | 86601-60023    | 1   | FILTER ASSY:ACTIVE                | 2848C    | 86601-60023     |
| A4C1                  | 0121-0465      | 13  | C:VAR AIR 10 PF                   | 2848C    | 0121-0465       |
| A4C2                  | 0121-0465      |     | C:VAR AIR 10 PF                   | 2848C    | 0121-0465       |
| A4C3                  | 0121-0465      |     | C:VAR AIR 10 PF                   | 2848C    | 0121-0465       |
| A4C4                  | 0121-0465      |     | C:VAR AIR 10 PF                   | 2848C    | 0121-0465       |
| A4C5                  | 0160-3036      |     | C:FXD CER 5000 PF +80-20% 200VDCW | 2848C    | 0160-3036       |
| A4C6                  | 0160-3036      |     | C:FXD CER 5000 PF +80-20% 200VDCW | 2848C    | 0160-3036       |
| A4J1                  | 1250-0901      |     | CONNECTOR:RF BULKHEAD             | 1555B    | 110 /D          |
| A4J2                  | 1250-0901      |     | CONNECTOR:RF BULKHEAD             | 1555B    | 110A/D          |
| A4MP1                 | 86601-60007    | 1   | BOTTOM:ACTIVE FILTER DIE.         | 2848C    | 86601-60007     |
| A4MP2                 | 86601-20037    | 1   | INSERT:ACTIVE FILTER ASSY         | 2848C    | 86601-20037     |
| A4MP3                 | 86601-20035    | 1   | HOUSING:ACTIVE FILTER ASSY        | 2848C    | 86601-20035     |
| A4MP4                 | 86601-20026    | 1   | STRIPLINE                         | 2848C    | 86601-20026     |
| A4MP5                 | 86601-00009    | 1   | COVER:ACTIVE FILTER ASSY          | 2848C    | 86601-00009     |
| A4A1                  | 86601-60011    | 1   | BOARD ASSY:INPUT AMPLIFIER        | 2848C    | 86601-60011     |
| A4A1C1                | 0160-3178      | 1   | C:FXD CER 1000 PF 20% 200VDCW     | 2848C    | 0160-3178       |
| A4A1C2                | 0160-3078      | 10  | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C3                | 0121-0447      | 10  | C:VAR CER 1.0-2.5 PF 200VDCW      | 2848C    | 0121-0447       |
| A4A1C4                | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C5                | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C6                | 0121-0447      |     | C:VAR CER 1.0-2.5 PF 200VDCW      | 2848C    | 0121-0447       |
| A4A1C7                | 0160-3078      | 6   | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C8                | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C9                | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C10               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C11               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C12               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C13               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C14               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C15               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C16               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C17               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C18               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C19               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C20               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C21               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C22               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C23               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C24               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C25               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C26               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C27               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C28               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C29               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C30               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C31               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C32               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C33               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C34               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C35               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C36               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C37               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C38               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C39               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C40               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C41               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C42               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C43               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C44               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C45               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C46               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C47               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C48               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C49               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C50               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C51               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C52               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C53               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C54               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C55               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C56               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C57               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C58               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C59               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C60               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C61               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C62               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C63               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C64               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C65               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C66               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C67               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C68               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C69               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C70               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C71               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C72               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C73               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C74               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C75               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C76               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C77               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C78               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C79               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C80               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C81               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C82               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C83               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C84               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C85               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C86               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C87               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C88               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C89               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C90               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C91               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C92               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H102M    |
| A4A1C93               | 0160-3078      |     | C:FXD CER 1000 PF 20% 100VDCW     | 08031    | 1430087H        |

Table 6-3. Replaceable Parts

| Reference Designation                                                                                      | MP Part Number                                                                                                                 | Qty                   | Description                                                                                                                                                                                                                                                                                                                                        | Mfr. Code                                                                              | Mfr Part Number                                                                                                                |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| A4A1R6<br>A4A1R7<br>A4A1R8<br>A4A1R9<br>A4A1R10                                                            | 0690-3151<br>0690-3440<br>0690-3443<br>0757-0294<br>0690-3443                                                                  | 3                     | R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 207 OHM 1% 1/8W<br>R:FXD NET FLN 17.0 OHM 1% 1/8W<br>R:FXD NET FLN 207 OHM 1% 1/8W                                                                                                                                                                               | 20400<br>20400<br>20400<br>20400<br>20400                                              | 0690-3151<br>0690-3440<br>0690-3443<br>0757-0294<br>0690-3443                                                                  |
| A4A2                                                                                                       | 86601-60012                                                                                                                    | 1                     | BOARD ASSY:OUTPUT AMPLIFIER                                                                                                                                                                                                                                                                                                                        | 20400                                                                                  | 86601-60012                                                                                                                    |
| A4A2C1<br>A4A2C2<br>A4A2C3<br>A4A2C4<br>A4A2C5                                                             | 0160-3070<br>0160-3070<br>0121-0447<br>0160-3070<br>0160-3070                                                                  |                       | C:FXD CER 1000 PF 20% 100VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>C:VAR CER 1.5-2.5 PF 63VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>C:FXD CER 1000 PF 20% 100VDCW                                                                                                                                                                                    | 80031<br>80031<br>20400<br>80031<br>80031                                              | CV2059K7R102M<br>CV2059K7R102M<br>0121-0447<br>CV2059K7R102M<br>CV2059K7R102M                                                  |
| A4A2C6<br>A4A2C7<br>A4A2R1<br>A4A2R2<br>A4A2R3                                                             | 0121-0447<br>0160-3070<br>9100-2247<br>1054-0345<br>1054-0345                                                                  |                       | C:VAR CER 1.5-2.5 PF 63VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>COIL:FXD RF 0.10 UH 10%<br>TSTR:SI NPN<br>TSTR:SI NPN                                                                                                                                                                                                                              | 20400<br>80031<br>20400<br>80131<br>80131                                              | 0121-0447<br>CV2059K7R102M<br>9100-2247<br>2N5179<br>2N5179                                                                    |
| A4A2R4<br>A4A2R5<br>A4A2R6<br>A4A2R7                                                                       | 0690-3429<br>0690-3151<br>0757-0439<br>0690-3440<br>0757-0439                                                                  |                       | R:FXD NET FLN 19.6 OHM 1% 1/8W<br>R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 6.01K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 6.01K OHM 1% 1/8W                                                                                                                                                                           | 20400<br>20400<br>20400<br>20400<br>20400                                              | 0690-3429<br>0690-3151<br>0757-0439<br>0690-3440<br>0757-0439                                                                  |
| A4A2R8<br>A4A2R9                                                                                           | 0690-3151<br>0690-3440                                                                                                         |                       | R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W                                                                                                                                                                                                                                                                                   | 20400<br>20400                                                                         | 0690-3151<br>0690-3440                                                                                                         |
| A5                                                                                                         | 86601-60080                                                                                                                    | 1                     | MODULATOR ASSY                                                                                                                                                                                                                                                                                                                                     | 20400                                                                                  | 86601-60080                                                                                                                    |
| A5C1<br>A5C2<br>A5C3                                                                                       | 0160-3036<br>0160-3036<br>0160-3036                                                                                            |                       | C:FXD CER 5000 PF +80-20% 200VDCW<br>C:FXD CER 5000 PF +80-20% 200VDCW<br>C:FXD CER 5000 PF +80-20% 200VDCW                                                                                                                                                                                                                                        | 20400<br>20400<br>20400                                                                | 0160-3036<br>0160-3036<br>0160-3036                                                                                            |
| A5J1<br>A5J2<br>A5J3<br>A5J4<br>A5MP1                                                                      | 1250-1194<br>1250-1194<br>1250-1194<br>1250-1194<br>86601-20065                                                                | 1                     | CONNECTOR:RF BULKHEAD RECEPTACLE<br>CONNECTOR:RF BULKHEAD RECEPTACLE<br>CONNECTOR:RF BULKHEAD RECEPTACLE<br>CONNECTOR:RF BULKHEAD RECEPTACLE<br>DIVIDER:MODULATOR                                                                                                                                                                                  | 98291<br>98291<br>98291<br>98291<br>20400                                              | 52-045-4610<br>52-045-4610<br>52-045-4610<br>52-045-4610<br>86601-20065                                                        |
| A5MP2<br>A5MP3                                                                                             | 86601-20067<br>86601-20072                                                                                                     | 1<br>1                | CABLE:MODULATOR<br>COVER:MODULATOR ASSY                                                                                                                                                                                                                                                                                                            | 20400<br>20400                                                                         | 86601-20067<br>86601-20072                                                                                                     |
| A5A1                                                                                                       | 86601-60070                                                                                                                    | 1                     | BOARD ASSY:MODULATOR                                                                                                                                                                                                                                                                                                                               | 20400                                                                                  | 86601-60070                                                                                                                    |
| A5A1C1<br>A5A1C2<br>A5A1C3<br>A5A1C4<br>A5A1C5                                                             | 0160-3070<br>0121-0447<br>0160-3070<br>0160-3070<br>0121-0447                                                                  |                       | C:FXD CER 1000 PF 20% 100VDCW<br>C:VAR CER 1.5-2.5 PF 63VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>C:VAR CER 1.5-2.5 PF 63VDCW                                                                                                                                                                                      | 80031<br>20400<br>80031<br>80031<br>20400                                              | CV2059K7R102M<br>0121-0447<br>CV2059K7R102M<br>CV2059K7R102M<br>0121-0447                                                      |
| A5A1C6<br>A5A1C7<br>A5A1C8<br>A5A1C9<br>A5A1C10                                                            | 0160-3070<br>0160-2200<br>0160-3070<br>0160-3440<br>0160-3440                                                                  | 2<br>1<br>1<br>4      | C:FXD CER 1000 PF 20% 100VDCW<br>C:FXD RICA 330 PF 5% 300VDCW<br>C:FXD CER 1000 PF 20% 100VDCW<br>C:FXD CER 100 PF 10% 250VDCW<br>C:FXD CER 1000 PF 10% 250VDCW                                                                                                                                                                                    | 80031<br>20400<br>80031<br>96209<br>96209                                              | CV2059K7R102M<br>0160-2200<br>CV2059K7R102M<br>C157F251F101K522-COM<br>C067F251F102K522-COM                                    |
| A5A1E1<br>A5A1E2<br>A5A1E3<br>A5A1E4<br>A5A1E5                                                             | 0960-2070<br>0960-1013<br>0960-00005<br>0960-00005<br>9100-2247                                                                | 2<br>1<br>4<br>1<br>1 | MIXER:500 MHZ<br>RELAY:REED 500 OHM 10% 5V<br>INDUCTOR<br>INDUCTOR<br>COIL:FXD RF 0.10 UH 10%                                                                                                                                                                                                                                                      | 20400<br>15000<br>20400<br>20400<br>20400                                              | 0960-2070<br>A2040-1<br>0960-00005<br>0960-00005<br>9100-2247                                                                  |
| A5A1E6<br>A5A1E7<br>A5A1E8<br>A5A1E9<br>A5A1E10                                                            | 0160-0150<br>1054-0345<br>1054-0345<br>0690-3429<br>0757-0439                                                                  |                       | COIL:FXD RF 1 UH 10%<br>TSTR:SI NPN<br>TSTR:SI NPN<br>R:FXD NET FLN 19.6 OHM 1% 1/8W<br>R:FXD NET FLN 6.01K OHM 1% 1/8W                                                                                                                                                                                                                            | 90000<br>80131<br>80131<br>20400<br>20400                                              | 1025-20<br>2N5179<br>2N5179<br>0690-3429<br>0757-0439                                                                          |
| A5A1E11<br>A5A1E12<br>A5A1E13<br>A5A1E14<br>A5A1E15<br>A5A1E16<br>A5A1E17<br>A5A1E18<br>A5A1E19<br>A5A1E20 | 0690-3151<br>0690-3440<br>0757-0294<br>0690-3151<br>0690-3440<br>0690-3151<br>0690-3440<br>0690-3151<br>0690-3440<br>0690-3151 |                       | R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 6.01K OHM 1% 1/8W<br>R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 2.07K OHM 1% 1/8W | 20400<br>20400<br>20400<br>20400<br>20400<br>20400<br>20400<br>20400<br>20400<br>20400 | 0690-3151<br>0690-3440<br>0757-0294<br>0690-3151<br>0690-3440<br>0690-3151<br>0690-3440<br>0690-3151<br>0690-3440<br>0690-3151 |
| A5A1E21<br>A5A1E22<br>A5A1E23                                                                              | 0757-0294<br>0757-0294<br>0757-1000                                                                                            | 1                     | R:FXD NET FLN 2.07K OHM 1% 1/8W<br>R:FXD NET FLN 19K OHM 1% 1/8W<br>R:FXD NET FLN 6.01K OHM 1% 1/8W                                                                                                                                                                                                                                                | 20400<br>20400<br>20400                                                                | 0757-0294<br>0757-0294<br>0757-1000                                                                                            |

See introduction to this section for ordering information



Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                         | Mfr Code | Mfr Part Number      |
|-----------------------|----------------|-----|-------------------------------------|----------|----------------------|
| ASA2                  | 86601-60060    | 1   | BOARD ASSY:REGULATOR II             | 28480    | 86601-60060          |
| ASA2C1                | 0160-3878      |     | C:FXD CER 100C PF 20S 100VDCM       | 80031    | CV2059K7R102M        |
| ASA2C2                | 0121-0447      |     | C:VAR CER 1.5-2.5 PF 63VDCM         | 28480    | 0121-0447            |
| ASA2C3                | 0160-3878      |     | C:FXD CER 1000 PF 20S 100VDCM       | 80031    | CV2059K7R102M        |
| ASA2C4                | 0121-0447      |     | C:VAR CER 1.5-2.5 PF 63VDCM         | 28480    | 0121-0447            |
| ASA2C5                | 0160-3878      |     | C:FXD CER 1000 PF 20S 100VDCM       | 80031    | CV2059K7R102M        |
| ASA2C6                | 0160-3878      |     | C:FXD CER 1000 PF 20S 100VDCM       | 80031    | CV2059K7R102M        |
| ASA2C7                | 0160-3878      |     | C:FXD CER 1000 PF 20S 100VDCM       | 80031    | CV2059K7R102M        |
| ASA2C8                | 0160-2200      |     | C:FXD NICA 330 PF 5S 300VDCM        | 28480    | 0160-2200            |
| ASA2E1                | 0960-2070      |     | MIXER:1500 MHZ                      | 28480    | 0960-2070            |
| ASA2L1                | 08660-80005    |     | INDUCTOR                            | 28480    | 08660-80005          |
| ASA2L2                | 08660-80005    |     | INDUCTOR                            | 28480    | 08660-80005          |
| ASA2L3                | 9100-2247      |     | COIL:FXD RF 0.10 UH 10T             | 28480    | 9100-2247            |
| ASA2L4                | 9140-0158      |     | COIL:FXD RF 1 UH 10T                | 99800    | 1025-20              |
| ASA201                | 1854-0345      |     | TSTR:SI NPN                         | 80131    | 2N5175               |
| ASA202                | 1854-0345      |     | TSTR:SI NPN                         | 80131    | 2N5175               |
| ASA2R1                | 0757-0439      |     | R:FXD MET FLM 6.81K OHM 1S 1/8W     | 28480    | 0757-0439            |
| ASA2R2                | 0690-3151      |     | R:FXD MET FLM 2.87K OHM 1S 1/8W     | 28480    | 0690-3151            |
| ASA2R3                | 0690-3440      |     | R:FXD MET FLM 19K OHM 1S 1/8W       | 28480    | 0690-3440            |
| ASA2R4                | 0757-0439      |     | R:FXD MET FLM 6.81K OHM 1S 1/8W     | 28480    | 0757-0439            |
| ASA2R5                | 0690-3151      |     | R:FXD MET FLM 2.87K OHM 1S 1/8W     | 28480    | 0690-3151            |
| ASA2R6                | 0690-3440      |     | R:FXD MET FLM 19K OHM 1S 1/8W       | 28480    | 0690-3440            |
| ASA2R7                | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| ASA2R8                | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6                    | 86601-60017    | 1   | PRE-AMPLIFIER ASSY                  | 28480    | 86601-60017          |
| A6C1                  | 0100-2058      |     | C:FXD AL ELECT 50 UF +75-10S 25VDCM | 56289    | 3005065025CC2-DSM    |
| A6C2                  | 0160-2306      | 2   | C:FXD NICA 27 PF 5S                 | 28480    | 0160-2306            |
| A6C3                  | 0160-2306      |     | C:FXD NICA 27 PF 5S                 | 28480    | 0160-2306            |
| A6C4                  | 0100-0197      |     | C:FXD ELECT 2.2 UF 10S 20VDCM       | 56289    | 1500225K020A2-OVS    |
| A6C5                  | 0160-2150      | 2   | C:FXD NICA 33 PF 5S                 | 28480    | 0160-2150            |
| A6C6                  | 0160-3036      |     | C:FXD CER 1000 PF 10S 250VDCM       | 56289    | C067F251F102K52B-COM |
| A6C7                  | 0160-3036      |     | C:FXD CER 1000 PF 10S 250VDCM       | 56289    | C067F251F102K52B-COM |
| A6C8                  | 0160-2055      | 1   | C:FXD CER 0.01 UF +80-20S 100VDCM   | 56289    | C023F101F102S22B-COM |
| A6C9                  | 0100-0197      |     | C:FXD ELECT 2.2 UF 10S 20VDCM       | 56289    | 1500225K020A2-OVS    |
| A6C10                 | 0100-0197      |     | C:FXD ELECT 2.2 UF 10S 20VDCM       | 56289    | 1500225K020A2-OVS    |
| A6C11                 | 0100-0197      |     | C:FXD ELECT 2.2 UF 10S 20VDCM       | 56289    | 1500225K020A2-OVS    |
| A6C12                 | 0160-3036      |     | C:FXD CER 1000 PF 10S 250VDCM       | 56289    | C067F251F102K52B-COM |
| A6C13                 | 0100-0197      |     | C:FXD ELECT 2.2 UF 10S 20VDCM       | 56289    | 1500225K020A2-OVS    |
| A6C14                 | 0160-3036      |     | C:FXD CER 5000 PF +80-20S 200VDCM   | 28480    | 0160-3036            |
| A6C15                 | 0160-3036      |     | C:FXD CER 5000 PF +80-20S 200VDCM   | 28480    | 0160-3036            |
| A6C16                 | 1902-0040      |     | D:ODE:BREAKDOWN 6.01V 5S            | 04713    | S210790-134          |
| A6C17                 | 1902-0040      |     | D:ODE:BREAKDOWN 6.01V 5S            | 04713    | S210790-134          |
| A6J1                  | 1250-0701      |     | CONNECTOR:RF BULKHEAD               | 15558    | 110470               |
| A6J2                  | 1250-0701      |     | CONNECTOR:RF BULKHEAD               | 15558    | 110470               |
| A6L1                  | 9100-1627      |     | COIL/CHOK 30 UH 5S                  | 82142    | 15-1310-2J           |
| A6L2                  | 86601-60004    | 2   | COIL                                | 28480    | 86601-60004          |
| A6L3                  | 9100-2240      | 1   | COIL/CHOK 0.12 UH 10S               | 82142    | 09-0416-2K           |
| A6L4                  | 86601-60004    |     | COIL                                | 28480    | 86601-60004          |
| A6M1                  | 86601-60023    | 1   | COVER:PRE-AMPLIFIER ASSY            | 28480    | 86601-60023          |
| A6M2                  | 86601-60002    | 1   | BOARD ASSY:PRE-AMPLIFIER            | 28480    | 86601-60002          |
| A6N1                  | 1854-0345      |     | TSTR:SI NPN                         | 80131    | 2N5175               |
| A6N2                  | 1854-0345      |     | TSTR:SI NPN                         | 80131    | 2N5175               |
| A6N3                  | 1854-0345      | 1   | TSTR:SI NPN                         | 80131    | 1854-0345            |
| A6N4                  | 1854-0345      | 1   | TSTR:SI NPN                         | 80131    | 1854-0345            |
| A6N5                  | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N6                  | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N7                  | 0690-3440      |     | R:FXD MET FLM 19K OHM 1S 1/8W       | 28480    | 0690-3440            |
| A6N8                  | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N9                  | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N10                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N11                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N12                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N13                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N14                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N15                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N16                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N17                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N18                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N19                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N20                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N21                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N22                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N23                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N24                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N25                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N26                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N27                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N28                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N29                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N30                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N31                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N32                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N33                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N34                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N35                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N36                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N37                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N38                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N39                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N40                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N41                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N42                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N43                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N44                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N45                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N46                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N47                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N48                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N49                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N50                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N51                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N52                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N53                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N54                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N55                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N56                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N57                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N58                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N59                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N60                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N61                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N62                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N63                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N64                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N65                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N66                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N67                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N68                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N69                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N70                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N71                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N72                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N73                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N74                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N75                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N76                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N77                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N78                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N79                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N80                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N81                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N82                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N83                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N84                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N85                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N86                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N87                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N88                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N89                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N90                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N91                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N92                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N93                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N94                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N95                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N96                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N97                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N98                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N99                 | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |
| A6N100                | 0757-0280      |     | R:FXD MET FLM 1K OHM 1S 1/8W        | 28480    | 0757-0280            |



Table 6-3. Replaceable Parts

| Reference Designation | Part Number | Qty | Description                                          | Mfr Code | Mfr Part Number |
|-----------------------|-------------|-----|------------------------------------------------------|----------|-----------------|
| A7                    | 86601-60009 | 1   | BOARD ASSY:W/THIR                                    | 2040C    | 86601-60009     |
| A7P1                  | 1251-2857   | 2   | CONNECTOR STRIP:14 MALE CONTACT                      | 02660    | 221-1515        |
| A7PA7                 | 1251-2857   |     | CONNECTOR STRIP:14 MALE CONTACT                      | 0266C    | 221-1515        |
| A7PA8                 | 1251-1626   | 1   | CONNECTOR:PC (2 X 12) 24 CONTACT                     | 71785    | 252-12-30-300   |
| A7PA9                 | 1251-2834   | 1   | CONNECTOR:PC EDGE (2 X 10) 20 CONTACT                | 71789    | 252-10-30-300   |
| A7PA10                | 1251-1388   | 1   | CONNECTOR:PC (2 X 15) 30 CONTACT                     | 71785    | 252-15-30-000   |
| A8                    | 86601-60006 | 1   | BOARD ASSY:ATTENUATOR DRIVER FOR OPTION 001, OMIT A8 | 2040C    | 86601-60006     |
| ABCR1                 | 1902-3002   | 4   | DIODE BREAKDOWN:2.37V 5%                             | 20400    | 1902-3002       |
| ABCR2                 | 1902-3002   |     | DIODE BREAKDOWN:2.37V 5%                             | 20400    | 1902-3002       |
| ABCR3                 | 1902-3002   |     | DIODE BREAKDOWN:2.37V 5%                             | 20400    | 1902-3002       |
| ABCR4                 | 1902-3002   |     | DIODE BREAKDOWN:2.37V 5%                             | 20400    | 1902-3002       |
| ABCR5                 | 1901-0025   | 9   | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR6                 | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR7                 | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR8                 | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR9                 | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR10                | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR11                | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| ABCR12                | 1901-0025   |     | DIODE:SILICON 100MA/1V                               | 07263    | FD 2387         |
| A1Q1                  | 1854-0361   | 4   | TSTR:SI PNP                                          | 00131    | 2N4234          |
| A1Q2                  | 1854-0361   |     | TSTR:SI NPN                                          | 00131    | 2N4235          |
| A1Q3                  | 1853-0213   | 4   | TSTR:SI PNP                                          | 00131    | 2N4234          |
| A1Q4                  | 1854-0361   |     | TSTR:SI NPN                                          | 00131    | 2N4235          |
| ABQ5                  | 1854-0071   |     | TSTR:SI NPN(SELECTED FROM 2N3704)                    | 20400    | 1854-0071       |
| ABQ6                  | 1853-0020   |     | TSTR:SI PNP(SELECTED FROM 2N3702)                    | 20400    | 1853-0020       |
| ABQ7                  | 1854-0071   |     | TSTR:SI NPN(SELECTED FROM 2N3704)                    | 20400    | 1854-0071       |
| ABQ8                  | 1853-0020   |     | TSTR:SI PNP(SELECTED FROM 2N3702)                    | 20400    | 1853-0020       |
| ABQ9                  | 1853-0213   |     | TSTR:SI PNP                                          | 00131    | 2N4234          |
| ABQ10                 | 1854-0361   |     | TSTR:SI NPN                                          | 00131    | 2N4235          |
| ABQ11                 | 1853-0213   |     | TSTR:SI PNP                                          | 00131    | 2N4234          |
| ABQ12                 | 1854-0361   |     | TSTR:SI NPN                                          | 00131    | 2N4235          |
| ABQ13                 | 1854-0071   |     | TSTR:SI NPN(SELECTED FROM 2N3704)                    | 20400    | 1854-0071       |
| ABQ14                 | 1853-0020   |     | TSTR:SI PNP(SELECTED FROM 2N3702)                    | 20400    | 1853-0020       |
| ABQ15                 | 1854-0071   |     | TSTR:SI NPN(SELECTED FROM 2N3704)                    | 20400    | 1854-0071       |
| ABQ16                 | 1853-0020   |     | TSTR:SI PNP(SELECTED FROM 2N3702)                    | 20400    | 1853-0020       |
| AB1                   | 0757-0280   |     | R1FXD NET FLX 1K OHM 1% 1/8W                         | 20400    | 0757-0280       |
| AB2                   | 0757-0280   |     | R1FXD NET FLX 1K OHM 1% 1/8W                         | 20400    | 0757-0280       |
| AB3                   | 0757-0280   |     | R1FXD NET FLX 1K OHM 1% 1/8W                         | 20400    | 0757-0280       |
| ABR4                  | 0757-0159   | 8   | R1FXD NET FLX 1K OHM 1% 1/8W                         | 20400    | 0757-0159       |
| ABR5                  | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| ABR6                  | 0690-3440   |     | R1FXD NET FLX 196 OHM 1% 1/8W                        | 20400    | 0690-3440       |
| ABR7                  | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| ABR8                  | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| ABR9                  | 0690-3440   |     | R1FXD NET FLX 196 OHM 1% 1/8W                        | 20400    | 0690-3440       |
| ABR10                 | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| ABR11                 | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| ABR12                 | 0690-3440   |     | R1FXD NET FLX 196 OHM 1% 1/8W                        | 20400    | 0690-3440       |
| ABR13                 | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| AB14                  | 0757-0149   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0149       |
| AB15                  | 0757-0401   |     | R1FXD NET FLX 100 OHM 1% 1/8W                        | 20400    | 0757-0401       |
| AB16                  | 0757-0159   |     | R1FXD NET FLX 1000 OHM 1% 1/2W                       | 20400    | 0757-0159       |
| AB17                  | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| AB18                  | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR19                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR20                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR21                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR22                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR23                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| ABR24                 | 0690-0002   |     | R1FXD NET FLX 464 OHM 1% 1/8W                        | 20400    | 0690-0002       |
| A9                    | 86601-60003 | 1   | BOARD ASSY:REFERENCE                                 | 2040C    | 86601-60003     |
| AC1                   | 0100-2226   | 1   | C1FND MICA 2200 PF 5% 100VDC                         | 2040C    | 0100-2226       |
| ACR1                  | 1900-0041   |     | DIODE:GERMANIUM 0.11V 5%                             | 04713    | 5210029-08      |

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                         | Mfr Code | Mfr Part Number      |
|-----------------------|----------------|-----|-------------------------------------|----------|----------------------|
| A9CR2                 | 1001-0225      |     | DIODE: SILICON 100MA/1V             | 07263    | FD 2387              |
| A9K1                  | 0490-0916      | 6   | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9K2                  | 0490-0916      |     | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9K3                  | 0490-0916      |     | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9K4                  | 0490-0916      |     | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9K5                  | 0490-0916      |     | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9K6                  | 0490-0916      |     | RELAY: REED 1 FORM A 0.5 AMP        | 15636    | RA30231051           |
| A9Q1                  | 1853-0071      |     | TSTR: SI NPN (SELECTED FROM 2N3764) | 28480    | 1854-CC71            |
| A9Q2                  | 1853-0015      | 5   | TSTR: SI PNP                        | 80131    | 2N3640               |
| A9Q3                  | 1853-0015      |     | TSTR: SI PNP                        | 80131    | 2N3640               |
| A9Q4                  | 1853-0322      | 4   | TSTR: SI PNP                        | 80131    | 2N2946A              |
| A9Q5                  | 1853-0015      |     | TSTR: SI PNP                        | 80131    | 2N3640               |
| A9Q6                  | 1853-0322      |     | TSTR: SI PNP                        | 80131    | 2N2946A              |
| A9Q7                  | 1853-0015      |     | TSTR: SI PNP                        | 80131    | 2N3640               |
| A9Q8                  | 1853-0322      |     | TSTR: SI PNP                        | 80131    | 2N2946A              |
| A9Q9                  | 1853-0015      |     | TSTR: SI PNP                        | 80131    | 2N3640               |
| A9Q10                 | 1854-0071      |     | TSTR: SI NPN (SELECTED FROM 2N3704) | 28480    | 1854-L071            |
| A9Q11                 | 1853-0322      |     | TSTR: SI PNP                        | 80131    | 2N2946A              |
| A9R1                  | 0757-0418      | 2   | RIFXD NET FLN 619 OHM 1% 1/8W       | 28480    | 0757-0418            |
| A9R2                  | 2100-2413      | 1   | RIVAR FLN 200 OHM 10% 1/2W          | 28480    | 2100-2413            |
| A9A3                  | 0757-0418      |     | RIFXD NET FLN 619 OHM 1% 1/8W       | 28480    | 0757-0418            |
| A9R4                  | 0690-3443      |     | RIFXD NET FLN 247 OHM 1% 1/8W       | 28480    | 0690-3443            |
| A9R5                  | 0757-0442      |     | RIFXD NET FLN 10.0K OHM 1% 1/8W     | 28480    | 0757-0442            |
| A9R6                  | 0757-0442      |     | RIFXD NET FLN 10.0K OHM 1% 1/8W     | 28480    | 0757-0442            |
| A9R7                  | 0690-3446      | 1   | RIFXD NET FLN 383 OHM 1% 1/8W       | 28480    | 0690-3446            |
| A9R8                  | 0757-0280      |     | RIFXD NET FLN 1K OHM 1% 1/8W        | 28480    | 0757-0280            |
| A9R9                  | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R10                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R11                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R12                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R13                 | 2100-2633      | 2   | RIVAR CERMET 1K OHM 10% 1/2W        | 28480    | 2100-2633            |
| A9R14                 | 0757-0280      |     | RIFXD NET FLN 1K OHM 1% 1/8W        | 28480    | 0757-0280            |
| A9R15                 | 0757-0442      |     | RIFXD NET FLN 10.0K OHM 1% 1/8W     | 28480    | 0757-0442            |
| A9R16                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R17                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R18                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R19                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9A20                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R21                 | 0690-4482      |     | RIFXD FLN 17.4K OHM 1% 1/8W         | 28480    | 0690-4482            |
| A9R22                 | 0690-3498      | 1   | RIFXD NET FLN 8.66K OHM 1% 1/8W     | 28480    | 0690-3498            |
| A9R23                 | 0690-3154      | 1   | RIFXD NET FLN 4.22K OHM 1% 1/8W     | 28480    | 0690-3154            |
| A9R24                 | 0690-4430      | 1   | RIFXD FLN 1.91K OHM 1% 1/8W         | 28480    | 0690-4430            |
| A9R25                 | 0690-4406      | 2   | RIFXD FLN 115 OHM 1% 1/8W           | 28480    | 0690-4406            |
| A9R26                 | 0690-4406      |     | RIFXD FLN 115 OHM 1% 1/8W           | 28480    | 0690-4406            |
| A9R27                 | 0690-3486      | 2   | RIFXD FLN 232 OHM 1% 1/8W           | 28480    | 0690-3486            |
| A9R28                 | 0690-3486      |     | RIFXD FLN 232 OHM 1% 1/8W           | 28480    | 0690-3486            |
| A9R29                 | 0690-3510      | 2   | RIFXD NET FLN 453 OHM 1% 1/8W       | 28480    | 0690-3510            |
| A9R30                 | 0690-3510      |     | RIFXD NET FLN 453 OHM 1% 1/8W       | 28480    | 0690-3510            |
| A9R31                 | 0690-3495      | 2   | RIFXD NET FLN 866 OHM 1% 1/8W       | 28480    | 0690-3495            |
| A9R32                 | 2100-2633      |     | RIVAR CERMET 1K OHM 10% 1/2W        | 28480    | 2100-2633            |
| A9R33                 | 0690-3495      |     | RIFXD NET FLN 866 OHM 1% 1/8W       | 28480    | 0690-3495            |
| A9R34                 | 2100-2632      | 1   | RIVAR FLN 10K OHM 10% 1/2W          | 28480    | 2100-2632            |
| A9R35                 | 0690-0083      |     | RIFXD NET FLN 1.96K OHM 1% 1/8W     | 28480    | 0690-0083            |
| A9R36                 | 0690-3453      | 1   | RIFXD NET FLN 106K OHM 1% 1/8W      | 28480    | 0690-3453            |
| A9R37                 | 0690-3150      | 1   | RIFXD NET FLN 2.37K OHM 1% 1/8W     | 28480    | 0690-3150            |
| A9U1                  | 1020-0201      | 1   | INTEGRAL CIRCUIT: OPERATIONAL AMPL  | 04713    | MC1430G              |
| A10                   | 06601-00000    | 1   | DCA-0 ASSY: CALIC                   | 28480    | 06601-00000          |
| A10C1                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C2                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C3                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C4                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C5                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C6                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C7                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C8                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C9                 | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C10                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C11                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C12                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C13                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C14                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C15                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C16                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C17                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C18                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C19                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C20                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C21                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C22                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C23                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C24                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C25                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C26                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C27                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C28                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C29                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C30                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C31                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C32                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C33                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C34                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C35                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C36                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C37                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C38                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C39                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C40                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C41                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C42                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C43                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C44                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C45                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C46                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C47                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C48                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C49                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C50                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C51                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C52                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C53                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C54                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C55                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C56                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C57                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C58                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C59                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C60                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C61                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C62                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C63                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C64                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C65                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C66                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C67                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C68                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C69                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C70                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C71                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C72                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C73                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C74                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C75                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C76                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C77                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C78                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C79                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C80                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0220 MC1502 DVS |
| A10C81                | 0100-0220      | 1   | CAPAC 100P 22 1/2 50V 10%WV         | 06204    | 1000-0               |



Table 6-3. Replaceable Parts

| Reference Designation | Mfr Part Number | Qty | Description                                         | Mfr Code | Mfr Part Number  |
|-----------------------|-----------------|-----|-----------------------------------------------------|----------|------------------|
| A11MP1                | 1250-1313       | 13  | CONNECTOR 6 P FEMALE CONNECTOR                      | 6244C    | 220-562          |
| A11MP2                | 1250-2088       | 1   | CONNECTOR BODY:15-OPEN POSITIONS                    | 7444B    | 221-1615         |
| A11MP3                | 1250-2087       | 10  | CONNECTOR 6 P CONNECTOR 616 FEMALE                  | 81312    | 100-09085        |
| A11M1                 | 86601-60041     | 1   | CONNECTOR FACE:166-PIN                              | 2848C    | 86601-60041      |
| A11M7                 | 86601-60037     | 2   | SEE W3                                              | 2848C    | 86601-60037      |
| A11M9                 | 86601-60038     | 2   | SEE W6                                              | 2848C    | 86601-60038      |
| A11M11                | 86601-60040     | 2   | SEE W11                                             | 2848C    | 86601-60040      |
| A11M17                | 86601-60040     | 2   | SEE W17                                             | 2848C    | 86601-60040      |
| A11M18                | 86601-60040     | 2   | SEE W18                                             | 2848C    | 86601-60040      |
| A12                   | 86601-60022     | 1   | FILTER ASSY:DUAL                                    | 2848C    | 86601-60022      |
| A12J1                 | 1250-0901       |     | CONNECTOR:RF BULKHEAD                               | 1555B    | 1104/D           |
| A12J2                 | 1250-0901       |     | CONNECTOR:PF BULKHEAD                               | 1555B    | 1104/D           |
| A12J3                 | 1250-0901       |     | CONNECTOR:RF BULKHEAD                               | 1555B    | 1104/D           |
| A12J4                 | 1250-0901       |     | CONNECTOR:PF BULKHEAD                               | 1555B    | 1104/D           |
| A12MP1                | 86601-30004     | 1   | COVER:DUAL FILTER                                   | 2848C    | 86601-30004      |
| A12MP2                | 86601-00025     | 1   | GASKET                                              | 2848C    | 86601-00025      |
| A12MP3                | 86601-20027     | 1   | STRIPLINE-455                                       | 2848C    | 86601-20027      |
| A12MP4                | 86601-20028     | 1   | STRIPLINE-500                                       | 2848C    | 86601-20028      |
| A12MP5                | 86601-20030     | 1   | INSERT-455                                          | 2848C    | 86601-20030      |
| A12MP6                | 86601-20031     | 1   | INSERT-500                                          | 2848C    | 86601-20031      |
| A12MP7                | 86601-20034     | 1   | HCUSING:DUAL FILTER                                 | 2848C    | 86601-20034      |
| A12MP8                | 86601-40003     | 2   | BOTTOM-455 DIE                                      | 2848C    | 86601-40003      |
| A12MP9                | 86601-40005     | 2   | BOTTOM-500 DIE                                      | 2848C    | 86601-40005      |
| A12A1                 |                 |     | BAND PASS FILTER:500 MHZ                            |          |                  |
| A12A1C1               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A1C2               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2                 |                 |     | BAND PASS FILTER:455-460 MHZ                        |          |                  |
| A12A2C1               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C2               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C3               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C4               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C5               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C6               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A12A2C7               | 0121-0465       |     | CIVAR AIR 10 PF                                     | 2848C    | 0121-0465        |
| A13                   | 86601-60039     | 1   | ATTENUATOR ASSY:3 SECTION FOR OPTION 001, OMIT A13. | 2848C    | 86601-60039      |
| A14                   | 86601-60021     | 1   | FILTER ASSY:LOW PASS                                | 2848C    | 86601-60021      |
| A14C1                 | 0160-2150       |     | CIFRD NICA 33 PF 58                                 | 2848C    | 0160-2150        |
| A14C2                 | 0160-2257       | 1   | CIFRD CER 10 PF 58 500VDCM                          | 72982    | 3C1-000-000-100J |
| A14C3                 | 0160-2308       | 1   | CIFRD NICA 36 PF 58                                 | 2848C    | 0160-2308        |
| A14C4                 | 0160-2200       | 1   | CIFRD NICA 43 PF 58                                 | 72136    | ADM15643CJC      |
| A14C5                 | 0160-2199       |     | CIFRD NICA 30 PF 58 300VDCM                         | 2848C    | 0160-2199        |
| A14C6                 | 0160-2199       |     | CIFRD NICA 30 PF 58 300VDCM                         | 2848C    | 0160-2199        |
| A14C7                 | 0160-2265       | 1   | CIFRD CER 22 PF 58 500VDCM                          | 72982    | 3C1-NPC-22PF     |
| A14L1                 | 86601-80001     | 1   | COIL:FXD 47                                         | 2848C    | 86601-80001      |
| A14L2                 | 86601-80002     | 1   | COIL:2 T                                            | 2848C    | 86601-80002      |
| A14L3                 | 86601-80003     | 1   | COIL:2-1/2 T                                        | 2848C    | 86601-80003      |
| A14MP1                | 86601-00010     | 1   | BOARD ASSY:LOW PASS FILTER                          | 2848C    | 86601-00010      |
| A14MP2                | 7100-1042       | 1   | CAN:RECTANGULAR 0.954" X 2.331"                     | 04879    | WU-5794-CR5-MTD  |
| A14MP3                | 10514-0005      | 1   | BRACKET:SEL                                         | 2848C    | 10514-0005       |
| A14J1                 | 1250-1021       | 2   | CONNECTOR:RF 50 OHM SNAP ON TYPE                    | 98291    | 51-043-4610      |
| A14J2                 | 1250-1021       | 2   | CONNECTOR:PF 50 OHM SNAP ON TYPE                    | 98291    | 51-043-4610      |
| A14MP4                | 86601-00027     | 1   | CAN:LP FILTER                                       | 2848C    | 86601-00027      |
| A15                   | 10514A-004/H58  | 1   | MIXER:DOUBLE BALANCED                               | 2848C    | 10514A-004/H58   |
| A16                   | 10514A-OPT 004  | 2   | MIXER DOUBLE BALANCED                               | 2848C    | 10514A-OPT 004   |

See Introduction to this section for ordering information



Table 6-3. Replacable Parts

| Reference Designation | HP Part Number | Qty | Description                                                    | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|----------------------------------------------------------------|----------|-----------------|
| A17                   | 10514A-004     |     | MIXER-DOUBLE BALANCED                                          | 28480    | 10514A-004      |
| A18                   | 86601-60091    | 1   | WIRING HARNESS:MAIN                                            | 28480    | 86601-60091     |
| A18MP1                | 1200-0063      | 17  | LUG:CRIMP                                                      | 28480    | 1200-0063       |
| A18MP2                | 1251-2262      | 2   | CONNECTOR:PC12 X 10120 CONTACTS                                | 76530    | 251-10-30-400   |
| A18MP3                | 1251-3087      |     | CONTACTOR & P CONNECTOR 816 FEMALE                             | 81312    | 100-05085       |
| A18MP4                | 5020-0176      | 17  | INSULATOR FOR SNAP-ON PINS                                     | 28480    | 5020-0176       |
| A19                   | 86601-60089    | 2   | CABLE ASSY GRAY/YEL                                            | 28480    | 86601-60089     |
| A19W4                 | 86601-60030    | 1   | SEE W4                                                         | 28480    | 86601-60030     |
| A19W8                 | 86601-60069    | 2   | SEE W8                                                         | 28480    | 86601-60069     |
| A19W9                 | 86601-60068    | 2   | SEE W9                                                         | 28480    | 86601-60068     |
| A19W10                | 86601-60071    | 2   | SEE W10                                                        | 28480    | 86601-60071     |
| A19W13                | 86601-60032    | 2   | SEE W13                                                        | 28480    | 86601-60032     |
| A19W19                | 86601-60070    | 2   | SEE W19                                                        | 28480    | 86601-60070     |
| W1                    | 86601-60041    |     | CABLE ASSY:WHITE/GREEN                                         | 28480    | 86601-60041     |
| W2                    | 86601-60035    | 1   | CABLE ASSY:GRAY                                                | 28480    | 86601-60035     |
| W3                    | 86601-60037    |     | CABLE ASSY:WHITE/RED                                           | 28480    | 86601-60037     |
| W4                    | 86601-60089    |     | CABLE ASSY GRAY/YEL                                            | 28480    | 86601-60089     |
| W5                    | 86601-60029    | 1   | CABLE ASSY:GRAY/ORANGE                                         | 28480    | 86601-60029     |
| W6                    | 86601-60038    |     | CABLE ASSY:WHITE/ORANGE                                        | 28480    | 86601-60038     |
| W7                    | 86601-60034    | 1   | CABLE ASSY:GRAY                                                | 28480    | 86601-60034     |
| W8                    | 86601-60069    |     | CABLE ASSY:GRAY/WHITE                                          | 28480    | 86601-60069     |
| W9                    | 86601-60068    |     | CABLE ASSY:GRAY/BLACK                                          | 28480    | 86601-60068     |
| W10                   | 86601-60071    |     | CABLE ASSY:GRAY/GREEN                                          | 28480    | 86601-60071     |
| W11                   | 86601-60040    |     | CABLE ASSY:WHITE/YELLOW                                        | 28480    | 86601-60040     |
| W12                   | 86601-60036    | 1   | CABLE ASSY:GRAY                                                | 28480    | 86601-60036     |
| W13                   | 86601-60032    |     | CABLE ASSY:GRAY/BLUE                                           | 28480    | 86601-60032     |
| W14                   | 86601-60027    | 1   | CABLE ASSY:GRAY/RED                                            | 28480    | 86601-60027     |
| W15                   | 86601-60026    | 1   | CABLE ASSY:GRAY/BROWN                                          | 28480    | 86601-60026     |
| W16                   | 86601-60059    | 1   | CABLE ASSY:ATTENUATOR, GRAY<br>(FOR OPTION 001)                | 28480    | 86601-60059     |
| W16                   | 86601-60028    | 1   | CABLE ASSY:ATTENUATOR, GRAY<br>FOR OPTION 001 ONLY 86601-60028 | 28480    | 86601-60028     |
| W17                   | 86601-60049    |     | CABLE ASSY:GRAY/ORANGE                                         | 28480    | 86601-60049     |
| W18                   | 86601-60086    |     | CABLE ASSY:WHITE/GREEN                                         | 28480    | 86601-60086     |
| W19                   | 86601-60070    |     | CABLE ASSY:GRAY/VIOLET                                         | 28480    | 86601-60070     |
| KA7-1                 | 1251-2550      | 1   | CONNECTOR:PC EDGE12 X 6112 CONTACT                             | 71785    | 251-06-30-400   |
| KA7-2                 | 1251-2262      |     | CONNECTOR:PC12 X 10120 CONTACTS                                | 76530    | 251-10-30-400   |
|                       | 0370-1089      | 1   | MISCELLANEOUS                                                  | 28480    | 0370-1089       |
|                       | 0370-2108      | 1   | KNOB:RND JADE GRAY FOR 0.125" DIA SHAFT                        | 28480    | 0370-2108       |
|                       | 1250-0914      | 1   | KNOB:BAR W/SKIRT, JADE GRAY                                    | 28480    | 131-150         |
|                       | 1750-0915      | 1   | BODY:RF CONNECTOR<br>FOR OPTION 001 ONLY                       | 02660    | 131-149         |
|                       | 7120-0004      | 1   | CONTACT:RF CONNECTOR<br>FOR OPTION 001 ONLY                    | 28480    | 7120-0004       |
|                       | 7124-1688      | 1   | NAMEPLATE:SERIAL                                               | 28480    | 7124-1688       |
|                       | 5040-0306      | 1   | LABEL:ID:MODEL/OPTION1                                         | 28480    | 5040-0306       |
|                       | 08555-20093    | 1   | INSULATOR<br>FOR OPTION 001 ONLY                               | 28480    | 08555-20093     |
|                       | 08555-20094    | 1   | CENTER CONDUCTOR<br>FOR OPTION 001 ONLY                        | 28480    | 08555-20094     |
|                       | 08761-2027     | 1   | BODY:BULBHEAD<br>FOR OPTION 001 ONLY                           | 28480    | 08761-2027      |
|                       | 86601-00001    | 1   | INSULATOR<br>FOR OPTION 001 ONLY                               | 28480    | 86601-00001     |
|                       | 86601-00002    | 1   | PANEL:FRONT                                                    | 28480    | 86601-00002     |
|                       | 86601-00006    | 1   | FOR STANDARD INSTRUMENT ONLY                                   | 28480    | 86601-00006     |
|                       | 86601-00013    | 1   | MOUNT:METER                                                    | 28480    | 86601-00013     |
|                       | 86601-00014    | 1   | BRACKET:MIXER                                                  | 28480    | 86601-00014     |
|                       | 86601-00020    | 1   | LATCH                                                          | 28480    | 86601-00020     |
|                       | 86601-00029    | 1   | BRACKET:ATTENUATOR                                             | 28480    | 86601-00029     |
|                       | 86601-00030    | 1   | FOR STANDARD INSTRUMENT ONLY                                   | 28480    | 86601-00030     |
|                       |                | 1   | PANEL:FRONT                                                    | 28480    | 86601-00030     |
|                       |                | 1   | FOR OPTION 001 ONLY                                            | 28480    | 86601-00030     |
|                       |                | 1   | COVER:OUTER                                                    | 28480    | 86601-00030     |
|                       |                | 1   | CIRCUIT BOARD                                                  | 28480    | 86601-00030     |

See Introduction to This Section for ordering information

Table 6-3. Replaceable Parts

| Reference Designation | Mfr Part Number | Qty | Description         | Mfr Code | Mfr Part Number |
|-----------------------|-----------------|-----|---------------------|----------|-----------------|
|                       | 86601-20013     | 2   | EXTRUSION:SHIELD    | 2848C    | 86601-20013     |
|                       | 86601-20014     | 1   | EXTRUSION:END PLATE | 2848C    | 86601-20014     |
|                       | 86601-20015     | 2   | EXTRUSION:DIVIDER   | 2848C    | 86601-20015     |
|                       | 86601-20016     | 1   | FRAME:FRONT PANEL   | 2848C    | 86601-20016     |
|                       | 86601-20018     | 1   | PANEL:REAR          | 2848C    | 86601-20018     |
|                       | 86601-20019     | 1   | STUD LATCH          | 2848C    | 86601-20019     |
|                       | 86601-20020     | 1   | WASHER:LATCH        | 2848C    | 86601-20020     |
|                       | 86601-20051     | 1   | WINDOW              | 2848C    | 86601-20051     |
|                       | 86601-40017     | 1   | SCREW:METER ADJUST  | 2848C    | 86601-40017     |

See Introduction to this section for ordering information

Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                          | Mfr Code | Mfr Part Number      |
|-----------------------|----------------|-----|--------------------------------------|----------|----------------------|
| A3                    | 86601-60019    | 1   | FEED-BACK AMPLIFIER ASSY             | 28480    | 86601-60019          |
| A3C1                  | 0180-0058      | 2   | C:FXD AL ELECT 50 UF +75-10% 25VDCM  | 56285    | 300506025CC2-DSM     |
| A3C2                  | 0180-0058      |     | C:FXD AL ELECT 50 UF +75-10% 25VDCM  | 56285    | 300506025CC2-DSM     |
| A3C3                  | 0160-2204      | 1   | C:FXD NICA 100PF 5% 5% 300VDCM       | 72136    | ADM15F101J3C         |
| A3C4                  | 0140-0198      | 2   | C:FXD NICA 200 PF 5% 300VDCM         | 72136    | ADM15F201J3C         |
| A3C5                  | 0160-2199      | 1   | C:FXD NICA 30 PF 5% 300VDCM          | 28480    | 0160-2199            |
| A3C6                  | 0140-2452      | 1   | C:FXD DISC CER 0.02 UF 20% 100VDCM   | 56285    | C0238101K203KS25-COM |
| A3C7                  | 0180-1733      | 1   | C:FXD ELECT 0.22 UF 10% 35VDCM       | 28480    | 0180-1733            |
| A3C8                  | 0180-0116      | 1   | C:FXD ELECT 6.8 UF 10% 35VDCM        | 56285    | 1500685X903582-DYS   |
| A3C9                  | 0160-0158      | 1   | C:FXD RV 0.0056 UF 10% 200VDCM       | 56285    | 152P56252-PTS        |
| A3C10                 | 0160-3063      | 5   | C:FXD NICA 390 PF 5% 300VDCM         | 00853    | ADM19F391J3S         |
| A3C11                 | 0160-3063      |     | C:FXD NICA 390 PF 5% 300VDCM         | 00853    | ADM19F391J3S         |
| A3C12                 | 0160-3063      |     | C:FXD NICA 390 PF 5% 300VDCM         | 00853    | ADM19F391J3S         |
| A3C13                 | 0160-3063      | 1   | C:FXD NICA 390 PF 5% 300VDCM         | 00853    | ADM19F391J3S         |
| A3C14                 | 0160-3063      |     | C:FXD NICA 390 PF 5% 300VDCM         | 00853    | ADM19F391J3S         |
| A3C15                 | 0160-3744      | 2   | C:FXD NICA 390 PF 5% 300VDCM         | 72982    | 2425-C0C-35U0-1022   |
| A3C16                 | 1902-0041      |     | DIODE: BREAKDOWN 5.11V 5% 5% 300VDCM | 04713    | S210939-58           |
| A3C17                 | 1902-0041      | 1   | DIODE: BREAKDOWN 5.11V 5% 5% 300VDCM | 04713    | S210939-58           |
| A3C18                 | 1902-0041      |     | DIODE: BREAKDOWN 5.11V 5% 5% 300VDCM | 04713    | S210939-58           |
| A3J1                  | 1250-0901      | 5   | CONNECTOR: RF BULKHEAD               | 15558    | 1104/0               |
| A3J2                  | 1250-0901      |     | CONNECTOR: RF BULKHEAD               | 15558    | 1104/0               |
| A3L1                  | 9140-1058      | 1   | COIL/CHOKE 1 OHM 5% 300VDCM          | 28480    | 9140-1058            |
| A3L2                  | 9140-0237      |     | COIL/CHOKE 200 OHM 5% 300VDCM        | 28480    | 9140-0237            |
| A3L3                  | 9140-0237      | 1   | COIL/CHOKE 200 OHM 5% 300VDCM        | 28480    | 9140-0237            |
| A3L4                  | 9140-0237      |     | COIL/CHOKE 200 OHM 5% 300VDCM        | 28480    | 9140-0237            |
| A3L5                  | 9100-1667      | 1   | COIL/CHOKE 3900 OHM 5% 300VDCM       | 82142    | 24-1313-20J          |
| A3M1                  | 86601-00025    |     | GASKET                               | 28480    | 86601-00025          |
| A3M2                  | 86601-60004    | 1   | BOARD ASSY: FEED-BACK AMPLIFIER      | 28480    | 86601-60004          |
| A3Q1                  | 1855-0020      |     | TSTR:SI FET N-CANAL                  | 28480    | 1855-0020            |
| A3Q2                  | 1855-0020      | 3   | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0020            |
| A3Q3                  | 1855-0020      |     | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0020            |
| A3Q4                  | 1855-0071      | 5   | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0071            |
| A3Q5                  | 1855-0071      |     | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0071            |
| A3Q6                  | 1855-0020      | 1   | TSTR:SI FET N-CANAL                  | 28480    | 1855-0020            |
| A3Q7                  | 1855-0020      |     | TSTR:SI FET N-CANAL                  | 28480    | 1855-0020            |
| A3Q8                  | 1855-0071      | 1   | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0071            |
| A3Q9                  | 1855-0020      |     | TSTR:SI PNPISELECTED FROM 2N3702     | 28480    | 1855-0020            |
| A3R1                  | 0690-3150      | 1   | R:FXD MET FLN 4.37K OHM 1% 1/8W      | 28480    | 0690-3150            |
| A3R2                  | 0690-0083      |     | R:FXD MET FLN 1.96K OHM 1% 1/8W      | 28480    | 0690-0083            |
| A3R3                  | 0690-3157      | 2   | R:FXD MET FLN 19.0K OHM 1% 1/8W      | 28480    | 0690-3157            |
| A3R4                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W      | 28480    | 0757-0442            |
| A3R5                  | 0757-0442      | 3   | R:FXD MET FLN 10.0K OHM 1% 1/8W      | 28480    | 0757-0442            |
| A3R6                  | 0757-0442      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W      | 28480    | 0757-0442            |
| A3R7                  | 0690-3153      | 1   | R:FXD MET FLN 3.03K OHM 1% 1/8W      | 28480    | 0690-3153            |
| A3R8                  | 0690-3159      |     | R:FXD MET FLN 26.1K OHM 1% 1/8W      | 28480    | 0690-3159            |
| A3R9                  | 0690-0083      | 4   | R:FXD MET FLN 1.96K OHM 1% 1/8W      | 28480    | 0690-0083            |
| A3R10                 | 0757-0208      |     | R:FXD MET FLN 1K OHM 1% 1/8W         | 28480    | 0757-0208            |
| A3R11                 | 0757-0208      | 2   | R:FXD MET FLN 1K OHM 1% 1/8W         | 28480    | 0757-0208            |
| A3R12                 | 0757-0430      |     | R:FXD MET FLN 5.11K OHM 1% 1/8W      | 28480    | 0757-0430            |
| A3R13                 | 0690-3153      | 1   | R:FXD MET FLN 3.03K OHM 1% 1/8W      | 28480    | 0690-3153            |
| A3R14                 | 0757-0430      |     | R:FXD MET FLN 5.11K OHM 1% 1/8W      | 28480    | 0757-0430            |
| A3R15                 | 0757-0401      | 2   | R:FXD MET FLN 100 OHM 1% 1/8W        | 28480    | 0757-0401            |
| A3R16                 | 0690-0083      |     | R:FXD MET FLN 2.01K OHM 1% 1/8W      | 28480    | 0690-0083            |
| A3R17                 | 0690-3151      | 5   | R:FXD MET FLN 2.07K OHM 1% 1/8W      | 28480    | 0690-3151            |
| A3R18                 | 0690-3157      |     | R:FXD MET FLN 19.0K OHM 1% 1/8W      | 28480    | 0690-3157            |
| A3R19                 | 0757-0401      | 1   | R:FXD MET FLN 100 OHM 1% 1/8W        | 28480    | 0757-0401            |
| A3R20                 | 0757-0447      |     | R:FXD MET FLN 10.0K OHM 1% 1/8W      | 28480    | 0757-0447            |
| A3R21                 | 0690-3153      | 1   | R:FXD MET FLN 3.03K OHM 1% 1/8W      | 28480    | 0690-3153            |
| A3R22                 | 1020-0470      |     | IC:OP. AMP. HI-SPEED                 | 07268    | 09F7719900           |
| A5                    | 86601-60016    | 1   | MOSFET ASSY                          | 28480    | 86601-60016          |
| A5E1                  | 0160-2036      | 1   | C:FXD CAR 5000 PF +50-20% 200VDCM    | 28480    | 0160-2036            |
| A5E2                  | 1250-0901      |     | CONNECTOR: RF BULKHEAD               | 15558    | 1104/0               |
| A5E3                  | 1250-0901      | 1   | CONNECTOR: RF BULKHEAD               | 15558    | 1104/0               |
| A5E4                  | 1250-0901      |     | CONNECTOR: RF BULKHEAD               | 15558    | 1104/0               |
| A5M1                  | 86601-60004    | 1   | BOARD ASSY: MOSFET                   | 28480    | 86601-60004          |
| A5R1                  | 86601-60001    |     | BOARD ASSY: MOSFET                   | 28480    | 86601-60001          |
| A5R2                  | 0160-2036      | 1   | C:FXD CAR 5000 PF +50-20% 200VDCM    | 28480    | 0160-2036            |
| A5R3                  | 0160-2036      |     | C:FXD CAR 5000 PF +50-20% 200VDCM    | 28480    | 0160-2036            |

See introduction to this section for ordering information



Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                       | Mfr Code | Mfr Part Number      |
|-----------------------|----------------|-----|-----------------------------------|----------|----------------------|
| ASA1C3                | 0160-2236      | 2   | C:FXD CER 1.0 PF 500VDCM          | 72982    | 301-000-CCND-109C    |
| ASA1C4                | 0160-3456      | 5   | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C5                | 0160-2327      |     | C:FXD CER 1000 PF 20% 100VDCM     | 96733    | 01C48H102M           |
| ASA1C6                | 0160-3456      |     | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C7                | 0160-2236      |     | C:FXD CER 1.0 PF 500VDCM          | 72982    | 301-000-CCND-109C    |
| ASA1C8                | 0160-3456      |     | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C9                | 0160-2327      | 1   | C:FXD CER 1000 PF 20% 100VDCM     | 96733    | 01C48H102M           |
| ASA1C10               | 0160-2327      |     | C:FXD CER 1000 PF 20% 100VDCM     | 96733    | 01C48H102M           |
| ASA1C11               | 0160-2236      |     | C:FXD CER 1.0 PF 500VDCM          | 72982    | 301-000-CCND-109C    |
| ASA1C12               | 0160-3456      |     | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C13               | 0160-2327      |     | C:FXD CER 1000 PF 20% 100VDCM     | 96733    | 01C48H102M           |
| ASA1C14               | 0160-3456      | 1   | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C15               | 0160-2327      |     | C:FXD CER 1.0 PF 500VDCM          | 72982    | 301-000-CCND-109C    |
| ASA1C16               | 0160-3456      |     | C:FXD CER 1000 PF 10% 250VDCM     | 56285    | C067F251F102K522-CDM |
| ASA1C17               | 0160-2327      |     | C:FXD CER 1000 PF 20% 100VDCM     | 96733    | 01C48H102M           |
| ASA1E1                | 0960-2070      | 1   | MIXER:500 MHZ                     | 28480    | 0960-2070            |
| ASA1L1                | 9100-2247      | 1   | COIL:FXD RF 0.10 UH 10%           | 28480    | 9100-2247            |
| ASA1L2                | 9140-0150      | 1   | COIL:FXD RF 1 UH 10%              | 99800    | 1025-20              |
| ASA1Q1                | 1854-0345      | 4   | TSTR:SI NPN                       | 80131    | 2N5175               |
| ASA1Q2                | 1854-0345      |     | TSTR:SI NPN                       | 80131    | 2N5175               |
| ASA1Q3                | 1854-0345      | 4   | TSTR:SI NPN                       | 80131    | 2N5175               |
| ASA1Q4                | 1854-0345      |     | TSTR:SI NPN                       | 80131    | 2N5175               |
| ASA1R1                | 0757-0439      | 4   | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0439            |
| ASA1R2                | 0690-3151      |     | R:FXD MET FLM 2.87K OHM 1% 1/8W   | 28480    | 0690-3151            |
| ASA1R3                | 0690-7195      | 1   | R:FXD MET FLM 19.6 OHM 2% 1/8W    | 28480    | 0690-7195            |
| ASA1R4                | 0690-3440      | 4   | R:FXD MET FLM 196 OHM 1% 1/8W     | 28480    | 0690-3440            |
| ASA1R5                | 0757-0439      |     | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0439            |
| ASA1R6                | 0690-3151      | 4   | R:FXD MET FLM 2.87K OHM 1% 1/8W   | 28480    | 0690-3151            |
| ASA1R7                | 0690-3440      |     | R:FXD MET FLM 196 OHM 1% 1/8W     | 28480    | 0690-3440            |
| ASA1R8                | 0757-0439      | 4   | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0439            |
| ASA1R9                | 0690-3151      |     | R:FXD MET FLM 2.87K OHM 1% 1/8W   | 28480    | 0690-3151            |
| ASA1R10               | 0690-3440      | 4   | R:FXD MET FLM 196 OHM 1% 1/8W     | 28480    | 0690-3440            |
| ASA1R11               | 0757-0439      |     | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0439            |
| ASA1R12               | 0690-3151      | 4   | R:FXD MET FLM 2.87K OHM 1% 1/8W   | 28480    | 0690-3151            |
| ASA1R13               | 0690-3440      |     | R:FXD MET FLM 196 OHM 1% 1/8W     | 28480    | 0690-3440            |
| ASA1R14               | 0690-3438      | 2   | R:FXD MET FLM 147 OHM 1% 1/8W     | 28480    | 0690-3438            |
| ASA1R15               | 0690-3435      |     | R:FXD MET FLM 38.3 OHM 1% 1/8W    | 28480    | 0690-3435            |
| ASA1R16               | 0690-3438      | 1   | R:FXD MET FLM 147 OHM 1% 1/8W     | 28480    | 0690-3438            |
| ASA1                  | 86601-60020    | 1   | FILTER:LOW PASS 600 MHZ           | 28480    | 86601-60020          |
| A9                    | 86601-60005    | 1   | BOARD ASSY:REFERENCE              | 28480    | 86601-60005          |
| A9C1                  | 0160-2226      | 1   | C:FXD MICA 2200 PF 5% 300VDCM     | 28480    | 0160-2226            |
| A9C2                  | 1902-0041      | 1   | DIODE:BREAKDOWN 5.11V 5%          | 04713    | SZ10939-98           |
| A9C3                  | 1901-0025      |     | DIODE:SILICON 100MA/1V            | 07263    | FD 2387              |
| A9K1                  | 0490-0916      | 4   | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9K2                  | 0490-0916      | 4   | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9K3                  | 0490-0916      |     | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9K4                  | 0490-0916      | 4   | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9K5                  | 0490-0916      |     | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9K6                  | 0490-0916      | 4   | RELAY:REED 1 FORM A 0.5 AMP       | 15636    | RA30231051           |
| A9Q1                  | 1854-0071      |     | TSTR:SI NPN(SELECTED FROM 2N3704) | 28480    | 1854-0071            |
| A9Q2                  | 1853-0015      | 5   | TSTR:SI PNP                       | 80131    | 2N3640               |
| A9Q3                  | 1853-0015      |     | TSTR:SI PNP                       | 80131    | 2N3640               |
| A9Q4                  | 1853-0322      | 4   | TSTR:SI PNP                       | 80131    | 2N2946A              |
| A9Q5                  | 1853-0015      |     | TSTR:SI PNP                       | 80131    | 2N3640               |
| A9Q6                  | 1853-0322      | 4   | TSTR:SI PNP                       | 80131    | 2N2946A              |
| A9Q7                  | 1853-0015      |     | TSTR:SI PNP                       | 80131    | 2N3640               |
| A9Q8                  | 1853-0322      | 4   | TSTR:SI PNP                       | 80131    | 2N2946A              |
| A9Q9                  | 1853-0015      |     | TSTR:SI PNP                       | 80131    | 2N3640               |
| A9Q10                 | 1854-0071      | 4   | TSTR:SI NPN(SELECTED FROM 2N3734) | 28480    | 1854-0071            |
| A9Q11                 | 1853-0322      |     | TSTR:SI PNP                       | 80131    | 2N2946A              |
| A9R1                  | 2100-2633      | 2   | R:VAR CERMET 1K OHM 10% LIN 1/2W  | 28480    | 2100-2633            |
| A9R2                  | 0757-0442      |     | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0442            |
| A9R3                  | 2100-2633      | 1   | R:VAR CERMET 1K OHM 10% LIN 1/2W  | 28480    | 2100-2633            |
| A9R4                  | 0757-0442      |     | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0442            |
| A9R5                  | 0757-0442      | 2   | R:FXD MET FLM 6.81K OHM 1% 1/8W   | 28480    | 0757-0442            |
| A9R6                  | 0690-0003      |     | R:FXD MET FLM 1.96K OHM 1% 1/8W   | 28480    | 0690-0003            |
| A9R7                  | 0690-0003      | 2   | R:FXD MET FLM 1.96K OHM 1% 1/8W   | 28480    | 0690-0003            |
| A9R8                  | 0690-0003      |     | R:FXD MET FLM 1.96K OHM 1% 1/8W   | 28480    | 0690-0003            |
| A9R9                  | 0690-0003      | 2   | R:FXD MET FLM 1.96K OHM 1% 1/8W   | 28480    | 0690-0003            |
| A9R10                 | 0690-0003      |     | R:FXD MET FLM 1.96K OHM 1% 1/8W   | 28480    | 0690-0003            |

See introduction to this section for ordering information.

Table 6-3. Replaceable Parts

| Reference Designation | HP Part Number | Qty | Description                          | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--------------------------------------|----------|-----------------|
| A9R10                 | C690-4482      | 1   | RIFXD FLP 17.4K OHM 1% 1/8W          | 2848C    | 0690-4482       |
| A9R11                 | C690-4426      |     | RIFXD FLP 115 OHM 1% 1/8W            | 2848C    | 0690-4426       |
| A9R12                 | C690-CJ03      |     | RIFXD MET FLM 1.96K OHM 1% 1/8W      | 2848C    | 0690-CJ03       |
| A9R13                 | C690-3486      |     | RIFXD FLM 232 OHM 1% 1/8W            | 2848C    | 0690-3486       |
| A9R14                 | C757-C280      | 2   | RIFXD MET FLM 1K OHM 1% 1/8W         | 2848C    | C757-C280       |
| A9R15                 | C690-CJ03      |     | RIFXD MET FLM 1.96K OHM 1% 1/8W      | 2848C    | C690-CJ03       |
| A9R16                 | C690-3498      |     | RIFXD MET FLM 8.66K OHM 1% 1/8W      | 2848C    | C690-3498       |
| A9R17                 | C690-3486      |     | RIFXD FLP 232 OHM 1% 1/8W            | 2848C    | C690-3486       |
| A9R18                 | C690-CJ03      | 2   | RIFXD MET FLP 1.96K OHM 1% 1/8W      | 2848C    | C690-CJ03       |
| A9R19                 | C690-3510      |     | RIFXD MET FLP 453 OHM 1% 1/8W        | 2848C    | C690-3510       |
| A9R20                 | C690-CJ03      |     | RIFXD MET FLM 1.96K OHM 1% 1/8W      | 2848C    | C690-CJ03       |
| A9R21                 | C690-3154      |     | RIFXD MET FLM 4.22K OHM 1% 1/8W      | 2848C    | C690-3154       |
| A9R22                 | C690-3510      | 1   | RIFXD MET FLM 453 OHM 1% 1/8W        | 2848C    | C690-3510       |
| A9R23                 | C690-CJ03      |     | RIFXD MET FLM 1.96K OHM 1% 1/8W      | 2848C    | C690-CJ03       |
| A9R24                 | C690-3495      |     | RIFXD MET FLM 866 OHM 1% 1/8W        | 2848C    | C690-3495       |
| A9R25                 | C690-CJ03      |     | RIFXD MET FLM 1.96K OHM 1% 1/8W      | 2848C    | C690-CJ03       |
| A9R26                 | C690-4436      | 1   | RIFXD FLM 1.91K OHM 1% 1/8W          | 2848C    | C690-4436       |
| A9R27                 | C690-3495      |     | RIFXD MET FLP 866 OHM 1% 1/8W        | 2848C    | C690-3495       |
| A9R28                 | C757-C280      |     | RIFXD MET FLM 1K OHM 1% 1/8W         | 2848C    | C757-C280       |
| A9R29                 | C757-C442      |     | RIFXD MET FLM 10.0K OHM 1% 1/8W      | 2848C    | C757-C442       |
| A9K30                 | 210C-2522      | 1   | RIVAN CERMET 1CK OHM 10% LIN 1/2W    | 2848C    | 210C-2522       |
| A9R31                 | C690-3453      | 1   | RIFXD MET FLP 196K OHM 1% 1/8W       | 2848C    | C690-3453       |
| A9K32                 | C690-3446      | 1   | RIFXD MET FLM 383 OHM 1% 1/8W        | 2848C    | C690-3446       |
| A9U1                  | 1820-C201      | 1   | INTEGRATED CIRCUIT: OPERATIONAL AMPL | 04713    | MC1435G         |

Table 6-4. Manufacturer's Code List

| MFR NO. | MANUFACTURER NAME                                    | ADDRESS                    | ZIP CODE |
|---------|------------------------------------------------------|----------------------------|----------|
| 01121   | ALLEN BRADLEY CO.                                    | MILWAUKEE, WIS.            | 53204    |
| 01295   | TEXAS INSTRUMENTS INC. SEMICONDUCTOR COMPONENTS DIV. | DALLAS, TEX.               | 75231    |
| C2114   | FERRUCUBE CORP.                                      | SAUGERTIES, N.Y.           | 12477    |
| C2670   | ARMEMOL CORP.                                        | BROADVIEW, ILL.            | 60153    |
| C2879   | MUDSIM TOOL & DIE CO.                                | NEWARK, N.J.               | 07105    |
| C4713   | MOTOROLA SEMICONDUCTOR PROD. INC.                    | PHOENIX, ARIZ.             | 85008    |
| C7263   | FAIRCHILD CAMERA & INST. CORP. SEMICONDUCTOR DIV.    | MOUNTAIN VIEW, CALIF.      | 94040    |
| 19550   | NICON ELECTRONICS INC.                               | GARDEN CITY LONG IS., N.Y. | 11530    |
| 19636   | ELEC-TROL INC.                                       | NORTHBRIDGE, CALIF.        | 91325    |
| 18324   | SIGNETICS CORP.                                      | SUNNYVALE, CALIF.          | 94086    |
| 2848C   | HEWLETT-PACKARD CO. CORPORATE HQ                     | YOUR NEAREST HP OFFICE     |          |
| 56289   | SPRAGUE ELECTRIC CO.                                 | N. ADAMS, MASS.            | 01247    |
| 71785   | CINCH MFG. CO. DIV TRW INC.                          | ELK GROVE VILLAGE, ILL.    | 60120    |
| 72136   | ELECTRO MOTIVE MFG. CO. INC.                         | WILLIAMSBURG, CONN.        | 06090    |
| 72928   | GUDEXAN DIV. GULTON IND. INC.                        | CHICAGO, ILL.              | 60610    |
| 72982   | ERIE TECHNOLOGICAL PROD. INC.                        | ERIE, PA.                  | 16512    |
| 74088   | ARMEMOL CORP. RF DIV.                                | DANBURY, CONN.             | 06810    |
| 76930   | CINCH MONADNOCK HILLS DIV. TRW INC.                  | CITY OF INDUSTRY, CALIF.   | 91746    |
| 76954   | OAK MFG. CO. DIV. OAK ELECTRONICS CORP.              | CRYSTAL LAKE, ILL.         | 60014    |
| 80021   | HEPCO DIV. BESSON'S CLUCK CO.                        | MORRISTOWN, N.J.           | 07960    |
| 80131   | ELECTRONIC INDUSTRIES ASSOCIATION                    | WASHINGTON D.C.            | 20540    |
| 81312   | MINICORP ELECTRONICS DIV. LITTON IND. INC.           | NARVILLE, CONN.            | 06179    |
| 82142   | AIRCO SPEER ELECT. CORP.                             | DY ROIS, PA.               | 19021    |
| 90733   | SAN FERNANDO ELECT. MFG. CO.                         | SAN FERNANDO, CALIF.       | 91341    |
| 98291   | SEALTEAD CORP.                                       | MARLBOROUGH, N.Y.          | 10546    |
| 99830   | DELEVAN ELECTRONICS CORP.                            | C. AMERICA, N.Y.           | 10982    |

See introduction to this section for ordering information

TABLE 6-5  
PART NUMBER-NATIONAL STOCK NUMBER  
CROSS REFERENCE INDEX

| PART<br>NUMBER | FSCM  | NATIONAL<br>STOCK<br>NUMBER | PART<br>NUMBER | FSCM  | NATIONAL<br>STOCK<br>NUMBER |
|----------------|-------|-----------------------------|----------------|-------|-----------------------------|
| 33042102M      | 96733 | 5910-00-244-7171            | 0180-0116      | 28480 | 5910-00-809-4701            |
| CV8059K7R102M  | 80031 | 5910-01-022-6482            | 0180-0197      | 28480 | 5910-00-850-5355            |
| PC14396        | 04713 | 5962-00-252-0225            | 0180-0228      | 28480 | 5910-00-719-9907            |
| PC4001P        | 04713 | 5962-00-455-1814            | 0180-1735      | 28480 | 5910-00-430-6016            |
| RA30231051     | 15636 | 5945-00-233-1542            | 0683-0565      | 28480 | 5905-00-931-1066            |
| RDPQ5E430J3C   | 72136 | 5910-00-195-4107            | 0698-0082      | 28480 | 5905-00-974-6075            |
| RDPQ5F101J3C   | 72136 | 5910-00-463-5949            | 0698-0083      | 28480 | 5905-00-407-0052            |
| R2846-1        | 15636 | 5945-00-448-6876            | 0698-0085      | 28480 | 5905-00-998-1814            |
| SN7400M        | 01295 | 5962-00-865-4625            | 0698-3132      | 28480 | 5905-00-828-0388            |
| SN7474N        | 01295 | 5962-00-106-4287            | 0698-3150      | 28480 | 5905-00-481-1357            |
| SZ10939-134    | 04713 | 5961-00-912-3099            | 0698-3151      | 28480 | 5905-00-246-8634            |
| SZ10939-38     | 04713 | 5961-00-350-2205            | 0698-3153      | 28480 | 5905-00-974-6081            |
| 0160-0198      | 28480 | 5910-00-914-2605            | 0698-3154      | 28480 | 5905-00-891-4215            |
| 0160-0157      | 28480 | 5910-00-961-9591            | 0693-3157      | 28480 | 5905-00-433-6904            |
| 0160-0158      | 28480 | 5910-00-497-7598            | 0698-3158      | 28480 | 5905-00-858-8927            |
| 0160-2055      | 28480 | 5910-00-211-1611            | 0698-3159      | 28480 | 5905-00-407-0053            |
| 0160-2199      | 28480 | 5910-00-244-7164            | 0698-3161      | 28480 | 5905-00-974-6082            |
| 0160-2200      | 28480 | 5910-00-195-4107            | 0698-3429      | 28480 | 5905-00-407-0075            |
| 0160-2204      | 28480 | 5910-00-463-5949            | 0698-3430      | 28480 | 5905-00-420-7136            |
| 0160-2208      | 28480 | 5910-00-430-5685            | 0698-3438      | 28480 | 5905-00-974-6080            |
| 0160-2226      | 28480 | 5910-00-885-6540            | 0698-3440      | 28480 | 5905-00-828-0377            |
| 0160-2236      | 28480 | 5910-00-444-6724            | 0698-3443      | 28480 | 5905-00-194-0341            |
| 0160-2265      | 28480 | 5910-00-444-6725            | 0698-3446      | 28480 | 5905-00-974-6083            |
| 0160-2306      | 28480 | 5910-00-883-6281            | 0698-3453      | 28480 | 5905-00-078-1548            |
| 0160-2327      | 28480 | 5910-00-244-7171            | 0698-3498      | 28480 | 5905-00-478-2244            |
| 0160-2437      | 28480 | 5910-00-431-3956            | 0698-3510      | 28480 | 5905-00-407-0107            |
| 0160-3036      | 28480 | 5940-00-138-1326            | 0698-7195      | 28480 | 5905-00-161-8921            |
| 0160-3447      | 28480 | 5910-00-913-0802            | 0698-7229      | 28480 | 5905-01-009-7560            |
| 0160-3456      | 28480 | 5910-01-014-2874            | 0757-0159      | 28480 | 5905-00-830-6677            |
| 0160-3876      | 28480 | 5910-00-348-2617            | 0757-0180      | 28480 | 5905-00-972-4907            |
| 0170-0040      | 28480 | 5910-00-829-0245            | 0757-0274      | 28480 | 5905-00-858-9105            |
| 0180-0058      | 28480 | 5910-00-027-7069            | 0757-0280      | 28480 | 5905-00-853-8190            |



TABLE 6-5  
PART NUMBER-NATIONAL STOCK NUMBER  
CROSS REFERENCE INDEX

| PART<br>NUMBER | FSCM  | NATIONAL<br>STOCK<br>NUMBER | PART<br>NUMBER | FSCM  | NATIONAL<br>STOCK<br>NUMBER |
|----------------|-------|-----------------------------|----------------|-------|-----------------------------|
| 0757-0290      | 28480 | 5905-00-858-8826            | 131-149        | 02060 | 5999-00-479-8176            |
| 0757-0294      | 28480 | 5905-00-974-5709            | 1820-0054      | 28480 | 5962-00-138-5248            |
| 0757-0316      | 28480 | 5905-00-981-7475            | 1820-0077      | 28480 | 5962-00-138-5250            |
| 0757-0317      | 28480 | 5905-00-244-7189            | 1820-0201      | 28480 | 5962-00-252-0225            |
| 0757-0346      | 28480 | 5905-00-998-1906            | 1853-0015      | 28480 | 5961-00-927-0845            |
| 0757-0394      | 28480 | 5905-00-412-4036            | 1853-0020      | 28480 | 5961-00-904-2540            |
| 0757-0399      | 28480 | 5905-00-929-7774            | 1853-0213      | 28480 | 5961-00-937-1409            |
| 0757-0401      | 28480 | 5905-00-981-7529            | 1854-0071      | 28480 | 5961-00-137-4608            |
| 0757-0402      | 28480 | 5905-00-405-8091            | 1854-0247      | 28480 | 5961-00-464-4049            |
| 0757-0405      | 28480 | 5905-00-493-0738            | 1854-0345      | 28480 | 5961-00-401-0507            |
| 0757-0417      | 28480 | 5905-00-858-9417            | 1854-0361      | 28480 | 5961-00-400-5973            |
| 0757-0418      | 28480 | 5905-00-412-4037            | 1854-0404      | 28480 | 5961-00-408-9807            |
| 0757-0421      | 28480 | 5905-00-891-4219            | 1855-0020      | 28480 | 5961-00-105-8867            |
| 0757-0438      | 28480 | 5905-00-929-2529            | 1901-0025      | 28480 | 5961-00-978-7468            |
| 0757-0439      | 28480 | 5905-00-990-0303            | 1901-0535      | 28480 | 5961-00-451-8685            |
| 0757-0442      | 28480 | 5905-00-998-1792            | 1902-0041      | 28480 | 5961-00-858-7372            |
| 0757-0447      | 28480 | 5905-00-981-7530            | 1902-0048      | 28480 | 5961-00-912-3099            |
| 0757-0458      | 28480 | 5905-00-494-4628            | 1902-3036      | 28480 | 5961-00-350-2205            |
| 0757-0461      | 28480 | 5905-00-089-7577            | 1910-0016      | 28480 | 5961-00-954-9182            |
| 0757-0465      | 28480 | 5905-00-904-4412            | 2N3640         | 80131 | 5961-00-927-0845            |
| 0757-1000      | 28480 | 5905-00-057-8480            | 2N4236         | 80131 | 5961-00-937-1409            |
| 0757-1094      | 28480 | 5905-00-917-0580            | 2N4239         | 80131 | 5961-00-400-5973            |
| 08555-20093    | 28480 | 5999-00-08-8444             | 2N5179         | 80131 | 5961-00-401-0507            |
| 08660-80005    | 28480 | 5950-00-443-9518            | 2100-1754      | 28480 | 5905-00-407-0077            |
| 1025-20        | 79800 | 5950-00-059-5920            | 2100-1755      | 28480 | 5905-00-407-0078            |
| 1200-0063      | 28480 | 5990-00-937-4420            | 2100-1759      | 28480 | 5905-00-221-7472            |
| 1205-0021      | 28480 | 5990-00-789-3794            | 2100-2413      | 28480 | 5905-00-138-5086            |
| 1250-0901      | 28480 | 5935-00-477-1147            | 2100-2922      | 28480 | 5905-00-476-5797            |
| 1250-0914      | 28480 | 5935-00-434-3040            | 2100-2612      | 28480 | 5905-00-476-5718            |
| 1251-2034      | 28480 | 5935-00-267-2973            | 2100-2633      | 28480 | 5905-00-476-5796            |
| 1251-2262      | 28480 | 5935-00-026-0952            | 2100-3113      | 28480 | 5905-00-470-3420            |
| 1251-3087      | 28480 | 5999-01-079-9981            | 2100-30-400    | 71785 | 5905-00-405-7709            |

TABLE 6-5  
PART NUMBER-NATIONAL STOCK NUMBER  
CROSS REFERENCE INDEX

| PART<br>NUMBER | FSCM  | NATIONAL<br>STOCK<br>NUMBER | PART<br>NUMBER | FSCM | NATIONAL<br>STOCK<br>NUMBER |
|----------------|-------|-----------------------------|----------------|------|-----------------------------|
| 252-10-30-300  | 71785 | 5935-00-267-2973            |                |      |                             |
| 252-12-30-300  | 71785 | 5935-00-448-2236            |                |      |                             |
| 252-15-30-008  | 71785 | 5935-00-138-5209            |                |      |                             |
| 5020-0176      | 28480 | 5970-00-531-7134            |                |      |                             |
| 5040-0306      | 28480 | 5970-00-470-7622            |                |      |                             |
| 9100-1627      | 28480 | 5950-00-475-4996            |                |      |                             |
| 9100-2247      | 28480 | 5950-00-405-3735            |                |      |                             |
| 9140-0158      | 28480 | 5950-00-059-5920            |                |      |                             |
| 9140-0237      | 28480 | 5950-00-431-3216            |                |      |                             |
| 9170-0029      | 28480 | 5950-00-406-6419            |                |      |                             |

## SECTION VII MANUAL CHANGES

### 7-1. INTRODUCTION

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

7-3. To adapt this manual to your instrument, refer to Table 7-1 and make all of the manual

changes listed opposite your instrument serial number. Perform these changes in the sequence listed.

7-4. Refer to paragraph 7-8 for manual changes pertaining to later aerial numbered instruments.

Table 7-1. Manual changes by Serial Number

| Serial Prefix or Number | Make Manual Changes | Serial Prefix or Number | Make Manual Changes |
|-------------------------|---------------------|-------------------------|---------------------|
| 1317A                   | A                   | 1214A                   | A - F               |
| 1307A                   | A, B                | 1201A                   | A - G               |
| 1250A                   | A - C               | 1150A                   | A - H               |
| 1249A                   | A - D               | 1110A                   | A - I               |
| 1223A                   | A - E               |                         |                     |

### 7-5. MANUAL CHANGE INSTRUCTIONS

7-6. Unless otherwise noted, make manual changes in the alphabetical order in which they appear until the serial prefix of your instrument is reached.

7-7. Table 7-3 provides a cross reference of assemblies to changes.

#### CHANGE A

Page 8-19, Figure 8-26 (A10 assembly)

Change part number to ~~86601-60008~~ and exchange part number to 86601-60104. Refer to Figure 7-2 for a partial schematic. Component part numbers and reference designators do not change.

#### CHANGE B

Page 8-17, Figure 8-24 and Table 6-3 (A9 assembly)

Delete A9R37. Replace with printed circuit trace.

#### CHANGE C

Table 6-3

Change A3J1 and A3J2 to: 1250-0901 CONNECTOR RF BULKHEAD 15558 1104 D



## CHANGE C (Cont'd)

## Table 6-3 (Cont'd)

**Change** A5J1 and A5J2 to: 1250-0901 CONNECTOR: RF BULKHEAD 15558 1104/D

**Delete:** 86601-00061, BRACKET: MIXER 28480 86601-00051.

86601-20080, GUIDE: PLUG-IN 28480 86601-20080.

86601-00052, COVER: HALF 28480 86601-00052.

**Add:** 86601-00096, BRACKET: MIXER 28480 86601-00006

86601-00029, COVER, OUTER 28480 86601-00029.

## CHANGE D

## Table 6-3

**Change** A1M1 part number to 1120-1561 (Option 001 1120-1563)

Page 8-17, Figure 8-24 and Table 6-3 (A3 assembly)

**Change** A3R4 to 0757-0442 R:FXD MET F:M 10.0 K OHM 1% 1/8 W.

Page 8-17, Figure 8-24 and Table 6-3 (A9 assembly)

**Change** A9R32 to 2100-2522 R:VARCERMET 10K OHM 10% LIN 1/2W.

## CHANGE E

Page 8-13, Figure 8-17 (A5 assembly)

Move inductive bead A5A1Z1 from the Base of A5A1Q1 to the Base of A5A1Q2.

## CHANGE F

Page 8-13, Figure 8-17, Table 6-1 and Table 6-3 (A5 assembly)

Change part number to 86601-60064 and exchange part number to 36601-60114.

Delete: A5J4, A5C3, A5A1C10, ASA1R10, A5A1K1.

Relabel the input to A5J1 CNTRL, change the wire color code to 80 and make the input symbol 4A.

Connect the lead from A5J1 to A1A5R9.

## NOTE

**If your instrument has serial prefix 110A or 1150A do not make these changes in your manual.**

## CHANGE G

## Table 6-3

**Change** A1M1 part number to 1120-1545 (Option 001 1120-1553).

**Change** 86601-00034 to 86601-00001.

86601-00036 to 86601-00002.

86601-00035 to 86601-00028.

86601-20069 to 86601-20016.

86601-20070 to 86601-20051.

86601-40018 to 86601-40017.

## CHANGE H

Page 8-13, Figure 8-17 and Table 6-1 (A5 assembly)

**Change** part number to 86601-60018 and exchange part number to 86601-60105.

**Refer to Figure 7-3 for schematic, Figure 7-4 for component locations and Table 7-2 for replaceable parts.**

## CHANGE H (Cont'd)

Page 8-17, Figure 8-24 and Table 6-1 (A9 assembly)

Change part number to 86601-60005 and exchange part number to 86601-60102.  
Refer to Figure 7-5 for schematic, Figure 7-6 for component locations and Table 7-2 for replaceable Parts.

Page 8-17, Figure 8-24 and Table 6-1 (A3 assembly)

Change part number to 86601-60019 and exchange part number to 86601-60108.  
Refer to Figure 7-7 for schematic, Figure 7-8 for component locations and Table 702 for replaceable parts.

Page 8-13, Figure 8-17 and Table 6-1

Delete the A20 assembly 86601-60066.

## CHANGE I

Page 8-13, Figure 8-17 and Table 6-3 (A4 assembly)

Change A4A1 and A4A2 components as follows:

C1 and C4 to 24 pF 0160-2266 R2 and R6 to 3830 ohms 0698-3153

C2 to .001 uF 0160-3456 R4 and R7 to 215 ohms 0698-3441

C5 and C7 to 1000 pF 0160-2327 Q1 and Q2 to 1854-0431

Delete the inductive bead, Z1, part number 9170-0029 from the base lead of A4A2Q2.

Page 5-2, Paragraph 5-14

Substitute the following procedure.

## RF OUTPUT METER CALIBRATION

REFERENCE: Service Sheets 3 and 4.

DESCRIPTION: The rf output meter reading is adjusted at +3 and -7 dBm to ensure tracking across the range of the VERNIER control.

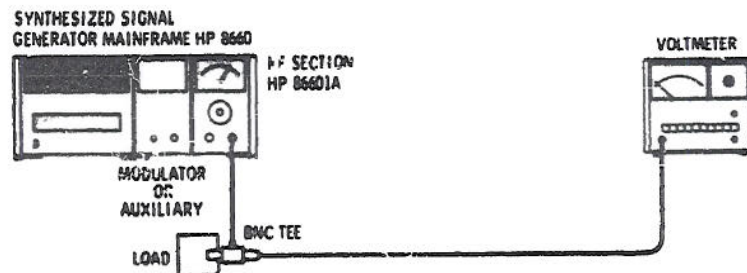


Figure 7-1. RF Output meter Calibration Setup

## RECOMMENDED TEST EQUIPMENT:

|                                        |                 |
|----------------------------------------|-----------------|
| Broadband Sampling Voltmeter . . . . . | HP 3406A        |
| BNC Tee Connector . . . . .            | UG274B/U        |
| 50 Ohm Load . . . . .                  | HP 1250-0, 1"   |
| Extender Cable . . . . .               | HP 11672-6, 10' |

## CHANGE I (Cont'd)

**RF OUTPUT METER CALIBRATION (cont'd)****PROCEDURE:**

1. **Clean the Model 86601A meter face with** anti-static solution.  
(Recommended: "STATNUL" manufactured by Weston Instruments Inc., Newark, NJ.)
2. **Connect the** BNC Tee connector to the 86601A OUTPUT, the 50 ohm load and the Broadband Sampling Voltmeter as shown in Figure 5-1.
3. Set the OUTPUT RANGE switch to +10 dBm and the VERNIER full clockwise.
4. Set the mainframe center frequency to 50 MHz.
5. **Set the REF ADJ control (A9R2) for a +13.5 dBm reading on the Broadband Sampling Voltmeter**
6. Adjust the VERNIER control counterclockwise to obtain a reading of +3 dBm on the Broadband Sampling Voltmeter.
7. Set the MTR ADJ Control (A9R32) for a reading on the Model 86601A output meter of +13 dBm
8. Adjust the VERNIER control counterclockwise for a reading on the Model 86601A output meter -7 dBm.
9. Set the DET control (A2R34) for a +3 dBm reading on the Broadband Sampling Voltmeter.
10. Repeat steps 5 through 9 until no further adjustment is necessary.

Table 7-2. Assembly-Change Cross Reference Index

| Assembly | Change |   |   |   |   |   |   |   |   |
|----------|--------|---|---|---|---|---|---|---|---|
|          | A      | B | C | D | E | F | G | H | I |
| A1       |        |   |   | X |   |   | X |   |   |
| A3       |        |   | X | X |   |   |   | X |   |
| A4       |        |   |   |   |   |   |   |   | X |
| A5       |        |   | X |   | X | F |   | X |   |
| A9       | X      | X |   | X |   |   |   | X |   |
| A10      |        |   |   |   |   |   |   | X |   |



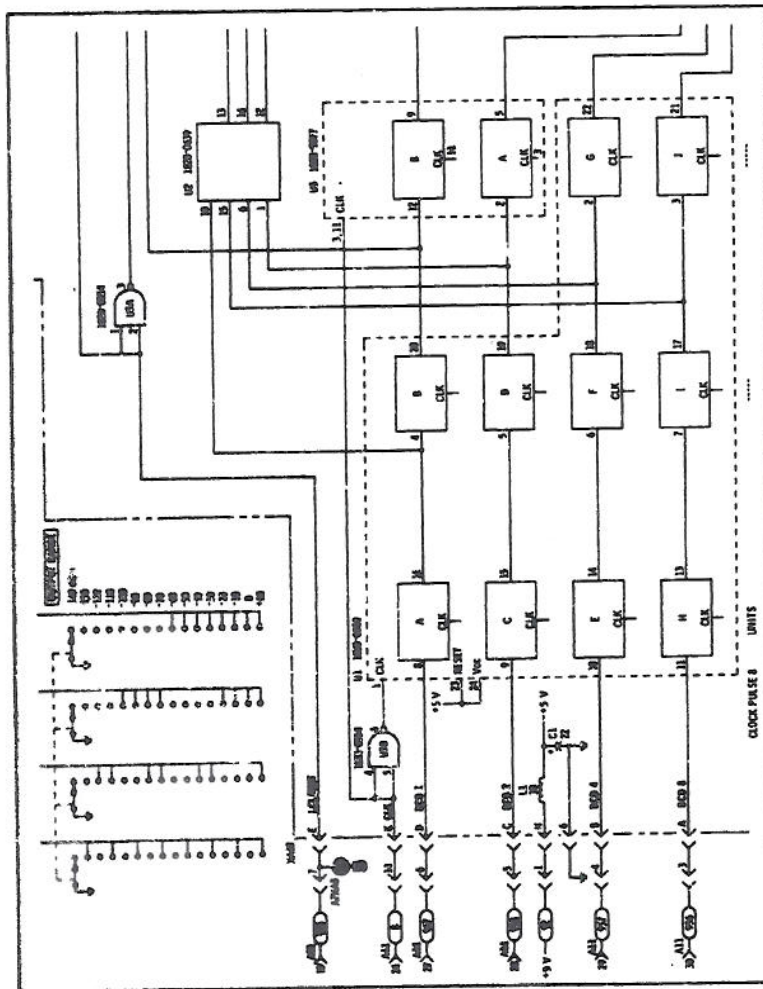
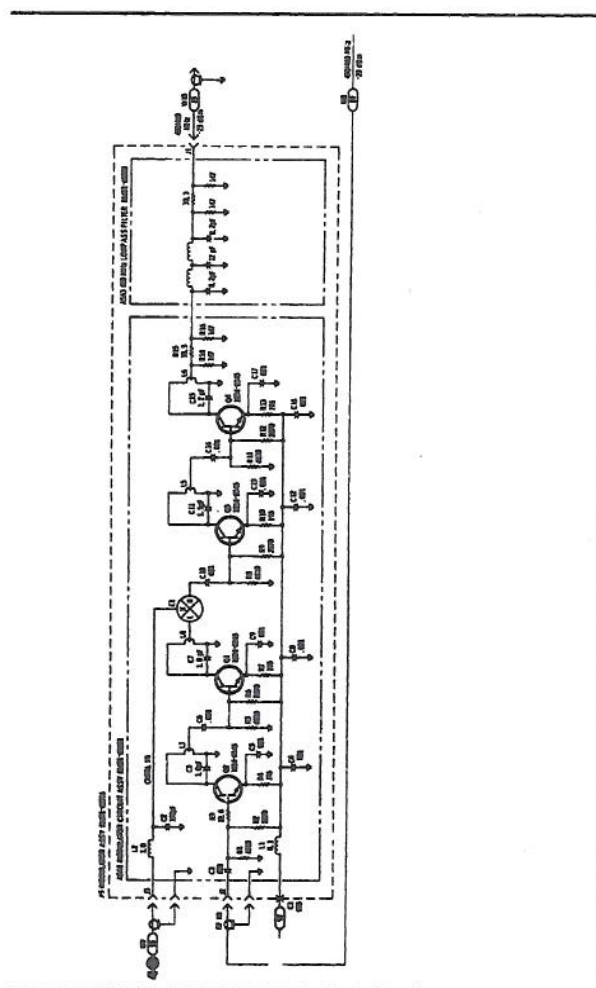


Figure 7-2. Partial Logic Schematic

Model 86601A



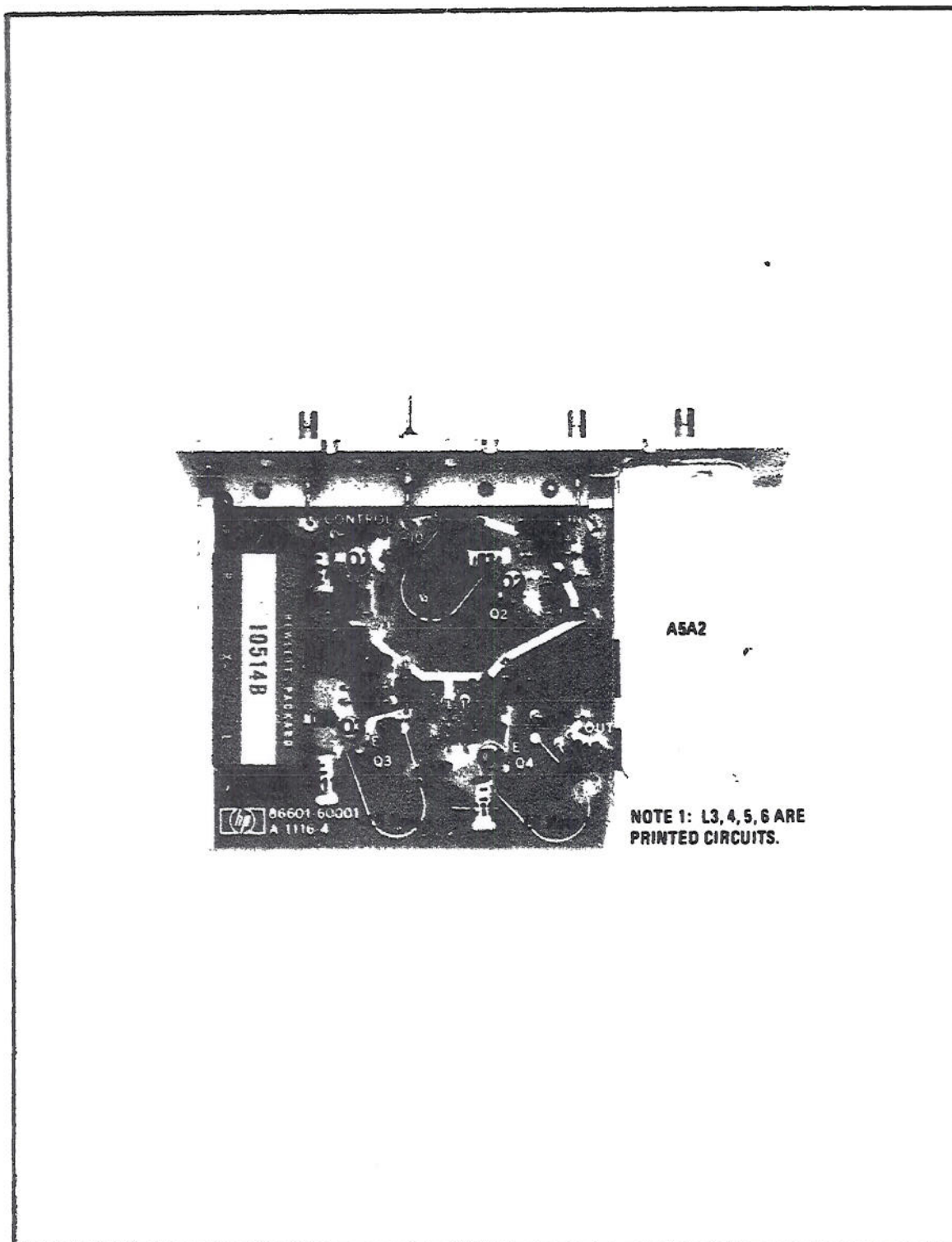


Figure 7-4. Modulator Assembly Component Locations



Model 86601A

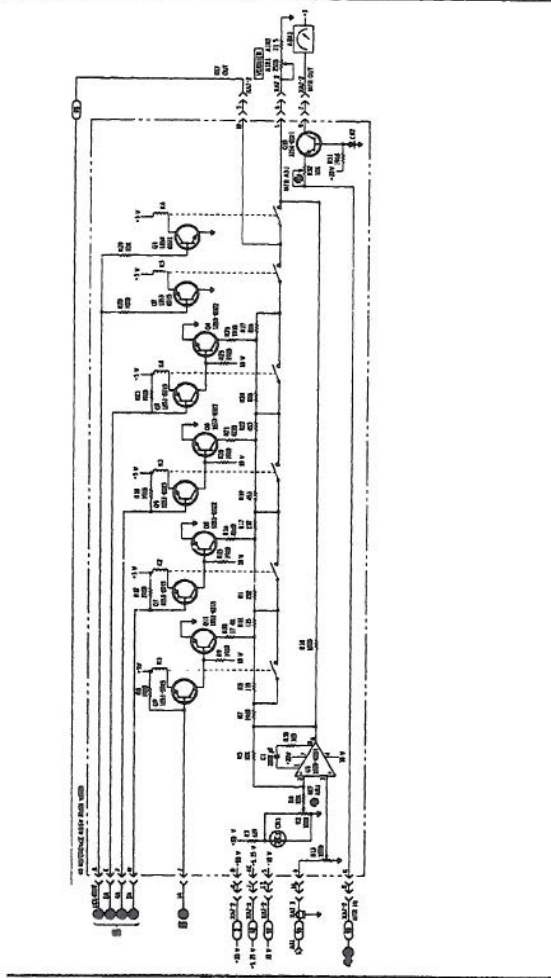


Figure 7-5. Reference Assembly

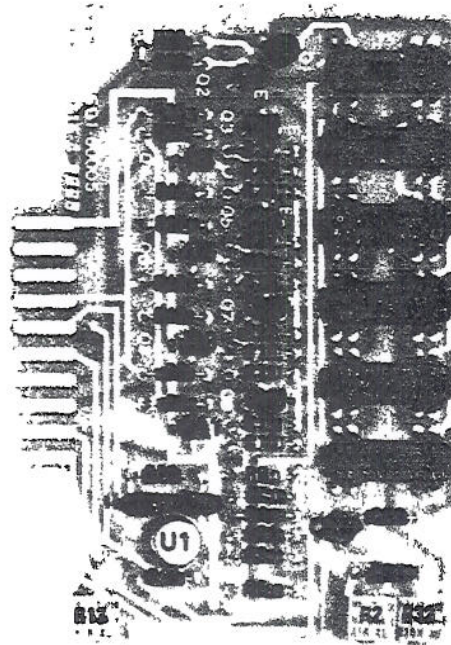


Figure 7-6. Reference Assembly Component Location

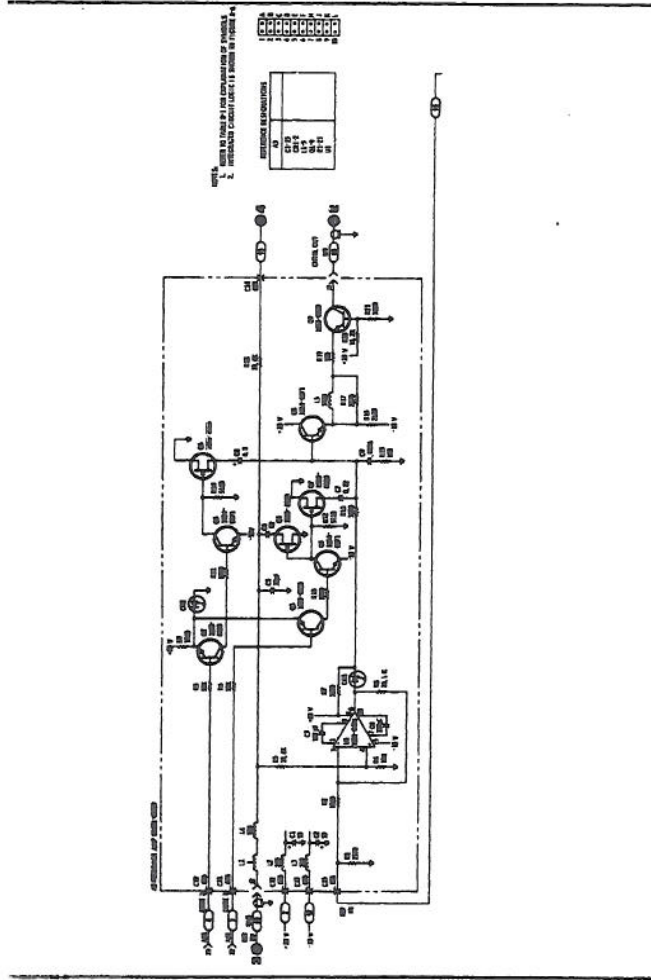


Figure 7-7. Feedback Amplifier



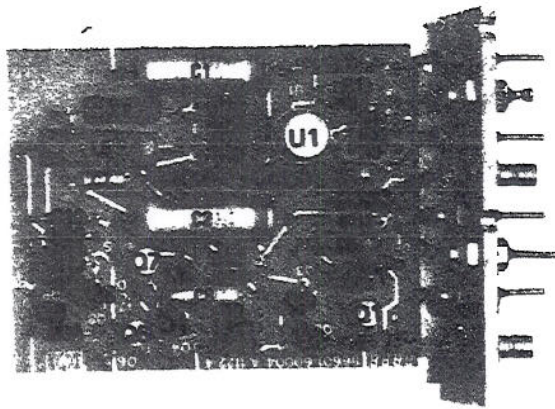


Figure 7-8. Feedback Amplifier Component Locations

**Manual Changes**

7-8. The manual changes given below are for correcting errors and for adapting the manual to instruments containing improvements made after the printing of the manual. Make all ERRATA corrections first and then make all appropriate serial number related changes indicated in the table.

| Serial Prefix or Number | Make Manual Changes | Serial Prefix or Number | Make Manual Changes |
|-------------------------|---------------------|-------------------------|---------------------|
| 1443A                   | 1                   | ▶ 1623A                 | 1 through 5         |
| 1508A                   | 1, 2                |                         |                     |
| 1520A                   | 1, 2, 3             |                         |                     |
| 1524A                   | 1 through 4         |                         |                     |
| 1551A                   | 1 through 5         |                         |                     |
| 1616A                   | 1 through 6         |                         |                     |

**▶ NEW ITEM****ERRATA**

Page 1-2, Table 1-1:

Change the heading "Spurious Signals" to "Spurious Signals (CW and AM only)".

Change the heading "Signal-to-Phase Noise Ratio" to "Signal-to-Phase Noise Ratio (CW and AM only)".

Change the heading "Residual FM" to "Residual FM (CW and AM only)".

Page 4-6, paragraph 4-15:

Change the first sentence of the SPECIFICATION to "All non-harmonically related spurious signals (in the CW and AM modes) are at least 80 dB below the selected output signal."

Page, paragraph 4-16:

Add the following to the SPECIFICATION sentence "in the CW and AM modes only".

Page 4-10, paragraph 4-18:

Add the following to the SPECIFICATION sentence "in the CW and AM modes only"

Page 4-13, Figure 4-11:

Change the Variable-Phase Generator's output to the sine-wave output connector (one connector to the left of the output shown).

Page 6-3, Table 6-3:

Change A1M1 HP Part Numbers to 1120-0540 (EXCEPT OPTION 001) and 1120-0542 (OPTION 001 ONLY)

Page 6-5 and 6-6, Table 6-3:

Change the A4 and A5 parts list as shown in the table in this supplement.

Page 6-8, Table 6-3:

Add A20, 98801-60066, 600 MHz Low Pass Filter Assembly

CHANGE 1

Page 6-8:

**Replace the parts list for the AS assembly with the new portion of Table 6-3 found in this supplement.**

Page 8-21:

**Replace Figure 8-27 with the new component location diagram found in this supplement.**

**Replace Figure 8-28 with the new schematic found in this supplement.**

CHANGE 2

**Change A1M1 HP Part Number 1120-0540 (EXCEPT OPTION 001) to 1120-0543 (EXCEPT OPTION 001).**

CHANGE 3

Page 6-5, Table 6-3:

**Change A4A1C1, A4A1C4, A4A2C1, and A4A2C4 to 0160-3875, CAPACITOR FXD 22 pF  $\pm 5\%$  200 SVDC CER, 28480, 0160-3875.**

**Add to A4A1 miscellaneous, 1200-0172, 2, INSULATOR XSTR TO-18, 28480, 1200-0172.**

**Add to A4A2 miscellaneous, 1200-0172, 2, INSULATOR XSTR TO-18, 28480, 1200-0172.**

Page 6-6, Table 6-3:

**Change A5A1C1, A5A1C4, A5A2C1, and A5A2C5 to 0160-3875, CAPACITOR FXD 22 pF  $\pm 5\%$  200 WVDC CER, 28480, 0160-3875.**

**Delete A5A1Z1**

**Add to A5A1 miscellaneous, 1200-0172, 2, INSULATOR XSTR TO-18, 28480, 1200-0172.**

**Add to A5A2 miscellaneous, 1200-0172, 2, INSULATOR XSTR TO-18, 28480, 1200-0172.**

Page 6-8, Table 6-3:

**Change A8R5, R6, R16, R16, R25 and R26 to 0683-0335, RESISTOR 3.3 5% .25W FC TC--400/+500, 01121, CB33G5.**

Page 8-13, Figure 8-13 (Service Sheet 2):

**Change the value of the following capacitors to 22 pF: A4A1C1, A4A1C4, A4A2C1, A4A2C4, A5A1C1, A5A1C4, A5A2C1, and A5A2C5.**

Page 8-21, Figure 8-28:

**Change the value of A8R5, R6, R16, R16, R25, and R26 to 3.3 ohms.**

**NOTE**

**Refer to Change 1 of this supplement.**

CHANGE 4

Page 6-1, Table 6-1:

**Change the A13 Programmable Attenuator to A13 Attenuator.**

**Change the New Part No. of the A13 Attenuator to 86603-60043.**

Page 6-9, Table 6-3 and page 8-21, Figure 8-28:

**Change the HP Part Number of A13 to 86603-60043. The Exchange Part No. is unchanged.**



Table 6-3. Replaceable Parts (P/O Errata; Page 1 of 2)

| Reference Designation | HP Part Number | Qty | Description                              | Mfr Code | Mfr Part Number    |
|-----------------------|----------------|-----|------------------------------------------|----------|--------------------|
| A4                    | 04401-00023    | 1   | FILTER ASSEMBLY, ACTIVE                  | 23480    | 04401-00023        |
|                       | 04401-00009    | 1   | COVER, ACTIVE FILTER ASSY                | 23480    | 04401-00009        |
|                       | 04401-20026    | 1   | STRIPLINE                                | 20480    | 04401-20026        |
|                       | 04401-20035    | 1   | HOUSING, ACTIVE FILTER ASSY              | 20480    | 04401-20035        |
|                       | 04401-20037    | 1   | INSERT, ACTIVE FILTER ASSY               | 20480    | 04401-20037        |
|                       | 04401-00007    | 2   | BOTTOM, ACTIVE FILTER DIE.               | 20480    | 04401-00007        |
| A4C1                  | 0121-0465      | 4   | CAPACITOR AIR 10 PF                      | 20480    | 0121-0465          |
| A4C2                  | 0121-0465      |     | CAPACITOR AIR 10 PF                      | 20480    | 0121-0465          |
| A4C3                  | 0121-0465      |     | CAPACITOR AIR 10 PF                      | 20480    | 0121-0465          |
| A4C4                  | 0121-0465      |     | CAPACITOR AIR 10 PF                      | 20480    | 0121-0465          |
| A4C5                  | 0160-3036      | 5   | CAPACITOR-FXD 5000PF +80-200 200WVDC CER | 20480    | 0160-3036          |
| A4C6                  | 0160-3036      |     | CAPACITOR-FXD 5000PF +80-200 200WVDC CER | 20480    | 0160-3036          |
| A4J1                  | 1250-0901      | 2   | CONNECTOR-RF SHB R SGL HOLE FR           | 2K497    | 700166             |
| A4J2                  | 1250-0901      |     | CONNECTOR-RF SHB R SGL HOLE FR           | 2K497    | 700166             |
| A4A1                  | 04401-00011    | 1   | BOARD ASSEMBLY, INPUT AMPLIFIER          | 20480    | 04401-00011        |
| A4A1C1                | 0160-3078      | 20  | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A1C2                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A1C3                | 0121-0447      | 8   | CAPACITOR; VAR; TRMR; CER; 1.5/2.5PF     | 00065    | 75-TRMR-03 1.5-2.5 |
| A4A1C4                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A1C5                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A1C6                | 0121-0447      |     | CAPACITOR; VAR; TRMR; CER; 1.5/2.5PF     | 00065    | 75-TRMR-03 1.5-2.5 |
| A4A1C7                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A1L1                | 9100-2267      | 4   | COIL-FXD WOLDED RF CHCKE 100MH 100       | 24226    | 10/100             |
| A4A1L2                | 00640-00005    | 8   | INDUCTOR                                 | 20480    | 00640-00005        |
| A4A1L3                | 00640-00005    |     | INDUCTOR                                 | 20480    | 00640-00005        |
| A4A101                | 1054-0945      | 2   | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A4A102                | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A4A1R1                | 0690-3429      | 3   | RESISTOR 10.6 1% .125W P TC=0-100        | 03088    | PMS5-1/8-T0-1000-F |
| A4A1R2                | 0690-3451      | 8   | RESISTOR 2.07K 1% .125W P TC=0-100       | 16209    | C4-1/8-T0-2071-F   |
| A4A1R3                | 0757-0439      | 8   | RESISTOR 6.08K 1% .125W P TC=0-100       | 24946    | C4-1/8-T0-6011-F   |
| A4A1R4                | 0690-3440      | 8   | RESISTOR 196 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-196R-F   |
| A4A1R5                | 0757-0439      | 8   | RESISTOR 6.08K 1% .125W P TC=0-100       | 24946    | C4-1/8-T0-6011-F   |
| A4A1R6                | 0690-3451      |     | RESISTOR 2.07K 1% .125W P TC=0-100       | 16209    | C4-1/8-T0-2071-F   |
| A4A1R7                | 0690-3440      |     | RESISTOR 196 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-196R-F   |
| A4A1R8                | 0690-3443      | 2   | RESISTOR 207 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-207R-F   |
| A4A1R9                | 0757-0294      | 1   | RESISTOR 17.0 1% .125W P TC=0-100        | 19701    | MPAC1/8-T0-170R-F  |
| A4A1R10               | 0690-3443      |     | RESISTOR 207 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-207R-F   |
| A4A2                  | 04401-00012    | 1   | BOARD ASSEMBLY, OUTPUT AMPLIFIER         | 20480    | 04401-00012        |
| A4A2C1                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A2C2                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A2C3                | 0121-0447      |     | CAPACITOR; VAR; TRMR; CER; 1.5/2.5PF     | 00065    | 75-TRMR-03 1.5-2.5 |
| A4A2C4                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A2C5                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A2C6                | 0121-0447      |     | CAPACITOR; VAR; TRMR; CER; 1.5/2.5PF     | 00065    | 75-TRMR-03 1.5-2.5 |
| A4A2C7                | 0160-3078      |     | CAPACITOR-FXD 1000PF +200 100WVDC CER    | 20480    | 0160-3078          |
| A4A2L1                | 9100-2267      |     | COIL-FXD WOLDED RF CHCKE 100MH 100       | 24226    | 10/100             |
| A4A2L2                | 00640-00005    |     | INDUCTOR                                 | 20480    | 00640-00005        |
| A4A2L3                | 00640-00005    |     | INDUCTOR                                 | 20480    | 00640-00005        |
| A4A201                | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A4A202                | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A4A2R1                | 0690-3429      |     | RESISTOR 10.6 1% .125W P TC=0-100        | 03088    | PMS5-1/8-T0-1000-F |
| A4A2R2                | 0690-3451      |     | RESISTOR 2.07K 1% .125W P TC=0-100       | 16209    | C4-1/8-T0-2071-F   |
| A4A2R3                | 0757-0439      |     | RESISTOR 6.08K 1% .125W P TC=0-100       | 24946    | C4-1/8-T0-6011-F   |
| A4A2R4                | 0690-3440      |     | RESISTOR 196 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-196R-F   |
| A4A2R5                | 0757-0439      |     | RESISTOR 6.08K 1% .125W P TC=0-100       | 24946    | C4-1/8-T0-6011-F   |
| A4A2R6                | 0690-3451      |     | RESISTOR 2.07K 1% .125W P TC=0-100       | 16209    | C4-1/8-T0-2071-F   |
| A4A2R7                | 0690-3440      |     | RESISTOR 196 1% .125W P TC=0-100         | 16209    | C4-1/8-T0-196R-F   |
| A4A21                 | 0170-0439      | 1   | COIL, MAG, SMITH LINE BEAD 100 OH 0-17   | 04114    | 00-000-1000/100    |
| A5                    | 04401-00000    | 1   | BOARD ASSEMBLY, POWER SUPPLY             | 20480    | 04401-00000        |
|                       | 04401-00000    | 1   | BOARD ASSEMBLY, POWER SUPPLY             | 20480    | 04401-00000        |
|                       | 04401-00000    | 1   | BOARD ASSEMBLY, POWER SUPPLY             | 20480    | 04401-00000        |
| A5C1                  | 0160-3036      |     | CAPACITOR-FXD 5000PF +80-200 200WVDC CER | 20480    | 0160-3036          |
| A5C2                  | 0160-3036      |     | CAPACITOR-FXD 5000PF +80-200 200WVDC CER | 20480    | 0160-3036          |
| A5C3                  | 0160-3036      |     | CAPACITOR-FXD 5000PF +80-200 200WVDC CER | 20480    | 0160-3036          |
| A5R1                  | 1054-0945      | 6   | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A5R2                  | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A5R3                  | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A5R4                  | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A5R5                  | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |
| A5R6                  | 1054-0945      |     | TRANSISTOR NPN 2N5179 SI TO-18 PD=200MW  | 04713    | 2N5179             |

Table 6-3. Replaceable Parts (P/O Errata; Page 2 of 2)

| Reference Designation | HP Part Number | Qty | Description                             | Mfr Code | Mfr Part Number    |
|-----------------------|----------------|-----|-----------------------------------------|----------|--------------------|
| ASA1                  | 06601-00070    | 1   | BOARD ASS'Y, MODULATOR                  | 20400    | 06601-00070        |
| ASA1C1                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C2                | 0121-0447      |     | CAPACITOR-VAR: TRIM: CER: 1.5/2.5PF     | 00065    | 72-TRIM-03 1.5-2.5 |
| ASA1C3                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C4                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C5                | 0121-0447      |     | CAPACITOR-VAR: TRIM: CER: 1.5/2.5PF     | 00065    | 72-TRIM-04 1.5-2.5 |
| ASA1C6                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C7                | 0160-3070      | 2   | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C8                | 0160-3070      | 2   | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA1C9                | 0160-3466      | 2   | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3466          |
| ASA1C10               | 0160-3466      | 1   | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3466          |
| ASA1F1                | 105140         | 2   | PIPER, 900 MHZ                          | 20400    | 105140             |
| ASA1H1                | 0490-1013      | 1   | RELAY: REED: IC .25A 3W CONT: 5V CIL    | 20400    | 0490-1013          |
| ASA1L1                | 00660-00005    |     | INDUCTOR                                | 20400    | 00660-00005        |
| ASA1L2                | 10460-00005    |     | INDUCTOR                                | 20400    | 00660-00005        |
| ASA1L3                | 9100-2247      |     | COIL-FIX MOLDED RF CHOKER 100MH 100     | 24226    | 10/100             |
| ASA1L4                | 9100-2130      | 2   | COIL-FIX MOLDED RF CHOKER 100MH 100     | 24226    | 10/101             |
| ASA1Q1                | 1054-0345      |     | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713    | 2N5179             |
| ASA1Q2                | 1054-0345      |     | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713    | 2N5179             |
| ASA1R1                | 0690-3131      |     | RESISTOR 190 1% .125W F TC=0+-100       | 03068    | PNE55-1/8-TO-190-F |
| ASA1R2                | 0757-0230      |     | RESISTOR 0.01K 1% .125W F TC=0+-100     | 24546    | CA-1/8-TO-0811-F   |
| ASA1R3                | 0690-3131      |     | RESISTOR 2.07K 1% .125W F TC=0+-100     | 16299    | CA-1/8-TO-2071-F   |
| ASA1R4                | 0690-3440      |     | RESISTOR 190 1% .125W F TC=0+-100       | 16299    | CA-1/8-TO-190-F    |
| ASA1R5                | 0757-0230      |     | RESISTOR 0.01K 1% .125W F TC=0+-100     | 24546    | CA-1/8-TO-0811-F   |
| ASA1R6                | 0690-3131      |     | RESISTOR 2.07K 1% .125W F TC=0+-100     | 16299    | CA-1/8-TO-2071-F   |
| ASA1R7                | 0690-3440      |     | RESISTOR 190 1% .125W F TC=0+-100       | 16299    | CA-1/8-TO-190-F    |
| ASA1R8                | 0757-0230      | 4   | RESISTOR 1K 1% .125W F TC=0+-100        | 24546    | CA-1/8-TO-1001-F   |
| ASA1R9                | 0757-0230      |     | RESISTOR 1K 1% .125W F TC=0+-100        | 24546    | CA-1/8-TO-1001-F   |
| ASA1R10               | 0757-0230      | 1   | RESISTOR 91.1 1% .5W F TC=0+-100        | 19701    | MF7C1/2-TO-91.1-F  |
| ASA1Z1                | 0170-0029      |     | CURE, MAC, SHIELDING BEAD, .130 OD .047 | 02114    | 36-990-05A2/4A     |
| ASA2                  | 06601-00060    | 1   | BOARD ASS'Y, MODULATOR II               | 20400    | 06601-00060        |
| ASA2C1                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA2C2                | 0121-0447      |     | CAPACITOR-VAR: TRIM: CER: 1.5/2.5PF     | 00065    | 72-TRIM-03 1.5-2.5 |
| ASA2C3                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA2C4                | 0121-0447      |     | CAPACITOR-VAR: TRIM: CER: 1.5/2.5PF     | 00065    | 72-TRIM-04 1.5-2.5 |
| ASA2C5                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA2C6                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA2C7                | 0160-3466      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3466          |
| ASA2C8                | 0160-2240      |     | CAPACITOR-FIX 330PF +-5% 300VDC NICA    | 20400    | 0160-2200          |
| ASA2C9                | 0160-3070      |     | CAPACITOR-FIX 1000PF +-20% 100VDC CER   | 20400    | 0160-3070          |
| ASA2F1                | 105140         |     | PIPER, 900 MHZ                          | 20400    | 105140             |
| ASA2L1                | 00660-00005    |     | INDUCTOR                                | 20400    | 00660-00005        |
| ASA2L2                | 00660-00005    |     | INDUCTOR                                | 20400    | 00660-00005        |
| ASA2L3                | 9100-2247      |     | COIL-FIX MOLDED RF CHOKER 100MH 100     | 24226    | 10/100             |
| ASA2L4                | 9100-2130      |     | COIL-FIX MOLDED RF CHOKER 100MH 100     | 24226    | 10/101             |
| ASA2Q1                | 1054-0345      |     | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713    | 2N5179             |
| ASA2Q2                | 1054-0345      |     | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713    | 2N5179             |
| ASA2R1                | 0757-0230      |     | RESISTOR 0.01K 1% .125W F TC=0+-100     | 24546    | CA-1/8-TO-0811-F   |
| ASA2R2                | 0690-3131      |     | RESISTOR 2.07K 1% .125W F TC=0+-100     | 16299    | CA-1/8-TO-2071-F   |
| ASA2R3                | 0690-3440      |     | RESISTOR 190 1% .125W F TC=0+-100       | 16299    | CA-1/8-TO-190-F    |
| ASA2R4                | 0757-0230      |     | RESISTOR 0.01K 1% .125W F TC=0+-100     | 24546    | CA-1/8-TO-0811-F   |
| ASA2R5                | 0690-3131      |     | RESISTOR 2.07K 1% .125W F TC=0+-100     | 16299    | CA-1/8-TO-2071-F   |
| ASA2R6                | 0690-3440      |     | RESISTOR 190 1% .125W F TC=0+-100       | 16299    | CA-1/8-TO-190-F    |
| ASA2R7                | 0757-0230      |     | RESISTOR 1K 1% .125W F TC=0+-100        | 24546    | CA-1/8-TO-1001-F   |
| ASA2R8                | 0757-0230      |     | RESISTOR 1K 1% .125W F TC=0+-100        | 24546    | CA-1/8-TO-1001-F   |
| ASA2Z1                | 06601-20067    | 1   | CABLE, MODULATOR                        | 20400    | 06601-20067        |



Table 6-3. Replaceable Parts (P/O Change 1)

| Reference Designation | HP Part Number | Qty | Description                          | Mfr Code | Mfr Part Number  |
|-----------------------|----------------|-----|--------------------------------------|----------|------------------|
| AS                    | 06602-0000     | 1   | ATTENUATOR 701/72 255V               | 28400    | 06602-0000       |
| ASCR1                 | 1901-0025      | 8   | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR2                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR3                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR4                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR5                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR6                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR7                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASCR8                 | 1901-0025      |     | DIODE-GERM PNP 100V 200MA            | 28400    | 1901-0025        |
| ASQ1                  | 1853-0213      | 4   | TRANSISTOR PNP 2N4236 SI CHIP PD=1W  | 04713    | 2N4236           |
| ASQ2                  | 1853-0213      | 4   | TRANSISTOR PNP 2N4236 SI CHIP PD=1W  | 04713    | 2N4236           |
| ASQ3                  | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ4                  | 1853-0071      | 8   | TRANSISTOR PNP SI PD=300MW FT=200MHZ | 28400    | 1853-0071        |
| ASQ5                  | 1853-0404      |     | TRANSISTOR PNP SI TO-18 PD=300MW     | 28400    | 1853-0404        |
| ASQ6                  | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ7                  | 1853-0213      |     | TRANSISTOR PNP 2N4236 SI CHIP PD=1W  | 04713    | 2N4236           |
| ASQ8                  | 1853-0341      |     | TRANSISTOR PNP 2N4239 SI PD=800MW    | 04713    | 2N4239           |
| ASQ9                  | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ10                 | 1853-0071      |     | TRANSISTOR PNP SI PD=300MW FT=200MHZ | 28400    | 1853-0071        |
| ASQ11                 | 1853-0404      |     | TRANSISTOR PNP SI TO-18 PD=300MW     | 28400    | 1853-0404        |
| ASQ12                 | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ13                 | 1853-0213      |     | TRANSISTOR PNP 2N4236 SI CHIP PD=1W  | 04713    | 2N4236           |
| ASQ14                 | 1853-0341      |     | TRANSISTOR PNP 2N4239 SI PD=800MW    | 04713    | 2N4239           |
| ASQ15                 | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ16                 | 1853-0071      |     | TRANSISTOR PNP SI PD=300MW FT=200MHZ | 28400    | 1853-0071        |
| ASQ17                 | 1853-0404      |     | TRANSISTOR PNP SI TO-18 PD=300MW     | 28400    | 1853-0404        |
| ASQ18                 | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ19                 | 1853-0213      |     | TRANSISTOR PNP 2N4236 SI CHIP PD=1W  | 04713    | 2N4236           |
| ASQ20                 | 1853-0341      |     | TRANSISTOR PNP 2N4239 SI PD=800MW    | 04713    | 2N4239           |
| ASQ21                 | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASQ22                 | 1853-0071      |     | TRANSISTOR PNP SI PD=300MW FT=200MHZ | 28400    | 1853-0071        |
| ASQ23                 | 1853-0404      |     | TRANSISTOR PNP SI TO-18 PD=300MW     | 28400    | 1853-0404        |
| ASQ24                 | 1853-0020      |     | TRANSISTOR PNP SI CHIP PD=300MW      | 28400    | 1853-0020        |
| ASR1                  | 0757-0290      | 8   | RESISTOR 1K 1% .125W F TUBULAR       | 24546    | C4-1/8-T0-1001-F |
| ASR2                  | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR3                  | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR4                  | 0690-3440      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 16299    | C4-1/8-T0-1001-F |
| ASR5                  | 0611-2915      | 4   | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR6                  | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR7                  | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR8                  | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR9                  | 0690-3440      | 4   | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR10                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR11                 | 0757-0290      |     | RESISTOR 1K 1% .125W F TUBULAR       | 24546    | C4-1/8-T0-1001-F |
| ASR12                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR13                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR14                 | 0690-3440      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 16299    | C4-1/8-T0-1001-F |
| ASR15                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR16                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR17                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR18                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR19                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR20                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR21                 | 0757-0290      |     | RESISTOR 1K 1% .125W F TUBULAR       | 24546    | C4-1/8-T0-1001-F |
| ASR22                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR23                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR24                 | 0690-3440      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 16299    | C4-1/8-T0-1001-F |
| ASR25                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR26                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR27                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR28                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR29                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR30                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR31                 | 0757-0290      |     | RESISTOR 1K 1% .125W F TUBULAR       | 24546    | C4-1/8-T0-1001-F |
| ASR32                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR33                 | 0757-0159      |     | RESISTOR 1K 1% .5W F TUBULAR         | 19701    | MF7C1/2-T0-100-F |
| ASR34                 | 0690-3440      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 16299    | C4-1/8-T0-1001-F |
| ASR35                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR36                 | 0611-2915      |     | RESISTOR 1.5 OHM 5% .5W PW TUBULAR   | 91637    | PS1/2-T2-105-J   |
| ASR37                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR38                 | 0757-0401      |     | RESISTOR 100 OHM 1% .125W F TUBULAR  | 24546    | C4-1/8-T0-101-F  |
| ASR39                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| ASR40                 | 0690-3440      |     | RESISTOR 1K 1% .125W F TUBULAR       | 16299    | C4-1/8-T0-1001-F |
| AST21                 | 1402-3002      |     | DIODE-GERM 2.37V SE DO-7 PDC=4W TC=  | 04713    | S2 10090-2       |
| AST22                 | 1402-3002      |     | DIODE-GERM 2.37V SE DO-7 PDC=4W TC=  | 04713    | S2 10090-2       |
| AST23                 | 1402-3002      |     | DIODE-GERM 2.37V SE DO-7 PDC=4W TC=  | 04713    | S2 10090-2       |
| AST24                 | 1402-3002      |     | DIODE-GERM 2.37V SE DO-7 PDC=4W TC=  | 04713    | S2 10090-2       |



A8

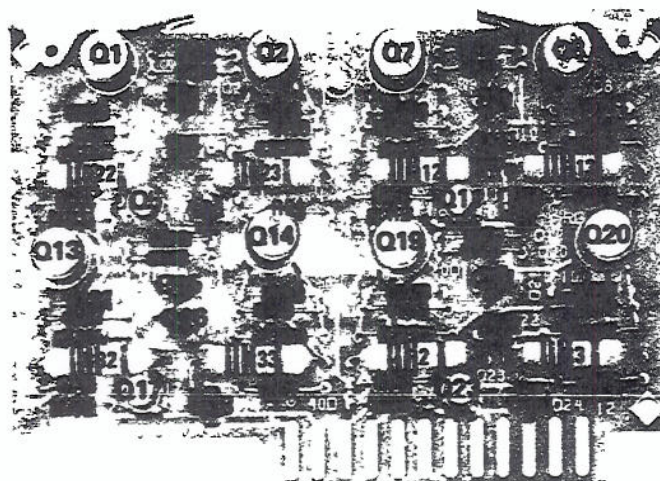


Figure 8-27. Attenuator Driver Component Locations (P/O Change 1)

Model 86601A

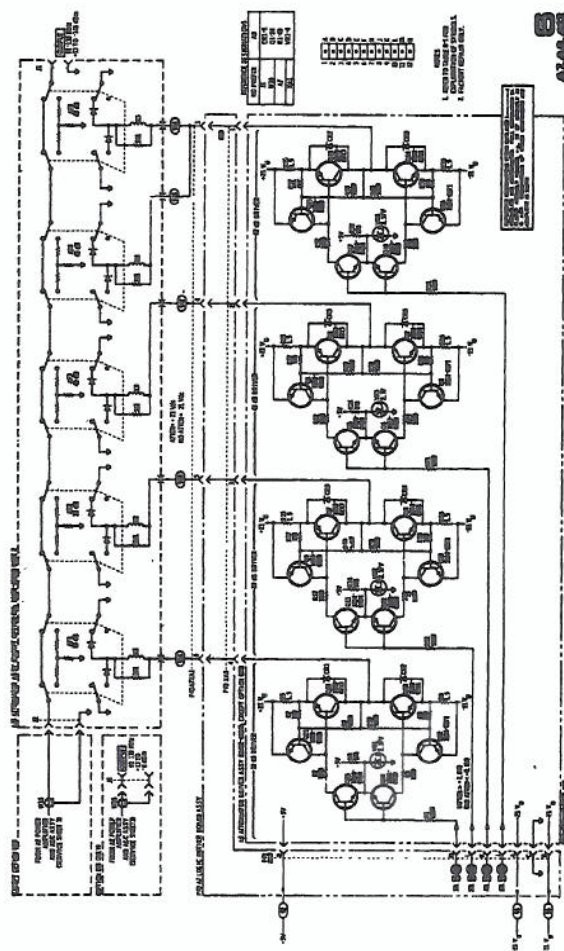


Figure 8-28. Attenuator Driver Assembly (P/O Change 1)

## CHANGE 5

Page 6-8, Table 6-3 and page 8-21, Figure 8-28 (Service Sheet 6):

Delete **A8R9, R10, R19, R20, R29, R30, R39 and R40.**

## ► CHANGE 8

Page 5-1:

Add the following paragraph:

**FACTORY SELECTED COMPONENTS**

**Factory selected** components are identified on the schematics and parts list by an asterisk which follows the reference designator. The normal value of the components are shown. The manual change sheets will provide updated information pertaining to the selected components. Tabel 5-1 lists the reference designator, the criterion used for selecting a particular value, the normal value range, and the service sheet where the component part is shown.

Page 5-1:

Add the following table:

**Factory Selected Components**

| Reference Designator                                                                        | Selected For                                                                                                                                                           | Normal Value Range                                                                                                            | Service Sheet |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------|
| A2R39                                                                                       | Minimum AM distortion at 90% AM depth with VERNIER control set for meter reading of -6 dB and OUTPUT RANGE switch set to +10 dBm.                                      | 400Ω<br>to<br>∞                                                                                                               | 3             |
| A5A1R1,<br>A5A1R6,<br>A5A2R1,<br>A5A2R2,<br>A5A2R6,<br>A5A2R7,<br>A5A2R8,<br>and<br>A5A2R12 | Gain of ≥ 41 dB with +0.5 Vdc on the control input; ≤ 1 dB with +0.1 Vdc on the control line. Change the resistors as indicated in the Modulator Assembly Adjustments. | 68.1Ω or omitted<br>68.1Ω or 511Ω<br>68.1Ω or omitted<br>0 or 26.1Ω<br>68.1Ω or 511Ω<br>68.1Ω or 511Ω<br><br>68.1Ω or omitted | 2             |



**Page 5-10:**

Add the following adjustment procedure.

**5-19. MODULATOR ASSEMBLY ADJUSTMENT**

REFERENCE: Service Sheet 2.

DESCRIPTION: The fixed dynamic range of the modulator is set so the gain extremes extend beyond specified limits. The gain extremes are set by selecting resistors with a specific control voltage input to the modulators.

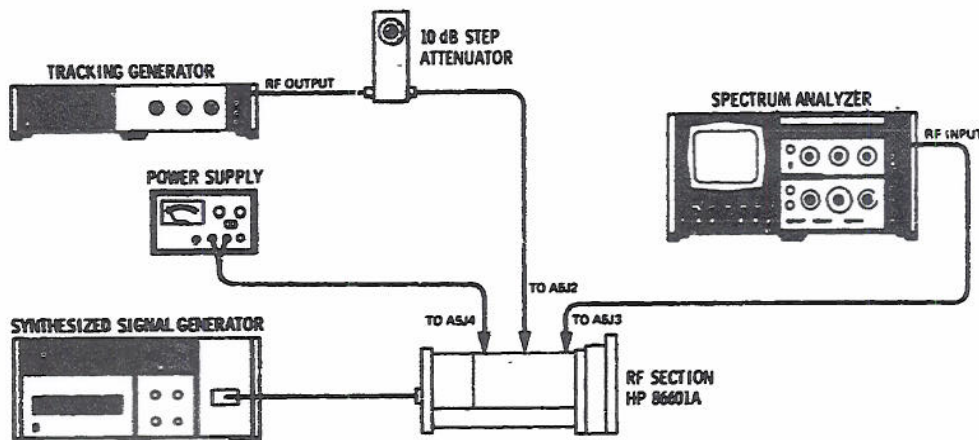


Figure 5-7. Modulator Assembly Adjustment Test Setup.

|                   |                                 |                     |
|-------------------|---------------------------------|---------------------|
| <b>EQUIPMENT:</b> | Tracking Generator . . . . .    | HP 8444A            |
|                   | Spectrum Analyzer . . . . .     | HP 140T/8554L/8552B |
|                   | Electronic Counter . . . . .    | HP 5245M/5253B      |
|                   | Extender Cable . . . . .        | HP 11672-60001      |
|                   | 10 dB Step Attenuator . . . . . | HP 355D             |
|                   | Power Supply . . . . .          | HP 6214A            |

- PROCEDURE:**
1. Remove the Model 86601A from the mainframe. Remove the cover and reconnect the Model 86601A with extender cable 11672-60001.
  2. Connect the Tracking Generator to the Spectrum Analyzer. (Refer to the Tracking Generator Operating and Service Manual.)
  3. Set the Spectrum Analyzer controls as follows: INPUT ATTENUATION 20 dB, LOG REF LEVEL +10 dBm, SCAN WIDTH PER DIVISION 2 MHz, SCAN TIME PER DIVISION 10 MILLISECONDS and BANDWIDTH 300 kHz.
  4. Connect the Tracking Generator RF OUTPUT to the Electronic Counter with the Spectrum Analyzer in the ZERO scan mode.
  5. Set the Spectrum Analyzer frequency to 455 MHz as indicated by the Electronic Counter.
  6. Set the 10 dB step attenuator for 10 dB attenuation. Adjust the Tracking Generator LEVEL to a reference of -24 dBm as indicated on the analyzer display.

## CHANGE 6 (Cont'd)

7. Set the power supply voltage to +5.0 Vdc.
8. Connect the equipment as shown in Figure 5-7.
9. Verify that the output is greater than or equal to +18 dBm. If the output is correct, proceed to step 10. Otherwise, change the following resistors in the order shown until the output is at least +18 dBm.

| Reference Designator | Change To              |
|----------------------|------------------------|
| A5A1R1<br>A5A2R12    | remove<br>511Ω         |
| A5A2R1<br>A5A2R6     | remove<br>511Ω         |
| A5A1R6<br>A5A2R7     | 511Ω<br>remove         |
| A5A2R2<br>A5A2R8     | 0Ω (wire)<br>0Ω (wire) |

10. Set the power supply voltage to +0.10 Vdc. Verify that the output is less than or equal to -23 dBm. If the output is correct, the adjustment is complete. Otherwise, change the following resistors in the order shown until the output is less than or equal to -23 dBm. If any resistors are changed, return to step 7 and recheck the levels in step 9.

| Reference Designator | Change To      |
|----------------------|----------------|
| A5A2R1<br>A5A2R6     | 68.1Ω<br>68.1Ω |
| A5A2R12<br>A5A2R1    | 68.1Ω<br>68.1Ω |
| A5A1R6<br>A5A2R7     | 68.1Ω<br>68.1Ω |
| A5A2R2<br>A5A2R8     | 26.1Ω<br>26.1Ω |

Page 6-4, Table 6-1

A5A1R1, A5A2R1, A5A2R6, A5A2R12, A5A2R7, A5A2R8

A5A1R6, A5A2R1, A5A2R6, A5A2R12, A5A2R7, A5A2R8, A5A2R2, A5A2R8

A5A1R6, A5A2R1, A5A2R6, A5A2R12, A5A2R7, A5A2R8, A5A2R2, A5A2R8

Model 86601A

## Manual Changes

### CHANGE 6 (Cont'd)

Page 6-5 and 6-6, Table 6-3:

**Change the parts list for the A5 Assembly as shown in the table.**

Page 8-13, Figure 8-17 (Service Sheet 2):

**Change the diagram as shown in the partial schematic.**

Page 8-15, Figure 8-20 (Service Sheet 3):

**Add A2R29\*, 619 ohm, in parallel with A2CR5.**



## Manual Changes

Table 6-3. Replaceable Parts (P/O Change 6; 1 of 2)

| Reference Designation | HP Part Number | Qty | Description                     | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---------------------------------|----------|-----------------|
| 40                    | 2000-0000      | 1   | AMPLIFIER ASSEMBLY              | 20000    | 2000-0000       |
| 40A1                  | 2000-0000      | 1   | CAPACITOR-0.001MFD 50V 50% 200V | 20000    | 2000-0000       |
| 40A2                  | 2000-0000      | 1   | CAPACITOR-0.001MFD 50V 50% 200V | 20000    | 2000-0000       |
| 40A3                  | 2000-0000      | 1   | CAPACITOR-0.001MFD 50V 50% 200V | 20000    | 2000-0000       |
| 40A4                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A5                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A6                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A7                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A8                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A9                  | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A10                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A11                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A12                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A13                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A14                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A15                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A16                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A17                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A18                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A19                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A20                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A21                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A22                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A23                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A24                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A25                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A26                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A27                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A28                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A29                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A30                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A31                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A32                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A33                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A34                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A35                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A36                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A37                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A38                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A39                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A40                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A41                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A42                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A43                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A44                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A45                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A46                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A47                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A48                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A49                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A50                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A51                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A52                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A53                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A54                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A55                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A56                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A57                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A58                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A59                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A60                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A61                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A62                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A63                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A64                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A65                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A66                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A67                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A68                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A69                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A70                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A71                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A72                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A73                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A74                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A75                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A76                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A77                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A78                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A79                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A80                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A81                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A82                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A83                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A84                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A85                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A86                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A87                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A88                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A89                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A90                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A91                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A92                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A93                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A94                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A95                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A96                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A97                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A98                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A99                 | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |
| 40A100                | 2000-0000      | 1   | COIL, 0.001MFD 50V 50% 200V     | 20000    | 2000-0000       |

## Manual Changes

Table 6-3. Replaceable Part (P/O Change 6; 2 of 2)

| Reference Designation | HP Part Number | Qty | Description                         | Mfr Code | Mfr Part Number   |
|-----------------------|----------------|-----|-------------------------------------|----------|-------------------|
| 2400000               | 2400-1000      | 1   | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |
| 2400000               | 2400-1000      |     | REPLACES 2400-1000 OF 2400-1000-000 | 24000    | CD-1/0-100-1000-0 |

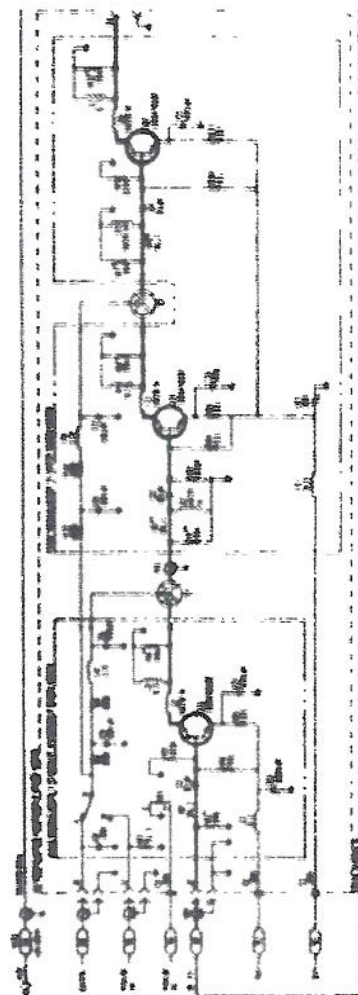


Figure 6-3. *Clapp-tuned and Modulated Receiver (partial schematic, part of Clapp-tuned)*



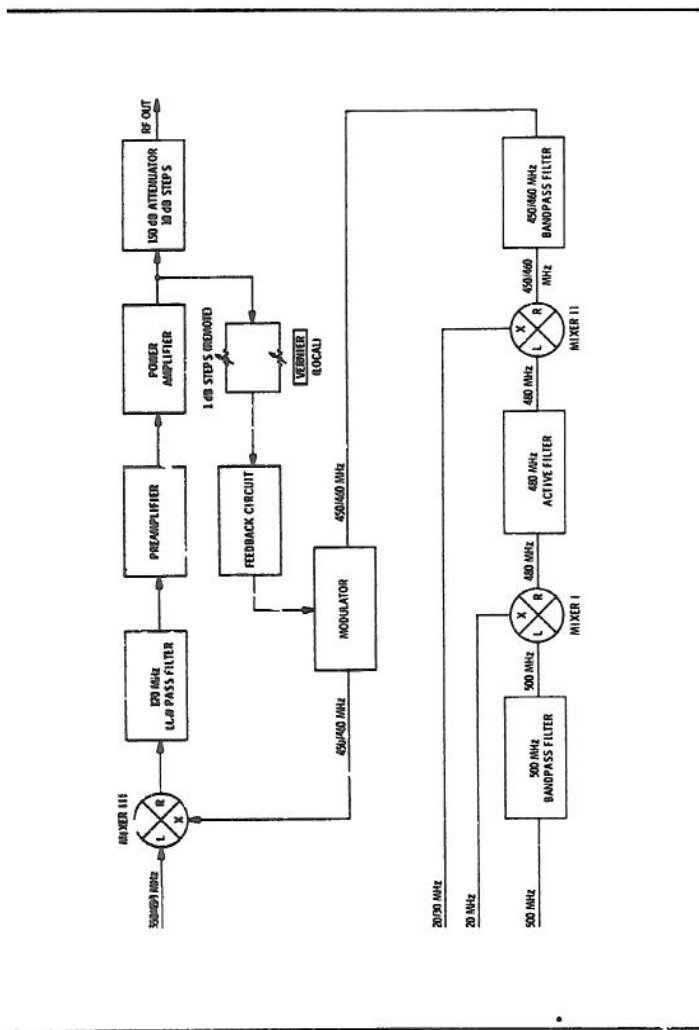


Figure 8-1. Model 86601A Simplified Block Diagram

## SECTION VIII

### SERVICE

#### 8-1. INTRODUCTION

8-2. **This section provides instructions for testing, troubleshooting and repairing the Hewlett-Packard Model 86601A RF Section. Information throughout this section is based on the assumption that the Model 86601A is interconnected with a Model 8660 Synthesized Signal Generator that is functioning properly.**

#### 8-3. PRINCIPLES OF OPERATION

8-4. Figure 8-1, Simplified Block Diagram, and the following discussion illustrate the basic principles of the Model 86601A. More detailed information about principles of operation of the Model 86601A may be found in the text for Service Sheet 1. In addition, detailed information to the circuit level is provided on the individual service sheets.

8-5. The Model 86601A RF Section has no internal oscillators. The output frequency is developed by mixing and filtering the precise digitally controlled rf inputs from the mainframe. The inputs from the mainframe are:

- a. A 500 MHz signal from the reference section.
- b. A 20 MHz signal from the reference section which is coupled through the Modulation Section.

#### NOTE

In the FM mode the 20 MHz signal is generated in the **Modulation Section**.

- c. **A signal between 20.000001 and 30.00000 MHz (1 Hz resolution) from the SL1 Loop.**

#### NOTE

In option 004 mainframes this signal is between 20.0001 and 30.0000 MHz (100 Hz resolution).

- d. A signal between 350 and 450 MHz (10 MHz steps) from the RF Loop.

8-6. There are three mixers in the Model 86601A. Mixer I mixes the 500 MHz and the 20 MHz inputs to produce a 480 MHz output. The 480 MHz signal is amplified and filtered and then coupled to Mixer

II where it is mixed with the 20 to 30 MHz signal from the mainframe SL1 Loop to provide a 450 to 460 MHz output. The output of Mixer II is filtered and amplified, and in the AM mode, modulated before it is coupled to Mixer III. In Mixer III the 450 to 460 MHz signal is mixed with the 350 to 450 MHz signal to produce the final output frequency which is between .01 and 100.999999 MHz (.01 to 109.9999 MHz when option 004 mainframe is used).

8-7. The output of Mixer III is coupled through two 120 MHz low pass filters and a pre-amplifier to the power amplifier.

8-8. The power amplifier assembly contains an Automatic Gain Control circuit which controls a feedback amplifier in the leveling loop. Code 1 and Code 2 inputs from the mainframe DCU operate an electronic band switch to aid in leveling the rf output across the output range.

8-9. Three attenuators are used to control the output level of the Model 86601A. These attenuators function as follows:

- a. In the local mode a 150 dB programmable attenuator, OUTPUT RANGE, controls the output level from +10 dBm to -140 dBm in 10 dB steps. A VERNIER control adds the capability of setting the output level to +13 dBm and to other points between the 10 dB steps.

- b. In the remote mode the 150 dB **programmable attenuator is remotely controlled and the front panel controls (OUTPUT RANGE and VERNIER) are inoperative.** A 1 dB per step **programmable attenuator in the Model 86601A is remotely programmed to set the output level between the 10 dB steps of the 150 dB attenuator.**

#### 8-10.0 RECOMMENDED TEST EQUIPMENT

8-11. Test equipment and accessories required to maintain the Model 86601A are listed in the **Maintenance Allocation Chart. Substitute test equipments are listed in Table 1-2.**

#### 8-12. TROUBLESHOOTING

8-13. Troubleshooting procedures are divided into two maintenance levels in this manual.

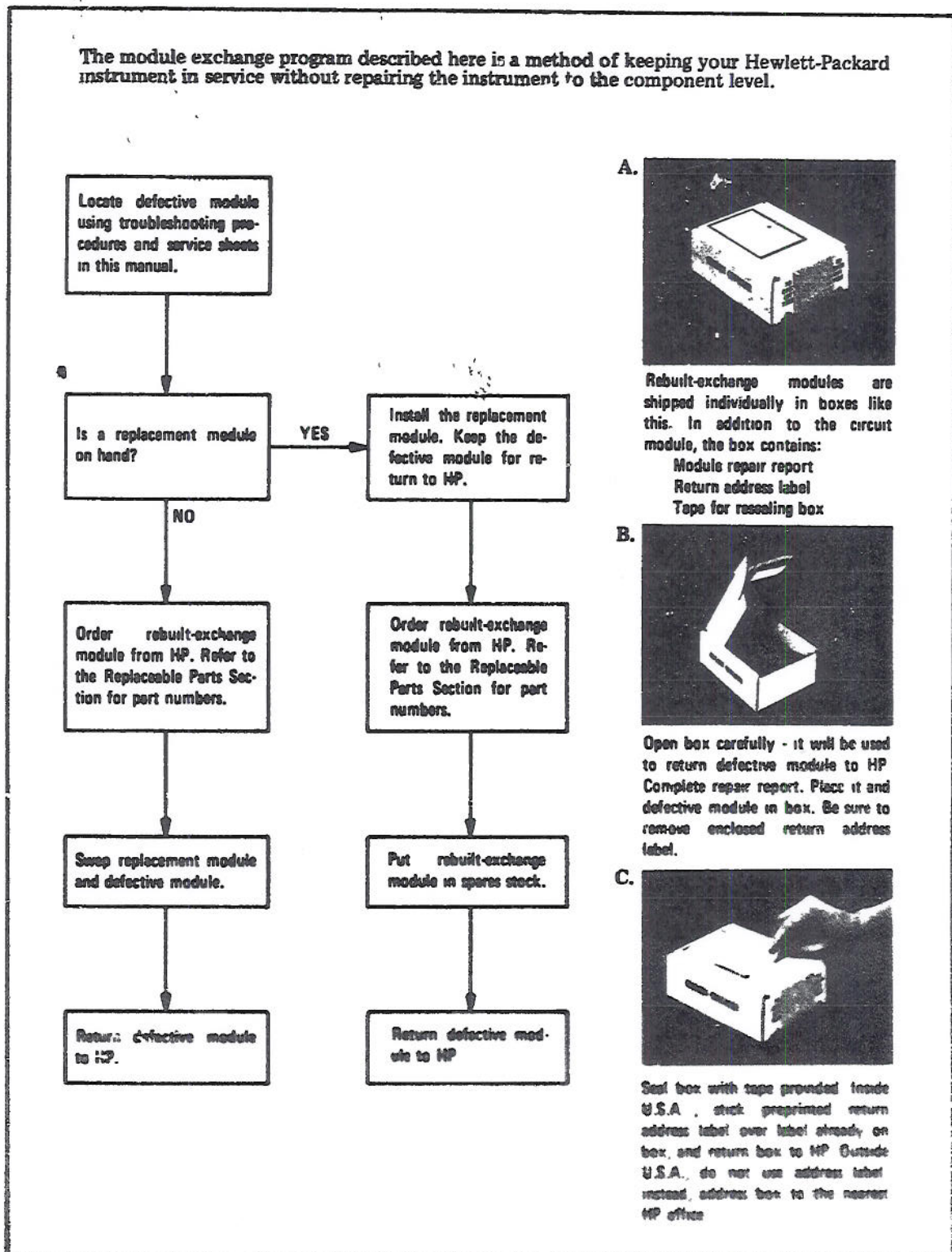


Figure 8-2. Diagram of Module Exchange Program



## SECTION VIII

### SERVICE

#### 8-1. INTRODUCTION

8-2. This section provides instructions for testing, troubleshooting and repairing the Hewlett-Packard Model 86601A RF Section. Information throughout this section is based on the assumption that the Model 86601A is interconnected with a Model 8660 Synthesized Signal Generator that is functioning properly.

#### 8-3. PRINCIPLES OF OPERATION

8-4. Figure 8-1, Simplified Block Diagram, and the following discussion illustrate the basic principles of the Model 86601A. More detailed information about principles of operation of the Model 86601A may be found in the text for Service Sheet 1. In addition, detailed information to the circuit level is provided on the individual service sheets.

8-5. The Model 86601A RF Section has no internal oscillators. The output frequency is developed by mixing and filtering the precise digitally controlled rf inputs from the mainframe. The inputs from the mainframe are:

- a. A 500 MHz signal from the reference section.
- b. A 20 MHz signal from the reference section which is coupled through the Modulation Section.

#### NOTE

In the FM mode the 20 MHz signal is generated in the Modulation Section.

- c. A signal between 20.000001 and 30.00000 MHz (1 Hz resolution) from the SL1 Loop.

#### NOTE

In option 004 mainframes this signal is between 20.0001 and 30.0000 MHz (100 Hz resolution)

- d. A signal between 350 and 450 MHz (10 MHz steps) from the RF Loop.

8-6. There are three mixers in the Model 86601A. Mixer I mixes the 500 MHz and the 20 MHz signals to produce a 450 MHz output. The 450 MHz signal is amplified and filtered and then coupled to Mixer

II where it is mixed with the 20 to 30 MHz signal from the mainframe SL1 Loop to provide a 450 to 460 MHz output. The output of Mixer II is filtered and amplified, and in the AM mode, modulated before it is coupled to Mixer III. In Mixer III the 450 to 460 MHz signal is mixed with the 350 to 450 MHz signal to produce the final output frequency which is between .01 and 109.999999 MHz (01 to 109.9999 MHz when option 004 mainframe is used).

8-7. The output of Mixer III is coupled through two 120 MHz low pass filters and a pre-amplifier to the power amplifier.

8-8. The power amplifier assembly contains an Automatic Gain Control circuit which controls a feedback amplifier in the leveling loop. Code 1 and Code 2 inputs from the mainframe DCU operate an electronic band switch to aid in leveling the rf output across the output range.

8-9. Three attenuators are used to control the output level of the Model 86601A. These attenuators function as follows:

- a. In the local mode a 150 dB programmable attenuator, OUTPUT RANGE, controls the output level from +10 dBm to -140 dBm in 10 dB steps. A VERNIER control adds the capability of setting the output level to +13 dBm and to other points between the 10 dB steps.

- b. In the remote mode the 150 dB programmable attenuator is remotely controlled and the front panel controls (OUTPUT RANGE and VERNIER) are inoperative. A 1 dB per step programmable attenuator in the Model 86601A is remotely programmed to set the output level between the 10 dB steps of the 150 dB attenuator

#### 8-10. RECOMMENDED TEST EQUIPMENT

8-11. Test equipment and accessories required to maintain the Model 86601A are listed in the Maintenance Allocation Chart. Substitute test equipments are listed in Table 1-2.

#### 8-12. TROUBLESHOOTING

8-13. Troubleshooting procedures are divided into two maintenance levels in this manual.

8-14. The first maintenance level is designed to utilize the Hewlett-Packard Module Exchange Program. A troubleshooting tree enables a relatively inexperienced technician to isolate the cause of a malfunction to a circuit board or assembly. A factory-repaired replacement for the defective circuit board or assembly may be ordered through the nearest HP Sales and Service office using the special part numbers listed in Table 6-1. Refer to paragraph 8-18 and to figure 8-2 for additional information relative to the Module Exchange Program.

8-15. The second maintenance level involves repairing the instrument to the component level. The troubleshooting tree, in addition to aiding in the detection of faulty circuit boards or assemblies, also refers the technician to the appropriate service sheets to be used if repairs are to be accomplished to the component level. Circuit descriptions and test procedures for this maintenance level are located on the page facing the schematic diagram of the circuit to be repaired.

8-16. If the cause of a malfunction is found and remedied in any circuit containing adjustable components, the applicable adjustment procedure in Section V of this manual should be performed.

#### 8-17. REPAIR

8-18. **Module Exchange.** This instrument, because of its modular design, may be repaired by simply replacing a defective module. Modular design is a method of construction that groups individual circuits on a replaceable assembly. Modular design, coupled with a factory-repaired module exchange program, eliminates the need to repair to the component level. Factory-repaired modules are available on an exchange-for-credit basis that reduces module cost substantially below the cost of a new module.

8-19. This manual provides a procedure which enables the technician to quickly isolate the cause of a malfunction to a defective module.

8-20. Exchange modules should be ordered by the exchange numbers shown in Table 6-1 from the nearest HP Sales and Service office.

8-21. Figure 8-2 illustrates the module exchange program.

#### NOTE

Do not send a defective module to the HP office until the replacement module is received.

8-22. **Voltage Requirements.** All power required to operate the Model 86601A is provided by the mainframe.

8-23. **Servicing Aids on Printed Circuit Boards.** Servicing aids on printed circuit boards include test points, transistor and integrated circuit reference designations, adjustment callouts and assembly stock numbers.

8-24. **Circuit Board Extenders.** Circuit board extenders are provided with the mainframe. These extender boards enable the technician to extend plug-in boards clear of the assembly to provide easy access to components and test points. See Figure 8-3 for a typical example of extender board Use.

8-25. **Diagram Notes.** Table 8-1, Schematic Diagram Notes, provides information relative to symbols and values shown on the schematic diagrams.

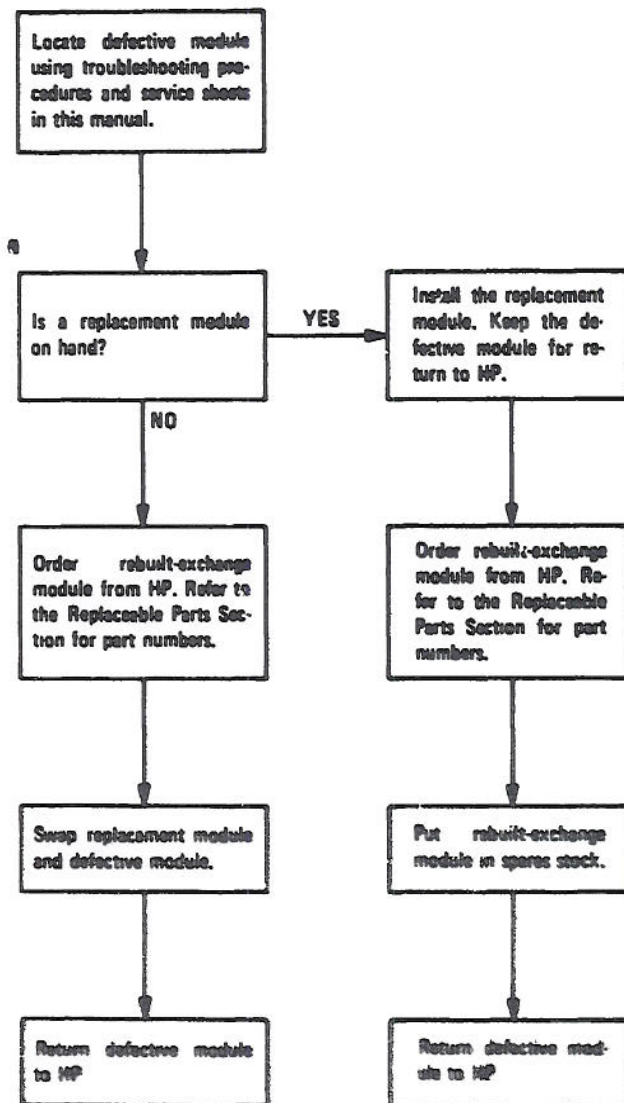
8-26. **Part Location Aids.** The locations of chassis mounted parts and major assemblies are shown in Figure 8-6. The locations of individual components mounted on printed circuit boards or other assemblies are shown on the appropriate schematic page or on the page opposite it. The part reference designator (as listed in Section VI) is the assembly designation plus the part designation (Example A10R1 is R1 on the A10 assembly). For specific component descriptions refer to the parts list in Section VI of this manual.

8-27. Table 8-2 lists all assemblies and provides location information for photos, schematics, etc.

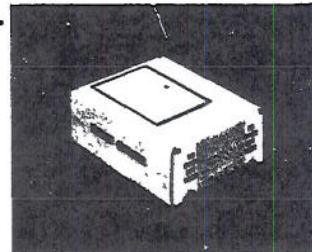
8-28. **Integrated Circuits.** Integrated circuit packaging is shown in Figure 8-5. Many types of IC's are used in the Model 86601A. In order to avoid duplicating information on the individual schematics, all IC outlines and pin numbers are shown in Figure 8-5.



The module exchange program described here is a method of keeping your Hewlett-Packard instrument in service without repairing the instrument to the component level.



A.



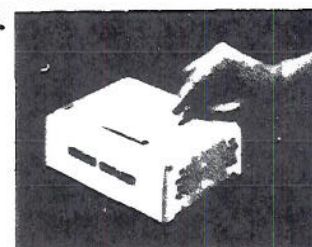
Rebuilt-exchange modules are shipped individually in boxes like this. In addition to the circuit module, the box contains:  
Module repair report  
Return address label  
Tape for resealing box

B.



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

C.



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

Figure 8-2. Diagram of Module Exchange Program



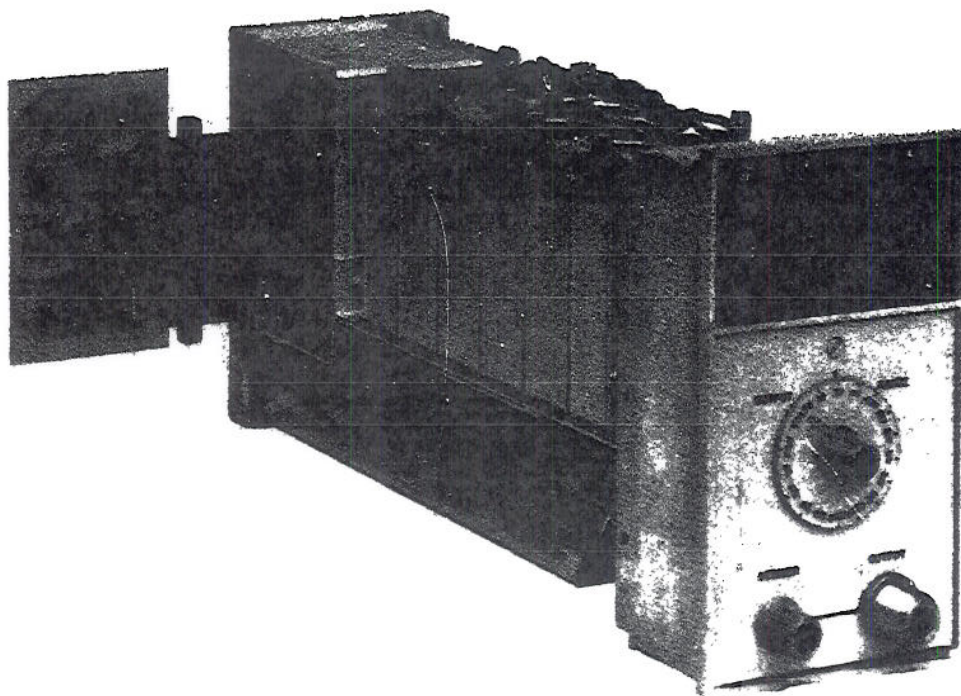


Figure 8-3. *Model 86601A with Circuit Board Extended for Maintenance*

Table 8-1. Schematic Diagram Notes

**SCHEMATIC DIAGRAM NOTES**

|                                                                                                                |                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inductance is in microhenries, Resistance is in ohms and Capacitance is in microfarads unless otherwise noted. |                                                                                                                                                                                                                                                                                                 |
| <b>P/O</b>                                                                                                     | part of                                                                                                                                                                                                                                                                                         |
|                               | Screwdriver Adjustment                                                                                                                                                                                                                                                                          |
|                               | Encloses Front Panel designations                                                                                                                                                                                                                                                               |
|                              | Encloses Rear Panel designations                                                                                                                                                                                                                                                                |
|                               | Circuit assembly borderline                                                                                                                                                                                                                                                                     |
|                               | Other assembly borderline                                                                                                                                                                                                                                                                       |
|                               | Wiper moves toward CW with clockwise rotation of control as viewed from shaft or knob.                                                                                                                                                                                                          |
|                               | Numbers in stars on circuit assemblies show locations of test points                                                                                                                                                                                                                            |
|                               | Encloses WIPE color code. Code used (MIL-STD-681) is the same as the resistor color code. First number identifies the base color, second number the wider stripe, and the third number the narrower stripe. Example: <b>(947)</b> denotes white base, yellow wide stripe, violet narrow stripe. |
|                             | Indicates an output from a schematic that goes to an input identified as  on Service Sheet 2                                                                                                               |
|                             | Indicates an input to a schematic that comes from an output identified as  on Service Sheet 6                                                                                                              |
|                             | Indicates Circuit ground                                                                                                                                                                                                                                                                        |

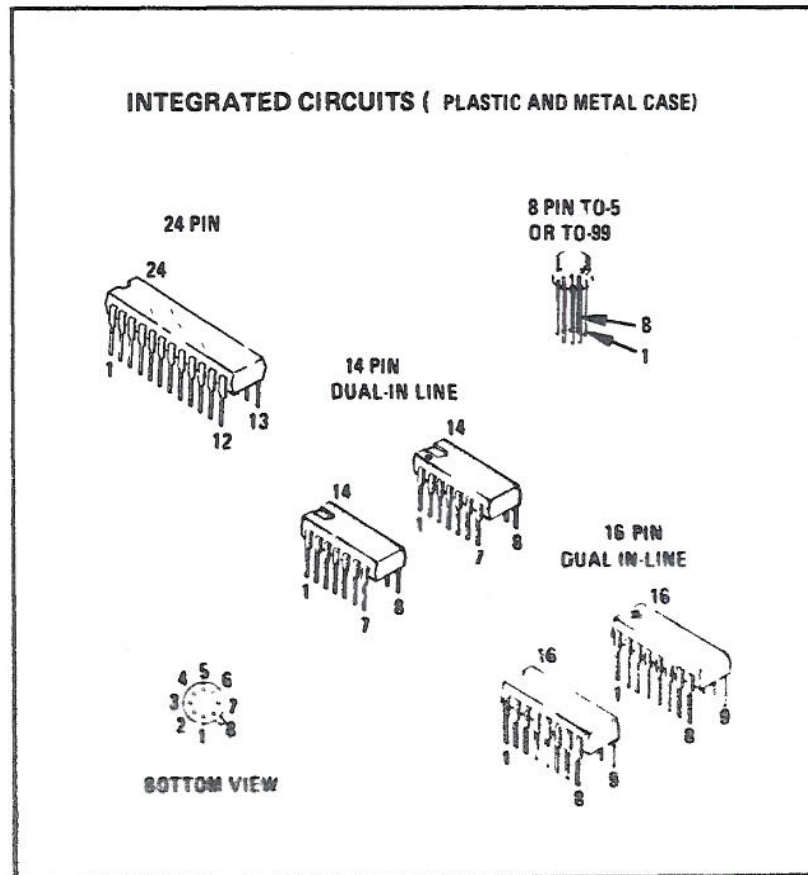


Figure 8-4. *Integrated Circuit Packaging*



Table 8-2. Assembly Locations

| Assy No. and Description    | Service Sheet |
|-----------------------------|---------------|
| A1 Front Housing            |               |
| A2 Power Amplifier          | 3             |
| A3 Feedback Amplifier       | 4             |
| A4 480 MHz Bandpass Filter  | 2             |
| A5 Modulator Assembly       | 2             |
| A6 Pre-amplifier            | 3             |
| A7 Mother Board             | 2             |
| A8 Attenuator Driver        | 6             |
| A9 Reference Assembly       | 4             |
| A10 Logic Assembly          | 5             |
| A11 Rear Connector Assembly |               |
| A12 Out Filter              | 2             |
| A13 Programmable Attenuator | 6             |
| A15 Mixer II                | 2             |
| A16 Mixer II                | 2             |
| A17 Mixer I                 | 2             |
| A18 Mixing Horns            |               |
| A19 Mixing Horns            |               |
| A20 Filter                  |               |

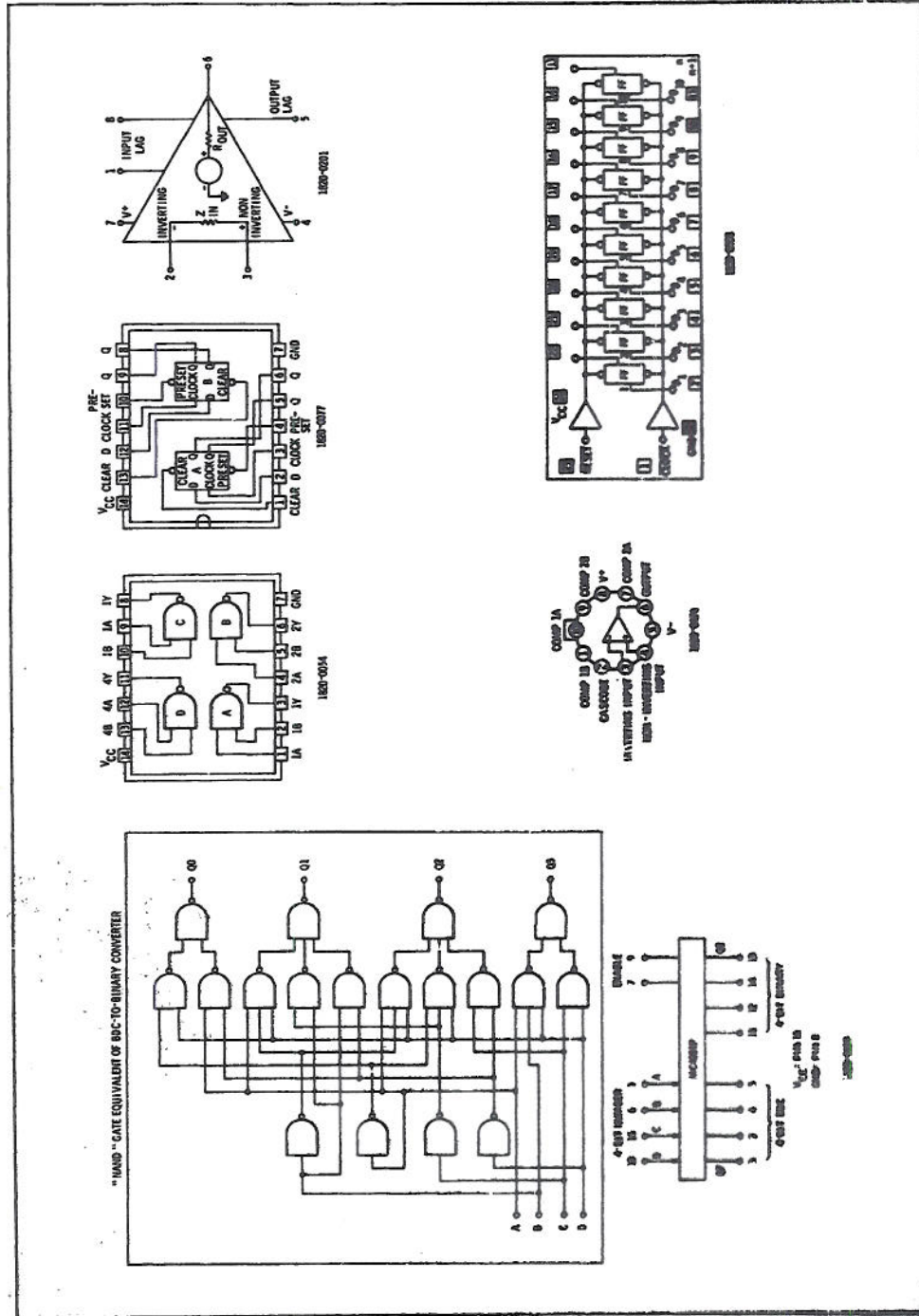
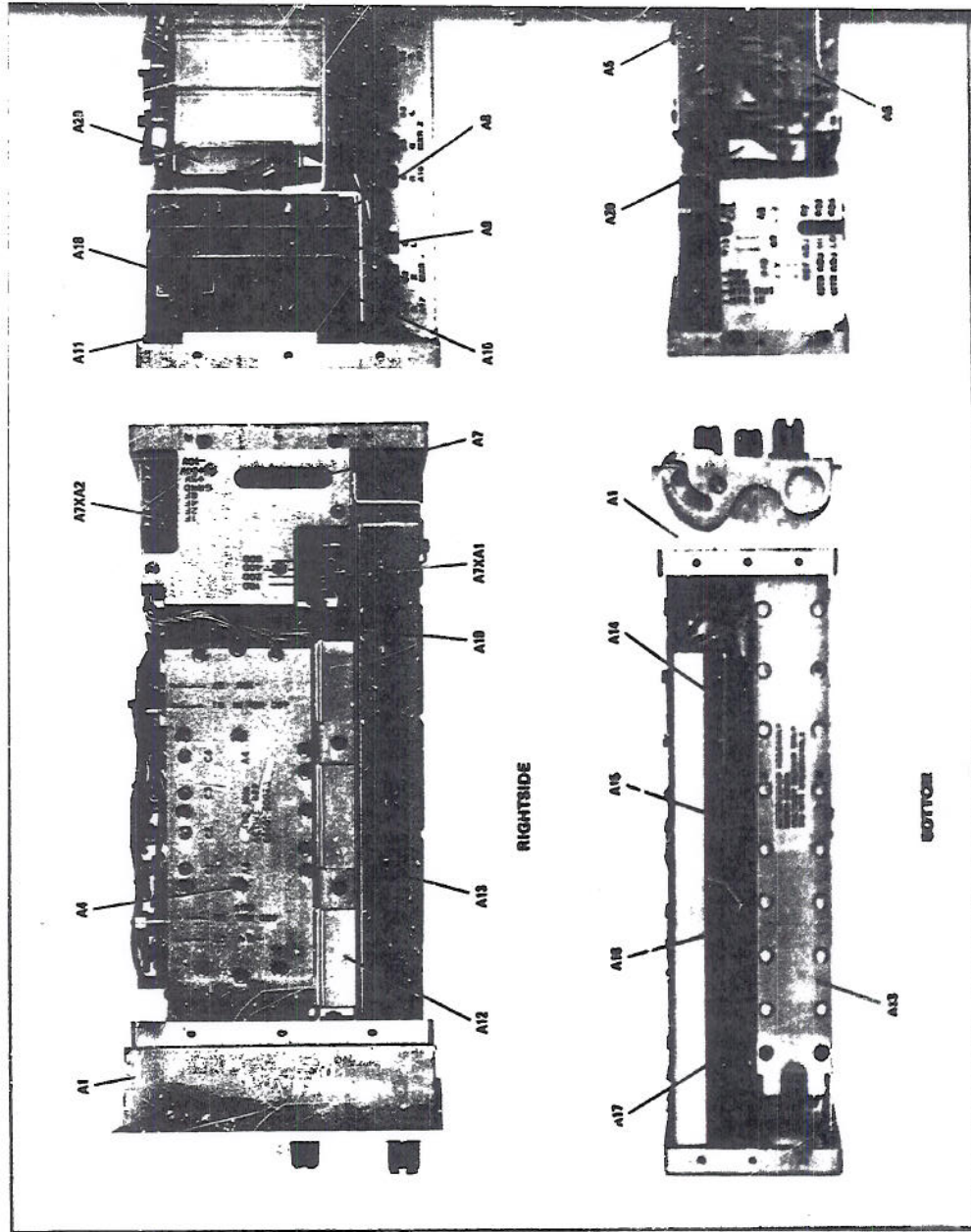


Figure 8-5. Integrated Circuits used in Model 86601A

Table 5-8. Assembly Locations

| Assy No. and Description    | Service Sheet | Photo Figure B-4 |
|-----------------------------|---------------|------------------|
| A1 Front Housing            |               | 6, 21            |
| A2 Power Amplifier          | 3             | 6, 19            |
| A3 Feedback Amplifier       | 4             | 6, 22            |
| A4 480 MHz Bandpass Filter  | 2             | 6, 13            |
| A5 Modulator Assembly       | 2             | 6, 16            |
| A6 Pre-amplifier            | 3             | 6, 18            |
| A7 Mother Board             | 2             | 6, 10            |
| A8 Attenuator Driver        | 6             | 6, 27            |
| A9 Reference Assembly       | 4             | 6, 23            |
| A10 Logic Assembly          | 5             | 6, 25            |
| A11 Rear Connector Assembly |               | 1                |
| A12 Dual Filter             | 2             | 6, 15            |
| A13 Programmable Attenuator | 6             | 6                |
| A15 Mixer III               | 2             | 6                |
| A16 Mixer II                | 2             | 6                |
| A17 Mixer I                 | 2             | 6                |
| A18 Mixing Network          |               | 6                |
| A19 Mixing Network          |               | 6                |
| A20 Filter                  |               | 6, 14            |



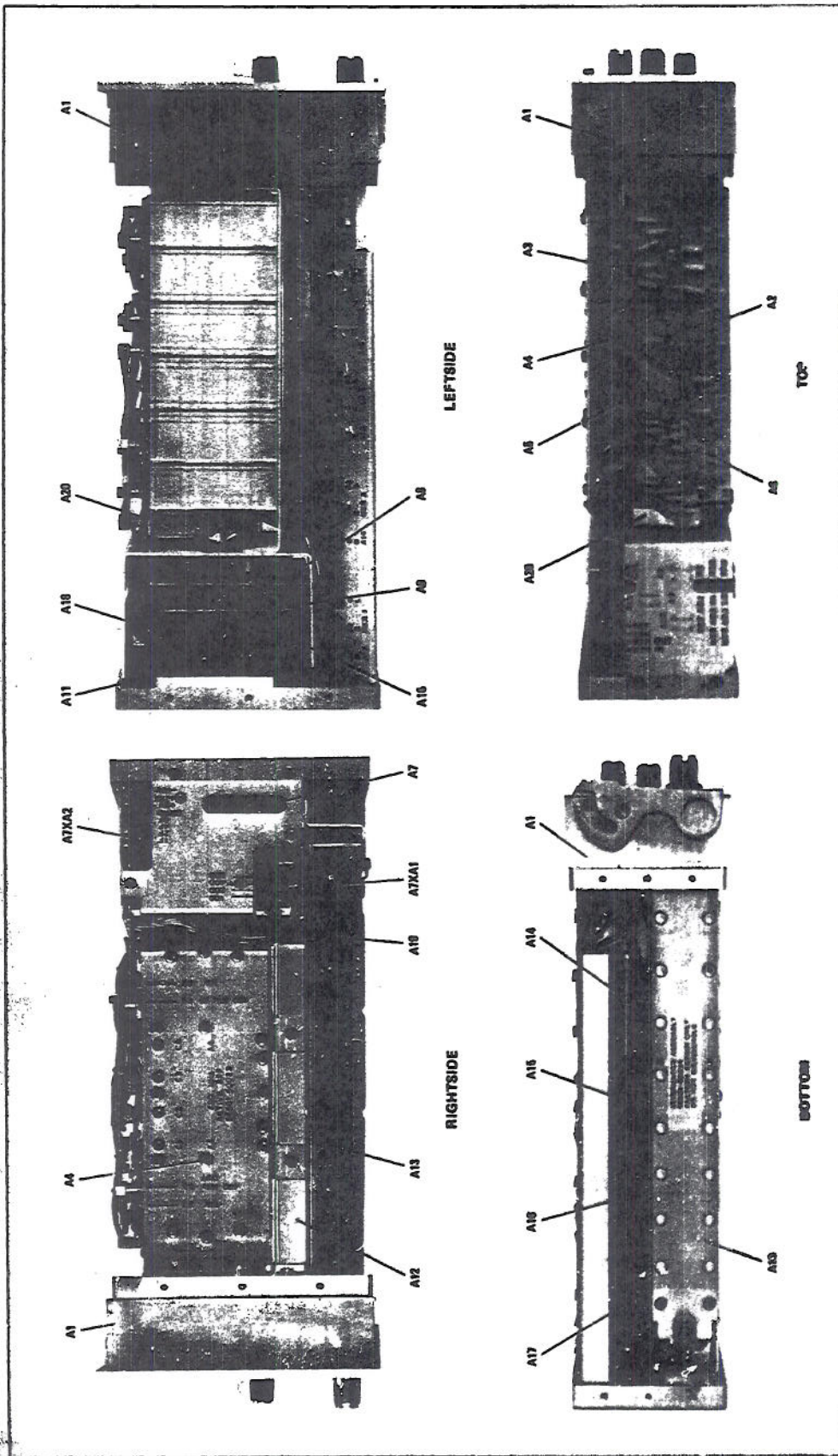
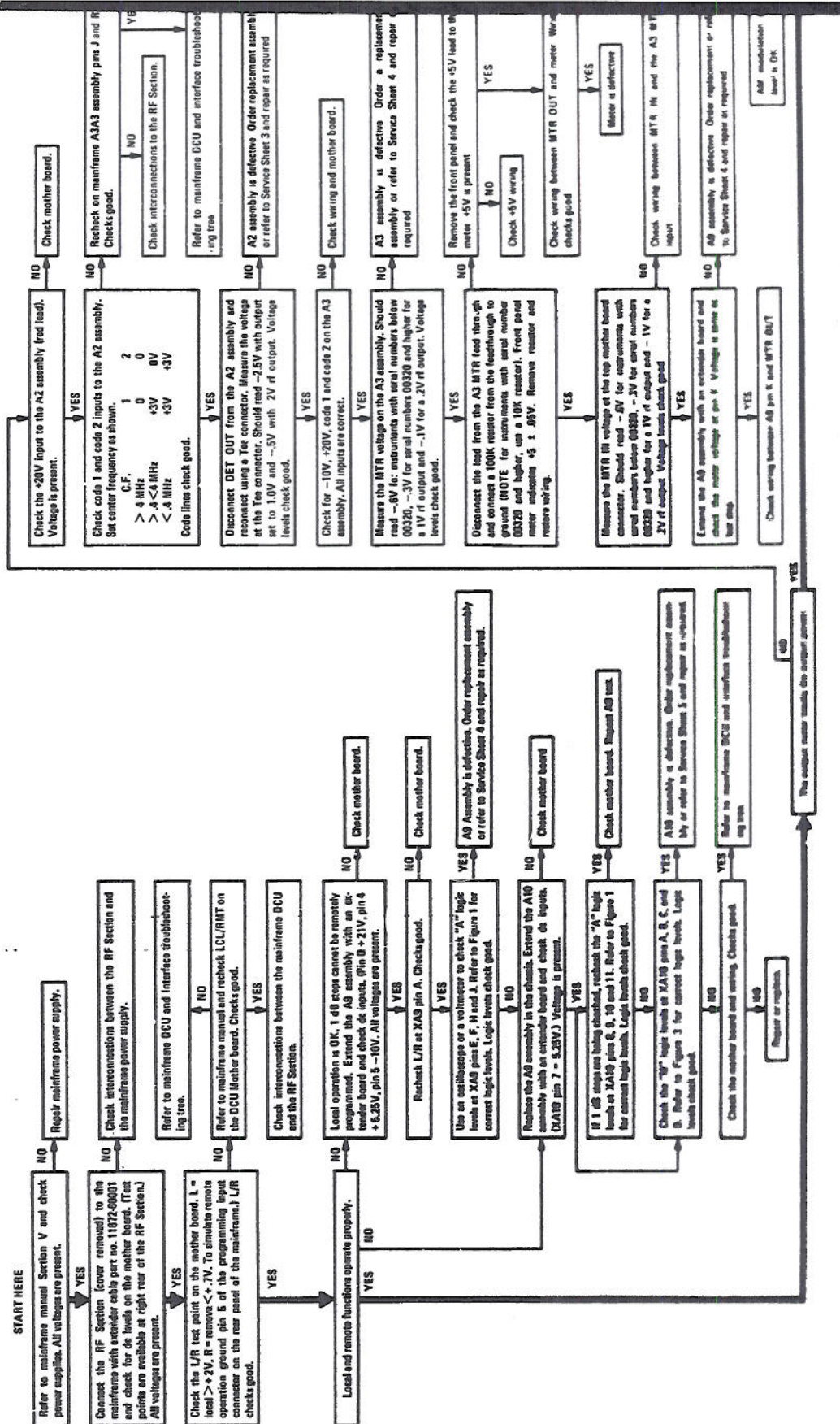


Figure 8-6. Chassis M-ventilator Parts and Assembly Locations









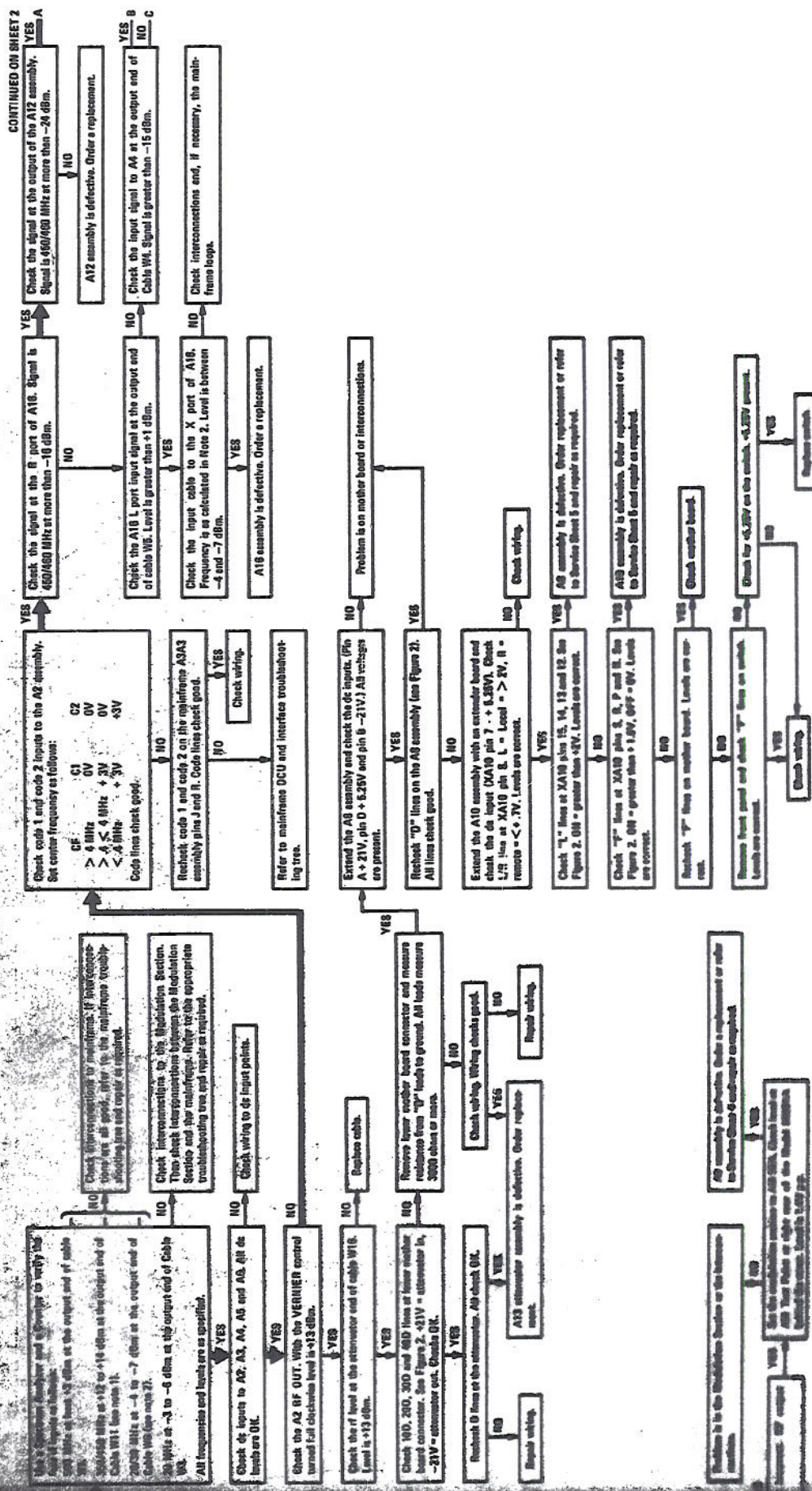


Figure 8-7. Model 86601A Troubleshooting Flow (1 of 2)





1. The output frequency from the high frequency section in the mainframe can be determined by subtracting number 1 of digit 0 and digit 0 from 450 MHz. Example: programmed frequency is 70 MHz.

The output frequency is 300 MHz.

2. The output frequency of the SLS loop may be determined by substituting the last 7 digits of the programmed frequency from 39,600000 MHz. Example: programmed frequency is 3,601321 MHz.

in *Artemisia* L. V.

Figure 1

"A" lines chd.

ON -> +2V OFF -< +.7V

1 40 atoms steps

|    |   |   |   |   |
|----|---|---|---|---|
| +3 | 0 | 4 | 2 | 1 |
| +2 | 0 | 0 | 0 | 0 |
| +1 | 0 | 0 | 1 | 0 |
| 0  | 0 | 0 | 1 | 1 |
| -1 | 0 | 1 | 0 | 0 |
| -2 | 0 | 1 | 0 | 1 |
| -3 | 0 | 1 | 1 | 1 |
| -4 | 0 | 1 | 0 | 0 |
| -5 | 1 | 0 | 0 | 1 |

DCO

**Figure 2**

|                                   | 8CD     |
|-----------------------------------|---------|
| "D" lines ON = +21V, OFF = -21V   | 6 4 2 1 |
| "L" lines ON = > +3V, OFF = < -3V | 0 0 0 0 |
| "P" lines ON = +1.8V, OFF = -1.7V | 0 0 0 1 |
|                                   | 0 0 1 1 |
|                                   | 0 1 0 0 |
|                                   | 0 1 1 1 |
|                                   | 0 1 1 0 |
|                                   | 0 1 1 1 |
|                                   | 0 1 1 1 |
|                                   | 0 1 0 0 |
|                                   | 1 0 0 1 |
|                                   | 1 0 1 1 |
|                                   | 1 0 1 1 |
|                                   | 1 1 0 0 |
|                                   | 1 1 0 1 |
|                                   | 1 1 1 0 |
|                                   | 1 1 1 1 |

Figure 2

"M"  
 the  
 with  
 See  
 See

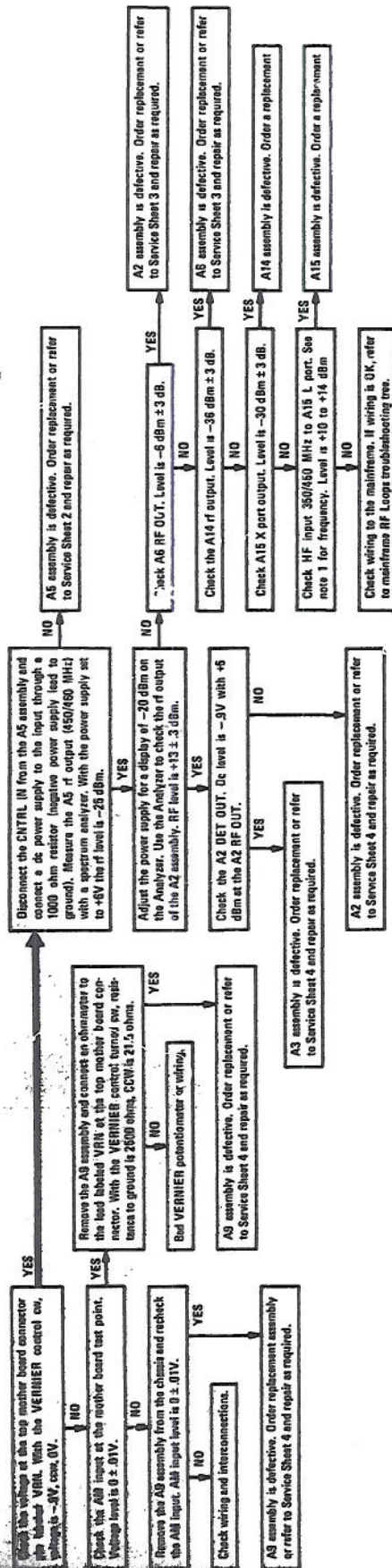


Figure 3

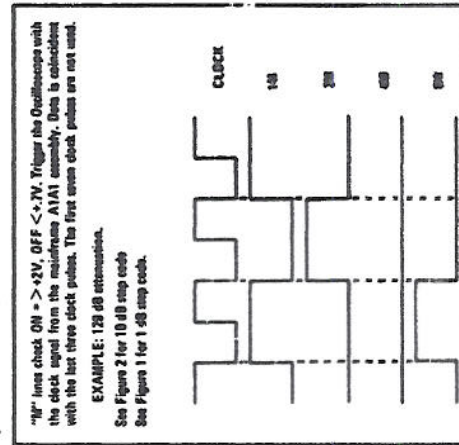
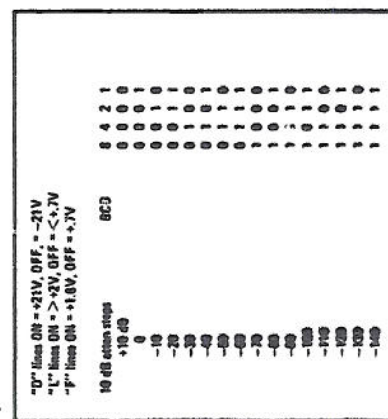


Figure 2

Figure 8-7. Model 88001A Troubleshooting Tree 1 of 2  
8-9

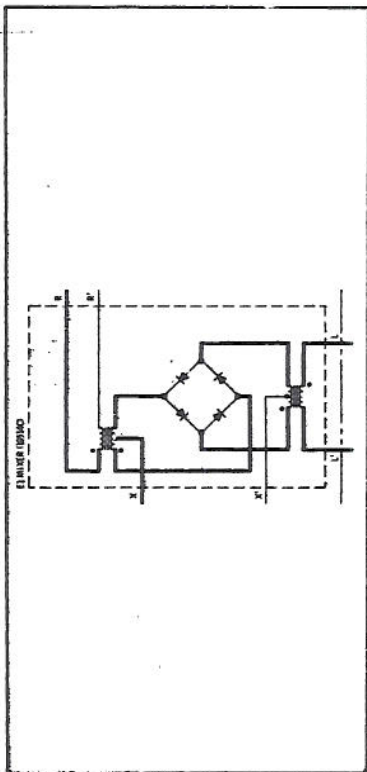


Figure 8-9. Mixer Schematic Diagram

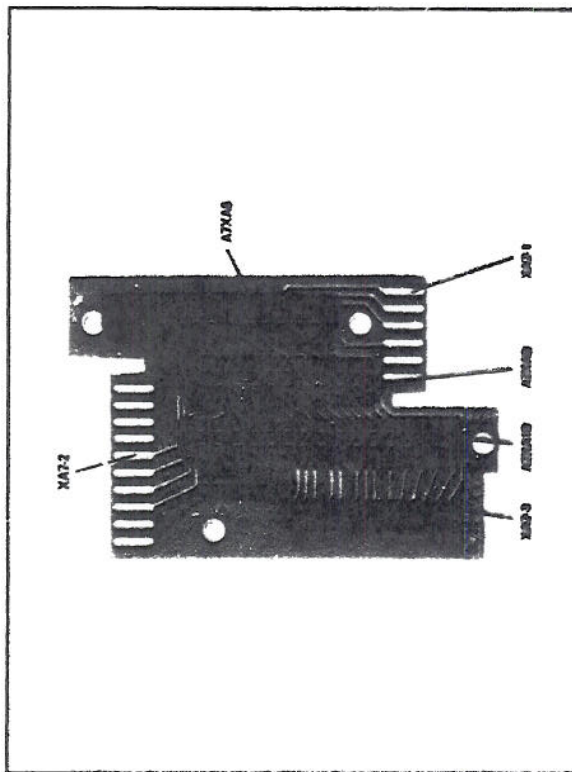


Figure 8-10. Mixer Board Component Locations

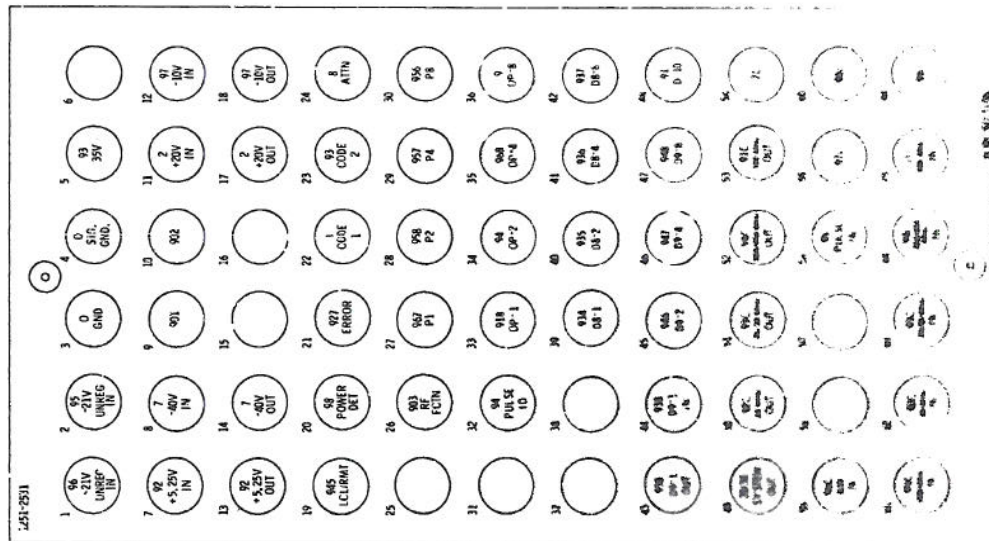
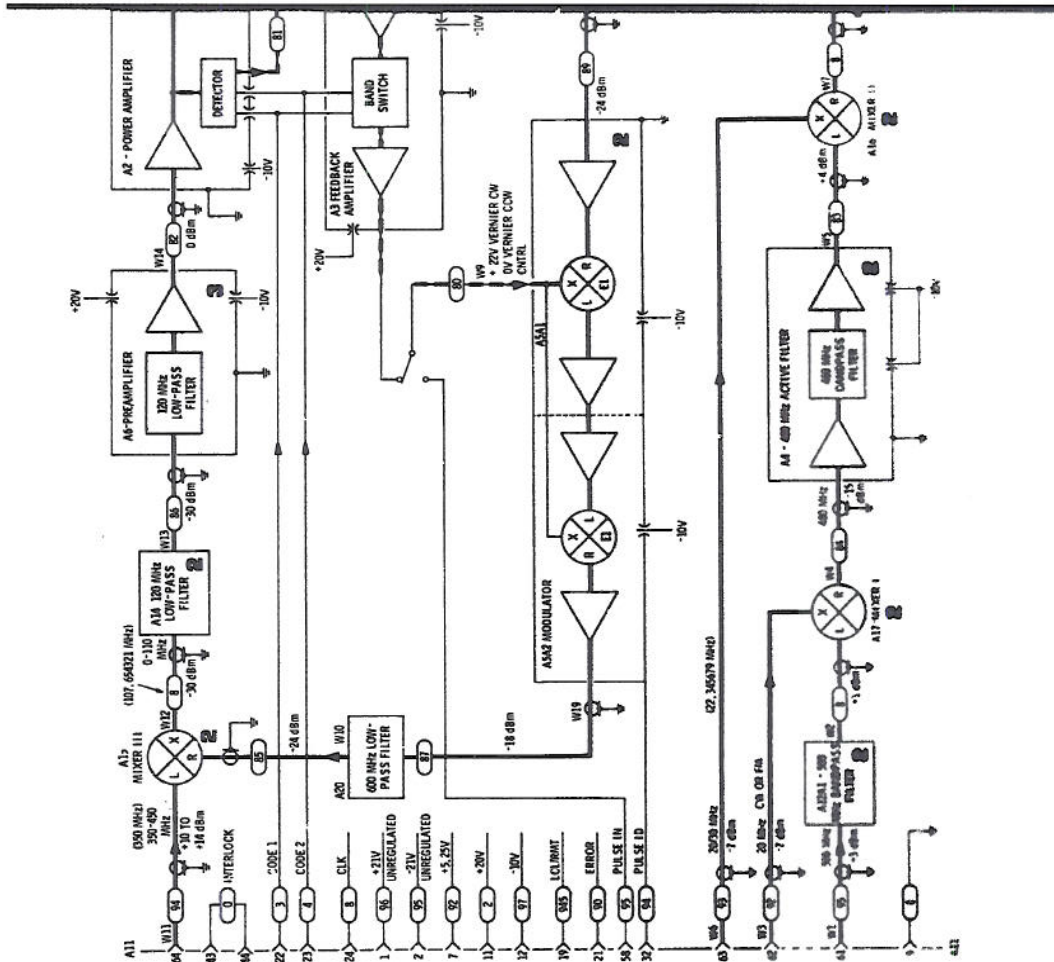


Figure 8-11. Input Connector

NOTE: 1. PIN NUMBERS 1-50. 2. INCLUDE PINS. 3. 20MA PINS ARE HE PA. 4. 20MA PINS ARE HE PA. 5. 20MA PINS ARE HE PA. 6. 20MA PINS ARE HE PA. 7. 20MA PINS ARE HE PA. 8. 20MA PINS ARE HE PA. 9. 20MA PINS ARE HE PA. 10. 20MA PINS ARE HE PA. 11. 20MA PINS ARE HE PA. 12. 20MA PINS ARE HE PA. 13. 20MA PINS ARE HE PA. 14. 20MA PINS ARE HE PA. 15. 20MA PINS ARE HE PA. 16. 20MA PINS ARE HE PA. 17. 20MA PINS ARE HE PA. 18. 20MA PINS ARE HE PA. 19. 20MA PINS ARE HE PA. 20. 20MA PINS ARE HE PA. 21. 20MA PINS ARE HE PA. 22. 20MA PINS ARE HE PA. 23. 20MA PINS ARE HE PA. 24. 20MA PINS ARE HE PA. 25. 20MA PINS ARE HE PA. 26. 20MA PINS ARE HE PA. 27. 20MA PINS ARE HE PA. 28. 20MA PINS ARE HE PA. 29. 20MA PINS ARE HE PA. 30. 20MA PINS ARE HE PA. 31. 20MA PINS ARE HE PA. 32. 20MA PINS ARE HE PA. 33. 20MA PINS ARE HE PA. 34. 20MA PINS ARE HE PA. 35. 20MA PINS ARE HE PA. 36. 20MA PINS ARE HE PA. 37. 20MA PINS ARE HE PA. 38. 20MA PINS ARE HE PA. 39. 20MA PINS ARE HE PA. 40. 20MA PINS ARE HE PA. 41. 20MA PINS ARE HE PA. 42. 20MA PINS ARE HE PA. 43. 20MA PINS ARE HE PA. 44. 20MA PINS ARE HE PA. 45. 20MA PINS ARE HE PA. 46. 20MA PINS ARE HE PA. 47. 20MA PINS ARE HE PA. 48. 20MA PINS ARE HE PA. 49. 20MA PINS ARE HE PA. 50. 20MA PINS ARE HE PA.





- NOTES:
1. PART NUMBERS SHOWN FOR CONNECTORS DO NOT INCLUDE PINS
  2. COAX PINS ARE HP PART NUMBER 1201-2011
  3. REGULAR PINS ARE HP PART NUMBER 1201-2011
  4. A TOOL KIT, WINCHESTER CATALOG NUMBER 1201-2011 AND A TOOL LOCATOR WINCHESTER CATALOG NUMBER 1201-2011 IS REQUIRED TO INSTALL COAX PINS.

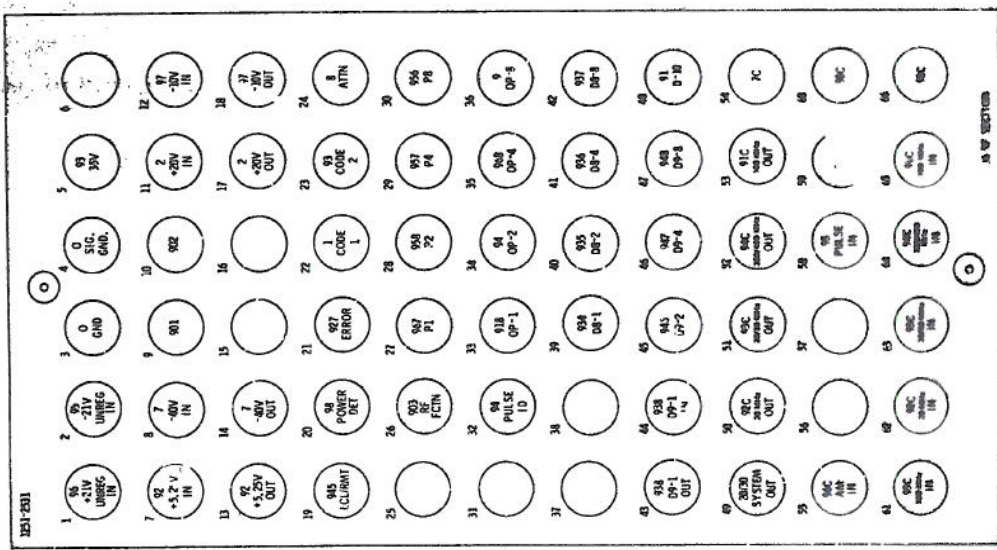


Figure 8-11. Radio Connector

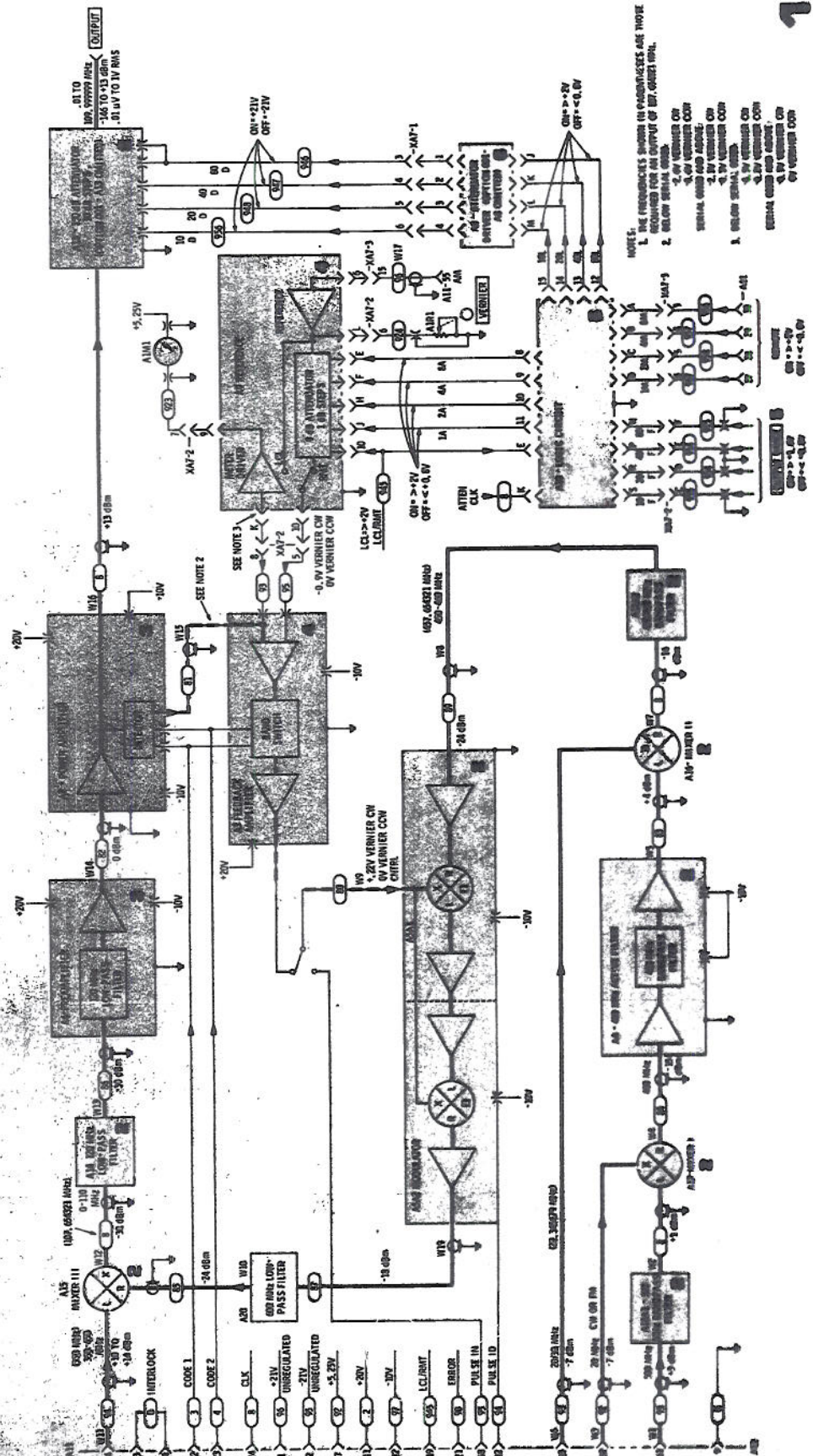


Figure 8-12. Model 60001A Block Diagram



## SERVICE SHEET 2

### INPUT SIGNAL PROCESSING

Normally, curves of a malfunction in the Model 8601A will be isolated to a circuit board or assembly as a result of performing the tests specified in the troubleshooting chart.

When trouble has been isolated to a specific circuit board or assembly it should be removed and retested in a position which provides easy access to test points and components. In some cases this may be accomplished by using extension boards; in others, it will be necessary to reconnect rf and dc inputs and outputs with the assembly removed from the housing in which it is normally contained.

### TEST EQUIPMENT REQUIRED (See Table 1-2)

Digital Voltmeter ..... Low Voltage Power Supply  
Electronic Counter ..... Spectrum Analyzer  
Vector Voltmeter

### GENERAL INFORMATION

The circuits shown and described on Service Sheet 3 convert the 4 inputs from the mainframe, by means of mixing and filtering processes, to the selected output frequency. The various filters greatly reduce harmonic signals, undesired mixing products, and spurious signals. The amplifier between the mixers compensates for the insertion losses of the filters and mixers.

#### 500 MHz BANDPASS FILTER (A12A1)

The 500 MHz bandpass filter effectively traps all harmonics of the 500 MHz input signal and the 100 MHz signal from which it is derived. Insertion loss is about 2 dB and the bandwidth is typically 3 MHz at 3 dB points on the response curve.

#### MIXER I (A17)

Mixer I is a matched-quad-diode double-balanced mixer. The inputs to the mixer are the precise 500 MHz output from the reference section in the mainframe and a precise 20 MHz signal from the reference section in the mainframe or a 20 MHz signal which is generated in the modulator section plug-in. Both of the input signals are balanced out in the mixer and only the sum and difference signals are available at the output port. The output of Mixer I is coupled to the A4 assembly.

#### 400 MHz ACTIVE FILTER (A4)

The A4 active filter consists of two identical two-stage tuned amplifiers separated by a bandpass filter. Each of the two-stage amplifiers has a gain of about 10 dB. The filter has an insertion loss of about 3 dB and the bandwidth is typically 6 MHz at 3 dB points on the response curve.

#### MIXER II (A18)

Mixer II is the same as Mixer I. This mixer mixes the 400 MHz signal from the A4 assembly with a signal between 30.000001 and 30.000000 MHz from the SLL loop in the mainframe. The difference signal (400/400MHz) at the output port is coupled to the A12A3 assembly.

#### 400/400 MHz BANDPASS FILTER (A12A3)

The A12A3 400/400 MHz bandpass filter has an insertion loss of about 5 dB. The preband is centered at 405 MHz and typically is 12 MHz at 2 dB points on the response curve.

#### MODULATOR ASSEMBLY (A8)

The signal from the 400/400 MHz bandpass filter is coupled to the A5 modulator assembly. A two-stage amplifier amplifies the signal before it is coupled to the 1 port of a double balanced mixer (B3) which acts as an attenuator to control the output level of the 60001A.

## SERVICE SHEET 2 (cont'd)

When the instrument is operated in the CW or FM modes the input to the X port of E1 is dc bias level that is controlled by the leveling loop and the reference assembly. Its purpose is to assure that the rf output from the instrument remains constant at a specific level.

When the instrument is operated in the AM mode, an ac modulating signal is superimposed on the dc bias level to the X port of E1. The amplitude of the ac signal controls the percentage of modulation of the Model 8601A output rf signal.

The output of the modulator is applied through a 600 MHz lowpass filter (A20) which has an insertion loss of about 7 dB and a 4 dB pad to Mixer III.

#### MIXER III (A15)

Mixer III is the same as Mixers I and II. This mixer mixes the 450/460 MHz output of the A5 assembly with a 350/450 MHz (10 MHz steps) from the high frequency loop in the mainframe. The output of Mixer III is between .01 and 110 MHz. The exact output frequency is selected by the mainframe in increments as low as 1 Hz except when the mainframe is an option 004 instrument. Mainframe option 004 limits frequency selection to 100 Hz increments (frequency selection is still exact).

#### 120 MHz LOWPASS FILTER (A14)

The output of Mixer III is applied to the pre-amplifier (A6 shown on Service Sheet 3) through a 120 MHz lowpass filter. This filter sharply attenuates all harmonic and spurious signals above 120 MHz. Insertion loss for signals below 120 MHz is typically less than 1 dB.

### NOTES

1. Verify the presence of dc operating voltages before taking other measurements. If dc voltages are not present check connections to the mainframe. If interconnections are good refer to the mainframe manual and make necessary repairs.
2. All measurements are taken with the Spectrum Analyzer unless otherwise specified.

### TEST PROCEDURE

Test 1-a. Measure the amplitude of the 500 MHz signal at the output end of W3. If the amplitude is greater than, or equal to +1 dBm, proceed to test 2-a. If the amplitude is less than +1 dBm, proceed to test 1-b.

Test 1-b. Measure the amplitude of the 500 MHz signal at the output end of cable W1. If the amplitude is equal to, or greater than +2 dBm, use a counter to verify that the frequency is exactly 500 MHz. If the amplitude and frequency are correct, repair or replace the A12 assembly or cable W2. If the specified signal is not present check cable W1. If Cable W1 is good, refer to the mainframe manual. Trouble is in the mainframe reference section or in interconnections.

## SERVICE SHEET 2 (cont'd)

### TEST PROCEDURE

Test 2-a. Measure the 480 MHz signal at the output end of Cable W4. If the amplitude is -14 dBm,  $\pm 2$  dB, proceed to test 3-a. If the amplitude is low, proceed to test 2-b.

Test 2-b. Measure the amplitude of the 20 MHz signal at the output end of cable W3. If the amplitude is -5 dBm  $\pm 1$  dB, use a counter to verify that the frequency is exactly 20 MHz (instrument operating in CW or AM mode). If the amplitude and frequency are correct, replace the A17 assembly or cable W4. If the specified signal is not present check cable W3. If cable W3 is good, refer to the mainframe manual; trouble is in the mainframe reference section or in interconnections.

### NOTE

The 20 MHz signal is coupled to the Model 8601A through the Modulation drawer. A modulation or Auxiliary section must be in place in the modulator drawer.

### TEST PROCEDURE q

Test 3-a. Measure the amplitude of the 480 MHz signal at the output end of cable W5. If the signal is equal to, or greater than, +1 dBm, proceed to test 4-a. If the amplitude is low, proceed to test 3-b.

3-b. Measure the 480 MHz signal at the output of the A4 assembly at J1.

### TEST PROCEDURE

Test 4-a. Measure the 450/460 MHz signal at the output end of cable W7. If the amplitude is -14 dBm  $\pm 2$  dB, proceed to TEST PROCEDURE 5. If the amplitude is low, proceed to Test 4-b.

Test 4-b. Measure the 30/30 MHz signal at the output end of cable W8. The amplitude should be -6 dBm  $\pm 2$  dB. Use the counter to check the frequency at the output end of cable W6.

### NOTE

The 20/30 MHz frequency may be determined by subtracting thumbwheel digits 1 through 7 from 30.000000 MHz. EXAMPLE: Thumbwheels are set to 0107.654321 MHz.

30.000000  
- 7.654321  
22.345679

If the signal amplitude and frequency are correct, repair or replace Mixer II or cable W7



# SERVICE SHEET 2 (cont'd)

Test 7-b. Measure the signal at the output end of cable W13. The signal should be  $-50 \pm 3$  dBm at the center frequency selected by the mainframe.

If the signal is not present, check the 120 MHz low pass filter and cable W13.

# SERVICE SHEET 2 (cont'd)

If the signal is missing or level is low, check cable W6; if W6 is good the problem is in the mainframe.

If the frequency is incorrect, trouble is in the mainframe.

## TEST PROCEDURE

Test 8-a. Measure the 460/460 MHz signal at the output end of cable W8. If the amplitude is  $-23$  dBm  $\pm 2$  dB, proceed to TEST PROCEDURE 9. If the amplitude is low, repair or replace the A13 bandpass filter of cable W8.

## TEST PROCEDURE

Test 9-a. Measure the signal at the output end of cable W10. If the signal is equal to or greater than  $-23$  dBm, proceed to TEST PROCEDURE 7. If the signal is less than  $-23$  dBm, proceed to test 6-b.

Test 6-b. Disconnect the CNTRL IN lead from the AS assembly and connect a power supply in its place (0 volts initially, 1000 ohms in series with positive lead, negative lead to ground). Monitor the output of cable W10 and slowly raise the power supply output to about 600 millivolts. If the signal at the output end of cable W10 is now about  $-23$  dBm, the problem is in the feedback loop or associated circuits; refer to Service Sheet 3. If the output signal did not increase with application of the dc level, proceed to Test 6-c.

Test 6-c. Remove the A5 assembly from the chassis and reconnect the leads. NOTE: Be sure to use an insulating material between the assembly and the chassis to avoid damage to the circuit.

Connect the Vector Voltmeter channel A input to the RF IN at J2 and lock the meter to the signal. Use the Vector Voltmeter channel B probe to trace the signal through the assembly.

When repairs are completed the A3 and A6 assembly adjustment procedures should be performed.

## TEST PROCEDURE

Test 7-a. Measure the signal at the output end of cable W12. The signal should be  $-50 \pm 3$  dBm at the center frequency selected by the mainframe.

If the correct signal is present proceed to Test 7-b.

If the correct signal is not present, check Mixer III, the 350/460 MHz input from the mainframe (W11) and cables W11 and W12.

## NOTE

The 350/460 MHz frequency may be determined by subtracting digits 8 and 9 from 460 MHz. (Digit 0 is always a zero or a one.) Example: Thumbwheel are set to 0107.664321 MHz.

460.000000

1 10 000000  
000 000000 MHz

# SERVICE SHEET 2 (cont'd)

## TEST PROCEDURE

Test 2-a. Measure the 490 MHz signal at the output end of Cable W4. If the amplitude is  $-14$  dBm  $\pm 2$  dB, proceed to test 3-a. If the amplitude is low, proceed to test 2-b.

Test 2-b. Measure the amplitude of the 30 MHz signal at the output end of cable W3. If the amplitude is  $-5$  dBm  $\pm 1$  dB, use a counter to verify that the frequency is exactly 30 MHz (instrument operating in CW or AM mode). If the amplitude and frequency are correct, replace the A17 assembly of cable W4. If the specified signal is not present check cable W3. If cable W3 is good, refer to the mainframe manual; trouble is in the mainframe reference section or in interconnections.

## NOTE

The 30 MHz signal is coupled to the Model 88601A through the Modulation drawer. A modulation or Auxiliary section must be in place in the modulator drawer.

## TEST PROCEDURE

Test 3-a. Measure the amplitude of the 480 MHz signal at the output end of cable W6. If the signal is equal to, or greater than,  $+1$  dBm, proceed to test 4-a. If the amplitude is low, proceed to test 3-b.

3-b. Measure the 480 MHz signal at the output of the A4 assembly at J1.

## TEST PROCEDURE

Test 4-a. Measure the 460/460 MHz signal at the output end of cable W7. If the amplitude is  $-14$  dBm  $\pm 2$  dB, proceed to TEST PROCEDURE 8. If the amplitude is low, proceed to Test 4-b.

Test 4-b. Measure the 20/30 MHz signal at the output end of cable W8. The amplitude should be  $-6$  dBm  $\pm 2$  dB. Use the counter to check the frequency at the output end of cable W8.

## NOTE

The 20/30 MHz frequency may be determined by subtracting thumbwheel digits 1 through 7 from 30.000000 MHz. Example: Thumbwheel are set to 0107.664321 MHz.

30.000000

7.664321

22.335679

If the signal amplitude and frequency are correct, repair or replace Mixer II or cable W7.

If the input signal is not present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

If the input signal is present, check the input filter and the input cable. If the input signal is present, check the input filter and the input cable.

# Check Diagram

If a warning or level is low, check cable W6; if W6 is in the mainframe.

Check the 400/450 MHz signal at the output end of cable W10. If the amplitude is  $-23 \text{ dBm} \pm 3 \text{ dB}$ , proceed to TEST PROCEDURE 6. If the amplitude is low, repair or replace the pass filter or cable W8.

Measure the signal at the output end of cable W10. If it is equal to or greater than  $-23 \text{ dBm}$ , proceed to PROCEDURE 7. If the signal is less than  $-23 \text{ dBm}$ , proceed to test 6-b.

Disconnect the CNTRL IN lead from the A5 assembly and set a power supply in its place (0 volts initially, 1000 series with positive lead, negative lead to ground). The output of cable W10 and slowly raise the power output to about 500 millivolts. If the signal at the output of cable W10 is now about  $-23 \text{ dBm}$ , the problem is in the loop or associated circuits; refer to Service Sheet 3. If the signal did not increase with application of the dc power, proceed to Test 6-c.

Remove the A5 assembly from the chassis and the leads. NOTE: Be sure to use an insulating material between the assembly and the chassis to avoid damage to the chassis.

Use the Vector Voltmeter channel A input to the RP IN at the meter to the signal. Use the Vector Voltmeter probe to trace the signal through the assembly.

When the A5 and A6 assembly adjustment is completed, the A5 and A6 assembly adjustment should be performed.

Measure the signal at the output end of cable W12. It should be  $-30 \pm 3 \text{ dBm}$  at the center frequency of the mainframe.

If the signal is present, proceed to Test 7-b.

If the signal is not present, check Meter III, the 300/400 MHz from the mainframe (W11) and cables W11 and W12.

## NOTE

300/400 MHz frequency may be determined by measuring the signal from 400 MHz. (Signal is change in frequency of 100 MHz. Example: The signal is not to be 400 MHz.)

## SERVICE SHEET 2 (cont'd)

Test 7-b. Measure the signal at the output end of cable W13. The signal should be  $-30 \pm 3 \text{ dBm}$  at the center frequency selected by the mainframe.

If the signal is not present, check the 130 MHz low pass filter and cable W13.

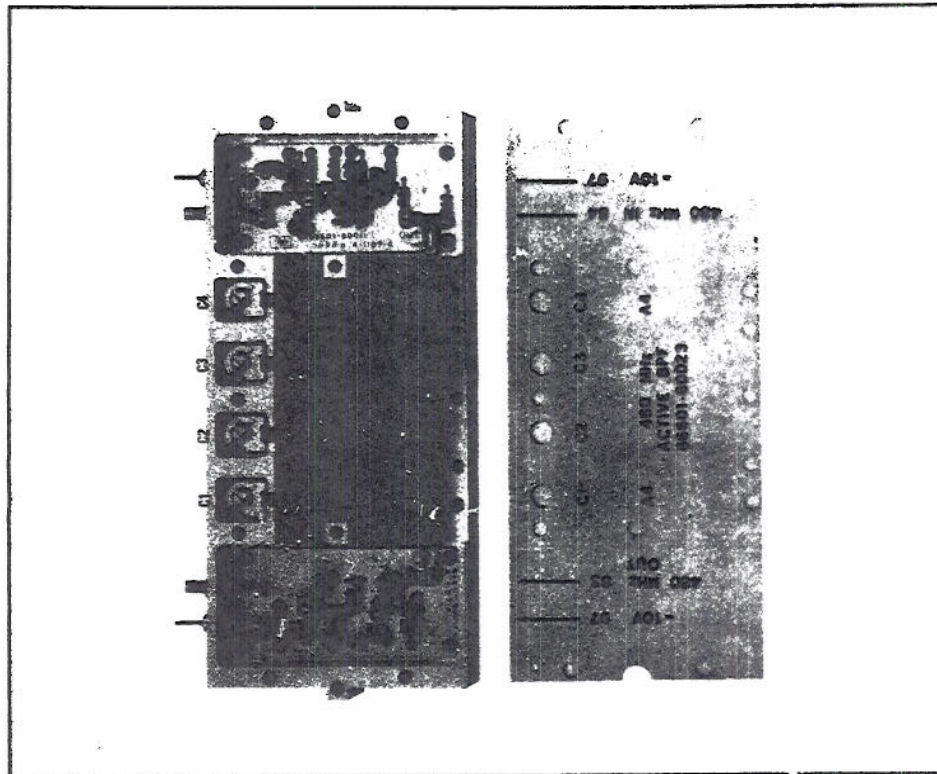


Figure 8-14. 400 MHz Band Pass Filter Component Locations



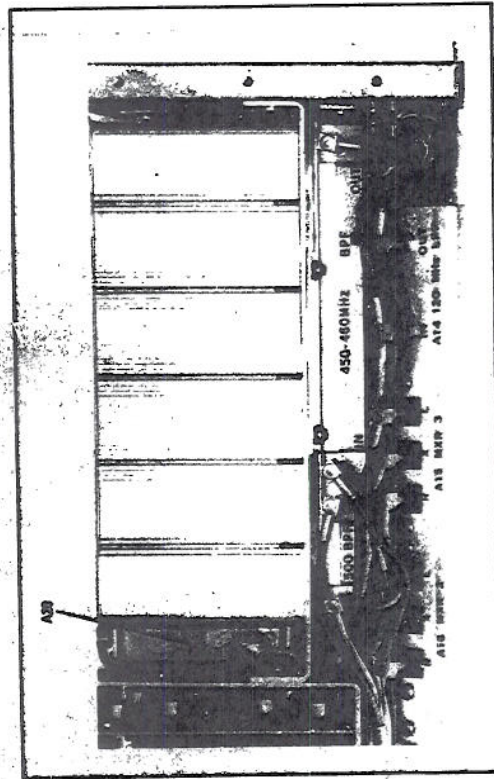


Figure 8-14. 600 MHz Low Pass Filter (A20) Location

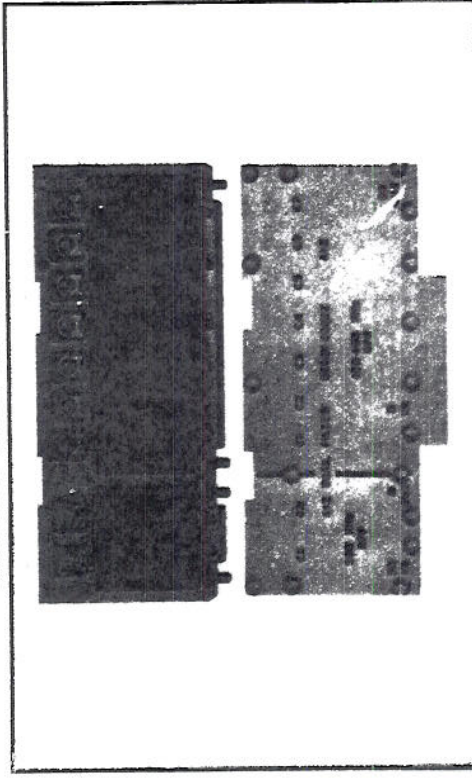


Figure 8-15. Band Filter Adjustment Locations

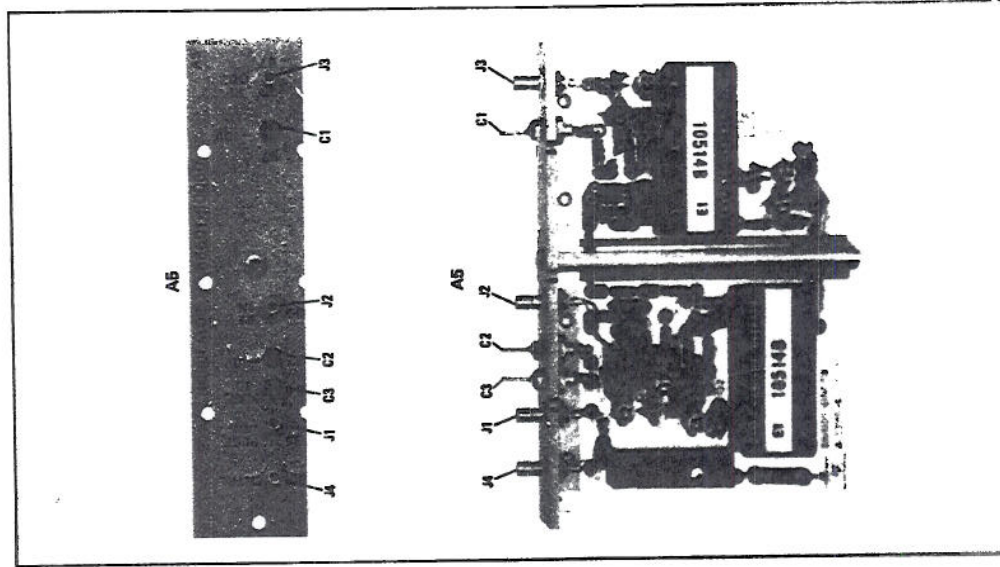


Figure 8-16. Mounting Assembly Component Locations







NOTES:

1. REFER TO TABLE 8-1 FOR EXPLANATION OF SYMBOLS.
2. FIGURE 8-8 PROVIDES SCHEMATIC INFORMATION FOR A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44, A45, A46, A47, A48, A49, A50, A51, A52, A53, A54, A55, A56, A57, A58, A59, A60, A61, A62, A63, A64, A65, A66, A67, A68, A69, A70, A71, A72, A73, A74, A75, A76, A77, A78, A79, A80, A81, A82, A83, A84, A85, A86, A87, A88, A89, A90, A91, A92, A93, A94, A95, A96, A97, A98, A99, A100, A101, A102, A103, A104, A105, A106, A107, A108, A109, A110, A111, A112, A113, A114, A115, A116, A117, A118, A119, A120, A121, A122, A123, A124, A125, A126, A127, A128, A129, A130, A131, A132, A133, A134, A135, A136, A137, A138, A139, A140, A141, A142, A143, A144, A145, A146, A147, A148, A149, A150, A151, A152, A153, A154, A155, A156, A157, A158, A159, A160, A161, A162, A163, A164, A165, A166, A167, A168, A169, A170, A171, A172, A173, A174, A175, A176, A177, A178, A179, A180, A181, A182, A183, A184, A185, A186, A187, A188, A189, A190, A191, A192, A193, A194, A195, A196, A197, A198, A199, A200, A201, A202, A203, A204, A205, A206, A207, A208, A209, A210, A211, A212, A213, A214, A215, A216, A217, A218, A219, A220, A221, A222, A223, A224, A225, A226, A227, A228, A229, A230, A231, A232, A233, A234, A235, A236, A237, A238, A239, A240, A241, A242, A243, A244, A245, A246, A247, A248, A249, A250, A251, A252, A253, A254, A255, A256, A257, A258, A259, A260, A261, A262, A263, A264, A265, A266, A267, A268, A269, A270, A271, A272, A273, A274, A275, A276, A277, A278, A279, A280, A281, A282, A283, A284, A285, A286, A287, A288, A289, A290, A291, A292, A293, A294, A295, A296, A297, A298, A299, A300, A301, A302, A303, A304, A305, A306, A307, A308, A309, A310, A311, A312, A313, A314, A315, A316, A317, A318, A319, A320, A321, A322, A323, A324, A325, A326, A327, A328, A329, A330, A331, A332, A333, A334, A335, A336, A337, A338, A339, A340, A341, A342, A343, A344, A345, A346, A347, A348, A349, A350, A351, A352, A353, A354, A355, A356, A357, A358, A359, A360, A361, A362, A363, A364, A365, A366, A367, A368, A369, A370, A371, A372, A373, A374, A375, A376, A377, A378, A379, A380, A381, A382, A383, A384, A385, A386, A387, A388, A389, A390, A391, A392, A393, A394, A395, A396, A397, A398, A399, A400, A401, A402, A403, A404, A405, A406, A407, A408, A409, A410, A411, A412, A413, A414, A415, A416, A417, A418, A419, A420, A421, A422, A423, A424, A425, A426, A427, A428, A429, A430, A431, A432, A433, A434, A435, A436, A437, A438, A439, A440, A441, A442, A443, A444, A445, A446, A447, A448, A449, A450, A451, A452, A453, A454, A455, A456, A457, A458, A459, A460, A461, A462, A463, A464, A465, A466, A467, A468, A469, A470, A471, A472, A473, A474, A475, A476, A477, A478, A479, A480, A481, A482, A483, A484, A485, A486, A487, A488, A489, A490, A491, A492, A493, A494, A495, A496, A497, A498, A499, A500, A501, A502, A503, A504, A505, A506, A507, A508, A509, A510, A511, A512, A513, A514, A515, A516, A517, A518, A519, A520, A521, A522, A523, A524, A525, A526, A527, A528, A529, A530, A531, A532, A533, A534, A535, A536, A537, A538, A539, A540, A541, A542, A543, A544, A545, A546, A547, A548, A549, A550, A551, A552, A553, A554, A555, A556, A557, A558, A559, A560, A561, A562, A563, A564, A565, A566, A567, A568, A569, A570, A571, A572, A573, A574, A575, A576, A577, A578, A579, A580, A581, A582, A583, A584, A585, A586, A587, A588, A589, A590, A591, A592, A593, A594, A595, A596, A597, A598, A599, A600, A601, A602, A603, A604, A605, A606, A607, A608, A609, A610, A611, A612, A613, A614, A615, A616, A617, A618, A619, A620, A621, A622, A623, A624, A625, A626, A627, A628, A629, A630, A631, A632, A633, A634, A635, A636, A637, A638, A639, A640, A641, A642, A643, A644, A645, A646, A647, A648, A649, A650, A651, A652, A653, A654, A655, A656, A657, A658, A659, A660, A661, A662, A663, A664, A665, A666, A667, A668, A669, A670, A671, A672, A673, A674, A675, A676, A677, A678, A679, A680, A681, A682, A683, A684, A685, A686, A687, A688, A689, A690, A691, A692, A693, A694, A695, A696, A697, A698, A699, A700, A701, A702, A703, A704, A705, A706, A707, A708, A709, A710, A711, A712, A713, A714, A715, A716, A717, A718, A719, A720, A721, A722, A723, A724, A725, A726, A727, A728, A729, A730, A731, A732, A733, A734, A735, A736, A737, A738, A739, A740, A741, A742, A743, A744, A745, A746, A747, A748, A749, A750, A751, A752, A753, A754, A755, A756, A757, A758, A759, A760, A761, A762, A763, A764, A765, A766, A767, A768, A769, A770, A771, A772, A773, A774, A775, A776, A777, A778, A779, A780, A781, A782, A783, A784, A785, A786, A787, A788, A789, A790, A791, A792, A793, A794, A795, A796, A797, A798, A799, A800, A801, A802, A803, A804, A805, A806, A807, A808, A809, A810, A811, A812, A813, A814, A815, A816, A817, A818, A819, A820, A821, A822, A823, A824, A825, A826, A827, A828, A829, A830, A831, A832, A833, A834, A835, A836, A837, A838, A839, A840, A84

|                        |      |          |
|------------------------|------|----------|
| REFERENCE DESIGNATIONS | A5   |          |
|                        | W-13 | J1-3     |
|                        | AM   | C1       |
|                        |      | ASAL     |
|                        |      | C1-17    |
|                        |      | E1       |
|                        |      | L1-9     |
|                        |      | Q1-4     |
|                        |      | R1-10    |
|                        |      | ASAS     |
|                        |      | A12, A13 |

Figure 8-17.



## SERVICE SHEET 3

### PREAMPLIFIER AND POWER AMPLIFIER ASSEMBLIES

Normally, the cause of a malfunction in the Model 86601A will be isolated to a circuit board or assembly as a result of performing the tests specified in the troubleshooting tree.

When trouble is traced to the A6 or A2 assemblies remove the defective assembly from the housing and reconnect the dc and rf inputs and outputs to provide access to test points and components. Be sure to use an insulating material between the circuit board and chassis to prevent short circuits.

TEST EQUIPMENT REQUIRED: (See Table 1-2.)

Digital Voltmeter  
Counter  
Spectrum Analyzer  
Low Voltage DC Power Supply

#### ■ PREAMPLIFIER ASSEMBLY A6

The rf signal from the A14 120 MHz Low Pass Filter is coupled to the base of Q1 through another 120 MHz Low Pass Filter (L2, 3, 4; C2, 3) and a peaking circuit (R4, C5).

The output of Q1 is amplified by Q2 and applied to the base of emitter-follower Q3. The signal at the emitter of Q2 provides a feedback bias to aid in leveling the flatness of the amplifier over the frequency range.

The output of emitter-follower Q3 is coupled through R14 and C13 to the input of the power amplifier assembly A2. The gain of the A6 preamplifier assembly is about 30 dB.

#### ■ POWER AMPLIFIER AND AGC ASSEMBLY A2

The rf signal from the preamplifier is coupled through C1 to the base of emitter-follower Q1. The signal from Q1 is used to drive complementary symmetry amplifier Q2/Q3. The output of Q2/Q3 provides:

- A feedback signal to optimize flatness of the output signal.
- The rf output to the 150 dB programmable attenuator.
- The signal to drive the Automatic Gain Control Circuit (AGC).

Q4 and Q5 couple the rf signal to detector CR2/CR3 and also provides isolation between the AGC circuit and the rf output.

When the output frequency of the Model 86601A is above 4 MHz, transient Q6 through Q11 have no effect on AGC operation. The effective time constant of the detector circuit is controlled only by R23/C18 and R34/C26.

When the output frequency of the Model 86601A is between 400 kHz and 4 MHz, the Code 1 input from the minimum DCU is high (about +6V) and Q7 is turned on to provide a ground

## SERVICE SHEET 3 (cont'd)

return for C22. The Code 1 signal also turns off Q10 to turn on Q11 and provide a ground return for C21. With C21 and C22 in the circuit the effective time constant is enlarged to improve the response of the detector circuit.

When an output rf signal below 400 kHz is selected the Code 2 input also goes high. This high level turns on Q8 to provide a ground return for C19. Q9 is turned off to turn on Q6 which provides a ground return for C17. The effective time constant of the detector is again increased to improve the response of the AGC circuit for the lower frequency signals.

The output of emitter-follower Q13 is applied across a voltage divider and the desired output level is controlled by R31. C24 and C25 by-pass remaining rf signals to ground.

### NOTES

- Verify the presence of dc operating voltages before taking other measurements. If dc voltages are not present, check connections to the mainframe. If the interconnections are good, refer to the mainframe manual and make repairs as required.
- Unless otherwise specified, all measurements are taken with the Spectrum Analyzer.
- If repairs are made in any part of the circuits shown on Service Sheet 3, the appropriate adjustment procedures in Section V of this manual should be performed.
- These procedures assume that the cause of malfunction has been isolated to the A2 or A6 assembly as a result of performing the tests specified in the troubleshooting tree.

## TEST PROCEDURE 0

Test 1-a. Use the Spectrum Analyzer to trace the input signal to the defective stage in the A6 assembly and repair as required.

## SERVICE SHEET 3 (cont'd)

### TEST PROCEDURE

If the rf output is low, or not present at all, at the rf connector on the A2 assembly proceed to test 2-a. If the output level flatness is not correct at low frequencies proceed to test 2-b.

Test 2-a. Use the Spectrum Analyzer to trace the input to the defective stage and repair as required.

Test 2-b. Recheck the code 1 and code 2 inputs at the assembly.

| Frequency       | Code 1   | Code 2 |
|-----------------|----------|--------|
| > 4 MHz         | < 150 mV | < 1V   |
| > 4 MHz < 4 MHz | > +3 V   | < 1V   |
| < 4 MHz         | > +3 V   | > +    |

If code 1 and code 2 levels are not as specified recheck inputs from the mainframe. If the inputs from the mainframe are not present refer to the mainframe manual and repair as required.

If code 1 and code 2 signals are present and the rf flatness is as specified above 4 MHz but is not as specified at 4 MHz, proceed to Test 2-c. If the code 1 and code 2 signals are present and the rf flatness is as specified above 4 MHz, below 4 MHz, proceed to Test 2d. If the rf output flatness is also incorrect above 4 MHz, proceed to Test 2-c.

Test 2-c. Check Q7, Q10, Q11 and associated components and Q11 should be on (saturated), and Q10 should be off.

Test 2-d. Check Q8, Q9, Q6 and associated components. Q8 should be on (saturated) and Q9 should be off.

Test 2-a. Disconnect the DET OUT and reconnect it using the connector. Connect the digital voltmeter to the third T input and monitor the dc level of the AGC signal. With the rf set to +13 dBm the digital voltmeter should read approximately -2.8V. With the VERNIER control set to -10 dBm on the Model 86601A meter the voltmeter should indicate approximately -0.6V.

If the AGC dc levels are not as specified perform the appropriate adjustment procedures in Section V of this manual.

If the adjustment procedures do not eliminate the defect check Q4, Q5, Q12, Q13 and associated components.



## SERVICE SHEET 3 (cont'd)

return for C22. The Code 1 signal also turns off Q10 to turn on Q11 and provide a ground return for C21. With C21 and C22 in the circuit the effective time constant is enlarged to improve the response of the detector circuit.

When an output rf signal below 400 kHz is selected the Code 2 input also goes high. This high level turns on Q8 to provide a ground return for C19. Q8 is turned off to turn on Q6 which provides a ground return for C17. The effective time constant of the detector is again increased to improve the response of the AGC circuit for the lower frequency signals.

The output of emitter-follower Q13 is applied across a voltage divider and the desired output level is controlled by R31. C24 and C25 by-pass remaining rf signals to ground.

## NOTES

1. Verify the presence of dc operating voltages before taking other measurements. If dc voltages are not present, check connections to the mainframe. If the interconnections are good, refer to the mainframe manual and make repairs as required.
2. Unless otherwise specified, all measurements are taken with the Spectrum Analyzer.
3. If repairs are made in any part of the circuits shown on Service Sheet 3, the appropriate adjustment procedures in Section V of this manual should be performed.
4. These procedures assume that the cause of malfunction has been isolated to the A2 or A6 assembly as a result of performing the tests specified in the troubleshooting tree.

## TEST PROCEDURE

Test 1-a. Use the Spectrum Analyzer to trace the input signal to the defective stage in the A6 assembly and repair as required.

## SERVICE SHEET 3 (cont'd)

## TEST PROCEDURE

If the rf output is low, or not present at all, at the RF OUT connector on the A2 assembly proceed to test 2-a. If the rf output level flatness is not correct at low frequencies proceed to test 2-b.

Test 2-a. Use the Spectrum Analyzer to trace the input signal to the defective stage and repair as required.

Test 2-b. Recheck the code 1 and code 2 inputs at the A2 assembly.

| Frequency       | Code 1   | Code 2   |
|-----------------|----------|----------|
| > 4 MHz         | < 150 mV | < 150 mV |
| > 4 MHz < 4 MHz | > +3 V   | < 150 mV |
| < 4 MHz         | > +3 V   | > +3 V   |

If code 1 and code 2 levels are not as specified recheck the inputs from the mainframe. If the inputs from the mainframe are not present refer to the mainframe manual and repair as required.

If code 1 and code 2 signals are present and the rf output flatness is as specified above 4 MHz but is not as specified below 4 MHz, proceed to Test 2-c. If the code 1 and code 2 signals are present and the rf flatness is as specified above 4 MHz but not below 4 MHz, proceed to Test 2-d. If the rf output flatness is also incorrect above 4 MHz, proceed to Test 2-e.

Test 2-c. Check Q7, Q10, Q11 and associated components. Q7 and Q11 should be on (saturated), and Q10 should be off.

Test 2-d. Check Q8, Q9, Q6 and associated components. Q6 and Q8 should be on (saturated) and Q9 should be off.

Test 2-e. Disconnect the DET OUT and reconnect it using a Tee connector. Connect the digital voltmeter to the third Tee port and monitor the dc level of the AGC signal. With the rf output set to +13 dBm the digital voltmeter should indicate approximately -2.5V. With the VERNIER control set for a reading of -10 dBm on the Model 86001A meter the digital voltmeter should indicate approximately -0.5V.

If the AGC dc levels are not as specified perform the applicable adjustment procedures in Section V of this manual.

If the adjustment procedures do not eliminate the problem check Q4, Q5, Q12, Q13 and associated components.

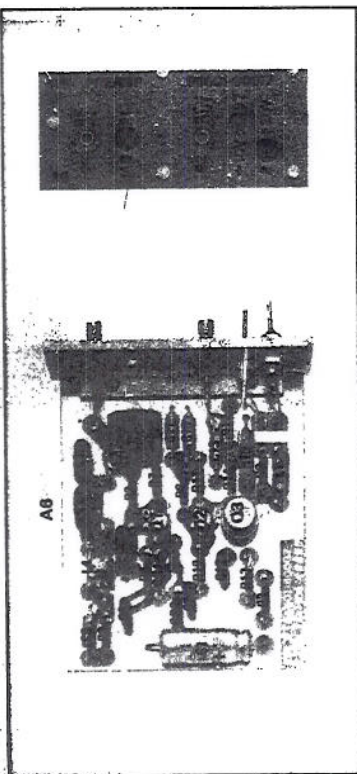


Figure 8-18. Preamplifier Component Locations

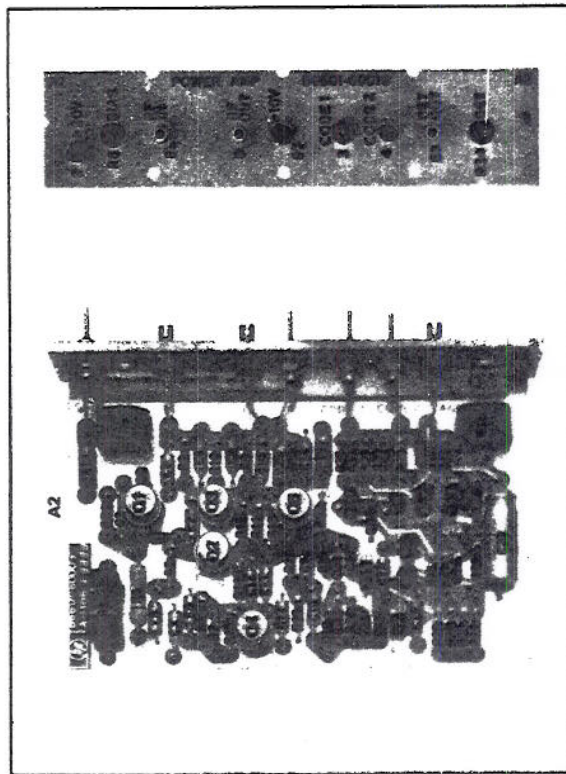
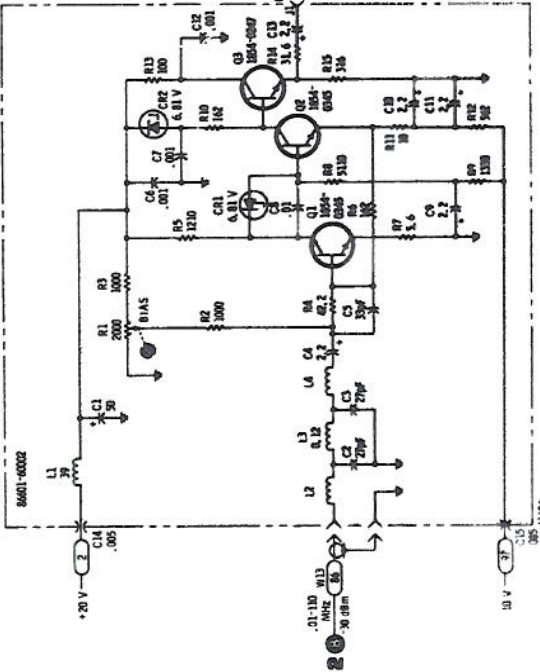


Figure 8-19. Power Amplifier and AGC Component Locations

| REFERENCE DESIGNATIONS |       | A2 |
|------------------------|-------|----|
| W13-16                 | C1-20 |    |
| A6                     | C81-4 |    |
| C1-15                  | L1-3  |    |
| C81-2                  | Q1-13 |    |
| L1-4                   | Q1-3  |    |
| Q1-3                   | R1-38 |    |
| R1-15                  |       |    |

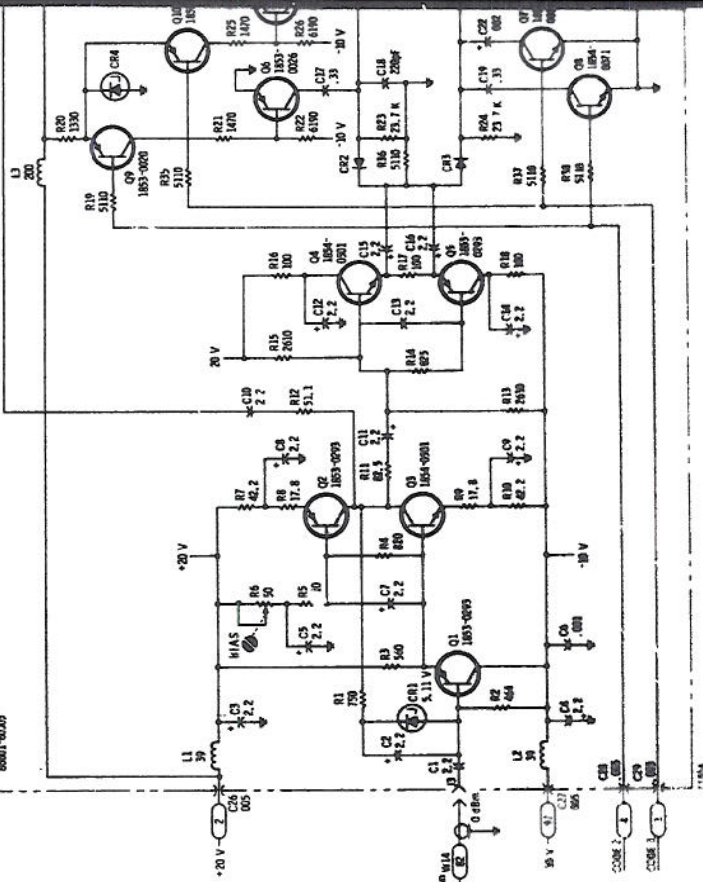
NOTES:  
1. REFER TO TABLE B-1 FOR  
EXPLANATION OF SYMBOLS

A6 PREAMPLIFIER ASSY 86601-00017



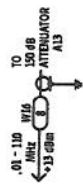
A2 POWER AMPLIFIER AND AGC ASSY 86601-00018

86601-00020





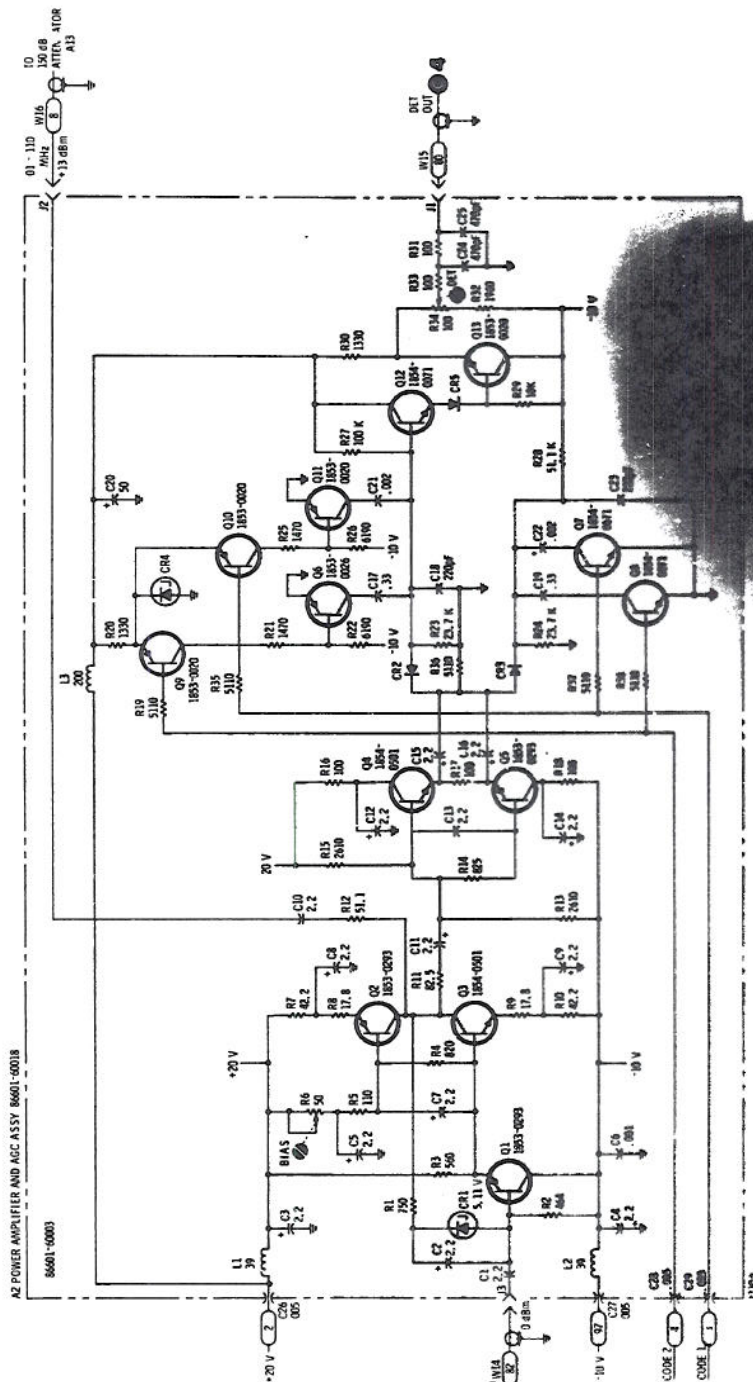
Service



3

and PWB Amp Substrate  
8 - 15

Figure 8-20.



NOTES:  
1. REFER TO TABLE R-1 FOR  
EXPLANATION OF SYMBOLS

3

# SERVICE SHEET 4 (cont'd)

Normally, the cause of a malfunction in the Model 86601A will be isolated to a circuit board or assembly as a result of performing the tests specified in the troubleshooting tree.

When the cause of trouble has been isolated to the A3 assembly, it must be removed from the well and reconnected to provide access to test points and components.

When the cause of trouble has been isolated to the A9 assembly it may be extended for maintenance with an extender board.

## TEST EQUIPMENT REQUIRED

Digital Voltmeter  
Start Card Programmer  
Spectrum Analyzer

Extender Cable  
Power Supply

## NOTE

A voltage designated as a high in this text will be  $> +2.2V$  unless otherwise noted and a low will be  $< +0.8V$ .

## REFERENCE AMPLIFIER ASSEMBLY A9

The output rf level from the A2 Power Amplifier is controlled by a dc reference from the A9 assembly.

The voltage source for the reference level is operational amplifier U1. When the instrument is in the CW mode the source voltage is  $-2V$ . The dc level at the output of U1 is coupled to the feedback amplifier, A3, in one of two ways.

In local operation the LCL/RMT input (XA9 pin A) is high. Q2 is turned off and Q1 is turned on to energize K6. The output of U1 is applied to a voltage divider network (R14, A1R1 and A1R2). The front panel VERNIER control (A1R1) is capable of controlling the rf output of the A3 power amplifier assembly from  $+13$  dBm to  $0$  dBm. At an output rf level of  $+13$  dBm the dc level to the feedback amplifier is  $-1V$ .

In remote operation the LCL/RMT input (XA9 pin A) is low. Q1 is turned off and Q2 is turned on to energize K3. The dc level to the A3 assembly is now controlled by K1 through K4 which are, in turn, controlled by the 1A, 2A, 4A, and 8A input lines. As an example, if the programmed output is  $+13$  dBm, the inputs on 1A, 2A, 4A, and 8A are all low; K1 through K4 are all energized and  $-1V$  is coupled to the A3 assembly. If an output of  $+13$  dBm is programmed in, input line 1A now goes high. Q9 is turned off, relay K1 is deenergized, and Q11 is turned on to provide a ground return for R10. Relays R3, R10 and R11 reduce the reference level to the feedback amplifier by the amount required to cause a 1 dB decrease of the rf output from the A3 power amplifier assembly.

Relays R3, R4 and associated components operate in the same manner as K1 except that the associated voltage networks are weighted to produce 2, 4 and 8 dB of attenuation to the A3 rf output.

The rf output of output meter is functional in both local and remote modes. The DET output from A3 is filtered in the A9 assembly and then applied to the meter drive stage (Q10) in the A9 assembly.

# SERVICE SHEET 4 (cont'd)

## FEEDBACK AMPLIFIER ASSEMBLY A3

Differential amplifier U1 has as its inputs the negative dc reference from the reference assembly and the DET output of the A2 assembly. These two inputs are compared and the difference determines the output of U1 at pin 6.

The output from U1 is coupled through Q8 and Q9 to the modulator assembly (A6) where it is used as a gain control. This gain control level directly affects the A2 power amplifier rf and AGC output levels. When the rf output of the A2 assembly reaches the programmed level the loop is stabilized and the output of U1 is a steady dc level (CW mode).

In the AM mode the amplitude modulating signal is superimposed on the reference level from the A5 assembly. The amplitude modulating signal also appears at the output of U1 and it is used to modulate the center frequency in the A5 assembly.

As long as the output frequency of the Model 86601A is greater than 4 MHz the frequency rolloff of the feedback amplifier is controlled by R15 and C9.

Code 1 and code 2 signals from the mainframe DCU alter the response time of the circuit in the following manner:

When the selected output frequency is below 4 MHz (but above 400 kHz), the code 1 line is high and Q7 is turned on to provide a ground return for C7. This increases the time constant of the circuit and improves the response at the selected frequency.

Note that Q1 is also turned on to provide a ground return for C6 to maintain leveling accuracy.

When an output frequency below 800 kHz is selected the code 2 line also goes high to turn on Q6. This provides a ground return for C8 to further increase the response time of the circuit.

The code 1 and code 2 levels ensure that the rf output level remains constant over the entire frequency range of the instrument.

## NOTES

1. Verify the presence of dc operating voltages before taking other measurements. If dc voltages are not present, check connections to the mainframe. If interconnections are good refer to the mainframe manual and make necessary repairs.

2. After making repairs in either of the circuits shown, the adjustment procedure specified in Section V of this manual should be performed.

3. These procedures assume that the cause of malfunction has been isolated to the A3 or A9 assembly as a result of performing the tests specified in the troubleshooting trees.

## TEST PROCEDURE

One of the following conditions exist:

The Model 86601A rf output is present but the output meter does not operate properly - proceed to Test 1.

# SERVICE SHEET 4 (cont'd)

The Model 86601A output level in local mode is properly controlled by the VERNIER control but remote 1 dB step programming is inaccurate - proceed to Test 1-c.

The Model 86601A output level is programmable but the VERNIER control does not properly control the output level - proceed to Test 1-d.

Neither the VERNIER control (local) or the 1 dB step attenuator (remote) operate properly - proceed to Test 1e.

Test 1-a. Extend the A5 assembly from the chassis on an extender board. With the Model 86601A VERNIER and OUTPUT RANGE controls set for a  $+13$  dBm output measure the dc level at XA9 pin K. The dc level should be about  $-550$  mV. Set the Model 86601A output to  $-10$  dBm. The dc level at XA9 pin K should be about  $-225$  mV. If the voltage is not present proceed to Test 1-b.

If the dc levels at XA9 pin K are as specified use the digital voltmeter to check the dc level at XA7-2 pin 7. With the Model 86601A output set to  $+13$  dBm the dc level should be about  $+5.05$  V. Turn the VERNIER control full counterclockwise - the dc level should increase to about  $+5.2$  V.

If the dc level at XA7-1 pin 7 is not present the meter or wiring to the  $+5.25V$  input is defective.

If the dc level at XA7-2 pin 7 is present, but does not vary as the VERNIER control is rotated, Q10 or associated components are defective.

If the dc level at XA7-2 pin 7 is present and varies as the VERNIER control is rotated, but the Model 86601A output meter does not change, the meter is defective.

Test 1-b. Recheck for the dc levels specified for XA9 pin K at the white-orange MTR lead on the A3 assembly. If the levels are now present, check the interconnections to the A9 assembly. If the dc levels still are not present proceed to Test Procedure 2.

Test 1-c. In the local mode set the instrument for a  $30$  MHz  $+13$  dBm output. Monitor the output with the spectrum analyzer and set the analyzer controls to display the peak of the signal at the top graticule line.

In the remote mode program 1, 2, 4 and 8 dB steps of attenuation. Observe the Model 86601A output meter and the analyzer display. If one or more of the steps do not produce the desired results check the logic levels at XA9 pins E, F, H and/or J against the levels shown in Table B-3. If these pins are correct, one or more of the relay/play driver circuits is defective. Examples: If the 1 dB step is defective, check Q9, Q11, K1 and associated components.

If the logic levels at XA9 pins E, F, H and J are not correct, trouble is in the logic circuit (see Service Sheet 5), the mainframe, or the programming device.



SERVICE SHEET 4 (cont'd)

Table 8-3. 1dB Attenuation Checks

| Attenuation (dB) | XA9 Pins |   |   |   |   |   |   |   |   |   |
|------------------|----------|---|---|---|---|---|---|---|---|---|
|                  | E        | F | G | H | I | J | K | L | M | N |
| 0                | L        | L | L | L | L | L | L | L | L | L |
| 1                | L        | L | L | L | L | L | L | L | L | L |
| 2                | L        | L | L | L | L | L | L | L | L | L |
| 3                | L        | L | L | L | L | L | L | L | L | L |
| 4                | L        | L | L | L | L | L | L | L | L | L |
| 5                | L        | L | L | L | L | L | L | L | L | L |
| 6                | L        | L | L | L | L | L | L | L | L | L |
| 7                | L        | L | L | L | L | L | L | L | L | L |
| 8                | L        | L | L | L | L | L | L | L | L | L |
| 9                | L        | L | L | L | L | L | L | L | L | L |

Test 1-d. With the instrument turned on in the local mode check for continuity between XA9 pins 10 and L. If a direct short does not exist between these pins check Q1 and K6.

If the direct short between XA9 pins 10 and L is present check A9R14, A1R1, A1R2 and interconnections.

Test 1-e. Perform the adjustment procedures specified in paragraphs 5-14 and 5-15. If the adjustments cannot be made A9U is probably defective.

TEST PROCEDURE

Test 2-a. Disconnect the input from CNTRL IN. Connect a low voltage power supply through a 1000 ohm resistor to CONTROL IN (-ground). With the front panel VERNIER control set full clockwise adjust the power supply for a +13 dBm output.

Measure the voltage at U1 pin 3 (-0.8V) and U1 pin 4 (0.9V). If the voltages are correct, proceed to Test 2-b.

If the level at U1 pin 4 is incorrect refer to Service Sheet 3.

If the level at U1 pin 3 is incorrect, refer to TEST PROCEDURE 1 of this Service Sheet.

Test 2-b. Measure the voltage at U1 pin 6 (should be approximately 800 mV). If the voltage is correct, check Q8, Q9 and associated components. If the voltage is incorrect, check U1 and associated components.

Test 2-c. Verify that the if output meter is tracking the DFT output to the meter driver at XA7-2 pin 8.

Set the front panel VERNIER control for output meter readings of 3.9V, 0.6V, and 0.3V. The dc level at XA7-3 pin 8 should be  $-0.6 \pm 0.1V$ ,  $-0.20 \pm 0.1V$  and  $-0.1 \pm .00V$  respectively.

Repeat the tests with the if output set to 4.2, 2.1 and 0.1 MHz. The dc levels specified at XA7-3 pin 8 should be the same at all three frequencies. If they are not, determine which cable there is not functioning properly and check the associated hardware including shields.

A8, A9 Pre-amplifier and Power Amplifier Assembly

SERVICE SHEET 5

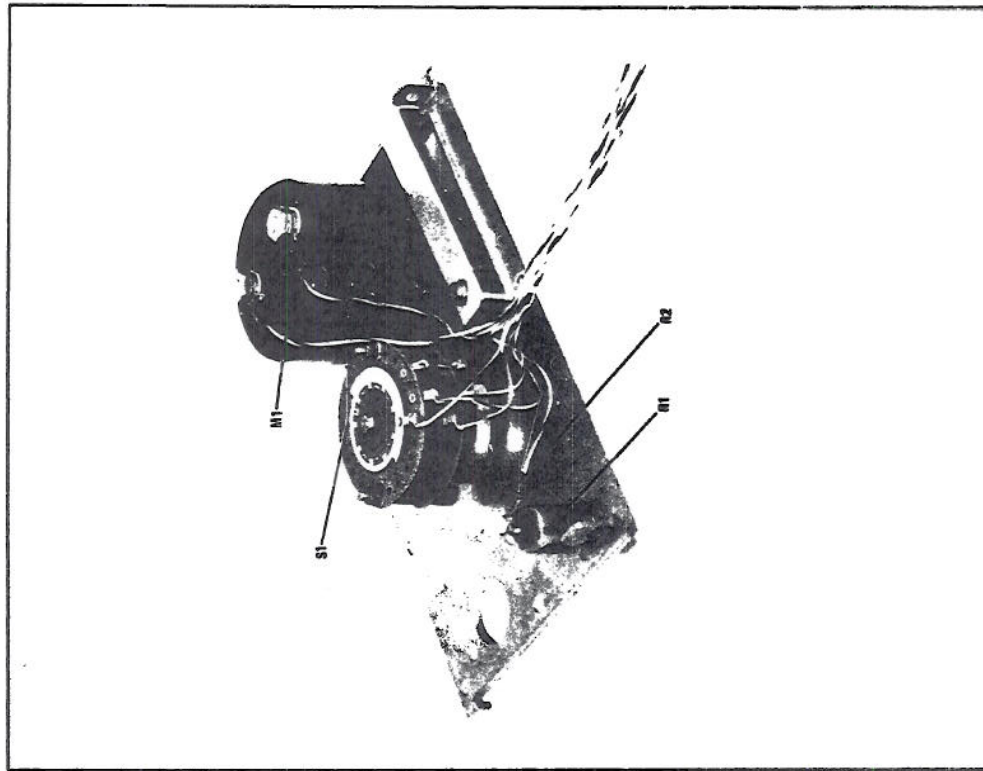


Figure 8-21. Front Panel Component Locations

Model 86601A

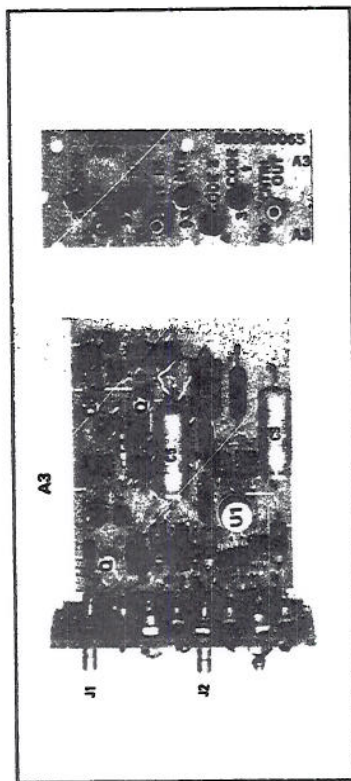


Figure 8-22. Feedback Amplifier Component Locations

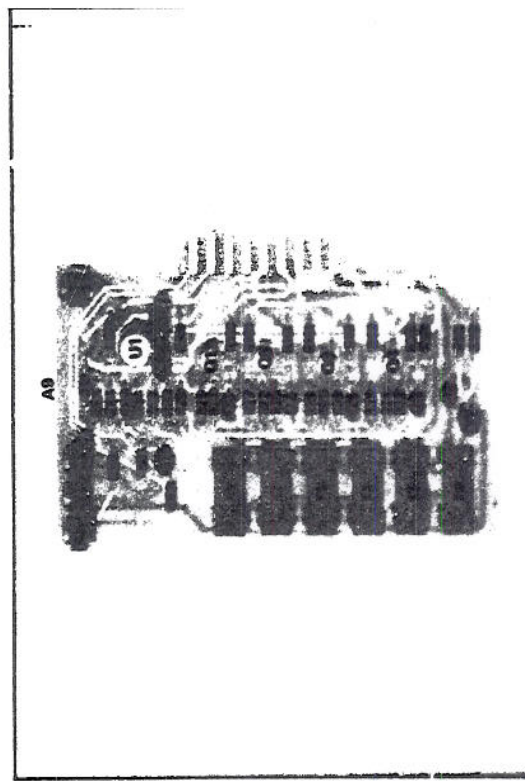


Figure 8-23. Reference Assembly Component Locations

REVISION  
86601A

- NOTES  
 1. REFER TO TABLE 8-1 FOR EXPLANATION OF SYMBOLS.  
 2. INTEGRATED CIRCUIT LOGIC IS SHOWN IN FIGURE 8-4.  
 3. † FOR LOWER SERIAL PREFIX SEE SECTION VII.

| A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |   |   |

| REFERENCE DESIGNATIONS | VALUES |
|------------------------|--------|
| A3                     | C1-15  |
| A0                     | C16    |
|                        | C17-19 |
|                        | C20    |
|                        | C21-23 |
|                        | C24    |
|                        | C25    |
|                        | C26    |
|                        | C27    |
|                        | C28    |
|                        | C29    |
|                        | C30    |
|                        | C31    |
|                        | C32    |
|                        | C33    |
|                        | C34    |
|                        | C35    |
|                        | C36    |
|                        | C37    |
|                        | C38    |
|                        | C39    |
|                        | C40    |
|                        | C41    |
|                        | C42    |
|                        | C43    |
|                        | C44    |
|                        | C45    |
|                        | C46    |
|                        | C47    |
|                        | C48    |
|                        | C49    |
|                        | C50    |
|                        | C51    |
|                        | C52    |
|                        | C53    |
|                        | C54    |
|                        | C55    |
|                        | C56    |
|                        | C57    |
|                        | C58    |
|                        | C59    |
|                        | C60    |
|                        | C61    |
|                        | C62    |
|                        | C63    |
|                        | C64    |
|                        | C65    |
|                        | C66    |
|                        | C67    |
|                        | C68    |
|                        | C69    |
|                        | C70    |
|                        | C71    |
|                        | C72    |
|                        | C73    |
|                        | C74    |
|                        | C75    |
|                        | C76    |
|                        | C77    |
|                        | C78    |
|                        | C79    |
|                        | C80    |
|                        | C81    |
|                        | C82    |
|                        | C83    |
|                        | C84    |
|                        | C85    |
|                        | C86    |
|                        | C87    |
|                        | C88    |
|                        | C89    |
|                        | C90    |
|                        | C91    |
|                        | C92    |
|                        | C93    |
|                        | C94    |
|                        | C95    |
|                        | C96    |
|                        | C97    |
|                        | C98    |
|                        | C99    |
|                        | C100   |

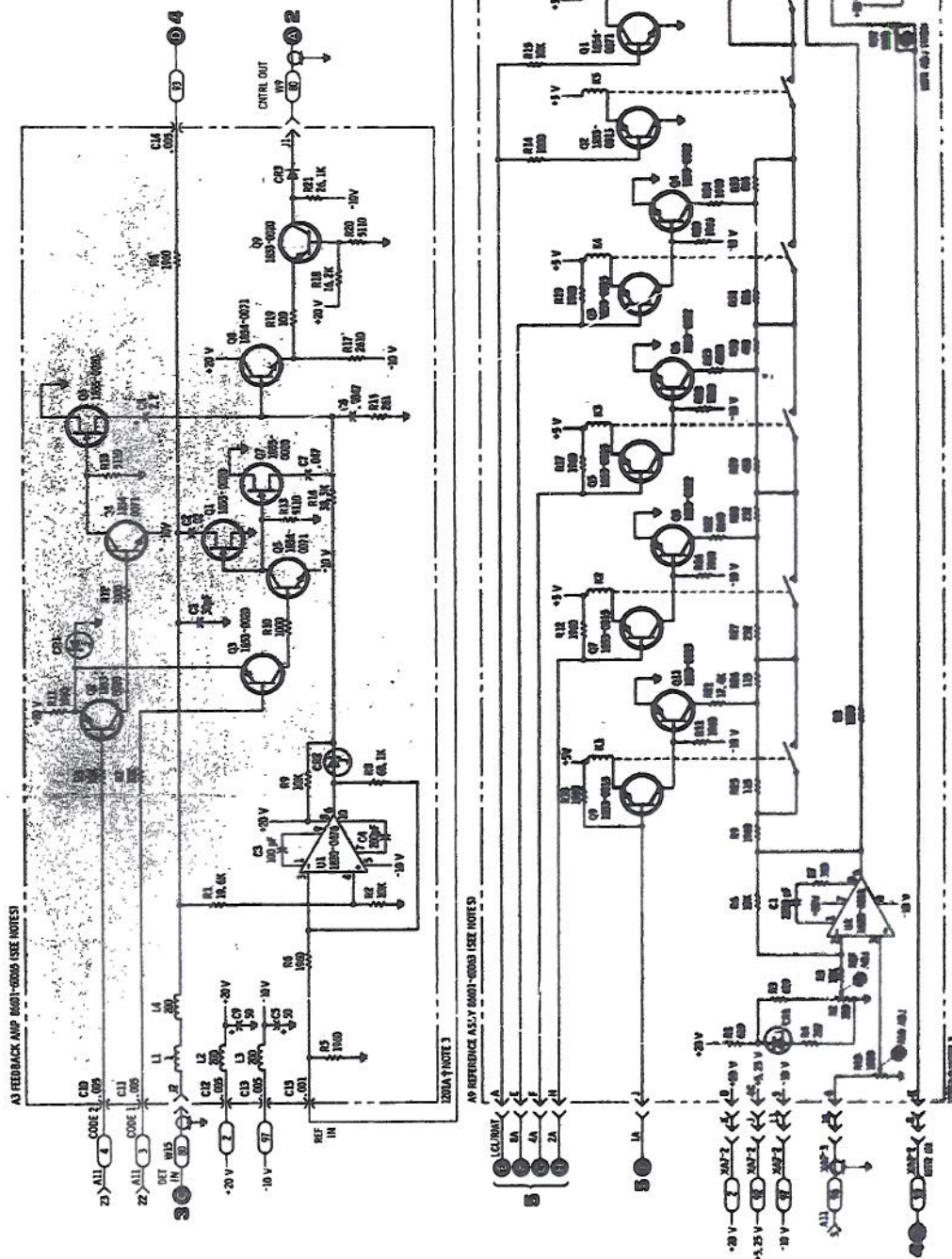


Figure 8-24 Feedback Amplifier and Reference Amp Schematic

4  
A3, A8



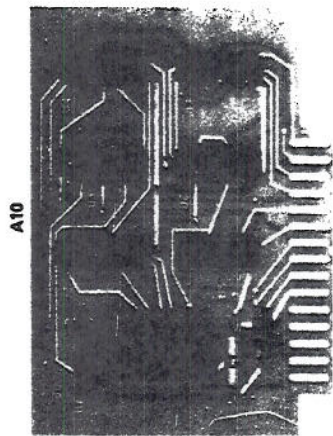


Figure 8-25 Logic Assembly Component Locations



Figure 8-26 *Loge und Drüsen Cervix uteri*  
8-19

## SERVICE SHEET 8

Normally, causes of malfunction in the Model 86601A will be isolated to a circuit board or assembly as a result of performing the tests specified in the troubleshooting tree.

When trouble has been isolated to the A8 assembly, the defective assembly should be extended from the chassis with an extender board to provide access to test points and components.

## EQUIPMENT REQUIRED:

Digital Voltmeter  
Extender Cable

## ATTENUATOR AND DRIVER ASSEMBLIES

The programmable attenuator is a five-section relay operated attenuator. There are one 10 dB, one 20 dB and three 40 dB sections in the attenuator. Two of the 40 dB attenuator sections are in series to provide 80 dB of attenuation.

## NOTE

The programmable attenuator is not considered a field replaceable item. If found defective it should be returned to the factory for repairs, or a replacement may be ordered as a module exchange item.

The A8 attenuator driver assembly consists of four identical transistor switching circuits. These switching circuits are controlled by the binary (1 - 2 - 3 - 4 - 8) inputs from the A10 logic assembly. Since the switching circuits are all identical, only the binary 1 (10 dB) circuit will be discussed.

When the binary input at XA8 pin M is low Q15 and Q11 are turned off, Q16 and Q12 are turned on, and -21V is applied to the 10 dB section of the 100 dB programmable attenuator through XA8 pin 4. The 10 dB section of the attenuator is bypassed (no attenuation provided).

When the binary input at XA8 pin M is high Q16 and Q12 are turned off, Q15 and Q11 are turned on, and -21V is applied to the 10 dB section of the 100 dB programmable attenuator through XA8 pin 4. The 10 dB section of the attenuator is enabled and 10 dB of attenuation is inserted into the IF output signal path.

The 100 dB programmable attenuator sections are selected by binary 1 - 2 - 3 - 4 - 8 inputs to the A8 assembly from 0000 to 1111 to provide 10 dB steps.

## NOTE

The programmed attenuation must be subtracted from +23 dBm in order to determine the IF output level of the Model 86601A. Example: with 120 dB of attenuation programmed, if the IF output will be -115 dBm.

## TEST PROCEDURES

Table 2-4 provides input and output level information for the attenuator driver assembly. Make the checks in bold words.

A10 Logic and Driver Circuit Assembly

◆ SERVICE SHEET 8

Table 8-4. Attenuator Driver Levels

| OUTPUT RANGE (dBm) | XA8 pins |   |   |   |   |   |   |   |  |  |
|--------------------|----------|---|---|---|---|---|---|---|--|--|
|                    | M        | L | K | J | 4 | 3 | 2 | 1 |  |  |
| -140               | H        | H | H | H | H | H | H | H |  |  |
| -130               | L        | H | H | H | L | H | H | H |  |  |
| -120               | H        | L | H | H | H | L | H | H |  |  |
| -110               | L        | L | H | H | L | L | H | H |  |  |
| -100               | H        | H | L | H | H | H | L | H |  |  |
| -90                | L        | H | L | H | L | H | L | H |  |  |
| -80                | H        | L | L | H | H | L | L | H |  |  |
| -70                | L        | L | L | H | L | L | L | H |  |  |
| -60                | H        | H | H | L | H | H | H | L |  |  |
| -50                | L        | H | H | L | L | H | H | L |  |  |
| -40                | H        | L | H | L | H | L | H | L |  |  |
| -30                | L        | L | H | L | L | L | L | H |  |  |
| -20                | H        | H | L | L | L | H | H | L |  |  |
| -10                | L        | H | L | L | L | L | H | L |  |  |
| 0                  | H        | L | L | L | L | L | L | L |  |  |
| +10                | L        | L | L | L | L | L | L | L |  |  |



Model 86601A

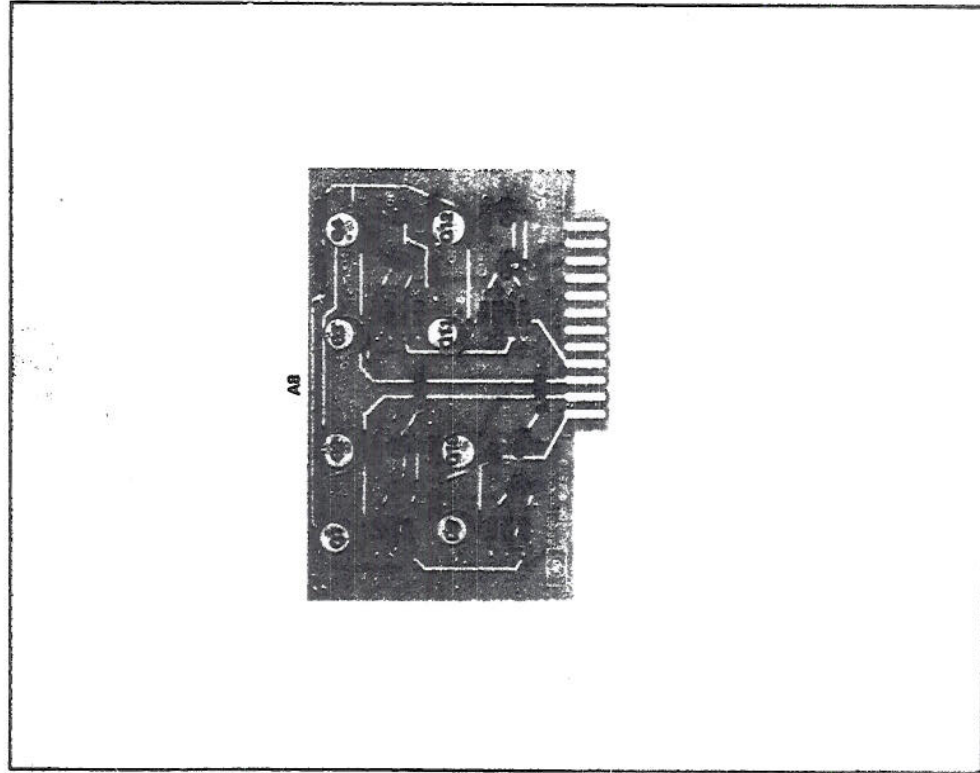


Figure 8-27. Attenuator Drive Component Location

SECRET

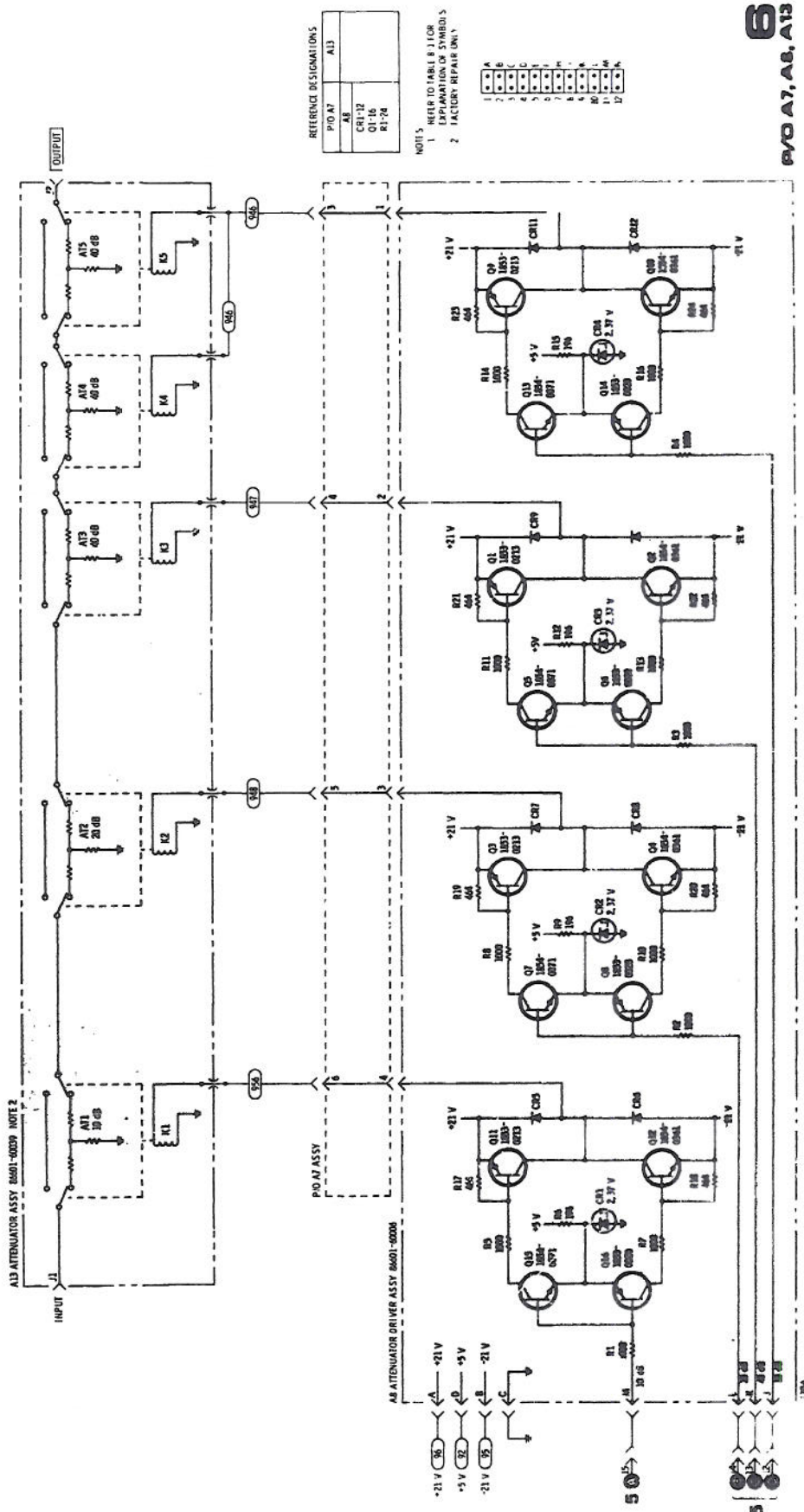


Figure 8-28. Attenuator Driver Assy. A13

APPENDIX A

REFERENCES

|                      |                                                                                                                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DA Pam 310-4</b>  | Index of Technical <b>Man</b> uals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.                                                              |
| <b>DA Pam 310-7</b>  | <b>US Army Equipment Index of Mod</b> ification Work Orders.                                                                                                                                        |
| TB 43-0118           | Field Instructions for <b>Painting and Preserv</b> ing Electronics Command Equipment Including <b>Camouflage Pattern</b> Painting of Electrical Equipment Shelters.                                 |
| TM 38-750            | <b>The Army Maintenance Manage</b> ment System ( <b>TAMMS</b> ).                                                                                                                                    |
| TM 750-244-2         | <b>Procedures for Destruction of Electronics Ma</b> teriel to Prevent Enemy Use (Electronics Command).                                                                                              |
| TM 11-6625-2837-14-1 | <b>Operator's, Organizational, DS and GS Maintenance Manual for Signa</b> l Generator, <b>Hewlett-Packard Model 8660C</b> Including Extension <b>M</b> odule, <b>Hewlett-Packard Model 11661B</b> . |



## APPENDIX D

## MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

## D-1. General.

This appendix provides a summary of the maintenance operations for R.F. Section Plug-In HP 86601A. It authorizes categories of maintenance for specific maintenance functions on repairable item and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

## D-2. Maintenance Function.

Maintenance functions will be limited to and defined as follows:

a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. *Test.* To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. *Adjust.* To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. *Align.* To adjust specified variable elements of an item to bring about optimum or desired performance.

f. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. *Install.* The act of assembling, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. *Replace.* The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. *Repair.* The application of maintenance services (*inspect, test, service, adjust, align, calibrate, replace*) or other maintenance actions (*welding, grinding, riveting, straightening, facing, remachining, or resurfacing*) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. *Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

## D-3. Column Entries.

a. *Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. *Column 2, Component/Assembly.* Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. *Column 3, Maintenance Functions.* Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions it is noted for purposes of having the group numbers in the MAI and EPTI manuals.

d. *Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C-Operator/Crew  
O-Organizational  
F-Direct Support  
H-General Support  
D-Depot

e. *Column 5, Tools and Equipment.* Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. *Column 6, Remarks.* Column 6 contains an alphabetic code which leads to the remark in section IV,

Remarks, which is pertinent to the item opposite the particular code.

#### D-4. Tool and Test Equipment Requirements (Sect. III).

a. *Tool or Test Equipment Reference Code.* The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. *Maintenance Category.* The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. *Nomenclature.* This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. *National/NATO Stock Number.* This column lists the National/NATO stock number of the specific tool or test equipment.

e. *Tool Number.* This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

#### D-5. Remarks (Sect. IV).

a. *Reference Code.* This code refers to the appropriate item in section II, column 6.

b. *Remarks.* This column provides the required explanatory information necessary to clarify items appearing in Section II.

(Next printed page is D-)

SECTION II MAINTENANCE ALLOCATION CHART  
FOR

R.F. SECTION PLUG-IN HP 86601A

TM 11-6625-2837-14&P-6

(1)  
GROUP  
NUMBER

00

| (2)<br>COMPONENT/ASSEMBLY      | (3)<br>MAINTENANCE<br>FUNCTION                             | (4)<br>MAINTENANCE CATEGORY |            |   |                   |     | (5)<br>TOOLS<br>AND<br>EQPT.                                                         | (6)<br>REMARKS |
|--------------------------------|------------------------------------------------------------|-----------------------------|------------|---|-------------------|-----|--------------------------------------------------------------------------------------|----------------|
|                                |                                                            | C                           | C          | F | H                 | D   |                                                                                      |                |
| R.F. SECTION PLUG-IN HP 86601A | Inspect<br>Test                                            |                             | 0.2<br>0.3 |   |                   |     | Visual<br>Simple,<br>oper-<br>ational<br>1 thru 7<br>8<br>27<br>27<br>8<br>1 thru 26 |                |
|                                | Test<br>Adjust<br>Install<br>Replace<br>Repair<br>Overhaul |                             | 0.2<br>0.3 |   | 0.5<br>0.6<br>1.0 | 8.0 |                                                                                      |                |



SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR

TM 11-6625-2837-14&P-6

R.F. SECTION PLUG-IN HP 86601A

| TOOL OR TEST<br>EQUIPMENT<br>REF CODE | MAINTENANCE<br>CATEGORY | NOMENCLATURE                                                                            | NATIONAL/NATO<br>STOCK NUMBER | TOOL NUMBER |
|---------------------------------------|-------------------------|-----------------------------------------------------------------------------------------|-------------------------------|-------------|
| 1                                     | H, D                    | ANALYZER, SPECTRUM TS-723/U                                                             | 6625-00-668-9418              |             |
| 2                                     | H, D                    | GENERATOR, SIGNAL AN/USM-205                                                            | 6625-00-788-9672              |             |
| 3                                     | H, D                    | MULTIMETER, ME-26/U                                                                     | 6625-00-913-9781              |             |
| 4                                     | H, D                    | OSCILLOSCOPE AN/USM-281                                                                 | 6625-00-106-9622              |             |
| 5                                     | H, D                    | VOLTMETER AN/GSM-64                                                                     | 6625-00-022-7894              |             |
| 6                                     | H, D                    | VOLTMETER AN/URM-145                                                                    | 6625-00-973-3986              |             |
| 7                                     | H, D                    | VOLTMETER ME-30/U                                                                       | 662500-643-1670               |             |
| 8                                     | H, D                    | TCOL KIT TK-100/G                                                                       | 5180-00-605-0075              |             |
| 9                                     | D                       | ANALYZER, SPECTRUM HP 141T                                                              |                               |             |
| 10                                    | D                       | PLUG-IN HP 8552B                                                                        |                               |             |
| 11                                    | D                       | PLUG-IN HP 8553B                                                                        |                               |             |
| 12                                    | D                       | PLUG-IN HP 8554B                                                                        |                               |             |
| 13                                    | D                       | PLUG-IN HP 8556A                                                                        |                               |             |
| 14                                    | D                       | GENERATOR, SIGNAL HP 203A                                                               |                               |             |
| 15                                    | D                       | GENERATOR, SIGNAL HP 8444A                                                              |                               |             |
| 16                                    | D                       | VOLTMETER HP 3406A                                                                      |                               |             |
| 17                                    | D                       | VOLTMETER HP 8405A                                                                      |                               |             |
| 18                                    | D                       | ATTENUATOR HP H38-355D                                                                  |                               |             |
| 19                                    | D                       | DETECTOR HP 8471A                                                                       |                               |             |
| 20                                    | D                       | DISCRIMINATOR, FM HP 5210A                                                              |                               |             |
| 21                                    | D                       | DUMMY LOAD HP 1250-0207                                                                 |                               |             |
| 22                                    | D                       | MARKED CARD PROGRAMMER HP 3260A                                                         |                               |             |
| 23                                    | D                       | MIXER, DOUBLE BALANCED HP 13514A                                                        |                               |             |
| 24                                    | D                       | POWER SUPPLY HP 721                                                                     |                               |             |
| 25                                    | D                       | PROBE HP 10004                                                                          |                               |             |
| 26                                    | D                       | SERVICE KIT HP 11672A                                                                   |                               |             |
| 27                                    | O                       | TOOLS AND TEST EQUIPMENT AVAILABLE TO THE REPAIRER BECAUSE OF HIS/HER ASSIGNED MISSION. |                               |             |