# TECHNICAL MANUAL

## OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

## SPECTRUM ANALYZER HEWLETT-PACKARD MODEL 85558B

HEADQUARTERS, DEPARTMENT OF THE ARMY
1 JANUARY 1986

**5** SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

**1** DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

**2** IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

**3** IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

**4** SEND FOR HELP AS SOON AS POSSIBLE

**5** AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

## SAFETY CONSIDERATIONS

### Safety Symbols

The following safety symbols are used throughout this manual and in the instrument. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Instruction manual symbol: the apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.

Indicates dangerous voltages.

**CAUTION** The CAUTION sign denotes a hazard. It calls attention to an operation procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

**WARNING** The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

### Operation

**WARNING**

BEFORE THIS INSTRUMENT IS SWITCHED ON, the oscilloscope mainframe protective earth terminal must be connected through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact. Failure to ground the instrument can result in personal injury.

**WARNING**

The 8558B Spectrum Analyzer should not be operated without protective covers (out of the mainframe). Adjustments, performance tests, and service procedures which require operation of the 8558B out of the mainframe should be performed only by trained service personnel.

**CAUTION**

BEFORE THIS INSTRUMENT IS SWITCHED ON, make sure that the oscilloscope mainframe is set to the voltage of the ac power source. Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

### Service and Adjustments

**WARNING**

There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Service and adjustments should be performed only by trained service personnel.

**WARNING**

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal may cause personal injury.

TM 11-6625-3061-14

Technical Manual )
)
No. 11-6625-3061-14)

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 January 1986

# OPERATOR'S ORGANIZATIONAL AND DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL SPECTRUM ANALYZER HEWLETT-PACKARD MODEL 8558B
(Includes Option 001 and Option 002)

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 2147A.

With modifications described in Section VII, this manual also applies to instruments with the serial prefixes 1914A through 2145A.

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

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5007.

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

## TABLE OF CONTENTS

CONTENTS

## CONTENTS



**NOTE**

**Schematic, block and component location diagrams are listed under ILLUSTRATIONS.**

## LIST OF ILLUSTRATIONS

## LIST OF ILLUSTRATIONS



## LIST OF TABLES

## LIST OF TABLES



## APPENDICES

**APPENDIX**

# SECTION 0.

# INTRODUCTION

## 0-1. SCOPE

This manual describes Spectrum Analyzer, Hewlett-Packard Model 8558B and provides instructions for operation and maintenance.

## 0-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications 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 prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

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 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

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

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5007. We'll send you a reply.

## 0-5. ADMINISTRATIVE STORAGE

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage is covered in paragraph 2-23.

## 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.

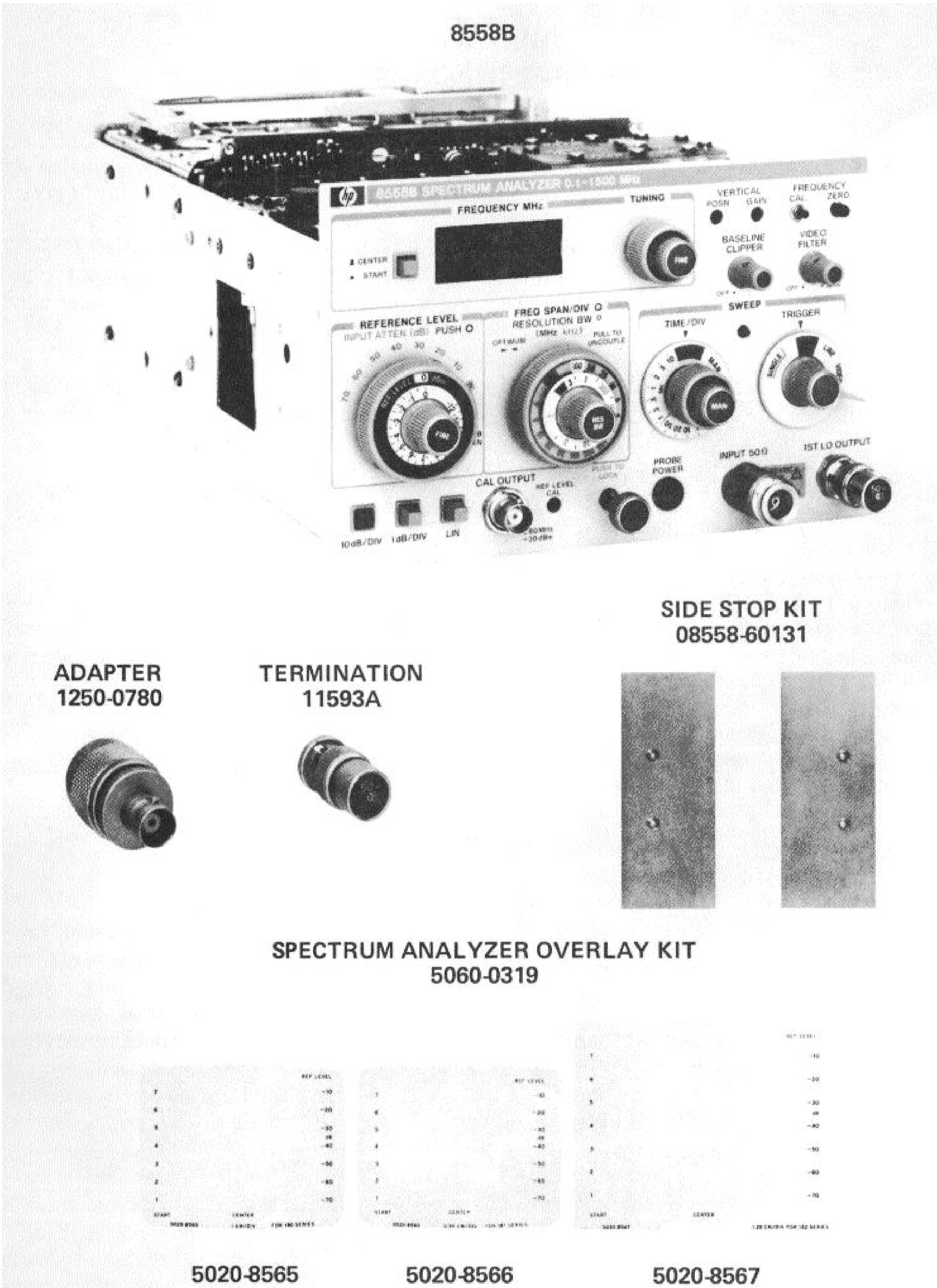



*Figure 1-1. HP Model 8558B Spectrum Analyzer with Accessories Supplied*

# SECTION I.

# GENERAL INFORMATION

## 1-1. INTRODUCTION

1-2. This Operation and Service manual contains information required to install, operate, test, adjust, and service the Hewlett-Packard Model 8558B Spectrum Analyzer. Figure 1-1 shows the standard instrument and accessories supplied. This section covers instrument identification, description, options, accessories, specifications, and other basic information.

## 1-3. DESCRIPTION

1-4. The HP 8558B displays the amplitude and frequency of each component of an input signal on a CRT. This display gives quantitative information often not available from a conventional oscilloscope. The HP 8558B is capable of measuring signals from -117 dBm to +30 dBm over a frequency range of 100 kHz to 1500 MHz.

*001: 110 dBm to + 30 dBm*
*002: 63 dBmV to + 80 dBmV*

1-5. The complete measuring system includes the HP 8558B Spectrum Analyzer plugged into a compatible Hewlett-Packard display mainframe.

## 1-6. MANUAL ORGANIZATION

1-7. This manual is divided into eight sections as follows:

SECTION I, GENERAL INFORMATION, contains the instrument description and specifications, explains accessories and options, and lists recommended test equipment.

SECTION II, INSTALLATION AND OPERATION VERIFICATION, contains information concerning initial mechanical inspection, preparation for use, operating environment, packaging and shipping, and operation verification.

SECTION III, OPERATION, contains detailed instructions for operation of the instrument.

SECTION IV, PERFORMANCE TESTS, contains the necessary tests to verify that the electrical operation of the instrument is in accordance with published specifications.

SECTION V, ADJUSTMENTS, contains the necessary adjustment procedures to properly adjust the instrument after repair.

SECTION VI, REPLACEABLE PARTS, contains the information necessary to order parts and/or assemblies for the instrument.

SECTION VII, MANUAL BACKDATING CHANGES, contains backdating information to make this manual compatible with earlier equipment configurations.

SECTION VIII, SERVICE, contains schematic diagrams, block diagrams, component location illustrations, circuit descriptions, and troubleshooting information to aid in repair of the instrument.

1-8. On the title page of this manual, below the manual part number, is a microfiche part number. This number may be used to order 4-by 6-inch microfilm transparencies of the manual. Each microfiche contains up to 60 photo-duplicates of the manual pages. The microfiche package also includes the latest Manual Changes supplement.

1-9. Where text changes are required to reflect Options 001 and 002, these changes are shown in bold type immediately following applicable text. Notes are also included in tables and illustrations where users of Options 001 and 002 need to be informed of differences from the standard instrument. Users of the standard instrument should ignore references to Options 001 and 002.

## 1-10. SPECIFICATIONS

1-11. Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument is tested. Table 1-2 lists supplemental characteristics. Supplemental characteristics are not specifications but are typical characteristics included as additional information for the user.

**NOTE**

**To ensure that the HP Model 8558B meets the specifications listed in Table 1-1, performance tests (Section IV) should be performed every six months.**

## 1-12. SAFETY CONSIDERATIONS

1-13. Before operating this instrument, you should familiarize yourself with the safety markings on the instrument and safety instructions in this manual. This instrument has been manufactured and tested according to international safety standards. However, to ensure safe operation of the instrument and personal safety of the user and service personnel, the cautions and warnings in this manual must be followed. Refer to the Safety Considerations at the front of the manual. Refer also to individual sections of this manual for detailed safety notation concerning the use of the instrument as described in those individual sections.

## 1-14. INSTRUMENTS COVERED BY MANUAL

### 1-15. Serial Numbers

1-16. Attached to the rear of your instrument is a mylar serial number label. The serial number is in two parts. The first four digits and letter are the serial number prefix; the last five digits are the suffix (see Figure 1-2). The prefix is the same for all identical instruments; it changes only when a change is made to the instrument. The suffix, however, is assigned sequentially and is different for each instrument. The contents of this manual apply to instruments with the serial number prefix(es) listed under SERIAL NUMBERS on the title page.


*Figure 1-2. Typical Serial Number Label*

### 1-17. Manual Changes Supplement

1-18. An instrument manufactured after the printing of this manual might have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the instrument is different from those described in this manual. The manual for this newer instrument is accompanied by a yellow Manual Changes supplement. This supplement contains change information that explains how to adapt the manual to the newer instrument.

1-19. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement carries a manual identification block that includes the model number, print date of the manual, and manual part number. Complimentary copies of the supplement are available from Hewlett-Packard. Addresses of Hewlett-Packard offices are located at the back of this manual.

### 1-20. Manual Backdating Changes

1-21. Instruments manufactured before the printing of this manual have been assigned serial number prefixes other than those for which this manual was written directly. Manual backdating information is provided in Section VII to adapt this manual to earlier serial number prefixes. For instruments with serial number prefixes 1829A and earlier, refer to the HP 8558B Operating and Service Manual dated October 1977, HP part number 08558-90043, and to the Manual Changes supplement supplied with that manual.

*Table 1-1. HP Model 8558B Specifications (1 of 3)*

## FREQUENCY SPECIFICATIONS

**FREQUENCY RANGE**
100 kHz to 1500 MHz

**FREQUENCY SPANS**

**Per Division (MHz/Div, kHz/Div)**
14 frequency scale calibrations in 1-2-5 sequence from 5 kHz/div to 100 MHz/div. Start or center frequency is set with the TUNING control and indicated by the FREQUENCY MHz readout.

**Zero Span (0)**
Analyzer functions as a manually tuned receiver, at the frequency indicated by the FREQUENCY MHz readout, for time-domain display of signal modulation.

**FREQUENCY ACCURACY**

**Tuning Accuracy**
Frequency MHz readout (start or center frequency), after zeroing on the LO feedthrough and operating the FREQUENCY CAL control, +10°C to +40°C: 0-195 MHz: ±(1 MHz+20% of frequency span per division)
195-1500 MHz: ±(5 MHz + 20% of frequency span per division)

**Frequency Readout Resolution**
0-195 MHz: 100 kHz
195-1500 MHz: 1 MHz

**Frequency Span Accuracy**
± 5% of displayed frequency separation

**SPECTRAL RESOLUTION AND STABILITY**

**Resolution Bandwidths**
Eight selectable resolution (3-dB) bandwidths in 1-3 sequence from 1 kHz to 3 MHz. Bandwidth may be selected independently or coupled with frequency span. Optimum ratio of frequency span to resolution bandwidth is indicated by alignment of markers ( > < ) on the two controls.

**Resolution Bandwidth Accuracy:**
Individual resolution bandwidth 3-dB points:
±20% (+10°C to +40°C)

**Selectivity:**
60-dB: 3-dB resolution bandwidth ratio: <15:1

**Stability**

**Residual FM:**
<1 kHz p-p in 0.1 second

**Noise Sidebands:**
>65 dB down, >50 kHz from center of CW signal with 1 kHz resolution bandwidth and full video filtering.

**Video Filter**
Post-detection low-pass filter averages displayed noise for a smooth trace. The MAX (detent) position selects a video filter bandwidth of approximately 1.5 Hz for noise level measurement.

## AMPLITUDE SPECIFICATIONS

**AMPLITUDE RANGE**
-117 dBm to +30 dBm
*001: - 110 dBm to +30 dBm*
*002: -63 dBm V to +80 dBm V*

**Maximum Input (Damage) Levels**

**Total Power:**
+30 dBm (1W, 7.1 Vrms)
*001: +30 dBm (1W, 8.7 Vrms)*
*002: +80 dBm V (1.3W, 10 Vrms)*

**dc or ac (<100 Hz):**
± 50V

Peak Pulse Power:
+50 dBm (100W, <10 μsec pulse width, 0.01% duty cycle) with input attenuation >20 dB
*002: + 100 dBm V (130W)*

**Average Noise Level**
The displayed average noise level determines sensitivity (minimum discernible signal). Signals at this input level peak approximately 3 dB above the displayed noise.
Maximum average noise level with 10 kHz resolution bandwidth, 0 dB input attenuation, and maximum (MAX) video filtering:
<-107 dBm (1-1500 MHz)
*001: <-100 dBm (1-1500 MHz)*
*002: <-53 dBmV (1-1500 MHz)*

**Calibrated Display Range**

**Log (from Reference Level):**
70 dB with 10 dB/DIV Amplitude Scale
8 dB with 1 dB/DIV Amplitude Scale

**Linear:**
8 divisions with LIN Amplitude Scale

**AMPLITUDE ACCURACY**
With AUTO sweep time selected, amplitude accuracy is determined by one or more of the following factors, depending on the measurement technique.

**Calibrator Output**
-30 dBm +1 dB (into 50Ω)
280 MHz ± 300 kHz
*001: -30 dBm + 1 dB (into 75Ω)*
*002: +20 dBm V + 1 dB (into 75Ω)*

*Table 1-1. HP Model 8558B Specifications (2 of 3)*

**Reference Level**
10-dB steps and a 12-dB vernier for calibrated Reference Level adjustment from -112 dBm to +60 dBm.
*(002: -62 dBm V to + 1 10 dBm V)* [1]

**Step Accuracy:**
Steps referenced with 0 dB input attenuation.
-10 dBm to -80 dBm: ± 0.5 dB
-10 dBm to -100 dBm: ±1.0 dB

**Vernier Accuracy**
±0.5 dB

**Frequency Response**
Frequency response includes input attenuator, limiter, and mixer flatness:
6<±1.0 dB with 10 dB input attenuation

**Input Attenuator**
0 dB to 70 dB of input attenuation selectable in 10-dB steps

**Step Accuracy:**
0 dB to 70 dB: <±0.5 dB per 10-dB step

**Maximum Cumulative Error:**
0 dB to 70 dB: <±1.0 dB

**Bandwidth Switching (Amplitude Variation)**
Bandwidths 3 MHz to 300 kHz: <±0.5 dB
Bandwidths 3 MHz to 1 kHz: <±1.0 dB[2]

**Display Fidelity**
CRT linearity and log or linear fidelity affect amplitude accuracy at levels other than Reference Level.

**Log Incremental Accuracy:**
±0.1 dB per dB from Reference Level

**Log Maximum Cumulative Error:**
<±1.5 dB over entire 70-dB range

**Linear Accuracy:**
±3% of Reference Level

**SPURIOUS RESPONSES**

**Second Harmonic Distortion:**
>70 dB3 below a -40 dBm input signal with 0 dB input attenuation.
*001: -35 dBm input signal*
*002: + 15 dBm V input signal*

**Third Order Intermodulation Distortion:**
>70 dB3 below two -30 dBm input signals, separated by >50 kHz, with 0 dB input attenuation.
*001: two -25 dBm input signals*
*002: two +25 dBm V input signals*

**Image and Multiple Responses:**
>70 dB[3] below a -40 dBm input level with 0dB input attenuation.
*001: -35 dBm input level*
*002: + 15 dBm V input level*

**RESIDUAL RESPONSES**
<-100 dBm (1-1500 MHz) with 0 dB input attenuation and no signal present at input.
*001: <-95 dBm (1--1500 MHz)*
*002: <-50 dBm V (1- 1500 MHz)*

## SWEEP SPECIFICATIONS

**SWEEP TIME**

**Automatic (AUTO):**
Sweep time adjusted automatically to maintain absolute amplitude calibration for any combination of frequency span, resolution bandwidth, and video filter bandwidth.

**Calibrated Sweep Times (sec/Div, mSec/Div):**
16 selectable sweep times in 1-2-5 sequence from 0.1 msec/div to 10 sec/div, provided primarily for time-domain calibration in zero span (0).

## GENERAL SPECIFICATIONS

**TEMPERATURE RANGE**
**Operating**: 0°C to +55°C
**Storage**: -40°C to +75°C.

**HUMIDITY RANGE**
Type-tested from 50% to 95% relative humidity (-<+40°C) per requirements of MIL-STD-810C, Method 507.1, Procedure IV.

**EMI**
Conducted and radiated interference is in compliance with MIL-STD 461A, Methods CE03 and RE02, CISPR Publication 11 (1975) and Messempfaenger Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen).

[1] Input level not to exceed +30 dBm *(002: +80 dBm V)* damage level.
[2] 100 kHz bandwidth limited to < 80% relative humidity. Amplitude variation is < +2.5 at 95% relative humidity, +40°C.
[3] > 60 dB for 100 kHz to 5 MHz input signals. k,

*Table 1-1. HP Model 8558B Specifications (3 of 3)*

**POWER REQUIREMENTS**

**HP Model 182T/180TR Display with HP Model 8558B Spectrum Analyzer:**
48440 Hz, 115 or 230 volts (±10%), 200VA maximum, convection cooled.

**HP Model 181T/181TR Display with HP Model 8558B Spectrum Analyzer:**
48440 Hz, 115 or 230 volts (±10%), 225 VA maximum, convection cooled.

**WEIGHT**

**HP Model 8558B Spectrum Analyzer:**
Net: 5.5 kg (12 lbs)
Shipping: 10.5 kg (23 lbs)

**HP Model 182T Display:**
Net: 12.5 kg (27 lbs)
Shipping: 16.5 kg (36 lbs)

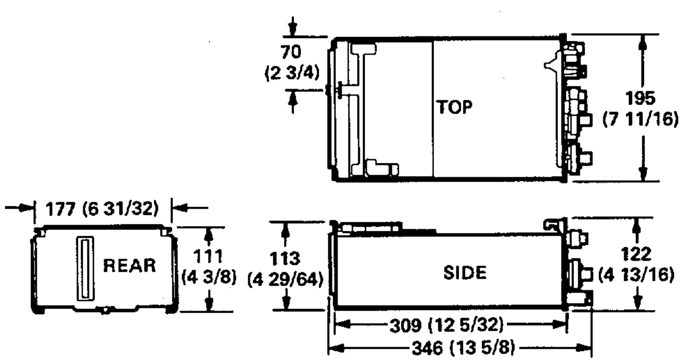
**HP Model 181T Display:**
Net: 11.0 kg (24 lbs)
Shipping: 15.5 kg (34 lbs)

**HP Model 181TR Display:**
Net: 12.0 kg (26 lbs)
Shipping: 17.5 kg (38 lbs)

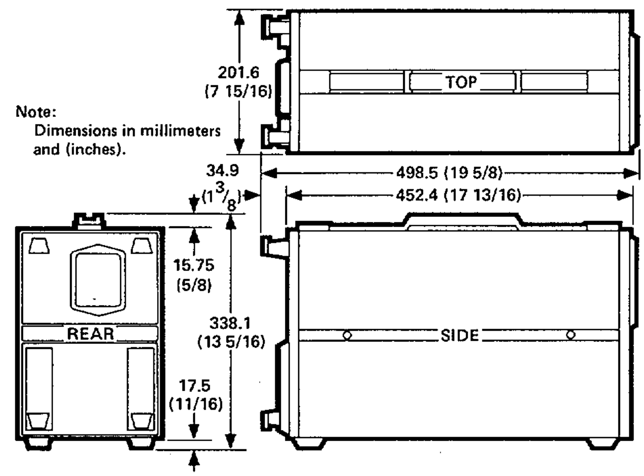
**HP Model 180TR Display:**
Net: 12.0 kg (26 lbs)
Shipping: 17.5 kg (38 lbs)

**DIMENSIONS**

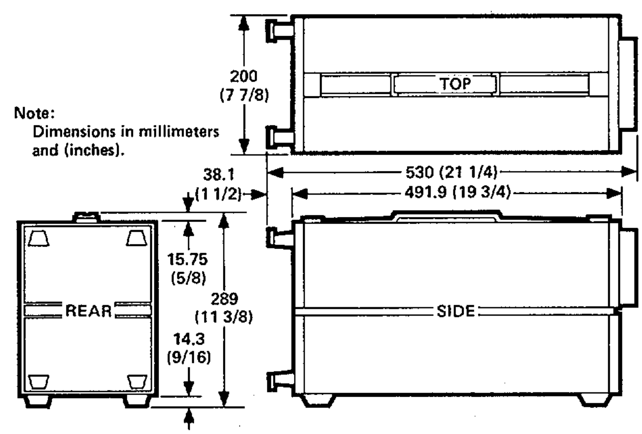
**HP Model 8558B Spectrum Analyzer:**




**HP Model 182T Display:**




**HP Model 181T Display:**




**HP Model 180TR/181TR Display:**

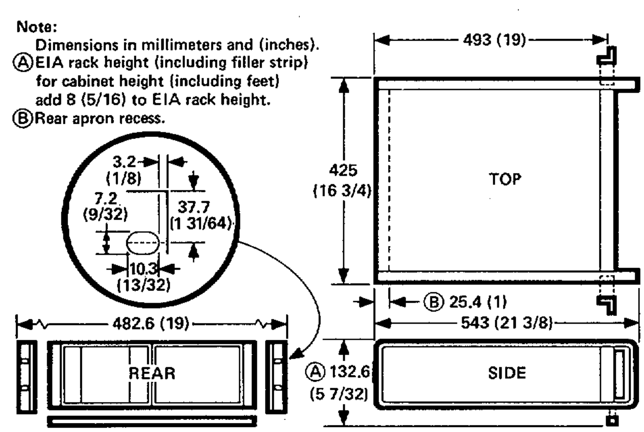


*Table 1-2. Model 8558B/180-Series Supplemental Characteristics (1 of 3)*

**SUPPLEMENTAL CHARACTERISTICS**

**NOTE:**

**Values in this table are not specifications. They are typical characteristics included for user information.**

---

## FREQUENCY CHARACTERISTICS

### FREQUENCY ACCURACY

**FREQUENCY ZERO**

Adjusts digital FREQUENCY MHz readout. FREQUENCY ZERO control may be used to calibrate the frequency readout on a known signal or on the LO feedthrough.

**FREQUENCY CAL**

Removes tuning hysteresis from first LO (YIG oscillator). FREQUENCY CAL button should be pressed to maintain FREQUENCY MHz readout accuracy whenever TUNING is changed by more than 50 MHz.

### FREQUENCY RANGE

**OUT-OF-RANGE BLANKING**

The CRT trace is automatically blanked whenever the spectrum analyzer is swept or tuned beyond its frequency range (approximately -50 MHz and 1600 MHz).

### SPECTRAL RESOLUTION AND STABILITY

**FREQUENCY DRIFT**

At fixed start/center frequency, after 2-hour warmup: <50 kHz in 10 minutes.

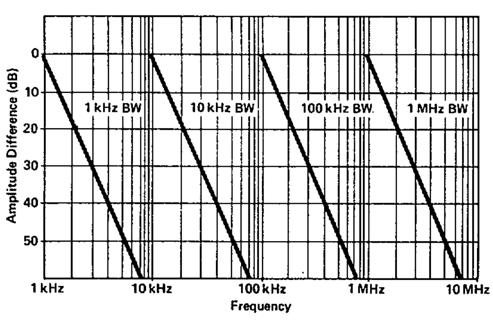
With temperature changes: <200 kHz/°C

**RESOLUTION BANDWIDTH SHAPE**

Approximately gaussian (synchronously-tuned, 4-pole filter).

**SPECTRAL RESOLUTION**

The following graph shows typical spectrum analyzer resolution for different resolution bandwidths.




*Signal Resolution vs. Frequency Separation*

## AMPLITUDE CHARACTERISTICS

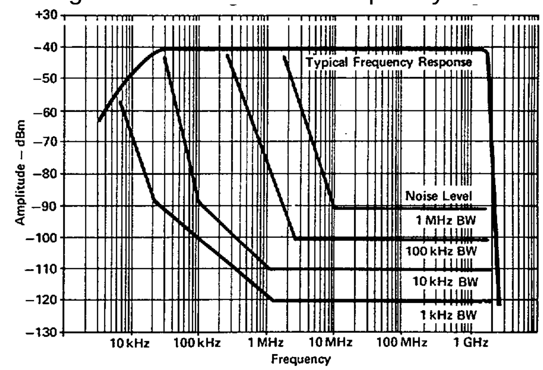
### AMPLITUDE RANGE AND ACCURACY

**DYNAMIC RANGE**

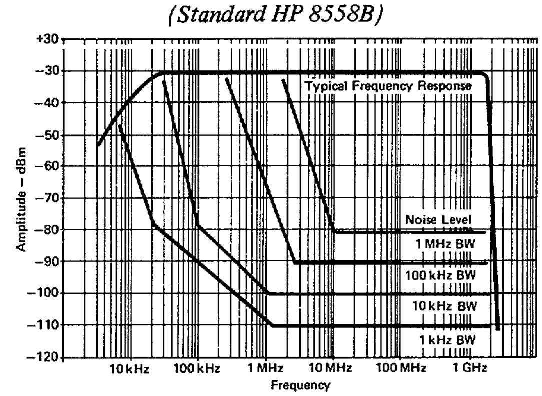
Maximum power ratio of two signals simultaneously present at the input that may be measured within the limits of specified accuracy, sensitivity, and distortion (i.e. spurious responses): >70 dB

### FREQUENCY RESPONSE AND AVERAGE NOISE LEVEL

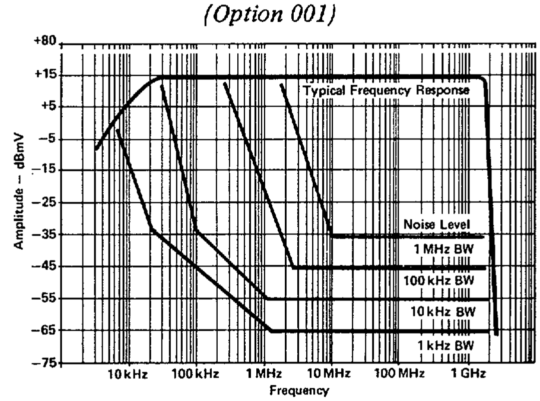
The following graphs show typical frequency response and average noise level versus frequency.




*(Standard HP 8558B)*




*(Option 001)*




*(Option 002)*

*Average Noise Level and Frequency Response*

*Table 1-2. Model 8558B/180-Series Supplemental Characteristics (2 of 3)*

**SUPPLEMENTAL CHARACTERISTICS**

**NOTE:**

**Values in this table are not specifications. They are typical characteristics included for user information.**

**GAIN COMPRESSION**
Gain compression is typically less than 1 dB for a -10 dBm input level with 0 dB input attenuation.
*001: -5 dBm input level*
*002: +45 dBmV input level*

**AMPLITUDE SCALE SWITCHING**
Reference Level variation is typically less than ±1 dB for any change in Amplitude Scale.

**SPURIOUS RESPONSES**

**SECOND HARMONIC AND THIRD ORDER INTERMODULATION DISTORTION**
The graphs below illustrate typical second harmonic and third order intermodulation distortion.

**SWEEP CHARACTERISTICS**

**SWEEP TIME**

**CALIBRATED SWEEP TIME ACCURACY (Sec/DIV, mSec/DIV)**
Sweep times are typically ±10% of indicated value.

**MANUAL**
Spectrum analyzer may be swept manually, in either direction, with front panel control.

**SWEEP TRIGGER**

**FREE RUN**
End of each sweep triggers new sweep.

**LINE**
Sweep triggered at ac line frequency.

**VIDEO**
Sweep triggered on post-detection video waveform. One-half major division of vertical deflection required to trigger sweep.

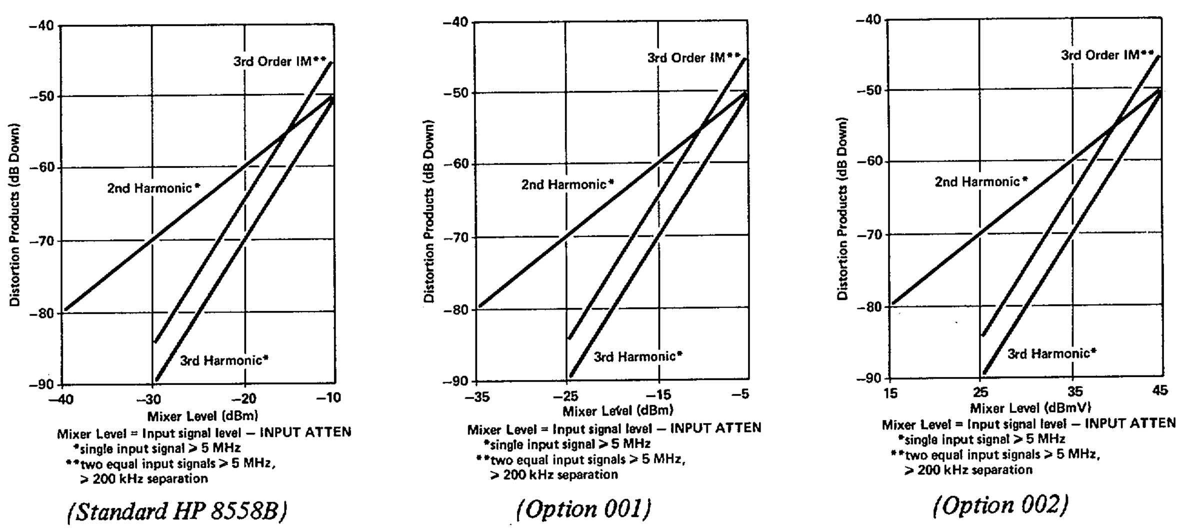
**SINGLE**
Single sweep started or reset by turning SWEEP TRIGGER clockwise momentarily.

**FRONT PANEL INPUT AND OUTPUT CHARACTERISTICS**

**SIGNAL INPUT**

**INPUT IMPEDANCE**
50 ohms nominal; Precision Type N female connector.
*001 and 002: 75 ohms nominal; 75-ohm BNC female connector.*

**INPUT SWR**
<1.5 SWR with >10 dB input attenuation
*001 and 002: <1.5 SWR*




*Distortion vs. Mixer Level*

*Table 1-2. Model 8558B/180-Series Supplemental Characteristics (3 of 3)*

**SUPPLEMENTAL CHARACTERISTICS**

**NOTE:**

**Values in this table are not specifications. They are typical characteristics included for user information.**

**CAL OUTPUT**

-30 dBm at 280 MHz with second through fourth harmonics greater than -70 dBm (into 50 ohms).
*001:-30 dBm at 280 MHz (into 75 ohms)*
*002: +20 dBm V at 280 MHz (into 75 ohms)*

**1ST LO OUTPUT**

+10 dBm nominal into 50 ohms, 2.05-3.55 GHz. Terminate with a 50-ohm load when not in use.

**PROBE POWER**

+15V, -12.6V, and GND (150 mA maximum) for use with HP High-Impedance Probes (i.e. HP 1120A, 1121A, 1123A, 1124A). The HP 1121A is recommended for its low noise characteristics.[1]

**REAR PANEL OUTPUT CHARACTERISTICS[2]**

**VERTICAL, PENLIFT/BLANKING, AND HORIZONTAL OUTPUTS (AUX A, B, D)**

These outputs are compatible with and may be used to drive HP X-Y Recorders (using positive pencoils or TTL penlift input) and CRT monitors.

[1]See Section II for details regarding use with 001 and 002 75ohm inputs.

[2]Rear panel outputs refer to 180T-series display mainframes and other 180-series mainframes with Option 807 installed. Horizontal, vertical, and blanking outputs, attenuated and shifted in dc level, are available on other 180-series mainframes at the MAIN SWEEP, MAIN GATE, and DELAYED GATE outputs, respectively. DO NOT connect an X-Y recorder to the DELAYED GATE OUTPUT, or damage will result.

**AUX A VERTICAL OUTPUT**

BNC output provides detected video signal from a 50-ohm output impedance. Typical 0-800 mV range corresponds to full 8-division CRT vertical deflection.

**AUX B PENLI FT/BLANKING OUTPUT**

BNC output provides a +15V penlift/blanking signal from a 10K-ohm output impedance when CRT trace is blanked. Otherwise, output is low at OV (low impedance, 150 mA max.) for an unblanked trace.

**AUX C 21.4 MHz IF OUTPUT**

BNC output provides 21.4 MHz IF signal (linearly related to spectrum analyzer RF input) from a 50-ohm output impedance. Output bandwidth controlled by spectrum analyzer RESOLUTION BW setting; output amplitude controlled by INPUT ATTEN, REFERENCE LEVEL FINE, and first six REFERENCE LEVEL positions (i.e. -10 through -60 dBm with 0 dB input attenuation). Output level is approximately -10 dBm into 50 ohms with a signal displayed at Reference Level.
*002: (i.e. +40 to -10 dBmV with 0 dB input attenuation).*

**AUX D HORIZONTAL OUTPUT**

BNC output provides horizontal sweep voltage from a 5K-ohm output impedance. -5V to +5V range corresponds to full 10-division CRT horizontal deflection.

1-22. This information should not be confused with information contained in the yellow Manual Changes supplement, which is intended to adapt this manual to instrument changes that are accomplished after its printing.

## 1-23. OPTIONS

**CAUTION**

**The two 75-ohm BNC connectors on Option 001 and Option 002 instruments are not compatible with 50ohm BNC connectors. Direct use of 50-ohm BNC connectors with these instruments might damage the INPUT and CAL OUTPUT connectors.**

### 1-24. Option 001

1-25. Option 001 provides direct-measurement capability in a 75-ohm system. The BNC input and calibration-output connectors have 75 Ω impedance (nominal). Option 001 is calibrated in dBm, providing a measurement range from -110 dBm to +30 dBm. Throughout the manual, differences between the standard instrument and Option 001 are given in boldface type following applicable text references and as necessary in tables and illustrations.

### 1-26. Option 002

1-27. Option 002 provides direct-measurement capability in a 75-ohm system. The BNC input and calibration-output connectors have 75Q impedance (nominal). Option 002 is calibrated in dBmV, providing a measurement range from -63 dBmV to + 80 dBmV. Throughout the manual, differences between the standard instrument and Option 002 are given in boldface type following applicable text references and as necessary in tables and illustrations.

### 1-28. Option 910

1-29. One additional Operation and Service manual is provided for each Option 910 ordered. To obtain additional manuals after initial shipment, order by the manual part number, which appears on the title page and on the back cover.

## 1-30. ACCESSORIES SUPPLIED

1-31. The following accessories, supplied with the instrument, are shown in Figure 1-1:

- BNC termination
- Cable adapter
- Side stop kit
- Graticule overlays

### 1-32. Termination

1-33. A BNC, 50-ohm termination, HP Model 11593A, is supplied for the front-panel 1ST LO OUTPUT.

### 1-34. Cable Adapter

1-35. A Type N male to BNC female adapter, HP part number 1250-0780, is supplied with the standard instrument for the use of lightweight cables with BNC connectors.

### 1-36. Side Stop Kit

1-37. A side stop kit, HP part number 08558-60131, is supplied to prevent the spectrum analyzer from sliding out of the mainframe. When the side stops are installed, the plug-in cannot be removed from the mainframe. Refer to Section II for installation or removal of the side stops.

### 1-38. Graticule Overlays

Three graticule overlays provide the operator with reference-level labels for the CRT. HP Part Number 5020-8565 is the overlay for 180-series display mainframes. HP Part Number 5020-8566 is the overlay for 181-series display mainframes. HP Part Number 5020-8567 is the overlay for 182- series display mainframes. For proper installation of the graticule overlay, refer to Section II.

## 1-39. EQUIPMENT REQUIRED BUT NOT SUPPLIED

### 1-40. Display Mainframe

1-41. A 180T-series display mainframe (180TR, 181T, 181TR, or 182T) is recommended for use with the HP Model 8558B. In the 180T-series mainframe, the rear-panel auxiliary output connectors (AUX A, AUX B, AUX C, and AUX D) provide, respectively, Vertical Output, Pen Lift Output, 21.4 MHz IF Output, and Horizontal Output.

1-42. A standard 180-series Display mainframe (180A/AR, 180C/D, 181A/AR, 182A/C, or 184A/B) provides only horizontal, vertical, and blanking rear panel outputs. Furthermore, these outputs are attenuated and shifted in dc level. Unbuffered rear panel outputs (similar to the 180T-series) are provided only if Option 807 is installed.

### 1-43. Extender Cable Assembly

1-44. An Extender Cable Assembly (Figure 1-3), HP Part Number 5060-0303, allows operation of the HP 8558B outside the display mainframe. This provides access to the HP 8558B for necessary adjustments and some performance tests. This cable is also useful for troubleshooting.

## 1-45. MEASUREMENT ACCESSORIES

### 1-46. AC Probe

1-47. The HP Model 8558B Spectrum Analyzer has a front-panel PROBE POWER connector for the use of high-impedance active probes such as the HP 1120A, HP 1121A, HP 1123A, and HP 1124A. High-impedance probes permit testing of high-frequency circuits without significant loading effects. The low-noise, AC-coupled HP 1121A is preferred for use with the HP 8558B.

**CAUTION**

**The 75-ohm BNC input connector on ANT Option 001 and 002 instruments is not compatible with 50-ohm BNC connectors. Direct connection of an AC probe might damage the input connector.**

*001 and 002: The AC probes have a 50-ohm output impedance. Use of a probe with the 75-ohm Option 001 or 002 without proper impedance matching causes a + 1.58 dB error in displayed signal levels.*

### 1-48. Modification Kit (Option 807 Connections)

1-49. A modification kit, HP part number 00180-69503, provides the materials and information necessary to install unbuffered rear panel connections (formerly included in Option 807) in the following display mainframes: 180A/AR, 180C/D, 181A/AR, 182A/C, and 184A/B. Refer to Table 1-3 for a description of parts included in the modification kit.

### 1-50. Oscilloscope Camera

1-51. The HP Model 197B, Option 002, General Purpose Camera can be used with 180- and 181-series display mainframes to make a permanent record of measurements. The HP 10367A adapter allows the camera to be used with 182-series mainframes.

## 1-52. SERVICE ACCESSORIES

1-53. Service accessories are shown in Figure 1-3.

*Table 1-3. Parts Included in Modification Kit 00180-69503*

| Quantity | Description | HP Part Number |
|---|---|---|
| 1 | Output Amplifier Assembly (Auxiliary Output Board) | 00180-66551 |
| 1 | Label | 7120-3116 |
| 2 | 3/4 inch pieces of shrink tubing | 0890-0720 |
| 1 | Service Note | 180A/AR-10, 180C/D-2, 181A/AR8 182A/C-1, or 184/B-1 (modification is similar for all instruments listed) |

## 1-54. RECOMMENDED TEST EQUIPMENT

1-55. Equipment required for operation verification, performance tests, adjustments, and troubleshooting of the HP Model 8558B is listed in Table 1-4. Other equipment may be substituted if it meets or exceeds the critical specifications listed in the table.

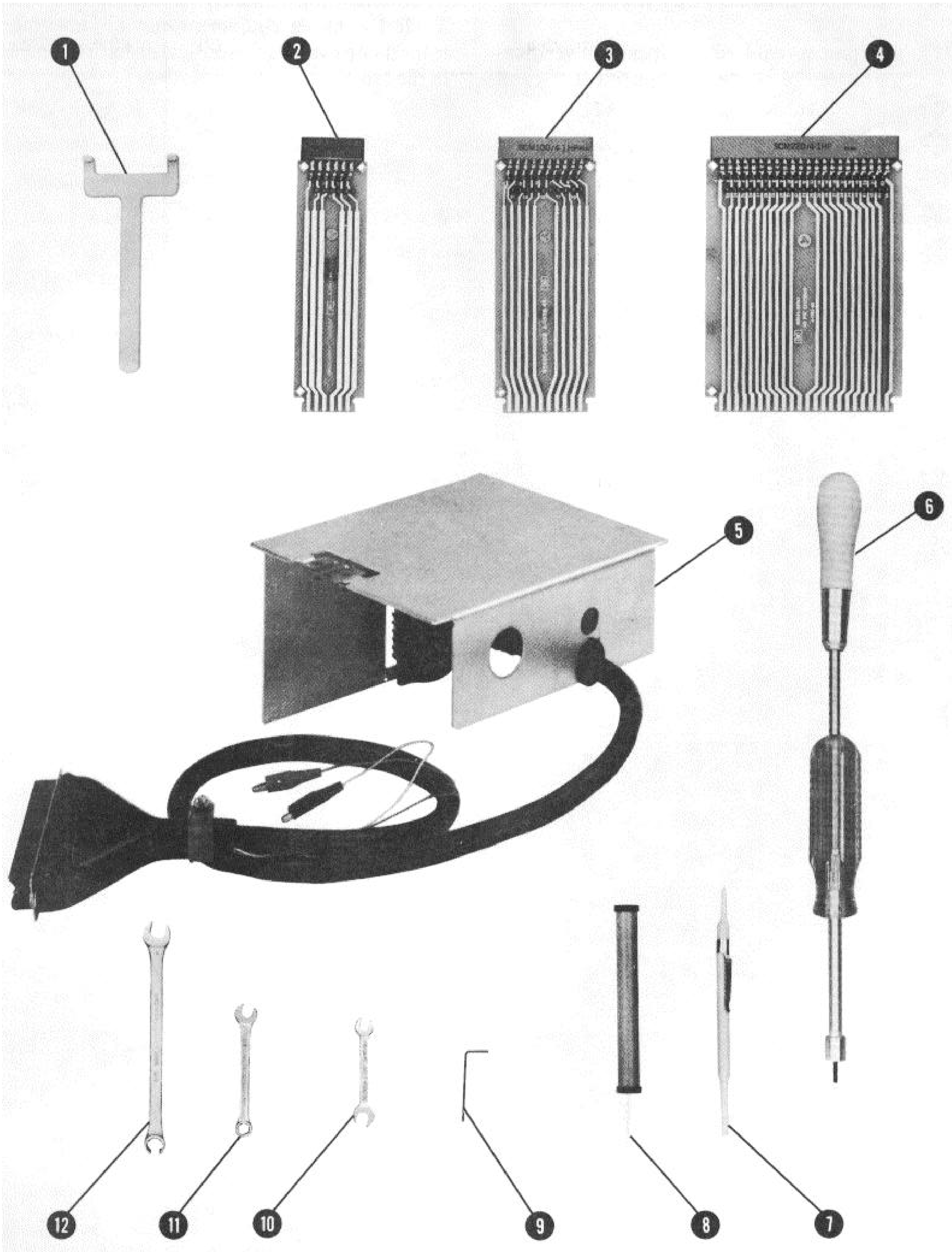


Figure 1-3. Service Accessories (1 of 2)

| Item | Description | CD | HP Part Number |
|---|---|---|---|
| (1) | Board Puller, 2 prongs to lift PC boards | 1 | 03950-4001 |
| (2) | Extender Board, 6 pin, 12 contacts | 2 | 08559-60042 |
| (3) | Extender Board, 10 pin, 20 contacts | 2 | 85680-60028 |
| (4) | Extender Board, 22 pin, 44 contacts | 8 | 08565-60107 |
| (5) | Extender Cable Assembly, for plug-in operation out of display mainframe | 9 | 5060-0303 |
| (6) | Tuning Tool, modified 5/16 inch nut driver with modified No. 10 Allen driver | 6 | 08555-60107 |
| (7) | Alignment tool, metal tip in plastic | 7 | 8710-0630 |
| (8) | Alignment tool, non-metallic | 4 | 8710-0033 |
| (9) | Wrench, No. 2 Bristol | 0 | 8710-0055 |
| (10) | Wrench, 15/64 inch, combination | 8 | 8710-0946 |
| (11) | Wrench, 1/4 inch, open end | 2 | 8720-0014 |
| (12) | Wrench, 5/16 inch, slotted box end/open end | 9 | 08555-20097 |

*Figure 1-3. Service Accessories (2 of 2)*

*Table 1-4. Recommended Test Equipment (1 of 4)*

| Equipment | Critical Specifications | Recommended Model | Use* |
|---|---|---|---|
| Display Mainframe | HP 180T Series with variable persistence | HP 181T/TR | P, A, T |
| Oscilloscope | Time Base: 1 ms/cm to 10 ms/cm<br>Vertical Sensitivity: 1 mV/cm to 20 V/cm | HP 1741A | A, T |
| Frequency Counter | Frequency Range: 150 MHz to 1.5 GHz<br>Sensitivity: -30 dBm | HP 5342A | P, A, T |
| Timer/Counter | Time base: 10 us | HP 5308A | A, T |
| Digital Voltmeter | Accuracy: ±(.05% Rdg ± digit) | HP 3455A | P, A, T |
| Power Meter | Power Range: -20 dBm to +10 dBm | HP 435A/B | P, A, T |
| Power Sensor | Frequency Range: 100 kHz to 1.5 GHz<br>Maximum SWR: 1.1,0.1 to 1 GHz | HP 8482A | P, A, T |
| Amplifier | Frequency Range: 200 MHz to 300 MHz<br>Gain: > 20 dB<br>Impedance: 50 Ω | HP 8447D | P, A, T |
| Signal Generator (2 required) | Frequency Range: 4 MHz to 305 MHz<br>Drift: Less than 50 ppm (or 5 Hz, whichever is greater)<br>Harmonic Distortion: > 30 dB below fundamental<br>Noise Sidebands: > 80 dB down, 50 kHz away, 1 kHz BW | HP 8640B | P, A, T |
| Tracking Generator | Frequency Range: 5 MHz to 1500 MHz | HP 8444A Opt. 059 | P, T |
| Sweep Oscillator | Manual Sweep | HP 8350A | A |
| RF Plug-In | Frequency Range: 10 MHz to 1.5 GHz<br>Flatness (external leveling): < ±0.1 dB | HP 83522A | A |
| Spectrum Analyzer | Frequency Range: 10 MHz to 1.5 GHz | HP 141T/8552B/ 8555A | T |
| Comb Generator | Accuracy: 0.01% | HP 8406A | P, A, T |
| Function Generator | Frequency Range: 5 kHz to 5 MHz | HP 3310A | P, T |
| Crystal Detector | Frequency Range: 10 MHz to 1.5 GHz<br>Frequency Response: ± 0.2 dB/octave to 2 GHz; ±0.5 dB overall | HP 423B | A, T |

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

*Table 1-4. Recommended Test Equipment (2 of 4)*

| Equipment | Critical Specifications | Recommended Model | Use* |
|---|---|---|---|
| 300 MHz LPF | Rejection: > 50 dB for signals above 300 MHz | Telonic TPL 3004AB | P, A, T |
| Power Splitter | Frequency Range: 100 kHz to 1.5 GHz<br>Input SWR: <, 1.15 | HP 11667A | P, A |
| 10 dB Attenuator (2 required) | Frequency Range: 100 kHz to 1.5 GHz<br>Accuracy: ±0.5 dB | HP 8491A Opt. 010 | P, A |
| Step Attenuator | Frequency Range: 20 MHz to 305 MHz<br>Attenuation: 12 dB in l-dB steps calibrated at 30 MHz by a standards lab<br>Accuracy: ±0.25 dB | HP 355C Opt. H80 | P, A, T |
| Step Attenuator | Frequency Range: 20 MHz to 305 MHz<br>Attenuation: 80 dB in 10-dB steps calibrated at 30 MHz and 280 MHz by a standards lab<br>Accuracy: ±0.01 dB ±0.02/10 dB step at calibrated frequencies | HP 355D Opt. H82 | P, A, T |
| Termination | Impedance: 50Ω | HP 908A/11593A | P, A |
| Type N Cable | 50Ω coaxial cable with Type N (m) connectors on both ends | HP 11500A | P, A |
| BNC Cable, 20 cm (9 in) | 50Ω coaxial cable with BNC (m) connectors on both ends | HP 10502A | P, A, T |
| BNC Cable, 120 cm (48 in) (2 required) | 50Ω coaxial cable with BNC (m) connectors on both ends | HP 10503A | P, A, T |
| Cable | BNC to Banana Plug | HP 11001A | P |
| Cable | SMC (f) to BNC (m) | HP 11592-60001 | A, T |
| Cable | Banana Plug to Alligator Clips | HP 11102A | A |
| Adapter | Banana plugs to BNC (f) | HP 10111 A | P, T |
| Adapter | N (m) to BNC (f) (3 required) | HP 1250-0780 | P, A |
| Adapter | SMC (m) to BNC (m) | HP 1250-0831 | P |
| Adapter | BNC (f) to BNC (f) | HP 1250-0080 | P |
| Adapter | BNC Tee | HP 1250-0781 | A |

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

*Table 1-4. Recommended Test Equipment (3 of 4)*

| Equipment | Critical Specifications | Recommended Model | Use* |
|---|---|---|---|
| Adapter | N (m) to N (m) | HP 1250-1475 | P |
| Adapter | BNC (m) to BNC (m) | HP 1250-0216 | P |
| Adapter | N (f) to BNC (m) | HP 1250-0077 | P |
| Adapter | SMC (m) to SMC (m) | HP 1250-0827 | A, T |
| Adapter | Type N (m) to SMC (m) | HP 1250-1023 | A, T |
| Adapter | BNC (f) to Alligator Clips | HP 8120-1292 | A, T |
| Adapter | SMC (f) to SMC (f) | HP 1250-1113 | A, T |
| Adapter | Type N (m) to SMA (f) | HP 1250-1250 | P, A |
| Adapter | BNC (f) to SMA (m) | HP 1250-1200 | P |
| Adapter | SMA (f) to SMA (f) | HP 1250-1158 | P |
| Extender Board | 6 pin, 12 contacts with 51.1 Ω resistor from pin 1 to pin 5 | HP 08505-60109<br>HP 0757-0394 | A, T |
| | **NOTE**<br>**The following equipment is required for Option 001 and Option 002.** | | |
| *Termination* | *Impedance: 75 W* | *HP 11652-60010* | *P* |
| *Power Sensor* | *Frequency Range: 10 MHz to 2 GHz*<br>*Maximum SWR: 1.18, 10 MHz to 2 GHz* | *HP 8483A* | *T* |
| *Adapter* | *75W BNC (m) to 75W Type N (f)* | *HP 1250-1534* | *T* |
| *Minimum Loss Adapter 5.72 dB attenuation* | *75W BNC (f) to 50W SMA (m)* | *HP 08558-60031* | *P, A, T* |
| *Adapter* | *BNC (f) to SMA (m)* | *HP 1250-1200* | *T* |
| *Adapter* | *SMA (f) to SMA (f)* | *HP 1250-1158* | *P, T* |

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

*Table 1-4. Recommended Test Equipment (4 of 4)*

| Equipment | Critical Specifications | Recommended Model | Use* |
|---|---|---|---|
| *Adapter* | *N (f) to N (f)* | *HP 1250-0777* | *A, T* |
| *Cable* | *BNC, 30 cm (12 in), 75W* | *HP 11652-60012* | *P, A, T* |
| *Cable* | *BNC, 60 cm (24 in), 75W* | *HP 11652-60013* | *P, A, T* |
| *Cable* | *BNC, 90 cm (37 in), 75W* | *HP 11652-60014* | *P, A, T* |
| *Adapter* | *BNC (m) to BNC (m)* | *HP 1250-1288* | *P, A, T* |
| *Adapter* | *Type N (m) to SMA (f)* | *HP 1250-1250* | *P, A, T* |

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

# SECTION II.
# INSTALLATION

## 2-1. INTRODUCTION

2-2. This section includes information on initial inspection, preparation for use, and storage and shipping requirements for the HP Model 8558B.

## 2-3. INITIAL INSPECTION

2-4. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The contents of the shipment should be as shown in Figure 1-1. The electrical performance is checked with the procedures in Section IV. If the contents are incomplete, if there is mechanical damage or defect, or if the instrument does not pass the Performance Test procedures, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for inspection by the carrier. The Hewlett-Packard office will arrange for repair or replacement without waiting for a claim settlement.

## 2-5. PREPARATION FOR USE

## 2-6. Installation

2-7. When properly installed, the spectrum analyzer obtains all necessary power from the display mainframe. The rear panel connector provides the interface.

**CAUTION**

**BEFORE SWITCHING ON THIS INSTRUMENT, make sure it is adapted to the voltage of the ac power source to be used and the proper fuse is installed. Failure to set the ac power input of the instrument for the correct voltage level could cause damage to the instrument when plugged in. Refer to the display mainframe Operation and Service Manual for line voltage and fuse selection.**

2-8. To install the spectrum analyzer in the mainframe:

1. Set display mainframe LINE switch to OFF.
2. Pull out lock knob and slide plug-in toward rear of compartment until it is seated firmly in place.
3. Push in lock knob to secure spectrum analyzer in mainframe.

## 2-9. Side Stop Kit

2-10. Installation of a Side Stop Kit, HP part number 08558-60131, prevents the removal of the analyzer from the 180-series mainframe without the use of hand tools. This kit contains two side stops, mounting hardware, label, and installation instructions. (Refer to Table 2-1 for part numbers of individual items.)

*Table 2-1. Side Stop Kit (08558-60131)*

| Quantity | Description | HP Part Number | C D |
|---|---|---|---|
| 2 | SIDE STOP | 08558-00094 | 7 |
| 4 | MACHINE SCREW, 440 .438-IN-LG 82 DEG FLATHEAD | 2200-0168 | 9 |
| 1 | LABEL, FRONT-PANEL | 7120-8131 | 7 |
| 1 | LABEL, INSTRUCTIONS | 7120-8215 | 8 |

2-11. To install side stops:

**WARNING**

**Before removing covers from the display mainframe, disconnect line power by removing the ac power cord.**

1. Remove side covers from bottom section of mainframe. (Remove only right side cover if mainframe is a rack-mounted model.)
2. Use flathead machine screws to install side stops as shown in Figure 2-1.0
3. Reinstall side covers on mainframe.
4. Place caution label on front panel of spectrum analyzer (upper right-hand corner) to indicate that plug-in is secured with side stops.

2-12. To remove side stops:

**WARNING**

**Before removing covers from the display mainframe, disconnect line power by removing the ac power cord.**

1. Remove side covers from bottom section of mainframe. (Remove only right side cover if mainframe is a rack-mounted model.)
2. Remove side stops. (See Figure 2-1.)
3. Reinstall side covers on display mainframe.

**2-13. Graticule Overlays**

2-14. To install a graticule overlay:

1. Select proper overlay. HP part number 5020-8565 is for 180TR display mainframes, HP part number 5020-8566, for 181T/TR display mainframes, and HP part number 5020-8567, for 182T display mainframes.
2. For 180TR and 181T/TR mainframes, remove CRT bezel and metallic-mesh contrast filter. Insert proper overlay and replace contrast filter and CRT bezel.
3. For 182T mainframes, grasp top portion of CRT bezel and pull straight up. Remove metallic-mesh contrast filter and insert proper overlay and contrast filter. (Either the metallic-mesh contrast filter or a light blue contrast filter may be used.)
4. Slide bezel back into place to retain overlay and filter.

**2-15. Mainframe Interconnections**

2-16. When the HP 8558B is properly installed in the display mainframe, the interconnections are as listed in Table 2-2.

**2-17. Operating Environment**

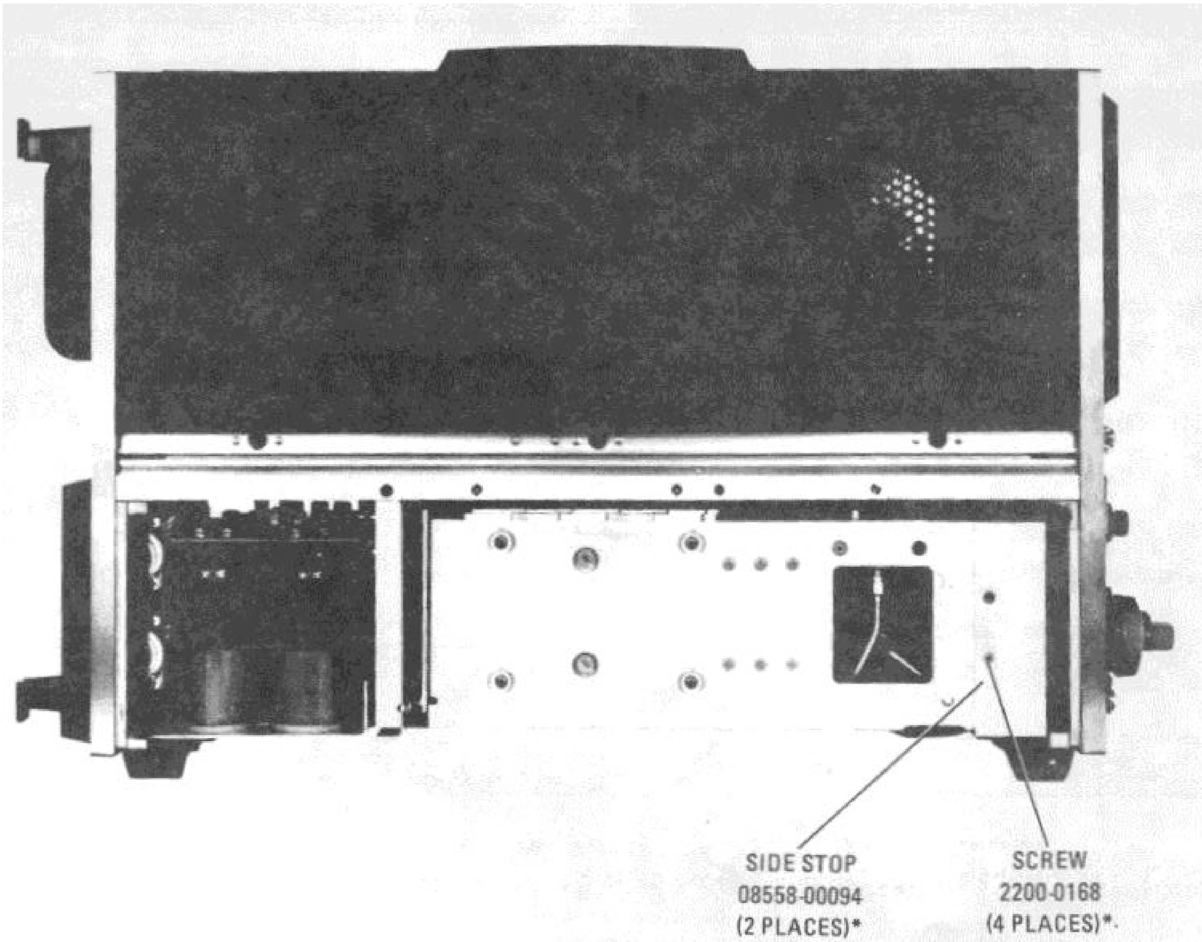
**2-18. Temperature**. The instrument may be operated in temperatures from 0°C to + 55°C.

**2-19. Humidity**. The instrument may be operated in environments with relative humidity from 5 percent to 95 percent, 0°C to +40°C. The recommended long-term operating environment is 5 percent to 80 percent relative humidity. The instrument should also be protected from abrupt temperature changes that cause internal condensation.

**2-20. Altitude**. The instrument may be operated in altitudes up to 4572 meters (15,000 feet).

**2-21. Modifications**

2-22. A Modification Kit, HP part number 00180-69503, provides materials and information necessary to add Option 807 rear-panel connections to the standard HP 180-series display. Refer to Table 1-3 in Section I. Option 807 is factory-installed in 180T, 181T, 181TR, and 182T mainframes. The modification kit is required for use with other mainframes if all four rear-panel outputs are needed.




* Only one side stop and two screws are used for rackmount models.

*Figure 2-1. Location of Side Stops*

## 2-23. STORAGE AND SHIPMENT

### 2-24. Environment

2-25. The instrument may be stored or shipped in environments within the following limits:

Temperature: -40°Cto +75°C
Humidity: 5% to95o (0°Cto +400C)
Altitude: Up to 15240 meters (50,000 feet)

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

### 2-26. Packaging

**2-27. Original Packaging**. Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. A supply of these tags is provided at the end of this section. Mark the container FRAGILE to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

*Table 2-2. HP Model 8558B Mainframe Interconnections*

| Pin on P1 | Signal or Voltage | Pin on P1 | Signal or Voltage |
|---|---|---|---|
| 1 | CRT HORIZ (adjusted horizontal signal) | 17 | BLANKING |
| | | 18 | NC |
| 2 | GROUND from mainframe (jumpered to pin 8) | 19 | GROUND from mainframe (jumpered in pin 24) |
| 3 | NC | 20 | AUTO SWP |
| 4 | L NORM | 21 | BEAM FINDER |
| 5 | YNORM | 22 | NC |
| 6 | NC | 23 | NC |
| 7 | SING SWP | 24 | GROUND from mainframe (jumpered to pin 19) |
| 8 | GROUND from mainframe (jumpered to pin 2) | 25 | NC |
| 9 | MAN SWP | 26 | NC |
| 10 | NC | 27 | NC |
| 11 | AUX D Horizontal Output (to mainframe rear panel) | 28 | -12.6 VDC from mainframe |
| | | 29 | +15 VDC from mainframe |
| 12 | AUX C 21.4 MHz IF Output (to mainframe rear panel) | 30 | +100 VDC from mainframe |
| | | 31 | 30V p-p from mainframe (for LINE TRIGGER) |
| 13 | AUX B Penlift/Blanking Output (to mainframe rear panel) | 32 | NC |
| 14 | AUX A Vertical Output (to mainframe rear panel) | W10P3 (2 contacts) | +VERT (top contact, yellow wire) |
| 15 | GROUND | | -VERT (bottom contact, orange wire) |
| 16 | NC | | |

**2-28. Other Packaging**. The following general instructions should be used for repackaging with commercially available materials:

1. Wrap instrument in heavy paper or plastic. If shipment is to a Hewlett-Packard office or service center, attach a tag indicating type of service required, return address, model number, and full serial number. A supply of these tags is provided at end of this section.

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

3. Use enough shock-absorbing material (3- to 4-inch layer) around all sides of the instrument to provide firm cushion and prevent movement inside container. Protect control panel with cardboard.

4. Seal shipping container securely.

5. Mark shipping container FRAGILE to assure careful handling.

# SECTION III. OPERATION

## 3-1. INTRODUCTION

3-2. This section provides operating information for the Model 8558B Spectrum Analyzer. It also provides a brief description of display mainframe controls. For a detailed description of the display mainframe, refer to its manual.

## 3-3. CONTROLS, INDICATORS, AND CONNECTORS

3-4. The spectrum analyzer is used with one of the 180-series display mainframes. The 180T-series display mainframes, or the 180-series mainframes with Option 807, have the correct rear-panel connections for spectrum analyzer horizontal, vertical, penlift, and IF outputs. Figure 3-1 shows the front-panel features of the HP 8558B Spectrum Analyzer and the display mainframe. Figure 3-2 shows the rear-panel features of the HP 8558B. The rear panels of all 180T-series mainframes, and 180-series mainframes with Option 807, are basically the same.

### 3-5. Control Grouping

3-6. The spectrum analyzer and display mainframe front-panel controls fall into three general groups: those that deal with the display, those that deal with frequency, and those that deal with amplitude.

**3-7. Display**. The display group consists of:

SWEEP TIME/DIV
SWEEP TRIGGER
VERTICAL POSN
VERTICAL GAIN
MAN SWEEP
HORIZ GAIN (rear panel of 8558B)
VIDEO FILTER
BASELINE CLIPPER
HORIZONTAL POSITION
INTENSITY
FOCUS
TRACE ALIGN
ASTIG

3-8. The display group enables the operator to calibrate the display and to select a variety of scan and display conditions. The controls are explained in Figures 3-1 and 3-2. However, when the SWEEP TIME/DIV control is placed in the AUTO position, sweep time is controlled by the RESOLUTION BW, FREQ SPAN/DIV, and VIDEO FILTER controls.

**3-9. Frequency**. The frequency group consists of:

TUNING
RESOLUTION BW
FREQ SPAN/DIV

3-10. The frequency group enables the operator to control how the spectrum analyzer displays the frequency domain. The RESOLUTION BW and FREQ SPAN/DIV controls when pushed in are coupled together, and moving either control moves the other. When the SWEEP TIME/DIV control is in the AUTO position varying the RESOLUTION BW or the FREQ SPAN/DIV (coupled or uncoupled) will change the sweep time to maintain calibration. With the two controls coupled together in the OPTIMUM position, RESOLUTION BW's of 3 MHz to 1 kHz will be automatically selected as the FREQ SPAN/DIV is narrowed from 100 MHz to 0. TUNING controls coarse and fine (coarse is larger knob) set the center frequency of the displayed spectrum. RESOLUTION BW control determines the resolution of the signals on the CRT.

**3-11. Amplitude**. The amplitude group consists of:

REFERENCE LEVEL
INPUT ATTEN
REF LEVEL FINE
REF LEVEL CAL
10 dB/DIV - 1 dB/DIV - LIN (Amplitude Scale)

3-12. The amplitude group enables the operator to measure signal amplitude in units of either voltage or dBm.

### 3-13. Variable Persistence and Storage Functions

3-14. With the 181T/TR Display Mainframe, the operator can set trace persistence for a bright, steady trace that does not flicker, even on the slow sweeps required for narrow band analysis. The variable persistence also permits the display of low repetition rate pulses without flickering; and using the longest persistence, intermittent signals can be captured and displayed. The storage capability allows side-by-side comparison of changing signals.

### 3-15. Persistence and Intensity

**CAUTION**

**Excessive INTENSITY may damage the CRT storage mesh.**

3-16. These controls determine the appearance of the CRT trace. Specifically, PERSISTENCE controls the rate at which a signal is erased and INTENSITY controls the trace brightness as the signal is written. With a given PERSISTENCE setting, the actual time of trace visibility can be increased by greater INTENSITY. Since the PERSISTENCE control sets the rate of trace erasure, a brighter trace requires more time to be erased. Conversely, a display of low intensity disappears more rapidly. The same principle applies to a stored display of high or low intensity.

**3-17. Storage**. These controls select the storage mode in which the CRT functions. In ERASE mode, STORE, WRITE, and MAX WRITE are disconnected and all written signals are removed from the CRT. The STORE selector disconnects the WRITE, MAX WRITE, and ERASE functions and implements signal retention at reduced intensity. In the STORE mode, PERSISTENCE and INTENSITY have no function.

**3-18. Writing Speed**. In the MAX WRITE mode, the CRT storage surface is primed to allow much faster writing on the storage surface. Since the erasing rate is decreased, the entire screen becomes illuminated more rapidly and the display is obscured. The effective persistence and storage times are thus considerably reduced. For this reason, MAX WRITE is not normally used with a spectrum analyzer plug-in.

### 3-19. Photographic Techniques

3-20. The HP Model 197A Oscilloscope Camera attaches directly to the spectrum analyzer's CRT bezel without adapters. Flood guns in the CRT provide background lighting of the display. When photography of stored traces (181T/TR) is required, a double exposure is needed. (Flood guns are turned off when STORE is pressed.) See Application Note AN 150-5 for full details.

## OPERATING PRECAUTIONS

The spectrum analyzer is a sensitive measuring instrument. To avoid damage to the instrument, do not exceed the following Absolute Maximum Inputs:

Total Power: + 30 dBm (1W, 7.1 Vrms)
*Option 001: + 30dBm(1W, 8.7 Vrms)*
*Option 002: +80dBmV(1.3W, 9.9 Vrms)*

dc or ac (< 100 Hz): ±50V

Peak Pulse Power:
+ 50 dB, (100W, < 10 µs pulse width, 0.01% duty cycle) with ≥20 dB INPUT ATTEN
*Option 002: + 100 dBmV (130W), <10 ms*

Overloading the input with too much power, peak voltages, or dc voltages will damage the input circuit and require expensive repairs.

**CAUTION**

**While the analyzer's reference level may be set for power levels up to +60 dBm, the total input power must not exceed the absolute maximum limits listed.**

## FRONT PANEL ADJUSTMENT PROCEDURE

Whenever an HP 8558B Spectrum Analyzer plug-in is reinstalled in a different mainframe, the spectrum analyzer should be calibrated to ensure proper correlation between plug-in and display. It is good practice to execute this adjustment procedure periodically (recommended daily) to correct for changes in calibration which may occur over a period of time. These adjustments are also an excellent way for the new user to become acquainted with the spectrum analyzer. For reference, a front panel view appears in Figure 3-1.

If an HP 181 Variable Persistence Display is being used, begin by setting the PERSISTENCE maximum counterclockwise and pushing in the WRITE button. Make the following spectrum analyzer settings.

| Function | Setting |
|---|---|
| INPUT ATTEN (push knob to engage) | 10 dB |
| REFERENCE LEVEL | 0 dBm<br>002: +50 dBmV |
| REF LEVEL FINE | 0 |
| Amplitude Scale | LIN |
| FREQ SPAN/DIV (uncoupled) | 10 MHz |
| RESOLUTION BW (uncoupled) | 1 MHz |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| START - CENTER | CENTER |
| TUNING | > 60 MHz |
| BASELINE CLIPPER | OFF |
| VIDEO FILTER | OFF |
| 180-series mainframes: | |
| DISPLAY | INT (out) |
| MAGNIFIER | X1 (out) |
| SCALE (180TR, 182T) | OFF |
| PERSISTENCE (181T/TR) | MIN (ccw) |
| Display Mode (181T/TR) | WRITE |

**DISPLAY ADJUSTMENTS**

1. With an adjustment tool, adjust VERTICAL POSN to place the CRT trace on a horizontal graticule line near center of CRT.

2. Reduce the INTENSITY and set the SWEEP TIME/DIV control to MAN. Adjust the MAN SWEEP knob to bring dot to center of CRT.

**CAUTION**

**Leaving a dot on the CRT for prolonged periods at high intensity may burn the phosphor.**

3. Adjust the FOCUS and ASTIG controls for the smallest round dot possible.

4. Reset the SWEEL TIME/DIV control to AUTO and increase the INTENSITY for an optimum CRT trace. Center the trace horizontally with the HORIZONTAL POSITION control. If the horizontal deflection is not exactly 10 divisions, adjust the HORIZ GAIN control (located on the spectrum analyzer rear panel) for a 10 division (wide) horizontal deflection.

**NOTE**

**The analyzer must be removed from the mainframe to adjust the HORIZ GAIN control.**

5. Adjust the TRACE ALIGN so that the CRT trace is parallel with the horizontal graticule lines.

6. Adjust the VERTICAL POSN until the trace aligns with the bottom graticule line.

**FREQUENCY ADJUSTMENTS**

7. Center the LO feedthrough - the 'signal' at 0 MHz - on the CRT with the TUNING control, pressing the FREQUENCY CAL pushbutton two or three times to remove tuning hysteresis in the first LO (YIG oscillator).

8. Narrow the FREQ SPAN/DIV to 200 kHz and press the FREQUENCY CAL pushbutton once more. Adjust the REF LEVEL FINE control as necessary to position the signal peak near the top CRT graticule line.

9. Re-center the LO feedthrough, if necessary, and adjust FREQUENCY ZERO to calibrate the FREQUENCY MHz readout at 00.0 MHz.

## AMPLITUDE ADJUSTMENTS

10. Set the FREQ SPAN/DIV control to 1 MHz and the REF LEVEL FINE control to 0. Adjust the TUNING control for a FREQUENCY MHz readout of approximately 280 MHz.

11. Press the 10 dB/DIV Amplitude Scale pushbutton, and set the REFERENCE LEVEL control to - 20 dBm (+ 30 dBmV for Option 002).

**CAUTION**

**The HP 8558B Options 001 and 002 feature 75-ohm (female) INPUT and CAL OUTPUT connectors. Standard 50-ohm BNC cables and adapters should not be used with these connectors since damage might result.**

12. Connect the 280 MHz CAL OUTPUT to the spectrum analyzer input and center the signal on the CRT with the TUNING control, pressing the FREQUENCY CAL pushbutton two or three times. The FREQUENCY MHz readout will indicate 280 MHz + 5 MHz.

13. Press the LIN Amplitude Scale pushbutton. Adjust the REF LEVEL FINE control to place the signal peak at the top CRT graticule line.

14. Press the 10 dB/DIV Amplitude Scale pushbutton. Adjust VERTICAL GAIN to place the signal peak at the top CRT graticule line.

15. Repeat steps 12 and 13 until the signal peak remains at the top CRT graticule line when the Amplitude Scale is alternated between 10 dB/DIV and LIN.

16. Set the REF LEVEL FINE control to 0 and the REFERENCE LEVEL control to -30 dBm (+ 20 dBmV for Option 002).

17. Press the LIN Amplitude Scale pushbutton and adjust REF LEVEL CAL to place the signal peak at the top CRT graticule line.

Once the Front Panel Adjustment Procedure is completed, the spectrum analyzer is calibrated for absolute amplitude and frequency measurements. During normal operation, the FREQUENCY CAL pushbutton should be pressed whenever the tuning is changed by more than 50 MHz. This removes tuning hysteresis and ensures maximum frequency accuracy.

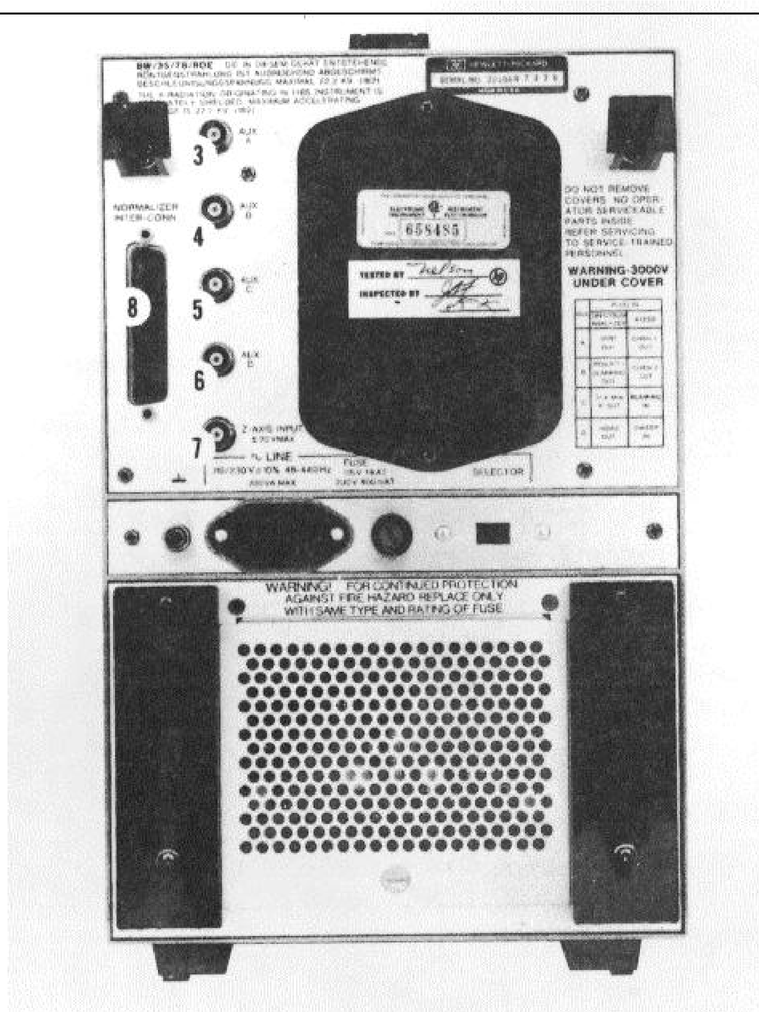


Figure 3-2. Rear Panel Controls and Connectors (2 of 2)

# SECTION IV.
# PERFORMANCE TESTS

## 4-1. INTRODUCTION

4-2. The procedures in this section test the electrical performance of the instrument against the specifications in Section I. The performance tests included in this section are listed in Table 4-1. Most of the tests can be performed without access to the interior of the instrument. If a test measurement is marginal, perform the appropriate adjustment procedures in Section V.

*Table 4-1. Performance Tests*

| Paragraph | Test |
|---|---|
| 4-11 | Frequency Span Accuracy |
| 4-12 | Tuning Accuracy |
| 4-13 | Residual FM |
| 4-14 | Noise Sidebands |
| 4-15 | Resolution Bandwidth Accuracy |
| 4-16 | Resolution Bandwidth Selectivity |
| 4-17 | Average Noise Level |
| 4-18 | Spurious Responses |
| 4-19 | Residual Responses |
| 4-20 | Frequency Response |
| 4-21 | Bandwidth Switching (Amplitude Variation) |
| 4-22 | Input Attenuator Accuracy |
| 4-23 | Reference Level Accuracy |
| 4-24 | Display Fidelity |
| 4-25 | Calibrator Accuracy |

## 4-3. INSTRUMENTS TESTED

4-4. Since a 180-series Display mainframe is required for operation of the HP Model 8558B Spectrum Analyzer plug-in, the specifications listed in Table 1-1 apply when both instruments are functioning together. Consequently, the performance tests in this section verify the proper operation of both the HP 8558B and the 180-series Display mainframe.

## 4-5. EQUIPMENT REQUIRED

4-6. The equipment required for the performance tests is listed under Recommended Test Equipment in Section I. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model.

## 4-7. TEST RECORD

4-8. Results of the performance tests may be tabulated in the Performance Test Record at the end of this section. The test record lists test specifications and acceptable limits.

## 4-9. CALIBRATION CYCLE

4-10. This instrument requires periodic calibration. Calibration should be verified every six months by means of the performance tests.

**NOTE**

**Perform the Front Panel Adjustment Procedure in Section III before proceeding with the performance tests. Allow at least 30 minutes warmup time.**

## 4-11. FREQUENCY SPAN ACCURACY

### SPECIFICATION

Fourteen calibrated spans from 100 MHz/div to 5 kHz/div in a 1, 2, 5 sequence. Frequency error between any two points on the display is less than - 5 % of the indicated frequency separation.

### DESCRIPTION

Wide span widths are checked by using the 100-, 10-, and 1-MHz outputs from a comb generator. Narrow span widths are checked by using the output from a comb generator modulated by a function generator. Since the comb generator produces frequency components separated by a precisely determined frequency interval, the resultant spectral lines displayed on the CRT are evenly spaced when no span error exists in the instrument. Thus, span error is the cumulative variance of distance among the spectral line intervals displayed across the CRT. The amount of span error is determined by comparing the distance of the first nine graticule divisions to the display distance of the corresponding spectral line intervals.

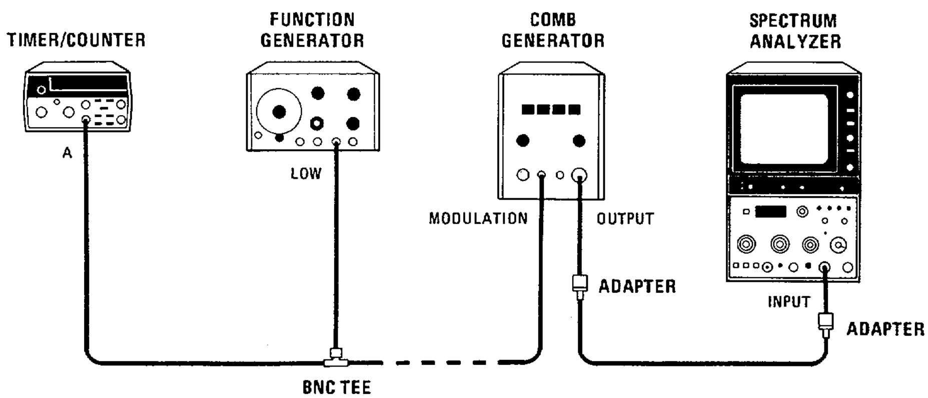



*Figure 4-1. Frequency Span Accuracy Test Setup*

### EQUIPMENT

Comb Generator.......................................... HP 8406A
Timer/Counter.......................................... HP 5308A
Function Generator.......................................... HP 3310A
BNC Cable, 120 cm (48 in).......................................... HP 10503A
Adapter, Type N (m) to BNC (f) (2 required).......................................... HP 1250-0780
BNC Tee.......................................... HP 1250-0781

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W.......................................... HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W.......................................... HP 1250-1288*
*Adapter, SMA (f) to SMA (f).......................................... HP 1250-1158*
*Adapter, BNC (f) to SMA (m).......................................... HP 1250-1200*

## 4-11. FREQUENCY SPAN ACCURACY(Cont'd)

### PROCEDURE

1. Set equipment controls as follows:

   Spectrum Analyzer:

   START-CENTER .......... CENTER
   TUNING .......... 800 MHz
   FREQ SPAN/DIV .......... 100 MHz
   RESOLUTION BW .......... OPTIMUM, coupled (pushed in)
   INPUT ATTEN .......... 0 dB
   REFERENCE LEVEL .......... -20 dBm
   *002: + 30 dBmV*
   Amplitude Scale .......... 10 dB/DIV
   SWEEP TIME/DIV .......... AUTO
   SWEEP TRIGGER .......... FREE RUN
   BASELINE CLIPPER .......... OFF
   VIDEO FILTER .......... OFF

   Comb Generator:

   COMB FREQUENCY- MHz .......... 100 MC
   INTERPOLATION AMPLITUDE- 1 MHz .......... OFF
   OUTPUT AMPLITUDE .......... 10 o'clock

   Function Generator:

   FUNCTION .......... SINE
   RANGE .......... 10K
   Frequency .......... 200 kHz
   DC OFFSET LEVEL .......... 0

2. Connect equipment as shown in Figure 4-1 but do not connect function generator to comb generator.

3. Adjust spectrum analyzer TUNING control to position one spectral line (from comb generator) at first graticule line (left-hand edge of display). Measure error between ninth spectral line and ninth graticule line as shown in Figure 4-2. Error should be no greater than - 0.4 division.

   __________ div

4. Set FREQ SPAN/DIV to 50 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between fifth spectral line and ninth graticule line. Error should be no greater than i 0.4 division.

   __________ div

## 4-11. FREQUENCY SPAN ACCURACY(Cont'd)

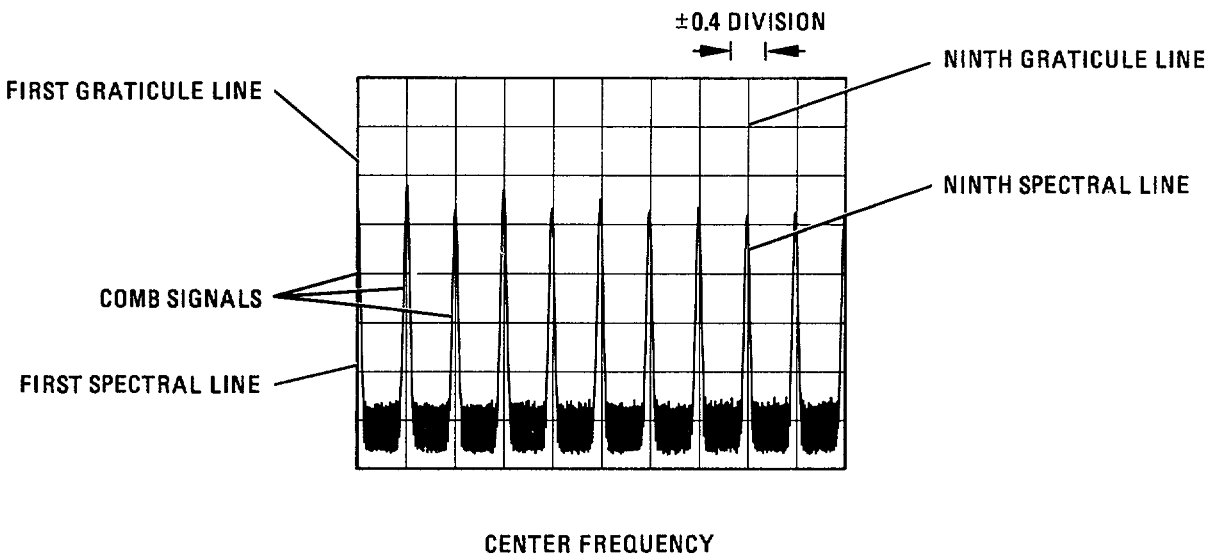



*Figure 4-2. Frequency Span Accuracy Measurement for Ninth Spectral Line*

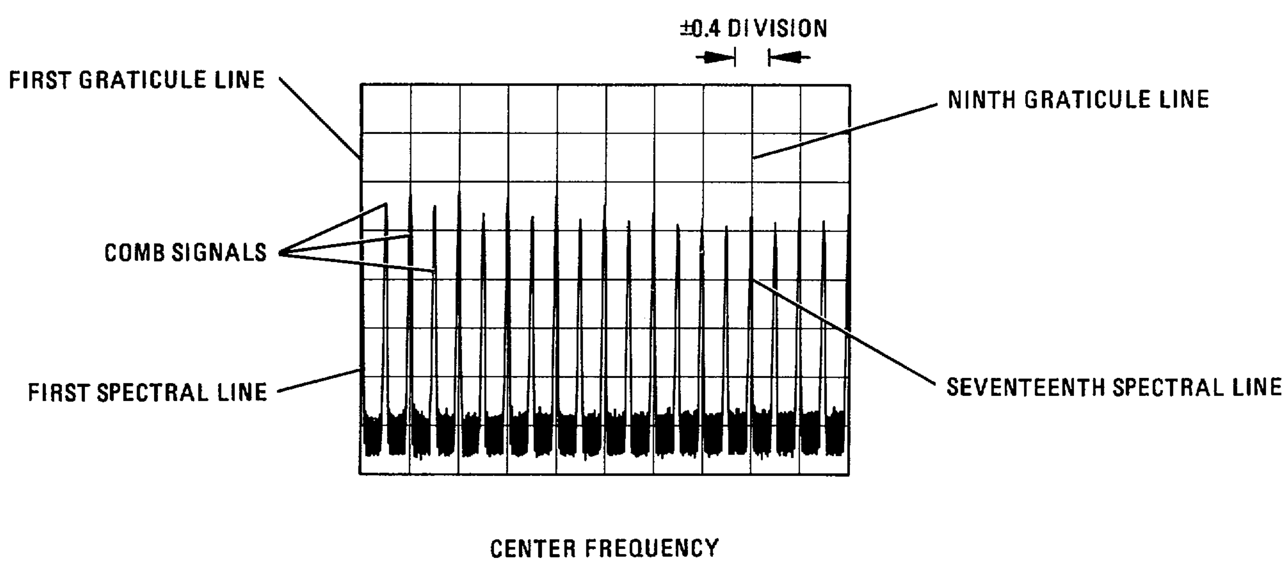



*Figure 4-3. Frequency Span Accuracy Measurement for Seventeenth Spectral Line*

## 4-11. FREQUENCY SPAN ACCURACY(Cont'd)

5. Set comb generator COMB FREQUENCY-MHz for 10-MHz comb. Set spectrum analyzer FREQ SPAN/DIV to 20 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between 17th spectral line and ninth graticule line as shown in Figure 4-3. Error should be no greater than ± 0.4 division.

   __________ div

6. Set FREQ SPAN/DIV to 10 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between ninth spectral line and ninth graticule line. Error should be no greater than ± 0.4 division.

   __________ div

7. Set FREQ SPAN/DIV to 5 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between fifth spectral line and ninth graticule line. Error should be no greater than ± 0.4 division.

   __________ div

8. Set comb generator COMB FREQUENCY-MHz for 1-MHz comb. Set spectrum analyzer FREQ SPAN/DIV to 2 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between 17th spectral line and ninth graticule line. Error should be no greater than ± 0.4 division.

   __________ div

9. Set FREQ SPAN/DIV to 1 MHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between ninth spectral line and ninth graticule line. Error should be no greater than ± 0.4 division.

   __________ div

10. Set FREQ SPAN/DIV to 500 kHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between fifth spectral line and ninth graticule line. Error should be no greater than ± 0.4 division.

    __________ div

11. Set comb generator COMB FREQUENCY-MHz for 10-MHz comb. Adjust spectrum analyzer TUNING to position a spectral line at center graticule line. Turn on comb generator INTERPOLATION AMPLITUDE- 1 MHz.

12. Set function generator frequency to 200 kHz (±0.5%) using frequency counter. Connect function generator output to comb generator MODULATION input. Set function generator OUTPUT LEVEL for a clean 200-kHz comb on the spectrum analyzer display.

## PERFORMANCE TESTS

### 4-11. FREQUENCY SPAN ACCURACY (Cont'd)

**NOTE**

**To obtain a clean comb on the spectrum analyzer display, use the LOW or HIGH output of the function generator as necessary. Readjust the function generator OUTPUT LEVEL and the comb generator INTERPOLATION AMPLITUDE - 1 MHz as necessary.**

13. Set spectrum analyzer FREQ SPAN/DIV to 200 kHz. Adjust TUNING control to position one spectral line at first graticule line. Measure error between ninth spectral line and ninth graticule line. Error should be no greater than 4 0.4 division.

__________ div

14. Using procedure of NOTE in step 12, vary spectrum analyzer FREQ SPAN/DIV and Function Generator Output Frequency in accordance with Table 4-2. Adjust spectrum analyzer TUNING control to position one spectral line at first graticule line. Measure span error between ninth spectral line and ninth graticule line.

*Table 4-2. Narrow Span Width Error Measurement*

| Spectrum Analyzer | | Function Generator Output Frequency* | Allowable Error (Max.) |
|---|---|---|---|
| FREQ SPAN/DIV | RESOLUTION BW | | |
| 100 kHz | OPTIMUM | 100 kHz | +0.4 Division |
| 50 kHz | OPTIMUM | 50 kHz | +0.4 Division |
| 20 kHz | OPTIMUM | 20 kHz | +0.4 Division |
| 10 kHz | OPTIMUM | 10 kHz | +0.4 Division |
| 5 kHz | OPTIMUM | 5 kHz | +0.4 Division |

* Check function generator output frequency using a frequency counter. Frequency readout should be within +0.5% of desired audio frequency.

PERFORMANCE TESTS

## 4-12. TUNING ACCURACY

### SPECIFICATION

0 to 195 MHz: ±(1 MHz ±20% of FREQ SPAN/DIV setting), 10°C to 40°C

195 to 1500 MHz: ±(5 MHz ±20% of FREQ SPAN/DIV setting), 10°C to 40°C.

### DESCRIPTION

A comb generator is used to provide 1-, 10-, or 100-MHz frequency components that produce spectral lines on the CRT at 1-, 10-, or 100-MHz intervals, respectively. The spectrum analyzer TUNING control is adjusted until the desired test frequency is shown on the FREQUENCY MHz readout of the Digital Panel Meter. The FREQUENCY CAL switch is pressed and the amount of readout (or tuning) error is found by measuring the distance of the spectral line offset from the center graticule line.

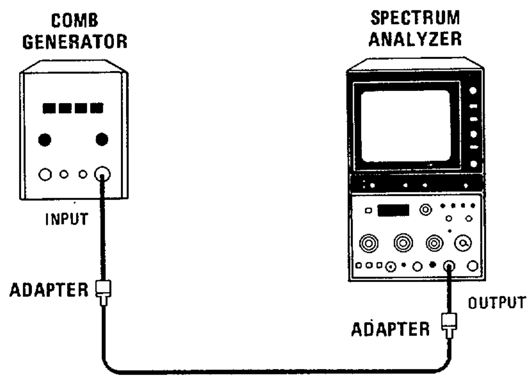



*Figure 4-4. Tuning Accuracy Test Setup*

### EQUIPMENT

Comb Generator.......................................................................................... HP 8406A
BNC Cable, 120 cm (48 in)......................................................................... HP 10503A
Adapter, Type N (m) to BNC (f) (2 required) ..................................................... HP 1250-0780

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W............................................................ HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W................................................................. HP 1250-1288*
*Adapter, SMA (f) to SMA (f)........................................................................... HP 1250-1158*
*Adapter, BNC (f) to SMA (m)......................................................................... HP 1250-1200*

## 4-12. TUNING ACCURACY (Cont'd)

### PROCEDURE

1. Set spectrum analyzer controls as follows:

   START-CENTER.......... CENTER
   FREQ SPAN/DIV .......... 200 kHz
   RESOLUTION BW .......... OPTIMUM
   INPUT ATTEN.......... 0 dB
   REFERENCE LEVEL .......... - 20 dBm
   *002: +30dBmV*
   Amplitude Scale .......... 10 dB/DIV
   SWEEP TIME/DIV .......... AUTO
   SWEEP TRIGGER.......... FREE RUN
   BASELINE CLIPPER.......... OFF
   VIDEO FILTER.......... OFF

2. Adjust spectrum analyzer TUNING control to position LO feedthrough signal at center graticule line of display. Press FREQUENCY CAL switch and reposition LO feedthrough signal at center graticule line, as required. Adjust FREQ ZERO control for zero indication on FREQUENCY MHz readout. LO feedthrough signal should still be positioned at center graticule line of display.

3. Connect equipment as shown in Figure 4-4.

4. Set comb generator controls as follows:

   COMB FREQUENCY - MHz.......... 10 MC
   INTERPOLATION AMPLITUDE- 1 MHz .......... OFF
   OUTPUT AMPLITUDE .......... 10 o'clock

5. Adjust spectrum analyzer TUNING control until FREQUENCY MHz readout indicates 10.0 MHz. Press FREQUENCY CAL switch. Comb generator spectral line, displayed on CRT, should be within 5.2 divisions ( - 1.04 MHz) of center graticule line.

   __________ div

**NOTE**

**If the spectral line is off screen, set FREQ SPANIDIV to 500 kHz and check that the spectral line is within 2.2 divisions of the center graticule line.**

6. Using procedure of step 5, adjust spectrum analyzer and comb generator controls as shown in Table 4-3 to measure TUNING accuracy. After tuning to each FREQUENCY MHz readout, press FREQUENCY CAL switch before measuring TUNING accuracy.

## 4-12. TUNING ACCURACY (Cont'd)

*Table 4-3. Tuning Accuracy Measurement*

| Spectrum Analyzer | | Comb Generator | Specification (Spectral line limits referenced to center graticule line) (Divisions) | |
|---|---|---|---|---|
| FREQUENCY MHz Readout (MHz) | FREQ SPAN/DIV. Setting | COMB FREQUENCY-MC Setting (MHz) | Min. | Max. |
| 20.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 40.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 60.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 80.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 100.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 120.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 140.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 160.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 180.0 | 200 kHz | 10 | -5.2 | +5.2 |
| 200 | 1 MHz | 100 | -5.2 | +5.2 |
| 400 | 1 MHz | 100 | -5.2 | +5.2 |
| 600 | 1 MHz | 100 | -5.2 | +5.2 |
| 800 | 1 MHz | 100 | -5.2 | +5.2 |
| 1000 | 1 MHz | 100 | -5.2 | +5.2 |
| 1200 | 1 MHz | 100 | -5.2 | +5.2 |
| 1400 | 1 MHz | 100 | -5.2 | +5.2 |
| 1500 | 1 MHz | 100 | -5.2 | +5.2 |

## 4-13. RESIDUAL FM

### SPECIFICATION

Less than 1 kHz peak-to-peak for time < 0.1 second

### FM DESCRIPTION

This test measures the inherent short-term instability (residual FM) of the LO system in the spectrum analyzer. A stable signal applied to the input of the spectrum analyzer is slope-detected on the linear portion of the 10 kHz bandwidth filter in zero span (fixed-tuned receiver). (See Figure 4-6a.) Instability in the LO system in transferred to the IF signal in the mixing process. As the IF signal moves in relation to the center of the IF filter, the attenuation of the signal changes in accordance with the skirt characteristics of the filter. If the signal stays on the linear portion of the IF filter skirt, the amplitude of the IF signal applied to the final detector (and thus the level on the display) is linearly related to the frequency of the IF signal. (See Figure 4-6b). Therefore, any variations in level seen on the display are linearly related to variations in LO frequency.

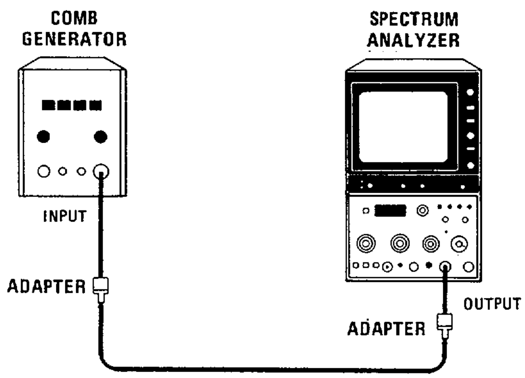



*Figure 4-5. Residual FM Test Setup*

### EQUIPMENT

Comb Generator........................................................................................ HP 8406A
BNC Cable, 120 cm (48 in)...................................................................................... HP 10503A
Adapter, Type N (m) to BNC (f) (2 required) .................................................... HP 1250-0780

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W........................................................... HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W................................................................ HP 1250-1288*
*Adapter, SMA (f) to SMA (f)............................................................................ HP 1250-1158*
*Adapter, BNC (f) to SMA (m)........................................................................... HP 1250-1200*

## 4-13. RESIDUAL FM (Cont'd)

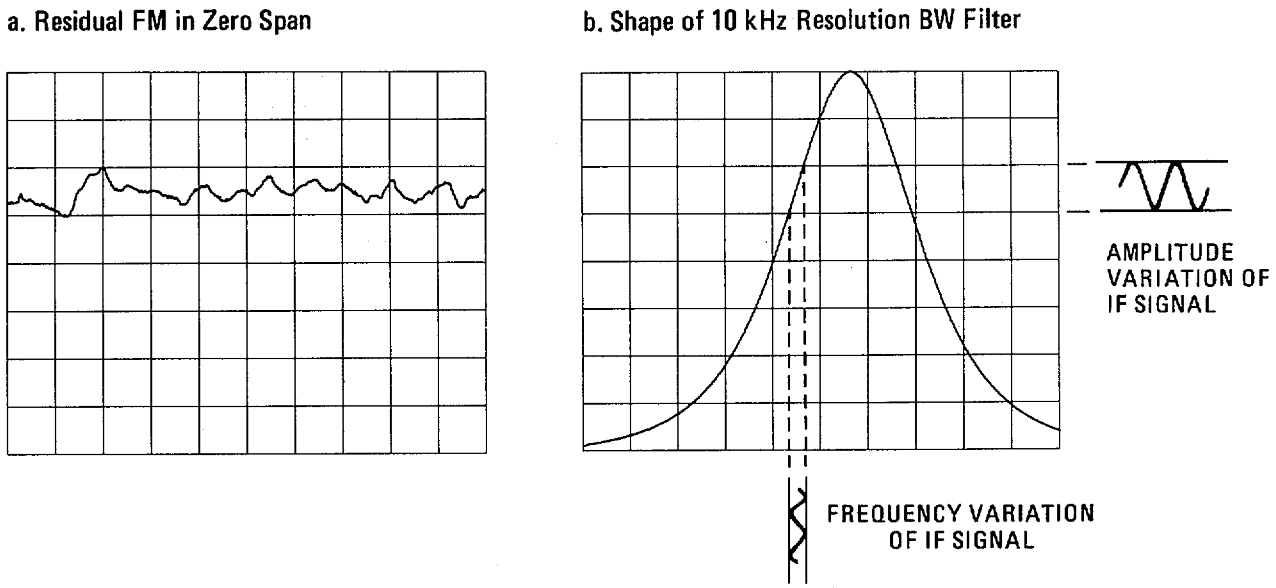



*Figure 4-6. Example of Residual FM*

### PROCEDURE

1. Set spectrum analyzer and comb generator controls as follows:

Spectrum Analyzer:

| | |
|---|---|
| START-CENTER | CENTER |
| FREQUENCY SPAN/DIV | 100 kHz |
| RESOLUTION BW | 10kHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | - 20 dBm |
| *002: +30dBmV* | |
| Amplitude Scale | LIN |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| BASELINE CLIPPER | OFF |
| VIDEO FILTER | OFF |

Comb Generator:

| | |
|---|---|
| COMB FREQUENCY - MHz | 100 MC |
| INTERPOLATION AMPLITUDE- 1 MHz | OFF |
| OUTPUT AMPLITUDE | Fully clockwise |

### 4-13. RESIDUAL FM (Cont'd)

2. Connect OUTPUT of comb generator to spectrum analyzer INPUT connector as shown in Figure 4-5.

**NOTE**

**The HP 8558B is sensitive to vibration. Be sure the instrument is in a vibration-free environment.**

3. Adjust spectrum analyzer TUNING control to display 500-MHz signal produced by comb generator. Adjust REFERENCE LEVEL and REF LEVEL FINE controls to position peak of signal at top graticule line.

4. Keep 500-MHz signal centered on CRT while reducing FREQ SPAN/DIV to zero.

5. Set RESOLUTION BW to 10 kHz and SWEEP TIME/DIV to .1 SEC.

6. Slightly readjust fine TUNING control of spectrum analyzer until trace appears between fourth and seventh graticule lines. Peak-to-peak variation of trace should not exceed one major vertical division for each major horizontal division. (See Figure 4-6a.)

__________ div

## 4-14. NOISE SIDEBANDS

### SPECIFICATION

More than 65 dB below CW signal, 50 kHz or more away from signal with a 1-kHz resolution bandwidth and full video filtering.

### DESCRIPTION

A stable 400-MHz CW signal is applied at a - 20 dBm level to the spectrum analyzer and is displayed on the CRT. The test is designed to measure the amplitude of noise-associated sidebands and unwanted responses.

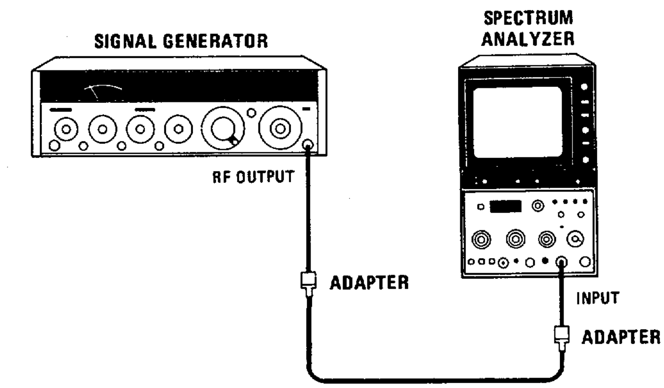



*Figure 4-7. Noise Sideband Test Setup*

### EQUIPMENT

Signal Generator ........................................................................................ HP 8640B
BNC Cable, 120 cm (48 in)....................................................................... HP 10503A
Adapter, Type N (m) to BNC (f) (2 required) .................................................... HP 1250-0780

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W ........................................................... HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W ................................................................. HP 1250-1288*
*Adapter, SMA (f) to SMA (f)............................................................................. HP 1250-1158*
*Adapter, BNC (f) to SMA (m)........................................................................... HP 1250-1200*

## 4-14. NOISE SIDEBANDS(Cont'd)

### PROCEDURE

1. Set equipment controls as follows:

   Spectrum Analyzer:

   START-CENTER........................................ CENTER
   TUNING........................................ 400MHz
   FREQUENCY SPAN/DIV........................................ 1 MHz
   RESOLUTION BW........................................ 30 KHz
   INPUT ATTEN........................................ 10 dB
   REFERENCE LEVEL........................................ - 20 dBm
   *002: +30dBmV*
   Amplitude Scale........................................10 dB/DIV
   SWEEP TIME/DIV........................................ AUTO
   SWEEP TRIGGER........................................ FREE RUN
   BASELINE CLIPPER........................................ OFF
   VIDEO FILTER........................................ OFF

   Signal Generator

   FREQUENCY........................................ 400 MHz
   RF OUTPUT........................................ - 20 dBm
   RF........................................ ON
   AM........................................ OFF
   FM........................................ OFF

2. Connect equipment as shown in Figure 4-7.

3. Adjust TUNING control to locate 400-MHz signal on CRT.

4. Adjust REFERENCE LEVEL and REF LEVEL FINE controls to position peak of 400-MHz signal at top graticule line.

5. Decrease FREQ SPAN/DIV to 20 kHz and RESOLUTION BW to 1 kHz. Adjust TUNING to keep signal centered.

6. Position signal at center of display. Turn VIDEO FILTER control fully clockwise (not in detent). Measure noise sidebands existing more than 2.5 division (50 kHz) from 400-MHz signal. Noise sidebands should be greater than 65 dB (6.5 divisions) down from top graticule line.

   _________ div down

## 4-15. RESOLUTION BANDWIDTH ACCURACY

### SPECIFICATION

Individual resolution bandwidth 3-dB points calibrated to 20%o (10°C to 400C)

### DESCRIPTION

Resolution bandwidth accuracy is measured in the linear mode to eliminate log amplifier errors. Since signal level at the 3-dB points (half-power points) is related to peak signal level by a voltage ratio of 0.707:1.0, a peak level of 7.1 vertical divisions on the spectrum analyzer display gives a half-power level of 5 vertical divisions:

$$0.707 \text{ (voltage ratio)} = X \text{ div}/7.1 \text{ div}$$

$$X \text{ div} = (7.1)(0.707)$$

$$\approx 5 \text{ div}$$

In the 30-, 10-, and 1-kHz bandwidths, a 301.4-MHz signal (second IF) is injected into A9 Third Converter Assembly to provide the stability required for measurement of narrow resolution bandwidths.

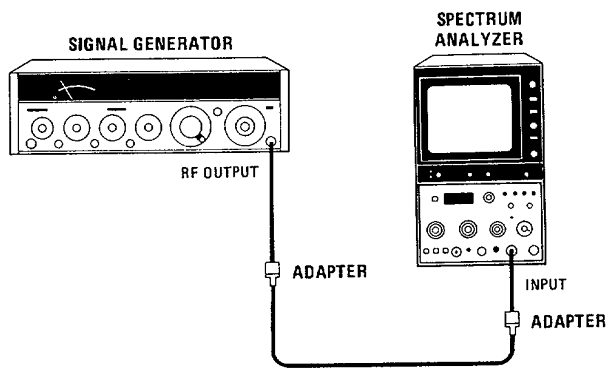



*Figure 4-8. Resolution Bandwidth Accuracy Test Setup, 3 MHz to 100 kHz*

### EQUIPMENT

Signal Generator ........ HP 8640B
Extender Cable Assembly ........ HP 5060-0303
Adapter, SMC (m) to BNC (m)........ HP 1250-0831
Adapter, BNC (f) to BNC (f)........ HP 1250-0080
Adapter, Type N (m) to BNC (f) (2 required) ........ HP 1250-0780
BNC Cable, 120 cm (48 in)........ HP 10503A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W ........ HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W........ HP 1250-1288*
*Adapter, SMA (f) to SMA (f)........ HP 1250-1158*
*Adapter, BNC (f) to SMA (m)........ HP 1250-1200*

## 4-15. RESOLUTION BANDWIDTH ACCURACY(Cont'd) ,

### PROCEDURE

**WARNING**

**This test must be performed with power supplied to the instrument and with protective covers removed. The test should be performed only by service-trained personnel who are aware of the hazards involved.**

1. Set equipment controls as follows:

   Spectrum Analyzer:

   START-CENTER........ CENTER
   TUNING........ 10 MHz
   FREQUENCY SPAN/DIV........ 0
   RESOLUTION BW........ 3 MHz
   INPUT ATTEN........ 20 dB
   REFERENCE LEVEL........ 0 dBm
   *002: +30dBmV*
   Amplitude Scale........ LIN
   SWEEP TIME/DIV........5 mSEC
   SWEEP TRIGGER........ FREE RUN
   BASELINE CLIPPER........ OFF
   VIDEO FILTER........ OFF

   Signal Generator

   COUNTER MODE........ INT, EXPAND X10
   AM........ OFF
   FM........ OFF
   FREQUENCY TUNE........10 MHz
   RF........ ON
   OUTPUT LEVEL........ 0 dBm

2. Connect equipment as shown in Figure 4-8.

3. Adjust spectrum analyzer TUNING control to locate peak of 10-MHz signal on CRT. Reduce signal generator output if necessary.

4. Adjust signal generator OUTPUT LEVEL to position trace at 7.1 divisions above graticule baseline.

5. Tune signal generator frequency until trace drops to 5 divisions above graticule baseline. Record signal generator frequency.

   __________ MHz

## 4-15. RESOLUTION BANDWIDTH ACCURACY(Cont'd)

6. Tune signal generator frequency in direction opposite to that of step 5 until trace peaks (7.1 divisions above graticule baseline) and then drops to 5 divisions above graticule baseline. Record signal generator frequency.

__________ MHz

7. Calculate and record resolution bandwidth at 3-dB points (difference between frequencies recorded in steps 5 and 6).

| Min. | Actual | Max. |
|---|---|---|
| 2.40 MHz | ________________ | 3.60 MHz |

8. Set RESOLUTION BW to 1 MHz, leaving FREQ SPAN/DIV set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

| Min. | Actual | Max. |
|---|---|---|
| 800 kHz | _________________ | 1200 kHz |

9. Set RESOLUTION BW to 300 kHz, leaving FREQ SPAN/DIV set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

| Min. | Actual | Max. |
|---|---|---|
| 240 kHz | _________________ | 360 kHz |

10. Set RESOLUTION BW to 100 kHz, leaving FREQ SPAN/DIV set to 0. Set signal generator to 10 MHz and repeat steps 3 through 7.

| Min. | Actual | Max. |
|---|---|---|
| 80 kHz | __________________ | 120 kHz |

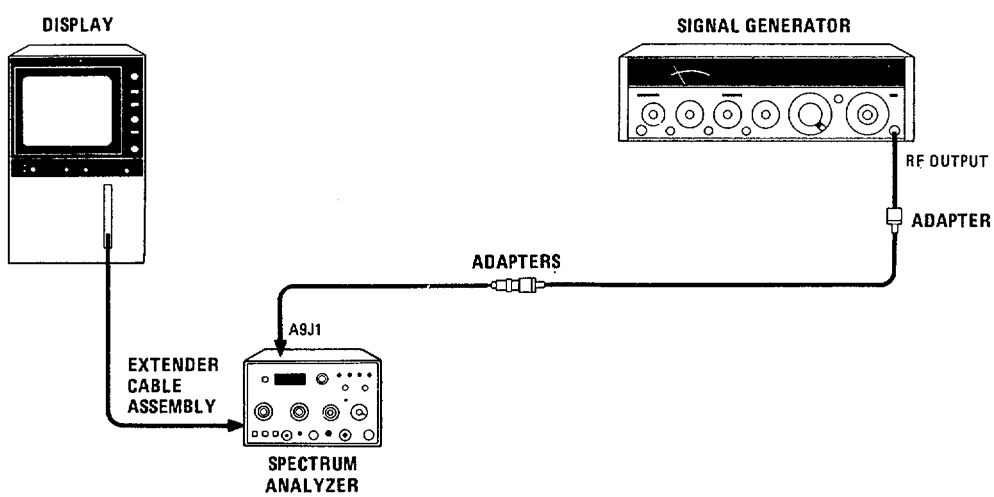



*Figure 4-9. Resolution Bandwidth Accuracy Test Setup, 1 kHz to 30 kHz*

## 4-15. RESOLUTION BANDWIDTH ACCURACY(Cont'd)

**WARNING**

**In the following procedure, the plug-in must be removed from the display mainframe and connected through the extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. This test should be performed only by a skilled person who knows the hazard involved.**

11. Set signal generator OUTPUT LEVEL to approximately -12 dBm and tune frequency to 301.4 MHz. Set COUNTER MODE to EXPAND X100.

12. Set spectrum analyzer INPUT ATTEN to 0 dB and REFERENCE LEVEL to -10 dBm. Set RESOLUTION BW to 30 kHz. Leave FREQ SPAN/DIV set to 0.

    *002: REFERENCE LEVEL, + 40 dBmV.*

13. Connect equipment as shown in Figure 4-9. Remove W7P1 from A10OJ2. Connect signal generator through adapters to W7P1.

14. Adjust signal generator frequency until spectrum analyzer trace is at peak. Set signal generator OUTPUT LEVEL to position trace at 7.1 divisions above graticule baseline.

15. Tune signal generator frequency until trace drops to 5 divisions above graticule baseline. Record signal generator frequency.

    __________ MHz

16. Tune signal generator frequency in direction opposite to that of step 15 until trace peaks and then drops to 5 divisions above graticule baseline. Record signal generator frequency.

    __________ MHz

17. Calculate and record resolution bandwidth at 3-dB points (difference between frequencies recorded in steps 15 and 16).

| Min. | Actual | Max. |
|---|---|---|
| 24 kHz | __________________ | 36 kHz |

18. Set RESOLUTION BW to 10 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 17.

| Min. | Actual | Max. |
|---|---|---|
| 8 kHz | ___________________ | 12 kHz |

PERFORMANCE TESTS

## 4-15. RESOLUTION BANDWIDTH ACCURACY(Cont'd) ,

19. Set RESOLUTION BW to 3 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 17.

| Min. | Actual | Max. |
| --- | --- | --- |
| 2.4 kHz | ________________ | 3.6 kHz |

20. Set RESOLUTION BW to 1 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 17.

| Min. | Actual | Max. |
| --- | --- | --- |
| 0.8 kHz | ________________ | 1.2 kHz |

21. Reconnect W7P1 to A10J2 unless continuing on with next performance test.

## 4-16. RESOLUTION BANDWIDTH SELECTIVITY '

### SPECIFICATION

60-dB:3-dB resolution bandwidth ratio < 15:1.

### DESCRIPTION

The 60-dB bandwidth is measured for all resolution bandwidths. The 60- to 3-dB resolution bandwidth ratio (shape factor) is then computed for each bandwidth by dividing the 3-dB value (from the Resolution Bandwidth Accuracy test) into the 60-dB value.

In the 30-, 10-, and 1-kHz bandwidths, a 301.4-MHz signal (second IF) is injected into A9 Third Converter assembly to provide the stability required for the measurement of narrow resolution bandwidths.

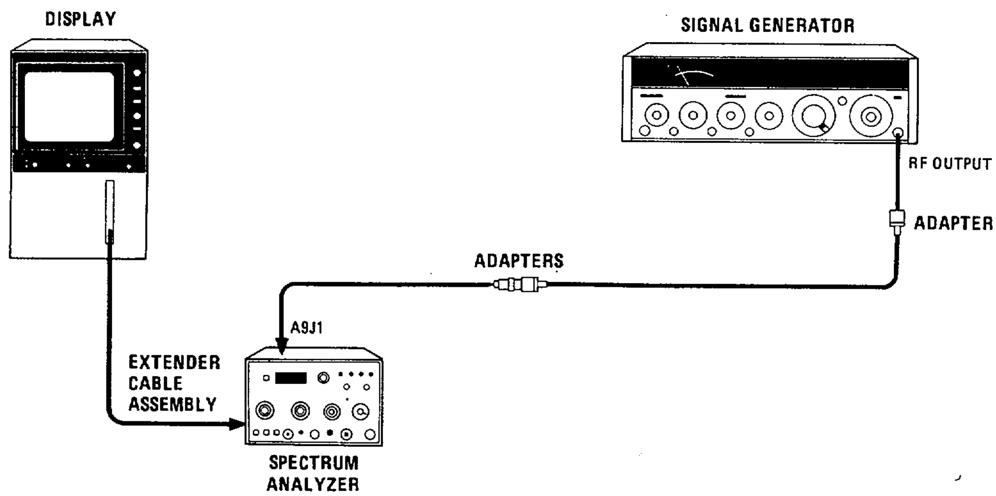



*Figure 4-10. Resolution Bandwidth Selectivity Test Setup, 1 kHz to 30 kHz*

**WARNING**

**In the following procedure, the plug-in must be removed from the display mainframe and connected through the extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. This test should be performed only by a skilled person who knows the hazard involved.**

## 4-16. RESOLUTION BANDWIDTH SELECTIVITY(Cont'd)

EQUIPMENT

Signal Generator .......... HP 8640B
Extender Cable Assembly .......... HP 5060-0303
Adapter, SMC (m) to BNC (m) .......... HP 1250-0831
Adapter, BNC (f) to BNC (f) .......... HP 1250-0080
Adapter, Type N (m) to BNC (f) (2 required) .......... HP 1250-0780
BNC Cable, 120 cm (48 in) .......... HP 10503A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75Ω to 50Ω .......... HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75Ω .......... HP 1250-1288*
*Adapter, SMA (f) to SMA (f) .......... HP 1250-1158*
*Adapter, BNC (f) to SMA (m) .......... HP 1250-1200*

PROCEDURE

1. Set equipment controls as follows:

Spectrum Analyzer

START-CENTER .......... CENTER
TUNING .......... 50 MHz
FREQ SPAN/DIV .......... 0
RESOLUTION BW .......... 1 kHz
INPUT ATTEN .......... 0 dB
REFERENCE LEVEL .......... -10 dBm
*002: + 40 dBm V*
Amplitude Scale .......... 10 dB/DIV
SWEEP TIME/DIV .......... 5 mSEC
SWEEP TRIGGER .......... FREE RUN
BASELINE CLIPPER .......... OFF
VIDEO FILTER .......... OFF

Signal Generator

COUNTER MODE .......... INT, EXPAND X10
AM .......... OFF
FM .......... OFF
FREQUENCY TUNE .......... 301.4 MHz
RF .......... ON
OUTPUT LEVEL .......... -20 dBm

2. Connect equipment as shown in Figure 4-10. Remove W7P1 from A10J2. Connect signal generator through adapters to W7P1.

3. Adjust signal generator frequency until spectrum analyzer trace is at peak. Set signal generator OUTPUT LEVEL to position trace at top graticule line.

**4-16. RESOLUTION BANDWIDTH SELECTIVITY(Cont'd)**

4. Tune signal generator until trace drops to 2 divisions above graticule baseline. Record signal generator frequency.

_____________MHz

5. Tune signal generator in direction opposite to that of step 4 until trace peaks and then drops to 2 divisions above graticule baseline. Record signal generator frequency.

_____________MHz

6. Calculate and record resolution bandwidth at 60-dB points (difference between frequencies recorded in steps 4 and 5).

_____________kHz

7 Set RESOLUTION BW to 3 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 3 through 6.

_____________kHz

8. Set RESOLUTION BW to 10 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 3 through 6.

_____________kHz

9. Set spectrum analyzer RESOLUTION BW to 30 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 3 through 6.

____________kHz

10. Reconnect W7P1 to A10J2. Set display LINE power to OFF and remove extender cable assembly. Install plug-in in mainframe and set LINE power to ON.

11. Set signal generator OUTPUT LEVEL to 0 dBm.

12. Set spectrum analyzer INPUT ATTEN to 20 dB and REFERENCE LEVEL to 0 dBm. Set RESOLUTION BW to 100 kHz, leaving FREQ SPAN/DIV set to 0.

    *002: REFERENCE LEVEL, +50 dBmV.*

13. Connect equipment as shown in Figure 4-11.

14. Set signal generator frequency to 50 MHz. Adjust spectrum analyzer TUNING to locate peak of 50-MHz signal on CRT.

15. Adjust signal generator OUTPUT LEVEL to position trace at top graticule line.

## 4-16. RESOLUTION BANDWIDTH SELECTIVITY (Cont'd)

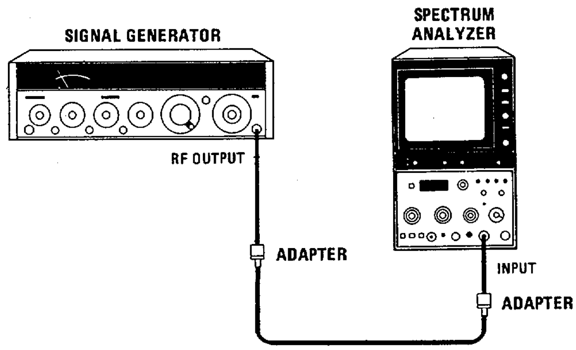



*Figure 4-11. Resolution Bandwidth Selectivity Test Setup, 100 kHz to 3 MHz*

16. Tune signal generator frequency until trace drops to 2 divisions above graticule baseline. Record signal generator frequency.

    _____________MHz

17. Tune signal generator frequency in direction opposite to that of step 16 until trace peaks and then drops to 2 divisions above graticule baseline. Record signal generator frequency.

    _____________MHz

18. Calculate and record resolution bandwidth at 60-dB points (difference between frequencies recorded in steps 16 and 17).

    _____________kHz

19. Set spectrum analyzer RESOLUTION BW to 300 kHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 18.

    _____________kHz

20. Set RESOLUTION BW to 1 MHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 18.

    _____________MHz

21. Set RESOLUTION BW to 3 MHz, leaving FREQ SPAN/DIV set to 0. Repeat steps 14 through 18.

    _____________MHz

22. In Table 4-4, record 3-dB bandwidths computed in Resolution Bandwidth Accuracy test.

23. In Table 4-4, record 60-dB bandwidths recorded in this procedure.

24. For each resolution bandwidth, divide 60-dB bandwidth by 3-dB bandwidth to obtain Resolution Bandwidth Ratio. Each ratio should be less than 15:1.

## 4-16. RESOLUTION BANDWIDTH SELECTIVITY (Cont'd)

*Table 4-4. Resolution Bandwidth Selectivity*

| RESOLUTION BW Setting | MEASURED 3 db BW | MEASURED 60 db BW | Resolution Bandwidth Ration (60 db BW): (3 dB BW) |
|---|---|---|---|
| 3 MHz | ______ | ______ | ______ |
| 1 MHz | ______ | ______ | ______ |
| 300 kHz | ______ | ______ | ______ |
| 100 kHz | ______ | ______ | ______ |
| 30 kHz | ______ | ______ | ______ |
| 10 kHz | ______ | ______ | ______ |
| 3 kHz | ______ | ______ | ______ |
| 1 kHz | ______ | ______ | ______ |

## 4-17. AVERAGE NOISE LEVEL

SPECIFICATION

Less than - 107 dBm with a 10-kHz resolution bandwidth (0 dB input attenuation), 1 MHz to 1500 MHz.

*001: Less than - 100dBm*
*002: Less than - 53 dBm V*

DESCRIPTION

The average noise level is checked by observing the average noise power level displayed on the CRT when no input signal is applied to the instrument. The test is performed with a 10-kHz resolution bandwidth.

PROCEDURE

1. Set spectrum analyzer controls as follows:

START-CENTER ........ CENTER
TUNING ........ 500 MHz
FREQ SPAN/DIV ........ 100 MHz
RESOLUTION BW ........ 10 kHz
INPUT ATTEN ........ 0dB
REFERENCE LEVEL ........ - 60 dBm
*002:-10 dBm V*
Amplitude Scale ........ 10 dB/DIV
SWEEP TIME/DIV ........ 10 mSEC
SWEEP TRIGGER ........ FREE RUN
BASELINE CLIPPER ........ OFF
VIDEO FILTER ........ 12 o'clock

2. Adjust TUNING until LO feedthrough is not on screen. Set VIDEO FILTER to MAX (not in detent) and observe CRT display of noise level from 1 MHz to 1000 MHz. Noise level, as shown in Figure 4-12, should be less than - 107.

*001: Change '- 107 dBm' to '- 100 dBm' throughout procedure and in Figure 4-12.*

*002: Change '- 107 dBm' to '- 53 dBmV' throughout procedure and in Figure 4-12.*

_______________< - 107 dBm

3. Set START-CENTER switch to START. Observe average noise level from 500 MHz to 1500 MHz. Noise level should be less than - 107 dBm.

_______________< - 107 dBm

## 4-17. AVERAGE NOISE LEVEL(Cont'd)

4. Set START-CENTER switch to CENTER and FREQ SPAN/DIV to 1 MHz. Adjust TUNING for a FREQUENCY MHz readout of 6 MHz and momentarily press FREQUENCY CAL switch.

5. Observe average noise level from I MHz to 11 MHz. Noise level should be less than - 107 dBm.

_____________< - 107 dBm

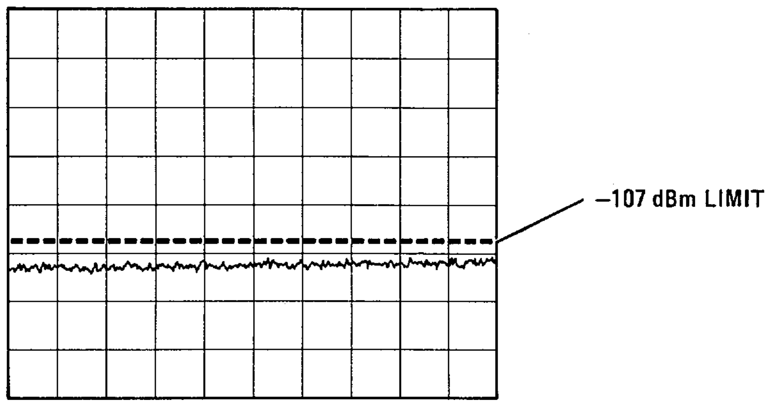



*Figure 4-12. Average Noise Level Measurement*

## 4-18. SPURIOUS RESPONSES

SPECIFICATION

Image and multiple responses and second harmonic distortion products are > 70 dB* below a - 40 dBm in-put signal with 0 dB input attenuation.

*001: - 35 dBm input signal*
*002: + 15dBmV input signal*

Third order intermodulation distortion products are >70 dB* below two -30 dBm input signals, separated by ≥ 50 kHz, with 0 dB input attenuation.

*001: two - 25 dBm input signals*
*002: two + 25 dBm V input signals*

* > 60 dB for 100 kHz to 5 MHz input signals.

DESCRIPTION:

A signal source with a lowpass filter is used to measure harmonic distortion. The LPF is required to ensure that the signals displayed on the CRT are due to harmonic distortion in the spectrum analyzer rather than to the harmonic content of the signal generator.

In measuring spurious responses due to image frequencies, out-of-band responses, and intermodulation distortion, signals from two separate sources are applied to the spectrum analyzer.

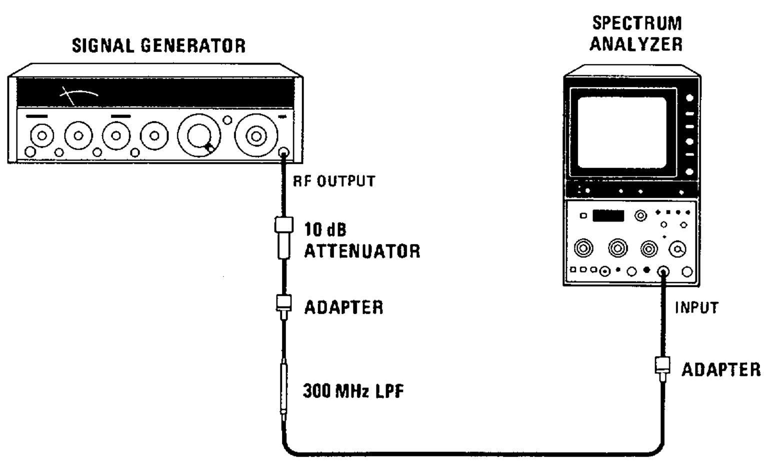



*Figure 4-13. Harmonic Distortion Test Setup*

## 4-18. SPURIOUS RESPONSES (Cont'd)

EQUIPMENT

Signal Generator (2 required) .......... HP 8640B
10 dB Attenuator (2 required) .......... HP 8491A Opt. 010
300 MHz LPF .......... Telonic TLP 300-4AB
BNC Tee .......... HP 1250-0781
Adapter, Type N (m) to BNC (f) (3 required) .......... HP 1250-0780
BNC Cable, 120 cm (48 in) (2 required) .......... HP 10503A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75Ω to 50W .......... HP 08558-60031*
*Adapter, BNC(m) to BNC(m), 75W .......... HP 1250-1288*
*Adapter, SMA (f) to SMA (f) .......... HP 1250-1158*
*Adapter, BNC (f) to SMA (m) .......... HP 1250-1200*

PROCEDURE

**Harmonic Distortion**

1. Set spectrum analyzer controls as follows:

START-CENTER .......... CENTER
TUNING .......... 280 MHz
FREQ SPAN/DIV .......... 500 kHz
RESOLUTION BW .......... 30 kHz
INPUT ATTEN .......... 0 dB
REFERENCE LEVEL .......... -40 dBm
*001: -30 dBm*
*002: + 20 dBm V*
REF LEVEL FINE .......... 0
*001: -5*
*002: -5*
Amplitude Scale .......... 10 dB/DIV
SWEEP TIME/DIV .......... AUTO
SWEEP TRIGGER .......... FREE RUN
BASELINE CLIPPER .......... OFF
VIDEO FILTER .......... 12 o'clock

2. Set signal generator frequency to 280 MHz and OUTPUT LEVEL to - 30 dBm.

3. Connect equipment as shown in Figure 4-13.

4. Momentarily press FREQUENCY CAL switch. Tune signal generator to center signal on spectrum analyzer display.

**4-18. SPURIOUS RESPONSES (Cont'd)**

5. Adjust signal generator OUTPUT LEVEL for -40 dBm displayed at top graticule line of spectrum analyzer CRT.

   *001: -35 dBm*
   *002: + 15 dBm V*

6. Increase signal generator OUTPUT LEVEL by 20 dB.

7. Set spectrum analyzer TUNING to approximately 560 MHz and identify second harmonic.

8. Center signal on spectrum analyzer display and reduce signal generator OUTPUT LEVEL by 20 dB.

9. Set spectrum analyzer RESOLUTION BW to 3 kHz. Harmonics should be more than 70 dB below input signal (below first graticule line from bottom).

   2nd Harmonic:______________dB

   3rd Harmonic:______________dB

10. Set RESOLUTION BW to 30 kHz. Increase signal generator OUTPUT LEVEL by 20 dB.

11. Set spectrum analyzer TUNING to approximately 840 MHz and identify third harmonic.

12. Repeat steps 8 and 9.

**Intermodulation Distortion**

13. Set spectrum analyzer controls as follows:

    START-CENTER .......... CENTER
    TUNING .......... 30 MHz
    FREQ SPAN/DIV .......... 500 kHz
    RESOLUTION BW .......... 30 kHz
    INPUT ATTEN .......... 0 dB
    REFERENCE LEVEL .......... - 30 dBm
      *001: -20dBm*
      *002: +30dBm V*
    REF LEVEL FINE .......... 0
      *001: -5*
      *002: -5*
    Amplitude Scale .......... 10 dB/DIV
    SWEEP TIME/DIV .......... AUTO
    SWEEP TRIGGER .......... FREE RUN
    BASELINE CLIPPER .......... OFF
    VIDEO FILTER .......... 12 o'clock

**4-18. SPURIOUS RESPONSES(Cont'd)**

14. Connect equipment as shown in Figure 4-14.

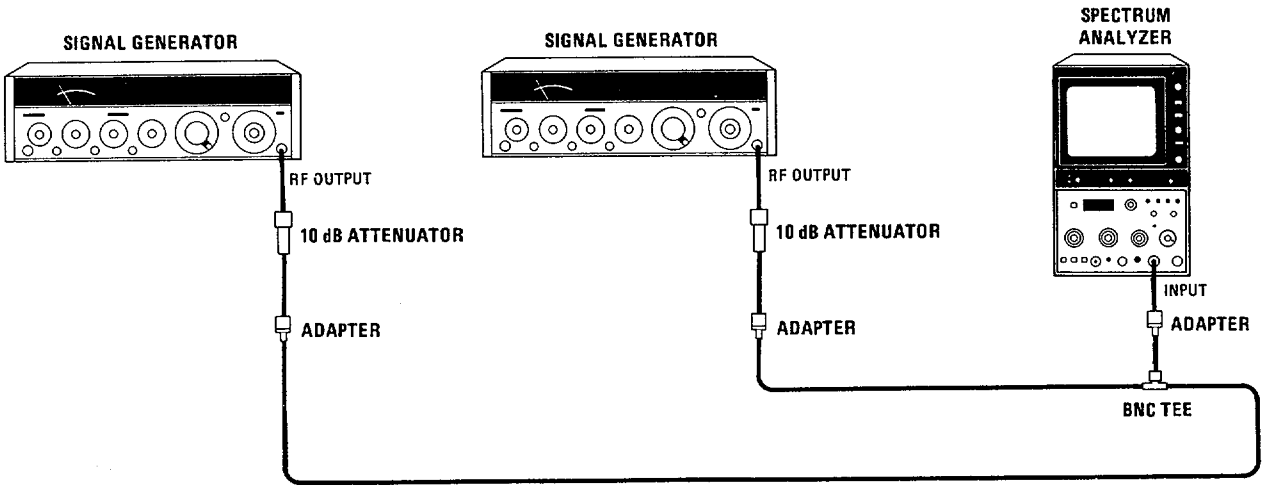



*Figure 4-14. Intermodulation Distortion Test Setup*

15. Set both signal generators for approximately 30 MHz output at - 24 dBm.

16. Momentarily press FREQUENCY CAL switch. Tune signal generators until signals are 2 divisions apart and centered on display.

17. Adjust OUTPUT LEVEL controls of both signal generators for - 30 dBm displayed on spectrum analyzer.

*001: -25 dBm*
*002: + 25 dBm V*

18. Reduce spectrum analyzer RESOLUTION BW to 3 kHz and check for third order intermodulation distortion products at approximately 3 divisions to either side of center graticule line (see NOTE below). They should be more than 70 dB below input signals (-100 dBm on spectrum analyzer display). (See Figure 4-15.)

*001: - 95 dBm on spectrum analyzer display*
*002: - 50 dBmV on spectrum analyzer display*

_____________dB

**NOTE**

**If the intermodulation distortion product cannot be located, increase output levels of both signal generators by 10 dB. Be sure to return the OUTPUT LEVEL of each signal generator to its previous setting before making the actual measurement.**

**4-18. SPURIOUS RESPONSES(Cont'd)**

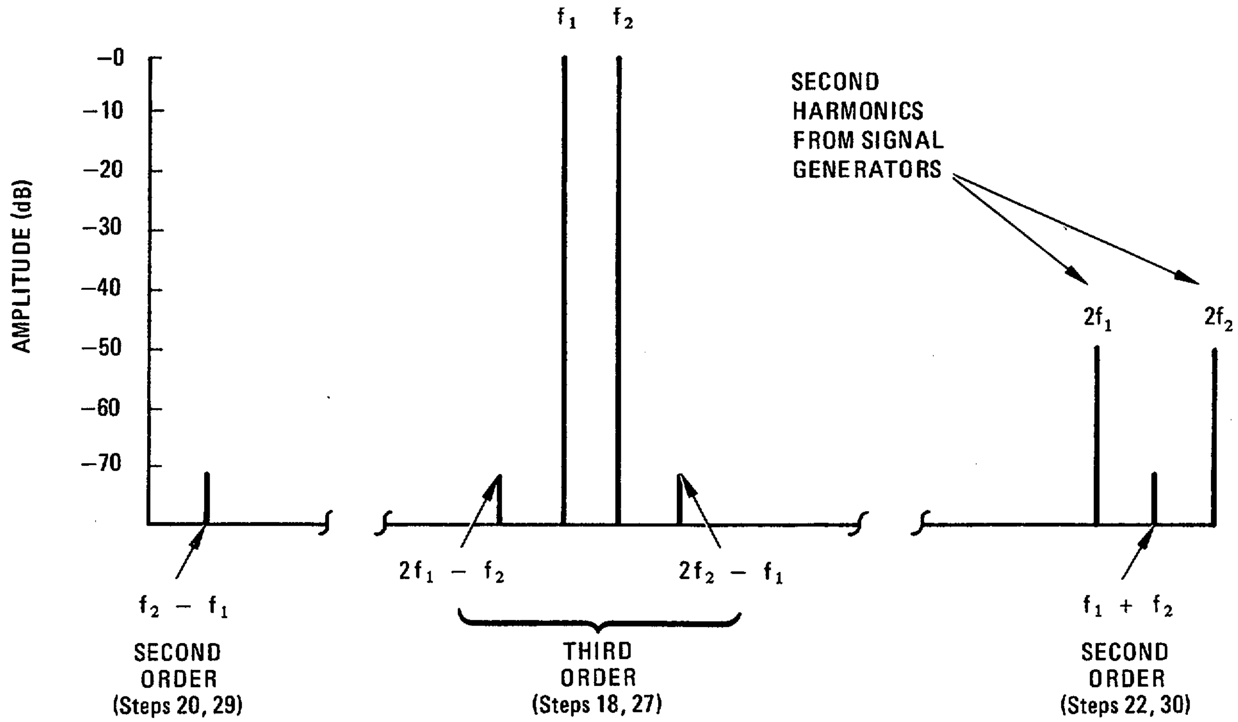



*Figure 4-15. Intermodulation Distortion Products*

19. Set INPUT ATTEN to 0 dB, REFERENCE LEVEL to -40 dBm, and RESOLUTION BW to 30 kHz. Adjust OUTPUT LEVEL of each signal generator to - 43 dBm as displayed on CRT.

    *001: REFERENCE LEVEL - 35 dBm; output level of - 38 dBm displayed on CRT*
    *002: REFERENCE LEVEL + 15 dBmV; output level of + 12 dBmV displayed on CRT*

20. Set spectrum analyzer TUNING to 1 MHz and momentarily press FREQUENCY CAL switch. Set RESOLUTION BW to 3 kHz and adjust VIDEO FILTER as necessary for more than 70 dB display range. Check for second order intermodulation distortion product (f2 fl) near center of display (see NOTE below). Second order intermodulation distortion product should be more than 60 dB below the total applied signal (- 100 dBm on spectrum analyzer display). (See Figure 4-15.)

    *001: - 95 dBm on spectrum analyzer display*
    *002: - 45 dBm V on spectrum analyzer display*

_____________dB

**NOTE**

**If the intermodulation distortion product cannot be located, increase output levels of both signal generators by 10 dB. Be sure to return the OUTPUT LEVEL of each signal generator to its previous setting before making the actual measurement.**

## 4-18. SPURIOUS RESPONSES (Cont'd)

21. Set spectrum analyzer TUNING to 60 MHz and RESOLUTION BW to 30 kHz. Momentarily press FREQUENCY CAL switch.

22. Check for second order intermodulation distortion product ($f_1$ + $f_2$) between $2f_1$ and $2f_2$ signals (see NOTE below). Set RESOLUTION BW to 3 kHz and adjust VIDEO FILTER as necessary for more than 70 dB display range. Second order intermodulation distortion product should be more than 70 dB below total applied signal (- 110 dBm on spectrum analyzer display). (See Figure 4-15.)

    *001: - 105 dBm on spectrum analyzer display*
    *002: - 60 dBm V on spectrum analyzer display*

_____________dB

**NOTE**

**If the intermodulation distortion product cannot be located, increase output levels of both signal generators by 10 dB. Be sure to return the OUTPUT LEVEL of each signal generator to its previous setting before making the actual measurement.**

23. Set spectrum analyzer controls as follows:

| | |
|---|---|
| START-CENTER | CENTER |
| TUNING | 4 MHz |
| FREQ SPAN/DIV | 500 kHz |
| RESOLUTION BW | 30 kHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | - 30 dBm |
| *001: - 20 dBm* | |
| *002: +30dBmV* | |
| REF LEVEL FINE | 0 |
| *001: -5* | |
| *002: -5* | |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| BASELINE CLIPPER | OFF |
| VIDEO FILTER | 12 o'clock |

24. Set both signal generators for approximately 4 MHz at - 24 dBm.

25. Momentarily press FREQUENCY CAL switch. Tune signal generators until signals are 2 divisions apart and centered on display.

26. Adjust OUTPUT LEVEL of each signal generator for - 30 dBm as displayed on CRT.

    001: - 25 dBm
    002: + 25 dBm V

**4-18. SPURIOUS RESPONSES(Cont'd)**

27. Check for third order intermodulation distortion products at approximately 3 divisions from either side of center graticule line. Third order intermodulation distortion products should be more than 60 dB below input signals (- 90 dBm on spectrum analyzer display).

*001: - 85 dBm on spectrum analyzer display*
*002: - 35 dBm V on spectrum analyzer display*

_____________dB

**NOTE**

**If signal generators other than HP 8640's are used, intermodulation distortion might be in the generators themselves because of crosstalk between the two sources.**

28. Set INPUT ATTEN to 0 dB and REFERENCE LEVEL to -40 dBm. Adjust OUTPUT LEVEL of each signal generator for - 43 dBm as displayed on CRT.

*001: REFERENCE LEVEL, - 35 dBm; output level of - 38 dBm displayed on CRT*
*002: REFERENCE LEVEL, + 15 dBmV; + 12 dBmV as displayed on CRT*

29. Set spectrum analyzer TUNING to 1 MHz and momentarily press FREQUENCY CAL switch. Set RESOLUTION BW to 3 kHz and adjust VIDEO FILTER as necessary for more than 70 dB display range. Check for second order intermodulation distortion product ($f_2$ - $f_1$) near center of display (see NOTE below). Second order intermodulation distortion product should be more than 60 dB below total applied signal (-100 dBm on spectrum analyzer display). (See Figure 4-15.)

*001: - 95 dBm on spectrum analyzer display*
*002: - 45 dBm V on spectrum analyzer display*

_____________dB

**NOTE**

**If the intermodulation distortion product cannot be located, increase output levels of both signal generators by 10 dB. Be sure to return the OUTPUT LEVEL of each signal generator to its previous setting before making the actual measurement.**

30. Set spectrum analyzer TUNING to 8 MHz and check for second order intermodulation distortion product ($f_1$ + $f_2$) between $2f_1$ and $2f_2$ signals. (See figure 4-15.) Second order intermodulation distortion product should be more than 60 dB below total applied signal (- 100 dBm on spectrum analyzer display). (See NOTE above.)

*001: - 95 dBm on spectrum analyzer display*
*002: - 45 dBmV on spectrum analyzer display*

_____________dB

## 4-19. RESIDUAL RESPONSES

SPECIFICATION
< - 100 dBm (1-1500 MHz) with 0 dB input attenuation and no signal present at input.

001: < - 95 dBm
002: < - 50 dBmV

DESCRIPTION

The spectrum analyzer is tested for residual responses with no signal applied to the INPUT 509 connector. The input attenuation is set to 0 dB.

*001 and 002: INPUT 75W*

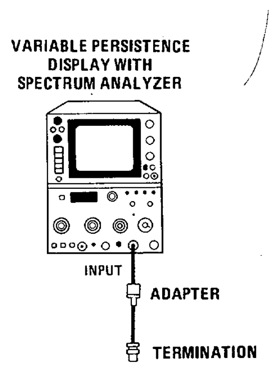



*Figure 4-16. Residual Responses Test Setup*

EQUIPMENT

Variable Persistence/Storage Display .......... HP 181T
50-Ohm Termination.......... HP 11593A

*001 and 002: 75-Ohm Termination, HP 11652-60010*

PROCEDURE

1. Set spectrum analyzer controls as follows:

START-CENTER.......... CENTER
TUNING .......... 500 MHz
FREQ SPAN/DIV.......... 100 MHz
RESOLUTION BW .......... 1 MHz
INPUT ATTEN.......... 0 dB
REFERENCE LEVEL.......... - 60 dBm
*002: - 10 dBm V*
Amplitude Scale .......... 10 dB/DIV
SWEEP TIME/DIV.......... AUTO
SWEEP TRIGGER .......... FREE RUN
VIDEO FILTER.......... Fully clockwise (not in detent)

### 4-19. RESIDUAL RESPONSES (Cont'd)

2. Terminate INPUT 501 connector with 50-ohm coaxial termination (see Figure 4-16).
   *001 and 002: 75W; 75-ohm*

3. With variable persistence display in NORM mode, set LO feedthrough to far left vertical graticule line. Set BASELINE CLIPPER to 3 o'clock.

4. Set HP 181T to WRITE mode. Set PERSISTENCE control to MAX and INTENSITY control to approximately 12 o'clock.

5. Set spectrum analyzer SWEEP TRIGGER to SINGLE sweep mode and RESOLUTION BW to 30 kHz. Momentarily press ERASE pushbutton.

**NOTE**

**When the ERASE pushbutton is pressed, the spectrum analyzer sweep might be triggered. To stop the sweep, turn SWEEP TRIGGER control clockwise.**

6. Turn SWEEP TRIGGER control clockwise to initiate sweep.

7. Slowly turn BASELINE CLIPPER control until peaks of trace begin to appear on display. It might be necessary to increase baseline clipping slightly near end of sweep to reduce blooming.

8. Trigger sweep at least one more time and check for residual responses from 1 to 1000 MHz. Record frequency at which residual response of greatest amplitude appears.

   _____________MHz

9. Set display to NORM mode. Set spectrum analyzer BASELINE CLIPPER fully counterclockwise and SWEEP TRIGGER to FREE RUN.

10. Set FREQ SPAN/DIV to 20 kHz and TUNING to center frequency of residual recorded in step 8.

11. Narrow FREQ SPAN/DIV and RESOLUTION BW, using TUNING control to keep signal centered. Use SWEEP TIME/DIV control to reduce sweep speed until signal level does not rise when sweep speed is further reduced. Residual response must be less than - 100 dBm.

    _____________dBm

    *001: < - 95 dBm*
    *002: < - 50 dBmV*

12. Repeat steps 1 through 5.

13. Set START-CENTER switch to START and repeat steps 6 and 7.

**4-19. RESIDUAL RESPONSES(Cont'd)**

14. Trigger sweep at least one more time and check for residual responses from 500 MHz to 1500 MHz. Record frequency at which residual response of greatest amplitude appears.

_____________MHz

15. Repeat step 9.

16. Set spectrum analyzer FREQ SPAN/DIV to 20 kHz and TUNING to center frequency of residual recorded in step 14.

17. Narrow FREQ SPAN/DIV and RESOLUTION BW, using TUNING control to keep signal centered. Use SWEEP TIME/DIV control to reduce sweep speed until signal level does not rise when sweep speed is further reduced. Residual response must be less than - 100 dBm.

_____________dBm

*001: < - 95 dBm*
*002: < - 50 dBm V*

## 4-20. FREQUENCY RESPONSE

SPECIFICATION

≤ ± 1.0 dB with 10 dB input attenuation

DESCRIPTION

Signals from 0.1 to 1500 MHz are applied to the input of the spectrum analyzer. The amplitude of each signal is adjusted to a reference set on the analyzer display. The power level, measured with a power meter, determines the frequency response of the spectrum analyzer.

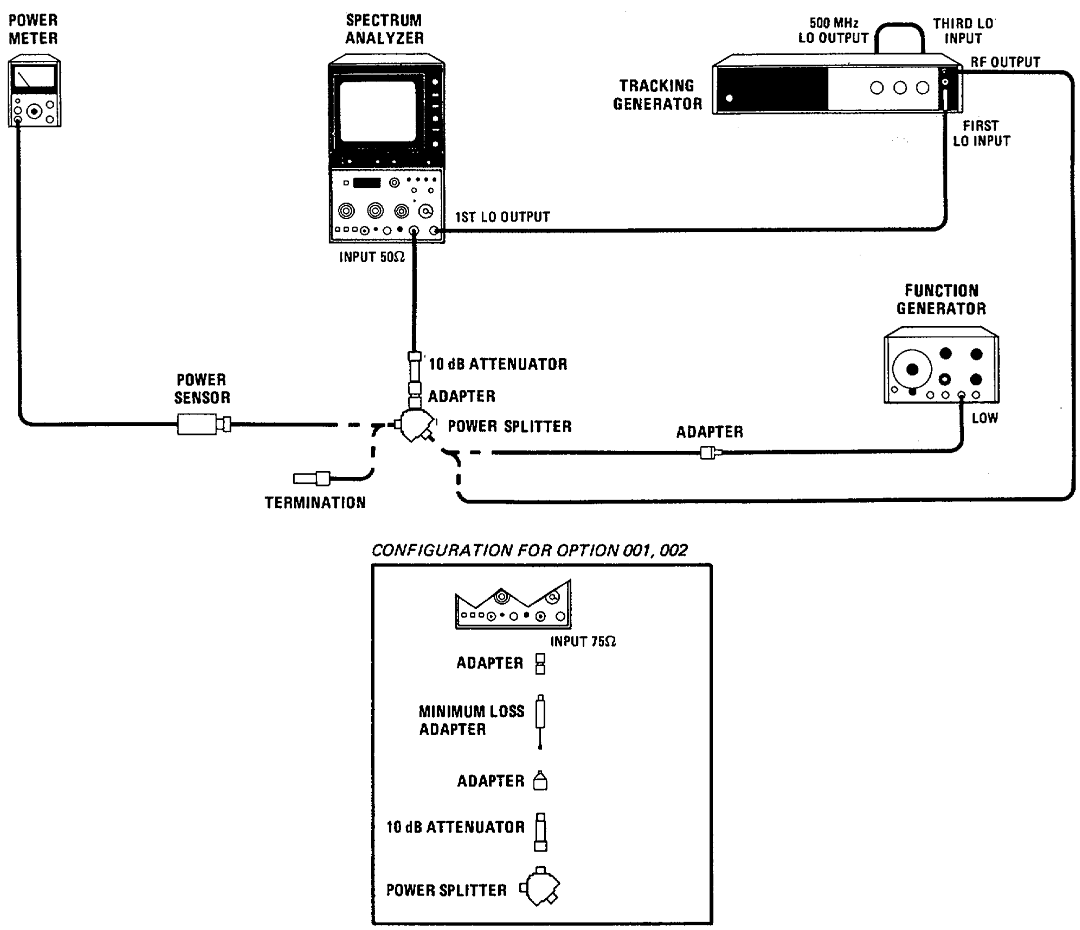



*Figure 4-17. Frequency Response Test Setup*

## 4-20. FREQUENCY RESPONSE(Cont'd)

EQUIPMENT

| | |
|---|---|
| Tracking Generator | HP 8444A Opt. 059 |
| Power Meter | HP 435B |
| Power Sensor | HP 8482A |
| Function Generator | HP 3310A |
| Power Splitter | HP 11667A |
| BNC Cable, 20 cm (9 in) | HP 10502A |
| BNC Cable, 120 cm (48 in) | HP 10503A |
| Type N cable, 180 cm (72 in) | HP 11500A |
| 10 dB Attenuator | HP 8491B Opt. 010 |
| Adapter, Type N (m) to Type N (m) | HP 1250-1475 |
| Adapter, Type N (m) to BNC (f) | HP 1250-0780 |

*Additional Equipment, Options 001 and 002:*

| | |
|---|---|
| *Adapter, BNC (m) to BNC (m), 75W* | *HP 1250-1288* |
| *Adapter, Type N (m) to SMA (f), 50W* | *HP 1250-1250* |
| *Minimum Loss Adapter, 75W to 50W* | *HP 08558-60031* |

PROCEDURE

1. Set controls as follows:

Spectrum Analyzer:

| | |
|---|---|
| START- CENTER | CENTER |
| TUNING | 0 |
| FREQ SPAN/DIV | 0 |
| RESOLUTION BW | 100 kHz |
| INPUT ATTEN | 10 dB |
| REFERENCE LEVEL | -10 dBm |
| *002: + 40 dBmV* | |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| BASELINE CLIPPER | OFF |
| VIDEO FILTER | OFF |

2. Adjust spectrum analyzer TUNING to peak LO feedthrough signal on display. Press FREQUENCY CAL and readjust TUNING for peak. Repeat. Adjust TUNING for peak and adjust FREQUENCY ZERO for a FREQUENCY MHz reading of 00.0.

3. Adjust TUNING for a FREQUENCY MHz reading of 5.0 MHz. Press FREQUENCY CAL. Set up equipment as shown in Figure 4-17. Connect the tracking generator 500 MHz LO OUTPUT to the THIRD LO INPUT (rear panel).

4. Set spectrum analyzer Amplitude Scale to 1 dB/DIV and adjust REF LEVEL FINE to bring the trace on the display. Peak the trace using tracking generator TRACK ADJ.

**4-20. FREQUENCY RESPONSE(Cont'd)**

5. Set power meter CAL FACTOR according to chart on power probe (5 MHz). Set RANGE to - 10 dBm.

6. Adjust tracking generator LEVEL to set a reference of - 12 dBm on the power meter.

7. Adjust spectrum analyzer REF LEVEL FINE to position trace to fourth graticule line.

8. For each setting in Table 4-5:

   a. Adjust spectrum analyzer TUNING and press FREQUENCY CAL.

   b. Set power meter CAL FACTOR.

   c. Adjust tracking generator TRACK ADJ to peak signal on display and adjust LEVEL to place signal on reference graticule.

   d. Record Power Meter Reading.

9. Disconnect Type N cable from power splitter. Connect function generator LOW output to power splitter.

10. Set controls as follows:

Spectrum Analyzer
FREQ SPAN/DIV........................................50 kHz
RESOLUTION BW........................................10 kHz
Amplitude Scale........................................10 dB/DIV

Function Generator:
RANGE........................................100 kHz
Frequency........................................5 MHz
FUNCTION........................................SINE
DC OFFSET........................................0

11. Set power meter CAL FACTOR according to chart on power sensor (5 MHz). Adjust spectrum analyzer TUNING to center 5 MHz signal on display. Set amplitude scale to 1 dB/DIV.

12. Adjust function generator OUTPUT LEVEL to - 12 dB on power meter.

13. Adjust REF LEVEL FINE to bring the peak of the 5 MHz signal to fourth graticule from bottom.

14. For each frequency in Table 4-6, set function generator frequency and tune spectrum analyzer to bring signal to center screen. Adjust function generator OUTPUT LEVEL to bring signal peak to reference graticule on the display. Set the power meter CAL FACTOR and record the power indicated by the power meter.

15. Find the overall maximum power reading from both Table 4-5 and Table 4-6.

_____________dBm

**4-20. FREQUENCY RESPONSE (Cont'd)**

16. Find the overall minimum power reading from both Table 4-5 and Table 4-6.

_____________dBm

17. The difference between the overall maximum power in step 15 and the overall minimum power in step 16 should be less than 2 dB.

_____________dB

*Table 4-5. Frequency Response, 5 lMHz to 1500 MHz*

| Spectrum Analyzer TUNING (MHz) | Power Meter Reading (dBm) |
|---|---|
| 5 | -12(Ref.) |
| 100 | ______________________ |
| 200 | ______________________ |
| 300 | ______________________ |
| 400 | ______________________ |
| 500 | ______________________ |
| 600 | ______________________ |
| 700 | ______________________ |
| 800 | ______________________ |
| 900 | ______________________ |
| 1000 | ______________________ |
| 1100 | ______________________ |
| 1200 | ______________________ |
| 1300 | ______________________ |
| 1400 | ______________________ |
| 1500 | ______________________ |

*Table 4-6. Frequency Response, 100 kHz to 5 MHz*

| Spectrum Analyzer/Function Generator Frequency | Power Meter Reading (dBm) |
|---|---|
| 5 MHz | -12 (Ref.) |
| 3 MHz | ______________________ |
| 1 MHz | ______________________ |
| 500 kHz | ______________________ |
| 100 kHz | ______________________ |

## 4-21. BANDWIDTH SWITCHING (AMPLITUDE VARIATION)

SPECIFICATION

3 MHz to 300 kHz: ≤ ± 0.5 dB
3 MHz to I kHz: ≤ ±1.0 dB (100 kHz bandwidth limited to < 80o R.H.)

DESCRIPTION

The spectrum analyzer 280 MHz CAL OUTPUT signal is applied to the INPUT connector and displayed on the CRT. The peak of the displayed 280 MHz signal is centered on the CRT and adjusted for a vertical deflection of seven divisions. The amplitude variation of the 280 MHz signal is measured for each RESOLUTION BW control setting. The overall variation between RESOLUTION BW settings of 3 MHz to 300 kHz should be equal to or less than 1 dB (± 0.5 dB). The overall variation between RESOLUTION BW settings of the 3 MHz to 1 kHz should be equal to or less than 2 dB (±1.0 dB).

EQUIPMENT

BNC Cable, 20 cm (9 in)....................HP 10502A
Adapter, Type N (m) to BNC (f) .................... HP 1250-0780

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W ....................HP08558-60031*
*Adapter, BNC(m) to BNC(m), 75W .................... HP 1250-1288*
*Adapter, SMA (f) to SMA (f).................... HP 1250-1158*
*Adapter, BNC (f) to SMA (m) .................... HP 1250-1200*

PROCEDURE

1. Set spectrum analyzer controls as follows:

START- CENTER.................... CENTER
TUNING ....................280 MHz
FREQ SPAN/DIV....................1 MHz
RESOLUTION BW ....................3 MHz
INPUT ATTEN....................0 dB
REFERENCE LEVEL....................-20 dBm
*002: + 30 dBm*
REF LEVEL FINE ....................-10
Amplitude Scale ....................1 dB/DIV
SWEEP TIME/DIV.................... AUTO
SWEEP TRIGGER ....................FREE RUN
BASELINE CLIPPER....................OFF
VIDEO FILTER....................OFF

2. Connect spectrum analyzer CAL OUTPUT signal to INPUT 50Ω connector.
*001 and 002: 75W*

### 4-21. BANDWIDTH SWITCHING (AMPLITUDE VARIATION) (Cont'd)

3. Set TUNING control, as required, to center 280 MHz signal on CRT.

4. Set REF LEVEL FINE control to position peak of 280 MHz signal seven divisions above graticule baseline.

5. Vary the RESOLUTION BW and FREQ SPAN/DIV controls in accordance with Table 4-7. Record the change in amplitude for each RESOLUTION BW setting. Changes in amplitude above reference level set in step 4 are positive (+). Changes below reference level are negative (-).

*Table 4-7. Amplitude Accuracy, Switching Between Bandwidths*

<table>
<tr><th>RESOLUTION BW Setting</th><th>FREQ SPAN/DIV Setting</th><th>Change in Amplitude (dB)</th><th>Overall Variation Between 3 MHz and 300 kHz RESOLUTION BW Settings (dB)</th><th>Overall Variation Between 3 MHZ and 1 HZ RESOLUTION BW Settings (dB)</th></tr>
<tr><td>3 MHz<br>1 MHz<br>300 kHz</td><td>1 MHz<br>500 kHz<br>100 KH</td><td>0 (Ref)<br>______<br>______</td><td>______</td><td rowspan="2">______</td></tr>
<tr><td>100 kHz<br>30 kHz<br>10 kHz<br>3 kHz<br>1 kHz</td><td>50 kHz<br>10 KHz<br>5 kHz<br>5 kHz<br>5 kHz</td><td>______<br>______<br>______<br>______<br>______</td><td></td></tr>
</table>

6. To find the overall variation in Table 4-7, algebraically subtract the greatest negative change in amplitude from the greatest positive change in amplitude. If all changes in amplitude are of the same sign, the overall variation is the largest positive or largest negative change in amplitude. The overall variation between 3 MHz and 300 kHz RESOLUTION BW settings should be ≤ 1.0 dB (± 5.0 dB). The overall variation between 3 MHz and 1 kHz RESOLUTION BW settings should be ≤2.0 dB ( ±1.0 dB).

## 4-22. INPUT ATTENUATOR ACCURACY

SPECIFICATION

Accuracy ±0.5 dB for each 10 dB step but not more than ±1.0 dB over full 70 dB range.

DESCRIPTION

The input attenuator accuracy is tested over its full 70 dB range using an RF substitution method. A step attenuator that has been calibrated by a Standards Laboratory at 30 MHz is used for substitution. The known error of the calibrated attenuator is taken into account when computing the 8558B input attenuator accuracy.

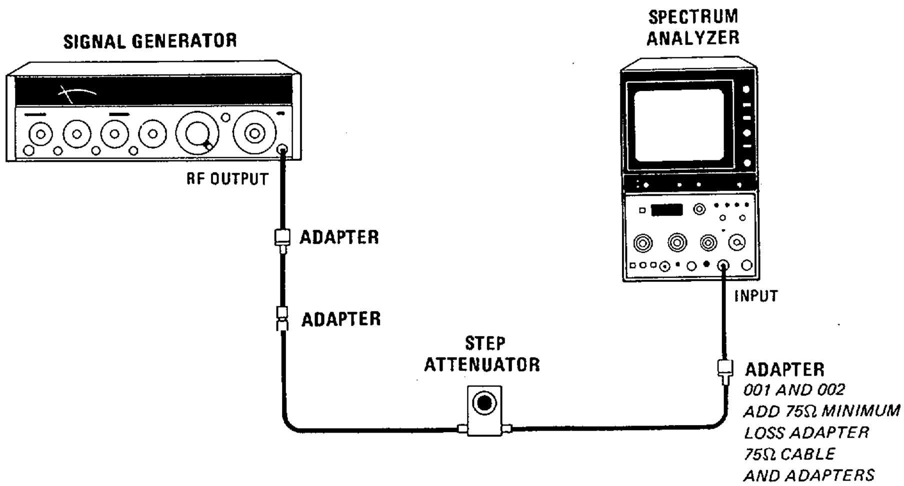



*Figure 4-18. Input Attenuator Accuracy Test Setup*

EQUIPMENT

Signal Generator .......... HP 8640B
Step Attenuator .......... HP 355D Opt. H82
Adapter, Type N (m) to BNC (f) (2 required) .......... HP 1250-0780
Adapter, BNC (m) to BNC (m) .......... HP 1250-0216
BNC Cable, 120 cm (48 in) .......... HP 10503A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W .......... HP 08558-60031*
*Adapter, BNC (m) to BNC (m) .......... HP 1250-0216*
*Adapter, BNC (f) to SMA (m) .......... HP 1250-1200*
*Adapter, SMA (f) to SMA (f) .......... HP 1250-1158*
*BNC Cable, 30cm (12 in), 75W .......... HP 11652-60012*

## 4-22 INPUT ATTENUATOR ACCURACY(Cont'd)

PROCEDURE

1. Set controls as follows:

Spectrum Analyzer

START - CENTER .......... CENTER
TUNING .......... 30 MHz
FREQ SPAN/DIV .......... 200 kHz
RESOLUTION BW .......... 30 kHz
INPUT ATTEN .......... 70 dB
REFERENCE LEVEL .......... 0 dBm
*001 -10dBm*
*002: +40dBmV*
Amplitude Scale .......... 1 dB/DIV
SWEEP TIME/DIV .......... AUTO
SWEEP TRIGGER .......... FREE RUN
BASELINE CLIPPER .......... OFF
VIDEO FILTER .......... 2 o'clock

Signal Generator

COUNTER MODE .......... INT
AM .......... OFF
FM .......... OFF
FREQUENCY TUNE .......... 30.0 MHz
OUTPUT LEVEL .......... 0 dBm
RF .......... ON

2. Connect equipment as shown in Figure 4-18 with step attenuator set at 0 dB. Locate signal on CRT and adjust signal generator OUTPUT LEVEL until signal peak is 6 divisions above graticule baseline.

3. Set HP 8558B INPUT ATTEN control and step attenuator to settings indicated in Table 4-8. Record deviation from sixth division reference set in step 2 for each setting.

*Table 4-8. Input Attenuator Accuracy*

| INPUT ATTEN Setting (dBm) | Step Attenuator Setting (db) | Deviation from 6th Division (db) | Step Attenuator Error (Calibration) | Corrected Deviation (db) |
|---|---|---|---|---|
| 70 | 0 | 0 (Ref.) | Ref. | 0 (Ref.) |
| 60 | 10 | ______ | ______ | ______ |
| 50 | 20 | ______ | ______ | ______ |
| 40 | 30 | ______ | ______ | ______ |
| 30 | 40 | ______ | ______ | ______ |
| 20 | 50 | ______ | ______ | ______ |
| 10 | 60 | ______ | ______ | ______ |
| 0 | 70 | ______ | ______ | ______ |

*Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (-). For example, 9.99 dB calibration for a 10 dB attenuator setting represents an error of -0.01 dB.

## 4-22. INPUT ATTENUATOR ACCURACY(Cont'd)

4. To compute Corrected Deviation, add Step Attenuator Error to Deviation from 6th Division for each setting. Corrected Deviation should not differ more than 0.5 dB between any two adjacent settings of input attenuator.

_____________Error Between Adjacent Settings

5. Record maximum positive and maximum negative Corrected Deviation values. Difference between these two values (total deviation) should not exceed 2.0 dB (± 1.0 dB).

_____________dB Maximum Positive Corrected Deviation
_______________dB Maximum Negative Corrected Deviation
_____________dB Total Corrected Deviation

## 4-23. REFERENCE LEVEL ACCURACY

SPECIFICATION

Step Accuracy:
Steps referenced with 0 dB input attenuation
-10 dBm to - 80 dBm: ± 0.5 dB
-10 dBm to - 100 dBm: ± 1.0 dB

Vernier Accuracy:
± 0.5 dB

DESCRIPTION

The reference level accuracy is tested over the range of - 10 dBm to - 100 dBm by checking the IF gain steps in 1 dB/DIV (Log) and in LIN. The resulting maximum deviation in each case must be less than 1.0 dB (± 0.5 dB) from - 10 dBm to - 80 dBm and less than 2.0 dB (+ 1.0 dB) from - 10 dBm to - 100 dBm.

*002: Change range to + 40 dBm V to - 50 dBm V.*

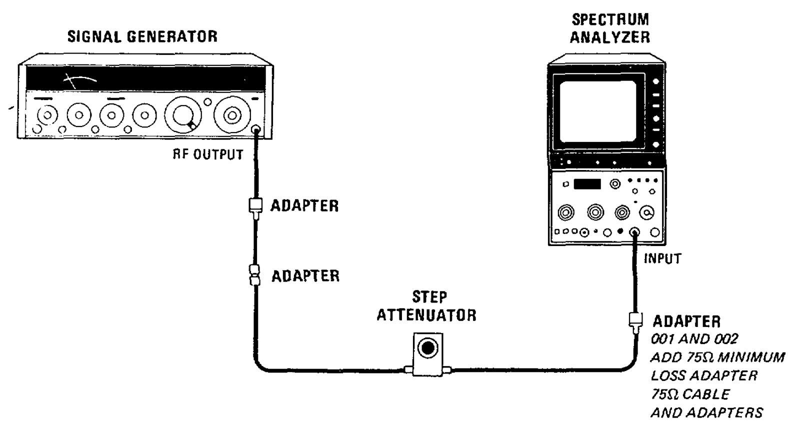



*Figure 4-19. Reference Level Accuracy Test Setup*

EQUIPMENT

Signal Generator .................... HP 8640B
1 dB Step Attenuator .................... HP 355C Opt. H80
10 dB Step Attenuator.................... HP 355D Opt. H82
Adapter (2 required).................... HP 1250-0780
BNC Cable, 20 cm (9 in).................... HP 10502A
BNC Cable, 120 cm (48 in).................... HP 10503A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W ....................HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W .................... HP 1250-1288*
*Adapter, SMA (f) to SMA (f).................... HP 1250-1158*
*Adapter, BNC (f) to SMA (m) .................... HP 1250-1200*

## 4-23. REFERENCE LEVEL ACCURACY (Cont'd)

PROCEDURE

**Step Accuracy in Log Mode**

1. Set controls as follows:

Spectrum Analyzer
START - CENTER .......... CENTER
TUNING .......... 30 MHz
FREQ SPAN/DIV .......... 5 kHz
RESOLUTION BW .......... 3 kHz
INPUT ATTEN .......... 0 dB
REFERENCE LEVEL dBm .......... -10 dBm
*002: +40dBmV*
Amplitude Scale .......... 1 dB/DIV
SWEEP TIME/DIV .......... AUTO
SWEEP TRIGGER .......... FREE RUN
BASELINE CLIPPER .......... OFF
VIDEO FILTER .......... 2 o'clock

Signal Generator
COUNTER MODE .......... INT
AM .......... OFF
FM .......... OFF
FREQUENCY TUNE .......... 30 MHz
OUTPUT LEVEL .......... -10 dBm

2. Connect equipment in Figure 4-19 with step attenuator set at 0 dB. Locate signal on CRT.

**NOTE**

**If signal is difficult to locate, press RESOLUTION BW control to couple with FREQ SPANIDIV control and turn the coupled controls clockwise until signal appears on display. Momentarily depress FREQ CAL switch and center the signal, using TUNING control. Return controls to positions called out in step 1, adjusting TUNING control as necessary to keep signal centered.**

3. Adjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline. Set the 8558B REFERENCE LEVEL control and step attenuator to settings indicated in Table 4-9. Record the Deviation from the 6th Division (reference set in step 2) for each setting.

4. To compute the Corrected Deviation, add the Step Attenuator Error to the Deviation from 6th Division for each setting. The difference between the maximum positive and the maximum negative Corrected Deviation values from -10 dBm to -80 dBm should not exceed 1.0 dB. The difference between the maximum positive and the maximum negative Corrected Deviation values from - 10 dBm to - 100 dBm should not exceed 2.0 dB.

- 10 dBm to - 80 dBm________dB
- 10 dBm to - 100 dBm________dB

*002: Change ranges to +40 dBm V to -30 dBm V and +40 dBm V to -50d BmV*

## 4-23. REFERENCE LEVEL ACCURACY (Cont'd)

*Table 4-9. IF Gain Accuracy in LOG Mode*

| REFERENCE LEVEL Setting (dBm) | Step Attenuator Setting (db) | Deviation from $6^{th}$ Division (db) | Step Attenuator Error (Calibration)* (dB) | Corrected Deviation (db) |
|---|---|---|---|---|
| -10 | 0 | 0 (Ref.) | Ref. | 0 (Ref.) |
| -20 | 10 | ______ | ______ | ______ |
| -30 | 20 | ______ | ______ | ______ |
| -40 | 30 | ______ | ______ | ______ |
| -50 | 40 | ______ | ______ | ______ |
| -60 | 50 | ______ | ______ | ______ |
| -70 | 60 | ______ | ______ | ______ |
| -80 | 70 | ______ | ______ | ______ |
| -90 | 80 | ______ | ______ | ______ |
| -100 | 90 | ______ | ______ | ______ |
| *002: REFERENCE LEVEL (dBm V) from top to bottom: 40, 30, 20, 10, 0, -10, -20, -30, -40, -50.* | | | | |
| *Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (-). For example, 9.99 dB calibration for a 10 dB attenuator setting represents an error of -0.01 dB. | | | | |

**Step Accuracy in Linear Mode**

5. Set the spectrum analyzer Amplitude Scale switch to LIN. Set REFERENCE LEVEL control to - 10 dBm and set step ttenuator to 0 dB. Readjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline.

6. Set the 8558B REFERENCE LEVEL control and step attenuator to settings indicated in Table 4-10. Record the Deviation from the 6th Division in Linear Mode (reference set in step 5) for each setting.

7. Using Table 4-11, convert Deviation from 6th Division in Linear Mode to deviation in dB for each setting. Record dB values in Table 4-10.

8. To compute the Corrected Deviation, add the Step Attenuator Error to the Deviation from the 6th Division in dB. The difference between the maximum positive and the maximum negative Corrected Deviation values from - 10 dBm to - 80 dBm should not exceed 1.0 dB. The difference between the maximum positive and the maximum negative Corrected Deviation values from - 10 dBm to - 100 dBm should not exceed 2.0 dB.

   *002: Change ranges to + 40 dBm V to -30 dBm V and +40 dBm V to -50 dBm V.*

- 10 dBm to - 80 dBm_________dB
- 10 dBm to - 100 dBm _______dB

## 4-23. REFERENCE LEVEL ACCURACY(Cont'd)

*Table 4-10. IF Gain Accuracy in Linear Mode*

| REFERENCE LEVEL Setting (dBm) | Step Attenuator Setting (db) | Deviation from 6th Division in Linear Mode (div.) | Deviation from 6th Division in db* | Step Attenuator Error (Calibration)** (dB) | Corrected Deviation (dB) |
|---|---|---|---|---|---|
| -10 | 0 | 0 (Ref.) | 0 (Ref.) | Ref. | 0 (Ref.) |
| -20 | 10 | ______ | ______ | ______ | ______ |
| -30 | 20 | ______ | ______ | ______ | ______ |
| -40 | 30 | ______ | ______ | ______ | ______ |
| -50 | 40 | ______ | ______ | ______ | ______ |
| -60 | 50 | ______ | ______ | ______ | ______ |
| -70 | 60 | ______ | ______ | ______ | ______ |
| -80 | 70 | ______ | ______ | ______ | ______ |
| -90 | 80 | ______ | ______ | ______ | ______ |
| -100 | 90 | ______ | ______ | ______ | ______ |
| *002: REFERENCE LEVEL (dBmV) from top to bottom: 40, 30, 20, 10, 0, -10, -20, -30, -40, -50.* | | | | | |
| *Use Table 4-11 to convert deviation in linear mode to deviation in dB.<br>**Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (-). | | | | | |

*Table 4-11. Conversion Table, Deviation in Linear Mode*

| POSTIVE DEVIATIONS (Above 6th division from graticule baseline) | | NEGATIVE DEVIATIONS (Below 6th division from graticule baseline) | |
|---|---|---|---|
| Liner (Divisions)l | dB | Linear (Divisions) | dB |
| 0 | 0 | 0 | 0 |
| +.1 | +0.14 | -.1 | -0.15 |
| +.2 | +0.28 | -.2 | -0.29 |
| +.3 | +0.42 | -.3 | -0.45 |
| +.4 | +0.56 | -.4 | -0.60 |
| +.5 | +0.70 | -.5 | -0.76 |
| +.6 | +0.82 | -.6 | -0.92 |
| +.7 | +0.96 | -.7 | -1.08 |
| +.8 | +1.09 | -.8 | -1.24 |
| +.9 | +1.21 | -.9 | -1.41 |
| +1.0 | +1.34 | -1.0 | -1.58 |
| +1.1 | +1.46 | -1.1 | -1.76 |
| +1.2 | +1.58 | -1.2 | -1.94 |
| +1.3 | +1.70 | | |
| +1.4 | +1.82 | | |
| +1.5 | +1.94 | | |

## 4-23. REFERENCE LEVEL ACCURACY(Cont'd)

### Vernier Accuracy

9. Replace 10 dB step attenuator with 1 dB step attenuator. Set spectrum analyzer as follows:

REFERENCE LEVEL.................................................- 10 dBm
REFERENCE LEVEL FINE.................................................0
Amplitude Scale .................................................dB/DIV
FREQ SPAN/DIV.................................................50 kHz
RESOLUTION BW .................................................300 kHz

10. Center the signal on the CRT and adjust signal generator OUTPUT LEVEL until trace is 6 divisions above graticule baseline. Set step attenuator and spectrum analyzer REFERENCE LEVEL FINE to settings indicated in Table 4-12. Record Deviation from 6th Division for each setting.

11. To compute Corrected Deviation, add Step Attenuator Error to Deviation from 6th Division for each setting. Corrected Deviation should not exceed + 0.5 dB or -0.5 dB for each setting.

*Table 4-12. Vernier Accuracy*

| Step Attenuator Setting (dB) | REFERENCE LEVEL FINE Setting | Deviation From 6$^{th}$ Division (dB) | Step Attenuator Error (Calibration)* (dB) | Corrected Deviation (dB) |
|---|---|---|---|---|
| 0 | 0 | 0 (Ref.) | Ref. | 0 (Ref.) |
| 1 | -1 | ______ | ______ | ______ |
| 2 | -2 | ______ | ______ | ______ |
| 3 | -3 | ______ | ______ | ______ |
| 4 | -4 | ______ | ______ | ______ |
| 5 | -5 | ______ | ______ | ______ |
| 6 | -6 | ______ | ______ | ______ |
| 7 | -7 | ______ | ______ | ______ |
| 8 | -8 | ______ | ______ | ______ |
| 9 | -9 | ______ | ______ | ______ |
| 10 | -10 | ______ | ______ | ______ |
| 11 | -11 | ______ | ______ | ______ |
| 12 | -12 | ______ | ______ | ______ |

* Attenuations > dial settings are positive (+). Attenuations < dial settings are negative (-).

## 4-24. DISPLAY FIDELITY

SPECIFICATION

Log Incremental Accuracy:
± 0.1 dB per dB from Reference Level
Log Maximum Cumulative Error:
< ± 1.5 dB over entire 70-dB range
Linear Accuracy:
± 3% of Reference Level

DESCRIPTION

The amplitude log display amplifier is tested by connecting a DVM to the rear panel AUX A connector (vertical output) of the mainframe. The widest analyzer bandwidth possible is selected so the signal appears as a straight horizontal line on the CRT display. The DVM is used to provide good resolution when checking for ±1 dB per 10 dB step (0.1 dB/dB).

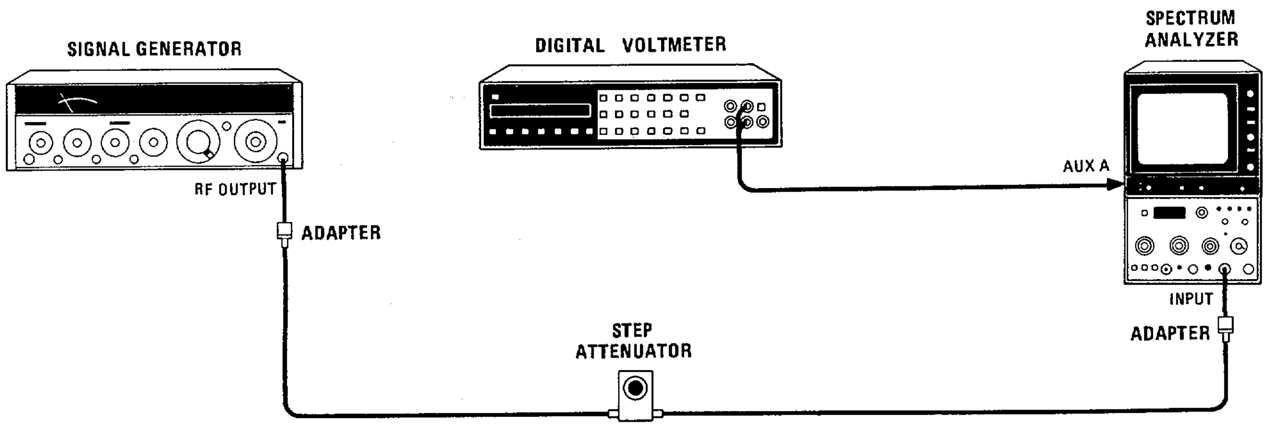



*Figure 4-20. Amplitude Log Display Accuracy Test Setup*

EQUIPMENT

Signal Generator ........ HP 8640B
Digital Voltmeter ........ HP 3455A
10 dB Step Attenuator ........ HP 355D Opt. H82
Adapter, Type N (m) to BNC (f) (2 required) ........ HP 1250-0780
Cable, BNC to Banana Plug ........ HP 11001A

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W ........ HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W ........ HP 1250-1288*
*Adapter, SMA (f) to SMA (f) ........ HP 1250-1158*
*Adapter, BNC (f) to SMA (m) ........ HP 1250-1200*

## 4-24. DISPLAY FIDELITY (Cont'd)

PROCEDURE

### Log Display Accuracy

1. Set controls as follows:

Spectrum Analyzer
START - CENTER.......CENTER
TUNING.......30 MHz
FREQ SPAN/DIV.......500 kHz
RESOLUTION BW.......300 kHz
INPUT ATTEN.......10 dB
REFERENCE LEVEL.......0 dBm
*002: + dBm V*
REF LEVEL FINE.......0
Amplitude Scale.......10 dB/DIV
SWEEP TIME/DIV.......AUTO
SWEEP TRIGGER.......FREE RUN
BASELINE CLIPPER.......OFF
VIDEO FILTER.......OFF

Digital Voltmeter
RANGE.......100
FUNCTION.......V (DC)
AUTO CAL.......AUTO
TRIGGER.......INTERNAL
MATH.......OFF

Signal Generator
FREQUENCY.......30 MHz
COUNTERMODE.......INT
OUTPUT LEVEL.......0 dBm
AM.......OFF
FM.......OFF

2. With no signal at INPUT, measure and record the vertical output (AUX A) offset of the spectrum analyzer.

_______ mV

3. Connect equipment as shown in Figure 4 20. Tune signal generator to 30 MHz and set power output for approximately 0 dBm. Set step attenuator to 0 dB.

4. Set spectrum analyzer Amplitude Scale to 10 dB/DIV and adjust TUNING control to center the signal on CRT display.

5. Set the FREQ SPAN/DIV control to zero (0) and RESOLUTION BW control to 100 kHz. Tune the signal generator frequency for maximum reading on DVM.

**4-24. DISPLAY FIDELITY(Cont'd)**

6. Set the signal generator OUTPUT LEVEL so the DVM reads + 800 mV plus the offset (step 2) ± 0.5 mV. The trace should be approximately at the top graticule line.

*Table 4-13. Amplitude Log Display Accuracy*

| Attenuator Setting (dB) | DVM Reading (mV) | Corrected DMV Reading* (mV) | AUX A Theoretical Reading (mV) | AUX A Theoretical Reading Subtracted From Corrected DMV Reading (mV) | Difference Between Adjacent Readings (mV) |
|---|---|---|---|---|---|
| 0 | | +800 (Ref.) | +800 | 0 | |
| 10 | - | - | +700 | - | - |
| 20 | - | - | +600 | - | - |
| 30 | - | - | +500 | - | - |
| 40 | - | - | +400 | - | - |
| 50 | - | - | +300 | - | - |
| 60 | - | - | +200 | - | - |
| 70 | - | - | +100 | - | - |

*DVM Reading minus offset recorded in step 2.

Example (+ 5 mV offset):

*Table 4-14. Sample Computations of Amplitude Log Display Accuracy*

| Attenuator Setting (dB) | DVM Reading (mV) | Corrected DMV Reading* (mV) | AUX A Theoretical Reading (mV) | AUX A Theoretical Reading Subtracted From Corrected DMV Reading (mV) | Difference Between Adjacent Readings (mV) |
|---|---|---|---|---|---|
| 0 | +805 | +800 | +800 | 0 | |
| 10 | +811 | +703 | +700 | +3 | -3 |
| 20 | +599 | +594 | +600 | -6 | +9 |
| 30 | +497 | +492 | +500 | -8 | +2 |
| 40 | +406 | +401 | +400 | +1 | -9 |

*DVM Reading minus offset recorded in step 2.

7. Record the DVM Reading for each 10 dB step of the step attenuator, up to 70 dB, in Table 4-13.

8. Having recorded the DVM readings for all of the attenuator settings from 0 to 70 dB, subtract the AUX A Theoretical Reading from the Corrected DVM Reading (DVM reading minus offset) in each case and record results in Table 4-13. Theoretical Reading Subtracted From Corrected DVM Reading should not exceed ± 15 mV (± 1.5 dB).

## 4.24. DISPLAY FIDELITY (Cont'd)

9. Subtract each converted reading (AUX A Theoretical Reading Subtracted From Corrected DVM Reading) from the previous converted reading. This subtraction must be performed algebraically. Record results in Table 4-13 (see Example).

10. The difference between adjacent readings (Table 4-13) should not exceed 10 mV (4 0.1 dB/dB).

**Linear Display Accuracy**

11. Replace 10 dB step attenuator with 1 dB step attenuator. Set step attenuator to 0 dB.

12. Set spectrum analyzer Amplitude Scale to LIN and RESOLUTION BW control to 1 MHz.

13. Peak the signal on the CRT display using the TUNING control. Set the signal generator OUTPUT LEVEL to place the trace at the top graticule line.

14. Set the step attenuator to 6 dB. Trace should be at 4th division above graticule baseline (center horizontal graticule line) 1.2 minor divisions.

_______ div

15. Set the step attenuator to 12 dB. Trace should be at 2nd division above graticule baseline 1.2 minor divisions.

_______ div

## 4-25. CALIBRATOR ACCURACY

SPECIFICATION

Amplitude: -30 dBm ± 1 dB.
*002: +20dBmV ± 1 dB.*

Frequency: 280 MHz ±300 MHz.

DESCRIPTION

The amplitude accuracy and frequency accuracy of the CAL OUTPUT signal are checked for -30 dBm ± 1 dB and 280 MHz ± 300 kHz, respectively.
*002: +20dBmV ±1 dB.*

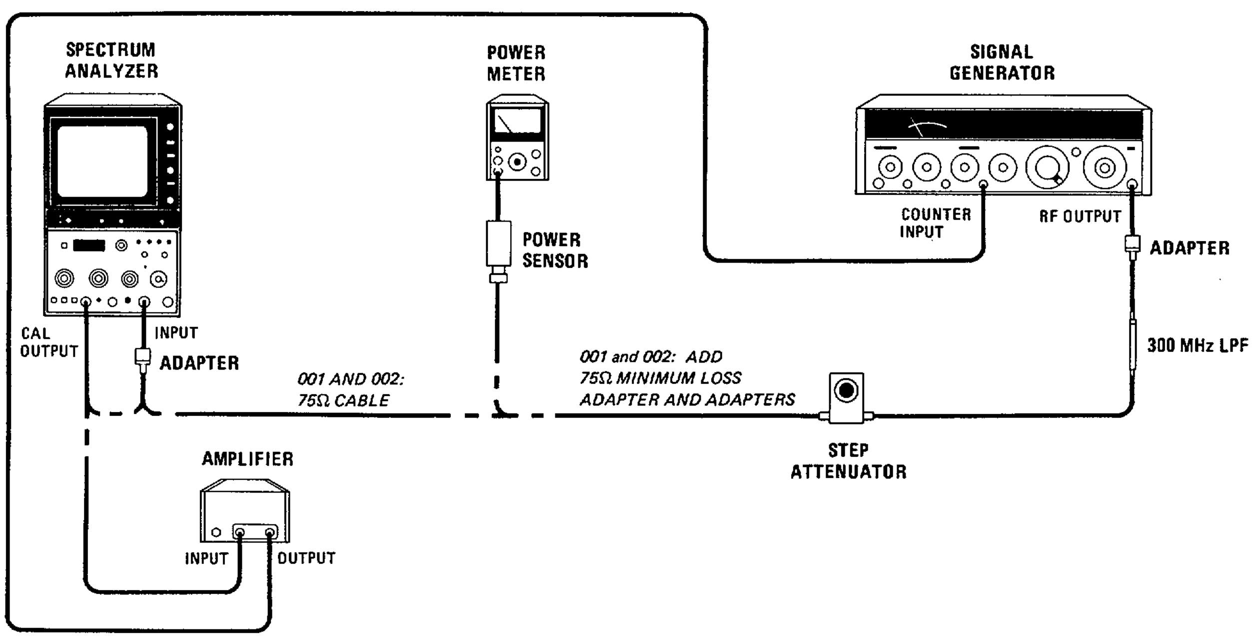



*Figure 4-21. Calibrator Accuracy Test Setup*

## 4-25. CALIBRATOR ACCURACY (Cont'd)

EQUIPMENT

| | |
|---|---|
| Amplifier | HP 8447D |
| Signal Generator | HP 8640B |
| 10 dB Step Attenuator (Calibrated at 280 MHz) | HP 355D Opt. H82 |
| Power Meter | HP 435B |
| 300 MHz LPF | TELONIC TLP 300-4AB |
| Power Sensor | HP 8482A |
| Adapter, Type N (m) to BNC (f) (2 required) | HP 1250-6780 |
| Adapter, Type N (f) to BNC (m) | HP 1250-0077 |
| BNC Cable, 120 cm (48 in) (2 required) | HP 10503A |

*Additional Equipment for Options 001 and 002:*

| | |
|---|---|
| *Power Sensor, 750* | *HP 8483A* |
| *Adapter, GR Type 874 to BNC (m), 75W* | *General Radio 0874-9754* |
| *Adapter, GR Type 874 to N (f), 75W* | *General Radio 0874-9751* |
| *Minimum Loss Adapter, 75Q to 50W* | *HP 08558-60031* |
| *Adapter, BNC (m) to BNC (m)* | *HP 1250-0216* |
| *Adapter, SMA (f) to SMA (f)* | *HP 1250-1158* |
| *Adapter, BNC(f) to SMA (m)* | *HP 1250-1200* |
| *BNC Cable 30 cm (12 in), 75W* | *HP 11652-60012* |

PROCEDURE

1. Set spectrum analyzer controls as follows:

| | |
|---|---|
| START - CENTER | CENTER |
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 1 MHz |
| RESOLUTION BW | 1 MHz |
| INPUT ATTEN | 10 dB |
| REFERENCE LEVEL | -20 dBm |
| *002: +30dBmV* | |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| BASELINE CLIPPER | OFF |

2. Set signal generator COUNTER MODE to EXT, 0-550, and EXPAND-X10. Connect spectrum analyzer CAL OUTPUT to signal generator COUNTER INPUT connector through amplifier. Frequency counter should indicate 280 MHz ± 300 kHz.

__________ MHz

3. Set signal generator COUNTER MODE to INT and tune frequency to 280 MHz. Connect output of signal generator to calibrated step attenuator through 300 MHz low pass filter. Set signal generator OUTPUT LEVEL to 0 dBm.

**4-25. CALIBRATOR ACCURACY(Cont'd)**

4. Set step attenuator to 10 dB and connect power sensor and power meter to attenuator as shown in Figure 4-21.

5. Set signal generator OUTPUT LEVEL power for a 10 dBm reading on power meter. Leave signal generator set at this level.

6. Set step attenuator to 30 dB and connect output of step attenuator to spectrum analyzer INPUT connector.

7. Set spectrum analyzer TUNING control to center signal on CRT display. Peak amplitude of reference signal should be one division down from top graticule line.

8. Set Amplitude Scale switch to I dB/DIV and adjust REF LEVEL FINE control so peak amplitude of reference signal is one division down from top graticule line.

9. Disconnect reference signal and connect spectrum analyzer CAL OUTPUT to the INPUT connector. Signal peak amplitude should be one division down from top graticule line ±1 division.

- 31 dBm _______ 29 dBm

*PROCEDURE FOR OPTIONS 001 and 002:*

*1. Set spectrum analyzer controls as indicated above.*

*2. Connect CAL OUTPUT to 8640B counter input connector through amplifier. Frequency counter should indicate 280 MHz ±300 kHz. (Use EXPAND X10 COUNTER MODE, EXT 0-550.)*

*3. Set signal generator frequency to 280 MHz. Connect output of signal generator to calibrated step attenuator and 75-ohm minimum loss adapter (approximately 5.7 dB attenuation). Set signal generator OUTPUT LEVEL to 5 dBm.*

*4. Set the step attenuator to 0 dB. Connect minimum loss adapter through power sensor to power meter.*

*5. Set signal generator OUTPUT LEVEL for a 10 dBm (Option 001) or -8.75 dBm (Option 002) reading on power meter. Leave the signal generator set at this level.*

*6. Set step attenuator to 20 dB and connect -30 dBm (+20 dBm V) reference signal from signal generator through step attenuator, minimum loss adapter, and 75 ohm cable to HP 8558B INPUT 75W connector.*

*7. With Amplitude Scale switch set to 10 dB/DIV, adjust TUNING control to center signal on CRT display. Peak amplitude of reference signal should be one division down from the top graticule line.*

PERFORMANCE TESTS

## 4-25. CALIBRATOR ACCURACY (Cont'd)

*8. Set Amplitude Scale switch to 1 dB/DIV and adjust REF LEVEL FINE control so peak amplitude of reference signal is on seventh graticule line (one division down from top).*

*9. Disconnect the reference signal and connect HP 8558B CAL OUTPUT through 75-ohm cable to INPUT 75g connector. Signal peak amplitude should be one division down from top, plus or minus one division.*

| | | | |
|---|---|---|---|
| *001:* | -31 dBm | _______ | 29 dBm |
| *002:* | + 19 dBm V | ______ | 21 dBm V |

*Table 4-15. Performance Test Record (1 of 4)*

Hewlett-Packard Company
Model 8558B
Spectrum Analyzer 0.1-1500 MHz

Tested by: __________

Serial No. ________________

Date: ______________

| Paragraph Number | Test Description | Results Min. | Results Actual | Results Max. |
|---|---|---|---|---|
| 4-11 | **Frequency Span Accuracy** | | | |
| | 3. 100 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 4. 50 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 5. 20 MHz FREQ SPAN/DIV | .-0.4 div | - | +0.4 div |
| | 6. 10 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 7. 5 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 8. 2 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 9. 1 MHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 10. 500 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 13. 200 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 14. 100 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 50 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 20 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 10 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| | 5 kHz FREQ SPAN/DIV | -0.4 div | - | +0.4 div |
| 4-12 | **TUNING Accuracy** | | | |
| | 5. 10.0 MHz | -5.2 div (8.96 MHz) | - | +5.2 div (11.04 MHz) |
| | 6. 20.0MHz | -5.2 div (18.96 MHz) | - | +5.2 div (21.04 MHz) |
| | 40.0 MHz | -5.2 div (38.96 MHz) | - | +5.2 div (41.04 MHz) |
| | 60.0 MHz | -5.2 div (58.96 MHz) | - | +5.2 div (61.04 MHz) |
| | 80.0 MHz | -5.2 div (78.96 MHz) | - | +5.2 div (81.04 MHz) |
| | 100.0 MHz | -5.2 div (96.96 MHz) | - | +5.2 div (101.04 MHz) |
| | 120.0 MHz | -5.2 div (118.96 MHz) | - | +5.2 div (121.04 MHz) |
| | 140.0 MHz | -5.2 div (138.96 MHz) | - | +5.2 div (141.04 MHz) |
| | 160.0 MHz | -5.2 div (158.96 MHz) | - | +5.2 div (161.04 MHz) |
| | 180.0 MHz | -5.2 div (178.96 MHz) | - | +5.2 div (181.04 MHz) |
| | 200 MHz | -5.2 div (194.8 MHz) | - | +5.2 div (205.2 MHz) |

*Table 4-15. Performance Test Record (2 of 4)*

| Paragraph Number | Test Description | Results | | |
|---|---|---|---|---|
| | | Min. | Actual | Max. |
| 4-12 | **TUNING Accuracy (Cont'd)** | | | |
| | 400 MHz | -5.2 div (394.8 MHz) | - | +5.2 div (405.2 MHz) |
| | 600 MHz | -5.2 div (594.8 MHz) | - | +5.2 div (605.2 MHz) |
| | 800 MHz | -5.2 div (794.8 MHz) | - | +5.2 div (805.2 MHz) |
| | 1000 MHz | -5.2 div (994.8 MHz) | - | +5.2 div (1005.2 MHz) |
| | 1200 MHz | -5.2 div (1194.8 MHz) | - | +5.2 div (1205.2 MHz) |
| | 1400 MHz | -5.2 div (1394.8 MHz) | - | +5.2 div (1405.2 MHz) |
| | 1500 MHz | -5.2 div (1494.8 MHz) | - | +5.2 div (1505.2 MHz) |
| 4-13 | **Residual FM** | | | |
| | 6. Peak-to-Peak Variation of Trace | | - | 1.0 div (1 kHz/0.1 sec) |
| 4-14 | **Noise Sidebands** | | | |
| | 6. Noise Sidebands | | - | 6.5 div down (-65 dB) |
| 4-15 | **Resolution Bandwidth Accuracy** | | | |
| | 7. 3 MHz Resolution BW | 2.40 MHz | - | 3.60 MHz |
| | 8. 1 MHz Resolution BW | 800 kHz | - | 1.20 MHz |
| | 9. 300 kHz Resolution BW | 240 kHz | - | 360 kHz |
| | 10. 100 kHz Resolution BW | 80 kHz | - | 120 kHz |
| | 17. 30 kHz Resolution BW | 24 kHz | - | 36 kHz |
| | 18. 10 kHz Resolution BW | 8 kHz | - | 12 kHz |
| | 19. 3 kHz Resolution BW | 2.4 kHz | - | 3.6 kHz |
| | 20. 1 kHz Resolution BW | 0.8 kHz | - | 1.2 kHz |
| 4-16 | **Resolution Bandwidth Selectivity** | | | |
| | 24. 3 MHz Resolution BW Selectivity | | - | 15:1 |
| | 1 MHz Resolution BW Selectivity | | - | 15:1 |
| | 300 kHz Resolution BW Selectivity | | - | 15:1 |
| | 100 kHz Resolution BW Selectivity | | - | 15:1 |
| | 30 kHz Resolution BW Selectivity | | - | 15:1 |
| | 10 kHz Resolution BW Selectivity | | - | 15:1 |
| | 3 kHz Resolution BW Selectivity | | - | 15:1 |
| | 1 kHz Resolution BW Selectivity | | - | 15:1 |

*Table 4-15. Performance Test Record (3 of 4)*

| Paragraph Number | Test Description | Results Min. | Actual | Max. |
|---|---|---|---|---|
| **4-17** | **Average Noise Level** | | | |
| | 2 Average Noise Level 1 MHz to 1000 MHz | | - | -107 dBm |
| | 3 Average Noise Level 500 MHz to 1500 MHz | | - | -107 dBm |
| | 5 Average Noise Level 1 MHz to 11 MHz | | - | -107 dBm |
| | *001: Max. is -100 dBm* | | | |
| | *002: Max. is -53 dBm V* | | | |
| **4-18** | **Spurious Responses** | | | |
| | 9. Harmonic Distortion | | | |
| | 2nd Harmonic | -70 dB | - | |
| | 3rd Harmonic | -70 dB | - | |
| | 18. Third Order Intermodulation Distortion, 30 MHz input signals | -70 dB | - | |
| | 20. Second Order Intermodulation Distortion, 30 MHz input signals ($f_1 + f_2$) | -70 dB | - | |
| | 22. Second Order Intermodulation Distortion, 30 MHz input signals ($f_1 + f_2$) | -70 dB | - | |
| | 27. Third Order Intermodulation Distortion, 4 MHz input signals | -60 dB | - | |
| | 29. Second Order Intermodulation Distortion, 4 MHz input signals ($f_1 + f_2$) | -60 dB | - | |
| | 30. Second Order Intermodulation Distortion, 4 MHz input signals ($f_1 + f_2$) | -60 dB | - | |
| **4-19** | **Residual Responses** | | | |
| | 11. Residual Responses 1 MHz to 1000 MHz | | - | -100 dBm |
| | 17. Residual Responses 500 MHz to 1500 MHz | | - | -100 dBm |
| | *001: Max. is <-95 dBm* | | | |
| | *002: Max. is <-45 dBm V* | | | |
| **4-20** | **Frequency Response** | | | |
| | 17. Frequency Response | | - | 2.0 dB |
| **4-21** | **Bandwidth Switching (Amplitude Variation)** | | | |
| | 6. 3 MHz to 300 kHz (overall variation) | -0.5 dB | - | +0.5 dB |
| | 3 MHz to 1 kHz (overall variation) | -1.0 dB | - | +1.0 dB |
| **4-22** | **Input Attenuator Accuracy** | | | |
| | 4. Error Between Adjacent Settings | | - | ±0.5 dB (1.0 dB) |
| | 5. Error Over Full 70 dB Range | | - | ±1.0 dB (2.0 dB) |

*Table 4-15. Performance Test Record (4 of 4)*

| Paragraph Number | Test Description | Results Min. | Actual | Max. |
|---|---|---|---|---|
| **4-23** | **Reference Level Accuracy** | | | |
| | 4. Step Accuracy in Log | | | |
| | -10 dBm to -80 dBm | | | ±0.5 dB (1.0 dB) |
| | -10 dBm to -100 dBm | | | ±1.0 dB (2.0 dB) |
| | *002: +40 dBm V to -30 dBm V* | | | |
| | *+40 dBm V to -50 dBm V* | | | |
| | 8. Step Accuracy in LIN | | | |
| | -10 dBm to 80 dBm | | | ±0.5 dB (1.0 dB) |
| | -10 dBm to -100 dBm | | | ±1.0 dB (2.0 dB) |
| | *002: +40 dBm V to -30 dBm V* | | | |
| | *+40 dBm V to -50 dBm V* | | | |
| | 11. Vernier Accuracy | | | |
| | REF LEVEL FINE: | | | |
| | -1 | -0.5 dB | | +0.5 dB |
| | -2 | -0.5 dB | | +0.5 dB |
| | -3 | -0.5 dB | | +0.5 dB |
| | -4 | -0.5 dB | | +0.5 dB |
| | -5 | -0.5 dB | | +0.5 dB |
| | -6 | -0.5 dB | | +0.5 dB |
| | -7 | -0.5 dB | | +0.5 dB |
| | -8 | -0.5 dB | | +0.5 dB |
| | -9 | -0.5 dB | | +0.5 dB |
| | -10 | -0.5 dB | | +0.5 dB |
| | -11 | -0.5 dB | | +0.5 dB |
| | -12 | -0.5 dB | | +0.5 dB |
| **4-24** | **Display Fidelity** | | | |
| | Log Display Accuracy | | | |
| | 8. Maximum Error Over Full 70 dB Display Range | | | ±1.5 dB (±15 mV) |
| | 10. Error Between Adjacent Readings | | | ±1.0 dB (±10 mV) |
| | Linear Display Accuracy | | | |
| | 14. Error at 4th division | 3.76 div | | 4.24 div |
| | 15. Error at 2nd division | 1.76 div | | 2.24 div |
| **4-25** | **Calibrator Accuracy** | | | |
| | 2. CAL OUTPUT Frequency | 279.7 MHz | | 280.3 MHz |
| | 9. CAL OUTPUT Amplitude | -31 dBm | | -29 dBm |
| | *002: Min. is + 19 dBm V, Max. is +21 dBm V* | | | |

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PAGES
4-63 through 4-69

# SECTION V.
# ADJUSTMENTS

## 5-1. INTRODUCTION

5-2. The adjustments in this section are required to optimize spectrum analyzer performance after repair. Table 5-1 lists adjustable components by adjustment name, reference designation, adjustment paragraph, and description.

5-3. Data taken during adjustment should be recorded in the spaces provided. Comparison of initial data with data taken during periodic adjustments is useful for preventive maintenance and troubleshooting.

**WARNING**

**The adjustments in this section require the spectrum analyzer to be removed from the display mainframe and connected through an extender cable assembly. Be very careful; the energy at some points in the instrument might, if contacted, cause personal injury. The adjustments in this section should be performed only by a skilled person who knows the hazard involved.**

**NOTE**

**Before performing any adjustments, allow 1 hour warmup time.**

## 5-4. EQUIPMENT REQUIRED

5-5. The table of Recommended Test Equipment in Section I lists the test equipment and test accessories required in the adjustment procedures. In addition, the table lists the required minimum specifications and suggested manufacturers' model numbers.

5-6. Required service accessories, with part numbers, are illustrated in Section I.

## 5-7. Adjustment Tools

5-8. For adjustments requiring a non-metallic tuning tool, use fiber tuning tool, HP Part Number 8170-0033. Never try to force an adjustment control in the analyzer. This is especially critical when tuning slug-tuned inductors and variable capacitors.

## 5-9. Extender Cable Installation

**WARNING**

**Disconnect mainframe line cord before installing extender cable assembly.**

5-10. Pull out the lock knob and slide the spectrum analyzer out of the display mainframe. If side stops are installed, refer to Section II for removal.

5-11. Carefully slide the extender cable assembly, HP part number 5060-0303, into the display mainframe, aligning the metal guide plate with the slotted side rails of the mainframe. Firmly seat the extender cable assembly to ensure good contact.

5-12. Connect the opposite end of the cable to the spectrum analyzer. The plug is keyed so it will go on correctly and will not make contact upside down. Remove the orange and the yellow leads from pins 3 and 4 on the A15 board at the rear of the spectrum analyzer. Connect the corresponding leads from the extender cable assembly to these pins by means of the insulated alligator clips.

## 5-13. RELATED ADJUSTMENTS

5-14. These adjustments should be performed whenever troubleshooting information in Section VIII indicates that an adjustable circuit is not operating properly. Perform the adjustments after repair or replacement of the circuit. The troubleshooting procedures and Table 5-1 specify the required adjustments.

## 5-15. FACTORY-SELECTED COMPONENTS

5-16. Table 5-2 provides a list of factory-selected components by reference designation, selection procedure paragraph number, range of values, and basis of selection. Factory-selected components are designated by an asterisk (*) on the schematic diagrams in Section VIII and in the table of Replaceable Parts, Section VI. Part numbers for standard-value components can be found in Table 5-3.

*Table 5-1. Adjustable Components (1 of 4)*

| Adjustment Name | Reference Designator | Adjustment Paragraph | Description |
|---|---|---|---|
| REF | A1A2R3 | 5-28 | Adjusts DPM reference voltage and adjusts frequency for correct FREQUENCY MHz readout at 1500 MHz. |
| 2nd MIXER MATCH | A5L2 | 5-17 | Adjust for optimum match between second converter output and second IF input. |
| Z1, Z2, Z3 | A5Z1 A5Z3 | 5-17 | Adjust the bandpass of the 2050 MHz bandpass filter. |
| 2nd LO FREQUENCY | A5Z4 | 5-17 | Adjusts second LO frequency to 1748.60 MHz. |
| 3.55 GHZ | A7R1 | 5-28 | Coarse adjustment of YIG upper frequency limit, 3.55 GHz. |
| 3.55 FINE | A7R2 | 5-28 | Fine adjustment of YIG upper frequency limit, 3.55 GHz. |
| 2.0 GHZ | A7R3 | 5-28 | Adjusts YIG lower frequency limit, 2.05 GHz |
| REF V | A7R4 | 5-28 | Adjusts reference voltage to 6.0 volts and is fine adjustment of YIG lower frequency limit, 2.05 GHz. |
| +14.5V | A7R5 | 5-28 | Adjusts 14.5 volt supply to +14.5 volts. |
| FM | A7R6 | 5-28 | Adjusts frequency span accuracy for frequency spans <1 MHz per division. |
| GAIN | A7R7 | 5-28 | Adjusts frequency for correct DPM frequency readout at 190.0 MHz. |
| RNG | A7R8 | 5-28 | Adjusts frequency control circuit for proper DPM ranging. |
| OFS | A7R72 | 5-28 | Adjusts frequency for correct FREQUENCY MHZ readout at 200 MHz. |
| 2 ms | A8R13 | 5-27 | Adjusts sweep ramp to calibrate 2 ms per division sweep time. |
| 1 ms | A8R10 | 5-27 | Adjusts sweep ramp to calibrate 1 ms per division sweep time. |
| +10V | A8R7 | 5-27 | Adjusts +10 volt supply. This adjustment must be performed while spectrum analyzer is still cold, during first five minutes after turn on. |
| XTL | A8R72 | 5-21<br>5-22 | Adjusts IF bandwidth between 3 dB points for RESOLUTION BW setting of 3 kHz. |
| LC | A8R85 | 5-21 | Adjusts IF bandwidth between 3 dB points for RESOLUTION BW setting of 1 MHz. |
| LO FREQ | A9L4 | 5-18 | Adjusts third converter 280 MHz crystal-controlled LO for maximum output. |

*Table 5-1. Adjustable Components (2 of 4)*

| Adjustment Name | Reference Designator | Adjustment Paragraph | Description |
|---|---|---|---|
| SLOPE COMP | A9R1 | 5-19 | Compensates for frequency response of input mixer, allowing flatness of less than 2 dB. |
| 3rd LO PWR | A9R5 | 5-18 | Adjusts CAL OUTPUT signal for -30 dBm power level.<br>*002: +20 dBm V.* |
| C 1, C2, C3 | A10C1 A10C3 | 5-20 | Adjust the bandpass of the Second IF assembly Bandpass Filter (301.4 MHz). |
| 2nd IF TUNING | A10L2 | 5-20 | Peaks second IF bandpass amplifier. Has very little effect on signal. |
| SYM | A11C15 | 5-21 | Adjust symmetry of first stage of crystal bandwidth filter. |
| LC CTR | A11C23 | 5-21 | Adjusts centering of first stage of LC bandwidth filter. |
| CTR | A11C25 | 5-21 | Adjusts centering of first stage of crystal bandwidth filter. |
| SYM | A11C38 | 5-21 | Adjusts symmetry of second stage of crystal bandwidth filter. |
| LC CTR | A11C45 | 5-21 | Adjusts centering of second stage of LC bandwidth filter. |
| CTR | A11C54 | 5-21 | Adjusts centering of second stage of crystal bandwidth filter. |
| C73 | A11C73 | 5-21 | Compensates for capacitance of CR3. |
| C74 | A11C74 | 5-21 | Compensates for capacitance of CR11. |
| LC | A11R26 | 5-21 | Adjusts feedback in LC circuit of bandpass filter. |
| XTL | A11R31 | 5-21 | Adjusts feedback in crystal circuit of bandpass filter. |
| 40 dB | A12R1 | 5-24 | Adjust 40 dB step gain. |
| 10 dB | A12R3 | 5-24 | Adjusts 10 dB step gain. |
| GAIN | A12R4 | 5-23 | Adjusts overall gain of Step Gain assembly. |
| 0 dB | A12R5 | 5-24 | Adjusts to calibrate 0 dB position of REF LEVEL FINE control. |

*Table 5-1. Adjustable Components (3 of 4)*

| Adjustment Name | Reference Designator | Adjustment Paragraph | Description |
|---|---|---|---|
| -12 dB | A12R6 | 5-24 | Adjusts to calibrate -12 dB position of REF LEVEL FINE control. |
| +19.5V | A12R7 | 5-25 | Adjusts +19.5 volt supply. |
| SYM | A13C15 | 5-21 | Adjusts symmetry of first stage of crystal bandwidth filter. |
| LC CTR | A13C23 | 5-21 | Adjusts centering of first stage of LC bandwidth filter. |
| CTR | A13C25 | 5-21 | Adjusts centering of first stage of crystal bandwidth filter. |
| SYM | A13C38 | 5-21 | Adjusts symmetry of second stage of crystal bandwidth filter. |
| LC CTR | A13C45 | 5-21 | Adjusts centering of second stage of LC bandwidth filter. |
| CTR | A13C54 | 5-21 | Adjusts centering of second stage of crystal bandwidth filter. |
| C73 | A13C73 | 5-21 | Compensate for capacitance of CR3. |
| C74 | A13C74 | 5-21 | Compensates for capacitance of CR11 . |
| LC | A13R26 | 5-21 | Adjusts feedback in LC circuit of bandpass filter. |
| XTL | A13R31 | 5-21 | Adjusts feedback in crystal circuit of bandpass filter. |
| OFFSET | A14R10 | 5-26 | Adjusts -8V temperature compensated supply. |
| TC | A14R21 | | Adjusts gain of +1V supply to provide temperature compensation for log mode temperature controlled variable gain amplifier. (Factory adjustable only.) |
| SLOPE | A14R23 | 5-26 | Adjusts gain of log mode temperature controlled gain amplifier. |
| G6 | A14R27 | 5-26 | Adjusts combined gain of 2nd and 3rd stages in linear mode. |
| G5 | A14R30 | 5-26 | Adjusts gain of 4th stage in linear mode. |
| G4 | A14R33 | 5-26 | Adjusts gain of 5th stage in linear mode. |

*Table 5-1. Adjustable Components (4 of 4)*

| Adjustment Name | Reference Designator | Adjustment Paragraph | Description |
|---|---|---|---|
| LIN | A14R34 | 5-26 | Adjusts combined gain of 6th and 7th stages in linear mode. |
| -10 dB | A14R39 | 5-26 | Adjusts shape of log fidelity curve at -10 dB. |
| -30 dB | A14R69 | 5-26 | Adjusts shape of log fidelity curve at -30 dB. |
| 1 VT | A14R88 | | Adjusts voltage at A14TP1 for approximately +1V. (Factory adjustable only.) |
| LOG GAIN | A14R121 | 5-26 | Adjusts dc offset circuitry at output of A14 Log Amplifier Assembly for 10 dB steps in log mode. |
| 1 dB OFFSET | A15R1 | 5-29 | Adjusts for equal amplitude displayed at full screen in 10 dB/DIV and 1 dB/DIV for a given input. |

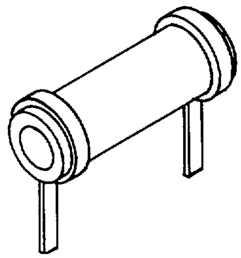
*Table 5-2. Factory Selected Components in Alpha-Numerical Order*

| Reference Designator | Selection Procedure Paragraph Number | Basis of Selection |
|---|---|---|
| A8R30 | | Selected to set start of sweep ramp to -5.OOOV ±30 mV. |
| A8R35 | | Selected to set high end of sweep ramp to +5V. |
| A8R74 | | Selected to optimize 1 kHz bandwidth. |
| A8R76 | | Selected to optimize 3 kHz bandwidth. |
| A8R78 | 5-22 | Selected to optimize 10 kHz bandwidth. |
| A9R89 | 5-22 | Selected to optimize 300 kHz bandwidth. |
| A8R92 | | Selected to optimize 1 MHz bandwidth. |
| A8R95 | 5-22 | Selected to optimize 3 MHz bandwidth. |
| A8R105 | | Selected for OV at A8TP8 with START CENTER switch in START, 100 MHz/DIV, single scan mode (no sweep). |
| A8R125 | | Selected for optimum automatic sweep time with VIDEO FILTER on (but not in detent). |
| A9R4 | 5-18 | Selected for proper Third Converter LO power. |
| A9R9 | | Selected for proper CAL OUTPUT power. |
| A9R12 | | Selected for proper gain of Third Converter. |
| A9R14 | | Selected for proper REF LEVEL CAL range. |
| A11C20 | | Selected to shift adjustment range of A11C23. |
| A11C44 | | Selected to shift adjustment range of A11C45. |
| A11R23 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 30 kHz. |
| A11R43 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 100 kHz. |
| A11R48 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 30 kHz. |
| A11R56 | | Selected to equalize feedback between LC stages (not field selectable). |
| A13C20 | | Selected to shift adjustment range of A13C23. |
| A13C44 | | Selected to shift adjustment range of A13C45. |
| A13R19 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 100 kHz. |
| A13R23 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 30 kHz. |
| A13R43 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 100 kHz. |
| A13R48 | 5-22 | Selected to give correct IF bandwidth for RESOLUTION BW of 30 kHz. |
| A13R56 | | Selected to equalize feedback between LC stages (not field selectable). |
| A14R93 | | Selected to shift adjustment range of A14R34. |
| A14R101 | | Selected to shift adjustment range of A14R34. |
| A14R107 | | Selected to shift adjustment range of A14R23. |
| A15R26 | | Selected to provide increased range adjustment for 1 dB offset circuit. |
| A17R1 | | Selected for proper voltage offset of A17Q1 and A17Q2 to ensure initial turn-on of oscillator. |

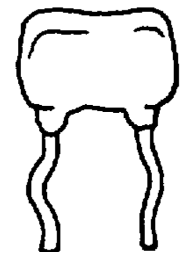
*Table 5-3. HP Part Numbers of Standard Value Replacement Components (1 of 3)*

**APACITORS**

RANGE: 1 to 24 pF
TYPE: Tubular
TOLERANCE:
1 to 9.1 pF = ±.25 pF
10 to 24 pF = ±5%



RANGE: 27 to 680 pF
TYPE: Dipped Mica
TOLERANCE: ±5%



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

*Table 5-3. HP Part Numbers of Standard Value Replacement Components (2 of 3)*

**RESISTORS**

RANGE: 10 to 464 K Ohms
TYPE: Fixed-Film
WATTAGE: .125 at 125° C
TOLERANCE: ±1.0%

| Value (W) | HP Part Number | C D | Value (W) | HP Part Number | C D | Value (W) | HP Part Number | C D |
|---|---|---|---|---|---|---|---|---|
| 10.0 | 0757-0346 | 2 | 464 | 0698-0082 | 7 | 21.5K | 0757-0199 | 3 |
| 11.0 | 0757-0378 | 0 | 511 | 0757-0416 | 7 | 23.7K | 0698-3158 | 4 |
| 12.1 | 0757-0379 | 1 | 562 | 0757-0417 | 8 | 26.1K | 0698-3159 | 5 |
| 13.3 | 0698-3427 | 0 | 619 | 0757-0418 | 9 | 28.7K | 0698-3449 | 6 |
| 14.7 | 0698-3428 | 1 | 681 | 0757-0419 | 0 | 31.6K | 0698-3160 | 8 |
| 16.2 | 0757-0382 | 6 | 750 | 0757-0420 | 3 | 34.8K | 0757-0123 | 3 |
| 17.8 | 0757-0294 | 9 | 825 | 0757-0421 | 4 | 38.3K | 0698-3161 | 9 |
| 19.6 | 0698-3429 | 2 | 909 | 0757-0422 | 5 | 42.2K | 0698-3450 | 9 |
| 21.5 | 0698-3430 | 5 | 1.0K | 0757-0280 | 3 | 46.4K | 0698-3162 | 0 |
| 23.7 | 0698-3431 | 6 | 1.1K | 0757-0424 | 7 | 51.1K | 0757-0458 | 7 |
| 26.1 | 0698-3432 | 7 | 1.21K | 0757-0274 | 5 | 56.2K | 0757-0459 | 8 |
| 28.7 | 0698-3433 | 8 | 1.33K | 0757-0317 | 7 | 61.9K | 0757-0460 | 1 |
| 31.6 | 0757-0180 | 2 | 1.47K | 0757-1094 | 9 | 68.1K | 0757-0461 | 2 |
| 34.8 | 0698-3434 | 9 | 1.62K | 0757-0428 | 1 | 75.0K | 0757-0462 | 3 |
| 38.3 | 0698-3435 | 0 | 1.78K | 0757-0278 | 9 | 82.5K | 0757-0463 | 4 |
| 42.2 | 0757-0316 | 6 | 1.96K | 0698-0083 | 8 | 90.9K | 0757-0464 | 5 |
| 46.4 | 0698-4037 | 0 | 2.15K | 0698-0084 | 9 | 100K | 0757-0465 | 6 |
| 51.1 | 0757-0394 | 0 | 2.37K | 0698-3150 | 6 | 110K | 0757-0466 | 7 |
| 56.2 | 0757-0395 | 1 | 2.61K | 0698-0085 | 0 | 121K | 0757-0467 | 8 |
| 61.9 | 0757-0276 | 7 | 2.87K | 0698-3151 | 7 | 133K | 0698-3451 | 0 |
| 68.1 | 0757-0397 | 3 | 3.16K | 0757-0279 | 0 | 147K | 0698-3452 | 1 |
| 75.0 | 0757-0398 | 4 | 3.48K | 0698-3152 | 8 | 162K | 0757-0470 | 3 |
| 82.5 | 0757-0399 | 5 | 3.83K | 0698-3153 | 9 | 178K | 0698-3243 | 8 |
| 90.9 | 0757-0400 | 9 | 4.22K | 0698-3154 | 0 | 196K | 0698-3453 | 2 |
| 100 | 0757-0401 | 0 | 4.64K | 0698-3155 | 1 | 215K | 0698-3454 | 3 |
| 110 | 0757-0402 | 1 | 5.11K | 0757-0438 | 3 | 237K | 0698-3266 | 5 |
| 121 | 0757-0403 | 2 | 5.62K | 0757-0200 | 7 | 261K | 0698-3455 | 4 |
| 133 | 0698-3437 | 2 | 6.19K | 0757-0290 | 5 | 287K | 0698-3456 | 5 |
| 147 | 0698-3438 | 3 | 6.81K | 0757-0439 | 4 | 316K | 0698-3457 | 6 |
| 162 | 0757-0405 | 4 | 7.50K | 0757-0440 | 7 | 348K | 0698-3458 | 7 |
| 178 | 0698-3439 | 4 | 8.25K | 0757-0441 | 8 | 383K | 0698-3459 | 8 |
| 196 | 0698-3440 | 7 | 9.09K | 0757-0288 | 1 | 422K | 0698-3460 | 1 |
| 215 | 0698-3441 | 8 | 10.0K | 0757-0442 | 9 | 464K | 0698-3260 | 9 |
| 237 | 0698-3442 | 9 | 11.0K | 0757-0443 | o | | | |
| 261 | 0698-3132 | 4 | 12.1K | 0757-0444 | 1 | | | |
| 287 | 0698-3443 | 0 | 13.3K | 0757-0289 | 2 | | | |
| 316 | 0698-3444 | 1 | 14.7K | 0698-3156 | 2 | | | |
| 348 | 0698-3445 | 2 | 16.2K | 0757-0447 | 4 | | | |
| 383 | 0698-3446 | 3 | 17.8K | 0698-3136 | 8 | | | |
| 422 | 0698-3447 | 4 | 19.6K | 0698-3157 | 3 | | | |

*Table 5-3. HP Part Numbers of Standard Value Replacement Components (3 of 3)*

**RESISTORS**

RANGE: 10 to 1.47M Ohms
TYPE: Fixed-Film
WATTAGE: .5 at 125°C
TOLERANCE: ±1%

| Value (W) | HP Part Number | C D | Value (W) | HP Part Number | C D | Value (W) | HP Part Number | C D | Value (W) | HP Part Number | C D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.0 | 0757-0984 | 4 | 215 | 0698-3401 | 0 | 4.64K | 0698-3348 | 4 | 110K | 0757-0859 | 2 |
| 11.0 | 0575-0985 | 5 | 237 | 0698-3102 | 8 | 5.11K | 0757-0833 | 2 | 121K | 0757-0860 | 5 |
| 12.1 | 0757-0986 | 6 | 261 | 0757-1090 | 5 | 5.62K | 0757-0834 | 3 | 133K | 0757-0310 | 0 |
| 13.3 | 0757-0001 | 6 | 287 | 0757-1092 | 7 | 6.19K | 0757-0196 | 0 | 147K | 0698-3175 | 5 |
| 14.7 | 0698-3388 | 2 | 316 | 0698-3402 | 1 | 6.81K | 0757-0835 | 4 | 162K | 0757-0130 | 2 |
| 16.2 | 0757-0989 | 9 | 348 | 0698-3403 | 2 | 7.50K | 0757-0836 | 5 | 178K | 0757-0129 | 9 |
| 17.8 | 0698-3389 | 3 | 383 | 0698-3404 | 3 | 8.25K | 0757-0837 | 6 | 196K | 0757-0063 | 0 |
| 19.6 | 0698-3390 | 6 | 422 | 0698-3405 | 4 | 9.09K | 0757-0838 | 7 | 215K | 0757-0127 | 7 |
| 21.5 | 0698-3391 | 7 | 464 | 0698-0090 | 7 | 10.0K | 0757-0839 | 8 | 237K | 0698-3424 | 7 |
| 23.7 | 0698-3392 | 8 | 511 | 0757-0814 | 9 | 12.1K | 0757-0841 | 2 | 261K | 0757-0064 | 1 |
| 26.1 | 0757-0003 | 8 | 562 | 0757-0815 | 0 | 13.3K | 0698-3413 | 4 | 287K | 0757-0154 | 0 |
| 28.7 | 0698-3393 | 9 | 619 | 0757-0158 | 4 | 14.7K | 0698-3414 | 5 | 316K | 0698-3425 | 8 |
| 31.6 | 0698-3394 | 0 | 681 | 0757-0816 | 1 | 16.2K | 0757-0844 | 5 | 348K | 0757-0195 | 9 |
| 34.8 | 0698-3395 | 1 | 750 | 0757-0817 | 2 | 17.8K | 0698-0025 | 8 | 383K | 0757-0133 | 5 |
| 38.3 | 0698-3396 | 2 | 825 | 0757-0818 | 3 | 19.6K | 0698-3415 | 6 | 422K | 0757-0134 | 6 |
| 42.2 | 0698-3397 | 3 | 909 | 0757-0819 | 4 | 21.5K | 0698-3416 | 7 | 464K | 0698-3426 | 9 |
| 46.4 | 0698-3398 | 4 | 1.00K | 0757-0159 | 5 | 23.7K | 0698-3417 | 8 | 51IK | 0757-0135 | 7 |
| 51.1 | 0757-1000 | 7 | 1.10K | 0757-0820 | 7 | 26.1K | 0698-3418 | 9 | 562K | 0757-0868 | 3 |
| 56.2 | 0757-1001 | 8 | 1.21K | 0757-0821 | 8 | 28.7K | 0698-3103 | 9 | 619K | 0757-0136 | 8 |
| 61.9 | 0757-1002 | 9 | 1.33K | 0698-3406 | 5 | 31.6K | 0698-3419 | 0 | 681K | 0757-0869 | 4 |
| 68.1 | 0757-0794 | 4 | 1.47K | 0757-1078 | 9 | 34.8K | 0698-3420 | 3 | 750K | 0757-0137 | 9 |
| 75.0 | 0757-0795 | 5 | 1.62K | 0757-0873 | 0 | 38.3K | 0698-3421 | 4 | 825K | 0757-0870 | 7 |
| 82.5 | 0757-0796 | 6 | 1.78K | 0698-0089 | 4 | 42.2K | 0698-3422 | 5 | 909K | 0757-0138 | 0 |
| 90.0 | 0757-0797 | 7 | 1.96K | 0698-3407 | 6 | 46.4K | 0698-3423 | 6 | 1M | 0757-0059 | 4 |
| 100 | 0757-0198 | 2 | 2.15K | 0698-3408 | 7 | 51.1K | 0757-0853 | 6 | 1.M | 0757-0139 | 1 |
| 110 | 0757-0798 | 8 | 2.37K | 0698-3409 | 8 | 56.2K | 0757-0854 | 7 | 1.21M | 0757-0871 | 8 |
| 121 | 0757-0799 | 9 | 2.61K | 0698-0024 | 7 | 61.9K | 0757-0309 | 7 | 1.33M | 0757-0194 | 8 |
| 133 | 0698-3399 | 5 | 2.87K | 0698-3101 | 7 | 68.1K | 0757-0855 | 8 | 1.47M | 0698-3464 | 5 |
| 147 | 0698-3400 | 9 | 3.16K | 0698-3410 | 1 | 75.0K | 0757-0856 | 9 | | | |
| 162 | 0757-0802 | 5 | 3.48K | 0698-3411 | 2 | 82.5K | 0757-0857 | 0 | | | |
| 178 | 0698-3334 | 8 | 3.83K | 0698-3412 | 3 | 90.9K | 0757-0858 | 1 | | | |
| 196 | 0757-1060 | 9 | 4.22K | 0698-3346 | 2 | 100K | 0757-0367 | 7 | | | |

*Table 5-4. Related Adjustments*

| Assembly Charged or Repaired | | Perform the Following Related Adjustments | Paragraph Number |
|---|---|---|---|
| A1 | Digital Panel Meter | A1A2R3 | 5-28 |
| A2 | Front Switch | A12RS, A12R6 | 5-24 |
| A3 | Input Attenuator | No related adjustments | |
| A4 | First Converter | A9R1 | 5-19 |
| AS | Second Converter | A5Z1, A5Z2, A5Z3, A5Z4, A5L2 | 5-17 |
| A6 | YIG Oscillator | A1A2R3, A7R1, A7R2, A7R3, A7R4, A7R6, A7R7, A7R8, A7R72 | 5-28 |
| A7 | Frequency Control | A5Z4<br>A1A2R3, A7R1, A7R2, A7R3, A7R4, A7R5, A7R6, A7R7, A7R72 | 5-17<br>5-28 |
| A8 | Sweep Generator | A8R2, A8R10, A8R13, A8R72, A8R85 | 5-22, 5-27 |
| A9 | Third Converter | A9L4, A9R5, A9R1 | 5-18, 5-19 |
| A10 | Second IF | A10C1, A10C2, A10C3, A10L2 | 5-20 |
| A11, A13* | Bandwidth Filters | A11C15, A11C23, A11C25, A11C38, A11C45, A11C54, A11C73, A11C74, A13C15, A13C23, A13C25, A13C38, A13C45, A13C54, A13C73, A13C74, A8R72, A8R85 | 5-21,5-22 |
| A12 | Step Gain | A12R1, A12R2, A12R3, A12R4, A12R5, A12R6, A12R7 | 5-23 - 5-25 |
| A14 | Log Amplifier | A14R23, A14R27, A14R30, A14R33, A14R34, A14R39, A14R69, A14R121 | 5-26<br>5-29 |
| A15 | Vertical Driver and Blanking | A15R1 | 5-29 |
| A16 | Motherboard | No related adjustments | |
| A17 | Inverter | No related adjustments | |

*A11 and A13 bandwidth filter assemblies contain a matched set of crystals. These two assemblies must be treated as a matched pair when replacement is necessary.

## 5-17. SECOND CONVERTER LO AND BANDPASS ADJUSTMENTS

REFERENCE

A5 Schematic

DESCRIPTION

The second converter is adjusted for 1748.60 MHz and the bandpass filter is adjusted for a 2050 MHz Bandpass.

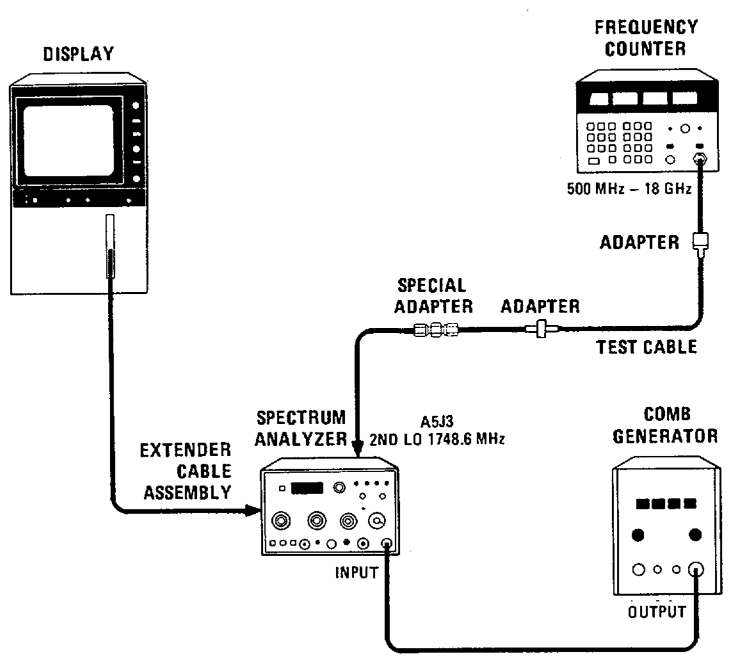



*Figure 5-1. Second Converter LO and Bandpass Adjustment Test Setup*

EQUIPMENT

Frequency Counter.................................... HP 5342A
Comb Generator.................................... HP 8406A
Test Cable, SMC (f) to BNC (m).................................... HP 11592-60001
Adapter, SMC (m) to SMC (m).................................... HP 1250-0827
Adapter, Type N (m) to BNC (f).................................... HP 1250-0780
Special Adapter.................................... See Figure 5-2
BNC Cable 120 cm (48 in).................................... HP 10503A
Extender Cable Assembly.................................... HP 5060-0303

*Additional Equipment, Options 001 and 002:*

*Minimum Loss Adapter, 75W to 50W.................................... HP 08558-60031*
*Adapter, BNC (m) to BNC (m), 75W.................................... HP 1250-1288*
*Adapter, SMA (f) to SMA (f).................................... HP 1250-1158*
*Adapter, BNC(f) to SMA (m).................................... HP 1250-1200*

## 5-17. SECOND CONVERTER LO AND BANDPASS ADJUSTMENTS (Cont'd)

**NOTE**

**The special adapter in Figure 5-1 is made from a SMC (f) to SMC (f) adapter, HP Part No. 1250-1113. The nuts must be soldered to the body of the subminiature RF adapter so they will both turn with the body. Be sure to space the nuts properly before soldering (see Figure 5-2).**

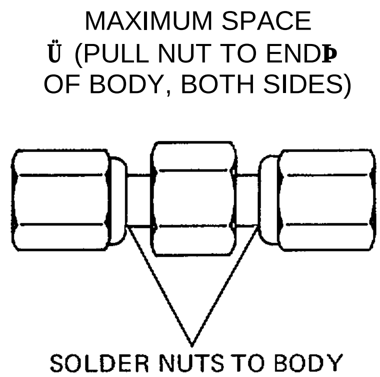



*Figure 5-2. Special Adapter Used in Second Converter LO and Bandpass Test Setup*

PROCEDURE

1. Set equipment as follows:

Spectrum Analyzer

| | |
|---|---|
| START - CENTER | CENTER |
| TUNING | 300 MHz |
| FREQ SPAN/DIV | 100 MHz |
| RESOLUTION BW | 1 MHz (optimum) |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | -30 dBm |
| *002: +20dBmV* | |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |

Frequency Counter

| | |
|---|---|
| 10 Hz-500 MHz/500 MHz- 18 GHz | 500 MHz- 18 GHz |
| SAMPLE RATE | Full counterclockwise |

Comb Generator

| | |
|---|---|
| COMB FREQUENCY | 100MC |
| INTERPOLATION AMPLITUDE | OFF |

## 5-17. SECOND CONVERTER LO AND BANDPASS ADJUSTMENTS (Cont'd)

2. Connect equipment as shown in Figure 5-1 and switch display mainframe power ON. Connect counter to A5J3 at the top of A5 Converter Assembly. Connect comb generator to HP 8558B INPUT.

3. Adjust second LO FREQUENCY adjustment A5Z4 for 1748.60 40.2 MHz. Use Allen wrench through center of drilled-out 5/16-inch nut driver to enable nut to be tightened without shifting frequency.

4. Set comb generator for 100 MHz comb.

5. Center a 100 MHz comb tooth using 8558B TUNING control. Turn FREQ SPAN/DIV control to 2 MHz and uncoupled RESOLUTION BW control to 300 kHz, keeping comb tooth centered on display.

6. Loosen lock nut on A5Z1 and A5Z2. Carefully turn tuning screws clockwise until they bottom on cavity.

7. Turn A5Z1 and A5Z2 one turn counterclockwise and lightly tighten lock nuts.

8. Loosen lock nut on A5Z3, and adjust A5Z3 for peak signal on display. Make final adjustment with Amplitude Scale switch in LIN position. It might be necessary to increase gain to see signal in linear mode. Leave in LIN position.

9. Adjust A5Z1 for peak signal on display. Reduce REFERENCE LEVEL as necessary to keep signal on display. Repeat A5Z1 and A5Z3 adjustments for maximum signal on display.

10. Adjust A5Z2 for maximum signal on display. Reduce REFERENCE LEVEL as necessary to keep signal on display.

11. Carefully tighten lock nuts on A5Z1, A5Z2, and A5Z3 so that signal does not change on display.

12. Adjust A5L2 2nd MIXER MATCH adjustment for maximum signal.

13. Check second LO frequency. If frequency error is greater than 4i0.5 MHz, repeat step 3.

## 5-18. THIRD CONVERTER LO AND CAL OUTPUT ADJUSTMENT

REFERENCE

A9 Schematic

DESCRIPTION

The third converter LO frequency is adjusted for maximum output, and power is adjusted for -30 dBm ±1.0 dB CAL OUTPUT. The third LO frequency is checked for 280 MHz ±300 kHz.

*002: +20 dBmV ±1.0dB*

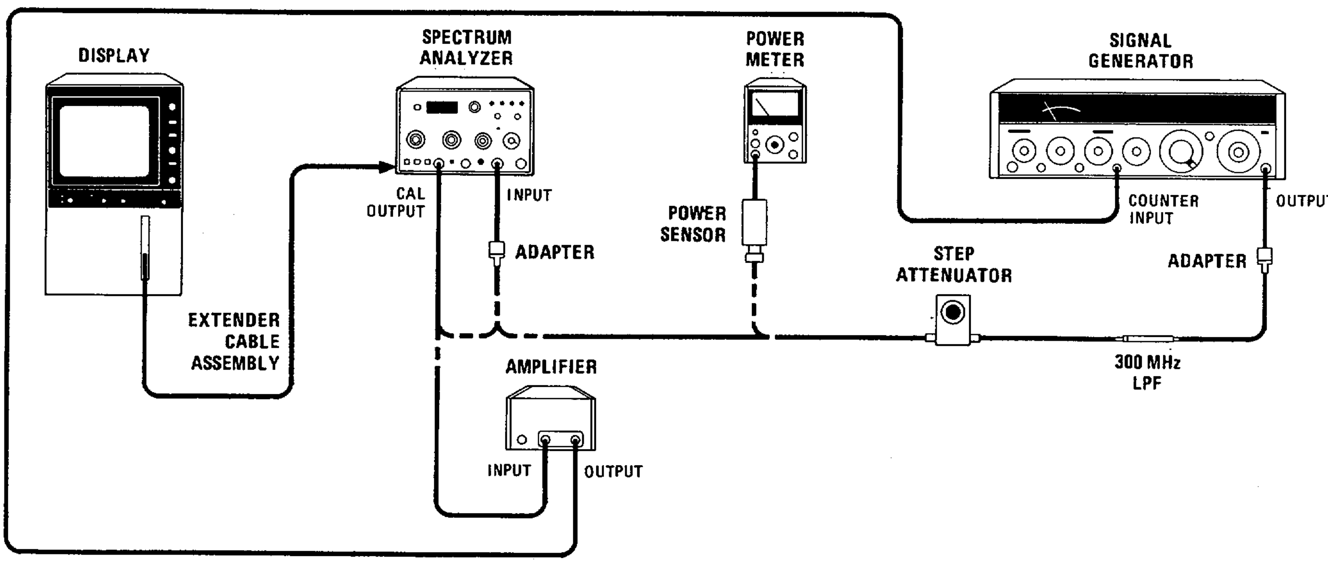



*Figure 5-3. Third Converter LO and CAL OUTPUT Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Amplifier | HP 8447A |
| Power Meter | HP 435B |
| Power Sensor | HP 8482A |
| Signal Generator | HP 8640B |
| 10 dB Step Attenuator (calibrated at 280 MHz) | HP 355D, Opt. H82 |
| 300 MHz LPF | Telonic TLP 300-4AB |
| Adapter, Type N (m) to BNC (f) (2 required) | HP 1250-0780 |

*Additional Equipment, Options 001 and 002:*

| | |
|---|---|
| *Power Sensor, 75W, HP 8483A* | |
| *Minimum Loss Adapter, 75W to 50W* | *HP 08558-60031* |
| *Adapter, BNC(m) to BNC(m), 75W* | *HP 1250-1288* |
| *BNC Cable, 30 cm (12 in), 75W* | *HP 11652-60012* |

## 5-18. THIRD CONVERTER LO AND CAL OUTPUT ADJUSTMENT (Cont'd)

PROCEDURE

1. Set equipment as follows:

| | |
|---|---|
| START- CENTER | CENTER |
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 500 kHz |
| RESOLUTION BW | 1 MHz |
| INPUT ATTEN | 10 dB |
| REFERENCE LEVEL dBm | -20 |
| *002: + 30 dBm V* | |
| Amplitude Scale | LIN |
| SWEEP TIME/DIV | AUTO |
| Extender Cable Assembly | HP 5060-0303 |

Signal Generator:

| | |
|---|---|
| OUTPUT LEVEL | + 10 dBm |
| FREQUENCY | 280 MHz |
| AM | OFF |
| FM | OFF |
| RF | ON |
| COUNTER MODE | INT |

2. Connect equipment as shown in Figure 5-3. Connect CAL OUTPUT to INPUT 50( connector.

   *001 and 002: 75W*

3. Center the 280 MHz signal on the display.

4. Adjust A9L4 third converter LO FREQ adjustment for maximum signal amplitude.

5. Tune signal generator to frequency of third converter LO (280 MHz ±300 kHz).

6. Connect signal generator through 300 MHz LPF to calibrated step attenuator. Set step attenuator to 10 dB.

7. Connect power sensor and power meter to step attenuator as shown in Figure 5-3.

8. Set signal generator OUTPUT LEVEL for a 0 dBm full scale reading on power meter. Leave signal generator set at this level.

   *001: +5.7 dBm*
   *002: + 7.0*

9. Set step attenuator to 40 dB and connect the reference signal set in step 8 (from signal generator through step attenuator) to the 8558B INPUT 50Ω connector.

   *001 and 002: INPUT 75W connector using Minimum Loss Adapter and 75W BNC Cable.*

## 5-18. THIRD CONVERTER LO AND CAL OUTPUT ADJUSTMENT (Cont'd)

10. Set signal from signal generator to a convenient reference level on display with REFERENCE LEVEL and REF LEVEL FINE controls.

11. Disconnect signal generator and connect spectrum analyzer CAL OUTPUT to the INPUT 500 connector.

    *001 and 002: 75W*

12. Adjust A9R5 3RD LO PWR adjustment, accessible from bottom of analyzer through motherboard, to the reference set in step 10. (If range is insufficient on A9R5, change value of factory-selected resistor A9R4*.)

13. Connect CAL OUTPUT to amplifier input and connect amplifier output to COUNTER INPUT of 8640B. Set HP 8640B COUNTER MODE to EXT EXPAND X10. The third LO frequency should read 280 MHz ±300 kHz.

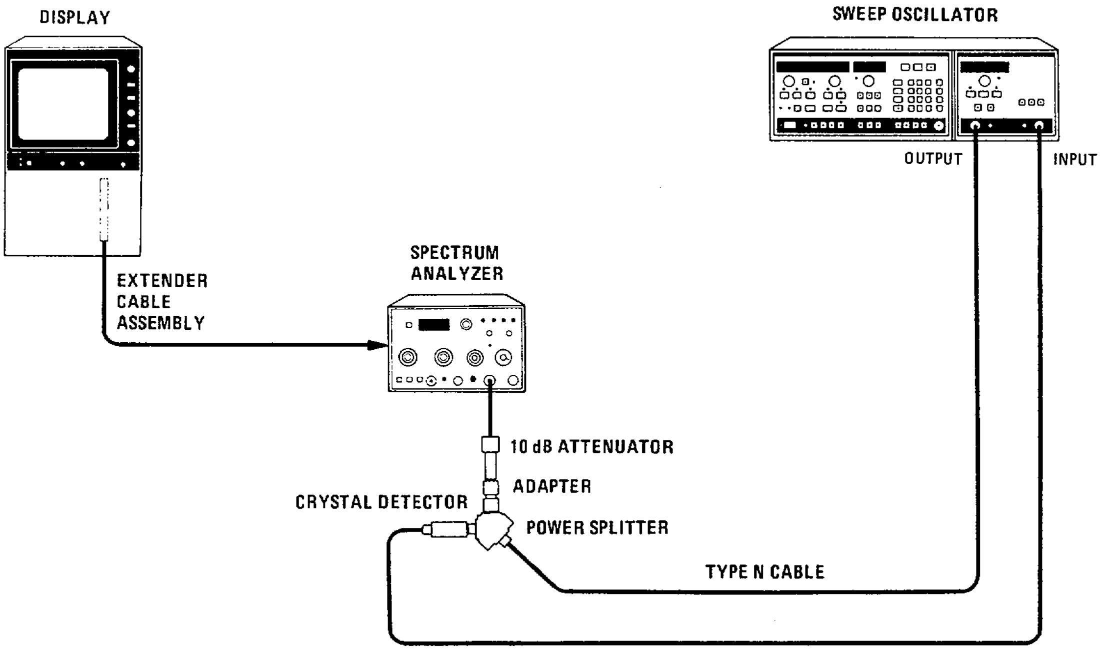
### 5-19. SLOPE ADJUSTMENT

REFERENCE

A9 Schematic

DESCRIPTION

An externally leveled signal is applied to the INPUT of the spectrum analyzer. The signal is adjusted across the frequency range of the spectrum analyzer. A9R1 SLOPE COMP is adjusted for best flatness, compensating for first converter conversion loss over frequency.



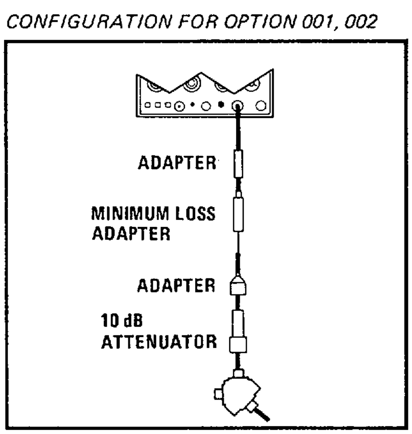




*Figure 5-4. Slope Adjustment Test Setup*

## 5-19. SLOPE ADJUSTMENT (Cont'd)

EQUIPMENT

Sweep Oscillator* .......... HP 8350A
RF Plug-In* .......... HP 83522A
Power Splitter .......... HP 11667A
Crystal Detector .......... HP 423B
10-dB Attenuator .......... HP 8491B Opt. 010
Adapter, Type N (m) to Type N (m) .......... HP 1250-1475
BNC Cable, 120 cm (48 in) .......... HP 10503A
Type N Cable .......... HP 11500A
Extender Cable Assembly .......... HP 5060-0303

*8620C/86222A may be substituted

*Additional Equipment, Options 001 and 002:*

Minimum Loss Adapter, 752 to 50Ω .......... HP 08558-60031
Adapter, BNC(m) to BNC (m), 75Ω .......... HP 1250-1288
Adapter, Type N (m) to SMA (f) .......... HP 1250-1250

PROCEDURE

1. Set equipment as follows:

Spectrum Analyzer
START - CENTER .......... CENTER
TUNING .......... 500 MHz
FREQ SPAN/DIV .......... 100 MHz
RESOLUTION BW .......... 1 MHz
INPUT ATTEN .......... 10 dB
REFERENCE LEVEL .......... -10 dBm
*002: +40dBmV*
REF LEVEL FINE .......... 0
Amplitude Scale .......... 1 dB/DIV
SWEEP TIME/DIV .......... AUTO
BASELINE CLIPPER .......... OFF
VIDEO FILTER .......... OFF

Sweep Oscillator
START .......... 10 MHz
STOP .......... 1.5 GHz
SWEEP .......... MAN
POWER LEVEL .......... 0 dBm
ALC MODE .......... EXT
FREQUENCY/TIME .......... 500 MHz

2. Connect equipment as shown in Figure 5-4.

**5-19. SLOPE ADJUSTMENT (Cont'd)**

3. Adjust spectrum analyzer REF LEVEL FINE to bring signal peak on display.

4. Set spectrum analyzer START - CENTER to CENTER. Manually tune sweep oscillator for output frequencies from 10 MHz to 1.0 GHz. Set spectrum analyzer START - CENTER to START. Manually tune sweep oscillator for output frequencies from 1.0 GHz to 1.5 GHz.

5. Using procedure of step 4, locate highest displayed amplitude. Adjust spectrum analyzer REF LEVEL FINE to bring highest displayed amplitude to fifth CRT graticule line from bottom.

6. Using procedure of step 4, locate lowest displayed amplitude.

7. Adjust spectrum analyzer A9R1 SLOPE COMP for minimum difference between highest and lowest displayed amplitudes.

8. Repeat steps 5, 6, and 7 until no further adjustment is necessary.

9. With highest displayed amplitude set to fifth graticule line from bottom lowest displayed amplitude should be at or above third graticule line from bottom.

## 5-20. SECOND IF BANDPASS AMPLIFIER AND BANDPASS FILTER ADJUSTMENT

REFERENCE

A10 Schematic

DESCRIPTION

Tune bandpass amplifier output and bandpass filter.

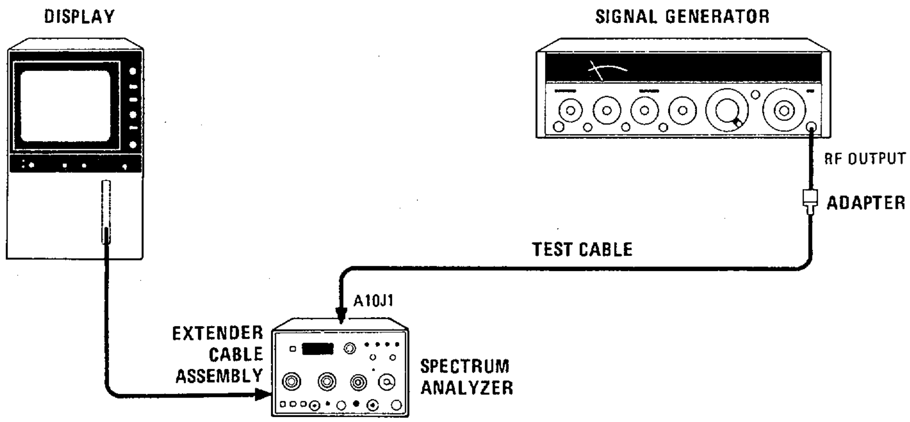



*Figure 5-5. Second IF Bandpass Amplifier and Bandpass Filter Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Signal Generator | HP 8640B |
| Adapter, Type N (m) to BNC (f) | HP 1250-0780 |
| Test Cable, SMC (f) to BNC (m) | HP 11592-60001 |
| Extender Cable Assembly | HP 5060-0303 |

PROCEDURE

1. Set spectrum analyzer controls as follows:

| | |
|---|---|
| FREQ SPAN/DIV | 100 MHz |
| RESOLUTION | 1 MHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | - 10 dBm |
| *002: +40 dBmV* | |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |

2. Set signal generator frequency to 301.4 MHz and set output level to approximately - 35 dBm.

## 5-20. SECOND IF BANDPASS AMPLIFIER AND BANDPASS FILTER ADJUSTMENT (Cont'd)

**NOTE**

**If 8640B is not used, adjust the signal generator for maximum signal on the display in step 3.**

3. Remove W6P2 from Second IF A10J1. Connect signal generator through test cable to A10J1 as shown in Figure 5-5.

4. Adjust bandpass filter capacitors A10C1, A10C2, and A10C3 on Second IF Assembly fully counterclockwise. Adjust REFERENCE LEVEL if necessary for an on-screen display.

5. Adjust A10C1 for maximum signal amplitude. Make final adjustment with Amplitude Scale switch in LIN position. Leave switch in LIN position. Use REFERENCE LEVEL and REF LEVEL FINE controls to keep signal on top half of display.

6. Adjust A10C3 for maximum signal amplitude. There may be a double peak; tune past first peak to second peak. Signal on display will peak and fall off slightly and then peak again.

7. Repeat steps 5 and 6 adjusting A10C1 and A10C3 for maximum amplitude.

8. Adjust A10C2 for maximum signal amplitude. There may be a double peak; tune to second peak. Reduce input signal level to keep signal on display.

**NOTE**

**The following adjustment of A10L2 has very little effect on the signal or performance of the spectrum analyzer. A10L2 need not be adjusted because the position of the core is not critical.**

9. Adjust A10L2 2ND IF TUNING adjustment for maximum signal amplitude. L2 is adjusted through motherboard on bottom of analyzer. Reconnect W6P2 to A10J1.

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS

REFERENCE

A8, A11, and A13 Schematics

DESCRIPTION

The crystal and LC bandwidth filter circuits are adjusted for symmetry, center, and peak. Three-dB bandwidths are adjusted on the Sweep Generator Assembly A8 (paragraph 5-22).

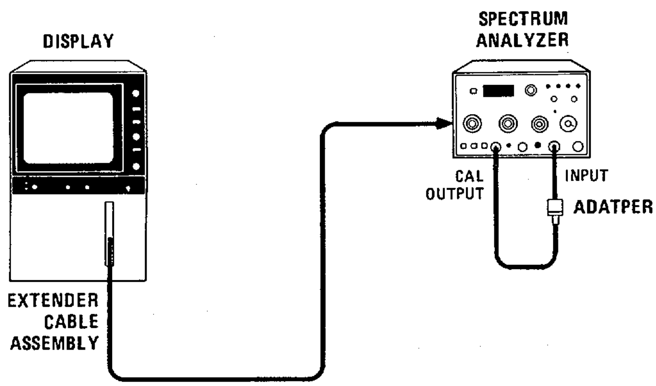



*Figure 5-6. Crystal and LC Bandwidth Filter Adjustment Test Setup*

EQUIPMENT

Adapter, Type N (m) to BNC (f) .......... HP 1250-0780
BNC Cable, 20 cm (9 in) .......... HP 10502A
Crystal Short (3 Required) .......... See Figure 5-7.
Extender Cable Assembly .......... HP 5060-0303

*Additional Equipment, Options 001 and 002:*

*BNC Cable, 30 cm (12 in), 75W .......... HP 11652-60012*

**NOTE**

**A crystal short consists of a .01 mF capacitor (HP Part No. 0160-0161) and a 90.9 ohm resistor (HP Part No. 0757-0400) connected in series. Two square-terminal connectors (HP Part No. 0362-0265) are used to connect the crystal short across the test points.**

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

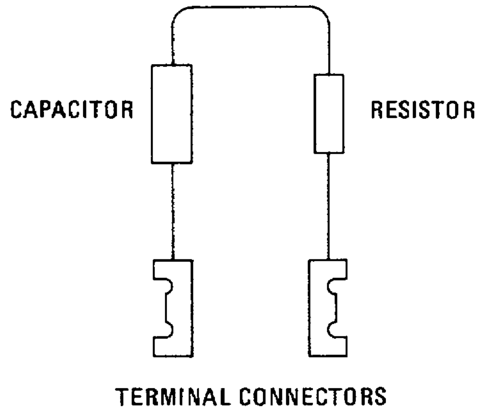



*Figure 5-7. Crystal Short Configuration*

PROCEDURE

**NOTE**

**Allow 30 minutes warmup time before performing adjustments.**

1. Set spectrum analyzer controls as follows:

| | |
|---|---|
| START- CENTER | CENTER |
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 5 kHz |
| RESOLUTION BW | 1 kHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | -20 dBm |
| *002: + 30 dBmV* | |
| Amplitude Scale | LIN |
| SWEEP TIME/DIV | 10 mSEC |
| SWEEP TRIGGER | FREE RUN |

**Crystal Alignment**

2. Connect equipment as shown in Figure 5-6.

**NOTE**

**If A8 Sweep Generator has been replaced or adjusted, perform steps 3 through 9. If not, proceed to step 10.**

3. Set FREQ SPAN/DIV to 500 kHz and RESOLUTION BW to 1 MHz.

4. Center the signal with TUNING control. Using REF LEVEL FINE control, place signal at 7.1 divisions (0.9 division from top graticule line).

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

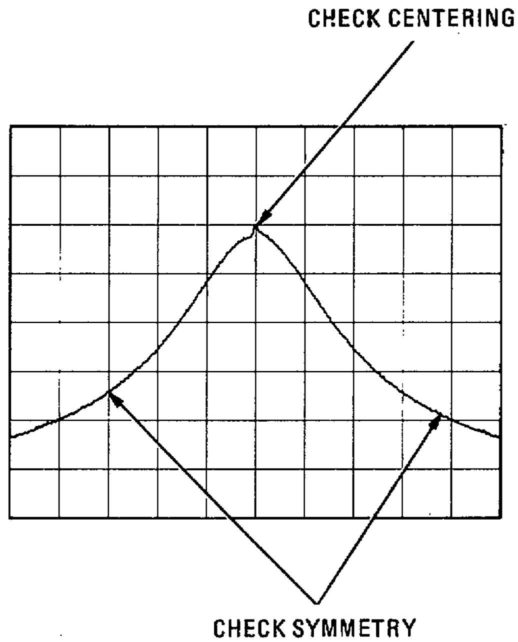



*Figure 5-8. Adjusting Crystal Symmetry and Crystal Centering*

5. Adjust A8R85 LC until signal is two divisions wide at the fifth graticule line (1 MH4z. wide at; 3-dB points).

6. Set FREQ SPAN/DIV to 5 kHz and RESOLUTION BW to 10 kHz.

7. Using REF LEVEL FINE control, place signal at 7.1 divisions.

8. Adjust A8R72 XTL until signal is two divisions wide- at the fifth graticule line (10 kHz wide at 3-dB points).

9. Set FREQ SPAN/DIV to 5 kHz and RESOLUTION BW to 1 kHz.

10. Center signal with TUNING control. (It might be necessary to increase FREQ SPAN/DIV temporarily to find the signal.) Set REF LEVEL FINE control to place signal at sixth graticule line.

11. Set FREQ SPAN/DIV to 20 kHz and RESOLUTION BW to 30 kHz.

**NOTE**

**A non-metallic tuning tool is required for adjustments on the Al1 and A13 bandwidth filter assemblies.**

12. Connect crystal shorts (through cover access holes) across A13TP1/TP2, A11TP1/TP2, and A11TP4/TP5.

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Co nt'd)

**NOTE**

**Keep crystal spike centered during adjustments. The SYM and CTR adjustments for each crystal interact.**

13. Adjust front-panel TUNING control to center bandpass spike (Figure 5-8) on the CRT display.

14. Adjust A13C38 SYM and A13C54 CTR for a centered and symmetrical bandpass as shown in Figure 5-8. Adjust A13C54 CTR for minimum signal amplitude.

15. Remove crystal short from A13TP1/TP2 and connect it across A13TP4/TP5.

16. Adjust A13C15 SYM and A13C25 CTR for a centered and symmetrical bandpass. Adjust A13C25 CTR for minimum signal amplitude.

17. Remove crystal short from A11TP4/TP5 and connect it across A13TP1/TP2.

18. Adjust A11C38 SYM and A11C54 CTR for a centered and symmetrical bandpass. Adjust A11C54 CTR for minimum signal amplitude.

19. Remove crystal short from A11TP1/TP2 and connect it across A11TP4/TP5.

20. Adjust A11C15 SYM and A11C25 CTR for a centered and symmetrical bandpass. Adjust A11C25 CTR for minimum signal amplitude.

21. Remove the crystal shorts.

**LC Alignment**

22. Perform preliminary LC filter adjustments as follows:

    a. Install A13 on extender board. Set RESOLUTION BW control to 100 kHz.

    b. Short to ground the following test points: A13TP6, A11TP3, and A11TP6. Jumper A8TP1 to A8TP2.

    c. Adjust A13C73 for minimum signal amplitude.

    d. Disconnect short from A13TP6 and short to ground A13TP3.

    e. Adjust A13C74 for minimum signal amplitude.

    f. Reinstall A13 and install A11 on extender board.

    g. Disconnect short from A11TP3 and short to ground A13TP6.

    h. Adjust A11C73 for minimum signal amplitude.

    i. Disconnect short from A11TP6 and short to ground A11TP3.

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

j. Adjust A11C74 for minimum signal amplitude.

k. Disconnect shorts from test points and reinstall A11. Replace covers on A11 and A13 assemblies. Remove jumper from A8TP1/A8TP2.

**NOTE**

**When A11 and A13 BW Filter Assemblies are installed with covers in place, midget copper alligator clips (HP Part No. 1400-0483) can be used to short test points to the cover.**

23. Carefully center signal on CRT in 30 kHz RESOLUTION BW; then switch RESOLUTION BW to 100 kHz. Note where signal intersects the center vertical graticule line.

24. Adjust A13C45 LC CTR for maximum signal amplitude where the signal intersects the center vertical graticule line.

25. Switch RESOLUTION BW to 30 kHz and center signal; then switch to 100 kHz. Note where signal intersects the center vertical graticule line.

26. Adjust A13C23 LC CTR for maximum signal amplitude where the signal intersects the center vertical graticule line.

27. Switch RESOLUTION BW to 30 KHz and center signal; then switch to 100 kHz. Note where signal intersects the center vertical graticule line.

28. Adjust A11C45 LC CTR for maximum signal amplitude where the signal intersects the center vertical graticule line.

29. Switch RESOLUTION BW to 30 kHz and center signal; then switch to 100 kHz. Note where signal intersects the center vertical graticule line.

30. Adjust A11C23 LC CTR for maximum signal amplitude where the signal intersects the center vertical graticule line.

31. Switch RESOLUTION BW between 100 kHz and 30 kHz to be sure the signal is centered at both bandwidth settings.

32. Set FREQ SPAN/DIV to 5 kHz and RESOLUTION BW to 1 kHz. Center signal with TUNING control.

**Bandwidth Amplitude**

33. Set A11R31 XTL and A13R31 XTL fully counterclockwise.

34. Set Amplitude Scale switch to 1 dB/DIV.

35. Jumper A8TP1 to A8TP2. Short A11TP3, A11TP6, A13TP3, and A13TP6 to ground.

## 5-21. CRYSTAL AND LC BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

36. Set RESOLUTION BW to 1 MHz and FREQ SPAN/DIV to 50 kHz.

37. Adjust fine TUNING and REF LEVEL FINE for a centered signal at 7 divisions.

38. Remove shorts from A13TP3 and A13TP6 and center signal with fine TUNING control. Adjust A13R26 LC for a signal amplitude of 7 divisions.

39. Remove shorts from Al1TP3 and Al1TP6. Adjust A11R26 LC for a signal amplitude of 7 divisions.

40. Repeat steps 35 through 39 until no further adjustment is necessary.

41. Set RESOLUTION BW to 1 kHz and FREQ SPAN/DIV to 5 kHz. Center signal with fine TUNING control. Adjust A11 R31 XTL and Al3R31 XTL equally for a signal amplitude of 7 divisions.

**NOTE**

**Each potentiometer should be adjusted to accomplish half the necessary increase in signal amplitude.**

42. Remove jumper from A8TP1 and A8TP2.

43. Set FREQ SPAN/DIV to 100 MHz and RESOLUTION BW to 3 MHz and push in to couple the two controls.

44. Turn coupled controls to set FREQ SPAN/DIV to 50 MHz and RESOLUTION BW to 1 MHz. Center signal with TUNING control. Adjust REF LEVEL FINE for a signal amplitude of 7 divisions.

45. With controls coupled, step down RESOLUTION BW from 1 MHz to 300 kHz. Variation in signal amplitude should be less than ±0.4 dB.

46. Step down RESOLUTION BW from 100 kHz to 1 kHz. Variation of signal amplitude should be less than ±0.5 dB.

47. Repeat steps 35 through 46 until variation in signal amplitude is within limits.

## 5-22. 3-dB BANDWIDTH ADJUSTMENT

REFERENCE

A8 Schematic

DESCRIPTION

The 3-dB bandwidths for the 3 MHz, 1 MHz and 300 kHz RESOLUTION BW settings are adjusted using the CAL OUTPUT as the signal source. The 3-dB bandwidths for the 10 kHz, 3 kHz, and 1 kHz RESOLUTION BW settings are adjusted by injecting a stable 301.4 MHz signal into the third converter of the spectrum analyzer.

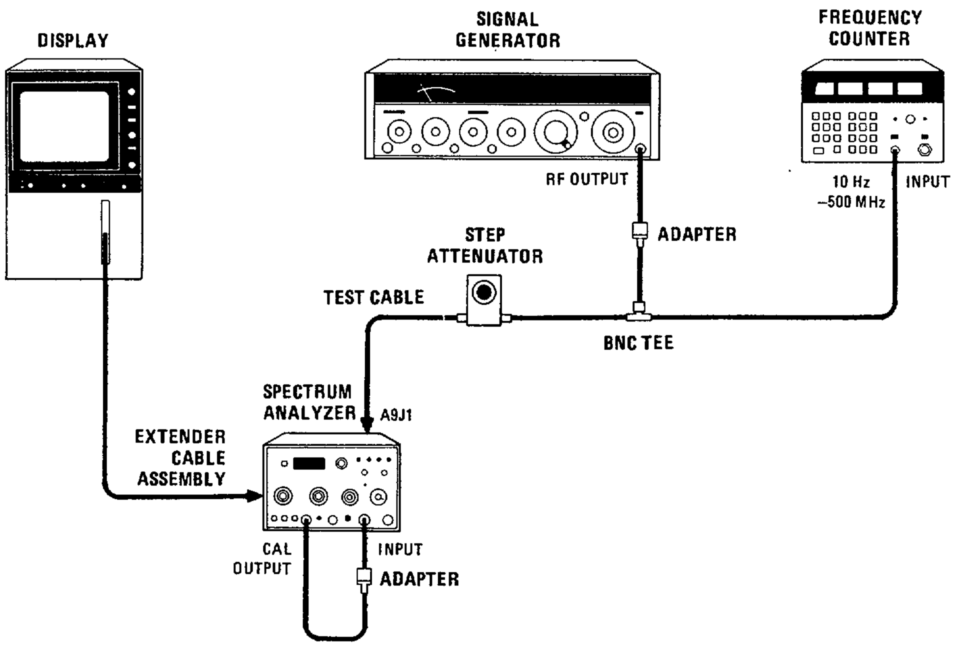



*Figure 5-9. 3-dB Bandwidth Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Signal Generator | HP 8640B |
| Frequency Counter | HP 5343A |
| 10 dB Step Attenuator | HP 355D |
| BNC Cable, 20 cm (9 in) | HP 10502A |
| Adapter, Type N (m) to BNC (f) (3 requird) | HP 1250-0780 |
| BNC Tee | HP 1250-0781 |
| Test Cable, SMC (f) to BNC (m) | HP 11592-60001 |
| Extender Cable Assembly | HP 5060-0303 |

## 5-22. 3-dB BANDWIDTH ADJUSTMENT (Cont'd)

PROCEDURE

1. Set spectrum analyzer controls as follows:

| | |
|---|---|
| START - CENTER | CENTER |
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 200 kHz |
| RESOLUTION BW | 1 MHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | -20 dBm |
| Amplitude Scale | LIN |
| SWEEP TIME/DIV | 1 mSEC |
| SWEEP TRIGGER | FREE RUN |
| VIDEO FILTER | OFF |

2. Connect equipment as shown in Figure 5-9 except for signal input to A9J1. Connect CAL OUTPUT to spectrum analyzer INPUT 50(.

3. Set signal level of 7.1 divisions on display with REF LEVEL FINE control. (Signal should be 0.9 division from top graticule line.)

4. Set RESOLUTION BW to 1 MHz and FREQ SPAN/DIV to 200 kHz. Adjust A8R85 LC to set bandwidth of 5 divisions at the fifth graticule line.

5. Set RESOLUTION BW to 3 MHz and FREQ SPAN/DIV to 500 kHz. The bandwidth at the fifth graticule line should be between 5.4 and 6.6 divisions.

**NOTE**

**A8R85 LC may be further adjusted to bring the 3 MHz and 300 kHz bandwidths within limits; however, the final measurement of the 1 MHz bandwidth must be between 4.5 and 5.5 divisions at the fifth graticule line. (If the 3 MHz bandwidth cannot be brought within limits by adjustment of A8R85 LC, change the value of factory-selected resistor A8R95*.)**

6. Set RESOLUTION BW to 300 kHz and FREQ SPAN/DIV to 50 kHz. The bandwidth should be between 5.4 and 6.6 divisions at the fifth graticule line. (If the bandwidth cannot be adjusted within the specified limits, change the value of factory-selected resistor A8R89*.)

7. Set RESOLUTION BW to 100 kHz and FREQ SPAN/DIV to 20 kHz. The bandwidth should be between 4.3 and 5.7 divisions at the fifth graticule line.

**NOTE**

**If the 100 kHz bandwidth is not within the specified limits, change the values of factory-selected resistors A13R19*, A13R43*, and A11R43*. If the bandwidth is too wide, increase the value of the resistors; if the bandwidth is too narrow, decrease the value of the resistors. The three factory-selected resistors need not be of equal value, but each must be within one standard value of the others.**

## 5-22. 3-dB BANDWIDTH ADJUSTMENT (Cont'd )

8. Set RESOLUTION BW to 30 kHz and FREQ SPAN/DIV to 5 kHz. The bandwidth should be between 5.2 and 6.8 divisions at the fifth graticule line.

**NOTE**

**If the 30 kHz bandwidth is not within the specified limits, change the values of factory-selected resistors A11R23*, A11R48*, A13R23*, and A13R48*. If the bandwidth is too wide, decrease the value of the factory selected resistors; if the bandwidth is too narrow, increase the value of the resistors. The four factory-selected resistors need not be of equal value, but each must be within one standard value of the others.**

9. Connect signal generator through the BNC Tee connector to the step attenuator and to the frequency counter as shown in Figure 5-9. Set the signal generator to approximately 0 dBm and the step attenuator to 30 dB. Set COUNTER MODE to EXPAND X100.

10. Remove W7P2 from Third Converter A9J1. Connect step attenuator through test cable to A9J1.

11. Set HP 8558B RESOLUTION BW to 1 MHz. Tune signal generator to peak signal on CRT display (near 301.4 MHz). Adjust the output level of signal generator to place the signal at 7.1 divisions.

12. Set RESOLUTION BW to 3 kHz. Tune signal generator to peak signal on CRT display.

13. Adjust REF LEVEL FINE to place signal at 7.1 divisions.

14. Note the counter frequency and tune the signal generator 1500 Hz below the center frequency noted. Record the new counter frequency.

15. Adjust A8R72 XTL to bring signal level to the fifth graticule line (three divisions from the top graticule line).

16. Increase signal generator frequency until signal on CRT display peaks and then decreases to the fifth graticule line. Record counter frequency.

17. Compare new frequency with frequency recorded in step 14. The difference between the two frequencies should be 2800 to 3200 Hz. If the bandwidth is not within limits, repeat steps 12 through 17, slightly readjusting A8R72 XTL, until the specified limits are achieved.

18. Set RESOLUTION BW to 10 kHz. Tune signal generator to peak signal on CRT display.

19. Adjust REF LEVEL FINE to place signal at 7.1 divisions.

20. Note the counter frequency and tune the signal generator 5 kHz below the center frequency noted. Record the new counter frequency.

21. Increase the signal generator frequency until the signal on the CRT display peaks and then decreases to the fifth graticule line. Record counter frequency.

22. Compare new frequency with frequency recorded in step 20. The difference between the two frequencies should be 9.000 kHz to 11.000 kHz.

## 5-22. 3-dB BANDWIDTH ADJUSTMENT (Cont'd)

**NOTE**

**A8R72 XTL may be further adjusted to bring the 10 kHz and 1 kHz bandwidths within limits; however, the final measurement of the 3 kHz bandwidth must be between 2700 Hz and 3300 Hz. (If the 10 kHz bandwidth cannot be brought within limits by adjustment of A8R72 XTL, change the value of factory-selected resistor A8R78*.)**

23. Set RESOLUTION BW to 1 kHz. Tune signal generator to peak signal on CRT display.

24. Adjust REF LEVEL FINE to place signal at 7.1 divisions.

25. Note the counter frequency. Increase signal generator frequency until signal on CRT display peaks and then decreases to the fifth graticule line. Record new counter frequency.

26. Compare new frequency with frequency originally noted in step 25. The difference between the two frequencies should be 450 Hz to 550 Hz.

27. Reconnect W7P2 to A9J1.

## 5-23. STEP GAIN ASSEMBLY RF GAIN ADJUSTMENT

REFERENCE

A12 Schematic

DESCRIPTION

The RF gain (sensitivity) of the Step Gain assembly is adjusted by injecting a 21.4 MHz signal at A16XA9. The Third Converter Assembly A9 is removed and replaced with a special extender board for applying the 21.4 MHz signal from the signal generator.

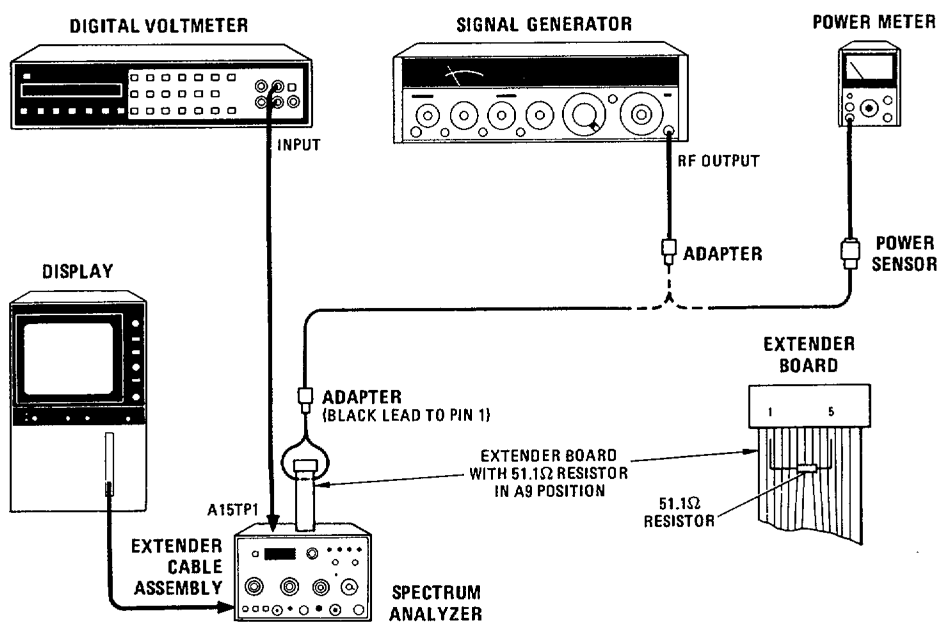



*Figure 5-10. Step Gain Assembly RF Gain Adjustment Test Setup*

EQUIPMENT

Signal Generator ........ HP 8640B
Digital Voltmeter ........ HP 3455A
Power Meter ........ HP 435B
Power Sensor ........ HP 8482A
Adapter, BNC (f) to alligator clips ........ HP 8120-1292
Special Extender Board with 51.1-ohm resistor ........ HP 08505-60109/0757-0394
BNC Cable, 120 cm (48 in) ........ HP 10503A
Extender Cable Assembly ........ HP 5060-0303

**NOTE**

**To make special extender board, solder 51.1 ohm resistor from pin 1 to pin 5 of standard extender board, HP Part No. 5060-0257. Leave resistor leads long for easy connection of clip leads.**

## 5-23. STEP GAIN ASSEMBLY RF GAIN ADJUSTMENT (Cont'd)

PROCEDURE

1. Set equipment as follows:

Spectrum Analyzer

| | |
|---|---|
| FREQ SPAN/DIV | 1 MHz |
| RESOLUTION BW | 1 MHz |
| INPUT ATTEN | 10 dB |
| REFERENCE LEVEL | 0 dBm |
| *002: + 50 dBmV* | |
| REF LEVEL FINE | 0 |
| Amplitude Scale | LIN |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| VIDEO FILTER | OFF |

Digital Voltmeter

| | |
|---|---|
| RANGE | AUTO |
| FUNCTION | DC Volts |
| TRIGGER | INTERNAL |
| MATH | OFF |
| AUTO CAL.: | ON |

2. Connect equipment as shown in Figure 5-10.

3. Set signal generator frequency to 21.4 MHz. Set OUTPUT LEVEL for approximately - 5 dBm.

4. Connect output of signal generator across 51.1 ohm resistor on special board using BNC to clip-lead adapter. The red lead (center conductor) should be connected to pin 5 of extender board.

5. Set signal generator frequency for peak amplitude on CRT display. Connect output of signal generator to power meter through power sensor and set OUTPUT LEVEL to - 1 dBm. Reconnect signal generator output to clip-lead adapter.

   *001: -5 dBm*
   *002: - 6 dBm*

6. Adjust A12R4 GAIN adjustment for signal one division from top graticule line. DVM should indicate + 700 mV ±30 mV. Remove special extender board and replace Third Converter Assembly A9.

**NOTE**

**Front panel VERTICAL GAIN and VERTICAL POSN control settings can affect the voltage measured at A15TP1. Vertical calibration should be checked after adjusting A12R4 for 700 mV. (Refer to Operator's Check, Section III).**

## 5-24. STEP AMPLIFIER GAIN ADJUSTMENTS

REFERENCE

A12 Schematic

DESCRIPTION

REF LEVEL FINE, 0 dB, and -12 dB adjustments are properly set and step gains of 10 dB, 20 dB, and 40 dB are adjusted.

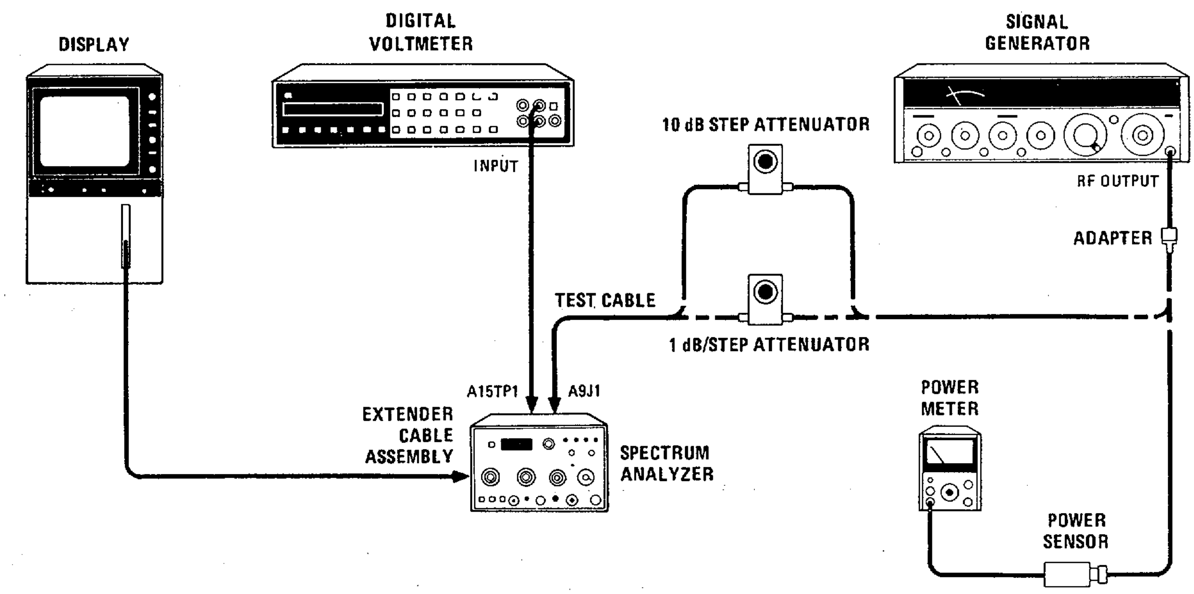



*Figure 5-11. Step Amplifier Gain Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Signal Generator | HP 8640B |
| 1-dB Step Attenuator | HP 355C Opt. H80 |
| 10-dB Step Attenuator | HP 355D Opt. H82 |
| Digital Voltmeter | HP 3455A |
| Power Meter | HP 435B |
| Power Sensor | HP 8482A |
| Adapter, Type N (m) to BNC (f) | HP 1250-0780 |
| Test Cable, SMC (f) to BNC (m) | HP 11592-60001 |
| Adapter, SMC (m) to SMC (m) | HP 1250-0827 |
| Extender Cable Assembly | HP 5060-0303 |

## 5-24. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont'd)

PROCEDURE

1. Set equipment as follows:

| | |
|---|---|
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 1 MHz |
| RESOLUTION BW | 1 MHz |
| INPUT ATTEN | 10 dB |
| REFERENCE LEVEL | 0 dBm |
| *002: + 50 dBm V* | |
| Amplitude Scale | 1 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| VIDEO FILTER | OFF |

2. Connect equipment as shown in Figure 5-11. Connect signal generator tuned to 301.4 MHz with approximately -13 dBm output to one side of a 1 dB/step attenuator. Connect attenuator output to A9J1 through test cable. Tune signal generator frequency for peak amplitude on display.

3. Set step attenuator to 12 dB and REF LEVEL FINE to - 12. Set signal generator level for a signal one division down from top graticule line.

4. Adjust A12R6 - 12 dB until signal stops rising on display, then adjust A12R6 counterclockwise until signal drops approximately one third to one half of a division.

5. Set signal generator level so signal is one division down from top graticule line on display.

6. Set step attenuator to 0 dB and REF LEVEL FINE to 0.

7. Adjust A12R5 0 dB adjustment for a signal level one division from top graticule line.

8. Set step attenuator to 12 dB and REF LEVEL FINE to -12. Signal level on display should be ±0.1 division from the reference one division down from top graticule line. If signal level is out of limits, repeat steps 3 through 8 until the signal level is within limits.

9. Check REF LEVEL FINE control from 0 to - 12 dBm, as shown in Table 5-5. Verify correct operation on display, or measure voltage at A15TP1 with digital voltmeter.

**NOTE**

**Be sure all covers in the IF section are secured by at least six screws before proceeding. If covers are left off or not secured by at least six screws, leakage between assemblies may occur. This leakage causes erroneous adjustment.**

10. Replace 1 dB/step attenuator with 10 dB/step attenuator set to 0 dB. Set REF LEVEL FINE control to 0.

## 5-24. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont'd)

*Table 5-5. REF LEVEL FINE Control Check*

| REF LEVEL FINE Setting | Step Attenuator Setting (dB | Deviation From Reference |
|---|---|---|
| 0 | 0 | Ref.____mV (Ref.) |
| -1 | 1 | ±0.3 Div ±30 mV |
| -2 | 2 | ±0.3 Div ±30 mV |
| -3 | 3 | ±0.3 Div ±30 mV |
| -4 | 4 | ±0.3 Div ±30 mV |
| -5 | 5 | ±0.3 Div ±30 mV |
| -6 | 6 | ±0.3 Div ±30 mV |
| -7 | 7 | ±0.3 Div ±30 mV |
| -8 | 8 | ±0.3 Div ±30 mV |
| -9 | 9 | ±0.3 Div ±30 mV |
| -10 | 10 | ±0.3 Div ±30 mV |
| -11 | 11 | ±0.3 Div ±30 mV |
| -12 | 12 | ±0.3 Div ±30 mV |

11. Connect power sensor and power meter to attenuator output and adjust signal generator output level for a power meter reading of - 13 dBm. Connect test cable from attenuator to A9J1.

12. Tune signal generator frequency for peak amplitude on the display (near 301.4 MHz).

13. Set step attenuator to 10 dB and REFERENCE LEVEL to - 10 dBm.
    *002: +40dBmV*

14. Adjust A12R3 10 dB adjustment for signal level one division from top graticule line.

15. Set step attenuator to 20 dB and REFERENCE LEVEL to - 20 dBm.
    *002: + 30 dBmV*

16. Adjust A12R2 20 dB adjustment for signal level one division from top graticule line.

17. Set attenuator to 40 dB and REFERENCE LEVEL to - 40 dBm.
    *002: +10dBmV*

**NOTE**

**Some video filtering might help reduce noise. Set VIDEO FILTER control so noise is reduced, but the signal amplitude remains unchanged.**

18. Adjust A12R1 40 dB adjustment for signal level one division from top graticule line.

## 5-24. STEP AMPLIFIER GAIN ADJUSTMENTS (Cont' d)

19. Check REFERENCE LEVEL control from 0 to - 50 dBm as shown in Table 5-6.

*002: + 50 dBmV to 0 dBm V. REFERENCE LEVEL dBmV settings in Table 5-6 are, from top to bottom, + 50, + 40, + 30, + 20, + 10, 0.*

20. Reconnect W7P2 to A9JI.

*Table 5-6. REFERENCE LEVEL Control Check*

| REFERENCE LEVEL (dBm) | Attenuator (dB) | Deviation From Reference |
|---|---|---|
| 0 | 0 | Reference |
| -10 | 10 | ±0.2 Div ±20 mV |
| -20 | 20 | ±0.2 Div ±20 mV |
| -30 | 30 | ±0.2 Div ±20 mV |
| -40 | 40 | ±0.2 Div ±20 mV |
| -50 | 50 | ±0.2 Div ±20 mV |

## 5-25. + 19.5V ADJUSTMENT

REFERENCE

A12 Schematic

DESCRIPTION

+ 19.5V for YIG Oscillator is adjusted.

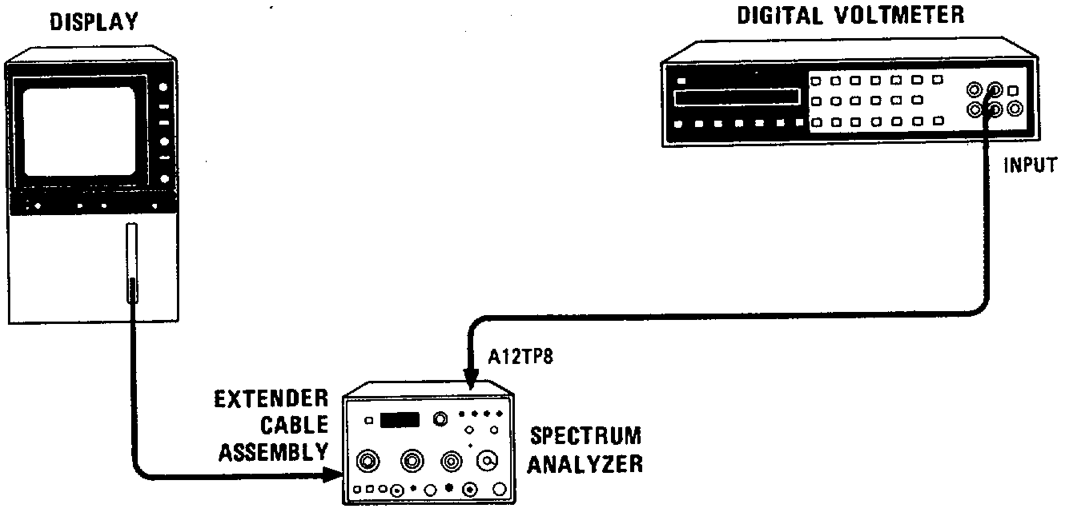



*Figure 5-12. +19.5VAdjustment Test Setup*

EQUIPMENT

Digital Voltmeter.................................... HP 3455A
Cable, Banana Plug to Alligator Clip.................................... HP 11102A
Extender Cable Assembly ....................................HP 5060-0303

PROCEDURE

1. Set Digital Voltmeter as follows:

   RANGE .................................... AUTO
   FUCTION .................................... dcV
   AUTO CAL ....................................ON
   TRIGGER....................................INTERNAL

2. Connect equipment as shown in Figure 5-12. Connect digital voltmeter to A12TP8 (left side of A12R7 + 19.5V adjustment).

3. Adjust A12R7 + 19.5V adjustment for + 19.5 ± 0.1 V.

## 5-26. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT

REFERENCE:

A9, A12, A14, and A15 Schematics

DESCRIPTION

Step attenuators are used to change, in calibrated steps, the input signal level of the spectrum analyzer. The output of Vertical Driver and Blanking Assembly A15 is monitored, and adjustments are performed to calibrate Log Amplifier Assembly A14.

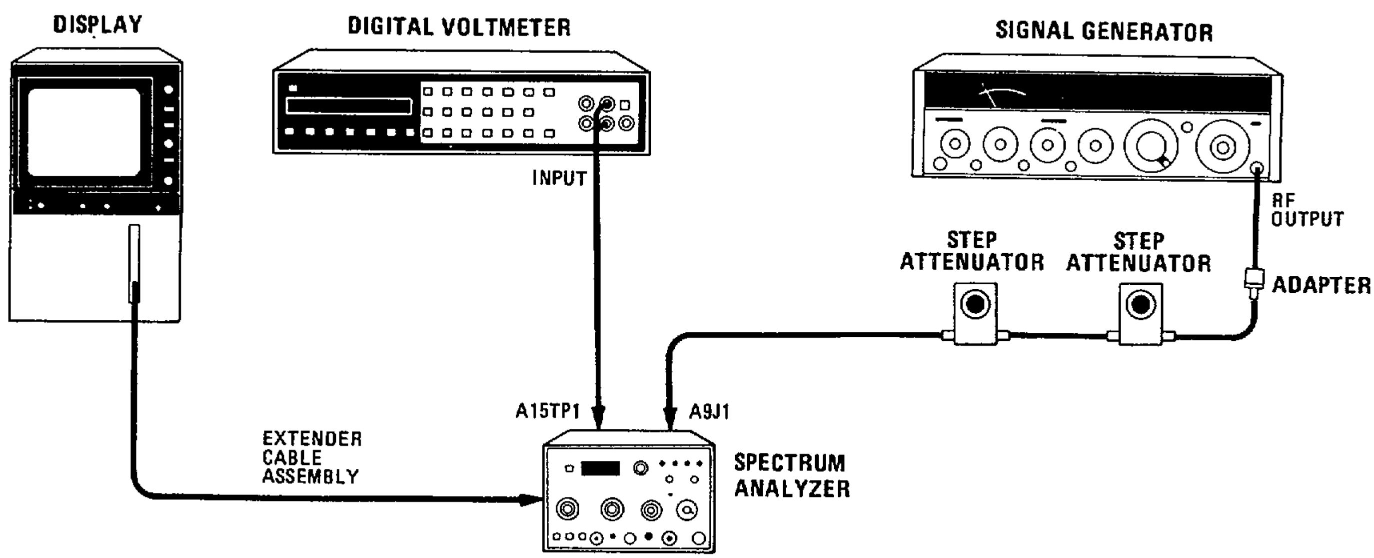



*Figure 5-13. Log Amplifier and Linear Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Signal Generator | HP 8640B |
| Digital Voltmeter | HP 3455A |
| 10-dB Step Attenuator | HP 355D, Opt. H82 |
| 1-dB Step Attenuator | HP 355C, Opt. H80 |
| Adapter, Type N (m) to SMC (m) | HP 1250-1023 |
| Adapter, Type N (m) to BNC (f) (2 required) | HP 1250-0780 |
| BNC Cable, 20 cm (9 in) | HP 18502A |
| BNC Cable, 120 cm (48 in) | HP 18503A |
| Cable Assembly, Banana Plug to Alligator Clip | HP 11102A |
| Test Cable, SMC (f) to BNC (m) | HP 11592-60001 |
| Extender Cable Assembly | HP 5060-0303 |

## 5-26. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

PROCEDURE

1. Set equipment as follows:

Spectrum Analyzer
FREQ SPAN/DIV .................... 0
RESOLUTION BW .................... 300 kHz
INPUT ATTEN .................... 10 dB
REFERENCE LEVEL .................... -50 dBm
*002: 0 dBmV*
Amplitude Scale .................... LIN
SWEEP TIME/DIV .................... AUTO
SWEEP TRIGGER .................... FREE RUN

Digital Voltmeter
RANGE .................... 10
FUNCTION .................... dcV
TRIGGER .................... INTERNAL
MATH .................... OFF
AUTO CAL .................... ON

2. Connect equipment as shown in Figure 5-13. Set 1-dB step attenuator to 10 dB. Set signal generator frequency to 301.4 MHz and OUTPUT LEVEL to -13 dBm. Remove W7 from A9J1. Connect signal generator output through step attenuators and test cable to A9J 1.

**NOTE**

**The HP 355C 10 dB attenuation is included to compensate for the 10 dB of gain on Step Gain Assembly A12 the TEST-NORM switch is in TEST.**

3. Set the TEST-NORM switch on Step Gain Assembly A12 to the TEST position. Tune signal generator frequency for maximum signal amplitude on display with 10 dB step attenuator set to 0 dB. (It may be necessary to reduce signal generator OUTPUT LEVEL slightly.)

4. Disconnect signal generator output from step attenuator. Measure offset at A15TP and record.

__________ mV

5. Connect signal generator to step attenuator and adjust signal generator FINE TUNE control to peak signal on CRT display.

6. Adjust spectrum analyzer REF LEVEL CAL and signal generator OUTPUT LEVEL for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

7. Set Amplitude Scale to 10 dB/DIV.

8. Set 10-dB step attenuator to 0 dB and adjust A14R23 SLOPE for DVM reading (I 1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

## 5-26. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

9. Set 10-dB step attenuator to 60 dB and adjust A14R10 OFFSET for DVM reading (± 1 mV) of 200 mV plus offset recorded in step 4, as measured at A15TP1.

10. Repeat steps 8 and 9 until no further adjustment is necessary.

11. Set 10-dB step attenuator to 30 dB and adjust A14R23 SLOPE for DVM reading (± 1 mV) of 500 mV plus offset recorded in step 4, as measured at A15TP1.

12. Set 10-dB step attenuator to 0 dB and adjust A14R69 - 30 dB for DVM (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

13. Repeat steps 11 and 12 until no further adjustment is necessary.

14. Set 10-dB step attenuator to 10 dB and adjust A14R23 SLOPE for DVM reading (± 1 mV) of 700 mV plus offset recorded in step 4, as measured at A15TP1.

15. Set 10-dB step attenuator to O dB and adjust A14R39 - 10 dB for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

16. Repeat steps 14 and 15 until no further adjustment is necessary.

17. Repeat steps 8 through 16 until limits in Table 5-7 are met.

*Table 5- 7. Log Fidelity Check*

| Step Attenuator Setting (dB) | DVM Reading* |
|---|---|
| 0 | Ref: 800 ±1 mV |
| 10 | 700 ±3 mV |
| 20 | 600 ±4 mV |
| 30 | 500 ±4 mV |
| 40 | 400 ±5 mV |
| 50 | 300 ±6 mV |
| 60 | 200 ±7 mV |
| 70 | 100 ±8 mV |

*Plus offset

### Linear Output and Linear Step Gain

18. Set spectrum analyzer controls as follows:

REFERENCE LEVEL ........................................ - 50 dBm
*002: 0 dBmV*
Amplitude Scale ........................................ LIN

## 5-26. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

19. Set 10-dB step attenuator to O dB and adjust A14R34 LIN for DVM reading (±1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

20. Make adjustments indicated in Table 5-8 .

*Table 5-8. Linear Gain Adjustments*

| Adjustment | Step Attenuator | Reference Level | DVM Reading* |
|---|---|---|---|
| A14R34 | 0 | -50 dBm | Ref: 800 ± 1 mV |
| A14R33 | 10 | -60 dBm | 800 ± 5 mV |
| A14R30 | 20 | -70 dBm | 800 ± 5 mV |
| A14R27 | 30 | -80 dBm | 800 ± 5 mV |
| No Adjustment | 40 | -90 dBm | 800 ± 10 mV |
| *Plus offset | | | |

**Log Gain**

21. Set spectrum analyzer control as follows:

REFERENCE LEVEL ........................................ - 50 dBm
*002: 0 dBmV*
Amplitude Scale ........................................ 1 dB/DIV

22. Set 10-dB step attenuator to 0 dB. Adjust signal generator for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

23. Set 10-dB step attenuator to 40 dB. Set REF LEVEL dBm to -90 and adjust A14R121 LOG GAIN for DVM reading (± 3 mV) of 800 mV plus offset recorded in step 4, as measured at A15TP1.

*002: - 40 dBmV*

24. Check log gain steps according to Table 5-9.

*Table 5-9. Log Gain Adjustment Limits*

| Step Attenuator | Reference Level | DVM Reading* |
|---|---|---|
| 0 | -50 dBm | Ref: 800 +1 mV |
| 10 | -60 dBm | 800 +30 mV |
| 20 | -70 dBm | 800 +30 mV |
| 30 | -80 dBm | 800 +30 mV |
| 40 | -90 dBm | 800 +30 mV |
| *Plus offset | | |

## 5-26. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (Cont'd)

### Error Check (1 dB/DIV)

25. Set spectrum analyzer controls as follows:

REFERENCE LEVEL ........................................ - 50 dBm
*002: 0dBmV*
Amplitude Scale ........................................ 1 dB

26. Set both step attenuators to 0 dB. Reduce signal generator OUTPUT LEVEL until signal appears at top of display. Adjust signal generator FINE TUNE to peak trace on display and adjust OUTPUT LEVEL for DVM reading (± 1 mV) of 800 mV plus offset recorded in step 4, as measured at A 5TP 1. Increase attenuation in 1-dB steps and take DVM readings to check log amplifier output. (Refer to Table 5-10.)

27. Return A12S1 TEST-NORM switch to NORM. Remove test cable and reconnect W7 to A9J1.

*Table 5-10. Log Amplifier Output Limits*

| Step Attenuator | DVM Reading* |
|---|---|
| 1 | 700 ± 10 mV |
| 2 | 600 ± 20 mV |
| 3 | 500 ± 30 mV |
| 4 | 400 ± 30 mV |
| 5 | 300 ± 30 mV |
| 6 | 200 ± 30 mV |
| 7 | 100 ± 30 mV |
| *Plus offset | |

## 5-27. SWEEP TIME PER DIVISION ADJUSTMENT

REFERENCE

A8 Schematic

DESCRIPTION

Sweep time per division is adjusted for proper sweep time and 'dead time.'

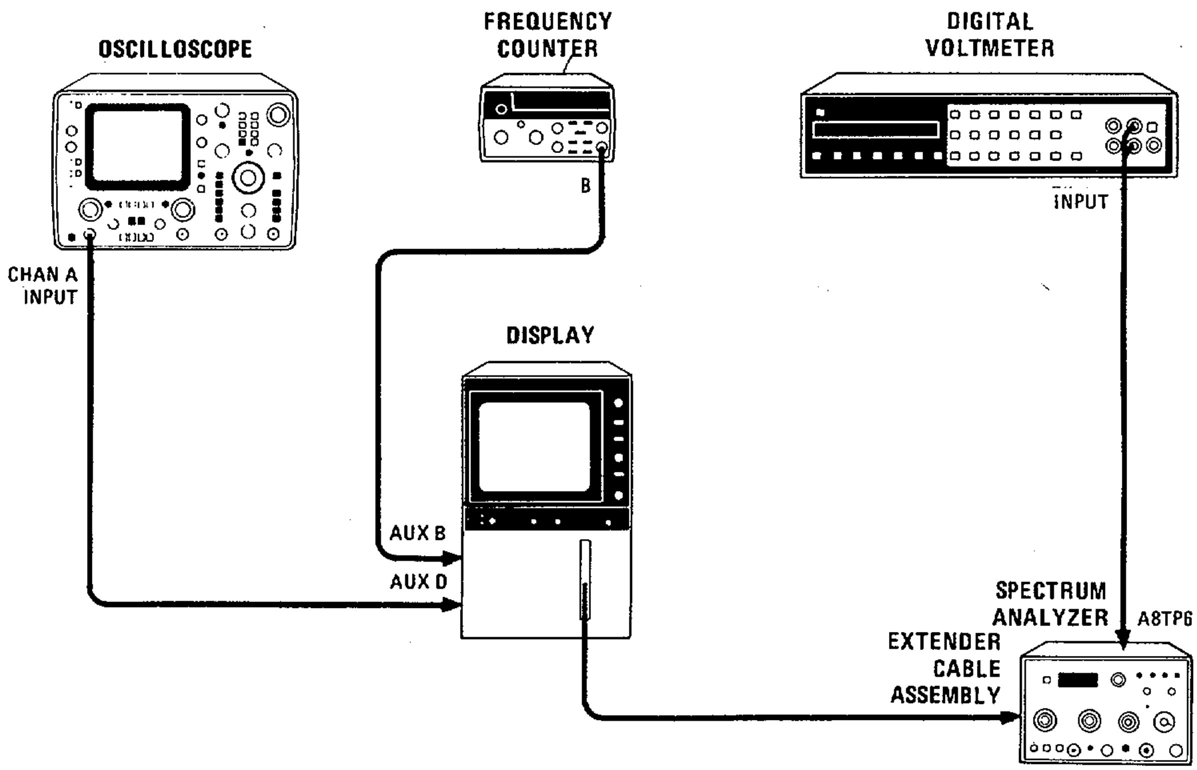



*Figure 5-14. Sweep Time Per Division Adjustment Test Setup*

EQUIPMENT

| | |
|---|---|
| Oscilloscope | HP 1741A |
| Digital Voltmeter | HP 3455A |
| Timer/Counter | HP 5308A |
| BNC Cable, 120 cm (48 in) | HP 18503A |
| Cable, Banana Plug to Alligator Clips 150 cm (60 in) | HP 11002A |
| Extender Cable Assembly | HP 5060-0303 |

## 5-27. SWEEP TIME PER DIVISION ADJUSTMENT (Cont'd)

PROCEDURE

1. Set equipment as follows:

Oscilloscope

| | |
|---|---|
| DISPLAY | A |
| TRIGGER | A |
| CHAN A | 2 VOLTS/DIV |
| AC-GND-DC | DC |
| WRITE | ON |
| TIME/DIV | 2 mSEC |
| MAG X5 | OFF |
| EXT TRIGGER | INT |
| MODE | MAIN |

Digital Voltmeter

| | |
|---|---|
| RANGE | AUTO |
| FUNCTION | dcV |
| AUTO CAL | ON |
| TRIGGER | INTERNAL |
| MATH | OFF |

TIMER/COUNTER

| | |
|---|---|
| TIME BASE | 10 µs |
| FUNCTION | PER B |

2. Connect equipment as shown in Figure 5-14. Connect oscilloscope to AUX D, HORIZONTAL OUT- PUT, rear of display mainframe, or to A8TP5 of HP 8558B. Connect digital voltmeter to A8TP6 (located to the left and below A8TP4.)

3. Adjust A8R7 + 10lOV adjustment for 1OV 40.02 V.

**NOTE**

**The + 10V must be adjusted while analyzer is still cold, during first five minutes after turn-on. If instrument has been operating, turn off mainframe and remove A8 Sweep Generator assembly. Let A8 assembly cool on bench for 15 minutes. Replace A8 and proceed with adjustment of A8R7 during the first five minutes after turn on.**

4. Set spectrum analyzer controls as follows:

| | |
|---|---|
| SWEEP TIME/DIV | 1 ms |
| SWEEP TRIGGER | FREE RUN |

5. Check oscilloscope trace for approximately a - 5V to + 5V ramp.

**5-27. SWEEP TIME PER DIVISION ADJUSTMENT (Cont'd)**

6. Adjust A8R10 1 ms adjustment for a 10 ms ramp time. Measure dead time of ramp.

| MIN. | ACTUAL | MAX. |
|---|---|---|
| 0.25 ms | ________ | 0.40 ms |

7. Set spectrum analyzer SWEEP TIME/DIV to 2 mSEC. Adjust A8R13 2 ms adjustment for a 20 ms ramp time. Measure dead time of ramp.

| MIN. | ACTUAL | MAX. |
|---|---|---|
| 6.0 ms | ________ | 9.0 ms |

8. Set SWEEP TIME/DIV to 1 mSEC. Frequency counter should read sweep time plus dead time (10 ms + dead time 40.05 ms). Adjust A8R10 if necessary to obtain an indication of 10 ms + dead time ± 0.05 ms.

9. Set SWEEP TIME/DIV to 2 mSEC. Frequency counter should read sweep time plus dead time (20 ms + dead time -0.10 ms). Adjust A8R13 if necessary to obtain an indication of 20 ms + dead time ± 0.10 ms.

10. Repeat steps 8 and 9 until the sweep time plus dead time (dt) for the 1 ms and 2 ms sweeps are within limits.

| MIN | ACTUAL | MAX. |
|---|---|---|
| 10 ms + dt - 0.05 ms | ________ | 10 ms + dt + 0.05 ms |
| 20ms + dt- 0.10ms | ________ | 20ms + dt + 0.10ms |

## 5-28. FREQUENCY CONTROL AND DPM ADJUSTMENTS

REFERENCE

A1 and A7 Schematics

DESCRIPTION

The + 14.5V and REF V voltages are adjusted and the - 10.0V voltage is checked. The frequency limits and linearity of the YIG oscillator are set. The FREQUENCY MHz readout is adjusted for proper voltage calibration and for correct ranging.

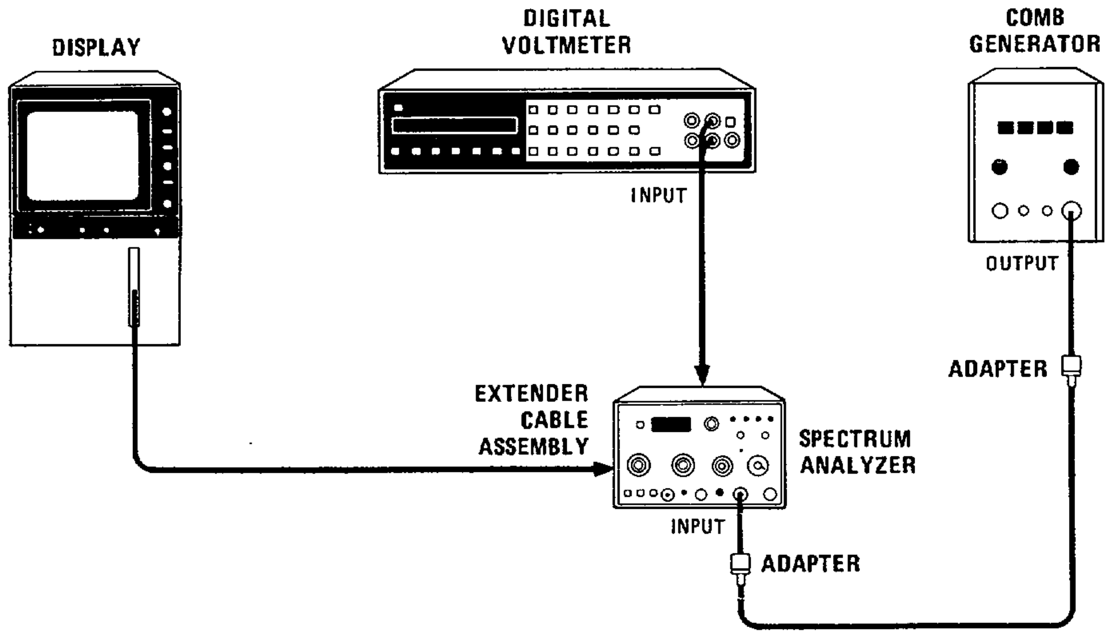



*Figure 5-15. Frequency Control and DPM Adjustments Test Setup*

EQUIPMENT

| | |
|---|---|
| Digital Voltmeter | HP 3455A |
| Comb Generator | HP 8406A |
| Adapter, Type N (m) to BNC (f) (2 required) | HP 1250-0780 |
| BNC Cable, 120 cm (48 in) | HP 18503A |
| Cable, Banana Plug to Alligator Clips 150 cm (60 in) | HP 11002A |
| Extender Cable Assembly | HP 5060-0303 |

*Additional Equipment, Options 001 and 002:*

| | |
|---|---|
| *Minimum Loss Adapter, 75Ω to 50Ω* | *HP 08558-60031* |
| *Adapter, BNC (m) to BNC (m), 75Ω* | *HP 1250-1288* |
| *Adapter, SMA (f) to SMA (f)* | *HP 1250-1158* |
| *Adapter, BNC (f) to SMA (m)* | *HP 1250-1200* |

## 5-28. FREQUENCY CONTROL AND DPM ADJUSTMENTS (Cont'd)

PROCEDURE

### Voltage Adjustments

1. Connect equipment as shown in Figure 5-15. Connect digital voltmeter to A7TP7 (located between A7R4 REF V and A7R5 + 14.5V adjustments).

2. Adjust A7R5 + 14.5V potentiometer for + 14.50 ± 0.02 V.

3. Connect digital voltmeter to A7TP8 (located to the right of A7R5 + 14.5V adjustment) and check for -10.0 ± 0.2 V.

4. Connect digital voltmeter to A7TP6 and adjust A7R4 REF V potentiometer for + 6.00 ± 0.01 V.

### YIG Oscillator Adjustment

**NOTE**

**Check HORIZ GAIN and HORIZ POSN adjustments and perform voltage adjustments before continuing with the following procedure.**

5. Set spectrum analyzer controls as follows:

START - CENTER ........ CENTER
FREQ SPAN/DIV ........ 5 MHz
RESOLUTION BW ........ 100 kHz
INPUT ATTEN ........ dB
REFERENCE LEVEL ........ -10 dBm
*002: +40dBmV*
Amplitude Scale ........ 10 dB/DIV
SWEEP TIME/DIV ........ AUTO
SWEEP TRIGGER ........ FREE RUN

6. Turn FREQUENCY ZERO control fully counterclockwise.

7. Adjust TUNING for FREQUENCY MHz readout of approximately - 16.0.

**NOTE**

**Press FREQUENCY CAL button to remove YIG oscillator hysteresis whenever the TUNING control is adjusted.**

8. Adjust A7R3 2.0 GHZ to center LO feedthrough (within one division) on CRT.

**NOTE**

**Disconnect comb generator whenever it is necessary to center the LO feedthrough.**

## 5-28. FREQUENCY CONTROL AND DPM ADJUSTMENTS (Cont'd)

9. Couple FREQ SPAN/DIV and RESOLUTION BW controls. Set FREQ SPAN/DIV to 100 MHz/DIV. Set comb generator frequency to 100 MHz. Adjust TUNING to approximately 500 MHz for full-screen display of comb teeth.

10. Adjust TUNING, A7R1 3.55 GHZ, and A7R2 3.55 FINE to align comb teeth on vertical graticule lines (one tooth per division).

11. Repeat steps 7 and 8. (A7R1 3.55 GHZ adjustment has a slight effect on A7R3 2.0 GHZ adjustment.)

12. Set FREQ SPAN/DIV to 1 MHz and comb generator frequency to 1 MHz.

13. Adjust TUNING to approximately 750 MHz. Adjust A7R6 FM to align comb teeth on vertical graticule lines (one tooth per division).

### Digital Panel Meter Adjustment

14. Set FREQ SPAN/DIV to 500 kHz.

15. Center LO feedthrough. Press FREQUENCY CAL button and re-center LO feedthrough.

16. Adjust FREQUENCY ZERO control for FREQUENCY MHz readout of 00.0.

17. Set comb generator frequency to 100 MHz. Adjust TUNING to center 1500-MHz tooth (15th tooth from LO feedthrough). Press FREQUENCY CAL button and re-center comb tooth. Adjust A1A2R3 REF for FREQUENCY MHz readout of 1500 + 1.

18. Adjust A7R8 RNG fully clockwise. Set comb generator frequency to 10 MHz. Adjust TUNING to center 190-MHz comb tooth (19th tooth from LO feedthrough). Adjust A7R7 GAIN for FREQUENCY MHz readout of 190.0.

**NOTE**

**Press FREQUENCY CAL frequently while counting the comb teeth to avoid miscounting.**

19. Adjust TUNING for FREQUENCY MHz readout of 198.5. Slowly adjust A7R8 RNG counterclockwise until range switches (no decimal on FREQUENCY MHz display).

20. Center LO feedthrough. Press FREQUENCY CAL button and re-center LO feedthrough. Set comb generator frequency to 100 MHz. Adjust TUNING to center 200-MHz comb tooth (second tooth from LO feedthrough). Press FREQUENCY CAL button and re-center comb tooth. Adjust A7R72 OFS for FREQUENCY MHz readout of 200.

21. Repeat steps 15 through 21 until 190.0 MHz, 200 MHz, and 1500 MHz readouts on FREQUENCY MHz display are calibrated.

## 5-29. 1 dB OFFSET ADJUSTMENT

REFERENCE

A15 Schematic

DESCRIPTION

Reference is set in 10 dB/DIV and 1 dB offset is adjusted in 1 dB/DIV for the same full display reference in 10 dB/DIV.

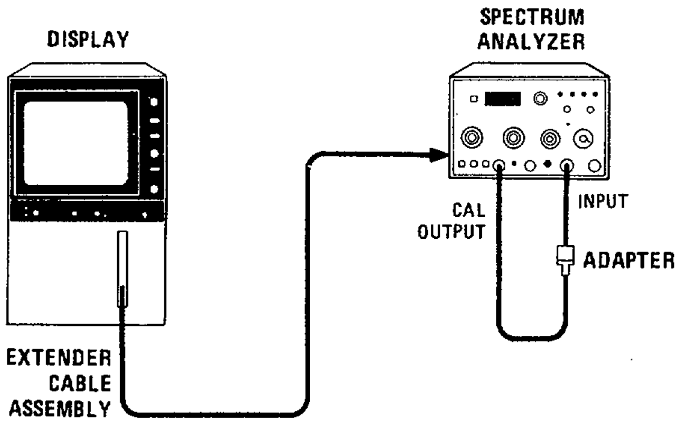



*Figure 5-16. 1-dB Offset Adjustment Test Setup*

EQUIPMENT

BNC Cable, 120 cm (9 in) .......... HP 18502A
Adapter, Type N (m) to BNC (f) .......... HP 1250-0780
Extender Cable Assembly .......... HP 5060-0303

*Additional Equipment, Options 001 and 002:*

*BNC Cable, 30 cm (12 in) .......... HP 11652-60012*

PROCEDURE

1. Set Spectrum Analyzer controls as follows:

START - CENTER .......... CENTER
TUNING .......... 280 MHz
FREQ SPAN/DIV .......... 1 MHz
RESOLUTION BW .......... 1 MHz
INPUT ATTEN .......... 10 dB
REFERENCE LEVEL .......... -20 dBm
*002: +30dBmV*
REF LEVEL FINE .......... Approximately - 10
Amplitude Scale .......... LIN
SWEEP TIME/DIV .......... AUTO
SWEEP TRIGGER .......... FREE RUN

## 5-29. 1-dB OFFSET ADJUSTMENT (Cont'd)

2. Connect equipment as shown in Figure 5-16.

3. Set Amplitude Scale switch to LIN. Set TUNING control to center the trace on the display. Set REF LEVEL FINE for a full-screen trace (signal at top graticule line).

4. Set Amplitude Scale switch to 10 dB/DIV. Adjust VERTICAL GAIN if necessary for full screen trace.

5. Repeat steps 3 and 4 until the trace is full screen in both LIN and 10 dB/DIV.

**NOTE**

**1 dB/DIV will read approximately 0.5 dB (0.5 division) low when using extender cable assembly. Adjusting A15Ri 1 dB OFFSET for a trace 0.5 division down from top graticule line should place signal at top graticule line when 8558B is properly installed in 180-series mainframe.**

6. Amplitude Scale switch to 1 dB/DIV. Adjust A15R1 1 dB OFFSET for a trace 0.5 division down from top graticule line.

**THIS PAGE MISSING NOT AVAILABLE FOR DIGITIZATION.**

**PAGES**
**5-53 through 5-59**

# SECTION VI.
# REPLACEABLE PARTS

## 6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. Table 6-1 includes a list of reference designations and a list of abbreviations used in the parts list. Table 6-2 lists names and addresses that correspond to the manufacturer code numbers in the parts list. Table 6-3 lists all replaceable parts in alpha-numerical order by reference designation.

## 6-3. REPLACEABLE PARTS LIST

6-4. Table 6-3, the list of replaceable parts, is organized as follows:

1. Electrical assemblies and their components in alpha-numerical order by reference designation
2. Miscellaneous parts, with appropriate electrical assembly
3. Chassis-mounted electrical parts, in alphanumerical order by reference designation
4. Mechanical chassis parts, at end of parts list

6-5. The following information is listed for each part:

1. The Hewlett-Packard part number
2. The part number check digit (CD)
3. The total quantity (Qty) in the instrument. This quantity is given only once, at the first appearance of the part in the list.
4. The description of the part
5. A five-digit code indicating a typical manufacturer of the part
6. The manufacturer's part number

## 6-6. ORDERING INFORMATION

6-7. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number (with check digit), indicate the quantity required, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate and timely processing of your order.

6-8. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

*Table 6-1. Reference Designations and Abbreviations (1 of 3)*

## REFERENCE DESIGNATIONS

A ........ Assembly
AT ........ Attenuator, Isolator, Limiter, Termination
B ........ Fan, Motor
BT ........ Battery
C ........ Capacitor
CP ........ Coupler
CR ........ Diode, Diode Thyristor, Step Recovery Diode (SCR), Varactor
DC ........ Directional Coupler
DL ........ Delay Line
DS ........ Annunciator, Lamp, Light Emitting Diode (LED), Signaling Device (Audible or Visible
E ........ Miscellaneous Electrical Part
F ........ Fuse
FL ........ Filter
H ........ Hardware
HY ........ Circulator
J ........ Electrical Connector (Stationary Portion), Jack
K ........ Relay
L ........ Coil, Inductor
M ........ Meter
MP ........ Miscellaneous Mechanical Part
P ........ Electrical Connector (Movable Portion), Plug
Q ........ Silicon Controlled Rectifier (SCR), Transistor, Triode Thyristor
R ........ Resistor
RT ........ Thermistor
S ........ Switch
T ........ Transformer
TB ........ Terminal Board
TC ........ Thermocouple
TP ........ Test Point
U ........ Integrated Circuit, Microcircuit
V ........ Electron Tube
VR ........ Breakdown Diode(Zener), Voltage Regulator
W ........ Cable, Transmission Path, wire
X ........ Socket
Y ........ Crystal Unit (Piezoelectric, Quartz)
Z ........ Tuned Cavity, Tuned Circuit

## ABBREVIATIONS

### A

A ........ Across Flats, Acrylic, Air (Dry Method), Ampere
ADJ ........ Adjust, Adjustment
ANSI ........ American National Standards Institute (formerly USASI-ASA)
ASSY ........ Assembly
AWG ........ American Wire Gage

### B

BCD ........ Binary Coded Decimal
BD ........ Deep, Depth, Diametric
BE-CU ........ Beryllium Copper
BNC ........ Type of Connector
BRG ........ Bearing, Boring
BRS ........ Brass
BSC ........ Basic
BTN ........ Button

### C

C ........ Capacitance, Capacitore, Center Tapped, Centistoke, Cermet, Circular Mil Foot, Closed Cup, Cold, Compression
CCP ........ Carbon Composition Plastic
CD ........ Cadmium, Card, Cold-Drawn, Cord
CER ........ Ceramic
CHAM ........ Chamfer
CHAR ........ Character, Characteristic, Charcoal
CMOS ........ Complementary Metal Oxide Semiconductor
CNDCT ........ Conducting, Conductive, Conductivity, Conductor
CONT ........ Contact, Continuous, Control, Controller
CONV ........ Converter
CPRSN ........ Compression
CUP-PT ........ Cup Point
CW ........ Clockwise, Continuous Wave

### D

D ........ Deep, Depletion, Depth, Diameter, Direct Current
DA ........ Darlington
DAP-GL ........ Diallyl Phthalate Glass
DBL ........ Double
DCDR ........ Decoder
DEG ........ Degree
D-HOLE ........ D-Shaped Hole
DIA ........ Diameter
DIP ........ Dual In-Line Package
DIP-SLDR ........ Dip Solder
D-MODE ........ Depletion Mode
DO ........ Package Type Designation
DP ........ Deep, Depth, Diametric Pitch, Dip
DP3TMINTR ........ Double Pole Three Throw, Miniature
DPDTMINTR ........ Double Pole Double Throw, Miniature
DWL ........ Dowel

### E

E-R ........ E-Ring
EXT ........ Extended, Extension, External, Extinguish

### F

F ........ Fahrenheit, Farad, Female, Film (Resistor), Fixed, Flange, Flint, Fluorine, Frequency
FC ........ Carbon Film / Composition, Edge of Cutoff Frequency, Face
FDTHRU ........ Feed Through
FEM ........ Female
FIL-HD ........ Fillister Head
FL ........ Flash, Flat, Fluid
FLAT-PT ........ Flat Point
FR ........ Front
FREQ ........ Frequency
FT ........ Current Gain Bandwidth Product (Transition Frequency); Feet, Foot
FXD ........ Fixed

### G

GEN ........ General, Generator
GND ........ Ground
GP ........ General Purpose, Group

### H

H ........ Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen
HDW ........ Hardware .
HEX ........ Hexadecimal, Hexagon, Hexagonal
HLCL ........ Helical
HP ........ Hewlett-Packard Company, High Pass, Horsepower

### I

IC ........ Collector Current, Integrated Circuit
ID ........ Identification, Inside Diameter
IF ........ Forward Current, Intermediate Frequency
IN ........ Inch, indium
INCL ........ Including
INT ........ Integral, Intensity, Internal
INTL ........ Internal, International

### J

J-FET ........ Junction Field Effect Transistor
JFET ........ Junction Field Effect Transistor

### K

K ........ Kelvin, Key, Kilo, Potassium
KNRLD ........ Knurled
KVDC ........ Kilovolts Direct Current

*Table 6-1. Reference Designations and Abbreviations (2 of 3)*

**L**

LED................... Light Emitting Diode
LG................................ Length, Long
LIN..... Linear, Linear Taper, Linearity
LK ....................................Link, Lock
LKG ...................... Leakage, Locking
LOGO ................................ Logotype
LUM ...................................Luminous

**M**

M .......... Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Tapping Hole Diameter
MA ..................................Milliampere
MACH ................................Machined
MAX.................................. Maximum
MC..................... Hot Molded Carbon Composition, Megacycle, Microcircuit, Molded Carbon Composition
MET.......................... Metal, Metallic, Metallized, Metallurgical
MHZ................................. Megahertz
MIT ..........................................Miter
MLD .............................Mold, Molded
MM ................... Magnetized Material (Restricted Articles Code); Millimeter
MOM............................... Momentary
MTG .................................. Mounting
MTLC....................................Metallic
MUW .............................. Music Wire
MW ..................................... Milliwatt

**N**

N..................Fan Out, Intrinsic Stand Off Ratio, Nano, Nanosecond, Nitrogen, None
N-CHAN........................... N-Channel
NH ...................................Nanohenry
NMH ............Nanometer Nonmetallic
NO ..............Normally Open, Number
NOM ....................................Nominal
NPN...................... Negative Positive Negative (Transistor)
NS Nanosecond, Non-Shorting, Nose
NUM ..................Numeric, Numerical
NYL...................... Nylon (Polyamide)

**O**

OA .......................... Other Restricted Articles, Group A (Restricted Articles Code); Over-All
OD ......Olive Drab, Outside Diameter
OP AMP...........Operational Amplifier
OPT ........... Optical, Option, Optional

**P**

PA...................... Picoampere, Power Amplifier, Pressure Angle, Protactinium
PAN-HD ............................ Pan Head
PAR ...........................Parallel, Parity
PB............ Lead (Metal), Push Button
PC ....................Picocoulomb, Piece, Printed Circuit ..............................
PCB ................. Printed Circuit Board
P-CHAN........................... P-Channel
PD .................. Pad, Palladium, Pitch Diameter, Power Dissipation
PF...............Picofarad; Pipe, Female Connection; Power Factor
PKG ................................... Package
PLSTC .................................. Plastic
PNL .........................................Panel
.................................................PNP

Positive (Transistor)
POLYC ...................... Polycarbonate
POLYE.............................. Polyester
POT ............................Potentiometer
POZI ........................Pozidriv Recess
PREC................................. Precision
PRP .........................Purple, Purpose
PSTN ..................................... Piston
PT..................... Part, Pint, Platinum, Point, Pulse Time
PW ..Power Wirewound, Pulse Width

**Q**

Q ...............................Figure of Merit

**R**

R................Range, Red, Resistance, Resistor, Right, Ring, Rosin, Rubber-Resin, Run Torque
REF ..................................Reference
RES . Research, Resistance, Resistor
RF.......................... Radio Frequency
RGD .........................................Rigid
RND.......................................Round
RR ........................................... Rear
RVT ............................Rivet, Riveted

**S**

SAWR.......... Surface Acoustic Wave Resonator
SEG ...................................Segment
SGL .......................................Single
SI.......................Silicon, Square Inch
SL.................................. Slide, Slow
SLT......................Slate, Slot, Slotted
SMA................Subminiature, A Type (Threaded Connector)
SMC ...............Subminiature, C Type (Threaded Connector)
SPCG ................................. Spacing
SPDTSUBMIN ....Single Pole Double Throw, Subminiature
SPST .........Single Pole Single Throw
SQ ........................................Square
SST ..........................Stainless Steel
STL..........................................Steel
SZ.............................................Size

**T**

T........... Tab Width, Taper, Teeth, Temperature, Tera, Tesla, Thermoplastic (Insulation), Thickness, Time, Timed, Tooth, Turns Ratio, Typical
TA............. Ambient Temperature, Tantalum
TC .......................... Thermoplastic
THD................. Thread, Threaded
THK ....................................Thick
TO .....Package Type Designation, Troy Ounce
Positive Negative..................TPG

TR-HD ....................... Truss Head
TRMR .............................Trimmer
TRN ........................... Turn, Turns
TRSN................................Torsion

**U**

UCD........................ Microcandela
UF ...............................Microfarad
UH ..............................Microhenry
UL............Microliter, Underwriters' Laboratories, Inc.
UNHDND .................. Unhardened

**V**

V........Vanadium, Variable, Violet, Volt, Voltage
VAC......................Vacuum; Volts, Alternating Current
VAC/DC......Volts, Alternating and Direct Current
VAR ................................ Variable
VDC..............Volts, Direct Current

**W**

W.............. Watt, Wattage, White, Wide, Width, Wire

W/CP....Wire / Conductive Plastic
W/SW........................With Switch
WW ..........................Wire Wound

**X**

X...... By (Used With Dimensions), Reactance
XSTR............................Transistor

**Y**

YIG .................Yttrium-ron-Garnet

**Z**

ZNR....................................Zener

*Table 6-1. Reference Designations and Abbreviations (3 of 3)*

**MULTIPLIERS**

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

*Table 6-2. Manufacturers Code List*

| Mfr. No. | Manufacturer Name | Address | Zip Codes |
|---|---|---|---|
| 00000 | ANY SATISFACTORY SUPPLIER | | |
| 01121 | ALLEN-BRADLEY CO | MILWAUKEE, WI | 53204 |
| 01295 | TEXAS INSTR INC SEMICOND CMPNT DIV | DALLAS, TX | 75222 |
| 02111 | SPECTROL ELECTRONICS CORP | CITY OF IND, CA | 91745 |
| 02660 | BUNKER RAMO CORP AMPHENOL CONN DIV | BROADVILLE, IL | 60153 |
| 03888 | K D I PYROFILM CORP | WHIPPANY, NJ | 07981 |
| 04713 | MOTOROLA SEMICONDUCTOR PRODUCTS | PHOENIX, AZ | 85008 |
| 06665 | PRECISION MONOLITHICS INC | SANTA CLARA, CA | 95050 |
| 11236 | CTS OF BERNE INC | BERNE, IN | 46711 |
| 13606 | SPRAGUE ELECT CO SEMICONDUCTOR DIV | CONCORD, NH | 03301 |
| 18736 | VOLTRONICS CORP | HANOVER, NJ | 07936 |
| 19701 | MEPCO/ELECTRA CORP | MINERAL WELLS; TX | 76067 |
| 24046 | TRANSITRON ELECTRONIC CORP | WAKEFIELD, MA | 01880 |
| 24546 | CORNING GLASS WORKS (BRADFORD) | BRADFORD, PA | 16701 |
| 28480 | HEWLETT-PACKARD CO CORPORATE HQ | PALO ALTO, CA | 94304 |
| 3L585 | RCA CORP SOLID STATE DIV | SOMERVILLE, NJ | |
| 30983 | MEPCO/ELECTRIC CORP | SAN DIEGO, CA | 92121 |
| 33095 | SPECTRUM CONTROL INC | FAIRVIEW, PA | 16415 |
| 52763 | STETTNER-TRUSH INC | CAZENOVIA, NY | 13035 |
| 56289 | SPRAGUE ELECTRIC CO | NORTH ADAMS, MA | 01247 |
| 71041 | BOSTON GEAR WKS DIV OF NA ROCKWELL | QUINCY, MA | 02171 |
| 72136 | ELECTRO MOTIVE CORP | FLORENCE, SC | 06226 |
| 72982 | ERIE TECHNOLOGICAL PRODUCTS INC | ERIE, PA | 16512 |
| 74970 | JOHNSON E F CO | WASECA, MN | 56093 |
| 78707 | TEK BEARING CO INC | NEW YORK, NY | 10013 |
| 9N171 | UNITRODE COMPUTER PRODUCTS CORP | METHUEN, MA | |
| 92830 | ASSOCIATED SPRING CORP | BRISTOL, CT | 06010 |

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A1 | | | | DIGITAL PANEL METER ASSEMBLY | | |
| A1A1 | | | | NOT ASSIGNED | | |
| A1A2 | 08558-60125 | 1 | 1 | DPM DRIVER ASSEMBLY<br>**NOTE**<br>SEE A2 FOR DPM DISPLAY | 28480 | 08558-60125 |
| A1A2C1 THRU | | | 2 | | | |
| A1A2C3 | | | | NOT ASSIGNED | | |
| A1A2C4 | 0180-0197 | 8 | 18 | CAPACITOR-FXD 2,2UF+-10X 20VDC TA | 56289 | 150D225X9020A2 |
| A1A2C5 THRU | | | | | | |
| A1A2C9 | | | | NOT ASSIGNED | | |
| A1A2C10 | 0160-4084 | 8 | 11 | CAPACITOR-FXD .UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A1A2C11 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A1A2CI2 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A1A2C13 | | | | NOT ASSIGNED | | |
| A1A2C14 | 0160-0168 | 1 | 1 | CAPACITOR-FXD .1UF +-10% 200VODC POLYE | 28480 | 0160-0168 |
| A1A2C15 | 0180-2207 | 5 | 1 | CAPACITOR-FXD 100UF +-10% 10VDC TA | 56289 | 150D107X9010R2 |
| A1A2C16 | 0160-4084 | 8 | | CAPACITOR-FXD , 1UF +-20X 50VDC CER | 28480 | 0160-4084 |
| A1A2CR1 | | | | NOT ASSIGNED | | |
| A1A2CR2 | 1901-0040 | 1 | 29 | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A1A2CR3 | 1901-0050 | 3 | 27 | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A1A2J1 | 1200-0508 | 0 | 1 | SOCKET-IC 14-CONT DIP-SLDR | 28480 | 1200-0508 |
| A1A2L1 | 9100-1644 | 3 | 1 | INDUCTOR RF-CH-MLD 330UH 5% .2DX.45L.G | 28480 | 9100-1644 |
| A1A2Q1 | | | | NOT ASSIGNED | | |
| A1A2Q2 | | | | NOT ASSIGNED | | |
| A1A2Q3 | 1854-0404 | 0 | 35 | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A1A2Q4 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A1A2R1 | 0757-0465 | 6 | 27 | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A1A2R2 | 0757-0420 | 3 | 7 | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A1A2R3 | 2100-1702 | 7 | 1 | RESISTOR-TRMR 100 10% WW SIDE-ADJ 20-TRN | 02660 | 3810P-101 |
| A1A2R4 | 0698-3446 | 3 | 3 | RESISTOR 383 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-383R-.F |
| A1A2R5 | 0757-0442 | 9 | | RESISTOR 10K 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A1A2R6 | 0698-3260 | 9 | 5 | RESISTOR 464K 1% .125W F TC=0+-1OO | 28480 | 0698-3260 |
| A1A2R7 | 0698-3457 | 6 | | RESISTOR 316K 1% .125W F TC=0+-100 | 28480 | 0698-3457 |
| A1A2R8 | 0698-3439 | 4 | 1 | RESISTOR 178 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-178R-F |
| A1A2R9 | 0757-0442 | 9 | | RESISTOR 10OK 1%X .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A1A2R10 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A1A2R11 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A1A2R12 | 0757-0458 | 7 | | RESISTOR 51.1K 1% .125W F TC=0+-O00 | 24546 | C4-1/B-TO-5112-F |
| A1A2R13 | 0757-0458 | 7 | | RESISTOR 51.1K 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-5112-F |
| A1A2R14 | 0757-0317 | 7 | 6 | RESISTOR 1.33K 1% .125W F TC=0+-100 | 24546 | C4--1/8-TO-1331-F |
| A1A2TP1 | 0360-0535 | 0 | 13 | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A1A2TP2 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A1A2TP3 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A1A2U1 | 1826-0431 | 4 | 1 | IC CONV 24-DIP- C PKG | 04713 | MC14433L |
| A1A2U2 | 1858-0047 | 5 | 1 | TRANSISTOR ARRAY 16-PIN PLSTC DIP | 13606 | ULN-2003A |
| A1A2U3 | 1820-1413 | 2 | 1 | IC DCDR CMOS BCD-TO-7-SEG 4-TO-7-LINE | 3L585 | CD45118E |
| A1A2U4 | 1810-0346 | 7 | t | NETWORK-RES 16-DIP080.0 OHM X S | 11236 | 761-3-RI80 |
| A1A2VR1 | | | | NOT ASSIGNED | | |
| A1A2VR2 | 1902-0064 | 1 | 2 | DIODE-ZNR 7.5V 5% DO-35 PD=,4W TC=+.05X | 28480 | 1902-0064 |
| **A2** | **08558-60100** | **2** | **1** | **FRONT SWITCH ASSEMBLY**<br>(ELECTRICAL PARTS)<br>**NOTE**<br>SEE FIGURE 6-3 FOR COMPLETE IDENT-<br>IFICATION OF FRONT SW. ASSY PARTS. | **28480** | **0855860100** |
| A2R1 | 2100-3593 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-TRN 5K 10%<br>(COARSE TUNE) | 28480 | 2100-3593 |
| A2R2 | 2100-.3452 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-.TRN 10K 10%<br>(FINE TINE) | 28480 | 2100-3452 |
| A2R3 | 2100-3066 | 0 | 1 | RESISTOR-VAR PREC WW 10-TRN 5K 5%<br>(FREQ. ZERO) | 28480 | 2100-3066 |
| A2R4 | 2100-0542 | 1 | 1 | RESISTOR-VAR CONTROL WW 10K 5% LIN<br>(RF LVL FINE) | 28480 | 2100-0542 |
| A2R5 | 2100-3973 | 8 | 3 | RESISTOR-VARIABLE W/SW 50K +-20%; 10CW<br>(VIDEO FILTER) | 28480 | 2100-3973 |
| A2R6 | 2100-3973 | 8 | | RESISTOR-VARIABLE W/SW 50K +-20%; 10CW<br>(VIDEO FILTER) | 28480 | 2100-3973 |
| A2S1 | 3101-0044 | 1 | 1 | SWITCH-PB SPST-NO MOM .5A 115VAC RED-BTN<br>(FREQ. CAL) | 28480 | 3101-0044 |
| A2S2 | 2100-3973 | 8 | | RESISTOR-VARIABLE W/SW 50K +-20%; 10CW<br>P/O A2RS/R6/52(MAX VIDEO FILTER) | 28480 | 2100-3973 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A2A1 | 08558-60160 | 4 | 1 | SWITCH BOARD ASSEMBLY | 28480 | 08558-60160 |
| A2A1CR1 | 1901-0025 | 2 | 1 | DIODE-GEN PRP 1OOV 200MA DO-7 | 28480 | 1901-0025 |
| A2A1CR2 | 1902-0064 | 1 | | DIODE-ZNR 7.5V 5% 0DO-35 PD=.4W TC=+.05% | 20480 | 1902-0064 |
| A2A1DS1 | 1990-0619 | 7 | 8 | DISPLAY-NUM-SEG 1-CHAR .3-H | 20480 | 1990-0619 |
| A2A1DS2 | 1990-0619 | 7 | | DISPLAY-.NUM-SEG 1-CHAR .3--H | 28480 | 1990-0619 |
| A2A1DS3 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 1990-0619 |
| A2A1DS4 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 1990-0619 |
| A2A1D55 | 1990-0485 | 5 | 2 | LED-LAMP LUM-INT=8OOUCD IF=3OMA-MAX | 28480 | 1990-0485 |
| A2A1R1 | 0757-0447 | 4 | 6 | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A2A1R2 | 2100-3340 | 3 | 1 | RESISTOR-VAR CONTROL CCP 1K 20% LIN | 28480 | 2100-3340 |
| A2A1R3 | 2100-2681 | 3 | 1 | RESISTOR-TRMR 5K 10% CCP TOP-ADJ I-TRN | 28480 | 2100-2681 |
| A21AR4 | 2100-3332 | 3 | 0 | RESISTOR-TRMR o10K 20% CC TOP-ADS 1-TRN | 28480 | 2100-3332 |
| A2A1R5 | 0757-0444 | 1 | 17 | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A2A1R6 | 2100-1412 | 6 | 1 | RESISTOR-TRMR 500 20% CCP TOP-ADJ 1-TRN | 28480 | 2100-1412 |
| A2A1R7 | 2100-3331 | 2 | 1 | RESISTOR-TRMR 10K 20% MC TOP-ADJ 1-TRN | 28480 | 2100-3331 |
| A2A1R8 | 0757-0317 | 7 | | RESISTOR 1.33K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1331-F |
| A2A1S1 | | | | (REF LEVEL DOM) SEE FIGURE 6-3. | | |
| A2A1S2 | 3101-2213 | 0 | 1 | SWITCH-PB DPDT(AMPLITUDE SCALE) | 28480 | 3101-2213 |
| A2A1S3 | | | | (SWEEP TIME/DIV) SEE FIGURE 6-3. | | |
| A2A1S4 | | | | (SWEEP TRIGGER) SEE FIGURE 6-3. | | |
| A2A1S5 | | | | (RESOLUTION BW) SEE FIGURE 6-3. | | |
| A2A1S6 | | | | (FREQ SPAN/DIV) SEE FIGURE 6-3. | | |
| A2A1S7 | 3101-2124 | 2 | 1 | SWITCH-PB DPDT (START/CENTER) | 28480 | 3101-2124 |
| A21AW1 | 018558-60168 | 2 | 1 | RIBBON CABLE ASSY-DPM | 28480 | 08558-60168 |
| A2A1W2 | 08558-60037 | 4 | 1 | RIBBON CABLE ASSY-INTERCONNECT | 28480 | 08558-60037 |
| A2A1XDS1 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 1990-0819 |
| A2A1XDS2 | 1990-0619 | 7 | | DISPLAY-NUM-SEG I-CHAR .3-H | 28480 | 1990-0619 |
| A2A1XDS3 | 1990-0619 | 7 | | DISPLAY-HUM-SEC i-CHAR .3--H | 28480 | 1990-0619 |
| A2A1XDS4 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 1990-0619 |
| A2A1XDS5 | 1990-0485 | 5 | | LED-LAMP LUM-INT=800UCD IF=30MA-MAX | 28480 | 1990-0485 |
| **A3** | **5086-7363** | **9** | **1** | **INPUT ATTENUATOR** | **28480** | **5086-7363** |
| | 08495-60004 | 9 | | RESTORED 08558-60003,EXCHANGE REQUIRED | 28480 | 08495-60004 |
| **A4** | **08558-60004** | **5** | **1** | **FIRST CONVERTER** | **28480** | **08558-60004** |
| A4J1 | 1250-1020 | 8 | 4 | CONNECTOR-RF SMA FEM SGL-HOLE-RR 50-OHM | 28480 | 1250-1020 |
| A4J2 | 1250-1020 | 8 | | CONNECTOR-RF SMA FEM SGL-HOLE-RR 50-OHM | 28480 | 1250-1020 |
| A4J3 | 1250--1020 | 8 | | CONNECTOR-RF SMA FEN SGL-HOLE-RR 50-OHM | 28480 | 1250-1020 |
| A4J4 | 1250-1020 | 8 | | CONNECTOR-RF SMA FEM SGL-'HOLE-RR 50-OHM | 28480 | 1250-1020 |
| A4MP1 | 0E8558-00052 | 7 | 1 | GASKET, FIRST CONVERTER | 28480 | 08558-00052 |
| A4HP2 | 08558--20042 | 7 | 1 | COVER, FIRST CONVERTER | 28480 | 08558-20042 |
| A4MP3 | 08558-20043 | 8 | 1 | MOUNT, FIRST CONVERTER | 28480 | 08558-20043 |
| A4R0 | 0698-7212 | 9 | 3 | RESISTOR 100 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-100R-F |
| A4R2 | 0698-7221 | 0 | 1 | RESISTOR 237 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-237R-F |
| 64R3 | 0698-7216 | 3 | 2 | RESISTOR 147 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-147R-F |
| 64R4 | 0698-7202 | 7 | 0 | RESISTOR 38.3 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-30R3-F |
| A4R5 | 0698-7216 | 3 | | RESISTOR 147 1% .85W F TC=0+-100 | 24546 | C3-1/8-TO-147R-F |
| A4U1 | 08550-60152 | 4 | 1 | FIRST MIXER DIODE ASSEMBLY | 28480 | 08558-60152 |
| **A5** | **08558-60097** | **6** | **1** | **SECOND-CONVERTER** | **28480** | **0855800097** |
| A5C1 | 0160-3036 | 8 | 2 | CAPACITOR-FDTHRU 5000PF +80 -20% 200V | 28480 | 0160-3036 |
| A5C2 | 0160-3036 | 8 | | CAPACITOR-FDTHRU 5000PF 0SO -20% 200V | 28480 | 0160-3036 |
| A5C3 | 0160-4959 | 6 | 1 | CAPACITOR-FDTHRU 10PF 5% 200V CER | 33095 | 54-713-002-XSE-100J |
| A5C4 | 0140-0075 | 7 | 1 | CAPACITOR-FDTHRU 22PF 10% 500V MICA | 72982 | 666-053-0160-220K |
| A5CR1 | 1901-0950 | 2 | 1 | DIODE-SM SIG SCHOTTKY | 28410 | 1901-0950 |
| A5J1 | 1250-1157 | 2 | 1 | CONNECTOR-RF SMA FEM THD-HOLE 50-OIIM | 28480 | 1250-1157 |
| A5J2 | 1250-1435 | 9 | 1 | CONN: RF: 500 OHM: SMC | 28480 | 1250-1435 |
| A5J3 | 1250-0829 | 3 | 1 | CONNECTOR-RF SMC M SGL-HOLE-FR 50-OHM | 28480 | 1250-0829 |
| A5L1 | 9100-2255 | 4 | 6 | INDUCTOR RF-CH-MLD 47ONH 10% .185DX.26LC | 28480 | 9100-2255 |
| A5L2 | 08558-80009 | 2 | 1 | COIL, SECOND CONVERTER | 28480 | 08558-80009 |
| A5L3 | 08550-00034 | 5 | 1 | COUPLING LOOP, INPUT | 28400 | 08558-00034 |
| A5L4 | 08558-00033 | 4 | 2 | COUPLING LOOP, FILTER | 28480 | 08558-00033 |
| A5L5 | 08558-00033 | 4 | | COUPLING LOOP, FILTER | 28480 | 08558-00033 |
| A5MP1 | 08558-20122 | 4 | 1 | OSCILLATOR HOUSING/SECOND CONV. COVER MATCHED> TO ASFMP2NOT SEPARATELY REPLA | 28480 | 08558-20122 |
| A5MP2 | 08558-20121 | 3 | 1 | CAVITY BLOCK, SECOND CONVERTER MATCHED TO A5MP1;NOT SEPARATELY REPLACE | 28480 | 08558-20121 |
| A5MP3 | | | | NOT ASSIGNED | | |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A5MP4 | 08558-20074 | 5 | 1 | INSULATOR, COUPLING POST | 28480 | 08558-20074 |
| A5MP5' | 085513-00032 | 3 | 1 | MOUNTING, MIXER DIODE | 28480 | 08558-00032 |
| A5MP6 | 08558-20120 | 2 | 1 | COVER, OSCILLATOR | 20480 | 08558-20120 |
| A5MP7 THRU A5MP10 | 3030-0397 | 6 | 4 | SCREW-SET 10-32 1-IN-LG FLAT-PT BRS | 00000 | ORDER BY DESCRIPTION |
| A5MP11 | 0380-0573 | 8 | 1 | STANDOFF-HEX .625-IN-LG 10-32THD | 00000 | ORDER BY DESCRIPTION |
| A5MP12THRU A5MP17 | 0516-0041 | 4 | 6 | SCREW-MACH 0-80 .125-IN-LG FIL-HD-SLT | 00000 | ORDER BY DESCRIPTION |
| A5MP18 | 2200-0151 | 0 | 1 | SCREW-MACH 4-40 ,75-IN-LG PAN-ND-POZI | 00000 | ORDER BY DESCRIPTION |
| A5MP19THRU A5MP22 | 2740-0001 | 3 | 4 | NUT-HEX-DBL-CHAM 10-32-THD .109-IN-THK | 00000 | ORDER BY DESCRIPTION |
| A5MP23 | 08565-20068 | 6 | 1 | CAPACITOR, INNER ELEMENT | 28480 | 08565-20068 |
| A5MP24 | 08565-20069 | 7 | 1 | CAPACITOR, OUTER ELEMENT | 28480 | 08565-20069 |
| ASMP25 | 08565-20092 | 6 | 1 | CAPACITOR, DIELECTRIC | 28480 | 08565-20092 |
| A5R1 | 0757-0346 | 2 | 30 | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TR-10R0-F |
| A5A1 | 08558-60028 | 3 | 1 | SECOND CONVERTER OSCILLATOR | 28480 | 08558-60028 |
| A5A1Q1 | 5086-4218 | 7 | 2 | TRANSISTOR, NPN, MICROWAVE | 28480 | 5086-4218 |
| A5A1R1 | 0683-4705 | 8 | 1 | RESISTOR 47 5% .25W FC TC=-400/+500 | 01121 | CB4705 |
| A5A1R2 | 0683-2715 | 6 | 1 | RESISTOR 270 5% .25W FC TC=-400/+600 | 01121 | C82715 |
| **A6** | **5086-7080** | **7** | **1** | **OSCILLATOR, YIG (DOES NOT INCL MTG. HDW}** | **28480** | **5086-7080** |
| A6MP1 | 08558-00008 | 3 | 2 | YIG BRACKET | 28480 | 08558-00008 |
| A6MP2 | 08558-00008 | 3 | | YIG BRACKET | 28480 | 08558-00008 |
| A6MP3 | 08558-00076 | 5 | 1 | STRAP, YIG OSCILLATOR | 28480 | 08558-00076 |
| A6MP4 | 08558-20118 | 8 | 1 | STANDOFF, NOTCHED | 28460 | 08558-20118 |
| A6MP5 THRU A6MP7 | 686558-20119 | 9 | 3 | STANDOFF, PLAIN | 28480 | 08558-20119 |
| **A7** | **08558-60126** | **2** | **1** | **FREQUENCY CONTROL** | **28480** | **08558R0126** |
| A7C1 | 0180-1746 | 5 | 2 | CAPACITOR-FXD 15lF+-10% 20VDC TA | 56289 | 150D156X9020812 |
| A7C2 | 0180-1746 | 5 | | CAPACITOR-FXD 15UF+--10% 20VDC TA | 56289 | 150D156X902082 |
| A7C3 | 0160-3466 | 8 | 3 | CAPACITOR-FXD 100PF +-10% 1KVDC CER | 28480 | 0160-3466 |
| A7C4 | 0180-0197 | 8 | | CAPACITOR--FXD 2,216F+-10% 2OVDC TA | 56289 | 150D225X9020A2 |
| A7C5 | 0160-3094 | 8 | 4 | CAPACITOR-FXD 1UF +-10% 10VDC CER | 28480 | 0160-3094 |
| A7C6 | 0160-3457 | 7 | 4 | CAPACITOR-FXD 200RPF +-10% 250VDC CER | 28480 | 0160-3457 |
| A7C7 | 0160-3094 | 8 | | CAPACITOR-FXD 1UF +-10% 1IRVDC CER | 28480 | 0160-3094 |
| A7C8 | 0180-0197 | 8 | | CAPACITOR-FXD 2,21UF+-1O% 2OVDC TA | 56289 | 1500225X9020A2 |
| A7C9 | 0180-1745 | 4 | 1 | CAPACITOR-FXD 1,SUF+-10% 20VDC TA | 56289 | 150D155X9020A2 |
| A7C10 | 0160-3466 | 8 | | CAPACITOR-FXD 100PF +-10% 1KVDC CER | 28480 | 0160-3466 |
| A7C11 | 0160-2055 | 9 | 98 | CAPACITOR-FXD .01UF +80-20% 10VDC CER | 20480 | 0160-2055 |
| A7C12 | 0160-2055 | 9 | | CAPACITOR-FXD ,.01UF +80-20% 10VDC CER | 26480 | 0160-2055 |
| A7C13 | 0180-1714 | 7 | 3 | CAPACITOR-FXD 330UF+-10% 6VDC TA | 56289 | 150D337X9006S2 |
| A7C14 | 0180-1714 | 7 | | CAPACITOR-FXD 330UF+-10% 6VDC TA | 56289 | 156B337X9006S2 |
| A7CR1 | 1901-0040 | 1 | | DIODE-SWITCHING 30V SOMA 2NS 0D-35 | 28480 | 1901-0040 |
| A7CR2 | 1901-0535 | 9 | 12 | DIODE-SM SIC SCHOTTKY | 28480 | 1901-0535 |
| A7CR3 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A7CR4 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A7CR5 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS D0-35 | 28480 | 1901-0050 |
| A7CR6 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 2ODMA 2NS D0-35 | 28480 | 1901-0050 |
| A7CR7 | 1901-0050 | 3 | | DIODE-SWITCHING 8OV I00MA 2NS D0-35 | 28480 | 1901-0050 |
| A7CR8 | | | | NOT ASSIGNED | | |
| A7CR9 | 1901--0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A7L1 | 08558-80011 | 6 | 2 | COIL, 100 UH | 26480 | 08558-80011 |
| A7L2 | 08558-80011 | 6 | | COIL, 100 UH | 28460 | 08558-80011 |
| A7MP1 | 1205-0002 | 9 | 3 | HEAT SINK TO-5/TO-39-CS | 28480 | 1205-0002 |
| A7MP2 | 1205-0002 | 9 | | HEAT SINK TO-5/TO-39-CS | 28480 | 1205-0002 |
| A7MP3 | 1205-0002 | 9 | | HEAT SINK TO-5/TO-39-CS | 28480 | 1205-0002 |
| A7MP4 | 08558-00007 | 2 | 1 | HEAT SINK, YIG DRIVE | 28430 | 08558-00007 |
| A7MP5 THRU A7MP8 | 0520-0129 | 8 | 4 | SCREW-MACH 2-56 .312-IN-LG PAN-HD-POZI | 00000 | ORDER BY DESCRIPTION |
| A7MP9 THRU A7MP12 | 0610-0001 | 6 | 4 | NUT-HEX-DBL-CHAM 2-56-THD .062-IN-THK | 00000 | ORDER BY DESCRIPTION |
| A7MP13THRU A7MP16 | 2190-0014 | 1 | 4 | WASHER-LK INTL T NO. 2 .089-IN-ID | 20480 | 2190-0014 |
| A7Q1 | 1854-0039 | 7 | 6 | TRANSISTOR NPN 2N30536 SI TO-39 PD=1W | 3L585 | 2N3053S |
| A7Q2 | 1853-0451 | 5 | 3 | TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW | 01295 | 2N3799 |
| A7Q3 | 1854-0023 | 9 | 2 | TRANSISTOR NPN SI TO-8IS PD=360MW | 28486 | 1854-0023 |
| A7Q4 | 1855-0417 | 7 | 4 | TRANSISTOR J-.FET N--CHAN D-MODE TO-18 SI | 26480 | 1855-0417 |
| A7Q5 | 1854-0039 | 7 | | TRANSISTOR NPN 2N3053S SI TO-39 PD=1W | 3L585 | 2N3053S |
| A7Q6 | 1854-0023 | 9 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0023 |
| A7Q7 | 1854-0475 | 5 | 3 | TRANSISTOR-DUAL NPN PD=750MW | 28480 | 1854-0475 |
| A7Q8 | 1853-0012 | 4 | 1 | TRANSISTOR PNP 2N2904A SI TO-39 PD=600MW | 01295 | 2N2904A |
| A7Q9 | 1854-0882 | 8 | 4 | TRANSISTOR NPN PD=300MW FT=20OMHZ | 28480 | 1854-0882 |
| A7Q10 | 1853-0007 | 7 | 26 | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |

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*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A7Q11 | 1854-0882 | 8 | | TRANSISTOR NPN PD=30OMNW FT=200MHZ | 20480 | 1854-0882 |
| A7Q12 | 1854-0039 | 7 | | TRANSISTOR NPN 2N30535 SI TO-39 PD=1W | 3L585 | 2N3053S |
| A7Q13 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| 47Q14 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A7Q15 | 1855-0062 | 8 | 5 | TRANSISTOR J-FET N-CHAN D-MODE SI | 28480 | 1855-0062 |
| A7Q16 | 1855-0062 | 8 | | TRANSISTOR J-FET N-CHAN D-MODE SI | 20480 | 1855-0062 |
| A7Q17 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360NMW | 28480 | 1854-0404 |
| A7Q18 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A7Q19 | 1855-0420 | 2 | 1 | TRANSISTOR J-FET 2N4391 N-CHAN D-MODE | 01295 | 2N4391 |
| A7Q20 | 1855-0062 | 8 | | TRANSISTOR J-FET N-CHAN D-MODE SI | 28480 | 1855-0062 |
| A7Q21 | 1B54-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A7Q22 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360HW | 28480 | 1854-0404 |
| A7Q23 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A7Q24 | 1855-0062 | 5 | | TRANSISTOR J-FET N-CHAN D-MODE SI | 28480 | 1855-0062 |
| A7Q25 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360hW | 28480 | 1854-0404 |
| A7R1 | 2100-1754 | 9 | 2 | RESISTOR-TRMR 50 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1754 |
| A7R2 | 2100-1760 | 7 | 1 | RESISTOR-TRMR 5K 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1760 |
| A7R3 | 2100-1754 | 9 | | RESISTOR-TRMR 50 5% WW SIDE-ADS 1-TRN | 28480 | 2100-1754 |
| A7R4 | 2100-1757 | 2 | 4 | RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1757 |
| A7R5 | 2100-1757 | 2 | | RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1757 |
| A7R6 | 2100-1756 | 1 | 1 | RESISTOR-TRMR 200 5% WW SIDE-ADJ I-TRN | 28480 | 2100-1756 |
| A7R7 | 2100-3123 | 0 | 4 | RESISTOR-TRMR 500 10% C SIDE-ADJ 17--TRN | 02111 | 43P501 |
| A7R8 | 2100-3123 | 0 | | RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN | 02111 | 43P501 |
| A7R9 | 0698-3458 | 7 | 6 | RESISTOR 348K 1% .125W F TC=0+-100 | 28480 | 0698-3450 |
| A7R10 | 0757-0317 | 7 | | RESISTOR 1.33K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1331-F |
| A7R11 | 0757-0465 | 6 | | RESISTOR 10OK 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A7R12 | 0683-1555 | 0 | 6 | RESISTOR 1.5N 5% .25W FC TC=.-900/+1100 | 01121 | CS1555 |
| A7R13 | 0757-0280 | 3 | 23 | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A7R14 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003--F |
| A7R15 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A7R16 | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W F TC= 0+-100 | 24546 | C4-1/8-TO-1101.-F |
| A7R17 | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A7R18 | 069B-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A7R19 | 0683-1555 | 0 | | RESISTOR 1.50 5% .25W FC TC=-900/+1100 | 01121 | C81555 |
| A7R20 | 0757-0438 | 3 | | RESISTOR 5.111K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5111-F |
| A7R21 | 0698-3458 | 7 | | RESISTOR 348K 1% .125W F T 0=D+-100 | 28480 | 0698-3450 |
| A7R22 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A7R23 | 0683-1555 | 0 | | RESISTOR 1.5M 5% .25W FC TC=-900/+1100 | 01121 | C155 |
| A7R24 | 0698-3458 | 7 | | RESISTOR 348K 1% .125W F TC=0+-100 | 28480 | 0698-5458 |
| A7R25 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=+-100 | 24546 | C4-1/8-TO-1003-F |
| 47R26 | 0757-0438 | 3 | | RESISTOR 5.11K 1% .125W F TC=0+-10 | 24546 | C4-1/8-TO-5111-F |
| A7R27 | 0698-0083 | 8 | 6 | RESISTOR 1.96K 1% .125W F TC= 0+-100 | 24546 | C4-1/8-TO-1961-F |
| A7R28 | 0698-3153 | 9 | | RESISTOR 3.83K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A7R29 | 0698-3151 | 7 | | RESISTOR 2.87K 1% ,125W F TC=0+-100 | 24546 | C4--1/8-TO-2871-F |
| A7R30 | 06B3-1555 | 0 | | RESISTOR 1.5N 5% .25W FC 'TC=-900/+1100 | 01121 | CB1555 |
| A7R31 | 0683-1555 | 0 | | RESISTOR 1.5M 5% .25W FC TC=-900/+1100 | 01121 | C81555 |
| A7R32 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=2+-100 | 24546 | C4-1/S-TO-1001 -F |
| A7R33 | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=2+-100 | 24546 | C4-.1/8-TO-3831-F |
| A7R34 | 0757-0290 | 5 | 11 | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4CI/8-TO-6191 -F |
| A7R35 | 0698-3154 | 0 | 2 | RESISTOR 4.22K 1% .125W F TC=0+ -100 | 24546 | C4-1/8-TO-4221-F |
| A7R36 | 0698-3458 | 7 | | RESISTOR 348K 1% .125W F TC=D+-100 | 28480 | 0698-3458 |
| A7R37 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A7R38 | 0698-3453 | 2 | 1 | RESISTOR 196K 1% .125W F TC=0+-100 | 24546 | C4-1/8-10-1963-F |
| A7R39 | 0757-0401 | 0 | 19 | RESISTOR 100 1% .125W F TC=2+-100 | 24546 | C4-1/S-TO-101-F |
| A7R40 | 0698-3458 | 7 | | RESISTOR 348K 1% .125W F TC= 0+-100 | 28480 | 06?98-2458 |
| A7R41 | 0757-0470 | 3 | 2 | RESISTOR 162K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1623.-F |
| A7R42 | 0698-3160 | 8 | 4 | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4--1/8-TO-3162-F |
| A7R43 | 0757-0470 | 3 | | RESISTOR 162K 1% .125W F TC=0+-1 00 | 24546 | C4- 1/8--1T623--F |
| A7R44 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-800 | 24546 | 84-1/8-TO-101 F |
| A7R45 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A7R46 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | 1/8-0-191-F |
| A7R47 | 0757-0199 | 3 | | RESISTOR 21.5K 1%  125W F TC=0+-100 | 24546 | C42/8-1-1--F |
| A7R48 | 0698-3151 | 7 | | RESISTOR 2.B7K 1% .125W F TC=0+-100 | 24546 | C4-01/8-0-2871-F |
| A7R49 | 0698-6271 | 8 | 1 | RESISTOR 3K .1% .125W F TC=0+-50 | 28480 | 0698-6271 |
| A7R50 | 0698-6315 | 1 | 1 | RESISTOR 503.1 .12X .125W F TC=0+-100 | 03888 | PME55-1/8-TO-503R1-C |
| A7R51 | 0683-1555 | 0 | | RESISTOR 1.5M 5% .25W FC TC=-800/+1100 | 01121 | C81555 |
| A7R52 | 0698-7799 | 7 | 1 | RESISTOR 2K .25% .125W F TC=0+-100 | 19701 | NF4C1/8-10-2001-C |
| A7R53 | 0698-8323 | 5 | 1 | RESISTOR 2.76K  .25% ,125W F TC=0+-50 | 19701 | MF4C1/8-T2-2761-C |
| A7R54 | 0698-3458 | 7 | | RESISTOR 348K 1% .125W F TC= 0-1100 | 28480 | 0698-345 8 |
| A7R55 | 0698-3438 | 3 | 3 | RESISTOR 147 1% .125W F TC=0+-100 | 84546 | C4-1/8-TO-147R-F |
| A7R56 | 0698-3162 | 0 | 5 | RESISTOR 46.4K 1% .12 5W F -TC=0+-10 | 24546 | C4-1/8-TO-4642-F |
| A7R57 | 0757-0317 | 7 | | RESISTOR 1.33K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1331-F |
| A7R58 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .15W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A7R59 | 0757-0279 | 0 | 22 | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A7R60 | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A7R61 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A7R62 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-00 | 24546 | C4-1/8-TO-511R-F |
| A7R63 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-1Dno | 24546 | C4-1/8-T0-2152-F |
| A7R64 | 0690-3450 | 9 | 4 | RESISTOR 41.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4222-F |
| A7R65 | 0757-0441 | 8 | 1 | RESISTOR 8.25K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-8251-F |
| A7R66 | 0811-3247 | 4 | 1 | RESISTOR 150 1% 7.5W PW TC=0+-20 | 21480 | 0811-3247 |
| A7R67 | 0683-1065 | 7 | 2 | RESISTOR 10N 5% .25W CC TC=-900/+1100 | 01121 | C01065 |
| A7R68 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A7R69 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A7R70 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A7R71 | 0811-3246 | 3 | 1 | RESISTOR 110 1% 7.5W PW TC=0+-20 | 28480 | 0811-3246 |
| A7R72 | 2100-3094 | 4 | 1 | RESISTOR-TRMR 100K 10% C SIDE-ADJ 17-TEN | 02111 | 43P104 |
| A7R73 | 0757-0462 | 3 | 1 | RESISTOR 75K 1% .125W F TC=0+-100 | 24546 | C41/8-TO-7502-F |
| A7R74 | 0757-0459 | 8 | | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622--F |
| A7R75 | 0698-3428 | 1 | 1 | RESISTOR 14.7 1% .125W F TC=0+-100 | 0388 | PME55-1/8-TO-14R7-F |
| A7R76 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A7R77 | 0698-3132 | 4 | 2 | RESISTOR 261 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2610-F |
| A7R78 | 0683-1065 | 7 | | RESISTOR 10M 5% .25W CC TC=-900/+1100 | 01121 | CB1065 |
| A7R79 | 0757-0422 | 5 | 1 | RESISTOR 909 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-909R-F |
| A7TP1 THRU | | | | | | |
| A7TP19** | 1251-0600 | 0 | 60 | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 20480 | 1251-0600 |
| A7U1 | 1826-0261 | 8 | 2 | IC OP AMP LOW-NOISE TO-99 PKG | 28480 | 1826-0261 |
| A7U2THRU | | | | | | |
| A7U4 | 1826-0229 | 8 | 3 | IC OP AMP LOW-DRIFT TO-99 PKG | 06665 | OP-05CJ |
| A7U5 | 1858-0032 | 8 | 2 | TRANSISTOR ARRAY 14-PIN PLSTC DIP | 3L585 | CA3146E |
| A7U6 | 1826-0092 | 3 | 5 | IC OP AMP GP DUAL TO-99 PKG | 28480 | 1826-0092 |
| A7VR1 | 1902-0033 | 4 | 3 | DIODE--ZNR IN823 6.2V 5% 0DO-7 PD=.4W | 24046 | 1N823 |
| A7VR2 | 1902-0680 | 7 | 1 | DIODE-ZNR 1N827 6.2V 5% D00-7 PD=.4W | 24046 | 1N827 |
| A7VR3 | 1902-0202 | 9 | 2 | DIODE-ZNR 15V 5% PD=1W IR=5UA | 28480 | 1902-0202 |
| **A8** | **08558-60123** | **9** | **1** | **SWEEP GENERATOR** | **28480** | **0855860123** |
| A8C1 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2LIF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A8C2 | 0160-3456 | 6 | 12 | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A8C3 | 0160-3402 | 2 | 1 | CAPACITOR-FXD 1IF +-5% 50VDC MET-POLYC | 28480 | 0160-3402 |
| A8C4 | 0160-3009 | 5 | 1 | CAPACITOR-FXD 982PF +-1% 1 100VDC MICA | 28480 | 0160-3009 |
| A8C5 | 0180-0197 | 0 | | CAPACITOR-FXD 2.21JF+-10% 20VDC TA | 56289 | 1500225X9020A2 |
| A8C6 | 0160-3094 | 8 | | CAPACITOR-FXD .1UF +-10% 100VDC CER | 28480 | 0160-3094 |
| A8C7 | 0160-3456 | 6 | | CAPACITOR-FXD 100PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A8C8 | 0160-3466 | 8 | | CAPACITOR-FXD 100PF +-10% 1KVDC CER | 28480 | 0160-3466 |
| A8C9 | 0160-2257 | 3 | 1 | CAPACITOR-FXD 10PF +-5% 50FVDC CER 0+-60 | 28480 | 0160-2257 |
| A8C10 | 0160-2150 | 5 | 1 | CAPACITOR-FXD 33PF +-5% 300VDC MICA | 28480 | 0160-2150 |
| A8C11 | 0180-0197 | 8 | | CAPACITOR-FXD 2.21WF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A8C12 | 0140-0192 | 9 | 1 | CAPACITOR-FXD 68PF +-5% 30OVDC MICA | 72136 | DM15E68OJO300WVICR |
| A8C13 | 0180-0197 | 8 | | CAPACITOR--FXD 2,21UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A8C14 | 0160-4297 | 5 | 2 | CAPACITOR-FXD .022UF +80-20% 100VDC CER | 56289 | C023F101H223ZS22-CDH |
| A8C15 | 0160-3456 | 6 | | CAPACITOR-FXD 100PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A8C16 | 0160-3094 | 5 | | CAPACITOR-FXD 1UF +-10% 100VDC CER | 24800 | 0160-3094 |
| A8C17 | 0160-3449 | 7 | 1 | CAPACITOR-FXD 200OPF +-10% 250VDC CER | 28480 | 0160-3449 |
| A8C18 | 0160-4297 | 5 | | CAPACITOR-FXD .022UF +80-20% 100VDC CER | 56289 | C023F101H223ZS22-CDH |
| A8C19 | 0180-2205 | 3 | 1 | CAPACITOR-FXD 33UF+-10% 35VDC TA | 56289 | 150D334X9035A2 |
| A8C20 | 0180-1743 | 2 | 1 | CAPACITOR-FXD .1UF+-10% 35VDC TA | 56289 | 150D104X9035A2 |
| A8C21 | 0160-0163 | 6 | 1 | CAPACITOR-FXD ,033UF +-10% 20OVDC POLYE | 28480 | 0160-0163 |
| A8C22 | 0160-2055 | 9 | | CAPACITOR-FXD O01UF +80-20% 100VDC CER | 28480 | 0160--2055 |
| A8C23 | 0160-0155 | 6 | 1 | CAPACITOR-FXD 3300PF +-10% 200VDC POLYE | 21480 | 0160-0155 |
| A8C24 | 0160-0153 | 4 | 1 | CAPACITOR-FXD 1000PF +-10% 20OVDC POLYE | 28480 | 0160-0153 |
| A8C25 | 0160-0134 | 1 | 1 | CAPACITOR-FXD 220PF +-5% 300VDC MICA | 28480 | 0160-0134 |
| A8C26 | 0180-0197 | 0 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 1500225X902A2 |
| A8C27 | 0170-0066 | 9 | 1 | CAPACITOR-FXD .027UF +-10% 20OVDC POLYE | 28480 | 0170-0066 |
| A8CR1 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50NA 2NS D0-35 | 28480 | 1901-0040 |
| A8CR2 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50NA 2NS D0-35 | 28480 | 1901-0040 |
| A8CR3 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A8CR4 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A8CR5 | 1901-0376 | 6 | 2 | DIODE-GEN PRP 35V 50MA D00-35 | 28480 | 1901-0376 |
| A8CR6 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A8CR7 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D00-35 | 28480 | 1901-0040 |
| A8CR8 | 1901-0040 | 1 | | DIODE--SWITCHING 30V 50MA 2NS D00-35 | 28480 | 1901-0040 |
| A8CR9 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D00-35 | 28480 | 1901-0040 |
| A8CR10 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D00-35 | 28480 | 1901-0040 |
| A8CR11 | 1901-0040 | 1 | | DIODE-SWITCHING 30V SOMA 2NS D00-35 | 28480 | 1901-0040 |
| A8CR12 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS D00-35 | 28480 | 1901-0050 |
| A8CR13 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS D00-35 | 28480 | 1901-0050 |
| A8CR14 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS 00-35 | 28480 | 1901-0050 |
| A8CR15 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS 00-35 | 28480 | 1901-0050 |

See introduction to this section for ordering information
*Indicates factory selected value

**A7TP11 IS GND;A7TP12 NOT ASSIGNED.

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A8CR16 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0 050 |
| A8CR17 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2HS DO-35 | 28480 | 1901-0050 |
| A8CR18 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A8CR19 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA INS DO-35 | 28480 | 1901-0050 |
| A8CR20 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A8CR21 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A8CR22 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS 00-35 | 28480 | 1901-0050 |
| A8CR23 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A8CR24 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A8CR25 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A8MP1 | 1205-0202 | 1 | 1 | THERMAL LINK DUAL TO-18-CS | 28480 | 1205-0202 |
| A8MP2 | 0380-0198 | 3 | 1 | STANDOFF-RVT-ON .312-IN-LG 6-32THD | 00000 | ORDER BY DESCRIPTION |
| A8MP3 | 2360-0055 | 1 | 1 | SCREW-MACH 6-32 .188-IN-LG BDG-HD-SLT | 00000 | ORDER BY DESCRIPTION |
| A8Q1 | 1854-0071 | 7 | 16 | TRANSISTOR NPN SI PD=3OOMW FT=200MNHZ | 28480 | 1854-0071 |
| A8Q2 | 1855-00B2 | 2 | 7 | TRANSISTOR J-FET P-CHAN D-.MODE SI | 28480 | 1855-0082 |
| A8Q3 | 1855-0082 | 2 | | TRANSISTOR J-FET P-CHAN D-MODE SI | 28480 | 1855-0082 |
| A8Q4 | 1853-0007 | 7 | | TRANSISTOR PNP 2N31251 SI T0-18 PD :360NW | 04713 | 2N3251 |
| A8Q5 | 1853-0020 | 4 | 5 | TRANSISTOR PNP SI PD=300MW FT=15SNHZ | 28480 | 1853-0020 |
| A8Q6 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=3OOnW FT=200NHZ | 28480 | 1854-0071 |
| A8Q7 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360NW | 04713 | 2N3251 |
| A8Q8 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=30OMW FT=200NHZ | 28480 | 1854-0071 |
| A8Q9 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=3SSNW FT=201HZ | 28480 | 1854-0071 |
| A8Q10 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q11 | 1855-0417 | 7 | | TRANSISTOR J-FET N-CHAN D0MODE TO-18 SI | 28480 | 1855-0417 |
| A8Q12 | 1853-0020 | 4 | | TRANSISTOR PNP SI PD=30OMW FT=150MIIZ | 28480 | 1853-0020 |
| A8Q13 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q14 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q15 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q16 | 1854-0019 | 3 | 20 | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A8Q17 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PS=360MW | 28480 | 1854-0404 |
| A8Q18 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360NW | 28480 | 1854-0019 |
| A8Q19 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PS=360MW | 28480 | 1854-0404 |
| A8Q20 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=36ONW | 28480 | 1854-0404 |
| A8Q21 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-B18 PD=360MW | 28480 | 1854-0404 |
| A8Q22 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q23 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q24 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-S18 PD=360MW | 28480 | 1854-0019 |
| A8Q25 | 1855-0002 | 2 | | TRANSISTOR J-FET P-CHAN D-MODE SI | 28480 | 1855-0082 |
| A8Q26 | 1855-0082 | 2 | | TRANSISTOR J-FET P--CHAN D-MODE SI | 28480 | 1855-0002 |
| A8Q27 | 1855-0082 | 2 | | TRANSISTOR J-FET P-CHAN D-MODE SI | 28480 | 1855-0082 |
| A8Q28 | 1855-0082 | 2 | | TRANSISTOR J-FET P--CHAN D-MODE SI | 28480 | 1855-0082 |
| A8Q29 | 1855-0062 | 8 | | TRANSISTOR J-FET N-CHAN D-MODE SI | 28480 | 1855-0062 |
| A8Q30 | 1855-0082 | 2 | | TRANSISTOR J-FET P-CHAN D-MODE SI | 28480 | 1855-0082 |
| A8Q31 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q32 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=20MHZ | 28480 | 1854-0071 |
| A8Q33 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q34 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q35 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q36 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q37 | 1853-0020 | 4 | | TRANSISTOR PNP SI PD=300MW FT=15MHZ | 28480 | 1853-0020 |
| A8Q38 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q39 | 1854-0071 | 7 | | TRANSISTOR NPN ST PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q40 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8Q41 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q42 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q43 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A8Q44 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q45 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A8Q46 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=3&0MW | 28480 | 1854-0404 |
| A8Q47 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=3&0MW | 28480 | 1854-0019 |
| A8Q48 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A8Q49 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO--IS PD=360MW | 28480 | 1854-0404 |
| A8Q50 | 1853-0020 | 4 | | TRANSISTOR PNP SI, PD=300MW FT=150MHZ | 28480 | 1353-0020( |
| A8Q51 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=20 0MHZ | 28480 | 1854-0071 |
| A8Q52 | 1855-0417 | 7 | | TRANSISTOR J--FET N-CHAN D-MODE TO-18 SI | 28480 | 1855-0417 |
| A8Q53 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=20PNDZ | 28480 | 1854-0071 |
| A8Q54 | 1853-0020 | 4 | | TRANSISTOR PNP SI PD=300MW FT=150MHZ | 28480 | 1853-0020 |
| A8Q55 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300MW FT=200MHZ | 28480 | 1854-0071 |
| A8R1 | 0698-3450 | 9 | | RESISTOR 42.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4222-F |
| A8R2 | 2100-3154 | 7 | 1 | RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN | 02111 | 43P102 |
| A8R3 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A8R4 | 0757-0419 | 0 | 6 | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-681R-F |
| A8R5 | 0757-0459 | 8 | | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622-F |
| A8R6 | 0698-3152 | 8 | 2 | RESISTOR 3.48K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3481-F |
| A8R7 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R8 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R9 | 0757-0444 | 1 | | RESISTOR 11.1K 17 .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A8R10 | 2100-3109 | 2 | 1 | RESISTOR-TRMR 2K 10% C SIDE-ADJ 17--TRN | 02111 | 43P202 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A8R11 | 0698-3457 | 6 | | RESISTOR 316K 1% .125W F TC=0+-100 | 28480 | 0698-3457 |
| A8R12 | 0698-3442 | 9 | 7 | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A8R13 | 2100-3052 | 4 | 3 | RESISTOR-TRMR 50 10% C SIDE-ADJ 17-TRN | 02111 | 43P500 |
| A8R14 | 0698-3446 | 3 | | RESISTOR 383 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-383R-F |
| A8R15 | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W - TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A8R16 | 0698-7412 | 1 | 3 | RESISTOR 13.3K .25% .125W F TC=0+-100 | 19701 | MF4C1/8 -TO-1332-C |
| A8R17 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R18 | 0757-0458 | 7 | | RESISTOR -51.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5112-F |
| A8R19 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R20 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R21 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A8R22 | 0757-0280 | 3 | | RESISTOR 1K 1% 125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A8R23 | 0698-3444 | 1 | 17 | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-T0-316R-F |
| A8R24 | 0698-7794 | 2 | 8 | RESISTOR 10K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R25 | 0698-0416 | 7 | 1 | RESISTOR 44K .25% .125W F TC=0+-50 | 19701 | MF4C1/8-TO-4402-C |
| A8R26 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=:0-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R27 | 0683-3355 | 2 | 3 | RESISTOR 3.3M 5%., .125W F TC=-900/+1100 | 01121 | CB3355 |
| A8R28 | 0683-3355 | 2 | | RESISTOR 3.3M 5% .25W F TC=-900/+1100 | 01121 | CB3355 |
| A8R29 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=+100 | 19701 | MF4C1/8-TO-1002-C |
| A8R30* | 0698-7798 | 6 | 1 | RESISTOR 5.25K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-5251-C |
| A8R31 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8 TO-1002-F |
| A8R32 | 0698-3160 | 8 | | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A8R33 | 0698-3260 | 9 | | RESISTOR 464k 1% .125W F TC=:+-100 | 28480 | 0698-3260 |
| A8R34 | 0698-3160 | 8 | | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A8R35* | 0757-0400 | 9 | | RESISTOR 90.9 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO -90R9-F |
| A8R36 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC:TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A8R37 | 0683-6845 | 1 | 1 | RESISTOR 680K 5% .25W F TC=-800/+900 | 01121 | CB6845 |
| A8R38 | 3498-3457 | 6 | | RESISTOR 316K 1% . 125W F TC=0+-100 | 28480 | 0698-3457 |
| A8R39 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R40 | 0698-3451 | 0 | 2 | RESISTOR 133K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1333-F |
| A8R41 | 0757-0459 | 8 | | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622-F |
| A8R42 | 0698-7421 | 2 | 3 | RESISTOR 40K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-4002-C |
| A8R43 | 0698-3194 | 8 | 4 | RESISTOR 20K .25% ,125W F TC=0+-50 | 03888 | PME55-1/8-T2-2002-C |
| A8R44 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R45 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=+-100 | 24546 | C4-1/8-TO-1472-F |
| A8R46 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R47 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0·1-100 | 24546 | C4-1/8-TO-10R0-F |
| A8R48 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC:0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R49 | 0757-0464 | 5 | 3 | RESISTOR 90.9K 1% .125W F TC=0+ -100 | 24546 | C4-1/8-TO-9092-F |
| AR850 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC-TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R51 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W E TC=D+-100 | 24546 | C4-1/8-TO-3161-F |
| A8R52 | 0757-0439 | 4 | 4 | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A8R53 | 0757-0460 | 1 | | RESISTOR 61.9K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6192-F |
| A8R54 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R55 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R56 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+ -100 | 24546 | C4-1/8-TO-1003-F |
| A8R57 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A8R58 | 0757-0465 | 6 | | RESISTOR 100K 1% ,125W F TC=0+ -100 | 24546 | C4-1/8-TO-1003-F |
| A8R59 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A8R60 | 0698-3160 | 8 | | RESISTOR 31.6K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A8R61 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R62 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R63 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A8R64 | 0757-0199 | 3 | | RESISTOR 21.5K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R65 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R66 | 0757-0199 | 3 | | RESISTOR 21 .5K 1% .125W F TC=0+-10S | 24546 | C4-1/8-TO-2152-F |
| A8R67 | 0757-0199 | 3 | | RESISTOR 21.5K 17 .125W F TC=04-100 | 24546 | C4-1/8-TO-2152-F |
| A8R68 | 0698-7412 | 1 | | RESISTOR 3.3K 25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-C |
| A8R69 | 0757-1094 | 9 | 4 | RESISTOR 1.47K 17 .125W F TC=0+-10 | 24546 | C4-1/8-TO-1471-F |
| A8R70 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R71 | 0757-0199 | 3 | | RESISTOR 21.5K 1-. 125W F TC=D+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R72 | 2100-2850 | 8 | 2 | RESISTOR-TRMR 10K 10% WW SIDE-ADJ 20-TRN | 02660 | 3810P-103 |
| A8R73 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R74* | 0698-3151 | 7 | 8 | RESISTOR 2.87K 1% .125W F TC=0+-10 0 | 24546 | C4-1/8-TO-2071-F |
| A8R75 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R76 | 0757-0442 | 9 | 47 | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R77 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R78* | 0757-0458 | 7 | 6 | RESISTOR 51.1K 1% ,125W F TC:0+-100 | 24546 | C4-1/8-TO-5112-F |
| A8R79 | 0757-0199 | 3 | | RESISTOR 21.5K 1% , 125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R80 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .1 -5W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R81 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-101 | 24546 | C4-1/8-TO-2152-F |
| A8R82 | 0698-0085 | 0 | 2 | RESISTOR 2.61K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2611-F |
| A8R83 | 0698-3260 | 9 | | RESISTOR 464K 1% .125W F TC=0+-100 | 28480 | 0698-3260 |
| A8R84 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A8R85 | 2100-2850 | 8 | | RESISTOR-TRMR 10K 10% WW SIDE-ADJ 20-TRN | 02660 | 3810P-103 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A8R86 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=0+-1O0 | 19701 | MF4C1/8-TO-1002-C |
| A8R87 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R88 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R89* | 0757-0460 | 1 | 3 | RESISTOR 61.9K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6192-F |
| A8R90 | 0698-7421 | 2 | | RESISTOR 40K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-4002-C |
| A8R91 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R92 | 0757-0289 | 2 | 7 | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A8R93 | 0698-3194 | 0 | | RESISTOR 20K .25% .125W F TC=0+-50 | 03888 | PME55-1/8-T2-2002-C |
| A8R94 | 0757-0199 | 3 | | RESISTOR 21.5K 1% ,125W F TC=0+ -100 | 24546 | C4-1/8-TO-2152-F |
| A8R95* | 0698-3153 | 9 | 10 | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A8R96 | 0698-7412 | 1 | | RESISTOR 13.3K .25% ,125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-C |
| A8R97 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R98 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8RR99 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A8R100 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-PF |
| A8R101 | 0698-7794 | 2 | | RESISTOR 10K .25% ,125W F TC=0+-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R102 | 0757-0459 | 8 | | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622-F |
| A8R103 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R104 | 0698-3154 | 0 | | RESISTOR 4.22K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-4221-F |
| A8R105* | 0698-3457 | 6 | 5 | RESISTOR 316K 1% .125W F TC=0+-100 | 28480 | 0698-3457 |
| A8R106 | 0757-0440 | 7 | 10 | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/B-TO-7501-F |
| A8R107 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R108 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R109 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R110 | 0698-3451 | 0 | | RESISTOR 133K 1% 3 125W F TC=0+-100 | 24546 | C4-1/8-TO-1333-F |
| A8R111 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R112 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R113 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R114 | 0757-0459 | B | | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622--F |
| A8R115 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R116 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R117 | 0698-3238 | 1 | 1 | RESISTOR 2.5K .25% .125W F TC=0+-50 | 28480 | 0698-3238 |
| A8R118 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R119 | 0698-7794 | 2 | | RESISTOR 10K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1002-C |
| A8R120 | 0698-7086 | 5 | 1 | RESISTOR 1.02K .25% -125W F TC=0+-100 | 28480 | 0690-7086 |
| A8R121 | 0698-8322 | 4 | | RESISTOR 111 .2% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-111R-C |
| A8R122 | 0683-1055 | 5 | 3 | RESISTOR 1M 5% .25W FC TC=0+-800/+900 | 01121 | CB1055 |
| A8R123 | 0683-1055 | 5 | | RESISTOR 1M 5% .25W FC TC=0+-800/+900 | 01121 | CB1055 |
| A8R124 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A8R125 | 0757-0461 | 2 | 1 | RESISTOR 68.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6812-F |
| A8R126 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R127 | 0698-7421 | 2 | | RESISTOR 40K .25% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-4002-C |
| A8R128 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R129 | 0698-3194 | 8 | | RESISTOR 20K .25% .125W F TC=0+-50 | 03888 | PME55-1/8-T2-2002-C |
| A8R130 | 0683-3355 | 2 | | RESISTOR 3.3M 5% .25W FC TC=0+-900/+1100 | 01121 | CB3355 |
| A8R131 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A8R132 | 0698-3194 | 8 | | RESISTOR 20K .25% .125W F rC=0+-50 | 03888 | PME55-1/8-T2-2002-C |
| A8TP1 THRU | | | | | | |
| A8TP9 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-S7 SQ | 28480 | 1251-0600 |
| A8U1 | 1820-0223 | 0 | 1 | IC OP AMP GP TD-99 PKG | 3L585 | CA301AT |
| A8U2 | 1826-0092 | 3 | | IC OP AMP GP DUAL TO-99 PKG | 28480 | 1826-0092 |
| A8U3 | 1826-0261 | 8 | | IC OP AMP LOW-NOISE TO-99 PKG | 28480 | 1826-0261 |
| A8VR1 | 1902-0025 | 4 | 2 | DIODE-ZNR 10V 5% DO-35 PD=4W TC=.06% | 28480 | 1902-0025 |
| A8VR2 | 1902-3139 | 7 | 1 | DIODE-ZNR 8.25V 5% DO-35 PD=.4W | 28480 | 1902-3139 |
| A8VR3 | 1902-0049 | 2 | I | DIODE-ZNR 6.19V 5% DO-35 PD=.4W | 28480 | 1902-0049 |
| A9 | 08558-60154 | 6 | 1 | THIRD CONVERTER | 28480 | 08558-60154 |
| A9 | 08558-60155 | 7 | 1 | THIRD CONVERTER, OPTION 001/002 | 28480 | 08558-60155 |
| A9C1 | 0160-3878 | 6 | 12 | CAPACITOR-FXD 1000PF +-20% 10IVOC CER | 28480 | 0160-3878 |
| A9C2 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 1009VDC CER | 28480 | 0160-3878 |
| A9C3 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A9C4 | 0160-2249 | 3 | 1 | CAPACITOR-FXD 4.7PF +-.25PF 500VDC CER | 28480 | 0160-2249 |
| A9C5 | 0160-2264 | 2 | 1 | CAPACITOR-FXD 20PF +-5% 500VDC CER 0+-30 | 28480 | 0160-2264 |
| A9C6 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A9C7 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A9C8 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A9C9 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A9C10 | 0160-2207 | 3 | 5 | CAPACITOR-FXD 300PF +-5% 300VDC MICA | 28480 | 0160-2207 |
| A9C11 | 0140-0195 | 2 | 2 | CAPACITOR-FXD 130PF +-5% 300VDC MICA | 72136 | DM15F131J0300WV1CR |
| A9C12 | 0140-0198 | 5 | 1 | CAPACITOR-FXD 200PF +-5% 300VDC MICA | 72136 | DM15F201J0300WV1CR |
| A9C13 | 0180-0197 | 3 | | CAPACITOR--FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A9C14 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2U2F+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A9C15 | 0160-3878 | 6 | | CAPACITOR-FXD 100PF +-20% 100VDC CER | 28480 | 0160-3878 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A9C16 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A9C17 | 0160-3879 | 7 | 10 | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A9C18 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A9C19 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A9C20 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A9CR1 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A9CR2 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A9CR3 | 1901-1070 | 9 | 23 | DIODE-PIN 110V | 28480 | 1901-1070 |
| A9CR4 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A9CR5 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A9CR6 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A9CR7 | 1901-0070 | 7 | 2 | DIODE-PWR RECT 600V 750MA DO-29 | 28480 | 1901-0070 |
| A9CR8 | 1901-0070 | 7 | | DIODE-PWR RECT 600V 750MA DO-29 | 28480 | 1901-0070 |
| A9E1 | 9170-0029 | 3 | 21 | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A9E2 | 1200-0173 | 5 | 3 | INSULATOR-XSTR DAP-GL | 28480 | 1200-0173 |
| A9E3 | 1200-0173 | 5 | | INSULATOR-XSTR DAP-GL | 28400 | 1200-0173 |
| A9J1 | 1250-0830 | 6 | 4 | CONNECTOR-RF SMC M SGL-HOLE-FR 50-OHM | 28480 | 1250-0830 |
| A9J2 | 1250-0830 | 6 | | CONNECTOR-RE SMC M SGL-HOLE-FR 50-OHM | 28480 | 1250-0830 |
| A9L1 | 9100-2255 | 4 | | INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG | 28480 | 9100-2255 |
| A9L2 | 9100-2255 | 4 | | INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG | 28480 | 9100-2255 |
| A9L3 | 08558-80002 | 5 | 1 | COIL, NEUTRALIZING | 28480 | 08558-80002 |
| A9L4 | 08558-80012 | 7 | 1 | COIL., FREQUENCY ADJUST | 28480 | 08558-80012 |
| A9L5 | 9100-2255 | 4 | | INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG | 28480 | 9100-2255 |
| A9L6 | 9100-2250 | 9 | 1 | INDUCTOR RF-CH-MLD 180NH 10% .105DX.26LG | 28480 | 9100-2250 |
| A9L7 | 9100-2255 | 4 | | INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG | 28480 | 9100-2255 |
| A9L8 | 9100-2255 | 4 | | INDUCTOR RF-CH-MLD 470NH 10% .105DX.26LG | 28480 | 9100-2255 |
| A9L9 | 9100-2249 | 6 | 2 | INDUCTOR RF-CH-MLD 150NH 10% .105DX.26LG | 28480 | 9100-2249 |
| A9L10 | 9100-2249 | 6 | | INDUCTOR RF-CH-MLD 150NH 10% .105DX.26LG | 28480 | 9100-2249 |
| A9L11 | 9100-2276 | 9 | 1 | INDUCTOR RF-CH-MLD 100UH 10% .185Dx.26L.G | 28480 | 9100-2276 |
| A9L12 | 9140-0178 | 0 | 4 | INDUCTOR RF-CH-MLD 12UH 10% .166DX.385LG | 28480 | 9140-0178 |
| A9L13 | 9140-0178 | 0 | | INDUCTOR RF-CH-MLD 12UH 10%.166DX.385LG | 28480 | 9140-0178 |
| A9L14 | 9140-0143 | 9 | 1 | INDUCTOR RF-CH-MLD 3.3UH 10% .105DX,26LG | 28480 | 9140-0143 |
| A9L15 | 9100-1623 | 8 | 2 | INDUCTOR RF-CH-MLD 27UH 5% .166DX,38SLG | 28480 | 9100-1623 |
| A9L16 | 9100-1623 | 8 | | INDUCTOR RF-CH-MLD 27UH 5% .166DX.385L.G | 28480 | 9100-1623 |
| A9MP1 | 08558-00014 | 1 | 1 | COVER, THIRD CONVERTER | 28480 | 08558-00014 |
| A9MP2 | 08558-00079 | 8 | 1 | RF SHIELD, MIXER | 28480 | 08558-00079 |
| A91Q | 1854-0345 | 8 | 6 | TRANSISTOR NPN 2N5179 SI T0-72 PD=200MW | 04713 | 2N5179 |
| A9Q2 | 1854-0247 | 9 | 2 | TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ | 28480 | 1854-0247 |
| A9Q3 | 1854-0247 | 9 | | TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ | 28480 | 1854-0247 |
| A9Q4 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A9Q5 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A9R1 | 2100-2522 | 1 | 4 | RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X103 |
| A9R2 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=O+-100 | 24546 | C4-1/8-TO-001-F |
| A9R3 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A9R4* | 0757-0424 | 7 | 8 | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A9R5 | 2100-3123 | 0 | | RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN | 02111 | 43P501 |
| A9R6 | 0757-0346 | 2 | | RESISTOR 10 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A9R7 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A9R8 | 0757-0799 | 9 | 1 | RESISTOR 121 1x .5W F TC=0+-100 | 28480 | 0757-0799 |
| A9R9* | 0757-0274 | 5 | 8 | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A9R10 | 0698-7188 | 8 | 1 | RESISTOR 10 1% .5OW F TC=0+-100 | 24546 | C3-1/8-TO-10R-F |
| A9R10 | 0698-7196 | 8 | 1 | RESISTOR 21.5 1% .05W F TC=0+-100 (OPTION 001/002) | 24546 | C3-1/8-TO-21R5-F |
| A9R10 | 0698-7203 | 8 | 1 | RESISTOR 42.2 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-42R2-F |
| A9R11 | 0698-7206 | 1 | 1 | RESISTOR 56.2 1% .05W F TC=0+-100 (OPTION 001/002) | 24546 | C3-1/8-TO-56R2-F |
| A9R12* | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=1+-100 | 24546 | C4-1/8-TO-511R-F |
| A9R12* | 0757-0416 | 7 | 12 | RESISTOR 511 1% .125W F TC=0+-100 (OPTION 001/002) | 24546 | C4-1/8-TO-511R-F |
| A9R13 | 0698-3450 | 9 | | RESISTOR 42.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4222-F |
| A9R14* | 0757-0463 | 4 | 1 | RESISTOR 02.5K 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-0252-F |
| A9R15 | 0698-3438 | 3 | | RESISTOR 147 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-147R-F |
| A9R16 | 0683-0475 | 1 | 2 | RESISTOR 4.7 5% .25W FC TC=-400/+500 | 01121 | CB47G5 |
| A9R17 | 0757-0464 | 5 | | RESISTOR 90,9K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-9092-F |
| A9R18 | 0698-3150 | 6 | 5 | RESISTOR 2,37K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2371-F |
| A9R19 | 0698-3156 | 2 | | RESISTOR 14.7K 1Z .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A9R20 | 0757-0418 | 9 | 4 | RESISTOR 619 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-619R-F |
| A9R21 | 0698-3159 | 5 | 0 | RESISTOR 26.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2612-F |
| A9R22 | 0757-0317 | 7 | | RESISTOR 1.33K-1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-1331-F |
| A9R23 | 0698-3447 | 4 | 0 | RESISTOR 422 1% ,125W F T=0+-100 | 24546 | C4-1/8-TO-422R-F |
| A9R24 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A9R25 | 0757-0418 | 9 | | RESISTOR 619 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-619R-F |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A9U1 | 0955-0076 | 5 | 1 | MIXER, D0UBLE BALANCED | 28480 | 0955-0076 |
| A9VR1 | 1902-3104 | 6 | 1 | DI0DE-ZNR 5.62V 5% DO-35 PD=.4W | 28480 | 1902-3104 |
| A9VR2 | 1902-0025 | 4 | | DI0DE-ZNR 10V 5% DO-35 PD=.4W TC=+.06% | 28480 | 1902-0025 |
| A9Z1 | 1GA1-8001 | 3 | 1 | SURFACE ACOUSTICAL. WAVE RESONATOR (SAWR) | 28480 | 1GA1-8001 |
| A10 | 08558-60010 | 3 | 1 | SECOND IF | 28480 | 08558-60010 |
| A10C1 | 0121-0457 | 9 | 3 | CAPACITOR-V TRMR-PSTN 8-8.5PF 750V | 18736 | TP9 |
| A10C2 | 0121-0457 | 9 | | CAPACITOR-V TRMR-PSTN .8-8.5PF 750V | 18736 | TP9 |
| A10C3 | 0121-0457 | 9 | | CAPACITOR-V TRMR-PSTN .8-8.5PF 750V | 18736 | TP9 |
| A10C4 | 0160-3878 | 6 | | CAPACITOR-FXD 1D00PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A10C5 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A10C6 | 0160-3877 | 5 | 1 | CAPACITOR-FXD 100PF +-20% 200VDC CER | 28480 | 0160-3877 |
| A10C7 | 0160-3878 | 6 | | CAPACITOR-FXD 100PF +-20% 100VDC CER | 28480 | 0160-3878 |
| A10C8 | 0160-2236 | 8 | 3 | CAPACITOR-FXD 1PF +-.25PF 500VDC CER | 28480 | 0160-2236 |
| A10C9 | 0160-2250 | 6 | 9 | CAPACITOR-FXD 5.1PF +-.25PF 500 VDC CER | 28480 | 0160-2250 |
| A10C10 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF +-.20% 100VDC CER | 28480 | 0160-3878 |
| A10C11 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500 VDC CER | 28480 | 0160-2250 |
| A10C12 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A10C13 | 0160-2252 | 8 | 1 | CAPACITOR-FXD 6.2PF +-.25PF 500VDC CER | 28480 | 0160-2252 |
| A10C14 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A10C15 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A10J1 | 1250-0830 | 6 | | CONNECTOR-RF SMC M SGL-H0LE-FR 50-OHM | 28480 | 1250-0830 |
| A10J2 | 1250-0830 | 6 | | CONNECTOR-RF SMC M SGL-H0LE-FR 50-OHM | 28480 | 1250-0830 |
| A10L1 | 9100-2247 | 4 | 2 | INDUCTOR RF-CH-MLD 100NH 10% .105DX.26LG | 28480 | 9100-2247 |
| A10L2 | 08558-80005 | 8 | 1 | COIL, PAR TANK | 28480 | 08558-80005 |
| A10L3 | 08558-80003 | 6 | 3 | COIL, BANDPASS FILTER | 28480 | 08558-80003 |
| A10L4 | 08558-80003 | 6 | | COIL, BANDPASS FILTER | 28480 | 08558-80003 |
| A10L5 | 08558-80003 | 6 | | COIL, BANDPASS FILTER | 28480 | 08558-80003 |
| A10MP1 | 08558-00015 | 2 | 1 | C0VER, SECOND I. F | 28480 | 08558-00015 |
| A10MP2 | 1200-0172 | 4 | 1 | INSULATOR-XSTR DAP-GL | 28480 | 1200-0172 |
| A10Q1 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A10Q2 | 5086-4218 | 7 | | TRANSISTOR, NPN MICROWAVE | 28480 | 5086-4218 |
| A10R1 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC:=0+-100 | 24546 | C4-1/8-T0-1002-F |
| A10R2 | 0698-3136 | 8 | 3 | RESISTOR 17.8K 1% .125W F TC=0+-100 | 24546 | C4-1/8-T0-1782-F |
| A10R3 | 0757-0438 | 3 | | RESISTOR 5.11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-T0-5111-F |
| A10R4 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4--1/8-T0-237R-F |
| A10R5 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=00+-100 | 24546 | C4-1/8-T0-1001-F |
| **A11** | **08558-60128** | **4** | **1** | **BANDWIDTH FILTER NO. 1** | **28480** | **08558-60128** |
| A11C1 | 0160-2055 | 9 | | CAPACITOR-FXD ,01UF +80-20% 100VDC CE0R | 28480 | 0160-2055 |
| A11C2 | 0160-0127 | 2 | 2 | CAPACITOR-FXD 11JF -20% 2SVDC CER | 28480 | 0160-0127 |
| A11C3 | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +-.2PF 5S00VDC CER | 28480 | 0160-2236 |
| A11C4 | 0160-2055 | 9 | | CAPACITOR-FXD .016F +80-20% 1100VDC CER | 28480 | 0160-2055 |
| A11C5 | 0160-2055 | 9 | | CAPACITOR-7FXD .0UF +00-20 1001VDC CER | 28480 | 0160-2055 |
| A11C6 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C7 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C8 | 0160-2207 | 3 | | CAPACITOR-FXD 500PF 1-5% 300VDC MICA | 28480 | 0160-2207 |
| A11C9 | 0160-2055 | 9 | | CAPACITOR-FXD 01UF +80-20% 10VD0C CER | 28480 | 0160-2055 |
| A11C10 | 0160-2055 | 9 | | CAPACITOR --FXD .01UF +80--207 10lVDC CER | 28480 | 0160-2055 |
| A11C1 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C12 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C13 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10%x 1KVDC CER | 28480 | 0160-3456 |
| A11C14 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25'SPF 500VDC CER | 28480 | 0160-2250 |
| A11C15 | 0121-0059 | 7 | 4 | CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG | 52763 | 304324 2/8PF NPO |
| A11C16 | | | | NOT ASSIGNED | | |
| A11C17 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-.20 100VDC CER | 28480 | 0160-2055 |
| A11C18 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +0--20% 1D0VDC 10 ER | 28480 | 0160-2055 |
| A11C19 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20X 100VDC CER | 28480 | 0160-2055 |
| A11C20* | 0140-0194 | 1 | 5 | CAPACITOR-FXD 110PF +-5% 300VDC MICA | 72136 | DM15F111J0300D0WV1CR |
| A11C21 | 0160-3431 | 7 | 4 | CAPACITOR-FXD 6.8 .+-.5PF 500VDC | 28480 | 0160-3431 |
| A11C22 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC | 28480 | 0160-4084 |
| A11C23 | 0121-0036 | 0 | 4 | CAPACITOR-V TRMR-CER 5.5-18PF 350V | 52763 | 304324 5.5/18PF NPO |
| A11C24 | | | | NOT ASSIGNED | | |
| A11C25 | 0121-0446 | 6 | 4 | CAPACITOR-V TRMR-CER 4.5-20PF 160V | 28480 | 0121-0446 |
| A11C26 | 0160-2055 | 9 | | CAPACITOR FXD 01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C27 | 0160-2055 | 9 | | CAPACITOR-FXD 01UF +80-20% 10UVDC CER | 28480 | 0160-2055 |
| A11C28 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +10-20% 10VDC CER | 28400 | 0160-2055 |
| A11C29 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A11C30 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF R80-20% 100VDC CER | 28400 | 0160-2055 |
| A11C31 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A11C32 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A11C33 | 0160-2207 | 3 | | CAPACITOR-FXD 300PF +-5% 300VDC MICA | 28480 | 0160-2207 |
| A11C34 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% - 100VDC CER | 28480 | 0160-2055 |
| A11C35 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% x100VDC CER | 28480 | 0160-2055 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A11C36 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C37 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A11C38 | 0121-0059 | 7 | | CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG | 52763 | 304324 2/8PF NPO |
| A11C39 | | | | NOT ASSIGNED | | |
| A11C40 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C41 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC: CER | 28480 | 0160-3456 |
| A11C42 | 0160-2055 | 9 | | CAPACITOR-FXD .01F +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C43 | 0160-3431 | 7 | | CAPACITOR-FXD 6.8PF +-5PF 500VDC CER | 28480 | 0160-3431 |
| A11C44 | 0140-0194 | 1 | | CAPACITOR-FXD 110PF +-5% 300VDC CER | 72136 | DM15F111J0300WV1CR |
| A11C45 | 0121-0036 | 0 | | CAPACITOR-V TRMR-CER 5.5-18PF 350V | 52763 | 304324 5.5/18PF NPO |
| A11C46 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF4-20% 50VDC CER | 28480 | 0160-4084 |
| A11C47 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20 100VDC CER | 28480 | 0160-2055 |
| A11C48 | 0160-2055 | 9 | | CAPACITOR--FXD .01UF +80-20% 100VDC CER | 284B0 | 0160-2055 |
| A11C49 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C50 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C51 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C52 | 0160-2055 | 9 | | CAPACITOR--FXD .01UF +80-2.0% 100VDC CER | 28480 | 0160-2055 |
| A11C53 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C54 | 0121-0446 | 6 | | CAPACITOR-V TRMR-CER 4.5-20PF 160V | 28480 | 0121-0446( |
| A11C55 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C56THRU A11C59 | | | | NOT ASSIGNED | | |
| A11C60 | 0160-2055 | 9 | | CAPACITOR--FXD .01UF +80-20% 10VDC CER | 28480 | 0160-2055 |
| A11C61 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C62 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C63 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C64 | 0160-2208 | 4 | 1 | CAPACITOR-FXD 330PF +-5% 300VDC MICA | 28480 | 0160-2208 |
| A11C65 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C66 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +50-20% 100VDC CER | 28480 | 0160-2055 |
| A11C67 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A11C68THRU A11C72 | | | | NOT ASSIGNED | | |
| A11C73 | 0121-0452 | 4 | 4 | CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V | 74970 | 187-0103-028 |
| A11C74 | 0121-0452 | 4 | | CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V | 74970 | 187-0103-028 |
| A11CR1 | 1901-0047 | 8 | 13 | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A11CR2 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A11CR3 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A11CR4 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A11CR5 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A11CR6 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A11CR7 | | | | NOT ASSIGNED | | |
| A11CR8 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A11CR9 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A11CR10 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A11CR11 | 1901-1070 | 9 | | DIODE--PIN 110V | 28480 | 1901-1070 |
| A11CR12 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A11CR13 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A11CR14 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A11CR15 | 1901-0535 | 9 | | DIODE.-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A11CR16 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75HA 10NS | 28480 | 1901-0047 |
| A11CR17 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A11E1 THRU A11E8 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A11L1 | 9140-0112 | 2 | 3 | INDUCTOR RF-CH-MLD 4.7UH 10% | 28480 | 9140-0112 |
| A11L2 | 9100-1641 | 0 | 4 | INDUCTOR RF-CH-MLD 240UH 5% .166DX,385LG | 28480 | 9100-1641 |
| A11L3 | 9140-0114 | 4 | 7 | INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG | 28480 | 9140-0114 |
| A11L4 | 9100-1624 | 9 | 6 | INDUCTOR RF-CH-MLD 30UH 5% 166DX.385LG | 28480 | 9100-1624 |
| A11L5 | 9140-0179 | 1 | 14 | INDUCTOR RF-CH-MLD 22UH 10% .166DX .385LG | 28480 | 9140-0179 |
| A11L6 | 9100-3854 | 1 | 4 | INDUCTOR 400NH 10% .3DX1 .016LG Q =150 | 28480 | 9100-3854 |
| A11L7 | 9140-0098 | 3 | 4 | INDUCTOR RF-CH-MLD 2.2UH 10 | 28480 | 9140-0098 |
| A11L8 | 9140-0178 | 0 | | INDUCTOR RF-CH-MLD 12UH 10% .166DX.385LG | 28480 | 9140-0178 |
| A11L9 | 9100-1641 | 0 | | INDUCTOR RF-CH-MLD 240UH 5% .166DX.385LG | 28480 | 9100-1641 |
| A11L10 | 9140-0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX .385LG | 28480 | 9140-0114 |
| A11L11 | 9100-1624 | 9 | | INDUCTOR RF-CH-MLD 30UH 5% .166DX. 385LG | 28480 | 9100-1624 |
| A11L12 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A11L13 | 9140-0098 | 3 | | INDUCTOR RF-CH-MLD 2,2UH 10% | 28480 | 9140-0098 |
| A11L14 | 9100-1620 | 5 | 2 | INDUCTOR RF-CH-MLD 15UH 10% .166DX385LG | 28480 | 9100-1620 |
| A11L15 | 9100-3854 | 1 | | INDUCTOR 400NH 10% .3DX1, .016LG Q=150 | 28480 | 9100-3854 |
| A11L16 | 9140-0144 | 0 | 3 | INDUCTOR RF-CH-MLD 4.7UH 10% .185 DX.26LG | 28480 | 9140-0144 |
| A11L17 | 9100-1624 | 9 | | INDUCTOR RF-CH-MLD 30UH 5% .1,6DX.385LG | 28480 | 9100-1624 |
| A11MP1 | 08565-00024 | 2 | 2 | BAFFLE, INDUCTOR | 28480 | 08565-00024 |
| A11Q1 | 1854-0345 | 8 | 1 | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713 | 2N5179 |
| A11Q2 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A11Q3 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A11Q4 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD:=360MW | 04713 | 2N3251 |
| A11Q5 | 1855-0267 | 5 | 4 | TRANSISTOR J-FET N-CHAN 0-MODE TO-92 SI | 28480 | 1855--0267 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A11Q6 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A11Q7 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A1RQ8 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A11Q9 | 1855-0267 | 5 | | TRANSISTOR J-FET N-CHAN D-M0DE TO-92 SI | 28480 | 1855-0267 |
| A11Q10 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A11R1 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0-100 | 24546 | C4-1/8-TO-1212-F |
| A11R2 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A11R3 | 0757-0402 | 1 | 6 | RESISTOR 110 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A11R4 | | | | NOT ASSIGNED | | |
| A11R5 | 0757-0405 | 4 | 2 | RESISTOR 162 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-162R-F |
| A11R6 | 0698-3431 | 6 | 2 | RESISTOR 23.7 1% .125W F TC=+-100 | 03888 | PME55-1/8-TO-23R7-F |
| A11R7 | 0698-8822 | 9 | 1 | RESISTOR 6.81 1% .1251W F TC=0+-100 | 28480 | 0698-8822 |
| A11R8 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A11R9 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A11R10 | 0757-1094 | 9 | | RESISTOR 1.47K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TR-1471-F |
| A11R11 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A11R12 | 0757-0447 | 4 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-'TO-1622-F |
| A11R13 | 0698-0082 | 7 | 1 | RESISTOR 464 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4640-F |
| A11R14 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A11R15 | 0698-3440 | 7 | 9 | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A11R16 | 0757-0419 | 0 | | RESISTOR 681 1% .125W F 1C=D+-100 | 24546 | C4-1/8-TO-681R-F |
| A11R17 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A11R18 | 0757-0279 | 0 | | RESISTOR 3.16K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-3161--F |
| A11R19 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A11R20 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=D+-100 | 24546 | C4-1/8-TO-1002-F |
| A11R21 | 0757-0442 | 9 | | RESISTOR 11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A11R22 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A11R23* | 0757-0289 | 2 | 14 | RESISTOR 13.3K 1%.125W F TC=0+-100 | 19701 | MS4C1/8-TO-1332F |
| A11R24 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A11R25 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A11R26 | 2100-3163 | 8 | 2 | RESISTOR-TRMR 1M 20% C SIDE-.ADJ 17-TRN | 02111 | 43P105 |
| A11R27 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-1R0 | 24546 | C4-1/8-TO-1212-F |
| A11R28 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A11R29 | 0757-1094 | 9 | | RESISTOR 1.47K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1471-F |
| A11R30 | 0757-0402 | 1 | | RESISTOR 110 1% .125W F TC=0 +-100 | 24546 | C4-1/8-TO-111-F |
| A11R31 | 2100-3052 | 4 | | RESISTOR-TRMR 50 10% C SIDE--ADJ 17-TRN | 02111 | 43P500 |
| A11R32 | | | | NOT ASSIGNED | | |
| A11R33 | 0757-0442 | 9 | | RESISTOR 11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A11R34 | 0757-0199 | 3 | | RESISTOR 21.5K 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A11R35 | 0757-0288 | 1 | 5 | RESISTOR 9.09K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A11R36 | 0698-0083 | 0 | | RESIST1)R 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A11R37 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A11R38 | 0698-3441 | 8 | 3 | RESISTOR 215 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-215R-F |
| A11R39 | 0757-0419 | 0 | | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-681R-F |
| A11R40 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A11R41 | 0757-0279 | 0 | | RESIST 0R 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A11R42 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4. 1/8-TO-1002-F |
| A11R43* | 0757-0200 | 7 | 4 | RESISTOR 5.62K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5621-F |
| A11R44 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A11R45 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1 /8-TO-101-F |
| A11R46 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A11R47 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A11R48* | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A11R49 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-110 | 24546 | C4-1/8TO-1212-F |
| A11R50 | | | | NOT ASSIGNED | | |
| A11R51 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8 -TO-10R0-F |
| A11R52 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8STD-6191-F |
| A11R53 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-110 | 24546 | C4-1/8-TO-196R-F |
| A11R54 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R--F |
| A11R55 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-10 | 24546 | C4-1/8-TO-1002-F |
| A11R56* | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A11R57 | 0757-0180 | 2 | 6 | RESISTOR 31.6 1x .125W F TC=0+-100 | 28480 | 0757-0180 |
| A11R58 | 0698-3152 | 8 | | RESISTOR 3.48K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3481-F |
| A11R59 | 0757-0180 | 2 | | RESISTOR 31.6 1% .125W F TC=0+-100 | 28480 | 0757-0180 |
| A11R60 | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A11TP1 | 0360-1788 | 7 | 8 | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A11TP2 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A11TP3 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ S0 | 28480 | 1251-0600 |
| A11TP4 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A11TP5 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ S | 28480 | 0360-1788 |
| A11TP6 | 1251-0600 | 0 | | CONNECTOR-SGL- CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A11TP7 | | | | NOT ASSIGNED | | |
| A11TP8 | 1251-0600 | 0 | | C10NNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A11TP9 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A11TP10 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A11TP1 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1,14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A11VR1 | 1902-0048 | 1 | 2 | DIODE-ZNR 6.81V 5% DO-35 PD=.4W | 28480 | 1902-0048 |
| A11Y1/2 | 0410-0450 | 5 | 2 | CRYSTAL, 21.4 MHZ (MATCHED SET OF FOUR; INCLUDES A11Y1, A11Y2, A13Y1, & A13Y2) | 28480 | 0410-0450 |
| A12 | 08558-60012 | 5 | 1 | STEP GAIN | 28480 | 08558-60012 |
| A12 | 08558-60073 | 8 | | STEP GAIN, OPTION 001/002 | 28480 | 08558-60073 |
| A12C1 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C2 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C3 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C4 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C5 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C6 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C7 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C8 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C9 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C10 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C11 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C12 | 0160-2055 | 3 | 2 | CAPACITOR-FXD 1UF+-10% 35VDC TA | 56289 | 150D105X9035A2 |
| A12C13 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C14 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C15 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C16 | 0160-2055 | 9 | | CAPACITOR-FXD 2000PF +-10% 250VDC CER | 28480 | 0160-3457 |
| A12C17 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C18 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C19 | 0160-2055 | 9 | | CAPACITOR-FXD 2000PF +-10% 250VDC CER | 28480 | 0160-3457 |
| A12C20 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C21 | 0160-2055 | 9 | | CAPACITOR-FXD 01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C22 | 0160-2055 | 9 | | CAPACITOR-FXD 2000PF +-10% 250VDC CER | 28480 | 0160-3457 |
| A12C23 | 0160-2055 | 9 | | CAPACITOR-FXD 01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A12C24 | 0160-2199 | 2 | 1 | CAPACITOR-FXD 30PF +-5% 300VDC MICA | 28480 | 0160-2199 |
| A12C25 | 0160-2307 | 4 | 1 | CAPACITOR-FXD 47PF +-5% 300VDC MICA | 28480 | 0160-2307 |
| A12C26 | 0140-0194 | 1 | | CAPACITOR-FXD 110PF +-5% 300VDC MICA | 72136 | DM15F111J0300WV1CR |
| A12C27 | 0180-0291 | 3 | | CAPACITOR-FXD 1UF+-10% 35VDC TA | 56209 | 150D105X9035A2 |
| A12CR1 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A12CR2 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A12CR3 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A12CR4 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A12CR5 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A12CR6 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A12E1 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A12E2 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A12E3 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A12L1 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L2 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L3 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L4 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L5 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L6 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L7 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L8 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A12L9 | 9100-2260 | 1 | | INDUCTOR RF-CH-MLD 1.8UH 10% .105DX.26LG | 28480 | 9100-2260 |
| A12L10 | 9140-0158 | 6 | 5 | INDUCTOR RF-CH-MLD 1UH 10% .105DX.26LG | 28480 | 9140-0158 |
| A12L11 | 9100-2552 | 4 | 4 | INDUCTOR RF-CH-MLD 15UH 10% .161DX.385LG | 28480 | 9100-2552 |
| A12Q1 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q2 | 1854-0345 | 8 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713 | 2N5179 |
| A12Q3 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q4 | 1854-0345 | 8 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713 | 2N5179 |
| A12Q5 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q6 | 1854-0345 | 8 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713 | 2N5179 |
| A12Q7 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q8 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q9 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q10 | 1854-0882 | 8 | | TRANSISTOR NPN PD=300MW FT=200MHZ | 28480 | 1854-0882 |
| A12Q11 | 1854-0882 | 8 | | TRANSISTOR NPN PD=300MW FT=200MHZ | 28480 | 1854-0882 |
| A12Q12 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A12Q13 | 1853-0213 | 7 | 1 | TRANSISTOR PNP 2N4236 SI TO-5 PD=1W | 04713 | 2N4236 |
| A12R1 | 2100-3103 | 6 | 3 | RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN | 02111 | 43P103 |
| A12R2 | 2100-3103 | 6 | | RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN | 02111 | 43P103 |
| A12R3 | 2100-3054 | 6 | 1 | RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN | 02111 | 43P503 |
| A12R4 | 2100-3061 | 5 | 1 | RESISTOR-TRMR 500K 10% C SIDE-ADJ 17-TRN | 02111 | 43P504 |
| A12R5 | 2100-3103 | 6 | | RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN | 02111 | 43P103 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A12R6 | 2100-3056 | 8 | 1 | RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN | 02111 | 43P502 |
| A12R7 | 2100-1757 | 2 | | RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1757 |
| A12R8 | 0757-0288 | 1 | | RESISTOR 9.09K 17 .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A12R9 | 0698-3457 | 6 | | RESISTOR 316K 1% .125W F TC=0+-100 | 213480 | 0698-3457 |
| A12R10 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A12R11 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A12812 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A12R13 | 0757-0208 | 1 | | RESISTOR 9.09K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A12R14 | 0757-0395 | 1 | 5 | RESISTOR 56.2 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-56R2-F |
| A12R15 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A12R16 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A12R17 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A12R18 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A12R19 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A12R20 | 0757-0279 | 0 | | RESISTOR 3.16K 1x .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A12R21 | 0698-3162 | 0 | | RESISTOR 46.4K 11 .125W F TC=0+-100 | 24546 | C4-1/8-TO-4642-F |
| A12R22 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4--1/8-TO-3161-F |
| A12R23 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A12824 | 0757-0395 | 1 | | RESISTOR 56.2 17 .125W F TC=0+-100 | 24546 | C4-1/8-TO-56R2-F |
| A12R25 | 0757-0280 | 3 | | RESISTOR 1K 11 .125W F TC=0+-108 | 24546 | C4-1/8-TO-1001-F |
| A12R26 | 0757-0417 | 8 | 2 | RESISTOR 562 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-562R-F |
| A12R26 | 0757-0419 | 0 | | RESISTOR 681 1% .125W F TC=0+-100 (OPTION 001/002) | 24546 | C4-1/8-TO-681R-F |
| A12827 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A12R28 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F C=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A12R29 | 0690-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A12R30 | 0757-0395 | 1 | | RESISTOR 56.2 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-56R2-F |
| A12R31 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A12R32 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A12R33 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A12R34 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A12R35 | 0698-3444 | 1 | | RESISTOR 316 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A12R36 | 0757-0395 | 1 | | RESISTOR 56.2 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-56R2-F |
| A12R37 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A12R38 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A12R39 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A12R40 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A12R41 | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A12R42 | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A12R43 | 0698-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2071-F |
| A12R44 | 0698-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A12R45 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A12R46 | 0698-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A12R47 | 0698-3162 | 0 | | RESISTOR 46.4K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4642-F |
| A12R48 | 0698-3162 | 0 | | RESISTOR 46.4K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4642-F |
| A12R49 | 0698-3162 | 0 | | RESISTOR 46.4K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-4642-F |
| A12S1 | 3101-0973 | 5 | 1 | SWITCH-SL DPDT MINTR .5A 125VAC/DC PC | 28480 | 3101-0973 |
| A12TP1 THRU A12TP9 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A12VR1 | 1902-0033 | 4 | | DIODE-ZNR 1N823 6.2V 5% DO-7 PD=.4W | 24046 | 1N823 |
| A13 | 08558-60129 | 5 | 1 | BANDWIDTH FILTER NO. 2 | 28480 | 08558-60129 |
| A13C1 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C2 | 0160-0127 | 2 | | CAPACITOR-FXD 1UF +-20% 25VDC CER | 28480 | 0160-0127 |
| A13C3 | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +-.25PF 500VDC CER | 28480 | 0160-2236 |
| A13C4 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C5 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C6 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C7 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C8 | 0160-2207 | 3 | | CAPACITOR-FXD 300PF +-5% 300VDC MICA | 28480 | 0160-2207 |
| A13C9 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C10 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C11 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C12 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C13 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A13C14 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A13C15 | 0121-0059 | 7 | | CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG | 52763 | 304324 2/8PF NPO |
| A13C16 | | | | NOT ASSIGNED | | |
| A13C17 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C18 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C19 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C20* | 0140-0194 | 1 | | CAPACITOR-FXD 110PF +-5% 300VDC MICA | 72136 | DM15F111J0300WV1CR |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A13C21 | 0160-3431 | 7 | | CAPACITOR-FXD 6.8PF +-.5PF 500VDC CER | 28480 | 0160-3431 |
| A13C22 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A13C23 | 0121-0036 | 0 | | CAPACITOR-V TRMR-CER 5.5-18PF 350V | 52763 | 304324 5.5/18PF NPO |
| A13C24 | | | | NOT ASSIGNED | | |
| A13C25 | 0121-0446 | 6 | | CAPACITOR-V TRMR-CER 4.5-20PF 160V | 28480 | 0121-0446 |
| A13C26 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20x 100VDC CER | 28480 | 0160--2055 |
| A13C27 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C28 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C29 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A13C30 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C31 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +-10% 1KVDC CER | 28480 | 0160-3456 |
| A13C32 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A13C33 | 0160-2207 | 3 | | CAPACITOR-FXD 300PF +-5% 300VDC MICA | 28480 | 0160-2207 |
| A13C34 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C35 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C36 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 20480 | 0160-2055 |
| A13C37 | 0160-2250 | 6 | | CAPACITOR-FXD 5.1PF +-.25PF 500VDC CER | 28480 | 0160-2250 |
| A13C38 | 0121-0059 | 7 | | CAPACITOR-V TRMR-CER 2-8PF 350V PC-MTG | 52763 | 304324 2/8PF NPO |
| A13C39 | | | | NOT ASSIGNED | | |
| A13C40 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C41 | 0160-3456 | 6 | | CAPACITOR-FXD 1000PF +.-10% 1KVDC CER | 28480 | 0160-3456 |
| A13C42 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 20480 | 0160-2055 |
| A13C43 | 0160-3431 | 7 | | CAPACITOR-FXD 6.8PF +-.5PF 500VDC CER | 28480 | 0160-3431 |
| A13C44* | 0140-0194 | 1 | | CAPACITOR-FXD 110PF +-5% 300VDC MICA | 72136 | DM15F111J0300WV1CR |
| A13C45 | 0121-0036 | 0 | | CAPACITOR-V TRMR-CER 5.5-18PF 350V | 52763 | 304324 5.5/18PF NPO |
| A13C46 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4084 |
| A13C47 | 0160-2055 | 9 | | CAPACITOR--FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C48 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-20550 |
| A13C49 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C50 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF+80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C51 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C52 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C53 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C54 | 0121-0446 | 6 | | CAPACITOR-V TRMR-CER 4.5-20PF 160V | 28480 | 0121-0446 |
| A13C55 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C56 THRU A13C59 | | | | NOT ASSIGNED | | |
| A13C60 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C61 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C62 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C63 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C64 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C65 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C66 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C67 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A13C68 THRU A13C72 | | | | NOT ASSIGNED | | |
| A13C73 | 0121-0452 | 4 | | CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V | 74970 | 187-0103-028 |
| A13C74 | 0121-0452 | 4 | | CAPACITOR-V TRMR-AIR 1.3-5.4PF 175V | 74970 | 187-0103-028 |
| A13CR1 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13CR2 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13CR3 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A13CR4 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A13CR5 | 1901-1070 | 9 | | DIODE-PIN 112V | 28480 | 1901-1070 |
| A13CR6 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A13CR7 | | | | NOT ASSIGNED | | |
| A13CR8 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A13CR9 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13CR10 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13CR11 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A13CR12 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A13CR13 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA-10NS | 28480 | 1901-0047 |
| A13CR14 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A13CR15 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A13CR16 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13CR17 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0535 |
| A13CR18 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A13E1 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E2 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E3 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E4 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E5 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E6 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E7 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A13E8 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A13L1 | 9140-0112 | 2 | | INDUCTOR RF-CH-MLD 4.7UH 10% | 28480 | 9140-0112 |
| A13L2 | 9100-1641 | 0 | | INDUCTOR RF-CH-MLD 240UH 5% .166DX.385LG | 28480 | 9100-1641 |
| A13L3 | 9140-0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG | 28480 | 9140-0114 |
| A13L4 | 9100-1624 | 9 | | INDUCTOR RF-CH-MLD 30UH 5% .166DX.385LG | 28480 | 9100-1624 |
| A13L5 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A13L6 | 9100-3854 | 1 | | INDUCTOR 400NH 10% .3DX1.016LG Q=150 | 28480 | 9100-3854 |
| A13L7 | 9140-0098 | 3 | | INDUCTOR RF-CH-MLD 2.2UH 10% | 28480 | 9140-0098 |
| A13L8 | 9140-0178 | 0 | | INDUCTOR RF-CH-MLD 12UH 10% .166DX.385LG | 28480 | 9140-0178 |
| A13L9 | 9100-1641 | 0 | | INDUCTOR RF-CH-MLD 240UH 5% .166DX.305LG | 28480 | 9100-1641 |
| A13L10 | 9140-0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX.38SLG | 28480 | 9140-0114 |
| A13L11 | 9100-1624 | 9 | | INDUCTOR RF-CH-MLD 30UH 5% .166DX.385LG | 28480 | 9100-1624 |
| A13L12 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A13L13 | 9140-0098 | 3 | | INDUCTOR RF-CH-MLD 2.2UH 10% | 28480 | 9140-0098 |
| A13L14 | 9100-1620 | 5 | | INDUCTOR RF-CH-MLD 15UH 10% .166DX.385LG | 28480 | 9100-1620 |
| A13L15 | 9100-3854 | 1 | | INDUCTOR 400NH 10% ,3DX1.016LG Q=150 | 28480 | 9100-3854 |
| A13L16 | 9140-0144 | 0 | | INDUCTOR RF-CH-MLD 4.7UH 10% ,105DX.26LG | 28480 | 9140-0144 |
| A13L17 | 9100-1624 | 9 | | INDUCTOR RF-CH-MLD 30UH 5% .166DX.385LG | 28480 | 9100-1624 |
| A13MP1 | 08565-00024 | 2 | | BAFFLE, INDUCTOR | 28480 | 08565-00024 |
| A13Q1 | 1854-0345 | 8 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW | 04713 | 2N5179 |
| A15Q2 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360NW | 28480 | 1854-0404 |
| A13Q3 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A13Q4 | 1053-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N5251 |
| A13Q5 | 1855-0267 | 5 | | TRANSISTOR J-FET N-CHAN D-MODE TO-92 SI | 28480 | 1855-0267 |
| A13Q6 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A13Q7 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A13Q8 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A13Q9 | 1855-0267 | 5 | | TRANSISTOR J-FET N-CHAN D-MODE TO-92 SI | 20480 | 1855-0267 |
| A13Q10 | 1853-0007 | 7 | | TRANSISTOR PNP 2N5251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A13R1 | 0757-0447 | 4 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A13R2 | 0698-3157 | 3 | 1 | RESISTOR 19.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1962-F |
| A13R3 | 0757-0402 | 1 | | RESISTOR 110 1X .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A13R4 | | | | NOT ASSIGNED | | |
| A13R5 | 0757-0405 | 4 | | RESISTOR 162 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-162R-F |
| A13R6 | 0698-3431 | 6 | | RESISTOR 23,7 1% .125W F TC=0+-100 | 03888 | PME55-1/8-TO-23R7-F |
| A13R7 | 0698-3427 | 0 | 1 | RESISTOR 13.3 1% .125W F TC=0+-100 | 03888 | PME55-1/8-TO-13R3-F |
| A13R8 | 0757-0402 | 1 | | RESISTOR 110 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A13R9 | 0757-0288 | 1 | | RESISTOR 9.09K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A13R10 | 0698-0083 | 8 | | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-2/8-TO-1961-F |
| A13011 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R12 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A13R13 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A13R14 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A13R15 | 0698-3441 | 8 | | RESISTOR 215 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-215R-F |
| A13R16 | 0757-0419 | 0 | | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-681R-F |
| A13R17 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A13R18 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A13019* | 0757-0200 | 7 | | RESISTOR 5.62K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5621-F |
| A13R20 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R21 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R22 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R23* | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A13R24 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A13R25 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A13R26 | 2100-3163 | 8 | | RESISTOR-TRMR 1M 20% C SIDE-ADJ 17-TRN | 02111 | 43P105 |
| A13R27 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A13R28 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-T0-6191-F |
| A13R29 | 0757-1094 | 9 | | RESISTOR 1.47K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1471-F |
| A13R30 | 0757-0402 | 1 | | RESISTOR 110 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A13R31 | 2100-3052 | 4 | | RESISTOR-TRMR 50 10% C SIDE-ADJ 17-TRN | 02111 | 4AF500 |
| A13R32 | | | | NOT ASSIGNED | | |
| A13R33 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-11/-TO-1002-F |
| A13R34 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A13R35 | 0757-0288 | 1 | | RESISTOR 9.09K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A13R36 | 0698-0083 | 8 | | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A13R37 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A13R38 | 0698-3441 | 8 | | RESISTOR 215 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-215R-F |
| A13R39 | 0757-0419 | 0 | | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-681R-F |
| A13R40 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A13R41 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A13R42 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13043* | 0757-0438 | 3 | 4 | RESISTOR 5.11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5111-F |
| A13R44 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R45 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101 F |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A13R46 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A13R47 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A13R48* | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A13R49 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A13R50 | | | | NOT ASSIGNED | | |
| A13R51 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A13R52 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A13R53 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A13R54 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A13R55 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A13R56* | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A13R57 | 0757-0180 | 2 | | RESISTOR 31.6 1% .125W F TC=.+-100 | 24546 | 0757-0180 |
| A13R58 | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A13R59 | 0757-0180 | 2 | | RESISTOR 31.6 1% .125W F TC=0+-100 | 28480 | 0757-0180 |
| A13R60 | 0698-3153 | 9 | | RESISTOR 3.83K 1%X .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A13TP1 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A13TP2 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A13TP3 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13TP4 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A13TP5 | 0360-1788 | 7 | | CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ | 28480 | 0360-1788 |
| A13TP6 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13TP7 | | | | NOT ASSIGNED | | |
| A13TP8 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13TP9 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13TP10 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13TP11 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A13VR1 | 1902-0048 | 1 | | DIODE-ZNR 6.81V 5%X DO-35 PD=.4W | 28480 | 1902-0048 |
| A13Y1/2 | 0410-0450 | 5 | | CRYSTAL, 21.4 MHZ (MATCHED SET OF 4;INCL.A13Y1,A13Y2,A11Y1 AND A11Y2) | 28480 | 0410-0450 |
| A14 | 5061-5411 | 2 | 1 | LOG AMPLIFIER ASSEMBLY | 28480 | 5061-5411 |
| A14C1 | 0160-4554 | 7 | 65 | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C2 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A14C3 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C4 | 0160-4554 | 7 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C5 | 0160-4554 | 7 | | CAPACITOR-FXD .1UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C6 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C7 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A14C8 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C9 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C10 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C11 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C12 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C13 | | | | NOT ASSIGNED | | |
| A14C14 THRU A14C34 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C35 | | | | NOT ASSIGNED | | |
| A14C36 THRU A14C69 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C70 | 0160-4519 | 4 | 1 | CAPACITOR-FXD 9.1PF +-.5PF 200VDC CER | 28480 | 0160-4519 |
| A14C71 | 0140-0195 | 2 | | CAPACITOR-FXD 130PF +-5% 300VDC MICA | 72136 | DM15F131J0300WV1CR |
| A14C72 | 0160-4386 | 3 | 1 | CAPACITOR-FXD 33PF +-5% 200VDC CER 0+-30 | 28480 | 0160-4386 |
| A14C73 | 0160-3872 | 0 | 1 | CAPACITOR-FXD 2.2PF +-.25PF 200VDC CER | 28480 | 0160-3872 |
| A14C74 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C75 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C76 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14C77 | 0160-4554 | 7 | | CAPACITOR-FXD .01UF +-20% 50VDC CER | 28480 | 0160-4554 |
| A14CR1 | 1910-0016 | 0 | 1 | DIODE-GE 60V 60MA 1US DO-7 | 28480 | 1910-0016 |
| A14CR2 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A14CR3 | | | | NOT ASSIGNED | | |
| A14CR4 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A14CR5 | | | | NOT ASSIGNED | | |
| A14CR6 | 1901-1085 | 6 | 16 | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR7 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR8 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28400 | 1901-1065 |
| A14CR9 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR10 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR11 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR12 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR13 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR14 | 1901-1085 | 6 | 1 | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR15 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14CR16 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR17 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1005 |
| A14CR18 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR19 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR20 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR21 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28400 | 1901-1085 |
| A14CR22 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR23 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1005 |
| A14CR24 | 1901-1005 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR25 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR26 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR27 | 1901-1085 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR28 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR29 | 1901-1070 | 9 | | DIODE-PIN 110V | 28400 | 1901-1070 |
| A14CR30 | 1901-1005 | 6 | | DIODE-SM SIG SCHOTTKY | 28480 | 1901-1085 |
| A14CR31 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A14CR32 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A14CR33 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A14E1 | 9170-0029 | 3 | | CORE-SHIELDING BEAD | 28480 | 9170-0029 |
| A14L1 | 9100-1618 | 1 | 2 | INDUCTOR RF-CH-MLD 5.6UH 10% | 28480 | 9100-1618 |
| A14L2 | 9140-0144 | 0 | | INDUCTOR RF-CH-MLD 4.7UH 10% .105DX.26LG | 28480 | 9140-0144 |
| A14L3 | 9140-0105 | 3 | 2 | INDUCTOR RF-CH-MLD 8.2UH 10% | 28480 | 9140-0105 |
| A14L4 | 9100-1619 | 2 | 2 | INDUCTOR RF-CH-MLD 6.8UH 10% | 28480 | 9100-1619 |
| A14L5 | 9100-1619 | 2 | | INDUCTOR RF-CH-MLD 6.8UH 10% | 28480 | 9100-1619 |
| A14L6 | 9140-0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG | 28480 | 9140-0114 |
| A14L7 | 9140--0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG | 28480 | 9140-0114 |
| A14L8 | 9140-0114 | 4 | | INDUCTOR RF-CH-MLD 10UH 10% .166DX.385LG | 28480 | 9140-0114 |
| A14L9 | 9140-0112 | 2 | | INDUCTOR RF-CH-MLD 4.7UH 10% | 28480 | 9140-0112 |
| A14L10 | 9140-0105 | 3 | | INDUCTOR RF-CH-MLD 8.2UH 10% | 28480 | 9140-0105 |
| A14L11 | 9100-1627 | 2 | 1 | INDUCTOR RF-CH-MLD 39UH 5% .166DX.385LG | 28480 | 9100-1627 |
| A14L12 | 9100-1629 | 4 | 1 | INDUCTOR RF-CH-MLD 47UH 5% .166DX.385LG | 28480 | 9100-1629 |
| A14L13 | 9100-1622 | 7 | 1 | INDUCTOR RF-CH-MLD 24UH 5% .166DX.385LG | 28480 | 9100-1622 |
| A14L14 | 9100-2257 | 6 | 1 | INDUCTOR RF-CH-MLD 820NH 10%X ,105DX.26LG | 28480 | 9100-2257 |
| A14Q1 | 1854-0637 | 1 | 1 | TRANSISTOR NPN 2N2219A SI TO-5 PD=800MW | 01295 | 2N2219A |
| A14Q2 | 1853-0281 | 9 | 3 | TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW | 04713 | 2N2907A |
| A14Q3 | 1853-0281 | 9 | | TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW | 04713 | 2N2907A |
| A14Q4 | 1053-0015 | 7 | 4 | TRANSISTOR PNP SI PD=200MW FT=500MHZ | 28480 | 1853-0015 |
| A14Q5 | 1053-0015 | 7 | | TRANSISTOR PNP SI PD=200MW FT=500MHZ | 28480 | 1853-0015 |
| A14Q6 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI T0-18 PD=360MW | 04713 | 2N3251 |
| A14Q7 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q8 | 1853-0015 | 7 | | TRANSISTOR PNP SI PD=200MW FT=500MHZ | 28480 | 1853-0015 |
| A14Q9 | 1854-0019 | 1 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q10 | 1853-0015 | 7 | 1 | TRANSISTOR PNP SI PD=200MW FT=500MHZ | 28480 | 1853-0015 |
| A14Q11 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14912 | 1053-0015 | 7 | | TRANSTSTOR PNP SI PD=200MW FT=500MHZ | 28480 | 1853-0015 |
| A14Q13 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q14 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q15 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q16 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q17 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q18 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q19 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q20 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14Q21 | 1854-0475 | 5 | | TRANSISTOR-DUAL NPN PD=750MW | 28480 | 1854-0475 |
| A14Q22 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO -18 PD=360MW | 28480 | 1854-0404 |
| A14Q23 | 1853-0181 | 9 | | TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW | 04713 | 2N2907A |
| A14Q24 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A14Q25 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A14R1 | 0757-0117 | 7 | | RESISTOR 1.33K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1331-F |
| A14R2 | 0757-0280 | 3 | | RESISTOR 1K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R3 | 0698-0084 | 9 | 2 | RESISTOR 2.15K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2151-F |
| A14R4 | 0698-1430 | 5 | 1 | RESISTOR 21.5 1% .125W F TC=0+-100 | 03888 | PME55-1/8-TO-21R5-F |
| A14R5 | 0757-0443 | 0 | 1 | RESISTOR 11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1102-F |
| A14R6 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R7 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003--F |
| A14R8 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R9 | 0698-3450 | 9 | | RESISTOR 42.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4222-F |
| A14R10 | 2100-2633 | 5 | 2 | RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X102 |
| A14R11 | 0698-3155 | 1 | 4 | RESISTOR 4.64K 1% .125W F TC=0+--100 | 24546 | C4-1/8-TO-4641-F |
| A14R12 | 0757-0458 | 7 | | RESISTOR 51.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5112-F |
| A14R13 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R14 | 0757-0460 | 1 | | RESISTOR 61,9K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6192-F |
| A14R15 | 0757-0458 | 7 | | RESISTOR 51.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5112-F |

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*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14R16 | 0757-0180 | 2 | | RESISTOR 31.6 1% .125W F TC=0+-100 | 28480 | 0757-0180 |
| A14R17 | 0757-0464 | 5 | | RESISTOR 90.9K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-9092-F |
| A14R18 | 0698-3136 | 8 | | RESISTOR 17.8K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1782-F |
| A14R19 | 0757-0123 | 3 | 1 | RESISTOR 34.8K 1% .125W F TC=0+-100 | 28480 | 0757-0123 |
| A14R20 | 0698-0003 | 8 | | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A14R21 | 2100-2489 | 9 | 2 | RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X502 |
| A14R22 | 0698-3452 | 1 | 1 | RESISTOR 147K 1% .125W F TO=0+-100 | 24546 | C4-1/8-TO-1473-F |
| A14R23 | 2100-2514 | 1 | 1 | RESISTOR-TRMR 20K 10% C SIDE-ADJ 1-TRN | 30983 | ET50W203 |
| A14R24 | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A14R25 | 0757-0274 | 5 | | RESISTOR 1.21K 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A14R26 | 0757-0274 | 5 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1211-F |
| A14R27 | 2100-2489 | 9 | | RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X502 |
| A14R28 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R29 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R30 | 2100-2522 | 1 | | RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X103 |
| A14R31 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R32 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-*100 | 24546 | C4-1/8-TO-10R0-F |
| A14R33 | 2100-2522 | 1 | | RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X103 |
| A14R34 | 2100-2521 | 0 | 1 | RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X202 |
| A14R35 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R36 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R37 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R38 | 0698-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A14R39 | 2100-2520 | 9 | 1 | RESISTOR-TRMR 50 20% C SIDE-ADJ 1-TRN | 30983 | ET50X500 |
| A14R40 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R41 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R42 | 0757-0200 | 7 | | RESISTOR 5.62K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5621-F |
| A14R43 | 0757-0447 | 4 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A14R44 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A14R45 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R46 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A14R47 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R48 | 0698-3150 | 6 | | RESISTOR 2.371K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2371-F |
| A14R49 | 0698-3132 | 4 | | RESISTOR 261 1% ,125W F TC=0+-100 | 24546 | C4-1/8-TO-2610-F |
| A14R50 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0 +-100 | 24546 | C4-1/8-TO-3161-F |
| A14R51 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R52 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R53 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R54 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R55 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R56 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R57 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R58 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R59 | 0698-3150 | 6 | | RESISTOR 2.37K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2371-F |
| A14R60 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R61 | 0757-0200 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R62 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R63 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R64 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R65 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R66 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R67 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R68 | 0698-8958 | 2 | 1 | RESISTOR 511K 1% .125W F TC=0+-100 | 28480 | 0698-0958 |
| A14R69 | 2100-2692 | 6 | 1 | RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRN | 30983 | ET5X105 |
| A14R70 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R71 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R72 | 0707-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC-=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R73 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A14R74 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R75 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R76 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R77 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R78 | 0698-3150 | 6 | | RESISTOR 2.37K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2371-F |
| A14R79 | 0690-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R80 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R81 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R82 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R83 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R84 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R85 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R86 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R87 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R88 | 2100-2522 | 1 | | RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X103 |
| A14R89 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R90 | 0757-0403 | 2 | 2 | RESISTOR 121 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-121R-F |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14R91 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R92 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R93* | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A14R94 | 0698-3150 | 6 | | RESISTOR 2.37K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2371-F |
| A14R95 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R96 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R97 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R98 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R99 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R100 | 0757-0403 | 2 | | RESISTOR 121 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-121R-F |
| A14R101* | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A14R102 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R103 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R104 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC-0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R105 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R106 | 0757-0417 | 8 | | RESISTOR 562 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-562R-F |
| A14R107* | 0757-0199 | 3 | 33 | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A14R108 | 0698-3434 | 9 | 1 | RESISTOR 34.8 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-34R8-F |
| A14R109 | 0757-0400 | 9 | | RESISTOR 90.9 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-90R9-F |
| A14R110 | 0757-0418 | 9 | | RESISTOR 619 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-619R-F |
| A14R111 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A14R112 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R113 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R114 | 0698-3136 | 8 | | RESISTOR 17.8K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1782-F |
| A14R115 | 0757-0401 | 0 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-101-F |
| A14R116 | 0757-0418 | 9 | | RESISTOR 619 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-619R-F |
| A14R117 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+- 100 | 24546 | C4-1/8-TO-7501-F |
| A14R118 | 0698-0085 | 0 | | RESISTOR 2.61K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2611-F |
| A14R119 | 0698-3438 | 3 | | RESISTOR 147 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-147R-F |
| A14R120 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R121 | 2100-2633 | 5 | | RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN | 30983 | ET50X102 |
| A14R122 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A14R123 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R124 | 0757-0447 | 4 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A14R125 | 0757-0447 | 4 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A14R126 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A14R127 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A14R128 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A14R129 | 0698-0083 | 8 | | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A14R130 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R131 | 0757-0402 | 1 | | RESISTOR 110 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A14R132 | 0757-1438 | 5 | 1 | RESISTOR-5.11K 1% .125W F TC=0+-100 | 28480 | 0757-1438 |
| A14R133 | 0698-7212 | 9 | | RESISTOR 100 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-101R-F |
| A14R134 | 0698-7212 | 9 | | RESISTOR 100 1% .05W F TC=0+-100 | 24546 | C3-1/8-TO-100R-F |
| A14TP1 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP2 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP3 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP4 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP5 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP6 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP7 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP8 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP9 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14TP10 | 0360-0535 | 0 | | TERMINAL TEST POINT PCB | 00000 | ORDER BY DESCRIPTION |
| A14U1 | 1826-0092 | 3 | | IC OP AMP GP DUAL TO-99 PKG | 28480 | 1826-0092 |
| A14U2 | 1826-0092 | 3 | | IC OP AMP GP DUAL TO-99 PKG | 28480 | 1826-0092 |
| A14VR1 | 1902-0901 | 5 | 1 | DIODE-ZNR 5.4V 1% DO-35 PD=.4W TC=+.046% | 28480 | 1902-0901 |
| A15 | 08558-60015 | 8 | 1 | VERTICAL DRIVE AND BLANKING | 28480 | 08558-00015 |
| A15C1 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A15C2 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A15C3 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A15C4 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A15C5 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A15C6 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28400 | 0160-2055 |
| A15CR1 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR2 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28400 | 1901-0040 |
| A15CR3 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR4 | 1901-0535 | 9 | | DIODE-SM SIG SCHOTTKY | 28450 | 1901-0535 |
| A15CR5 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR6 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR7 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR8 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A15CR9 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A15CR10 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A15CR11 | 1901-0050 | 3 | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A15CR12 | 1901-0518 | 8 | 1 | DIODE-SM SIG SCHOTTKY | 28480 | 1901-0518 |
| A15L1 | 9140-0179 | 1 | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A15L2 | 9140-0179 | I | | INDUCTOR RF-CH-MLD 22UH 10% .166DX.385LG | 28480 | 9140-0179 |
| A15MP1 | 1200-0173 | 5 | | INSULATOR-XSTR DAP-GL | 28480 | 1200-0173 |
| A15Q1 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A15Q2 | 1854-0234 | 4 | 4 | TRANSISTOR NPN 2N3440 SI TO-5 PD=1W | 3L585 | 2N3440 |
| A19Q3 | 1854-0234 | 4 | | TRANSISTOR NPN 2N3440 SI TO-5 PD=1W | 3L585 | 2N3440 |
| A15Q4 | 1854-0009 | 1 | 1 | TRANSISTOR NPN SI PD=300MW FT=600MHZ | 04713 | 2N709 |
| A15Q5 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A15Q6 | 1854-0234 | 4 | | TRANSISTOR NPN 2N3440 SI TO-5 PD=1W | 3L585 | 2N3440 |
| A15Q7 | 1854-0234 | 4 | | TRANSISTOR NPN 2N3440 SI TO-5 PD=1W | 3L585 | 2N3440 |
| A15Q8 | 1853-8007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A15Q9 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0019 |
| A15Q10 | 1854-0039 | 7 | | TRANSISTOR NPN 2N3053S SI TO-39 PD=1W | 3L585 | 2N30535 |
| A15Q11 | 1853-0451 | 5 | | TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW | 01295 | 2N3799 |
| A15Q12 | 1853-0451 | 5 | | TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW | 01295 | 2N3799 |
| A15Q13 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A15Q14 | 1854-0475 | 5 | | TRANSISTOR-DUAL NPN PD=750MW | 28480 | 1854-0475 |
| A15Q15 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A15Q16 | 1853-0007 | 7 | | TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW | 04713 | 2N3251 |
| A15Q17 | 1855-0049 | 1 | 1 | TRANSISTOR-JFET DUAL N-CHAN D-MODE SI | 28480 | 1855-0049 |
| A15Q18 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A15Q19 | 1855-0417 | 7 | | TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI | 28480 | 1855--0417 |
| A15Q20 | 1854-0404 | 0 | | TRANSISTOR NPN SI TO-18 PD=360MW | 28480 | 1854-0404 |
| A15Q21 | 1855-0020 | 8 | 1 | TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI | 28480 | 1855-0020 |
| A15R1 | 2100-3123 | 0 | | RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN | 02111 | 43P501 |
| A15R2 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R3 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A15R4 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A15R5 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A15R6 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A15R7 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A15R8 | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A15R9 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A15R10 | 8757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R11 | 0698-3155 | 1 | | RESISTOR 4.64K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4641-F |
| A15R12 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A15R13 | 0683-0475 | 1 | | RESISTOR 4.7 5% .25W FC TC=-400/+500 | 01121 | CB47G5 |
| A15R14 | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A15R15 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R16 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R17 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A15R18 | 0698-3155 | 1 | | RESISTOR 4.64K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4641-F |
| A15R19 | 0698-0084 | 9 | | RESISTOR 2,15K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2151-F |
| A15R20 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-10O | 24546 | C4-1/8-TO-511R-F |
| A15R21 | 0683-1055 | 5 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| A15R22 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A15R23 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A15R24 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A15R25 | 0757-0199 | 3 | | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R26* | 0698-3153 | 9 | | RESISTOR 3.83K 1% .125WF TC=0+-100 | 24546 | C4-1/8-TO-3831-F |
| A15R27 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A15R28 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A15R29 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A15R30 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A15R31 | 0757-0444 | 1 | | RESISTOR 12.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212-F |
| A15R32 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A15R33 | 0757-0424 | 7 | | RESISTOR 1,1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A15R34 | 0698-3156 | 2 | | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A15R35 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A15R36 | 0757-0200 | 7 | | RESISTOR 5.62K 1% .125W F T=0+-100 | 24546 | C4-1/8-TO-5621-F |
| A15R37 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1013-F |
| A15R38 | 0757-0199 | 3 | | RESISTOR 21.5K 1% 125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A15R39 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A15R40 | 0757-0394 | 0 | 1 | RESISTOR 51.1 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-51R1-F |
| A15R41 | 0698-3155 | 1 | | RESISTOR 4.64K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4641-F |
| A15R42 | 0757-0416 | 7 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A15R43 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W FTC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A15R44 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A15R45 | 0757-0837 | 6 | 2 | RESISTOR 8.25K 1% .5W F TC=0+-100 | 28480 | 0757-0837 |
| A15R46 | 0757-0844 | 5 | 2 | RESISTOR 16.2K 1% .5W F TC=0+-100 | 28480 | 0757-0844 |
| A15R47 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |
| A15R48 | 0757-0420 | 3 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A15R49 | 0757-0844 | 5 | | RESISTOR 16.2K 1% .5W F TC=0+-100 | 28480 | 0757-0844 |
| A15R50 | 0698-3440 | 7 | | RESISTOR 196 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-196R-F |

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*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A15R51 | 0757-0837 | 6 | | RESISTOR 8.25K 1% .5W F TC=0+-100 | 28480 | 0757-0837 |
| A15R52 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A15R53 | 0698-3260 | 9 | | RESISTOR 464K 1% .125W F TC=0+-100 | 28480 | 0698-3260 |
| A15R54 | 0698-3446 | 3 | | RESISTOR 383 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-383R-F |
| A15R55 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A15R56 | 0698-7284 | 5 | 1 | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C3-1/8-TO-1003-F |
| A15V1 | 1826-0092 | 3 | | IC OF AMP GP DUAL TO-99 PKG | 28480 | 11326-0092 |
| A15V2 | 1E58-0032 | 8 | | TRANSISTOR ARRAY 14-PIN PLSTC DIP | 3L585 | CA3146E |
| A15VR1 | 1902-0033 | 4 | | DIODE-ZNR 1N823 6.2V 5% DO-7 PD=.4W | 24046 | 1N823 |
| A15VR2 | 1902-0202 | 9 | | DIODE-ZNR 15V 5% PD=1W 1R=5UA | 28480 | 1902-0202 |
| A15VR3 | 1902-0556 | 6 | 1 | DIODE-ZNR 20V 5% PD=1W 1R=5UA | 28480 | 1902-0556 |
| A15TP1 THRU | | | | | | |
| A15TP8 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A16 | 08558-65159 | 1 | 1 | MOTHERBOARD (INCL W12, W13 & P1) | 28480 | 08558-65159 |
| A16C1 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20 100VDC CER | 28480 | 0160-3879 |
| A16C2 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20 100VDC CE.R | 2B480 | 0160-3879 |
| A16C3 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20 100VDC CER | 28480 | 0160-3879 |
| A16C4 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20 100VDC CER | 28480 | 0160-3879 |
| A16C5 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A16C6 | 0180-0197 | 8 | | CAPACITOR-FXD 2.2UF+-10% 20VDC TA | 56289 | 150D225X9020A2 |
| A16C7 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF +-20% 100VDC CER | 28480 | 0160-3879 |
| A16C8 THRU | | | | | | |
| A16C14 | 0160-2055 | | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A16CR1 | 1901-0033 | | | DIODE-GEN PRP 180V 200MA DO-7 | 28480 | 1901-0033 |
| A16CR2 | 1901-0376 | | | DIODE-GEN PRP 35V 50MA DO-35 | 28480 | 1901-0376 |
| A16CR3 | 1901-0050 | | | DIODE-SWITCHING 80V 200MA 2NS DO-35 | 28480 | 1901-0050 |
| A16L1 | 9140-0158 | 6 | | INDUCTOR RF-CH-MLD 1UH 10 .105DX.26LG | 28480 | 9140-0158 |
| A16L2 | 9140-0158 | 6 | | INDUCTOR RF-CH-MLD 1UH 10 .105DX.26LG | 28480 | 9140-0158 |
| A16L3 | 9140-0158 | 6 | | INDUCTOR RF-CH-MLD 1UH 10 .105DX.26LG | 28480 | 9140-0158 |
| A16L4 | 9140-0158 | 6 | | INDUCTOR RF-CH-MLD 1UH 10 .105DX.26LG | 28480 | 9140-0158 |
| A16L5 | 9100-2247 | 4 | | INDUCTOR RF-CH-MLD 100NH 10% .105DX.26LG | 28480 | 9100-2247 |
| A16MP1 | 08558-20159 | 7 | | BOARD-MOTHER | 28480 | 08558-20159 |
| A16MP2 | 0380-0843 | 5 | 1 | STANDOFF-RVT-ON .125-IN-LG 4-40THD | 00000 | ORDER BY DESCRIPTION |
| A16R1 | 0757-0424 | 7 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1101-F |
| A16R2 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A16R3 | 0698-5360 | 2 | 1 | RESISTOR 3.74K .25% .125W F TC=0+-50 | 28480 | 0698-5368 |
| A16R4 | 2100-1757 | 2 | | RESISTOR-TRMR 500 5% WW SIDE-ADJ 1-TRN | 28480 | 2100-1757 |
| A16R5 | 0757-0444 | 1 | | RESISTOR 12.1K 17 .125W F TC=0+-100 | 24546 | C4-1/8-TO-1212--F |
| A16R6 | 0698-3442 | 9 | | RESISTOR 237 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-237R-F |
| A16R7 | 0757-0395 | 1 | | RESISTOR 56.2 1% .125W F TC= 0+-100 | 24546 | C4-1/8-TO-56R2-F |
| A16R8 | 0698-3260 | 9 | | RESISTOR 464K 1% .125W F TC=0+-100 | 28480 | 0698-3260 |
| A16TP1 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A16TP2 | 1251-0600 | 0 | | CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ | 28480 | 1251-0600 |
| A16VR1 | 1902-0625 | 0 | 1 | DIODE-ZNR 1N829 6.2V 5% DO-7 PD=.25W | 04713 | 1N829 |
| A16VR2 | 1902-0631 | 0 | 1 | DIODE-ZNR 1N5351B 6.2V 5% DO-7 PD=.25W | 04713 | 1N5351B |
| A16VR3 | 1902-0632 | 0 | 1 | DIODE-ZNR 1N5354B 6.2V 5% DO-7 PD=.25W | 04713 | 1N5354B |
| A16VR4 | 1902-3182 | 0 | 1 | DIODE-ZNR 1N829 12.1V 5% DO-7 PD=.25W | 04713 | 1902-3182 |
| A16W1 | 08558-60169 | 3 | 1 | CABLE ASSY-.REAR PANEL INTERCONNECT | 28480 | 08558-60169 |
| A16W2 | 08558-60044 | 3 | 1 | CABLE ASSY-YIG DRIVER | 28480 | 08558-60044 |
| A16W3 | 08558-60080 | 7 | 1 | CABLE ASSY-SECOND CONVERTER | 28480 | 08558-60080 |
| A16W4 | 08558-60081 | 8 | 1 | CABLE ASSY-DPM DRIVER | 28480 | 08558-60081 |
| A16XA1 THRU | | | | | | |
| A16XA6 | | | | NOT ASSIGNED | | |
| A16XA7 | 1251-1365 | 6 | 6 | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA8 | 1251-1365 | 6 | | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA9 | 1251-0472 | 4 | 2 | CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS | 28480 | 1251-0472 |
| A16XA10 | 1251-0472 | 4 | | CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS | 28480 | 1251-0472 |
| A16XA11 | 1251-1365 | 6 | | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA12 | 1251-1365 | 6 | | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA13 | 1251-1365 | 6 | | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA14 | 1251-1365 | 6 | | CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS | 28480 | 1251-1365 |
| A16XA15 | 1251-2034 | 8 | 1 | CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS | 28480 | 1251-2034 |
| A17 | 08558-60035 | 2 | 1 | INVERTER | 28480 | 08558-60035 |
| A17C1 | 11100-0228 | 6 | 1 | CAPACITOR-FXD 22.UF+-10% 15VDC TA | 56289 | 150D226X9015B2 |
| A17C2 | 0180-1747 | 6 | 1 | CAPACITOR-FXD 150UF+-20% 15VDC TA | 56289 | 150D157X0015 |
| A17C3 | 0160-0128 | 3 | 2 | CAPACITOR-FXD 2.2UF +-20% 50VDC CER | 28480 | 0160-0128 |
| A17C4 | 0180-0229 | 7 | 1 | CAPACITOR-FXD 33UF+-10% 10VDC TA | 56289 | 150D336X9010B2 |
| A17C5 | 0160-0128 | 3 | | CAPACITOR-FXD 2.2UF +-20% 50VDC CER | 28480 | 0160-0128 |

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*Table 6-3. Replaceable Parts*

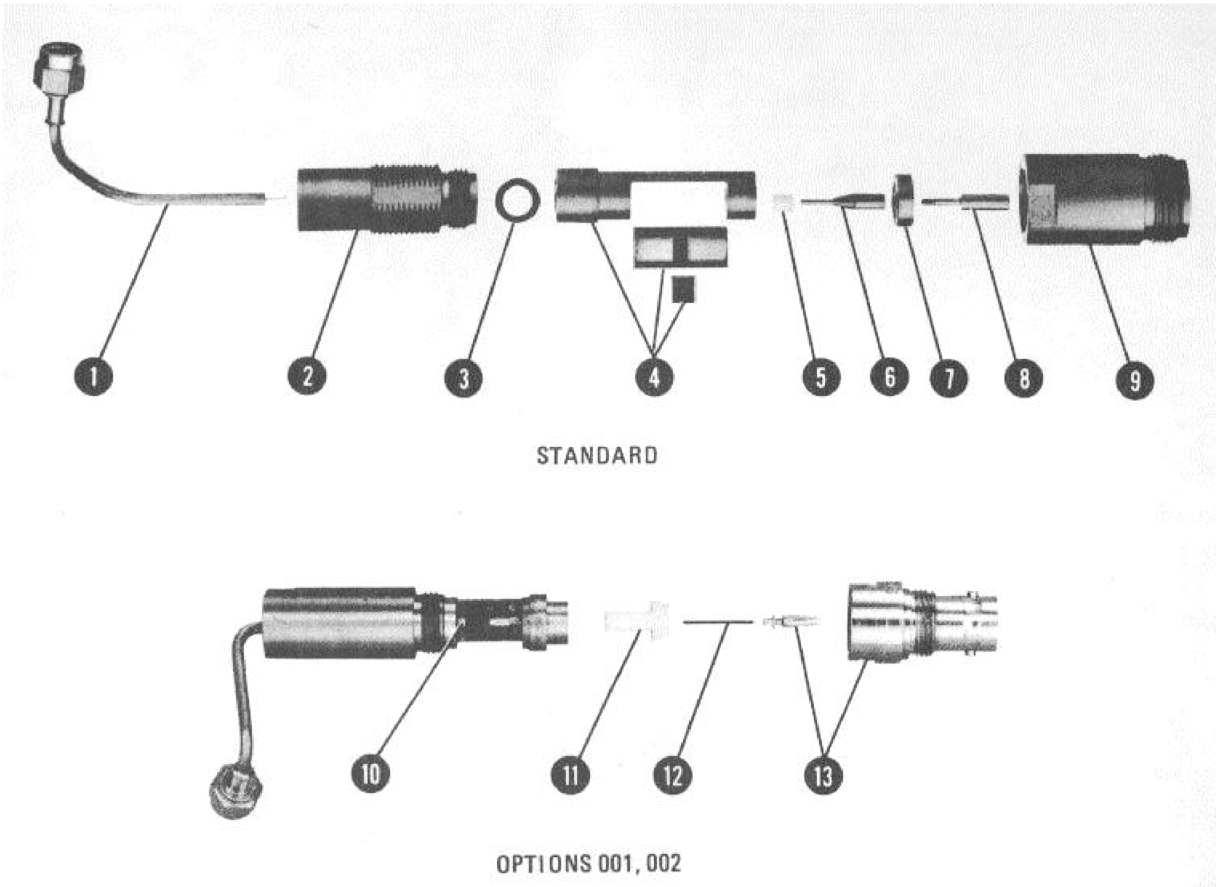
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A17C6 | 0180-1714 | 7 | | CAPACITOR-FXD 330UF+-10% 6VDC TA | 56289 | 150D337X9006S2 |
| A17CR1 | 1901-0620 | 3 | 8 | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR2 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR3 | 1901--0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR4 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR5 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR6 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR7 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17CR8 | 1901-0620 | 3 | | DIODE-SWITCHING 60V 400MA DO-35 | 9N171 | NDP250 |
| A17L1 | 9100-2552 | 4 | | INDUCTOR RF-CH-MLD 15UH 10% .161DX .385LG | 28480 | 9100-2552 |
| A17L2 | 08558-80010 | 5 | 1 | COIL, FILTER, ORANGE, 500 UH | 28480 | 08550-80010 |
| A17L3 | 9100-1618 | 1 | | INDUCTOR RF-CH-MLD 5.6UH 10% | 28480 | 9100-1618 |
| A17L4 | 9100-2552 | 4 | | INDUCTOR RF-CH-MLD 15UH 10% .161DX.385LG | 28480 | 9100-2552 |
| A17L5 | 9100-2552 | 4 | | INDUCTOR RF-CH-MLD 15UH 10% .161DX.385LG | 28480 | 9100-2552 |
| A17L6 | 9140-0096 | 1 | 1 | INDUCTOR RF-CH-MLD 1UH 10% .166DX.385LG | 28480 | 9140-0096 |
| A17L7 | 08558-80007 | 0 | 2 | COIL, FILTER, GREEN, 150 UH | 28480 | 08558-80007 |
| A17L8 | 08558-80007 | 0 | | COIL, FILTER, GREEN, 150 UH | 28480 | 08558-80007 |
| A17NP1 | 7100-0529 | 9 | 1 | COVER | 28480 | 7100-0529 |
| A17MP2 | 7100-0530 | 2 | 1 | CAN | 28480 | 7100-0530 |
| A17MP3 | 08558-00049 | 2 | 1 | INSULATOR, INVERTER | 28480 | 0855EI-00049 |
| A17Q1 | 1854-0039 | 7 | | TRANSISTOR NPN 2N3053S SI TO-39 PD=1W | 3L585 | 2N3053S |
| A17Q2 | 1854-0039 | 7 | | TRANSISTOR NPN 2N3053S SI TO-39 PD=1W | 3L585 | 2N3053S |
| A17R1* | 0757-0459 | 8 | 6 | RESISTOR 56.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5622-F |
| A17R2 | 0757-0180 | 2 | | RESISTOR 31.6 1% .125W F TC=0+-100 | 28480 | 0757-0100 |
| A17T1 | 08558-80006 | 9 | 1 | TRANSFORMER, INVERTER | 28480 | 08558-80006 |
| A17VR1 | 1902-0551 | 1 | 1 | DIODE-ZNR 6.2V 5% PD=1W 1R=10UA | 28480 | 1902-0551 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 6-3. Replaceable Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| | | | | ACCESSORIES SUPPLIED | | |
| | 11593A | 7 | 1 | TERMINATION-50 OHM | 28480 | 11593A |
| | 1250-0780 | 5 | 1 | ADAPTER, TYPE N MALE TO BNC FEMAL.E | 28480 | 1250-0780 |
| | 5020-8565 | 7 | 1 | CRT-OVERLAY, 180-SERIES DISPLAYS | 28480 | 5020-8565 |
| | 5020-8566 | 0 | 1 | CRT-OVERLAY, 181-SERIES DISPLAYS | 28480 | 5020-8566 |
| | 5020-8567 | 9 | 1 | CRT-OVERLAY, 182-SERIES DISPLAYS | 28480 | 5020-8567 |
| | 08558-60131 | 9 | 1 | SIDE STOP KIT | 28480 | 08558-60131 |
| | | | | ELECTRICAL CHASSIS PARTS | | |
| V1 | 5086-7282 | 1 | 1 | LIMITER, RF INPUT,THRESH=1MW; MAX 10W,2WDC | 28480 | 5086-7282 |
| W1 | 08558-60031 | 8 | 1 | CABLE ASSY-750 OHM INPUT(OPT.001,002) | 28480 | 08558-60031 |
| W1 | 08558-60038 | 5 | 1 | CABLE ASSY-50 OHM INPUT(STD. SEE FIG.6-1) | 28480 | 08558-60038 |
| W2 | | | | NOT ASSIGNED | | |
| W3 | 08558-20071 | 2 | 1 | CABLE ASSY-1ST LO OUTPUT | 28480 | 08558-20071 |
| W4 | 08558-20090 | 5 | 1 | CABLE ASSY-YIG OSC TO FIRST CONVERTER | 28480 | 08558-20090 |
| W5 | 08558-20073 | 4 | 1 | CABLE ASSY-FIRST CONVERTER TO SECOND CON | 28480 | 08558-20073 |
| W6 | 08558-60047 | 6 | 1 | CABLE ASSY-SECOND CONVERTER TO SECOND IF | 28480 | 08558-60047 |
| W7 | 08558-60048 | 7 | 1 | CABLE ASSY-SECOND IF TO THIRD CONVERTER | 28480 | 08558-60048 |
| W8 | 08558-60046 | 5 | 1 | CABLE ASSY-50-OHM CAL OUTPUT (STD) | 28480 | 08558-60046 |
| W8 | 08558-60074 | 9 | 1 | CABLE ASSY-75-OHM CAL OUTPUT(OPT.001/002 | 28480 | 08558-60074 |
| W9 | | | | NOT ASSIGNED | | |
| W10 | 08557-60045 | 3 | 1 | CABLE ASSY-VERT. OUTPUT(ON TOP GUIDE RAIL | 28480 | 08557-60045 |
| W11 | | | | NOT ASSIGNED | | |
| W12 | | | | NOT ASSIGNED | | |
| W13 | | | | NOT ASSIGNED | | |
| W14 | 08558-20117 | 7 | 1 | CABLE ASSY-ATTEN TO LIMITER | 28480 | 08558-20117 |
| W15 | 08558-20116 | 6 | 1 | CABLE ASSY-LIMITER TO FIRST CONVERTER | 28480 | 08558-20116 |
| W16 | 08558-60170 | 6 | 1 | CABLE ASSY- PROBE POWER | 28480 | 08558-60170 |

See introduction to this section for ordering information
*Indicates factory selected value




| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| 1 | 08558-20080 | 3 | 1 | Assy: Cable (Includes W1P1) | 28480 | 08558-20080 |
| 2 | 08558-20079 | 0 | 1 | Shell: Type-N Capacitor | 28480 | 08558-20079 |
| 3 | 3050-0253 | 5 | 1 | Washer: Spring | 28480 | 3050-0253 |
| 4 | 08558-60127 | 3 | 1 | Blocking Capacitor Assy | 28480 | 08558-60127 |
| 5 | 08558-20077 | 8 | 1 | Dielectric | 28280 | 08558-20077 |
| 6 | 08558-20076 | 7 | 1 | Conductor: Inner Type-N | 28480 | 08558-20076 |
| 7 | 5040-0306 | 0 | 1 | Capacitor Insulator | 28480 | 5040-0306 |
| 8 | 1250-0915 | 8 | 1 | Contact: RF Connector | 02660 | 131-149 |
| 9 | 1250-0914 | 7 | 1 | Body: RF Connector | 02660 | 131-150 |
| 10 | 0160-3344 | 1 | 1 | Capacitor: 0.12µF 50 Vdc | 28480 | 0160-3344 |
| 11 | 08558-20101 | 9 | 1 | Dielectric | 28480 | 08558-20101 |
| 12 | | | | 24 AWG Wire | | |
| 13 | 1250-0505 | 2 | 1 | RF Connector: 75 ohm (separate white teflon dielectric supplied with connector and pin is not used) | 28480 | 1250-0505 |

*Figure 6-1. Cable Assembly W1 (08558-60038 or 08558-60031) Replaceable Parts*

THIS PAGE MISSING NOT AVAILABLE FOR DIGITIZATION.

PAGES
6-31 through 6-33

# SECTION VII.
# MANUAL BACKDATING CHANGES

## 7-1. INTRODUCTION

7-2. This section contains information for adapting this manual to earlier 8558B Spectrum Analyzers. If the serial number prefix of your spectrum analyzer appears on the title page of this manual, the contents of the manual are directly applicable to your instrument. If, however, your spectrum analyzer has a lower serial number prefix than what is shown on the title page, you must adapt this manual to your instrument by changing it as indicated in this section.

7-3. To adapt this manual to your instrument, refer to Table 7-1 and make all the manual changes listed opposite your instrument serial number. Make the changes in the sequence in which they are given.

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

**NOTE**

**In instruments with serial numbers listed in Table 7-1, some parts have part numbers that are different from those listed in the Replaceable Parts list (Table 6-3) of this manual. Unless otherwise indicated by the 'change' instructions in this section, however, the listed parts are the recommended replacement parts.**

*Table 7-1. Manual Change Requirements by Serial Number*

| Serial Number, Prefix or Complete Number | Make Manual Changes: |
|---|---|
| 2145A | A |
| 2142A | A, B |
| 2118A | A,B,C |
| 2024A06643 thru -06691, and 2024A06731 to, but not including, prefix 2118A | A, B, C, D |
| 2024A prefix with suffixes thru 06642 | A, B, C, D, E |
| 1926A prefixes and 1914A with suffixes 04747,04918, 04993,05158,05160, 05172, 05228,05229,05252, 05281,05297, 05300, thru 05307,05311,05312, 05313,05316,05318,05320 | A, B, C, D, E, F |
| 1914A with suffixes other than those listed above | A, B, C, D, E, F, G |

## 7-5. MANUAL CHANGE INSTRUCTIONS

### CHANGE A

Page 6-5, Table 6-3:
Insert Table 7-2 (CHANGE A), A1 Digital Panel Meter parts list, of this section so it precedes the A1A2 list.

Page 6-28, Table 6-3:
Substitute Table 7-3 (CHANGE A) of this section for list of Accessories and Chassis Parts shown in Table 6-3.

Page 6-31, Figure 6-2, Mechanical Chassis Parts:
Substitute Figure 7-1 (CHANGE A) of thissection for Figure 6-2.

Page 6-33, Figure 6-3, Front Panel Assembly:
Substitute Figure 7-2 (CHANGE A) in this section for Figure 6-3.

Page 8-26, Figure 8-12, Front Switch Board Assembly A2A1 Component Locations:
Delete Figure 8-12.

Page 8-27, Figure 8-13, Front Switch Assembly A2 Schematic Diagram:
Substitute Figure 7-3 of this section for Figure 8-13.

General:
Change all references to front-panel control INPUT ATTEN (dB) to read 'OPTIMUM INPUT.' In Section III and in the operation booklet, 8558B Spectrum Analyzer Operation, change front panel PUSH TO LOCK to LOCK (rotate clockwise to lock 8558B into mainframe).
Change description of OPTIMUM INPUT (changed from INPUT ATTEN) control function to read: 'The optimum and maximum input level selected is designated by the pointer behind the control. Push in control knob and turn it to select the required input level range.

Use table below to translate input attenuation levels given in manual to optimum input levels.

| INPUT ATTEN (dB) | OPTIMUM INPUT | OPTION 001 | OPTION 002 |
|---|---|---|---|
| 0 | -40 dBm | -35 dBm | 15 dBmV |
| 10 | -30 dBm | -25 dBm | 25 dBmV |
| 20 | -20 dBm | -15 dBm | 35 dBmV |
| 30 | -10 dBm | -5 dBm | 45 dBmV |
| 40 | 0 dBm | 5 dBm | 55 dBmV |
| 50 | 10 dBm | 15 dBm | 65 dBmV |
| 60 | 20 dBm | 25 dBm | 75 dBmV |
| 70 | 30 dBm | 30 dBm | 80 dBmV |

### CHANGE B

Page 5-6,Table 5-1:
Add adjustment LOG GAIN, A14R1, paragraph 7-6, adjusts dc offset circuitry at output of Log Amplifier for 10 dB steps in Log mode.
Add adjustment LOG/LIN, A14R2, paragraph 7-6, adjusts for Log-to-linear full-screen display translations.
Add adjustment LIN GAIN, A14R3, paragraph 7-6, adjusts Log Amplifier for 10 dB gain steps in Linear mode. Affects adjustment of LOG/LIN.

## 7-5. MANUAL CHANGE INSTRUCTIONS (Cont'd)

### CHANGE B (Cont'd)

Page 5-45, Paragraph 5-26, Figure 5-13:
Substitute paragraph 7-6, LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B) in this section for paragraph 5-26, and Figure 7-4 (CHANGE B) for Figure 5-13.

Pages 6-21 through 6-24, Table 6-3:
Replace entire A14 Replaceable Parts list (A14 through A14VR1) with Table 7-7 (CHANGE B) of this section.

Page 6-31, Figure 6-2, Mechanical Chassis Parts:
Change item 30 to HP Part Number 08558-00086, Check Digit 7.

Page 8-84, Figure 8-37, A14 Log Amplifier Component and Test Point Locations:
Replace Figure 8-37 with Figure 7-5 (CHANGE B) of this section.

Pages 8-85/8-86 and 8-87/8-88, Figure 8-38, A14 Log Amplifier Schematic:
Replace Figure 8-38 with Figure 7-6 (2 sheets) (CHANGE B) of this section.

### CHANGE C

Page 1-3,Table 1-1:
Under **Calibrator Output**, change '±300 kHz' to '±50 kHz.'

Page 1-8, Table 1-2:
Under **Cal Output**, change text to read as follows:
'-30 dBm, 280 MHz with 2nd through 5th harmonics greater than -60 dBm.
002: + 20 dBm V, 280 MHz with 2nd through 5th harmonics greater than - 10 dBm V.'

Page 6-12, Table 6-3:
Change A9C5 to HP Part Number 0150-2251, Check Digit 6, Qty 1, CAPACITOR-FXD 5.6PF ± .25PF.
Delete A9C20

Page 6-14, Table 6-3:
Add A9Y1, HP Part Number 0410-0447, Check Digit 0, Qty 1, CRYSTAL-QUARTZ FREQ = 280 MHz 11th OVERTONE.
Delete A9Z 1.

Page 8-60, Figure 8-25:
Replace Figure 8-25 with Figure 7-7 (CHANGE C) of this section.

Page 8-61, Figure 8-26:
Replace function block A with function block A shown in Figure 7-8 (CHANGE C) of this section.

### CHANGED

Page 6-14, Table 6-3:
Change A11C14 to HP Part Number 0160-2253, Check Digit 9, Qty 1, CAPACITOR-FXD 6.8PF ± .25PF 500VDC CER, 28480, 0160-2253.
Change A11C37 to HP Part Number 0160-2252, Check Digit 8, Qty 1, CAPACITOR-FXD 6.2PF ± .25PF 500VDC CER, 28480, 0160-2252.

## 7-5. MANUAL CHANGE INSTRUCTIONS (Cont'd)

### CHANGE D (Cont'd)

Pages 6-18, and 6-19, Table 6-3:
Change A13C14 to HP Part Number 0160-2253, Check Digit 9, Qty 1, CAPACITOR- FXD 6.8PF ± .25PF 500VDC CER, 28480, 0160-2253.
Change A13C37 to HP Part Number 0160-2252, Check Digit 8, Qty 1, CAPACITOR-FXD 6.2PF ± .25PF 500VDC CER, 28480, 0160-2252.

Page 8-69, Figure 8-30, A11 Bandwidth Filter No. 1 Schematic:
Change value of C14 to 6.8PF, and value of C37 to 6.2PF.

Page 8-79, Figure 8-35, A13 Bandwidth Filter No. 2 Schematic:
Change value of C14 to 6.8PF, and value of C37 to 6.2PF.

### CHANGE E

Page 6-26, Table 6-3:
Delete A16C9 and A16C10.

Page 8-97, Figure 8-44:
Delete C9 and C10.

### CHANGE F

Page 5-7,Table 5-2:
Change A9R14 to A9R25.

Pages 6-12 and 6-13, Table 6-3:
Delete A9C17, A9C18, A9C19, A9CR7, A9L15, and A9L16.
Change A9R12* (standard instrument) to HP Part Number 0698-3132, Check Digit 4, Qty 1, RESISTOR 261 1% .125W F TC=0 ± 100, 24546, C4-1/8-TO-2610-F.
Change A9R14* to A9R14, HP Part Number 0757-0462, Check Digit 3, Qty 1, RESISTOR 75K 1% .125W F TC = 0 ± 100, 24546, C4-1/8-TO-7502-F.
Change A9R25 to A9R25*.

Page 8-60, Figure 8-25:
Replace Figure 8-25 with Figure 7-9 of this section.

Pages 8-57, and 8-58:
Replace circuit descriptions for 21.4 MHz Amplifier (E) and PIN Driver (F) with the circuit descriptions provided below.

#### 21.4 MHz Amplifier E

The 21.4 MHz Amplifier consists of A9Q3 in a common-emitter configuration and A9Q4 as an emitter follower. Transistor A9Q3 employs resistor A9R12 and zener diode A9VR2 to furnish base bias and negative feedback for gain control and stabilization. Resistor A9R12 is factory selected to provide the proper gain of the third converter assembly. Capacitor A9C14 is connected across A9VR2 to reduce zener noise. The output of the 21.4 MHz Amplifier looks into a voltage-controlled attenuator consisting of two PIN diodes, A9CR3 and CR4, resistor A9R25, and the input impedance of the A11 Bandwidth Filter No. 1.

## 7-5. MANUAL CHANGE INSTRUCTIONS (Cont'd)

### CHANGE F (Cont'd)

**PIN Driver (F)**

The PIN diode resistance of A9CR3 and CR4 is controlled by the PIN driver A9Q5 and its associated circuitry. The base of A9Q5 is the summing point for the frequency analog voltage from the A7 Frequency Control and a dc level set by the front-panel REF LEVEL CAL screwdriver adjustment A2R3. Setting the dc level by adjusting A2R3 calibrates the 8558B display at a given frequency, usually performed at 280 MHz. The frequency analog voltage is a dc level varying from + 0.6 volts to + 6.7 volts as a function of frequency. This frequency analog voltage at the base of A9Q5 compensates for input mixer response. SLOPE COMP adjustment A9R1 sets the amount of compensation required for a flat frequency response. The total current through the PIN diodes A9CR3 and CR4 is shaped by the emitter network of A9Q5. This network provides a change in current through the PIN diodes to cause a change of PIN diode resistance. The change in resistance is required to provide the proper log curve within an 8 dB range for the voltage-controlled attenuator.

Page 8-61, Figure 8-26:
Replace function block E and F with function blocks E and F shown in Figure 7-10 (CHANGE F).

### CHANGE G

Page 7-11, Figure 7-2:
Change item 53 HP Part Number to 08558-20052, Check Digit 9.
Change item 57 on HP Part Number 08552-20053, Check Digit 0.

*Table 7-2. Replaceable Parts (CHANGE A)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A1 | | | | DIGITAL PANEL METER ASSEMBLY | | |
| A1MP1 | 08558-00090 | 3 | 1 | BRACKET, LEFT-HAND | 28480 | 08558-00090 |
| A1MP2 | 08558-00091 | 4 | 1 | BRACKET, RIGHT-HAND | 28480 | 08558-00090 |
| A1MP3 | 08558-20130 | 4 | 2 | DPM DISPLAY MOUNT | 28480 | 08558-20130 |
| A1MP4 | 08558-20130 | 4 | | DPM DISPLAY MOUNT | 28480 | 08558-20130 |
| A1MP5 | 2200-0107 | 6 | 4 | SCREW-MACH 4-40.375-IN-LG PAN-HD-POZI | 28480 | 2200-0107 |
| A1MP6 | 2200.0107 | 6 | | SCREW-MACH 4-40.375-IN-LG PAN-HD-POZI | 28480 | 2200-0107 |
| A1MP7 | 2200-0107 | 6 | | SCREW-MACH 4-40.375-IN-LG PAN-HD-POZI | 28480 | 2200-0107 |
| A1IMP8 | 2200-0107 | 6 | | SCREW-MACH 4-40.375-IN-LG PAN-HD-POZI | 28480 | 2200-0107 |
| A1MP9 THRU | | | 1 | | | |
| A1MP16 | 0520-0174 3 | | 8 | SCREW-MACH 2-56 .25-IN-LG PAN-HD-POZI | 28480 | 0520-0174 |
| A1MP17 THRU | | | | | | |
| A1MP20 | 0610-0001 | 6 | 4 | NUT-HEX-DBL-CHAM 2-56-THD.062-IN-THK | 28480 | 0610-0001 |
| A1MP21 THRU | | | | | | |
| A1MP24 | 2190-0890 | 1 | 4 | WASHER-LK MTCL NO. 2.088-IN-ID | 28480 | 2190-0890 |
| A1MP25 THRU | | | | | | |
| A1MP28 | 3050-0098 | 6 | 4 | WASHER-FL MTLC NO. 2.094-IN-ID | 28480 | 3050-0098 |
| A1A1 | 08558-60124 | 0 | 1 | DPM DISPLAY | 28480 | 08558-60124 |
| A1A1DS1 | 1990-0619 | 7 | 4 | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 5082-7613 |
| A1A1DS2 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 5082-7613 |
| A1A1DS3 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 5082-7613 |
| A1A1DS4 | 1990-0619 | 7 | | DISPLAY-NUM-SEG 1-CHAR .3-H | 28480 | 5082-7613 |
| A1A1W1 | 08558-60130 | 8 | 1 | CABLE ASSY RIBBON, DPM | 28480 | 08558-60130 |
| A1A1XDS1 | 1200-0693 | 4 | 4 | SOCKET-IC 10-CONT DIP DIP-SLDR | 51167 | 10-513-11 |
| A1A1XDS2 | 1200-0693 | 4 | | SOCKET-IC 10-CONT DIP DIP-SLDR | 51167 | 10-513-11 |
| A1A1XDS3 | 1200-0693 | 4 | | SOCKET-IC 10-CONT DIP DIP-SLDR | 51167 | 10-513-11 |
| A1A1XDS4 | 1200-0693 | 4 | | SOCKET-IC 10-CONT DIP DIP-SLDR | 51167 | 10-513-11 |

*Table 7-3. Replaceable Parts (CHANGE A)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| | | | | ACCESSORIES SUPPLIED | | |
| AT1 | 11593A | 7 | 1 | TERMINATION, 50 OHM | 28480 | 11593A |
| | 1250-0780 | 5 | 1 | ADAPTER, TYPE N MALE TO BNC FEMALE | 28480 | 1250-0780 |
| | 5020-8565 | 7 | 1 | OVERLAY, 180 SERIES SCOPES | 28480 | 5020-8565 |
| | 5020-8566 | 8 | 1 | OVERLAY, 181 SERIES SCOPES | 28480 | 5020-8565 |
| | 5020-8567 | 9 | 1 | OVERLAY, 182 SERIES SCOPES | 28480 | 5020-8567 |
| | 08558-60131 | 9 | 1 | KIT, SIDE STOP | 28480 | 08558-60131 |
| | | | | CHASSIS PARTS | | |
| P1 | 08558-60117 | 1 | 1 | REAR-PANEL INTERCONNECT (PREWIRED) | 28480 | 08558-60117 |
| R1 | 2100-3593 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-TRN 5K 10% | 28480 | 2100-3593 |
| R2 | 2100-3452 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-TRN 10K 10% | 28480 | 2100-3452 |
| R3 | 2100-3066 | 0 | 1 | RESISTOR-VAR PREC WW 10-TRN 5K 5% | 28480 | 2100-3066 |
| R4 | 2100-0542 | 1 | 1 | RESISTOR-VAR CONTROL WW 10K 5% LIN | 28480 | 2100-0542 |
| R5 | 2100-3317 | 4 | 2 | RESISTOR-VARIABLE W/SW 50K +-20% 10CW | 28480 | 2100-3317 |
| R6 | 2100-3317 | 4 | | RESISTOR-VARIABLE W/SW 50K +-20% 10CW | 28480 | 2100-3317 |
| S1 | 3101.0044 | 1 | 1 | SWITCH-PB SPST-NO MOM .5A 115VAC RED-BTN | 28480 | 3101-0044 |
| U1 | 5086-7282 | 1 | 1 | LIMITER, RF INPUT | 28480 | 5086-7282 |
| W1 | 08558-60038 | 5 | 1 | CABLE ASSY, INPUT, RF(SEE FIG. 6-1) | 28480 | 08558-60038 |
| W1 | 08558-60031 | 8 | 1 | CABLE ASSY, INPUT, RF (OPT. 001/002) | 28480 | 08558-60031 |
| W2 | | | | NOT ASSIGNED | | |
| W3 | 08558-20071 | 2 | 1 | CABLE ASSY, OUTPUT, L.O. | 28480 | 08558-20071 |
| W4 | 08558-20090 | 5 | 1 | CABLE ASSY, INPUT, 1ST L.O. | 28480 | 08558-20090 |
| W5 | 08558-20073 | 4 | 1 | CABLE ASSY, OUTPUT, 1ST I.F. | 28480 | 08558-20073 |
| W6 | 08558-20047 | 6 | 1 | CABLE ASSY, INPUT, 2ND I.F. | 28480 | 08558-60047 |
| W7 | 08558-20048 | 7 | 1 | CABLE ASSY, OUTPUT, 2ND I.F. | 28480 | 08558-60048 |
| W8 | 08558-20046 | 5 | 1 | CABLE ASSY, CAL OUTPUT | 28480 | 08558-60046 |
| W8 | 08558-20074 | 9 | 1 | CABLE ASSY, CAL OUTPUT (OPT. 001/002) | 28480 | 08558-60074 |
| W9 | 08558-60037 | 4 | 1 | CABLE ASSY, INTERCONNECT | 28480 | 08558-60037 |
| W10 | 08558-60043 | 2 | 1 | CABLE ASSY, OUTPUT, VERTICAL | 28480 | 08558-60043 |
| W11 | | | | NOT ASSIGNED | | |
| W12 | 08558-60044 | 3 | 1 | CABLE ASSY, YIG DRIVER | 28480 | 08558-60044 |
| W13 | 08558-60080 | 7 | 1 | CABLE ASSY, SECOND CONVERTER | 28480 | 08558-60080 |
| W14 | 08558-20117 | 7 | 1 | CABLE ASSY, ATTENUATOR TO LIMITER | 28480 | 08558-20117 |
| W15 | 08558-20116 | 6 | 1 | CABLE ASSY, LIMITER TO FIRST CONVERTER | 28480 | 08558-20116 |

See introduction to this section for ordering information
*Indicates factory selected value

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| | | | | MECHANICAL CHASSIS PARTS | | |
| 1 | 08558-00002 | 7 | 1 | PANEL, FRONT, SUP | 28480 | 08558-00002 |
| 2 | 08558-00004 | 9 | 1 | GUSSET, LEFT | 28480 | 08558-00004 |
| 3 | 08558-00005 | 0 | 1 | GUSSET, RIGHT | 28480 | 08558-00005 |
| 4 | 08558-00003 | 8 | 1 | PANEL, REAR | 28480 | 08558-00003 |
| 5 | 08558-20039 | 2 | 1 | GUIDE RAIL, LEFT | 28480 | 08558-20039 |
| 6 | 08558-20040 | 5 | 1 | GUIDE RAIL, RIGHT | 28480 | 08558-20040 |
| 7 | 08558-20037 | 0 | 1 | EXTRUSION, END PLATE ENCLOSURE | 28480 | 08558-20037 |
| 8 | 08558-20036 | 9 | 1 | EXTRUSION, CIRCUIT ENCLOSURE, TAPPED (4) | 28480 | 08558-20036 |
| 9 | 08558-20051 | 7 | 2 | EXTRUSION, CIRCUIT ENCLOSURE | 28480 | 08558-20051 |
| 10 | 08558-20038 | 1 | 1 | EXTRUSION, ENCLOSURE DIVIDER | 28480 | 08558-20038 |
| 11 | 08558-40015 | 6 | 1 | HOUSING, LATCH (FOR INSTRUMENTS WITH SERIAL PREFIX 13344 & BELOW, SEE SECTION VII | 28480 | 08558-40015 |
| 12 | 08558-20092 | 7 | 1 | SHIFT, LATCH | 28480 | 08558-20092 |
| 13 | 08558-20030 | 1 | 1 | INSULATOR, BOTTOM GUIDE RAIL | 28480 | 08558-00030 |
| 14 | 08558-20041 | 6 | 1 | GUIDE RAIL, BOTTOM | 28480 | 08558-20041 |
| 15 | 08558-20027 | 8 | 1 | BOARD, VERTICAL OUTPUT CONNECTOR | 28480 | 08558-20027 |
| 16 | 0624-0203 | 9 | 8 | SCREW-TPG 4-40 .375-IN-LG 82 DEG | 28480 | 0624-0203 |
| 17 | 2200-0055 | 3 | 1 | SCREW-MACH 4-40 .125-IN-LG 82 DEG | 28480 | 2200-0055 |
| 18 | 2200-0104 | 3 | 17 | SCREW-MACH 4-40 .25-IN-LG 82 DEG | 28480 | 2200-0104 |
| 19 | 2360-0210 | 0 | 4 | SCREW-MACH 6-32 .625-IN-LG 82 DEG | 28280 | 2360-0210 |
| 20 | 0624-0268 | 6 | 40 | SCREW-TPG 4-24 .375-IN-LG PAN-HD-POZI | 28480 | 0624-0268 |
| 21 | 0624-0206 | 2 | 1 | SCREW-TPG 6-32 .25.-IN-LG PAN-HD-POZI STL | 28480 | 0624-0206 |
| 22 | 2200-0103 | 2 | 4 | SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI | 28480 | 2200-0103 |
| 23 | 2360-0115 | 4 | 1 | SCREW-MACH 6-32 .31 2-IN-LG PAN-HD-POZI | 28480 | 2360-0115 |
| 24 | 2200-0170 | 3 | 2 | SCREW-MACH 4-40 .625.-IN-LG 82 DEG | 28480 | 2200-0170 |
| 25 | 0380-0006 | 2 | 2 | SPACER-RND .375-IN-LG .18-IN-ID | 28480 | 0380-0006 |
| 26 | 2260-0003 | 7 | 2 | NUT.HEX-PLSTC LKG 4-40-THD .141-IN.-THK | 28480 | 2260-0003 |
| 27 | 2200-0107 | 2 | | SCREW-MACH 4-40 .375IN-LG PAN-HD-POZI | 28480 | 2200-0107 |
| 28 | 2200-0164 | 5 | 7 | SCREW-MACH 4-40 .188-IN.LG UNCT 82 DEG | 28480 | 2200-0164 |
| 29 | 2200-0168 | 9 | 3 | SCREW-MACH 4-40 .438-IN-LG 82 DEG | 28480 | 2200-0168 |
| 30 | 08558-00086 | 7 | 1 | COVER, LOG AMPLIFIER | 28480 | 08558-00086 |
| 31 | 08558-00089 | 0 | 2 | COVER, BANDWIDTH FILTER NO. 1 | 28480 | 08558-00089 |
| 32 | 08558-00088 | 9 | 1 | COVER, STEP GAIN | 28480 | 08558-00088 |
| 33 | 08558-00087 | 8 | 1 | COVER, BANDWIDTH FILTER NO. 2 | 28480 | 08558-00087 |
| 34 | 08565-20096 | 0 | 1 | EXTRUSION, CIRCUIT ENCLOSURE,TAPPED (8) | 28480 | 08565-20096 |
| 35 | 08565-20093 | 7 | 1 | EXTRUSION, CIRCUIT ENCLOSURE,TAPPED (4) | 28480 | 08565-20093 |

*Figure 7-1. Mechanical Chassis Parts (1 of 2) (CHANGE A)*

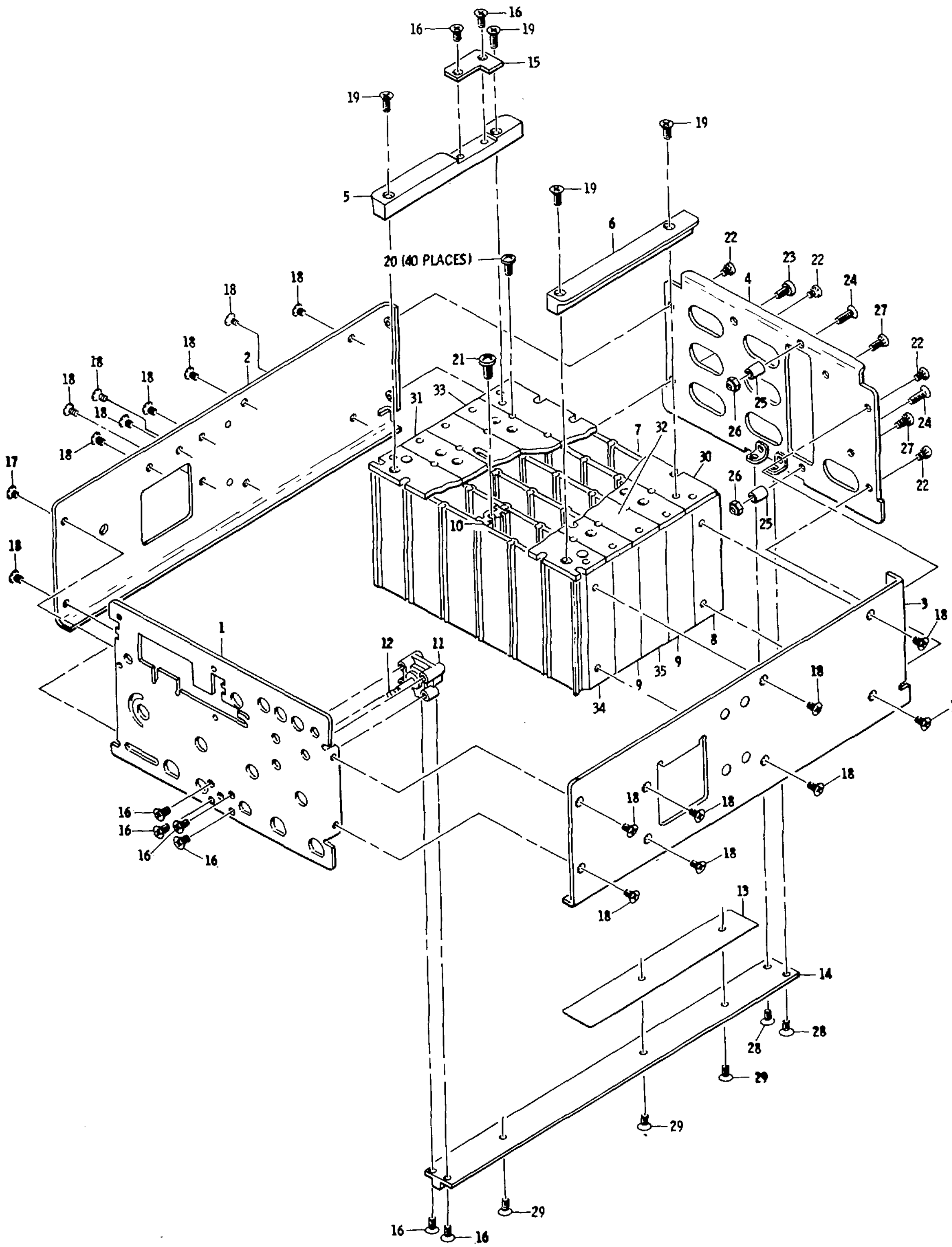



*Figure 7-1. Mechanical Chassis Parts (2 of 2) (CHANGE A)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| | | | | FRONT PANEL ASSEMBLY | | |
| 1 | 08558-00036 | 7 | 1 | KNOB,REF LEVEL FINE | 28480 | 08558-00036 |
| 2 | 3030-0007 | 5 | 33 | SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT | 28480 | 3030-0007 |
| 3 | 0510-0089 | 8 | 1 | RETAINER-RING BSC EXT .188-IN-DIA BE-CU | 28480 | 0510-0089 |
| 4 | 08558-00017 | 4 | 1 | DISC, INDEX | 28480 | 08558-00017 |
| 4 | 08558-00055 | 0 | 1 | DISC, INDEX (OPTION 002) | 28480 | 08558-00055 |
| 5 | 3050-0032 | 8 | 1 | WASHER-FL MTLC NO. 8 .189-IN-ID | 28480 | 3050-0032 |
| 6 | 08558-60050 | 1 | 1 | KNOB, REF LEVEL | 28480 | 08558-60050 |
| 6 | 08558-60072 | 7 | 1 | KNOB, REF LEVEL (OPTION 002) | 28480 | 08558-60072 |
| 7 | 3030-0022 | 4 | 10 | SCREW-SET 6-32 .125-IN-LG SMALL CUP-PT | 28480 | 3030-0022 |
| 8 | 08558-00043 | 9 | 1 | NUT | 28480 | 08558-00043 |
| 9 | 08558-00018 | 5 | 1 | POINTER, ATTENUATOR | 28480 | 08558-00018 |
| 10 | 08558-00038 | 9 | 1 | KNOB, DIAL, RESOLUTION | 28480 | 08558-00038 |
| 11 | 08558-60051 | 2 | 1 | KNOB, FREQUENCY | 28480 | 08558-60051 |
| 12 | 00180-67402 | 9 | 1 | KNOB, FINE TUNING | 28480 | 00180-67402 |
| 13 | 08558-00043 | 6 | 1 | KNOB, COARSE TUNING | 28480 | 08558-00043 |
| 14 | 08558-40003 | 2 | 1 | WINDOW, DBM | 28480 | 08558-40003 |
| 15 | 2950-0043 | 8 | 9 | NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK | 28480 | 2950-0043 |
| 16 | 2190-0016 | 3 | 13 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 28480 | 2190-0016 |
| 17 | 1410-0721 | 4 | 1 | BUSHING PNL .265-ID .47-LG 3/8-32-THD | 28480 | 1410-0721 |
| 18 | 08558-40001 | 0 | 1 | SLIDER, REF LEVEL | 28480 | 08558-40001 |
| 19 | 2200-0781 | 2 | 3 | SCREW-MACH 4-40 2.75-IN-LG PAN-HD-POZI | 28480 | 2200-0781 |
| 20 | 08558-00019 | 6 | 3 | DETENT, ATTENUATOR | 28480 | 08558-00019 |
| 21 | 0380-0411 | 3 | 14 | SPACER-RND .5-IN-LG .114-IN-ID | 28480 | 0380-0411 |
| 22 | 08558-20047 | 2 | 4 | BUSHING, PANEL | 28480 | 08558-20047 |
| 23 | 08558-20051 | 8 | 1 | SHAFT, REF LEVEL | 28480 | 08558-20051 |
| 24 | 1410-0006 | 8 | 6 | BALL-BRG TYPE .1875-DIA GRADE-50 SST | 28480 | 1410-0006 |
| 25 | 1460-0578 | 4 | 5 | SPRING-CPRSN .18-IN-OD .312-IN-DA-LG MUW | 28480 | 1460-0578 |
| 26 | 08559-60060 | 4 | 6 | HUB ASSEMBLY | 28480 | 08559-60060 |
| 27 | 1480-0367 | 1 | 1 | PIN-DWL ANSI-UNHDND/GND .0625-IN-DIA | 28480 | 1480-0367 |
| 28 | 1480-0059 | 8 | 10 | PIN-ROLL .062-IN-DIA .25-IN-LG STL | 28480 | 1480-0059 |
| 29 | 08558-40011 | 1 | 1 | ROTOR, ATTENUATOR DRIVE | 28480 | 08558-40011 |
| 30 | 08558-40008 | 1 | 1 | GEAR, 45 TEETH | 28480 | 08558-40008 |
| 31 | 0510-0015 | 2 | 2 | RETAINER-RING E-R EXT .125-IN-DIA STL | 28480 | 0510-0015 |
| 32 | 08558-60046 | 2 | 2 | CABLE, CAL OUTPUT | 28480 | 08558-60046 |
| 32 | 08558-60074 | | | CABLE, CAL OUTPUT, 75 OHM (OPT. 001/002) | 28480 | 08558-60074 |
| 33 | 2200-0509 | 1 | 1 | SCREW-MACH 4-40 1.625-IN-LG PAN-HD-POZI | 28480 | 2200-0509 |
| 34 | 2200-0125 | 1 | 1 | SCREW-MACH 4-40 1.5-IN-LG PAN-HD-POZI | 28480 | 2200-0125 |
| 35 | 08558-00024 | 2 | 2 | DETENT, SWEEP TIME | 28480 | 08558-00024 |
| 36 | 08558-20050 | 1 | 1 | SHAFT, SWEEP WIDTH | 28480 | 08558-20050 |
| 37 | 08558-20066 | 1 | 1 | ROTOR, FREQUENCY SPAN | 28480 | 08558-20066 |
| 38 | 08558-20089 | 2 | 1 | BUSHING, SLOTTED | 28480 | 08558-20089 |
| 39 | 1460-1376 | 2 | 1 | SPRING-TRSN MUW | 28480 | 1460-1376 |
| 40 | 08558-20088 | 1 | 1 | GEAR, 20 TEETH | 28480 | 08558-20088 |
| 41 | 0520-0139 | 0 | 2 | SCREW-MACH 2-56 .875-IN-LG PAN-HD-POZI | 28480 | 0520-0139 |
| 42 | 0380-0487 | 3 | 2 | SPACER-RND .625-IN-LG .086-IN-ID | 28480 | 0380-0487 |
| 43 | | | | NOT ASSIGNED | 28480 | |
| 44 | 0610-0002 | 7 | 2 | NUT, HEX-BL-CHAM 2-56-THD .062-IN-LG | 28480 | 0610-0002 |
| 45 | 08558-20002 | 9 | 1 | BOARD, FRONT SWITCH | 28480 | 08558-20002 |
| 46 | 08558-40005 | 4 | 3 | ROTOR, DOUBLE CONTACT | 28480 | 08558-40005 |
| 47 | 3050-0017 | 9 | 3 | WASHER-FL MTLC ¼ IN .26-IN-ID | 28480 | 3050-0017 |
| 48 | 1460-0532 | 0 | 1 | SPRING-CPRSN .54-IN-OD .45-IN-DA-LG MUW | 28480 | 1460-0532 |
| 49 | 2200-0165 | 6 | 4 | SCREW-MACH 4-40 .25-IN-LG 82 DEG | 28480 | 2200-0165 |
| 50 | 08558-00020 | 9 | 1 | DETENT, IF GAIN | 28480 | 08558-00020 |
| 51 | 08558-20061 | 0 | 1 | LOCKOUT, ROTATING | 28480 | 08558-20061 |
| 52 | 08558-20062 | 1 | 1 | LOCKOUT, FIXED | 28480 | 08558-20062 |
| 53 | 08558-20052 | 9 | 1 | SHAFT, FIXED | 28480 | 08558-20052 |
| 54 | 2260-0002 | 6 | 18 | NUT-HEX-DBL-CHAM 4-40-THD .062-IN-THK | 28480 | 2260-0002 |
| 55 | 0380-0413 | 5 | 3 | SPACER-RND 1.25-IN-LG .114-IN-ID | 28480 | 0380-0413 |
| 56 | 08558-00022 | 1 | 1 | CRANK, SLOTTED | 28480 | 08558-00022 |
| 57 | 08558-20053 | 0 | 1 | SHAFT, REF LEVEL FINE | 28480 | 08558-20053 |
| 58 | 1490-0841 | 7 | 1 | COUPLER-RGD .375-LG BRS | 28480 | 1490-0841 |
| 59 | 2950-0006 | 3 | 4 | NUT-HEX-DBL-CHAM ¼-32-THD .094-IN-THK | 28480 | 2950-0006 |
| 60 | 2190-0027 | 6 | 6 | WASHER-LK INTL T ¼ IN .256-IN-ID | 28480 | 2190-0027 |
| 61 | 08558-00021 | 0 | 1 | PLATE, LEVEL POT | 28480 | 08558-00021 |
| 62 | 2190-0019 | 6 | | WASHER-LK HLCL NO. 4 .115-IN-ID | 28480 | 2190-0019 |
| 63 | 08558-20054 | 1 | 1 | SHAFT, ATTENUATOR DRIVE | 28480 | 08558-20054 |
| 64 | 1430-0036 | 6 | 2 | GEAR-MIT 16-T 32-DP 20-DEG PA BRS | 28480 | G462Y (MOD) |
| 65 | | | | NOT ASSIGNED | 28480 | |
| 66 | 08558-00081 | 2 | 1 | BRACKET, ATTENUATOR | 28480 | 08558-00081 |
| 67 | 3050-0105 | 6 | 4 | WASHER-FL MTLC NO. 4 .125-IN-ID | 28480 | 3050-0105 |
| 68 | | | | NOT ASSIGNED | 28480 | |
| 69 | 08558-20030 | 3 | 1 | BOARD, REAR SWITCH | 28480 | 08558-20030 |
| 70 | 2200-0143 | 0 | 2 | SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI | 28480 | 2200-0143 |
| 71 | 08558-40004 | 3 | 1 | ROTOR, SINGLE CONTACT | 28480 | 08558-40004 |
| 72 | 08558-00025 | 4 | 1 | DETENT, BANDWIDTH | 28480 | 08558-00025 |

*Figure 7-2. Front Panel Assembly (1 of 3) (CHANGE A)*

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**PAGES**
**7-11 through 7-14**

**ADJUSTMENTS**

## 7-6. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B)

REFERENCE

A14 and A15 Schematics

DESCRIPTION

10 dB/DIV and LIN are adjusted for correct steps and full-screen display translations.

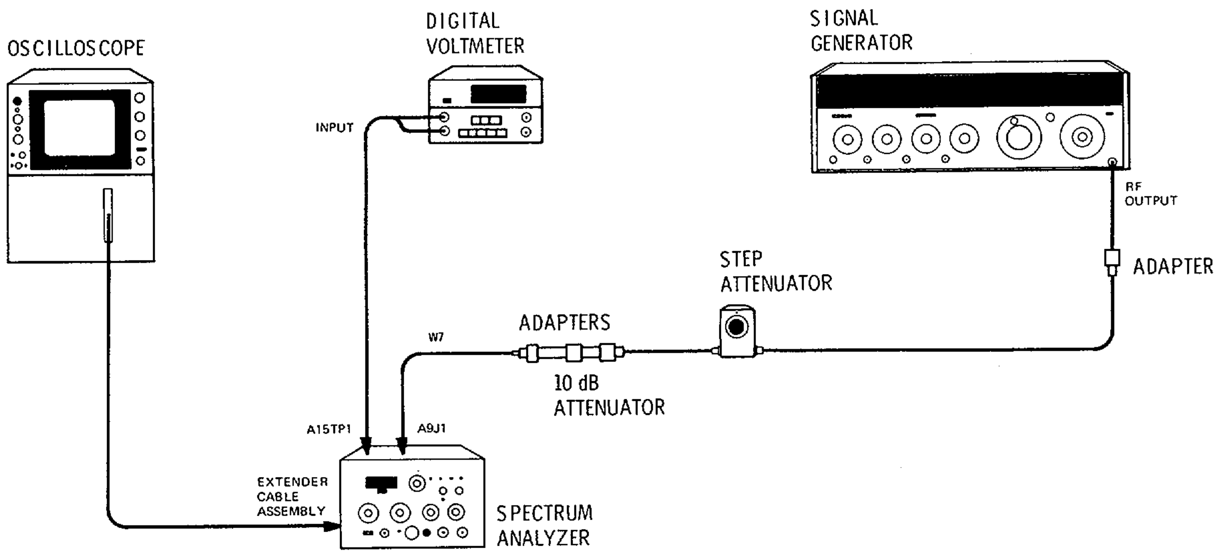


*Figure 7-4. Log Amplifier Log and Linear Adjustment Test Setup (CHANGE B)*

EQUIPMENT

| | |
|---|---|
| Signal Generator | HP 8640B |
| Digital Voltmeter | HP 34740A/34702A |
| 10 dB Attenuator | HP 8491A, Option 010 |
| Step Attenuator (10 dB/step) | HP 355D |
| Adapter, Type N Male on one end, BNC Female on other end (2 required) | HP 1250-0780 |
| Adapter, Type N Female on both ends | HP 1250-0777 |
| Adapter, Type N Male on one end, SMC Male on other end | HP 1250-1023 |

**7-6. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B) (Cont'd)**

PROCEDURE

1. Set spectrum analyzer controls as follows:

FREQ SPAN/DIV ........................................1 MHz
RESOLUTION BW ........................................300 kHz
OPTIMUM INPUT ........................................- 30 dBm
*001: - 25 dBm*
*002: + 25 dBm V*
REFERENCE LEVEL dBm ........................................- 50
*002: 0 dBm V*
10 dB/DIV - 1 dB/DIV - LIN........................................LIN
SWEEP TIME/DIV ........................................AUTO
SWEEP TRIGGER........................................FREE RUN

2. Connect equipment as shown in Figure 7-4. Set signal generator frequency to 301.4 MHz and output level to - 13 dBm. Remove W7P1 from Second IF assembly A10J2. Connect signal generator output through step attenuator, 0 dB attenuator, and adapters to W7P1.

**NOTE**

**The 10 dB attenuator is included to compensate for the 10 dB of gain on A12 Step Gain assembly when the TEST-NORM switch is in TEST.**

3. Set the TEST-NORM switch on A12 Step Gain assembly to the TEST position. Tune signal generator frequency for maximum signal amplitude on oscilloscope display with step attenuator set at 0 dB.

4. Set output level of signal generator for a digital voltmeter reading of 700 mV, with step attenuator set at 0 dB and REFERENCE LEVEL control set to - 50 dBm.
*002: 0 dBm V*

5. Set 8558B REFERENCE LEVEL to - 80 dBm and set step attenuator to 30 dB. Observe digital voltmeter reading.
*002: - 30 dBm V*

6. Adjust A14R3 LIN GAIN for a digital voltmeter reading of 700 mV.

7. Repeat steps 4, 5, and 6 until the DVM reading in step 5 is 700 +2 . mV.

8. Set 8558B REFERENCE LEVEL to -50 dBm and set step attenuator to 0 dB. Change REFERENCE LEVEL and step attenuator settings as shown in Table 7-4. If Deviation From Reference is not within the given limits, readjust A14R3.

*002: Set REFERENCE LEVEL dBm V to 0 and set attenuator to 0 dB. REFERENCE LEVEL (dBmV) settings in Table 5-7 top to bottom are, 0, -10, -20, -30, -40.*

## 7-6. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B) (Cont'd)

*Table 7-4. Linear Gain Adjustment Limits*

| Reference Level (dBm) | Step Attenuator Setting (dB) | Deviation From Reference |
|---|---|---|
| -50 | 0 | Reference |
| -60 | 10 | ±0.2 DIV ±20 mV |
| -70 | 20 | ±0.2 DIV ±20 mV |
| -80 | 30 | ±0.2 DIV ±20 mV |
| -90 | 40 | ±0.3 DIV ±30 mV |

9. Set 8558B REFERENCE LEVEL to 0 dBm and disconnect signal generator from step attenuator. Record offset reading (DVM). The offset should be less than + 30 mV.
   *002: REFERENCE LEVEL, +50 dBm V*

10. Reconnect signal generator as shown in Figure 7-3. Set 10 dB/DIV - 1 dB/DIV - LIN switch to 10 dB/DIV and set step attenuator to 40 dB.

11. Set output level of signal generator for a digital voltmeter reading of 400 mV plus offset recorded in step 9 (algebraic sum). (Example: If offset is - 23 mV, set output level of signal generator for a DVM reading of 377 mV.)

12. Set step attenuator to 0 dB. Digital voltmeter should indicate 800 mV, plus offset (algebraic sum) ±1 mV. If DVM reading is not within limits, adjust A14R2 LOG/LIN adjustment for a digital voltmeter reading of 800 mV, plus offset minus 50 percent of overshoot. Example: If DVM indicates 767 mV and should be indicating 777 mV (-10 mV overshoot), adjust A14R2 for a DVM reading of 777 mV minus - 5 mV, or 782 mV.

13. Repeat steps 10, 11, and 12 until the digital voltmeter indicates 800 mV plus offset ±1 mV with no further adjustment of A14R2 in step 12.

14. Set the step attenuator to the positions shown in Table 7-5 and record DVM reading for each setting. Correct the DVM readings by algebraically adding the offset (recorded in step 9).

15. Readjust A14R2 if necessary to meet the limits in Table 7-5.

16. Set step attenuator to 0 dB and set output level of signal generator for a digital voltmeter reading of 800 mV plus offset (recorded in step 9)±1 mV.

17. Set 10 dB/DIV - 1 dB/DIV - LIN switch to LIN. The digital voltmeter should indicate the reading set in step 16 ±25 mV. If it does, go to step 19. If it does not, or if log fidelity is not within limits, go to step 18 and select A14R16*.

## 7-6. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B) (Cont'd)

*Table 7-5. Log Fidelity Check*

| Step Attenuator Setting (dB) | DVM Reading (mV) | DVM Reading Corrected For Offset | | |
|---|---|---|---|---|
| | | Min. (mV) | Actual (mV) | Max. (mV) |
| 0 | ______ | 799 | ______ | 801 |
| 10 | ______ | 697 | ______ | 703 |
| 20 | ______ | 596 | ______ | 604 |
| 30 | ______ | 496 | ______ | 504 |
| 40 | ______ | 395 | ______ | 405 |
| 50 | ______ | 294 | ______ | 306 |
| 60 | ______ | 193 | ______ | 207 |
| 70 | ______ | 92 | ______ | 108 |

18. Select A14R16* to obtain an output in step 17 within ±25 mV of the reading set in step 16. Decreasing A14R16* 10 percent will increase the DVM reading approximately 30 mV in step 17.

**NOTE**

**Log fidelity must be considered when selecting A14R16*. That is, if the DVM READING CORRECTED FOR OFFSET in Table 7-5 is greater than 100 mV for a STEP ATTENUATOR SETTING of 70 dB, A14R16* should be selected for a DVM reading greater than the reading set in step 16. If the READING CORRECTED FOR OFFSET is less than 100 mV, A14R16* should be selected for DVM reading less than the reading set in step 16.**

19. Set output level of signal generator for a digital voltmeter reading of 800 mV plus offset (algebraic sum) 1 V.

20. Set 8558B 10 dB/DIV - 1 dB/DIV - LIN switch to 10 dB/DIV and adjust A14R2 LOG/LIN adjustment for a digital voltmeter reading of 800 mV plus offset.

21. Repeat step 14 to recheck the log fidelity.

22. Set the 8558B REFERENCE LEVEL dBm control to -50. Set the 10 dB/DIV - 1 dB/DIV - LIN switch to 1 dB/DIV.
    *002: 0 dBm V*

23. Set the step attenuator to 0 dB and set output level of signal generator for a digital voltmeter reading of 700 mV (do not include offset).

24. Set the 8558B REFERENCE LEVEL dBm control to -90 and the step attenuator to 40 dB. Adjust A14RI LOG GAIN adjustment for a digital voltmeter reading of 700 mV.
    *002: - 40 dBm V*

## 7-6. LOG AMPLIFIER LOG AND LINEAR ADJUSTMENT (CHANGE B) (Cont'd)

25. Change REFERENCE LEVEL and step attenuator settings as shown in Table 7-6. Deviation From Reference should not exceed the given limits.
    *002: REFERENCE LEVEL (dBmV) settings, top to bottom are, 0, -10, -20, -30, -40.*

26. Return the TEST-NORM switch on A12 assembly to the NORM position.

*Table 7-6. Log Gain Adjustment Limits*

| Reference Level (dBm) | Step Attenuator Setting (dB) | Deviation From Reference |
|---|---|---|
| -50 | 0 | Reference |
| -60 | 10 | ±0.3 DIV ±30 mV |
| -70 | 20 | ±0.3 DIV ±30 mV |
| -80 | 30 | ±0.3 DIV ±30 mV |
| -90 | 40 | ±0.3 DIV ±30 mV |

*Table 7-7. Replaceable Parts (1 of 4) (CHANGE B)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14 | 08565-60111 | 4 | 1 | LOG AMPLIFIER | 28480 | 08565-60111 |
| A14C1 | 0160-2055 | 9 | 59 | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C2 | 0160-3459 | 9 | 7 | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C3 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C4 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C5 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C6 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C7 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C8 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C9 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C10 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C11 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C12 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C13 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C14 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C15 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C16 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C17 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C18* | 0160-2234 | 6 | 1 | CAPACITOR-FXD .51PF +-.25PF 500VDC CER | 28480 | 0160-2055 |
| A14C19 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C20 | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +-25PF 500VDC CER | 28480 | 0160-2236 |
| A14C21 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C22 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C23 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C24 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C25 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C26 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C27 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C28 | 0160-0228 | 6 | 1 | CAPACITOR-FXD 22UF +-10% 15VDC TA | 28480 | 150D226X901582 |
| A14C29 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C30* | 0160-2236 | 8 | 5 | CAPACITOR-FXD 1PF +-25PF 500VDC CER | 28480 | 0160-2236 |
| A14C31 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C32 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C33 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C34 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C35 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C36 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C37 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C38 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C39 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C40* | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +-25PF 500VDC CER | 28480 | 0160-2236 |
| A14C41 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C42 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C43 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C44 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C45 | | | | NOT ASSIGNED | | |
| A14C46 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C47 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C48 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C49 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C50 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C51 | 0160-3459 | 9 | | CAPACITOR-FXD .02UF +-20% 100VDC CER | 28480 | 0160-3459 |
| A14C52* | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +-25PF 500VDC CER | 28480 | 0160-2236 |
| A14C53 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C54 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C55 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C56 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C57* | 0160-2256 | 2 | | CAPACITOR-FXD 9.1PF +-.2PF 500VDC CER | 28480 | 0160-2256 |
| A14C58 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C59 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C60 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C61 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C62 | 0160-0195 | 2 | 1 | CAPACITOR-FXD 130PF +-5% 300VDC MICA | 28480 | DM15F131J0300WV1CR |
| A14C63 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C64 | 0160-2308 | 5 | 1 | CAPACITOR-FXD 36PF +-5% 500VDC MICA | 28480 | 0160-2308 |
| A14C65 | 0160-2240 | 4 | 1 | CAPACITOR-FXD 2PF +-.25PF 500VDC CER | 28480 | 0160-2240 |
| A14C66 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C67 | 0160-2236 | 8 | | CAPACITOR-FXD 1PF +0-.25PF 500VDC CER | 28480 | 0160-2236 |
| A14C68 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C69 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C70 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 7-7. Replaceable Parts (2 of 4) (CHANGE B)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14C71 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C72 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20, 100VDC CER | 28480 | 0160-2055 |
| A14C73 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20 100VDC CER | 28080 | 0160-2055 |
| A14C74 | 0180-2206 | 4 | 1 | CAPACITOR-FXD 60UF+ -10% 6VDC TA | 56289 | 150D606X9006B2 |
| A14C75 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C76 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CER | 28480 | 0160-2055 |
| A14C77 | 0160-2055 | 9 | | CAPACITOR-FXD .01UF +80-20% 100VDC CE | 28480 | 0160-2055 |
| A14C78 | 0180-0197 | 8 | 5 | CAPACITOR-FXD 2.2UF+ -10% 20VDC TA | 56280 | 150D225X9020A2 |
| A14CR1 | 1901-0040 | 1 | 17 | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR2 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR3 | 1901-1085 | 6 | 17 | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR4 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR5 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR6 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 284080 | 1901-0040 |
| A14CR7 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR8 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR9 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR10 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR11 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR12 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR13 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR14 | 1901-0040 | 8 | 3 | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A14CR15 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR16 | 1901-1070 | 9 | 2 | DIODE-PIN 110V | 28480 | 1901-1010 |
| A14CR17 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR18 | 1901-1070 | 9 | | DIODE-PIN 110V | 28480 | 1901-1070 |
| A14CR19 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A14CR20 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR21 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR22 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR23 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR24 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR25 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR26 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A14CR27 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR28 | 1901-1085 | 6 | | DIODE-SCHOTTKY | 28480 | 1901-1085 |
| A14CR29 | 1901-0047 | 8 | | DIODE-SWITCHING 20V 75MA 10NS | 28480 | 1901-0047 |
| A14CR30 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14CR31 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS D0-35 | 28480 | 1901-0040 |
| A14CR32 | 1901-0040 | 1 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A14E1 | 9170-0029 | 3 | 1 | CORE-SHIELDING READ | 28480 | 9170-0029 |
| A14L1 | 9100-1622 | 7 | 2 | COIL-MLD 24AUH 5% Q=60 .155DX .375L-NOM | 28480 | 9100-1622 |
| A14L2 | 9100-0105 | 3 | 1 | COIL-MLD 8.2UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-0105 |
| A14L3 | 9100-1619 | 2 | 7 | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L4 | 9100-1619 | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L5 | 9100- | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L6 | 9100-1619 | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L7 | 9100-1619 | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L8 | 9100-1619 | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L9 | 9100-1627 | 2 | 1 | COIL-MLD 39UH 5% Q=60 .155DX.375LG-NOM | 28480 | 9100-1627 |
| A14L10 | 9100-1629 | 4 | 1 | COIL-MLD 47UH 5% Q=55 .155DX.375LG-NOM | 28480 | 9100-1629 |
| A14L11 | 9100-1622 | 7 | | COIL-MLD 24UH 5% Q=60 .155DX .375LG-NOM | 28480 | 9100-1622 |
| A14L12 | 9100-1619 | 2 | | COIL-MLD 6.8UH 10% Q=50 .155DX .375LG-NOM | 28480 | 9100-1619 |
| A14L13 | 9140-0145 | 1 | 1 | COIL-MLD 8.2UH 10% Q=60 .095DX .25LG-NOM | 28480 | 9140-0145 |
| A14L14 | 9100-2269 | 0 | 0 | COIL-MLD 27UH 10% Q=45 .095DX .25LG-NOM | 28480 | 9100-2269 |
| A14Q1 | 1854-0071 | 7 | 3 | TRANSISTOR NPN SI PD=300mw FT=20OMHZ | 28480 | 1854-0071 |
| A14Q2 | 1854-0019 | 3 | 15 | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q3 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q4 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q5 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q6 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q7 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q8 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q9 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q10 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q11 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q12 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q13 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q14 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q15 | 1854-0019 | 3 | | TRANSISTOR NPN SI TO-18 PD=360mw | 28480 | 1854-0019 |
| A14Q16 | 1853-0020 | 4 | 2 | TRANSISTOR PNP SI PD=300mw FT=150MHZ | 28480 | 1853-0020 |
| A14Q17 | 1853-0007 | 7 | 4 | TRANSISTOR PNP 2N3251 SI TO=18 PD=360mw | 04713 | 2N3251 |
| A14Q18 | 1853-0345 | 8 | 1 | TRANSISTOR NPN 2N5179 SI T0=72 PD=I200mw | 04713 | 2N5179 |
| A14Q19 | 1853-0015 | 7 | 1 | TRANSISTOR PNP SI PD=200mw FT=500MHZ | 28480 | 1853-0015 |
| A14Q20 | 1854-0475 | 5 | 2 | TRANSISTOR-DUAL NPN PD=750mw | 28480 | 185-0475 |

See introduction to this section for ordering information
* Indicates factory selected value

*Table 7-7. Replaceable Parts (3 of 4) (CHANGE B)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14Q21 | 1854-0404 | 0 | 6 | TRANSISTOR NPN SI TO=18 PD=360MW | 28480 | 1854-0404 |
| A14Q22 | 1853-0020 | 4 | | TRANSISTOR PNP SI PD=300mw FT=150MHZ | 28480 | 1854-0020 |
| A14Q23 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300mw FT=200MHZ | 28480 | 1854-0071 |
| A14Q24 | 1854-0071 | 7 | | TRANSISTOR NPN SI PD=300mw FT=200MHZ | 28480 | 1854-0071 |
| A14Q25 | 1854-0039 | 7 | 2 | TRANSISTOR NPN 2N30538 SI TO=39 PD=1w | 01928 | 2N30538 |
| A14R1 | 2100-3109 | 2 | 2 | RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN | 02111 | 43P202 |
| A14R2 | 2100-3161 | 6 | 1 | RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN | 02111 | 43P203 |
| A14R3 | 2100-3109 | 2 | | RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN | 02111 | 43P202 |
| A14R4 | 0757-0442 | 9 | 9 | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R5 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R6* | 0757-0346 | 2 | 20 | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1080-F |
| A14R7 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R8* | 0757-0280 | 3 | 9 | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R9 | 0757-0430 | 4 | 9 | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R10 | 0757-0465 | 6 | 4 | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A14R11 | 0757-0440 | 7 | 2 | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R12 | 0698-3157 | 3 | 2 | RESISTOR 19.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1962-F |
| A14R13 | 0698-3444 | 1 | 12 | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R14 | 0757-0420 | 3 | 3 | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-751-F |
| A14R15 | 0698-3136 | 8 | 1 | RESISTOR 17.8K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1782-F |
| A14R16* | 0698-3443 | 0 | 1 | RESISTOR 287 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-287R-F |
| A14R17 | 0698-3156 | 2 | 5 | RESISTOR 14.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1472-F |
| A14R18 | | | | NOT ASSIGNED | | |
| A14R19 | 0698-0085 | 0 | 2 | RESISTOR 2.61K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2611-F |
| A14R20 | 0757-0279 | 0 | | RESISTOR 13.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R21 | 0757-0289 | 2 | 12 | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R22 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R23 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R24 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R25 | 0698-3152 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R26 | 0757-0290 | 5 | | RESISTOR 16.9K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R27 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R28 | 0698-3449 | 6 | 1 | RESISTOR 28.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2872-F |
| A14R29 | 0757-0199 | 3 | 7 | RESISTOR 21.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2152-F |
| A14R30 | 0698-3152 | 8 | 2 | RESISTOR 3.48K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3481-F |
| A14R31 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R32 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R33 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R34 | 0698-3154 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R35* | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R36 | 0698-3438 | 3 | 2 | RESISTOR 147 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-147R-F |
| A14R37 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R38 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R39 | 0698-3154 | 0 | 1 | RESISTOR 4.22K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-4221-F |
| A14R40 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R41 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R42 | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R43 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R44 | | | | NOT ASSIGNED | | |
| A14R45 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R46* | 0698-0083 | 8 | 2 | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A14R47 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R48 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R49 | 0757-0416 | 7 | 5 | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A14R50 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R51* | 0757-0346 | 2 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R52 | 0757-0465 | 6 | | RESISTOR 100K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1003-F |
| A14R53 | 0698-0083 | 8 | | RESISTOR 1.96K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1961-F |
| A14R54 | 0757-0280 | 3 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R55 | 0698-3151 | 7 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A14R56 | 0757-0458 | 7 | | RESISTOR 51.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5112-F |
| A14R57 | 0757-0346 | 2 | | RESISTOR 10.1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R58 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R59 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R60 | 0698-3157 | 3 | | RESISTOR 19.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1962-F |
| A14R61 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R62 | 0698-3152 | 8 | | RESISTOR 3.48K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3481-F |
| A14R63 | 0698-3159 | 5 | 1 | RESISTOR 2.61K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2612-F |
| A14R64* | 0757-0279 | 0 | 14 | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R65 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R66 | 0757-0439 | 4 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R67 | 0757-0279 | 0 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R68 | 0757-0289 | 2 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R69 | 0757-0440 | 7 | | RESISTOR 7.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-7501-F |
| A14R70 | 0757-0463 | 4 | 1 | RESISTOR 82.5K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-8252-F |

See introduction to this section for ordering information
*Indicates factory selected value

*Table 7-7. Replaceable Parts (4 of 4) (CHANGE B)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A14R71 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R72 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R73* | 0757-0346 | 5 | | RESISTOR 10 1% .125W F TC=0+-100 | 19701 | C4-1/8-TO-10R0-F |
| A14R74* | 0698-3151 | 1 | | RESISTOR 2.87K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2871-F |
| A14R75 | 0757-0442 | 5 | | RESISTOR 10K 1% .125W F TC=0+-100 | 19701 | C4-1/8-TO-1002-F |
| A14R76 | 0757-0289 | 5 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R77 | 0757-0280 | 1 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R78 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R79 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R80 | 0757-0439 | 1 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R81 | 0757-0403 | 1 | | RESISTOR 121 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-121R-F |
| A14R82* | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R83 | 0757-0418 | 1 | | RESISTOR 619 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-619R-F |
| A14R84 | 0757-0402 | 1 | | RESISTOR 110 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-111-F |
| A14R85 | 0757-0279 | 1 | | RESISTOR 3.16 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R86 | | | | NOT ASSIGNED | | |
| A14R87 | 0757-0289 | 5 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R88 | 0757-0416 | 1 | | RESISTOR 511 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-511R-F |
| A14R89 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R90 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R91 | 0757-0439 | 1 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R92 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R93 | 0757-0438 | 1 | | RESISTOR 5.11K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-5111-F |
| A14R94 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R95 | 0757-0289 | 5 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R96 | 0757-0280 | 1 | | RESISTOR 1K1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R97 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R98 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R99 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R100 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R101 | 0757-0439 | 1 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R102* | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R103 | 0757-0405 | 1 | | RESISTOR 162 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-162R-F |
| A14R104 | 0757-0279 | 1 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R105 | 0757-0280 | 1 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1001-F |
| A14R106 | 0757-0289 | 5 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R107 | 0757-0288 | 5 | | RESISTOR 9.09K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-9091-F |
| A14R108 | 0698-3444 | 1 | | RESISTOR 316 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-316R-F |
| A14R109 | 0757-0439 | 1 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R110 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R111 | 0698-3158 | 1 | | RESISTOR 23.7K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2372-F |
| A14R112 | 0698-3160 | 1 | | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A14R113 | 0698-3160 | 1 | | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A14R114 | 0698-3160 | 1 | | RESISTOR 31.6K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3162-F |
| A14R115 | 0757-0346 | 1 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-10R0-F |
| A14R116 | 0757-0289 | 5 | | RESISTOR 13.3K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-1332-F |
| A14R117 | 0698-0085 | 1 | | RESISTOR 2.61K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-2611-F |
| A14R118 | 0757-0439 | 1 | | RESISTOR 6.81K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-6811-F |
| A14R119* | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R120 | 0757-0279 | 1 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-3161-F |
| A14R121 | 0698-0348 | 1 | | RESISTOR 147 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-147R-F |
| A14R122 | 0757-0447 | 1 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A14R123 | 0757-0447 | 1 | | RESISTOR 16.2K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1622-F |
| A14R124 | 0757-0441 | 1 | | RESISTOR 8.25K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-8251-F |
| A14R125 | 0698-3260 | 9 | 2 | RESISTOR 464K 1% .125W F TC=0+-100 | 28480 | 0698-3260 |
| A14R126 | 0757-0442 | 1 | | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1002-F |
| A14R127 | 0757-0421 | 1 | | RESISTOR 825 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-825R-F |
| A14R128 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R129 | 0757-0290 | 5 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/8-TO-6191-F |
| A14R130* | 0757-0467 | 1 | | RESISTOR 121K 1% .125W F TC=0+-100 | 24546 | C4-1/8-TO-1213-F |
| A14U1 | 1826-0092 | 3 | 2 | OP AMP GP DUAL TO-99 | 28480 | 1826-0092 |
| A14VR1 | 1902-0041 | 4 | 1 | DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009% | 28480 | 1902-0041 |
| A14VR2 | 1902-0048 | 1 | 1 | DIODE-ZNR 6.81V 5% DO-7 PD=4W TC=+.043% | 28480 | 1902-0048 |
| A14VR3 | 1902-0579 | 3 | 1 | DIODE-ZNR 5.11V 5% DO-15 PD=1W TC=-.009% | 28480 | 1902-0579 |

See introduction to this section for ordering information
*Indicates factory selected value

**A14**

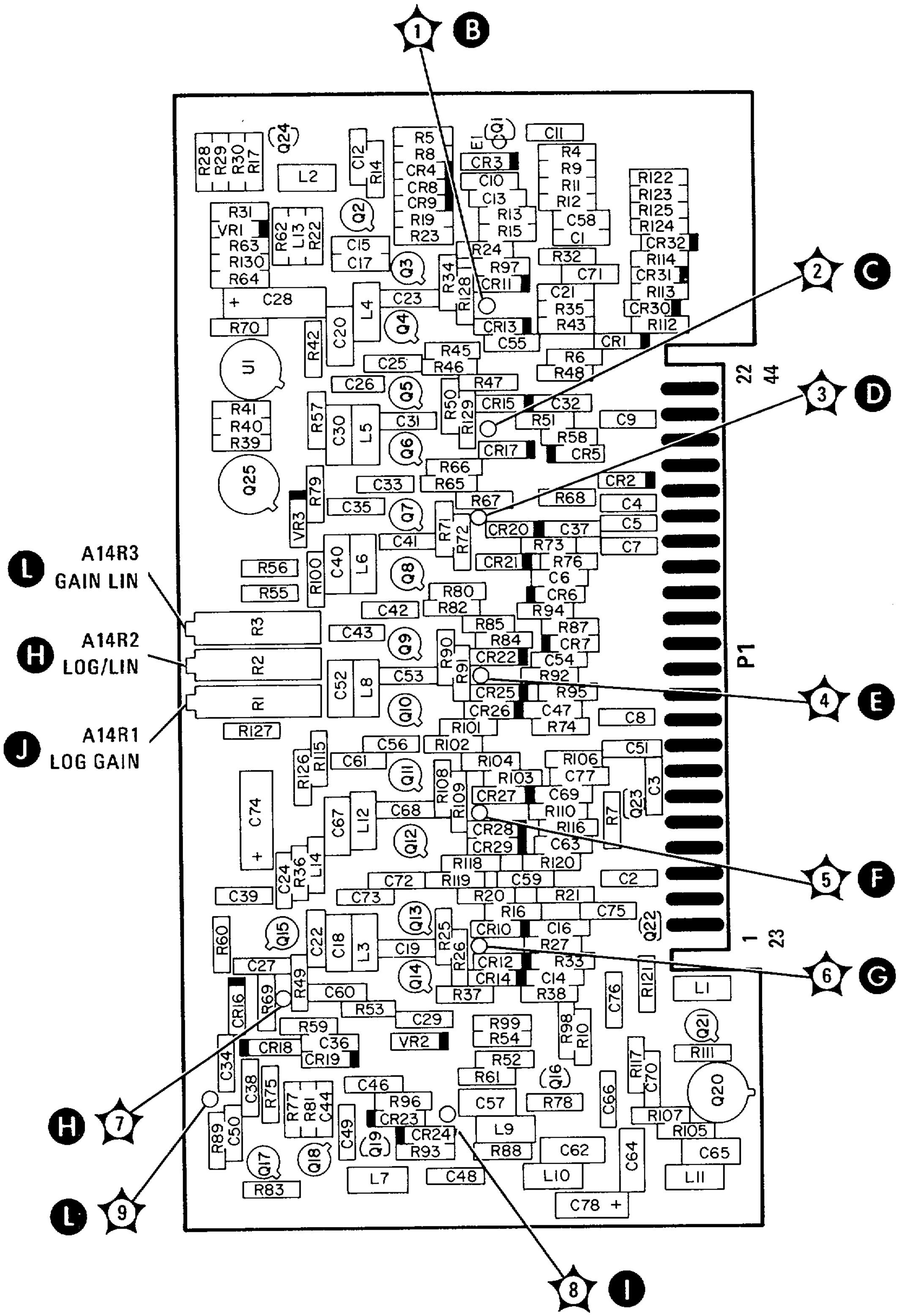


*Figure 7-5. A14 Log Amplifier, Component and Test Point Locations (CHANGE B)*

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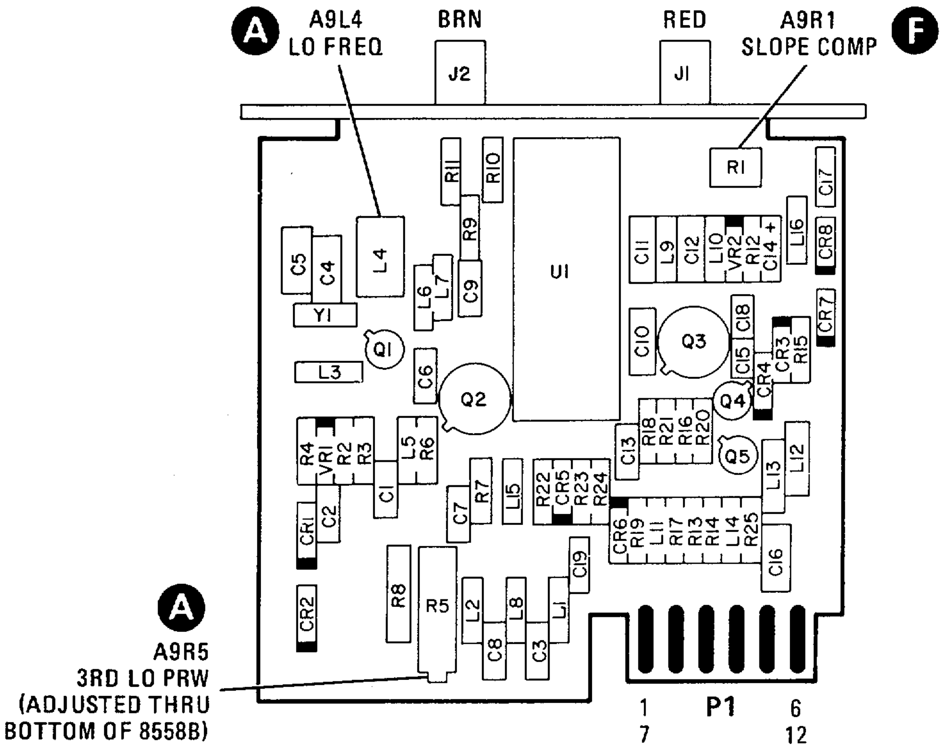
PAGES
7-25 through 7-26

A9




A10

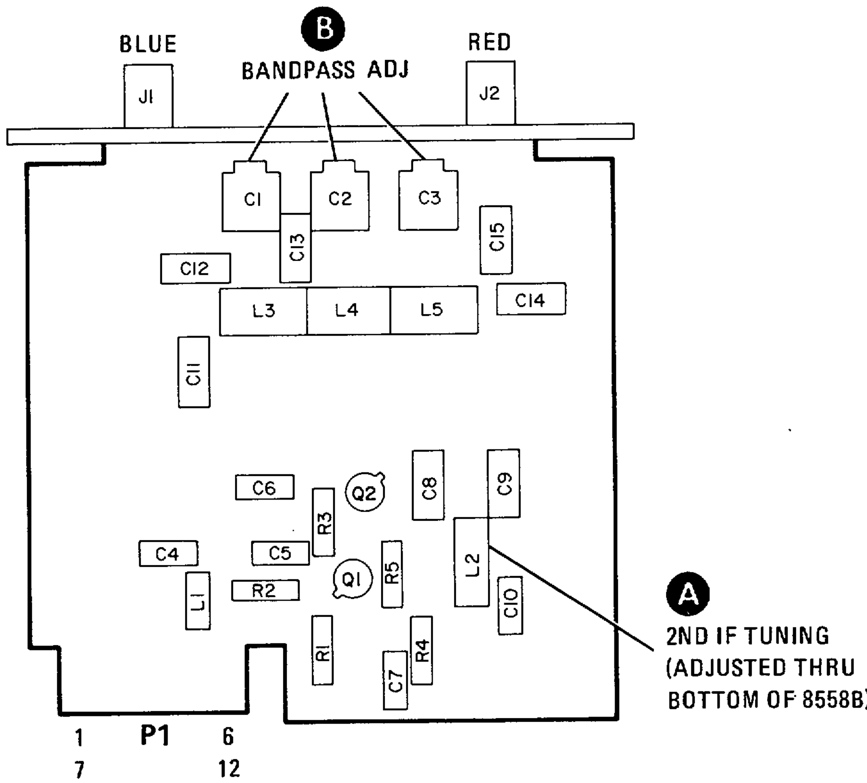



*Figure 7-7. A9 Third Converter and A10 Second IF, Component Locations (CHANGE C)*

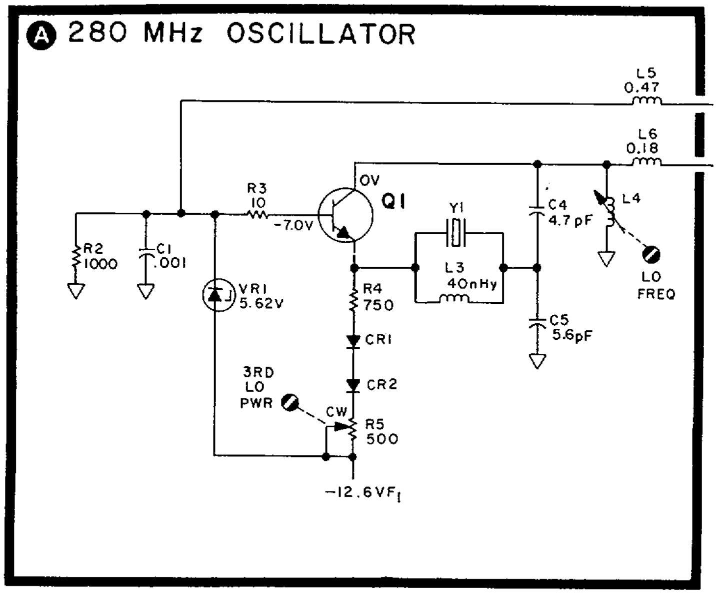



*Figure 7-8. P/O A9 Third Converter and A10 Second IF Schematic Diagram (CHANGE C)*

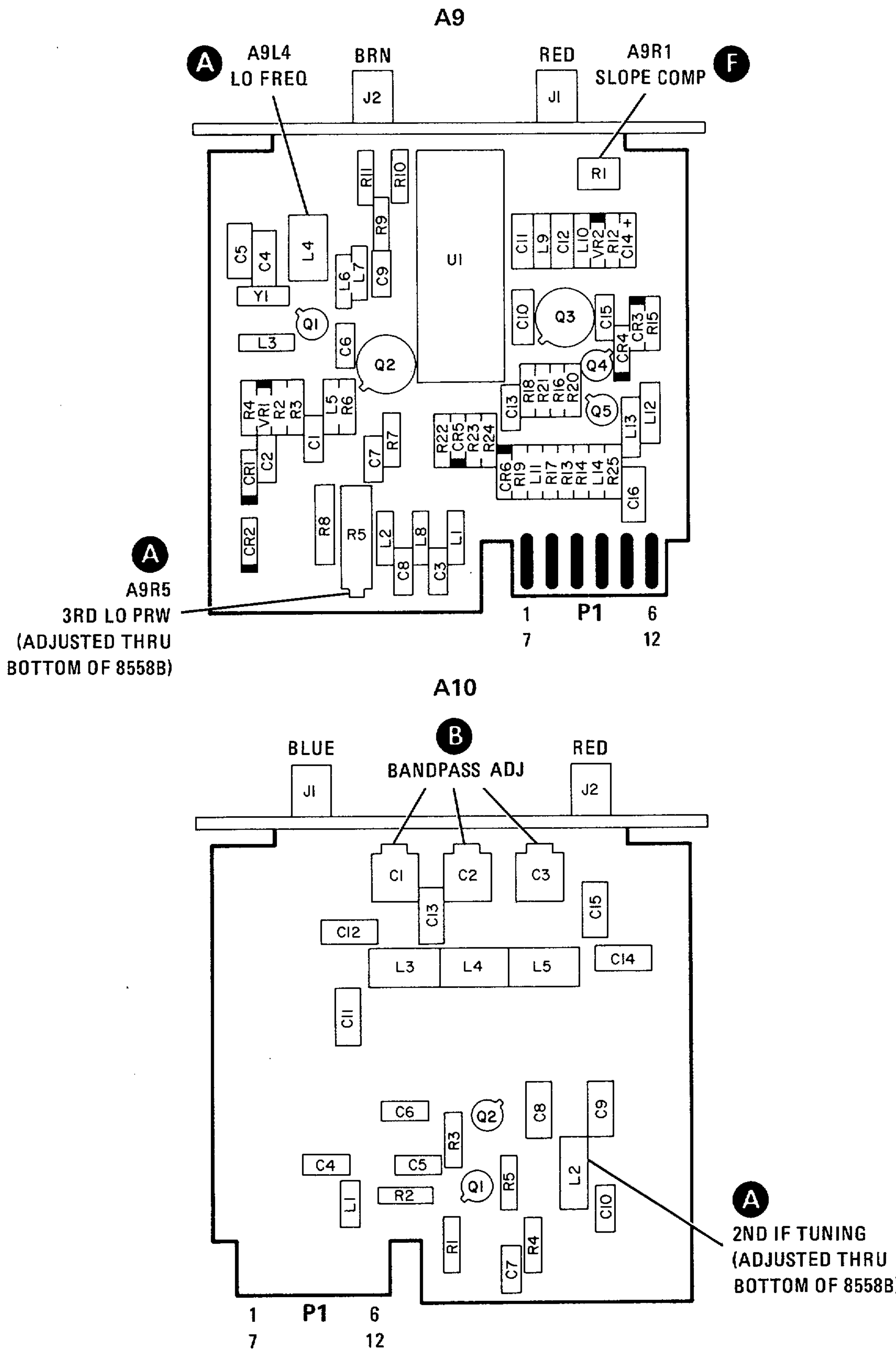



*Figure 7-9. A9 Third Converter and A10 Second IF, Component Locations (CHANGE F)*

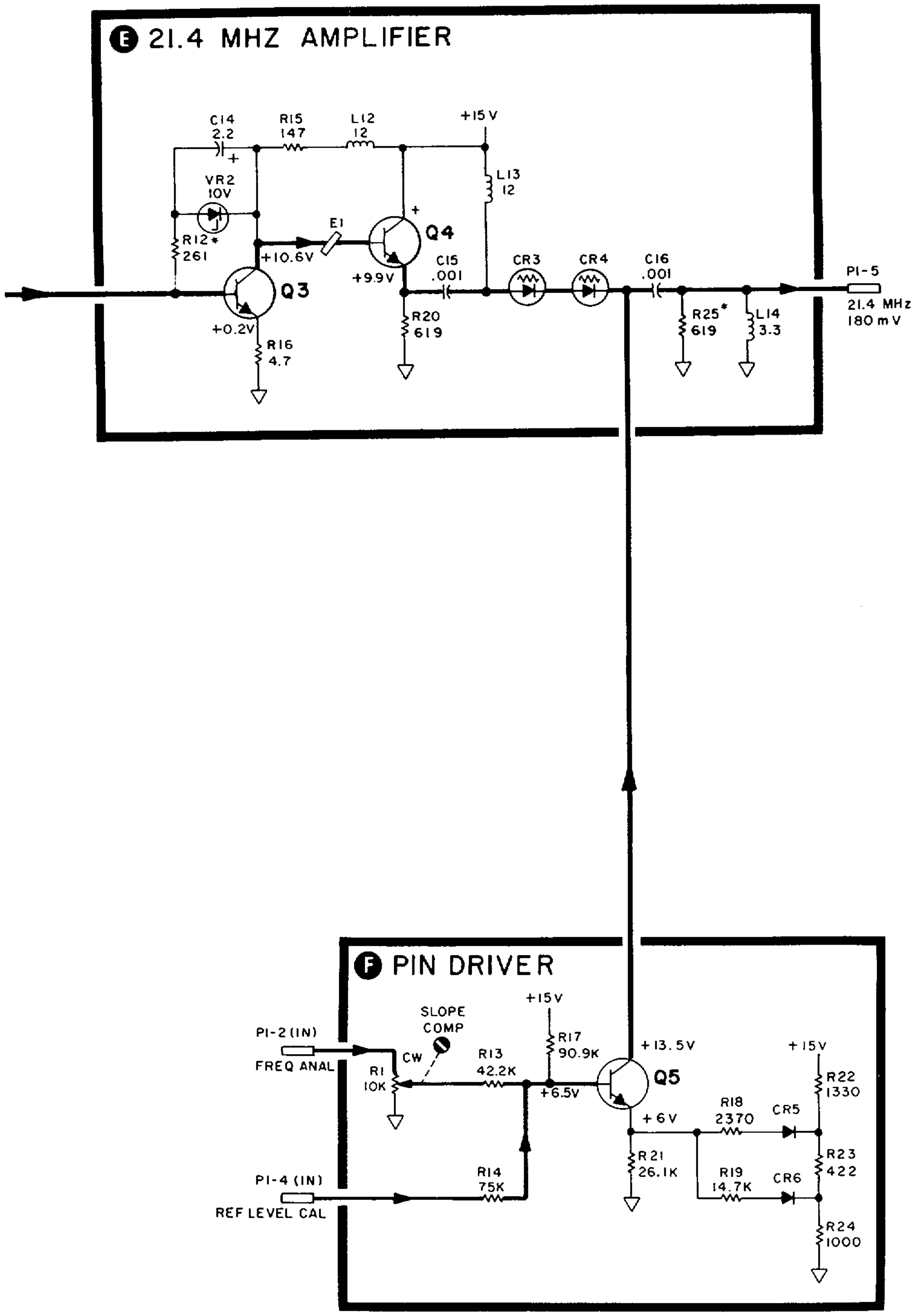



*Figure 7-10. P/O A9 Third Converter and A10 Second IF Schematic Diagram (CHANGE F)*

# SECTION VIII.
# SERVICE

## 8-1. INTRODUCTION

8-2. This section provides instructions for troubleshooting and repairing the HP Model 8558B Spectrum Analyzer. It includes general servicing hints and information, block diagrams of the instrument, circuit descriptions, parts identification illustrations, and schematic diagrams.

**WARNING**

**To troubleshoot and repair this instrument, you must remove it from the display mainframe and reconnect it to the mainframe through an extender cable. Operating the spectrum analyzer outside the mainframe in this manner exposes high voltage points in the instrument which might, if contacted, cause personal injury. Maintenance and repair of this instrument should, therefore, be performed only by a skilled person who knows the hazards involved.**

## 8-3. SERVICE INFORMATION INDEX

8-4. Table 8-1 lists specific kinds of information about the spectrum analyzer main assemblies, and indicates where the information is located. The service information for each assembly normally includes a description of the assembly circuits, a diagram showing the locations of the assembly components, and a schematic of the assembly circuits. These packages of assembly information are arranged in assembly number order with the circuit descriptions and component locations diagram preceding the assembly schematic. The assembly numbers are printed in large, bold-faced, alpha-numeric characters (e.g., A4) in the lower right-hand corner of each schematic diagram.

## 8-5. SCHEMATIC SYMBOLS, TERMINOLOGY, AND VOLTAGE LEVELS

8-6. Symbols and terminology used on the schematic diagrams are explained in Figure 8-1. Test conditions for the signal and dc voltage levels shown on the block and schematic diagrams are provided in Figure 8-2.

## 8-7. TEST EQUIPMENT

8-8. Test instruments and accessories used to maintain the spectrum analyzer are listed in Table 1-4. If the listed instrument is not available, another instrument that meets the required minimums specifications may be substituted.

## 8-9. TROUBLESHOOTING

### 8-10. General

8-11. Troubleshooting to the assembly level is accomplished by referring to the overall and troubleshooting block diagrams, and by checking for the voltages given for the various system test points. Once the problem is isolated to a particular assembly, the circuit description and schematic diagram for the suspect assembly are used to locate the faulty component.

8-12. Before pursuing any troubleshooting in the spectrum analyzer, you should first make sure the problem is not in the display mainframe, or is not caused by a faulty connection between the spectrum analyzer and the display mainframe.

### 8-13. Troubleshooting Hints

**NOTE**

**When a part is replaced, an adjustment of the affected circuitry is usually required. For adjustment procedures, refer to Section V.**

**8-14. Residual FM**. The troubleshooting procedure provided in Table 8-2 can usually isolate the cause of residual FM to a particular circuit or circuit component. Figure 8-3 shows how certain components affect FM in these procedures. Note that the zener diode causes peaks which are sharp and extreme compared to the IC peaks. A leaky

*Table 8-1. Service Information Index (1 of 2)*

| Subject | Location |
|---|---|
| General Troubleshooting | Paragraph 8-10 |
| Troubleshooting Hints | |
| Residual FM | Paragraph 8-14 |
| Sideband Noise | Paragraph 8-15 |
| Spurious Responses | Paragraph 8-16 |
| Baseline Step | Paragraph 8-17 |
| Troubleshooting Block Diagram | Figure 8-6 |
| General Principles of Operation | Paragraph 8-18 |
| Simplified Block Diagram | Figure 8-5 |
| DPM Driver Assembly A1A2 | |
| Schematic (includes display) | Figure 8-11 |
| Component Locations | Figure 8-10 |
| Circuit Description | Precedes Figure 8-1 |
| Front Switch Assembly A2 | |
| Schematic | Figure 8-13 |
| Board Assembly A2A1 Component Locations | Figure 8-12 |
| Disassembly and Repair Procedures | Follows Figure 8-47 |
| Input Attenuator Assembly A3 | Figure 8-14 |
| Schematic | Figure 8-18 |
| Description | Precedes Figure 8-18 |
| First Converter Assembly A4 | |
| Schematic | Figure 8-18 |
| Component Locations | Figure 8-16 |
| Circuit Description | Precedes Figure 8-18 |
| Second Converter Assembly A5 | |
| Schematic | Figure 8-18 |
| Component Locations | Figure 8-17 |
| Circuit Description | Precedes Figure 8-18 |
| Frequency Control Assembly A7 | |
| Schematic | Figure 8-20 |
| Component Locations | Figure 8-19 |
| Circuit Description | Precedes Figure 8-20 |
| Sweep Generator Assembly A8 | |
| Schematic | Figure 8-23 |
| Component Locations | Figure 8-22 |
| Circuit Description | Precedes Figure 8-23 |
| Third Converter Assembly A9 | |
| Schematic | Figure 8-26 |
| Component Locations | Figure 8-25 |
| Circuit Description | Precedes Figure 8-26 |

*Table 8-1. Service Information Index (2 of 2)*

| Subject | Location |
|---|---|
| Second IF Assembly A10 | |
| Schematic | Figure 8-26 |
| Component Locations | Figure 8-25 |
| Circuit Description | Follows Figure 8-23 |
| Bandwidth Filter No. 1 Assembly A11 | |
| Schematic | Figure 8-30 |
| Component Locations | Figure 8-29 |
| Circuit Description | Precedes Figure 8-30 |
| Step Gain Assembly A12 | |
| Schematic | Figure 8-33 |
| Component Locations | Figure 8-32 |
| Circuit Description | Precedes Figure 8-33 |
| Bandwidth Filter No. 2 Assembly A13 | |
| Schematic | Figure 8-35 |
| Component Locations | Figure 8-34 |
| Circuit Description | Precedes Figure 8-35 |
| Log Amplifier Assembly A14 | |
| Schematic | Figure 8-38 |
| Component Locations | Figure 8-37 |
| Circuit Description | Precedes Figure 8-38 |
| Vertical Driver and Blanking Assembly A15 | |
| Schematic | Figure 8-42 |
| Component Locations | Figure 8-41 |
| Circuit Description | Precedes Figure 8-42 |
| Motherboard Assembly A16 | |
| Schematic | Figure 8-44 |
| Component Locations | Figure 8-43 |
| Inverter Assembly A17 | |
| Schematic | Figure 8-46 |
| Component Locations | Figure 8-45 |
| Circuit Description | Precedes Figure 8-46 |
| Major Assemblies, Location of | Figure 8-47 |

electrolytic capacitor (not shown) usually causes the displayed signal to step down and remain at the same level for several divisions before stepping up to a new level.

**8-15. Sideband Noise**. Sideband noise is usually caused by YIG Oscillator Assembly A6.

**8-16. Spurious Responses**. Spurious responses are usually caused by loose RF connections. Check all the RF connections.

**8-17. Baseline Step**. If the left side of the baseline lifts to the signal peak level, the trouble is A7Q17; a lift of the right side of the baseline is caused by A7Q18 (see Figure 8-4).

**8-18. GENERAL PRINCIPLES OF OPERATION**

8-19. A simplified block diagram of the HP 8558B Spectrum Analyzer is shown in Figure 8-5. The HP 8558B is basically a superheterodyne receiver with a YIG (Yttrium-Iron-Garnet) tuned oscillator for the first LO (local oscillator). The first LO is the only LO that is swept. The sweep width is determined by the sweep attenuator (part of A8) which attenuates the ramp driving the LO. This ramp is produced by the sweep generator on A8. The ramp also drives the horizontal sweep of the CRT, and is available at a rear panel BNC connector to synchronize other instruments, such as X-Y recorders, with the analyzer.

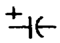
8-20. The RF input to the spectrum analyzer passes through an attenuator network on assembly A3 which is controlled by the front panel INPUT ATTEN dB control. This control is used to set the input signal level as required for a wide dynamic range. From the attenuator, the signal goes to first converter assembly A4. Here it is mixed with a 2050 to 3550 MHz output from YIG oscillator assembly A6. The lower sideband, 2050 MHz, of the resulting signal is passed by a 2050 MHz IF amplifier immediately following the first converter circuit. It then enters second converter assembly A5 where it is mixed with a fixed 1748.6 MHz signal from a fixed-cavity local oscillator. This produces a 301.4 MHz IF signal which is amplified and fed to third converter assembly A9. This time, the signal is mixed with a 280 MHz signal from a SAWR (surface acoustic wave resonator) oscillator, resulting in a 21.4 MHz IF signal. The final 21.4 MHz signal is amplified and detected, then filtered by low pass video filter A2 before it is applied to the vertical deflection amplifier of the CRT. The vertical deflection seen on the CRT corresponds to the RF input signal amplitude. The 280 MHz signal from the SAWR oscillator is fed out of the front panel for use as a -30 dBm calibration reference.

8-21. Circuit descriptions for each assembly precede the assembly schematic diagram.

## SYMBOLS USED IN SCHEMATICS AND BLOCK DIAGRAMS

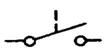
### BASIC COMPONENT SYMBOLS


Variable Resistor: Clockwise rotation of shaft moves wiper towards end of resistor marked CW.



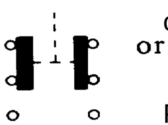
Electrolytic capacitor

Variable capacitor

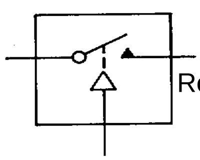


Slide, toggle, or rocker switch

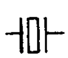
Ferrite bead (prevents high frequency parasitic oscillations)



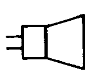

Pushbutton switch



Relay



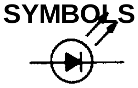
Crystal



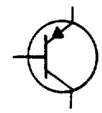
Speaker

Breakdown (zener) diode

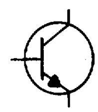
Schottky diode



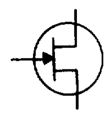
Light-emitting diode



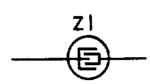
Transistor, PNP



Transistor, NPN



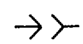
MOS-FET, N-Channel



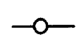

Surface Acoustic Wave Resonator (SAWR)

Indicates a factory-select component

Indicates shielding conductor for cables



Indicates a plug-in connection



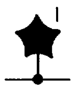
Indicates a soldered or mechanical connection

Indicates a single pin of a PC board edge connector

*Figure 8-1. Symbols Used in Schematics and Block Diagrams (1 of 4)*

## SYMBOLS USED IN SCHEMATICS AND BLOCK DIAGRAMS

### BASIC COMPONENT SYMBOLS

| | | | |
|---|---|---|---|
|  | Connection symbol indicating a Jack (except for PC board edge connectors) |  | Indicates wire or cable color code. Color code same as resistor color code. First number indicates base color, second and third numbers indicate colored stripes. |
|  | Connection symbol indicating a Plug (except for PC board edge connectors) |  | Earth ground |
|  | Test Point: Terminal provided for test probe. |  | Instrument chassis ground. May be accompanied by a number or letter to specify a particular ground. |
|  | Measurement Point: Used to indicate a convenient point for measurement. No terminal provided for test probe. |  | Screwdriver adjustment |
| | |  | Front-panel control |

### COMMONLY USED ASSEMBLY AND CIRCUIT SYMBOLS

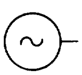
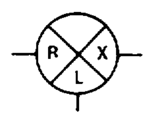
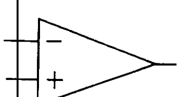
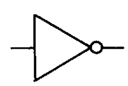
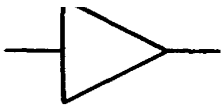
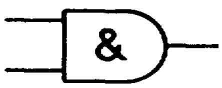
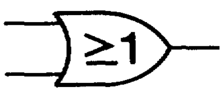
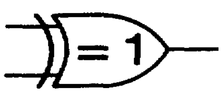
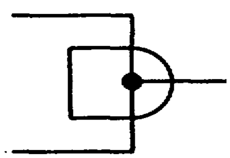
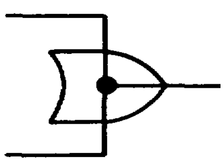
| | | | |
|---|---|---|---|
|  | Oscillator |  | Mixer |
|  | Operational amplifier |  | Inverter, buffer |

*Figure 8-1. Symbols Used in Schematics and Block Diagrams (2 of 4)*

## SYMBOLS USED IN SCHEMATIC AND BLOCK DIAGRAMS

### BASIC LOGIC SYMBOLS

Distinctive-Shape Symbols

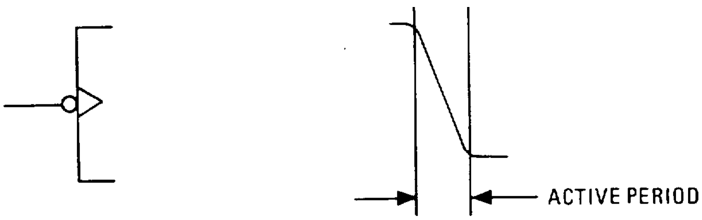
| | | |
|---|---|---|
|  | AMPLIFIER/BUFFER | Output is active when input is active. |
|  | AND FUNCTION | Output is active only when all inputs are active. |
|  | OR FUNCTION | Output is active when one or more inputs are active. |
|  | EXCLUSIVE-OR FUNCTION | Output is active when only one input is active. |
|  | WIRED AND FUNCTION | Two or more elements are joined together to achieve the effect of an AND function. |
|  | WIRED OR FUNCTION | Two or more elements are joined together to achieve the effect of an OR function. |

*jure 8-1. Symbols Used in Schematics and Block Diagrams (3 of 4)*

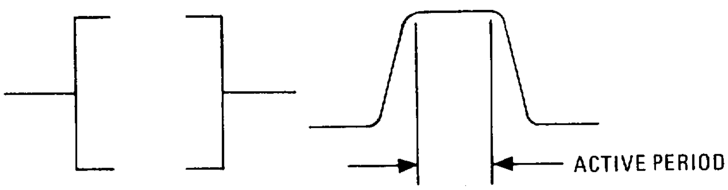
**SYMBOLS USED IN SCHEMATIC AND BLOCK DIAGRAMS**

**BASIC LOGIC SYMBOLS**

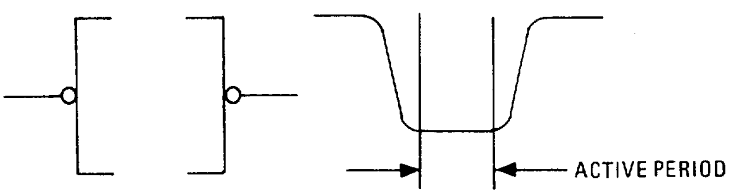
Indicator Symbols (positive logic assumed)



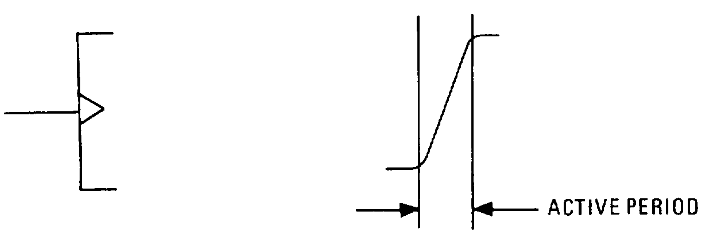

Input is active only on the negative-going transition.




ACTIVE-HIGH inputs and outputs are indicated by the absence of the negation symbol, O.



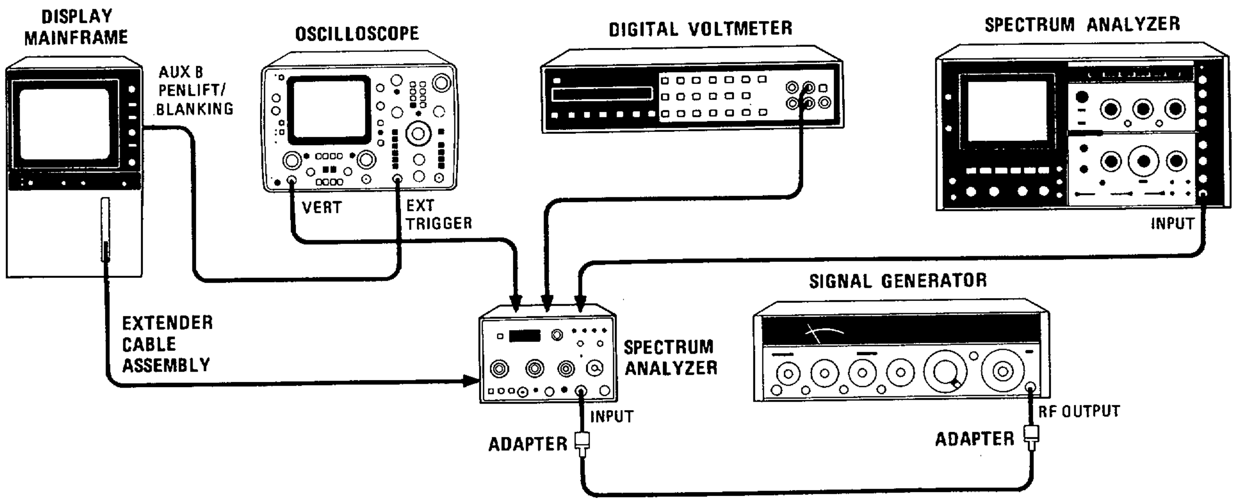

ACTIVE-LOW inputs and outputs are indicated by the presence of the negation symbol, O.




EDGE-TRIGGERED (dynamic) inputs are indicated by the presence of the dynamic input symbol.
Input is active only on the positive-going transition.

*Figure 8-1. Symbols Used in Schematics and Block Diagrams (4 of 4)*

Nominal power levels, voltages, and waveforms shown on schematic diagrams were measured using the test setup shown below. Note that signal characteristics shown on schematic diagrams are provided as a troubleshooting aid only. They should not be used for making instrument adjustments.




EQUIPMENT:

| | |
|---|---|
| Oscilloscope(with 10:1 probe) | HP 1741A |
| Spectrum Analyzer | HP 141T/8552B/8555A |
| Digital Voltmeter | HP 3455A |
| Signal Generator | HP 8640B |
| Extender Cable Assembly | HP 5060-0303 |
| Adapter, Type N to BNC (2 required) | HP 1250-0780 |

*Figure 8-2. Conditions for Schematic Diagram Measurements (1 of 2)*

PROCEDURE:

1. Set HP 8558B Spectrum Analyzer controls as follows:

| | |
|---|---|
| START-CENTER | CENTER |
| TUNING | 280 MHz |
| FREQ SPAN/DIV | 1 MHz |
| RESOLUTION BW | 300 kHz |
| INPUT ATTEN | 0 dB |
| REFERENCE LEVEL | -10 dBm |
| *Option 002: +40 dBm V* | |
| REFERENCE LEVEL FINE | 0 |
| Amplitude Scale | 10 dB/DIV |
| SWEEP TIME/DIV | AUTO |
| SWEEP TRIGGER | FREE RUN |
| VIDEO FILTER | OFF |
| BASELINE CLIPPER | OFF |
| BL CLIP | OFF |

2. Connect equipment as shown. Set signal generator for a 280 MHz, -10 dBm output signal. Center the signal on the display.

3. Using board extenders when necessary, check voltages and waveforms indicated on schematic diagrams. Trigger oscilloscope on negative transition of AUX B PENLIFT/BLANKING signal from rear of display mainframe.

4. To measure RF power levels, set RESOLUTION BW control to 3 MHz and FREQ SPAN/DIV to 0 (zero span). The first LO is not swept in zero span, allowing signal levels to be checked with a second spectrum analyzer (use adapter cables as necessary). DO NOT use a power meter (harmonics and LO signals will contribute to give erroneous levels).

*Figure 8-2. Conditions for Schematic Diagram Measurements (2 of 2)*

*Table 8-2. Residual FM Troubleshooting Procedure (1 of 2)*

| Troubleshooting Step | Probable FM Source |
|---|---|
| 1. Set 8558B controls as follows:<br>INPUT ATTEN....................................0 dB<br>REF LEVEL...........................................-20<br>*(Option 002: +30 dBm V)*<br>FREQ SPAN/DIV..............................2 MHz<br>RESOLUTION BW ...........................1 MHz<br>SWEEP TIME/DIV............................AUTO<br>SWEEP TRIGGER....................FREE RUN<br>AMPLITUDE SCALE............................LIN<br>VIDEO FILTER...................................OFF | |
| 2. Tune LO feedthrough to the left edge of CRT display and make sure a double lobe (Figure 8-3d) does not occur. | Main Coil Filter A7Q4 and associated circuitry. |
| 3. Connect CAL OUTPUT to spectrum analyzer input. Center 280 MHz signal on CRT and adjust REF LEVEL FINE for a top-of-screen signal. | |
| 4. Step FREQ SPAN/DIV from 2 MHz to 1 MHz. Frequency shift should be less than one major division. | Main Coil Filter A7Q4 and associated circuitry. |
| 5. Use FREQUENCY CAL pushbutton to remove YIG hysteresis, then center 280 MHz signal on CRT. Repeated operations should shift signal less than one major division. | Calibrate single shot A7Q21-23. Proceed to step 11. |
| 6. Second LO frequency should be stable and not vary more than 200 kHz (check at A5J3). | ASCR1 or A5Q1 |
| 7. Check the voltages at A7TP6 and A7TP7 for correct level and stability.<br>A7TP6 ≈ +6V<br>A7TP7 ≈ +14.5V | <br><br>A7VR2<br>A7VR1 |
| 8. Select a 10 kHz RESOLUTION BW and tune the spectrum analyzer so the 280 MHz signal skirt crosses the center frequency graticule line between the fourth and seventh horizontal graticule lines. Switch to zero (0) span and select a .1 SEC/DIV sweep time. Peak-to-peak variations of the trace should not exceed one major vertical division for each major horizontal division. | |
| 9. Try FM check (step 8) with TUNING potentiometer in several different positions. (Tune slightly off frequency with COARSE TUNING control and adjust FINE TUNING control for proper display.) | TUNING potentiometer |

*Table 8-2. Residual FM Troubleshooting Procedure (2 of 2)*

| Troubleshooting Step | Probable FM Source |
|---|---|
| 10. Disconnect one end of A7C13 and repeat step 8. Reconnect A7C13, disconnect one end of A7C4, and again repeat step 8. | A7C13 or A7C14 |
| 11. Remove A7CR2 and A7Q22. If FM is still present, remove A7Q21 and A7Q23. | Calibrate single shot circuit on Frequency Control Assy A7. |
| 12. Remove A7R55 and repeat step 8. | YIG FM coil driver circuit on Frequency Control Assy A7. Probably A7U1. |
| 13. Disconnect one end of A7VR3 or A7CR9 and repeat step 8. | A7VR3 or A7CR9 |
| 14. Ground A7TP1 and repeat step 8. | YIG main coil gate on Frequency Control Assy A7. |
| 15. If residual FM is still present, the problem is in the YIG main coil drivers on Frequency Control Assembly A7. Refer to the Frequency Control Assembly schematic diagram for further troubleshooting. | |

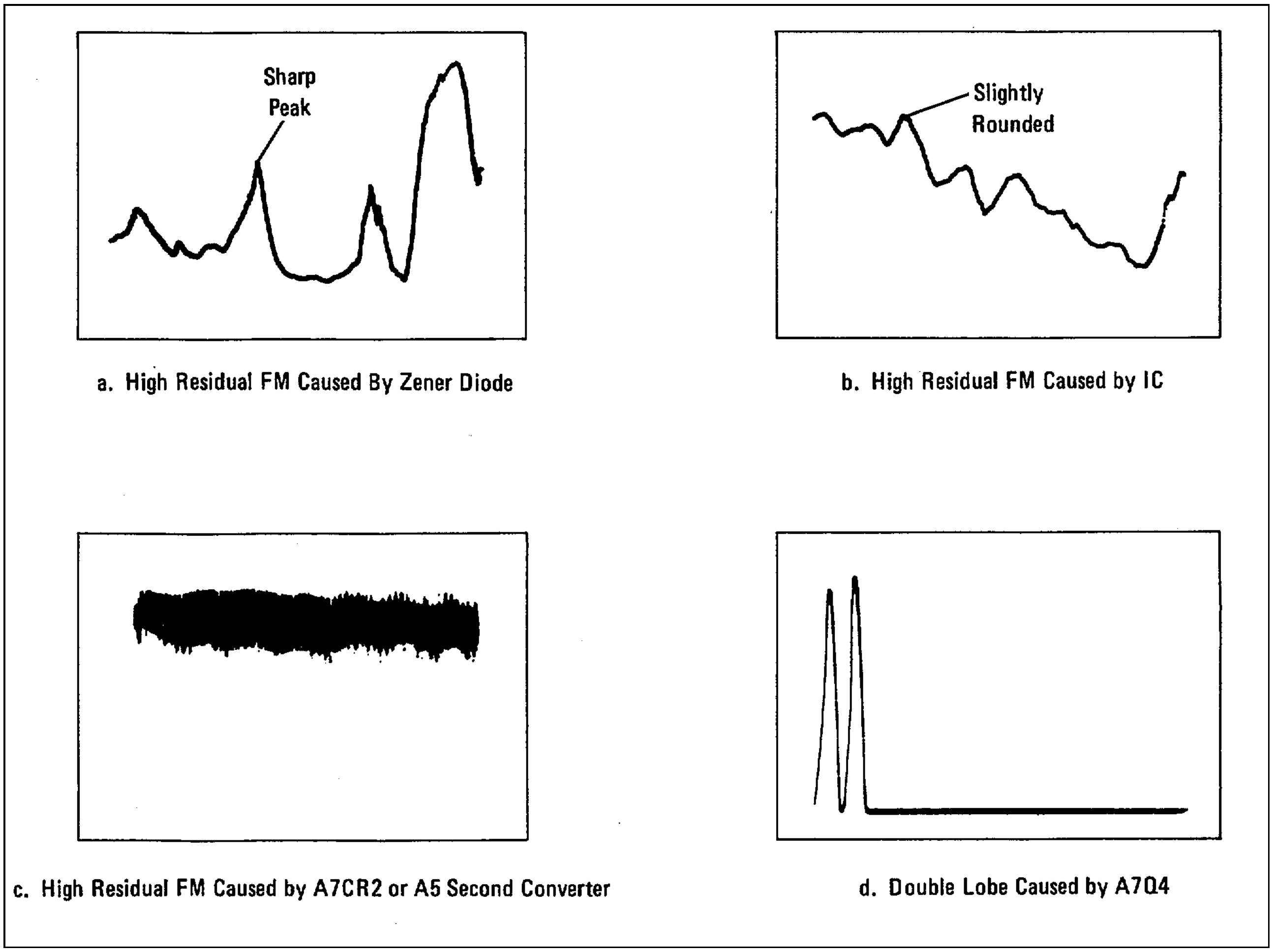



*Figure 8-3. CRT Displays for Residual FM Troubleshooting*

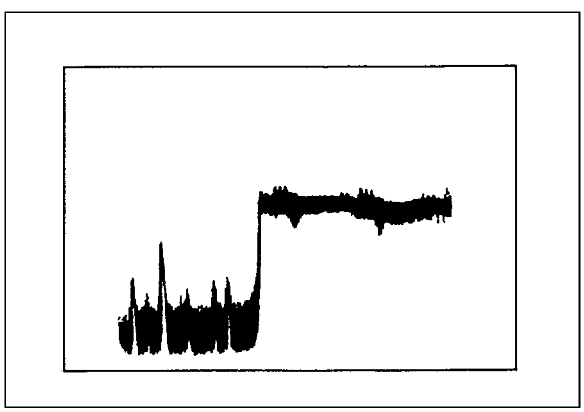


*Figure 8-4. Baseline Step Caused by Failure of A7Q18*

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PAGES
8-15 through 8-18

## A1A2 DPM DRIVER ASSEMBLY CIRCUIT DESCRIPTION

The DPM circuit is a dc voltmeter that measures a tuning voltage from Frequency Control Assembly A7, and converts it to a front-panel frequency readout.

The DPM Driver is divided into three parts:

1. The Analog-to-Digital Converter.

2. The Segment Driver.

3. The Digit Driver.

### Analog-to-Digital Converter

The Analog-to-Digital converter comprises an MOS LSI device, A1A2U1, and associated circuitry. A1A2U1 compares the input voltage (MTR V) on pin 3 with a reference voltage (V REF) on pin 2 and outputs the measured voltage in a binary-coded decimal (BCD) format. The BCD data is multiplexed out of A1A2U1, one decimal digit (four bits) at a time on pins 20 through 23. DS1 through DS4 (pins 16 through 19) are the enable lines for A2DS1 (MSD) through A2DS4 (LSD). A1A2R2, A1A2R3, and A1A2R4 form an adjustable voltage divider which divides the 6.2 volts from A16VRI down to approximately 2.0V for the reference voltage (V REF) at pin 2 of A1A2U1.

### Segment Drive

AIA2U3 converts the BCD data to seven-segment data for the displays and provides a test function which lights all the segments of all the displays when pin 3 (TP2) is jumpered to ground. A1A2Q3 switches the decimal point LED on for frequencies below 198.6 MHz. (The voltage, MTR V, is multiplied by 10 on the Frequency Control Assembly.) A1A2Q4 allows the 'g' segment line of A2DS1 to go high when the input voltage (MTR V) is less than zero. This causes a minus sign (-) to be displayed.

### Digit Driver

The digits are enabled one at a time, sequentially through digit driver A1A2U2. Each digit display is in turn enabled for 300 microseconds until a 250 millisecond period has passed. This is the length of time A1A2U1 requires to make a new voltage measurement. After 250 milliseconds, the new data is put out on pins 20 through 23 of A1A2U1 and the cycle repeats. (See Figures 8-8 and 8-9.)

### Display

The digit displays, A2DS1 through A2DS4, are of the common-cathode type. When the digit enable line (cathode) is low and a segment line is high, that segment is turned on. Although only one digit display is enabled at a time, the enable rate is fast enough to prevent visible display flicker.

### Troubleshooting

To check the digit displays, jumper A1A2TP2 (LT) to ground. All segments of all four numeric displays (A2DS1 through A2DS4) should light. To troubleshoot DPM Driver A1A2, check for proper clock and outputs at A1A2U1 (see Figures 8-7, 8-8, and 8-9 and Table 8-3).

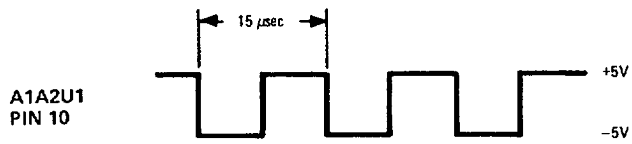



*Figure 8-7. A1A2U1 Clock*

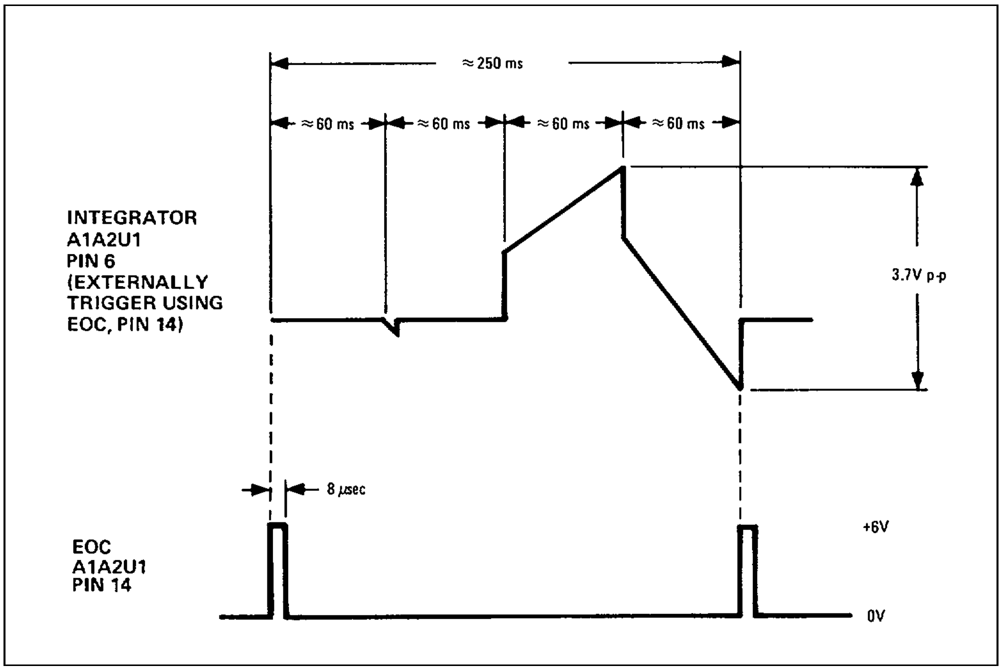
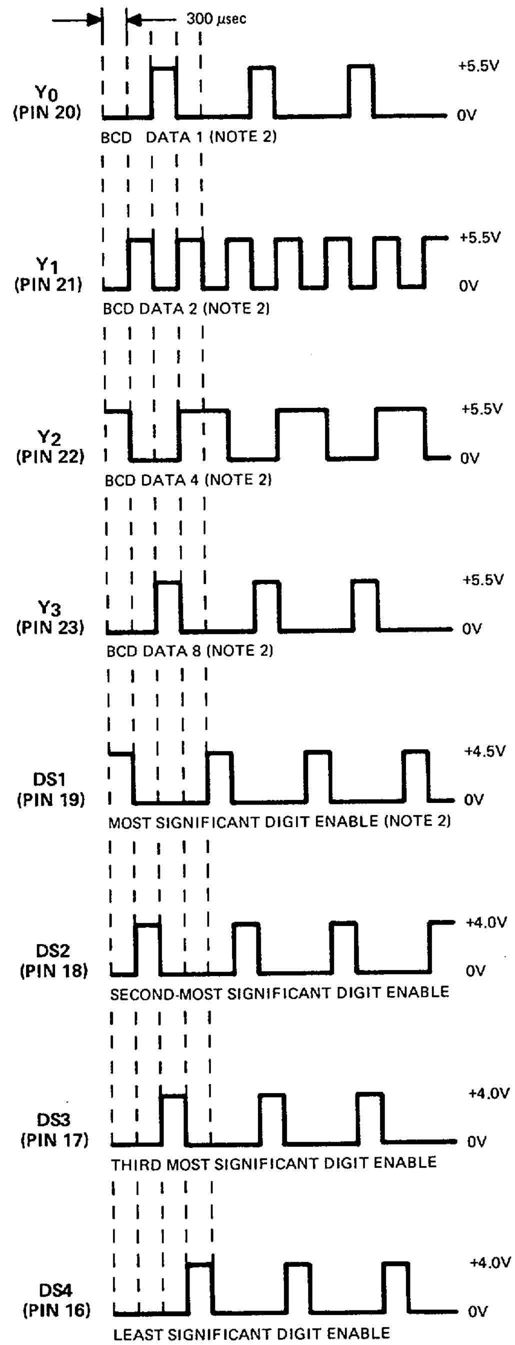



*Figure 8-8. Integrator and EOC Waveforms for FREQUENCY MHz Display of 1296 MHz*

*Table 8-3. Truth Table for A2DS1 Display*

| A1A2U1 Data Output | | | | Decimal Equivalent | A1A1DS1 Display |
|---|---|---|---|---|---|
| $Y_3$ | $Y_2$ | $Y_1$ | $Y^0$ | | |
| 0 | 0 | 0 | 0 | 0 | -1 |
| 0 | 0 | 1 | 1 | 3 | -1 |
| 0 | 1 | 0 | 0 | 4 | 1 |
| 0 | 1 | 1 | 1 | 7 | 1 |
| 1 | 0 | 1 | 0 | 10 | - |
| 1 | 0 | 1 | 1 | 11 | - |
| 1 | 1 | 1 | 0 | 14 | Blank |
| 1 | 1 | 1 | 1 | 15 | Blank |




**NOTES**

1. **TRIGGER OSCILLOSCOPE EXTERNALLY USING EOC {(END OF CONVERSION), A1A2U1 PIN 14.**

2. **DURING THE TIME INTERVAL THAT DS1 LINE IS HIGH,THE DATA ON PINS 20 THROUGH 23 IS NOT STANDARD BCD CODE. SEE TABLE 8-2.**

*Figure 8-9. A1A2U1 Outputs for FREQUENCY MHz Display of 1296 MHz*

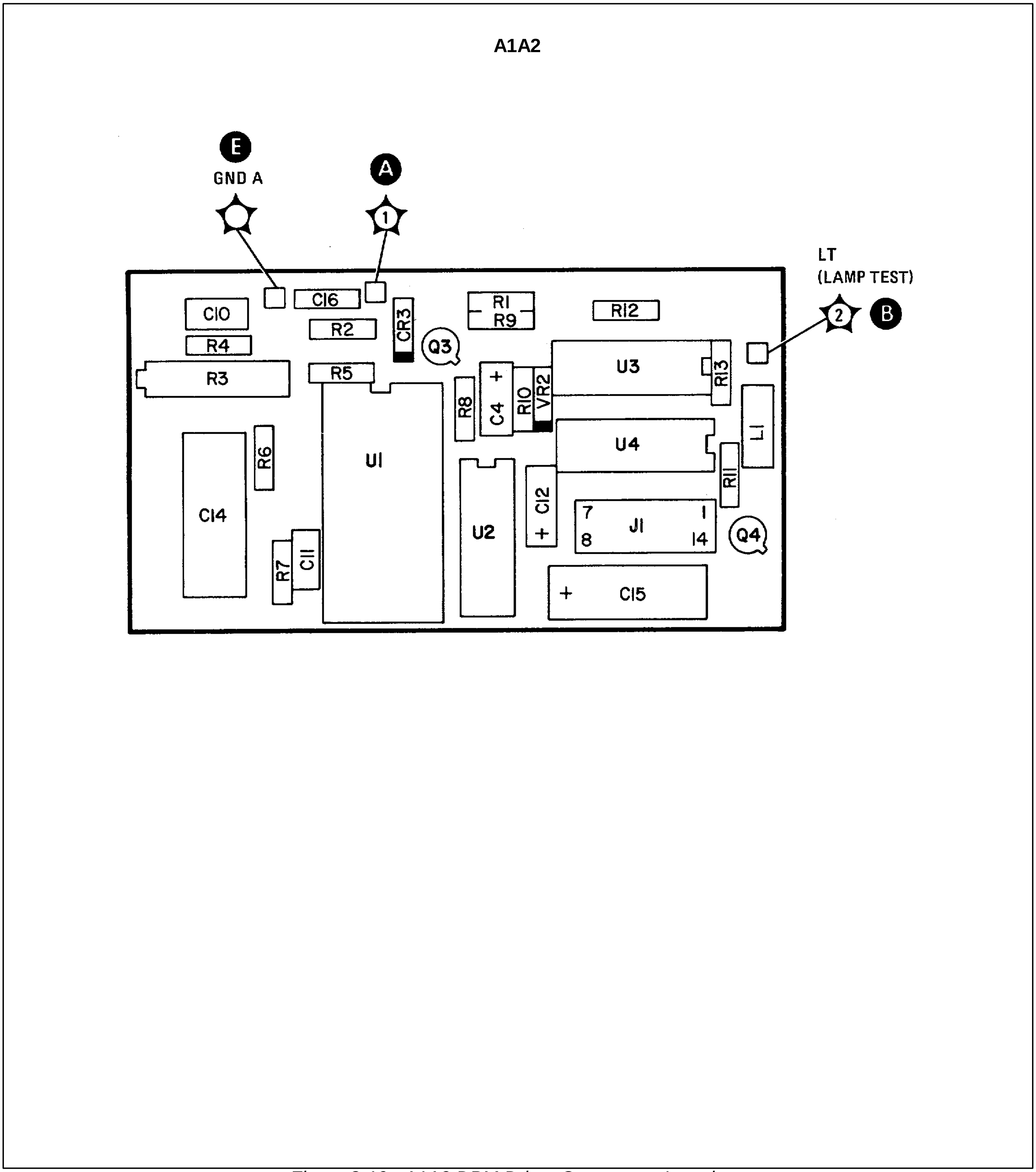



Figure 8-10. A1A2 DPM Driver Component Locations

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PAGES
8-23 through 8-24

## A2 FRONT SWITCH ASSEMBLY CIRCUIT DESCRIPTION

Functions of the switches and potentiometers on Front Switch Assembly A2 and Front Switch Board Assembly A2A1 are covered in the circuit descriptions for the electronic assemblies they control. Disassembly and repair procedures for the Front Switch Assembly are at the back of this section (following Figure 8-47).

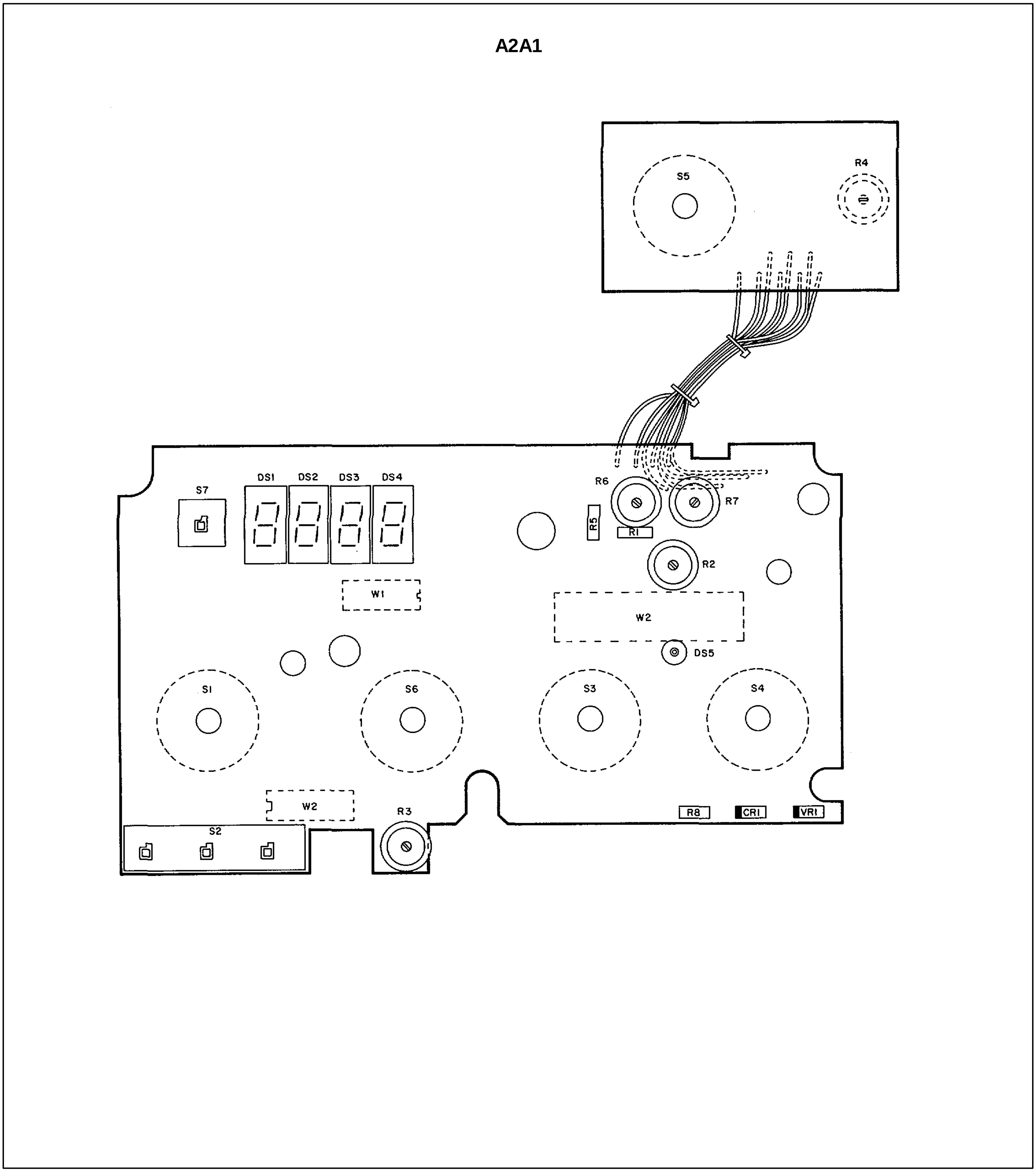


*Figure 8-12. Front Switch Board Assembly A2A1, Component Locations*

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PAGES
8-27 through 8-28

## A3, U1, A4, A5, A6 CIRCUIT DESCIPTIONS

### A3 Input Attenuator Circuit Description

The 8558B input attenuator (Figure 8-14) is a 50-ohm, precision, coaxial step attenuator. Attenuation in 10 dB steps from 0 dB to 70 dB is accomplished by switching the signal path through one or more of the three resistive pads in a predetermined sequence. (Note that the input attenuator is not field repairable.)

### U1, RF Input Limiter Circuit Description

The RF input limiter contains Schottky diodes which clamp the input signal voltage, protecting the mixer diodes in the First Converter Assembly A4. The typical limiting threshold is 1 mW (0 dBm). The limiter is not field serviceable.

### A4 First Converter Circuit Description

The RF signal input (0.1 1500 MHz) passes through a 1550 MHz low pass filter to the mixer diode assembly, U1. The output impedance of this low-pass filter seen from the mixer is effectively a short circuit at 2050 MHz, reflecting any IF power back to the mixer. The first LO input from YIG Oscillator Assembly A6 passes through a 3 dB power splitter consisting of two resistors, R1 and R2, and etched transmission lines. One of the power splitter outputs provides the front panel LO OUTPUT; the other output is through a balun (short piece of semi-rigid coaxial transmission line) to provide drive voltage to the mixer diodes. The LO signal is coupled to one mixer diode through the balun shield and to the other mixer diode through the balun center conductor. This arrangement splits the LO signal voltage evenly between the two mixer diodes. The 2050 MHz output signal from the mixer (first IF) is split-line coupled to a 6 dB 'pi' resistive matching pad (R3, R4, and R5). A small block of polyiron is placed over the split-output line. The polyiron helps balance the mixer and absorbs harmonics of the mixing signals. A 5000 MHz low-pass filter etched on the A4 printed circuit board provides additional filtering to the 2050 MHz IF signal after the 6 dB pad. The signal is then coupled to Second Converter Assembly A5 through a semi-rigid coaxial cable.

### A5 Second Converter Circuit Description

The IF signal from the First Converter is coupled into the Second Converter bandpass filter through coupling loop L3. The bandpass filter consists of three circular, slug-tuned cavity resonators operating as less than a quarter wavelength inductive transmission lines. The cavities provide high 'Q' for good selectivity at 2050 MHz. Coupling loops L4 and L5 provide coupling between the cavities. The 2050 MHz signal is loop coupled to the cathode end of second mixer diode CR1. The second LO signal is loop coupled to the anode end of CR1. The second local oscillator is a Colpitts type circuit operating at 1748.6 MHz. The capacitive 'fingers' etched on the A5A1 printed circuit board and the internal transistor capacitances of A5A1Ql provide the positive feedback necessary to sustain oscillation. The oscillator tank circuit is a slug-tuned cavity, Z4. The signal from the second LO is coupled into cavity Z4 by a 4 - 40 machine screw extending down into the cavity. The second LO output is also available at test jack A5J3. The 1748.6 MHz local oscillator provides the drive for mixer diode CR1. The difference frequency between the first IF, 2050 MHz, and the second LO frequency, 1748.6 MHz, is 301.4 MHz. This 301.4 MHz signal is coupled through the matching filter to the A10 Second IF. The matching filter is a passive network designed to match the relatively high impedance of the second mixer, about 200 ohms, to the low input impedance of the second IF, about 50 ohms. The match may be optimized by adjusting A5L2, 2nd MIXER MATCH adjustment.

### A6 YIG Oscillator Circuit Description

The YIG Oscillator is a transistorized thin-film microcircuit. It uses an yttrium-iron-garnet (YIG) sphere as the frequency determining structure. The YIG sphere is a ferromagnetic material whose resonant frequency is directly proportional to the applied magnetic field. The sphere is placed in the gap of an electromagnet to provide a magnetic tuning structure whose field (and thereby the oscillator's frequency) is linearly proportional to the drive current from Frequency Control Assembly A7.

The main coil is used for wide range sweeping and tuning with the coil current varying from approximately 50 to 8 mA. The FM coil is used only for narrow spans (1 MHz/DIV and less) with the coil current varying from approximately - 25 mA to + 25 mA.

The YIG Oscillator Assembly consists of three parts: a sealed magnet assembly which encloses the YIG sphere and oscillator; a bias board which uses discrete components to establish oscillator/amplifier bias and to protect against supply noise and voltage overloads; and a mu-metal magnetic shielding can.

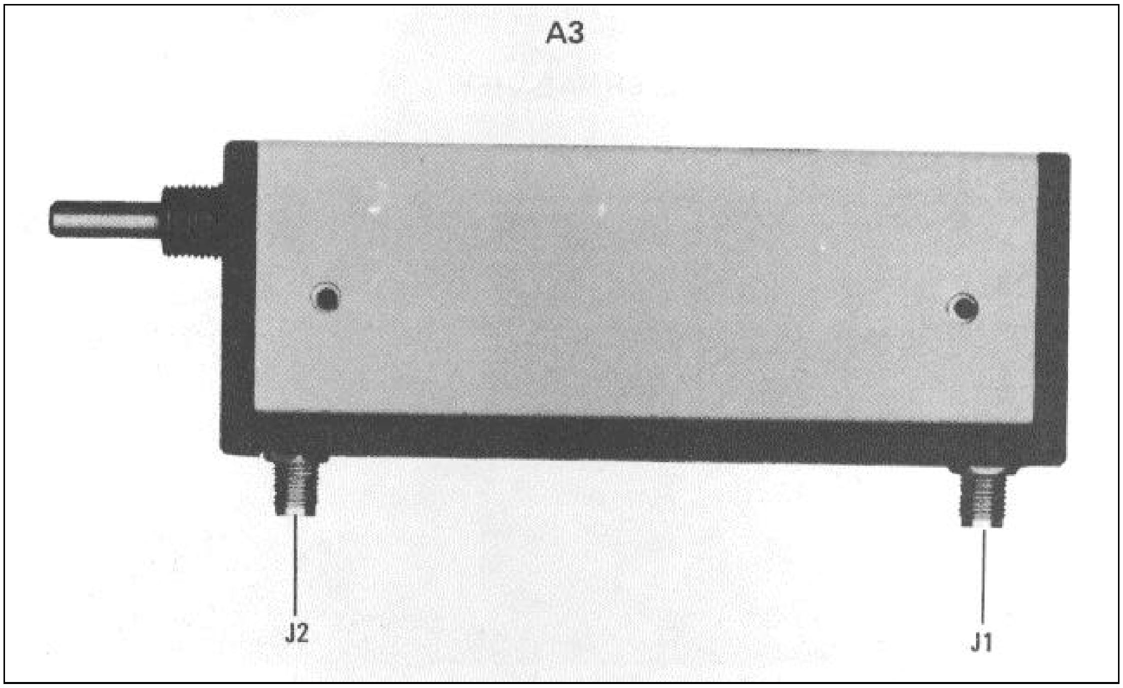


*Figure 8-14. A3 Input Attenuator*

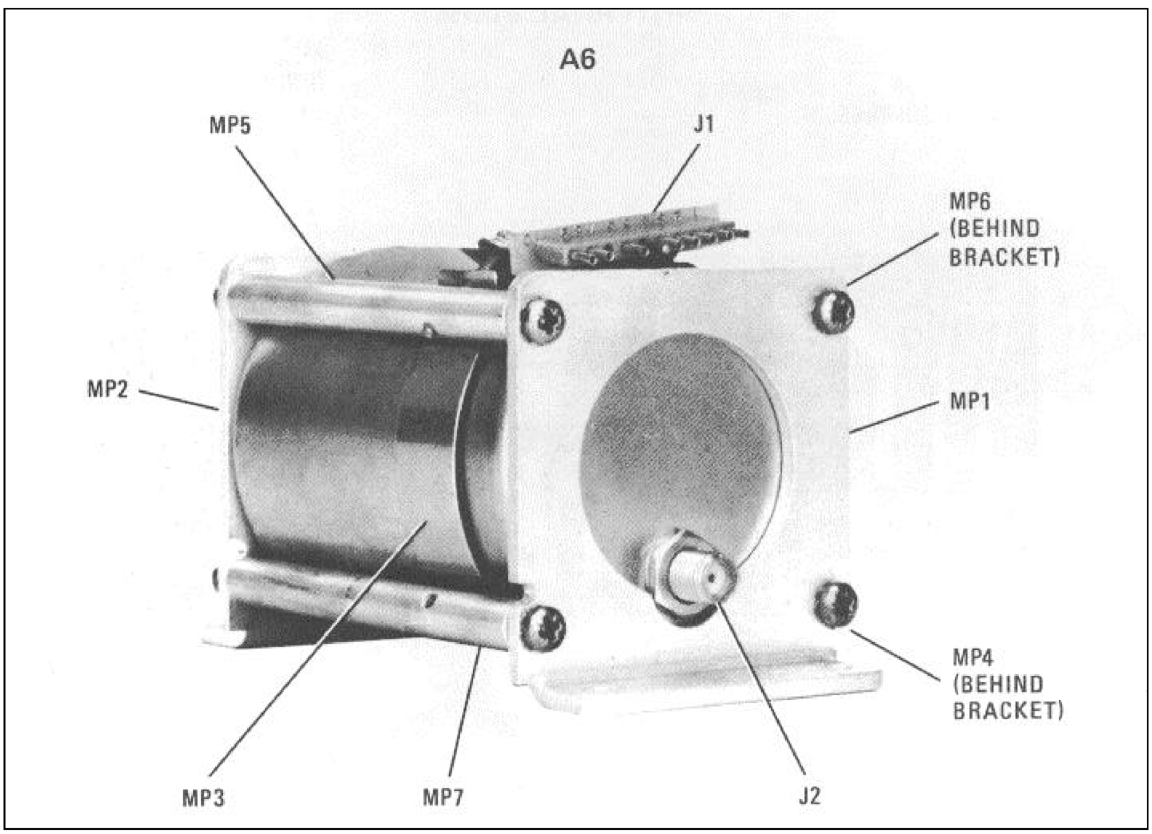


*Figure 8-15. A 6 YIG Oscillator*

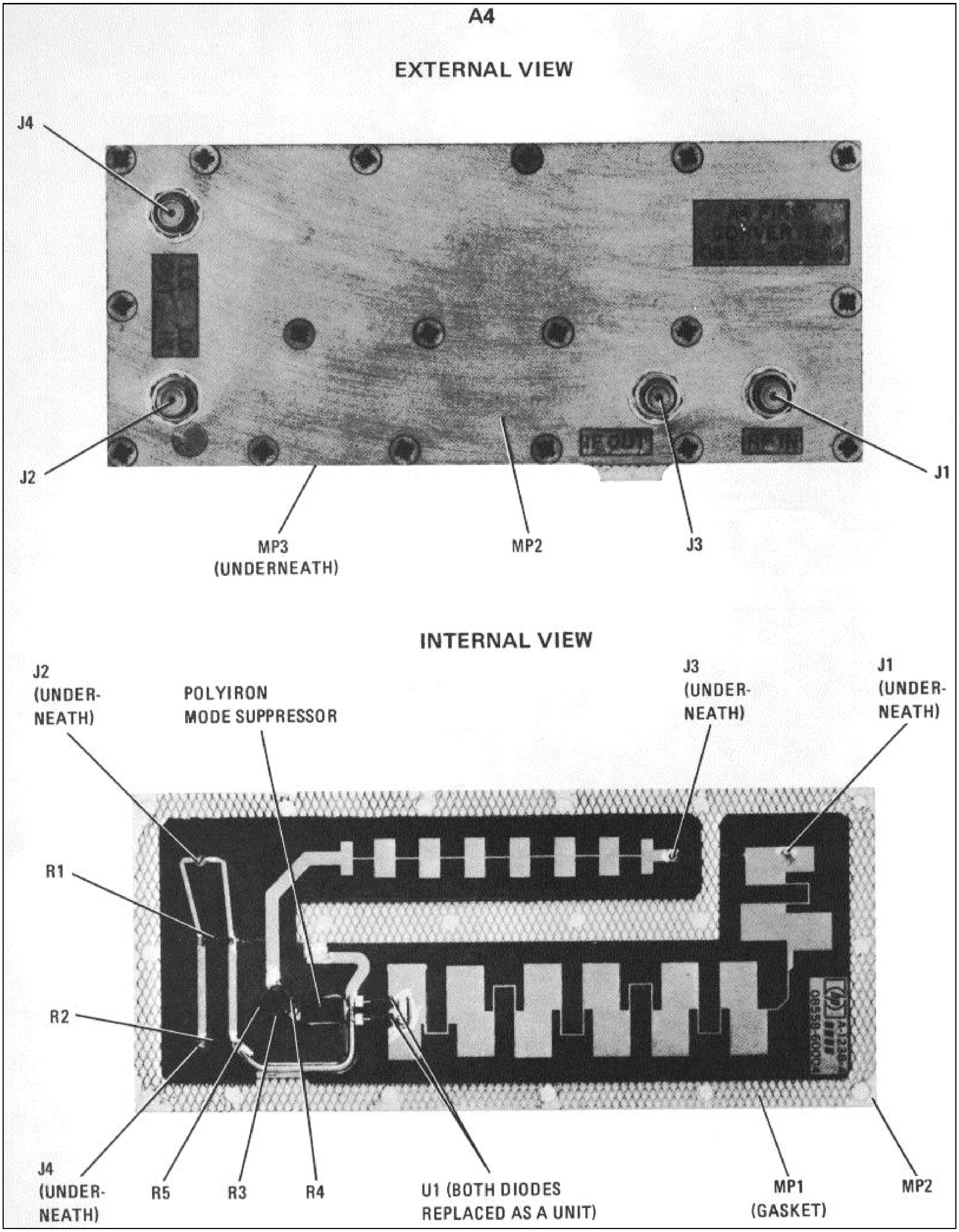


*Figure 8-16. A4 First Converter, Component Locations*

A5

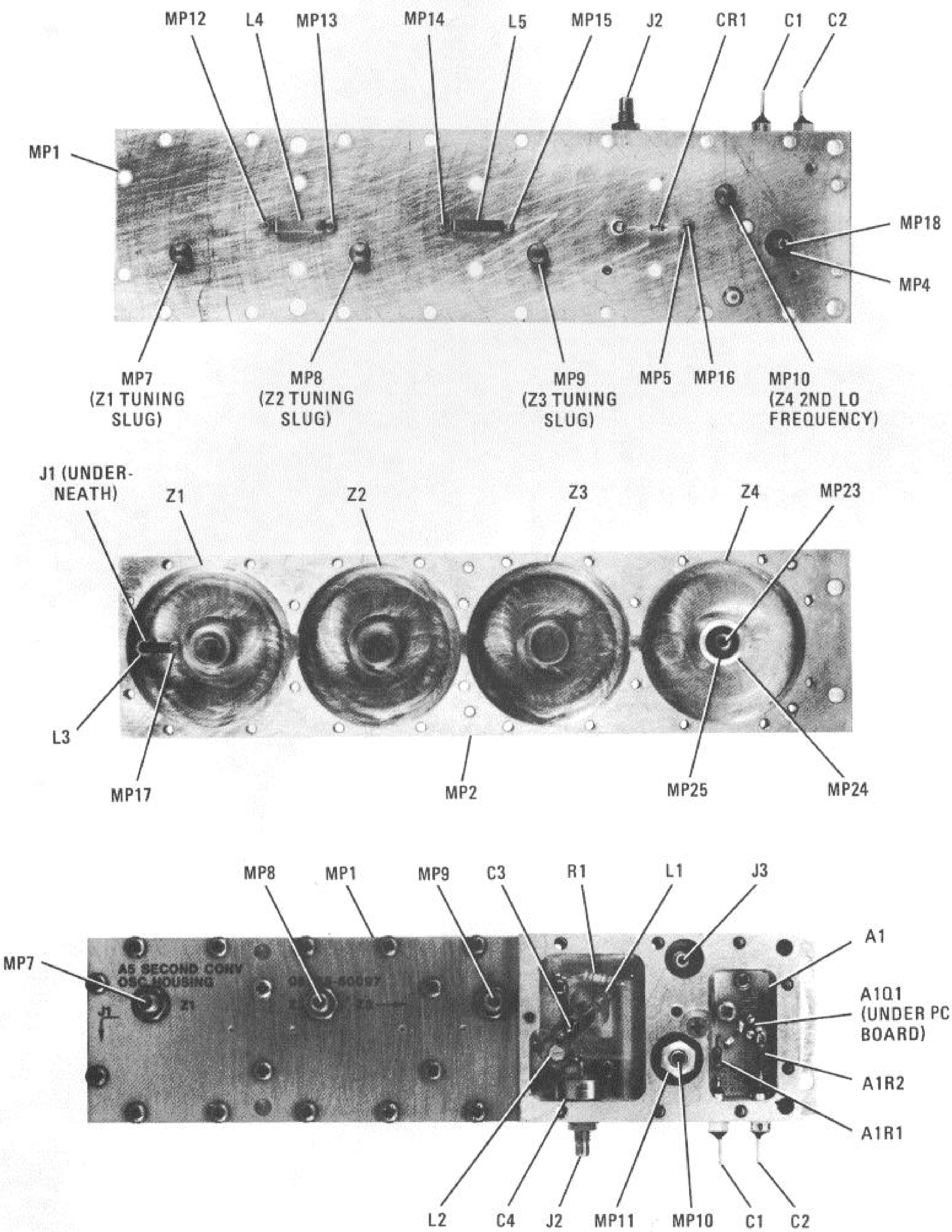


*Figure 8-17. A5 Second Converter Assembly, Component Locations*

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PAGES
8-35 through 8-36

## A7 FREQUENCY CONTROL CIRCUIT DESCRIPTION

### General Description

Frequency Control Assembly A7 contains the circuitry to drive and control YIG Oscillator Assembly A6. The frequency is controlled by the sum of the sweep and tune voltages. The tune voltage is generated by the center frequency coarse and fine TUNING controls. The tune voltage is measured by the digital panel meter (DPM) voltmeter to provide the center-frequency digital readout. The sweep voltage, controlled by the FREQ SPAN/DIV switch, is generated in Sweep Generator Assembly A8. The YIG Oscillator has two driving coils: the main tuning coil and the FM coil. The tune voltage is applied to the main tuning coil driver. The sweep voltage is either summed with the tune voltage and applied to the main tuning coil driver or, in narrow frequency spans, it is applied to the FM coil driver. Gating circuits determine whether the sweep voltage is applied to the main or FM coil. The Frequency Control Assembly also contains separate low-noise voltage regulators to bias the YIG Oscillator and the 1748.6 MHz second local oscillator.

### YIG Main Coil Fixed Driver

The YIG Main Coil Fixed Driver consists of differential amplifier A7Q7, a Darlington pair current source, A7Q5 and Q6, and a + 6V reference voltage from A7VR2 and R4. The fixed driver is used to tune the YIG oscillator to the minimum frequency of 2050 MHz.

The + 6V reference voltage is one input to A7Q7 and the other input, measured at TP3, is negative feedback that senses the voltage across A7R3 and R71. The operation of the fixed coil driver maintains a constant +6.OV across A7R3 and R71. A11 current through R3/R71 comes from the YIG main coil through Darlington current source A7Q5 and Q6. A7R3 is the 2.05 GHz lower frequency adjustment and sets the emitter current of A7Q5 and Q6. The current source provides the fixed current to determine the zero CENTER FREQUENCY point set by A7R3.

### YIG Main Coil Swept Driver

The YIG Main Coil Swept Driver consists of a swept driver, A7U4, and a Darlington pair current source, A7Q1 and Q3. The swept driver tunes the YIG oscillator over the frequency range of 2050 MHz to 3550 MHz. The inputs to A7U4 are the Coarse and Fine TUNING voltage from the Tune Summing Amplifier, and the attenuated sweep ramp from the Sweep Buffer. The output from A7U3 is the attenuated sweep only when 2 MHz/DIV or wider frequency spans have been selected. In narrower frequency spans, only the sum of the TUNING voltages is applied to the main coil swept driver. The attenuated sweep and TUNING voltages are summed across A7R49 and R52 and then applied to the noninverting input of A7U4. Diode A7CR3 prevents the input of the swept driver from going negative and driving it into cutoff. A7U4 drives the current source which converts the voltage at the emitter of Q1 into current to drive the YIG main tuning coil.

The current from A7Q1/Q3 is summed with the current from the fixed driver current source, A7Q5/Q6, to increase the main coil current synchronously with the TUNING and sweep voltages. The YIG upper frequency 3.55 GHz is set by A7R1 (coarse adjust) and A7R2 (fine adjust). The emitter of A7Q1 is connected to the inverting input of A7U4 to provide a voltage proportional to the collector current of Q1/Q3 to be used as negative feedback.

Frequency AnA10g Output for Blanking. The emitter of A7Q1 also drives the base of A7Q2. A7Q2 is an emitter follower that provides the frequency anA10g output voltage to Third Converter Assembly A3 and to the Sweep Ramp High/Low Limit Comparator (A15U1) of Vertical Driver and Blanking Assembly A15. (See A15 Schematic.)

**Coarse and Fine TUNING**. The Coarse and Fine tuning voltages from control potentiometers A2R1 and A2R2 (shown on A2 schematic) are applied to the noninverting and inverting inputs respectively of A7U2. A7U2 sums these voltages and applies the voltage sum to the junction of A7R52 and R53. It is in turn summed with the attenuated sweep signal from the output of the sweep buffer A7U3 if 2 MHz/DIV or wider frequency spans have been selected. In narrower frequency spans, the input of buffer A7U3 is grounded so only the summed tuning voltages are applied to A7U4.

**YIG FM Coil Driver**

The FM Coil Driver consists of A7U1, Q17, Q18, and FM adjust R6. Selecting 1 MHz/DIV and narrower frequency spans enables the YIG FM Coil Gate, allowing the attenuated sweep to be applied to the YIG FM Coil Driver. (A7Q15 is on and Q16 is off.) A7U1 converts the sweep ramp voltage into current to drive the YIG FM coil. Transistors A7Q17/Q18 are biased at cutoff and provide additional current drive. The FM adjust, A7R6, sets the maximum FM coil current.

**YIG Main and FM Coil Gates**

The YIG Coil Gates determine which YIG coil is used to control the YIG oscillator frequency. The YIG Coil Gates are selected by the Scan Select which is controlled by FREQ SPAN/DIV control A2S6.

**YIG Main Coil Gate**. When 2 MHz/DIV and wider frequency spans are selected, the base of transistor A7U5C is returned to 12.6V through A7R11 and A8R131. A7U5C is turned off and the collector rises to about 5V while the emitter drops to near 12.6V. The collector of A7U5C turns on U5E and U5D, and these two transistors then turn off FETs Q15 and Q24 respectively. The emitter of A7U5C turns off U5A and U5B, which then turn on FETs Q16 and Q20. With A7Q20 conducting and A7Q24 open, the attenuated sweep is applied to sweep buffer A7U3 and YIG main coil swept driver A7U4 to control the YIG oscillator frequency. FET A7Q15 is turned off preventing the attenuated sweep input from reaching the ./ YIG FM Coil Driver, and A7Q16 is turned on, grounding the input to the YIG FM coil driver.

**YIG FM Coil Gate**. The selection of 1 MHz/Div and narrower frequency spans with FREQ SPAN/DIV control A2S6 applies + 15V to the input of A7USC. The + 15V turns U5C on; FETs Q20 and Q16 are turned off, and FETs Q24 and Q15 are turned on. This enables the YIG FM coil gate, allowing the sweep signal to be applied to the YIG FM Coil Driver. A7Q20 prevents the Attenuated Sweep input from reaching the sweep buffer A7U3 and A7Q24 grounds the input of A7U3. However, the tuning voltage from the tune summing amplifier is still applied to the YIG main coil swept driver.

**Main Coil Filter**

When the narrower frequency spans are selected, the + 15V from FREQ SPAN/DIV switch A2S6 is also applied to A7Q4 in the main coil filter. The main coil filter consists of FET switch A7Q4, R75, and C13/C14. The filter provides noise filtering in the 1 MHz and narrower frequency spans. With the FET switch closed, the filter is connected in parallel with the YIG main tuning coil.

**Meter Ranging**

The DPM is a digital voltmeter which measures the TUNING voltage at the output of the tune summing amplifier. The output of the tune summing amplifier, approximately 0 to -10V, is divided down to 0 to 1.5V at pins 2 and 5 of A7U6 by A7R53 and R50. This provides a 1 mV/MHz voltage to the DPM. The FREQ ZERO adjust R3 (shown on A2 schematic), A7R43, and A7R54 enable this voltage to be offset 4 15 mV to zero the DPM. The FREQ ZERO adjustment compensates for the changes in the frequency of the YIG oscillator caused by temperature drift.

A7U6A functions as a comparator and A7U6B as a switchable Xl/X10 gain stage. When the instrument is tuned to a frequency below 198.4 MHz, the voltage at A7U6 pin 2 is less than 198 mV. Since the voltage at A7U6 pin 3 is adjusted to be approximately 198 mV, the output at A7U6 pin 1 is positive. This turns on Q19, causing A7U6B to have a gain of approximately 10 and results in an output voltage at pin 7 of 10 mV/MHz.

When the instrument is tuned above 198.4 MHz, A7U6A pin 1 goes low, turning Q19 off, causing A7U6B to have a gain of 1. This results in an output voltage at pin 7 of 1 mV/MHz. The output of A7U6A pin 1 is also used to turn A7Q25 off to turn off the decimal point. The positive feedback from the emitter of A7Q25 to A7U6A pin 3 provides hysteresis for rapid switching of the X1/X10 crossover point. A7CR6 and CR7 provide proper biasing for FET Q19. OFS adjustment A7R72 compensates for input offset of A7U6B.

**+ 14.5V Regulator** The + 14.5V Regulator consists of series regulator A7Q8, driver Q10, and reference amplifier Q9 and Q11. The +6.2V developed across zener diode A7VRI provides the base reference for A7Q9. This is compared to the voltage at the base of A7Q11 1 which senses the + 14.5V output across voltage divider A7R28, R29, and the + 14.5V adjust R5. Should the output voltage increase, A7Q11 conducts more, decreasing the conduction of A7Q9 and driving the base of Q10 more positive. This decreases the drive current to A7Q8 and causes the output voltage to drop (return to + 14.5V). A7C4 provides stability compensation and some additional noise filtering at the output.

The + 14.5V supply is used for the positive supply on A7U2, U3, U4, and Q7. It is also used on Sweep Generator Assembly A8 as the voltage reference that sets the 5V to + 5V ramp amplitude. The + 14.5V is also applied to Second Converter A5 as the positive supply for the 1748.6 MHz second local oscillator.

**+ 6.00V Reference Voltage Regulator**

The + 14.5V at A7R32 and the +6.2V dropped across A7VR2, develop the +6.00V reference voltage. A7R4 REF V adjusts the voltage at TP6 to + 6.00V.

**-10V Regulator**

The regulated + 14.5V provides a reference voltage for voltage divider A7R34 and R35 for the -10V regulator. The -10V regulator consists of series regulator A7Q12 and reference amplifier A7Q13 and Q14. Should the -10V tend to become more positive (less negative), A7Q13 decreases its conduction and turns A7Q14 on harder. A7Q14 then increases the conduction of A7Q12, dropping the output voltage back to -10V.

The -10V supply is used for the negative supply on A7U2, U3, U4, and Q7. It is also used as the negative supply for the A6 YIG Oscillator and the second local oscillator in A5.

**Calibrate Single Shot**

The calibrate single shot circuit consists of A7Q23, Q22, and Q21. The circuit is activated when the front panel FREQ CAL button is pressed. With the FREQ CAL switch A2S1 (shown on A2 schematic) closed, the YIG Oscillator is tuned to its lowest frequency. Releasing the FREQ CAL button returns the YIG Oscillator to the previous operating frequency.

Pressing the FREQ CAL button shorts the + 6V line to ground, discharging A7C8 and turning A7Q23 off. The emitter of A7Q22 is grounded, turning it on, and its collector goes low, turning off FET switch A7Q4. The main coil filter is now disabled and the charge held on A7C13/C14 remains the same during the calibration sequence. The charge voltage represents the previous operating frequency. The ground on the + 6V line is applied to the base of A7Q7, disabling the YIG main coil fixed driver. When the + 6.OV line is grounded, the output of the coarse TUNING control is grounded; the YIG main coil swept driver is disabled by the output from A7U2. With both YIG main coil drivers disabled, the magnetic current is removed and the magnet hysteresis is cancelled.

When the FREQ CAL button is released, the +6.0V reference line jumps to approximately + 1V. The charge on capacitor A7C8 turns on A7Q23 which then turns on Q21. A7C8, Q21, and Q23 form a Miller Integrator and the +6.0V reference line slowly charges to +6.0V. This takes about 0.3 second and prevents the introduction of transients into the main coil. However, as long as the + 6.0V reference line is charging; the conduction of A7Q23 keeps FET switch A7Q4 off, still disabling the main coil filter. The charge on A7C13/C14 has no path for discharge and remains the same. This allows the YIG Oscillator to return to the previous frequency faster since A7C13 and C14 do not have to be recharged.

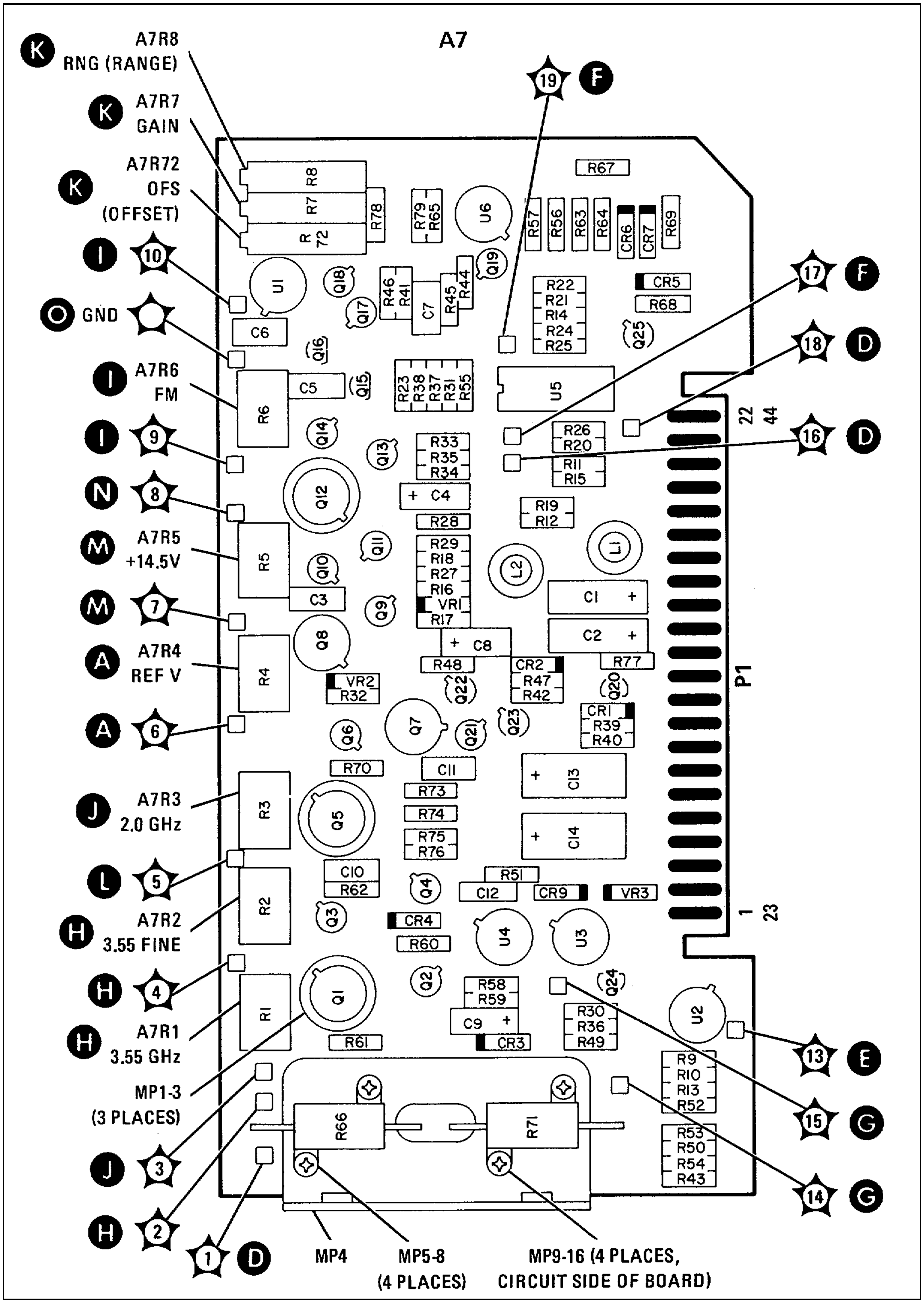


*Figure 8-19. A7 Frequency Control Assembly, Component and Test Point Locations*

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PAGES
8-43 through 8-44

## A8 SWEEP GENERATOR CIRCUIT DESCRIPTION

### General Description

The Sweep Generator Assembly generates a -5 volt to + 5 volt linear sweep voltage. The sweep voltage controls the frequency of YIG oscillator Assembly A6, and also controls the horizontal deflection of the CRT beam. The SWEEP TIME/DIV control varies from 0.1 mSEC/DIV to 10 SEC/DIV so the full scan sweep time varies from 1 ms to 100 sec. The sweep may be synchronized with either the video input or the line voltage. Manual and free run modes are also provided. A single sweep may be started or stopped with the front panel TRIGGER switch. A retrace voltage is generated and applied to Vertical Driver and Blanking Assembly A15.

Sheet 2 of the A8 schematic (Figure 8-23) shows the resolution bandwidth control circuit, the video filter, the sweep attenuator circuit, and the + V sweep offset circuit. The resolution bandwidth control circuit has three purposes. First it provides the bandwidth filter control current to the PIN diodes on Bandwidth Filter Assemblies A11 and A13. Second, it provides current to the sweep generator current source (AST line) to control the AUTO sweep time circuit as a function of resolution bandwidth. Third, it switches in the proper capacitor for the RC lowpass video filter to provide video filtering as a constant percentage of resolution bandwidth. The sweep attenuator circuit attenuates the sweep ramp to Frequency Control Assembly A7 in proportion to the FREQ SPAN/DIV selected. It also provides a current to the sweep generator current source (AST line) to control the automatic sweep time circuit as a function of frequency span per division. The + V sweep offset circuit offsets the ramp voltage by 5 volts so the ramp voltage, when START frequency is selected, is from 0V to + 10V instead of 5V to + 5V.

### Sweep Generator Circuit

The sweep ramp is generated in the following cycle. (See Figure 8-21.)

When transistor Q10 turns on, the sweep ramp is initiated. At the beginning of the sweep cycle, the voltage at TP3 is -4V and dead-time capacitor C15 is charging toward + 15V through R33. When the anode voltage on CR11 reaches + 1 .5V, Q10 turns on and the TP5 voltage becomes + 3V.

Pin 2 of U1 is at -5V and comparator U1 toggles to its positive supply voltage of + 14.5V. CR5 is now reverse biased. The current source can begin charging timing capacitors C3 and C4 positively, forming the positive slope of the sweep ramp.

As the sweep ramp level approaches + 5V at TP8, the U1 feedback circuit takes control, holding pin 2 of U1 at 2.68V and temporarily bringing pin 6 out of saturation. The anode voltage of zener diode VR1 equals the voltage at pin 6 minus 10V:

$$E_{VR1} = E_{pin6} - 10V$$

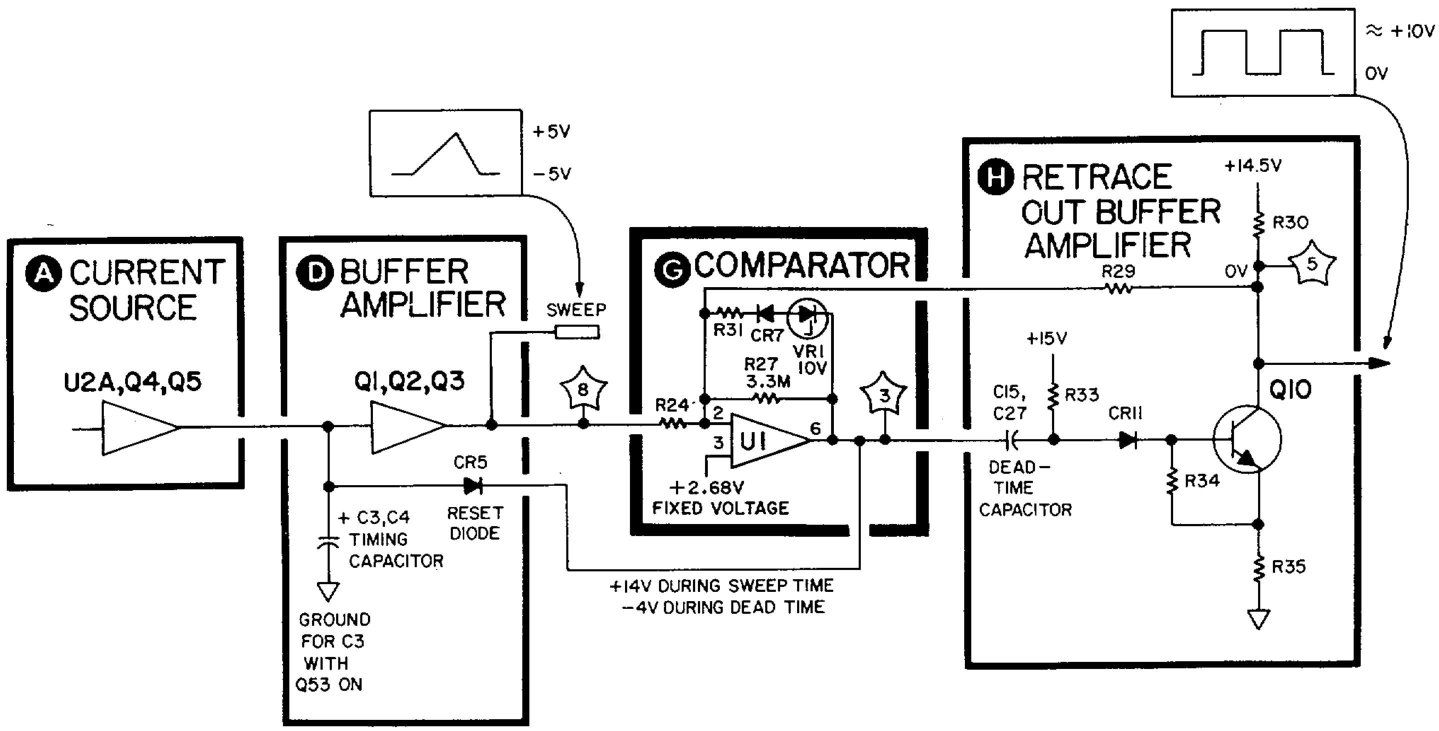


*Figure 8-21. Simplified Schematic of Sweep Generator in AUTO Mode*

As the voltage at U1 pin 6 (TP3) decreases, the anode voltage of VR1 decreases. At some time (when the level of the sweep ramp at TP8 is + 5V), the anode voltage of VR1 will no longer forward bias CR7, and the zener feedback loop opens. At this point, the 3.3 megaohm feedback loop becomes active and U1 saturates again. The comparator toggles, this time toward the negative operational amplifier supply, and 4V appears at TP3.

The -4V at T3 forward biases CR5. Timing capacitors C3 and C4 discharge through CR5, forming the negative slope of the sweep ramp. Dead-time capacitor C15 discharges.

The endpoints of the sweep ramp at TP8, 5V and + 5V, are controlled by the voltage divider R21, R24, R29, and R30 or R35, and by U1 and its feedback loops. U1 controls the ramp voltage as it maintains 2.68V at pin 2.

At the end of the ramp, when CR5 is forward biased, and the comparator output (pin 6 of U1) is approaching its negative supply, U1 uses Q1 and Q3 to maintain 2.68V at pin 2. Q10 is off, and the voltage divider R21, R24, R29, and R30 produces -5V at TP8.

At the beginning of the ramp, when CR5 is reverse biased, and the comparator output is approaching its positive supply, U1 again maintains 2.68V at pin 2. This time, Q10 is on, and voltage divider R21, R24, R29, and R35 produces + 5V at TP8.

**Fast/Slow Sweep Time Operation**. The ST6 control line from Front Switch Assembly A2A1, selects timing and dead-time capacitors C3, C4, C5, and C27, to control fast and slow sweep times. If the same amount of charging current is supplied to a larger capacitor, it charges at a slower rate.

Timing capacitors C3 and C4 are used to provide fast and slow sweep operation. When a fast sweep time (ms/div) is selected at TIME/DIV switch A2A1S3, the ST6 (FAST SWEEP) control line is grounded, turning off Q55 and Q53. With Q53 off, C3 and C4 are in series and the timing capacitor becomes C4. With Q55 off, the + 15V at R57 back biases CR9 and CR6, so C27 is switched out of the dead-time circuit. the dead-time (about 0.4 ms) is set by C15. In sweep times greater than 1 ms/div (or in AUTO sweep times), the ST6 (FAST SWEEP) control line is open, Q55 and Q53 are both on. With Q53 on, a ground is provided for C3 and it becomes the timing capacitor. CR6 and CR9 are on because of the conduction of Q55. C15 and C27 are in parallel, so the longer dead-time (about 7.5 ms) is set by C27.

When selecting FREE RUN mode (A2A1S4), + 15 volts is routed to the voltage divider, R59 and R60, via the TRIG control line. CR10 is reversed biased.

**FREE RUN TRIGGER Operation**. The circuit free runs and QI0 conducts when U1 switches on and off at a time determined by the RC time constants.

**VIDEO TRIGGER OPERATION**. When the video mode is selected (VIDEO position on A2A1S4 switch), CR10 is forward biased by R59, and Q10 is off. The sweep ramp is generated by turning on Q10 with a negative pulse from the pulse shaper circuitry. The negative pulse is applied to the emitter of Q10.

The pulse shape consists of a Schmitt trigger (Q39 and Q40), a differentiator (C12 and R55), and an emitter follower (Q12). The Schmitt trigger produces a pulse which exists as long as the video trigger information on the SYNC line is above a certain dc level. When the TRIGGER switch is in VIDEO position, video information from Vertical Driver and Blanking Assembly A15 is routed through the switch to the base of Q40. Q40 is normally off and Q39 is conducting. During the positive portion of the SYNC signal, Q40 turns on, turning Q39 off. C7 accelerates the Q39 switching. When Q40 switches on, the negative change at the collector is differentiated by C12 and R55, and coupled through Q12 to the Q10 emitter. The negative pulse turns on Q10. CR8, R32, and VR1 keep Q10 on while the ramp is being generated. After the ramp is completed, the circuit returns to its dead-time state and another trigger is required to generate another sweep. Trigger pulses from Q40, which may occur during the sweep, have no effect since Q10 is already on.

**LINE TRIG Operation** The sweep may be synchronized with the ac line voltage in the same manner as described in VIDEO operation. With TRIGGER switch A2A1S4 in LINE position, the ac line from the mainframe power transformer is connected to the Schmitt trigger (Q40 and Q39) input. A16R2 and A16C2 on the motherboard attenuate the ac line signal to approximately 2 volts p-p and filter any line spikes.

**SINGLE Sweep Trigger and Abort**. Q10 is initially held off by R59 and CR10. Q9 is on, and voltage divider R37 and R38 charges C16 to +2.8V. When the trigger switch A2A1R4 is set to SINGLE sweep (spring-loaded position), + 15V is applied to R62 turning on Q11. This shorts the positive end of C16 to ground and produces a negative pulse at the emitter of Q10. This turns Q10 on starting a sweep.

During the generation of a sweep, Q9 is off and the voltage divider R37 and R38 charges C16 to 4V. The sweep may be aborted (reset to 5V) by pressing the SINGLE switch to the spring-loaded position. This switches on Q11. The negative end of C16 is shorted to ground, a positive pulse is generated at the emitter of Q10, and Q10 is turned off aborting the sweep.

#### MANUAL Sweep Control

Manual control of the sweep is obtained with the TIME/DIV switch A2A1S3 in MAN position. A ground is applied to the base of Q38 and Q37 by the ST7 line from A2A1S3 in all sweep modes except manual; the ground holds Q38 and Q37 off. With A2A1S3 in MAN position, Q38 and Q37 are turned on. Q37 turns Q10 on and keeps it on. CR5 is on and the feedback loop to the timing capacitor is closed. Turning the MANUAL SWEEP control A2A1R4 changes the voltage at the collector of Q38 which changes the input current at U1 pin 2. Since the feedback current through R29 is constant, any change in manual sweep current must be compensated by a change in the current through R24, thereby varying the ramp output voltage.

#### Current Source

Current for the generation of the sweep is provided by the current source circuit. The temperature dependent power supply provides a nominal + 10V; Q6 is the temperature sensing element (diode). The following switches control current to operational amplifier U2A pin 2: RESOLUTION BW switch A2A1S5, FREQ SPAN/DIV switch A2A1S6, VIDEO FILTER potentiometer A2R5, and TIME/DIV switch A2A1S3. In the AUTO sweep time mode, the sweep time is controlled by the RESOLUTION BW, FREQ SPAN/DIV, and VIDEO FILTER which set the currents to U2A. These currents are summed by U2A to produce a voltage proportional to the log of the sweep time. Q4 is the current driver and converts voltage variations into current variations proportional to sweep time. The current is applied to the timing capacitors C3 and C4, in the buffer amplifier circuit.

Q7 provides temperature compensation for Q4. Q8 is a constant-current regulator for Q7. In AUTO, the sweep time is limited to 1 ms and longer because current is limited to 1 mA by Q5/R15.

In the calibrated sweep time/division mode, the gate of Q52 is grounded. This turns Q52 off and disconnects the currents proportional to RESOLUTION BW, FREQ SPAN/DIV, and VIDEO FILTER. Calibrated sweep times are now produced by the currents fed to U2A through R40 through R44. Those resistors are grounded in various combinations by SWEEP TIME/DIV switch A2A1S3 resistor network. (See A2 Schematic.)

**XTAL Resolution Bandwidth Control**

When a XTAL bandwidth is selected (30 kHz, 10 kHz, 3 kHz, 1 kHz), control line BW5 is released from + 15V on the front panel and is pulled to -.5V by Q13. This has four effects.

1. On the Bandwidth Filter boards CR2 and CR13 are turned off and Q3, Q6, CR8 and CR15 are turned on, allowing the XTAL filters to operate.

2. Q21 is turned off allowing BW7 to be pulled up to more than + -10V by CR18 and R82. This turns off the LC filter sections on the Bandwidth Filter boards.

3. Q14 is turned off allowing the voltage on BW6 to be controlled by the current through A8Q 19.

4. Q22 is turned off having an effect on sweep time which is discussed in detail later.

The current through Q19 is a function of the states (off or on) of Q15, Q17, Q42, the values of factory select resistors R74, R76, and R78, and the setting of. R72 XTL (3 kHz adjustment). The off/on states of Q15, Q17, and Q42 are controlled by BW1, BW2, and BW3 which are controlled by the front panel RESOLUTION BW switch and are at either + 15V or some negative voltage. The amount of current through Q19 controls the bandwidths of the XTAL filter sections on the Bandwidth Filter boards.

**LC Resolution Bandwidth Control**

When an LC bandwidth is selected, (3 MHz, 1 MHz, 300 kHz, 100 kHz), control line BW5 is pulled to + 15V at the front panel. This has four effects.

1. On the Bandwidth Filter boards: Q3, Q6, CR8, and CR15 are turned off and CR2 and CR13 are turned on, thus blocking any signal from passing through the XTAL filer sections.

2. Q14 is turned on, pulling BW6 to -4V, which further defeats any possible action of the XTAL filter sections.

3. Q21 is turned on, allowing the voltage on BW7 to be controlled by the current through Q20.

The current through Q20 is a function of the states (off or on) of Q23, Q44, Q49, the values of factory select resistors R89, R92, and R95, and the setting of R85 LC (1 MHz adjustment). The off/on states of Q23, Q44, Q49 are controlled by BW2, BW3, and BW4 which are controlled by the front panel bandwidth switch and are either at + 15V or some negative voltage. The amount of current through Q20 controls the bandwidths of the LC filter sections on the Bandwidth Filter boards.

4. Q22 is turned on having an effect on AUTO sweep time which is discussed later.

**Video Filter**

The video filter is composed of front panel control A2R6, switch A2S2, and 8 capacitors on Sweep Generator A8. The amount of filtering is controlled by the Resolution Bandwidth setting through Q16, Q18, Q43, Q41, Q46, Q24, and Q45. These transistors switch in and out various combinations of filter capacitors to provide more video filtering when the resolution bandwidth is decreased. In LC mode, BW6 is low holding Q15, Q17, Q42, Q41 off and keeping C19, C20, C21 and C22 out of the circuit.

Switch A2S2 applies maximum video filtering for noise measure mode by switching in C26 through Q47.

**Sweep Attenuator**

The sweep attenuator circuit changes the amplitude of the sweep voltage applied to the Frequency Control A7 as a function of the FREQ SPAN/DIV selected. The attenuator attenuates the -5V to +5V ramp routed through XA8 pin 39 in a divide by 1, 2, 5, and 10 sequence from a divide-by-1 to a divide-by-200. The circuit also generates an auto-sweep control current used to control the AUTO sweep time circuit as a function of the frequency span.

The sweep attenuator has two voltage dividers buffered by the unity gain voltage follower U3. The divider at the input of U3 provides either a divide-by-two or a divide-by-five; the divider at the output of the U3 provides a divide-by-one, a divide-by-ten, and a divide-by-one hundred.

Assuming that FS3 (divide-by-two) is selected, + 15V turns on Q31 and Q32 grounds a 10K ohm resistor R113. The -5V to +5V ramp is divided across the input resistor R101 (10K ohms) and R113 (10K ohms). The ramp is now divided in half and applied to sweep buffer U3 pin 3. The dividers at the output of U3 (controlled by FS4 and FS5) have reversed control logic; they are normally connected to + 15V by A2A1S5 and open when selected. Q50 is a gate to drive Q30. When FS4 and FS5 are connected to + 15V, Q50 is off and Q30 is on, connecting the divide-by-one divider at the output of U3. If either FS4 or FS5 is open, Q30 is off and Q28 or Q26 is on, providing either a divide-by-10 or divide-by-100. AUTO sweep control current is applied to Q52 as a function of frequency span by Q35, Q31, Q33, Q27, and Q25 and the appropriate resistors. For narrow spans (1 MHz/DIV or less), when the YIG FM coil is swept, FS6 is connected to + 15V by A2A1S5. Q29 is on and the additional current in the AUTO sweep control is used to reduce the sweep time.

### + V Sweep Offset

Normally, START-CENTER switch A2A1S7 is in the CENTER position. The + 15V back biases Q54 and holds it off. Switching to START allows Q54 to conduct and adds 0.5 mA of current through R67 to offset the sweep ramp. When START frequency is used, the ramp excursion is from 0V to a positive voltage.

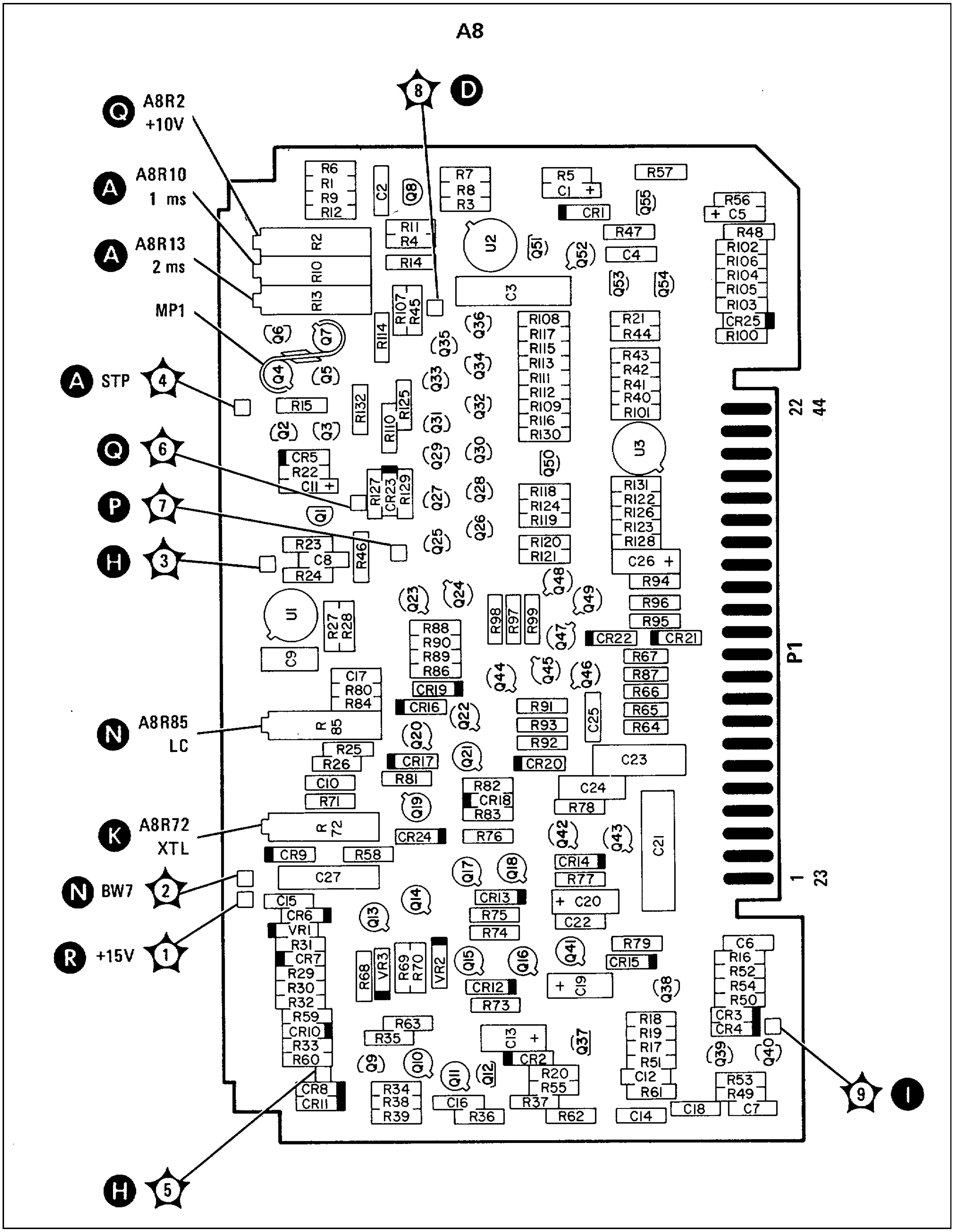


*Figure 8-22. A8 Sweep Generator Assembly, Component and Test Point Locations*

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PAGES
8-53 through 8-56

## A9 THIRD CONVERTER CIRCUIT DESCRIPTION

### General Description

The Third Converter Assembly contains of a 280 MHz oscillator followed by a buffer amplifier, a balanced mixer, a matching filter, a 21.4 MHz amplifier,, and a PIN attenuator. The 301.4 MHz second IF signal from A10 is mixed with the 280 MHz oscillator (third LO) in balanced mixer A9U1. The output from the mixer is the difference frequency, 21.4 MHz, which is applied to the matching filter. This is a 21.4 MHz bandpass filter which also acts as an inter-stage impedance matching device. The signal is then amplified by the 21.4 MHz amplifier and coupled to a divider network consisting of two PIN diodes A9CR3 and CR4, resistor R25, and the input impedance of the Bandwidth Filter No. 1 Assembly A11. PIN driver A9Q5 changes the bias of the PIN diodes as a function of frequency, compensating for input mixer frequency response. The 21.4 MHz third IF output signal is coupled to the input of Bandwidth Filter No. 1. The 280 MHz Oscillator also provides the front panel CAL OUTPUT 280 MHz -30 dBm signal. It is sometimes necessary to select a different value for R9 to provide the 30 dBm CAL OUTPUT level while maintaining the proper input level to the balanced mixer.

### 280 MHz Oscillator (Third LO)

The third local oscillator is a modified Colpitts circuit with a 280 MHz surface acoustic wave resonator (SAWR) A9Z1 in the positive feedback path to provide increased frequency stability. Inductor A9L3, across the SAWR, tunes out the SAWR shunt capacitance. The oscillator tuned circuit consists of capacitors A9C4, C5, and inductors L4 and L6. This tuned circuit ensures that the oscillator oscillates only on the proper overtone of the SAWR. A1though A9L4 is called the LO FREQ adjustment, it is used to adjust for maximum LO output power and has only a slight effect on the output frequency. Inductor A9L5 provides a dc path for base bias of buffer amplifier A9Q2. Diodes A9CRI and CR2 provide temperature compensation for the 280 MHz oscillator and indirectly stabilize the CAL OUTPUT level. Power is taken out of the oscillator through L6, which transforms the output to approximately 50 ohms at a level of 0 dBm. The output level of the circuit is controlled by 3RD LO PWR adjustment A9RS, which sets the emitter current of A9Q1 and allows adjustment f6r a 30 dBm 280 MHz front-panel CAL OUTPUT level. It is sometimes necessary to select a different value for A9R4 to provide the proper third LO output level. Buffer amplifier A9Q2 provides isolation for the 280 MHz oscillator and provides about 10 dB of power gain to the L port of balanced mixer U1. The buffer amplifier also provides the proper output level to the front-panel CAL OUTPUT (by selecting A9R9) for a given balanced mixer input.

### Balanced Mixer (Third Mixer)

The third LO 280 MHz input to the L port of the balanced mixer is approximately + 10 dBm. The level of the second IF 301.4 MHz input to the X port of the mixer is about 12 dBm or less. The third mixer output (Port R) is the 21.4 MHz difference frequency produced by heterodyning the 301.4 MHz IF and the 280 MHz LO. The third mixer has a conversion loss of about 7 dB.

### Matching Filter

The output of the balanced mixer is applied to the matching filter which consists of A9L9, C10, C11, C12, and L10. The matching filter is a 21.4 MHz bandpass filter which also serves as an impedance matching network. The circuit raises the low input impedance of the 21.4 MHz amplifier (about 10 ohms) to match the higher output impedance of the balanced mixer (about 50 ohms).

### 21.4 MHz Amplifier

The 21.4 MHz amplifier consists of A9Q3 in a common-emitter configuration and A9Q4 as an emitter follower. Transistor A9Q3 employs resistor A9R12 and zener diode A9VR2 to furnish base bias and negative feedback for gain control and stabilization. Resistor A9R12 is factory selected to provide the proper gain of the Third Converter Assembly. Capacitor A9C14 is connected across A9VR2 to reduce zener noise. The output of the 21.4 MHz amplifier looks into a voltage-controlled attenuator consisting of two PIN diodes, A9CR3 and CR4, resistor A9R25, and the input impedance of the Bandwidth Filter No. 1 Assembly A11.

**PIN Driver**

The PIN diode resistance of A9CR3 and CR4 is controlled by the PIN driver A9Q5 and its associated circuitry. The base of A9Q5 is the summing point for the frequency anA10g voltage from the Frequency Control Assembly A7 and a dc level set by front-panel REF LEVEL CAL screwdriver adjustment A2R3. Setting the dc level by adjusting A2R3 calibrates the 8558B display at a given frequency, usually performed at 280 MHz. The frequency analog voltage is a dc level varying from + 0.6 volts to + 6.7 volts as a function of frequency. This frequency anA10g voltage at the base of A9Q5 compensates for input mixer response. SLOPE COMP adjustment A9R1 sets the amount of compensation required for a flat frequency response. The total current through the PIN diodes A9CR3 and CR4 is shaped by the emitter network of A9Q5. This network provides a change in current through the PIN diodes to cause a change of PIN diode resistance. The change in resistance is required to provide the proper log curve within an 8 dB range for the voltage-controlled attenuator.

## A10 SECOND IF CIRCUIT DESCRIPTION

### General Description

The Second IF Assembly contains a bandpass amplifier which provides a gain of approximately 16 dB at 301.4 MHz. It also contains a bandpass filter which provides further rejection of unwanted signals. The bandpass filter has a 3 dB loss, giving the Second IF Assembly a net gain of approximately 13 dB at 301.4 MHz. The 301.4 MHz IF output signal is coupled to Third Converter Assembly A9 by cable W7. This signal is the input to the X port of the balanced mixer on the Third Converter Assembly.

### Bandpass Amplifier

The bandpass amplifier consists of A10Q2 in a common-emitter configuration, and A10Q1 connected to control the base drive and bias current of A10Q2. Capacitors A10C4, C5, C7, and C10 serve as decoupling for high frequencies. The gain of the bandpass amplifier is set by the high frequency characteristics of A10Q2, R5, and the small amount of inductance on the emitter connection of Q2. The emitter inductance is used to establish a 50 ohm input impedance and to help stabilize the current gain of A10Q2. Resistor A10R5 in parallel with the output resistance of A10Q2 establishes an output impedance of about 500 ohms. Components A10L2, C8, C9 and the collector capacitance (Cc) of Q2 form the collector tank circuit (see Figure 8-24). This tank circuit determines the center frequency of the bandpass amplifier and transforms the 500 ohm output impedance at the collector of A10Q1 down to 50 ohms. The output of the bandpass amplifier flows from A10C9 through a 50 ohm microstrip transmission line (etched on the printed circuit board) to the bandpass filter. The bandpass amplifier has a gain of about 16 dB from the base of A10Q2 to the 50 ohm output of A10C9.

### Bandpass Filter

The output of the bandpass amplifier passes through a 301.4 MHz bandpass filter. The bandpass filter is made up of A10L3, L4, L5, C11, C12, C13, C14, C15 and adjustable piston-type capacitors A10C1, C2, and C3. Capacitors A10C11 and C15 are used to transform the bandpass filter input and output impedance to 50 ohms. Inductors A10L3, L4, and L5 are wound on a common coil form which provides mutual inductance coupling between filter sections. The bandpass filter has an insertion loss of approximately 3 dB and 3 dB bandwidth of about 12 MHz.

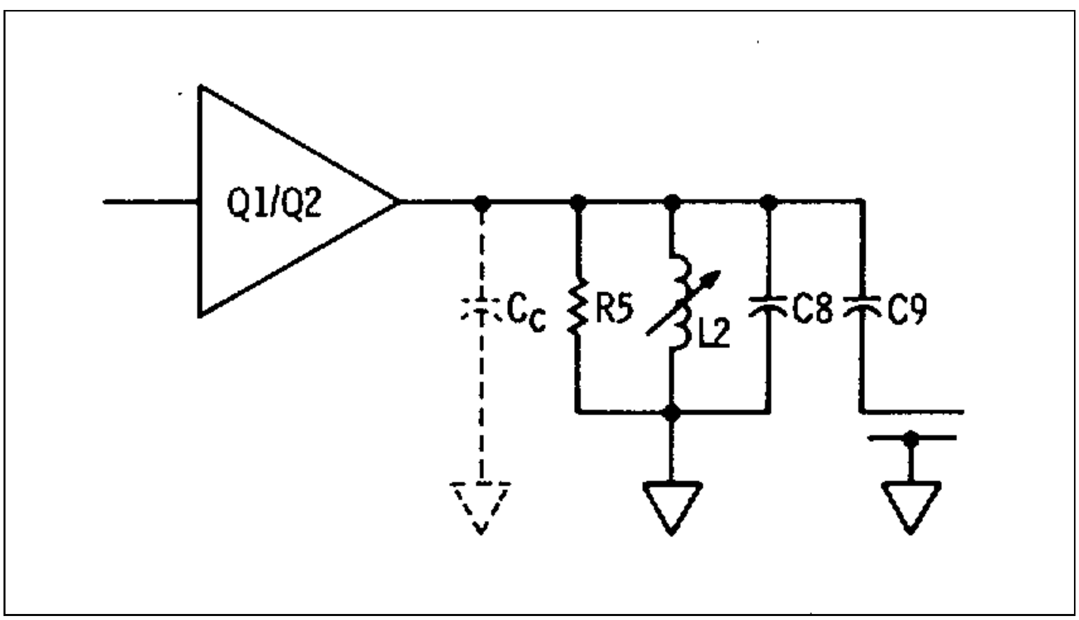


*Figure 8-24. Bandpass Amplifier Tank Circuit, Simplified Schematic*

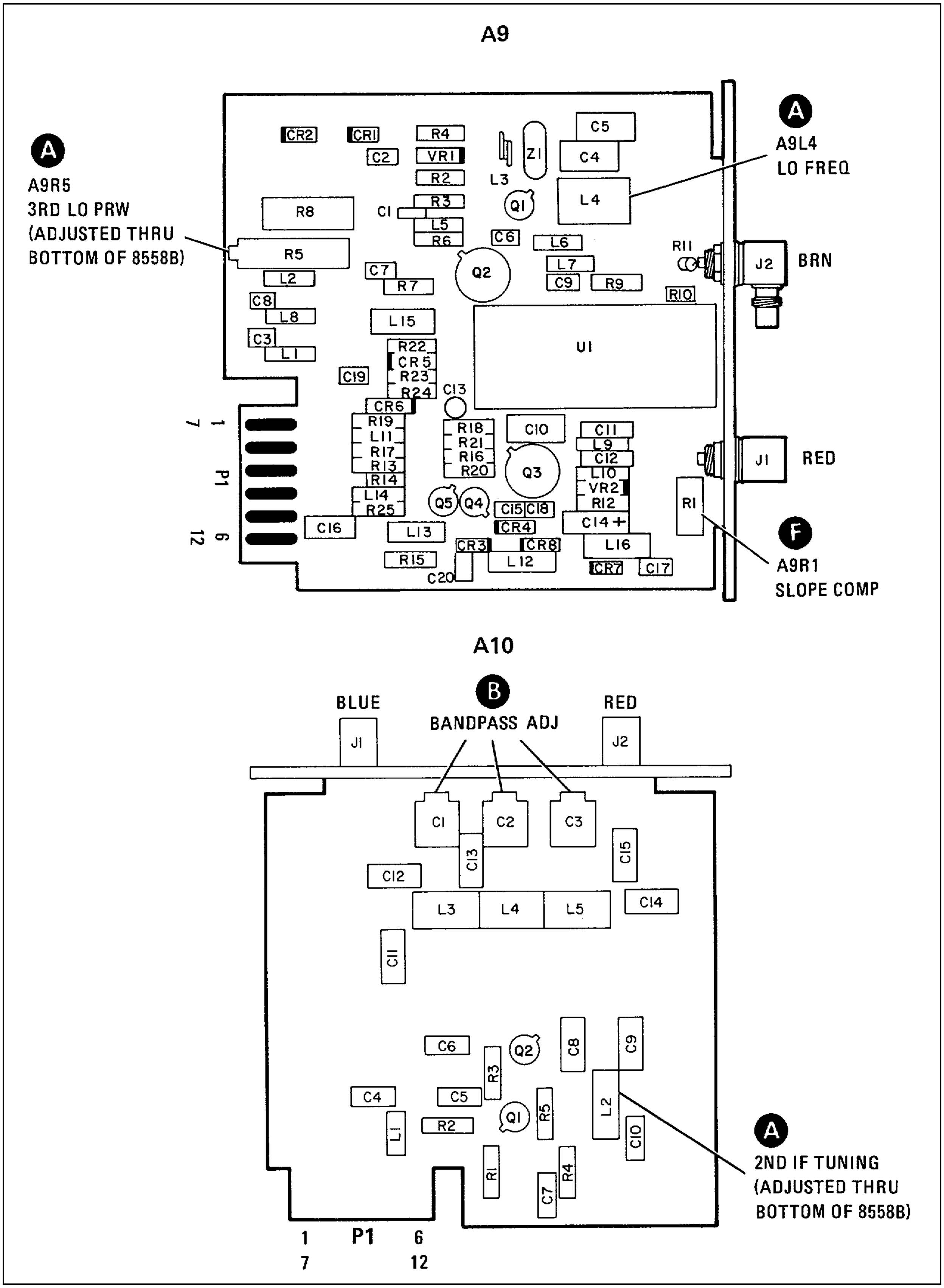


*Figure 8-25. A9 Third Converter Assembly, and A10 Second IF Assembly, Component Locations*

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**PAGES**
**8-61 through 8-62**

## A11 BANDWIDTH FILTER NO. 1 CIRCUIT DESCRIPTION

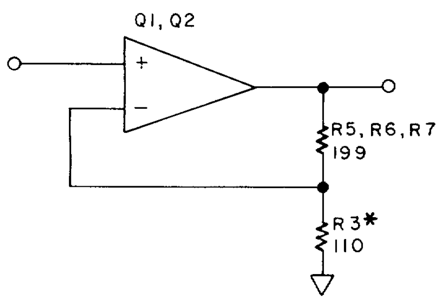
### General Description

Bandwidth Filter No. 1 operates at 21.4 MHz and is variable in bandwidth from 3 MHz to 1 kHz. The front-panel RESOLUTION BW switch is used to select one of eight available bandwidth settings (3 MHz, 1 MHz, 300 kHz, 100 kHz, 30 kHz, 10 kHz, 3 kHz, or 1 kHz).

The narrower bandwidths (1 kHz through 30 kHz) are obtained from four synchronously tuned crystal filters; the four wider bandwidths (100 kHz through 3 MHz), from four synchronously tuned LC tank circuits. The four stages of bandwidth filters are on two similar printed-circuit boards, Bandwidth Filter No. 1 (A11) and Bandwidth Filter No. 2 (A13). Two LC tank circuits and two crystal filters are on each board. The four crystals in the two bandwidth assemblies (A11Y1, A11Y2, A13Y1, and A13Y2) are a factory-selected matched set. If replacement of a Bandwidth Filter assembly is necessary, the new board is shipped with two crystals installed. The other two crystals (which must be used to replace the existing two crystals in the good Bandwidth Filter assembly) are packaged separately and shipped with the new Bandwidth Filter board. In addition to the filter stages, each Bandwidth Filter provides 10 dB of gain in both LC and crystal filter operation. (There is some gain in the "unity" gain buffer amplifiers.)

### 10 dB Input Buffer Amplifier

The 10 dB input buffer amplifier functions as a non-inverting operational amplifier.




$$G = 1 + \frac{R5+R6+R7}{R3}$$

$$= 1 + \frac{199}{110}$$

$$= 2.81$$

$$G_{dB} = 20 \log G$$

$$G = \sim 9 \text{ dB}$$

In the crystal mode (bandwidths <30 kHz), the amplifier includes Q3. The biasing of the amplifier is independent of its ac (21.4 MHz) operation but is very critical for its proper functioning. If a malfunction occurs, the dc bias should be checked first.

In the LC mode (the four wider bandwidths), the BW5 line goes to + 14.8V and turns off current source Q3. The current supplied by Q3 in the crystal mode is then supplied through CR1 and R13 from the BW5 line.

### Unity Gain Buffer Amplifier

The unity gain buffer amplifier is the same as the 10 dB input buffer amplifier, except that it has a FET input (Q5) and is connected for unity gain. The input is selected by the BW5 line from CR9 in the LC mode, or from CR8 in the crystal mode.

In the crystal mode, the current through Q5 is determined by the difference between the current sourced by Q6 and that sunk by Q7: about 4 mA. A significant deviation from this current should be reflected by the gate-to-source voltage of Q5. The source should be at least 0.2V more positive than the gate, but not more than 1.5V more positive. If the difference is less than 0.2V, the FET current is too high; if the difference is greater than 1.5V, the FET current is too low. In either case the FET could also be defective. To determine precisely the current through Q5, the difference between the current through R38 and that through R60 should be subtracted from the current through R30. If the results are inconsistent, check the above mentioned resistors.

In LC mode of operation, current is supplied through R37 and CR19 from the BW5 line instead of through Q6. The difference between the current through R37 and that through R30 yields the FET current.

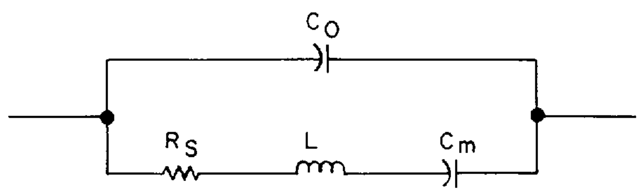
Output Buffer Amplifier The output buffer amplifier is a complementary pair of transistors in which Q9 acts as a source follower boosted by Q10. The current through FET Q9 is set by R53:

$$I_{FET} = \frac{V_{be}\,(Q10)}{196\Omega} \approx \frac{.7V}{196\Omega} \approx 3\text{ mA}$$

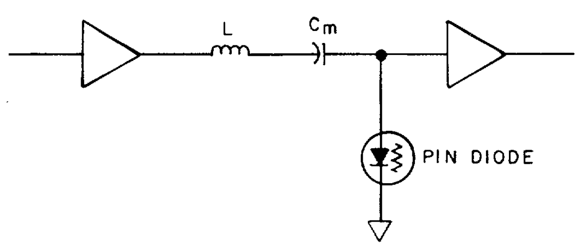
The total current through Q9 and Q10 is set by R54. The input is selected by the BW5 line from either CR16 in the LC mode or CR15 in the crystal mode.

**Crystal Filtering Circuits**

The bandwidths 1 kHz, 3 kHz, 10 kHz, and 30 kHz are obtained by crystal filtering. The crystals are used in series resonant mode and can be modeled as a series resonant circuit with a parallel capacitance:




The parallel capacitance (Co) and series resistance (Rs) are not desired and are compensated for in the circuit, resulting in this simplified schematic of a single pole of crystal filtering:




PIN diode CR4 functions as a variable resistor at 21.4 MHz. As the resistance is lowered by increasing the current in the BW6 line, the bandshape becomes narrower. The bandwidth of one pole widens to approximately 70 kHz when the PIN is turned off completely at the 30 kHz BW setting. (For a four-pole filter, the bandwidth of each pole is about 2.3 times the bandwidth of all four poles taken together. The bandwidth of two poles is about 1.5 times the bandwidth of all four poles taken together).

A simplified schematic of a crystal pole, including compensation for Rx and Co in the crystal and input capacitance of the buffer amplifier, is shown in Figure 8-27.

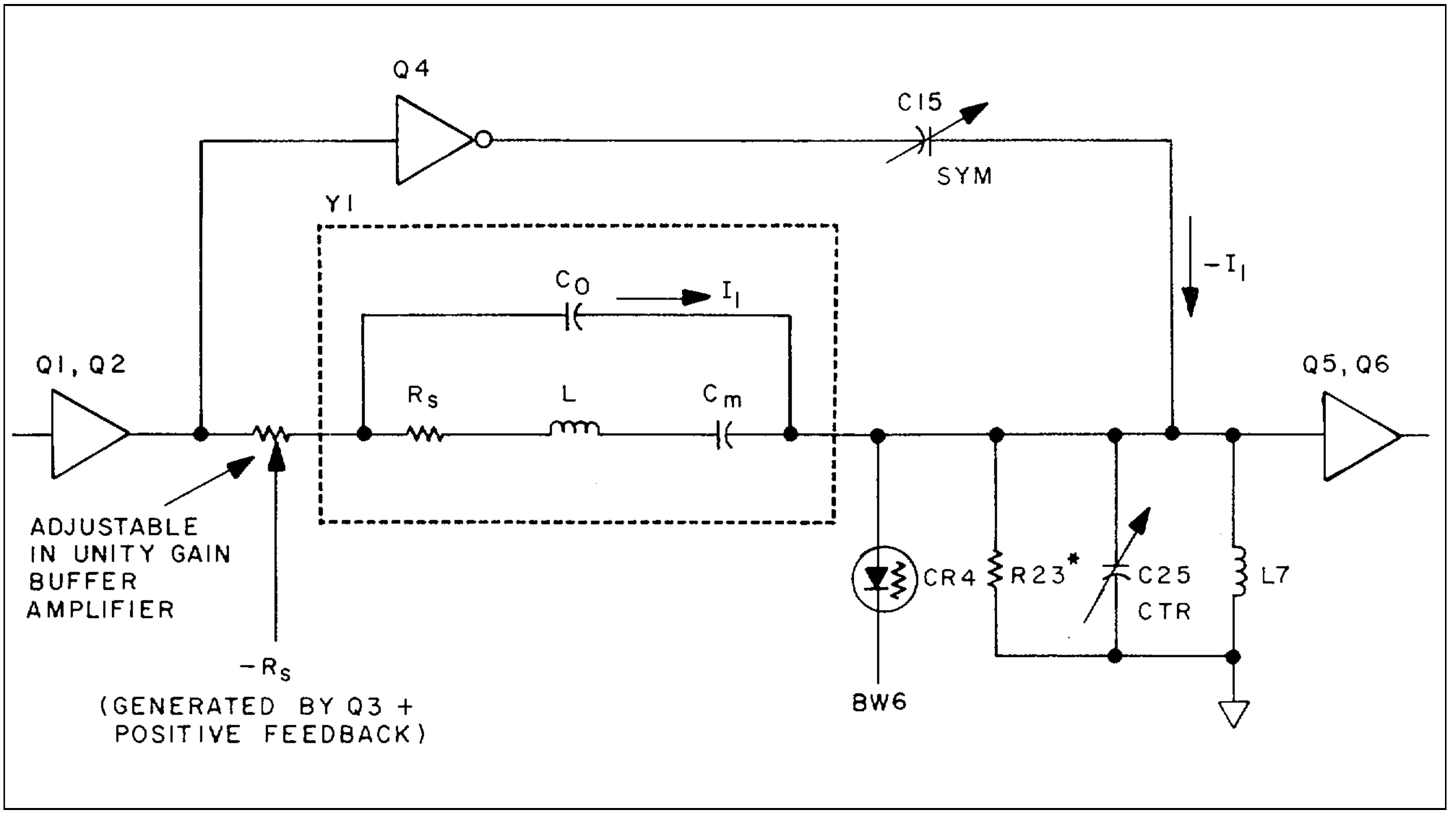



*Figure 8-27. Crystal Pole, Simplified Schematic*

The SYM adjustment, C15, compensates for Co by producing a current (-11) that is equal to the current (11) through Co of the crystal but opposite in phase. These currents cancel and nullify the effect of Co. The positive feedback from the collector of Q3 generates a negative output resistance that cancels Rs of the crystal. This is approximated by resistor R6 in the 10 dB input buffer amplifier and by potentiometer R31 in the unity gain buffer amplifier.

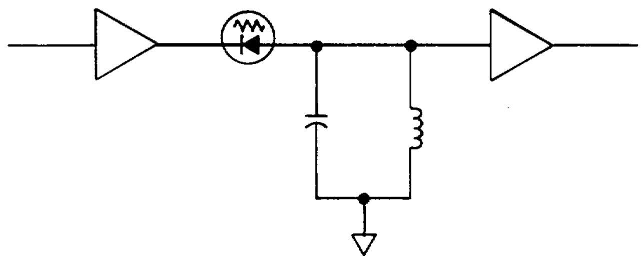
The input capacitance of the buffer amplifier, the printed circuit board capacitance, the PIN capacitance, and the centering (CTR) capacitor C25 are in parallel resonance with L7. These components have negligible effect on the band shape and as long as C25 has sufficient range to 'dip' the bandshape, they can be ignored in analyzing the remainder of the circuit.

PIN diode CR4 controls bandwidths from 1 kHz to 10 kHz. For the 30 kHz bandwidth, CR4 is back biased, and R23 sets the bandwidth. If the 30 kHz bandwidth is much too narrow, even with CR4 back biased, the circuit may be loaded by a bad buffer amplifier (Q5, Q7) or inverting amplifier (Q4). If the bandwidth is only slightly narrow, it may be widened by padding R23. If the narrowest bandwidths (1 kHz or 3 kHz) have too little gain, and it cannot be increased enough by R31, either the crystals have too high a series resistance (defective crystal); or the output resistance is not negative enough (defective buffer amplifier or Q3).

Almost any defect in the Bandwidth Filter boards will result in a faulty dc bias condition in one of the three buffer amplifiers on each board. The dc bias of each stage is less straightforward than ac (21.4 MHz) operation and should be checked carefully.

**LC Filtering Circuits**

The two LC filtering circuits are used for the wider bandwidths (100 kHz through 3 MHz). They are similar in function; the first LC pole circuit is described. A schematic of the simplified equivalent circuit is shown below:



The LC filter uses a metallized inductor L6 in parallel with three capacitors: C23 (LC CTR) for centering, C21 for temperature compensation, and C20*. The parallel circuit is driven through PIN diode CR3, which functions as a variable resistor. The BW7 line sets the current through CR3. Higher resistance results in narrower bandwidth. A simplified schematic of the first LC pole circuit is shown in Figure 8-28.

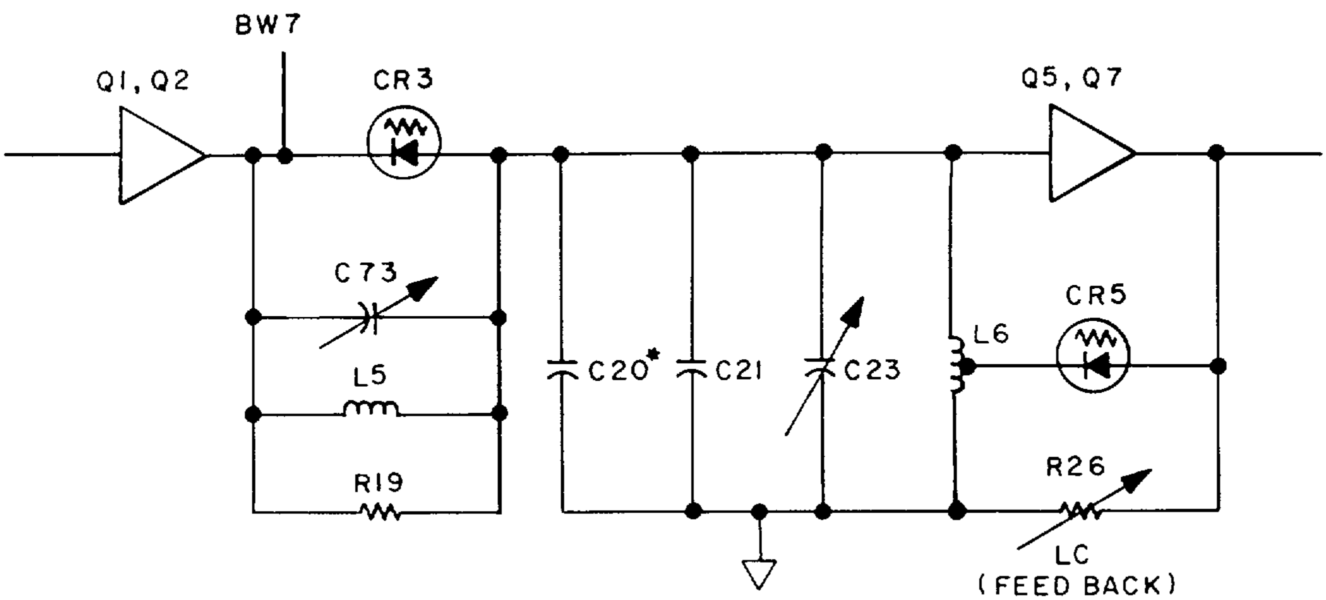



*Figure 8-28. LC Pole, Simplified Schematic*

C73 and L5 tune out the capacitance of CR3. R19 sets the 100 kHz bandwidth when CR3 is back biased (i.e., highest resistance). CR5 is controlled by the LC FEEDBACK pot R26 and compensates for losses in the parallel resonant circuit. (In the second LC pole circuit, fixed resistor R56* replaces CR5.) Low gain in one of the poles in the 100 kHz bandwidth is caused by:

1. The pole being centered at some frequency other than 21.4 MHz (a defective metallized inductor is most common).

2. The Q of the pole being too low (not a common failure).

3. Insufficient feedback from the buffer amplifier.

4. Defective buffer amplifier is loading the circuit.

If the 100 kHz bandwidth amplitude is correct, but that of the 300 kHz bandwidth is too low, either C73 or C74 might not be properly adjusted. If the 300 kHz amplitude is too high, the four LC poles are not tuned close enough to the same frequency. In either case, refer to Section V, Adjustments.

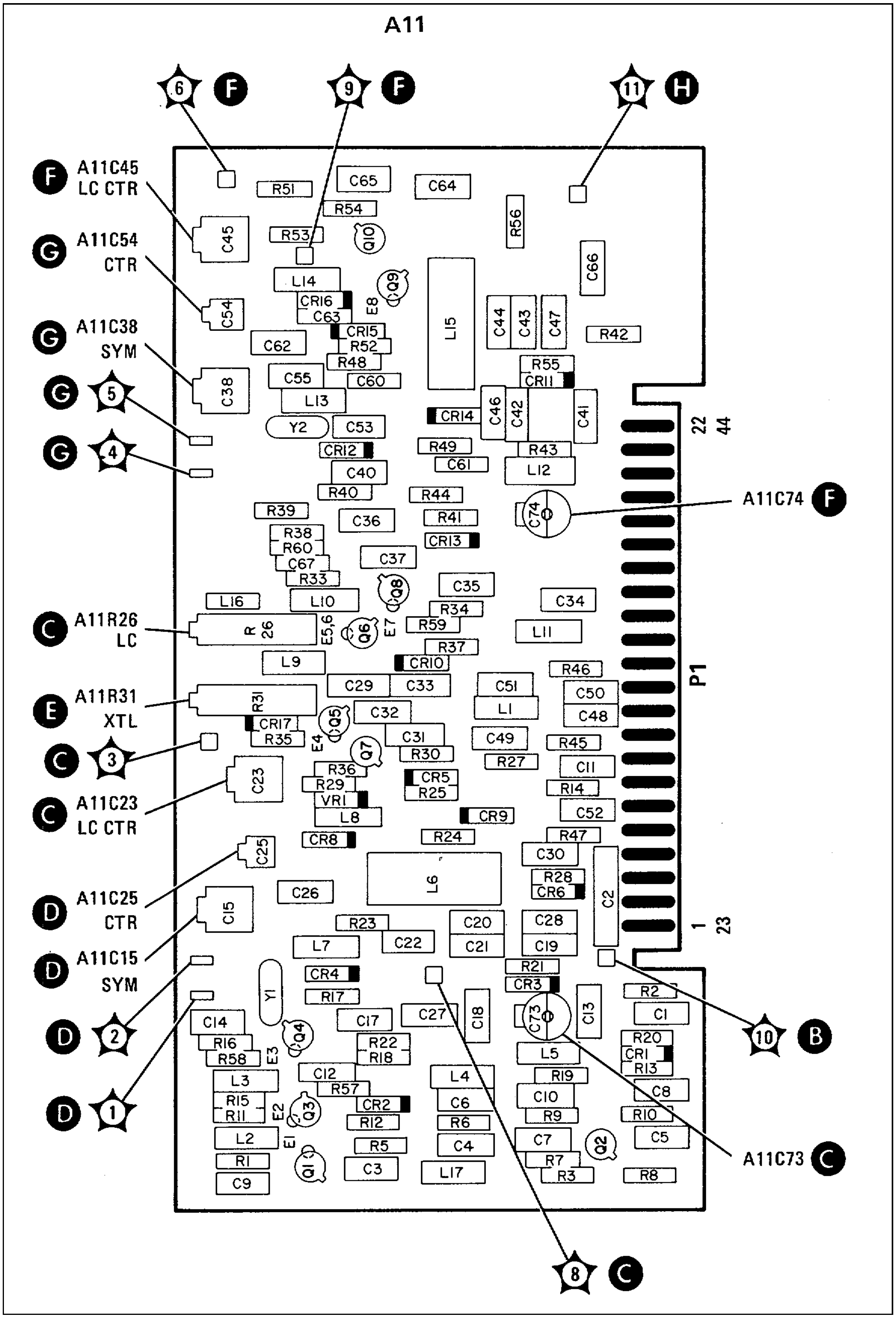



*Figure 8-29. A11 Bandwidth Filter No. 1 Assembly, Component and Test Point Locations*

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PAGES
8-69

## A12 STEP GAIN CIRCUIT DESCRIPTION

### General Description

The Step Gain Assembly contains three amplifier stages to provide a 0 to 50 dB amplification of the 21.4 MHz third IF signal. The amplifier stages are selected by front panel REF LEVEL dBm switch A2S1. At the output of the final amplifier is a two-section bandpass filter. In conjunction with the front panel REF LEVEL FINE control, the step gain assembly also contains the circuitry for the 0 to 12 dB fine control for the reference level. A TEST/NORM switch is available; in TEST position, tests are made at a low gain level.

### 0 - 12 dB Control

A minimum current flow through PIN diode A12CR3 (maximum allowable diode resistance) is established by the 12 dB potentiometer, A12R6, so the diode is never completely cutoff. Adjustment of A12R6 sets the 0.3 dB point and is adjusted with the REF LEVEL FINE control fully clockwise (-12 position).

The maximum current flow through the PIN diode is set by the 0 dB potentiometer, A12R5. A12R5 is adjusted to the 12.3 dB attenuation point with the REF LEVEL FINE control fully counterclockwise (0 position).

Transistors A12Q8 and A12Q9 are identical current sources. The maximum current is set by 0 dB adjustment A12R5 in the common base circuit. Diode A12CR1 provides temperature compensation for the transistors.

A12Q8 provides current for a bias voltage applied to the anode of the PIN diode. The voltage source consists of A12R6, A12R17, and A12CR2. Diode A12CR2 provides temperature compensation for the PIN diode. Inductance A12L5 isolates the current source from the RF signal.

A12Q9 provides current for a variable voltage source at the cathode of PIN diode A12CR3. A resistance is formed by REF LEVEL FINE control R4 (shown on A2 schematic) and fixed resistor A12R9. The fixed 316K ohm resistor is used to shape the value of potentiometer R4 to match the PIN diode resistance changes. The REF LEVEL FINE control varies the voltage at the cathode of PIN diode A12CR3 and thus varies diode current flow. Regulating the current flow through the PIN diode controls the amount of signal attenuation. For example, if PIN diode current flow is increased, more RF signal is shunted or bypassed to ground. A12C12 provides the RF ground and also isolates from ground the variable dc from the REF LEVEL FINE control. When the REF LEVEL FINE control is fully clockwise, the PIN diode is at minimum conduction, and maximum signal is applied to the base of A12Q7. Conversely, when the REF LEVEL FINE control is fully counterclockwise, the PIN diode is at maximum conduction and minimum signal is applied to A12Q7.

### Step Gain Amplifiers

Buffer amplifier A12Q7 operates in an emitter-follower configuration and provides isolation between the 0 12 dB control and the 10 dB amplifier.

The three step gain amplifiers can be considered as operational amplifiers. An equivalent circuit for the three stages is shown in Figure 8-31. The gain for each amplifier is Av = Rf/Ri. The feedback resistance (Rf) for the 10 dB amplifier is A12R26, 562 ohms; and for the 20 dB amplifiers it is A12R32 and A12R38, 750 ohms. The input resistance $R_i$ is a combination of a fixed series resistance (56.2 ohms) and the controlled resistance of the PIN diodes. The resistance of the PIN diodes is approximatey 10 to 1000 ohms and increases as the forward bias current is decreased from 100 mA to 1 µA. $R_i$ is approximately 260 ohms for the 10 dB amplifier and approximately 83 ohms for the 20 dB amplifiers.

Selection of the correct combination of step gain amplifiers is accomplished with front panel REF LEVEL dBm switch A2S 1. Rotating the switch grounds the emitter circuit of the selected amplifier(s) allowing current to flow through the PIN diode(s). The possible switch combinations allow the gain to vary from unity (all switches open) to 50 dB maximum gain with all three emitter circuits grounded.

A TEST/NORM switch, A12S1, is included in the emitter paths of the 20 dB step gain amplifiers. In the TEST position, the switch defeats the two 20 dB amplifier stages, providing a fixed 10 dB of gain for use when making LOG amplifier adjustments.

**Bandpass Filter**

The output of the step-gain amplifiers is coupled through a two-section bandpass filter. The bandpass filter consists of A12L9, A12L10, A12C24, and A12C25 and provides rejection of signals outside the region of 21.4 MHz.

**+ 19.5V Regulator**

The + 19.5V regulator consists of series regulator A12Q13, driver A12Q12, and reference amplifier A12Q10 and Q11. Zener diode A12VR1 provides a +6.2V reference for the base of Q11. Q10 senses the + 19.5V output across resistors A12R45, R46, and R7, the + 19.5V adjustment. Should the output voltage start to drop below + 19.5V, Q10 will start to turn off. This will turn on Q11 which turns on Q12 and Q13, raising the output back to + 19.5V. L11 and C27 filter the + 19.5V output. C26 between the collector and emitter of Q 12 is used to stabilize the feedback gain at high frequencies.

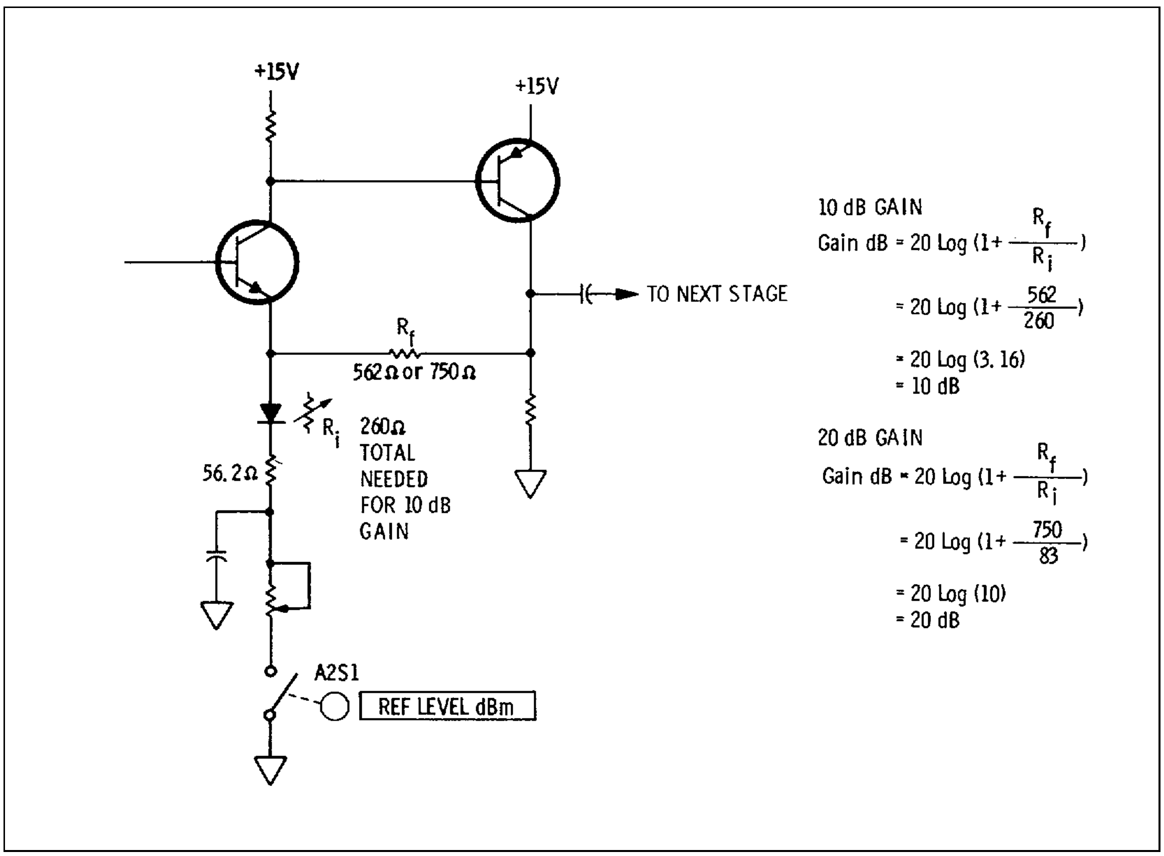


*Figure 8-31. Equivalent Circuit for Step Gain Amplifiers*

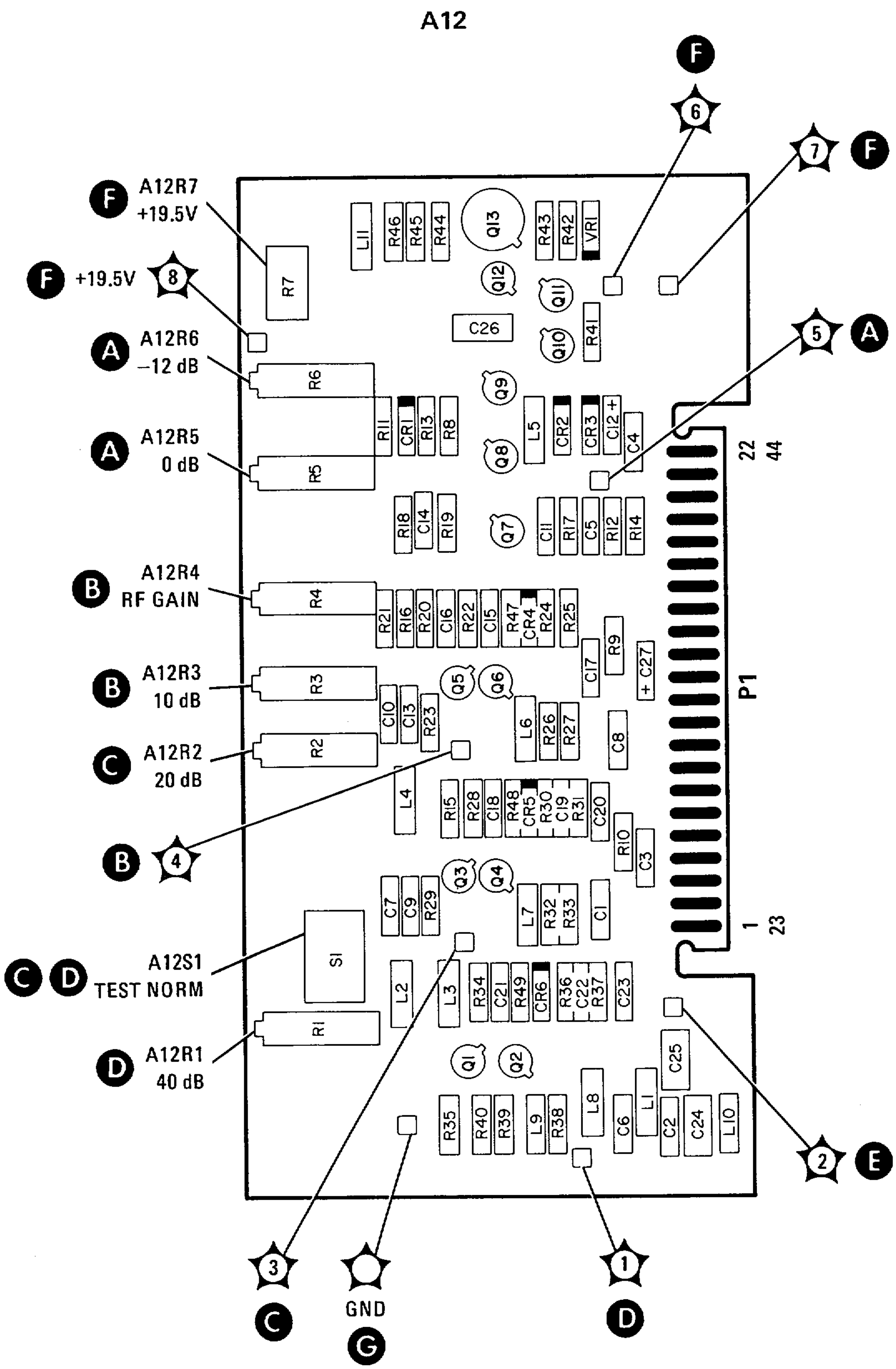


*Figure 8-32. A12 Step Gain Assembly,* Component *and Test Point Locations*

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PAGES
8-75 through 8-76

## A13 BANDWIDTH FILTER NO. 2 CIRCUIT DESCRIPTION

The Bandwidth Filter No. 2 Assembly is very similar to the Bandwidth Filter No. 1 Assembly A11, and corresponding components have the same reference designators. The differences between the two board assemblies are as follows:

1. A13 has a limiting diode, CR18, connected between the input (P1-23) and ground; A11 does not.

2. The values of some resistors and capacitors in A13 are different from their counterparts in A11.

3. A13 has about 0.5 dB less gain than A11.

A13

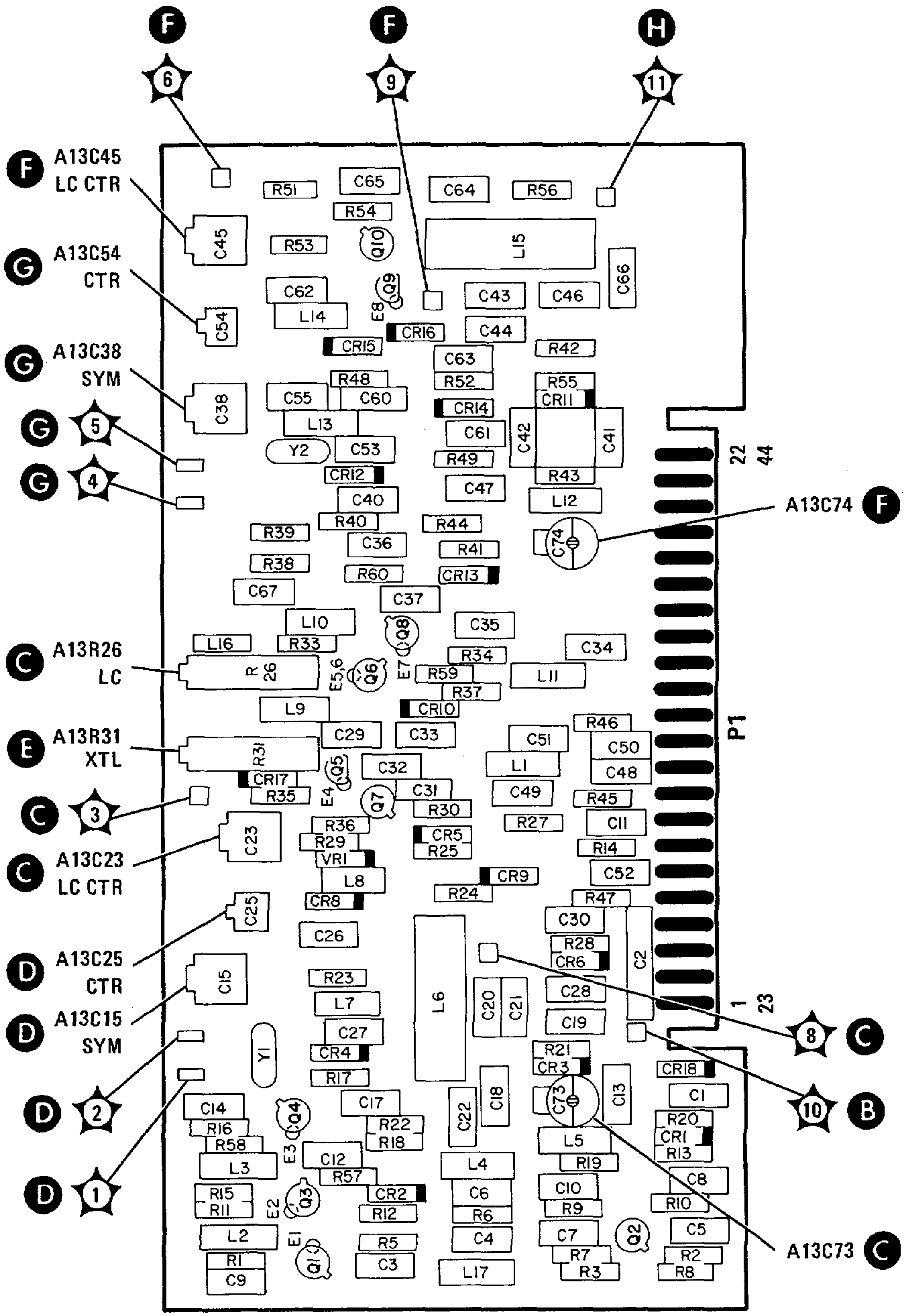


*Figure 8-34. A13 Bandwidth Filter No. 2 Assembly, Component and Test Point Locations*

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PAGES
8-79 through 8-80

## A14 LOG AMPLIFIER ASSEMBLY, CIRCUIT DESCRIPTION

### General Description

The Log Amplifier Assembly provides the ability to display signals in either a linear mode or 70 dB LOG mode. It also operates with the Step Gain Assembly A12 to provide the last 40 dB of step gain amplification of the 21.4 MHz IF signal.

The Log Amplifier Assembly has seven amplifier stages, with each stage capable of providing both linear and logarithmic amplification. Following the amplifier stages, the amplified IF signal is detected to produce the vertical signal for the display. An offset circuit, following the detector, is used-in the log mode to offset the vertical output in steps equivalent to 40 dB of IF gain.

### Log Mode of Operation

The seven amplifier stages limit the gain in sequence to provide 70 dB of log amplification. Each stage consists of an emitter follower used as a voltage source to drive a common-base amplifier whose gain decreases with increasing signal level.

**Log Amplifier Gain.** The operation of the second stage is described. In the log mode of operation, Q24 (Gain Control Lines circuit) is on, forward biasing the log diodes, CR10 and CR11, which are Schottky diodes with a forward bias voltage of approximately 0.4V. The gain of the amplifier is set by the ratio of R52 to the total resistance RT between the emitters of Q13 and Q8. An example of gain computation is shown in Figure 8-36 RT is at a minimum (approximately 150 ohms) for small signals when the ac signal current in log diodes CR10 and CR11 is small compared to their dc bias current. As the ac signal level is increased, the ac signal current increases to the level of the dc bias current and RT increases because of current limiting in the diodes.

The initial (maximum) gain of the stage (approximately 10 dB) is set by the dc bias current through the log diodes. The bias current is controlled by the temperature variable -8VT supply at the emitter of Q24. The final (minimum) gain of the stage (0 dB) is set by the circuit configuration (RT becomes very large) and can be set further by the adjustment of R39 -10 dB.

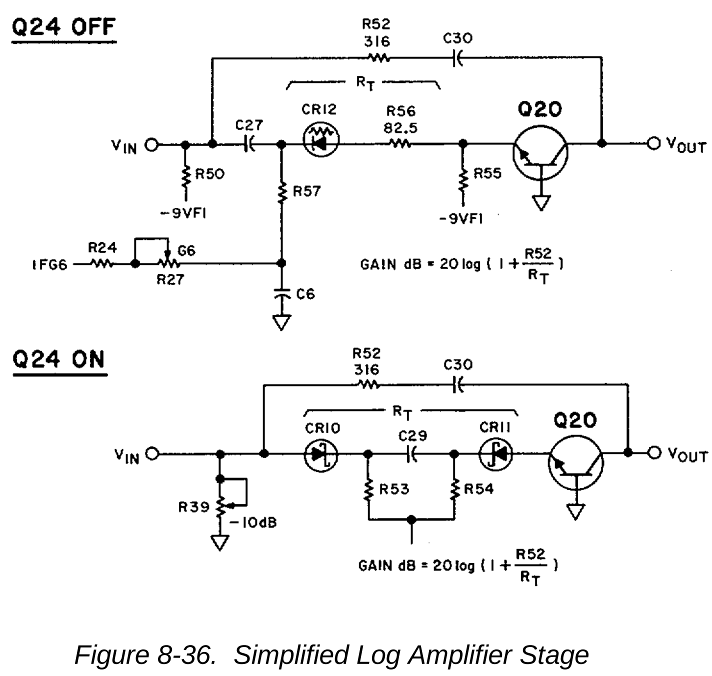


*Figure 8-36. Simplified Log Amplifier Stage*

**Linear Mode of Operation**

**Linear Gain.** In the linear mode, the limiting action of the log diodes is removed from the seven amplifier stages. The operation of the second stage is described. Q24 is turned off, and the dc bias current through log diodes CR10 and CR11 is zero. With zero dc bias current the total resistance, $R_T$, is maximum and the stage gain is approximately unity (0 dB). (See Figure 8-26.)

In the sixth and seventh stages, an alternate signal path is used to set the gain at about 5 dB per stage. The purpose of this fixed gain is to scale properly between the log and linear modes. These stages are activated by the -8VT from the AMPLITUDE SCALE switch through R34 (LIN), R93, and R101, and finally through the cathodes of CR25 and CR28. The combined gain of the two stages is adjusted with R34 (LIN), which controls the dc bias current in the PIN diodes.

**Step Gain Operation**

The Log Amplifier Board Assembly provides 40 dB of step gain in 10 dB steps. This gain, combined with 50 dB of step gain from Step Gain Assembly A12, will produce up to 90 dB of total step gain. The amount of step gain is selected by the front panel REFERENCE LEVEL switch (A2A1S1). The control lines from A2AiS1, IFG4, IFG5, and IFG6, control the step gain on the Log Amplifier Board Assembly.

**Step Gain When in Log Mode.** When in log mode, control lines IFG4, IFG5, and IFG6 route + 15V to the Log Offset circuit through R24, R25, and R26. This forward biases diodes CR32, CR33, and CR31. The Log Offset circuit provide 10, 20, 30, or 40 dB of step gain, depending on the state of the control lines. (See Log Offset circuit description.)

**Step Gain When in Linear Mode.** In linear mode, amplifier stages 2, 3, 4, and 5, are used to provide 40 dB of step gain in 10 dB steps. In linear mode, the LOG/LIN line is at -8VT, Q24 is off, and the log diodes are normally off. Each amplifier stage has unity gain (0 dB). The control lines, IFG4, IFG5, and IFG6 are used to forward bias the log diodes, thus changing the gain of the amplifier stages from 0 dB to 10 dB. The state of the control lines determine which of stages 2, 3, 4, or 5 has a gain of 10 dB.

For example, with INPUT ATTEN at 0 dB and REFERENCE LEVEL dBm at -60, -8VT is routed through A2A1S2 and A2A1S1 to the IFG4 control line to forward bias CR22. The fifth amplifier stage gain changes from 0 dB to 10 dB, providing 10 dB of step gain.

Resistors R33, R30, and R27 may be adjusted to set the step gains of stages 5, 4, and 3 and 2, respectively.

**Log Mode Temperature Controlled Variable Gain Amplifier**

**LOG/LIN Relationship.** In linear mode, when approximately 700 mVrms (+ 10 dBm) is applied to the input of the log amplifier, the voltage at the output of stage 7 (TP5) is about 1.5 Vrms. With the same input signal in log mode, the output at TP5 is about 2.0 Vrms. To maintain equal relationship with maximum input signal (trace at the top of the display) the output in log mode must be attenuated. This attenuation is achieved through the use of variable gain amplifier Q7, whose gain is determined by the ratio of its collector load to its emitter load.

**Variable Gain Amplifier.** In linear mode, the LOG/LIN control line is at -8VT. This forward biases CR4 and causes the output of U2B (TP1) to go to approximately + 15V. CR29 is reverse biased, and the gain of the variable gain amplifier is R104/R105 (100/316), or approximately 0.3. In log mode, the LOG/LIN control line is at + 15V, which reverse biases CR4. The output of U2B is now approximately + 0.45V. CR29 is forward biased and has an ac resistance of about 100 ohms, which is in parallel with the 100-ohm R104, so the collector load of Q7 is 50 ohms. The gain is 50/316, or 0.15. This gain depends upon the resistance of CR29, which is set by SLOPE adjustment R23.

### Detector and Buffer Amplifier

The signal output of Q7 is applied to the base of Q6, which converts voltage variations into current variations. Q5 is the current driver for the detector. Q4, a half-wave rectifier, is biased just below cutoff by CR1. When the input signal is positive, Q4 is in conduction but is cut off during the negative transistion. The detector output is routed to a low-pass filter and a X2 buffer amplifier, Q21 and Q22, to provide the video output.

### Log Offset

The last 40 dB of log step gain is produced in this circuit. When this gain is used, there is already a full 50 dB of gain in the Step Gain Assembly, so the noise of the analyzer is amplified into the log range of the Log Amplifier Assembly. This makes further amplificiation unnecessary since any signal below the log range of the Log Amplifer Assembly would be buried in the noise. The output of the detector can then be offset in 100-mV steps corresponding to 10 dB of IF amplification. This offset is provided by Q23 operating as a stepped current source into R115. With the AMPLITUDE SCALE switch in one of the LOG/DIV positions, + 15V is routed throuh the closed contacts of the REFERENCE LEVEL dBm switch to the IF gain control lines IFG4, IFG5, and IFG6. With an IF gain control line connected to + 15V, a log-shift diode (CR31, CR32, or CR33) is forward biased, and this bias current, determined by R123, R124, or R125, flows into the emitter of current source Q23. IFG4 and IFG5 each provides 10 dB (100 mV) of log offset gain and IFG6 provides 20 dB (200 mV). The LOG GAIN adjustment R121 sets the operating point of Q23 for 100-mV steps.

### Temperature Compensation Power Supply

Temperature compensation is provided for the - 8VT and + 1V regulators. CR2 and CR4 operate as the temperature-sensing element. Temperature variations cause diode voltage changes that are amplified by U1A for the - 8VT supply and by U2B for the + 1V supply. The - 8VT supply provides bias current for the Schottky diodes in the LOG mode. In the linear mode, the - 8VT supply provides bias current for CR12, CR15, CR19, CR22, CR25, and CR28. The + 1V supply provides bias current for CR29.

### +11 V Regulated Power Supply

A precise 5.4V reference voltage VR1 is provided for the + 11V Regulator. This reference voltage is applied to the positive input of U1B. R5 and R6 set the gain of U1B to 2.1. The output at TP2 is 2.1 x 5.4, or 11.3V. Q1 acts as an emitter follower and provides the current drive for the + 11 V supply.

A14

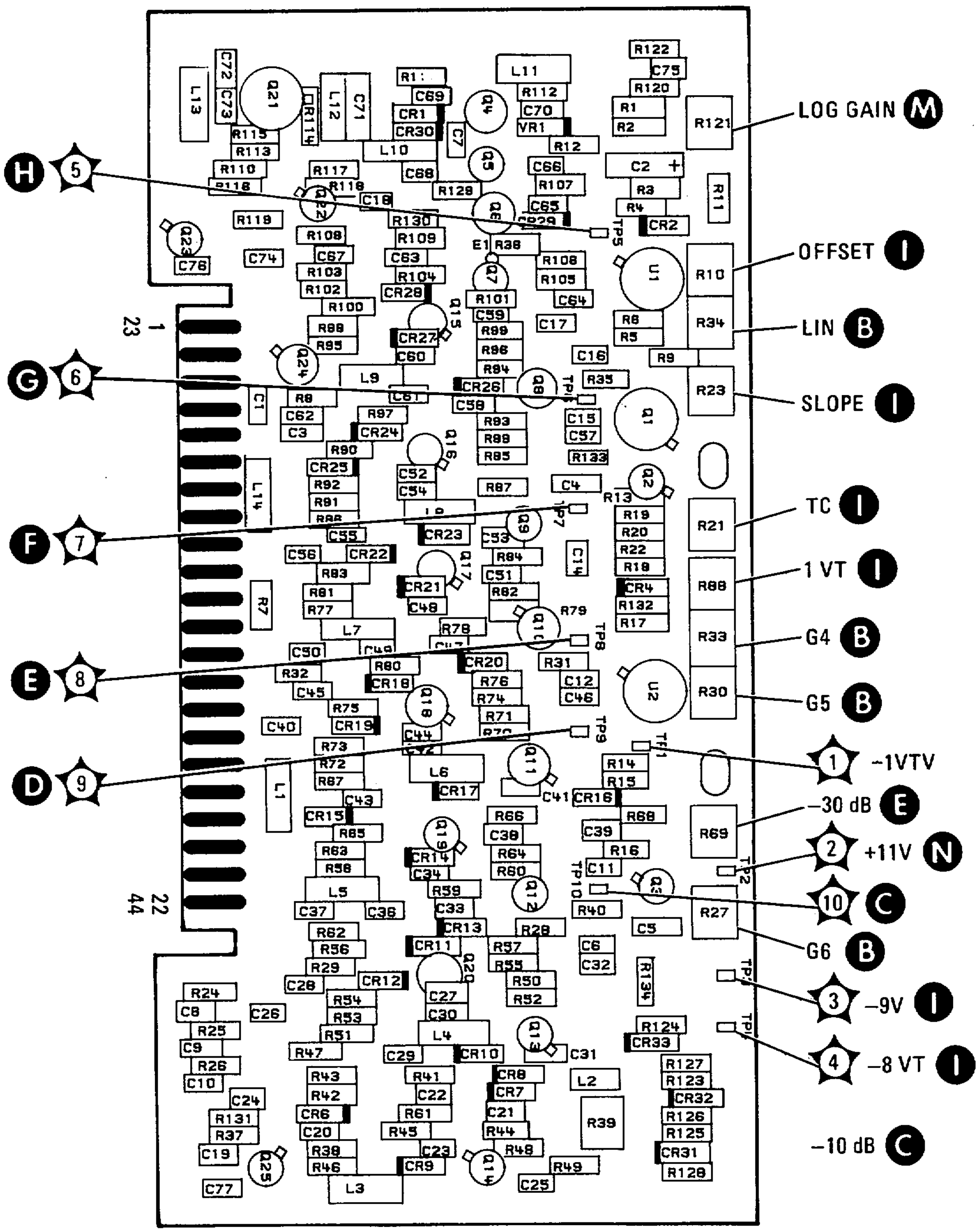


*Figure 8-37. A14 Log Amplifier Assembly, Component Locations*

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PAGES
8-85 through 8-88

## A15 VERTICAL DRIVER AND BLANKING CIRCUIT DESCRIPTION

### General Description

The Vertical Driver and Blanking Assembly provides a preamplifier circuit to amplify the detected and filtered video from the log amplifier. The video signal needed to trigger the sweep generator in INT mode is picked off at the preamplifier. A vertical driver (differential amplifier) converts the signal to drive the vertical deflection plates (push-pull output).

The blanking and pen lift drive signals are also generated on assembly A15.

### Preamplifier

The detected and filtered video input (0V to 0.8V) from the Log Amplifier Assembly A14 is applied to the gate of A15Q17A. A15Q17, Q11, Q12, and Q18 make up a differential amplifier. The gate of Q17A is the noninverting input and the gate of Q17B is the inverting input. The output at the emitter of A15Q18 is feedback applied to the gate of Q17B through voltage divider A15R11, R12, and R13. The voltage gain of the preamplifier is 1 + R11/R12 + R13 = 10. With an input voltage range of 0V to 0.8V, the maximum signal measured at the output of A15Q18 (TP5) would be 8V. (This signal coupled through A15R17 is the trigger voltage for INT mode.) A buffer amplifier consisting of A15U2A, U2B, and Q20 provides isolation between the preamplifier and vertical driver. A15U2D and Q13 are current sources to bias the differential amplifier.

The vertical deflection sensitivity of the following vertical driver is 0.8V for full-scale deflection. Since a maximum possible signal of 8V is available from the preamplifier, to obtain the correct signal amplitude, a divide-by-10 and an offset circuit are used.

**10 dB/DIV and LIN.** The preamplifier output is divided by 10 when LOG/LIN switch A2S2 is in either LIN or 10 dB/DIV. With LIN or 10 dB/DIV selected, + 15V is applied to the Expand line, back biasing A15CR1, and turning A15Q19 on. Also A15CR2 is on and CR3 is back biased. With A15Q19 on, a voltage divider consisting of A15R18, R20, and Q19 divides the preamplifier output by 10.

**1 dB/DIV.** With 1 dB/DIV selected, the Expand line is open and A15Q19 is held off by A15CR1 and R22. The divide-by-10 circuit is disabled and the full 8-volt preamp voltage is available. Since only the 0.8V peak can be displayed, the signal to the buffer amplifier is offset by -7.2 volts as follows: A current source A15U2C is on, drawing current through A15CR3 and R18. The voltage drop across R18 is set for 7.2V, so the 8V input is shifted -7.2V below ground. When the signal goes below ground (OV), A15CR4 conducts and clamps the signal at -0.6V. The 1 dB OFFSET adjustment, A15R1, sets the current for the correct voltage shift.

### -5.5V Temperature Compensated Supply

The -5.5V temperature-compensated supply controls four current sources: A15U2D, Q13, U2C, and Q15. The temperature-sensing element, A15U2E (connected as a diode), tracks the base-emitter temperature changes of the current-source transistors.

### Vertical Driver

The vertical driver-is a differential amplifier that consists of A15Q2, Q3, Q6, Q7, and Q14 with Q15 as the current source. (See Figure 8-39.) The 0V to 0.8V vertical signal from the output of the preamplifier is converted to a push-pull signal to drive the CRT vertical deflection plates. A15Q14 is a dual transistor used as the input stage to the Vertical Driver circuit. The reference input level at the base of A15Q14A is set by the VERT POSN control, A2R6. The gain of the vertical driver is set by the voltage divider consisting of A15R34, R42, and VERT GAIN control A2R7. The transistor pairs A15Q2/Q6 and A15Q3/Q7 are current-to-voltage amplifiers and are driven by the current from the collectors of A15Q14A and B respectively. Diodes A15CR5 through CR8 protect the bases of A15Q2, Q3, Q6, and Q7 to prevent them from being driven more negative than approximately 0.6V (the voltage drop across a diode). The resistors A15R44 and R52 decouple the capacitive load of the CRT plates from the emitters of A15Q2 and Q3, preventing overshoot and ringing in the vertical driver. A15Q21, CR11, and CR12 provide vertical driver input switching for normalizer compatibility. When the normalizer is not connected, pull-up resistor A15R56 places the cathode of A15CR11 at + 15V, preventing CR11 from conducting. A15Q21 is turned on so the input to the vertical driver is from the output of the preamplifier. When the normalizer is connected and in the BYPASS mode, the L NORM line at A15J3 is high (+ 12V) preventing A15CR11 from conducting. When the normalizer is operating, the L NORM line is pulled low (- 12V) causing A15CR11 to conduct. A15Q21 is turned off by the negative voltage at the gate, switching the vertical driver input to the normalizer output (Y NORM).

### Blanking OR

Normally A15Q4 is off placing a low at the base of A15Q9 and turning it on. A15Q4 requires a positive voltage or about 1 mA to turn on and cut Q9 off. A high into the OR circuit provides a high blanking output (0V) to the mainframe. There are four conditions that cause blanking of the sweep. (See Figure 8-40.) When the normalizer is not connected, pull-up resistor A15R56 places the cathode of A15CR12 at + 15V, preventing CR12 from conducting. When the normalizer is connected and in the bypass mode, the L NORM line at A15J3 is high (+12V) keeping A15CR12 from conducting. When the normalizer is operating, the L NORM line is pulled low (-12V) causing A15CR12 to conduct. With A15CR12 conducting, the output of the blanking OR is held at a negative voltage level, inhibiting blanking from the 8558B.

### Vertical/Baseline Comparator

The vertical/baseline comparator circuit consists of A15Q16 and Q8. The baseline clipping reference voltage is set by front panel BASELINE CLIPPER control A2R2 which varies the base voltage of A15Q16. The vertical preamplifier output signal is applied to the base of A15Q8. The signal voltage at the base of A15Q8 is compared to the dc reference on Q16. When the signal voltage becomes more negative than the reference, Q8 turns on and the high input to its base turns A15Q4 on, blanking the display.

### Sweep Ramp High/Low Limit Comparator

Operational amplifier A15Q1A and Q1B is connected to form a comparator circuit. A voltage divider made up of A15R6, R7, and R8 establishes a high and low voltage reference at UIA pin 2 and U1B pin 5. The switching limits are approximately + 0.6V at U1B pin 5 (low frequency blanking) and +6.8V at U1A pin 2 (high frequency blanking). The signal to the other inputs of the comparator is the frequency analog voltage from the YIG main coil swept driver. The frequency analog input voltage is proportional to the instantaneous frequency to which the analyzer is tuned and sweeps from 0.7V to 6.7V as the analyzer tunes from 0 to 1500 MHz. If the YIG tuning voltage at U1B pin 6 goes below 0.6V, the output of U1B rises to about + 14V. This turns on A15Q4 and blanks the display. If the YIG tuning voltage at U1A pin 2 rises above 6.8V, the output of U1A rises to about + 14V turning on A15Q4. Blanking of the display occurs whenever the analyzer is swept below about - 30 MHz or above about 1600 MHz.

### Pen Lift Driver

The display is blanked during retrace and the dead time of the sweep voltage. The Retrace Blanking input from A8Q9 in the sweep generator circuit is applied to the emitter of buffer amplifier A15Q1. When the sweep ramp is turned off (dead time), the Retrace Blanking signal rises to + 10V. The + 10V connected to the base of A15Q4 produces the blanking output. The same + 10V Retrace Blanking input is applied to the base of A15Q5, turning Q5 on and Q10 off. The collector of A15Q10 then rises to + 15V. A15Q10 provides a signal that can be used to drive the Pen Lift input on an X-Y recorder. This signal causes the pen to lift during the analyzer sweep retrace and dead time. Breakdown diodes A15VR2 and VR3 suppress the high positive and negative voltage transients that some X-Y recorder pen lift coils can generate.

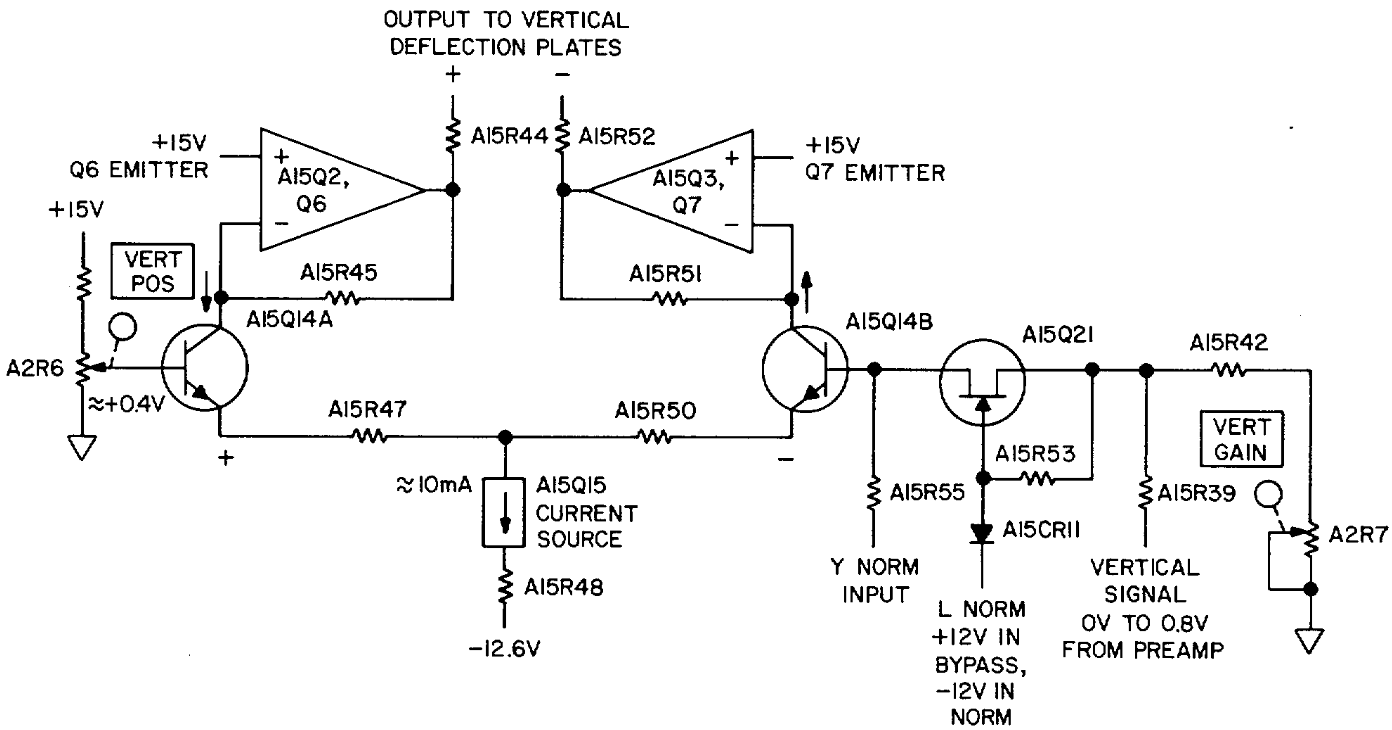


*Figure 8-39. Simplified Vertical Driver Circuit*

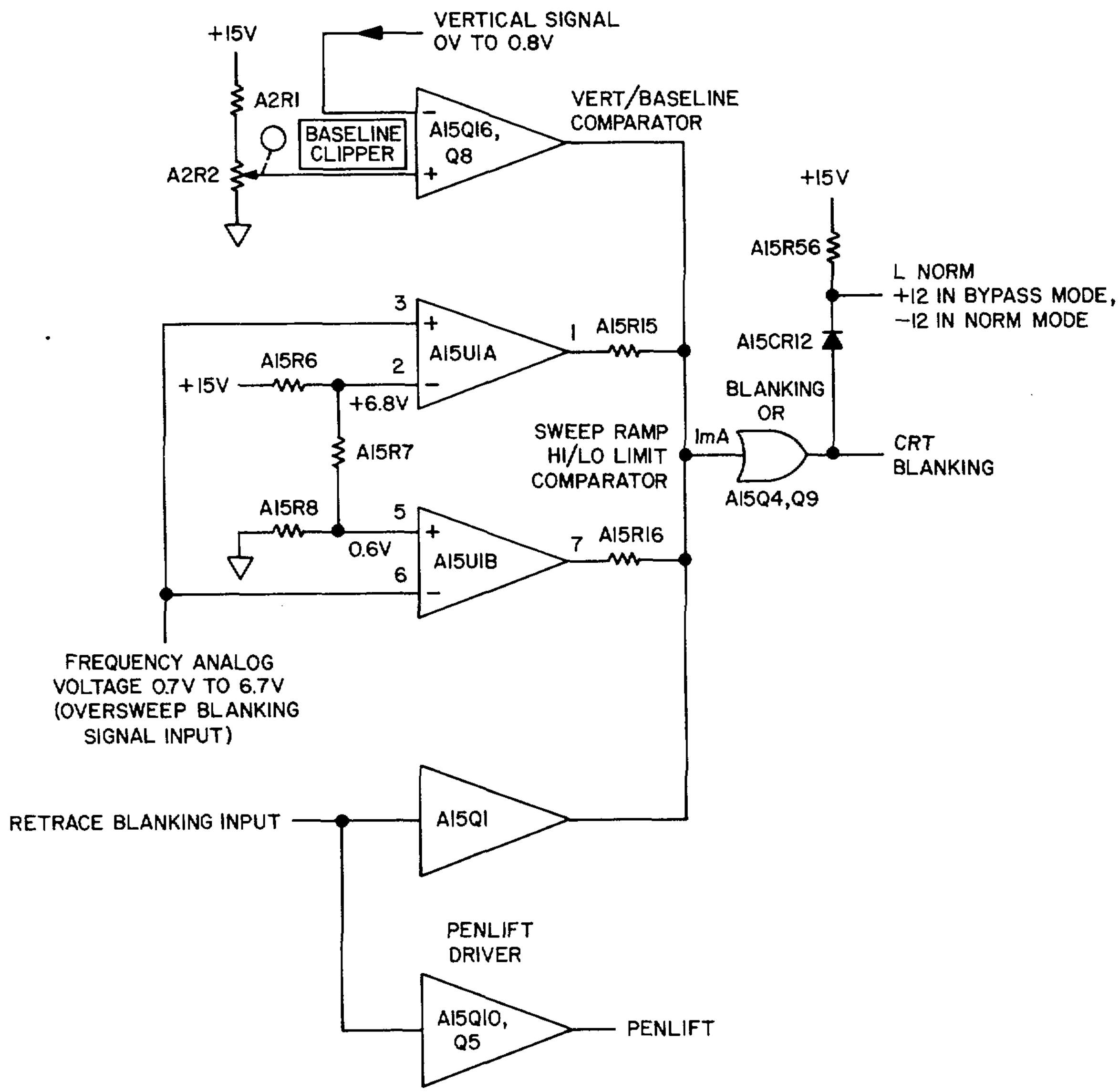


*Figure 8-40. Simplified Blanking Circuit*

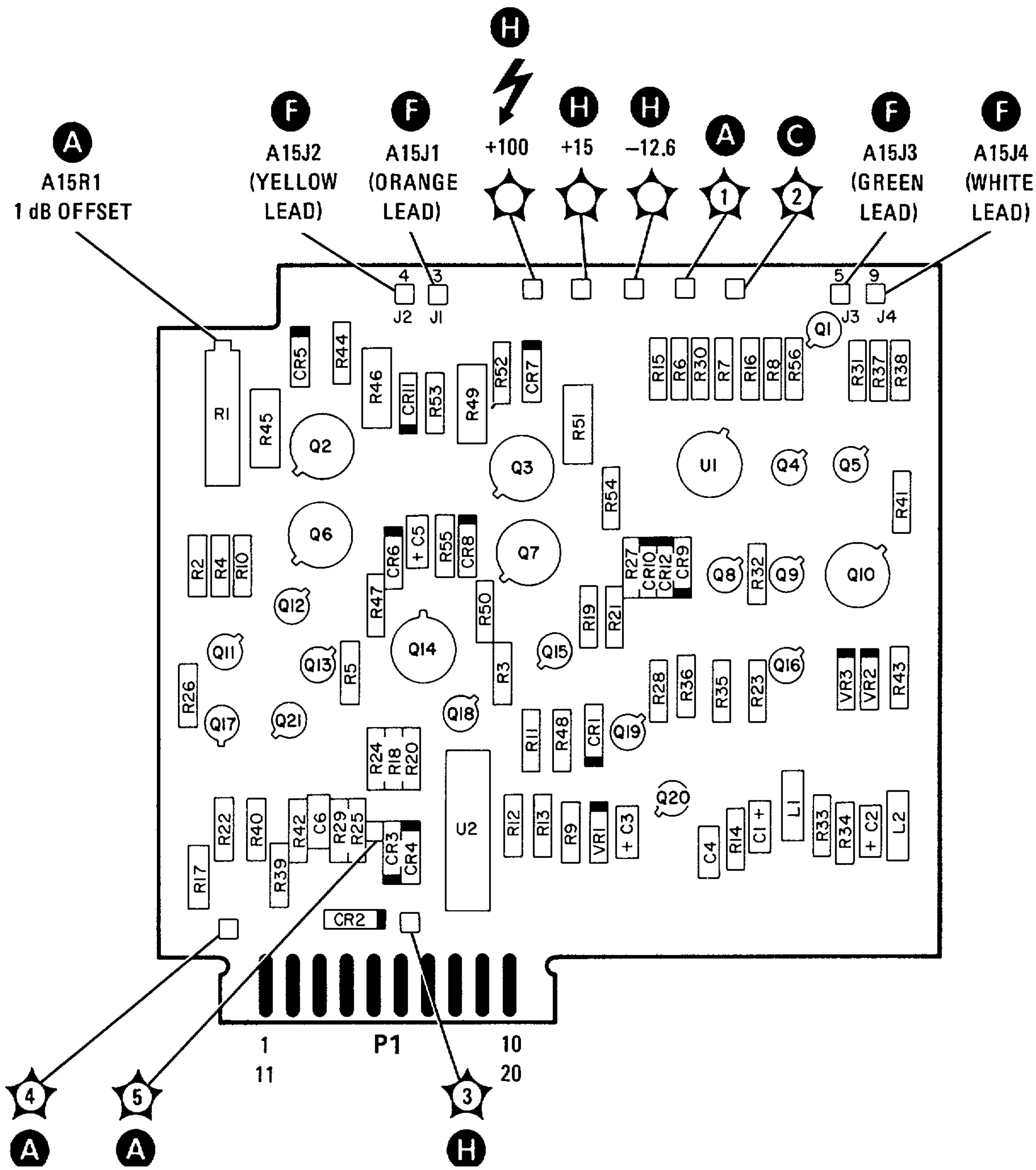


*Figure 8-41. A15 Vertical Driver and Blanking Assembly, Component and Test Point Locations*

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**PAGES**
**8-95 through 8-100**

## A17 INVERTER CIRCUIT DESCRIPTION

### +5V Power Supply

Inverter Assembly A17 is a single transformer inverter with A17Q1 and Q2 operating as a 22 kHz squarewave oscillator. Diodes A17CR1 and CR2 prevent the transistors from base-emitter reverse breakdown. Positive feedback to sustain the oscillation is taken from the transistor base tickler winding of T1. A17R1* provides current to the base of Q2 to start oscillations when the -12.6V supply is first turned on. The voltage at the collectors of A17Q1 and Q2 is a -12V to +12V square wave. Diodes A17CR5, CR6, CR7, and CR8 are connected as a full-wave rectifier, receiving ac power from 6V taps on either side of the grounded center tap. The rectified dc is filtered by A17L6, L7, L8, C5, and C6. The filtered output voltage is +5V and powers DPM Driver Assembly A1A2. A17VR1, a 6.19V zener, provides protection for the DPM Driver in case of excessive or reverse voltage.

### +20.5V Power Supply

The oscillating current between the collectors of A17Q1 and Q2 through the primary winding of T1 induces a voltage in the secondary of T1. Diodes CR3 and CR4 full-wave rectify this voltage, which is then filtered by A17L3, L4, L5, C3, and C4. The dc output voltage, approximately +5.5V, is added to the +15V supply to obtain a + 20.5V supply

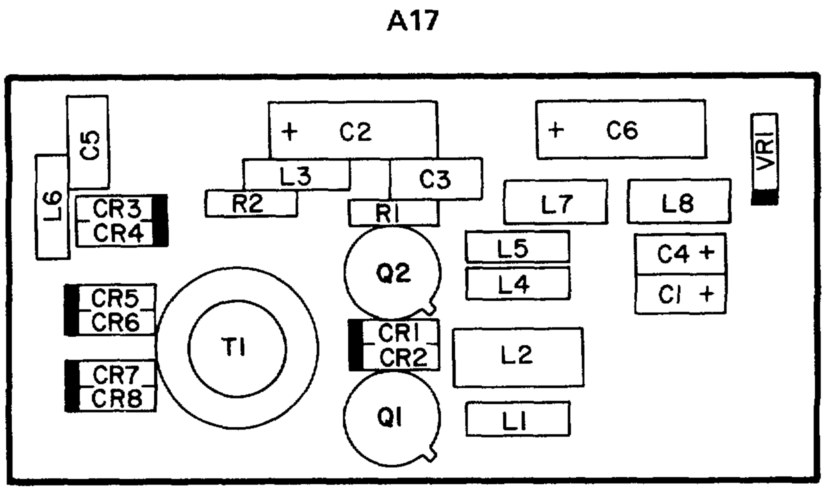


*Figure 8-45. A17 Inverter Assembly, Component Locations*

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**PAGES**
**8-103 through 8-106**

## FRONT SWITCH ASSEMBLY A2 DISASSEMBLY AND REPAIR

*Tools and Materials Required*

| Description | HP Part Number | Check Digit |
|---|---|---|
| No. 2 Spline (Bristol) Wrench | 8710-0055 | 0 |
| Long No.4 Hex (Allen) Wrench | 5020-0288 | 5 |
| Long No. 6 Hex (Allen) Wrench | 5020-0289 | 6 |
| 13/64-inch Open-end Wrench | 8710-0946 | 8 |
| 5/16-inch Open-end Wrench | 8720-0015 | 3 |
| 3/8-inch Open-end Wrench | 8720-0016 | 4 |
| 1/2-inch Open-end Wrench | 8720-0025 | 5 |
| 5/8-inch Open-end Wrench | 8720-0010 | 8 |
| 1/4-inch Nut Driver | 8720-0002 | 8 |
| 5/16-inch Nut Driver | 8720-0003 | 9 |
| 3/8-inch Nut Driver | 8720-0005 | 1 |
| 1/2-inch Nut Driver (end covered with heatshrink tubing) | 8720-0007 | 3 |
| 9/16-inch Nut Driver (drilled out, end covered with heatshrink tubing) | 8720-0008 | 4 |
| Pozi-driv Screwdriver | 8710-0899 | 0 |
| Long-nose Pliers | 8710-0030 | 1 |
| Wire Cutters | 87100012 | 9 |
| Instrument Grease | 6040-0584 | 7 |
| Tiewraps | 1400-0249 | 0 |
| Small Brush (for Grease Application) | 8520-0015 | 9 |
| Isoproply Alcohol/Distilled Water Mixture (50%-50%, for use as cleaning solvent) | | |

### REMOVAL OF FRONT SWITCH ASSEMBLY FROM HP 8558B CHASSIS

1. Turn HP 8558B upside down on a flat work surface.

**NOTE**

**Numbers in parentheses match the numerical callouts on Figure 6-3, Front Switch Assembly (exploded view), in Section VI. Unless otherwise indicated, all other illustrations referenced in these procedures follow the last procedural step.**

2. Use a 9/16-inch nut driver (drilled out, if necessary, to fit over front panel BNC connectors, and covered with heatshrink tubing or tape to avoid scratching enameled front panel) to remove two dress nuts holding 1 ST LO OUTPUT and CAL OUTPUT connectors to front panel.

3. Use a 5/16-inch open-end wrench to carefully disconnect semi-rigid Cable W14 from RF Input Limiter U1 (cable connects Limiter to Input Attenuator A3).

4. Cut plastic tiewrap holding brown CAL OUTPUT Cable W8 to Front Switch Standoff (69).

5. Disconnect 50-conductor Ribbon Cable A2A1W3 (53) from Motherboard Assembly A16.

6. Turn HP 8558B right-side up, with front panel facing you.

7. Disconnect 14-conductor Ribbon Cable A2AlWl (52) from DPM Driver Assembly A1A2. Fold cable up away from board.

8. Remove the four Screws (19) attaching DPM Driver Assembly A1A2 to DPM Mounting Brackets (20, 21).

9. Disconnect four wires (0, 916, 918, 923) from upper right corner of Front Switch Board Assembly A2A1 (next to FREQUENCY ZERO potentiometer).

10. Remove the four screws attaching Front Switch Diecast (1) to left and right side gussets. Remove Front Switch Assembly A2, with Front Panel and RF Input Attenuator A3, from HP 8558B chassis and set chassis to one side.

## DISASSEMBLY OF FRONT SWITCH ASSEMBLY

### NOTE

**It is not necessary to remove front panel, all connectors, and all knobs to service Front Switch Board Assembly A2A1 (steps 11-24).**

11. Remove the following front panel knobs using a no. 4 hex (Allen) wrench: FINE TUNE, COARSE TUNE, RESOLUTION BW, FREQ SPAN/DIV, REF LEVEL FINE, and REFERENCE LEVEL (including Index Disc, Retaining Clip, Nylon Spacer Washer(s), Conical Spring, and Input Attenuator pointer).

12. Remove VIDEO FILTER and BASELINE CLIPPER knobs using a no. 2 spline (Bristol) wrench.

13. Remove dress nut on FREQUENCY CAL pushbutton using a 13/64-inch open-end wrench.

14. Remove front panel hex nut and lockwasher on Coarse Tune Bushing (42) using a 1/2-inch nut driver (covered with heatshrink tubing or tape to avoid scratching enameled front panel).

15. Remove Retaining Clip (25) from RESOLUTION BW Shaft (61).

16. Place Front Switch Assembly on flat working surface with remaining knobs face-down and lock mechanism facing you. Prop sides of switch assembly to allow knobs and shafts to clear working surface (be careful not to scratch front panel enamel).

17. Loosen hex nut attaching RF Input Cable Assembly W1 to Front Switch Assembly using a 5/8-inch open-end wrench *(Options 001 and 002: Loosen front panel dress nut with special 9/16-inch nut driver).* Carefully disconnect input cable assembly from RF Input Attenuator A3 using a 5/16-inch open-end wrench. Remove input cable assembly from Front Switch Assembly.

18. Remove Screw (19) and Washer (56) attaching Attenuator Bracket (55) to Front Switch Diecast (1). Remove RF Input Attenuator A3 from Front Switch Assembly.

19. Disassembly of REFERENCE LEVEL Switch:

   a. Cut tiewrap holding REF LEVEL FINE wires to Standoff (69).

   b. Remove the three Screws (54) attaching Ref Level Fine Pot Plate (75) to Standoffs (69).

   c. Remove Index Disc Locator and Ref Level Fine Assembly (35, 36, and 71 through 76) from Front Switch Assembly (set to one side, without detaching wires).

d. Remove three Standoffs (69) used to support Ref Level Fine Pot Plate (75). Use a no. 6 hex wrench to loosen the two set screws on Miter Gear (57) attached to Attenuator Shaft Assembly (17); then remove Miter Gear from shaft.

e. Use a no. 4 hex wrench to loosen Rotating Lockout (70) attached to Ref Level Shaft (6), and remove lockout from shaft. Remove Ref Level Detent (68) from Front Switch Assembly. Be careful to keep Ball Bearing (10) and Spring (11) with Ref Level Rotor (67).

f. Remove the three Studs (59) used to support Ref Level Detent (68).

g. Use a no. 4 hex wrench to loosen the two set screws on front Anticrush Drive Hub Assembly (7) (between Front Switch Board A2A1 and Front Switch Diecast (1) on Ref Level Shaft (6); accessible from side of Front Switch Assembly). Remove Ref Level Rotor (67) and Ref Level Shaft (6) with rear Anticrush Drive Hub Assembly (7) still attached.

**NOTE**

**Rear Anticrush Drive Hub Assembly (7) on Ref Level Shaft (6) is preset at 9.525 mm (03 in.) from end of shaft (see Figure 848A). Do not remove drive hub unless necessary for repair.**

20. Disassembly of RESOLUTION BW Switch.

a. Use a 1/4-inch Nut Driver to remove two Hex Nuts (22) attaching Bandwidth Switch Board (66) to Front Switch Assembly, and set board to one side (without detaching wires).

b. Remove Rotor Spacer (64) and Bandwidth Rotor (63). Be careful to keep Ball Bearings (10) and Springs (62) with rotor.

c. Remove Bandwidth Shaft (61), with rear Drive Hub (14) still attached, from Front Switch Assembly.

**NOTE**

**Rear Drive Hub (14) on Bandwidth Shaft (61) is preset flush with collar on shaft (see Figure 848B). Do not remove drive hub unless necessary for repair.**

d. Use a no. 4 hex wrench to loosen the two screws on Coupling Hub (60) attached to Frequency Span Shaft (9), and remove hub from shaft.

e. Remove the two Studs (59) used to support Bandwidth Switch Board (66). Remove Bandwidth Detent (58) from Front Switch Assembly.

21. Disconnect Probe Power wires (0, 92, 97) from Front Switch Board Assembly A2A1.

22. Remove Screw (23) and Spacer (24) attaching Front Switch Board Assembly A2A1 to Front Switch Diecast (1) above DPM Display.

23. Remove the three remaining Screws (54, not shown in Figure 6-3) attaching Front Switch Board Assembly A2A1 to Front Switch Diecast (1).

24. Twist the left side of Front Switch Board Assembly A2Al down approximately 1/8-inch to provide clearance from Front Switch Diecast support arm (upper left corner). Lift Front Switch Board Assembly A2A1 from Front Switch Diecast (1) and set aside.

25. Removal of Rotor Assemblies:

   a. Remove Attenuator Drive Rotor (8), front Anticrush Drive Hub Assembly (7), and Attenuator Shaft Assembly (17) from Front Switch Diecast (1), and set these parts aside.

   b. Remove Frequency Span Rotor (13) with associated parts (9-12, 14-16) from Front Switch Diecast (1), and set aside. Be careful to keep Ball Bearings (10) and Springs (11) with Frequency Span Rotor (13).

**NOTE**

**Drive Hub (14) on Frequency Span Shaft (9) is preset at 12.954 mm (0.510 in.) from end of shaft (see Figure 848C). Do not remove drive hub from shaft unless necessary for repair.**

   c. Remove SWEEP TRIGGER, MANUAL SWEEP, and SWEEP TIME/DIV knobs using a no. 4 hex wrench.

   d. Remove both remaining rotor assemblies from Front Switch Diecast (1), and set aside. Be careful to keep Ball Bearings (10) and Springs (27) with their respective rotors.

26. Use a no. 4 hex wrench to loosen the two set screws in Lock Knob. Remove Lock Knob.

27. Use a 5/16-inch nut driver to remove the two nuts attaching front panel to Front Switch Diecast (1). Remove front panel from Front Switch Diecast.

28. Disassembly of Lock:

   a. Press Locking Link (5) into Front Switch Diecast (1) to release pressure on Dowel Pin (4). Remove Dowel Pin through cutout in Front Switch Diecast. (Individual parts are identified in Figure 8-50.)

   b. Remove Locking Link (5), Locking Shaft (3), and Lock Spring (2) from Front Switch Diecast.

**CLEANING AND INSPECTION OF FRONT SWITCH ASSEMBLY**

1. All switch contacts must be totally clean and grease-free for proper operation. Use a 50-50 mixture of isopropyl alcohol and distilled water to thoroughly clean switch rotor contacts and Front Switch Board Assembly A2A1. Avoid touching contacts with fingers.

2. Inspect for bent or damaged shafts, worn or broken contacts, weak or broken springs, rough feeling potentiometers, cracked castings, and damaged PC boards. Check for signs of corrosion or rust. Replace any suspect parts.

3. A special Instrument Grease, (see list of Tools and Materials at beginning of these procedures) is recommended exclusively for use during switch reassembly. Lubrication is essential for proper operation of switches and lock. A small brush is recommended for applying the Instrument Grease.

**CAUTION**

**Misapplied grease might cause intermittent switch connections. Utmost care must be taken during reassembly to avoid excessive application of grease and contamination of switch contacts. Avoid getting grease on fingers.**

## ASSEMBLY OF FRONT SWITCH ASSEMBLY

1. Assembly of Lock:

   a. Lightly grease Locking Shaft (3) and insert into Front Switch Diecast (1). Lightly grease bearing surfaces of Locking Link (5).

   b. Insert Lock Spring (2) into Front Switch Diecast (1). Press Locking Link (5) fully into Front Switch Diecast and insert Dowel Pin (4) through access cutout (left side of lock boss) to hold lock mechanism in place. Check for correct lock operation.

**CAUTION**

**Pressed-in mounting studs on front panel will break if overtightened.**

2. Use a 5/16-inch nut driver and two hex nuts to carefully install front panel (with pushbutton bezels and DPM window installed) on Front Switch Diecast (1).

3. Use a no. 4 hex (Allen) wrench to install lock knob on Locking Shaft (3). Base of Lock Knob should clear front panel when Locking Shaft is pushed in.

4. Installation of Rotor Assemblies:

   a. Lightly grease all switch rotor detent holes on back of Front Switch Diecast (1).

   b. Place Front Switch Assembly on flat working surface with front panel face-down and lock mechanism facing you. Prop sides of switch assembly to provide clearance for knobs and shafts during assembly (be careful not to scratch front panel enamel).

   c. Inspect SWEEP TRIGGER rotor assembly (10, 12, 27-31). Stop Arm (30) and Horseshoe Spring (31) are held in position by Push-on Retainer (29) and should move smoothly without binding (see Figure 849A). Roll Pins (12) should be positioned in hole 7 and hole 18 on SWEEP TRIGGER Rotor (28). Check that Spring (27) and Ball Bearing (10) are in position.

   d. Lightly grease long side of SWEEP TRIGGER Shaft (28) and insert SWEEP TRIGGER rotor assembly into left-most bushing in Front Switch Diecast (1). Position rotor so that Ball Bearing (10) aligns with stop boss on left side of Front Switch Diecast (see Figure 8-51).

   e. Inspect SWEEP TIME/DIV rotor assembly (10, 25-28), Figure 8-49B. MANUAL SWEEP Shaft (26) should be lightly greased and should turn freely inside SWEEP TIME/DIV Shaft (28). Check that Spring (27) and Ball Bearing (10) are in position. Note that there are no roll pins inserted in the SWEEP TIME/DIV Rotor (28).

   f. Lightly grease long side of SWEEP TIME/DIV Shaft (28) and insert SWEEP TIME/DIV rotor assembly into next bushing in Front Switch Diecast (1) (see Figure 8-51).

   g. Inspect FREQ SPAN/DIV rotor assembly (9-16). If Drive Hub (14) has been loosened or removed from Frequency Span Shaft (9), refer to Figure 8-49C for correct dimensions for adjustment. Roll Pins (12) should be positioned in hole 1 and hole 16 on Frequency Span Rotor (13), as shown in Figure 849C. Slotted Bushing (15), Hairpin Spring (16), and Frequency Span Shaft must be lightly greased where they contact each other for proper operation of push-pull mechanism. Check that Springs (11), Ball Bearings (10), Slotted Bushing, and Hairpin Spring are in correct position.

h. Lightly grease long side of Frequency Span Shaft (9) and insert FREQ SPAN/DIV rotor assembly (9-16) into next bushing in Front Switch Diecast (I). Position FREQ SPAN/DIV rotor assembly so that stop boss on Front Switch Diecast does not fall within small span between Roll Pins (12), as shown in Figure 8-51.

i. Inspect Attenuator Drive Rotor (8). Roll Pins (12) should be positioned in hole 1 and hole 9, as shown in Figure 8-49D.

j. Inspect front Anticrush Drive Hub Assembly (7). Note that pin is offset to one side of drive hub; place drive hub over right-most bushing in Front Switch Diecast (1) with this side down (i.e., pin as close as possible to Front Switch Diecast) for proper switch operation.

**NOTE**

**Correct side of front Anticrush Drive Hub (7) must be oriented towards Front Switch Diecast (1) for proper operation of Front Switch Assembly.**

k. Set Attenuator Drive Rotor (8) over Anticrush Drive Hub (7) with Attenuator Drive Rotor gear facing up. Long pin on Attenuator Drive Rotor should protrude through curved slot in diecast.

l. Lightly grease gear end of Attenuator Shaft Assembly (17) and insert into Front Switch Diecast (1) as shown in Figure 8-51 Place metal Washer (18) on shaft.

m. Clean contact fingers on all rotors using lint-free cloth and isopropyl alcohol/distilled water mixture. All rotors should be in proper position as shown in Figure 8-51

5. Installation of Front Switch Board Assembly A2A1:

a. Inspect Front Switch Board Assembly. Check switch traces for dirt, grease, or wear. Check interconnect wires, solder joints, pushbutton switches, and ribbon cables (52, 53).

b. Clean switch traces using lint-free cloth and isopropyl alcohol/distilled water mixture. No residue should be visible on traces.

c. Use a 1/4-inch nut driver to tighten Hex Nuts (22) and Screws (19) fastening DPM Mounting Brackets (20, 21) to Front Switch Board Assembly.

d. Use a 3/8-inch open-end wrench to tighten Hex Nut (36) and Lockwasher (35) attaching FREQUENCY ZERO Potentiometer (37) to Front Switch Board Assembly. Use a no. 2 spline (Bristol) wrench to install FREQUENCY ZERO Knob (34).

e. Use a 3/8-inch open-end wrench to tighten Hex Nut (36) and Lockwasher (35) attaching VIDEO FILTER Potentiometer (39) and metal Washer (38) to Front Switch Board Assembly.

f. Use a 1/2-inch open-end wrench to tighten inner Hex Nut (32) and Washer (33) attaching Dual Tune Pot assembly (25, 32, 33, 40-51, 77) to Front Switch Board Assembly. Note that Roll Pin (12) aligns with hole in switch board to locate Dual Pot Bracket (45); Washer (33) between bracket and switch board is critical to proper switch operation. See Figure 8-52 for front view of assembled switch board.

g. Check Dual Tune Pot assembly for smooth operation and proper gear meshing; disassemble and lightly grease shafts if necessary. Install second Hex Nut (32) mid-way onto Coarse Tune Shaft Bushing (42).

h. Set Front Switch Board Assembly into place on partially-assembled Front Switch Assembly and use a Stud (59) on right-most side of switch assembly to loosely fasten switch board to Front Switch Diecast (1).

i. With one Stud (59) in place but not tight, twist left side of Front Switch Board Assembly up approximately 1/8-inch to fasten switch board under Front Switch Diecast support arm (upper left corner) and align switch shafts.

j. Loosely install the three remaining Screws (54, not shown in Figure 6-3) used to fasten Front Switch Board Assembly to Front Switch Diecast (1).

k. Use a no. 4 hex wrench to temporarily install SWEEP TRIGGER, SWEEP TIME/DIV, MANUAL SWEEP, and FREQ SPAN/DIV knobs. Insert FREQUENCY CAL pushbutton through front panel and fasten with dress nut. Use a 13/64-inch open-end wrench to tighten nut to front panel.

**CAUTION**

**Do not overtighten screws and studs into Front Switch Diecast (1).**

l. Tighten Stud (59) and left-most Screw (54) attaching Front Switch Board Assembly to Front Switch Diecast (1). Check all switch rotors for smooth, free switch action. Readjust position of Front Switch Board Assembly as necessary for proper switch action.

m. Install Screw (23) and Spacer (24) used to attach Front Switch Board Assembly to Front Switch Diecast (1) above DPM Display.

n. Tighten the two remaining Screws (54) attaching Front Switch Board Assembly to Front Switch Diecast (1).

o. Recheck all switch rotors for smooth, free switch action and readjust Front Switch Assembly as necessary.

p. Connect PROBE POWER wires (0, 92, 97) to respective pins on Front Switch Board Assembly.

6. Assembly of RESOLUTION BW Switch:

a. Place Coupler Hub (60) on Frequency Span Shaft (9) with pin facing up (away from Front Switch Assembly). Do not tighten Coupler Hub at this time.

b. Center Bandwidth Detent (58) over Coupler Hub (60) with stop tab towards top of Front Switch Assembly, and fasten to Front Switch Assembly using two Studs (59).

c. If Drive Hub (14) has been removed or loosened from Bandwidth Shaft (61), refer to Figure 8-48B for proper adjustment. Lightly grease narrow end of Bandwidth Shaft (61) and detent holes on Bandwidth Detent (58). Insert Bandwidth Shaft (61) through Frequency Span Shaft (9).

d. Inspect RESOLUTION BW Rotor (63). Roll Pins (12) should be positioned in hole 1 and hole 18 as shown in Figure 8-49E. Check that Springs (62) and Ball Bearings (10) are in position.

e. Place RESOLUTION BW Rotor (63) onto Bandwidth Shaft (61). Position RESOLUTION BW Rotor assembly so that stop tab does not fall within small span between Roll Pins (12).

f. Place Rotor Spacer (64) onto RESOLUTION BW Rotor (63).

g. Clean contract fingers on RESOLUTION BW Rotor and switch traces on Bandwidth Switch Board (66) using lint-free cloth and isopropyl alcohol/distilled water mixture.

h. Use a 1/4-inch nut driver to fasten Bandwidth Switch Board (66) to Front Switch Assembly with two Hex Nuts (22). End of Bandwidth Shaft (61) must not bind against hole in board. Align MANUAL SWEEP Shaft (26) with MANUAL SWEEP Potentiometer (65) by turning MANUAL SWEEP knob clockwise until shaft engages with MANUAL SWEEP Potentiometer.

**NOTE**

**Depth of MANUAL SWEEP Shaft (26) can be adjusted if necessary by carefully tapping SWEEPTIME/DIV Shaft (28) farther into the white plastic rotor.**

i. Turn Front Switch Assembly over and remove FREQ SPAN/DIV knob using a no. 4 hex wrench.

j. Install Retainer Clip (25) on Bandwidth Shaft (61).

k. Use a no. 4 hex wrench to temporarily install FREQ SPAN/DIV and RESOLUTION BW knobs.

l. Pull and turn FREQ SPAN/DIV Knob until a set screw is visible on Coupling Hub (60). Push FREQ SPAN/DIV knob in and out to align pin on Coupling Hub with slots in Bandwidth Rotor (63). With FREQ SPAN/DIV knob pushed in and Coupling Hub flush against Bandwidth Rotor (pin aligned), tighten set screw using a no. 4 hex wrench. Turn FREQ SPAN/DIV knob until second set screw is visible, and tighten second set screw.

m. Push FREQ SPAN/DIV knob in and out while observing Bandwidth Rotor (63). Bandwidth Rotor will not move if Coupling Hub (60) is properly aligned. Readjust Coupling Hub as necessary for proper operation.

7. Assembly of REFERENCE LEVEL Switch:

a. Install remaining two Studs (59) on Front Switch Assembly. Check that all screws and studs have been tightened.

b. If rear Anticrush Drive Hub Assembly (7) has been loosened or removed from Ref Level Shaft (6), refer to Figure 8-48A for correct dimensions for adjustment.

c. Inspect Ref Level Rotor (67). Roll Pins (12) should be positioned in hole 1 and hole 9, as shown in Figure 849F. Check that Spring (11) and Ball Bearing (10) are in position. Insert Ref Level Shaft (6) through Ref Level Rotor so that rear Anticrush Drive Hub (7) seats properly into rotor.

d. Lightly grease long end of Ref Level Shaft (6) and insert through Front Switch Board Assembly A2Al, Attenuator Drive Rotor (8), front Anticrush Drive Hub (7), and bushing in Front Switch Diecast (1).

e. Lightly grease detent holes on flat side of Ref Level Detent (68). Mount detent on three Studs (59) and fasten tightly with three Standoffs (69).

**CAUTION**

**Hollow Ref Level Shaft (6) might be damaged if set screws in Rotating Lockout (70) are tightened excessively.**

f. Place Rotating Lockout (70) on Ref Level Shaft (6) with teeth flat against Ref Level Detent (68). Lockout teeth should be aligned to miss pin on Ref Level Detent when Ref Level Shaft is pushed in (switch in any detent position). With Ref Level Shaft fully extended from front panel, use a no. 4 hex wrench to tighten Rotating Lockout.

g. Push Ref Level Shaft (6) in and out and check for smooth mechanical feel and proper Rotating Lockout (70) alignment. Rotating Lockout should not bind against Ref Level Detent (68) and should allow Ref Level Shaft to turn smoothly between detent positions. Adjust Rotating Lockout as necessary for proper operation.

h. Use a no. 4 hex wrench to lightly tighten one set screw in front Anticrush Drive Hub (7) visible between Attenuator Drive Rotor (8) and Front Switch Diecast (1).

i. Turn Attenuator Drive Rotor (8) so that long pin (for Input Attenuator pointer) is at bottom of Front Switch Diecast (1). Hold Attenuator Drive Rotor in position and push in on Ref Level Shaft (6) to align front Anticrush Drive Hub (7).

j. Push Ref Level Shaft (6) in and out while observing Ref Level Rotor (67) and Attenuator Drive Rotor (8). Rotors will not move when front Anticrush Drive Hub (7) is properly adjusted.

k. Use a no. 4 hex wrench to firmly tighten both set screws in front Anticrush Drive Hub (7). Recheck Ref Level Shaft (6) as in step j, and readjust front Anticrush Drive Hub as necessary.

l. Slip Miter Gear (57) over Attenuator Shaft Assembly (17). Do not tighten at this time.

m. Inspect Ref Level Fine Assembly (35, 36, 72-76). Ref Level Fine Shaft (72) should turn smoothly. Check Ref Level Fine Potentiometer (76) and connecting wires for good electrical connections. Lightly grease Ref Level Fine Shaft and hollow Index Disc Locator (71) shaft.

n. Install Index Disc Locator (71) on Front Switch Assembly. Hole in locator bar rides over left-most Standoff (69) used to support Ref Leve Fine Pot Plate (75). Install Ref Level Fine Assembly (35, 36, 72-76) on Front Switch Assembly with three Screws (54). Connecting wires should be routed as shown in Figure 8-53. Ref Level Fine Shaft (72) should turn smoothly without binding over its full rotation. Adjust position of Ref Level Fine Pot Plate as necessary.

o. Use a new tiewrap to attach Ref Level Fine connecting wires to Standoff (69) as shown in Figure 8-53.

8. Installation of RF Input Attenuator A3:

a. Mount RF Input Attenuator to Attenuator Bracket (55) using two Screws (53). Check all eight attenuator positions by hand for proper detent action and smooth operation. Leave attenuator in full counter-clockwise position.

b. Slide Miter Gear (57) to end of Attenuator Shaft Assembly (17) against Ref Level Fine Pot Plate (75). Set Attenuator Assembly in place on Front Switch Assembly, with notch in Attenuator Bracket (55) lightly greased and aligned with Attenuator Shaft Assembly. Use Washer (56) and Screw (19) to fasten Attenuator Bracket to lower left corner of Front Switch Diecast (1). (Do not tighten Miter Gear at this time.)

c. Insert RF Input Cable Assembly W1 through front panel and loosely attach with hex nut. Carefully connect cable assembly to RF Input Attenuator using a 5/16-inch open-end wrench. Tighten cable assembly to front panel using a 5/8-inch open-end wrench (*Options 001 and 002: use special 9/16-inch nut driver to tighten front panel dress nut).*

**NOTE**

**Front-panel control knobs and their attaching parts are identified in Figure 6-2. Numbers in parentheses match numerical callouts on Figure 6-3.**

9. Installation of Knobs:

a. Turn SWEEP TRIGGER Shaft (28) fully clockwise (as seen from front of Front Switch Assembly) to spring4oaded SINGLE position and release. Use a no. 4 hex wrench to install SWEEP TRIGGER knob with SINGLE line aligned with painted arrow on front panel. Check for proper switch operation and alignment.

b. Turn SWEEP TIME/DIV Shaft (28) to align Ball Bearing (10) on SWEEP TIME/DIV Rotor with left-most edge of stop boss on Front Switch Diecast (1). This positions SWEEP TIME/DIV Rotor with Ball Bearing slightly right of 12 o'clock position (as seen from front of Front Panel Assembly). Use a no. 4 hex wrench to lightly tighten SWEEP TIME/DIV knob onto SWEEP TIME/DIV Shaft with approximate center of green AUTO position aligned with painted arrow on front panel. Turn SWEEP TIME/DIV knob to any calibrated sweep time position and align knob markings exactly with painted arrow on front panel. Tighten SWEEP TIME/DIV knob and check for proper switch operation and alignment.

c. Uncouple RESOLUTION BW Shaft (61) from FREQ SPAN/DIV Shaft (9) by pulling both shafts out. Turn each shaft fully clockwise. Use a no. 4 hex wrench to install FREQ SPAN/DIV knob with 100 MHz indicated, checking that the plastic indicator guide on back of knob does not completely bottom into hole in Front Switch Diecast (1). Install RESOLUTION BW Knob with 3 MHz indicated. Check for proper operation and alignment of both switches. Push-pull action should be smooth and positive.

d. Set nylon shim washer(s) and Index Disc (see Figure 6-2) in place on REFERENCE LEVEL knob to check for proper shim width. Nylon washers should shim Index Disc slightly away from labelled ring on REFERENCE LEVEL knob to prevent rubbing against painted numbers. Add or remove shim washers as necessary to provide slight clearance.

e. Turn Attenuator Drive Rotor (8) fully counter-clockwise so that Input Attenuator Pointer guide pin (P/O 8) is at bottom of front panel. Turn Ref Level Shaft (6) fully clockwise. Place plastic Input Attenuator Pointer over guide pin (pointer should indicate 70 dB). Place large end of conical spring against Input Attenuator Pointer and slide REFERENCE LEVEL knob, nylon washer(s), and Index Disc (from step d) onto Ref Level Shaft, securing with retainer clip.

f. Use a no. 6 hex wrench to adjust Miter Gears (57) for alignment of Input Attenuator Pointer with 70 dB front panel label and proper gear mesh (Input Attenuator A3 still in full counter-clockwise position).

g. Turn REFERENCE LEVEL knob to indicate level of CAL OUTPUT signal (i.e., -30 dB; Option 002: +20 dBm V) and tighten knob securely with a no. 4 hex wrench. Check for proper operation and alignment of REFERENCE LEVEL and INPUT ATTEN controls, and readjust knob, gears, and Rotating Lockout (70) as necessary. Reference Level should range from -10 dBm to -100 dBm with 0 dB INPUT ATTEN selected *(Option 002: +40 dBm V to -50 dBm).*

h. Turn REF LEVEL FINE Shaft (72) fully counter-clockwise and use a no. 4 hex wrench to install REF LEVEL FINE knob with 0 dB indicated. Check for proper operation and alignment and readjust knob as necessary.

i. Turn BASELINE CLIPPER Shaft and VIDEO FILTER Shaft (39) fully counter-clockwise and use a no. 2 spline wrench to install BASELINE CLIPPER and VIDEO FILTER knobs in OFF position. Check for proper operation and alignment and readjust as necessary.

j. Loosely tighten second Hex Nut (32) on Coarse Tune Bushing (42) against Front Switch Diecast (1). Install front panel nut and washer on Coarse Tune Bushing and tighten with special 1/2-inch nut driver.

k. Use a no. 4 hex wrench to install COARSE TUNE and FINE TUNE knobs. Base of COARSE TUNE knob should clear front panel. Check for proper operation of TUNING control.

**INSTALLATION OF FRONT SWITCH ASSEMBLY INTO HP 8558B CHASSIS**

10. Set Front Switch Assembly into place in chassis, being careful not to bend semi-rigid cables or pinch wires or ribbon cables. Attach Front Switch Diecast (1) to left and right side gussets with four screws.

11. Connect four wires (0, 916, 918, 923) to correspondingly4abelled pins in upper right corner of Front Switch Board A2A1.

12. Attach DPM Driver Assembly A1A2 to DPM Mounting Brackets (20, 21) with four Screws (19).

13. Connect 14-conductor Ribbon Cable A2A1W1 (52) to DPM Driver Assembly A1A2.

14. Connect 50-conductor Ribbon Cable A2A1 W2 (53) to Motherboard Assembly A16.

15. Use a 5/16-inch open-end wrench to carefully connect Semi-rigid Cable W14 to RF Input Limiter U1.

16. Use special 9/16-inch nut driver to install CAL OUTPUT and 1ST LO OUTPUT connectors to front panel with two dress nuts.

17. Attach brown CAL OUTPUT Cable W8 to Front Switch Standoff (69) with tiewrap.

18. Slide HP 8558B into display mainframe, turn instrument ON, and verify proper operation of all controls.

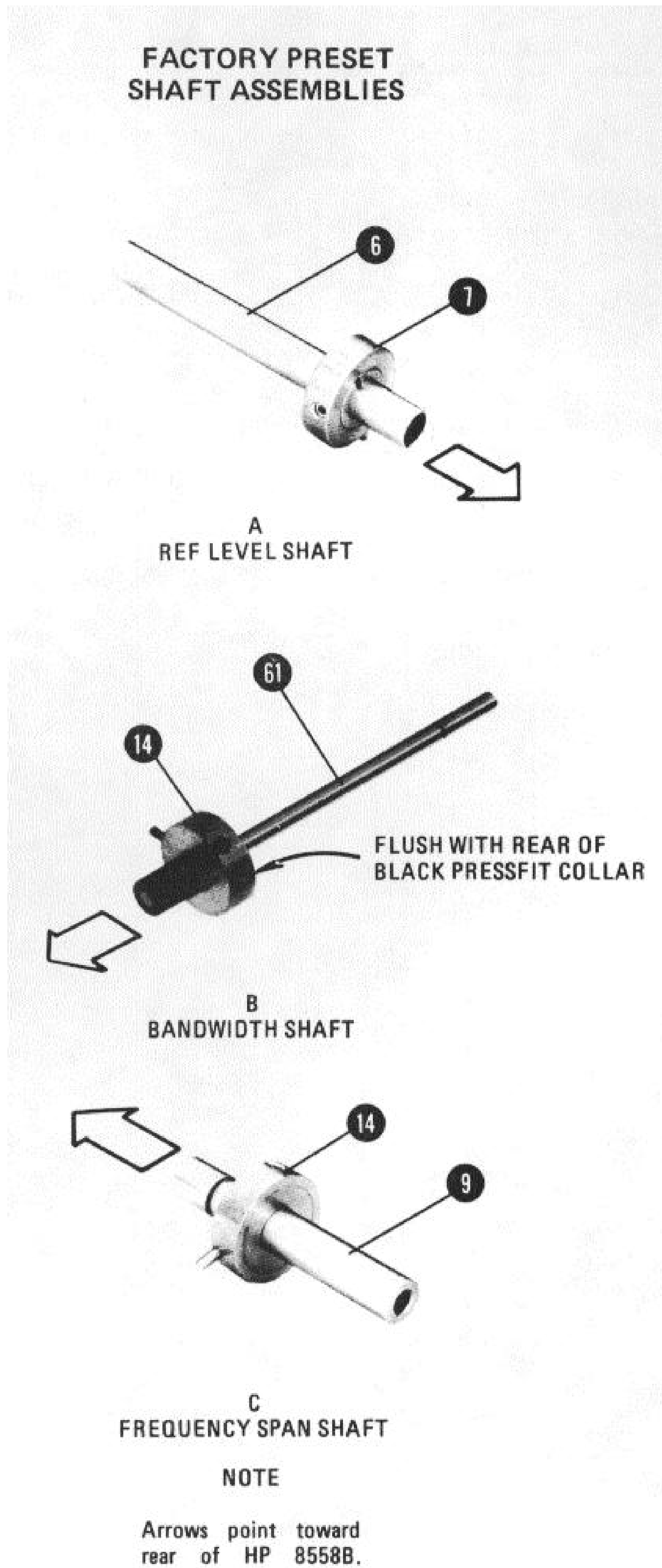


*Figure 8-48. Shaft Assemblies*

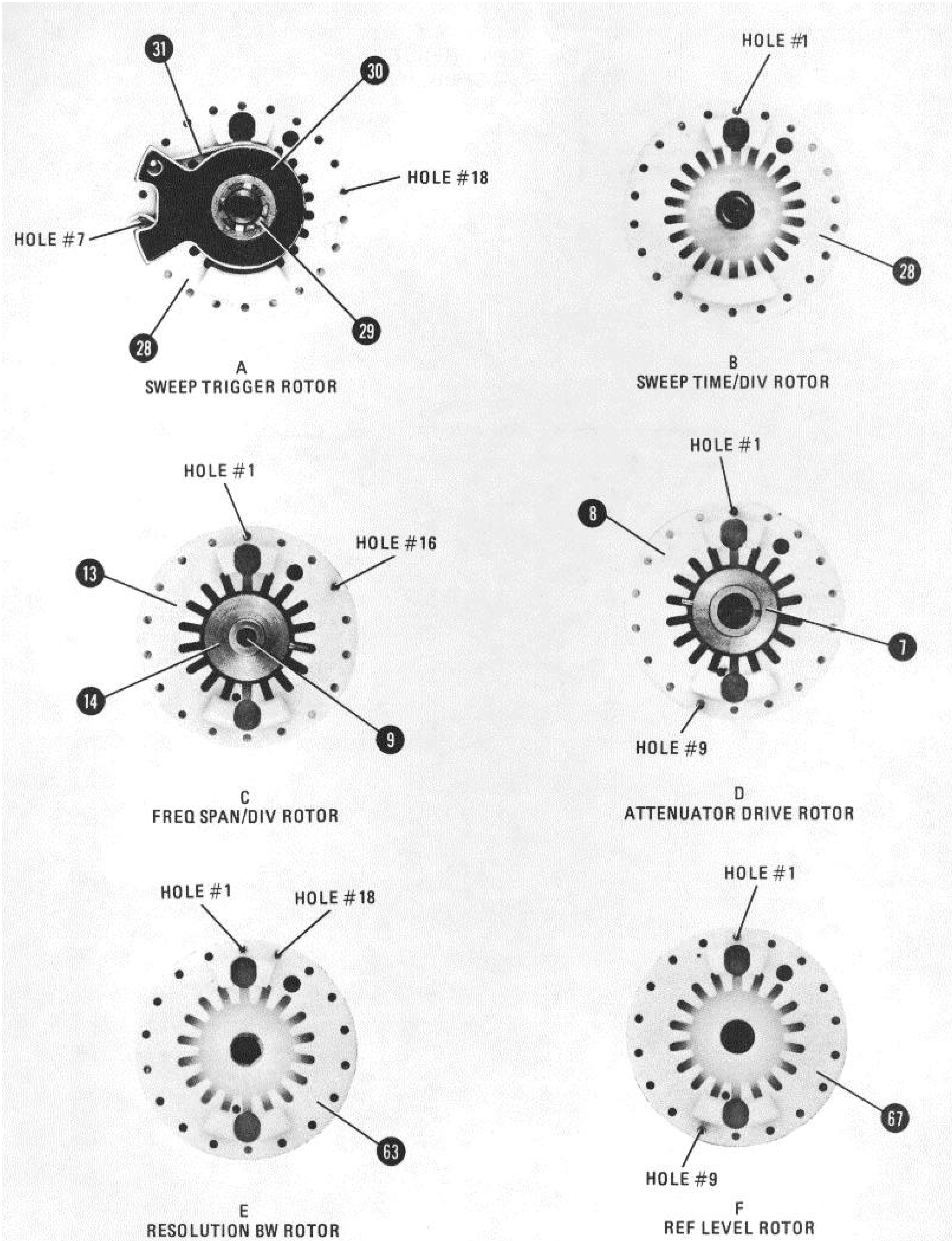


*Figure 8-49. Rotor Assemblies*

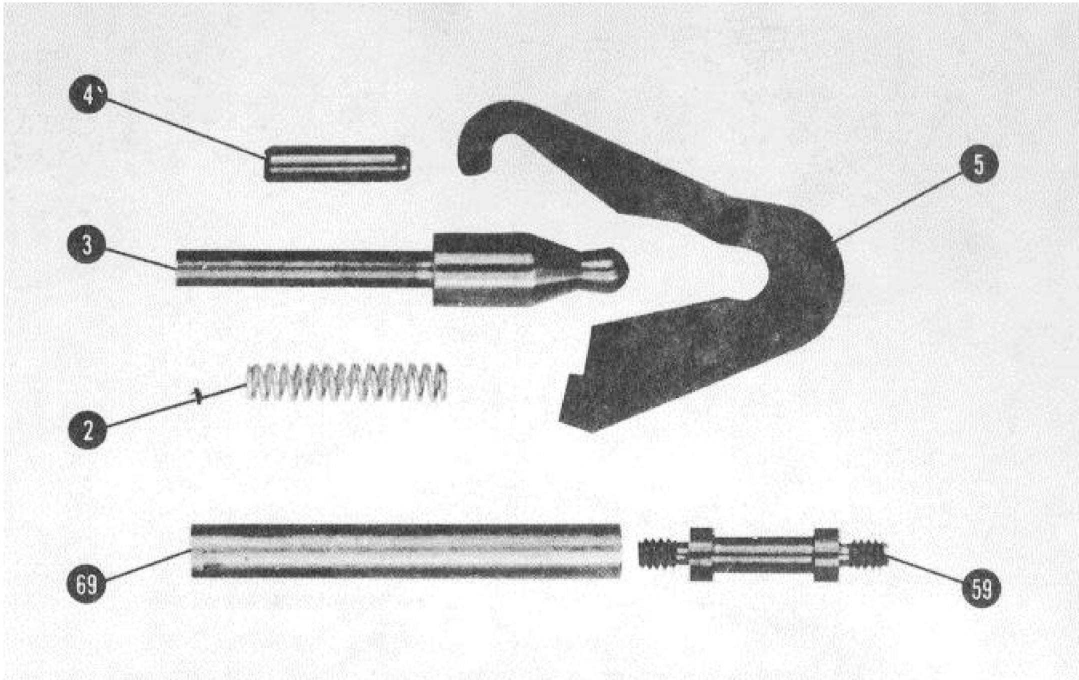


*Figure 8-50. Machined Parts*

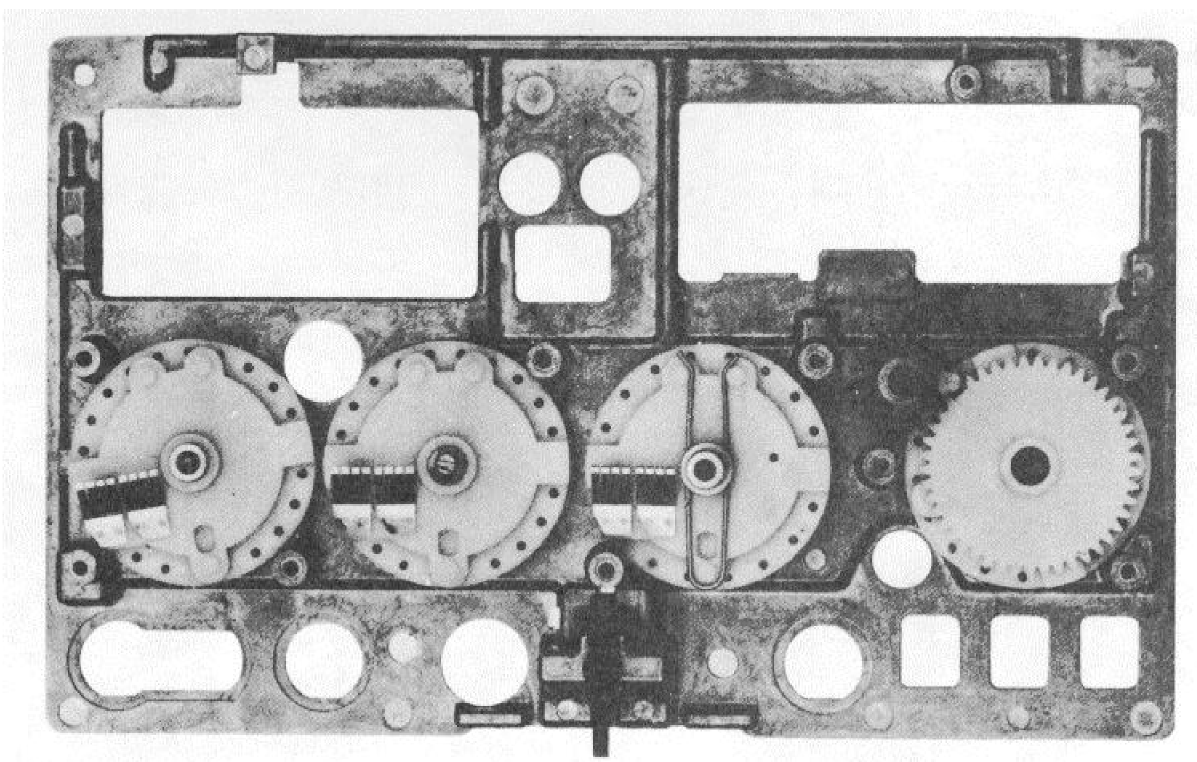

*Figure 8-51. Proper Positioning of Rotors on Front Switch Diecast*

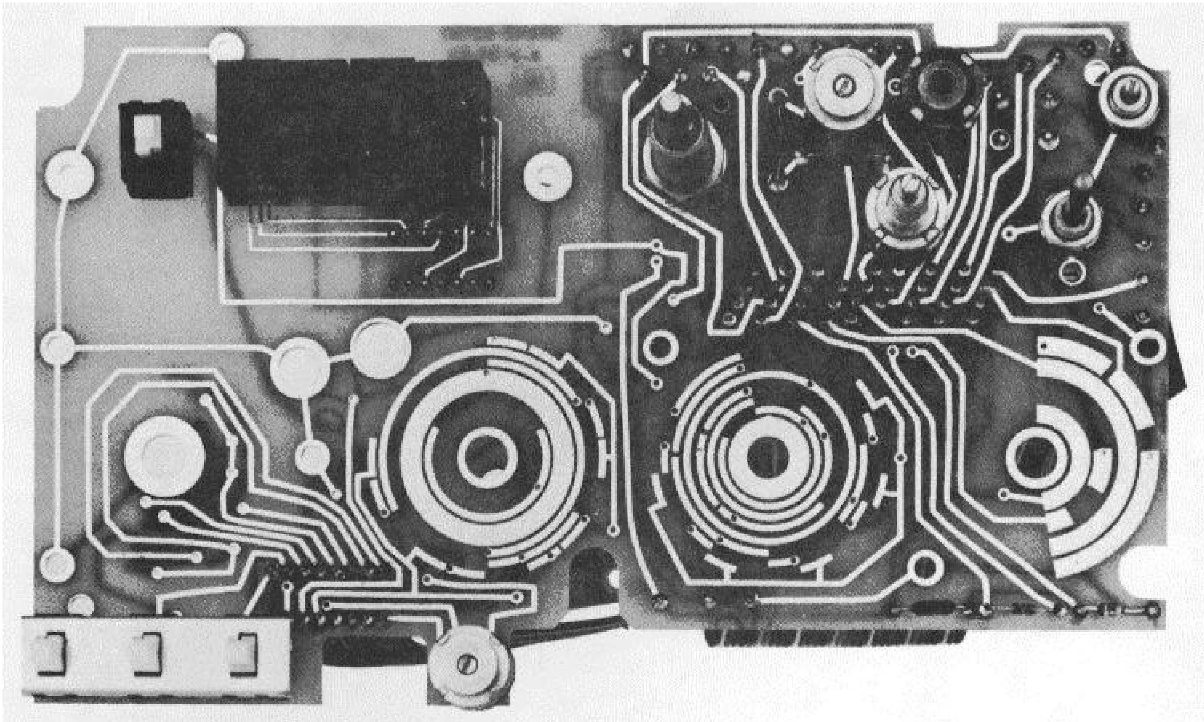

*Figure 8-52. Front View of Switchboard Assembly A2A1*

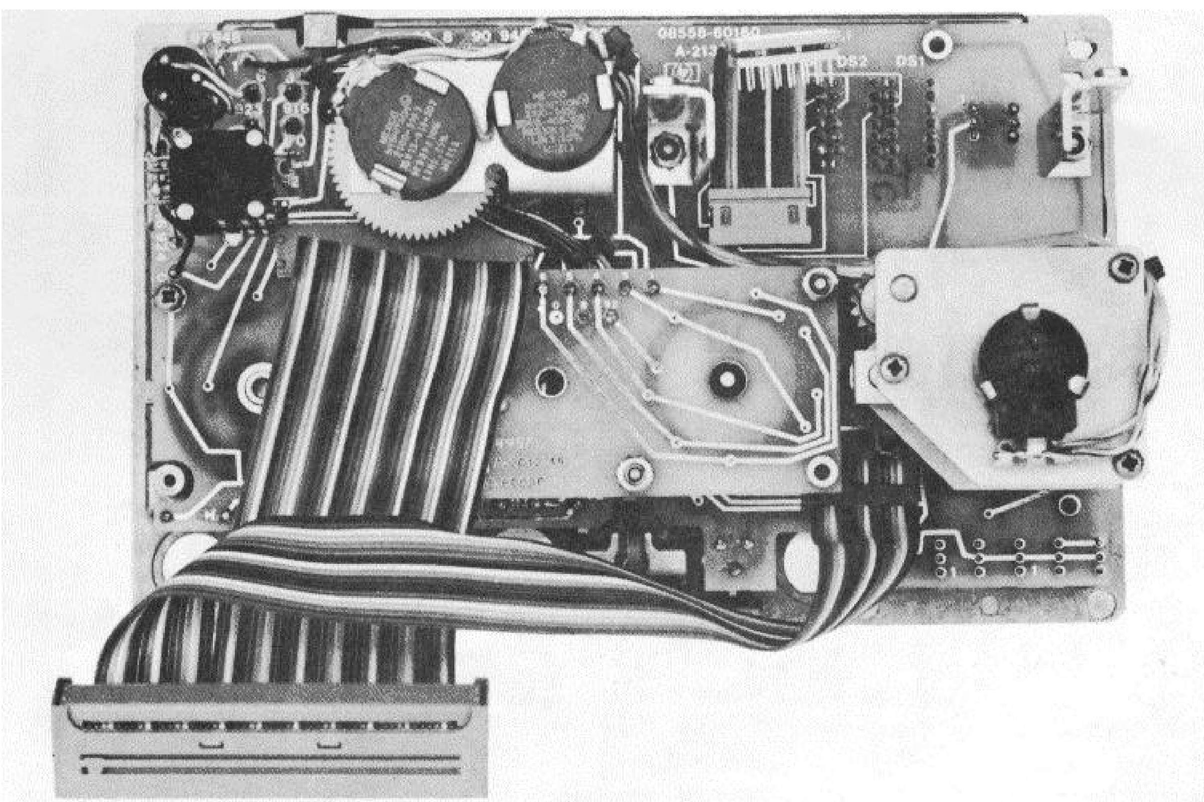

*Figure 8-53. Rear View of Front Switch Assembly A2*

# APPENDIX A

## REFERENCES

| | |
|---|---|
| DA Pam 310-1 | Consolidated Index of Army Publications and Blank Forms. |
| DA Pam 738-750 | The Army Maintenance Management System (TAMMS). |
| TM 750-244-2 | Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command). |
| TM 11-6625-3061-24P | Organizational, Direct Support, and General Support Maintenance, Repair Parts and Special Tools List, and Maintenance Allocation Chart for Spectrum Analyzer Hewlett-Packard Model 8558B |

# APPENDIX B

## COMPONENTS OF END ITEM LIST

### Section I. INTRODUCTION

B-1. Scope

The appendix lists integral components of and basic issue items for Spectrum Analyzer, HP Model 8558B to help you inventory items required for safe and efficient operation.

B-2. General

This Components of End Item List is divided into the-following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the Spectrum Analyzer, HP Model 8558B and must accompany it whenever it is transferred or turned in. The illustrations referenced will help you in identify these items.

b. Section III. Basic Issue Items. Not applicable.

B-3. Explanation of Columns

a. Illustration. This column is divided as follows:
(1) Figure number. Indicates the figure number of the illustration on which item is shown.
(2) Item number. The number used to identify item called out in the illustration.

b. National Stock Number. Indicates the National Stock Number assigned to the item and which will be used for requisitioning.

c. Description. Indicated the Federal item name and, if required, a minimum description to identify the item. The part number indicated the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. Following the part number, the Federal Supply Code for Manufacturers (FSCM) is shown in parentheses.

d. Location. The physical location of each item listed is given in the column. The lists are designed to inventory all items in one area of the major item before moving in to an adjacent area.

e. Usable on Code. Not applicable.

f. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

g. Quantity. This column is left blank for use during the inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item.

## Section II. INTEGRAL COMPONENTS OF END ITEM

| (1) ILLUSTRATION (A) FIG. NO. | (1) ILLUSTRATION (B) ITEM NO. | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION PART NUMBER | (3) CAGE | (4) LOCATION | (5) USUABLE ON CODE | (6) QTY REQD | (7) QUANTITY RCVD | (7) QUANTITY DATE |
|---|---|---|---|---|---|---|---|---|---|
| | | | SPECTRUM ANALYZER, HP MODEL 8558B | 28480 | | | | | |

# APPENDIX D

# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

D-1. General

This appendix provides a summary of the maintenance operations for Spectrum Analyzer, HP Model 8558B. It authorizes categories of maintenance for specific maintenance function on repairable items 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; ie., 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 setting the operating characteristics to specified parameters.

e. Aline. 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 in instruments or test measuring and diagnostics equipments use in precision measurement. Consists of comparison of two instruments, one in which is a certified standard of known accuracy of the instrument being compared.

g. Install. The act of emplacing, 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, aline, calibrate, replace) or other maintenance actions (welding, grinding, riveting, staightening, 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. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

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 indentify 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 column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "work time" 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 "work time" figures will be shown for each category. The number of task-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, components, 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 indentified for the maintenance function 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. Columns 5, Tools and Equipment. Column 5 specifies by code, those common tools sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains as 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 (Sec III)

a. Tool and 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 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 (Sec 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.

## SECTION II MAINTENANCE ALLOCATION CHART FOR SPECTRUM ANALYZER HP8558B

| (1) GROUP NUMBER | (2) COMPONENT ASSEMBLY | (3) MAINTENANCE FUNCTION | (4) MAINTENANCE LEVEL C | O | F | H | D | (5) TOOLS AND EQUIPMENT | (6) REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 00 | SPECTRUM ANALYZER | Inspect | | | | 0.1 | | | |
| | HP8558B | Test | | | | 3.0 | | 1-20 | B |
| | MTBF= 10,000 Hrs | Test | | | | | 3.0 | | |
| | | Adjust | | | 0.3 | | | 6 | A |
| | | Calibrate | | | | 9.2 | | 1,3-25 | B |
| | | Replace | | | 0.1 | | | | |
| | | Repair | | | | 10. | | 1,2,6-20,22-30 | B,C,E D |
| | | Repair | | | | | 10. | | |
| 01 | FRONT SWITCH ASSY | Inspect | | | | 0.1 | | | |
| | 08558-60100 | Test | | | | | 1.0 | | |
| | A2 | Replace | | | | 0.3 | | | 6 |
| | | Repair | | | | | 4.0 | | |
| 0101 | SWITCH BOARD ASSY | Inspect | | | | 0.1 | | | |
| | 08558-60160 | Test | | | | | 1.0 | | |
| | A2A1 | Replace | | | | 03 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 02 | FIRST CONVERTER | Inspect | | | | 0.1 | | | |
| | 08558-60004 | Test | | | | | 1.0 | | |
| | A4 | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 03 | SECOND CONVERTER | Inspect | | | | 0.1 | | | |
| | 08558-60097 | Test | | | | | 1.0 | | |
| | AS | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 04 | THIRD CONVERTER | Inspect | | | | 0.1 | | | |
| | 08558-60154 | Test | | | | | 1.0 | | |
| | A9 | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 05 | BW FILTER NO. 1 | Inspect | | | | 0.1 | | | |
| | 08559-60058 | Test | | | | | 1.0 | | |
| | All | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 06 | BW FILTER NO. 2 | Inspect | | | | 0.1 | | | |
| | 08558-6019 | Test | | | | | 1.0 | | |
| | A13 | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 07 | LOG AMPLIFIER ASSY | Inspect | | | | 0.1 | | | |
| | 5061-5411 | Test | | | | | 1.0 | 6 | |
| | A14 | Replace | | | | 0.3 | | 6 | |
| | | Repair | | | | | 4.0 | | |
| 08 | MOTHERBOARD ASSY | Inspect | | | | 0.1 | | | |
| | 08558-65159 | Test | | | | | 2.0 | 6 | |
| | A16 | Replace | | | | 0.5 | | 6 | |
| | | Repair | | | | | 4.0 | | |

## SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR

## SPECTRUM ANALYZER HP8558B

| TOOL OR TEST EQUIPMENT REF CODE | MAINTENANCE CATEGORY | NOMENCLATURE | NATIONAL/NATO STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|
| 1 | H | TRACKING GENERATOR HP8444A | 6625-00-185-4802 | |
| 2 | H | FUNCTION GENERATOR HP3310A | 6625-01-028-4989 | |
| 3 | H | POWER SPLITTER HP11667A | 6625-01-017-2713 | |
| 4 | H | 10 dB ATTENUATOR HP8491A | 5985-00-128-0195 | |
| 5 | H | 50 ohm TERMINATOR HP908A | | |
| 6 | F,H | TOOL KIT, ELEC EQUIP TK-105/G | 5180-00-610-8177 | |
| 7 | H | TUNING TOOL 08555-60107 | | |
| 8 | H | ALINEMENT TOOL, MET TIP 8710-0630 | 5120-01-080-7650 | |
| 9 | H | ALINEMENT TOOL, PLASTIC 8710-0033 | 1005-00-634-8012 | |
| 10 | H | DISPLAY MAINFRAME HP181T | | |
| 11 | H | FREQUENCY COUNTER HP5342A | 6625-01-103-2958 | |
| 12 | H | DIGITAL VOLTMETER HP3455A | 6625-01-874-1000 | |
| 13 | H | POWER METER HP435A | 6625-00-449-9167 | |
| 14 | H | POWER SENSOR HP8482A | | |
| 15 | H | AMPLIFIER HP8447D | 6625-01-065-0305 | |
| 16 | H | SIGNAL GENERATOR HP8460 | 6625-00-318-6304 | |
| 17 | H | COMB GENERATOR HP8406A | 6625-00-937-3525 | |
| 18 | H | 300 MHz LP FILTER TPL300-4AB | | |
| 19 | H | STEP ATTENUATOR HP355C | 5985-00-525-5074 | |
| 20 | H | STEP ATTENUATOR HP355D | 5985-00-957-1860 | |
| 21 | H | SWEEP OSCILLATOR HP8350A | | |
| 22 | H | RF PLUGIN HP83522A | | |
| 23 | H | TIME COUNTER HP5308A | 6625-01-022-6231 | |
| 24 | H | OSCILLOSCOPE HP1741A | 6625-01-058-0139 | |
| 25 | H | CRYSTAL DETECTOR HP423B | 6625-01-035-0626 | |
| 26 | H | SPECTRUM ANALYZER HP141T | 6625-00-424-4370 | |
| 27 | H | BOARD PULLER 03950-4001 | | |
| 28 | H | EXTENDER BOARD, 6 PIN 08559-60042 | | |
| 29 | H | EXTENDER BOARD, 10 PIN 85680-60028 | 6625-01-137-2674 | |
| 30 | H | EXTENDER BOARD, 22 PIN 08565-60107 | | |
| 31 | H | EXTENDER CABLE ASSY 5060-0303 | 5995-01-036-2960 | |

## SECTION IV. REMARKS
## SPECTRUM ANALYZER HP8558B

| REFERENCE CODE | REMARKS |
|---|---|
| A | Adjustments made when combining units with other subassemblies in display frame. |
| B | Test, repair, and calibrate by USATSG at general support. |
| C | Subassemblies A3, A6, A7, A8, A10, A12, A15, A17 and W1 through W6 are throw-aways. |
| D | Repair consists of replacement of subassemblies and mainframe components as required. |
| E | A1is not a replaceable subassembly and has no part number. |

By Order of the Secretary of the Army:

JOHN A. WICKHAM JR.
*General, United States Army*
*Chief of Staff*

Official:

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**FRONT PANEL FEATURES**

1. VERTICAL POSN: Adjusts vertical position of CRT trace.

2. VERTICAL GAIN: Adjusts deflection circuit gain for amplitude scale calibration of CRT display.

3. FREQUENCY CAL: Removes tuning hysteresis from first LO (YIG oscillator). Should be pressed before calibration and whenever TUNING (22) is changed by more than 50 MHz.

4. FREQUENCY ZERO: Adjusts FREQUENCY MHz (20) readout for calibration on LO feedthrough.

5. BASELINE CLIPPER: Blanks variable lower portion of CRT display. Prevents CRT blooming with a variable persistence storage display mainframe (i.e. 181T/TR).

6. VIDEO FILTER: Post-detection low-pass filter smooths CRT trace by averaging random noise. Filter bandwidth scaled by resolution bandwidth (15) setting. MAX (detent) position selects 1.5 Hz bandwidth for maximum noise averaging and noise level measurements. MAX VIDEO FILTER should **not** be used for CW signal analysis.

7. SWEEP Indicator: Remains lit during each sweep.

8. SWEEP TRIGGER: Selects sweep trigger mode.

   VIDEO: Sweep triggered on internal post-detection video waveform. One-half major division of vertical deflection (noise, AM signal, etc.) required to trigger sweep. Normally used with 0 (zero) frequency span for time-domain analysis.

   LINE: Sweep triggered at ac line frequency.

   FREE RUN: End of each sweep triggers new sweep.

   SINGLE: Single sweep triggered or reset by turning SWEEP TRIGGER clockwise momentarily.

9. 1st LO OUTPUT: 50-ohm BNC output provides 2.05-3.55 GHz first LO signal at approximately + 10 dBm. Terminate with 50ohm load when not in use.

10. INPUT 50f: Precision type N (female) signal input connector with 50-ohm input impedance.
    *Options 001 and 002: INPUT 75f- 75-ohm BNC (female) signal input connector.*

**CAUTION**

**50-ohm BNC connectors might cause damage if used directly with Option 001 and 002 75-ohm BNC INPUT and CAL OUTPUT connectors.**

11. SWEEP TIME/DIV: Selects time required to sweep one major horizontal division on CRT.

    AUTO: Automatically selects fastest allowable sweep time as a function of FREQ SPAN/DIV (13), RESOLUTION BW (15), and VIDEO FILTER (6) settings to maintain display amplitude calibration. AUTO operation retained with FREQ SPAN/DIV and RESOLUTION BW controls uncoupled.

    TIME/DIV: Selects calibrated sweep time; used primarily with 0 (Zero) frequency span for time-domain analysis of modulation waveforms. Display amplitude calibration not automatically guaranteed for other frequency spans.

    MAN: Enables manual frequency scan using MAN SWEEP knob.

12. PROBE POWER: Provides power for high-impedance active probes such as the HP 1121A. (See Section I of HP 8558B Operation and Service Manual for details regarding use with Options 001 and 002.)
13. FREQ SPAN/DIV: Selects CRT horizontal axis frequency calibration.

    MHz/DIV
    kHz/DIV: Selects desired frequency span. Alignment of OPTIMUM markings (><) selects optimum resolution bandwidth (15).

    0 (Zero Span): Spectrum analyzer operates as a manually-tuned receiver, at frequency indicated by FREQUENCY MHz readout, for time-domain display of signal modulation. 16 calibrated sweep times selectable with SWEEP TIME/DIV control (11).

14. REF LEVEL CAL: Adjusts spectrum analyzer RF gain to calibrate top CRT graticule line for absolute amplitude measurements.

15. RESOLUTION BW: Selects spectrum analyzer 3-dB bandwidth. Alignment of OPTIMUM markings ( > < ) automatically selects optimum resolution bandwidth for any frequency span. Control pushed in to couple mechanically with FREQ SPAN/DIV.

16. CAL OUTPUT: BNC output provides 280 MHz, -30 dBm calibration signal from 50f output impedance.
    *Option 001: 280 MHz, -30 dBm calibration signal from 759 output impedance.*
    *Option 002: 280 MHz, + 20 dBmV calibration signal from 752 output impedance.*

**CAUTION**

**50-ohm BNC connectors might cause damage if used directly with Option 001 and 002 75-ohm BNC INPUT and CAL OUTPUT connectors.**

17. 10 dB/DIV - dB/DIV - LIN (Amplitude Scale): Selects CRT vertical axis amplitude calibration (logarithmic or linear scale). Reference Level remains constant at top CRT graticule line.

18. REFERENCE LEVEL: Adjusts' power level (in dBm or dBmV) represented |by top CRT graticule line. Large outer knob provides adjustment in calibrated 10-dB steps; FINE vernier provides 12 dB of continuous adjustment.

19. INPUT ATTEN: Selects desired RF input attenuation, indicated by blue numbers (push and turn).

20. FREQUENCY MHz: Displays spectrum analyzer start or center frequency. Automatically ranges at approximately 195 MHz for increased resolution at lower frequencies.

21. START-CENTER: Selects mode of FREQUENCY MHz (20) readout.

22. TUNING: Adjusts spectrum analyzer start or center frequency. Coarse tuning is provided by large knob; smaller knob provides FINE tuning.

**180-Series Display Mainframes**

23. CALIBRATOR (180TR, 182T): Provides 1 kHz square wave at two amplitudes: 250 mV and 10V p-p (not used with spectrum analyzer).

24. Ground Connection (180TR, 182T): Provides chassis ground connection point.

25. SCALE (180TR, 182T): Adjusts CRT graticule illumination.

26. TRACE ALIGN: Adjusts CRT trace alignment with horizontal graticule lines.

27. FOCUS: Adjusts CRT trace sharpness.

28. ASTIG: Adjusts CRT spot shape.

29. INTENSITY: Adjusts CRT trace intensity.

30. FIND BEAM: Intensifies trace and forces on-screen display (normally not used with spectrum analyzer).

31. HORIZONTAL POSITION: Single knob provides coarse and fine horizontal adjustment of CRT trace.

32. MAGNIFIER: Selects horizontal deflection factor (normally left in X1 position).

33. DISPLAY: Selects CRT sweep source (normally left in INT position).

34. EXT VERNIER: Provides continuous deflection factor adjustment for external CRT sweep signals. In CAL detent position, deflection factor is selected by MAGNIFIER (32) control (normally not used with spectrum analyzer).

35. EXT COUP ts EXT INPUT (36) ac or dc coupling (normally not used with spectrum analyzer).

36. EXT INPUT: BNC input for external CRT sweep signal (normally not used with spectrum analyzer).

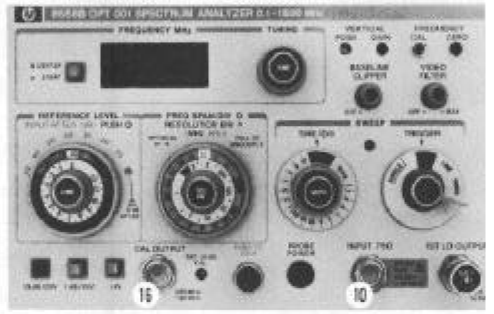
**NOTE**

**HORIZONTAL EXT INPUT does not sweep the spectrum analyzer first LO. Analyzer should be set to 0 (zero) FREQ SPANIDIV, AUTO TIMEIDIV, and SINGLE SWEEP TRIGGER- when operated with an external horizontal input.**

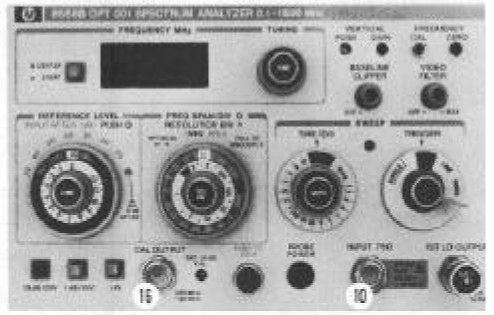
37. Switch with indicator light for turning power ON and OFF.

**NOTE**

**See Appendix A for details regarding HP 181TITR Variable Persistence Storage Display Mainframes.**



*HP 8558B Front Panel, Option 001*



*HP 8558B Front Panel, Option 002*

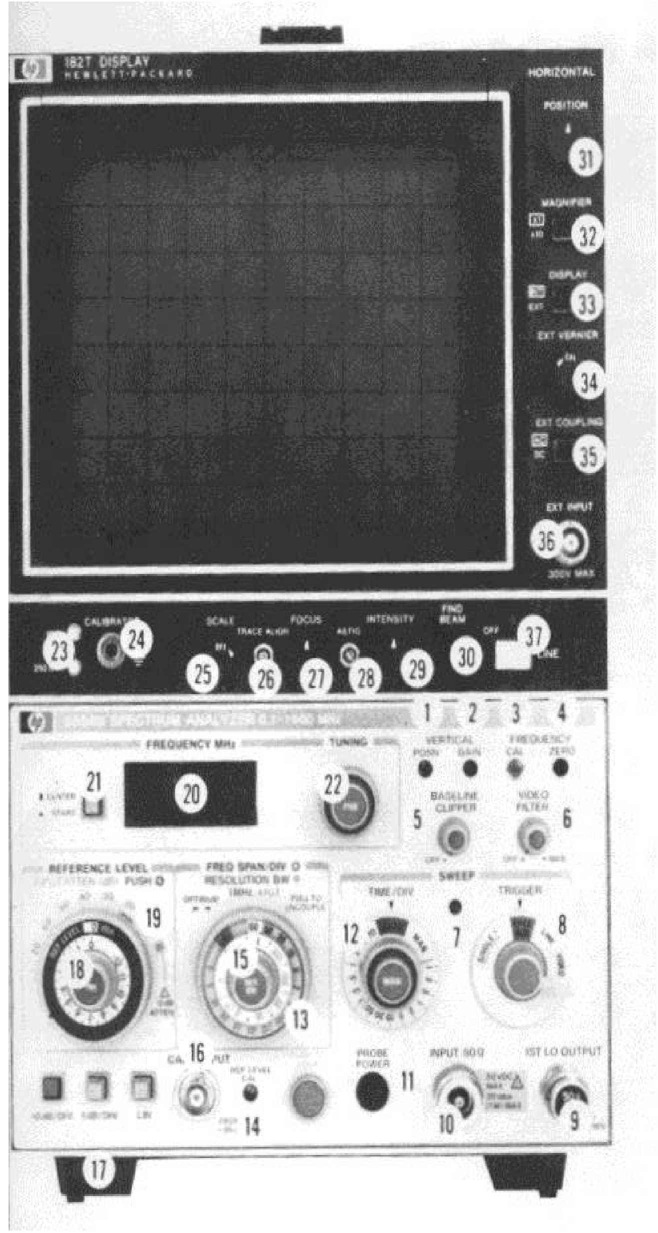


*Figure 3-1. HP 8558B Installed in HP 182T Display Mainframe*

## REAR PANEL FEATURES

1. P1 Connector: Connects spectrum analyzer plug-in to display mainframe.

2. HORIZ GAIN: Allows ± 1/2 major division of horizontal gain adjustment to calibrate spectrum analyzer plug-in with display mainframe.

3. AUX A Vertical Output: BNC output provides detected video signal from a 50-ohm output impedance. Typical 0-800 mV range corresponds to full 8-division display deflection.

4. AUX B PENLIFT/BLANKING OUTPUT: BNC output provides a + 15V penlift/blanking signal from a 10K-ohm output impedance when CRT trace is blanked. Otherwise, output is low at 0V (low impedance, 150 mA max.) for an unblanked trace.

5. AUX C 21.4 MHz IF OUTPUT: BNC output provides 21.4 MHz IF signal (linearly related to spectrum analyzer RF input) from a 50-ohm output impedance. Output bandwidth controlled by spectrum analyzer RESOLUTION BW setting; output amplitude controlled by INPUT ATTEN, REFERENCE LEVEL FINE, and first six REFERENCE LEVEL positions (i.e., with 0 dB input attenuation, - 10 through -60 dBm; for Option 002, + 40 through - 10 dBmV).

6. AUX D Horizontal Output: BNC output provides horizontal sweep voltage from a 5Kohm output impedance. -5V to + 5V range corresponds to full 10-division display deflection.

7. Z-Axis Input: BNC input with a 5K-ohm impedance allows external modulation of CRT trace intensity. Approximately + 2V blanks normal-intensity trace; negative voltage increases trace intensity. Maximum input voltage ± 20 Vdc.

8. NORMALIZER INTER-CONN (180TR/182T): Provides connections for HP 8750A Storage Normalizer.

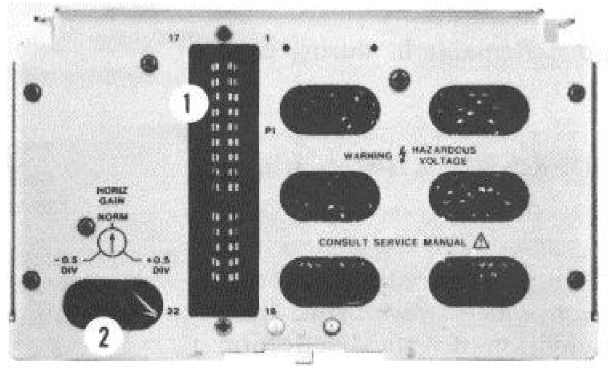



*Figure 3-2. Rear Panel Controls and Connectors (1 of 2)*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| | | | | MECHANICAL CHASSIS PARTS | | |
| | | | | **NOTE** | | |
| | | | | **COMPLETE FRONT PANEL ASSEMBLIES (LISTED BELOW) INCLUDE A2 FRONT SWITCH ASSY, PANEL, ALL KNOBS, & PROBE POWER INPUT, CAL OUTPUT, AND LO OUTPUT CABLES** | | |
| | 08558-60161 | 5 | 1 | FRONT PANEL ASSY (STD.) | 28480 | 08558-60161 |
| | 08558-60164 | 8 | | FRONT PANEL ASSY (OPT. 001) | 28480 | 08558-60164 |
| | 08558-60165 | 9 | 1 | FRONT PANEL ASSY (OPT. 002) | 28480 | 08558-60165 |
| 1 | 08558-00114 | 2 | 1 | PANEL-FRONT (STD.) | 28480 | 08558-00114 |
| 1 | 08558-00121 | 1 | 1 | PANEL-FRONT (OPT.001) | 28480 | 08558-00121 |
| 1 | 08558-00122 | 2 | 1 | PANEL-FRONT (OPT.002) | 28480 | 08558-00122 |
| 2 | 08558-00116 | 4 | 1 | SIDE GUSSET (LEFT) | 28480 | 08558-00116 |
| 3 | 08558-00115 | 3 | 1 | SIDE GUSSET (RIGHT) | 28480 | 08558-00115 |
| 4 | 08558-00003 | 8 | 1 | PANEL (REAR) | 28480 | 08558-00003 |
| 5 | 5061-5426 | 9 | 1 | GUIDE RAIL (TOP) | 28480 | 5061-5426 |
| 6 | 08565-20093 | 7 | 4 | EXTRUSION, CIRCUIT ENCLOSURE, TAPPED | 28480 | 08565-20093 |
| 7 | 08558-20037 | 0 | 1 | EXTRUSION, END PLATE ENCLOSURE | 28480 | 08558-20037 |
| 8 | 08558-20036 | 9 | 4 | EXTRUSION, CIRCUIT ENCLOSURE, TAPPED | 28480 | 08558-20036 |
| 9 | 08565-20051 | 7 | 1 | EXTRUSION, CIRCUIT ENCLOSURE | 28480 | 08565-20051 |
| 10 | 08558-20038 | 1 | 1 | EXTRUSION, ENCLOSURE DIVIDER | 28480 | 08558-20038 |
| 11 | 08565-20096 | 0 | 8 | EXTRUSION, CIRCUIT ENCLOSURE, TAPPED | 28480 | 08565-20096 |
| 12 | 5021-3229 | 2 | 1 | WINDOW, FREQ. DISPLAY (GLUED TO 1) | 28480 | 5021-3229 |
| 13 | 08558-00030 | 1 | 1 | INSULATOR-GUIDE RAIL (BOTTOM) | 28480 | 08558-00030 |
| 14 | 08558-20164 | 4 | 1 | GUIDE RAIL (BOTTOM) | 28480 | 08558-20164 |
| 15 | 08557-60045 | 3 | 1 | CABLE ASSY (W10) VERTICAL OUTPUT | 28480 | 08557-60045 |
| 16 | 2200-0165 | 6 | 2 | SCREW-MACH 4-40 .25-IN-LG 82 DEG | 28480 | 2200-0165 |
| 17 | 2360-0194 | 9 | 4 | SCREW-MACH 6-32 .312-IN-LG 100 DEG | 28480 | 2360-0194 |
| 18 | 2200-0104 | 3 | 6 | SCREW-MACH 4-40 .25-IN-LG 82 DEG | 28480 | 2200-0104 |
| 19 | 2360-0201 | 9 | 2 | SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI | 28480 | 2360-0201 |
| 20 | 0624-0099 | 1 | 81 | SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI | 28480 | 0624-0099 |
| 21 | 0624-0206 | 2 | 1 | SCREW-TPG 6-32 .25-IN-LG PAN-HD-POZI | 28480 | 0624-0206 |
| 22 | 2200-0103 | 2 | 12 | SCREW-MACH 440 .25-IN-LG PAN-HD-POZI | 28480 | 2200-0103 |
| 23 | 2360-0115 | 4 | 3 | SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI | 28480 | 2360-0115 |
| 24 | 2200-0170 | 3 | 1 | SCREW-MACH 440 .625-IN-LG 82 DEG | 28480 | 2200-0170 |
| 25 | 0380-0005 | 1 | 1 | SPACER-RND .312 IN-LG .18-IN-ID | 28480 | 0380-0005 |
| 26 | 2260-0003 | 7 | 1 | NUT-HEX-PLSTC LKG 4-40-THD .141-IN-THK | 28480 | 2260-0003 |
| 27 | 2200-0105 | 4 | 6 | SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI | 28480 | 2200-0105 |
| 28 | 2200-0164 | 5 | 2 | SCREW-MACH 4-40 .188-IN-LG UNCT 82 DEG | 28480 | 2200-0164 |
| 29 | 2200-0168 | 9 | 3 | SCREW-MACH 4-40 .438-IN-LG 82 DEG | 28480 | 2200-0168 |
| 30 | 08558-00108 | 4 | 1 | COVER-LOG AMPLIFIER | 28480 | 08558-00108 |
| 31 | 08558-00089 | 0 | 1 | COVER-BANDWIDTH FILTER NO. 1 | 28480 | 08558-00089 |
| 32 | 08558-00088 | 9 | 1 | COVER-STEP GAIN | 28480 | 08558-00088 |
| 33 | 08558-00087 | 8 | 1 | COVER-BANDWIDTH FILTER NO. 2 | 28480 | 08558-00087 |
| 34 | 0380-0005 | 1 | 1 | SPACER-RND .312 IN-LG .18-IN-ID | 28480 | 0380-0005 |
| 35 | 3050-0105 | 6 | 4 | WASHER-FL MTLC NO. 4 .125-IN-ID | 28480 | 3050-0105 |
| 36 | 1400-0082 | 9 | 2 | CLAMP-CABLE .125-iDIA .375-WD NYL | 28480 | 1400-0082 |
| 37 | 2420-0001 | 5 | 2 | NUT-HEX-W/LKWR 6-32-THD .109-IN-THK | 28480 | 2420-0001 |
| 38 | 2190-0016 | 3 | 2 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 28480 | 2190-0016 |
| 39 | 2950-0043 | 8 | 1 | NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK | 28480 | 2950-0043 |
| 40 | 2190-0068 | 5 | | 1 WASHER-LK INTL T 1/2 IN .505-IN-ID | 28480 | 2190-0068 |
| 41 | 2950-0054 | 1 | 1 | NUT-HEX-DBL-CHAM 1/2-28-THD .125-IN-THK | 28480 | 2950-0054 |
| 42 | 0370-0606 | 7 | 4 | BEZEL-PB .330-IN-SQ;JADE GRAY | 28480 | 0370-0606 |
| 43 | 5040-8817 | 4 | 3 | PUSHBUTTON- SQUARE; JADE GRAY | 28480 | 5040-8817 |
| 44 | 08565-40011 | 1 | 1 | POINTER-INPUT ATTENUATOR | 28480 | 08565-40011 |
| 45 | 1460-0532 | 0 | 1 | SPRING-CONICAL | 28480 | 1460-0532 |
| 46 | 08558-60166 | 0 | 1 | KNOB ASSY-REFERENCE LEVEL (OPT. 002) | 28480 | 08558-60166 |
| 46 | 08558-60167 | 1 | 1 | KNOB ASSY-REFERENCE LEVEL (STD. OPT. 001) | 28480 | 08558-60167 |
| 47 | 08558-00123 | 3 | 1 | INDEX DISK (OPT. 002) REFERENCE LEVEL | 28480 | 08558-00123 |
| 47 | 08565-00043 | 5 | 1 | INDEX DISK (STD. OPT. 001) REFERENCE LEVEL | 28480 | 08565-00043 |
| 48 | 0510-0089 | 8 | 1 | RETAINER-RING BSC EXT .188-IN-DIA BE-CU | 28480 | 0510-0089 |
| 49 | 08565-60047 | 5 | 1 | KNOB ASSY, REF. LEVEL (FINE) | 28480 | 08565-60047 |
| 50 | 08558-20161 | 1 | 1 | KNOB ASSY, RESOLUTION BW | 28480 | 08558-20161 |
| 51 | 08558-20162 | 2 | 1 | KNOB ASSY, FREQ. SPAN/DIV | 28480 | 08558-20162 |
| 52 | 5040-8819 | 6 | 1 | PUSHBUTTON-SQUARE, WILLOW GREEN | 28480 | 5040-8819 |
| 53 | 0590-1251 | 6 | 2 | NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD | 28480 | 0590-1251 |
| 54 | 0370-1121 | 3 | 1 | KNOB-LOCK | 28480 | 0370-1121 |
| 55 | 08558-60170 | 6 | 1 | CABLE ASSY-PROBE POWER (W16) | 28480 | 08558-60170 |
| 56 | 08558-60031 | 8 | 1 | CABLE ASSY-75 OHM INPUT (W1) OPT. 001, 002 | 28480 | 08558-60031 |
| 56 | 08558-60038 | 5 | 1 | CABLE ASSY-50 OHM INPUT (W1) STD. SEE FIG 6-1 | 28480 | 08558-60038 |
| 57 | 0370-3021 | 6 | 1 | KNOB ASSY-MANUAL SWEEP | 28480 | 0370-3021 |
| 58 | 08558-20163 | 3 | 1 | KNOB ASSY-SWEEP TIME/DIV | 28480 | 08558-20163 |
| 59 | 08559-20050 | 8 | 1 | KNOB ASSY-SWEEP TRIGGER | 28480 | 08559-20050 |
| 60 | 0370-3006 | 7 | 1 | KNOB ASSY-FINE TUNE | 28480 | 0370-3006 |
| 61 | 0370-3004 | 5 | 1 | KNOB ASSY-COARSE TUNE | 28480 | 0370-3004 |
| 62 | 08565-60170 | 5 | 2 | KNOB-BASELINE CLIP/VIDEO FILTER | 28480 | 08565-60170 |
| 63* | 2190-0390 | 6 | 1 | WASHER-FL NM 1/4 IN .26-IN-ID .562-IN-OD | 28480 | 2190-0390 |
| 64 | 2950-0001 | 8 | 1 | NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK | 28480 | 2950-0001 |
| 65 | 2200-0119 | 0 | 2 | SCREW-MACH 440 1-IN-LG PAN-HD-POZI | 28480 | 2200-0119 |
| 66* | 3050-0929 | 2 | 1 | WASHER-FL NM 1/4 IN .26-IN-ID .562-IN-OD (SHIM WASHER, NOT SHOWN, USED WITH 63 FOR PROPER SPACING BETWEEN 46 AND 47.) | 28480 | 3050-0929 |

*7-2. Front Panel Assembly (2 of 3) (CHANGE A)*

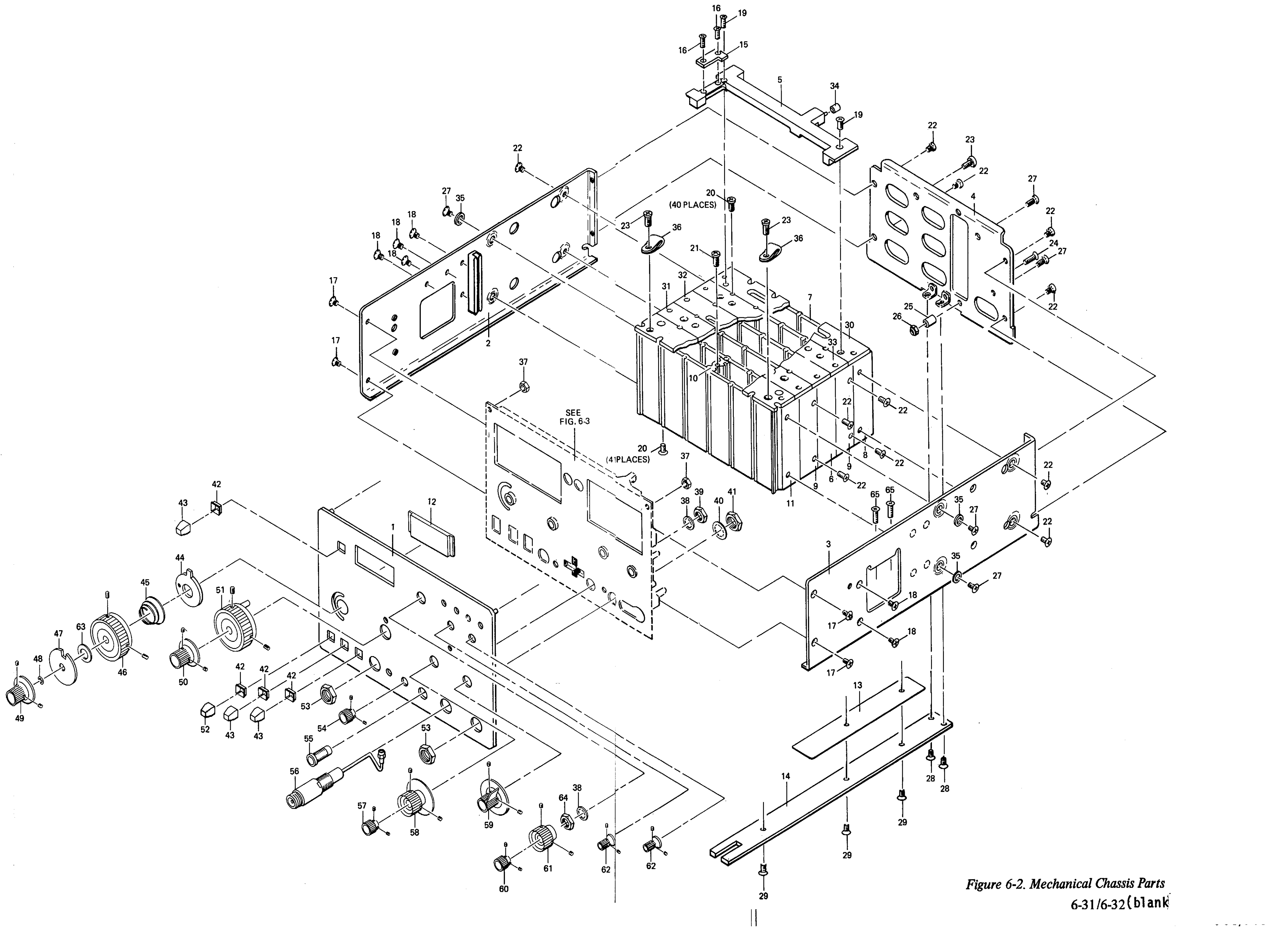



*Figure 6-2. Mechanical Chassis Parts*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| A2 | 08558-60100 | 2 | 1 | FRONT SWITCH ASSEMBLY (MECH PARTS)<br>**NOTE**<br>**SEE A2 FRONT SWITCH ASSY LISTING FOR ELECTRICAL PARTS; SEE FIG 6-2 FOR FRONT PANEL PARTS** | 28480 | 08558-60100 |
| 1 | 5021-3213 | 4 | 1 | DIECAST-FRONT SWITCH | 28480 | 5021-3213 |
| 2 | 1460-0012 | 1 | 1 | SPRING-CPRSN .135-IN-OD .688-IN-OA-LG | 28480 | 1460-0012 |
| 3 | 5021-3227 | 0 | 1 | SHAFT-LOCKING | 28480 | 5021-3227 |
| 4 | 1480-0017 | 8 | 1 | PIN-DOWEL .125 OD | 28480 | 1480-0017 |
| 5 | 5001-5818 | 7 | 1 | LINK-LOCKING | 28480 | 5001-5818 |
| 6 | 5021-3218 | 9 | 1 | SHAFT-REF LEVEL | 28480 | 5021-3218 |
| 7 | 08559-60060 | 4 | 2 | HUB ASSEMBLY-DRIVE, ANTI-CRUSH | 28480 | 08559-60060 |
| 8 | 08558-60098 | 7 | 1 | ROTOR-ATTENUATOR DRIVE | 28480 | 08558-60098 |
| 9 | 5021-3224 | 7 | 1 | SHAFT-FREQUENCY SPAN | 28480 | 5021-3224 |
| 10 | 1410-0006 | 8 | 7 | BALL-BRG TYPE .1875-DIA GRADE-50 SST | 78707 | GRADE 50 |
| 11 | 1460-0623 | 0 | 3 | SPRING-COMPRESSION .18-IN-OD .312-IN-OA-L | 28480 | 1460-0623 |
| 12 | 1480-0059 | 8 | 11 | PIN-ROLL | 28480 | 1480-0059 |
| 13 | 08558-20066 | 5 | 1 | ROTOR-FREQUENCY SPAN | 28480 | 08558-20066 |
| 14 | 08558-20059 | 6 | 2 | HUB-DRIVE | 28480 | 08558-20059 |
| 15 | 08558-20089 | 2 | 1 | BUSHING-SLOTTED | 28480 | 08558-20089 |
| 16 | 1460-1376 | 2 | 1 | SPRING-HAIRPIN | 28480 | 1460-1376 |
| 17 | 5061-5424 | 7 | 1 | SHAFT ASSEMBLY-ATTENUATOR | 28480 | 5061-54240 |
| 18 | 3050-0032 | 8 | 1 | WASHER-FL MTLC NO. 8 .189-IN-ID | 28480 | 3050-0032 |
| 19 | 2200-0105 | 4 | 7 | SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI | 28480 | 2200-0105 |
| 20 | 5001-5813 | 2 | 1 | BRACKET-LEFT DPM MOUNTING | 28480 | 5001-5813 |
| 21 | 5001-5814 | 3 | 1 | BRACKET-RIGHT DPM MOUNTING | 28480 | 5001-5814 |
| 22 | 2260-0009 | 3 | 4 | NUT-HEX-W/LKWR 4-40-THD .094-IN-THK | 28480 | 2260-0009 |
| 23 | 2200-0111 | 2 | 1 | SCREW-MACH 4-40.5-IN-LG PAN-HD-POZI | 28480 | 2200-0111 |
| 24 | 0380-0034 | 6 | 1 | SPACER-RND .312-IN-LG .116-IN-ID | 28480 | 0380-0034 |
| 25 | 0510-0015 | 0 | 5 | RETAINER-RING E-R EXT.125-IN-DIA STL | 28480 | 0510-0015 |
| 26 | 5021-3226 | 9 | 1 | SHAFT-MANUAL SWEEP | 28480 | 5021-3226 |
| 27 | 1460-0578 | 4 | 2 | SPRING-COMPRESSION | 28480 | 1460-0578 |
| 28 | 5061-5425 | 8 | 2 | ROTOR/SHAFT ASSEMBLY, DOUBLE CONTACT | 28480 | 5061-5425 |
| 29 | 0510-0027 | 4 | 1 | RETAINER-PUSH ON | 28480 | 0510-0027 |
| 30 | 08558-00053 | 8 | 1 | STOP ARM | 28480 | 08558-00053 |
| 31 | 1460-0537 | 5 | 1 | SPRING-HORSESHOE | 28480 | 1460-0537 |
| 32 | 2950-0001 | 8 | 4 | NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK | 28480 | 2950-0001 |
| 33 | 2190-0016 | 3 | 4 | WASHER-LK INTL T 3/8 IN .377-IN-ID | 28480 | 2190-0016 |
| 34 | 08558-40007 | 6 | 1 | KNOB-FREQ. ZERO | 28480 | 08558-40007 |
| 35 | 2190-0067 | 4 | 3 | WASHER-LK INTL T 1/4 IN .256-IN-ID | 28480 | 2190-0067 |
| 36 | 2950-0006 | 3 | 3 | NUT-HEX-DBL-CHAM 1/4-32-THD .094-IN-THK | 28480 | 2950-0006 |
| 37 | 2100-3066 | 0 | 1 | RESISTOR-VAR 5K 5% PREC WW (A2R3) FREQ. | 28480 | 2100-3066 |
| 38 | 3050-0028 | 2 | 1 | WASHER-FL MTLC NO. 12 .25-IN-ID | 28480 | 3050-0028 |
| 39 | 2100-3973 | 8 | 1 | RESISTOR-VAR 50K 20% 5W(VIDEO FILTER) | 28480 | 2100-3973 |
| 40 | 08558-20114 | 4 | 1 | SHAFT-FINE TUNE | 28480 | 08558-20114 |
| 41 | 08558-20113 | 3 | 1 | SHAFT-COARSE TUNE | 28480 | 08558-20113 |
| 42 | 08559-20040 | 6 | 1 | BUSHING-COARSE TUNE SHAFT | 28480 | 08559-20040 |
| 43 | 1430-0568 | 9 | 1 | GEAR-SPUR, 40T | 28480 | 1430-0568 |
| 44 | 1460-1542 | 4 | 1 | SPRING-UNIVERSAL COUPLER | 28480 | 1460-1542 |
| 45 | 5001-5825 | 6 | 1 | BRACKET-DUAL POT | 28480 | 5001-5825 |
| 46 | 2100-3452 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-TRN 10K 10% | 28480 | 2100-3452 |
| 47 | 2100-3593 | 8 | 1 | RESISTOR-VAR PREC W/CP 10-TRN 5K 10% | 28480 | 2100-3593 |
| 48 | 1430-0567 | 8 | 1 | GEAR-SPUR, 60T | 28480 | 1430-0567 |
| 49 | 2190-0390 | 6 | 1 | WASHER-FL NM 1/4 IN .26-IN-ID .562-IN-OD | 28480 | 2190-0390 |
| 50 | 3050-0086 | 2 | 1 | WASHER-FL MTLC 3/8 IN .406-IN-ID | 28480 | 3050-0086 |
| 51 | 1460-0019 | 8 | 1 | SPRING-COMPRESSION | 28480 | 1460-0019 |
| 52 | 08558-60168 | 2 | 1 | CABLE ASSY, DPM RIBBON (A2A1W1) (P/O A2A1) | 28480 | 08558-60168 |
| 53 | 08558-60171 | 7 | 1 | CABLE ASSY, INT RIBBON (A2A1W2) (P/O A2A1) | 28480 | 08558-60171 |
| 54 | 2200-0103 | 2 | 8 | SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI | 28480 | 2200-0103 |
| 55 | 5001-5817 | 6 | 1 | BRACKET-ATTENUATOR | 28480 | 5001-5817 |
| 56 | 3050-0105 | 6 | 1 | WASHER-FL MTLC NO. 4 .125-IN-ID | 28480 | 3050-0105 |
| 57 | 1430-0036 | 6 | 2 | GEAR-MIT 16-T 32-DP 20-DG PA BRS | 71041 | G462Y(MOD) |
| 58 | 5001-5816 | 5 | I | DETENT-BANDWIDTH | 28480 | 5001-5816 |
| 59 | 5021-3220 | 3 | 5 | STUD-.500-IN-LG, 4-40 THD | 28480 | 5021-3220 |
| 60 | 08558-20058 | 5 | 1 | HUB-COUPLING | 28480 | 08558-20058 |
| 61 | 5021-3225 | 8 | 1 | SHAFT-BANDWIDTH | 28480 | 5021-3225 |
| 62 | 1460-1860 | 9 | 2 | SPRING-CPRSN .18-IN-OD | 92830 | C0180-014-0310-S |
| 63 | 08558-40004 | 3 | 1 | ROTOR-SINGLE CONTACT | 28480 | 08558-40004 |
| 64 | 08558-20139 | 3 | 1 | SPACER-ROTOR | 28480 | 08558-20139 |
| 65 | 2100-3332 | 3 | 1 | RESISTOR-TRMR 10K 20% CC 1-TRN(A2A1R4) | 28480 | 2100-3332 |
| 66 | 08558-20030 | 3 | 1 | BOARD-BANDWIDTH SWITCH (P/O A2A1) | 28480 | 08558-20030 |
| 67 | 08558-40005 | 4 | 1 | ROTOR-DOUBLE CONTACT | 28480 | 08558-40005 |
| 68 | 5061-5423 | 6 | 1 | DETENT-REF. LEVEL | 28480 | 5061-5423 |
| 69 | 5021-3221 | 4 | 3 | STANDOFF-1 .438-1N-LG 4-40 THD | 28480 | 5021-3221 |
| 70 | 08558-20061 | 0 | 1 | LOCKOUT-ROTATING | 28480 | 08558-20061 |
| 71 | 5061-5422 | 5 | 1 | LOCATOR-INDEX DISC | 28480 | 5061-5422 |
| 72 | 5021-3217 | 8 | 1 | SHAFT-REF. LEVEL (FINE) | 28480 | 5021-3217 |
| 73 | 1490-0841 | 7 | 1 | COUPLING-RGD .375-LG BRS | 28480 | 1490-0841 |
| 74 | 3050-0080 | 6 | 1 | WASHER-FL NM NO. 5 .13-IN-ID .25-IN-OD | 28480 | 3050-0080 |
| 75 | 08558-00021 | 0 | 1 | PLATE-REF. LEVEL, FINE POT | 28480 | 08558-00021 |
| 76 | 2100-0542 | 1 | 1 | RESISTOR-VAR CONTROL WW 10K 5% LIN | 28480 | 2100-0542 |
| 77 | 3050-0017 | 9 | 1 | WASHER-FL MTLC .25-IN-ID | 28480 | 3050-0017 |

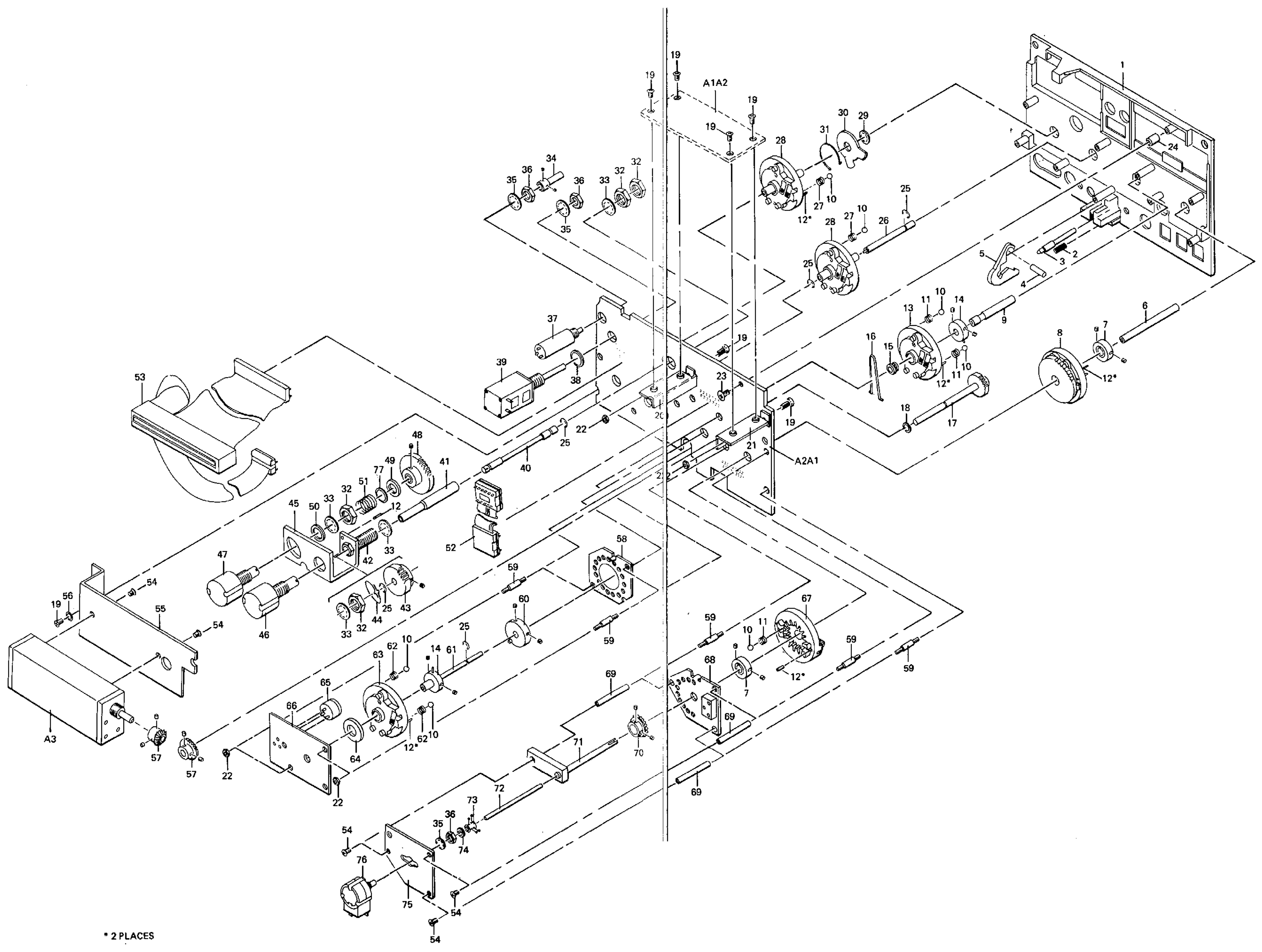



*Figure 6-3. Front Switch Assembly*

| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|---|---|---|---|---|---|---|
| 73 | 2260-0001 | 5 | 2 | NUT-HEX-DBL-CHAM 4-40 | 28480 | 2260-0001 |
| 74 | 08558-20056 | 3 | 1 | SHAFT, BANDWIDTH | 28480 | 08558-20056 |
| 75 | 08558-20058 | 5 | 1 | HUB, COUPLING | 28480 | 08558-20058 |
| 76 | 2190-0102 | 8 | 1 | WASHER-LK INTL T-15/32 IN .472-IN-ID | 28480 | 2190-0102 |
| 77 | 3050-0124 | 9 | 2 | WASHER-FL MTLC NO. 5 .13-IN-ID | 28480 | 3050-0124 |
| 78 | 08558-20055 | 2 | 1 | SHAFT, MANUAL SWEEP | 28480 | 08558-20055 |
| 79 | 3030-0332 | 9 | 2 | SCREW-SET 2-56 .094-IN-LG CUP-PT SST | 28480 | 3030-0332 |
| 80 | 08558-40007 | 6 | 1 | KNOB, KNURLED | 28480 | 08558-40007 |
| 81 | 2950-0142 | 8 | 1 | NUT-HEX-DBL-CHAM 3/8-32-THD .635-IN-THX | 28480 | 2950-0142 |
| 82 | 08558-20049 | 4 | 1 | SHAFT, SWEEP TIME | 28480 | 08558-20049 |
| 83 | 2200-0151 | 6 | 1 | WASHER-FL NM ¼ IN .26-IN-ID .562-IN-OD | 28480 | 2190-0390 |
| 84 | 08558-20048 | 3 | 1 | SHAFT, SWEEP TRIGGER | 28480 | 08558-20048 |
| 85 | 1460-0537 | 5 | 1 | SPRING-TRSN MUW CD | 28480 | 1460-0537 |
| 86 | 08558-00053 | 8 | 1 | STOP ARM | 28480 | 08558-00053 |
| 87 | 08558-00026 | 5 | 1 | DETENT, SWEEP TRIGGER | 28480 | 08558-00026 |
| 88 | 2200-0151 | 0 | 4 | SCREW-MACH 4-40 .75-IN-LG PAN-HD-POZI | 28480 | 2200-0151 |
| 89 | 2950-0054 | 1 | 1 | NUT-HEX-DBL-CHAM ½-28-THD .125-IN-THX | 28480 | 2950-0054 |
| 90 | 2190-0068 | 5 | 1 | WASHER-LK INTL T ½ IN .505-IN-ID | 28480 | 2190-0068 |
| 91 | 2200-0155 | 4 | 1 | SCRE-MACH 4-40 1-IN1LG PAN-HD-POZI | 28480 | 2200-0155 |
| 92 | 08558-20071 | 2 | 2 | CABLE, LO OUTPUT | 28480 | 08558-20071 |
| 93 | 08558-20092 | 7 | 1 | SHAFT, LATCH | 28480 | 08558-20092 |
| 94 | 08558-00082 | 3 | 1 | PANEL, FRONT (SEE FIG. 6-2 FOR SUB-PANEL) | 28480 | 08558-00082 |
| 94 | 08558-00083 | 4 | 1 | PANEL, FRONT (OPTION 001) | 28480 | 08558-00083 |
| 94 | 08558-00084 | 5 | 1 | PANEL, FRONT (OPTION 002) | 28480 | 08558-00084 |
| 95 | 2950-0072 | 3 | 1 | NUT-HEX-DBL-CHAM ¼-32-THD .062-IN-THK | 28480 | 2950-0072 |
| 96 | 3101-0044 | 1 | 2 | SWITCH-PB SPST-NO MOM .5A 115VAC RED-BTN | 28480 | 3101-0044 |
| 97 | 00183-67407 | 7 | 2 | KNOB | 28480 | 00183-67407 |
| 98 | 0510-0045 | 6 | 1 | RETAINER-RING F-R EXT .188-IN-DIA STL | 28480 | 0510-0045 |
| 99 | 0590-0012 | 5 | 2 | NUT-KNRLD-R 15/32-32-THD .062-IN-THK | 28480 | 0590-0012 |
| 100 | 08558-20093 | 8 | 1 | KNOB, LATCH | 28480 | 08558-20093 |
| 101 | 08558-00045 | 8 | 1 | KNOB, MANUAL SWEEP | 28480 | 08558-00045 |
| 102 | 08558-00044 | 7 | 1 | KNOB, SWEEP TIME | 28480 | 08558-00044 |
| 103 | 5060-0467 | 6 | 1 | CONNECTOR, MALE, PROBE POWER | 28480 | 5060-0467 |
| 104 | 08558-60038 | 5 | 1 | CABLE ASSY, INPUT, RF | 28480 | 08558-60038 |
| 104 | 08558-60031 | 8 | 1 | CABLE ASSY, 75 OHM INPUT, RF | 28480 | 08558-60031 |
| 105 | 08558-00107 | 3 | 1 | KNOB, TRIGGER SWITCH | 28480 | 08558-00107 |
| 106 | 0380-0063 | 1 | 1 | SPACER-RND .125-IN-LG .129-IN-ID | 28480 | 0380-0063 |
| 107 | 1430-0567 | 8 | 1 | GEAR, SPUR, 60 T | 28480 | 1430-0567 |
| 108 | 1430-0568 | 9 | 1 | GEAR, SPUR, 40 T | 28480 | 1430-0568 |
| 109 | 1460-1542 | 4 | 1 | SPRING, UNIVERSAL COUPLER | 28480 | 1460-1542 |
| 110 | 3050-0086 | 2 | 2 | WASHER-FL MTLC 3/8 IN .406-IN-ID | 28480 | 3050-0086 |
| 111 | 08558-00069 | 6 | 1 | SPRING | 28480 | 08558-00069 |
| 112 | 08558-00070 | 9 | 1 | BRACKET, DUAL POT | 28480 | 08558-00070 |
| 113 | 08558-20111 | 1 | 1 | BUSHING, COARSE TUNE SHAFT | 28480 | 08558-20111 |
| 114 | 08558-20112 | 2 | 1 | WASHER, THRUSH | 28480 | 08558-20112 |
| 115 | 08558-20113 | 3 | 1 | SHAFT, COARSE TUNE | 28480 | 08558-20113 |
| 116 | 08558-20114 | 4 | 1 | SHAFT, FINE TUNE | 28480 | 08558-20114 |
| 117 | 1460-0623 | 0 | 1 | SPRING-CPRSN .18-INOD .312-IN-OA-LG MUW | 28480 | 1460-0623 |
| 118 | 2200-0165 | 6 | | SCREW-MACH 4-40 .25-IN-LG 82 DEG | 28480 | 2200-0165 |
| 119 | 6960-0016 | 0 | 1 | PLUG-HOLE TR-HD FOR .125-D-HOLE NYL | 28480 | 6960-0016 |
| 120 | 2200-0121 | 4 | 1 | SCREW-MACH 4-40 1.1258-IN-LG PAN-HD-POZI | 28480 | 2200-0121 |
| 121 | 2190-0004 | 9 | 1 | WASHER-LK INTL T NO. 6 .115-IN-ID | 28480 | 2190-0004 |
| 122 | 2950-0001 | 8 | 1 | NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK | 28480 | 2950-0001 |
| 123 | 7120-7136 | 0 | 1 | LABEL, HP LOGO | 28480 | 7120-7136 |

*Figure 7-2. Front Panel Assembly (2 of 3) (CHANGE A)*

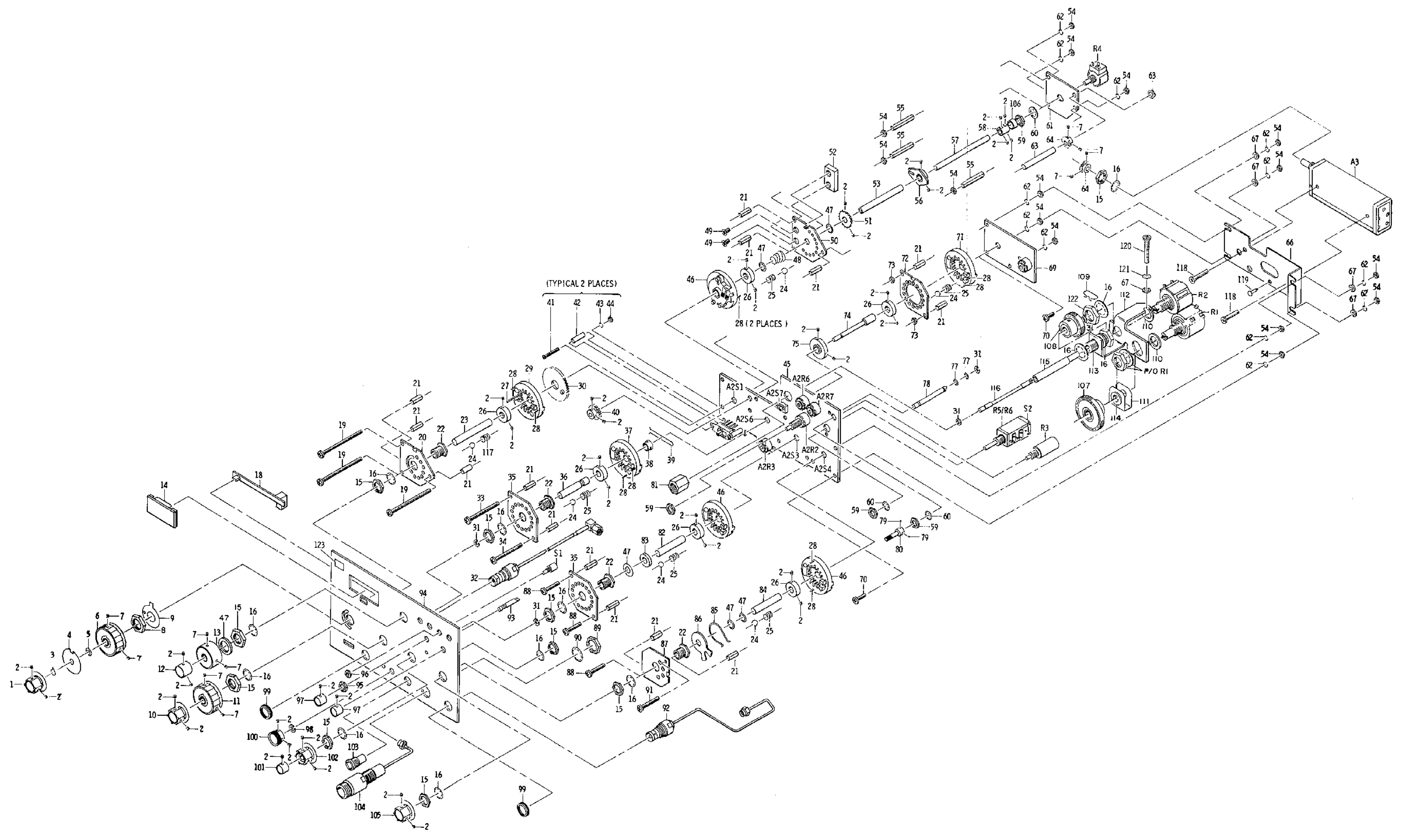
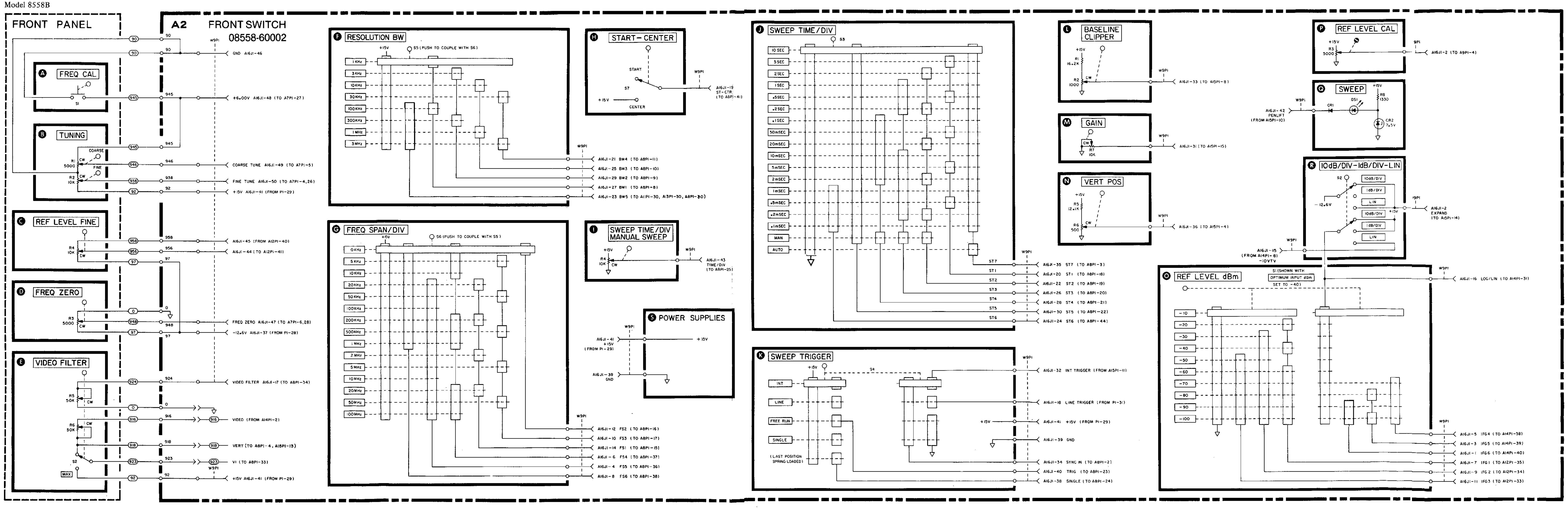


*Figure 7-2. Front Panel Assembly (3 of 3) (CHANGE A)*

Model 8558B




NOTES

1. EXCEPT FOR W9 INTERCONNECT CABLE ASSY, REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.

2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS (Ω)
CAPACITANCE IN MICROFARADS (μF)
INDUCTANCE IN MICROHENRIES (μH)

3. MNEMONIC TABLE:

| MNEMONIC | DEFINITION |
|---|---|
| BW1-5 | BANDWIDTH CONTROL LINES |
| FS1-6 | FREQUENCY SPAN CONTROL LINES |
| IFG1-6 | IF GAIN CONTROL LINES |
| ST1-6 | SCAN TIME CONTROL LINES (ST6 ENABLES FAST SCAN TIMES) |
| ST - CTR | START - CENTER |
| −10 VTV | −10V TEMP VARIABLES |

A2

*Figure 7-3. Front Switch Assembly A2, Schematic (CHANGE A)*

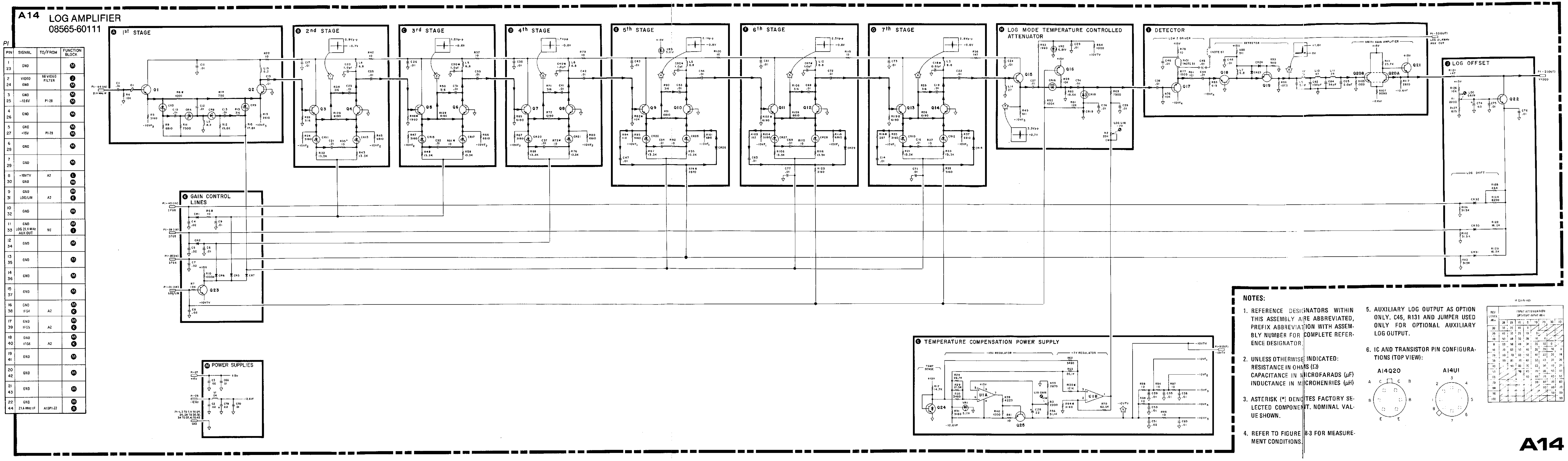



*Figure 7-6. A14 Log Amplifier Assembly Schematic (CHANGE B)*

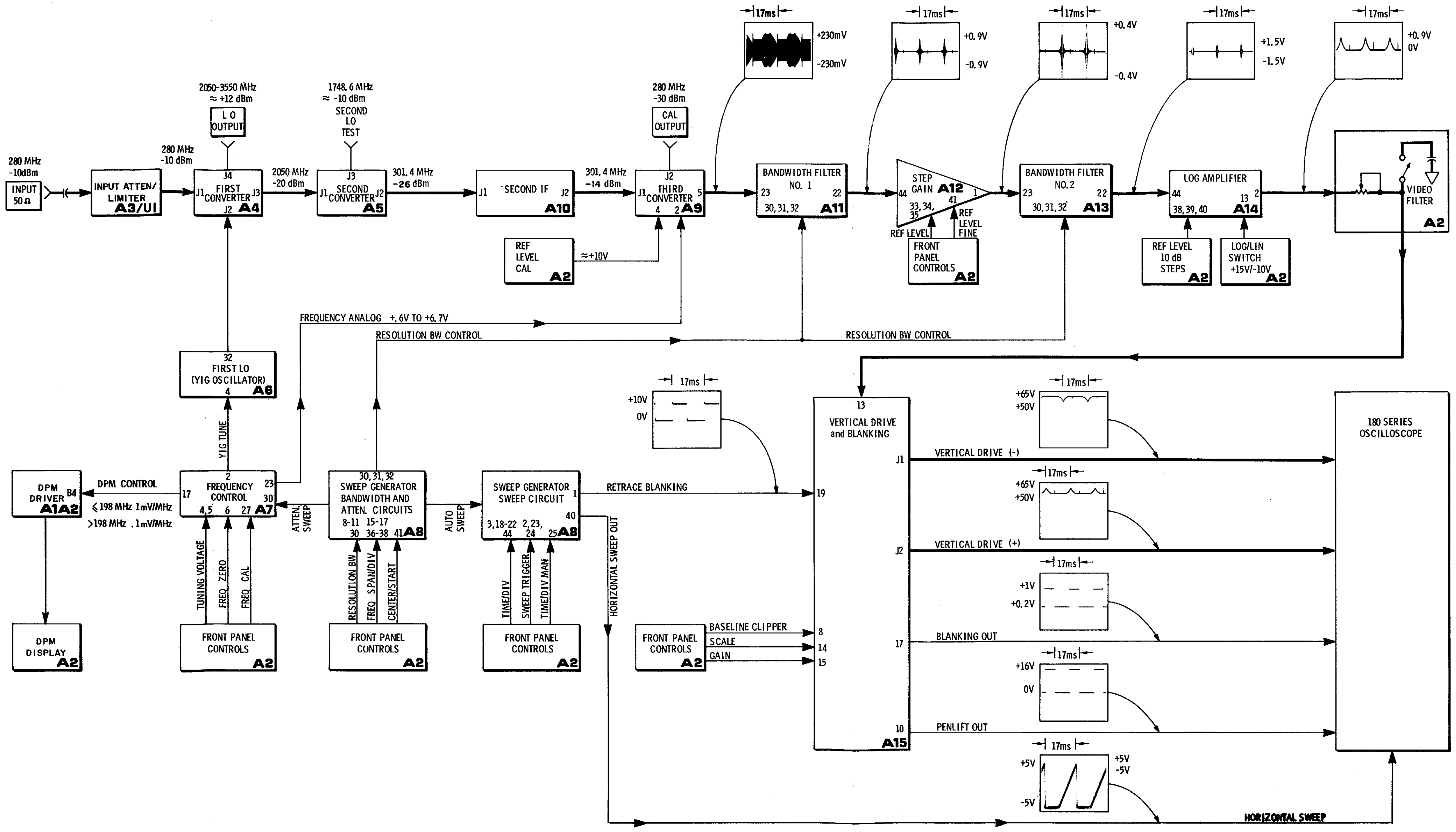



*Figure 8-5. Simplified Block Diagram*

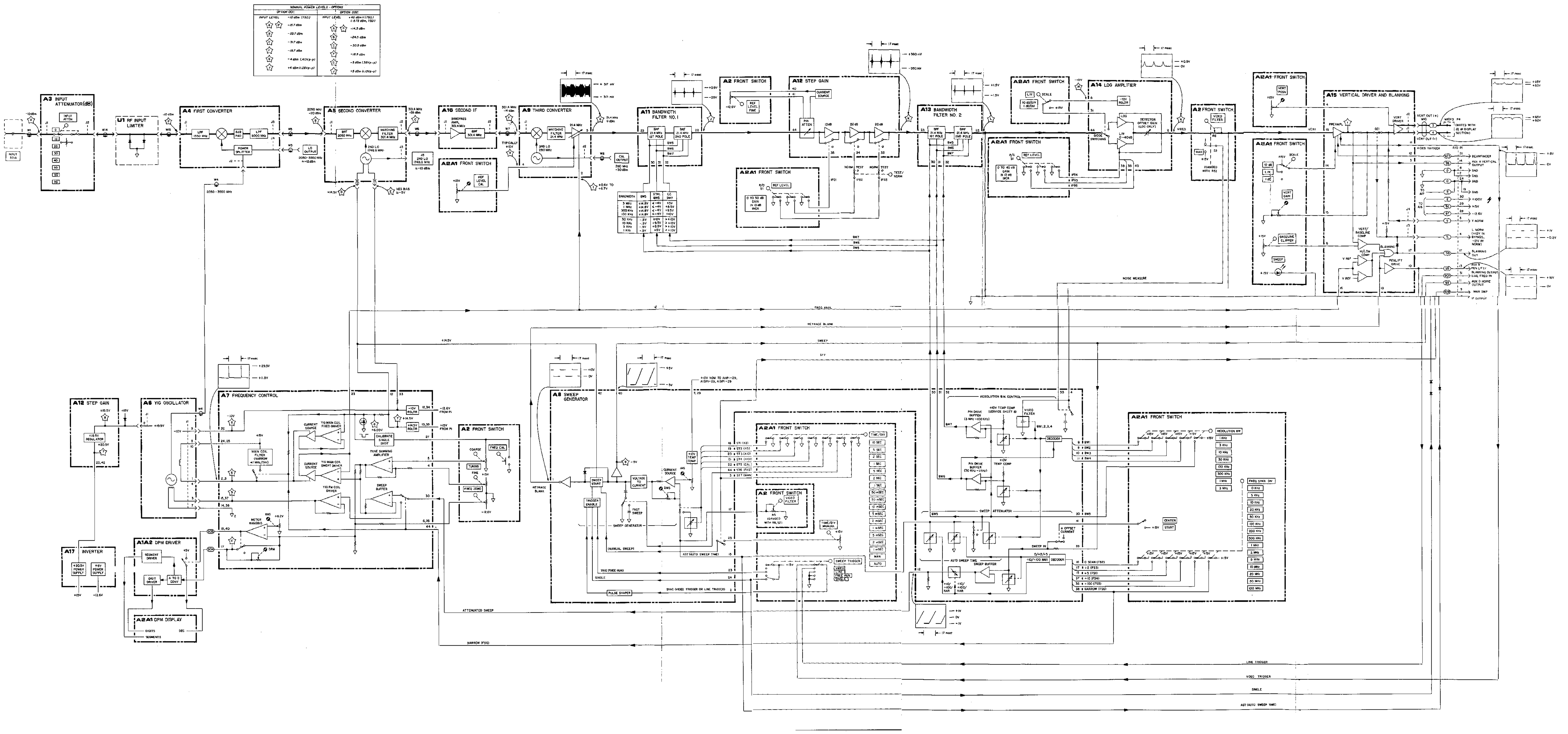
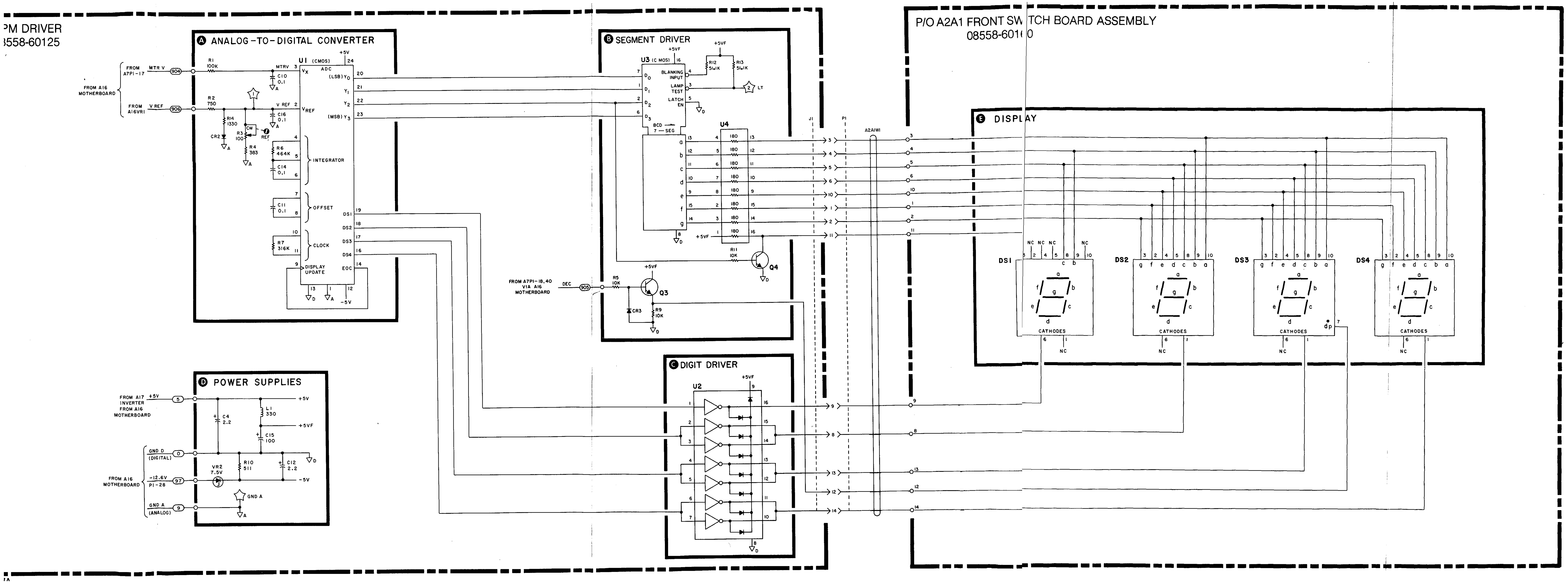



*Figure 8-6. Troubleshooting Block Diagram*




A1A2

NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.

2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS (Ω)
CAPACITANCE IN MICROFARADS (μF)
INDUCTANCE IN MICROHENRIES (μH)

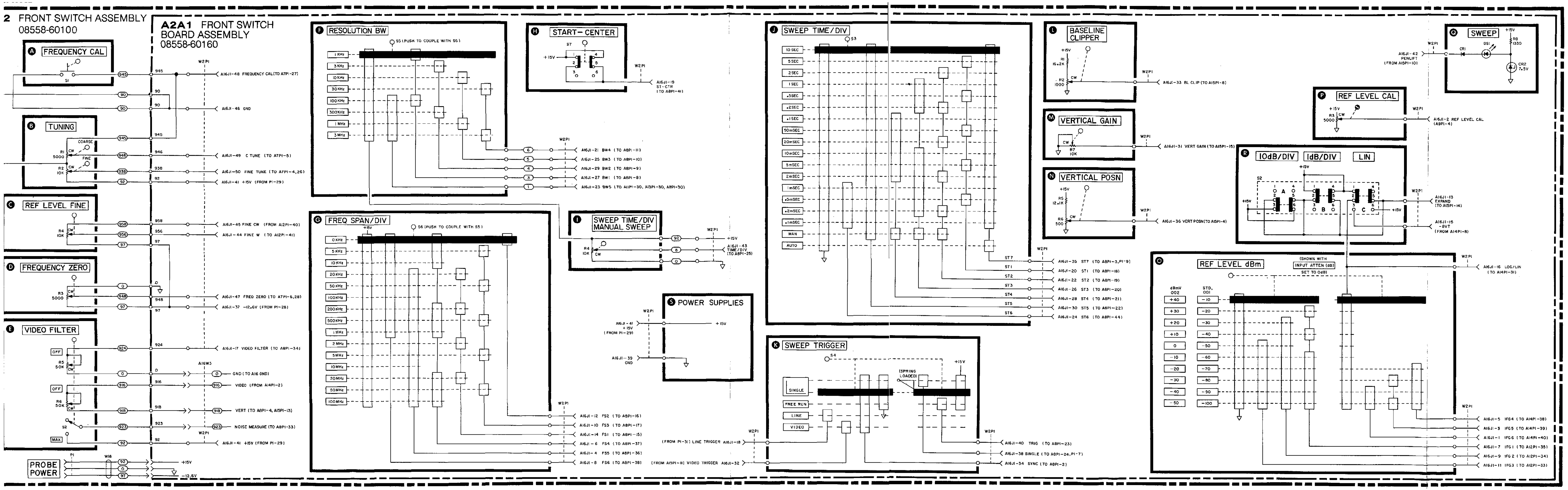
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.

4. MNEMONIC TABLE:

| MNEMONIC | DEFINITION |
|---|---|
| DEC | DECIMAL POINT LINE (LOW=OFF) |
| GND A | DPM ANALOG GROUND |
| GND D | DPM DIGITAL GROUND |
| LT | LAMP TEST (GND=TEST) |
| MTR V | DPM VOLTAGE |
| V REF | DPM REFERENCE VOLTAGE |

FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC.

*Figure 8-11. A1A2 DPM Driver (and DPM Display), Schematic*



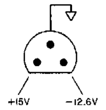

NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. FOR COMPLETE DESIGNATOR, PREFIX WITH ASSEMBLY REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω).
   CAPACITANCE IN MICROFARADS (μF).
   INDUCTANCE IN MICROHENRIES (μH).
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. MNEMONIC TABLE

| MNEMONIC | DESCRIPTION |
|---|---|
| BW1–5 | BANDWIDTH CONTROL LINES |
| FS1–6 | FREQUENCY SPAN CONTROL LINES (FS2=ZERO SPAN, FS6=YIG MAIN/FM COIL) |
| IFG1–6 | IF GAIN CONTROL LINES |
| ST1–7 | SCAN TIME CONTROL LINES (ST5=AUTO, ST6=SLOW/FAST, ST7=MANUAL) |
| ST-CTR | START-CENTER (LOW=START) |
| TRIG | TRIGGER (HIGH=FREE RUN |
| VERT | FILTERED VIDEO SIGNAL |
| FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC. | |

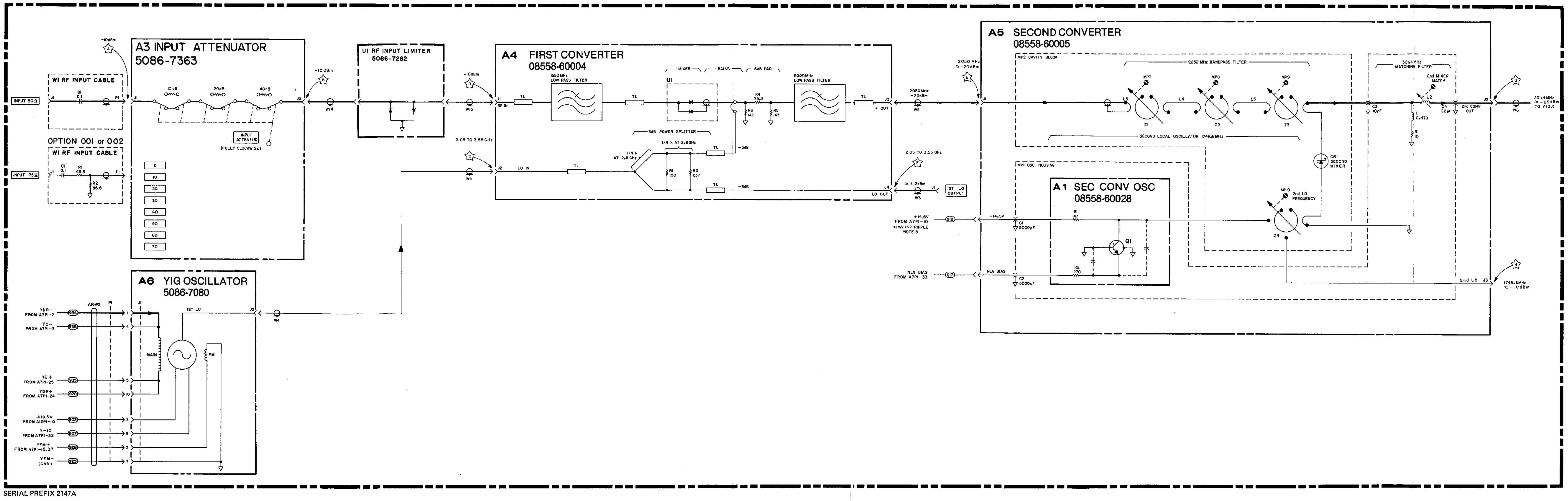
5. FRONT PANEL PROBE POWER SOCKET DIAGRAM

FRONT VIEW



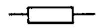

A2

*Figure 8-13. A2 Front Switch, Schematic Diagram*




NOTES

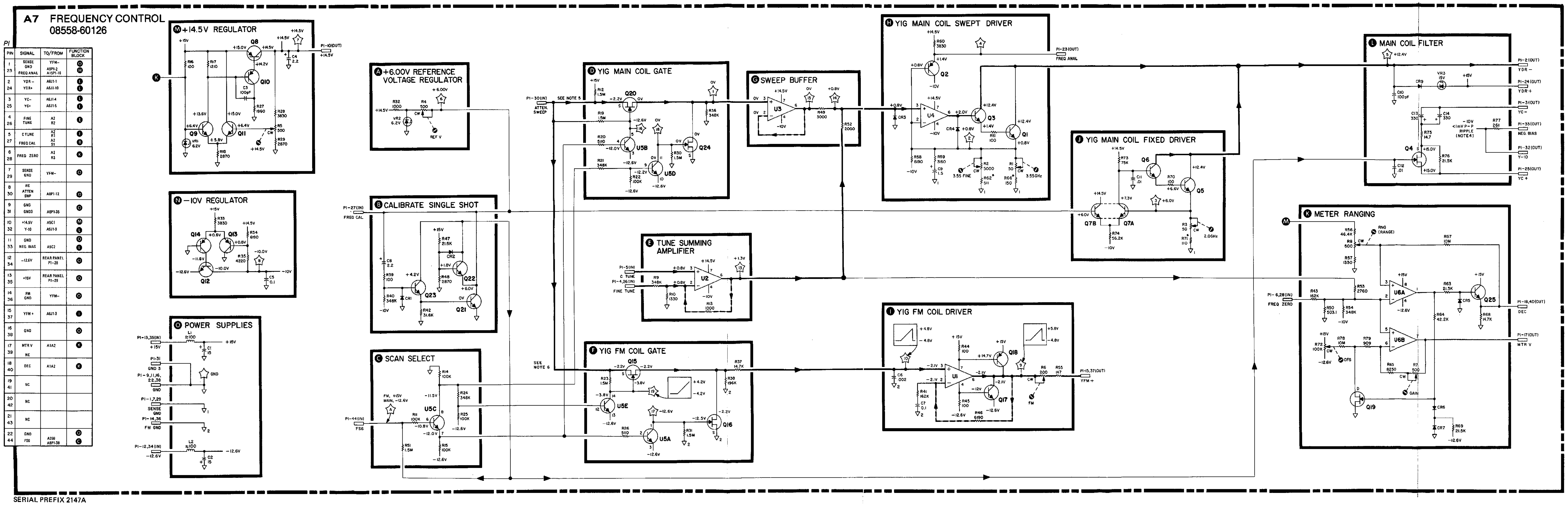
1. REFERENCE DESIGNATORS WITHIN ASSEMBLIES ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω)
   CAPACITANCE IN MICROFARADS (μF)
   INDUCTANCE IN MICROHENRIES (μH)
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. TRANSMISSION LINES ARE SHOWN AS FOLLOWS:




5. RIPPLE MEASURED WITH SWEEP TIME/DIV CONTROL SET TO MAN.

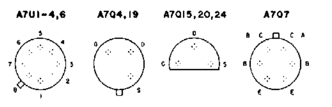
**A3, A4, A5, A6**

*Figure 8-18. A3 Input Attenuator, A4 First Converter, A5 Second Converter and A6 YIG Oscillator, Schematic*




NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω)
   CAPACITANCE IN MICROFARADS (μF)
   INDUCTANCE IN MICROHENRIES (μH)
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. RIPPLE MEASURED WITH SWEEP DIV CONTROL SET TO MAN.
5. SIGNAL PATH FOR FREQ SPAN DIV CONTROL SETTINGS OF 2 MHz OR GREATER.
6. SIGNAL PATH FOR FREQ SPAN DIV CONTROL SETTINGS OF 1 MHz OR LESS.
7. TRANSISTOR AND IC PIN DIAGRAMS (TOP VIEW):

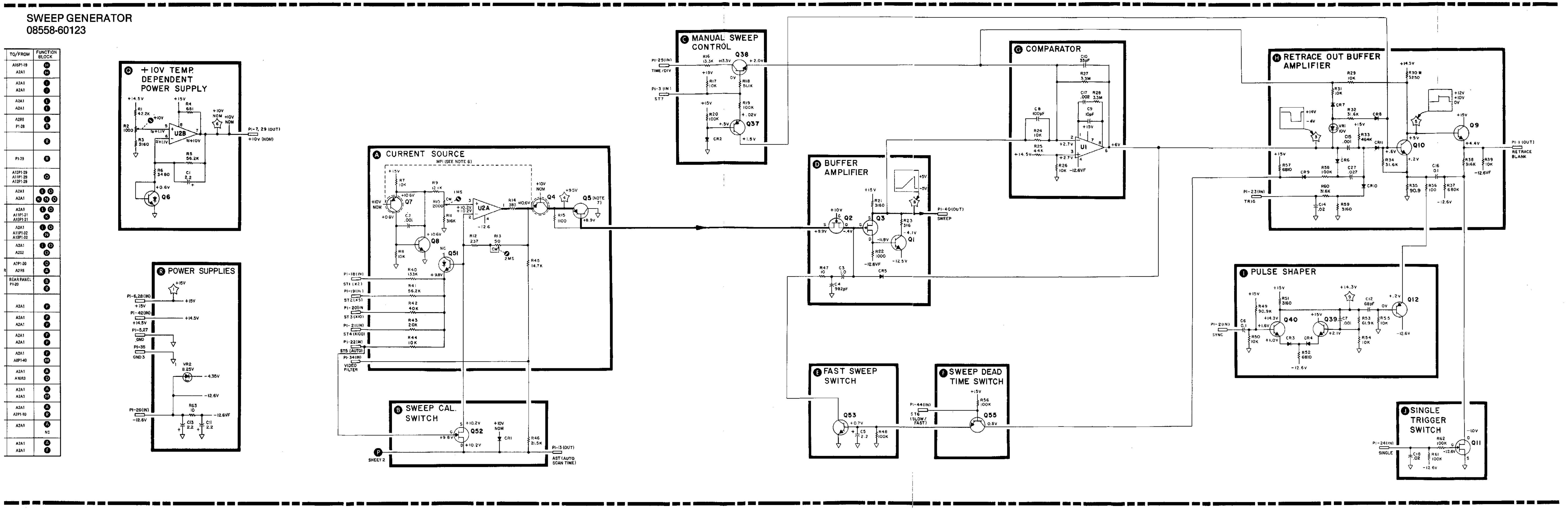



8. MNEMONIC TABLE:

| MNEMONIC | DESCRIPTION |
|---|---|
| DEC | DECIMAL POINT LINE (LOW=OFF) |
| FM GND | FM COIL DRIVER GROUND (TO GND, YFM– ON YIG) |
| FS6 | YIG MAIN/FM COIL CONTROL LINE |
| GND3 | GROUND (TO A8 SWEEP GENERATOR) |
| MTR V | DPM VOLTAGE |
| Y –10 | YIG –10V |
| YC–<br>YC+ | YIG COIL SIGNAL |
| YDR–<br>YDR+ | YIG MAIN COIL SIGNAL |
| YFM–<br>YFM+ | YIG FM COIL SIGNAL (YFM– TO GND, SENSE GND) |
| FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC. | |

A7

*Figure 8-20. A7 Frequency Control, Schematic*

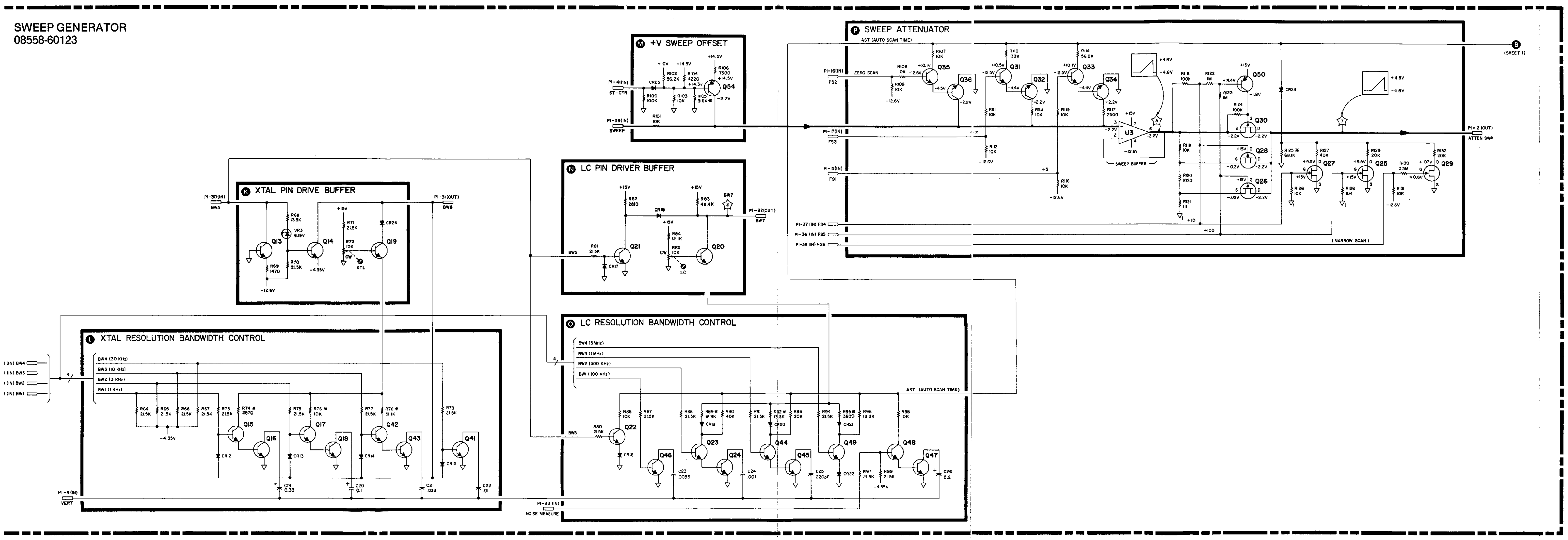



MNEMONIC TABLE

| MNEMONIC | DESCRIPTION |
|---|---|
| AST | AUTO SCAN TIME VOLTAGE |
| BW1–7 | BANDWIDTH CONTROL LINES |
| FS1–6 | FREQUENCY SPAN CONTROL LINES (FS2=ZERO SPAN, FS6=YIG MAIN/FM COIL) |
| GND3 | GROUND (FROM A7 FREQUENCY CONTROL) |
| ST1–7 | SCAN TIME CONTROL LINES (ST5=AUTO, ST6=SLOW/FAST, ST7=MANUAL) |
| ST-CTR | START-CENTER (LOW=START) |
| TIME/DIV | MANUAL SWEEP VOLTAGE |
| TRIG | TRIGGER (HIGH=FREE RUN) |
| VERT | FILTERED VIDEO SIGNAL |

FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC.

*Figure 8-23. A8 Sweep Generator, Schematic (1 of 2)*




NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.

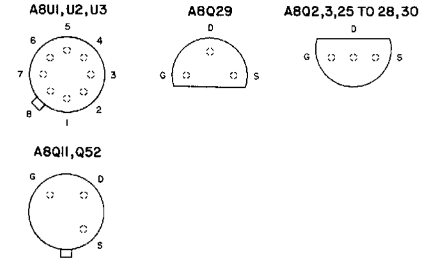
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS (Ω)
CAPACITANCE IN MICROFARADS (μF)
INDUCTANCE IN MICROHENRIES (μH)

3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.

4. BW CONTROL LINE TYPICAL VOLTAGES:

| RESOLUTION BANDWIDTH | MODE XTAL OR LC | BW CONTROL LINE TYPICAL VOLTAGES BW1 | BW2 | BW3 | BW4 | BW5 | BW6 | BW7 |
|---|---|---|---|---|---|---|---|---|
| 3 MHz | LC | –4 | –4 | –4 | +15 | +15 | –4 | +7 |
| 1 MHz | LC | –4 | –4 | +15 | –4 | +15 | –4 | +9 |
| 300 KHz | LC | –4 | +15 | –4 | –4 | +15 | –4 | +10 |
| 100 KHz | LC | +15 | –4 | –4 | –4 | +15 | –4 | +14 |
| 30 KHz | XTAL | –4 | –4 | –4 | +15 | –.5 | +10 | +12 |
| 10 KHz | XTAL | –4 | –4 | +15 | –4 | –.5 | +10 | +14 |
| 3 KHz | XTAL | –4 | +15 | –4 | –4 | –.5 | +9 | +14 |
| 1 KHz | XTAL | +15 | –4 | –4 | –4 | –.5 | +7 | +15 |

5. IC AND FET PIN CONFIGURATIONS (TOP VIEW):



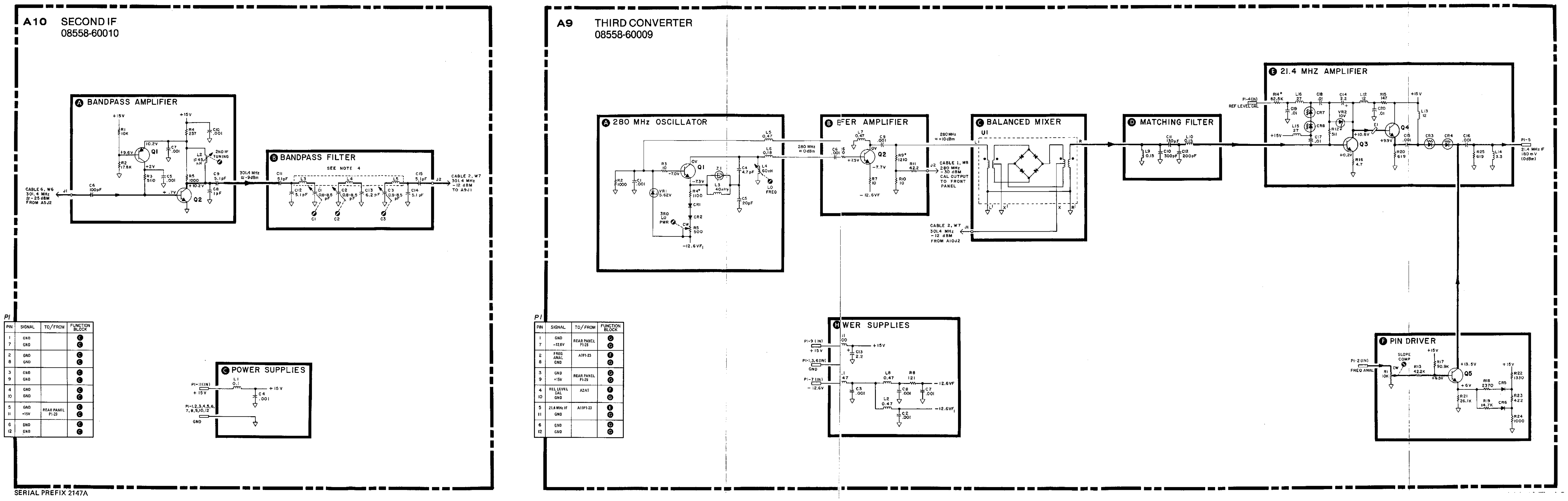

6. A8MP1 IS A THERMAL LINK. A8Q7 PROVIDES TEMPERATURE COMPENSATION FOR A8Q4.

7. A8Q5 IS A 1 mA CURRENT LIMITER.

8. REFER TO SHEET 1 FOR MNEMONIC TABLE.

A8

*Figure 8-23. A8 Sweep Generator, Schematic (2 of 2)*




NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω)
   CAPACITANCE IN MICROFARADS (μF)
   INDUCTANCE IN MICROHENRIES (μH)
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. A10L3, L4, AND L5 ARE ON SAME COIL FORM (NOT SEPARATELY REPLACEABLE).
5. MNEMONIC TABLE:

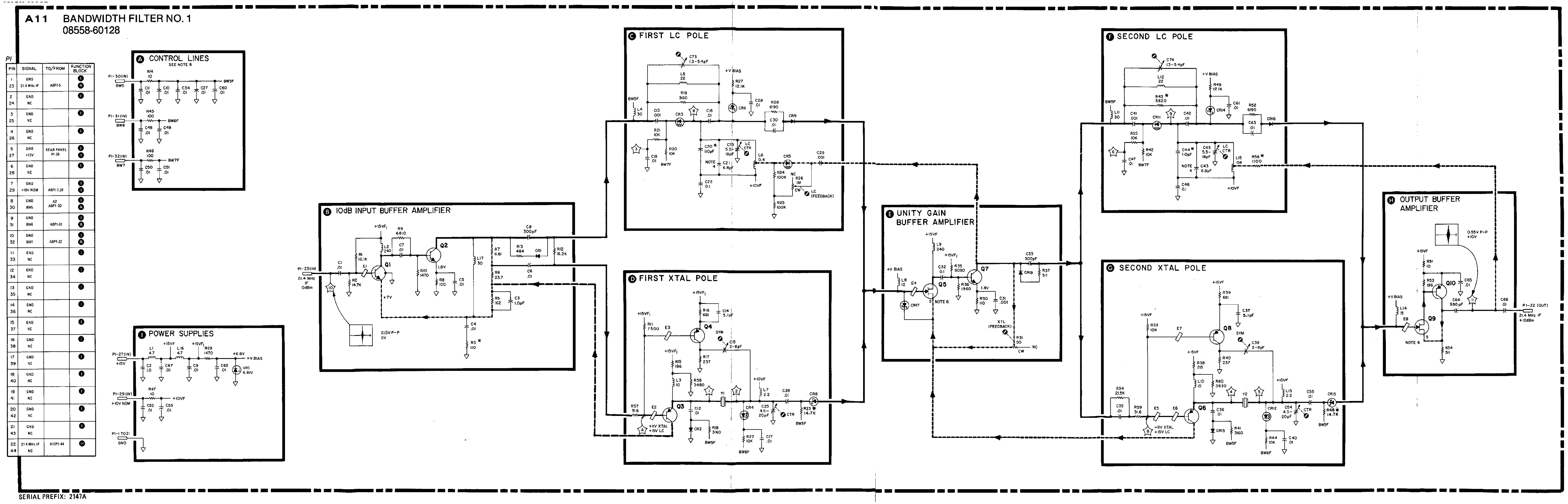
| MNEMONIC | DESCRIPTION |
|---|---|
| FREQ ANAL | FREQUENCY ANALOG VOLTAGE |
| REF LEVEL CAL | REFERENCE LEVEL CALIBRATION VOLTAGE |
| FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC. | |

A9, A10

Figure 8-26. A9 Third Converter and A10 Second IF, Schematic



TM 11-6625-3061-14




## NOTES

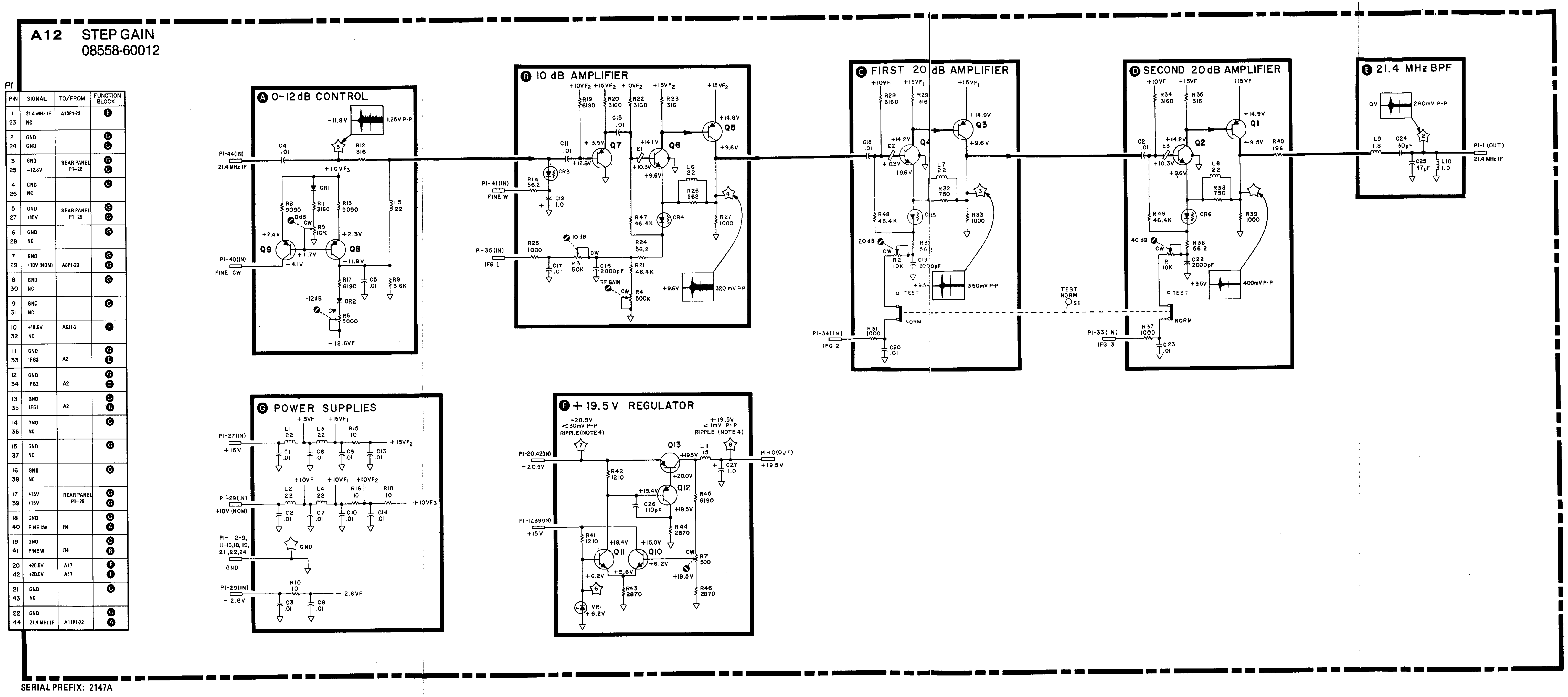
1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω)
   CAPACITANCE IN MICROFARADS (μF)
   INDUCTANCE IN MICROHENRIES (μH)
3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. TEMPERATURE COMPENSATING CAPACITOR.
5. ASTERISK (*) DENOTES FACTORY SELECTED COMPONENT. NOMINAL VALUE IS SHOWN.
6. SOURCE VOLTAGE SHOULD BE 0.2V TO 1.5V GREATER THAN THE GATE VOLTAGE.
7. VOLTAGES SHOULD BE MEASURED WITH 1KΩ OR GREATER AT PROBE TIP TO PREVENT OSCILLATION AND ERRONEOUS READINGS.
8.

| BANDWIDTH | BW CONTROL LINES TYPICAL VOLTAGES | BW6 XTAL | BW7 LC |
|---|---|---|---|
| 3 MHz | +15 | –4 | +7 |
| 1 MHz | +15 | –4 | +9 |
| 300 kHz | +15 | –4 | +10 |
| 100 kHz | +15 | –4 | +14 |
| 30 kHz | –.5 | +10 | +12 |
| 10 kHz | –.5 | +10 | +14 |
| 3 kHz | –.5 | +9 | +14 |
| 1 kHz | –.5 | +7 | +15 |

9. DESIGNATES SHIELDING BEAD.

A11

*Figure 8-30. A11 Bandwidth Filter No. 1, Schematic*



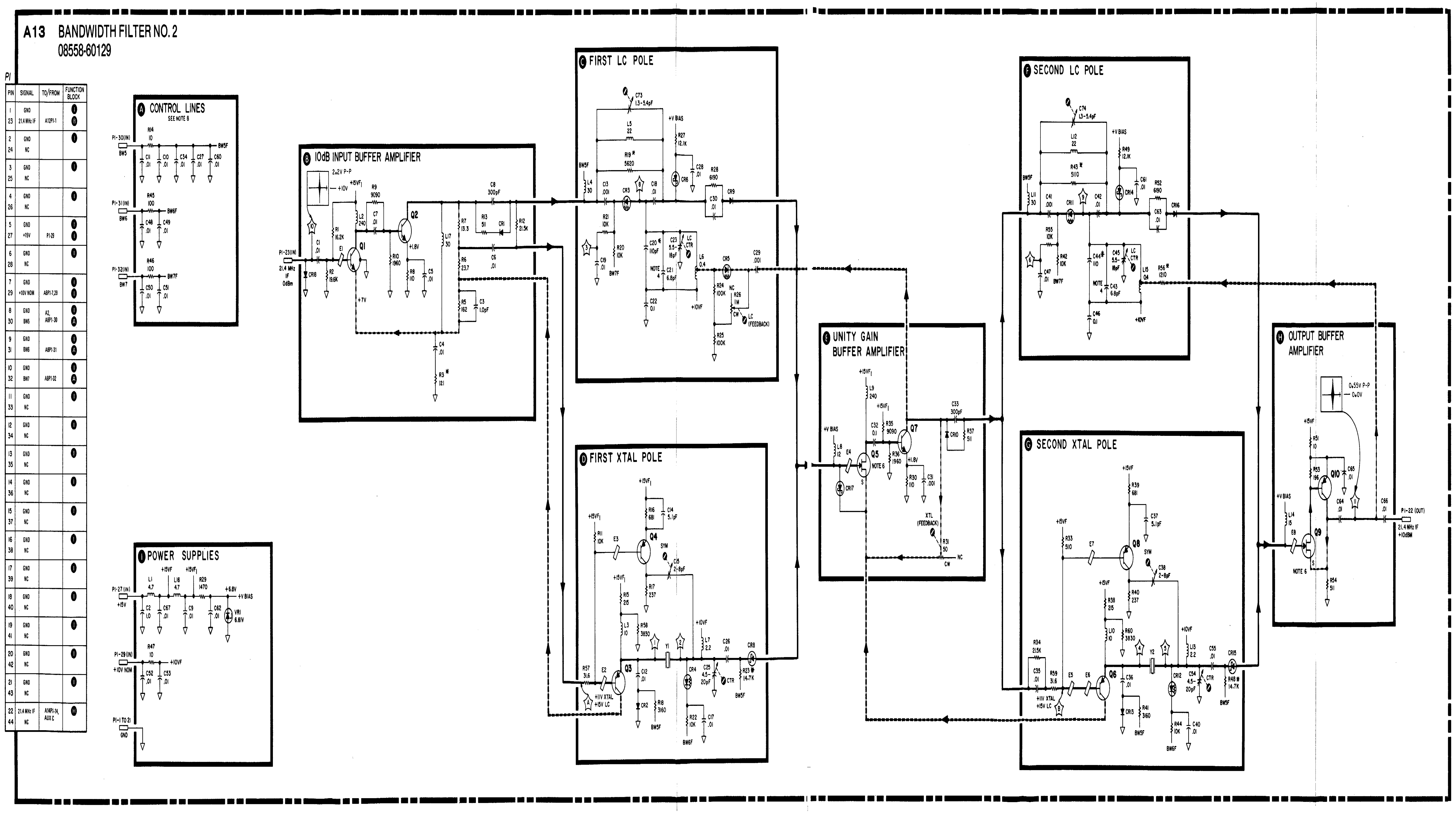

NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED:
   RESISTANCE IN OHMS (Ω)
   CAPACITANCE IN MICROFARADS (μF)
   INDUCTANCE IN MICROHENRIES (μH)
3. SEE FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. RIPPLE MEASURED WITH SWEEP TIME/DIV CONTROL SET TO MAN.
5. MNEMONIC TABLE:

| MNEMONIC | DEFINITION |
|---|---|
| FINE CW | REF LEVEL FINE REFERENCE VOLTAGE (CW END OF R4) |
| FINE W | REF LEVEL FINE VOLTAGE (WIPER OF R4) |
| IFG1–3 | IF GAIN CONTROL LINES |

A12

Figure 8-33. A12 Step Gain, Schematic




NOTES

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.

2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS (Ω)
CAPACITANCE IN MICROFARADS (μF)
INDUCTANCE IN MICROHENRIES (μH)

3. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.

4. TEMPERATURE COMPENSATING CAPACITOR.

5. ASTERISK (*) DENOTES FACTORY SELECTED COMPONENT. NOMINAL VALUE IS SHOWN.

6. SOURCE VOLTAGE SHOULD BE .2V TO 1.5V GREATER THAN THE GATE VOLTAGE.

7. VOLTAGES SHOULD BE MEASURED WITH 1 KΩ OR GREATER AT PROBE TIP TO PREVENT OSCILLATION AND ERRONEOUS READINGS.

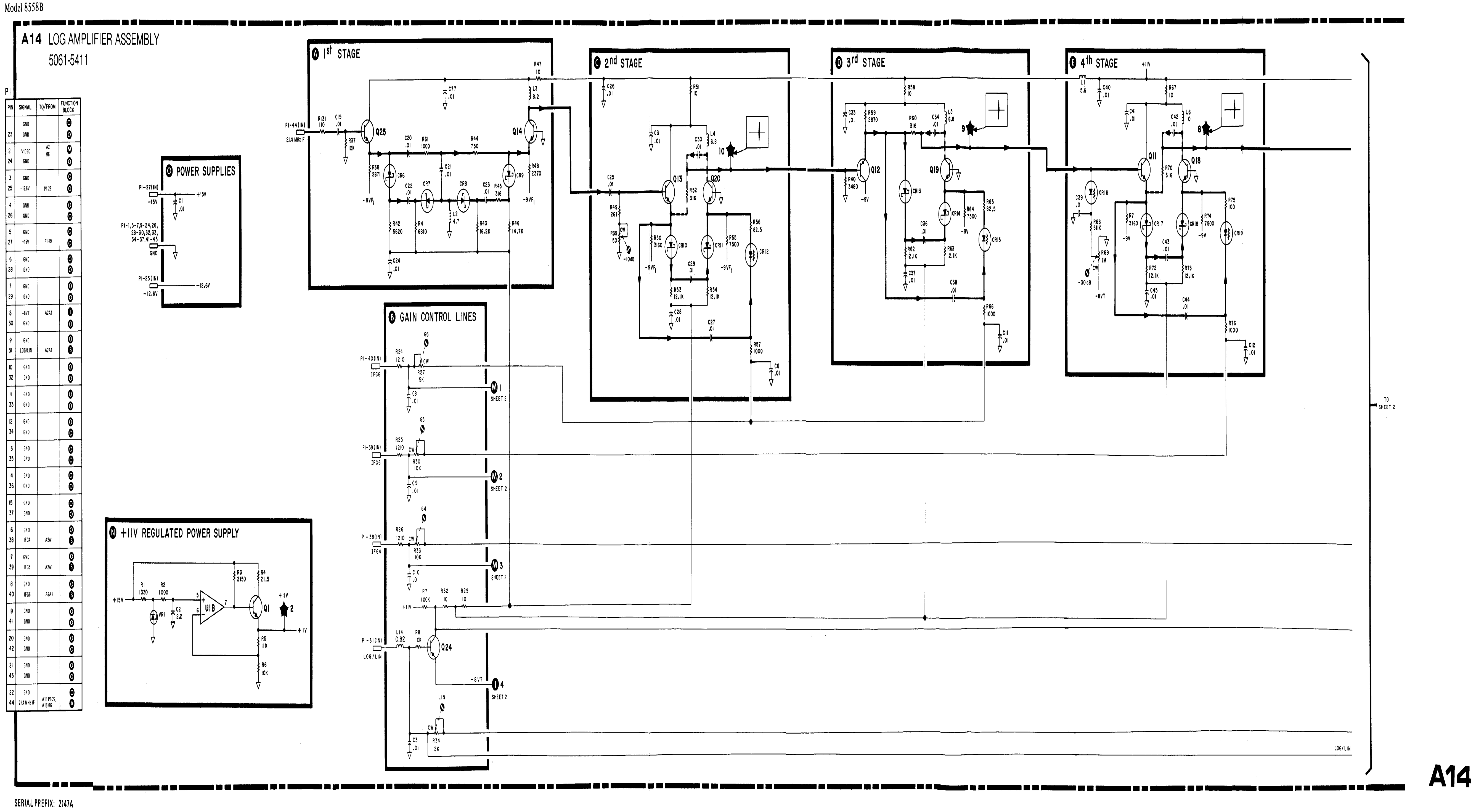
8.

| BANDWIDTH | BW CONTROL LINES TYPICAL VOLTAGES | BW6 XTAL | BW7 LC |
|---|---|---|---|
| 3 MHz | +15 | –4 | +7 |
| 1 MHz | +15 | –4 | +9 |
| 300 kHz | +15 | –4 | +10 |
| 100 kHz | +15 | –4 | +14 |
| 30 kHz | –.5 | +10 | +12 |
| 10 kHz | –.5 | +10 | +14 |
| 3 kHz | –.5 | +9 | +14 |
| 1 kHz | –.5 | +7 | +15 |

9. DESIGNATES SHIELDING BEAD.

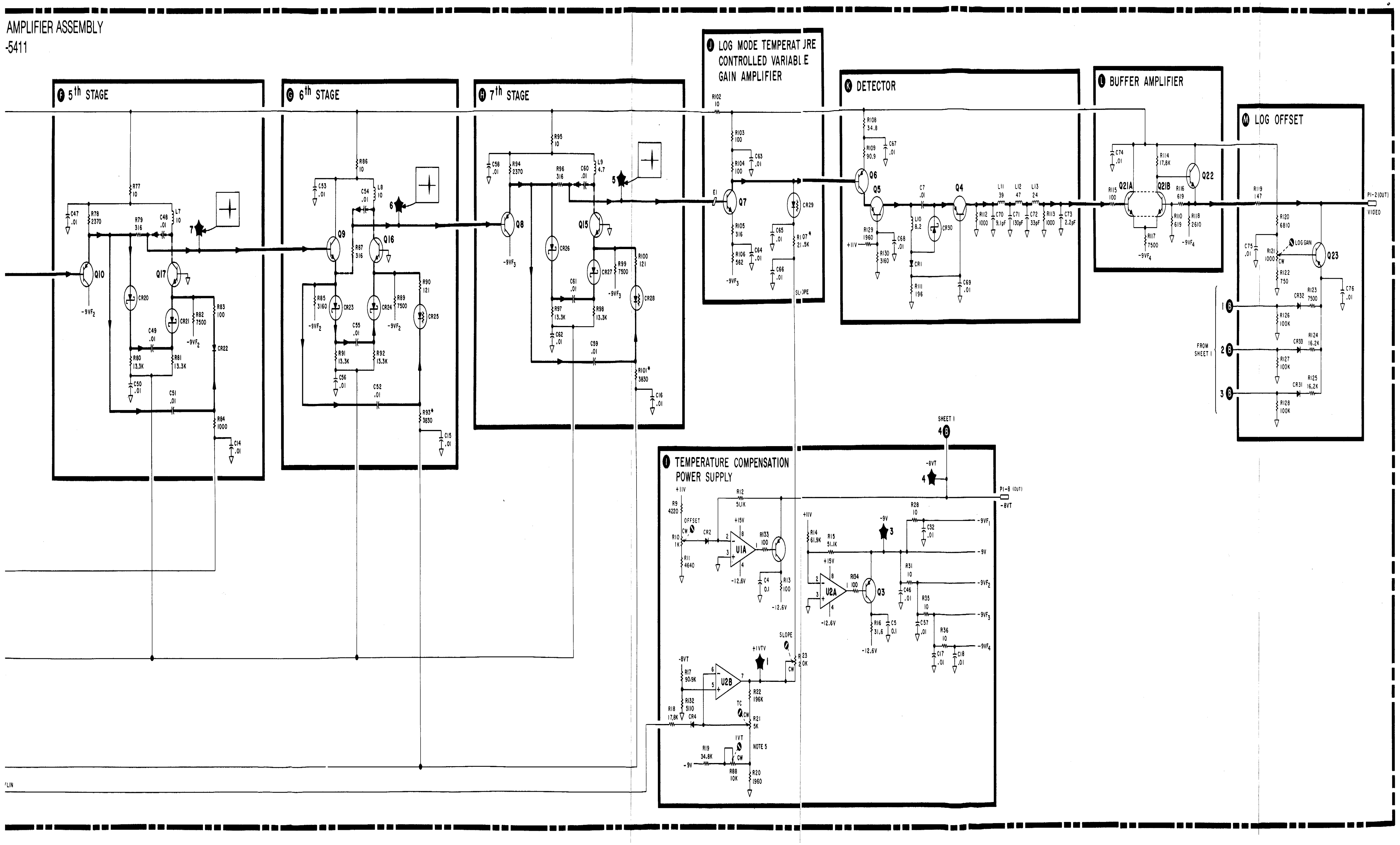
A13

*Figure 8-35. A13 Bandwidth Filter No. 2, Schematic*




SERIAL PREFIX: 2147A

*Figure 8-38. A14 Log Amplifier Assembly, Schematic (1 of 2)*




NOTES:

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. FOR COMPLETE DESIGNATOR, PREFIX WITH ASSEMBLY REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS (Ω) CAPACITANCE IN MICROFARADS (μF) INDUCTANCE IN MICROHENRIES (μH)
3. * ASTERISK DENOTES FACTORY SELECTED COMPONENT. NOMINAL VALUE SHOWN.
4. REFER TO FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
5. R21 TC AND R88 1VT FACTORY ADJUSTABLE ONLY.
6. MNEMONIC TABLE:

| MNEMONIC | DISCRIPTION |
|---|---|
| IFG4<br>IFG5<br>IFG6 | IF GAIN CONTROL LINES |
| LOG/LIN | SELECTS EITHER LOG OR LINEAR |
| –8VT | –8 VOLTS TEMPERATURE COMPENSATED |
| –9V<br>$-9VF_1$<br>$-9VF_2$<br>$-9VF_3$ | –9 VOLTS TEMPERATURE COMPENSATED |

FOR COMPLETE LIST OF SIGNAL NAMES AND MNEMONICS, SEE A16 MOTHERBOARD SCHEMATIC.

A14

*Figure 8-38. A14 Log Amplifier Assembly, Schematic (2 of 2)*

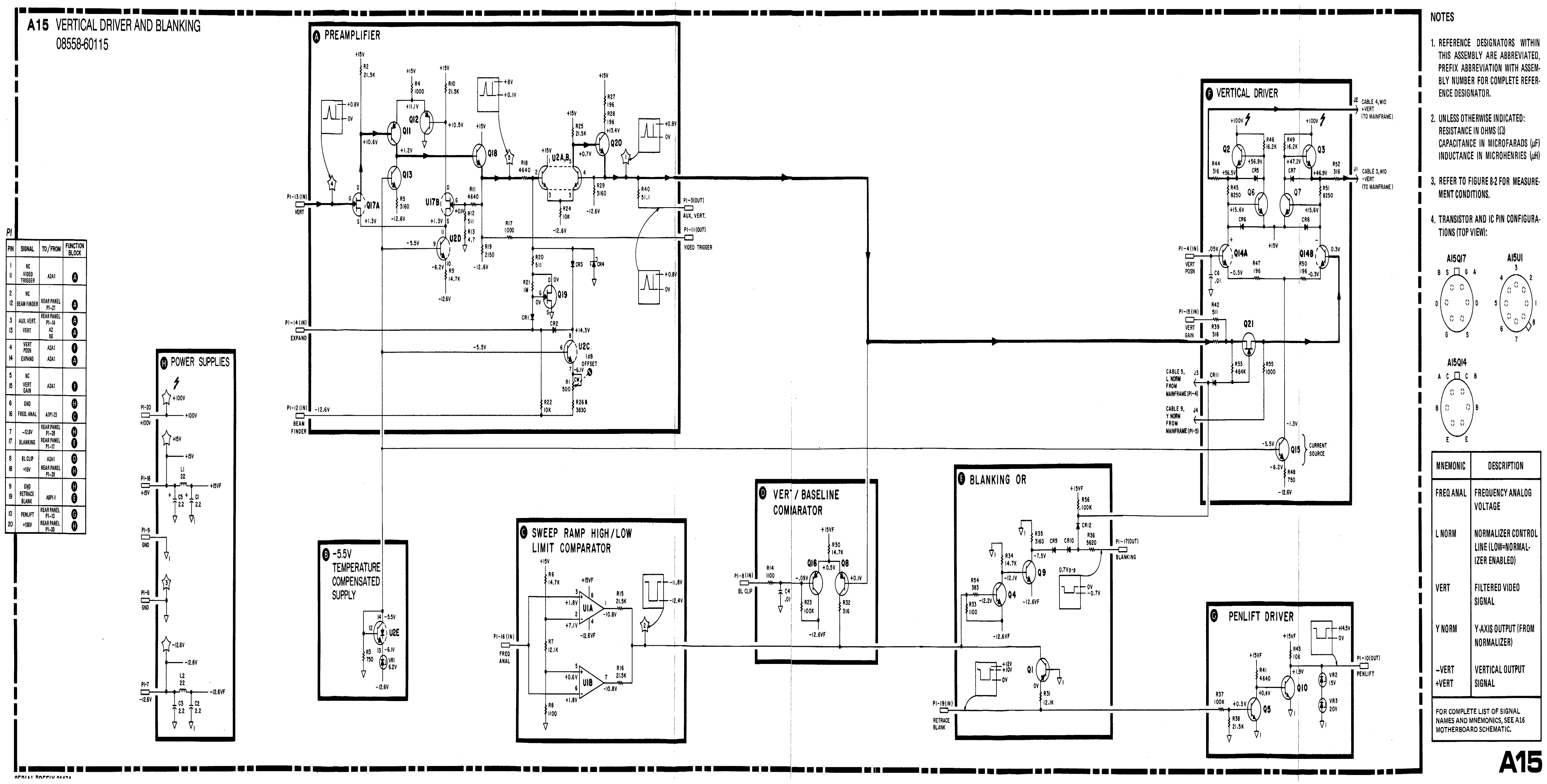



*Figure 8-42. A15 Vertical driver and Blanking, Schematic*

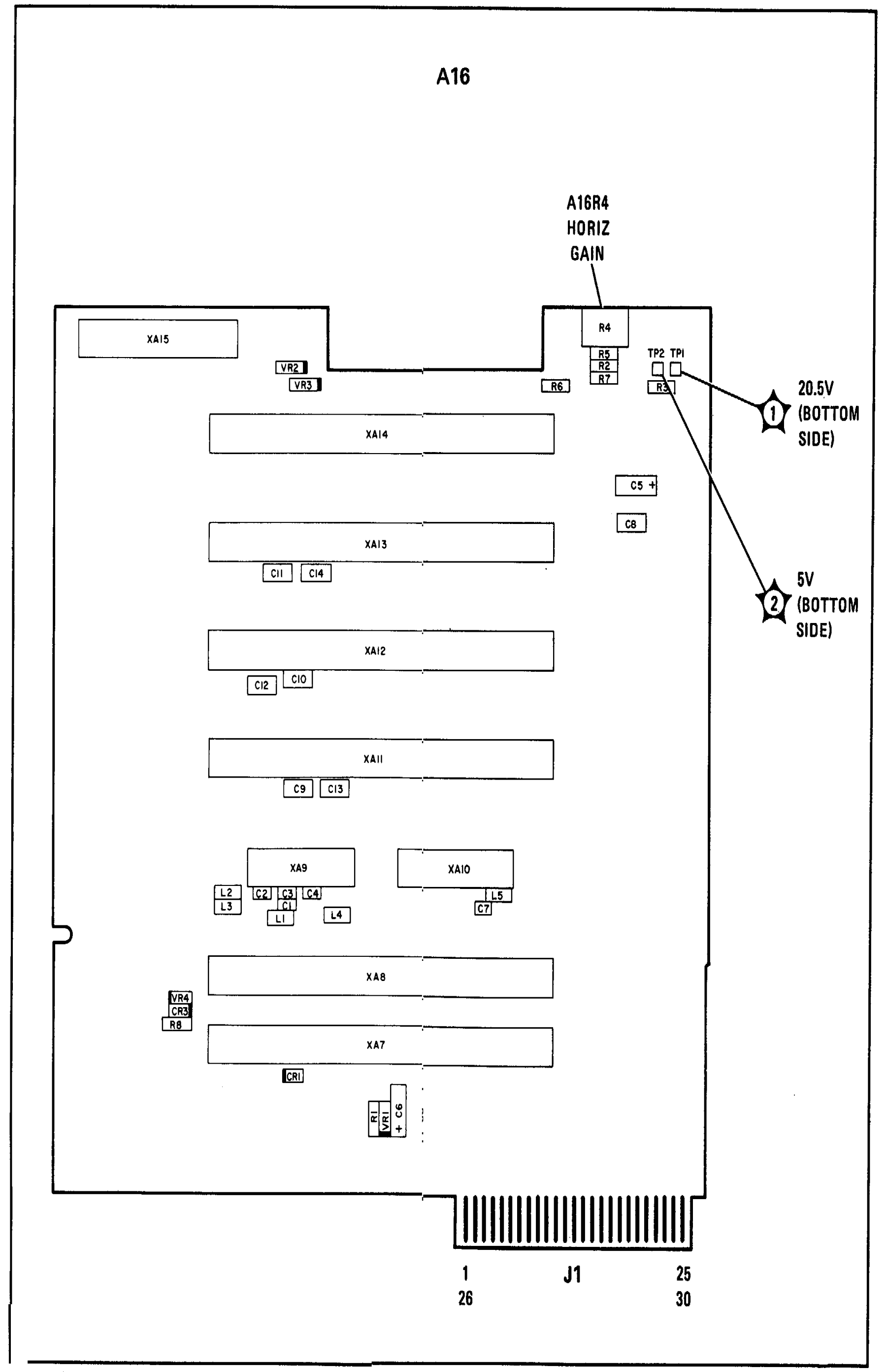



Figure 8-43. A16 Motherboard Assembly, Components and Test Point Locations

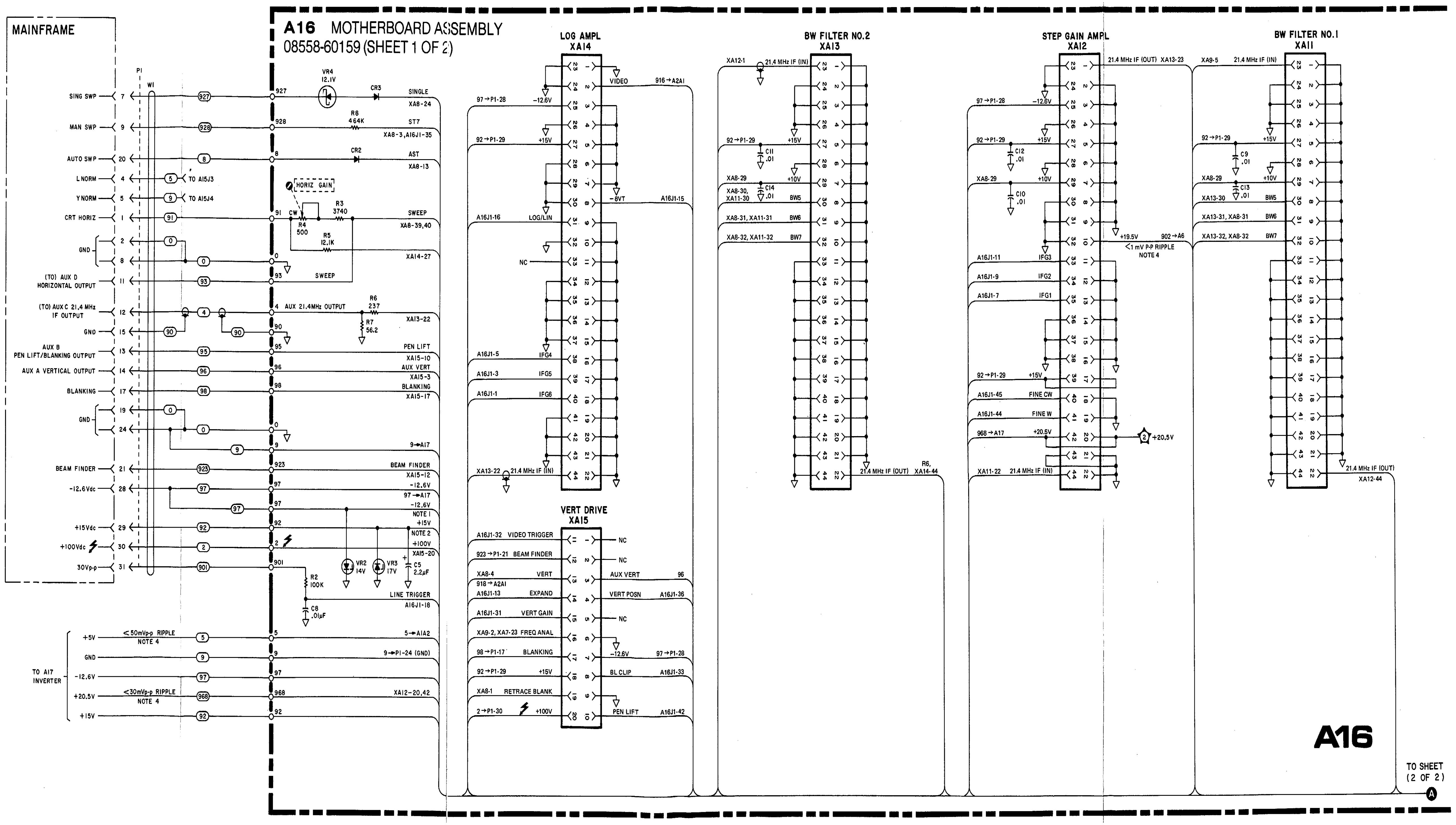
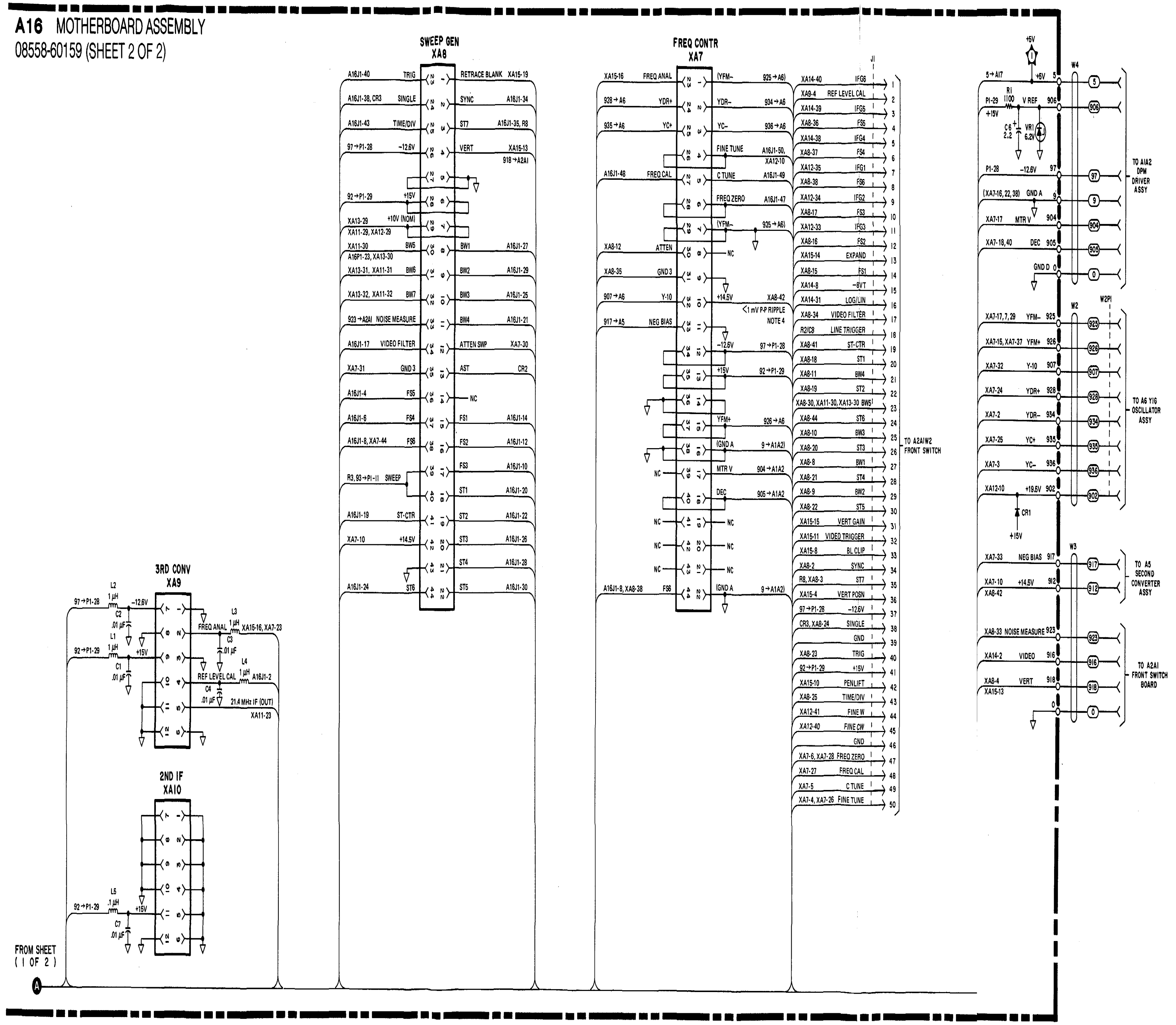



Figure 8-44. A16 Motherboard, Schematic Diagram (1 of 2)




## NOTES

1. THE –12.6V AT THIS POINT GOES TO THE FOLLOWING LOCATIONS: A16J1-37, XA7-12, XA7-34, XA8-26, XA9-7 (FILTERED), XA12-25, XA14-25, XA15-7, 97→A17 AND 97→A1A2.
2. THE +15V AT THIS POINT GOES TO THE FOLLOWING LOCATIONS: A16J1-41, XA7-13, XA7-35, XA8-6, XA8-28, XA9-9 (FILTERED), XA10-11 (FILTERED), XA11-27, XA12-17, XA12-27, XA12-39, XA13-27, XA14-27, XA15-18, 92 → A17, AND R1.
3. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED. FOR COMPLETE DESIGNATOR, PREFIX WITH ASSEMBLY REFERENCE DESIGNATOR.
4. RIPPLE MEASURED WITH SWEEP TIME/DIV CONTROL SET TO MAN.
5. FROM/TO DESIGNATIONS FOR A16W1P1 ARE SHORTENED TO P1.

| A16 MOTHERBOARD SIGNAL MNEMONIC OR NAME | DESCRIPTION |
|---|---|
| AST | AUTO SCAN TIME VOLTAGE |
| ATTEN SWP | ATTENUATED SWEEP VOLTAGE |
| AUTO SWP | (FOR FUTURE USE) |
| AUX VERT | AUXILIARY VERTICAL OUTPUT SIGNAL |
| BEAM FINDER | BEAM FINDER CONTROL LINE (LOW=OFF) |
| BL CLIP | BASELINE CLIPPER VOLTAGE |
| BLANKING | CRT BLANKING SIGNAL |
| BW1–7 | BANDWIDTH CONTROL LINES |
| C TUNE | COARSE TUNE VOLTAGE |
| DEC | DECIMAL POINT LINE (LOW=OFF) |
| EXPAND | 1 dB/DIV CONTROL LINE (LOW=1 dB/DIV) |
| FINE TUNE | FINE TUNE VOLTAGE |
| FINE CW | REF LEVEL FINE REFERENCE VOLTAGE (CW END OF A2R4) |
| FINE W | REF LEVEL FINE VOLTAGE (WIPER OF A2R4) |
| FREQ ANAL | FREQUENCY ANALOG VOLTAGE |
| FREQ CAL | FREQUENCY CALIBRATION CONTROL LINE (LOW=CAL) |
| FREQ ZERO | FREQUENCY ZERO VOLTAGE |
| FS1–6 | FREQUENCY SPAN CONTROL LINES (FS2=ZERO SPAN, FS6=YIG MAIN/FM COIL) |
| GND A | DPM ANALOG GROUND |
| GND D | DPM DIGITAL GROUND |
| GND3 | GROUND (FROM A7 FREQUENCY CONTROL) |
| IFG1–6 | IF GAIN CONTROL LINES |
| LINE TRIGGER | +30V p-p TRIGGER SIGNAL (FROM MAINFRAME LINE POWER) |
| L NORM | NORMALIZER CONTROL LINE (LOW=NORMALIZER ENABLED) |
| LOG/LIN | LOG/LIN CONTROL LINE (LOW=LIN) |
| MAN SWP | (FOR FUTURE USE) |
| MTR V | DPM VOLTAGE |
| NEG BIAS | –10V (TO SECOND CONVERTER OSCILLATOR) |
| NOISE MEASURE | MAX VIDEO FILTER CONTROL LINE (HIGH=MAX) |
| PENLIFT | PENLIFT/BLANKING OUTPUT SIGNAL |
| REF LEVEL CAL | REFERENCE LEVEL CALIBRATION VOLTAGE |
| RETRACE BLANK | RETRACE BLANKING SIGNAL |
| SINGLE | SINGLE SWEEP CONTROL LINE (HIGH=START/STOP) |
| SING SWP | (FOR FUTURE USE) |
| ST1–7 | SCAN TIME CONTROL LINES (ST5=AUTO, ST6=SLOW/FAST, ST7=MANUAL) |
| ST-CTR | START-CENTER CONTROL LINE (LOW=START) |
| SWEEP | CRT HORIZONTAL SWEEP SIGNAL |
| SYNC | SWEEP SYNC SIGNAL |
| TIME/DIV | MANUAL SWEEP VOLTAGE |
| TRIG | TRIGGER CONTROL LINE (HIGH=FREE RUN) |
| V REF | DPM REFERENCE VOLTAGE |
| VERT | FILTERED VIDEO SIGNAL |
| VERT GAIN | VERTICAL GAIN VOLTAGE |
| VERT POSN | VERTICAL POSITION VOLTAGE |
| VIDEO | VIDEO SIGNAL (BEFORE VIDEO FILTERING) |
| VIDEO TRIGGER | VIDEO TRIGGER SIGNAL |
| Y NORM | Y-AXIS OUTPUT (FROM NORMALIZER) |
| Y-10 | YIG –10V |
| YC– | YIG COIL SIGNAL (–) |
| YC+ | YIG COIL SIGNAL (+) |
| YDR– | YIG MAIN COIL SIGNAL (–) |
| YDR+ | YIG MAIN COIL SIGNAL (+) |
| YFM– | YIG FM COIL SIGNAL (–) (TO GND, SENSE GND) |
| YFM+ | YIG FM COIL SIGNAL (+) |
| –VERT | NEGATIVE VERTICAL OUTPUT SIGNAL |
| +VERT | POSITIVE VERTICAL OUTPUT SIGNAL |
| –8VT | –8 VOLTS TEMPERATURE COMPENSATED |

**A16**

*Figure 8-44. A16 Motherboard, Schematic Diagram (2 of 2)*

TM 11-6625-3061-14

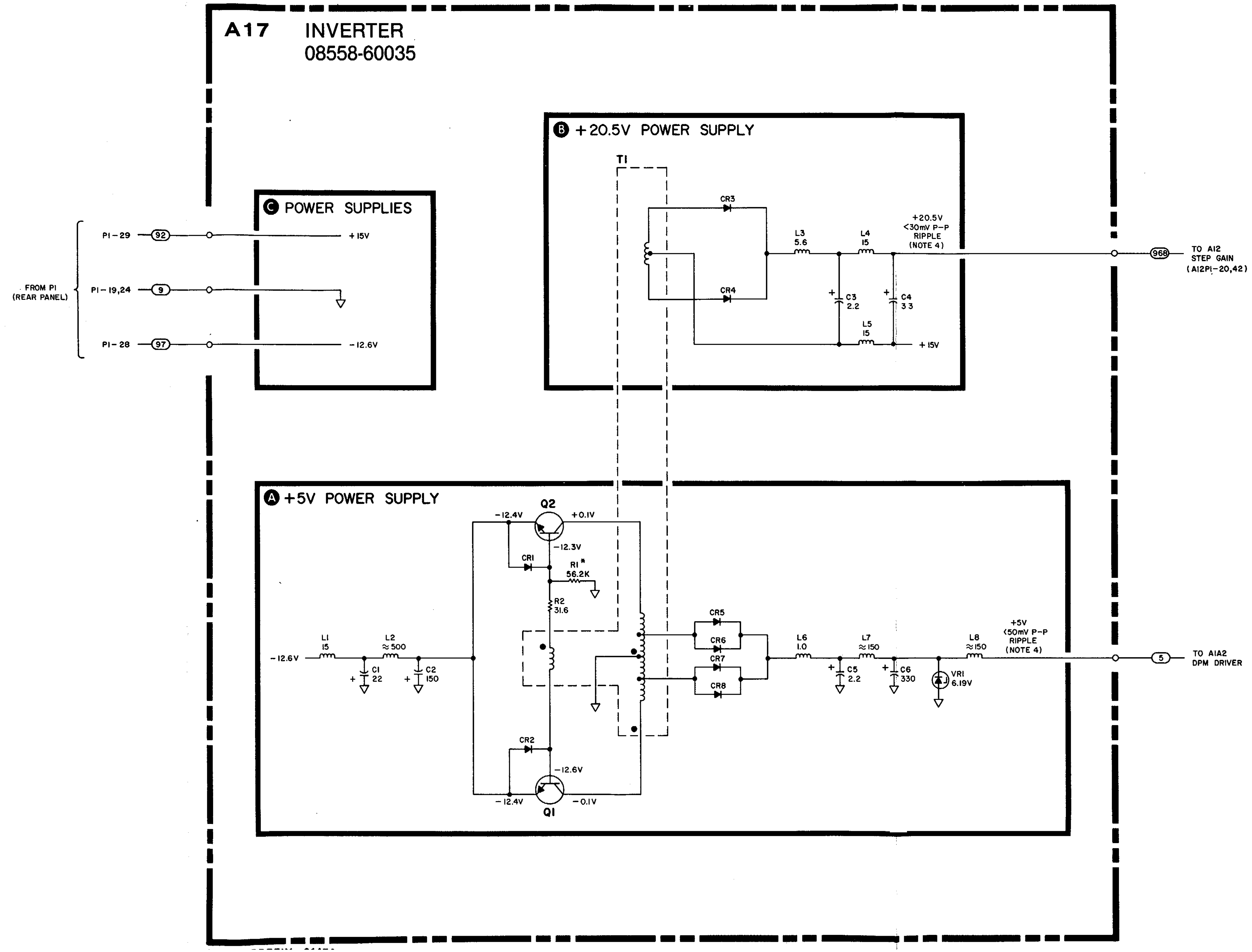



Figure 8-46. A17 Inverter. Schematic

NOTES:

1. REFERENCE DESIGNATORS WITHIN THIS ASSEMBLY ARE ABBREVIATED, PREFIX ABBREVIATION WITH ASSEMBLY NUMBER FOR COMPLETE REFERENCE DESIGNATOR.
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS (Ω) CAPACITANCE IN MICROFARADS (μF) INDUCTANCE IN MICROHENRIES (μH)
3. SEE FIGURE 8-2 FOR MEASUREMENT CONDITIONS.
4. RIPPLE MEASURED WITH SWEEP TIME/DIV CONTROL SET TO MAN.

A17

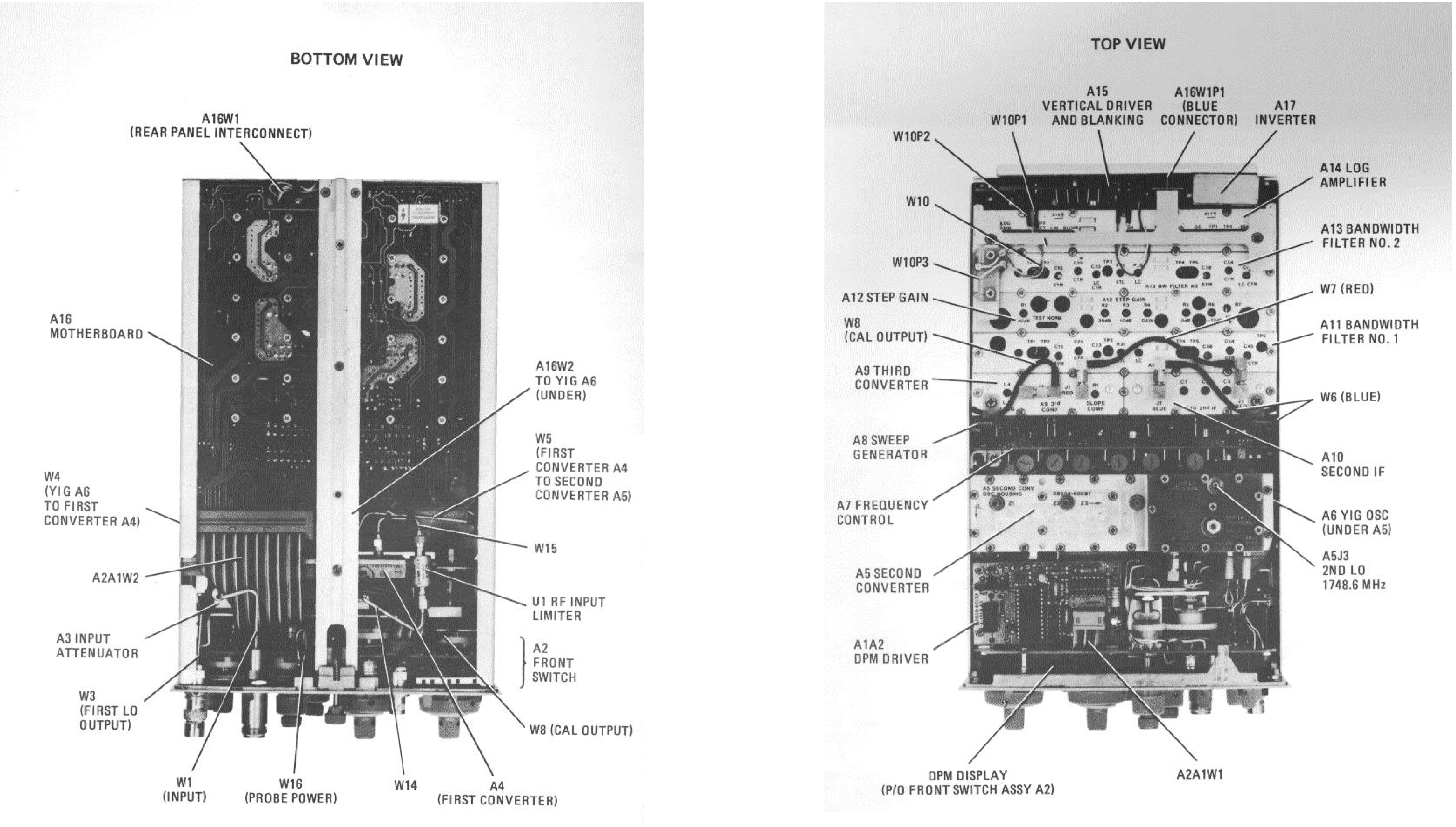



*Figure 8-47. Location of Major Assemblies*

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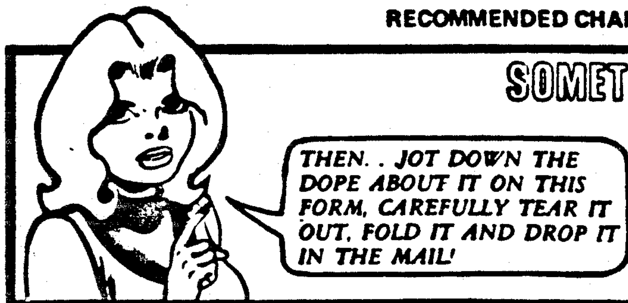


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