Errata

Title & Document Type: **8640M RF Section Operating and Service Manual**

Manual Part Number: **08641-90008**

Revision Date: **December 1976**

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HP References in this Manual

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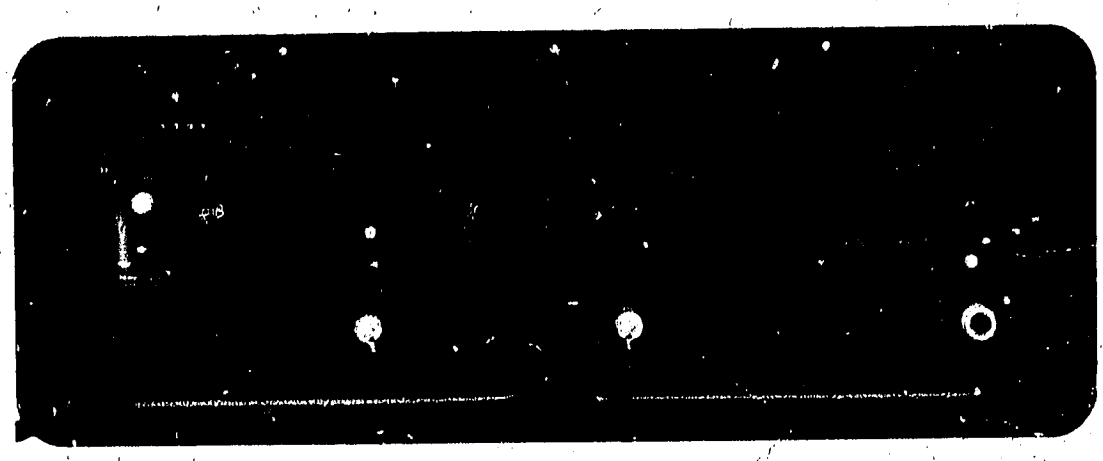
OPERATING AND SERVICE MANUAL

8640M
SIGNAL GENERATOR



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CERTIFICATION

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

WARRANTY AND ASSISTANCE

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

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OPERATING AND SERVICE MANUAL

8640M
SIGNAL GENERATOR

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 1634A and 1639A.

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

1501 PAGE MILL ROAD, PALO ALTO, CALIFORNIA, U.S.A.

MANUAL PART NO. 08641-90008
Microfiche Part No. 08641-90010

Printed: December 1976

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SAFETY CONSIDERATIONS

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. This product has been designed and tested in accordance with international standards.

SAFETY SYMBOLS

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage (refer to Table of Contents).

Indicates hazardous voltages.

Indicates earth (ground) terminal.

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 personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

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

SAFETY EARTH GROUND

This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

BEFORE APPLYING POWER

Verify that the product is configured to match the available main power source per the input power configuration instructions provided in this manual.

If this product is to be energized via an auto-transformer make sure the common terminal is connected to the neutral (grounded side of mains supply).

SERVICING

WARNINGS

Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

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

Capacitors inside this product may still be charged even when disconnected from its power source.

To avoid a fire hazard, only fuses with the required current rating and of the specified type (normal blow, time delay, etc.) are to be used for replacement.

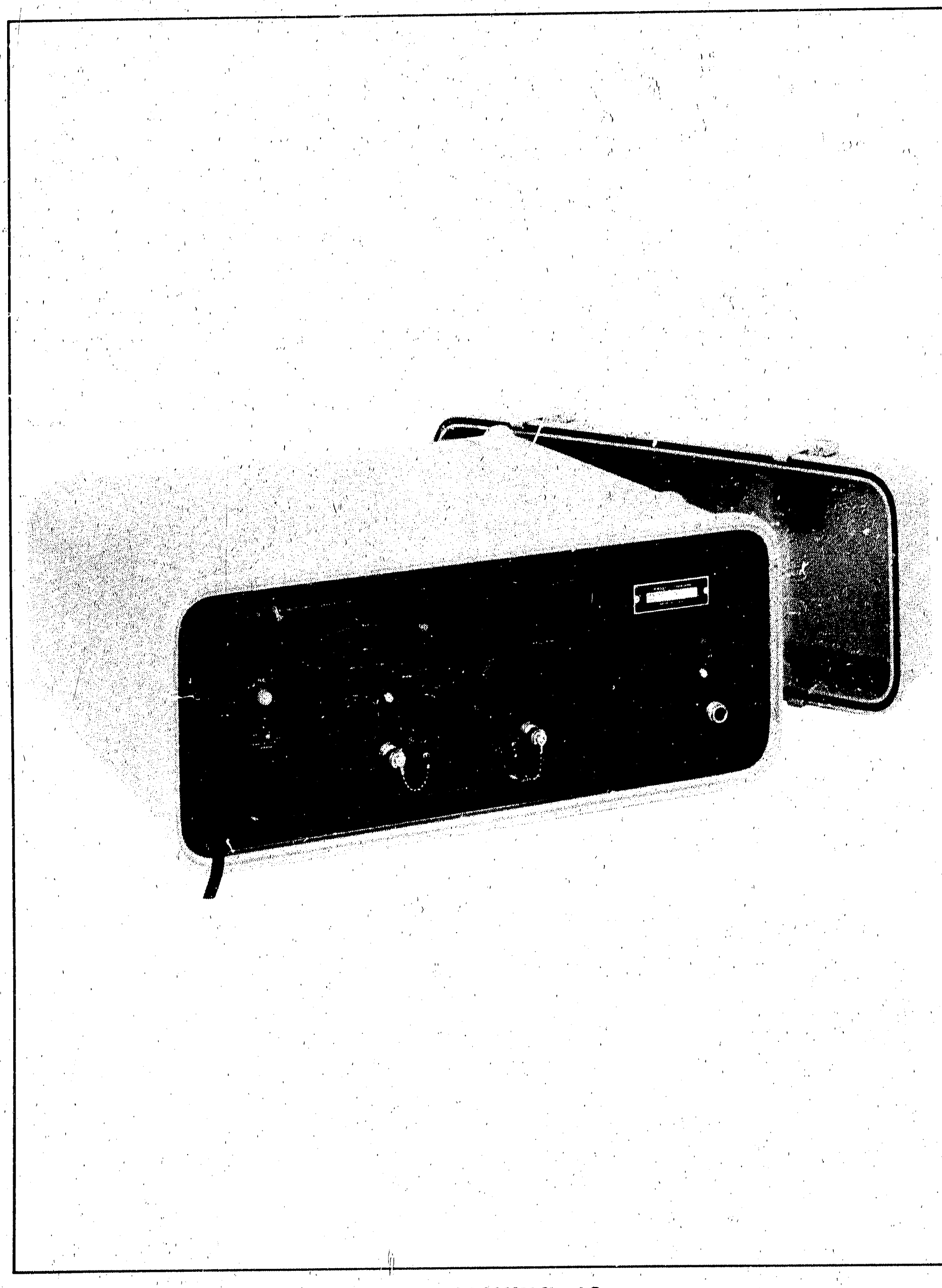


Figure 1-1. HP Model 8640M Signal Generator

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual contains the operating and service information for the Hewlett-Packard Model 8640M Signal Generator. The Signal Generator is shown in Figure 1-1.

1-3. This section of the manual describes the instruments documented by this manual and covers instrument description, accessories, specifications, and other basic information. The other sections contain the following information:

Section II, Installation: provides information about initial inspection, preparation for use, and storage and shipment.

Section III, Operation: provides information about panel features, and provides operating checks, instructions, and maintenance information.

Section IV, Performance Tests: provides information required to check the performance of the instrument against the critical specifications in Table 1-1.

Section V, Adjustments: provides the information required to properly adjust and align the instrument.

Section VI, Replaceable Parts: provides ordering information for all replaceable parts and assemblies.

Section VII, Manual Changes: this section is reserved to provide manual change information in future revisions of this manual.

Section VIII, Service: provides the information required to repair the instrument.

1-4. Packaged with this manual is an Operating Information Supplement. This is simply a copy of the first three sections of this manual, and should stay with the instrument for use by the operator. Additional copies can be ordered through your nearest Hewlett-Packard Sales and Service office; the part number is listed on the title page of this manual and on the rear cover of the supplement.

1-5. Also listed on the title page of this manual is a "Microfiche" part number. This number can be used to order 102 x 152 mm (4 x 6 inch) microfilm transparencies of the manual. Each microfiche contains up to 96 photo duplicates of the manual's pages. The microfiche package also includes the latest Manual Changes supplement as well as all pertinent Service Notes.

1-6. SPECIFICATIONS

1-7. Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument can be tested. Paragraph 1-18 lists some supplemental performance characteristics. Supplemental characteristics are not specifications but are typical characteristics included as additional information for the user. Table 1-2 lists environmental performance characteristics.

1-8. INSTRUMENTS COVERED BY MANUAL

1-9. This instrument has a two-part serial number. The first four digits and the letter constitute the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply directly to instruments having the same serial number prefix as listed under SERIAL NUMBERS on the title page.

1-10. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument is supplied with a Manual Changes supplement that contains "change information" documenting the differences.

1-11. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to this manual's print date and part number, both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-12. For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

1-13. GENERAL DESCRIPTION

1-14. The Model 8640M Signal Generator is a ruggedized generator covering the frequency range 500 kHz to 512 MHz (450 kHz to 550 MHz with over-range) and can be extended to 1024 MHz with an external doubler. This broad coverage, together with calibrated output and modulation, permits complete RF and IF performance tests on virtually any type of HF, VHF, or UHF receiver. Protection against RF power accidentally applied into the generator output is installed.

1-15. This solid-state generator has an output level range of +18 to −145 dBm (1.8V to 0.013 μV) from 500 kHz to 512MHz and is calibrated and metered. The output is leveled to within +0.75 to −1.25 dB across the full frequency range of the instrument.

1-16. The generator also provides AM, FM, and PULSE modulation for a wide range of receiver test applications. AM, FM, and PULSE can be performed in either the internal or external modes. This modulation is calibrated and metered for readout under all operating conditions. The internal modulation oscillator provides frequencies of 400, 1000, and 5000 Hz for AM and FM. The internal pulse generator can be varied in width and rate.

1-17. Other significant features are extremely low noise, built-in counter, phase lock, and front panel controls designed for operating convenience and flexibility. The generator has the ON/OFF switch interconnected with thermal protection, also an elapsed time meter keeps count of operating hours.

1-18. PERFORMANCE CHARACTERISTICS

1-19. Spectral Purity

1-20. The basic frequency source of the Signal Generator is a mechanically-tuned high-Q cavity oscillator that operates over the frequency range 230—550 MHz. This oscillator has an inherent stability of better than 15 ppm/10 min and exceptionally low noise characteristics. The lower 9 frequency ranges are obtained by dividing the basic oscillator frequency and filtering the unwanted harmonics. Using this technique, sub-harmonic and non-harmonic spurious signals are virtually eliminated. A band over-range of +7% and −10% adds convenience when operating near the nominal band edges. An external doubler which is available extends the frequency range to 1024 MHz.

1-21. Frequency tuning within a selected range is accomplished with an 8-turn FREQUENCY TUNE control (see Figure 3-2) for fast selection of the desired output frequency. A mechanical FINE TUNE control has a tuning range of 1000 ppm for precise frequency setting.

1-22. Restabilization time is short when tuning the frequency across any one range. The total frequency excursion after any frequency change is typically < 20 ppm and within 15 minutes the output has restabilized to the specified 15 ppm/10 min. When *not* phase locked, no restabilization time is required when switching frequency ranges for a fixed position on the FREQUENCY TUNE control.

1-23. Noise performance of the generator is state-of-the-art for a solid-state generator. The high-Q cavity oscillator has been optimized by use of a low noise microwave transistor for a spectrally pure output signal. Figure 1-2 shows the typical measured single-sideband noise performance in a 1 Hz bandwidth for various offsets from a (256 and 512 MHz) carrier. The low close-in noise characteristic is ideally suited for the stringent adjacent channel tests that are commonly made on a wide variety of communication receivers.

1-24. Figure 1-3 gives a plot of the guaranteed SSB noise performance for a 20 kHz offset from the carrier for the 256—512 MHz range. From 230 to 450 MHz, noise is > 125 dB/$\sqrt{\text{Hz}}$ below the carrier level and rises to 115 dB/$\sqrt{\text{Hz}}$ at 550 MHz. This signal-to-noise ratio decreases by approximately 6 dB for each division of the output frequency down to the broadband noise floor of better than 130 dB/$\sqrt{\text{Hz}}$.

1-25. Frequency Counter

1-26. The Signal Generator has a built-in 550 MHz frequency counter and phase lock synchronizer with a 6-digit LED display. The resolution for the internal count mode is 10 Hz at 0.5 MHz and 10 kHz at 512 MHz but can be increased using the INT X10. When using the INT X10, it is possible for significant digits or the decimal point to be shifted off the display. An OVERFLOW light reminds the operator that the display is not showing the complete output frequency.

1-27. This resolution, combined with the high stability of the generator, allows precise frequency selection and meaningful measurements on high performance receiver systems.

Frequency Counter (Cont'd)

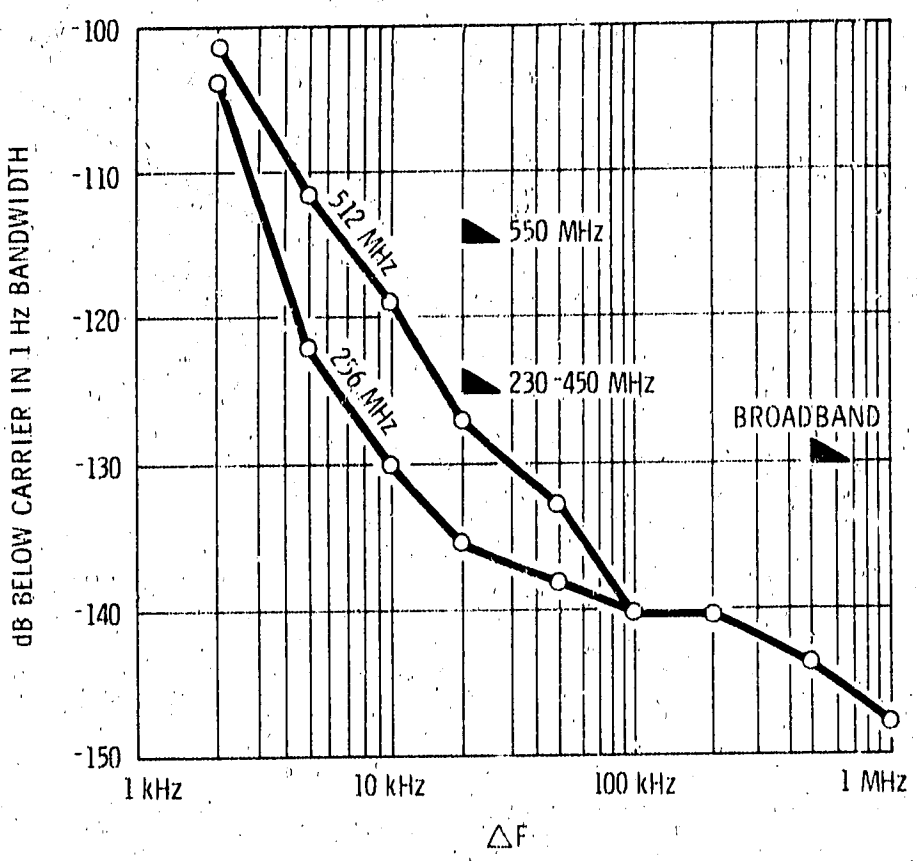


Figure 1-2. Measured Single Sideband Noise vs Offset from Carrier (stated in a 1 Hz bandwidth at 256 and 512 MHz carrier frequencies on 256–512 MHz Range). Markers indicate specified limits.

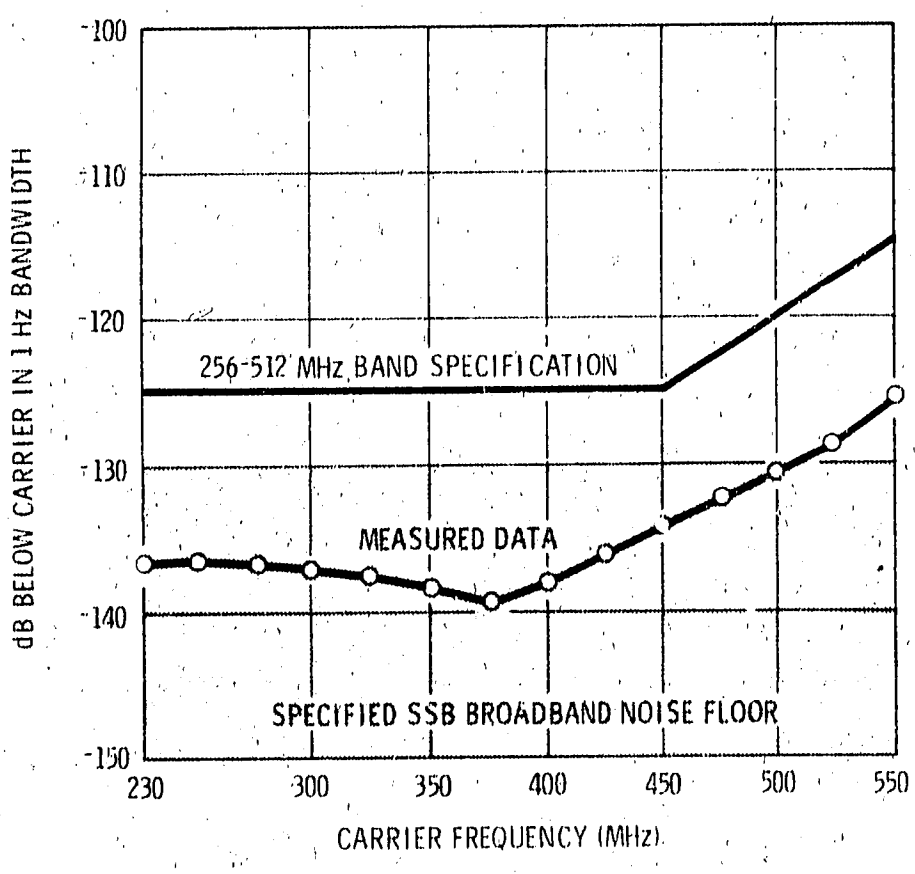


Figure 1-3. Specified Signal-to-Phase-Noise Ratio at 20 kHz Offset vs Carrier Frequency (stated in a 1 Hz bandwidth). For lower frequencies, phase noise decreases approximately 6 dB per frequency division down to the broadband noise floor.

1-28. The built-in counter can also be used to count external input signals from 10 Hz to 550 MHz and eliminates the need for a separate frequency counter in many measurement systems. Input sensitivity is ⩾125 mVrms into 50Ω. Maximum resolution in the EXT count mode is 10 Hz for 0—10 MHz and 1 kHz for 10—550 MHz.

1-29. Phase Lock Mode

1-30. Also included in the Signal Generator is a built-in phase lock synchronizer that locks the RF output frequency to the crystal time base used in the counter. In this locked mode, output stability is better than 2 ppm/10 min and the spectral purity and FM capability (down to 50 Hz rates) of the unlocked mode are preserved.

1-31. Phase locking the generator is simple — just select the front panel LOCK position. The generator is then locked to the frequency shown on the LED display. If lock is broken (for example by tuning to a new output frequency or during warm-up), there is an immediate indication: the LED display blinks. The generator can be relocked by switching to NORM, retuning and switching back to LOCK.

1-32. The generator can be locked in the normal counter mode or in the X10 INT mode. It is not possible to lock when counting external inputs. Maximum resolution when in the phase lock mode is 1 Hz for 500 kHz to 1 MHz and 1 kHz for 100 to 512 MHz.

1-33. When phase locked, the narrow bandwidth of the phase lock loop (< 5 Hz) preserves full FM capabilities down to rates of 50 Hz and assures no degradation in noise from the unlocked mode.

1-34. Amplitude Modulation

1-35. AM is variable from 0 to 95% with the bandwidth, accuracy, and low incidental FM required for the most stringent AM applications. The front panel meter gives a readout of AM% in either the internal or external mode. This is read on the 0—10 scale in tens of percent.

1-36. AM at rates up to 60 kHz is possible depending on carrier frequency and modulation depths. Distortion is specified at 1000 Hz to be < 5% up to 70% AM, < 10% to 95% AM. Figure 1-4 shows measured AM distortion characteristics for other modulation frequencies. Note that for 0—50% AM, distortion is < 1% to approximately 50 kHz for an output frequency of 200 MHz.

Amplitude Modulation (Cont'd)

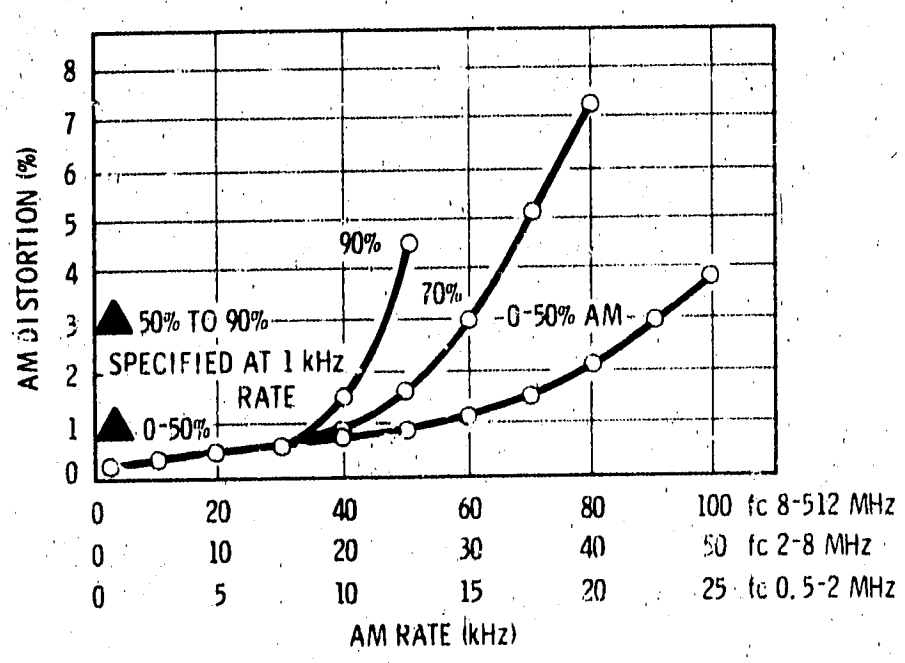


Figure 1-4. AM Distortion vs AM Rate Measured at 200 MHz and +13 dBm (but applies to all ranges). (Supplemental information only.)

1-37. Pulse Modulation

1-38. Also included on the MODULATION MODE switch are positions for EXT and INT PULSE modulation. In EXT PULSE mode, pulse inputs with repetition rates to 500 kHz and widths down to 2 μs can be applied to modulate the RF carrier. Rise and fall times vary with output frequency down to <1 μs from 8 to 512 MHz. The INT PULSE can be changed in PULSE WIDTH from 1 to 40 μs and in RATE from 0.05 to 5 kHz.

1-39. Pulse inputs turn the RF on. Hence with no pulse input the RF will read approximately zero on the built-in level meter. Figure 1-5 shows pulsed RF 20 MHz carrier. For pulse inputs greater than 0.5V, the RF output is on, level calibration is preserved, and the level meter reads the pulse-on power of the RF output. For repetition rates below that specified, the pulsed RF output is still available but the pulse-on level is no longer calibrated or metered.

1-40. Frequency Modulation

1-41. FM is calibrated, metered, and constant with RF frequency and range changes. Figure 1-6 shows FM distortion vs FM rate measured on the 8—16 MHz range. Peak deviations to at least 0.5% of carrier frequency are available (i.e., 1% of the minimum frequency in each octave range). On the 256—512 MHz range, for example, the maximum deviation is 2.56 MHz peak or 5.12 MHz peak-to-peak. With this capability, it is possible to sweep the generator, using FM EXT DC and a saw-tooth input, to test and align IF filters and discriminators.

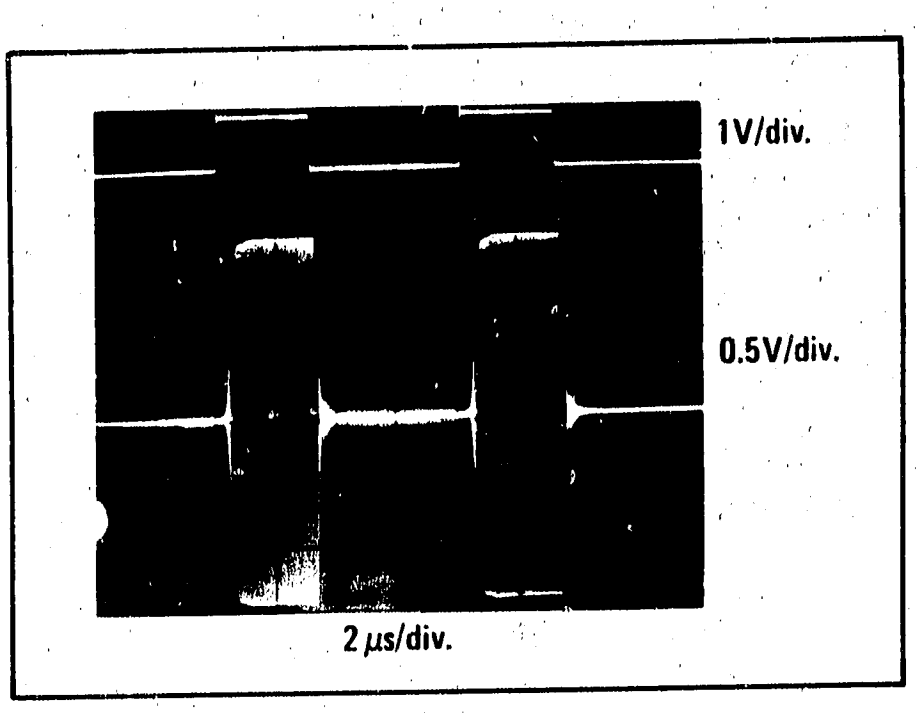


Figure 1-5. Pulsed RF 20 MHz Carrier

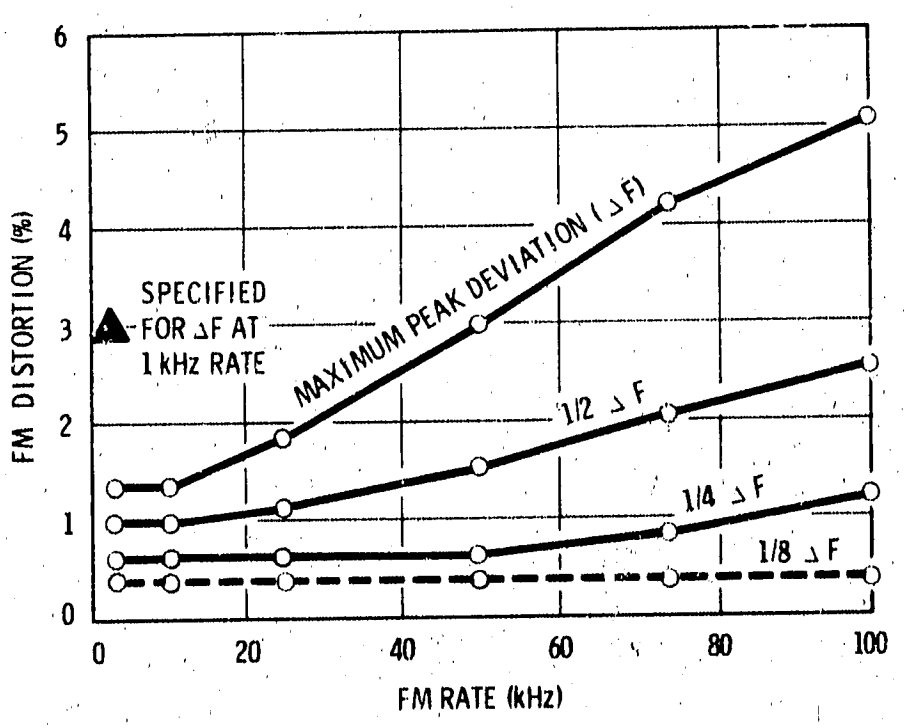


Figure 1-6. FM Distortion vs FM Rate Measured on the 8—16 MHz Range (but applies to all ranges). (Supplemental information only.)

1-42. For narrowband FM applications, a minimum full-scale deviation of 5 kHz is provided on the meter and the PEAK DEVIATION range switch. When switching from the OFF to FM mode, there is negligible shift in carrier frequency and no degradation in spectral purity. With the generator in the phase locked mode it is possible to modulate at rates from 50 Hz to 250 kHz with accurate narrowband FM and the carrier drift stability of a crystal oscillator. Using the unlocked mode, it is possible to modulate from dc to 250 kHz with a carrier drift stability of <15 ppm/10min.

1-43. Internal Modulation Oscillator

1-44. Standard tones for internal AM and FM are 400, 1000, 5000 Hz. These frequencies and the

Internal Modulation Oscillator (Cont'd)
internal pulse generator output are available at the front panel whenever an internal modulation mode is selected.

1-45. Multi-Function Meter

1-46. The panel meter on the Signal Generator monitors the RF output level in dBm and volts, the AM percentage, and the FM peak deviation in kHz or MHz.

1-47. A front panel annunciator indicates when certain settings of FM modulation controls exceed specified limits. Besides alerting the operator to invalid control settings, the annunciator indicates how to return the instrument to proper operation.

1-48. The REDUCE PEAK FM DEVIATION annunciator lights whenever the PEAK FM DEVIATION switch or the LEVEL vernier has been set to exceed the allowable limits. The specification allows for a maximum peak deviation of 1% of the minimum frequency in each range (e.g., 2.56 MHz on the 256—512 MHz range). When the switch setting exceeds this limit, the annunciator lights, the FM is automatically turned off, and the FM meter reads zero. If the LEVEL control is set so that the input to the FM amplifier is >1V peak, the annunciator lights but the FM remains on.

1-49. Output Range

1-50. The wide output range of the generator is achieved with a 10 dB step attenuator and a concentric vernier. Output levels are read on the meter, in conjunction with the output level switch.

1-51. The maximum output level of +18 dBm permits high level tests on receiver IF's, amplifiers, and mixers without additional power amplification. At the same time, extremely low leakage enables receiver sensitivity measurements down to levels of 0.03 μV in a shielded system.

1-52. ACCESSORIES SUPPLIED

1-53. The Model 8640M is supplied with a Combination Wrench (HP 08640-00027) mounted inside chassis. This wrench is used on SMC type connectors.

1-54. EQUIPMENT AVAILABLE

1-55. Down Converter. The HP Model 11710A Down Converter is a self-contained unit that extends the frequency range of the generator down to 5 kHz. This is accomplished by heterodyning a 5.0 to 5.5 MHz output from the generator with a 5 MHz local oscillator. Output level and modulation calibration of the Signal Generator are preserved, and the output frequency is that displayed by the generator minus 5 MHz. For convenience the output of the Down Converter can be switched to provide direct output from the Signal Generator.

1-56. Termination. The HP Model 11507A Termination maintains the generator's output level calibration when the output is connected to load impedances other than 50 ohms. It can provide source impedances of 25 and 5 ohms, and can simulate a broadcast-band dummy antenna. The frequency range is 50 kHz to 65 MHz.

1-57. 75-Ohm Adapter. The HP Model 11687A 50-to-75 Ohm Adapter connects to the generator's output to provide a source impedance of 75 ohms.

1-58. Doubler. The HP Model 11690A Doubler extends the usable frequency range of the generator one octave to 1024 MHz (actually to 1100 MHz with 7% frequency overrange). Conversion loss in the doubler is typically < 13 dB.

1-59. SERVICE AND USER AIDS

1-60. Video Tapes. Video tapes covering instrument use, application, and service are available. Contact the nearest Hewlett-Packard Sales and Service Office for a list of presently available tapes.

1-61. Application Notes. Informative notes concerning the use of signal generators are also available from the nearest Hewlett-Packard Sales and Service Office.

1-62. Service Notes. Hewlett-Packard makes design improvements to its current line of instruments on a continuing basis. Many of these improvements can be incorporated in instruments produced earlier. Modification and general service information is passed on in the form of Service Notes. To obtain the Service Notes contact the nearest Hewlett-Packard Sales and Service Office.

1-63. WARRANTY

1-64. The Signal Generator is warranted and certified as indicated on the inner front cover of this manual. For further information, contact the nearest Hewlett-Packard Sales and Service Office; addresses are provided at the back of this manual.

1-65. TEST EQUIPMENT REQUIRED

1-66. Tables 1-3 and 1-4 list the test equipment and accessories required to check, adjust and repair the Signal Generator. (Table 4-1 is a separate list of relatively inexpensive, commonly available test equipment for the Basic Functional Check only.) If substitute equipment is used it must meet the listed critical specifications.

NOTE

The safety classifications of this instrument is Safety Class I. It has been designed and tested according to international standards. The instruction manual contains information, warnings, and cautions which must be followed by the user to ensure safe operation and to retain the instrument in safe condition.

Table 1-1. Specifications (1 of 5)

(All specifications apply over the nominal Frequency Ranges and over the top 10 dB of the output level vernier range unless otherwise specified.)

FREQUENCY CHARACTERISTICS

Range: 500 kHz to 512 MHz in 10 octave ranges, (to 1024 MHz with External Frequency Doubler).

Ranges and Range Overlap: Ranges extend approximately 10% below and 7% above the nominal Frequency Ranges shown below.

Frequency Ranges (MHz)	Frequency Range (MHz) (with overlap)
0.5—1	0.45—1.07
1—2	0.90—2.14
2—4	1.80—4.29
4—8	3.60—8.59
8—16	7.20—17.1
16—32	14.4—34.3
32—64	28.8—68.7
64—128	57.5—137
128—256	115—275
256—512	230—550
External Doubler Range	
512—1024[1]	460—1100

Internal Counter Resolution (Unlocked):

Frequency Ranges (MHz)	Normal Mode	Expand x10
0.5—1	10 Hz	1 Hz
1—16	100 Hz	10 Hz
16—128	1 kHz	100 Hz
128—1024	10 kHz	1 kHz

Optimum Counter Resolution When Phase-Locked:

Frequency Ranges (MHz)	Resolution
0.5—0.999999	1 Hz
1.0—9.99999	10 Hz
10.0—99.9999	100 Hz
100.0—999.999	1 kHz
1000—1024	10 kHz

Accuracy: 6-digit LED display with X10 expand.

$$\left[\begin{array}{l}\text{Total}\\ \text{Count}\\ \text{Accuracy}\end{array}\right] = {}^{2}\left[\begin{array}{l}\text{Counter}\\ \text{Resolution}\\ (\pm\ 1\ \text{count})\end{array}\right] + \left[\begin{array}{l}\text{Reference}\\ \text{Error}\\ (\text{INT or EXT})\end{array}\right]$$

Internal Reference Error: See counter internal reference characteristics.

[1] 512—1024 MHz can only be obtained using an external doubler such as Model 11690A.

[2] When phase locked, Counter Resolution error is eliminated.

Table 1-1. Specifications (2 of 5)

FREQUENCY CHARACTERISTICS (Cont'd)

Fine Tuning: Unlocked > 1000 ppm total range.

Stability:

	Normal	Locked
Time (after 3 hour warm-up)	<15 ppm/10 min.	<2 ppm/10 min
Temperature	<50 ppm/°C	<1 ppm/°C[1]
Line Voltage[2] (±5% line voltage change)	<10 ppm	<0.1 ppm

SPECTRAL PURITY

Harmonics (at 1 volt, +10 dBm output range and below):
0.5 to 512 MHz: > 30 dB below carrier (dBc).

Subharmonics and Nonharmonic Spurious: (excluding frequencies within 15 kHz of carrier:
> 95 dB below carrier.

Noise: (Averaged rms noise level below carrier stated in a 1 Hz bandwidth):
SSB Phase Noise at 20 kHz offset from carrier.
256 to 512 MHz: > 125 dBc from 230 to 450 MHz increasing linearly to > 115 dBc at 550 MHz.
0.5 to 256 MHz: decreases approximately 6 dB for each divided frequency range until it reaches SSB Broadband Noise Floor of > 130 dBc.

SSB Broadband Noise Floor at maximum output vernier and greater than 500 kHz offset from carrier.
0.5 to 512 MHz: > 130 dBc.

Residual FM and AM: (Averaged rms):

Post-Detection Noise Bandwidth	FM[3] CW and up to 1/8 maximum allowable peak deviation	AM
300 Hz to 3 kHz	<5 Hz, typical	>80 dBc, typical
20 Hz to 15 kHz	<50 Hz	> 70 dBc

OUTPUT CHARACTERISTICS

Impedance: 50Ω, ac coupled, SWR <2.5 on 2V and 1V output ranges; <2.0 on all other ranges.

Range: 10 dB steps and 18 dB vernier provide output power settings from +18 to −145 dBm (1.8V to 0.013 μV) into 50Ω.

[1] Phase lock may break due to temperature change (i.e., during warm-up) simply relock at desired frequency.

[2] This specification is for short term transient line changes.

[3] Residual FM is measured on the 256—512 MHz range and not locked. For lower ranges residual FM decreases by approximately 1/2 for each divided frequency range until limited by the Broadband Noise Floor. This limit for 300 Hz to 3 kHz bandwidth is ≈1 Hz and for 20 Hz to 15 kHz bandwidth is ≈4 Hz.

Table 1-1. Specifications (3 of 5)

OUTPUT CHARACTERISTICS (Cont'd)

Level Accuracy (total accuracy as indicated on Level Meter):[1]

Frequency Range (MHz)	Output Level (dBm)			
	Using Top 10 dB of Vernier Range			Using Full Vernier Range
	+13 to –7	–7 to –47	–47 to –137	+18 to –145
0.5—512	±2.0 dB	±2.5 dB	±3.0 dB	Add ±0.5 dB

Reverse Power Damage Level: 40 Vdc maximum or 50W (+47 dBm) of RF power (between dc and 1100 MHz) into generator output.

Level Flatness: < +0.75 dB to −1.25 dB from 0.5 to 512 MHz referred to output at 50 MHz. (Flatness applies from +13 to −7 dBm and for top 10 dB of vernier range.)

Leakage (with all unused outputs terminated properly): Leakage limits are below those specified in MIL-I-6181D. Furthermore, less than 3 μV is induced in a 2-turn, 1-inch diameter loop one inch away from any surface and measured into a 50Ω receiver. This permits receiver sensitivity measurements to at least < 0.03 μV in a shielded system.

MODULATION CHARACTERISTICS

General

Types: Internal and External AM, FM, and PULSE.

External Sensitivity: Nominal 1 volt peak yields 100% AM or maximum peak deviation (with vernier in full cw position).

Internal Modulation Sources:
Sine Wave: Frequency: fixed 400 Hz, 1 kHz and 5 kHz ±5%.
Pulse: Rate: 50 to 5000 pps
Width: 1 to 40 μs.

Amplitude Modulation

(AM specifications apply to the top 10 dB of output vernier range unless otherwise specified.)

Depth: 0 to 95%

AM Rates: External ac; 20 Hz to AM 3 dB bandwidth.
External dc; dc to AM 3 dB bandwidth.

AM 3-dB Bandwidth:

Frequency Ranges (MHz)	0 to 50% AM	50 to 90% AM
0.5—2	20 kHz	12.5 kHz
2—8	40 kHz	25 kHz
8—512	60 kHz	50 kHz

AM Distortion (1 kHz rates):
0 to 70% AM: < 5%
70 to 95% AM: < 10%

Indicated AM Accuracy (1 kHz rates using internal meter):
±(7.5% of reading +1.5% full scale)

Peak Incidental Phase Modulation (at 30% AM):
0.5 to 128 MHz: < 0.15 radians.
128 to 512 MHz: < 0.3 radians.

Peak Incidental Frequency Deviation: Equals peak incidental phase modulation × modulation rate.

[1] Level Accuracy error consists of allowances for: meter accuracy, detector linearity, temperature, flatness, attenuator accuracy, and twice the measurement error. All but the attenuator accuracy and the measurement error can be calibrated out with a power meter at a fixed setting. See HP Application Note 170-1.

Table 1-1. Specifications (4 of 5)

MODULATION CHARACTERISTICS (Cont'd)

Frequency Modulation

Deviation: Maximum allowable deviation equals 1% of lowest frequency in each range as shown below.

Frequency Range (MHz)	Maximum Peak Deviation (kHz)
0.5—1	5
1—2	10
2—4	20
4—8	40
8—16	80
16—32	160
32—64	320
64—128	640
128—256	1280
256—512	2560
512—1024[1]	5120

FM 3-dB Bandwidth:[2]
Internal and External ac: 20 Hz to 250 kHz.
External dc: dc to 250 kHz.

FM Distortion (1 kHz rates):
< 1.5% for deviations up to 1/β maximum allowable.
< 5% for deviations up to maximum allowable.

Indicated FM Accuracy (1 kHz rates using internal meter):
Excluding maximum peak deviation position: ±(12% of reading +1.5% full scale).
Maximum peak deviation position: ±(15% of reading +1.5% full scale), typically.

Incidental AM (1 kHz rates):
< 0.5% AM for FM deviations up to 1/8 maximum allowable.
< 1.0% AM for FM deviations up to maximum allowable.

Pulse Modulation

(Specifications apply for top 10 dB of output vernier range)

Frequency Ranges (MHz)	0.5 to 1	1 to 2	2 to 8	8 to 32	32 to 512
Rise and Fall Times	< 9 μs	< 4 μs	< 2 μs	< 1 μs	
Pulse Repetition Rate	50 Hz to 50 kHz		50 Hz to 100 kHz	50 Hz to 250 kHz	50 Hz to 500 kHz
Pulse Width Minimum for Level Accuracy Within 1 dB of CW (> 0.1% duty cycle)	10 μs		5 μs	2 μs	
Pulse ON/OFF Ratio At Maximum Vernier	> 40 dB				
External Peak Input Required	Nominally > +0.5V (+5V max.) waveform, return to zero, into 50Ω Schmitt trigger.				

[1] 512—1024 MHz can be obtained using an external doubler such as Model 11690A.

[2] When in locked mode, FM is possible only for rates greater than 50 Hz.

Table 1-1. Specifications (5 of 5)

COUNTER CHARACTERISTICS

External RF Input:
Frequency Range: 10 Hz to 550 MHz.
Sensitivity: ⩾ 125 mVrms, ac only, into 50Ω (⩾ −5 dBm). Input level may not exceed +15 dBm (1.3 Vrms).

External Count Resolution:

MODE (MHz)	Resolution
EXT 0–10	10 Hz
EXT 10–550	1 kHz

Internal Reference Accuracy (after calibration at 25°C):
< ±20 ppm (between −40°C and +55°C).
Better than ±2 ppm for 15°C to 35°C typical.

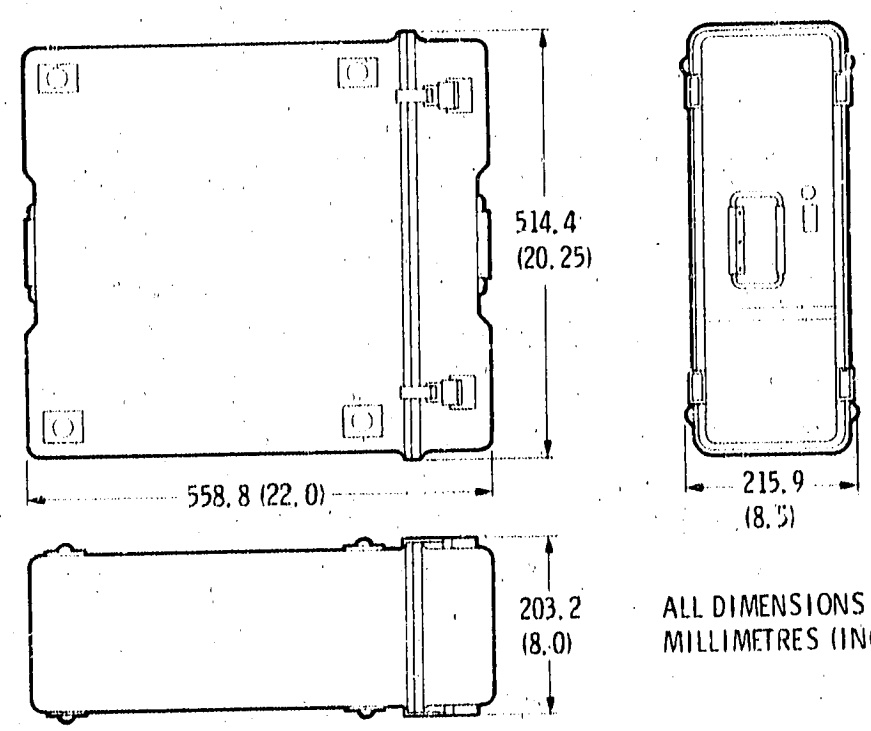
GENERAL CHARACTERISTICS

Operating Temperature Range: −40° to +55°C.

Power Requirements: 115 Vac ±10% 47.5–420 Hz or 230 Vac ±10% 47.5–66 Hz.

Weight: without case 20 kg (44 lb), with case and accessories 29.6 kg (65 lb).

Dimensions:[1] 558.8 mm L x 514.4 mm W x 215.9 mm H (22.0 in. L x 20.25 in. W x 8.5 in. H).



[1] Dimensions are for general information only. If dimensions are required for building special enclosures, contact your HP office.

Table 1-2. Environmental Performance Characteristics

The 8640M has been successfully type tested to these specifications without degradation in electrical performance.

Temperature: MIL-STD-810B, Method 501, 502 Proc. 1.

Operating: 1. Continuous operation allowed between -40°C (-40°F) and +55°C (131°F).

2. Intermittent operation (< 20 min.) allowed up to +71°C (160°F).

Non-Operating: Storage allowed between -60°C (-76°F) and +85°C (185°F).

Humidity: MIL-STD-810B, Method 507 Proc. 1.
10-day test.

Operating: -40°C (-40°F) to +40°C (104°F) at up to 95% RH.

Non-Operating: Storage allowed between -60°C (-76°F) and +60°C (140°F) up to 95% RH. Condensation allowed.

Altitude: MIL-STD-810B, Method 500 Proc. 1.

Operating: 3048m (10,000 ft.)

Non-Operating: 15240m (50,000 ft.).

Shock: MIL-T-21200J Class II
When mounted in its combination case, the 8640M will withstand 20 g's shock in any of 3 planes without damage.

Vibration: MIL-T-21200J Class II tested to:

Vibration Rates	Displacement (D.A.)
5-15 Hz	0.06 inch
16-25 Hz	0.04 inch
26-55 Hz	0.02 inch

Rain: MIL-STD-810B Method 506 Proc. 1. Simulated rain and wind conditions up to 12 in./hour rainfall and up to 40 mph wind. Instrument was in normal operating configuration.

Explosive Atmosphere: MIL-STD-810B Method 511 Proc. 1.
Type testing verified successful operation in potentially explosive atmosphere laden with avionic fuel vapor.

Salt Fog: MIL-STD-810B Method 509 Proc. 1.
A mechanical mock-up was tested to verify the non-corrosive nature of parts, materials, and processes.

Fungus: Non-fungus nutrient material used.

EMI: MIL-STD-461A.
Type tested per MIL-STD-461A, Class C1, Test Methods CE 03 and RE 02.

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

Instrument Type	Critical Specifications	Suggested Model	Use*
20 dB Amplifier (2 required)	Range: 0.5–520 MHz Gain: 20 to 25 dB Flatness over Range: ±2 dB Impedance: 50Ω Noise Figure: < 5 dB	HP 8447A	P
20 dB Amplifier	Range: .4–1200 MHz Gain: > 20 dB Flatness: ±2 dB Impedance: 50Ω Noise Figure: < 5 dB to 1 GHz	HP 8447B	P
40 dB Amplifier	Range: 5 Hz to 100 kHz Gain: 20 and 40 dB ± 1 dB Input Impedance: > 5 kΩ Output Impedance: 50Ω Noise: < 25 μVrms referred to input Output: > 1 Vrms into 50Ω	HP 465A	P, A
40 dB Amplifier	Range: 20 Hz to 100 kHz Gain: 40 ± 1 dB Input Impedance: 50Ω Noise Figure: < 3 dB when driven from 50Ω Output Level: > 100 mV in 50Ω	HP 08640–60506	P
One–Inch Loop Antenna	To ensure measurement accuracy, no substitution is possible. Fabrication depends upon machining and assembling to close tolerances.	HP 08640–60501	P
10 dB Step Attenuator	Attenuation: 0–120 dB in 10 dB steps Range: 0.45–1 GHz Accuracy: ±1.5 dB to 90 dB, ±0.3 dB to 120 dB (below 1 kHz)	HP 355D	P, A
10 dB Attenuator	Accuracy: ±0.5 dB to 1.2 GHz	HP 8491A Opt. 010	A
Crystal Detector	Range: 0.45–1200 MHz Low Level Sensitivity: > 0.35 mV/μW No internal dc return	HP 8471A	P, A
Digital Multimeter	DC Accuracy: ± (0.01% of reading + 0.02% of range) AC Accuracy: ± 0.1% of reading Ohms Range: to 1 kΩ	HP 3490A	P, A, T
Distortion Analyzer	Range: 20 Hz to 600 kHz Distortion Range: < 0.1% Minimum Input: < 300 mVrms	HP 331A	P

*P = Performance; A = Adjustments; T = Troubleshooting

Table 1-3. Recommended Test Equipment (2 of 4)

Instrument Type	Critical Specifications	Suggested Model	Use*
15 kHz Low-Pass Filter	15 kHz low-pass (7 pole) Impedance: 50Ω Ripple: < ±0.2 dB	CIR-Q-TEL** FLT/21B-15K-7/50-3A/3B	P
Frequency Counter	Range: to 550 MHz Input Sensitivity: < 100 mV Inputs: 50Ω and high impedance (1 MΩ) Accuracy: < 1 ppm Period and Frequency Measurement Capability Time Base: 10 MHz	HP 5327C	P, A, T
Frequency Meter Filter Kit	Ranges: 100 kHz to 10 MHz Linearity: < 0.05% Analog Output 1V for full scale Output Low-Pass Filters for Frequency Meter (20 kHz and 1 MHz Butterworth filters)	HP 5210A HP 10531A	P, A
Frequency Standard	Frequency: 10 MHz, 5 MHz, 1 MHz, or 100 kHz Accuracy: $< 10^{-7}$ (preferred)	Suitable House Standard	A
FM Linearity Circuit (see para. 5-39 for possible requirement)	See Figure 1-8	HP 08640-60503	A
Mixer	Double Balanced Range: 0.45-550 MHz	HP 10514A	P, A
Noise Phase Lock Circuit	See Figure 1-7	HP 08640-60504	P
Oscilloscope	50 MHz Real Time Sensitivity: 5 mV/division Internal/External Sweep and Triggering	HP 180C/1801A/1820C	P, A, T
Power Meter Power Sensor	Accuracy: ±1% of reading Range 0.45-1200 MHz Input Level: -20 to +20 dBm VSWR: < 1.2:1	HP 435A HP 8482A	P, A, T
Pulse Generator	Range: 50 Hz to 500 kHz Output: > 1V into 50Ω Pulse Width: down to 1 μs Transition Time: < 50 ns	HP 8003A	P, A, T
RMS Voltmeter (continued on next page)	Range: 10 Hz to 100 kHz Reading: True rms (ac only) Voltage Range: 1 mV to 10V full scale	HP 3400A	P

*P = Performance; A = Adjustments; T = Troubleshooting
**CIR-Q-TEL INC. / 10504 Wheatley / Kensington, MD. 20795 / Phone 301-946-1800

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

Instrument Type	Critical Specifications	Suggested Model	Use*
RMS Voltmeter (continued)	Accuracy: 1% of full scale 50 Hz to 50 kHz Scale: Voltage and dB		
Signal Generator	Range: 0.45–550 MHz Output: > 13 dBm into 50Ω Drift: < 20 ppm/10 min. SSB Phase Noise: > 130 dB down from 230 to 450 MHz increasing linearly to > 122 dB down at 550 MHz (stated in a 1 Hz bandwidth at 20 kHz offset from carrier) and decreasing approximately 6 dB/octave for each divided down range – but need not be less than 140 dB down. Residual FM: < 15 Hz rms in 20 Hz to 15 kHz post-detection noise bandwidth. Aux RF Out: > –5 dBm. Leakage: < 3 μV induced in a 2-turn, 1-inch diameter loop 1 inch away from any surface and measured into a 50Ω receiver. FM: dc coupled; at least 40 kHz deviation for 1V input.	HP 8640A	P, A
Audio Spectrum Analyzer	Range: 20–200 kHz Amplitude Calibration: Display Accuracy: ± 0.25 dB/dB but not more than 1.5 dB over 70 dB dynamic range. Flatness: ± 0.2 dB Vertical Reference Scale: 10 dB/division log, 2 dB/division (or less) log, and linear display calibration. Average Noise Level: < –120 dBm (50Ω) with 1 kHz IF bandwidth. Spurious Responses: > –60 dB down for nominal specified inputs. Tracking Generator: Flatness: ± 0.25 dB Level: > 3 Vrms into 600Ω	HP 8556A/8552B/ 141T	P, A
RF Spectrum Analyzer	Range: 0.5–1250 MHz Amplitude Calibration: Display Accuracy: ±0.25 dB/dB but not more than 1.5 dB over 70 dB dynamic range. Flatness: ±1 dB IF Gain Step Accuracy: ±0.2 dB	HP 8554B/8552B/ 141T	P, A, T

*P = Performance; A = Adjustments; T = Troubleshooting

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

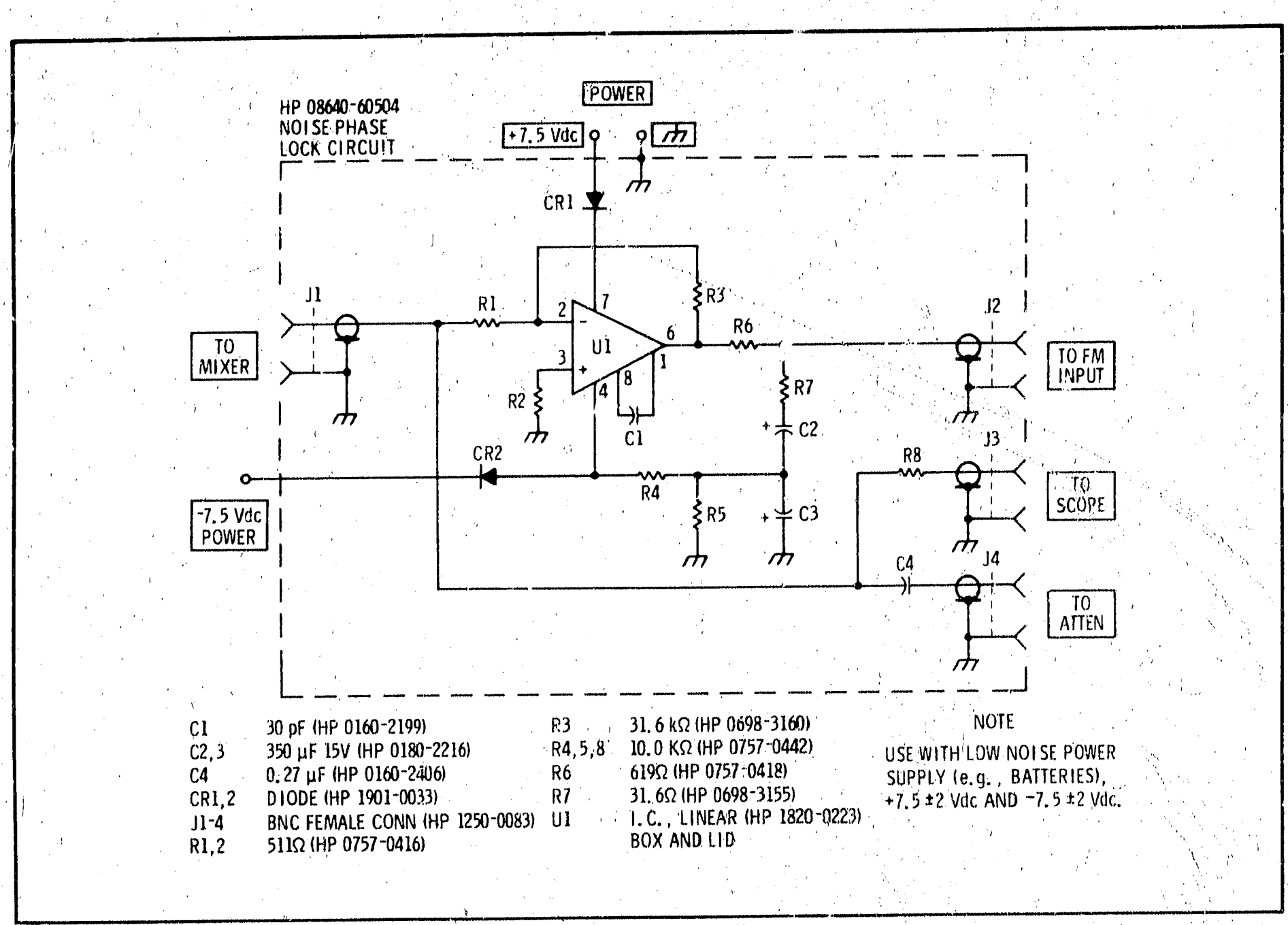
Instrument Type	Critical Specifications	Suggested Model	Use*
RF Spectrum Analyzer (continued)	Amplitude Calibration (continued): Vertical Reference Scale: 10 dB/division log, 2 dB/division (or less) log, and linear display calibration. Average Noise Level: < −102 dBm with 10 kHz IF bandwidth Spurious Responses: > 60 dB down for inputs of −40 dBm or less Span Width: 0−1 GHz Compatible with Tracking Generator		
Test Oscillator	Range: 10 Hz to 10 MHz Output Impedance: 600Ω and 50Ω Distortion: > 40 dB down Output Level: > 3 Vrms	HP 651B	P, A, T
Test Oscillator	Frequency: 600 kHz Output Impedance: 600Ω Output: > 10 Vrms into 600Ω	HP 200CD	T
Tracking Generator	Output: to 0 dBm (50Ω) Flatness: ±0.5 dB Compatible with Spectrum Analyzer (HP 8554B/8552B/141T)	HP 8444A	A
Variable Phase Oscillator (see para. 5−39 for possible requirement)	Frequency: 1 kHz Level: > 1V into 600Ω Phase Variability: 0 to 360°	HP 203A	A
VSWR Bridge	Range: 0.45−1200 MHz Connectors: Type N	Wiltron Model** 60N50	A

*P = Performance; A = Adjustments; T = Troubleshooting

**WILTRON COMPANY / 930 E. Meadow Drive / Palo Alto, CA. 94303 / TWX 9103731156 / Phone 415-494-6666

Table 1-4. Recommended Test Accesssories

Accessory Type	Suggested Model
Adapter (Type N male and BNC Female connectors)	HP 1250-0067
Adapter (BNC Male and dual Banana post connectors)	HP 10110A
Adapter (two SMC Male connectors)	HP 1250-0827
Adapter (Type N Male to GR 874)	HP 1250-0847
Double Shielded Cable (BNC Male connectors, coaxial)	HP 08708-6033
Nine-inch Cable (BNC Male connectors, coaxial)	HP 10502A
Test Cable (48-inch, BNC Male connectors, coaxial)	HP 10503A
Test Cable (SMC Male and BNC Male connectors)	HP 11592-60001
600 Ohm Feedthrough	HP 11095A
50 Ohm Load (Male, BNC, coaxial)	HP 11593A
50 Ohm Load (Male Type N)	HP 908A
Coaxial Short (Male Type N)	HP 11512A
Tee (Coaxial, BNC, one Male and two Female connectors)	HP 1250-0781
Voltage Probe (1:1) (2 preferred)	HP 10025A
Extender Board (30 pins)	HP 08640-60036
Extender Board (20 pins)	HP 5060-0256
Bumpers (2) for Extender Board	HP 0403-0115
1 kΩ Resistor	HP 0757-0280
100Ω Resistor	HP 0757-0401

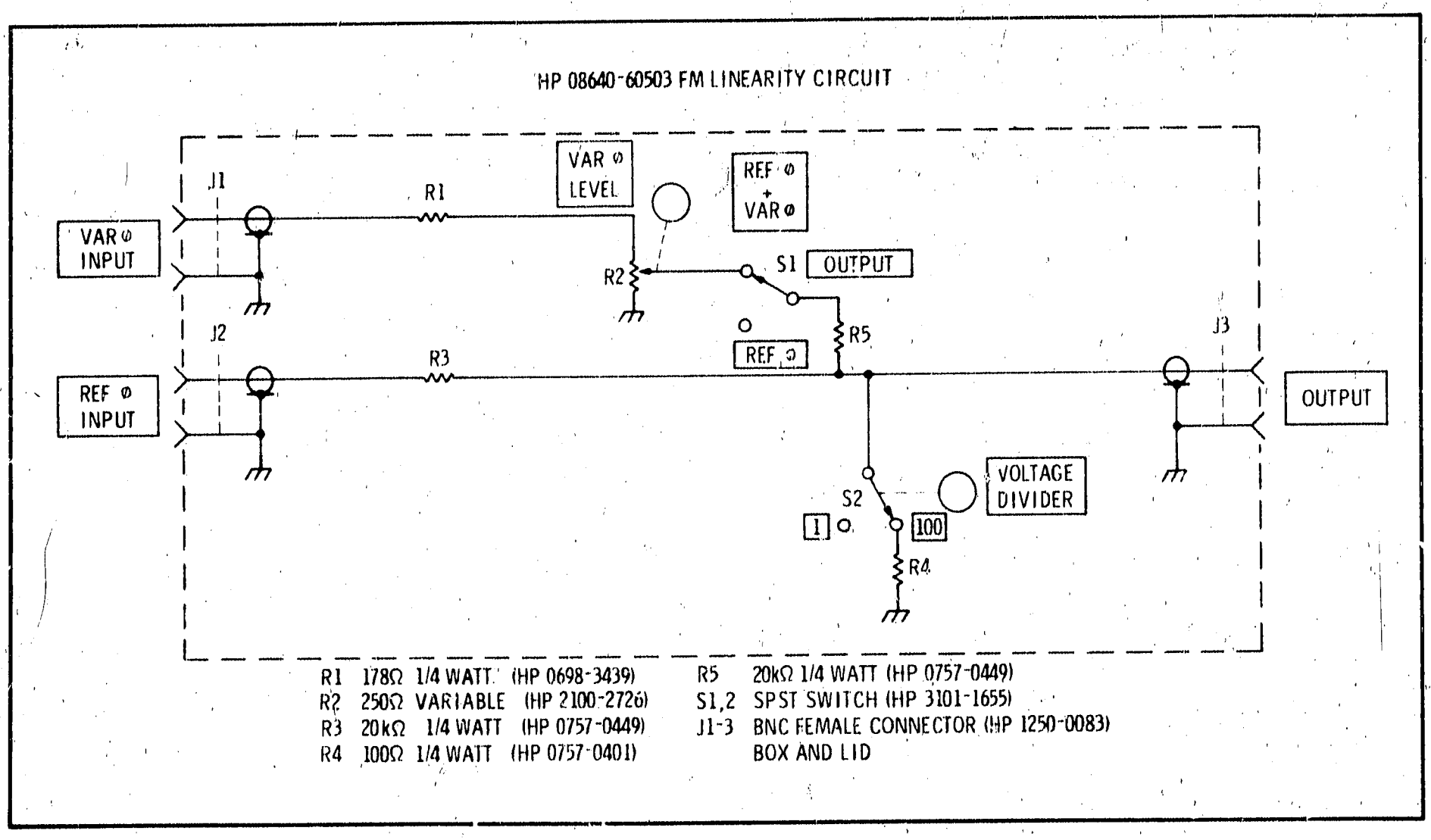


C1	30 pF (HP 0160-2199)	R3	31.6 kΩ (HP 0698-3160)
C2,3	350 µF 15V (HP 0180-2216)	R4,5,8	10.0 KΩ (HP 0757-0442)
C4	0.27 µF (HP 0160-2406)	R6	619Ω (HP 0757-0418)
CR1,2	DIODE (HP 1901-0033)	R7	31.6Ω (HP 0698-3155)
J1-4	BNC FEMALE CONN (HP 1250-0083)	U1	I.C., LINEAR (HP 1820-0223)
R1,2	511Ω (HP 0757-0416)		BOX AND LID

NOTE

USE WITH LOW NOISE POWER SUPPLY (e.g., BATTERIES), +7.5 ±2 Vdc AND -7.5 ±2 Vdc.

Figure 1-7. Noise Phase Lock Circuit



R1	178Ω 1/4 WATT (HP 0698-3439)	R5	20kΩ 1/4 WATT (HP 0757-0449)
R2	250Ω VARIABLE (HP 2100-2726)	S1,2	SPST SWITCH (HP 3101-1655)
R3	20kΩ 1/4 WATT (HP 0757-0449)	J1-3	BNC FEMALE CONNECTOR (HP 1250-0083)
R4	100Ω 1/4 WATT (HP 0757-0401)		BOX AND LID

Figure 1-8. FM Linearity Circuit

INSTALLATION

SECTION II
INSTALLATION

2-1. INTRODUCTION

2-2. This section explains how to prepare the Model 8640M Signal Generator for use. It explains how to position the slide switch to accept available line voltage, and it also describes operation, storage, and shipment.

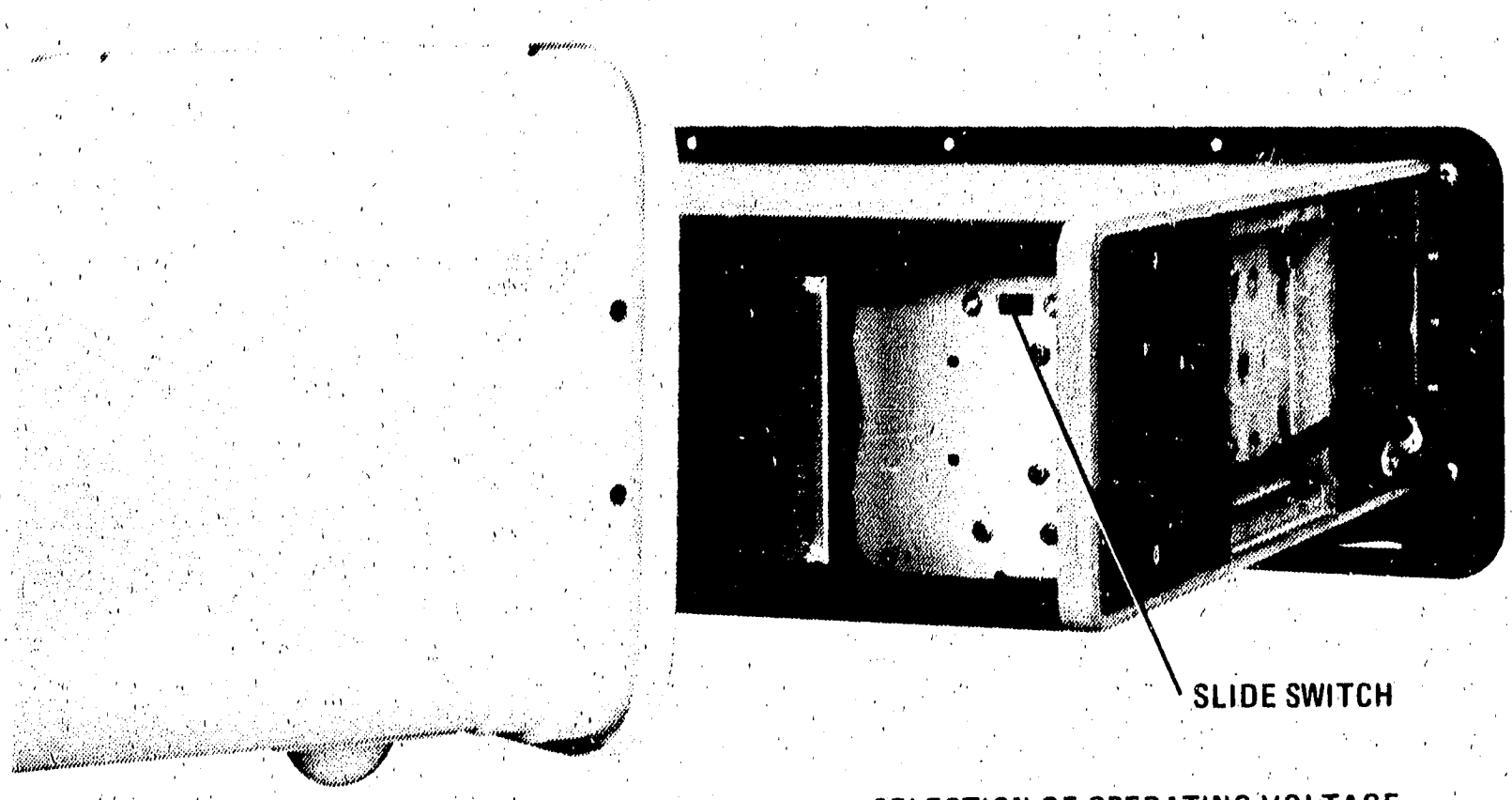
2-3. INITIAL INSPECTION

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

2.5 PREPARATION FOR USE

2-6. Power Requirements

2-7. The Model 8640M requires a power source of 115 Vac ±10%, 47.5 to 420 Hz or 230 Vac ±10%, 47.5 to 66 Hz, single phase. Power consumption is 175 VA maximum.



SELECTION OF OPERATING VOLTAGE

1. Remove instrument from case.
2. Locate slide switch on rear panel.
3. Select operating voltage by positioning slide switch to desired voltage.

Figure 2-1. Line Selector

2-8. Line Voltage Selection

CAUTION

To prevent damage to the instrument, make the line voltage selection BEFORE connecting the line power. Also ensure the line power cord is connected to a line power socket that is provided with a protective earth contact.

2-9. A rear panel, screwdriver-operated slide switch permits operation on line power of 115 or 230 Vac. The number visible on the slider indicates the nominal line voltage to which the instrument must be connected (see Figure 2-1).

2-10. To prepare the instrument for operation, slide the instrument from its case, and set rear panel slide switch to line voltage available. Install proper line fuse for selected voltage into front panel fuse holder.

NOTE

The correct fuse rating for the line voltage selected is 2 AMP for 115 Vac and 1.5 AMP for 230 Vac. More information about fuses is given in the table of replaceable parts in Section VI (reference designation is F1).

2-11. Power Cable

2-12. In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate power line outlet, this cable grounds the instrument cabinet.

WARNING

To avoid the possibility of injury, the following precautions must be followed before the instrument is switched on:

a. If this instrument is to be energized via an autotransformer, make sure that the common terminal is connected to the neutral (grounded side of mains supply).

b. The power cable plug shall only be inserted into a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor (grounding).

c. Before switching on the instrument, the protective earth terminal of the instrument must be connected to a protective conductor of the power cord. This is accomplished by ensuring that the instrument's internal earth terminal is correctly connected to the instrument's chassis and that the power cord is wired correctly (see Service Sheet 22).

2-13. Mating Connectors

2-14. Mating connectors used with the Model 8640M should be either 50 ohm-type BNC male or Type N male connectors that are compatible with US MIL-C-39012.

2-15. Operating Environment

2-16. The operating environment should be within the following limitations:

Temperature	−40°C to +55°C
Humidity	< 95% relative
Altitude	3048 m (< 10 000 feet)

2-17. A forced-air cooling system is used to maintain the operating temperature required within the instrument. The air intake and exhaust is through the front panel louvered ducts. An air filter is mounted on the rear panel near the fan.

2-18. Operation

2-19. The instrument has a waterproof combination case providing a protective outer shell and cushioned mounts for operation is a wide range of environments. With the front panel cover removed and primary power applied, the instrument is ready to operate.

2-20. STORAGE AND SHIPMENT

2-21. Environment

2-22. The instrument should be stored in a clean, dry environment. The following environmental limitations apply to both storage and shipment:

Temperature	−60°C to +85°C
Humidity	< 95% relative
Altitude	15 240 m (< 50 000 feet)

2-23. Packaging

2-24. Original Packaging. Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Also, mark the container FRAGILE to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

2-25. Other Packaging. The following general instructions should be used for re-packaging with commercially available materials:

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

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

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

d. Seal the shipping container securely.

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

OPERATION

SECTION III
OPERATION

3-1. INTRODUCTION

3-2. This section describes the functions of the controls and indicators of the Model 8640M Signal Generator. It explains how to set the frequency, amplitude, and modulation controls, and covers such operator maintenance as fuse and indicator lamp replacement and fan filter cleaning.

3-3. PANEL FEATURES

3-4. Front panel controls, indicators, and connectors are shown and described in Figure 3-2. Rear panel controls and connectors are shown and described in Figure 3-3.

3-5. OPERATOR'S CHECKS

3-6. Use the operator's checks in Figure 3-4 to verify proper operation of the Signal Generator's main functions.

3-7. OPERATING INSTRUCTIONS

3-8. Figures 3-5 and 3-6 explain how to set the frequency, amplitude, and modulation controls. Figure 3-5 also explains how to use the frequency counter and phase lock controls.

3-9. OPERATOR'S MAINTENANCE

3-10. Fuse. The main ac line fuse is located on the front panel. To remove the fuse, disconnect line power cable from power line outlet, and rotate fuse holder cap in direction of arrow.

CAUTION

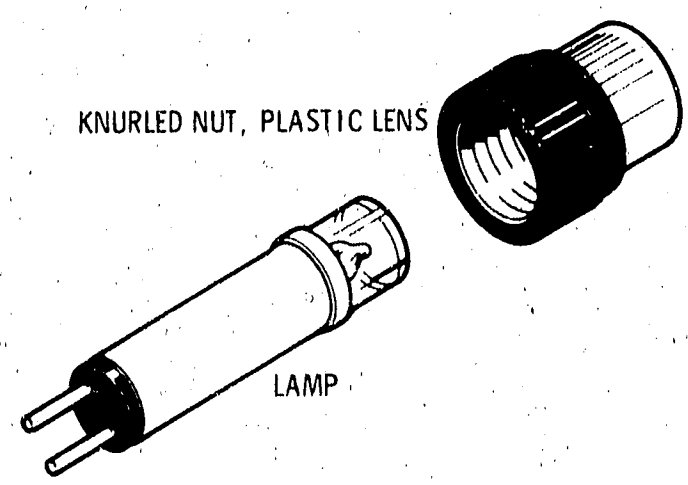
Be sure to select the correct fuse rating for the selected line voltage (see LINE VOLTAGE SELECTION in Section II).

3-11. Fan. The cooling fan's filter is located on the rear panel. To service the filter, use a No. 2 Pozidriv screwdriver (HP 8710-0900) to remove the four screws that hold the filter to the rear panel. Then clean it, using a solution of warm water and soap, or replace it, using the part number listed in the table of replaceable parts in Section VI.

3-12. The fan motor has factory lubricated, sealed bearings and requires no periodic maintenance.

3-13. Lamp Replacement. Figure 3-1 explains how to replace the lamp used in the line power circuit.

3-14. Meter Zeroing. To mechanically zero the front panel meter, set LINE switch to OFF and place instrument in its normal operating position. Turn adjustment screw cw until indicator indicates zero, then turn adjustment slightly ccw to free mechanism from adjusting peg.

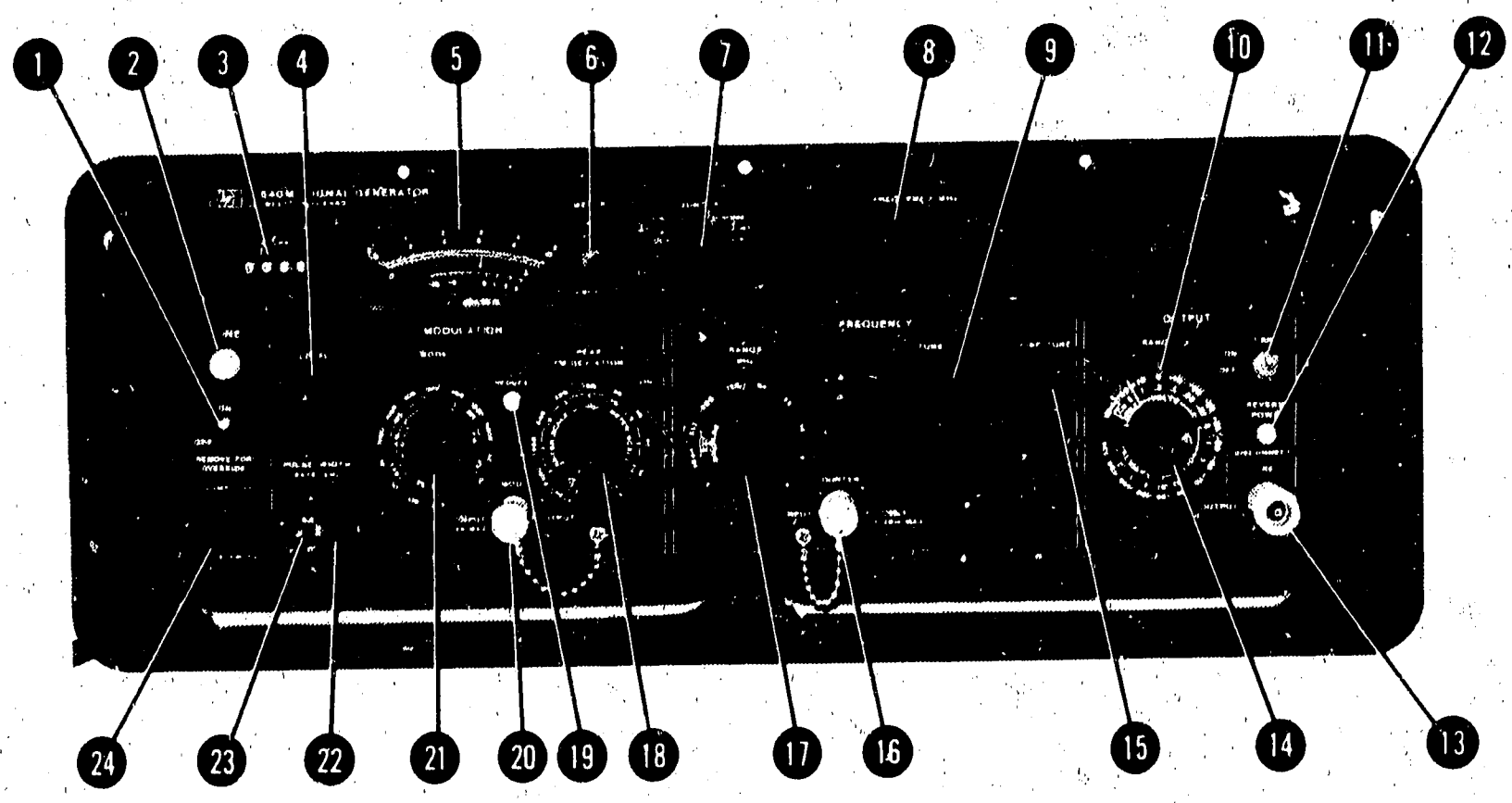


POWER LAMP REPLACEMENT

1. Unscrew knurled nut plastic lens combination.
2. Remove lamp from socket.
3. To replace lamp align contacts with socket and insert.

Figure 3-1. Lamp Replacement

FRONT PANEL FEATURES



1. **ON/OFF:** switch applies or removes AC power. A third position is available to override the internal thermal protection.

2. **LINE:** indicator that lights when ac power is applied to the signal generator.

3. **HOURS:** elapsed time meter M2 indicates total time signal generator has operated.

4. **LEVEL:** potentiometer controls amount of modulation from the internal modulation oscillator.

5. **METER:** multifunction meter that provides indication of amplitude and frequency modulation and RF output level. Amplitude modulation is indicated in percent on the 0 to 10 scale; frequency modulation is indicated in kHz or MHz on the 0 to 3, 0 to 5, or 0 to 10 scales. RF output level is indicated in microvolts, millivolts, or volts on the 0 to 3 or 0 to 10 scales and in dBm on the lower-most scale. The MODULATION MODE, PEAK FM DEVIATION, and OUTPUT RANGE control positions indicate which meter scale is to be read.

6. **METER control:** toggle switch that selects either RF LEVEL or MODULATION to be indicated on the multifunction meter M1.

7. **COUNTER switch:** controls operation of frequency counter.

   EXT 0—10, 10—550: programs counter to count frequency of signal at COUNTER INPUT jack; also selects counter frequency range in MHz.

   INT NORM: programs counter to count frequency of Signal Generator.

   LOCK: phase locks Signal Generator to the internal crystal reference. Display indicates lock frequency; loss of lock causes display to flash and indicate actual frequency of Signal Generator.

   INT X10: expands resolution one digit, moving the decimal point one place to the left.

8. **FREQUENCY MHz:** six-digit display that indicates the frequency to which the signal generator output is tuned or, in the EXT mode, the frequency at the COUNTER INPUT.

9. **FREQUENCY TUNE:** coarse frequency control.

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

FRONT PANEL FEATURES

10 **OUTPUT RANGE:** rotary switch and potentiometer, concentrically mounted, that attenuate the RF output level. The rotary switch with a calibrated dial has 16 positions to control a step attenuator in 10 dB steps. Dial indicates attenuation in microvolts, millivolts, volts, and dBm. The inner control, a potentiometer, provides continuous attenuation over an 18 dB range.

11 **RF ON/OFF:** toggle switch that enables or disables RF OUTPUT.

NOTE

The RF ON/OFF switch is wired to turn off only the amplitude modulator. This allows the RF Oscillator to remain warmed up, the Auxiliary RF Output to remain on, and the counter and phase lock to remain operating (see Service Sheet B).

12 **REVERSE POWER:** annunciator that lights when reverse power has been applied to RF OUTPUT.

13 **RF OUTPUT:** type N connector for applying RF output signal to user equipment.

14 **RANGE vernier:** potentiometer for continuous control over 18 dB of RF level.

NOTE

For optimum operation, use vernier in the top 10 dB of its range.

15 **FINE TUNE:** fine tunes the oscillator over a frequency range of 1000 parts per million on each frequency range.

16 **COUNTER INPUT:** jack providing for external inputs to frequency counter.

CAUTION

Do not apply dc voltage or > +15 dBm to COUNTER INPUT.

17 **RANGE MHz:** eleven-position rotary switch assembly that selects one of ten octave frequency ranges from 0.5 to 1 MHz, to 256 to 512 MHz. The eleventh position is calibrated for extending the output frequency to 1024 MHz through the use of an external frequency doubler.

18 **MODULATION PEAK FM DEVIATION:** eleven-position rotary switch assembly selects range of peak FM deviation. Dial also shows which meter scale to read.

19 **REDUCE:** indicator lights when FM modulation level and/or deviation settings exceed capability of signal generator.

20 **MODULATION INPUT/OUTPUT:** coaxial jack that is used for applying an external modulation signal. Also, when signal generator is in internal modulation mode, jack is used as an output port for the internally generated modulation signal.

21 **MODULATION MODE:** thirteen-position rotary switch assembly that selects modes of modulation. Also selected are external or internal sources and the modulation frequencies for the internal AM and FM modes.

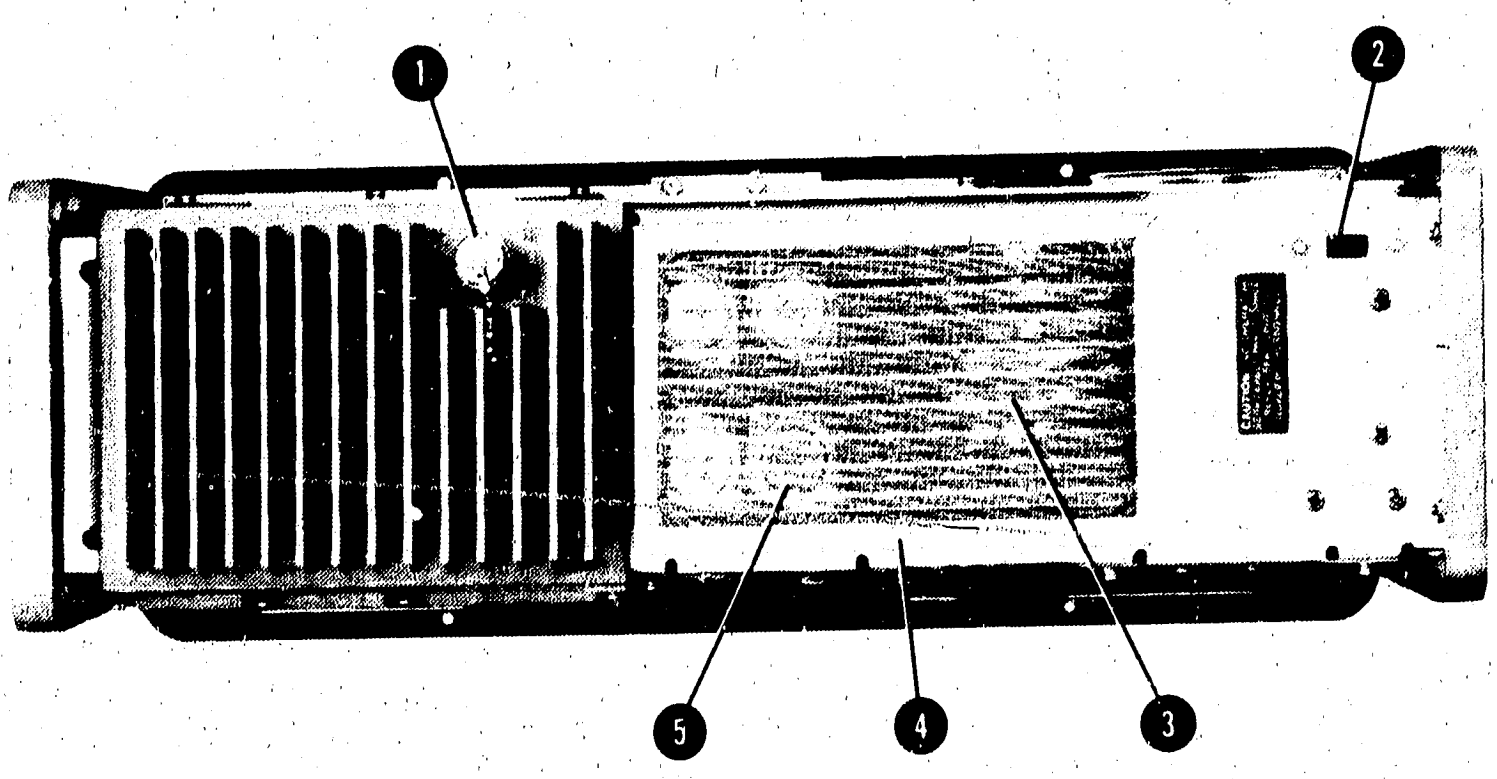
22 **PULSE WIDTH:** part of dual-potentiometer selects modulation pulse widths from 1 to 40 microseconds.

23 **PULSE RATE:** part of dual-potentiometer selects modulation rates from 0.05 to 5 kHz.

24 **FUSE:** input ac power line protection. Fuse size 2A for 115 Vac operation and 1.5A for 230 Vac operation.

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

REAR PANEL FEATURES



1 AUX RF OUTPUT: nominal −5 dBm auxiliary RF output; 500 ohm source impedance. Signal does not contain amplitude or pulse modulation (however, it does contain FM). On the 512—1024 MHz range the auxiliary RF output is one-half the frequency of the indicated RF frequency.

2 LINE POWER SWITCH: permits operation from 115 or 230 Vac. The number visible in window indicates nominal line voltage to which instrument must be connected. Line power cable center conductor is safety earth ground.

WARNING

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

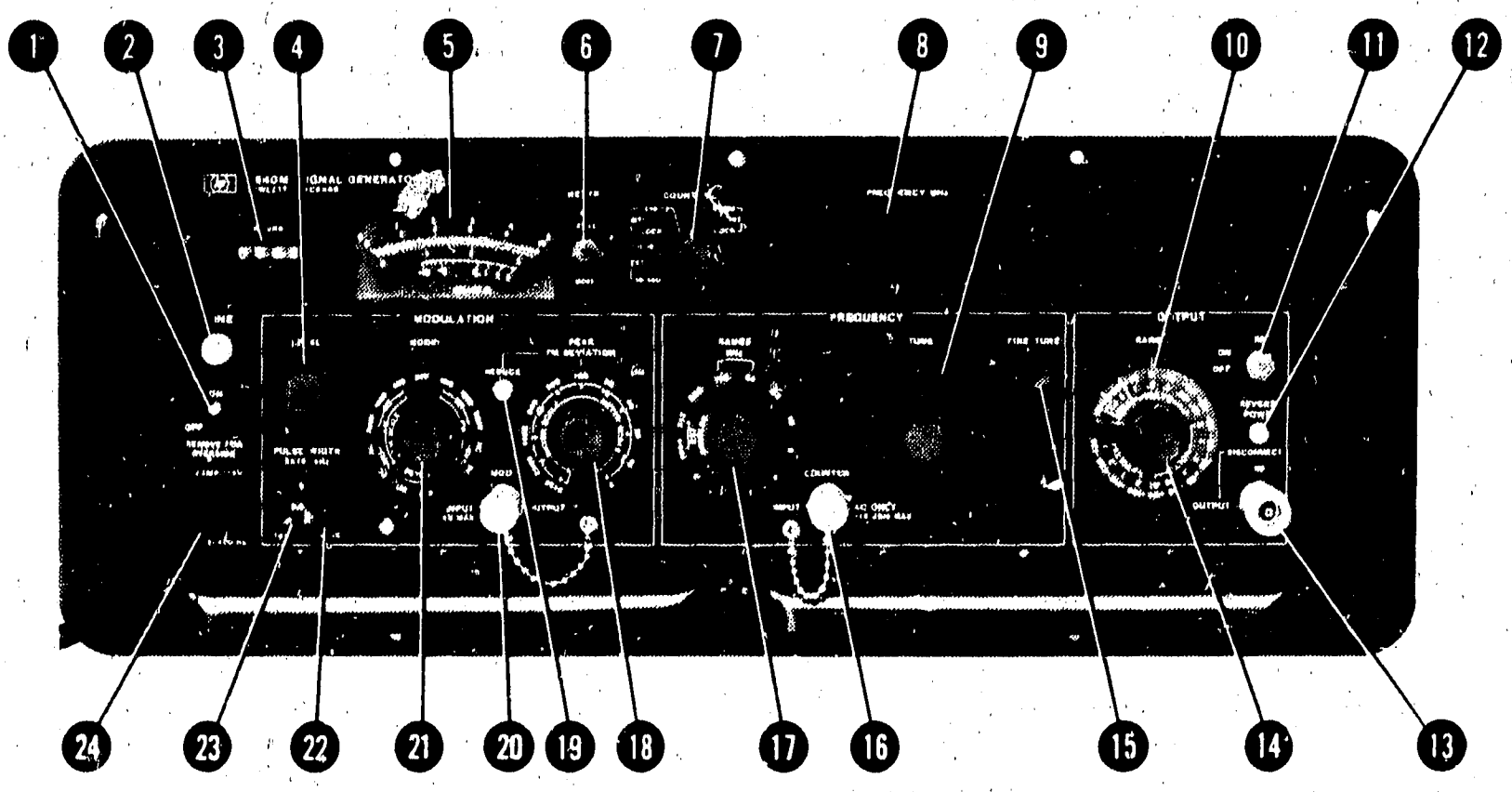
3 FAN: internal cooling of the instrument provided by circulating air taken in through louvered ducts on front panel.

4 FILTER: collects dust present in the operating environment. Can be cleaned with soap and water.

5 POWER SUPPLY TRANSISTORS: Q1 +5.2V, Q2 +20V, Q3 +44.6V, and Q4 −20V.

Figure 3-3. Rear Panel Features

OPERATOR'S CHECKS



INITIAL CONTROL SETTINGS

a. Set LINE switch (1) to ON.

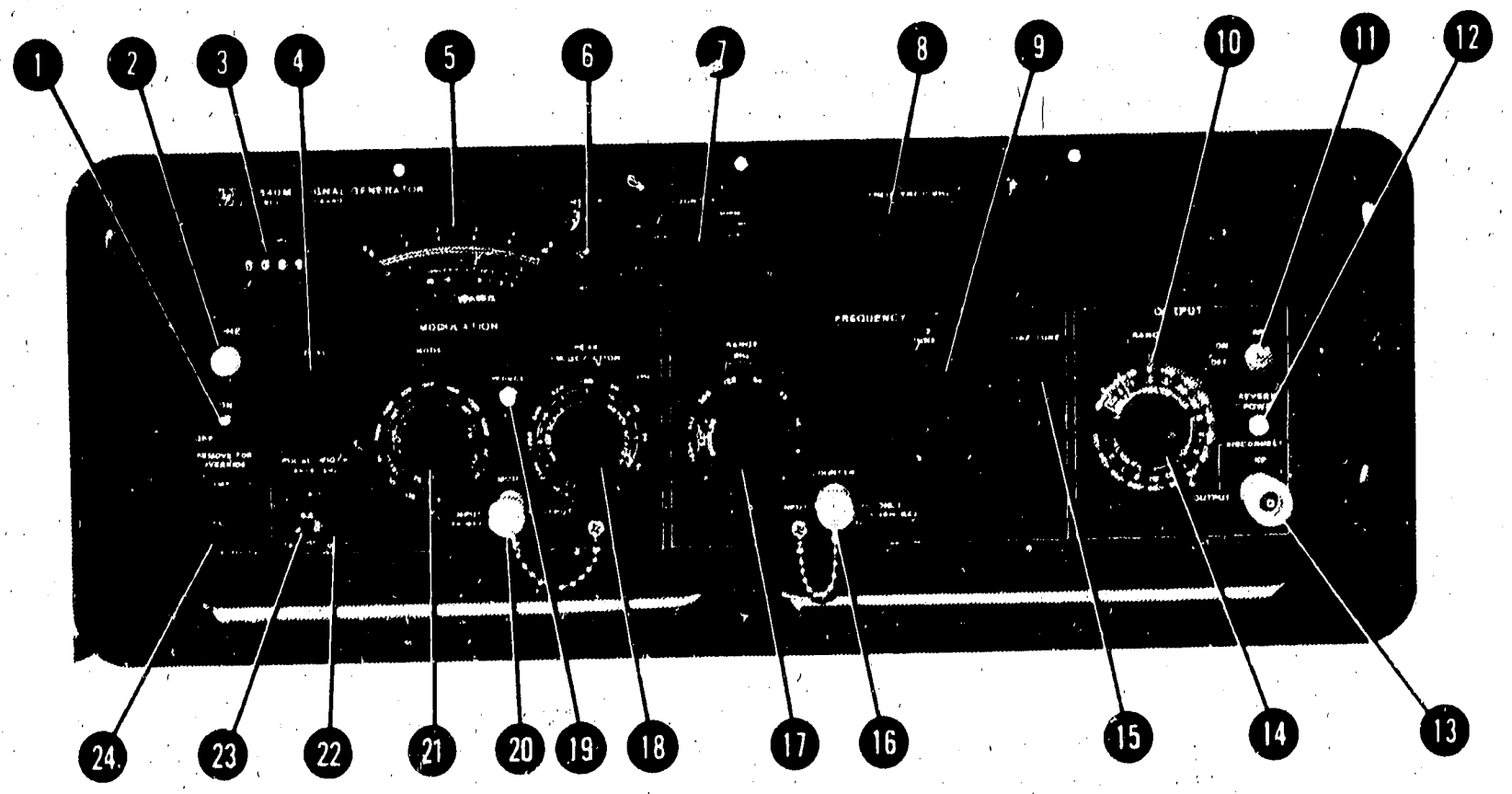
b. Set the controls as follows:

(7)	COUNTER		INT NORM
(6)	METER		RF LEVEL
(4)	MODULATION:	LEVEL	Fully ccw
(22)		PULSE WIDTH	Fully cw
(23)		PULSE RATE	Fully cw
(21)		MODE	AM INT 1000
(18)		PEAK FM DEVIATION	5 kHz
(17)	FREQUENCY:	RANGE	0.5—1 MHz
(9)		TUNE	Fully cw
(15)		FINE TUNE	Centered
(10)	OUTPUT:	RANGE Switch	+10 dBm
(14)		RANGE Vernier	Fully cw
(11)		RF ON/OFF	ON

Use FREQUENCY FINE TUNE in conjunction with FREQUENCY TUNE to set whatever frequency is required.

Figure 3-4. Operator's Checks (1 of 4)

OPERATOR'S CHECKS



COUNTER AND RF OSCILLATOR

c. Use a Type N to BNC adapter and a BNC to BNC cable to connect RF OUTPUT (13) to COUNTER INPUT (16).

d. Adjust FREQUENCY TUNE (9) and FINE TUNE (15) until FREQUENCY (8) reads 0.75000 MHz. Set COUNTER to INT X10 (7); FREQUENCY display (8) should read about .750000 MHz (the reading should shift one place to the left).

e. Set COUNTER to INT NORM (7). With RANGE (17) set as follows, FREQUENCY (8) should read approximately as shown:

Range MHz	FREQUENCY MHz
0.5—1	0.75000
1—2	01.5000
2—4	03.0000
4—8	06.0000
8—16	12.0000
16—32	024.000
32—64	048.000
64—128	096.000
128—256	0192.00
256—512	0384.00

Figure 3-4. Operator's Checks (2 of 4)

OPERATOR'S CHECKS

PHASE LOCK

f. Set RANGE (17) to 256—512 MHz. Note that the right-hand digit on the FREQUENCY display (8) flickers between two digits. Set COUNTER to INT LOCK (7); the flickering should stop. Slowly adjust FINE TUNE (15) one-quarter turn; the FREQUENCY reading should not change. Adjust FREQUENCY TUNE (9) one-quarter turn; the FREQUENCY display should blink at about a 2 Hz rate and the reading should change (the reading should follow FREQUENCY TUNE).

RF OUTPUT

g. Set COUNTER (7) to EXT 10—550. Adjust FREQUENCY TUNE (9) until FREQUENCY (8) reads 384.000 MHz. Step through the ranges specified in step e. FREQUENCY should read approximately as shown in step e, with the exception of the position of the decimal point. Set COUNTER (7) to EXT 0—10 when switching to lower 4 ranges (4—8 through 0.5—1 MHz).

METER

h. Set OUTPUT RANGE (10) to 1 VOLT (+10 dBm) and OUTPUT RANGE vernier (14) until the meter (5) indicates 5 on the 0—10 scale.

i. Adjust OUTPUT RANGE vernier fully cw, meter indicates full scale (>10) on the 0—10 scale.

AMPLITUDE MODULATION

j. Set RANGE (17) to 0.5—1 MHz. Set METER (6) to MOD and MODULATION MODE (21) to AM INT 1000. Slowly turn LEVEL (4) clockwise until the meter indicates 10 (i.e., 100% modulation).

FREQUENCY MODULATION

k. Set MODULATION MODE (21) to FM INT 1000. Set PEAK FM DEVIATION (18) to 5 kHz and LEVEL (4) fully counterclockwise; the METER (5) should indicate 0.

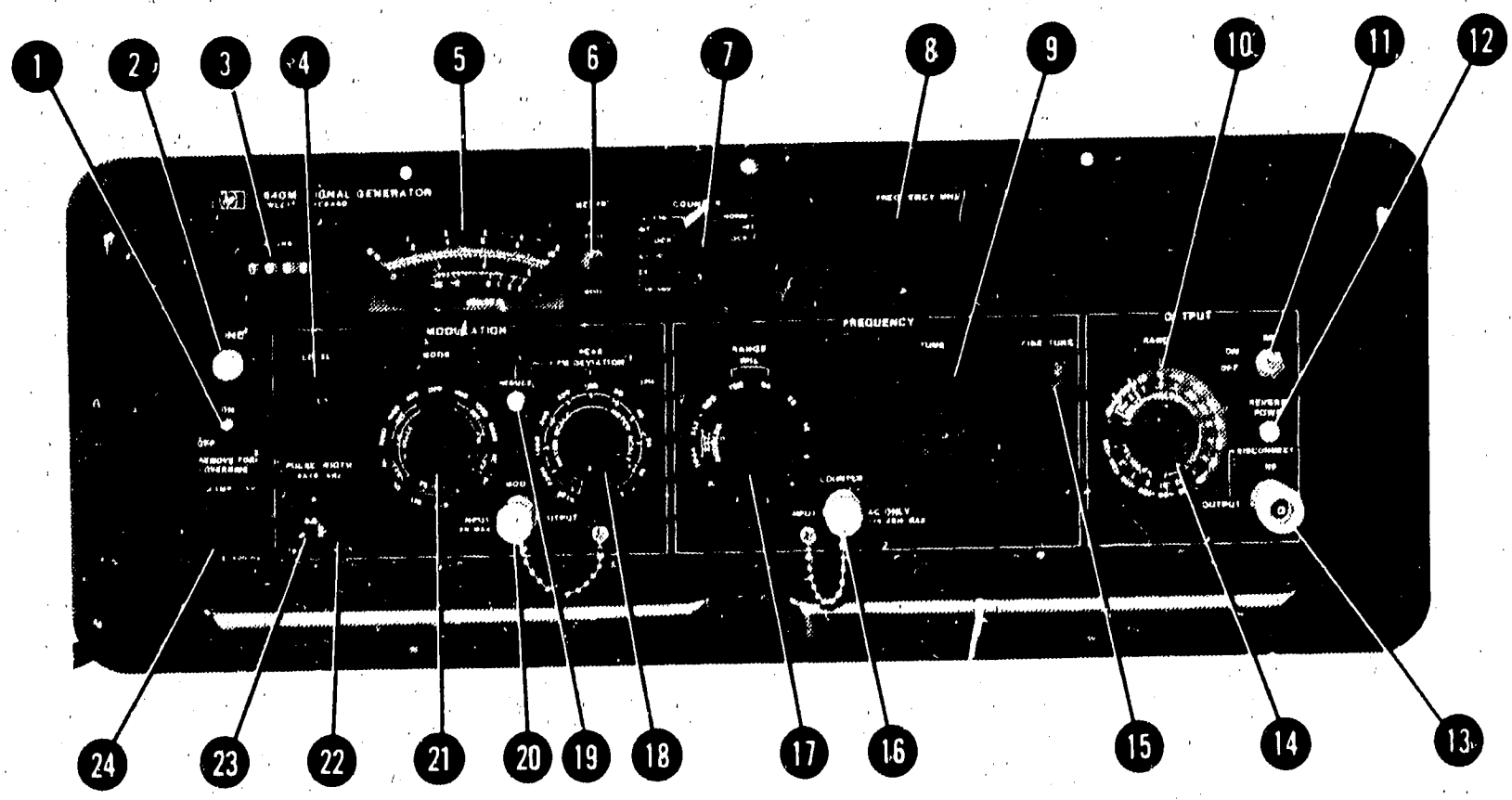
l. Turn LEVEL (4) fully clockwise; the METER (5) should indicate greater than 5 kHz and the REDUCE PEAK FM DEVIATION (19) annunciator should light.

m. Reduce LEVEL (4) until METER (5) reads 5 kHz (the annunciator should go out). Set PEAK FM DEVIATION (18) to 10 kHz; the REDUCE PEAK FM DEVIATION (19) annunciator should light and the meter should indicate 0.

n. Set RANGE (17) to 1—2 MHz (the annunciator should go out) and turn the LEVEL (4) fully counterclockwise; the METER (5) should indicate 0 on the 0—10 scale.

Figure 3-4. Operator's Checks (3 of 4)

OPERATOR'S CHECKS



INTERNAL MODULATION OSCILLATOR

o. Using the BNC to BNC cable, connect MOD OUTPUT (20) to COUNTER INPUT (16). Set COUNTER (7) to EXT 0—10. Set MODULATION MODE (21) in turn to AM INT 400, 1000 and 5000. The FREQUENCY MHz (8) should display approximately 0.00040, 0.00100, and 0.00500.

Figure 3-4. Operator's Checks (4 of 4)

SETTING FREQUENCY AND AMPLITUDE

FREQUENCY

a. Set COUNTER (7) to INT NORM.

b. Set RANGE (17) to span the desired frequency.

c. Use FREQUENCY TUNE (9) and FINE TUNE (15) to set the Signal Generator to the desired frequency.

d. The decimal point on the FREQUENCY display (8) is automatically set by the RANGE control. For more resolution, set COUNTER (17) to INT X10.

e. To phase lock the generator's output, set COUNTER (7) to INT LOCK.

NOTE

If the OVERFLOW annunciator lights, the generator will not enter calibrated phase lock.

f. Whenever phase lock is lost, FREQUENCY MHz (8) will flash. To re-establish phase lock, switch COUNTER (7) from LOCK to either X10 or NORM depending on mode then back to LOCK.

g. To use an external frequency doubler, connect doubler to RF OUTPUT (13) and set RANGE (17) to 512--1024 MHz EXT DOUBLER. The frequency display will indicate the frequency out of the doubler (i.e., FREQUENCY MHz (8) indicates twice the frequency at RF OUTPUT).

AMPLITUDE

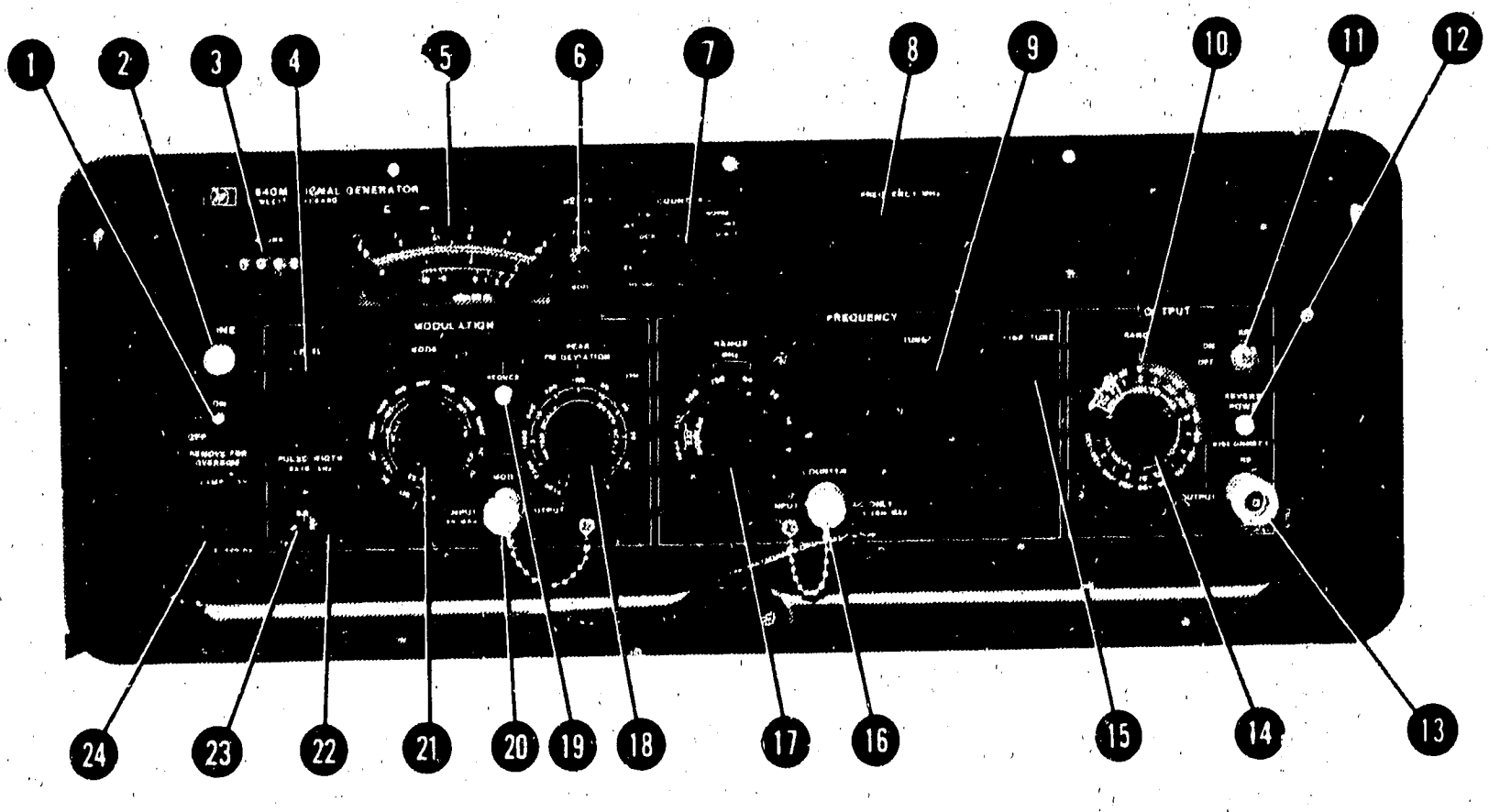
a. Use OUTPUT RANGE (10) and vernier (14) to set the desired signal level (there are two types of scales; rms volts and dBm). Set METER switch (6) to RF LEVEL. To enable the RF OUTPUT signal, set the RF ON/OFF (11) to ON.

b. To determine output level, the meter is read in conjunction with the OUTPUT RANGE switch (10) (i.e., with OUTPUT RANGE switch set to .03 VOLTS, a meter reading of 2.1 indicates that the actual level is 21 mVrms).

c. If a 50 ohm to 75 ohm adapter (consisting of a 25 ohm series resistor) is connected to RF OUTPUT (13), the OUTPUT RANGE (14) voltage scale will be correct if the instrument is used with 75 ohm terminations. However, 1.76 dB must be subtracted from the dB scale for correct readings.

Figure 3-5. Setting the Frequency and Amplitude Controls

SETTING MODULATION



AMPLITUDE MODULATION

a. Set METER switch (6) to MOD.

b. To use the internal oscillator, set MODULATION MODE (21) to AM INT at the desired modulation frequency and adjust LEVEL (4) for percent of modulation. Modulation is indicated by the METER (5) (i.e., a meter reading of 5.4 on the 10 scale indicates 54% AM).

c. With the MODULATION MODE (21) set to AM INT the internal modulation oscillator signal is present at the MOD INPUT/OUTPUT (20) jack.

d. To use an external modulation signal, set MODULATION MODE (21) to AM EXT AC (or DC if modulation signal is less then 20 Hz). Apply the signal to the MOD INPUT. The signal generator requires 1 Vpk (0.707 Vrms) for 100% modulation. Set percent of modulation with the LEVEL (4), percent AM is indicated by the meter.

NOTE

The meter reading is accurate when AM is set to DC only if no DC offset is applied to the MOD INPUT jack. The meter responds to the positive peak of the ac component of the modulating signal.

PULSE MODULATION

a. Set METER switch (6) to RF LEVEL.

Figure 3-6. Setting the Modulation Controls (1 of 2)

SETTING MODULATION

PULSE MODULATION (Cont'd)

b. Set the desired pulse-on level using OUTPUT RANGE switch (10) and vernier (14).

c. To use the internal pulse generator, set MODULATION MODE (21) to PULSE INT, and select the desired PULSE WIDTH (22) and RATE (23).

d. To use an external input, set MODULATION MODE (21) to PULSE EXT (this disables the RF OUTPUT). Apply the modulation pulse (> 0.5V) to the MOD INPUT jack (20). The Signal Generator requires a positive level to produce an RF output.

FREQUENCY MODULATION

a. Set METER switch (6) to MOD.

b. To use the internal modulation oscillator, set MODULATION MODE (21) to FM INT at the desired modulation frequency. Set PEAK FM DEVIATION (18) to the desired deviation range. Use LEVEL (4) in conjunction with the meter to set the exact deviation desired.

NOTE

The REDUCE PEAK FM DEVIATION annunciator (19) lights when the PEAK DEVIATION switch setting is too high for the selected frequency range, or when the LEVEL control is set too high. When it lights, reduce peak deviation.

c. Peak frequency deviation is indicated by the METER (5) and is read in conjunction with PEAK FM DEVIATION switch (18) (i.e., with PEAK FM 320 kHz, a meter reading of 2.8 indicates that peak frequency deviation is 280 kHz.

d. With the MODULATION MODE switch (21) set to FM INT the internal modulation oscillator is present at the MOD OUTPUT jack (20)

e. To use an external modulation signal, set MODULATION MODE (21) to FM EXT AC (or DC if modulation signal is less than 20 Hz). Apply the signal to the MOD INPUT jack (20). The Signal Generator requires 1V pk (0.707 Vrms) for full peak deviation. The PEAK FM DEVIATION controls and the METER are used the same way as when using the internal modulation oscillator signal.

Figure 3-6. Setting the Modulation Controls (2 of 2)

PERFORMANCE CHECK

SECTION IV
PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. The procedures in this section test the critical electrical performance of the Signal Generator using the specifications of Table 1-1 as the performance standards. The first test (Basic Functional Checks) presents steps for checking the overall basic functions of the generator. The performance tests that follow provide the most comprehensive check of the specifications. A simpler operational test is included in Section III under Operator's Checks.

4-3. The Basic Functional Checks should be useful for incoming inspections, routine maintenance and general post-repair checks, but is not intended to be a complete check of specifications. The test requires only commonly available equipment and is written so that a wide variety of models with equivalent specifications may be used.

4-4. EQUIPMENT REQUIRED

4-5. Table 4-1 lists the test equipment recommended for the Basic Functional Checks only. Equipment required for the other performance tests is listed in the Recommended Test Equipment table in Section I. Any equipment that satisfies the critical specifications given in the tables may be substituted for the recommended model(s).

4-6. TEST RECORD

4-7. A separate check-off list is provided as a test record at the end of the Basic Functional Checks. Results of the other performance tests may be tabulated on the Test Record at the end of the procedures. The Test Record lists all of the tested specifications and their acceptable limits. Test results recorded at incoming inspection can be used for comparison in periodic maintenance and troubleshooting and after repairs or adjustments.

4-8. TEST PROCEDURES

4-9. It is assumed that the person performing the following tests understands how to operate the specified test equipment. Equipment settings, other than those for the Model 8640M are stated in general terms. For example, a test might require that a spectrum analyzer's resolution bandwidth be set to 100 Hz; however, the time per division setting would not be specified and the operator would set that control so that the analyzer operates correctly.

4-10. It is also assumed that the person performing the tests will supply whatever cables, connectors, and adapters are necessary. The Test Accessories table in Section I lists the requirements for some of these items.

4-11. Unless otherwise specified, set the following controls as shown:

COUNTER ..... INT NORM
METER .....RF LEVEL
LINE .....ON
MODULATION: LEVEL .....Fully ccw
PULSE WIDTH .....Fully cw
PULSE RATE .....Fully cw
MODE .....AM INT 1000
PEAK FM DEVIATION . . 5 kHz
FREQUENCY: RANGE .....0.5—1 MHz
TUNE .....Fully cw
FINE TUNE .....Centered
OUTPUT: RANGE Switch ..... +10 dBm
RANGE Vernier .....Fully cw
RF ON/OFF .....ON

Use FREQUENCY FINE TUNE in conjunction with FREQUENCY TUNE to set whatever frequency is required.

CAUTION

To avoid the possibility of damage to test equipment, read completely through each test before starting it. Make any preliminary control settings necessary for correct test equipment operation.

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS

DESCRIPTION: A minimum of test equipment is used to check the overall basic functions of the signal generator.

EQUIPMENT:

Table 4-1. Recommended Test Equipment (Basic Functional Checks)

Instrument Type	Critical Specifications	Suggested Models
AC Voltmeter	Accuracy: ±1% at 0.7 Vrms	HP 400E, or HP 34740A/34702A, or HP 3490A
Frequency Counter	Range: 10 MHz Accuracy: <0.1 ppm	HP 5326C Option 010, or HP 5382A Option 001
Power Meter	Frequency Range: 10 MHz to 1.5 GHz Max Input Level: 10 dBm Accuracy: ±1%	HP 435A/8482A, or HP 432A/478A
Spectrum Analyzer	Range: >100 MHz Resolution Bandwidth: >100 kHz to <3 kHz Log and linear display	HP 8558B/182C, or HP 8553B/8552A/141T, or HP 651B
Test Oscillator	Range: > 10 kHz Output: >1 Vrms into 600Ω	HP 204D, or HP 651B

PROCEDURE: **1.** Set the Signal Generator's controls as follows. Return the controls to these initial settings before starting any section within the check.

COUNTER		INT NORM
METER		MOD
LINE		ON
MODULATION:	LEVEL	Fully ccw
	PULSE WIDTH	Fully cw
	PULSE RATE	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	5 kHz
FREQUENCY:	RANGE	0.5—1 MHz
	TUNE	Approximately centered
	FINE TUNE	Approximately centered
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS (Cont'd)

2. **Preliminary Checks** (refer to step 1 for initial control settings):

   a. Set LINE switch to OFF. The panel meter should read exactly 0 when viewed directly from the front.

   b. Set LINE switch to ON. The lamp above the switch should light.

   c. The fan should be operating.

   d. Every six minutes, the elapsed time meter should produce an audible click, and the HOURS total should increment by one each hour.

   e. Set PEAK FM DEVIATION to 10 kHz, and MODULATION MODE to FM INT 400. The REDUCE annunciator should light.

   f. Set PEAK FM DEVIATION to 5 kHz and MODULATION LEVEL fully cw. The REDUCE annunciator should light. Return MODULATION MODE to OFF and MODULATION LEVEL fully ccw.

3. **Counter and Frequency Checks** (refer to step 1 for initial control settings):

   a. Measure the frequency of the RF OUTPUT with an accurate 1 Hz resolution counter. The frequency should agree on both counters to ±20 ppm ± 1 count. For example if the generator is set for a reading of 0.70000 MHz on its counter, the external counter should read between 699 985 and 700 015 Hz.

   b. Set FREQUENCY RANGE and COUNTER as indicated below. The location of the decimal point should be correct as shown.

FREQUENCY RANGE (MHz)	COUNTER	Decimal Point
128–1024	INT NORM	X X X X.X X
16–128	INT NORM	X X X.X X X
1–16	INT NORM	X X.X X X X
0.5–1	INT NORM	X.X X X X X
0.5–1	INT X10	.X X X X X X

   c. At the last setting in b, tune FREQUENCY TUNE fully cw. The OVERFLOW annunciator should be on.

   d. Using FREQUENCY RANGE and TUNE controls, check each display digit for proper lighting of the LEDs.

   e. Set COUNTER to INT NORM then to LOCK. The displayed count should be steady and the display should not blink.

   f. Rotate FINE TUNE one-quarter turn cw. The display should remain unchanged.

   g. Rotate FINE TUNE one-half turn ccw. The display should remain unchanged.

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS (Cont'd)

h. Rotate FREQUENCY TUNE one-half turn. Phase lock should break and display should blink.

i. Set COUNTER to EXT 0—10, FREQUENCY RANGE to 0.5—1 MHz, TUNE to fully ccw position, FINE TUNE centered, and OUTPUT RANGE switch to 0 dBm. Meter switch to RF LEVEL and OUTPUT RANGE vernier adjusted to —5 dBm on meter. Connect RF OUTPUT to COUNTER INPUT. Counter should read 0.450 MHz or less (but not all zeros).

j. Rotate FREQUENCY TUNE to fully cw position. Counter should read 1.07 MHz or greater.

k. Set FREQUENCY TUNE for display of 0.500 MHz. Set FREQUENCY RANGE as indicated below and note frequency displayed for COUNTER set to both EXT 0—10 and INT NORM. The frequency should be correct as shown and except for the number of significant digits displayed, should be the same for both counter modes.

FREQUENCY RANGE (MHz)	Counter Reading (MHz)
0.5—1	0.500
1—2	1.00
2—4	2.00
4—8	4.00
8—16	8.00

l. Continue as in the preceding step except set EXT range to 10—550. Compare the counter reading for COUNTER set to both EXT 10—550 and INT NORM.

FREQUENCY RANGE (MHz)	Counter Reading (MHz)
8—16	8.00
16—32	16.0
32—64	32.0
64—128	64.0
128—256	128
256—512	256
512—1024	256 (EXT); 512 (INT)

m. Set FREQUENCY RANGE to 256—512 MHz and tune to 550 MHz. Counter should read 550 MHz with COUNTER set to EXT 10—550.

n. Tune frequency to approximately 345 MHz. Slowly rotate FREQUENCY TUNE in a cw direction. A faint but audible click should be heard when tuning through the range 355—357 MHz. This is relay switching of the high band filters.

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS (Cont'd)

4. Meter and Modulation Oscillator Checks (refer to step 1 for initial control settings):

a. Set MODULATION MODE to AM EXT AC and LEVEL fully cw, and METER to MOD. Connect a test oscillator to MOD INPUT through a BNC tee. Connect an ac voltmeter to the tee. Set test oscillator to 1 kHz and 0.707 Vrms as read on the voltmeter. The generator's front panel meter should read between 9.6 and 10.4.

b. Disconnect test oscillator and voltmeter. Set MODULATION MODE to AM INT 1000. Connect high impedance external counter to MOD OUTPUT. The counter should read between 950 and 1050 Hz. Record this frequency for future reference.

950 _____ 1050 Hz

c. Set MODULATION MODE to PULSE INT. Set PULSE RATE fully cw; counter should read greater than 5 kHz. Set PULSE RATE fully ccw; counter should read less than 50 Hz.

5. Output Level Checks (refer to step 1 for initial control settings):

a. Set FREQUENCY RANGE to 32—64 MHz, FREQUENCY TUNE to 50 MHz, and METER to RF LEVEL. Connect a power meter to RF OUTPUT and set OUTPUT RANGE vernier for a front panel meter indication of —1 dB. The power meter should read between +8.5 and +9.5 dBm.

b. Reduce OUTPUT RANGE vernier to —7 dB as read on the panel meter. The power meter should read between +2.5 and +3.5 dBm.

c. Return OUTPUT RANGE vernier to +9 dBm *as read on the power meter.* Tune across all frequency ranges for which the power sensor is specified and note maximum and minimum level variations. The level should be between +8.0 and +10.0 dBm.

6. AM and Pulse Checks (refer to step 1 for initial control settings):

a. Set FREQUENCY RANGE to 64—128 MHz, FREQUENCY TUNE to 100 MHz, and OUTPUT RANGE switch to —40 dBm (with vernier fully cw). Connect RF OUTPUT to the input of a spectrum analyzer.

b. Set analyzer controls to display the 100 MHz signal with 100 kHz or greater resolution bandwidth, linear vertical scale, 5 to 20 kHz of display smoothing, and zero frequency span width. Check that the signal is peaked on the display and adjust the vertical sensitivity for 4 divisions of deflection. (Also ensure that the base line with no signal is at the bottom line of the display.)

c. Set MODULATION MODE to AM INT 1000. Adjust MODULATION LEVEL for a panel meter reading of 50%. The peak-to-peak amplitude on the display should be between 3.6 and 4.4 divisions centered about the fourth division from bottom. The waveform should appear undistorted.

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS (Cont'd)

d. Set MODULATION MODE to OFF. Set analyzer resolution bandwidth to 100 kHz or greater and no display smoothing.

e. Check that signal is peaked and at fourth division. Set MODULATION MODE to PULSE INT. The level of the flat part of the pulses should be between 3.5 and 4.5 divisions.

f. Set MODULATION MODE to OFF. Adjust analyzer to view the 100 MHz signal in smallest resolution bandwidth and frequency span that is reasonable, and set vertical scale to 10 dB log per division. Step OUTPUT LEVEL switch down in 10 dB steps and check that the output signal decreases in 10 dB steps to the lowest visible level on the analyzer

7. **FM Check** (refer to step 1 for initial control settings):

a. Set FREQUENCY TUNE to 1 MHz, and OUTPUT RANGE switch to −40 dBm. Locate signal on spectrum analyzer. Adjust analyzer for full-scale deflection of signal with 10 dB log per vertical division, 100 Hz resolution bandwidth, and 500 Hz to 2 kHz frequency span per division. (If 100 Hz resolution bandwidth is not available, see steps c and d.)

b. Set MODULATION MODE to FM INT 1000 and increase PEAK FM DEVIATION vernier for a panel meter reading of 2.4 kHz (note that the carrier decreases as peak deviation increases). The carrier signal should be down greater than 18 dB from its original level (which corresponds to a peak deviation accuracy of ±10%).

NOTE

To obtain a more accurate measurement, adjust PEAK FM DEVIATION vernier for a carrier null. The panel meter should read 2.405 times the modulation rate measured in step 4b (±10%). The above steps may also be repeated for other carrier frequencies.

c. If a spectrum analyzer with 100 Hz resolution bandwidth is not available, set FREQUENCY RANGE to 4—8 MHz, FREQUENCY TUNE to 8 MHz, and OUTPUT RANGE switch to −40 dBm. Locate signal on spectrum analyzer. Adjust analyzer for full-scale deflection of signal in the 10 dB log per vertical division setting with 3 kHz resoltuion bandwidth and 20 kHz frequency span per division.

d. Set an external audio oscillator to 1 Vrms at 10 kHz, connect to MOD INPUT, and set MODULATION MODE to FM EXT AC. Set the 10 kHz frequency with a counter. Set PEAK FM DEVIATION switch to 40 kHz and increase PEAK FM DEVIATION vernier for a panel meter reading of 24 kHz (note that the carrier decreases as peak deviation increases). The carrier signal should be down greater than 18 dB from its original level (which corresponds to a peak deviation accuracy of ±10%.

PERFORMANCE TESTS

4-12. BASIC FUNCTIONAL CHECKS (Cont'd)

Table 4-2. Record of Basic Functional Checks

Step	Description	√
2.	**Preliminary Checks**	
	a. Meter mechanical zero	_____
	b. LINE ON/OFF lamp	_____
	c. Fan	_____
	d. Elapsed time meter	_____
	e. REDUCE annunciator (switch)	_____
	f. REDUCE annunciator (vernier)	_____
3.	**Counter and Frequency Checks**	
	a. Frequency accuracy	_____
	b. Decimal point	_____
	c. OVERFLOW annunciator	_____
	d. Frequency display LEDs	_____
	e. Phase lock achieved	_____
	f. Phase lock range	_____
	g. Phase lock range	_____
	h. Phase lock broken	_____
	i. Low frequency range	_____
	j. High frequency range	_____
	k. Range check and counter sensitivity 0.5—16 MHz	_____
	l. Range check and counter sensitivity 16—1024 MHz	_____
	m. Counter high frequency sensitivity	_____
	n. High-band/low-band switching	_____
4.	**Meter and Modulation Oscillator Checks**	
	a. Panel meter accuracy	_____
	b. Modulation oscillator frequency accuracy — sinewave	_____
	c. Modulation oscillator frequency accuracy — pulse	_____
5.	**Output Level Checks**	
	a. Output level accuracy +9 dBm	_____
	b. Output level accuracy +3 dBm	_____
	c. Output level flatness	_____
6.	**AM and Pulse Checks**	
	c. AM accuracy and distortion	_____
	e. Pulse level accuracy	_____
	f. Output attenuator	_____
7.	**FM Check**	
	b. or d. FM accuracy	_____

PERFORMANCE TESTS

4-13. FREQUENCY RANGE TEST

SPECIFICATION: **Range:** 500 kHz to 512 MHz in 10 octave ranges (to 1024 MHz with external frequency doubler).

Ranges and Range Overlap: Ranges extend approximately 10% below and 7% above the nominal frequency ranges shown below.

FREQUENCY RANGES (MHz)	FREQUENCY RANGES (MHz) (with overlap)
0.5—1	0.45—1.07
1—2	0.90—2.14
2—4	1.80—4.29
4—8	3.60—8.59
8—16	7.19—17.1
16—32	14.4—34.3
32—64	28.8—68.7
64—128	57.5—137
128—256	115—275
256—512	230—550
External Doubler Range	
512—1024	460—1100

DESCRIPTION: The frequency range is verified by using the generator's internal counter to indicate the frequency at the high and low end of each range. The Counter External Sensivitity Test (paragraph 4-31) can be performed to verify the actual existence of a signal at the output for each range.

PROCEDURE: 1. Set Signal Generator controls as follows:

COUNTER . . . . . INT NORM
MODULATION MODE . . . . OFF
FREQUENCY: RANGE . . . 0.5—1 MHz
TUNE . . . . Fully ccw
FINE TUNE. . Approximately centered

2. Note displayed frequency for each FREQUENCY RANGE. Set FREQUENCY TUNE fully cw and repeat. For each FREQUENCY RANGE setting, the frequency should be within the limits shown below.

FREQUENCY RANGES (MHz)	Low End (MHz)	High End (MHz)
0.5—1	_____ 0.45	1.07 _____
1—2	_____ 0.90	2.14 _____
2—4	_____ 1.80	4.29 _____
4—8	_____ 3.60	8.59 _____
8—16	_____ 7.19	17.1 _____
16—32	_____ 14.4	34.3 _____

(continued on next page)

PERFORMANCE TESTS

4-13. FREQUENCY RANGE TEST (Cont'd)

FREQUENCY RANGES (MHz)	Low End (MHz)	High End (MHz)
32–64	28.8	68.7
64–128	57.5	137
128–256	115	275
256–512	230	550
512–1024	460*	1100*
*Actual frequency output is 230 MHz (low end) and 550 MHz (high end)		

4-14. HARMONIC DISTORTION TEST

SPECIFICATION: Harmonics (at 1 volt, +10 dBm output range and below):
0.5 to 512 MHz: >30 dB below carrier (dBc)

DESCRIPTION: Harmonics are measured with a spectrum analyzer as the Signal Generator frequency is tuned from 0.5 to 512 MHz.

EQUIPMENT: Spectrum Analyzer . . . . . HP 8554B/8552B/141T

PROCEDURE:

1. Connect Signal Generator RF OUTPUT to spectrum analyzer input after setting generator controls as follows:

   COUNTER . . . . . INT NORM
   METER . . . . . RF LEVEL
   MODULATION MODE . . . . . OFF
   FREQUENCY: RANGE . . . . 0.5—1 MHz
   TUNE . . . . . 0.5 MHz
   OUTPUT: RANGE Switch . . . +10 dBm
   RANGE Vernier . . . Meter reads +3 dB

2. Set spectrum analyzer input attenuation to 40 dB (use an external attenuator if necessary). Set analyzer resolution bandwidth, frequency span per division, center frequency controls and Signal Generator FREQUENCY RANGE control as listed in the following table. For each FREQUENCY RANGE setting, tune FREQUENCY TUNE across range beginning at high frequency end and note level of harmonics with respect to the fundamental. Harmonics should be within the limits shown.

PERFORMANCE TESTS

4-14. HARMONIC DISTORTION TEST (Cont'd)

Spectrum Analyzer			Sig. Gen.	Harmonics (dB down from fundamental)
Frequency Span per Division (MHz)	Center Frequency (MHz)	Resolution Bandwidth (kHz)	FREQUENCY RANGES (MHz)	
1	0	100	0.5–1	30 _____
2	0	100	1–2	30 _____
5	0	300	2–4	30 _____
10	0	300	4–8	30 _____
10	50	⩾ 300	8–16	30 _____
20	100	⩾ 300	16–32	30 _____
50	250	⩾ 300	32–64	30 _____
100	500	⩾ 300	64–128	30 _____
100	600	⩾ 300	128–256	30 _____
100	700	⩾ 300	256–512	30 _____

4-15. SINGLE SIDEBAND PHASE NOISE TEST

SPECIFICATION: SSB phase noise at 20 kHz offset from carrier:
[averaged rms noise level below carrier (dBc) stated in a 1 Hz bandwidth.]

256 MHz to 512 MHz: >125 dBc from 230 to 450 MHz increasing linearly to >115 dBc at 550 MHz.

0.5 MHz to 256 MHz: Decreases approximately 6 dB for each divided frequency range until it reaches SSB Broadband Noise Floor of > 130 dBc.

DESCRIPTION: Phase noise is measured with a spectrum analyzer. A reference signal generator and a mixer are used to down-convert the test Signal Generator's CW signal to 0 Hz (the two signal generators are phase locked together). Then the spectrum analyzer measures SSB phase noise at a 20 kHz offset from the carrier.

NOTE

This test measures the total SSB phase noise of both generators. Therefore, the reference signal generator must have SSB phase noise that is less than or equal to the specification for the test generator.

PERFORMANCE TESTS

4-15. SINGLE SIDEBAND PHASE NOISE TEST (Cont'd)

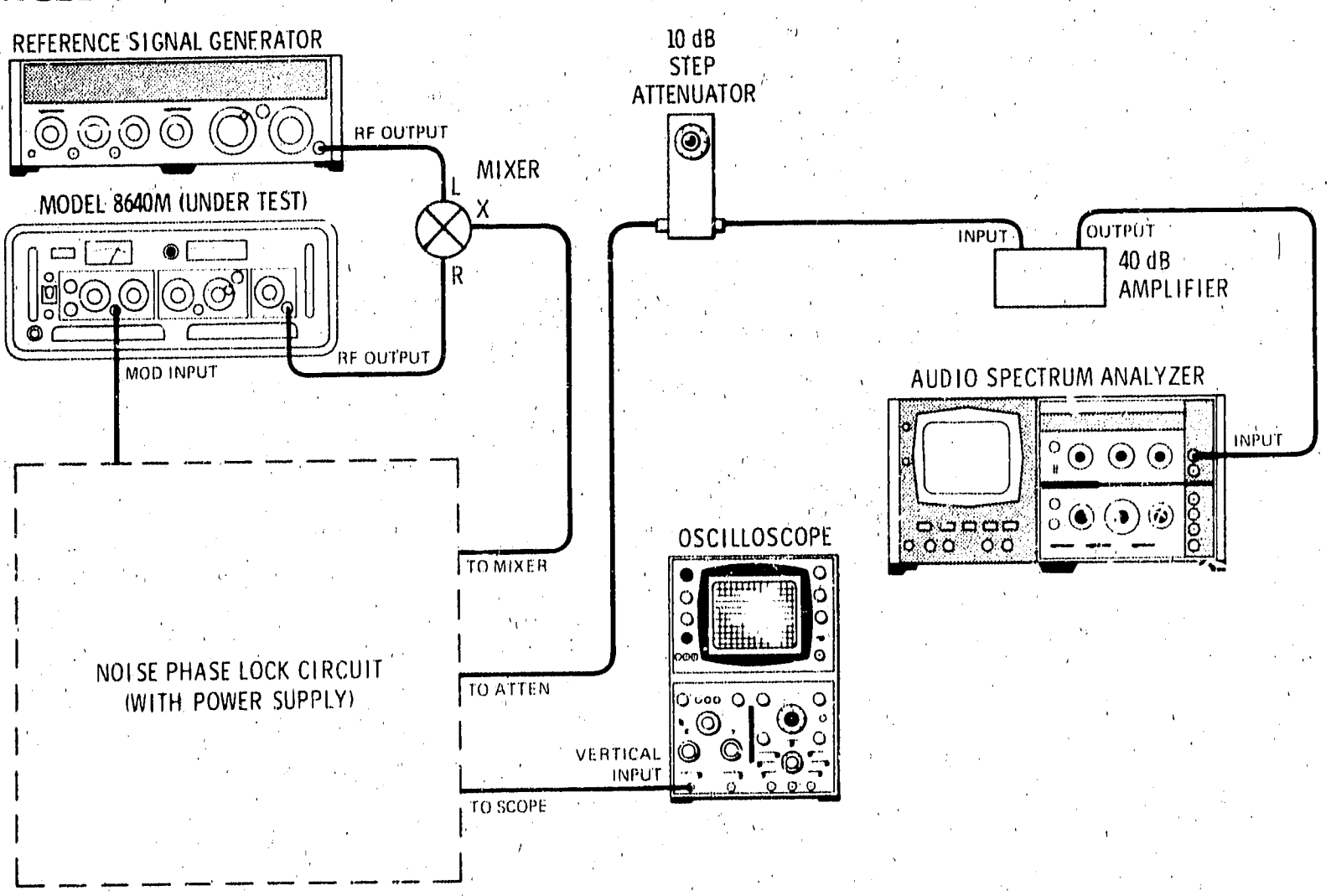


Figure 4-1. Single Sideband Phase Noise Test Setup

EQUIPMENT:

Reference Signal Generator	HP 8640A
Mixer	HP 10514A
10 dB Step Attenuator	HP 355D
40 dB Amplifier	HP 08640-60506
Oscilloscope	HP 180C/1801A/1820C
Spectrum Analyzer	HP 8556A/8552B/141T
Noise Phase Lock Circuit	HP 08640-60504

PROCEDURE:

1. Connect equipment as shown in Figure 4-1 after setting test Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION:	LEVEL	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	5 kHz
FREQUENCY:	RANGE	256—512 MHz
	TUNE	550 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Set analyzer's input level control to —40 dBm, resolution bandwidth to 1 kHz, dBm/dBV control to dBm 50 ohms, span width per division (scan width) to 5 kHz, and center frequency controls to 20 kHz. Set display reference level

PERFORMANCE TESTS

4-15. SINGLE SIDEBAND PHASE NOISE TEST (Cont'd)

to −40 dBm (at 10 dB per division). Using analyzer's 20 kHz markers, measure and note 20 kHz on the display.

3. Set oscilloscope's volts/div control to 0.02 and time/div control to 50 μs; set the input to measure dc. Set 10 dB step attenuator to 80 dB. Set 40 dB amplifier's input impedance switch to 50 ohms.

4. Set reference signal generator for a 549.98 MHz, CW signal at +13 dBm (i.e., 20 kHz below test generator's frequency). Fine adjust its frequency for a 20 kHz signal on analyzer's display. Adjust analyzer's display reference level controls so that the 20 kHz signal is 4.3 dB below the top (reference) graticule line.

NOTE

The correction factors for this measurement are as follows:

a. The DSB to SSB transfer is −6 dB because the mixing process translates two **correlated** *1 kHz BW portions of the noise into the 1 kHz BW of the analyzer − giving twice the effective noise voltage.*

b. +2.5 dB because noise is average detected after logging.[1]

c. −0.8 dB. Effective noise BW is 1.2 x 3 dB BW which gives −0.8 dB −10 log (actual 3 dB BW/nominal 3 dB BW).[1]

Summing of correction factors gives −4.3 dB −10 log (actual 3 dB BW/nominal 3 dB BW) or approximately −4.3 dB ±1 dB.

5. Phase lock the generators by setting test generator's MODULATION MODE switch to FM EXT DC and by tuning reference signal generator to 550 MHz (i.e., for a difference frequency of 0 Hz). Monitor phase lock on oscilloscope, checking that mixer's output is 0 Vdc (if it is not, fine tune reference generator until it is).

6. Set analyzer's display smoothing (video filter) to 10 Hz. Set step attenuator to 0 dB. The top (reference) graticule line on analyzer's display represents 110dB/$\sqrt{\text{Hz}}$ below carrier level (the transfer from a 1 kHz BW to a 1 Hz BW is 30 dB). The average noise level on the display should be >5 dB below top graticule line at 20 kHz (i.e., >115 dB below carrier).

5 dB _____

NOTE

Set oscilloscope to check for possible line-related signals in test setup. They should be <10 mVp-p.

7. Set test Signal Generator to 450 MHz and MODULATION MODE switch to OFF. Set reference signal generator to 449.98 MHz (i.e., 20 kHz below the test generator's frequency). Repeat steps 2 through 6. The average noise level on the display should be >15 dB below top graticule line at 20 kHz (i.e. > 110 dBc).

15 dB _____

[1] See Hewlett-Packard Application Note 150-4, Spectrum Analysis — Noise Measurements.

PERFORMANCE TESTS

4-16. SINGLE SIDEBAND BROADBAND NOISE FLOOR TEST

SPECIFICATION: SSB Broadband Noise Floor at maximum output vernier and greater than 500 kHz offset from carrier: (Averaged rms noise level below carrier stated in a 1 Hz bandwidth.)
0.5 to 512 MHz: >130 dBc.

DESCRIPTION: A spectrum analyzer is used to measure the broadband noise floor (a reference signal generator and a mixer are used to down-convert the test Signal Generator's RF output and noise to within the range of the spectrum analyzer). A reference level is set on the analyzer with a 5 kHz signal, the signal is changed to 500 kHz and removed from the analyzer with a filter, and the broadband noise floor is measured.

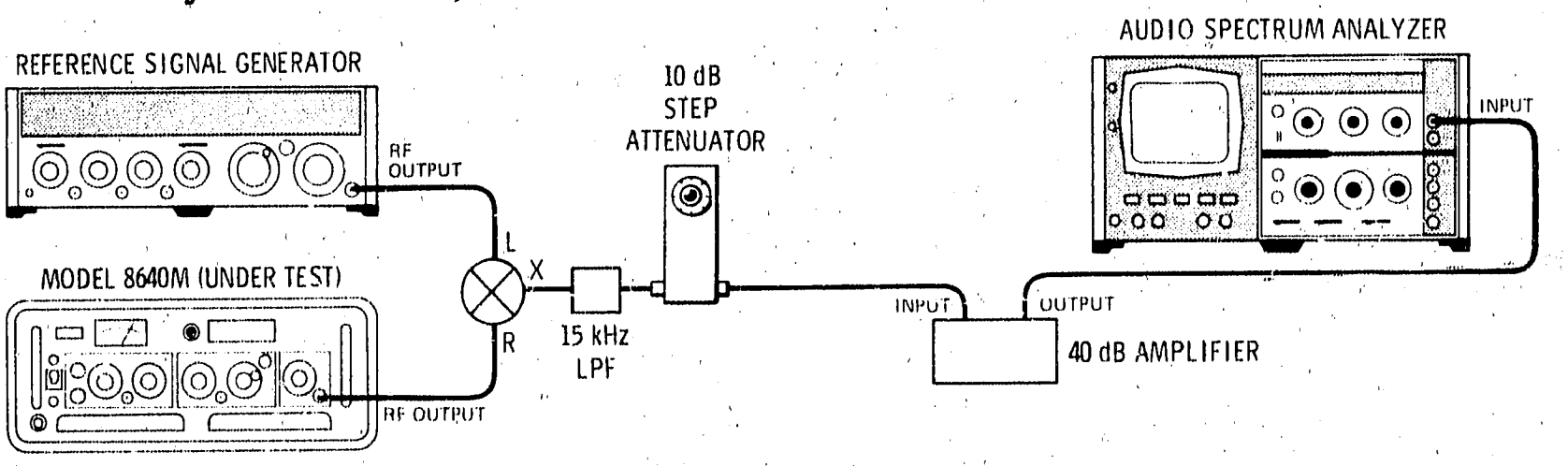


Figure 4-2. Single Sideband Broadband Noise Floor Test Setup

EQUIPMENT:

Reference Signal Generator	HP 8640A
Mixer	HP 10514A
15 kHz Low-Pass Filter	CIR-Q-TEL 7 Pole
10 dB Step Attenuator	HP 355D
40 dB Amplifier	HP 08640-60506
Spectrum Analyzer	HP 8556A/8552B/141T

PROCEDURE:

1. Connect equipment as shown in Figure 4-2 after setting test Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	500.000 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Set 10 dB step attenuator to 80 dB. Set reference signal generator for a 500.005 MHz (i.e., 5 kHz above the test generator's frequency), CW signal at +13 dBm (output vernier maximum cw). Set 40 dB amplifier's input impedance switch to 50 ohms.

3. Set spectrum analyzer's resolution bandwidth to 1 kHz, set input level control to —40 dBm and dBm/dBV to dBm 50 ohms, and adjust frequency controls to set the 5 kHz difference frequency in the center of the display. Set analyzer's display ref-

PERFORMANCE TESTS

4-16. SINGLE SIDEBAND BROADBAND NOISE FLOOR TEST (Cont'd)

erence level controls for 10 dB per division with the 5 kHz difference signal 1.3 dB from the top (reference) graticule line on the display.

NOTE

The correction factors for this measurement are as follows:

a. The DSB to SSB transfer is —3 dB because the mixing process translates two **uncorrelated** *1 kHz BW portions of the noise into the 1 kHz BW of the analyzer — giving $\sqrt{2}$ times the effective noise voltage.*

b. +2.5 dB because noise is average detected aftering logging.[1]

c. —0.8 dB. Effective noise BW is 1.2 x 3 dB BW which gives —0.8 dB —10 log (actual 3 dB BW/nominal 3 dB BW).[1]

Summing the correction factors gives —1.3 dB —10 log (actual 3 dB BW/nominal 3 dB BW) or approximately —1.3 dB ±1 dB.

4. Change reference signal generator's output frequency to 500.50 MHz. Set 10 dB step attenuator to 0 dB. Set analyzer's display smoothing (video filter) to 10 Hz. The top graticule line on analyzer's display represents —110 dB (the transfer from a 1 kHz BW to a 1 Hz BW is 30 dB). The average noise level on the display should be >20 dB below the top graticule line (i.e., >130 dB below carrier).

20 dB _____

NOTE

If the test generator appears to be out of specification, check for excessive noise in the test setup by disconnecting the test generator. The noise level on the analyzer's display should decrease at least 10 dB.

4-17. RESIDUAL AM TEST

SPECIFICATION: **Residual AM** (averaged rms):

Post-Detection Noise Bandwidth	
300 Hz to 3 kHz	**20 Hz to 15 kHz**
>80 dBc, typical	>70 dBc

[1] See Hewlett-Packard Application Note 150-4, Spectrum Analysis — Noise Measurements.

PERFORMANCE TESTS

4-17. RESIDUAL AM TEST (Cont'd)

DESCRIPTION: An rms voltmeter is calibrated with a measured amount of amplitude modulation from the Signal Generator. Then the AM is removed and the generator's residual AM is read directly from the voltmeter. Residual AM is measured only for a 20 Hz to 15 kHz post-detection noise bandwidth since any out-of-tolerance condition for it will also be out of the typical range for a 300 Hz to 3 kHz bandwidth.

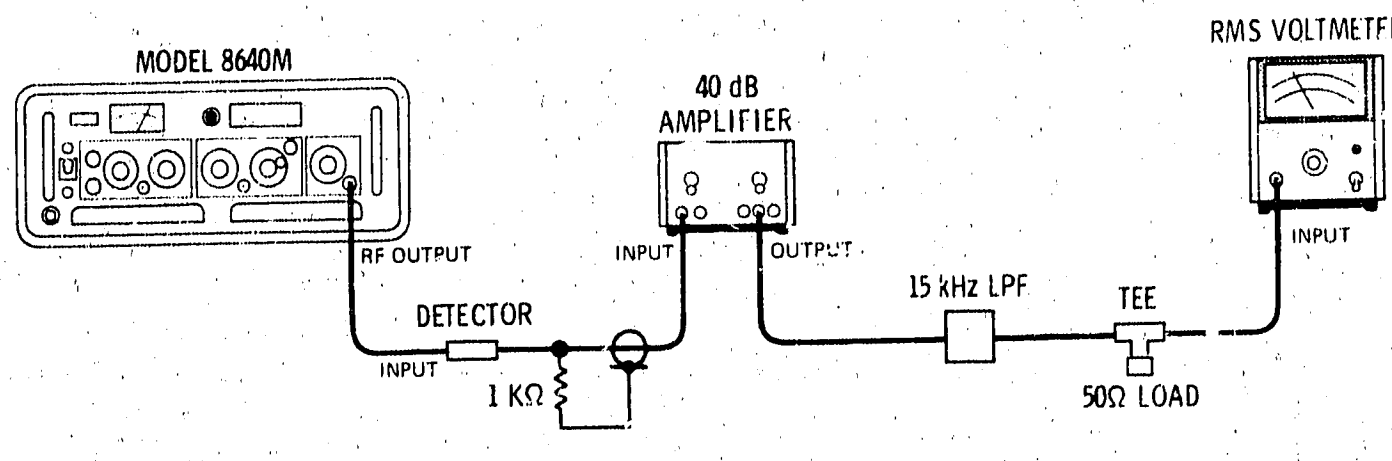


Figure 4-3. Residual AM Test Setup

EQUIPMENT:

RMS Voltmeter	HP 3400A
Crystal Detector	HP 8471A
15 kHz Low-Pass Filter (LPF)	CIR-Q-TEL 7 Pole
40 dB Amplifier	HP 465A
50 Ohm Load	HP 11593A
1 kΩ Resistor	HP 0757-0280

PROCEDURE:

1. Connect equipment as shown in Figure 4-3 (with the generator connected to the rms voltmeter through the detector, amplifier, 15 kHz LPF, and across the 50 ohm load). Set Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully ccw
	MODE	AM INT 1000
FREQUENCY:	RANGE	256—512 MHz
	TUNE	500 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw

2. Slowly turn Signal Generator's MODULATION LEVEL control clockwise until its panel meter indicates 10% AM. Note voltmeter reading in dB.

3. Set generator's MODULATION MODE switch to OFF. Residual AM should read >50 dB below the reference noted in step 2 (i.e., >70 dB down, since the 10% AM, after detection, is 20 dB below the carrier level).

50 dB _____

PERFORMANCE TESTS

4-18. RESIDUAL FM TEST

SPECIFICATION: **Residual FM** (averaged rms):

Post-Detection Noise Bandwidth		
FREQUENCY RANGE (MHz)	CW and up to 1/8 maximum allowable peak deviation	
	300 Hz to 3 kHz	20 Hz to 15 kHz
256 to 512	<5 Hz, Typical	<50 Hz

Note: Residual FM is measured on the 256—512 MHz range and not locked. For lower ranges residual FM decreases by approximately 1/2 for each divided frequency range until limited by the Broadband Noise Floor. This limit for 300 Hz to 3 kHz bandwidth is ≈1 Hz and for 20 Hz to 15 kHz bandwidth is ≈4 Hz.

DESCRIPTION: A frequency meter is used as an FM discriminator to measure FM deviation (a reference signal generator and a mixer are used to down-convert the test Signal Generator's RF output to within the range of the discriminator). The discriminator output is filtered and amplified and then measured with a voltmeter. The voltmeter reading, in mVrms, is proportional to the rms frequency deviation of the residual FM.

NOTE

This test measures the total residual FM of both generators. Therefore, the reference generator must have residual FM that is less than or equal to the specification for the test generator. Residual FM is measured only for a 20 Hz to 15 kHz post-detection noise bandwidth since any out-of-tolerance condition for it will also be out of the typical range for a 300 Hz to 3 kHz bandwidth.

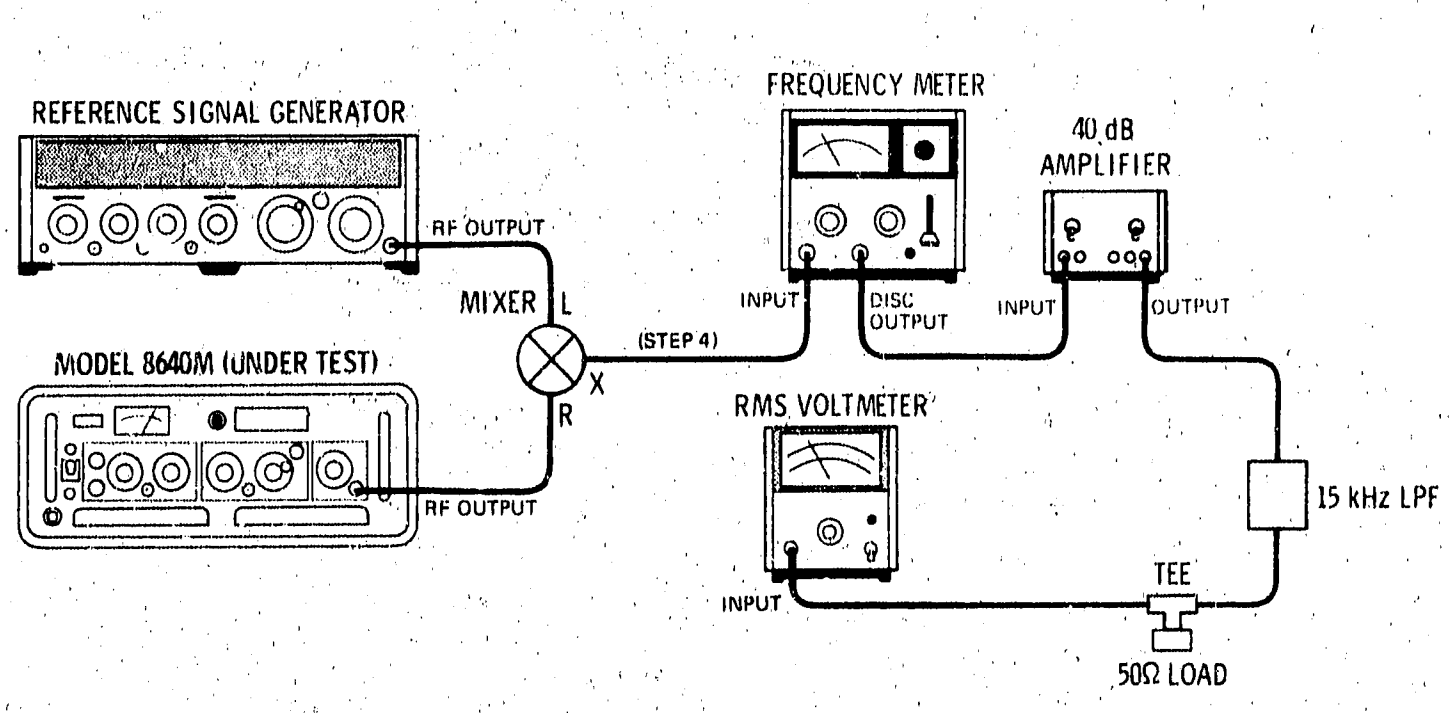


Figure 4-4. Residual FM Test Setup

PERFORMANCE TESTS

4-18. RESIDUAL FM TEST (Cont'd)

EQUIPMENT:

Frequency Meter	HP 5210A
Filter Kit	HP 10531A
RMS Voltmeter	HP 3400A
40 dB Amplifier	HP 465A
Reference Signal Generator	HP 8640A
Mixer	HP 10514A
15 kHz Low-Pass Filter (LPF)	CIR-Q-TEL 7 Pole
50 Ohm Load	HP 11593A

PROCEDURE

1. Connect equipment as shown in Figure 4-4 after setting test Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION:	LEVEL	Fully cw
	MODE	FM EXT AC
	PEAK FM DEVIATION	320 kHz
FREQUENCY:	RANGE	256—512 MHz
	TUNE	500 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Install shorting board in frequency meter and calibrate it for 1 Vdc (at the output jack) for a full-scale meter reading. Remove shorting board, prepare a 20 kHz Butterworth low-pass filter (from filter kit), and install filter in frequency meter.

3. Set reference signal generator for a 500.10 MHz, CW signal at +13 dBm.

4. Connect frequency meter to mixer. Set frequency meter's range to 100 kHz and sensitivity to 0.01 Vrms. Fine tune either generator for a full-scale meter reading on frequency meter.

5. Connect amplifier to discriminator output. Connect voltmeter through 15 kHz L[illegible] o amplifier's output. The signal out of the amplifier is 0.5 mVrms per 1 Hz (rms) of residual FM deviation, and the average voltmeter reading should be less than 25 mVrms (i.e., < 50 Hz (rms) residual FM).

_____ 25 mVrms

NOTE

Test setup calibration can be checked by setting the test generator's MODULATION MODE switch to FM INT 1000 and PEAK FM DEVIATION to 5 kHz (as read on panel meter with METER set to MOD). The voltmeter should read 1.77 Vrms.

PERFORMANCE TESTS

4-19. OUTPUT LEVEL ACCURACY TEST

SPECIFICATION: **Range:** 10 dB steps and 18 dB vernier provide output power settings from +18 to −145 dBm (1.8V to 0.013 μV) into 50Ω.

Level Accuracy (total accuracy as indicated on level meter):

FREQUENCY RANGE (MHz)	Output Level (dBm)			
	Using Top 10 dB of Vernier Range			Using Full Vernier Range
	+13 to −7	−7 to −47	−47 to −137	+18 to −145
0.5–512	±2.0 dB	±2.5 dB	±3.0 dB	Add ±0.5 dB

DESCRIPTION: The RF level accuracy for the upper four OUTPUT RANGE attenutor settings is measured with a power meter. For the lower ranges, a reference signal is established on a spectrum analyzer display, the Signal Generator's OUTPUT RANGE switch and the spectrum analyzer's vertical scale log reference level control are stepped together, and any amplitude variations are measured on the analyzer's display. An RF attenuator and amplifier at the RF OUTPUT are adjusted for analyzer compatibiltiy and best sensitivity.

This procedure uses an IF substitution technique in which the spectrum analyzer's IF is the standard. The IF step accuracy should be within ±0.2 dB overall. The IF step accuracy can be checked using the above technique by comparing a lab calibrated attenuator (such as HP Model 355D Option H36) with the IF step control at the frequency of attenuator calibration (e.g., 3 MHz for the HP 355D Option H36).

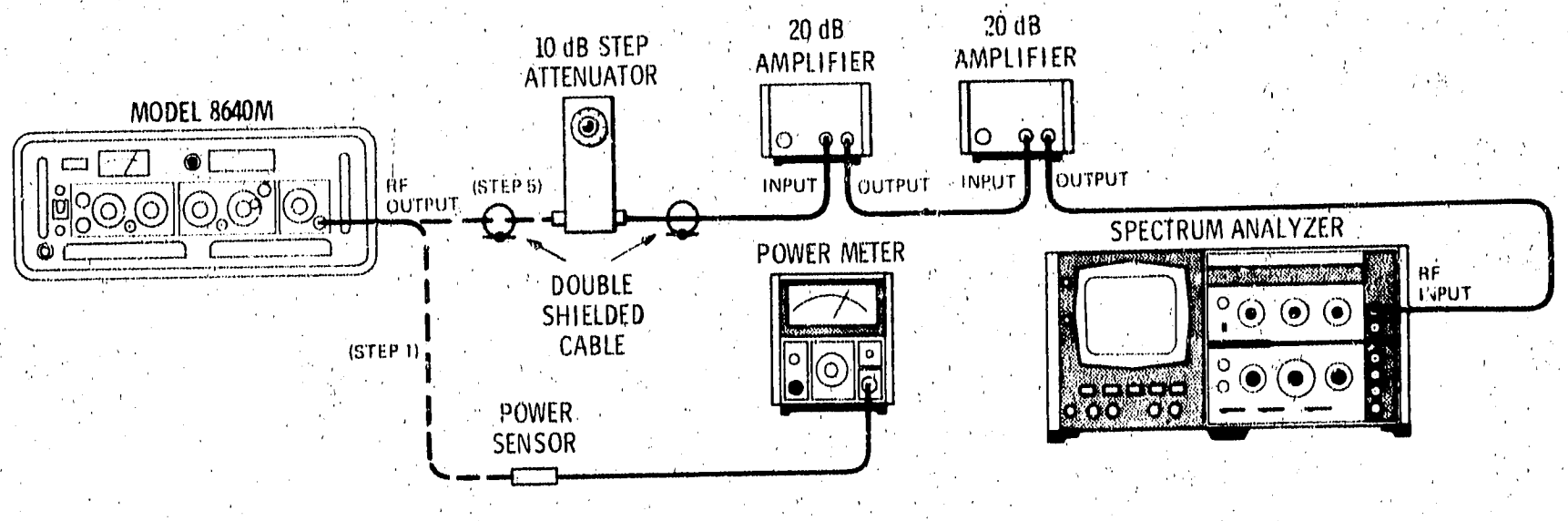


Figure 4-5. Output Level Accuracy Test Setup

EQUIPMENT:

Spectrum Analyzer	HP 8554B/8552B/141T
Power Meter	HP 435A
Power Sensor	HP 8482A
20 dB Amplifier (2 required)	HP 8447A
10 dB Step Attenuator	HP 355D
Double Shielded Cable (2 required)	HP 08708-6033

PERFORMANCE TESTS

4-19. OUTPUT LEVEL ACCURACY TEST (Cont'd)

PROCEDURE: 1. Connect equipment as shown in Figure 4-5 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	512 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Meter reads +3 dB

2. Set power meter's controls so that it can measure +13 dBm. Connect power sensor to Signal Generator's RF OUTPUT.

3. Set Signal Generator's OUTPUT RANGE controls for levels (using generator's panel meter) shown in the table below; verify that the level on the power meter is within the specified tolerance.

Signal Generator		Power Meter Reading (dBm)
OUTPUT RANGE Switch (dBm)	Panel Meter Indication (dB)	
+10	+3	+11.0 _____ +15.0
	−2	+6.0 _____ +10.0
	−7	+1.0 _____ + 5.0
	−10	−2.5 _____ + 2.5
0	+3	+1.0 _____ + 5.0
−10	+3	−9.5 _____ − 4.5

4. Set step attenuator to 70 dB. Set spectrum analyzer center frequency to 512 MHz, resolution bandwidth to 1 kHz, frequency span per division (scan width) to 0.5 kHz, input attenuation to 0 dB, tuning stabilizer on, display smoothing (video filter) to 100 Hz, and vertical log display to 2 dB per division with a −20 dBm reference level.

5. Connect attenuator to generator's RF OUTPUT without disturbing generator's controls. Center signal on analyzer's display. Consider the center horizontal graticule line equivalent to −7 dBm (with a panel meter reading of +3 dB), then with the vertical scale reference vernier control set the signal peak to be equal to the last level measured on the power meter.

NOTE

If, for example, the last power meter reading was −7.4 dBm, the vertical scale resolution is 2 dB/division, therefore, the signal peak should be 0.4 dB or 0.2 division below the center (reference) graticule line.

PERFORMANCE TESTS

4-19. OUTPUT LEVEL ACCURACY TEST (Cont'd)

6. Step Signal Generator's OUTPUT RANGE switch and analyzer's vertical scale log reference level control switch as shown in the following table. Verify that the amplitude falls within the specified tolerance. If necessary, use generator's OUTPUT RANGE vernier to reset panel meter +3 dB.

Signal Generator	Spectrum Analyzer	
OUTPUT RANGE Switch (dBm)	**Log Reference Level Control (dBm)**	**Display Amplitude (dB)**
		Set Level
−10	−20	−2.5 _____ +2.5
−20	−30	−2.5 _____ +2.5
−30	−40	−2.5 _____ +2.5
−40	−50	

7. Set analyzer's vertical scale log reference level to −10 dBm and reset the 10 dB step attenuator to 30 dB. With the vertical scale log reference vernier, set the signal peak to the same level, with respect to the horizontal center (reference) graticule line, as the last measurement recorded on the preceding table.

NOTE

If generator appears to be out of specification, check accuracy of spectrum analyzer's vertical scale calibration.

8. Step Signal Generator's OUTPUT RANGE switch and analyzer's vertical scale log reference level control switch as shown in the following table. Verify that the amplitude is within the specified tolerance. If necessary, use generator's OUTPUT RANGE vernier to reset panel meter to +3 dB.

Signal Generator	Spectrum Analyzer	
OUTPUT RANGE Switch (dBm)	**Log Reference Level Control (dBm)**	**Display Amplitude (dB)**
		Set Level
−40	−10	−3.0 _____ +3.0
−50	−20	−3.0 _____ +3.0
−60	−30	−3.0 _____ +3.0
−70	−40	−3.0 _____ +3.0
−80	−50	

9. Set step attenuator to 0 dB; set spectrum analyzer's vertical scale log reference level to −20 dBm. Adjust vertical scale log reference vernier to give the same level, with respect to the center (reference) graticule line, as the last recorded entry on the previous table.

PERFORMANCE TESTS

4-19. OUTPUT LEVEL ACCURACY TEST (Cont'd)

10. Set Signal Generator and analyzer controls as shown in the following table. The amplitude levels should be within the specified tolerances. If necessary, use generator's OUTPUT RANGE vernier to reset panel meter to +3 dB.

Signal Generator	Spectrum Analyzer	
OUTPUT RANGE Switch (dBm)	Log Reference Level Control (dBm)	Display Amplitude (dB)
−80	−20	Set Level
−90	−30	−3.0 _____ +3.0
−100	−40	−3.0 _____ +3.0
−110	−50	−3.0 _____ +3.0
−120	−60	−3.0 _____ +3.0

11. Set analyzer's display to 10 dB/division log. Adjust log reference level vernier to set signal to −10 dB graticule line (one major division from top of display) plus last recorded entry on previous table.

NOTE

If the following step appears to be out of specification, check the accuracy of the analyzer's display with an external, calibrated attenuator.

12. Set generator's OUTPUT RANGE switch to −130 dBm (adjust vernier for +3 dB indication on panel meter). The amplitude level indicated on analyzer's display should be within ±3.0 dB of the −20 dB graticule line (second major division from top of display).

−23.0 _____ −17.0 dB

NOTE

The noise level on the analyzer's display should be >10 dB below the signal level. The signal should drop into the noise when the OUTPUT RANGE vernier is turned fully ccw.

4-20. OUTPUT LEVEL FLATNESS TEST

SPECIFICATION: **Level Flatness:** <+0.75 dB to −1.25 dB from 0.5 to 512 MHz referred to output at 50 MHz (flatness applies from +13 to −7 dBm and for top 10 dB of vernier range).

DESCRIPTION: Output flatness across each frequency range is measured with a power meter.

EQUIPMENT:

Power Meter	HP 435A
Power Sensor	HP 8482A

NOTE

The power sensor's SWR should be <1.2:1.

PERFORMANCE TESTS

4-20. OUTPUT LEVEL FLATNESS TEST (Cont'd)

PROCEDURE: 1. Connect power sensor to generator's RF OUTPUT after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	32—64 MHz
	TUNE	50 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Meter reads —1 dB

2. Adjust OUTPUT RANGE vernier for a power meter reading of +9 dBm at 50 MHz. Using FREQUENCY RANGE TUNE controls, slowly tune Signal Generator from 512 MHz to 0.5 MHz. On each range, note maximum and minimum power meter readings in dBm. The overall maximum reading and the overall minimum reading should both be between +7.75 and +9.75 dBm.

4-21. OUTPUT LEAKAGE TEST

SPECIFICATION: **Leakage** (with all unused outputs terminated properly): Leakage limits are below those specified in MIL-I-6181D. Furthermore, less than 3 μV is induced in a 2-turn, 1-inch diameter loop 1 inch away from any surface and measured into a 50Ω receiver.

DESCRIPTION: A loop antenna is held one inch from all surfaces of the Signal Generator and any leakage monitored with a spectrum analyzer. The loop antenna is suspended in a molding so that when the molding is in contact with a surface, the loop antenna is one inch from the surface.

NOTES

The use of a screen room may be necessary to reduce external radiated interference.

To avoid disturbing antenna's field and causing measurement error, grasp antenna at the end that has the BNC connector.

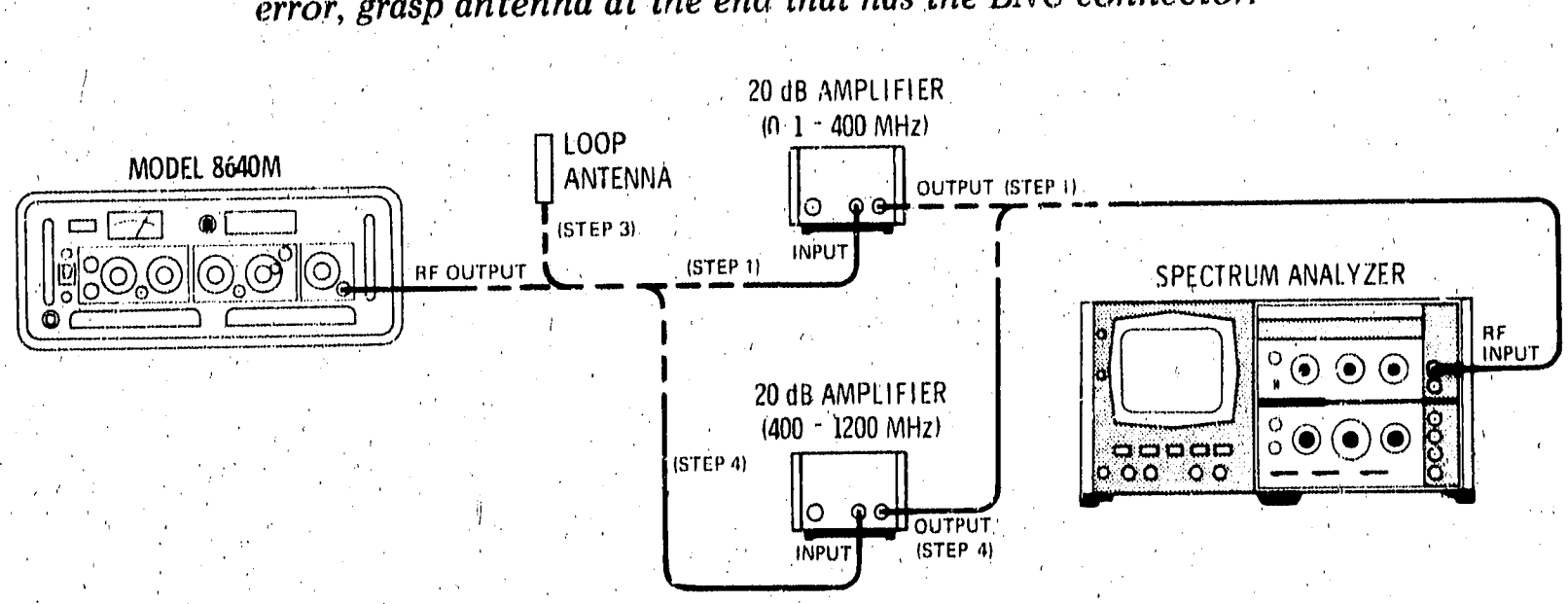


Figure 4-6. Output Leakage Test Setup

PERFORMANCE TESTS

4-21. OUTPUT LEAKAGE TEST (Cont'd)

EQUIPMENT:

One-Inch Loop Antenna	HP 08640-60501
20 dB Amplifier (0.5—400 MHz)	HP 8447A
20 dB Amplifier (400—1200 MHz)	HP 8447B
Spectrum Analyzer	HP 8554B/8552B/141T

PROCEDURE:

1. Connect equipment as shown in Figure 4-6 (with Signal Generator connected to spectrum analyzer through 0.5—400 MHz amplifier) after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	64—128 MHz
	TUNE	100 MHz
OUTPUT:	RANGE Switch	—100 dBm
	RANGE Vernier	Meter reads +3 dB

2. Set spectrum analyzer's resolution bandwidth to 30 kHz, input attenuation to 0 dB, frequency span per division (scan width) to 50 kHz, scale to log (10 dB per division), scale reference level controls to —50 dBm, and scale center frequency controls to 100 MHz. Calibrate the analyzer by using the scale reference level controls to set the —97 dBm (3 μV) signal from the generator to the —40 dB graticule line on the display. Disconnect generator from analyzer. Install caps on COUTER INPUT and MOD INPUT/OUTPUT. (Internal rear panel AUX RF OUTPUT cap assumed to be installed.)

3. Connect one-inch loop antenna to analyzer through 0.5—400 MHz amplifier. Set analyzer frequency span to 20 MHz per division. Hold end of loop antenna cylinder in contact with all surfaces of Signal Generator. Repeat the test for a 300 MHz center frequency. All signals and noise should be below the —40 dB graticule line on analyzer's display (below 3 μV) from 0.5 to 400 MHz.

_____ —40 dB

4. Replace 0.5—400 MHz amplifier with 400—1200 MHz amplifier. Set analyzer's center frequency controls to 500 MHz; set generator's FREQUENCY RANGE control to 256—512 MHz and FREQUENCY TUNE control to 500 MHz, and connect generator to analyzer and calibrate analyzer as specified in step 2. Then reconnect loop antenna to analyzer and hold end of loop antenna cylinder in contact with all surfaces of generator. Repeat the test for center frequencies of 700, 800, and 1100 MHz. All signals and noise should be below the —40 dB graticule line on analyzer's display from 400 to 1200 MHz.

_____ —40 dB

PERFORMANCE TESTS

4-22. MODULATION OSCILLATOR FREQUENCY ACCURACY TEST

SPECIFICATION: **Sine Wave:** Frequency: Fixed 400 Hz, 1 kHz, 5 kHz ±5%.
Pulse: Rate: 50 to 5000 pps.

DESCRIPTION: The frequency of the sine wave and pulse modulation oscillators is measured with an external counter.

EQUIPMENT: Frequency Counter . . . . . HP 5327C

PROCEDURE:

1. Connect high impedance input of counter to MOD OUTPUT jack.

2. Set Signal Generator's MODULATION MODE switch as shown. Counter should read within ±5% of frequency setting.

MODULATION MODE Switch	Frequency Limits (Hz)
INT AM 400	380 _____ 420
INT AM 1000	950 _____ 1050
INT AM 5000	4750 _____ 5250

3. Set MODULATION MODE switch to PULSE INT. Set PULSE RATE fully cw. Counter should read 5000 Hz or greater.

5000 Hz _____

4. Set PULSE RATE fully ccw. Counter should read 50 Hz or less.

_____ 50 Hz

4-23. AM BANDWIDTH TEST

SPECIFICATION: AM 3-dB Bandwidth:

FREQUENCY RANGES (MHz)	0 to 50% AM	50 to 90% AM
0.5—2	20 kHz	12.5 kHz
2—8	40 kHz	25 kHz
8—512	60 kHz	50 kHz

DESCRIPTION: The Signal Generator is externally amplitude modulated by a test oscillator. The AM is demodulated with a spectrum analyzer in a zero span mode. The demodulated AM, available at the analyzer's vertical output, is measured with a distortion analyzer which is used as an adjustable voltmeter. As the test oscillator frequency is increased, the decrease in AM depth is noted.

PERFORMANCE TESTS

4-23. AM BANDWIDTH TEST (Cont'd)

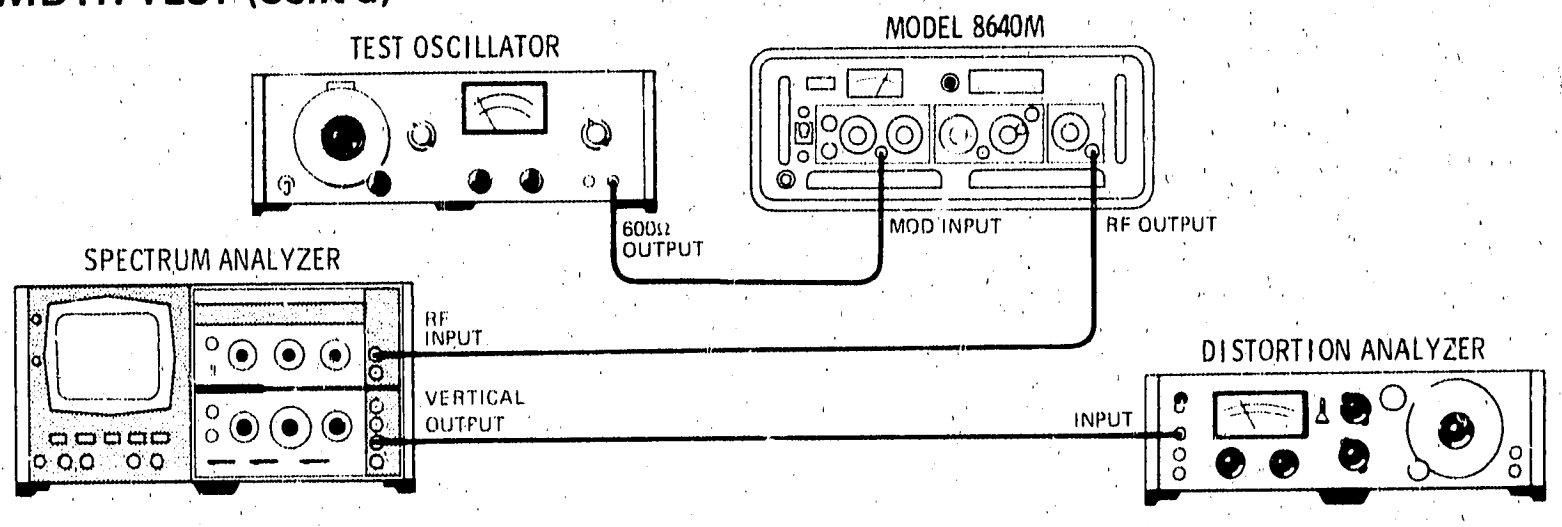


Figure 4-7. AM Bandwidth Test Setup

EQUIPMENT:

Spectrum Analyzer	HP 8554B/8552B/141T
Distortion Analyzer	HP 331A
Test Oscillator	HP 651B

PROCEDURE:

1. Connect equipment as shown in Figure 4-7 after setting Signal Generator as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully ccw
	MODE	AM EXT AC
FREQUENCY:	RANGE	1—2 MHz
	TUNE	2 MHz
OUTPUT:	RANGE Switch	—40 dBm
	RANGE Vernier	Fully cw

2. Set spectrum analyzer resolution bandwidth to 300 kHz or greater, input attenuation to 0 dB, vertical scale to linear, display smoothing (video filter) to minimum (off), and adjust center frequency controls to center 2 MHz signal on display. Set frequency span to 0; fine adjust frequency controls to peak signal on display. Adjust vertical reference level controls to bring signal level to approximately fourth graticule line from bottom of display.

3. Set test oscillator to 1 kHz and 1 Vrms into 600Ω.

4. Increase MODULATION LEVEL until panel meter indicates 50% AM. Set distortion analyzer to set level position and adjust set level control for an indication of 0 dB. Increase test oscillator frequency to 20 kHz. Distoriton analyzer should indicate a level of within 3 dB.

_____3 dB

5. Set test oscillator back to 1 kHz. Increase MODULATION LEVEL for 90% AM. Re-adjust distortion analyzer's set level for 0 dB. Increase test oscillator frequency to 12.5 kHz. Distortion analyzer should indicate a level of within 3 dB.

_____3 dB

PERFORMANCE TESTS

4-23. AM BANDWIDTH TEST (Cont'd)

6. Repeat steps 2 through 5 with the Signal Generator set to the frequencies given below. The distortion analyzer should indicate a level of within ±3 dB for the test oscillator frequencies indication.

Signal Generator		Test Oscillator Frequency	
FREQUENCY RANGES (MHz)	FREQUENCY TUNE (MHz)	for 50% AM (kHz)	for 90% AM (kHz)
4–8	8	40	25
8–16	16	60	50

4-24. AM DISTORTION TEST

SPECIFICATION: **AM Distortion** (at 1 kHz rate):
0 to 70% AM: <5%
70 to 95% AM: <10%

DESCRIPTION: The Signal Generator is amplitude modulated by the internal modulation oscillator. The AM is demodulated by a spectrum analyzer in a zero span mode and percent of AM is set; a distortion analyzer is connected to the analyzer's vertical output and used to measure AM distortion.

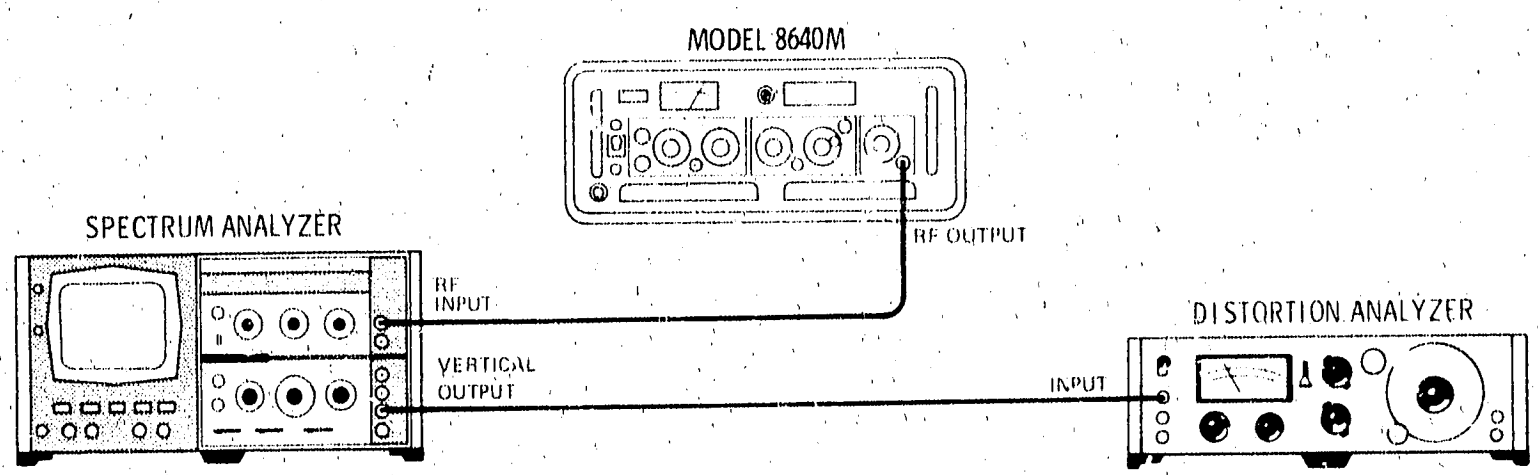


Figure 4-8. AM Distortion Test Setup

EQUIPMENT:

Spectrum Analyzer	HP 3554B/8552B/141T
Distortion Analyzer	HP 331A

PROCEDURE:

1. Connect equipment as shown in Figure 4-8 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully ccw
	MODE	OFF

PERFORMANCE TESTS

4-24. AM DISTORTION TEST (Cont'd)

FREQUENCY:	RANGE	256—512 MHz
	TUNE	512 MHz
OUTPUT:	RANGE Switch	—40 dBm
	RANGE Vernier	Fully cw

2. Set spectrum analyzer's resolution bandwidth to 300 kHz or greater, input attenuation to 0 dB, vertical scale to linear, display smoothing (video filter) to 10 kHz, and adjust center frequency controls to center 512 MHz signal on display. Set frequency span to 0; fine adjust frequency controls to peak signal on display. Adjust vertical reference level controls to bring signal level to approximately fourth graticule line from bottom of display.

3. Set generator's MODULATION MODE switch to AM INT 1000 and adjust MODULATION LEVEL control for 70% AM as read on panel meter.

4. Calibrate distortion analyzer and measure distortion. Distortion should be less than 5%.

_____ 5%

5. Increase AM to 95%. Calibrate distortion analyzer and measure distortion. Distortion should be less than 10%.

_____ 10%

6. Increase OUTPUT RANGE switch to —30 dBm and reduce OUTPUT RANGE vernier 10 dB (panel meter should read —7 dB in RF LEVEL). Repeat steps 2 thru 5.

70% AM _____ 5%

95% AM _____ 10%

4-25. INDICATED AM ACCURACY TEST

SPECIFICATION: **Indicated AM Accuracy** (1 kHz rate using internal meter): ±(7.5% of reading + 1.5% of full scale).

DESCRIPTION: The Signal Generator is internally amplitude modulated. The AM is demodulated by a spectrum analyzer in a zero span mode. The AM depth is measured directly on the display and is compared with the panel meter reading.

EQUIPMENT:

Spectrum Analyzer	HP 8554B/8552B/141T

PROCEDURE:

1. Connect Signal Generator RF OUTPUT to spectrum analyzer input after setting generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully ccw
	MODE	AM INT 1000
FREQUENCY:	RANGE	256—512 MHz
	TUNE	512 MHz
OUPTUT:	RANGE Switch	—40 dBm
	RANGE Vernier	Fully cw

PERFORMANCE TESTS

4-25. INDICATED AM ACCURACY TEST (Cont'd)

2. Set analyzer controls to display the 512 MHz signal with 300 kHz or greater resolution bandwidth, 0 dB input attenuation, linear vertical scale, 5 to 20 kHz of display smoothing, and zero frequency span width. Check that the signal is peaked on the display and adjust the vertical sensitivity for 4 divisions of deflection. (Also ensure that the base line is at the bottom line of the display with no signal applied.)

3. Adjust generator's MODULATION LEVEL until demodulated signal spans the second and sixth graticule lines from the bottom of the display. Panel meter should read between 44.75 and 55.25% (i.e., 50% ± (0.075 x 50% + 1.5%) = 50% ± 5.25%).

44.75% _____ 55.25%

4-26. FM BANDWIDTH TEST

SPECIFICATON: **FM 3-dB Bandwidth:**
Internal and external ac; 20 Hz to 250 kHz.
External dc; dc to 250 kHz.

DESCRIPTION: An audio spectrum analyzer is used to measure the 3-dB bandwidth. The analyzer is set to sweep over the specified audio frequency range and its tracking generator output is used to frequency modulate the Signal Generator. The generator's RF output is demodulated with a frequency meter. The demodulated signal is fed to the analyzer's input and any amplitude variation is measured on the analyzer's display. Bandwidth is checked at maximum deviation on the 8—16 MHz range.

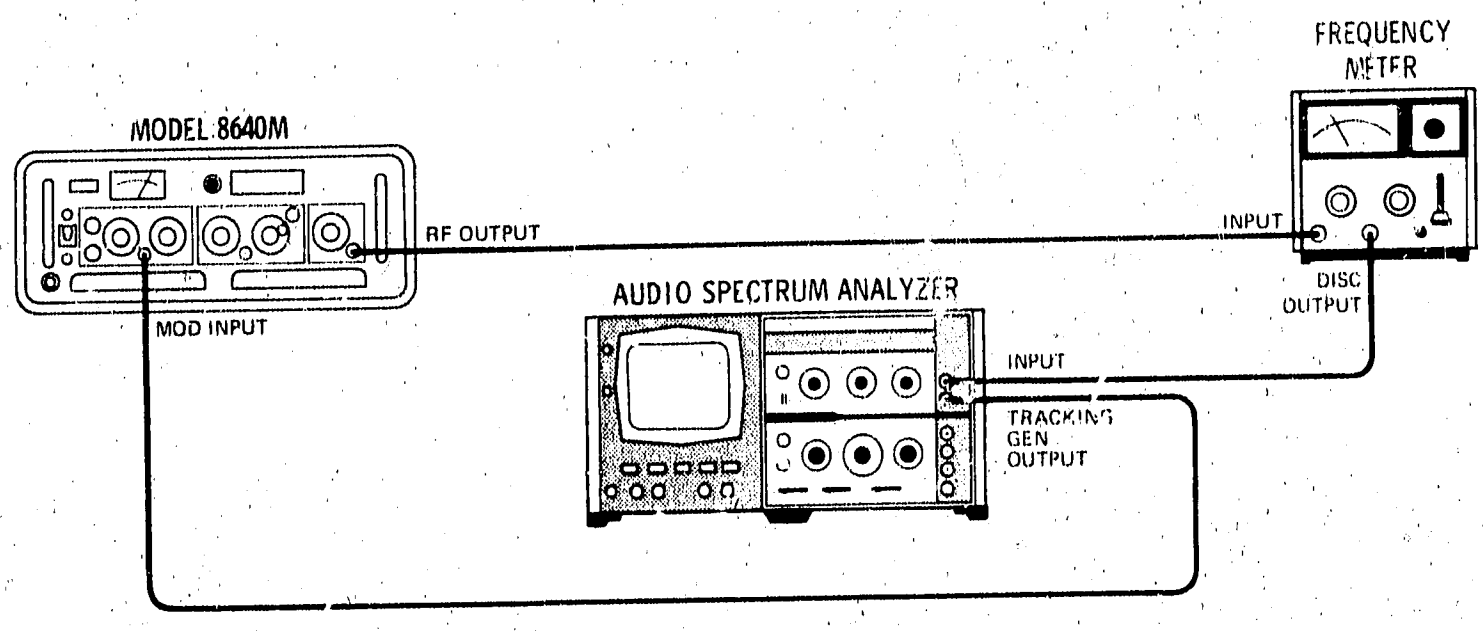


Figure 4-9. FM Bandwidth Test Setup

EQUIPMENT:

Audio Spectrum Analyzer	HP 8556A/8552B/141T
Frequency Meter	HP 5210A
Filter Kit (for Frequency Meter)	HP 10531A

PROCEDURE:

1. Connect equipment as shown in Figure 4-9 after setting Signal Generator's controls as follows:

COUNTER	INT NORM
METER	MOD

PERFORMANCE TESTS

4-26. FM BANDWIDTH TEST (Cont'd)

MODULATION:	LEVEL	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	80 kHz
FREQUENCY:	RANGE	8—16 MHz
	TUNE	8 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw

2. Prepare a 1 MHz Butterworth low-pass filter and install it in the frequency meter. Set frequency meter's range to 10 MHz and input sensitivity to 1V.

3. Set Signal Generator's MODULATION MODE switch to FM EXT AC. Set spectrum analyzer's resolution bandwidth to 3 kHz and its center frequency controls to 1 kHz (with no sweep). Set analyzer's tracking generator output level for 80 kHz peak deviation as read on generator's panel meter. Set the analyzer's frequency controls for a 0 to 250 kHz sweep. Set the analyzer's display for 2 dB per division; adjust the display reference level controls to display the demodulated sweep.

4. Measure the sweep on the analyzer's display. Total amplitude variation from 20 Hz to 250 kHz should be ±3 dB.

−3 dB _____ +3 dB

NOTE

If the frequency meter's incidental AM rejection is insufficient, the generator could appear to be out of specification. To check the frequency meter, note analyzer's reading (in dBm), set generator's MODULATION MODE switch to AM EXT AC and connect analyzer's tracking generator output to MOD INPUT. Set MODULATION LEVEL for 10% as read on panel meter. The analyzer should read >30 dB below the reading noted above. If it does not, adjust frequency meter sensitivity and trigger level (or generator's OUTPUT RANGE vernier) until it does. Then repeat steps 2 through 4.

4-27. FM DISTORTION TEST

SPECIFICATION: **FM Distortion** (at 400 and 1 kHz rates):
< 1.5% for deviations up to 1/8 maximum allowable.
< 5% for deviations up to maximum allowable.

DESCRIPTION: The Signal Generator is modulated with a 1 kHz signal. The generator's RF output is then demodulated with a frequency meter and the distortion on the frequency meter output is measured with a spectrum analyzer.

PERFORMANCE TESTS

4-27. FM DISTORTION TEST (Cont'd)

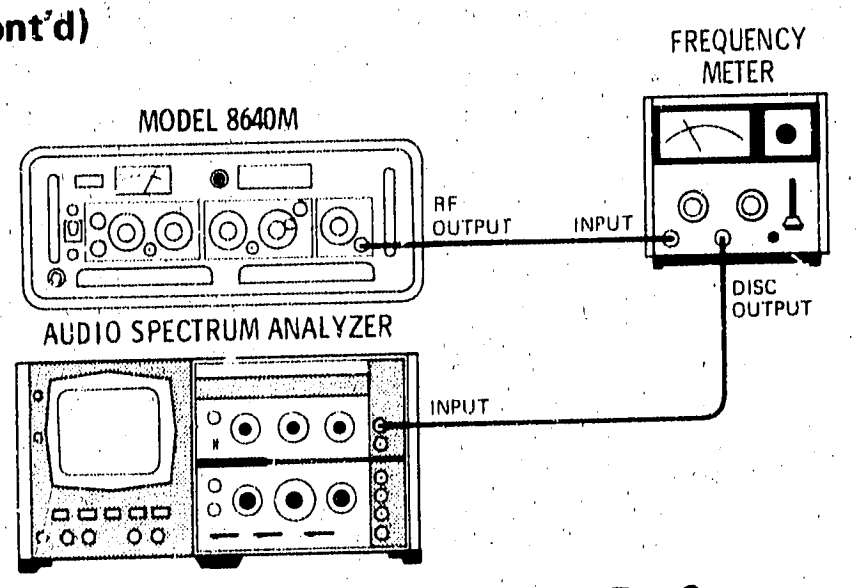


Figure 4-10. FM Distortion Test Setup

EQUIPMENT:

Frequency Meter	HP 5210A
Filter Kit (for Frequency Meter)	HP 10531A
Audio Spectrum Analyzer	HP 8556A/8552B/141T

PROCEDURE:

1. Connect equipment as shown in Figure 4-10 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully cw
	MODE	FM INT 1000
	PEAK FM DEVIATION	80 kHz
FREQUENCY:	RANGE	8—16 MHz
	TUNE	8 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw

2. Using the filter kit, prepare a 1 MHz Butterworth low-pass filter and install it in the frequency meter.

3. Set frequency meter's range to 10 MHz and sensitivity to 1V.

4. Set spectrum analyzer's resolution bandwidth to 100 Hz and its center frequency controls for a 0 to 5 kHz span. Set the display for 10 dB per division.

5. Use generator's MODULATION LEVEL control to set 80 kHz of peak deviation (as read on panel meter). Use analyzer's display reference level controls to set the demodulated 1 kHz signal to the top (reference) graticule line on the display.

6. Note the level of the 1 kHz signal's harmonics (2 kHz, 3 kHz, etc.). For less than 5% distortion, they should be more than 26 dB below the reference graticule line.

   26 dB _____

7. Set generator's PEAK FM DEVIATION switch to 10 kHz. If necessar , use generator's MODULATION LEVEL control to set 10 kHz of peak deviation; use analyzer's display reference level controls to set the demodulated 1 kHz signal to the reference graticule line.

PERFORMANCE TESTS

4-27. FM DISTORTION TEST (Cont'd)

8. For less than 1.5% distortion, the 1 kHz signal's harmonics should be more than 36.5 dB below the reference graticule line.

36.5 dB _____

4-28. INDICATED FM ACCURACY TEST

SPECIFICATION: **Indicated FM Accuracy** (1 kHz rate using internal meter):
Excluding maximum peak deviation position: ±(12% of reading + 1.5% of full scale).

DESCRIPTION: The Signal Generator's indicated FM accuracy is checked using the carrier (Bessel) null technique. An externally applied 2.079 kHz signal is used to FM the generator. The modulation signal's amplitude is adjusted for the first order null of the carrier and the panel meter reading noted. (For the first order null of the carrier, peak deviation equals 2.405 times the 2.079 MHz modulation rate or 5 kHz deviation.) The reference generator and mixer convert the signal into the range of the spectrum analyzer.

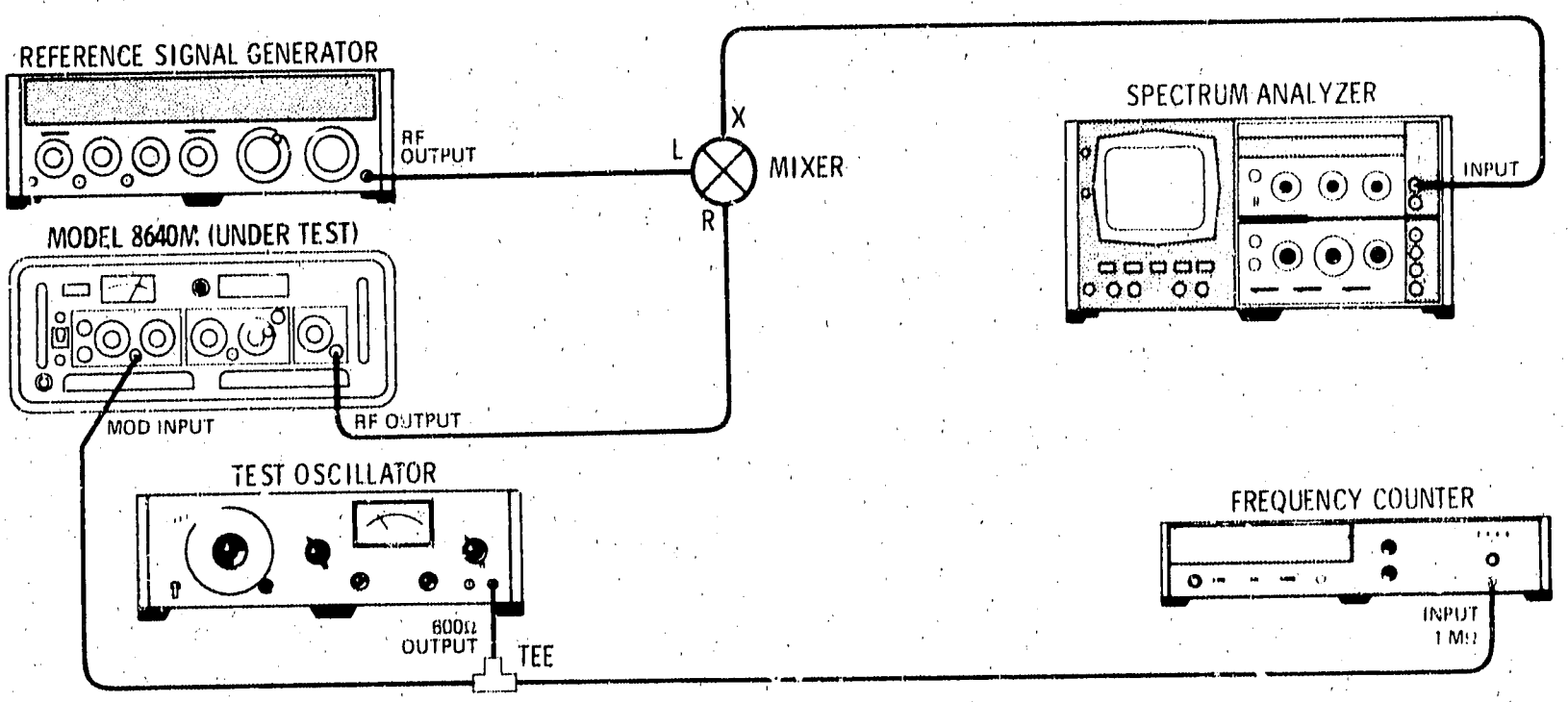


Figure 4-11. Indicated FM Accuracy Test Setup

NOTE

The reference signal generator should have frequency drift and residual FM specifications equal to the Model 8640A.

EQUIPMENT:

Test Oscillator	HP 651B
Frequency Counter	HP 5327C
Spectrum Analyzer	HP 8554B/8552B/141T
Reference Signal Generator	HP 8640A
Mixer	HP 10514A

PERFORMANCE TESTS

4-28. INDICATED FM ACCURACY TEST (Cont'd)

PROCEDURE: 1. Connect equipment as shown in Figure 4-11 (with test Signal Generator connected to mixer, and mixer connected to analyzer) after setting test generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	5 kHz
FREQUENCY:	RANGE	256—512 MHz
	TUNE	512 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Set reference signal generator for a 513 MHz, CW signal at +13 dBm.

3. Set spectrum analyzer's center frequency controls to 1 MHz, input attenuation to 20 dB, resolution bandwidth to 0.1 kHz, span width per division (scan width) to 1 kHz, and set display to 10 dB per division. Set reference level controls to put peak of the signal at top (log reference) graticule line on the display.

4. Set test oscillator for approximately 0.7 Vrms signal at 2.079 kHz. Set test generator's MODULATION MODE switch to FM EXT AC and fine adjust test oscillator's amplitude for the first carrier null on analyzer's display (at least 50 dB below the top graticule line). The panel meter should read between 4.3 and 5.7 kHz (i.e., 5 kHz ± 13.5%).

4.3 _____ 5.7 kHz

5. Use the procedures given above to check the remaining ranges by setting the test Signal Generator's FREQUENCY RANGE switch as shown below. As outlined in steps 1 through 4, on each range set MODULATION MODE to OFF and tune the generators for a 1 MHz difference. Set the reference on the analyzer, set MODULATION MODE to FM EXT AC (with a 2.079 kHz modulating signal at approximately 0.7 Vrms) and adjust the modulating signal's amplitude for the first carrier null. The panel meter should read 5 kHz ± 13.5%.

FREQUENCY RANGES (MHz)	FREQUENCY TUNE (MHz)	Reference Generator Frequency (MHz)	Panel Meter Reading (kHz)
128—256	256	257	4.3 _____ 5.7
64—128	128	129	4.3 _____ 5.7
32—64	64	65	4.3 _____ 5.7
16—32	32	33	4.3 _____ 5.7
8—16	16	17	4.3 _____ 5.7
4—8	8	9	4.3 _____ 5.7
2—4	4	5	4.3 _____ 5.7
1—2	2	3	4.3 _____ 5.7

PERFORMANCE TESTS

4-29. PULSE MODULATION TEST

SPECIFICATION: **Pulse Modulation** (specifications apply for top 10 dB of output vernier range):

FREQUENCY RANGES (MHz)	0.5 to 1	1 to 2	2 to 8	8 to 32	32 to 512
Rise and Fali Times	< 9 μs	< 4 μs	< 2 μs	< 1 μs	
Pulse Repetition Rate	50 Hz to 50 kHz		50 Hz to 100 kHz	50 Hz to 250 kHz	50 Hz to 500 kHz
Pulse Width Minimum for Level Accuracy Within 1 dB of CW (>0.1% duty cycle)	10 μs		5 μs	2 μs	
External Peak Input Required	Nominally > +0.5V (+5V max) waveform, return to zero, into 50Ω Schmitt trigger.				

DESCRIPTION: The Signal Generator is internally pulse modulated. For low frequencies the RF pulses are observed directly on an oscilloscope. For high frequencies, the RF is detected and the detected envelope is observed on the oscilloscope.

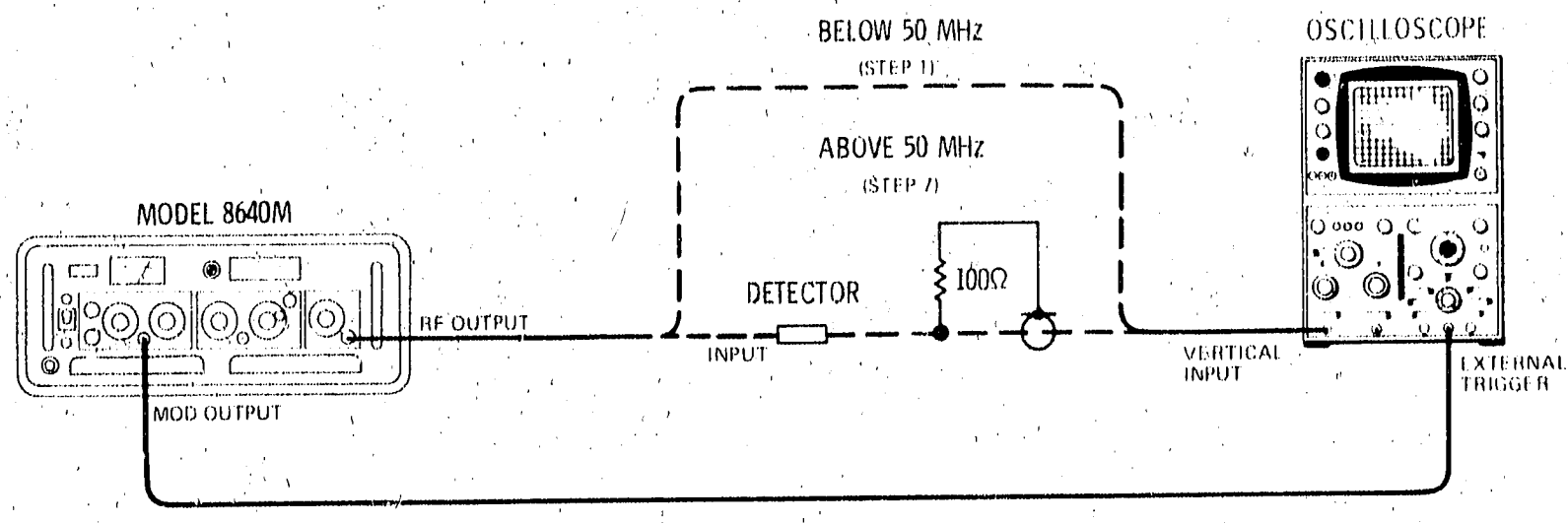


Figure 4-12. Pulse Modulation Test Setup

EQUIPMENT:

Oscilloscope	HP 180C/1801A/1820C
Crystal Detector	HP 8471A
100Ω Resistor	HP 0757-0401

PROCEDURE:

1. Connect equipment as shown in Figure 4-12, with oscilloscope connected directly to test generator's RF OUTPUT, after setting test Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION:	PULSE WIDTH	Fully cw
	PULSE RATE	Fully cw
	MODE	PULSE INT

PERFORMANCE TESTS

4-29. PULSE MODULATION TEST (Cont'd)

FREQUENCY:	RANGE	0.5—1 MHz
	TUNE	1 MHz
OUTPUT:	RANGE Switch	—20 dBm
	RANGE Vernier	Meter reads +3 dB

2. Adjust oscilloscope to display the RF pulse envelope. Adjust generator's PULSE RATE for 100 Hz (or 10 ms period) as read on oscilloscope. Adjust the PULSE WIDTH for 10 μs (measured at 50% amplitude points) and measure the rise and fall times (see Figure 4-13). Both should be less than 9 μs (measured between 10% and 90% of the full pulse amplitude).

Rise Time: _____ 9 μs
Fall Time: _____ 9 μs

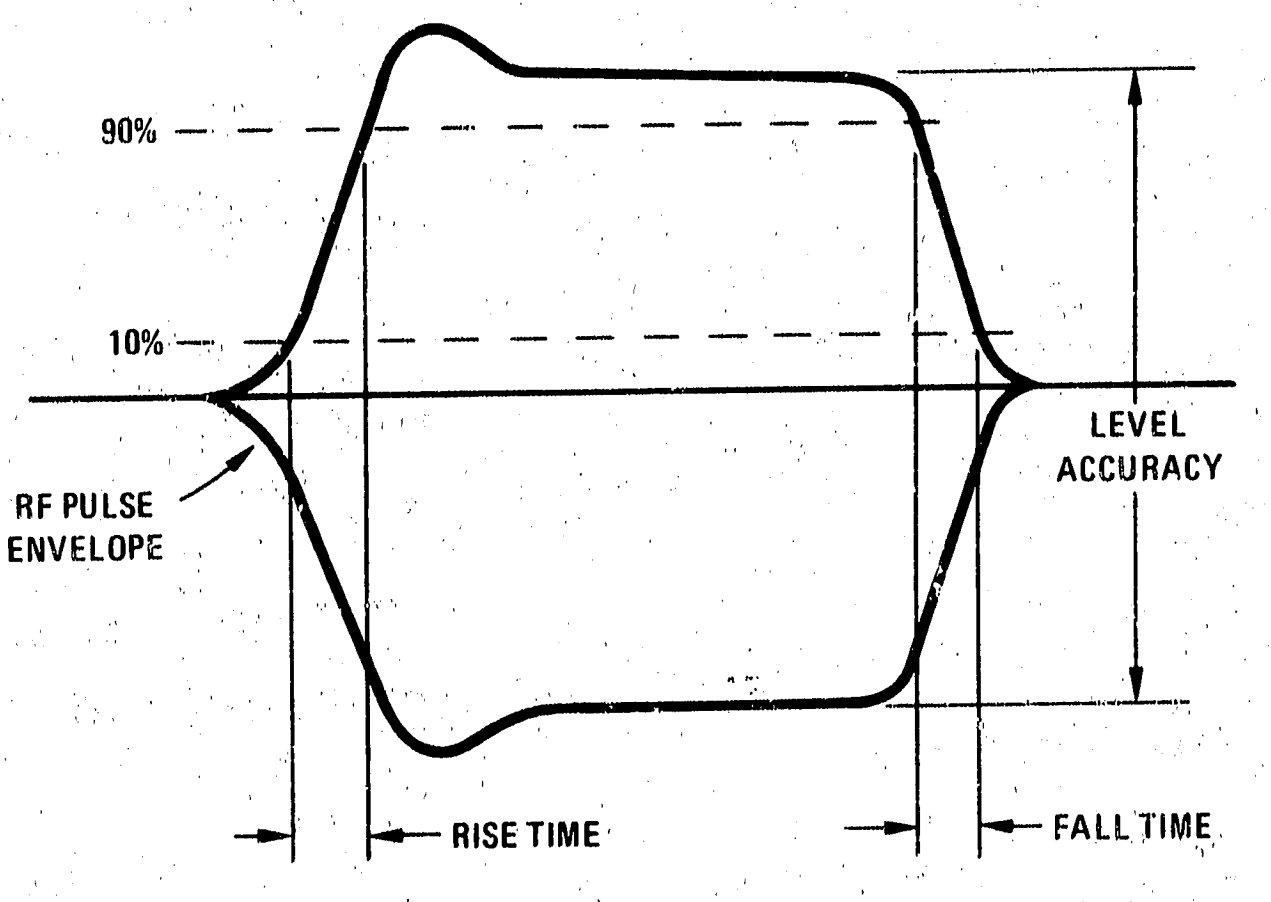


Figure 4-13. Pulse Measurements

3. Set test Signal Generator's MODULATION MODE switch to OFF and adjust oscilloscope's vertical controls for 6 divisions of deflection on the display (peak to peak).

4. Set test Signal Generator's MODULATION MODE switch to PULSE INT. Pulse amplitude (peak to peak) on oscilloscope's display should be 5.4 to 6.7 divisions.

5.4 _____ 6.7 div

5. Repeat steps 1 through 5 for the frequency ranges shown below. The rise and fall times and level accuracy should be as specified.

PERFORMANCE TESTS

4-29. PULSE MODULATION TEST (Cont'd)

Signal Generator			Rise Time (μs)	Fall Time (μs)	Level Accuracy (Divisions)
FREQUENCY RANGES (MHz)	PULSE RATE (Hz)	PULSE WIDTH (μs)			
1–2	100	10	_____4	_____4	5.4 _____ 6.7
2–4	200	5	_____2	_____2	5.4 _____ 6.7
4–8	200	5	_____2	_____2	5.4 _____ 6.7
8–16	500	2	_____1	_____1	5.4 _____ 6.7
16–32	500	2	_____1	_____1	5.4 _____ 6.7

6. Connect detector and 100Ω detector load to RF OUTPUT as shown in Figure 4-12. Set OUTPUT RANGE switch to +10 dBm.

7. Repeat steps 1 through 5 (using the detector to monitor the pulse envelope) for the frequency ranges shown below. For the level accuracy portion of the measurement the oscilloscope's vertical controls should be adjusted for 6 divisions of deflection with respect to ground (dc coupled). The rise and fall times and level accuracy should be as specified.

Signal Generator			Rise Time (μs)	Fall Time (μs)	Level Accuracy (Divisions)
FREQUENCY RANGES (MHz)	PULSE RATE (Hz)	PULSE WIDTH (μs)			
32–64	500	2	_____1	_____1	5.4 _____ 6.7
64–128	500	2	_____1	_____1	5.4 _____ 6.7
128–256	500	2	_____1	_____1	5.4 _____ 6.7
256–512	500	2	_____1	_____1	5.4 _____ 6.7

4-30. PULSE ON/OFF RATIO TEST

SPECIFICATION: Pulse ON/OFF ratio at maximum vernier: >40 dB.

DESCRIPTION: The on/off ratio of the pulse modulation circuits is measured with a spectrum analyzer.

EQUIPMENT: Spectrum Analyzer . . . . . HP 8554B/8552B/141T

PERFORMANCE TESTS

4-30. PULSE ON/OFF RATIO TEST (Cont'd)

PROCEDURE:

1. Connect generator's RF OUTPUT to analyzer's input after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	256 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Set spectrum analyzer's input attenuation to 20 dB. Adjust center frequency controls to center the 256 MHz signal on the display. Adjust scale reference level controls to set the signal to the top (0 dB) graticule line with the scale controls set to display 10 dB per division.

3. Set generator's MODULATION MODE switch to PULSE EXT and tune across range. The signal on the analyzer's display should decrease and remain more than 40 dB below reference.

40 dB _____

4-31. COUNTER EXTERNAL SENSITIVITY TEST

SPECIFICATION: **External RF Input:**
Frequency Range: 10 Hz to 550 MHz.
Sensitivity: ≥125 mVrms, ac only, into 50Ω (≥ —5 dBm).

DESCRIPTION: The Signal Generator's RF output is used to verify the counter's range and sensitivity.

PROCEDURE:

1. Connect RF OUTPUT to COUNTER INPUT after setting Signal Generator's controls as follows:

COUNTER		EXT 10—550
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	550 MHz
OUTPUT:	RANGE Switch	0 dBm
	RANGE Vernier	Meter reads —5 dB

2. Slowly tune Signal Generator down to 10 MHz using FREQUENCY RANGE and TUNE. The display should indicate the frequency of the signal at the RF OUTPUT at all frequencies.

10 to 550 MHz _____(√)

3. Set COUNTER to EXT 0—10. Slowly tune Signal Generator down to 0.5 MHz using FREQUENCY RANGE and TUNE. The display should indicate the frequency of the signal at all frequencies.

0.5 to 10 MHz _____(√)

PERFORMANCE TESTS

4-32. COUNTER ACCURACY TEST

SPECIFICATION: Internal Reference Accuracy (after calibration at 25°C): <±20 ppm.

DESCRIPTION: The frequency of the RF output is measured with an external counter and compared to the internal counter reading.

EQUIPMENT: Frequency Counter . . . . . HP 5327C

PROCEDURE:

1. Connect frequency counter to RF OUTPUT after setting Signal Generator's controls as follows:

COUNTER		INT X10
MODULATION MODE		OFF
FREQUENCY:	RANGE	8—16 MHz
	TUNE	10 MHz
OUTPUT:	RANGE Switch	0 dBm
	RANGE Vernier	Fully cw

2. Set counter gate time to 100 ms. The external and internal counters should read the same frequency ± 200 Hz.

−200 Hz _____ +200 Hz

Table 4-3. Performance Test Record (1 of 4)

Hewlett-Packard
Model 8640M

Signal Generator
Serial No. _____

Tested By _____

Date _____

Para No.	Test Description	Results		
		Min	Actual	Max
4-13	**Frequency Range Test**			
	External Doubler Range: 512–1024 MHz	1100 MHz	_____	
	High End of Band: 256–512 MHz	550 MHz	_____	
	128–256 MHz	275 MHz	_____	
	64–128 MHz	137 MHz	_____	
	32–64 MHz	68.7 MHz	_____	
	16–32 MHz	34.3 MHz	_____	
	8–16 MHz	17.1 MHz	_____	
	4–8 MHz	8.59 MHz	_____	
	2–4 MHz	4.29 MHz	_____	
	1–2 MHz	2.14 MHz	_____	
	0.5–1 MHz	1.07 MHz	_____	
	External Doubler Range: 512–1024 MHz		_____	460 MHz
	Low End of Band: 256–512 MHz		_____	230 MHz
	128–256 MHz		_____	115 MHz
	64–128 MHz		_____	57.5 MHz
	32–64 MHz		_____	28.8 MHz
	16–32 MHz		_____	14.4 MHz
	8–16 MHz		_____	7.19 MHz
	4–8 MHz		_____	3.60 MHz
	2–4 MHz		_____	1.80 MHz
	1–2 MHz		_____	0.90 MHz
	0.5–1 MHz		_____	0.45 MHz
4-14	**Harmonic Distortion Test**			
	Frequency Range: 0.5–1 MHz	30 dB	_____	
	1–2 MHz	30 dB	_____	
	2–4 MHz	30 dB	_____	
	4–8 MHz	30 dB	_____	
	8–16 MHz	30 dB	_____	
	16–32 MHz	30 dB	_____	
	32–64 MHz	30 dB	_____	
	64–128 MHz	30 dB	_____	
	128–256 MHz	30 dB	_____	
	256–512 MHz	30 dB	_____	
4-15	**Single Sideband Phase Noise Test**			
	At 550 MHz > 115 dBc	12 dB	_____	
	At 450 MHz > 125 dBc	20 dB	_____	

Table 4-3. Performance Test Record (2 or 4)

Para No.	Test Description	Results		
		Min	Actual	Max
4-16	**Single Sideband Broadband Noise Floor Test** > 130 dBc	30 dB	_____	
4-17	**Residual AM Test** > 80 dBc 300 Hz to 3 kHz > 70 dBc 20 Hz to 15 kHz	60 dB 50 dB	_____ _____	
4-18	**Residual FM Test** < 50 Hz 20 Hz to 15 kHz	25 mVrms	_____	
4-19	**Output Level Accuracy Test**			
	OUTPUT RANGE Switch (dBm) / Panel METER Indication (dB)		Power Meter Reading (dBm)	
	+3	+11.00	_____	+15.0
	−2	+ 6.0	_____	+10.0
+10	−7	+ 1.0	_____	+ 5.0
	−10	− 2.5	_____	+ 2.5
0	+3	+ 1.0	_____	+ 5.0
−10	+3	− 9.5	_____	− 4.5
	Spectrum Analyzer Log Reference Level Control (dBm)		Spectrum Analyzer Display Amplitude (dB)	
			Set Level	
−10	−20			
−20	−30	− 2.5	_____	+ 2.5
−30	−40	− 2.5	_____	
−40	−50	− 2.5	_____	
			Set Level	
−40	−10			
−50	−20	− 3.0	_____	+ 3.0
−60	−30	− 3.0	_____	+ 3.0
−70	−40	− 3.0	_____	+ 3.0
−80	−50	− 3.0	_____	+ 3.0
			Set Level	
−80	−20			
−90	−30	− 3.0	_____	+ 3.0
−100	−40	− 3.0	_____	+ 3.0
−110	−50	− 3.0	_____	+ 3.0
−120	−60	− 3.0	_____	+ 3.0
−130		−23.0	_____	−17.0
4-20	**Output Level Flatness Test**	−1.25 dB	_____	
4-21	**Output Leakage Test**			
	0.5–400 MHz		_____	−40 dB
	400–600 MHz		_____	−40 dB
	600–1200 MHz		_____	−40 dB

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

Para No.	Test Description	Results		
		Min	Actual	Max
4-22	**Modulation Oscillator Frequency Accuracy Test** 400 Hz Fixed 1 kHz Fixed 5 kHz Fixed	 380 Hz 950 Hz 4750 Hz	 _____ _____ _____	 420 Hz 1050 Hz 5250 Hz
4-23	**AM Bandwidth Test** Range / % AM / Bandwidth 0.5—2 MHz / 50% / 0—20 kHz 90% / 0—12.5 kHz 2—8 MHz / 50% / 0—40 kHz 90% / 0—25 kHz 8—512 MHz / 50% / 0—60 kHz 90% / 0—50 kHz		 _____ _____ _____ _____ _____ _____	 3 dB 3 dB 3 dB 3 dB 3 dB 3 dB
4-24	**AM Distortion Test** Range / Vernier Setting / % AM 0.5—512 MHz / cw / 70% 95% 0.5—512 MHz / —10 dB / 70% 95%		 _____ _____ _____ _____	 5% 10% 5% 10%
4-25	**Indicated AM Accuracy Test** Indicated Accuracy: 90% 70% 50% 30% 20% 10%	 81.75% 63.25% 44.75% 26.25% 17.00% 7.75%	 _____ _____ _____ _____ _____ _____	 98.25% 76.75% 55.25% 33.75% 23.00% 12.25%
4-26	**FM Bandwidth Test**		_____	3 dB
4-27	**FM Distortion Test** Maximum allowable 1/8 Maximum allowable	 26.0 dB 36.5 dB	 _____ _____	
4-28	**Indicated FM Accuracy Test** Accuracy: Frequency Range 128—256 MHz 64—128 MHz 32—64 MHz 16—32 MHz 8—16 MHz 4—8 MHz 2—4 MHz 1—2 MHz	 4.3 kHz 4.3 kHz 4.3 kHz 4.3 kHz 4.3 kHz 4.3 kHz 4.3 kHz 4.3 kHz	 _____ _____ _____ _____ _____ _____ _____ _____	 5.7 kHz 5.7 kHz 5.7 kHz 5.7 kHz 5.7 kHz 5.7 kHz 5.7 kHz 5.7 kHz

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

Para No.	Test Description		Result		
			Min	Actual	Max
4-29	**Pulse Modulation Test**				
	0.5—1 MHz	Rise Time		_____	9 μs
		Fall Time		_____	9 μs
		Level Accuracy	5.4 div	_____	6.7 div
	1—2 MHz	Rise Time		_____	4 μs
		Fall Time		_____	4 μs
		Level Accuracy	5.4 div	_____	6.7 div
	2—4 MHz	Rise Time		_____	2 μs
		Fall Time		_____	2 μs
		Level Accuracy	5.4 div	_____	6.7 div
	4—8 MHz	Rise Time		_____	2 μs
		Fall Time		_____	2 μs
		Level Accuracy	5.4 div	_____	6.7 div
	8—16 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
	16—32 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
	32—64 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
	64—128 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
	128—256 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
	256—512 MHz	Rise Time		_____	1 μs
		Fall Time		_____	1 μs
		Level Accuracy	5.4 div	_____	6.7 div
4-30	**Pulse ON/OFF Ratio Test**				
	Frequency Range: 256—512 MHz		40 dB	_____	
4-31	**Counter External Sensitivity Test**				
		10 to 550 MHz		_____	(√)
		0.5 to 10 MHz		_____	(√)
4-32	**Counter Accuracy Test**				
		10 MHz	—200 Hz	_____	+200 Hz

ADJUSTMENTS

SECTION V
ADJUSTMENTS

5-1. INTRODUCTION

5-2. This section describes adjustments required to return the Signal Generator to peak operating condition when repairs are required. Included in this section are test setups and check and adjustment procedures. Removal and replacement procedures are given on the alphabetic service sheets (after the schematics in Section VIII). Adjustment location photographs are given on the last two foldouts in Section VIII.

5-3. SAFETY CONSIDERATIONS

5-4. Although this instrument has been designed in accordance with international safety standards, this manual contains information and warnings which must be followed to ensure safe operation and to retain the instrument in a safe condition (refer to Safety Considerations page in the front of the manual). Service and adjustments should be performed only by qualified service personnel.

WARNING

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

5-5. Any adjustment, maintenance, and repair of the opened instrument with voltage present should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved. The opening of covers or removal of parts, except those to which access can be gained by hand, may expose live parts, and also accessible terminals may be live.

5-6. Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

5-7. Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

5-8. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

5-9. TEST EQUIPMENT REQUIRED

5-10. Tables 1-3 and 1-4 contain a list of test equipment and test accessories required in the adjustment procedures. In addition, the tables contain the required minimum specifications and a suggested manufacturer's model number.

5-11. Pozidriv Screwdrivers

5-12. Many screws in the instrument appear to be Phillips, but are not. To avoid damage to the screw slots, Pozidriv screwdrivers should be used.

5-13. Blade Tuning Tools

5-14. For adjustments requiring a non-metallic metal-blade tuning tool, use the J.F.D. Model No. 5284 (HP 8710-1010). In situations not requiring non-metallic tuning tools, an ordinary small screwdriver or other suitable tool is sufficient. No matter what tool is used, never try to force any adjustment control in the generator. This is especially critical when tuning variable slug-tuned inductors, and variable capacitors.

5-15. Service Aids

5-16. Miscellaneous Hardware Kit. The HP 08640-60095 Miscellaneous Hardware Kit contains mechanical spare parts for the generator — such things as nuts, bolts, screws and washers.

5-17. Extender Board. An extender board (HP 08640-60036) is available which can be used to extend all circuit plug-in boards (except the A10A2 RF Divider Assembly, A2 Meter Detector and Drive, and the A12 Rectifier Assembly). The RF Divider Assembly is self-extending; just remove the riser board and insert the Divider Assembly into the riser's socket.

5-18. Wrench. A wrench is supplied with the generator. One end fits 7/32 inch connectors while the other fits the 1/4 inch size. Both these sizes of SMC RF connectors are used in the generator.

5-19. FACTORY SELECTED COMPONENTS

5-20. Table 5-1 contains a list of factory selected components by reference designation, basis of selection, and schematic diagram location. Factory selected components are designated by an asterisk (*) on the schematic diagrams in Section VIII.

5-21. The following information supplements Table 5-1.

a. A5R42 Selection: If the A3 RF Oscillator Assembly has been changed, perform the FM Sensitivity Adjustment. If insufficient adjustment range exists on the Low-End Sensitivity Adjustment pot, A3A4R2, to achieve a carrier null (of at least 50 dB), a resistor, A5R42 should be added between pins 11 and 12 of the A5 FM Amplifier Assembly. The addition of this resistor increases the overall gain of the FM Amplifier. Select the value as follows:

1. Set up the FM Sensitivity Adjustment at 16 MHz and adjust A3A4R2 for maximum sensitivity (e.g., fully cw until no further effect is noticed).

2. Adjust the frequency of the test oscillator downward until a carrier null (at least 50 dB) is achieved. Note this frequency.

3. Compute the value of A5R42 using the following formula:

$$A5R42 = \frac{36}{40 - (2.405)f_{null}}$$

where: A5R42 is in kilohms and f_{null} is the frequency in kHz where the null (at least 50 dB) occurred.

4. Choose the next lowest standard resistance value and solder it between pins 11 and 12 of the A5 FM Amplifier circuit board.

5. Perform the FM Sensitivity Adjustment.

b. A8A1C5, C8, and C11 Selection. If the A8A1 RF Scaler has been repaired, selection of A8A1C5, C8, and C11 may be necessary in order to achieve the proper high frequency sensitivity while preventing self-oscillation in the EXT 10—550 MHz mode. Select as follows:

1. Set COUNTER MODE source to EXT and range to 10—550 MHz and remove all connections to counter input.

2. If the display shows a frequency count greater than 550 MHz, increase A8A1C5 and C8 until no count is displayed. C8 has a greater effect than C5. Do not increase C5 or C8 to a value greater than 4.7 pF.

3. If the display shows a frequency count less than 550 MHz, decrease C11 by one standard value until no count is displayed.

4. When the point is reached where no count is displayed, check counter external sensitivity. At 55°C, if the counter's sensitivity is not within specified limits at high frequencies, increase C11 to increase sensitivity (but not to a value greater than 4.7 pF).

c. A8A1C12 Selection. When counting high frequency signals (> 250 MHz) at high levels (> 0 dBm) in the EXT 10—550 MHz mode, and the counter either miscounts or displays no count. The signal to A8A1U1 may have too high a harmonic content. Check the level of the second harmonic at A8A1U1 pin 13 with a spectrum analyzer. If it is less than 6 dB below fundamental, add A8A1C12 to the holes provided at pin 13 of A8A1U1. Increasing C12 decreases the second harmonic level, however, values greater than 4.7 pF should not be used.

d. A9A2C6, C7 and C8 Selection. If the A9A2 FM Gain Switch Board Assembly has been replaced or repaired, measure the 3-dB bandwidth at A7TP3 with an oscilloscope on the following RF frequency ranges while driving the FM INPUT with an external test oscillator. Change the corresponding capacitor, if necessary, for best flatness (less than 3 dB down at 250 kHz rate). Increase capacitance to decrease deviation (at 250 kHz rate).

RANGE (MHz)	PEAK DEVIATION Range (kHz)	Capacitor
512—1024	5	A9 A2C8
256—512	5	A9 A2C7
128—256	5	A9 A2C6

NOTE

Changing any capacitor will likely affect flatness on other ranges.

e. A10A2R3 Selection. If A10A2U11 or U12 is replaced and RF output irregularities are

FACTORY SELECTED COMPONENTS (Cont'd)

observed, it may be necessary to change the value of A10A2R3. Select the proper value as follows:

1. Set RANGE to 64—128 MHz.
2. Observe RF OUTPUT signal with spectrum analyzer.
3. Tune FREQUENCY TUNE across range.
4. If signal irregularities (e.g., erratic frequency, sub-harmonics, or increased level of the noise floor) are observed, increase the value of A10A2R3 within the range of values shown in Table 5-1.

f. A10A2R6-8, R12-14, and R18-20 Selection. If A26U2 (Service Sheet 12) has been replaced, check second harmonic level at RF OUTPUT jack on the following ranges: 128—256 MHz, 64—128 MHz, and 32—64 MHz. If second harmonic level is out of specification, increase affected range's divider output attenuation until second harmonic level is within specification. The following table indicates correct values of resistance for 3 to 6 dB of attenuation (change attenuation in 1 dB steps).

Frequency Range (MHz)	Resistors (A10A2)		
128—256	R6	R7	R8
64—128	R12	R13	R14
32—64	R18	R19	R20
Attenuation	**Resistance**		
3 dB	17.8Ω	287Ω	287Ω
4 dB	23.7Ω	237Ω	237Ω
5 dB	31.6Ω	178Ω	178Ω
6 dB	38.3Ω	147Ω	147Ω

g. To change attenuation, change all three resistors associated with the range that's out of specification. For example, if 64—128 MHz range's second harmonic is too high, then R12, R13, and R14 will have to be changed. Change attenuation in 1 dB steps (e.g., to change their attenuation to 5 dB, change R12 to 31.6Ω, R13 to 178Ω, and R14 to 178Ω.)

NOTE

Attenuation should be no higher than necessary to bring a range's second harmonic within specification. Excessive attenuation may reduce maximum RF output level below +18 dBm.

h. A26A3C3, C4, C5, and C6 Selection. If the modulator has been repaired, check RF output for harmonics. If the harmonics are too high, they can be lowered by proper selection of A26A3C3, C4, C5, and C6. Capacitors may or not be used; their values are always 0.22 pF. Select as follows:

1. Set AM switch to PULSE, RANGE to 256—512 MHz, and RF ON/OFF to ON.
2. Connect a spectrum analyzer to RF OUTPUT jack, A26A3J1.

Table 5-1. Factory Selected Components

Component	Service Sheet	Range of Values	Basis of Selection
A5R42	6	10 kΩ to infinity	See paragraph 5-21a
A8A1C5, C8, C11	18	0—4.7 pF	See paragraph 5-21b
A8A1C12	18	0—4.7 pF	See paragraph 5-21c
A9A2C6	6	50—150 pF	See paragraph 5-21d
A9A2C7		500—1500 pF	
A9A2C8		1000—3000 pF	
A10A2R3	11	51.1—75.0Ω	See paragraph 5-21e
A10A2R6—8, R12-14, & R18-20	11		See paragraphs 5-21 f-g
A26A3C3,C4,C5,C6	12	0.22 pF	See paragraph 5-21h
A10A2C55	11	2.2 pF	See paragraph 5-21i

FACTORY SELECTED COMPONENTS (Cont'd)

3. Check from 256 to 512 MHz (tune FREQUENCY TUNE across range). Signals should always be below —58 dBm.

4. Add or remove capacitors across diodes as necessary to keep signals below —58 dBm.

i. If A10A2U11 has been replaced, use a RF spectrum analyzer to check for low frequency spurious signals while tuned to 520 MHz. The spurs will occur at approximately 80 dBc between 5 and 30 MHz. To suppress the spur, add A10A2C55, 2.2 pF, from A10A2U11 pin 8 to ground.

NOTE

A low-pass or notch filter at the input of the spectrum analyzer will prevent overdriving its input mixer with the signal generator fundamental.

5-22. POST-REPAIR TESTS AND ADJUSTMENTS

5-23. Table 5-2 lists the performance tests and adjustments needed to calibrate or verify calibration of a repaired assembly. The tests and adjustments are classified by assembly repaired. All tests on which a given faulty assembly could have an effect are listed with that assembly. This makes the list useful for troubleshooting conditions which are out of specification (rather than catastrophic failures) because it serves as a cross reference between performance tests and the possible source of failure. For many repairs not all the tests listed need be performed. The notes under each assembly

Table 5-2. Post-Repair Tests and Adjustments (1 of 3)

Assembly Repaired	Reference	Performance Tests and Adjustments	Notes
A1 Output Range Assembly NOTE 1. Perform if A1 replaced.	4-12	Basic Functional Checks (steps 1 and 5)	1
	4-19	Output Level Accuracy Tests	
	4-20	Output Level Flatness Test	1
	4-21	Output Leakage Test	1
	5-30	Output Level and Meter Adjustment	1
A2 Meter Detector and Drive Assembly M1 Panel Meter NOTE 1. Perform for all A2 and M1 repairs.	4-12	Basic Functional Checks (steps 1 and 4)	1
	5-28	Meter Adjustments	1
	5-30	Output Level and Meter Adjustment	
A3 RF Oscillator Assembly NOTES 1. Perform if A3 replaced. 2. Perform if A3Q1 replaced. 3. Perform if A3A1A2 or A3A1A3 repaired. 4. Perform if A3R1 replaced or loosened.	4-13	Frequency Range Test	1
	4-14	Harmonic Distortion Test	
	4-15	Single Sideband Phase Noise Test	
	4-18	Residual FM Test	2
	4-20	Output Level Flatness Test	
	4-21	Output Leakage Test	1, 3
	4-27	FM Distortion Test	
	4-28	Indicated FM Accuracy Test	
	5-33	V_T Pot Adjustment	4
	5-34	V_T Voltage Adjustment	1, 4
	5-35	RF Oscillator End Stop Adjustment	

(cont'd on next page)

Table 5-2. Post-Repair Tests and Adjustments (2 of 3)

Assembly Repaired	Reference	Performance Test and Adjustments	Notes
A3 (cont'd)	5-36	RF Oscillator Output Power Adjustment	1, 2, 3
	5-40	FM Linearity Adjustment (Alternate)	1
	5-41	FM Sensitivity Adjustment	1
A5 FM Amplifier Assembly A7 FM Shaping Assembly NOTES 1. Perform if shapers repaired. 2. Perform if phase lock loop filter repaired. 3. Perform if over-deviation detector repaired.	4-12	Basic Functional Checks (steps 1, 2, and 7)	3
	4-15	Single Sideband Phase Noise Test	
	4-18	Residual FM Test	2
	4-26	FM Bandwidth Test	
	4-27	FM Distortion Test	
	4-28	Indicated FM Accuracy Test	
	5-38	Preliminary FM Adjustments	2
	5-40	FM Linearity Adjustment (Alternate)	1
	5-41	FM Sensitivity Adjustment	1
A8 Counter/Lock Assembly NOTES 1. Perform for all A8 repairs. 2. Perform with COUNTER set to INT LOCK X10 if phase lock system repaired.	4-12	Basic Functional Checks (steps 1 and 3)	1
	4-18	Residual FM Test	2
	4-21	Output Leakage Test	1
	4-31	Counter External Sensitivity Test	
	4-32	Counter Accuracy Test	
	5-44	Internal Reference Frequency Adjustment	
A9 Peak Deviation and Range Switch Assembly NOTE 1. Perform for all A9 repairs.	4-12	Basic Functional Checks (steps 1, 2, 3, and 7)	1
	4-26	FM Bandwidth Test	
	4-28	Indicated FM Accuracy Test	
	5-32	Range Switch Adjustment	1
A10 Divider/Filter Assembly NOTES 1. Perform if A10A1 repaired. 2. Perform if A10A2 repaired.	4-14	Harmonic Distortion Test	1, 2
	4-20	Output Level Flatness Test	1, 2
	4-21	Output Leakage Test	1, 2
	5-34	V_T Voltage Adjustment	2
	5-37	RF Filter Adjustment	
A11 Internal Modulation Oscillator Assembly	4-22	Modulation Oscillator Frequency Accuracy Test	
	5-26	Sinewave Modulation Oscillator Adjustment	
	5-27	Pulse Generator and Timer Adjustments	

Table 5-2. Post-Repair Tests and Adjustments (3 of 3)

Assembly Repaired	Reference	Performance Test and Adjustments	Notes
A12 Rectifier Assembly A16 Fan Motor Assembly A18 —5.2V Regulator and Fan Driver Assembly A20 +5.2 and +44.6V Regulator Assembly A22 +20V and —20V Regulator Assembly	4-15 4-18 5-25	Single Sideband Phase Noise Test Residual FM Test Power Supply Adjustments	
A21 Reverse Power Protection Assembly NOTES 1. Perform for all A21 repairs. 2. Perform if relay (K1) replaced.	4-19 4-20 4-21 5-42 5-43	Output Level Accuracy Test Output Level Flatness Test Output Leakage Test Output Impedance Adjustment Reverse Power Level Sense Adjustment	 1 2 1
A26 AM/AGC and RF Amplifier Assembly NOTES 1. Perform if A26U1 replaced. 2. Perform if A26U2 replaced. 3. Perform if modulator repaired. 4. Perform if AM and leveling circuits (except for RF components) repaired. 5. Perform if pulse circuits repaired.	4-12 4-14 4-16 4-17 4-19 4-20 4-21 4-23 4-24 4-25 4-29 4-30 5-29 5-30 5-31	Basic Functional Checks (steps 1 and 6) Harmonic Distortion Test Single Sideband Broadband Noise Floor Test Residual AM Test Output Level Accuracy Test (steps 1 to 3) Output Level Flatness Test Output Leakage Test AM Bandwidth Test AM Distortion Test Indicated AM Accuracy Test Pulse Modulation Test Pulse On/Off Ratio Test RF Detector Offset Adjustment Output Level and Meter Adjustment AM Sensitivity Adjustment	 1,2,3 4 4 1,2,3 1, 2 4 1, 4 5 3 1, 4 1, 4 1

indicate which of the tests and adjustments listed should be performed for many common repairs.

5-24. For all repairs the Basic Functional Checks (paragraph 4-12) are recommended to verify that the assembly is operating and that all other parts of the instrument are functioning properly. Also, if any casting was opened or any RF connectors removed during a repair, the Output Leakage Test (paragraph 4-21) should be performed. In general, the power supply voltages should be checked but not adjusted unless out of tolerance (see Power Supply Adjustment, paragraph 5-25).

ADJUSTMENTS

5-25. POWER SUPPLY ADJUSTMENTS

REFERENCE: Service Sheets 22 and 23.

DESCRIPTION: A digital voltmeter is used to check the power supply voltages. They are then adjusted for the correct voltage. These voltages should be checked before making any other adjustment.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE:

1. Set LINE switch to ON. The fan should run and five LED's located on power supply boards (A18, A20, and A22) should light.

2. Connect DVM to each of the test points listed below. The voltages should be within the tolerances shown; if not, adjust appropriate resistor for a reading within the indicated tolerances.

Test Point	Adjust	Voltage Level
−5.2V A18TP5	A18R2	−5.200V ± 10 mV_____ *
+5.2V A20TP10	A20R16	+5.200V ± 10 mV_____
+20V A22TP4	A22R7	+20.000V ± 10 mV_____ **
−20V A22TP9	A22R19	−20.000V ± 10 mV_____ ***
+44.6V A20TP4	A20R8	+44.600V ± 100 mV_____

* For ambient temperatures other than 25°C, modify the voltage level setting by −4.2 mV/°C.

** Perform Internal Reference Frequency Adj. (paragraph 5-44).

***Perform VARACTOR BIAS adjustment (paragraph 5-38, step 20).

5-26. INTERNAL MODULATION OSCILLATOR ADJUSTMENT

REFERENCE: Service Sheet 9.

DESCRIPTION: A digital voltmeter is used to monitor the audio oscillator's output while setting its level.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE:

1. Connect DVM to A11TP7 (Audio). Set Signal Generator's MODULATION MODE to AM INT 1000.

2. Adjust Audio Output pot, A11R4, for 850 ± 20 mVrms as read on DVM.

3. Set MODULATION MODE to AM INT 400 and 5000 and note DVM reading. If the readings are not within 850 ± 20 mVrms, readjust A11R4 to bring all three readings (400, 1000, and 5000 Hz) within limits.

ADJUSTMENTS

5-27. PULSE GENERATOR AND TIMER ADJUSTMENTS

REFERENCE: Service Sheet 9

DESCRIPTION: The pulse generator's repetition rate and timer's frequency are set using a counter. The pulse generator's pulse width is set using an oscilloscope.

EQUIPMENT:
Frequency Counter . . . . . HP 5327C
Oscilloscope . . . . . HP 180C/1801A/1820C

PROCEDURE:

1. Connect counter's high impedance input to test point A11TP6. Set counter to measure frequency with a 10 s gate time.
2. The frequency should read 0.7 Hz. If it does not adjust Meter Frequency pot, A11R3, for a reading of 0.7 Hz.
3. Now set counter to measure period with a one-period average. Fine adjust Meter Frequency pot, A11R3, for a period of 1.40 to 1.41 s (1.40625 s would be exact).

NOTE

If counter overflows, assume an initial "1" count in the unit seconds digit.

4. Connect counter input to test point A11TP1, Rate. Set counter to measure frequency with a 1 s gate time.
5. Set Signal Generator's MODULATION MODE to PULSE INT and PULSE RATE fully cw. Adjust Pulse Rate pot, A11R1, for a frequency of 5.1 to 5.2 kHz.
6. Set PULSE RATE fully ccw. Check that rate is less than 50 Hz.
7. Set PULSE RATE fully ccw and PULSE WIDTH fully ccw. Connect oscilloscope to test point A11TP2.
8. Adjust oscilloscope to observe the +1.5V pulses, triggering on the + slope. Adjust Pulse Width pot, A11R2, for a width of 0.5 to 0.9 μs.
9. Set PULSE WIDTH fully cw. Check that pulse width is greater than 40 μs.

5-28. METER ADJUSTMENTS

REFERENCE: Service Sheet 14 and 17.

DESCRIPTION: The panel meter is mechanically zeroed. The meter circuitry is then adjusted at zero and full scale. Meter scale linearity is also checked.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE:

1. With LINE switch set to OFF, place Signal Generator in its normal operating position.

ADJUSTMENTS

5-28. METER ADJUSTMENTS (Cont'd)

2. Adjust mechanical zero adjustment screw beneath the panel meter face, cw for a zero meter reading. Then turn screw slightly ccw to free mechanism from adjusting peg.

3. Set generator's controls as follows:

METER . . . . . MOD
MODULATION: LEVEL . . Fully ccw
MODE . . AM INT 1000
LINE . . . . . ON

4. Connect DVM to BUFFER test point, A2TP2 on A2 Meter Detector and Drive Assembly. Adjust A2R3 for 0 ± 1 mVdc at A2TP2.

5. Connect DVM to MET adjust test point A2TP4. Adjust A2R2 for 0 ± 1 mVdc at A2TP4.

6. Connect DVM to AM IN test point, A26A2TP1. Adjust MODULATION LEVEL control clockwise until DVM reads 0.707 Vrms at AM IN test point, A26A2TP1. Then adjust A2R1 for a full scale reading (10 on the 0–10 scale) on the panel meter.

7. Adjust the MODULATION control to give the panel meter readings indicated in the table below and check the voltage at A26A2TP1 against the listed tolerances. If a DVM reading falls out of limits, adjust A2R1 until all meter settings yield voltages within the ranges below.

Set Panel Meter (% AM)	Voltage at A26A2TP1 (mVrms)		
	Minimum	Nominal	Maximum
100	697	707	718
70	487	495	503
50	345	354	362
30	205	212	220

5-29. RF DETECTOR OFFSET ADJUSTMENT

REFERENCE: Service Sheets 12 and 13.

DESCRIPTION: A digital voltmeter is used to set the proper offset voltage out of the RF detector.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE: 1. Connect DVM to DET test point, A26A4TP2, and set Signal Generator's controls as follows:
MODULATION MODE . . . OFF
FREQUENCY RANGE . . . 32–64 MHz
RF ON/OFF . . . . . OFF

ADJUSTMENTS

5-29. RF DETECTOR OFFSET ADJUSTMENT (Cont'd)

2. Set AGC switch, A26A4S1, to off. Adjust detector offset adjust pot (DET), A26A1R19 for −60 ± 1 mVdc at DET test point, A26A4TP2.

3. Set AGC switch to on and set front panel RF ON/OFF switch to ON.

4. Perform Output Level and Meter Adjustment, paragraph 5-30.

5-30. OUTPUT LEVEL AND METER ADJUSTMENT

REFERENCE: Service Sheet 12.

DESCRIPTION: With the OUTPUT RANGE vernier fully clockwise, the output level is adjusted for +13.2 dBm (on the ±10 dB range). Then the level is set to +13.0 dBm and the panel meter adjusted to correspond.

NOTE

Check that the Meter Adjustments (paragraph 5-28) and RF Detector Offset Adjustment (paragraph 5-29) are correct before performing this adjustment.

EQUIPMENT:

Power Meter	HP 435A
Power Sensor	HP 8482A

PROCEDURE:

1. Connect power sensor to generator's RF OUTPUT after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	32—64 MHz
	TUNE	50 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

2. Adjust LVL pot, A26A4R1, for a +13.2 dBm reading on power meter.

3. Turn OUTPUT LEVEL vernier ccw until power meter reads +13.0 dBm. Adjust MET pot, A26A4R12, for a panel meter indication of +3 dB.

5-31. AM SENSITIVITY ADJUSTMENT

REFERENCE: Service Sheet 14.

DESCRIPTION: AM sensitivity is adjusted while comparing the actual amount of amplitude modulation to the level of the input modulating signal. The AM is demodulated by a spectrum analyzer in a zero span mode. The AM depth is measured directly on the display.

ADJUSTMENTS

5-31. AM SENSITIVITY ADJUSTMENT (Cont'd)

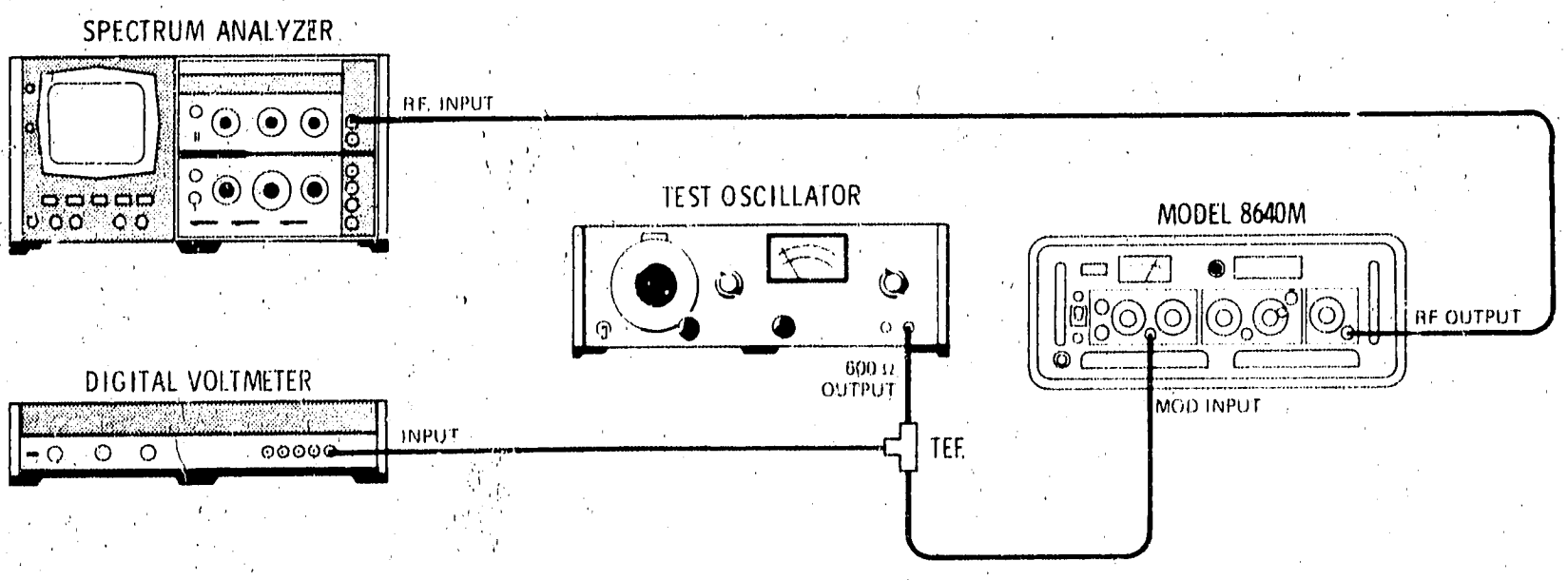


Figure 5-1. AM Sensitivity Adjustment Test Setup

EQUIPMENT:

Spectrum Analyzer	HP 8554B/8552B/141T
Digital Voltmeter	HP 3490A
Test Oscillator	HP 651B

PROCEDURE:

1. Connect equipment as shown in Figure 5-1 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully ccw
	MODE	AM INT 1000
FREQUENCY:	RANGE	256—512 MHz
	TUNE	512 MHz
OUTPUT:	RANGE Switch	—40 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

2. Set analyzer controls to display the 512 MHz signal with 300 kHz or greater resolution bandwidth, 0 dB input attenuation, linear vertical scale, 5 to 20 kHz of display smoothing, and zero frequency span width. Check that the signal is peaked on the display and adjust the vertical sensitivity for 4 divisions of deflection. (Also ensure the base line is at the bottom line of the display with no signal applied.)

3. Set generator's MODULATION LEVEL control fully cw. Set test oscillator for a 1 kHz, 353.6 mVrms signal as read on DVM (50% AM).

4. Adjust % AM adjustment, A26A2R19, until the demodulated signal spans exactly the second and sixth division (i.e., 50% AM).

ADJUSTMENTS

5-32. RANGE SWITCH ADJUSTMENT

REFERENCE: Service Sheet 10.

DESCRIPTION: The frequency at RF OUTPUT is monitored with the internal counter. The divider/filter cams are positioned so that the frequency at RF OUTPUT agrees with the frequency indicated on the generator's readout. The FREQUENCY RANGE switch knob is then set to the correct range. This procedure should be performed whenever the A9 Peak Deviation and Range Switch Assembly or the A10 Divider/Filter Assembly has been removed or replaced.

NOTE

For disassembly and contact rotor alignment procedures, see Service Sheet D.

PROCEDURE:

1. Connect RF OUTPUT to COUNTER INPUT. Set Signal Generator's controls as follows:

COUNTER		INT NORM
MODULATION MODE . . .		OFF
FREQUENCY:	RANGE . . .	Fully ccw
	TUNE . . .	0.5 MHz
OUTPUT:	RANGE Switch . .	0 dBm
	RANGE Vernier .	Fully cw
	RF ON/OFF . . .	ON

2. Monitor generator's frequency with COUNTER set alternately to INT NORM and EXT 0—10. Loosen shaft coupling between FREQUENCY RANGE switch and divider/filter cams and check that the FREQUENCY RANGE switch is rotated fully ccw. Rotate cam side of shaft until the frequency display indicates the same frequency for both INT NORM and EXT 0—10 (i.e., to approximately 500 kHz). Tighten shaft coupler.

NOTE

When the correct position of the cam shaft is determined, be sure it is centered in its own detent before tightening the coupler.

3. Loosen FREQUENCY RANGE switch knob, position it so that it indicates that the range is 0.5—1 MHz, and tighten it.

4. Set FREQUENCY RANGE switch to each of its other positions (from both directions). The frequency counter should display readings that agree for both INT NORM and EXT 0—10 (above 10 MHz set COUNTER to EXT 10—550). The correct frequency counter reading for the 512—1024 MHz EXT DOUBLER range is one half that indicated for INT NORM.

ADJUSTMENTS

5-33. V_T POT ADJUSTMENT

REFERENCE: Service Sheet 5 and B.

DESCRIPTION: The V_T pot, A3R1, is aligned so that it will not hit either end-stop as the FREQUENCY TUNE control is tuned through its full range. This adjustment should be performed whenever the pot has been replaced and if the RF Oscillator end stops cannot be adjusted properly.

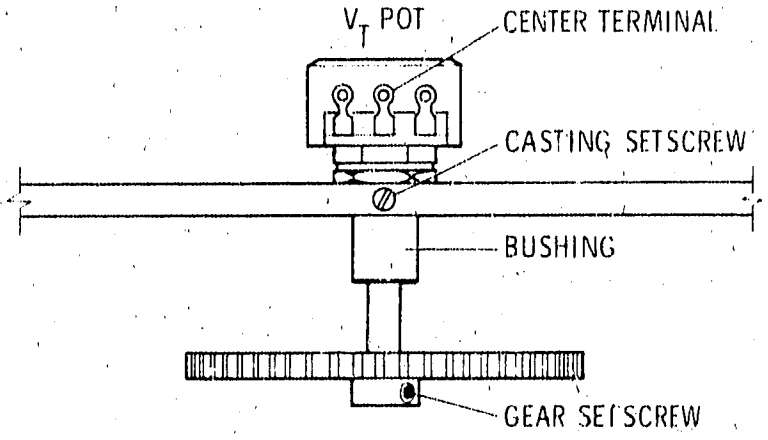


Figure 5-2. V_T Pot Adjustment

PROCEDURE:

1. Set FREQUENCY TUNE fully cw.
2. Hand tighten the bushing to V_T pot and set shaft fully cw.
3. Install pot with gear in casting so that center terminal (934 wire) is in line with casting setscrew (see Figure 5-2).
4. Tighten setscrews in gear and casting.
5. Perform V_T Voltage Adjustment (paragraph 5-34).

5-34. V_T VOLTAGE ADJUSTMENT

REFERENCE: Service Sheets 5, 10, and 11.

DESCRIPTION: This procedure should be performed whenever either the V_T pot, the A3 RF Oscillator Assembly, or the A10A2 RF Divider Assembly has been replaced or repaired.

PROCEDURE:

1. Set Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	340 MHz
	FINE TUNE	Centered
OUTPUT:	RANGE Switch	0 dBm
	RANGE Vernier	Meter reads 0 dB
	RF ON/OFF	ON

ADJUSTMENTS

5-34. V_T VOLTAGE ADJUSTMENT (Cont'd)

2. Set FREQUENCY TUNE to 356.5 MHz by tuning cw; adjust V_T adjustment pot, A3A4R1 until the realys in the A10 assembly just actuate. When the relays actuate, they make a faint but audible click.

3. Tune FREQUENCY TUNE one turn ccw and then cw until relays actuate. The frequency at actuation should be 356—357 MHz.

4. Tune FREQUENCY TUNE from 256 to 512 MHz. The generator's panel meter should read 0 dBm through the entire frequency range.

5-35. RF OSCILLATOR END STOP ADJUSTMENT

REFERENCE: Service Sheets 5, 6, and 7.

DESCRIPTION: This procedure describes the adjustment of the high and low frequency end stops of the A3 RF Oscillator. Slight adjustment of the end stops may be necessary when the RF Oscillator or fine tune assembly has been repaired or replaced.

NOTE

Normally, the adjustment can be made with the RF Oscillator in place. However, if the oscillator has already been removed, the adjustment is easier if the A3A4 Connector Board Assembly is plugged in and the oscillator set into place with the front resting on the front panel. Temporarily connect the RF cable (W2) to the counter and install the FREQUENCY TUNE knob.

PROCEDURE: 1. Set Signal Generator's controls as follows:

COUNTER		INT NORM
FREQUENCY:	RANGE . . .	0.5—1 MHz
	FINE TUNE .	Centered
	LINE	OFF

2. Switch LINE to ON and let instrument warm up for one hour.

3. Check that Varactor Anode bias is −14.70 ±0.01 Vdc at A7TP2. If adjustment is necessary, connect DVM to Varactor Anode A7TP2 and set VAR pot (varactor anode bias) A7R19 to−14.70 ±0.01 Vdc.

4. Tune FREQUENCY TUNE fully ccw. Compare the position of the stop ring teeth with Figure 5-3.

NOTE

Notice how the teeth on the stop rings line up in a staircase at the end stops. The stop pin and the adjustable stop ring determine the lower frequency limit. The stop pin and forward-most stop ring determine the high frequency limit, however, adjustment of this ring will also affect the low frequency limit.

ADJUSTMENTS

5-35. RF OSCILLATOR END STOP ADJUSTMENT (Cont'd)

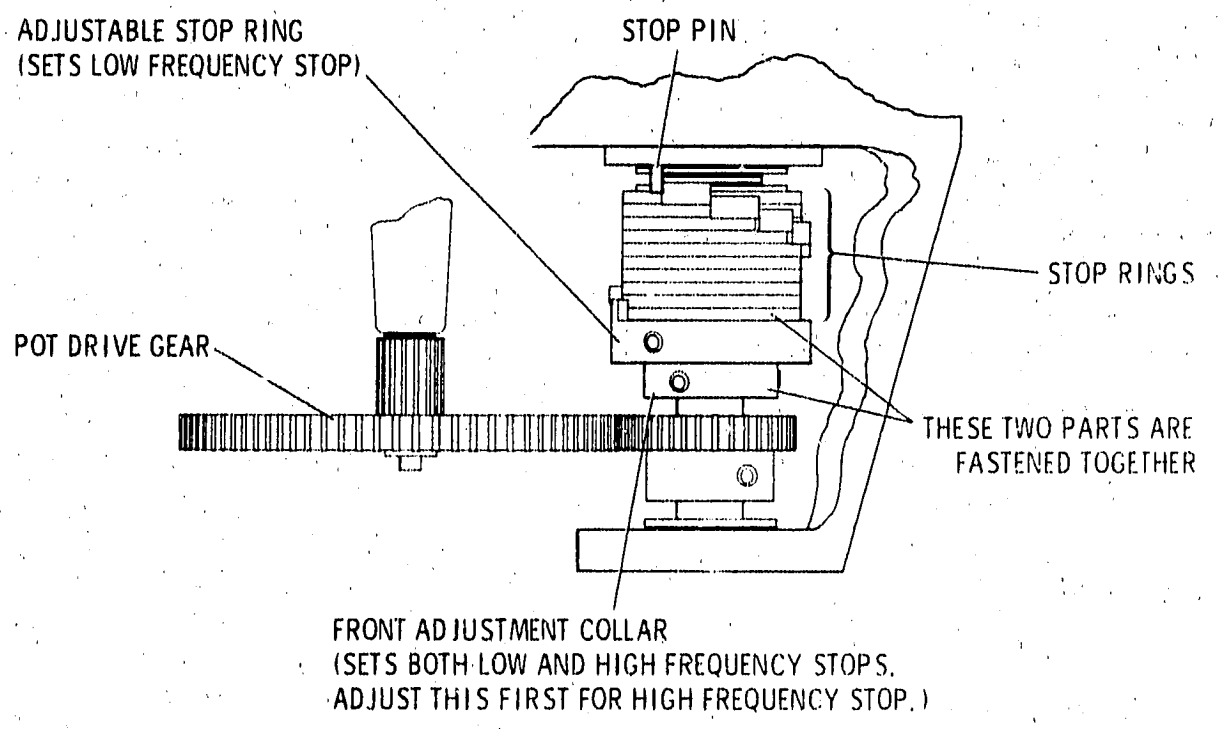


Figure 5-3. Locations of RF Oscillator Stop Adjustments Shown in Maximum ccw Position. Top View with Instrument Upside Down

5. Adjust FREQUENCY TUNE fully cw. The frequency should read between 1.0752 and 1.0760 MHz. If it does not, note how far off the frequency is.

6. Adjust FREQUENCY TUNE ccw until first setscrew on front adjustment collar appears. Loosen setscrew.

7. Tune further ccw until second setscrew appears.

8. Loosen setscrew and rotate FREQUENCY TUNE up or down by the amount of correction needed (as noted in step 6), and tighten setscrew. Do not allow front adjustment collar to rotate.

9. Recheck high stop frequency and repeat preceding step as needed until stop frequency is correct. Then secure both setscrews.

NOTE

If the preceding steps have no effect, check that the V_T and FM Gain Compensation pots do not reach their stops first. If so, loosen the gear on the pot shaft and continue.

10. Adjust FREQUENCY TUNE fully ccw. The frequency should read between 0.4475 and 0.4482 MHz. If it does not, note how far off the frequency is.

11. Adjust FREQUENCY TUNE cw until first setscrew on adjustable stop ring appears. Loosen setscrew.

12. Tune further cw until second setscrew appears.

13. Loosen setscrew and rotate FREQUENCY TUNE up or down by the amount of correction needed (as noted in step 10), and tighten setscrew. Do not allow adjustable stop ring to rotate.

ADJUSTMENTS

5-35. RF OSCILLATOR END STOP ADJUSTMENT (Cont'd)

14. Recheck low stop frequency and repeat preceding step as needed until stop frequency is correct. Then secure both setscrews.

NOTE

If the preceding steps have no effect, check that the V_T and FM Gain Compensation pots do not reach their stops first. If so, loosen the gear on the pot shaft and continue.

15. Recheck both stop frequencies.

16. If either the V_T or FM Gain Compensation pots were altered, perform either the V_T Pot Adjustment (paragraph 5-33), or Preliminary FM Adjustment (paragraph 5-38).

5-36. RF OSCILLATOR OUTPUT POWER ADJUSTMENT

REFERENCE: Service Sheet 5.

DESCRIPTION: The A3 RF Oscillator output will require adjustment if the power level varies beyond −1 to +3.5 dBm at the Divider/Filter Buffer Amplifier, or beyond the limits −3 to +3 dBm at the Frequency Counter Buffer Amplifier. The power level is adjusted by changing the input loop penetration of the appropriate buffer amplifier in the oscillator cavity.

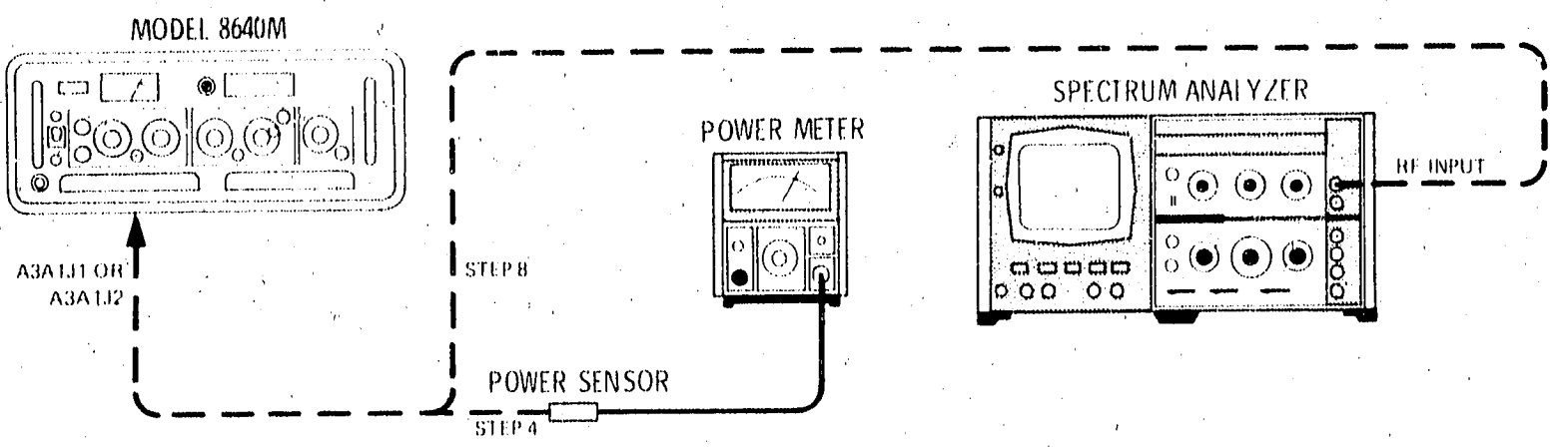


Figure 5-4. RF Oscillator Output Power Adjustment Test Setup

EQUIPMENT:

Power Meter	HP 435A
Power Sensor	HP 8482A
Spectrum Analyzer	HP 8554B/8552B/141T

PROCEDURE:

1. Remove A3 RF Oscillator from chassis and reinstall knob on FREQUENCY TUNE shaft. Refer to Service Sheet B for removal procedure.

2. Remove cover from the appropriate buffer amplifier assembly.

ADJUSTMENTS

5-36. RF OSCILLATOR OUTPUT POWER ADJUSTMENT (Cont'd)

3. Re-insert A3A4 Connector Board Assembly into place while keeping oscillator section free of chassis. (It may be necessary to unsnap the clip on the rear of the oscillator housing to free the wiring harness.)

4. Connect power meter sensor to oscillator output connector A3A1J1 (Divider/ Filter Amplifier) or A3A1J2 (Counter Buffer Amplifier). See Figure 5-4.

5. Turn LINE to ON. Tune FREQUENCY TUNE across entire range and note point of minimum power as read on power meter. Tune to frequency of minimum power.

6. Loosen two screws on the buffer amplifier board and slide board forward or backward until power reads −1.0 dBm (Divider/Filter Buffer Amplifier) or −3 dBm (Counter Buffer Amplifier). (Pushing board forward will increase power.)

7. Tighten screws and check power level across range. Power should remain within the limits of −1.0 to +3.5 dBm (Divider/Filter Buffer Amplifier) or −3 to +3 dBm (Counter Buffer Amplifier).

8. Disconnect power sensor and connect spectrum analyzer to the buffer amplifier output.

9. Set analyzer's input attenuation to 50 dB, resolution bandwidth to 300 kHz, frequency controls to span 200 to 1200 MHz, and vertical sensitivity (reference level) controls to +10 dBm.

10. Tune oscillator across range and observe second and third harmonics, which should be more than 17 dB below fundamental for all frequencies.

11. Re-install RF Oscillator.

12. Perform Harmonic Distortion Test (paragraph 4-14), Output Level Flatness Test (paragraph 4-20), and Output Leakage Test (paragraph 4-21).

5-37. RF FILTER ADJUSTMENT

REFERENCE: Service Sheet 10.

DESCRIPTION: A spectrum analyzer and a tracking generator are used to measure the insertion loss and frequency response of each of the RF filters. Those filters that are adjustable are adjusted if necessary. A frequency counter, connected to the tracking generator's auxiliary output, is used to accurately set the analyzer's frequency. This procedure should be performed only when the RF filters have been repaired or are suspect.

The filters must meet specified pass band and stop band characteristics. Figure 5-5 illustrates the terms used in the procedure.

ADJUSTMENTS

5-37. RF FILTER ADJUSTMENT (Cont'd)

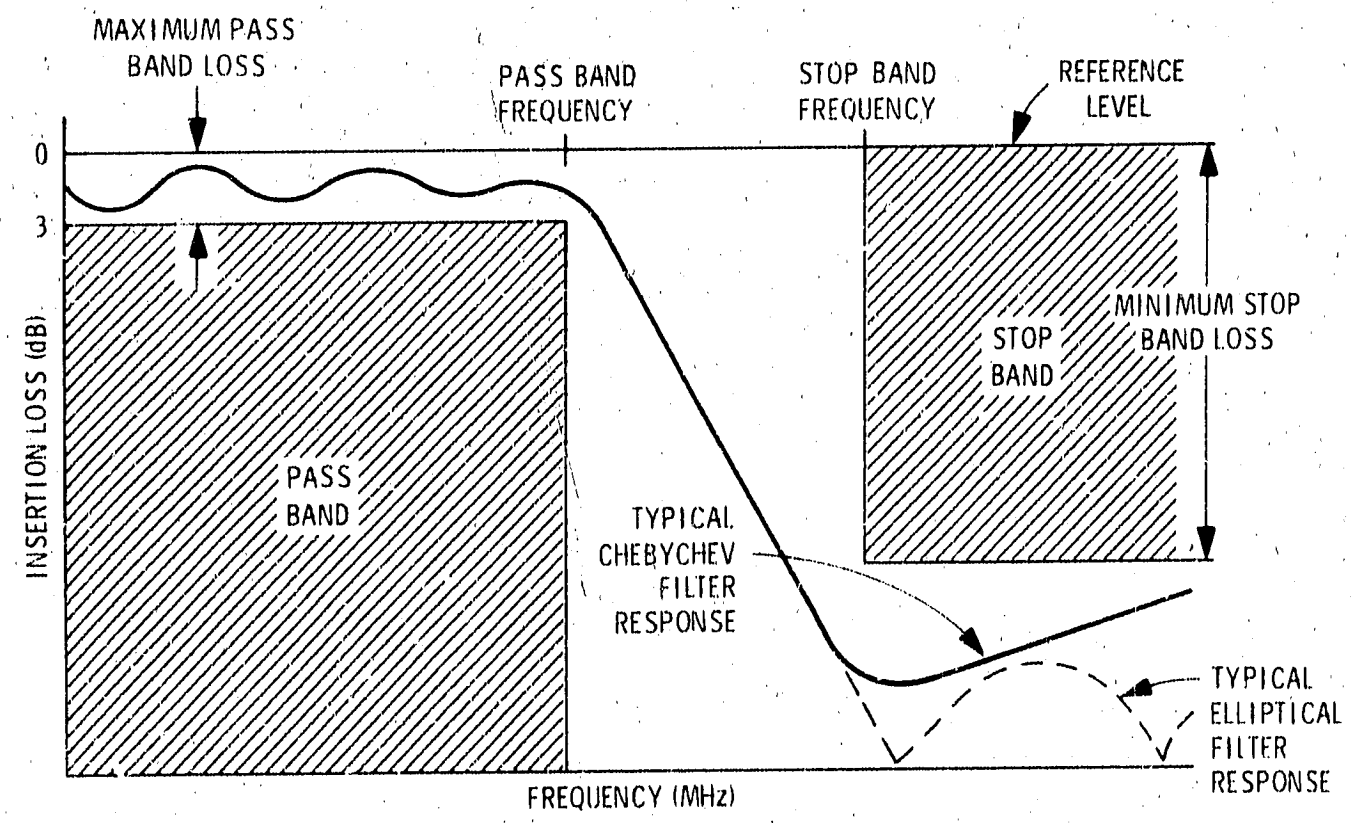


Figure 5-5. Filter Terminology

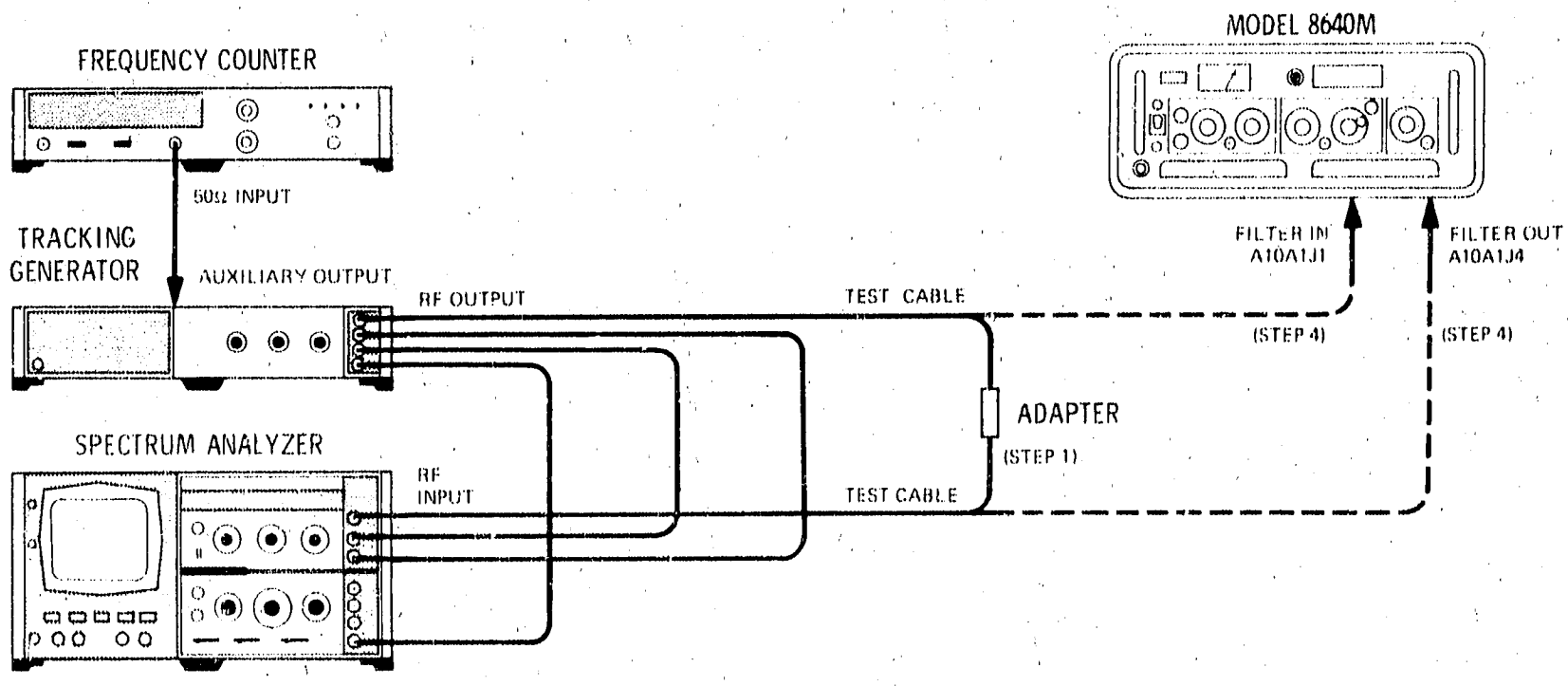


Figure 5-6. RF Filter Adjustment Test Setup

EQUIPMENT:

Spectrum Analyzer	HP 8554B/8552B/141T
Tracking Generator	HP 8444A
Frequency Counter	HP 5327C
Test Cable (2 required)	HP 11592-60001
Adapter	HP 1250-0827

ADJUSTMENTS

5-37. RF FILTER ADJUSTMENT (Cont'd)

PROCEDURE:

1. Connect equipment as shown in Figure 5-6 after setting Signal Generator's controls as follows:

   FREQUENCY: RANGE . . . . 256–512 MHz
   TUNE . . . . Fully cw
   RF ON/OFF . . OFF

2. Set spectrum analyzer center frequency to 550 MHz, frequency span (scan width) to 100 MHz per division, resolution bandwidth to 10 kHz, and input attenuation to 20 dB.

3. Set tracking generator's output level to 0 dBm. Adjust the tracking for maximum response in a 10 kHz resolution bandwidth. (Tracking should be checked periodically during this test.) Set analyzer's resolution bandwidth to 300 kHz.

4. For each of the frequency ranges listed in Table 5-3, perform the following:

   a. Connect spectrum analyzer's RF input to tracking generator's RF output (use test cables and adapter as shown in test setup). Set Signal Generator's FREQUENCY RANGE and TUNE controls as listed in the table. Set spectrum analyzer's frequency span (scan width) controls to zero Hz.

   NOTE

   Geometric mean switching (on the 8 to 512 MHz ranges) occurs near the middle of the frequency range. Switching is controlled by the position of the FREQUENCY TUNE control and switches between the high and low band filters for the frequency range. It can be noted either by listening for the faint but audible clicking of the RF relays or by observing a change in the spectrum analyzer's display when connected to the RF filters.

   b. Adjust analyzer's center frequency controls for a frequency counter indication of the pass band frequency listed in the table. Adjust analyzer's vertical sensitivity controls to set trace to top (reference) graticule line on display (use 2 dB log per division); this sets the reference level for the filter check.

   c. Set analyzer's frequency span controls as listed in the table. Connect test cables to RF filter input and output as shown in the test setup. Check maximum loss at pass band frequency (center vertical graticule line) and below; it should be as specified.

   d. Set analyzer's frequency span controls to zero Hz. Adjust analyzer's center frequency controls for a frequency counter indication of the stop band frequency listed in the table. Then reset frequency span controls as listed in the table and set analyzer's display for 10 dB log per division.

   NOTE

   To measure the stop band frequency on the highest range it is necessary to set a frequency of 492 MHz at the second vertical graticule line to the left of center. This puts 692 MHz at the center (the counter will only read to 550 MHz.

   e. Check minimum loss at stop band frequency (center vertical graticule line) and above; it should be as specified.

ADJUSTMENTS

5-37. RF FILTER ADJUSTMENT (Cont'd)

Table 5-3. RF Filter Check

Signal Generator			Spectrum Analyzer Frequency Span per Division (MHz)	Pass Band		Stop Band		Adjustment (A10A1)
RANGE (MHz)	FREQUENCY TUNE	Filter		Frequency (MHz)	Maximum Loss (dB)	Frequency (MHz)	Minimum Loss (dB)	
256–512	Fully cw Fully ccw	High Low	100 50	550 356	3 3	692 469	30 30	C81–84 L43–45
128–256	Fully cw Fully ccw	High Low	50 20	275 128	3 3	346 230	30 30	L40–42 L37–39
64–128	Fully cw Fully ccw	High Low	20 10	137 89	3 3	173 115	30 25	L31–33 None
32–64	Fully cw Fully ccw	High Low	10 5	69 45	3 3	86.5 58	25 25	None None
16–32	Fully cw Fully ccw	High Low	5 2	34 22	3 3	43.2 28.7	20 20	None None
8–16	Fully cw Fully ccw	High Low	2 2	17.0 11.0	3 3	21.6 14.3	15 15	None None
4–8	*	*	1	8.6	3	10.7	38	None
2–4	*	*	1	4.3	3	5.40	40	None
1–2	*	*	1	2.2	3	2.70	30	None
0.5–1	*	*	1	1.1	3	1.30	30	None

* The 0.5 to 8 MHz ranges have a single filter for each range. Geometric mean switching does not take place and the FREQUENCY TUNE control can be left at any position.

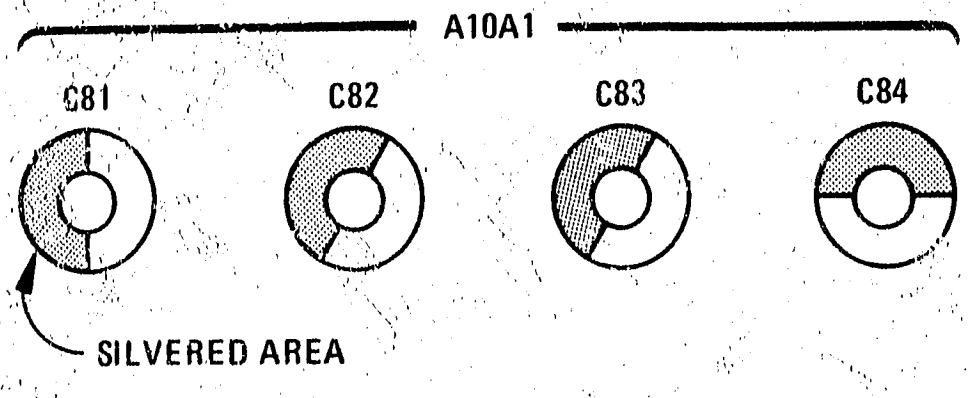


Figure 5-7. 256–512 MHz High-Band Capacitor Adjustment Orientation

ADJUSTMENTS

5-37. RF FILTER ADJUSTMENT (Cont'd)

f. If necessary, on the 64—512 MHz ranges, adjust the appropriate filter components to set pass band and stop band insertion loss within the specified limits. Use a non-metallic tuning tool.

NOTE

The 256—512 MHz high-band is the most difficult to adjust and usually takes many iterations. Start with the adjustment capacitors oriented as in Figure 5-7. Stop band minimum loss should be >30 dB from 692--1000 MHz.

5-38. PRELIMINARY FM ADJUSTMENTS

REFERENCE: Service Sheet 6 and 7.

DESCRIPTION: A digital voltmeter is used to correctly set the mechanical position of the FM compensation pot on the RF oscillator (this is necessary only if either the oscillator or the pot has been changed). Then the DVM is used to adjust the offset (balance) voltages in the FM amplifiers.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE:

1. Set Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	2.56 MHz
FREQUENCY:	RANGE	256—512 MHz
	TUNE	Fully ccw
	RF ON/OFF	ON

NOTE

If compensation pot, A3R2, has been replaced or reoriented, continue with step 2; if not, continue with step 5.

2. To set the compensation pot, A3R2, turn generator's LINE switch to OFF. Loosen setscrews in the gear on pot's shaft. Set DVM to measure ohms, and connect it between 936 and 938 wires on the pot.

3. Without changing position of FREQUENCY TUNE knob, rotate compensation pot's shaft until DVM indicates between 0 and 9 ohms across the two wires.

4. Remove DVM, tighten setscrews, and set LINE to ON.

5. To adjust amplifier offset voltages, set MODULATION MODE to FM EXT DC, and set FREQUENCY TUNE to 300 MHz. Connect DVM to BUFFER OUT test point, A5TP6, and adjust buffer offset adjustment, A5R23, for 0 ± 1.0 mVdc at A5TP2.

6. Connect DVM to OUTPUT test point, A5TP2, and adjust amplifier OFFSET adjustment, A5R8, for 0 ± 1.0 mVdc at A5TP2.

7. Connect DVM to VARACTOR CATHODE test point, A7TP3, and set PEAK DEVIATION switch as shown below. The DVM should read as specified.

ADJUSTMENTS

5-38. PRELIMINARY FM ADJUSTMENTS (Cont'd)

PEAK DEVIATION	DVM Reading at A7TP3
2.56 MHz	_____ < ±5.6 mVdc
1.28 MHz	_____ < ±5.6 mVdc
640 kHz	_____ < ±5.6 mVdc
320 kHz	_____ < ±5.6 mVdc
160 kHz	_____ < ±4.5 mVdc
80 kHz	_____ < ±2.2 mVdc
40 kHz	_____ < ±1.1 mVdc
20 kHz	_____ < ± 0.6 mVdc
10 kHz	_____ < ± 0.6 mVdc
5 kHz	_____ < ± 0.6 mVdc

8. Reset PEAK FM DEVIATION to 2.56 MHz. Turn MODULATION LEVEL control and FREQUENCY TUNE control through their ranges. The voltage at A7TP3 should remain less than 5.6 mVdc.

9. Set MODULATION MODE to OFF and note frequency displayed on generator's counter. Set MODULATION MODE to FM EXT DC; the frequency should change less then 5 kHz.

10. To set VAR pot (varactor bias) A7R19, connect DVM to Varactor Anode A7TP2 and check that voltage is −14.70 ± 0.01 Vdc. If it is not, adjust A7R19 until it is.

11. Perform the FM Linearity Adjustment, paragraph 5-39 or 5-40.

5-39. FM LINEARITY ADJUSTMENT

REFERENCE: Service Sheet 7.

DESCRIPTION: The positive and negative shaping circuits are adjusted to match the characteristics of the varactors in the RF oscillator. The reference output of a variable-phase generator is used to drive the Signal Generator's FM circuits; its variable phase output is used to drive an oscilloscope's horizontal circuits and the FM linearity circuit. A frequency meter is used to demodulate the FM and the demodulated signal is subtracted (i.e., summed 180° out of phase) from the modulation signal in the FM linearity circuit and fed to the oscilloscope's vertical circuits. The shaping circuits are then adjusted for the flatest trace possible on the oscilloscope's display. A reference signal generator and a mixer are used to down-convert the test generator's output to within the range of the frequency meter.

NOTE

The Preliminary FM Adjustments (paragraph 5-38) should be made before performing this adjustment.

A simpler method for adjusting FM linearity, using less test equipment, is presented in paragraph 5-40. This alternate method however, is not as effective for locating the source of FM distortion when used in troubleshooting.

ADJUSTMENTS

5-39. FM LINEARITY ADJUSTMENT (Cont'd)

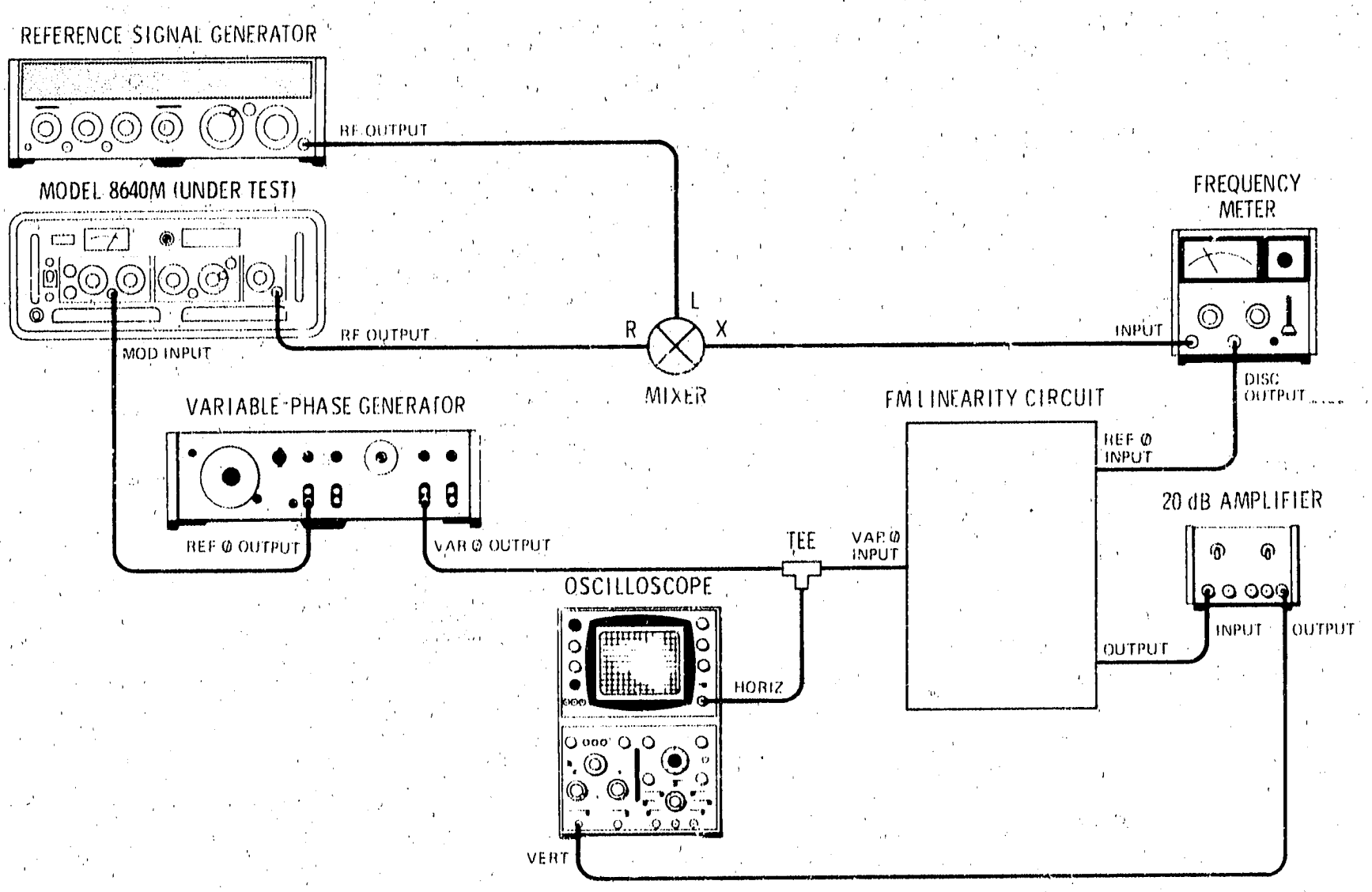


Figure 5-8. FM Linearity Adjustment Test Setup

EQUIPMENT:

Reference Signal Generator	HP 8640A
Mixer	HP 10514A
Frequency Meter	HP 5210A
Filter Kit (for Frequency Meter)	HP 10531A
Variable-Phase Generator	HP 203A
Oscilloscope	HP 180C/1801A/1820C
FM Linearity Circuit	HP 08640-60503
20 dB Amplifier	HP 465A

NOTE

The reference signal generator should have low RF drift, low residual FM (performance approximately equal to the Model 8640A) and be capable of producing 355 MHz at +7 dBm.

PROCEDURE:

1. Connect equipment as shown in Figure 5-8 after setting Signal Generator's controls as follows:

COUNTER	INT NORM
METER	MOD

ADJUSTMENTS

5-39. FM LINEARITY ADJUSTMENT (Cont'd)

MODULATION:	LEVEL	Fully cw
	MODE	FM EXT AC
	PEAK FM DEVIATION	2.56 MHz
FREQUENCY:	RANGE	256—512 MHz
	TUNE	360 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

NOTE

If it is desired to optimize FM linearity at a frequency other than mid-band, proceed as follows:

a. Set FREQUENCY RANGE and TUNE to the desired frequency.

b. Set FREQUENCY RANGE to 256—512 MHz.

c. Set the reference signal generator 5 MHz below the test generator's output frequency.

2. Set reference signal generator for a 355 MHz, CW signal at +7 dBm.

3. Calibrate the frequency meter; prepare a 20kHz filter (from the filter kit) and install it in the frequency meter. Set FM linearity circuit's output switch to ref ϕ. Adjust variable-phase generator's variable phase output's amplitude and the oscilloscope's horizontal gain for full screen deflection on the display. Adjust reference signal generator for 5 MHz on the frequency meter.

4. Set variable-phase generator's reference phase output for a 1 kHz signal at an amplitude that gives a 2.56 MHz peak deviation indication on the Signal Generator's panel meter. Set linearity circuit's voltage divider switch to 100. Adjust generator's variable phase output's phase for a straight line on the display as shown in Figure 5-9. Adjust oscilloscope's vertical gain for ±1 division at edge of display.

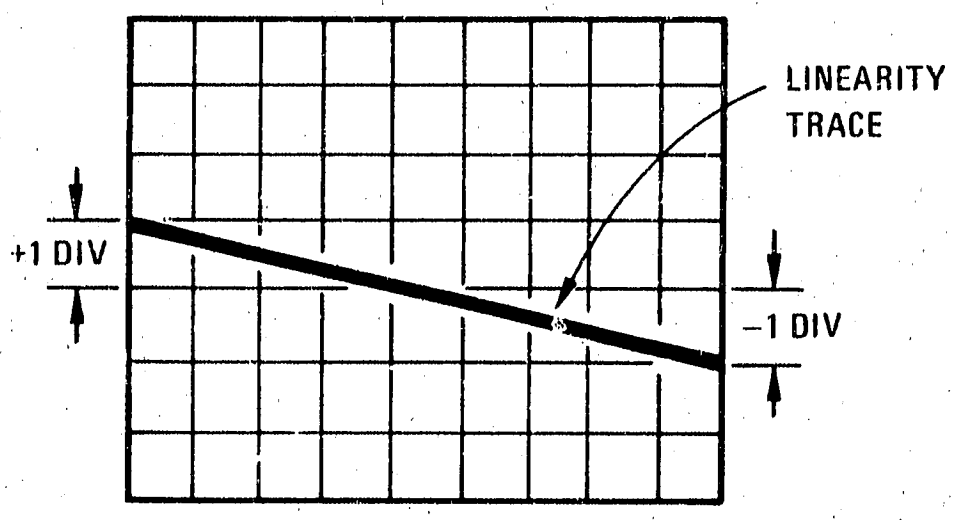


Figure 5-9. FM Linearity Display

ADJUSTMENTS

5-39. FM LINEARITY ADJUSTMENT (Cont'd)

5. Set linearity circuit's output switch to ref ϕ + var ϕ and the voltage divider switch to 1. This calibrates the display for 1% error in linearity per division.

6. Adjust variable-phase generator's variable phase output's phase and linearity circuit's var ϕ level control for the best possible horizontal straight line over *center* portion of trace.

7. Adjust POS SHAPE and NEG SHAPE adjustments, A7R12 and A7R41, for the best possible horizontal straight line at both ends of the trace (but within ± one major division or ±1%).

8. Perform the FM Sensitivity Adjustment (paragraph 5-41).

5-40. FM LINEARITY ADJUSTMENT (Alternate)

REFERENCE: Service Sheet 7.

DESCRIPTION: The Signal Generator is modulated with a 1 kHz signal. The generator's RF output is then demodulated with a frequency meter and the distortion on the frequency meter output is observed with a spectrum analyzer. The shaping circuits are then adjusted for minimum distortion across the 0.5 to 1 MHz frequency range. (See paragraph 5-39 for another FM Linearity Adjustment which should be more useful in troubleshooting FM distortion).

NOTE

The preliminary FM Adjustment (paragraph 5-38) should be made before performing this adjustment.

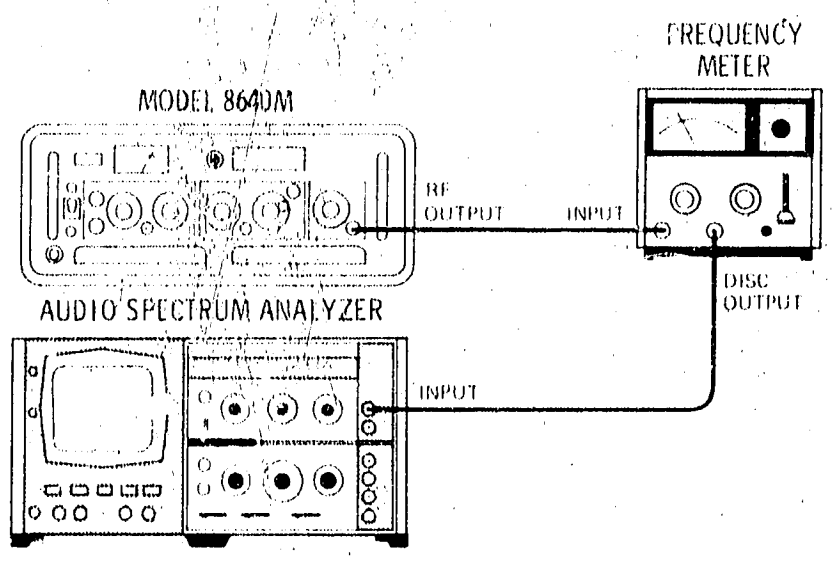


Figure 5-10. FM Linearity Adjustment (Alternate) Test Setup

EQUIPMENT:

Frequency Meter	HP 5210A
Filter Kit (for Frequency Meter) . .	HP 10531A
Audio Spectrum Analyzer	HP 8556A/8552B/141T

ADJUSTMENTS

5-40. FM LINEARITY ADJUSTMENT (Alternate) (Cont'd)

PROCEDURE: 1. Connect equipment as shown in Figure 5-10 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully cw
	MODE	FM 1000
	PEAK FM DEVIATION	5 kHz
FREQUENCY:	RANGE	0.5—1 MHz
	TUNE	0.7 MHz
OUTPUT:	RANGE Switch	+10 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

NOTE

If it is desired to optimize FM linearity at a frequency other than mid-range, proceed as follows:

a. Set FREQUENCY RANGE and TUNE to the desired frequency.

b. Set FREQUENCY RANGE to 0.5—1 MHz.

2. Using the filter kit, prepare a 20 kHz Butterworth low-pass filter and install it in the frequency meter.

3. Set the frequency meter's range to 1 MHz and sensitivity to 1V.

4. Set spectrum analyzer's resolution bandwidth to 100 Hz and its center frequency controls for a 0 to 5 kHz span. Set the display for 10 dB per division.

5. Use generator's MODULATION LEVEL control to set 5 kHz peak deviation (as read on panel meter). Use analyzer's display reference level controls to set the demodulated 1 kHz signal to the top (reference) graticule line on the display.

6. Adjust POS SHAPE and NEG SHAPE adjustments, A7R12 and A7R41, for minimum distortion. Observe both second and third harmonics.

7. Slowly tune from 0.5 to 1 MHz and observe distortion. If harmonics are less than 30 dB down (3% distortion) or if it is desired to minimize distortion across the range, adjust A7R12 and A7R41 for best compromise. However, harmonics must always be greater than 30 dB down.

8. Perform the FM Sensitivity Adjustment (paragraph 5-41).

ADJUSTMENTS

5-41. FM SENSITIVITY ADJUSTMENT

REFERENCE: Service Sheets 6 and 7.

DESCRIPTION: The Signal Generator is frequency modulated with an accurate, 1 Vpk, 16.63 kHz signal. The modulated RF output is monitored on a spectrum analyzer and FM sensitivity is adjusted for the first carrier (Bessel) null.. The adjustments are made at mid-range and at both ends of the range. (Peak deviation = 2.405 x f_{mod} at first carrier null.)

NOTE

The FM Linearity Adjustment (paragraph 5-39 or 5-40) should be made before performing this adjustment.

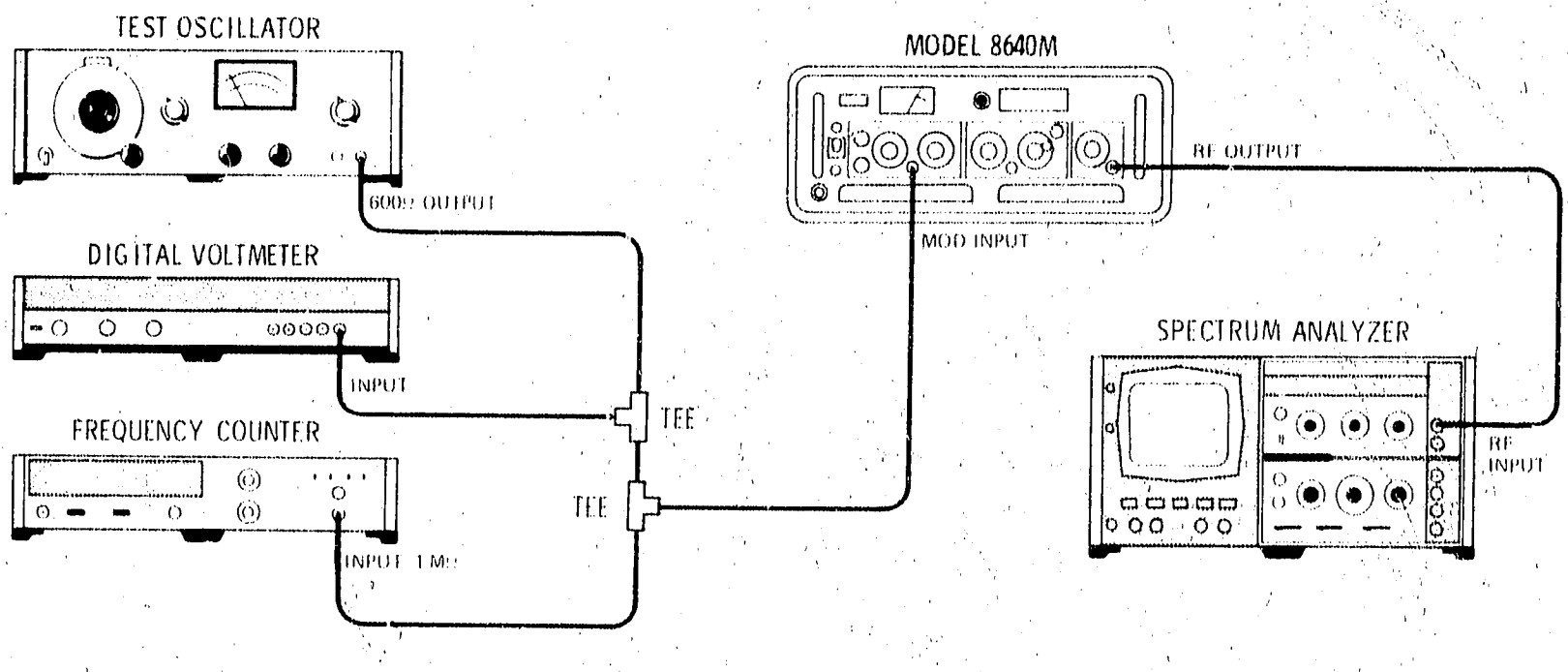


Figure 5-11. FM Sensitivity Adjustment Test Setup

EQUIPMENT:

Test Oscillator	HP 651B
Digital Voltmeter	HP 3490A
Frequency Counter	HP 5327C
Spectrum Analyzer	HP 8554B/8552B/141T

PROCEDURE:

1. Connect equipment as shown in Figure 5-11 after setting Signal Generator's controls as follows:

COUNTER		INT NORM
METER		MOD
MODULATION:	LEVEL	Fully cw
	MODE	OFF
	PEAK FM DEVIATION	40 kHz
FREQUENCY:	RANGE	16—32 MHz
	TUNE	24 MHz
OUTPUT:	RANGE Switch	—40 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

ADJUSTMENTS

5-41. FM SENSITIVITY ADJUSTMENT (Cont'd)

2. Set spectrum analyzer's center frequency to 24 MHz, resolution bandwidth to 3 kHz frequency span per division to 20 kHz, and input attenuation to 0 dB. Center signal on display and use reference level controls (set for 10 dB/division) to set signal peak to top (0 dB reference) graticule line on display.

3. Set Signal Generator's MODULATION MODE to FM INT AC. Adjust test oscillator for a frequency counter reading of 16.63 kHz at 707 mVrms as read on DVM.

4. Adjust MID FM SENS adjustment, A3A4R3, for at least 50 dB of carrier null.

NOTE

The carrier is the center spectrum line on the display. A 50 dB null is when it drops 50 dB or more below its CW amplitude (set in step 2).

5. Set Signal Generator's FREQUENCY TUNE to 16 MHz. Adjust analyzer to center the carrier on the display. Adjust LOW FM SENS adjustment, A3A4R2 for at least 50 dB of carrier null.

6. Set Signal Generator's FREQUENCY TUNE to 32 MHz. Adjust analyzer to center the carrier on the display. Adjust HI FM SENS adjustment, A3A4R4, for at least 50 dB of carrier null.

7. Repeat steps 4 through 6 until carrier null of greater than 50 dB at 16, 24, and 32 MHz is obtained.

8. Perform the FM Distortion Test (paragraph 4-27) and Indicated FM Accuracy Tests (paragraph 4-28).

5-42. OUTPUT IMPEDANCE ADJUSTMENT

REFERENCE: Service Sheet 13B.

DESCRIPTION: A tracking generator is used as an external 50Ω signal source to feed an SWR bridge. The output port of the bridge is connected to a spectrum analyzer. The through port of the bridge is connected to a short circuit to establish a reference, then to the output of A21 Reverse Power Protection Assembly. Return loss versus frequency is dispalyed on the spectrum analyzer.

ADJUSTMENTS

5-42. OUTPUT IMPEDANCE ADJUSTMENT (Cont'd)

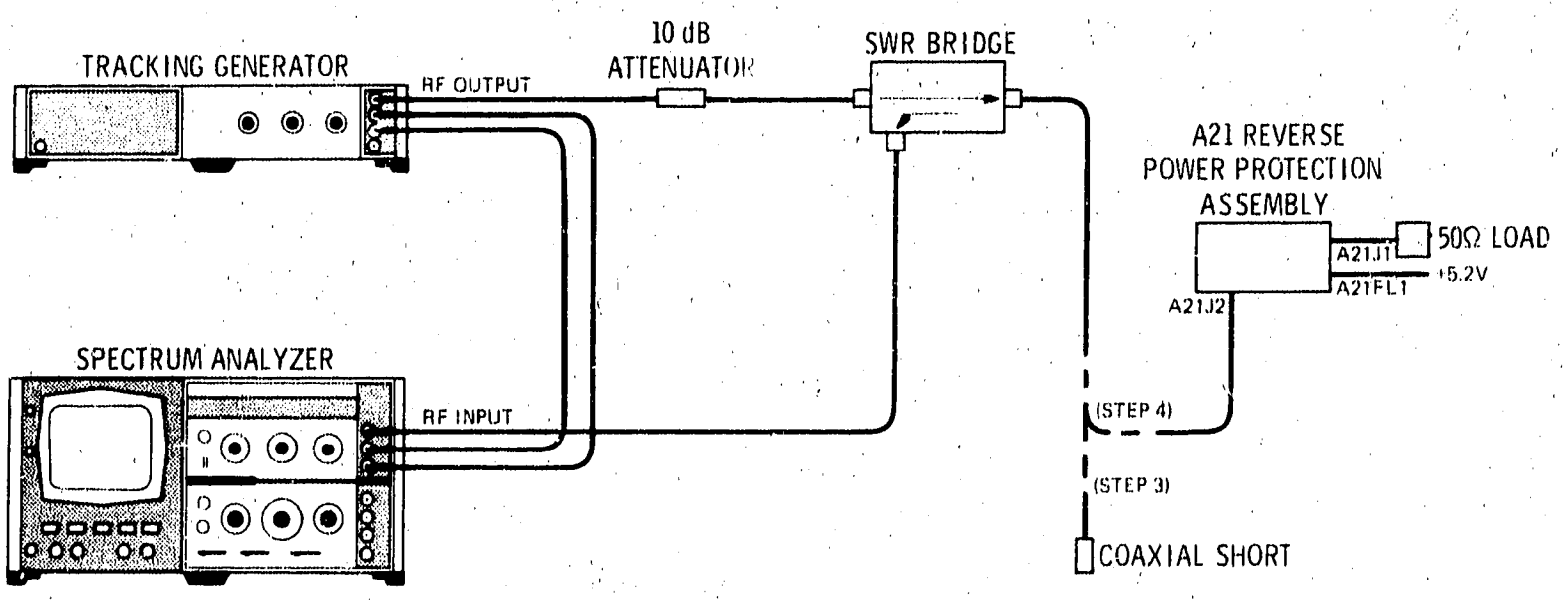


Figure 5-12. Output Impedance Adjustment Test Setup

EQUIPMENT:

Tracking Generator	HP 8444A
Spectrum Analyzer	HP 8554B/8552B/141T
SWR Bridge	Wiltron 60N50
Coaxial Short	HP 11512A
10 dB Attenuator	HP 8491A OPT 10
50Ω Load	HP 908A

PROCEDURE:

1. Remove cables and screws securing A21 Reverse Power Protection Assembly. Orient assembly so that circuit components are accessible and the +5.2V supply and ground (if needed) are connected.

2. Connect equipment as shown in Figure 5-12.

3. Set spectrum analyzer for a frequency span of 50 to 550 MHz, 300 kHz resolution bandwidth, 20 dB input attenuation, and 10 dB per division log display. Set tracking generator output level to 0 dBm.

4. To establish a reference level, connect coaxial short to bridge output port. Use the spectrum analyzer's vertical scale, logarithmic level controls to set the reference level trace to the top of the analyzer display.

5. Remove coaxial short and connect bridge output to output jack A21J2.

6. Set Signal Generator LINE to ON.

7. The level now shown on the spectrum analyzer should be greater than 18 dB down from the reference level set in step 5. If not, adjust FLATNESS ADJ, A21C9, or A21L1 and L2 for minimum level (i.e., maximum return loss). A21L1 and L2 can be adjusted by bending them, or raising and lowering them after they are desoldered.

ADJUSTMENTS

5-42. OUTPUT IMPEDANCE ADJUSTMENT (Cont'd)

NOTE

If adjustment seems necessary, check the return loss of the 50Ω load alone by connecting it to the bridge output. Return loss should be greater than 30 dB.

5-43. REVERSE POWER LEVEL SENSE ADJUSTMENT

REFERENCE: Service Sheet 13.

DESCRIPTION: The output jack, A21J2, of A21 Reverse Power Protection Assembly is driven by a 1 MHz source. Input jack A21J1 is monitored by a high impedance ac voltmeter. The LEVEL SENSE ADJ is set to trip the level sensor at a signal level of 6.1 Vrms.

NOTE

This procedure is also useful for verifying the operation of the reverse power protection without endangering the generator output circuitry.

EQUIPMENT:

Test Oscillator	HP 651B
Digital Voltmeter	HP 3490A

PROCEDURE:

1. Remove cables and screws securing A21 Reverse Power Protection Assembly. Orient assembly so that circuit components are accessible and the +5.2V supply and ground (if needed) are connected.

2. Connect voltmeter to input jack A21J1.

3. Connect 50Ω output of test oscillator to output jack A21J2. Set test oscillator frequency to 1 MHz at approximately 3 Vrms into an open circuit.

4. Set Signal Generator LINE to ON.

CAUTION

Avoid setting the switching point below the stated limits. The Signal Generator's own output can trip the Level Sensor (particularly during low frequency, open-circuit operation). This condition can cause relay contact chatter and reduce contact life.

ADJUSTMENTS

5-43. REVERSE POWER LEVEL SENSE ADJUSTMENT (Cont'd)

5. Slowly increase test oscillator level until the reading on the voltmeter switches to zero. Note the signal level at which this occurs. The signal level should be between 6.0 and 6.2 Vrms. If the signal level is incorrect, adjust LEVEL SENSE ADJ, A21R2, until switching occurs within the correct limits.

NOTE

Always approach switching point from a lower level. The level sensor has a small amount of hysteresis causing the switching point to be lower for a decreasing signal level than for an increasing level.

5-44. INTERNAL REFERENCE FREQUENCY ADJUSTMENT

REFERENCE: Service Sheet 19.

DESCRIPTION: An oscilloscope triggered by an external reference is used to set the internal reference frequency.

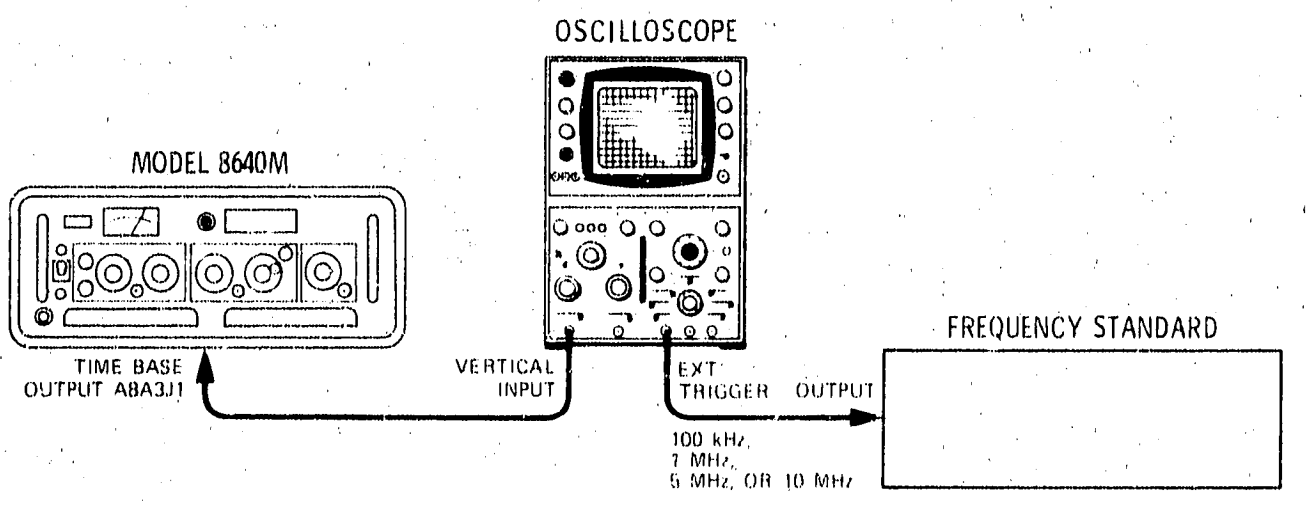


Figure 5-13. Internal Reference Frequency Adjustment Test Setup

EQUIPMENT:

Frequency Standard	Suitable House Standard such as HP 5062C
Oscilloscope	HP 180C/1801A/1820C

PROCEDURE:

1. Remove counter top cover and extend Counter/Lock board assembly as shown in Figure 8-1.
2. Allow generator to warm up for 2 hours.
3. Connect equipment as shown in Figure 5-13. Connect oscilloscope vertical input to A8A3J1 Time Base oscillator output.
4. Set oscilloscope's vertical sensitivity to view time base output and horizontal scale for 0.1 μs/div. Set oscilloscope's trigger to external.

ADJUSTMENTS

5-44. INTERNAL REFERENCE FREQUENCY ADJUSTMENT (Cont'd)

5. Set time base adjustment, in A8A3Y1 for a stationary waveform.

NOTE

Movement of the waveform to the right at a rate of 1 div/s means that the generator's time base frequency is low by 0.1 ppm. Movement of the waveform to the left of 1 div/s means the time base is high by 0.1 ppm.

6. Re-assemble counter assembly.

PARTS LIST

SECTION VI
REPLACEABLE PARTS

6-1. INTRODUCTION

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

6-3. EXCHANGE ASSEMBLIES

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

6-5. ABBREVIATIONS

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

6-7. REPLACEABLE PARTS LIST

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

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

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

c. Miscellaneous parts.

6-9. The information given for each part consists of the following:

a. The Hewlett-Packard part number.

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

c. The description of the part.

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

e. The manufacturer's number for the part.

6-10. The total quantity for each part is given only once — at the first appearance of the part number in the list.

6-11. ORDERING INFORMATION

6-12. To order a part listed in the replaceable parts table, quote the Hewlett-Packard Part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office.

6-13. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

6-14. SPARE PARTS KIT

6-15. Stocking spare parts for an instrument is often done to ensure quick return to service after a malfunction occurs. Hewlett-Packard has a "Spare Parts Kit" available for this purpose. The kit consists of selected replaceable assemblies and components for this instrument. The contents of the kit and the "Recommended Spares" list are based on failure reports and repair data, and provides parts support for one year. A complimentary "Recommended Spares" list for this instrument may be obtained on request and the "Spare Parts Kit" may be ordered through your nearest Hewlett-Packard office.

6-16. ILLUSTRATED PARTS BREAKDOWNS

6-17. Illustrated Parts Breakdowns for the following assemblies are given on the alphabetic foldout

ILLUSTRATED PARTS BREAKDOWNS (Cont'd)

pages in this manual (located after the numbered, schematic foldouts:

A1 Output Range Assembly
A3 RF Oscillator Assembly
A8 Counter/Lock Assembly
A9 Peak Deviation and Range Switch Assembly
A10 Divider/Filter Assembly
A23 Modulation Mode Frequency Switch
A26 AM/AGC and RF Amplifier Assembly

6-18. Figure 6-1 locates front panel mechanical parts. Figures 6-2 and 6-3 are breakdowns of the generator's cabinet parts and the parts that constitute the Type N connector, J1.

Table 6-1. Part Numbers for Exchange Assemblies

Reference Designation	Description	Part Number	
		Exchange Assy	New Assy
A1	RF Output Range Assy	08641-60202	08641-60194
A3	RF Oscillator Assy	08641-60201	08641-60174

Table 6-2. Reference Designations and Abbreviations

REFERENCE DESIGNATIONS

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

ABBREVIATIONS

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

NOTE

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

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

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

NOTE

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

MULTIPLIERS

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

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08641-60194	1	RF OUTPUT RANGE ASSEMBLY	28480	08641-60194
	08641-60202		RESTORED 08641-60194,REQUIRES EXCHANGE	28480	08641-60202
A1MP1	08640-00112	1	SUPPORT, VARIABLE RESISTOR	28480	08640-00112
A1MP2	0380-0660	2	SPACER-RND 1.25LG .128ID .190OD STL CD-PL	28480	0380-0660
A1MP3	3130-0038	1	COUPLER,SWITCH SST U-SHAPED	76854	12276-6
A1MP4	0510-0005	2	RETAINER-RING .25-DIA CD PL STL	0018A	1400-25-CD
A1MP5	3050-0103	4	WASHER-FL MTLC NO.-12 .25-IN-ID	28480	3050-0103
A1MP6	1460-0019	4	SPRING-CPRSN .384-OD .375-LG MUW	28480	1460-0019
A1MP7	08640-20249	2	SWITCH, ROTOR 3-C	28480	08640-20249
A1MP8	08640-00111	1	SUPPORT BOARD	28480	08640-00111
A1MP9	08640-20266	1	SUPPORT, ATTENUATOR	28480	08640-20266
A1MP10	3130-0462	1	SHAFT, INNER 0.125" DIA8 9.38" LG	76854	A-3130-9008-1
A1MP11	2190-0016	2	WASHER-LK INTL T NO.-3/8 .377-IN-ID	28480	2190-0016
A1MP12	2950-0001	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-THK	28480	2950-0030
A1MP13	2200-0127	3	SCREW-MACH 4-40 1.75-IN-LG PAN-HD-POZI	28480	2200-0127
A1MP14	0550-0053	2	SCREW-MACH 5-40 .75-IN-LG PAN-HD-POZI	28480	0550-0055
A1MP15	2200-0109	8	SCREW-MACH 4-40 .438-IN-LG PAN-HD-POZI	28480	2200-0109
A1MP16	2190-0019	17	WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0019
A1MP17	2190-0020	2	WASHER-LK HLCL NO.-5 .128-IN-ID	28480	2190-0020
A1MP18	08641-00004	1	COVER, ATTENUATOR	28480	08641-00004
A1R1	2100-2728	1	RESISTOR-VAR CONTROL C 1K 20% LIN	28480	2100-2728
A1A1	08641-60232	1	RF VERNIER ATTENUATOR SWITCH	28480	08641-60232
A1A1R1	0698-7532	1	RESISTOR 100 .25% .125W F TC=0+-100	19701	MF4C1/8-T0-100R-C
A1A1R2	0698-7794	1	RESISTOR 10K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-1002-C
A1A1R3	0698-3449	2	RESISTOR 28.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2872-F
A1A1R4	0757-0280	22	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1A1TP1	1251-0600	68	CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A1A1TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A1A2	08640-60144	1	OUTPUT ATTENUATOR ASSEMBLY	28480	08640-60144
A1A2C1			NSR		
A1A2J1			NSR		
A1A2J2			NSR		
A2	08641-60031	1	METER DETECTOR AND DRIVER ASSEMBLY	28480	08641-60031
A2C1	0180-0197	18	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A2C2	0180-0116	9	CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A2C3	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A2C4	0180-0228	4	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X901582
A2C5	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A2C6	0160-2055	25	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A2C7	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A2C8	0140-0190		CAPACITOR-FXD 39PF +-5% 300WVDC MICA	72136	DM15E390J0300WV1CR
A2C9	0180-2207	2	CAPACITOR-FXD 100UF+-10% 10VDC TA	56289	150D107X9010R2
A2C10	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A2CR1	1901-0040	31	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2L1	9140-0096	3	COIL-MLD 1UH 10% Q=50 .155Dx.375LG	99800	1537-12
A2L2	9140-0096		COIL-MLD 1UH 10% Q=50 .155Dx.375LG	99800	1537-12
A2Q1	1854-0404	13	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A2R1	2100-2574	2	RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A2R2	2100-2522	1	RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	30983	ET50X103
A2R3	2100-2633	2	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A2R4	0698-3160	3	RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A2R5	0757-0442	36	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R6	0757-0158	1	RESISTOR 619 1% .5W F TC=0+-100	19701	MF7C1/2-10-619R-F
A2R7	0698-3440	7	RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A2R8	0698-3194	2	RESISTOR 20K .25% .125W F TC=0+-50	03888	PME55-1/8-T2-2002-C
A2R9	0757-0279	3	RESISTOR 5.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A2R10	0698-0084	3	RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A2R11	0757-0420	9	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A2R12	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R13	0698-3460	1	RESISTOR 422K 1% .125W F TC=0+-100	91637	CMF-55-1, T-1
A2TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A2TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A2TP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A2TP4	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A2U1	1826-0011	2	IC UA 741 OP AMP	07263	741HM
A2U2	1820-0158	2	IC LM 302 OP AMP	27014	LM302H
A2U3	1820-0476	1	IC UA 715C OP AMP	07263	715HC

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2VR1	1902-0025	3	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	28480	1902-0025
A2VR2	1902-0041	2	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	15818	CD 35822
A3	08641-60174	1	RF OSCILLATOR ASSY(SEE SERVICE SHEET 8)	28480	08641-60174
	08641-60201		RESTORED 08641-60174,REQUIRES EXCHANGE	28480	08641-60201
A3MP1	0510-0052	3	RETAINER-RING .125-DIA STL CD-PL	97464	7200-12-CD
A3MP2	0510-0055	2	RETAINER-RING .438-DIA CD PL STL	C018A	1400-43-CD
A3MP3	1430-0537	1	GEAR SPUR	28480	1430-0537
A3MP4	1430-0759	4	GEAR SPUR	28480	1430-0759
A3MP5	08640-00085	1	GASKET, COVER(FINE TUNE)	28480	08640-00085
A3MP6	08640-20106	2	BUSHING, POT	28480	08640-20106
A3MP7	8160-0233	1	RFI PLUG BE CU AU PL .173-OD .18-L	28480	8160-0233
A3MP8	08640-20106		BUSHING, POT	28480	08640-20106
A3MP9	08640-20224	1	CAP, TRANSISTOR	28480	08640-20224
A3MP10	08640-60206	1	OSCILLATOR, FINE TUNE ASSEMBLY	28480	08640-60206
A3MP11	2200-0151	5	SCREW-MACH 4-40 .75-IN-LG PAN-HD-POZI	28480	2200-0151
A3MP12	2190-0019		WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0019
A3MP13	8160-0203	1	RFI ROUND STRIP NI ALY .06-OD	07700	20-90044
A3MP14	0510-0055		RETAINER-RING .438-DIA CD PL STL	C018A	1400-43-CD
A3MP15	3030-0007	9	SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT	28480	3030-0007
A3MP16	1430-0759		GEAR SPUR	28480	1430-0759
A3MP17	3030-0196	2	SCREW-SET 4-40 .188-IN-LG SMALL CUP-PT	28480	3030-0196
A3MP18	2190-0016		WASHER-LK INTL T NO.-378 .377-IN-ID	28480	2190-0016
A3MP19	3030-0196		SCREW-SET 4-40 .188-IN-LG SMALL CUP-PT	28480	3030-0196
A3MP20	2190-0016		WASHER-LK INTL T NO.-378 .377-IN-ID	28480	2190-0016
A3MP21	3030-0007		SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT	28480	3030-0007
A3MP22	2510-0135		SCREW-MACH 8-32 2.25-IN-LG PAN-HD-POZI	28480	2510-0135
A3MP23	3050-0001	1	WASHER-FL MTLC NO.-8 .172-IN-ID	28480	3050-0001
A3MP24	2190-0017	1	WASHER-LK HLCL NO.-8 .168-IN-ID	28480	2190-0017
A3MP25	08640-20193	1	SHAFT MOD. FINE TUNE	28480	08640-20193
A3MP26	0510-0015	2	RETAINER-RING .125-DIA CD PL STL	0018A	1500-12-CD
A3Q1	5086-4282	1	TRANSISTOR	28480	5086-4282
A3R1	2100-3265	1	RESISTOR-VAR 10K 20% C	71450	550
A3R2	2100-0541	1	RESISTOR-VAR PREC WW 1-TRN 1K 3%	28480	2100-0541
			NOTE: WHEN REPLACING A3R1,R2, ALSO REPLACE BUSHING A3MP6 OR MP8.		
A3A1	08641-60200	1	FILTER/BUFFER AMPLIFIER ASSY, NREP	28480	08641-60200
A3A1FL1	0160-0204	10	FILTER-LP STUD-TERMS	01121	SMFB-A2
A3A1FL2	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A3A1FL3			NSR		
A3A1FL4			NSR		
A3A1FL5	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A3A1FL6	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A3A1J1	1250-0830	2	CONNECTOR-RF SMC M SGL HOLE FR	2K497	701873
A3A1J2	1250-0830		CONNECTOR-RF SMC M SGL HOLE FR	2K497	701873
A3A1MP1	08640-00011	2	COVER, BUFFER BOARD	28480	00640-00011
A3A1MP2	2200-0105	20	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A3A1MP3	3050-0105	6	WASHER-FL MTLC NO.-4 .125-IN-ID	28480	3050-0105
A3A1MP4	8160-0229	4	GASKET, RFI	07700	48-90092
A3A1MP5	08640-00011		COVER, BUFFER BOARD	28480	08640-00011
A3A1MP6	8160-0229		GASKET, RFI	07700	48-90092
A3A1MP7	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A3A1MP8	3050-0105		WASHER-FL MTLC NO.-4 .125-IN-ID	28480	3050-0105
A3A1MP9	2740-0001	2	NUT-HEX-DBL-CHAM 10-32-THD .109-THK	28480	2740-0001
A3A1MP10	2190-0011	2	WASHER-LK INTL T NO.-10 .195-IN-ID	0G791	1022
A3A1MP11	2740-0001		NUT-HEX-DBL-CHAM 10-32-THD .109-THK	28480	2740-0001
A3A1MP12	2190-0011		WASHER-LK INTL T NO.-10 .195-IN-ID	0G791	1022
A3A1MP13	2200-0121	10	SCREW-MACH 4-40 1.125-IN-LG PAN-HD-POZI	28480	2200-0121
A3A1MP14	2190-0019		WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0019
A3A1MP15	2190-0019		WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0019
A3A1MP16	2200-0143	4	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0143
A3A1A1	08640-20117	1	VARACTOR HEAD FILTER ASSY, NREP	28480	08640-20117
A3A1A2	08640-60024	1	RF DIVIDER/FILTER BUFFER AMPLIFIER ASSY	28480	08640-60024
A3A1A2C1	0160-3456	39	CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A2C2	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A2C3	0160-3878	7	CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3A1A2C4	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A2C5	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3A1A2C6	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3A1A2C7	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A2C8	0160-3873	2	CAPACITOR-FXD 4.7PF +-.5PF 200WVDC CER	28480	0160-3873
A3A1A2C9	0160-3876	2	CAPACITOR-FXD 47PF +-20% 200WVDC CER	28480	0160-3876
A3A1A2L1	9140-0142	4	COIL-MLD 2.2UH 10% Q=32 .095DX.25LG	99800	1025-28
A3A1A2L2	9140-0142		COIL-MLD 2.2UH 10% Q=32 .095DX.25LG	99800	1025-28
A3A1A2MP1	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A3A1A2Q1	1854-0247	8	TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0247
A3A1A2Q2	1854-0247		TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0247
A3A1A2R1	0757-0422	5	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3A1A2R2	0698-7212	3	RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-G
A3A1A2R3	0698-7188	4	RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T00-10R-G
A3A1A2R4	0698-3445	4	RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A3A1A2R5	0698-7214	2	RESISTOR 121 1% .05W F TC=0+-100	24546	C3-1/8-T0-121R-G
A3A1A2R6	0698-7224	5	RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-T0-316R-G
A3A1A2R7	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3A1A2R8	0698-7193	2	RESISTOR 16.2 1% .05W F TC=0+-100	24546	C3-1/8-T00-16R2-G
A3A1A2R9	0698-3445		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A3A1A2R10	0698-7214		RESISTOR 121 1% .05W F TC=0+-100	24546	C3-1/8-T0-121R-G
A3A1A2T1	08640-00007	3	LOOP BUFFER INPUT	28480	08640-00007
A3A1A3	08640-60037	1	COUNTER/BUFFER AMPLIFIER ASSY	28480	08640-60037
A3A1A3C1	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A3C2	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A3C3	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3A1A3C4	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A3C5	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A3C6	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A3A1A3C7	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A3A1A3L1	9140-0142		COIL-MLD 2.2UH 10% Q=32 .095DX.25LG	99800	1025-28
A3A1A3L2	9140-0142		COIL-MLD 2.2UH 10% Q=32 .095DX.25LG	99800	1025-28
A3A1A3MP1	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A3A1A3Q1	1854-0247		TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0247
A3A1A3Q2	1854-0247		TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0247
A3A1A3R1	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3A1A3R2	0698-7212		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-G
A3A1A3R3	0698-7188		RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T00-10R-G
A3A1A3R4	0698-3445		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A3A1A3R5	0698-7216	1	RESISTOR 147 1% .05W F TC=0+-100	24546	C3-1/8-T0-147R-G
A3A1A3R6	0698-7224		RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-T0-316R-G
A3A1A3R7	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3A1A3R8	0698-7193		RESISTOR 16.2 1% .05W F TC=0+-100	24546	C3-1/8-T00-16R2-G
A3A1A3R9	0698-3445		RESISTOR 348 1% .125W F TC=0+-100	24546	C4-1/8-T0-348R-F
A3A1A3R10	0698-7196	2	RESISTOR 21.5 2% .05W F TC=0+-100	24546	C3-1/8-T0-21R5-G
A3A1A3R11	0698-7196		RESISTOR 21.5 2% .05W F TC=0+-100	24546	C3-1/8-T00-21R5-G
A3A1A3R12	0698-7205	2	RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-51R1-G
A3A1A3T1	08640-00007		LOOP BUFFER INPUT	28480	08640-00007
A3A2	08640-60134	1	VARACTOR HEAD ASSY, NRFR	28480	08640-60134
A3A3	08640-60135	1	OSCILLATOR LOOP ASSY, NHFR	28480	08640-60135
A3A4	08640-60196	1	CONNECTOR BOARD ASSY	28480	08640-60196
A3A4C1	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X9035B2
A3A4C2	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X9035B2
A3A4L1	9100-1664	2	COIL-MLD 3MH 5% Q=70 .215DX.56LG	24226	22/302
A3A4L2	9100-1664		COIL-MLD 3MH 5% Q=70 .215DX.56LG	24226	22/302
A3A4MP1	08640-00036	1	SUPPORT, P.C. BOARD	28480	08640-00036
A3A4MP2	2200-0141	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0141
A3A4MP3	3050-0105		WASHER-FL MTLC NO.-4 .125-IN-ID	28480	3050-0105
A3A4MP4	2190-0009	2	WASHER-LK INTL T NO.-8 .168-IN-ID	0G791	820-BC
A3A4MP5	2260-0009	6	NUT-HEX-W/LKWR 4-40-THD .094-THK .25-A/F	28480	2260-0011
A3A4R1	2100-3054	1	RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-503
A3A4R2	2100-3107	3	RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-202
A3A4R3	2100-3123	5	RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	32997	3006P-1-501
A3A4R4	2100-3154	3	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-102
A3A4R5	0698-3439	1	RESISTOR 178 1% .125W F TC=0+-100	24546	C4-1/8-T0-178R-F
A3A4R6	0757-0416	17	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A3A4R7	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3A4TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A3A4TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A4			NOT ASSIGNED		
A5	08640-60029	1	FM AMPLIFIER ASSY (DOES NOT INCL A5MP3)	28480	08640-60029
A5C1	0160-2228	2	CAPACITOR-FXD 2700PF +-5% 300WVDC MICA	28480	0160-2228
A5C2	0160-2228		CAPACITOR-FXD 2700PF +-5% 300WVDC MICA	28480	0160-2228
A5C3	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A5C4	0180-1715	3	CAPACITOR-FXD 150UF+-10% 6VDC TA	56289	150D157X9006R2
A5C5	0180-0269	1	CAPACITOR-FXD 1[illegible]F +75-10% 150VDC AL	56289	30D105G150BA2
A5C6	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A5C7	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X903582
A5C8	0180-2211	1	CAPACITOR-FXD 5UF+50-10% 150VDC AL	56289	30D505F150CC2
A5CR1-A5CR4		3	NOT ASSIGNED		
A5CR5	1901-0025	20	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5CR6	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5CR7	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5CR8	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5CR9	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5CR10	1901-0050	17	DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR11	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR12	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A5CR13	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A5MP1	4040-0750	1	EXTRACTOR-PC BD RED POLYC .062-BD-THKNS	28480	4040-0750
	1480-0073	13	PIN:DRIVE 0.250" LG	00000	OBD
A5MP2	4040-0756	1	EXTRACTOR-PC BOARD, WHITE	28480	4040-0756
	1480-0073		PIN:DRIVE 0.250" LG	00000	OBD
A5MP3	0400-0418	1	CHANNEL GROMMET, 1.25" LG	00000	OBD
A5Q1	1854-0221	5	TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A5Q2	1854-0221		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A5Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A5Q4	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A5Q5	1853-0038	4	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
	1205-0011	3	HEAT SINK TO-5/TO-39-PKG	28480	1205-0011
	1200-0173	23	INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q6	1853-0038		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
	1205-0011		HEAT SINK TO-5/TO-39-PKG	28480	1205-0011
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q7	1853-0038		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q8	1854-0039	2	TRANSISTOR NPN 2N3053 SI TO-5 PD=1W	04713	2N3053
	1205-0011		HEAT SINK TO-5/TO-39-PKG	28480	1205-0011
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q9	1854-0022	3	TRANSISTOR NPN SI TO-39 PD=700MW	07263	S17843
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q10	1854-0237	2	TRANSISTOR NPN SI TO-66 PD=20W FT=10MHZ	04713	2N3738
	0510-0002	2	THREADED INSERT-NUT 6-32 .062-LG	28480	0510-0002
	1205-0085	2	HEAT SINK TO-66-PKG	28480	1205-0085
	2360-0199	2	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	28480	2360-0199
	2420-0003	2	NUT-HEX-DBL-CHAM 6-32-THD .094-THK	28480	2420-0004
	2190-0018	6	WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0018
	2190-0007	2	WASHER-LK INTL T NO.-6 .141-IN-ID	78189	1906-00
A5Q11	1853-0012	1	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A5Q12	1854-0237		TRANSISTOR NPN SI TO-66 PD=20W FT=10MHZ	04713	2N3738
	0510-0002		THREADED INSERT-NUT 6-32 .062-LG	28480	0510-0002
	1205-0085		HEAT SINK TO-66-PKG	28480	1205-0085
	2360-0199		SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	28480	2360-0199
	2420-0003		NUT-HEX-DBL-CHAM 6-32-THD .094-THK	28480	2420-0004
	2190-0018		WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0018
	2190-0007		WASHER-LK INTL T NO.-6 .141-IN-ID	78189	1906-00
A5R1	0698-3162	12	RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A5R2	0757-0180	3	RESISTOR 31.6 1% .125W F TC=0+-100	24546	C4, T-0
A5R3	0757-0403	2	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A5R4	0757-0290	7	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A5R5	0757-0317	7	RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A5R6	0698-3132	9	RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A5R7	0698-3410	1	RESISTOR 3.16K 1% .5W F TC=0+-100	91637	MFF-1/2-10
A5R8	2100-3164	1	RESISTOR-TRMR 10 20% C SIDE-ADJ 17-TRN	32997	3006P-1-100
A5R9	0698-3085	7	RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A5R10	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R11	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A5R12	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A5R13	0757-0180		RESISTOR 31.6 1% .125W F TC=0+-100	24546	C4, T=0
A5R14	0757-0403		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A5R15	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A5R16	0757-0401	15	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R17	0698-3446	2	RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A5R18	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A5R19	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R20	0757-0346	14	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A5R21			NOT ASSIGNED		
A5R22	0698-3430	1	RESISTOR 21.5 1% .125W F TC=0+-100	03888	PME55-1/8-T0-21R5-F
A5R23	2100-3154		RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-102
A5R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R26	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A5R27	0757-0441	6	RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A5R28	0757-0440	7	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A5R29	0698-3158	1	RESISTOR 23.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2372-F
A5R30	0757-0443	3	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A5R31	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R32	0757-0438	31	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R33	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A5R34	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A5R35	0757-0399	5	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A5R36	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A5R37	0698-3391	1	RESISTOR 21.5 1% .5W F TC=0+-100	19701	MF7C-1
A5R38	0757-0198	2	RESISTOR 100 1% .5W F TC=0+-100	19701	MF7C1/2-T0-101-F
A5R39	0698-5839	2	RESISTOR 9.1 5% .25W FC TC=-400/+500	01121	CB91G5
A5R40	0698-5839		RESISTOR 9.1 5% .25W FC TC=-400/+500	01121	CB91G5
A5R41	0698-3260	2	RESISTOR 464K 1% .125W F TC=0+-100	91637	CMF-55-1, T-1
A5R42	0698-3157	4	RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1962-F
A5TP1	0360-1514	46	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5TP6	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A5U1	1820-0158		IC LM 302 OP AMP	27014	LM302H
A6			NOT ASSIGNED		
A7	08640-60309	1	FM SHAPING BOARD ASSY	28480	08640-60309
A7C1	0180-1735	3	CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	150D224X9035A2
A7C2	0180-1735		CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	150D224X9035A2
A7C3	0180-0373	1	CAPACITOR-FXD .68UF+-10% 35VDC TA	56289	150D684X9035A2
A7C4	0180-2141	1	CAPACITOR-FXD 3.3UF+-10% 50VDC TA	56289	150D335X9050B2
A7C5	0180-0141	2	CAPACITOR-FXD 50UF+75-10% 50VDC AL	56289	30D506G050DD2
A7C6	0180-1715		CAPACITOR-FXD 150UF+-10% 6VDC TA	56289	150D157X9006R2
A7C7	0160-2453	1	CAPACITOR-FXD .22UF +-10% 80WVDC POLYE	28480	0160-2453
A7C8	0180-1846	1	CAPACITOR-FXD 2.2UF+-10% 35VDC TA	56289	150D225X9035B2
A7C9	0160-2204	6	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A7C10	0180-0141		CAPACITOR-FXD 50UF+75-10% 50VDC AL	56289	30D506G050DD2
A7C11	0180-1715		CAPACITOR-FXD 150UF+-10% 6VDC TA	56289	150D157X9006R2
A7C12	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A7C13	0180-2206	3	CAPACITOR-FXD 60UF+-10% 6VDC TA	56289	150D606X9006B2
A7CR1	1901-0033	20	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR2	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR3	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR4	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR5	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR6	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR7	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR8	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR9	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR10	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A7CR11	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR12	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR13	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR14	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR15	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7CR16	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR17	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR18	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR19	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR20	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR21	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7K1	0490-1080	1	RELAY-REED 1C .25A 150V CONT 5V-COIL	28480	0490-1080
A7MP1	4040-0751	1	EXTRACTOR-PC BD ORN POLYC .062-BD-THKNS	28480	4040-0751
	1480-0073		PIN:DRIVE 0.250" LG	00000	08D
A7MP2	4040-0748	3	EXTRACTOR-PC BD BLK POLYC .062-BD-THKNS	28480	4040-0748
	1480-0073		PIN:DRIVE 0.250" LG	00000	C8D
A7Q1	1854-0071	26	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q2	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q3	1854-0022		TRANSISTOR NPN SI TO-39 PD=700MW	07263	S17843
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A7Q4	1853-0020	14	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A7Q5	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A7Q6	1853-0038		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A7Q7	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A7Q8	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A7R1	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A7R2	0698-3450	6	RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A7R3	0698-3153	3	RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A7R4	0757-0199	4	RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A7R5	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A7R6	0698-3243	2	RESISTOR 178K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1783-F
A7R7	0698-3454	1	RESISTOR 215K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2153-F
A7R8	0757-0289	3	RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A7R9	0698-3161	2	RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3832-F
A7R10	0698-3154	7	RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A7R11	0757-0288	1	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A7R12	2100-3109		RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-202
A7R13	0698-3155	9	RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A7R14	0698-3260		RESISTOR 464K 1% .125W F TC=0+-100	91637	CMF-55-1, T-1
A7R15	0757-0458	6	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A7R16	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A7R17	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A7R18	0757-0123	1	RESISTOR 34.8K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3438-F
A7R19	2100-3103	1	RESISTOR TRMR 10K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-103
A7R20	0698-3152	2	RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A7R21	0698-3437	3	RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A7R22	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A7R23	0698-0083	16	RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A7R24	0757-0279		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A7R25	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A7R26	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A7R27	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A7R28	0757-0439	6	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R29	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7R30	0698-4037	7	RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R31	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R32	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R33	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R34	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R35	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R36	0698-4037		RESISTOR 46.4 1% .125W F TC=0+-100	24546	C4-1/8-T0-46R4-F
A7R37	0757-0180		RESISTOR 31.6 1% .125W F TC=0+-100	24546	C4, T-0
A7R38	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7R39	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A7R40	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R41	2100-3109		RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-202
A7R42	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A7R43	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A7R44	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A7R45	0698-3156	3	RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A7R46	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A7R47	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A7R48	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R49	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A7R50	0757-0200	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A7R51	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A7R52	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A7R53	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A7R54	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A7R55	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7R56	0698-3432	2	RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7R57	0757-0402	1	RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A7R58	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7R59	0757-0400	3	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A7R60	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A7R61	0757-0398	3	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A7R62	0757-0397	6	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A7R63	0757-0276	4	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A7R64	0757-0395	1	RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A7R65	0757-0394	9	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A7R66	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A7R67			NOT ASSIGNED		
A7R68			NOT ASSIGNED		
A7R69			NOT ASSIGNED		
A7R70	0698-3150	5	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A7R71	0757-0424	1	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A7R72	0698-3450		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A7R73	0698-3450		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A7R74	0698-3150		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A7R75	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A7R76	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A7R77	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A7R78	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A7R79	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A7TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A7TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A7TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A7TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A7TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A7U1	1826-0013	1	IC 741 OP AMP	28480	1826-0013
A7U2	1820-0125	1	IC UA 711C COMPARATOR	07263	711HC
A7U3	1820-0175	1	IC-DIGITAL SN7405N TTL HEX 1	01295	SN7405N
A7VR1	1902-0049	4	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	28480	1902-0049
A7VR2	1902-3182	2	DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	28480	1902-3182
A8	08641-60176	1	COUNTER/LOCK ASSEMBLY (SEE SERVICE SHEET C)	28480	08641-60176
A8C1	0160-2049	13	CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A8C2	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A8C3			NOT ASSIGNED		
A8C4	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A8C5	0160-2357	2	CAPACITOR-FDTHRU 1000PF +80 -20% 500V	28480	0160-2357
A8C6	0160-2357		CAPACITOR-FDTHRU 1000PF +80 -20% 500V	28480	0160-2357
A8FL1	0160-0204		FILTER-LP STUD-TERMS	01121	9MFB-A2
A8FL2	0160-0204		FILTER-LP STUD-TERMS	01121	9MFB-A2
A8FL3	0160-0204		FILTER-LP STUD-TERMS	01121	9MFB-A2
A8L1	9100-2232	4	COIL-MLD 560NH 10% Q=50 .156DX.375LG	24226	15/560
A8L2	9100-2232		COIL-MLD 560NH 10% Q=50 .156DX.375LG	24226	15/560
A8L3			NOT ASSIGNED		
A8L4	9100-2232		COIL-MLD 560NH 10% Q=50 .156DX.375LG	24226	15/560
A8L5	9100-2232		COIL-MLD 560NH 10% Q=50 .156DX.375LG	24226	15/560
A8MP1	2200-0704	1	SCREW-MACH 4-40 .375-IN-LG BDG-HD-SLT	28480	2200-0704
A8MP2	2190-0027	3	WASHER-LK INTL T NO.-1/4 .256-IN-ID	78189	1914-00
A8MP3	3050-0443	2	WASHER-FL NM NO.-8 .176-IN-ID .375-IN-OD	86928	5624-16-10
A8MP4	8160-0219	1	RFI STRIP NI ALY 1.06-W 2.64-L	28480	8160-0219
A8MP5	8160-0220	1	RFI STRIP NI ALY 2.48-W 4.215-L	28480	8160-0220
A8MP6	08641-00047	1	SHIELD, LED	28480	08641-00047
A8MP7	08640-00009	1	COVER, COUNTER FILTER	28480	08640-00009
A8MP8	08640-00051	1	FRAME C, SHIELD, LARGE	28480	08640-00051
A8MP9	08640-00052	1	FRAME C, SHIELD, SMALL	28480	08640-00052
A8MP10	08640-20059	1	COUNTER COVER, INPUT	28480	08640-20059
A8MP11	08641-20226	1	HEAT SINK, COUNTER	28480	08641-20226
A8MP12			NOT ASSIGNED		
A8MP13	08640-20089	2	SUPPORT, P.C. BOARD, COUNTER	28480	08640-20089
A8MP14			NOT ASSIGNED		
A8MP15	08641-20207	1	TOP COVER, COUNTER	28480	08641-20202
A8MP16	08640-20203	1	BOTTOM COVER, COUNTER	28480	08640-20203
A8MP17			NOT ASSIGNED		
A8MP18	08640-40041	1	PIPE, LIGHT, O-FLOW	28480	08640-40041
A8MP19 THRU A8MP24			NOT ASSIGNED		
A8MP25	05640-00100	1	INSULATOR, RF SCALER	28480	08640-00100

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8MP26	2200-0147	5	SCREW-MACH 4-40 .5-IN-LG PAN-HD-POZI	28480	2200-0147
A8MP27	2200-0107	51	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A8MP28	2200-0151		SCREW-MACH 4-40 .75-IN-LG PAN-HD-POZI	28480	2200-0151
A8MP29	2190-0005	2	WASHER-LK EXT T NO.-4 .116-IN-ID	78189	1804-01
A8MP30	2950-0006	3	NUT-HEX-DBL-CHAM 1/4-32-THD .094-THK	73734	9000
A8MP31	2200-0140	7	SCREW-MACH 4-40 .25-IN-LG 100 DEG	28480	2200-0140
A8MP32	08640-00102	1	INSULATOR, COUNTER (TIME BASE)	28480	08640-00102
A8MP33	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A8MP34			NOT ASSIGNED		
A8MP35			NOT ASSIGNED		
A8MP36	0516-0005	2	SCREW-MACH 0-80 .188-IN-LG PAN-HD-SLT	28480	0516-0005
A8MP37	2200-0103	5	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	28480	2200-0103
A8MP38			NOT ASSIGNED		
A8MP39	0361-0207	2	RIVET:BLIND, BLACK NYLON 0.125" DIA	00000	OBD
A8MP40	2200-0504	4	SCREW-MACH 4-40 1.062-IN-LG PAN-HD-POZI	28480	2200-0506
A8MP41	08640-00096	1	INSULATOR, COUNTER, HEAT SINK	28480	08640-00096
A8MP42	0520-0174	1	SCREW-MACH 2-56 .25-IN-LG PAN-HD-POZI	28480	0520-0174
A8MP43	2190-0124	8	WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A8MP44	2190-0019		WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0019
A8MP45	2950-0078	8	NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A8MP46	08640-20297	1	GROUND, SCALER	28480	08640-20297
A8MP47	2950-0001	1	HEX NUT-DBL-CHAM 3/8-32-THD .094"THK	28480	2950-0001
A8MP48	2190-0016	2	WASHER, LOCK INT T NO.-3/8.377-IN-ID	28480	2190-0016
A8U1			NOT ASSIGNED		
A8U2	1990-0462	6	DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U3	1990-0462		DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U4	1990-0462		DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U5	1990-0462		DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U6	1990-0462		DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U7	1990-0462		DISPLAY-NUM DOT MAT 1-CHAR .29-H	28480	1990-0462
A8U8	1820-1003	1	IC-DIGITAL ECL HEXADEC	28480	1820-1003
A8A1	08640-60306	1	RF SCALER BOARD ASSEMBLY (DOES NOT INCLUDE A8U8)	28480	08640-60306
A8A1C1	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A8A1C2	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A8A1C3	0160-3878		CAPACITOR-FXD 1000PF +-20% 100WVDC CER	28480	0160-3878
A8A1C4	0160-3879	20	CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A1C5			CAPACITOR, FXD, NORMALLY NOT LOADED		
A8A1C6	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A1C7	0160-4084	4	CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A8A1C8	0160-0690	1	CAPACITOR-FXD 1PF +-.5PF 100WVDC CER	28480	0160-0690
A8A1C9	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A1C10	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A1C11	0160-3872	2	CAPACITOR-FXD 2.2PF +-.25PF 200WVDC CER	28480	0160-3872
A8A1C12			CAPACITOR, FXD, NORMALLY NOT LOADED		
A8A1C13	0160-0572	1	CAPACITOR-FXD 2200PF +-20% 100WVDC CER	28480	0160-0572
A8A1CR1	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1CR2	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1CR3	1901-0639	3	DIODE-PIN 110V	28480	1901-0639
A8A1CR4	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1CR5	1901-0639		DIODE-PIN 110V	28480	1901-0639
A8A1CR6	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1CR7	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1CR8	1901-0639		DIODE-PIN 110V	28480	1901-0639
A8A1CR9	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A8A1J1	1250-1220	6	CONNECTOR-RF SMC M PC	98291	50-051-0109
A8A1J2	1250-1220		CONNECTOR-RF SMC M PC	98291	50-051-0109
A8A1K1	0490-1073	6	RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A8A1L1			PRINTED CIRCUIT TRACE INDUCTANCE		
A8A1L2			PRINTED CIRCUIT TRACE INDUCTANCE		
A8A1Q1	1854-0345	2	TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A8A1Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A8A1Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A8A1R1	0698-7215	3	RESISTOR 133 1% .05W F TC=0+-100	24546	C3-1/8-T0-133R-G
A8A1R2	0698-7218	5	RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A8A1R3	0698-7215		RESISTOR 133 1% .05W F TC=0+-100	24546	C3-1/8-T0-133R-G
A8A1R4	0698-7188		RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T00-10R-G
A8A1R5	0698-7206	2	RESISTOR 56.2 1% .05W F TC=0+-100	24546	C3-1/8-T00-56R2-G
A8A1R6	0698-7206		RESISTOR 56.2 1% .05W F TC=0+-100	24546	C3-1/8-T00-56R2-G
A8A1R7	0698-3152		RESISTOR 3.48K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3481-F
A8A1R8	0698-7205		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-51R1-G
A8A1R9	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A8A1R10	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8A1R11	0698-7227	6	RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A8A1R12	0698-7201	1	RESISTOR 34.8 1% .05W F TC=0+-100	24546	C3-1/8-T00-34R8-G
A8A1R13	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A8A1R14	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A8A1R15	0698-7240	2	RESISTOR 1.47K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1471-G
A8A1R16	0698-7240		RESISTOR 1.47K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1471-G
A8A1R17	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A8A1R18	0757-1094	4	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A8A1R19	0757-0465	5	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A8A1R20	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A8A1R21	0698-3434	1	RESISTOR 34.8 1% .125W F TC=0+-100	24546	C4-1/8-T0-34R8-F
A8A1R22	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A8A1U1	1820-0736	2	IC-DIGITAL ECL DUAL BIN	28480	1820-0736
A8A1U2			NOT ASSIGNED		
A8A1U3	1820-0145	6	IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A8A1U4	1820-0817	1	IC-DIGITAL MC10131P ECL DUAL D-M/S	04713	MC1013;P
A8A1U5	1820-0982	3	IC 5084-0164 DIFF AMPL	28480	1820-0982
A8A1U6	1820-0982		IC 5084-0164 DIFF AMPL	28480	1820-0982
			A8A1 MISCELLANEOUS		
	1200-0475	33	CONNECTOR-SGL CONT SKT .016-IN-BSC-SZ	22526	75060-007
A8A2	08641-60196	1	COUNTER LOCK/DISPLAY ASSEMBLY (DOES NOT INCLUDE A8U1 THRU A8U7)	28480	08641-60196
A8A2A1			NSR, P/O A8A2, COUNTER/LOCK ASSEMBLY	28480	
A8A2A1C1	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A8A2A1C2	0160-3094	9	CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A8A2A1C3	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A8A2A1C4	0180-0374	10	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A8A2A1C5	0180-1735		CAPACITOR-FXD .22UF+-10% 35VDC TA	56289	150D224X9035A2
A8A2A1C6	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A2A1C7	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A8A2A1C8	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X901582
A8A2A1C9	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X901582
A8A2A1C10	0160-3455	3	CAPACITOR-FXD 470PF +-10% 1000WVDC CER	28480	0160-3455
A8A2A1C11	0160-3455		CAPACITOR-FXD 470PF +-10% 1000WVDC CER	28480	0160-3455
A8A2A1C12	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A8A2A1C13	0160-2207	1	CAPACITOR-FXD 300PF +-5% 300WVDC MICA	28480	0160-2207
A8A2A1C14	0160-3875	2	CAPACITOR-FXD 22PF +-5% 200WVDC CER	28480	0160-3875
A8A2A1C15	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A2A1C16	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A2A1C17	0160-0174	4	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A8A2A1C18	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A8A2A1C19	0160-2201	1	CAPACITOR-FXD 51PF +-5% 300WVDC MICA	28480	0160-2201
A8A2A1C20	0180-0291	10	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A8A2A1C21	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A2A1C22	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A2A1C23	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A2A1C24	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A8A2A1C25	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A8A2A1C26	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A8A2A1C27	0140-0205	3	CAPACITOR-FXD 62PF +-5% 300WVDC MICA	72136	DM15E620J0300WV1CR
A8A2A1C28			NOT ASSIGNED		
A8A2A1C29			NOT ASSIGNED		
A8A2A1C30			NOT ASSIGNED		
A8A2A1C31	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A8A2A1C32	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A8A2A1C33	0160-3877	2	CAPACITOR-FXD 100PF +-20% 200WVDC CER	28480	0160-3877
A8A2A1CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8A2A1CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A8A2A1CR3	1901-0539	6	DIODE-SCHOTTKY	28480	1901-0539
A8A2A1L1	9140-0112	3	COIL-MLD 4.7UH 10% Q=33 .155DX.375LG	24226	15/471
A8A2A1L2	9140-0112		COIL-MLD 4.7UH 10% Q=33 .155DX.375LG	24226	15/471
A8A2A1L3	9140-0210	1	COIL-MLD 100UH 5% Q=50 .155DX.375LG	24226	15/103
A8A2A1Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q2	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q3	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q4	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q5	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q6	1855-0062	1	TRANSISTOR J-FET N-CHAN D-MODE SI	28480	1855-0062
A8A2A1Q7	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q8	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q9	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q10	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8A2A1Q11	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q12	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q13	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q14	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q15	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1Q16	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q17	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A8A2A1Q18	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A2A1R1	0698-7219	3	RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-G
A8A2A1R2	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A8A2A1R3	0698-7253	7	RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A8A2A1R4	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A8A2A1R5	0698-7239	2	RESISTOR 1.33K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1331-G
A8A2A1R6	0698-7239		RESISTOR 1.33K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1331-G
A8A2A1R7	0698-7246	4	RESISTOR 2.61K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2611-G
A8A2A1R8	0698-7246		RESISTOR 2.61K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2611-G
A8A2A1R9	0698-7277	7	RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A8A2A1R10	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A8A2A1R11	0683-8245	2	RESISTOR 820K 5% .25W FC TC=-800/+900	01121	CB8245
A8A2A1R12	0683-8245		RESISTOR 820K 5% .25W FC TC=-800/+900	01121	CB8245
A8A2A1R13	0698-7267	2	RESISTOR 19.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1962-G
A8A2A1R14	0698-7272	3	RESISTOR 31.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3162-G
A8A2A1R15	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A8A2A1R16	0698-7267		RESISTOR 19.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1962-G
A8A2A1R17	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A8A2A1R18	0698-7284	2	RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-G
A8A2A1R19	0698-7270	1	RESISTOR 26.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2612-G
A8A2A1R20	0698-7288	1	RESISTOR 147K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1473-G
A8A2A1R21	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A8A2A1R22	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A8A2A1R23	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A8A2A1R24	0698-7260	6	RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A8A2A1R25	0698-7284		RESISTOR 100K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1003-G
A8A2A1R26	0698-3453	2	RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A8A2A1R27	0698-7260		RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A8A2A1R28	0698-7258	2	RESISTOR 8.25K 1% .05W F TC=0+-100	24546	C3-1/8-T0-8251-G
A8A2A1R29	0698-7256	1	RESISTOR 6.81K 1% .05W F TC=0+-100	24546	C3-1/8-T0-6811-G
A8A2A1R30	0698-7258		RESISTOR 8.25K 1% .05W F TC=0+-100	24546	C3-1/8-T0-8251-G
A8A2A1R31	0698-7260		RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A8A2A1R32	0698-7260		RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A8A2A1R33	0698-7264	1	RESISTOR 14.7K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1472-G
A8A2A1R34	0698-7243	3	RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A8A2A1R35	0698-7229	5	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A8A2A1R36	0757-0442		RESISTOR 1UK 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A2A1R37	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A8A2A1R38	0698-3442	1	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A8A2A1R39	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A2A1R40	0757-0279		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
A8A2A1R41	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A2A1R42	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A8A2A1R43	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A8A2A1R44	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A8A2A1R45			NOT ASSIGNED		
A8A2A1R46			NOT ASSIGNED		
A8A2A1R47	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A8A2A1R48			NOT ASSIGNED		
A8A2A1R49	0698-7243		RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A8A2A1R50	0698-7236	4	RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A8A2A1R51	0698-7248	2	RESISTOR 3.16K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3161-G
A8A2A1R52	0698-7248		RESISTOR 3.16K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3161-G
A8A2A1R53	0698-7229		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A8A2A1R54	0698-7229		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A8A2A1R55	0698-7236		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A8A2A1R56	0811-1662	1	RESISTOR .47 5% 2W PW TC=0+-800	75042	BWH2-47/100-J
A8A2A1R57	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A8A2A1R58			NOT ASSIGNED		
A8A2A1R59	0698-7281	1	RESISTOR 75K 2% .05W F TC=0+-100	24546	C3-1/8-T0-7502-G
A8A2A1R60	0698-7188		RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T00-10R-G
A8A2A1R61	0698-7243		RESISTOR 1.96K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1961-G
A8A2A1R62	0698-0090	1	RESISTOR 46.4 1% .5W F TC=0+-100	91637	MFF-1/2-10
A8A2A1R63	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A8A2A1TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A2A1TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A2A1TP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A2A1TP4	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A2A1TP5	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8A2A1TP6	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A2A1U1	1820-0077	1	IC-DIGITAL SN7474N TTL DUAL D-TYPE	01295	SN7474N
A8A2A1U2	1820-1197	6	IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A8A2A1U3	1820-1197		IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A8A2A1U4	1820-1199	1	IC-DIGITAL SN74LS04N TTL LS HEX 1	01295	SN74LS04N
A8A2A1U5	1820-1112	3	IC-DIGITAL SN74LS74N TTL LS DUAL	01295	SN74LS74N
A8A2A1U6	1820-1322	2	IC-DIGITAL SN74S02N TTL S QUAD 2 NOR	01295	SN74S02N
A8A2A1U7	1820-0701	6	IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U8	1820-0701		IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U9	1820-0701		IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U10	1820-0701		IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U11	1820-0701		IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U12	1820-0701		IC-DIGITAL 93L14DC TTL L D-TYPE	07263	93L14DC
A8A2A1U13	1820-1201	4	IC-DIGITAL SN74LS08N TTL LS QUAD 2 AND	01295	SN74LS08N
A8A2A1U14	1820-0205	1	IC-DIGITAL MC3003P TTL QUAD 2 OR	04713	MC3003P
A8A2A1U15	1820-0054	1	IC-DIGITAL SN7400N TTL QUAD 2 NAND	01295	SN7400N
A8A2A1U16	1820-1197		IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A8A2A1U17	1820-1201		IC-DIGITAL SN74LS08N TTL LS QUAD 2 AND	01295	SN74LS08N
A8A2A1U18	1820-1201		IC-DIGITAL SN74LS08N TTL LS QUAD 2 AND	01295	SN74LS08N
A8A2A1U19	1820-0546	1	IC-DIGITAL SN74192N TTL DECD UP/DOWN	01295	SN74192N
A8A2A1U20	1820-1684	6	IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U21	1820-1684		IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U22	1820-1684		IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U23	1820-1684		IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U24	1820-1684		IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U25	1820-1322		IC-DIGITAL SN74S02N TTL S QUAD 2 NOR	01295	SN74S02N
A8A2A1U26	1820-1112		IC-DIGITAL SN74LS74N TTL LS DUAL	01295	SN74LS74N
A8A2A1U27	1820-1208	2	IC-DIGITAL SN74LS32N TTL LS QUAD 2 OR	01295	SN74LS32N
A8A2A1U28	1820-1684		IC-DIGITAL 9LS192PC TTL LS BCD	07263	9LS192PC
A8A2A1U29	1826-0092	2	IC MC 1458 OP AMP	28480	1826-0092
A8A2A1VR1	1902-3070	1	DIODE-ZNR 4.22V 5% DO-7 PD=.4W TC=-.038%	15818	CD 35598
A8A2A1VR2	1902-3182		DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	28480	1902-3182
A8A2A2	08641-60182	1	COUNTER DISPLAY ASSEMBLY (DOES NOT INCLUDE A8U2 THRU A8U7)	28480	08641-60182
A8A2A2DS1			NOT ASSIGNED		
A8A2A2DS2	2140-0016	1	LAMP-INCAND 683 5VDC 60MA T-1-BULB	0050I	11-A823
A8A2A2E1	1251-4244	1	CONNECTOR 11-PIN M POST TYPE (PINS 1 THRU 11)	22526	65521-411
A8A2A2E2	1251-4243	1	CONNECTOR 25-PIN M POST TYPE (PINS 12 THRU 36)	22526	65521-425
A8A2A2J1A	1200-0595	2	SOCKET-IC 28-CONT DIP-SLDR	28480	1200-0595
A8A2A2J1B	1200-0595		SOCKET-IC 28-CONT DIP-SLDR	28480	1200-0595
A8A3	08641-60183	1	TIME BASE ASSY	28480	08641-60183
A8A3C1	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C2	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C3	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C4	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C5	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C6	0160-4084		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A8A3C7	0160-0575	2	CAPACITOR-FXD .047UF +-20% 50WVDC CER	28480	0160-0575
A8A3C8	0160-0575		CAPACITOR-FXD .047UF +-20% 50WVDC CER	28480	0160-0575
A8A3C9	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C10	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C11	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A3C12	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A3C13	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C14			CAP. LOADED, BUT NOT USED ELECTRICALLY		
A8A3C15	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A8A3C16	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C17	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C18			CAP. LOADED, BUT NOT USED ELECTRICALLY		
A8A3C19			CAP. LOADED, BUT NOT USED ELECTRICALLY		
A8A3C20	0160-2204	4	CAPACITOR-FXD 160PF +-5% 300WVDC MICA	28480	0160-2206
A8A3C21	0160-2206		CAPACITOR-FXD 160PF +-5% 300WVDC MICA	28480	0160-2206
A8A3C22	0160-3446	1	CAPACITOR-FXD 220PF +-10% 1000WVDC CER	28480	0160-3446
A8A3C23	0160-3455		CAPACITOR-FXD 470PF +-10% 1000WVDC CER	28480	0160-3455
A8A3C24			CAP. LOADED, BUT NOT USED ELECTRICALLY		
A8A3C25			CAP. LOADED, BUT NOT USED ELECTRICALLY		
A8A3C26	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A8A3C27	0160-3876		CAPACITOR-FXD 47PF +-20% 200WVDC CER	28480	0160-3876
A8A3C28	0160-4084		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084
A8A3C29	0160-4084		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-4084

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8A3CR1			DIODE,LOADED, BUT NOT USED ELECTRICALLY		
A8A3CR2			DIODE,LOADED, BUT NOT USED ELECTRICALLY		
A8A3J1	1250-1383	1	CONNECTOR-RF SM SNP M SGL HOLE RR	28480	1250-1383
A8A3L1	9140-0137	10	COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L2	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L3	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L4	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L5	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L6	08640-80001	7	FILTER, TOROID	28480	08640-80001
A8A3L7	08640-80001		FILTER, TOROID	28480	08640-80001
A8A3L8	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L9	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L10	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L11	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L12	9140-0137		COIL-MLD 1MH 5% Q=60 .19DX.44LG SRF=3MHZ	99800	2500-28
A8A3L13	08640-80001		FILTER, TOROID	28480	08640-80001
A8A3MP1	08640-20211	6	GUIDE, CONNECTOR COUNTER	28480	08640-20211
A8A3MP2	08640-40040	1	INSULATOR, SWITCH	28480	08640-40040
A8A3Q1			TSTR,LOADED, BUT NOT USED ELECTRICALLY		
A8A3Q2	1854-0019	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A8A3Q3	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A8A3R1	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R2	0757-0274	2	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A8A3R3	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A8A3R4	1810-0206	1	NETWORK-RES 8-PIN-SIP .1-PIN-SPCG	11236	750-81-R10K
A8A3R5-A8A3R10			NOT ASSIGNED		
A8A3R11	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R12	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R13	0698-3151	1	RESISTOR 2.87K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2871-F
A8A3R14	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A8A3R15	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R16	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A8A3R16			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R17	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R17			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R18	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8A3R18			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R19	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A8A3R19			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R20	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A8A3R21	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A8A3R22	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A8A3R23	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1962-F
A8A3R24	0698-3444	3	RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A8A3R25	0698-3444		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A8A3R25			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R26	0698-7275	1	RESISTOR 42.2K 1% .05W F TC=0+-100	24546	C3-1/8-T0-4222-G
A8A3R26			RES.,LOADED, BUT NOT USED ELECTRICALLY		
A8A3R27	0698-7215		RESISTOR 133 1% .05W F TC=0+-100	24546	C3-1/8-T0-133R-G
A8A3R28	0698-7210	1	RESISTOR 82.5 1% .05W F TC=0+-100	24546	C3-1/8-T00-82R5-G
A8A3R29	0698-7224		RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-T0-316R-G
A8A3R30	0698-7272		RESISTOR 31.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3162-G
A8A3R31	0698-7236		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A8A3TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A8A3U1	1820-1442	5	IC-DIGITAL SN74LS290N TTL LS DECD	01295	SN74LS290N
A8A3U2	1820-1112		IC-DIGITAL SN74LS74N TTL LS DUAL	01295	SN74LS74N
A8A3U3	1820-1421	1	IC-DIGITAL SN74LS96N TTL LS R-S	01295	SN74LS96N
A8A3U4	1820-1442		IC-DIGITAL SN74LS290N TTL LS DECD	01295	SN74LS290N
A8A3U5	1820-1208		IC-DIGITAL SN74LS32N TTL LS QUAD 2 OR	01295	SN74LS32N
A8A3U5			IC, LOADED, BUT NOT USED ELECTRICALLY		
A8A3U6	1820-1197		IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A8A3U7	1820-1197		IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A8A3U8	1820-1752	3	IC-DIGITAL 93L00 TTL L BCD SYNCHRO	34335	93L10PC
A8A3U9	1820-1442		IC-DIGITAL SN74LS290N TTL LS DECD	01295	SN74LS290N
A8A3U10	1820-1752		IC-DIGITAL 93L00 TTL L BCD SYNCHRO	34335	93L10PC
A8A3U11	1820-1201		IC-DIGITAL SN74LS08N TTL LS QUAD 2 AND	01295	SN74LS08N
A8A3U12	1820-1053	1	IC-DIGITAL SN7414N TTL HEX 1	01295	SN7414N
A8A3U13	1820-1752		IC-DIGITAL 93L00 TTL L BCD SYNCHRO	34335	93L10PC
A8A3U14	1820-1442		IC-DIGITAL SN74LS290N TTL LS DECD	01295	SN74LS290N
A8A3U15	1820-1442		IC-DIGITAL SN74LS290N TTL LS DECD	01295	SN74LS290N
A8A3VR1	1902-3203	1	DIODE-ZNR 14.7V 5% DO-7 PD=.4W TC=+.057%	28480	1902-3203

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8A3XA8A5	1251-2035		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-300
A8A3Y1	1813-0063	1	IC XTAL OSC	28480	1813-0063
A8A4	08640-60028	1	COUNTER RISER BOARD ASSEMBLY	28480	08640-60028
A8A4XA842A	1251-2035		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-300
A8A5	08641-60180	1	COUNTER CONTROL SWITCH	28480	08641-60180
A8A5CR1	1901-0539		DIODE-SCHOTTKY	28480	1901-0539
A8A5CR2	1901-0539		DIODE-SCHOTTKY	28480	1901-0539
A8A5S1	3100-3336	1	SWITCH, ROTARY 0.812 STRUT CTR SPCG	76854	
A9	08641-60177	1	PEAK DEVIATION & RANGE SWITCH ASSY (SEE SERVICE SHEET D) (DOES NOT INCLUDE SHAFT COUPLER MP29)	28480	08641-60177
A9MP1	0380-0013	1	SPACER-RND 1LG .18ID .250D BRS NI-PL	28480	0380-0014
A9MP2	2190-0008	1	WASHER-LK EXT T NO.-6 .141-IN-ID	78189	1806-00
A9MP3	0510-0005		RETAINER-RING .25-DIA CD PL STL	0018A	1400-25-CD
A9MP4	3030-0018	1	SCREW-SET 4-40 .25-IN-LG FLAT-PT ALY STL	28480	3030-0018
A9MP5	3030-0022	1	SCREW-SET 6-32 .125-IN-LG SMALL CUP-PT	28480	3030-0022
A9MP6	0510-0015		RETAINER-RING .125-DIA CD PL STL	0018A	1500-12-CD
A9MP7	0510-0052		RETAINER-RING .125-DIA STL CD-PL	97464	7100-12-CD
A9MP8	3030-0007		SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT	28480	3030-0007
A9MP9	1430-0759		GEAR SPUR	28480	1430-0759
A9MP10	1430-0772	2	GEAR:PLANET	28480	1430-0772
A9MP11	1430-0772		GEAR:PLANET	28480	1430-0772
A9MP12	1430-0773	1	GEAR:COMBINATION	28480	1430-0773
A9MP13	1430-0774	1	GEAR:COMBINATION	28480	1430-0774
A9MP14	1460-0019		SPRING-CPRSN .384-OD .375-LG MUW	28480	1460-0019
A9MP15	1460-0019		SPRING-CPRSN .384-OD .375-LG MUW	28480	1460-0019
A9MP16	1460-0019		SPRING-CPRSN .384-OD .375-LG MUW	28480	1460-0019
A9MP17	2190-0390	1	WASHER-FL NM NO.-1/4 .26-IN-ID	73734	103204
A9MP18	3050-0103		WASHER-FL MTLC NO.-12 .25-IN-ID	28480	3050-0103
A9MP19	3050-0103		WASHER-FL MTLC NO.-12 .25-IN-ID	28480	3050-0103
A9MP20	3050-0103		WASHER-FL MTLC NO.-12 .25-IN-ID	28480	3050-0103
A9MP21	3130-0503	1	SHAFT INDEX ASSEMBLY	28480	3130-0503
A9MP22	3130-0504	1	SHAFT INDEX ASSEMBLY	28480	3130-0504
A9MP23	08640-00091	1	MOUNTING PLATE, DETENTS	28480	08640-00091
A9MP24	08640-00092	1	MOUNTING PLATE, GEARS	28480	08640-00092
A9MP25	08640-00093	1	MOUNTING PLATE, POT	20480	08640-00093
A9MP26	08640-00098	1	BOARD, SUPPORT	28480	08640-00098
A9MP27	08640-20241	1	BUSHING, PLASTIC	28480	08640-20241
A9MP28	08640-20242	1	SHAFT, FM GAIN SWITCH	28480	08640-20242
A9MP29	08640-20248	1	SWITCH, ROTOR 4-CONTACT(P/O A9A2S1)	28480	08640-20248
A9MP30	08640-20249		SWITCH, ROTOR 3-CONTACT(P/O A9A1S2)	28480	08640-20249
A9MP31	08640-20250	1	SWITCH, ROTOR 2-CONTACT(P/O A9A1S1)	28480	08640-20250
A9MP32	2360-0220	1	SCREW-MACH 6-32 2.25-IN-LG PAN-HD-POZI	28480	2360-0220
A9MP33	2360-0123	2	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	28480	2360-0123
A9MP34	2260-0009		NUT-HEX-W/LKWR 4-40-THD .094-THK .25-A/F	28480	2260-0011
A9MP35			NOT ASSIGNED		
A9MP36	2360-0135	1	SCREW-MACH 6-32 1.5-IN-LG PAN-HD-POZI	28480	2360-0135
A9MP37	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A9MP38	2360-0129	2	SCREW-MACH 6-32 1-IN-LG PAN-HD-POZI	28480	2360-0129
A9MP39	2190-0006	2	WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0006
A9MP40	2950-0006		NUT-HEX-DBL-CHAM 1/4-32-THD .094-THK	73734	9000
A9MP41	2190-0027		WASHER-LK INTL T NO.-1/4 .256-IN-ID	78189	1914-00
A9A1	08641-60234	1	PEAK DEVIATION BAND SWITCH BOARD ASSY (DOES NOT INCLUDE ROTORS A9A1MP31 AND A9A1MP30, P/O S1 AND S2)	28480	08641-60234
A9A1R1	0698-8299	1	RESISTOR 4.259K .25% .125W F TC=0+-25	19701	MF4C1/8-T9-4259R-C
A9A1R2	0698-8298	1	RESISTOR 1.071K .25% .125W F TC=0+-25	19701	MF4C1/8-T9-1071R-C
A9A1R3	0698-8297	1	RESISTOR 1.284K .25% .125W F TC=0+-25	19701	MF4C1/8-T9-1284R-C
A9A1R4	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A9A1R5	0698-8296	1	RESISTOR 1.493K .25% .125W F TC=0+-25	19701	MF4C1/8-T9-1493R-C
A9A1R6	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A9A1R7	0698-8295	1	RESISTOR 1.556K .25% .125W F TC=0+-25	19701	MF4C1/8-T9-1556R-C
A9A1R8	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A9A1R9	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A9A1S1			NSR,INCLUDES P.C. TRACES & ROTOR A9MP31.		
A9A1S2			NSR,INCLUDES P.C. TRACES & ROTOR A9MP30.		
A9A1W1	8120-2247	1	CABLE ASSY 26AWG 16-CNDCT	28480	8120-2247

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A9A2	08641-60233	1	FM GAIN SWITCH BOARD ASSEMBLY (DOES NOT INCLUDE ROTOR A9MP29, P/O S1)	28480	08641-60233
A9A2C1	0140-0191	6	CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A9A2C2	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A9A2C3	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A9A2C4	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A9A2C5	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A9A2C6	0160-2222	1	CAPACITOR-FXD 1500PF +-5% 300WVDC MICA	28480	0160-2222
A9A2C7	0160-2218	1	CAPACITOR-FXD 1000PF +-5% 300WVDC MICA	28480	0160-2218
A9A2C8	0140-0198	1	CAPACITOR-FXD 200PF +-5% 300WVDC MICA	72136	DM15F201J0300WV1CR
A9A2R1	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9A2R2	0757-0278	6	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A9A2R3	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A9A2R4	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A9A2R5	0698-0082	1	RESISTOR 464 1% .125W F TC=0+-100	24546	C4-1/8-T0-4640-F
A9A2R6	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9A2R7	0698-7799	1	RESISTOR 2K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-2001-C
A9A2R8	0698-5669	6	RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R9	0698-8212	1	RESISTOR 6K .25% .125W F TC=0+-25	19701	MF4C1/4-T9-6001-C
A9A2R10	0698-5669		RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R11	0698-8213	4	RESISTOR 3K .25% .125W F TC=0+-25	19701	MF4C1/4-T9-3001-C
A9A2R12	0698-5669		RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R13	0698-8213		RESISTOR 3K .25% .125W F TC=0+-25	19701	MF4C1/4-T9-3001-C
A9A2R14	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A9A2R15	0698-5669		RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R16	0698-8213		RESISTOR 3K .25% .125W F TC=0+-25	19701	MF4C1/4-T9-3001-C
A9A2R17	0698-5669		RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R18	0698-8213		RESISTOR 3K .25% .125W F TC=0+-25	19701	MF4C1/4-T9-3001-C
A9A2R19	0698-5669		RESISTOR 1.5K .25% .125W F TC=0+-25	24546	NE55
A9A2R20	0757-0447	2	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A9A2S1			NSR,INCLUDES P.C. TRACES & ROTOR A9MP29.		
A9A2TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A9A2W1	8120-2246	1	CABLE ASSY 26AWG 16-CNDCT	28480	8120-2246
A10	08641-60188	1	DIVIDER/FILTER ASSY(SEE SERVICE SHEET E) (DOES NOT INCLUDE SHAFT COUPLER MP29)	28480	08641-60188
A10MP1	0403-0156	2	GUIDE-PC BD YEL POLYC .062-BD-THKNS 1-LG	28480	0403-0156
A10MP2	0403-0157	2	GUIDE-PC BD GRN POLYC .062-BD-THKNS 1-LG	28480	0403-0157
A10MP3	0403-0158	1	GUIDE-PC BD BLU POLYC .062-BD-THKNS 1-LG	28480	0403-0158
A10MP4	8160-0226		RFI ROUND STRIP NI ALY .062-OD	28480	8160-0226
A10MP5	08640-00047	1	SHIELD, SPRING #1	28480	08640-00047
A10MP6	08640-00048	1	SHIELD, SPRING #2	28480	08640-00048
A10MP7	08640-00049	1	SHIELD, SPRING #3	28480	08640-00049
A10MP8	08640-00050	1	SHIELD, SPRING #4	28480	08640-00050
A10MP9	08640-20098	1	CAST,TOP COVER, D/F	28480	08640-20098
A10MP10	08640-20099	1	CAST, CENTER, D/F	28480	08640-20099
A10MP11	2190-0003	1	WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0003
A10MP12	2200-0101	1	SCREW-MACH 4-40 .188-IN-LG PAN-HD-POZI	28480	2200-0101
A10MP13	2200-0121		SCREW-MACH 4-40 1.125-IN-LG PAN-HD-POZI	28480	2200-0121
A10MP14	2200-0147		SCREW-MACH 4-40 .5-IN-LG PAN-HD-POZI	28480	2200-0147
A10MP15	2200-0127		SCREW-MACH 4-40 1.75-IN-LG PAN-HD-POZI	28480	2200-0127
A10MP16	2190-0124		WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A10MP17	2950-0078		NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A10MP18	2200-0129	2	SCREW-MACH 4-40 2-IN-LG PAN-HD-POZI	28480	2200-0129
A10MP19	0361-1071	1	RIVET,BLIND, DOME HD 0.125" DIA	11815	AAP-4-3
A10A1	08640-60053	1	RF FILTER ASSY	28480	08640-60053
A10A1C1	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C2	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C3	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C4	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C5	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C6	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C7	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C8	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A1C9	0140-0219	2	CAPACITOR-FXD 180PF +-2% 300WVDC MICA	72136	DM15F181G0300WV1CR
A10A1C10	0140-0226	2	CAPACITOR-FXD 320PF +-1% 300WVDC MICA	72136	DM15F321F0300WV1C
A10A1C11	0140-0226		CAPACITOR-FXD 320PF +-1% 300WVDC MICA	72136	DM15F321F0300WV1C
A10A1C12	0140-0220	3	CAPACITOR-FXD 200PF +-1% 300WVDC MICA	72136	DM15F201F0300WV1CR
A10A1C13	0140-0195	2	CAPACITOR-FXD 130PF +-5% 300WVDC MICA	72136	DM15F131J0300WV1CR
A10A1C14	0140-0220		CAPACITOR-FXD 200PF +-1% 300WVDC MICA	72136	DM15F201F0300WV1CR
A10A1C15	0140-0220		CAPACITOR-FXD 200PF +-1% 300WVDC MICA	72136	DM15F201F0300WV1CR

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A1C16	0140-0195		CAPACITOR-FXD 130PF +-5% 300WVDC MICA	72136	DM15F131J0300WV1CR
A10A1C17	0160-4456	2	CAPACITOR-FXD 750PF +-1% 300WVDC MICA	28480	0160-4456
A10A1C18	0160-3940	1	CAPACITOR-FXD 3200PF +-1% 100WVDC MICA	28480	0160-3940
A10A1C19	0160-2587	1	CAPACITOR-FXD 4000PF +-1% 100WVDC MICA	28480	0160-2587
A10A1C20	0160-4217	1	CAPACITOR-FXD 3900PF +-1% 500WVDC MICA	28480	0160-4217
A10A1C21	0160-2276	1	CAPACITOR-FXD 2780PF +-2% 300WVDC MICA	28480	0160-2276
A10A1C22	0140-0172	1	CAPACITOR-FXD 3000PF +-1% 100WVDC MICA	72136	DM19F302F0100WV1CR
A10A1C23	0160-2585	2	CAPACITOR-FXD 2000PF +-1% 100WVDC MICA	28480	0160-2585
A10A1C24	0160-3537	3	CAPACITOR-FXD 360PF +-1% 300WVDC MICA	28480	0160-2537
A10A1C25	0160-0341	2	CAPACITOR-FXD 640PF +-1% 300WVDC MICA	28480	0160-0341
A10A1C26	0160-0341		CAPACITOR-FXD 640PF +-1% 300WVDC MICA	28480	0160-0341
A10A1C27	0140-0200	1	CAPACITOR-FXD 390PF +-5% 300WVDC MICA	72136	DM15F391J0300WV1CR
A10A1C28	0140-0199	2	CAPACITOR-FXD 240PF +-5% 300WVDC MICA	72136	DM15F241J0300WV1CR
A10A1C29	0160-0939	2	CAPACITOR-FXD 430PF +-5% 300WVDC MICA	28480	0160-0939
A10A1C30	0160-0939		CAPACITOR-FXD 430PF +-5% 300WVDC MICA	28480	0160-0939
A10A1C31	0140-0199		CAPACITOR-FXD 240PF +-5% 300WVDC MICA	72136	DM15F241J0300WV1CR
A10A1C32	0160-2537		CAPACITOR-FXD 360PF +-1% 300WVDC MICA	28480	0160-2537
A10A1C33	0160-3092	1	CAPACITOR-FXD 1600PF +-1% 100WVDC MICA	28480	0160-3092
A10A1C34	0160-2585		CAPACITOR-FXD 2000PF +-1% 100WVDC MICA	28480	0160-2585
A10A1C35	0160-3937	1	CAPACITOR-FXD 1910PF +-1% 100WVDC MICA	28480	0160-3937
A10A1C36	0160-3939	1	CAPACITOR-FXD 1400PF +-1% 100WVDC MICA	28480	0160-3939
A10A1C37	0160-3938	1	CAPACITOR-FXD 1470PF +-1% 100WVDC MICA	28480	0160-3938
A10A1C38	0160-2387	2	CAPACITOR-FXD 1000PF +-1% 500WVDC MICA	28480	0160-2387
A10A1C39	0160-0335	2	CAPACITOR-FXD 91PF +-1% 300WVDC MICA	28480	0160-0335
A10A1C40	0160-2206		CAPACITOR-FXD 160PF +-5% 300WVDC MICA	28480	0160-2206
A10A1C41	0160-2206		CAPACITOR-FXD 160PF +-5% 300WVDC MICA	28480	0160-2206
A10A1C42	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A10A1C43	0140-0205		CAPACITOR-FXD 62PF +-5% 300WVDC MICA	72136	DM15E620J0300WV1CR
A10A1C44	0160-0839	2	CAPACITOR-FXD 110PF +-1% 300WVDC MICA	28480	0160-0839
A10A1C45	0160-0839		CAPACITOR-FXD 110PF +-1% 300WVDC MICA	28480	0160-0839
A10A1C46	0140-0205		CAPACITOR-FXD 62PF +-5% 300WVDC MICA	72136	DM15E620J0300WV1CR
A10A1C47	0140-0219		CAPACITOR-FXD 180PF +-2% 300WVDC MICA	72136	DM15F181G0300WV1CR
A10A1C48	0160-3395	1	CAPACITOR-FXD 800PF +-1% 300WVDC MICA	28480	0160-3395
A10A1C49	0160-2387		CAPACITOR-FXD 1000PF +-1% 500WVDC MICA	28480	0160-2387
A10A1C50	0160-3935	1	CAPACITOR-FXD 958PF +-1% 100WVDC MICA	28480	0160-3935
A10A1C51	0160-3936	1	CAPACITOR-FXD 700PF +-1% 100WVDC MICA	28480	0160-3936
A10A1C52	0160-4456		CAPACITOR-FXD 750PF +-1% 300WVDC MICA	28480	0160-4456
A10A1C53	0140-0234	2	CAPACITOR-FXD 500PF +-1% 300WVDC MICA	72136	DM15F501F0300WV1C
A10A1C54	0160-2307	3	CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480	0160-2307
A10A1C55	0160-0974	2	CAPACITOR-FXD 80PF +-2% 300WVDC MICA	28480	0160-0974
A10A1C56	0160-0974		CAPACITOR-FXD 80PF +-2% 300WVDC MICA	28480	0160-0974
A10A1C57	0160-4457	3	CAPACITOR-FXD 51PF +-5% 300WVDC MICA	28480	0160-4457
A10A1C58	0160-2306	1	CAPACITOR-FXD 27PF +-5% 300WVDC MICA	28480	0160-2306
A10A1C59	0160-4457		CAPACITOR-FXD 51PF +-5% 300WVDC MICA	28480	0160-4457
A10A1C60	0160-4457		CAPACITOR-FXD 51PF +-5% 300WVDC MICA	28480	0160-4457
A10A1C61	0160-2199	1	CAPACITOR-FXD 30PF +-5% 300WVDC MICA	28480	0160-2199
A10A1C62	0160-0335		CAPACITOR-FXD 91PF +-1% 300WVDC MICA	28480	0160-0335
A10A1C63	0160-2538	1	CAPACITOR-FXD 400PF +-1% 300WVDC MICA	28480	0160-2538
A10A1C64	0140-0234		CAPACITOR-FXD 500PF +-1% 300WVDC MICA	72136	DM15F501F0300WV1C
A10A1C65	0160-2542	1	CAPACITOR-FXD 480PF +-1% 300WVDC MICA	28480	0160-2542
A10A1C66	0160-3934	1	CAPACITOR-FXD 350PF +-1% 100WVDC MICA	28480	0160-3934
A10A1C67	0160-2537		CAPACITOR-FXD 360PF +-1% 300WVDC MICA	28480	0160-2537
A10A1C68	0160-3046	1	CAPACITOR-FXD 250PF +-1% 100WVDC MICA	28480	0160-3046
A10A1C69	0160-2265	1	CAPACITOR-FXD 22PF +-5% 500WVDC CER	28480	0160-2265
A10A1C70	0140-0190		CAPACITOR-FXD 39PF +-5% 300WVDC MICA	72136	DM15E390J0300WV1CR
A10A1C71	0140-0190		CAPACITOR-FXD 39PF +-5% 300WVDC MICA	72136	DM15E390J0300WV1CR
A10A1C72	0160-3266	3	CAPACITOR-FXD 24PF +-5% 500WVDC CER	28480	0160-2266
A10A1C73	0160-2260	1	CAPACITOR-FXD 13PF +-5% 500WVDC CER	28480	0160-2260
A10A1C74	0160-2266		CAPACITOR-FXD 24PF +-5% 500WVDC CER	28480	0160-2266
A10A1C75	0160-2266		CAPACITOR-FXD 24PF +-5% 500WVDC CER	28480	0160-2266
A10A1C76	0160-2262	1	CAPACITOR-FXD 16PF +-5% 500WVDC CER	28480	0160-2262
A10A1C77	0160-2257	2	CAPACITOR-FXD 10PF +-5% 500WVDC CER	28480	0160-2257
A10A1C78	0160-2263	2	CAPACITOR-FXD 18PF +-5% 500WVDC CER	28480	0160-2263
A10A1C79	0160-2263		CAPACITOR-FXD 18PF +-5% 500WVDC CER	28480	0160-2263
A10A1C80	0160-2257		CAPACITOR-FXD 10PF +-5% 500WVDC CER	28480	0160-2257
A10A1C81	0121-0060	2	CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	00865	304322 2/8PF NPO
A10A1C82	0121-0061	2	CAPACITOR-V TRMR-CER 5.5/18PF 350V	00865	304322 5.5/18PF NPO
A10A1C83	0121-0061		CAPACITOR-V TRMR-CER 5.5/18PF 350V	00865	304322 5.5/18PF NPO
A10A1C84	0121-0060		CAPACITOR-V TRMR-CER 2/8PF 350V PC-MTG	00865	304322 2/8PF NPO
A10A1C85	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10A1C86	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A1C87	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10A1C88	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A1C89	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10A1C90	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A1C91	0160-2055		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A1FL1	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A10A1FL2	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A10A1FL3	0160-0204		FILTER-LP STUD-TERMS	01121	SMFB-A2
A10A1J1	1250-1220		CONNECTOR-RF SMC M PC	98291	50-051-0109
A10A1J2	1250-1220		CONNECTOR-RF SMC M PC	98291	50-051-0109
A10A1J3	1250-1220		CONNECTOR-RF SMC M PC	98291	50-051-0109
A10A1J4	1250-1220		CONNECTOR-RF SMC M PC	98291	50-051-0109
A10A1K1	0490-1073		RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A10A1K2	0490-1073		RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A10A1K3	0490-1073		RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A10A1K4	0490-1073		RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A10A1L1	9100-3375	2	COIL-MLD 462NH 5% Q=40 .190X.385LG	0004A	AE-.462J-P
A10A1L2	9100-3365	2	COIL-MLD 500NH 5% Q=40 .190X.385LG	0004A	AE-.50J-P
A10A1L3	9100-3375		COIL-MLD 462NH 5% Q=40 .190X.385LG	0004A	AE-.462J-P
A10A1L4	9100-3361	2	COIL-MLD 300NH 5% Q=40 .190X.385LG	28480	9100-3361
A10A1L5	9100-3382	1	COIL-MLD 323NH 5% Q=40 .2DX.385LG	0004A	AD-.323J-P
A10A1L6	9100-3361		COIL-MLD 300NH 5% Q=40 .190X.385LG	28480	9100-3361
A10A1L7	9100-3364	1	COIL-MLD 8UH 5% Q=40 .2DX.385LG SRF=1MHZ	0004A	AH-8.00J-P
A10A1L8	9100-3374	2	COIL-MLD 4UH 5% Q=40 .190X.385LG	0004A	AK-4.00J-P
A10A1L9	9100-3363	1	COIL-MLD 4.74UH 5% Q=40 .190X.385LG	0004A	AK-4.74J-P
A10A1L10	9100-3369	2	COIL-MLD 924NH 5% Q=40 .190X.385LG	0004A	AF-.924J-P
A10A1L11	9100-3370	3	COIL-MLD 1UH 5% Q=40 .190X.385LG	0004A	AF-1.00J-P
A10A1L12	9100-3369		COIL-MLD 924NH 5% Q=40 .190X.385LG	0004A	AF-.924J-P
A10A1L13	9100-3368	2	COIL-MLD 600NH 5% Q=40 .190X.385LG	0004A	AE-.600J-P
A10A1L14	9100-3367	1	COIL-MLD 646NH 5% Q=40 .190X.385LG	0004A	AE-.646J-P
A10A1L15	9100-3368		COIL-MLD 600NH 5% Q=40 .190X.385LG	0004A	AE-.600J-P
A10A1L16	9100-3374		COIL-MLD 4UH 5% Q=40 .190X.385LG	0004A	AK-4.00J-P
A10A1L17	9100-3372	2	COIL-MLD 2UH 5% Q=40 .190X.385LG	0004A	AJ-2.00J-P
A10A1L18	9100-3373	1	COIL-MLD 2.37UH 5% Q=40 .190X.385LG	0004A	AJ-2.37J-P
A10A1L19	9100-3359	2	COIL-MLD 231NH 5% Q=40 .190X.385LG	0004A	AC-.231J-P
A10A1L20	9100-3360	1	COIL-MLD 250NH 5% Q=40 .190X.385LG	0004A	AC-.250J-P
A10A1L21	9100-3359		COIL-MLD 231NH 5% Q=40 .190X.385LG	0004A	AC-.231J-P
A10A1L22	9100-3357	2	COIL-MLD 150NH 5% Q=40 .190X.385LG	0004A	AC-.150J-P
A10A1L23	9100-3358	1	COIL-MLD 162NH 5% Q=40 .190X.385LG	0004A	AC-.162J-P
A10A1L24	9100-3357		COIL-MLD 150NH 5% Q=40 .190X.385LG	0004A	AC-.150J-P
A10A1L25	9100-3372		COIL-MLD 2UH 5% Q=40 .190X.385LG	0004A	AJ-2.00J-P
A10A1L26	9100-3370		COIL-MLD 1UH 5% Q=40 .190X.385LG	0004A	AF-1.00J-P
A10A1L27	9100-3371	1	COIL-MLD 1.18UH 5% Q=40 .190X.385LG	0004A	AG-1.18J-P
A10A1L28	9100-3355	2	COIL-MLD 115NH 5% Q=40 .190X.385LG	0004A	AC-.115J-P
A10A1L29	9100-3356	1	COIL-MLD 125NH 5% Q=40 .190X.385LG	0004A	AC-.125J-P
A10A1L30	9100-3355		COIL-MLD 115NH 5% Q=40 .190X.385LG	0004A	AC-.115J-P
A10A1L31	9100-3513	3	COIL-FXD NON-MOLDED RF CHOKE 75UH	24226	8123-2
A10A1L32	9100-3513		COIL-FXD NON-MOLDED RF CHOKE 75UH	24226	8123-2
A10A1L33	9100-3513		COIL-FXD NON-MOLDED RF CHOKE 75UH	24226	8123-2
A10A1L34	9100-3370		COIL-MLD 1UH 5% Q=40 .190X.385LG	0004A	AF-1.00J-P
A10A1L35	9100-3365		COIL-MLD 500NH 5% Q=40 .190X.385LG	0004A	AE-.500J-P
A10A1L36	9100-3366	1	COIL-MLD 592NH 5% Q=40 .190X.385LG	0004A	AE-.592J-P
A10A1L37	9100-3512	3	COIL-FXD NON-MOLDED RF CHOKE 50UH	24226	8123-1
A10A1L38	9100-3512		COIL-FXD NON-MOLDED RF CHOKE 50UH	24226	8123-1
A10A1L39	9100-3512		COIL-FXD NON-MOLDED RF CHOKE 50UH	24226	8123-1
A10A1L40	9100-3514	6	COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L41	9100-3514		COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L42	9100-3514		COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L43	9100-3514		COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L44	9100-3514		COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L45	9100-3514		COIL-FXD NON-MOLDED RF CHOKE 30UH	24226	8123-3
A10A1L46			PART OF ETCHED CIRCUIT BOARD		
A10A1L47			PART OF ETCHED CIRCUIT BOARD		
A10A1L48			PART OF ETCHED CIRCUIT BOARD		
A10A1L49	9140-0144	2	COIL-FXD MOLDED RF CHOKE 4.7UH 10%	24226	10/471
A10A1L50	9140-0144		COIL-FXD MOLDED RF CHOKE 4.7UH 10%	24226	10/471
A10A1L51	08640-80001		FILTER, TOROID	28480	08640-80001
A10A1L52	08640-80001		FILTER, TOROID	28480	08640-80001
A10A1L53	08640-80001		FILTER, TOROID	28480	08640-80001
A10A1L54	08640-80001		FILTER, TOROID	28480	08640-80001
A10A1MP1	1480-0352	1	PIN:DETENT 0.055 X 0.750" DIA	00000	1480-0352
A10A1MP2	00335-20034	1	ROLLER, DETENT	28480	00335-20034
A10A1MP3	08640-00029	1	SPRING, DETENT	28480	08640-00029
A10A1MP4	08640-20082	1	SHAFT, CAM	28480	08640-20082
A10A1MP5	08640-20083	1	SHAFT, CAM ROLL	28480	08640-20083
A10A1MP6	08640-20200	1	DIVIDER/FILTER COVER (BOTTOM)	28480	08640-20200
A10A1MP7	08640-20214	1	BUSHING, CAM HOUSING	28480	08640-20214
A10A1MP8	08640-20192	1	COVER, CAM, ALC	28480	08640-20192
A10A1MP9	08640-40004	1	FOLLOWER, CAM	28480	08640-40004
A10A1MP10	08640-20064	1	CLAMP, SLIDER	28480	08640-20064

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A1MP11	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A10A1MP12	08640-20133	1	SUPPORT, CLAMP	28480	08640-20133
A10A1MP13	3030-0007		SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT	28480	3030-0007
A10A1MP14	2200-0145	1	SCREW-MACH 4-40 .438-IN-LG PAN-HD-POZI	28480	2200-0145
A10A1MP15	08640-20206	1	RETAINER, SLIDER	28480	08640-20206
A10A1MP16	0510-0015		RETAINER-RING .125-DIA CD PL STL	0018A	1500-12-CD
A10A1MP17	3050-0080	1	WASHER-FL NM NO.-5 .13-IN-ID .25-IN-OD	76854	3482-12
A10A1R1	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R2	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R3	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R4	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R5	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R6	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R7	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R8	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1R9	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10A1S1	08640-60106	8	SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480	8	CONTACT:SWITCH	28480	3130-0480
A10A1S2	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S3	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S4	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S5	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S6	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S7	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1S8	08640-60106		SWITCH, SLIDE D/F	28480	08640-60106
	3130-0480		CONTACT:SWITCH	28480	3130-0480
A10A1W1	8120-1830	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1830
A10A1W2	8120-1832	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1832
A10A1W3	8120-1831	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1831
A10A1XA10A3A	1251-2035	5	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-300
A10A1XA10A3B	1251-2026	2	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-300
A10A2	08640-60023	1	RF DIVIDER ASSY	28480	08640-60023
A10A2C1	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C2	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C3	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C4	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C5			NOT ASSIGNED		
A10A2C6	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C7	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C8	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C9	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C10	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C11	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C12	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C13	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C14	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C15	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C16	0180-0100	3	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	150D475X903582
A10A2C17	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C18	0180-0100		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	150D475X903582
A10A2C19	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C20	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A10A2C21	0180-1743	11	CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C22			NOT ASSIGNED		
A10A2C23	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A10A2C24	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C25	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C26	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C27	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C28	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C29	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C30	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C31	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C32	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C33	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C34	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C35	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A2C36	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C37	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C38	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C39	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C40	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C41	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A10A2C42	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C43	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C44	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C45	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C46	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C47	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C48	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C49	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C50	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C51	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C52	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C53	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C54	0160-3456		CAPACITOR-FXD 1000PF +-10% 1000WVDC CER	28480	0160-3456
A10A2C55	0160-3872		CAPACITOR-FXD 2.2 PF +0.25PF 200WVDC CER	28480	0160-3872
A10A2CR1	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR2	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR3	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR4	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR5	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR6	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR7	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR8	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR9	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2L1			PART OF ETCHED CIRCUIT BOARD		
A10A2L2			NOT ASSIGNED		
A10A2L3	9100-1620	13	COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A10A2L4	9140-0096		COIL-MLD 1UH 10% Q=50 .155DX.375LG	99800	1537-12
A10A2L5	9100-1612	1	COIL-MLD 330NH 20% Q=45 .155DX.375LG	99800	1537-04
A10A2L6	9140-0094	1	COIL-MLD 680NH 10% Q=50 .155DX.375LG	24226	15/680
A10A2L7	9100-1615	1	COIL-MLD 1.2UH 10% Q=33 .155DX.375LG	24226	15/121
A10A2L8	9140-0098	1	COIL-MLD 2.2UH 10% Q=33 .155DX.375LG	24226	15/221
A10A2L9	9100-1618	1	COIL-MLD 5.6UH 10% Q=45 .155DX.375LG	99800	1537-30
A10A2L10	9140-0114	1	COIL-MLD 10UH 10% Q=55 .155DX.375LG	99800	1537-36
A10A2L11	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A10A2L12	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A10A2L13	9100-1628	2	COIL-MLD 43UH 5% Q=60 .155DX.375LG	24226	15/432
A10A2L14	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A10A2L15	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A10A2L16	9100-1628		COIL-MLD 43UH 5% Q=60 .155DX.375LG	24226	15/432
A10A2Q1	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHI	28480	1854-0071
A10A2Q2	1853-0034	9	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A10A2Q3	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A10A2Q4	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A10A2Q5	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A10A2R1	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R2	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R3	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A10A2R4	0757-0984	9	RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R5	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R6	0698-7197	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T00-23R7-G
A10A2R7	0698-7221	2	RESISTOR 237 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-G
A10A2R8	0698-7221		RESISTOR 237 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-G
A10A2R9	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R10	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R11	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R12	0698-7200	2	RESISTOR 31.6 1% .05W F TC=0+-100	24546	C3-1/8-T00-31R6-G
A10A2R13	0698-7218		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R14	0698-7218		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R15	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R16	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R17	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R18	0698-7200		RESISTOR 31.6 1% .05W F TC=0+-100	24546	C3-1/8-T00-31R6-G
A10A2R19	0698-7218		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R20	0698-7218		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R21	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A10A2R22	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R23	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R24	0698-7224		RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-T0-316R-G
A10A2R25	0698-7219		RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-G

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A2R26	0698-7190	2	RESISTOR 12.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-12R1-G
A10A2R27	0698-7227		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R28	0698-7227		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R29	0698-3437		RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A10A2R30	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A10A2R31	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R32	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R33	0698-7224		RESISTOR 316 1% .05W F TC=0+-100	24546	C3-1/8-T0-316R-G
A10A2R34	0698-7219		RESISTOR 196 1% .05W F TC=0+-100	24546	C3-1/8-T0-196R-G
A10A2R35	0698-7190		RESISTOR 12.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-12R1-G
A10A2R36	0698-7227		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R37	0698-7227		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R38			NOT ASSIGNED		
A10A2R39			NOT ASSIGNED		
A10A2R40	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R41	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R42	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R43	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R44	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R45	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A10A2R46	0698-7253		RESISTOR 5.11K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5111-G
A10A2R47	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A10A2R48	0698-3444		RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A10A2R49	0757-0379	1	RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A10A2R50	0698-3447	9	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A10A2R51	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A10A2R52	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R53	0757-0984		RESISTOR 10 1% .5W F TC=0+-100	19701	MF7C1/2-T0-10R0-F
A10A2R54	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R55	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A10A2R56			NOT ASSIGNED		
A10A2R57	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A10A2R58	0698-3243		RESISTOR 178K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1783-F
A10A2R59	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R60	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A10A2R61	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A10A2R62	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A10A2T1	08553-6012	5	TRANSFORMER,RF(CODE = BLUE)	28480	08553-6012
A10A2T2	08553-6012		TRANSFORMER,RF(CODE = BLUE)	28480	08553-6012
A10A2T3	08553-6012		TRANSFORMER,RF(CODE = BLUE)	28480	08553-6012
A10A2T4	08553-6012		TRANSFORMER,RF(CODE = BLUE)	28480	08553-6012
A10A2T5	08553-6012		TRANSFORMER,RF(CODE = BLUE)	28480	08553-6012
A10A2T6	08640-80002	1	TRANSFORMER, RF 12-TURN	28480	08640-80002
A10A2TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A10A2TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A10A2TP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A10A2TP4	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A10A2U1	1826-0303	1	IC CA 741 OP AMP	02735	CA741CG
A10A2U2	1820-0102	4	IC-DIGITAL MC1013P ECL J-K	04713	MC1013P
A10A2U3	1820-0102		IC-DIGITAL MC1013P ECL J-K	04713	MC1013P
A10A2U4	1820-0102		IC-DIGITAL MC1013P ECL J-K	04713	MC1013P
A10A2U5	1820-0143	2	IC-DIGITAL MC1027P ECL J-K	04713	MC1027P
A10A2U6	1820-0535	1	IC-DIGITAL SN754518P TTL DUAL 2 AND	01295	SN754518P
A10A2U7	1820-0145		IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A10A2U8	1820-0145		IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A10A2U9	1820-0145		IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A10A2U10	1820-0753	3	IC-DIGITAL ECL DUAL 3	28480	1820-0753
A10A2U11	1820-0982		IC 5084-0164 DIFF AMPL	28480	1820-0982
A10A2U12	1820-0736		IC-DIGITAL ECL DUAL BIN	28480	1820-0736
A10A2U13	1820-0753		IC-DIGITAL ECL DUAL 3	28480	1820-0753
A10A2U14	1820-1354	1	IC-DIGITAL ECL BIN	28480	1820-1354
A10A2U15	1820-0753		IC-DIGITAL ECL DUAL 3	28480	1820-0753
A10A2U16	1820-0557	1	IC-DIGITAL ECL D-M/S	28480	1820-0557
A10A2U17	1820-0145		IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A10A2U18	1820-0143		IC-DIGITAL MC1027P ECL J-K	04713	MC1027P
A10A2U19	1820-0145		IC-DIGITAL MC1010P ECL QUAD 2 NOR	04713	MC1010P
A10A2U20	1820-0102		IC-DIGITAL MC1013P ECL J-K	04713	MC1013P
A10A2VR1	1902-3002	1	DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=-.074%	15818	CD 35526
A10A2W1	8120-1823	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1823
A10A2W2	8120-1824	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1824
A10A2W3	8120-1825	1	CABLE-COAX 50 OHM .086-OD	23480	8120-1825
A10A2W4	8120-1826	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1826
A10A2W5	8120-1828	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1828

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10A2W6	8120-1827	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1827
A10A2W7	8120-1829	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1829
A10A3	08640-60022	1	RISER ASSY	28480	08640-60022
A10A3XA1CA2A	1251-2035		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-300
A10A3XA10A2B	1251-2026		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-300
A11	08641-60230	1	INTERNAL MODULATION OSCILLATOR	28480	08641-60230
A11C1	0160-0148	1	CAPACITOR-FXD .01UF +-2% 100WVDC MICA	28480	0160-0148
A11C2	0180-0058	4	CAPACITOR-FXD 50UF+75-10% 25VDC AL	56289	30D506G025CC2
A11C3	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11C4	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11C5	0180-0094	1	CAPACITOR-FXD 100UF+75-10% 25VDC AL	56289	30D107G025DD2
A11C6	0180-2207		CAPACITOR-FXD 100UF+-10% 10VDC TA	56289	150D107X9010R2
A11C7	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A11C8	0160-0889	1	CAPACITOR-FXD .33UF +-10% 80WVDC POLYE	28480	0160-0889
A11C9	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11C10	0180-1746	3	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X902082
A11C11	0180-2206		CAPACITOR-FXD 60UF+-10% 6VDC TA	56289	150D606X900682
A11C12	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11C13	0160-0159	2	CAPACITOR-FXD 6800PF +-10% 200WVDC POLYE	56289	292P68292
A11C14	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X902082
A11C15	0180-1746		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X902082
A11C16	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11C17	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A11C18	0160-3536	2	CAPACITOR-FXD 620PF +-5% 100WVDC MICA	28480	0160-3536
A11C19	0160-3536		CAPACITOR-FXD 620PF +-5% 100WVDC MICA	28480	0160-3536
A11C20	0180-0374		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X902082
A11CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11CR9	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A11MP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11MP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11MP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11MP4	4040-0749	3	EXTR-PC BD BRN POLYC .062-BD-THKNS	28480	4040-0749
A11Q1	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A11Q2	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A11Q3	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q4	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q5	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q6	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A11Q7	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A11Q8	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A11Q9	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A11R1	2100-2574		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A11R2	2100-2413	2	RESISTOR-TRMR 200 10% C SIDE-ADJ 1-TRN	30983	ET50X201
A11R3	2100-2514	2	RESISTOR-TRMR 20K 10% C SIDE-ADJ 1-TRN	30983	ET50W203
A11R4	2100-2633		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A11R5	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A11R6	0757-0198		RESISTOR 100 1% .5W F TC=0+-100	19701	MF7C1/2-T0-101-F
A11R7	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A11R8	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R9	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R10	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A11R11	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A11R12	0698-3457	1	RESISTOR 316K 1% .125W F TC=0+-100	91637	CMF-55-1, T-1
A11R13	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R14	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R15	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R16	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R17	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A11R18	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R19	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A11R20	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4642-F
A11R21	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R22	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R23	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A11R24	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A11R25	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A11R26	0698-0024	1	RESISTOR 2.61K 1% .5W F TC=0+-100	91637	MFF-1/2-10
A11R27	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-
A11R28	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A11R29	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A11R30	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R31	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A11R32	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R33	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R34	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R35	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A11R36	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A11R37	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A11R38	0757-0003	1	RESISTOR 26.1 1% .5W F TC=0+-100	19701	MF7C1/2-T0-26R1-F
A11R39	0698-3432		RESISTOR 26.1 1% .125W F TC=0+-100	03888	PME55-1/8-T0-26R1-F
A11R40	0757-0447		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A11R41	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A11R42	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A11TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP4	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP5	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP6	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11TP7	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A11U1	1820-0223	2	IC LM 301A OP AMP	27014	LM301AH
A11U2	1820-0261	1	IC-DIGITAL SN74121N TTL MONOSTBL	01295	SN74121N
A11U3	1820-0223		IC LM 301A OP AMP	27014	LM301AH
A11U4	1820-1478	2	IC-DIGITAL SN74LS93N TTL LS BIN	01295	SN74LS93N
A11U5	1820-1478		IC-DIGITAL SN74LS93N TTL LS BIN	01295	SN74LS93N
A11U6	1820-1197		IC-DIGITAL SN74LS00N TTL LS QUAD 2 NAND	01295	SN74LS00N
A11U7	1826-0011		IC UA 741 OP AMP	07263	741HM
A11VR1	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	15818	CD 35622
A11VR2	1902-0202	3	DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057%	28480	1902-0202
A11VR3	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	28480	1902-0049
A12	08640-60326	1	RECTIFIER ASSY	28480	08640-60326
A12C1	0160-0168	5	CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A12C2	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A12C3	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A12C4	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A12C5	0160-0168		CAPACITOR-FXD .1UF +-10% 200WVDC POLYE	56289	292P10492
A12CR1	1901-0418	20	DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR2	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR3	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR4	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR5	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR6	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR7	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR8	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR9	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR10	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR11	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR12	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR13	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR14	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR15	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR16	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR17	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR18	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR19	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12CR20	1901-0418		DIODE-PWR RECT 400V 1.5A	04713	SR1846-12
A12MP1	0403-0026	3	GLIDE:NYLON	28480	0403-0026
A1201			NOT ASSIGNED		
A12R1			NOT ASSIGNED		
A12R2			NOT ASSIGNED		
A12R3	0757-0199		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A12R4	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R5	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R6	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A12R7	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A13	08640-60222	1	MODULATION/METERING MOTHER BOARD ASSY	28480	08640-60222
A13C1	0180-2208	2	CAPACITOR-FXD 220UF+-10% 10VDC TA	56289	150D227X901082
A13C2	0180-0058		CAPACITOR-FXD 50UF+75-10% 25VDC AL	56289	30D506G025CC2
A13C3	0180-2154	1	CAPACITOR-FXD 1900UF+75-10% 15VDC AL	56289	39D198G015GL4
A13CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A13J1	1250-0257	2	CONNECTOR-RF SMB M PC 50-OHM	28480	1250-0257
A13J2			NOT ASSIGNED		
A13J3	1250-0257		CONNECTOR-RF SMB M PC 50-OHM	28480	1250-0257
A13J4			NOT ASSIGNED		
A13J5			NOT ASSIGNED		
A13J6	1200-0507	2	SOCKET-IC 16-CONT DIP-SLDR-TERMS	06776	ICN-163-83W
A13J7	1200-0507		SOCKET-IC 16-CONT DIP-SLDR-TERMS	06776	ICN-163-83W
A13J8	1200-0508	2	SOCKET-IC 14-CONT DIP-SLDR-TERMS	06776	ICN-143-83W
A13J9	1200-0508		SOCKET-IC 14-CONT DIP-SLDR-TERMS	06776	ICN-143-83W
A13J10	1251-3898	1	CONNECTOR 10-PIN M POST TYPE	28480	1251-3898
A13K1	0490-1013	1	RELAY-REED 1C 250MA 28VAC 5VDC-COIL 3VA	28480	0490-1013
A13MP1	0403-0026		GLIDE:NYLON	28480	0403-0026
A13MP2	0403-0026		GLIDE:NYLON	28480	0403-0026
A13MP3	1400-0049	1	CLAMP-CA .812-DIA .5-WD NYL	95987	13/16-6
A13MP4	5040-0170	1	GUIDE:PLUG-IN PC BOARD	28480	5040-0170
A13MP5	08640-20211		GUIDE, CONNECTOR DOWELS	28480	08640-20211
A13MP6	08640-20211		GUIDE, CONNECTOR DOWELS	28480	08640-20211
A13Q1	1854-0039		TRANSISTOR NPN 2N3053 SI TO-5 PD=1W	04713	2N3053
A13Q2	1853-0007	4	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A13R1	0698-3405	1	RESISTOR 422 1% .5W F TC=0+-100	19701	MF7C1/2-T0-422R-F
A13R2	0698-3194		RESISTOR 20K .25% .125W F TC=0+-50	03888	PME55-1/8-T2-2002-C
A13R3	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A13R4	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A13XA2	1251-0472	2	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
A13XA5	1251-2571	6	CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A13XA7	1251-2571		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A13XA11	1251-2571		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A13XA15	1251-2035		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-300
A13XA3A4	1251-0472		CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
			A13 MISCELLANEOUS		
	1251-0600	62	CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A14			NOT ASSIGNED		
A15	08640-60018	1	RISER ASSY	28480	08640-60018
A15MP1	0403-0153	2	GUIDE-PC BD BRN POLYC .062-BD-THKNS 1-LG	28480	0403-0153
A15MP2	0403-0154	1	GUIDE-PC BD RED POLYC .062-BD-THKNS 1-LG	28480	0403-0154
A15MP3	0403-0155	1	GUIDE-PC BD ORN POLYC .062-BD-THKNS 1-LG	28480	0403-0155
A15XA17	1251-3308	1	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-12-30-032
A16	08640-60119	1	FAN MOTOR ASSEMBLY	28480	08640-60119
A16B1	3140-0490	1	MOTOR BRUSHLESS 10VDC 2550-RPM	3M768	1AD3001-0A
A16P1	1251-0198	1	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	251-06-30-261
	5040-0327	1	HOOD:CONNECTOR	28480	5040-0327
A17	08640-60001	1	POWER SUPPLY MOTHER BOARD ASSY	28480	08640-60001
A17MP1	1251-2361	1	CONTACT-CONN MALE DPSLDR	00779	86091-2
A17XA12	1251-2034	3	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300
A17XA18	1251-2571		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A17XA20	1251-2571		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A17XA22	1251-2571		CONNECTOR-PC EDGE 15-CONT/ROW 1-ROW	26742	91-6915-0702-00
A17XA24	1251-2034		CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300
A17XA26	1251-2034		CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300
A18	08641-60185	1	REGULATOR & FAN DRIVER ASSY, -5.2V	28480	08641-60185
A18C1	0180-0229	5	CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X901082
A18C2	0160-3534	4	CAPACITOR-FXD 510PF +-5% 100WVDC MICA	28480	0160-3534
A18C3	0180-2214	1	CAPACITOR-FXD 90UF+75-10% 16VDC AL	56289	30D906G016CC2
A18C4	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A18C5	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A18CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR2	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A18CR3	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A18CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR6	1901-0159	5	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A18CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR9	1901-0049	2	DIODE-PWR RECT 50V 750MA DO-29	28480	1901-0049
A18CR10	1901-0049		DIODE-PWR RECT 50V 750MA DO-29	28480	1901-0049
A18CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A18CR12	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A18DS1	1990-0326	5	LED-VISIBLE LUM-INT=300UCD IF=50MA-MAX	28480	1990-0326
A18F1	2110-0425	1	FUSE 2A 125V SLO-BLO .25X.27	71400	GMW 2A
A18MP1	4040-0752	2	EXTR-PC BD YEL POLYC .062-BD-THKNS	28480	4040-0752
	1480-0073		PIN;DRIVE 0.250" LG	00000	OBD
A18Q1	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A18Q2	1854-0232	4	TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18Q3	1884-0012	5	THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A18Q4	1854-0003	1	TRANSISTOR NPN SI TO-39 PD=800MW	28480	1854-0003
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18Q5	1853-0027	4	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0027
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18Q6	1853-0050	4	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A18Q7	1853-0027		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0027
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18Q8	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A18Q9	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A18Q10	1853-0027		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0027
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18Q11	1853-0050		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0050
A18Q12	1853-0027		TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0027
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A18R1	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A18R2	2100-3123		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	32997	3006P-1-501
A18R3	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A18R4	0683-0335	1	RESISTOR 3.3 5% .25W FC TC=-400/+500	01121	CB33G5
A18R5	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A18R6	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A18R7	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A18R8	0698-3161		RESISTOR 38.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3832-F
A18R9	0811-2813	3	RESISTOR 1 5% .75W PW TC=0+-50	91637	RS1/2-T2-1R0-J
A18R10	0757-0276	2	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-61R9-F
A18R11	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A18R12	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A18R13	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A18R14	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A18R15	0757-0453		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A18R16	0811-1553	1	RESISTOR .68 5% 2W PW TC=0+-800	75042	BWH2-11/16-J
A18R17	0698-3438	4	RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A18R18	0698-3438		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A18R19	0698-7246		RESISTOR 2.61K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2611-G
A18TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18TP6	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A18U1	1826-0177	5	IC UA 723 V RGLTR	15818	7238E
A18VR1	1902-3005	2	DIODE-ZNR 2.43V 5% DO-7 PD=.4W TC=-.076%	04713	SZ 10939-5
A18VR2	1902-3094	1	DIODE-ZNR 5.11V 2% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-99
A18VR3	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	28480	1902-0049
A18XF1A	1251-2313	10	CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A18XF1B	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A19			NOT ASSIGNED		
A20	08640-60005	1	REGULATOR ASSEMBLY,+5.2V & +44.6V	28480	08640-60005

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A20C1	0160-0153	1	CAPACITOR-FXD 1000PF +-10% 200WVDC POLYE	56289	292P10292
A20C2	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X901082
A20C3	0180-0234	1	CAPACITOR-FXD 33UF+-20% 75VDC TA	56289	109D336X0075F2
A20C4	0180-0228		CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	150D226X901582
A20C5	0160-0300	1	CAPACITOR-FXD 2700PF +-10% 200WVDC POLYE	56289	292P27292
A20C6	0180-2208		CAPACITOR-FXD 220UF+-10% 10VDC TA	56289	150D227X901082
A20C7	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X901082
A20C8	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A20CR1	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A20CR2	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A20CR3	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A20CR4	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A20CR5	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A20DS1	1990-0326		LED-VISIBLE LUM-INT=300UCD IF=50MA-MAX	28480	1990-0326
A20DS2	1990-0326		LED-VISIBLE LUM-INT=300UCD IF=50MA-MAX	28480	1990-0326
A20F1	2110-0332	1	FUSE 3A 125V NORM-BLO .25X.27	71400	GMW 3
A20F2	2110-0047	1	FUSE 1A 125V NORM-BLO .25X.27	71400	GMW-1
A20MP1	4040-0748		EXTRACTOR-PC BD BLK POLYC .062-BD-THKNS	28480	4040-0748
	1480-0073		PIN:DRIVE 0.250" LG	00000	OBD
A20MP2	4040-0753	2	EXTRACTOR-PC BD GRN POLYC .062-BD-THKNS	28480	4040-0753
	1480-0073		PIN:DRIVE 0.250" LG	00000	OBD
A20Q1	1884-0012		THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A20Q2	1854-0232		TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A20Q3	1854-0022		TRANSISTOR NPN SI TO-39 PD=700MW	07263	S17843
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A20Q4	1853-0224	1	TRANSISTOR PNP SI TO-39 PD=1W FT=15MHZ	02735	2N5415
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A20Q5	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A20Q6	1854-0023	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0023
A20Q7	1884-0012		THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A20R1	0698-3160		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A20R2	0698-3438		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A20R3	0757-0462	1	RESISTOR 75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7502-F
A20R4	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A20R5	0698-3407	1	RESISTOR 1.96K 1% .5W F TC=0+-100	91637	MFF-1/2-10
A20R6	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4641-F
A20R7	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2872-F
A20R8	2100-3154		RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	32997	3006P-1-102
A20R9	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A20R10	0811-2813		RESISTOR 1 5% .75W PW TC=0+-50	91637	RS1/2-T2-1R0-J
A20R11	0757-0819	1	RESISTOR 909 1% .5W F TC=0+-100	19701	MF7C1/2-T0-909R-F
A20R12	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A20R13	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A20R14	0811-1666	3	RESISTOR 1 5% 2W PW TC=0+-800	75042	BWH2-1R0-J
A20R15	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A20R16	2100-3123		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	32997	3006P-1-501
A20R17	0698-3150		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A20R18	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A20R19	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A20R20	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A20R21	0811-2813		RESISTOR 1 5% .75W PW TC=0+-50	91637	RS1/2-T2-1R0-J
A20R22	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A20R23	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A20R24	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A20R25	0811-1666		RESISTOR 1 5% 2W PW TC=0+-800	75042	BWH2-1R0-J
A20R26	0811-1666		RESISTOR 1 5% 2W PW TC=0+-800	75042	BWH2-1R0-J
A20R27	0698-7246		RESISTOR 2.61K 1% .05W F TC=0+-100	24546	C3-1/8-T0-2611-G
A20TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP6	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP7	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP8	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP9	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20TP10	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A20U1	1826-0177		IC UA 723 V RGLTR	15818	7238E
A20U2	1826-0177		IC UA 723 V RGLTR	15818	7238E
A20VR1	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	28480	1902-0025
A20VR2	1902-3234	1	DIODE-ZNR 19.6V 5% DO-7 PD=.4W TC=+.073%	04713	SZ 10939-266
A20VR3	1902-0244	2	DIODE-ZNR 30.1V 5% DO-15 PD=1W TC=+.075%	28480	1902-0244
A20VR4	1902-3345	1	DIODE-ZNR 51.1V 5% DO-7 PD=.4W TC=+.081%	04713	SZ 10939-386
A20VR5	1902-3005		DIODE-ZNR 2.43V 5% DO-7 PD=.4W TC=-.076%	04713	SZ 10939-5

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A20VR6	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.^22%	28480	1902-0049
A20XF1A	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A20XF1B	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A20XF2A	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A20XF2B	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A21	08641-60189	1	REVERSE POWER ASSEMBLY	28480	08641-60189
A21FL1	9135-0002	2	FILTER-LP SOLDER-TERMS	28480	9135-0002
A21FL2	9135-0002		FILTER-LP SOLDER-TERMS	28480	9135-0002
A21J1	1250-0829	3	CONNECTOR-RF SMC M SGL-HOLE-FR 50-OHM	98291	50-045-4610
A21J2	1250-0829		CONNECTOR-RF SMC M SGL-HOLE-FR 50-OHM	98291	50-045-4610
A21L1	1460-1395	2	W.REFORM CU ALY	28480	1460-1395
A21L2	1460-1395		WIREFORM CU ALY	28480	1460-1395
A21MP1	08640-20276	1	HOUSING, REVERSE POWER ASSY	28480	08640-20276
A21MP2	2200-0103		SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	28480	2200-0103
A21A1	08640-60049	1	POWER PROTECTOR BOARD ASSEMBLY	28480	08640-60049
A21A1C1	0160-0576	4	CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-0576
A21A1C2	0160-0576		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-0576
A21A1C3	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A21A1C4	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A21A1C5	0160-3877		CAPACITOR-FXD 100PF +-20% 200WVDC CER	28480	0160-3877
A21A1C6	0160-0576		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-0576
A21A1C7	0160-3875		CAPACITOR-FXD 22PF +-5% 200WVDC CER	28480	0160-3875
A21A1C8	0160-3873		CAPACITOR-FXD 4.7PF +-.5PF 200WVDC CER	28480	0160-3873
A21A1C9	0121-0448	1	CAPACITOR-V TRMR-CER 2.5/5PF 63V PC-MTG	00868	58-TRIKO-04 2.5-5 PF-N033
A21A1C10	0160-0699	1	CAPACITOR-FXD 1PF +-.1PF 100WVDC CER	72982	8101-A112-COK-1098
A21A1C11	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A21A1CR1	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A21A1CR2	1901-0518	7	DIODE-SCHOTTKY	28480	1901-0518
A21A1CR3	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A21A1CR4	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A21A1K1	0490-1073		RELAY-REED 1A 250MA 120VAC 4.5VDC-COIL	28480	0490-1073
A21A1MP1	0363-0105	2	CONTACT	28480	0363-0105
A21A1MP2	0363-0105		CONTACT	28480	0363-0105
A21A1Q1	1854-0210	3	TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A21A1Q2	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A21A1Q3	1854-0210		TRANSISTOR NPN 2N2222 SI TO-18 PD=500MW	04713	2N2222
A21A1R1	0698-7241	1	RESISTOR 1.62K 1% .05W F TC=0+-100	24546	C-3, T-0
A21A1R2	2100-1986	1	RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRN	73138	62-206-1
A21A1R3	0683-1055	5	RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A21A1R4	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A21A1R5	0698-7212		RESISTOR 100 1% .05W F TC=0+-100	24546	C3-1/8-T0-100R-G
A21A1R6	0683-0275	3	RESISTOR 2.7 5% .25W FC TC=-400/+500	01121	CB27G5
A21A1R7	0698-7277		RESISTOR 51.1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-5112-G
A21A1R8	0698-7236		RESISTOR 1K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1001-G
A21A1R9	0698-7229		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A21A1R10	0698-7229		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A21A1R11	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A21A1U1	1826-0026	2	IC LM 311 COMPARATOR	27014	LM311H
A21A1VR1	1902-0554	2	DIODE-ZNR 10V 5% DO-15 PD=1W TC=+.06%	28480	1902-0554
A21A1VR2	1902-0244		DIODE-ZNR 30.1V 5% DO-15 PD=1W TC=+.075%	28480	1902-0244
A21A1VR3	1902-0554		DIODE-ZNR 10V 5% DO-15 PD=1W TC=+.06%	28480	1902-0554
A22	08640-60177	1	REGULATOR ASSY, +20V & -20V	28480	08640-60177
A22C1	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X9010B2
A22C2	0160-3534		CAPACITOR-FXD 510PF +-5% 100WVDC MICA	28480	0160-3534
A22C3	0160-0158	2	CAPACITOR-FXD 5600PF +-10% 200WVDC POLYE	56289	292P56292
A22C4	0180-0058		CAPACITOR-FXD 50UF+75-10% 25VDC AL	56289	30D506G025CC2
A22C5	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	150D336X9010B2
A22C6	0160-3534		CAPACITOR-FXD 510PF +-5% 100WVDC MICA	28480	0160-3534
A22C7	0160-0158		CAPACITOR-FXD 5600PF +-10% 200WVDC POLYE	56289	292P56292
A22C8	0180-0058		CAPACITOR-FXD 50UF+75-10% 25VDC AL	56289	30D506G025CC2
A22CR1	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A22CR2	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A22CR3	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050
A22CR4	1901-0025		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A22CR5	1901-0050		DIODE-SWITCHING 80V 200MA 2NS DO-7	28480	1901-0050

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A22CR6	1901-0159		DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A22DS1	1990-0326		LED-VISIBLE LUM-INT=300UCD IF=50MA-MAX	28480	1990-0326
A22DS2	1990-0326		LED-VISIBLE LUM-INT=300UCD IF=50MA-MAX	28480	1990-0326
A22F1	2110-0424	2	FUSE .75A 125V SLO-BLO .25X.27	71400	GMW 3/4A
A22F2	2110-0424		FUSE .75A 125V SLO-BLO .25X.27	71400	GMW 3/4A
A22MP1	4040-0748		EXTRACTOR-PC BD BLK POLYC .062-BD-THKNS	28480	4040-0748
	1480-0073		PIN:DRIVE 0.250" LG	00000	ORD
A22MP2	4040-0754	1	EXTRACTOR-PC BD BLU POLYC .062-BD-THKNS	28480	4040-0754
	1480-0073		PIN:DRIVE 0.250" LG	00000	ORD
A22Q1	1884-0012		THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A22Q2	1854-0232		TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A22Q3	1854-0232		TRANSISTOR NPN SI TO-39 PD=1W FT=15MHZ	28480	1854-0232
	1200-0173		INSULATOR-XSTR TO-5 .075-THK	28480	1200-0173
A22Q4	1884-0012		THYRISTOR-SCR JEDEC 2N3528	02735	2N3528
A22R1	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A22R2	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A22R3	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A22R4	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A22R5	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A22R6	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A22R7	2100-3123		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	32997	3006P-1-501
A22R8	0683-0275		RESISTOR 2.7 5% .25W FC TC=-400/+500	01121	CB27G5
A22R9	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A22R10	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A22R11	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A22R12	0811-1668	2	RESISTOR 1.5 5% 2W PW TC=0+-400	75042	BWH2-1R5-J
A22R13	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A22R14	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A22R15	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A22R16	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A22R17	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A22R18	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A22R19	2100-3123		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	32997	3006P-1-501
A22R20	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2151-F
A22R21	0683-0275		RESISTOR 2.7 5% .25W FC TC=-400/+500	01121	CB27G5
A22R22	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A22R23	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A22R24	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A22R25	0811-1668		RESISTOR 1.5 5% 2W PW TC=0+-400	75042	BWH2-1R5-J
A22R26	0698-7260		RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A22R27	0698-7260		RESISTOR 10K 1% .05W F TC=0+-100	24546	C3-1/8-T0-1002-G
A22R28	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A22TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP6	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP7	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP8	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP9	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22TP10	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A22U1	1826-0177		IC UA 723 V RGLTR	15818	7238E
A22U2	1826-0177		IC UA 723 V RGLTR	15818	7238E
A22VR1	1902-0202		DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057%	28480	1902-0202
A22VR2	1902-3256	2	DIODE-ZNR 23.7V 5% DO-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A22VR3	1902-0761	2	DIODE-ZNR 1N821 6.2V 5% DO-7 PD=.25W	04713	1N821
A22VR4	1902-0202		DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057%	28480	1902-0202
A22VR5	1902-3256		DIODE-ZNR 23.7V 5% DO-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A22VR6	1902-0761		DIODE-ZNR 1N821 6.2V 5% DO-7 PD=.25W	04713	1N821
A22XF1A	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A22XF1B	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A22XF2A	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A22XF2B	1251-2313		CONNECTOR-SGL CONT SKT .04-DIA	00779	3-332070-5
A23	08641-60192	1	MODULATION MODE/ FREQUENCY SWITCH	28480	08641-60192
A23MP1	2200-0113	2	SCREW-4-40 .625-IN-LG PAN-HD-POZI	28480	2200-0113
A23MP2	3050-0105	2	WASHER-FLAT MTLC NO.4 .125-IN-ID	28480	3050-0105
A23MP3	0380-0020	2	STANDOFF-RND .25-IN-LG .128-ID.188-OD BRS	76854	2295-616
A23MP4	0380-0011	4	SPACER-RND .75-IN-LG.18-ID.25-OD BRS NI	28480	0380-0011
A23MP5	2190-0018	4	WASHER-LOCK HLCL NO.6 .141-IN-ID	28480	2190-0018

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A23MP6	2360-0139	2	SCREW-MACH 6-32 2-IN-LG PAN-HD-POZI	28480	2360-0139
A23MP7	0510-0005	2	RETAINER-RING .25-DIA CD PL STL	0018A	1400-25-CD
A23MP8	3050-0103	2	WASHER-FLAT MTLC NO.12 .25-IN-ID	28480	3050-0103
A23MP9	1460-0019	2	SPRING-COMPRESSION .384-IN-OD.375-IN-LG	28480	1460-0019
A23MP10	08640-20249	2	SWITCH ROTOR CONTACTS	28480	08640-20249
A23MP11	08641-00054	1	DETENT PLATE	28480	08641-00054
A23MP12	3130-0525	1	SHAFT INDEX ASSEMBLY	28480	3130-0525
A23A1	08641-60235	1	MODULATION MODE SELECT	28480	08641-60235
A23A1MP1 - 5	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A23A1R1	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-TO-751-F
A23A1W1	8120-2384	1	CABLE ASSEMBLY	28480	8120-2384
A23A2	08641-60236	1	MODULATION FREQUENCY	28480	08641-60236
A23A2R1	0698-3160		RESISTOR 31.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3162-F
A23A2R2	0698-8272	2	RESISTOR 157K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1573-F
A23A2R3	0757-0479	2	RESISTOR 392K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-3923-F
A23A2R4	0757-0453		RESISTOR 30.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3012-F
A23A2R5	0698-8272		RESISTOR 157K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1573-F
A23A2R6	0757-0479		RESISTOR 392K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-3923-F
A23A2MP1 - 3	0362-0227	3	TERMINAL-CRIMP QDISC-FEM 30-24-AWG	28480	0362-0227
A23A2W1	8120-2385	1	CABLE ASSEMBLY	28480	8120-2385
A23A3	08641-60237	1	MODULATION LEVEL POT	28480	08641-60237
A23A3R1	2100-2729	1	RESISTOR-VAR CONTROL C 2.5K 20% LIN	11236	550
A23A3R2	0757-0421	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A24	08640-60007	1	SERIES REGULATOR SOCKET ASSY	28480	08640-60007
A24MP1	0403-0152	1	GUIDE-PC BD BLK POLYC .062-BD-THKNS 1-LG	28480	0403-0152
A24MP2	0361-0009	1	RIVET, SEMITUBULAR OVAL HD 0.188" LG	00000	OBD
A24XQ1	1200-0041	4	SOCKET-XSTR 2-CONT TO-3-PKG	22753	PTS-1
A24XQ2	1200-0041		SOCKET-XSTR 2-CONT TO-3-PKG	22753	PTS-1
A24XQ3	1200-0041		SOCKET-XSTR 2-CONT TO-3-PKG	22753	PTS-1
A24XQ4	1200-0041		SOCKET-XSTR 2-CONT TO-3-PKG	22753	PTS-1
A25			NOT ASSIGNED		
A26	08641-60198	1	AM/AGC & RF AMPLIFIER (SEE SERVICE SHEET F) (DOES NOT INCLUDE A26U1,U2)	28480	08641-60198
A26C1	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C2	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C3	0160-3219	3	CAPACITOR-FDTHRU 100PF 20% 500V CERAMIC	28480	0160-3219
A26C4	0160-3219		CAPACITOR-FDTHRU 100PF 20% 500V CERAMIC	28480	0160-3219
A26C5	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C6	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C7	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C8	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C9	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C10	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C11			NOT ASSIGNED		
A26C12			NOT ASSIGNED		
A26C13	0160-3961	1	CAPACITOR-FDTHRU 56PF 20% 500V CERAMIC	28480	0160-3961
A26C14	0160-3219		CAPACITOR-FDTHRU 100PF 20% 500V CERAMIC	28480	0160-3219
A26C15	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C16	0160-2049		CAPACITOR-FDTHRU 5000PF +80 -20% 500V	28480	0160-2049
A26C17	0160-2152	2	CAPACITOR-FDTHRU 10PF 20% 500V CERAMIC	28480	0160-2152
A26C18	0160-2152		CAPACITOR-FDTHRU 10PF 20% 500V CERAMIC	28480	0160-2152

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26J1	1250-0829		CONNECTOR-RF BMC M SGL-HOLE-FR 50-OHM	98291	50-045-4610
A26J2			NSR, P/O A26W4		
A26L1	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15 '52
A26L2	9100-1621	1	COIL-MLD 18UH 10% Q=75 .155DX.375LG	24226	15/182
A26L3	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26L4	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26L5	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26L6			NOT ASSIGNED		
A26L7	9140-0178	1	COIL-MLD 12UH 10% Q=65 .155DX.375LG	24226	15/122
A26L8	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26MP1	8160-0218	1	RFI STRIP NI ALY .782-W 4.728-L	28480	8160-0218
A26MP2	8160-0222	1	RFI STRIP NI ALY 2.027-W 3.053-L	28480	8160-0222
A26MP3	8160-0223	1	RFI STRIP NI ALY 1-W 2.196-L	28480	8160-0223
A26MP4	8160-0224	1	GASKET:MOD BOTTOM COVER	28480	8160-0224
A26MP5	08640-00012	1	COVER, ACCESS	28480	08640-00012
A26MP6	08640-00018	1	COVER, FILTER MODULE	28480	08640-00018
A26MP7			NOT ASSIGNED		
A26MP8	08640-20263	1	CASTING, MODULE	28480	08640-20263
A26MP9	08640-20264	1	COVER, BOTTOM MODULE	28480	08640-20264
A26MP10	08640-00013	1	COVER, AMPLIFIER FILTER (EXCEPT OPTION 002. FOR OPT 002, SEE SECOND A26 LISTING, A26A1MP1).	28480	08640-00013
A26MP11	0403-0153		GUIDE-PC BD BRN POLYC .062-BD-THKNS 1-LG	28480	0403-0153
A26MP12	0403-0156		GUIDE-PC BD YEL POLYC .062-BD-THKNS 1-LG	28480	0403-0156
A26MP13	0403-0157		GUIDE-PC BD GRN POLYC .062-BD-THKNS 1-LG	28480	0403-0157
A26MP14			NOT ASSIGNED		
A26MP15	1250-1423	1	CAP-COAX TO FIT F-BNC NON-SHTG 2.5-CH	24931	28PC107-1
A26MP16	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP17	2950-0035	1	NUT-HEX-DBL-CHAM 15/32-32-THD .078-THK	28480	2950-0039
A26MP18	2190-0068	1	WASHER-LK INTL T NO.-1/2 .505-IN-ID	78189	1924-02
A26MP19					
A26MP20	1251-3231	2	CONNECTOR; PC EDGE; 15-CONT; WIRE WRAP	28480	1251-3231
A26MP21	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP22	1251-1886	6	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-340
A26MP23			NOT ASSIGNED		
A26MP24	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP25	0520-0173	4	SCREW-MACH 2-56 .188-IN-LG PAN-HD-POZI	28480	0520-0173
A26MP26			NOT ASSIGNED		
A26MP27	2360-0203	4	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	28480	2360-0203
A26MP28	2190-0018		WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0018
A26MP29	3050-0066	4	WASHER-FL MTLC NO.-6 .147-IN-ID	28480	3050-0066
A26MP30	2360-0203		SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	28480	2360-0203
A26MP31	2190-0018		WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0018
A26MP32	3050-0066		WASHER-FL MTLC NO.-6 .147-IN-ID	28480	3050-0066
A26MP33	08640-00002	2	HEAT SINK, MICROCIRCUITS	28480	08640-00002
A26MP34	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A26MP35	2950-0078		NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A26MP36	2190-0124		WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A26MP37	2950-0078		NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A26MP38	2190-0124		WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A26MP39	2950-0078		NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A26MP40	2190-0124		WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A26MP41	2950-0078		NUT-HEX-DBL-CHAM 10-32-THD .067-THK	74163	500220
A26MP42	2190-0124		WASHER-LK INTL T NO.-10 .195-IN-ID	74163	500222
A26MP43	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A26MP44	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP45	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP46	2200-0107		SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	28480	2200-0107
A26MP47	2190-0034	1	WASHER-LK HLCL NO.-10 .194-IN-ID	28480	2190-0034
A26MP48	2200-0105		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	28480	2200-0105
A26R1	0757-0159	1	RESISTOR 1K 1% .5W F TC=0+-100	19701	MF7C1/2-T0-1K0-F
A26U1	08640-67002	1	OUTPUT AMPLIFIER	28480	08640-67002
A26U2	08640-67003	1	MODULATOR PREAMPLIFIER	28480	08640-67003
A26W1	8120-1889	1	CABLE-COAX .086-OD	28480	8120-1889
A26W2	8120-1887	1	CABLE-COAX 50 OHM .086-OD	28480	8120-1887
A26W3	8120-1905	1	CABLE-COAX .086-OD	28480	8120-1905
A26W4	8120-1892	1	CABLE-COAX .086-OD	28480	8120-1892
A26A1	08640-60043	1	POWER AMPLIFIER & AGC DETECTOR ASSY (EXCEPT OPTION 002. FOR OPT 002, SEE SECOND A26 LISTING.) (INCLUDES A26W1 AND A26W2)	28480	08640-60043
A26A1C1	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A26A1C2	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A26A1C3	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A26A1C4	0160-2209	1	CAPACITOR-FXD 360PF +-5% 300WVDC MICA	28480	0160-2209
A26A1C5	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26A1C6	0180-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A26A1CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A1CR2	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A1CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A1CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A1CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A1CR6	1901-0539		DIODE-SCHOTTKY	28480	1901-0539
A26A1L1	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26A1L2	9140-0163	1	COIL-MLD 2.7UH 10% Q=33 .155DX.375LG	24226	15/271
A26A1Q1	1853-0007		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A26A1Q2	1855-0049	1	TRANSISTOR-JFET DUAL N-CHAN D-MODE SI	28480	1855-0049
A26A1Q3	1855-0020	1	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
A26A1Q4	1853-0007		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A26A1Q5	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A1Q6	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A1Q7	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A1Q8	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A1Q9	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A1R1	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A26A1R2	0698-3446		RESISTOR 383 1% .125W F TC=0+-100	24546	C4-1/8-T0-383R-F
A26A1R3	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A26A1R4	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A26A1R5	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A26A1R6	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A26A1R7	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A26A1R8	0698-3443	1	RESISTOR 287 1% .125W F TC=0+-100	24546	C4-1/8-T0-287R-F
A26A1R9	0757-0199		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A26A1R10	0757-0199		RESISTOR 21.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2152-F
A26A1R11	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A26A1R12	0683-3355	1	RESISTOR 3.3M 5% .25W FC TC=-900/+1100	01121	CB3355
A26A1R13	0698-3450		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A26A1R14	0698-3450		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4222-F
A26A1R15	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A26A1R16	0698-3438		RESISTOR 147 1% .125W F TC=0+-100	24546	C4-1/8-T0-147R-F
A26A1R17	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A26A1R18	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A1R19	2100-2061	1	RESISTOR-TRMR 200 10% C TOP-ADJ 1-TRN	73138	62-204-1
A26A1R20	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A1R21	0698-7233	1	RESISTOR 750 1% .05W F TC=0+-100	24546	C3-1/8-T0-750R-G
A26A1R22	0698-7272		RESISTOR 31.6K 1% .05W F TC=0+-100	24546	C3-1/8-T0-3162-G
A26A1R23	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A26A1TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A1TP2	0340-0044	1	TERMINAL-STUD DBL-TUR PRESS-MTG	98291	013-2061-00-0 479
A26A1VR1	1902-0184	2	DIODE-ZNR 16.2V 5% DO-7 PD=.4W TC=+.066%	04713	SZ 10939-242
A26A1VR2	1902-0048	1	DIODE-ZNR 6.81V 5% DO-7 PD=.4W TC=+.043%	04713	SZ 10939-134
A26A1XA26U1A-E	1251-2613		CONNECTOR-8SL CONT SKT .033-IN-BSC-SZ	00779	50864-3
A26A2	08640-60013	1	AM OFFSET & PULSE SWITCHING ASSY	28480	08640-60014
A26A2C1	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A2C2	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A2C3	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A2C4	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A2C5	0160-3450	2	CAPACITOR-FXD 5000PF +-10% 250WVDC CER	28480	0160-3450
A26A2C6	0160-0161	2	CAPACITOR-FXD .01UF +-10% 200WVDC POLYE	56289	292P10392
A26A2C7	0160-3450		CAPACITOR-FXD 5000PF +-10% 250WVDC CER	28480	0160-3450
A26A2C8	0180-1743		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A26A2C9			NOT ASSIGNED		
A26A2C10	0180-0100		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	150D475X9035A2
A26A2C11	0180-0116		CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	150D685X9035A2
A26A2C12	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A2CR1	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A2CR2	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A2CR3	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A2CR4	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A2CR5			NOT ASSIGNED		
A26A2CR6			NOT ASSIGNED		
A26A2CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A2CR8			NOT ASSIGNED		
A26A2CR9	1901-0539		DIODE-SCHOTTKY	28480	1901-0539
A26A2CR10	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26A2CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A2CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A2CR13	1901-0539		DIODE-SCHOTTKY	28480	1901-0539
A26A2CR14	1910-0022	4	DIODE-GE 5V 60MA 3.5NS DO-7	28480	1910-0022
A26A2CR15	1910-0022		DIODE-GE 5V 60MA 3.5NS DO-7	28480	1910-0022
A26A2CR16	1910-0022		DIODE-GE 5V 60MA 3.5NS DO-7	28480	1910-0022
A26A2CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A2CR18	1910-0022		DIODE-GE 5V 60MA 3.5NS DO-7	28480	1910-0022
A26A2L1	9100-1641	4	COIL-MLD 240UH 5% Q=65 .155DX.375LG	24226	15/243
A26A2L2	9100-1641		COIL-MLD 240UH 5% Q=65 .155DX.375LG	24226	15/243
A26A2L3	9100-1620		COIL-MLD 15UH 10% Q=65 .135DX.375LG	24226	15/152
A26A2MP1	4040-0749		EXTR-PC BD BRN POLYC .062-BD-THKNS	28480	4040-0749
	1480-0073		PIN:DRIVE 0.250" LG	00000	OBD
A26A2MP2	4040-0752		EXTR-PC BD YEL POLYC .062-BD-THKNS	28480	4040-0752
	1480-0073		PIN:DRIVE 0.250" LG	00000	OBD
A26A2Q1	1854-0221		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A26A2Q2	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A26A2Q3	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A2Q4	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A2Q5	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A26A2Q6	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A26A2Q7	1854-0404		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A26A2Q8	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A2Q9	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A2R1	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1003-F
A26A2R2	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-7501-F
A26A2R3	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R4	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R5	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4641-F
A26A2R6	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R7	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-7501-F
A26A2R8	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-TO-909R-F
A26A2R9	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TO-825R-F
A26A2R10	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-TO-6811-F
A26A2R11	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R12	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R13	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A26A2R14	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TO-825R-F
A26A2R15	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R16	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A26A2R17	0698-3440		RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-TO-196R-F
A26A2R18	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R19	2100-2413		RESISTOR-TRMR 200 10% C SIDE-ADJ 1-TRN	30983	ET50X201
A26A2R20	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1962-F
A26A2R21	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-TO-511R-F
A26A2R22	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-51R1-F
A26A2R23	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4642-F
A26A2R24	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R25	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4642-F
A26A2R26	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R27	0698-0085		RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2611-F
A26A2R28	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4642-F
A26A2R29	0698-3150		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2371-F
A26A2R30	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R31	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4221-F
A26A2R32	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R33	0698-3450		RESISTOR 42.2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4222-F
A26A2R34	0757-0289		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-TO-1332-F
A26A2R35	0698-3447		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-TO-422R-F
A26A2R36	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1961-F
A26A2R37	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A26A2R38	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A26A2R39	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1961-F
A26A2R40	0698-3157		RESISTOR 19.6K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1962-F
A26A2TP1	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP2	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP3	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP4	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP5	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP6	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP7	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2TP8	0360-1514		TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-1514
A26A2U1	1826-0114	1	IC UA 710 COMPARATOR	07263	710HM
A26A2U2	1820-0448	1	IC-DIGITAL SN5400N TTL QUAD 2 NAND	01295	SN5400N
A26A2U3	1820-0579	1	IC-DIGITAL SN74123N TTL DUAL	01295	SN74123N

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26A2VR1	1902-3139	1	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A26A3	08640-60016	1	MODULATOR ASSY(INCLUDES A26W3)	28480	08640-60016
A26A3C1	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A26A3C2	0160-3094		CAPACITOR-FXD .1UF +-10% 100WVDC CER	28480	0160-3094
A26A3C3	0150-0048	4	CAPACITOR-FXD .22PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A26A3C4	0150-0048		CAPACITOR-FXD .22PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A26A3C5	0150-0048		CAPACITOR-FXD .22PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A26A3C6	0150-0048		CAPACITOR-FXD .22PF +-5% 500WVDC TI DIOX	95121	TYPE QC
A26A3CR1	08640-60163	1	MATCHED DIODE SET (INCLUDES A26A3CR2 THRU 8, NSR)	28480	08640-60163
A26A3CR2			NSR, PART OF A26A3CR1.		
A26A3CR3			NSR, PART OF A26A3CR1.		
A26A3CR4			NSR, PART OF A26A3CR1.		
A26A3CR5			NSR, PART OF A26A3CR1.		
A26A3CR6			NSR, PART OF A26A3CR1.		
A26A3CR7			N , PART OF A26A3CR1.		
A26A3CR8			NSR, PART OF A26A3CR1.		
A26A3J1	1250-1425	1	CONNECTOR-RF SMC M SGL HOLE RR	2K497	700177-1
A26A3J2	1251-2194	8	CONNECTOR-SGL CONT SKT .021-IN-BSC-SZ	00779	3-331272-0
A26A3L1	9100-1620		COIL-MLD 15UH 10% Q=65 .155DX.375LG	24226	15/152
A26A3L2	9140-0112		COIL-MLD 4.7UH 10% Q=33 .155DX.375LG	24226	15/471
A26A3R1	0698-7227		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A26A3R2	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A26A3R3	0698-3132		RESISTOR 261 1% .125W F TC=0+-100	24546	C4-1/8-T0-2610-F
A26A3R4	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A26A3R5	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A26A3T1	08640-80003	2	BALUN ASSY	28480	08640-80003
A26A3T2	08640-80003		BALUN ASSY	28480	08640-80003
			A26A3 MISCELLANEOUS		
	1251-2229	8	CONNECTOR-SGL CONT SKT .033-DIA	00779	1-331677-3
A26A3XA26U1A-E	1251-2613	10	CONNECTOR-SGL CONT SKT .033-IN-BSC-SZ	00779	50864-3
A26A4	08640-60337	1	AGC AMPLIFIER ASSY	28480	08640-60337
A26A4C1	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A4C2	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A4C3	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A4C4	0160-2307		CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480	0160-2307
A26A4C5	0160-2307		CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480	0160-2307
A26A4C6	0160-3458	1	CAPACITOR-FXD 5000PF +-10% 250WVDC CER	28480	0160-3458
A26A4C7	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	150D105X9035A2
A26A4C8	0160-0197		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A26A4C9	0160-0161		CAPACITOR-FXD .01UF +-10% 200WVDC POLYE	56289	292P10392
A26A4C10	0160-0302	1	CAPACITOR-FXD .018UF +-10% 200WVDC POLYE	56289	292P18392
A26A4C11	0160-0159		CAPACITOR-FXD 6800PF +-10% 200WVDC POLYE	56289	292P68292
A26A4C12	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A26A4C13	0180-2206		CAPACITOR-FXD 60UF+-10% 6VDC TA	56289	150D606X9006B2
A26A4C14	0160-0576		CAPACITOR-FXD .1UF +-20% 50WVDC CER	28480	0160-0576
A26A4C15	0160-0297	1	CAPACITOR-FXD 1200PF +-10% 200WVDC POLYE	56289	292P12292
A26A4C16	0160-3534		CAPACITOR-FXD 510PF +-5% 100WVDC MICA	28480	0160-3534
A26A4C17	0160-3459	1	CAPACITOR-FXD .02UF +-20% 100WVDC CER	28480	0160-3459
A26A4CR1	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A4CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A4CR3			NOT ASSIGNED		
A26A4CR4			NOT ASSIGNED		
A26A4CR5	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A4CR6	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A4CR7	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A26A4CR8	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A26A4CR9	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A26A4CR10	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A4CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A26A4CR12	1901-0022		DIODE-STABISTOR 10V 250MA	28480	1901-0022
A26A4CR13	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A26A4CR14	1901-0518		DIODE-SCHOTTKY	28480	1901-0518
A26A4L1	9100-1641		COIL-MLD 240UH 5% Q=65 .155DX.375LG	24226	15/243
A26A4L2	9100-1641		COIL-MLD 240UH 5% Q=65 .155DX.375LG	24226	15/243
A26A4MP1	4040-0749		EXTR-PC BD BRN POLYC .062-BD-THKNS	28480	4040-0749
	1480-0073		PIN;DRIVE 0.250" LG	00000	OBD
A26A4MP2	4040-0753		EXTRACTOR-PC BD GRN POLYC .062-BD-THKNS	28480	4040-0753
	1480-0073		PIN;DRIVE 0.250" LG	00000	OBD

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26A4Q1	1854-0221		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A26A4Q2	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A4Q3	1853-0007		TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A26A4Q4	1854-0221		TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0221
A26A4Q5	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A4Q6	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A4Q7	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A26A4Q8			NOT ASSIGNED		
A26A4Q9	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A26A4R1	2100-2521	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	30983	ET50X202
A26A4R2			NOT ASSIGNED		
A26A4R3	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A26A4R4	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A26A4R5			NOT ASSIGNED		
A26A4R6	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A26A4R7	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A26A4R8	0757-0440		RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A26A4R9	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A26A4R10	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R11	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R12	2100-2514		RESISTOR-TRMR 20K 10% C SIDE-ADJ 1-TRN	30983	ET50W203
A26A4R13	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A26A4R14	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R15	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1472-F
A26A4R16	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A4R17	0698-3453		RESISTOR 196K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1963-F
A26A4R18	0698-3153		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A26A4R19	0757-0464	1	RESISTOR 90.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-9092-F
A26A4R20	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A4R21	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A4R22	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A26A4R23	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A26A4R24	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A26A4R25	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A26A4R26	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A4R27	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A26A4R28			NOT ASSIGNED		
A26A4R29	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R30	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A26A4R31	0757-0317		RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A26A4R32	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R33	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A26A4R34	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A26A4R35	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A26A4R36	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A26A4R37	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A26A4R38	0698-3153		RESISTOR 3.83K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3831-F
A26A4R39	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A26A4R40	0698-3437		RESISTOR 133 1% .125W F TC=0+-100	24546	C4-1/8-T0-133R-F
A26A4R41	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A26A4R42	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A26A4R43	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1961-F
A26A4R44	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A26A4R45	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A26A4R46	0698-3154		RESISTOR 4.22K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4221-F
A26A4R47	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A26A4R48	0757-0289		RESISTOR 13.3K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-1332-F
A26A4R49	0698-3150		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A26A4R50	0698-3451	1	RESISTOR 133K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1333-F
A26A4R51			NOT ASSIGNED		
A26A4R52	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A26A4R53	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A26A4S1	3101-0860	1	SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC PC	79727	GF126-0064B
A26A4TP1	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP2	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP3	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP4	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP5	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP6	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP7	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4TP8	1251-0600		CONTACT-CONN U/W-POST-TYPE MALE DPSLDR	28480	1251-0600
A26A4U1	1826-0092		IC MC 1458 OP AMP	28480	1826-0092
A26A4U2	1826-0026		IC LM 311 COMPARATOR	27014	LM311H
A26A4U3	1820-0328	1	IC-DIGITAL SN7402N TTL QUAD 2 NOR	01295	SN7402N
A26A4U4	1820-0471	1	IC-DIGITAL SN7406N TTL HEX 1	01295	SN7406N

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A26A4VR1	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	28480	1902-0025
A26A4VR2	1902-0184		DIODE-ZNR 16.2V 5% DO-7 PD=.4W TC=+.066%	04713	SZ 10939-242
A26A5	08640-60302	1	RISER ASSY	28480	08640-60302
A26A5XA26A6	1251-3231		CONNECTOR; PC EDGE; 15-CONT; WIRE WRAP	28480	1251-3231
A26A6	08640-60011	1	AM MOTHER BOARD ASSY	28480	08640-60011
A26A6XA26A2	1251-1886		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-340
A26A6XA26A4	1251-1886		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	71785	252-15-30-340

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CHASSIS PARTS		
C1	0180-2530	2	CAPACITOR-FXD 3900UF+75-10% 50VDC AL	56289	36D392G050AC2B
C2	0180-2530		CAPACITOR-FXD 3900UF+75-10% 50VDC AL	56289	36D392G050AC2B
C3	0180-2334	1	CAPACITOR-FXD 3900UF+75-10% 75VDC AL	56289	36D392F075BB2B
C4	0180-2277	2	CAPACITOR-FXD 8200UF+75-10% 25VDC AL	56289	36D822G025AC2A
C5	0180-2277		CAPACITOR-FXD 8200UF+75-10% 25VDC AL	56289	36D822G025AC2A
DS1	1450-0509	1	LIGHT-IND CLR-TP .291-DIA BIPIN-TERM	28480	1450-0509
	1450-0508	1	LIGHT-IND LAMPHOLDER WHT TP LENS	28480	1450-0508
DS2	2140-0092	2	LAMP-INCAND 685 5VDC 60MA T-1-BULB	71744	CM685
	1450-0153	2	LIGHT-IND LAMPHOLDER	08717	102S-R BODY
	1450-0157	2	LENS CAP WHT-TL .219-DIA 12-40 THD	08717	102-W-STD LENS
DS3	2140-0092		LAMP-INCAND 685 5VDC 60MA T-1-BULB	71744	CM685
	1450-0153		LIGHT-IND LAMPHOLDER	08717	102S-R BODY
	1450-0157		LENS CAP WHT-TL .219-DIA 12-40 THD	08717	102-W-STD LENS
F1	2110-0002	1	FUSE 2A 250V FAST-BLO 1.25X.25 UL IEC	75915	312002.
	2110-0465	1	FUSEHOLDER-EXTR POST UL/IEC .25X1.25FUSE	28480	2110-0465
	2110-0467	1	NUT, HEX SINGLE CHAMFER 1/2-28 THREAD	75915	903-070
	2110-0470	1	FUSEHOLDER-EXTR POST 20A 200V UL/IEC	75915	345003-010
	2190-0037	1	WASHER-LK INTL T NO.-1/2 .512-IN-ID	78189	1224-08
	0900-0028	1	"RING" .426"ID, .07"XSECT-DIA NTRL	51633	5427-89
FL1	9135-0012	1	FILTER-LINE SOLDER-TERMS	28480	9135-0012
J1	08640-60103	1	CONNECTOR ASSEMBLY, OUTPUT	28480	08640-60103
M1	1120-1566	1	METER; 2.50" 1 MA FSD;TAUT BAND	32171	820-614A
M2	0960-0340	1	COUNTER, ELECTRIC;TA=-40 TO +80 DEG C	00371	CE70DN3099B02
	1460-0615	1	SPRING-CLIP .625-W 2.01-LG SST PSVT	28480	1460-0615
	08641-40004	1	HOUSING, ELAPSED METER	28480	08641-40004
MP1	0340-0486	1	INSULATOR-COVER TO- 3 .33-THK (FOR Q5)	0011J	A22-2003
MP2	08641-00023	1	KNOB, RANGE	28480	08641-00023
MP3	08641-00036	1	KNOB, LEVEL (MOD)	28480	08641-00036
MP4	08641-00046	1	KNOB, COUNTER	28480	08641-00046
MP5	08641-00021	1	KNOB, PEAK DEVIATION	28480	08641-00021
MP6	08641-20051	1	BRACKET, SIDE FRAME, LEFT	28480	08641-20051
MP7	08641-20055	1	BRACKET, SIDE FRAME, RIGHT	28480	08641-20055
MP8	08641-00039	2	KNOB, FINE TUNE	28480	08641-00039
MP9	08641-00006	1	BRACKET, METER BOARD	28480	08641-00006
MP10	08641-00039		KNOB, VERNIER	28480	08641-00039
MP11	08641-00022	1	KNOB, MODE	28480	08641-00022
MP12	0403-0026	3	CLIDE:NYLON MAIN DECK	28480	0403-0026
MP13	0590-1011	2	NUT-KNRLD-R 15/32-32-THD .12-THK .61-WD	28480	0590-1011
MP14	1250-1423		CAP-COAX TO FIT F-BNC NON-SHTG 2.5-CH (COUNTER IN, MOD. I/O)	24931	28PC107-1
MP15	1250-1423		CAP-COAX TO FIT F-BNC NON-SHTG 2.5-CH (COUNTER IN, MOD. I/O)	24931	28PC107-1
MP16	4040-0976	1	COVER, CAPACITOR	00000	OBD
MP17	3150-0203	1	FILTER-CARTRIDGE EXP AL 3.6-W .6-L	28480	3150-0203
MP18	5001-0135	1	WRENCH, COMB	28480	5001-0135
MP19	5060-0109	1	CONNECTOR:15 CONTACTS	28480	5060-0109
MP20	08641-20224	1	LOCKOUT, OVERRIDE	28480	08641-20224
MP21	08640-00021	1	SHIELD, FM AMPLIFIER	28480	08640-00021

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
MP22	08641-20225	1	SHAFT, CENTER SWITCH	28480	08641-20225
MP23	08640-00022	1	SUPPORT, PC BOARD	28480	08640-00022
MP24	08640-00030	1	SUPPORT, MODULATOR	28480	08640-00030
MP25	08640-00058	1	INSULATOR, COUNTER	28480	08640-00058
MP26	08640-00059	1	INSULATOR, CONNECTOR	28480	08640-00059
MP27	0360-1114	1	COVER-BARR BLOCK 3-TERM NPRN 1.5-IN-L	84971	TA 15 M02-03
MP28	0360-1484	1	BARRIER BLOCK 3-TERM 6-32 TWIN SCREW	75382	600A-3
MP29	1500-0433	1	COUPLER-FLEX .66-LG NYL/BRS	99934	A-201-34A
MP30	0340-0137	1	GROMMET, ROUND 0.312"ID, 5" GROOVE OD	0011E	0340-0137
MP31	08641-00061	1	SUPPORT, METER	28480	08641-00061
MP32	08641-00020	1	KNOB, DIAL ASSEMBLY, OUTPUT	28480	08641-00020
MP33	0400-0175	1	GROMMET, ROUND 0.125" ID .219" GROOVE OD	77969	9#1 MOD
MP34	08641-00037	1	KNOB, PULSE WIDTH	28480	08641-00037
MP35	08641-40001	1	WINDOW, COUNTER	28480	08641-40001
MP36	08641-00038	1	KNOB, PULSE RATE	28480	08641-00038
MP37	08641-00024	1	CRANK, KNOB ASSEMBLY	28480	08641-00024
MP38	0400-0192	1	GROMMET, ROUND 0.425" ID .562" GROOVE OD	00000	OBD
MP39	0624-0311	4	SCREW-TPG 4-20 .5-IN-LG 82 DEG	00089	
MP40	0403-0313	4	BUMPER, FOOT PRS-IN .31-THK RBR	77969	9105-Q
MP41			ATTENUATOR SHAFT		
MP42	0400-0201	2	GROMMET, ROUND .25"ID .438" GROOVE OD OSCILLATOR SHAFT	00000	OBD
MP43	0900-0023	1	"O" RING 0.250"ID (REDUCE DS2)	07322	MR 8010
MP44	0624-0267	8	SCREW-TPG 6-20 .625-IN-LG PAN-HD-POZI	28480	0624-0277
MP45	0905-0500	1	GASKET, RECT. .062" THK 1.5-LG .75W (FRONT PANEL TO M2)	00000	OBD
MP46	1200-0043	5	INSULATOR-XSTR ALUMINUM	76530	322047
MP47	3160-0217	1	FAN BLADE .76-THK 3-OD .079-ID	28480	3160-0217
MP48	5040-0170	2	GUIDE:PLUG-IN PC BOARD	28480	5040-0170
MP49	1251-2361	1	CONTACT-CONN MALE DPSLDR (FRONT PANEL TO M1)	00779	86091-2
MP50	08641-00014	1	BRACKET, PC BOARD, MTG PLATE FOR S6	28480	08641-00014
MP51	0400-0005	1	GROMMET:RUBBER FOR 0.562" DIA HOLE	73734	#1660
MP52	08620-20016	1	HEAT SINK, TRANSISTOR	28480	08620-20016
MP53	08640-00014	1	DECK, TRANSFORMER	28480	08640-00014
MP54	08640-00015	1	DECK, MAIN	28480	08640-00015
MP55	0900-0017	1	RING:RUBBER (METER ADJUST)	28480	0900-0017
MP56	0905-0502	1	GASKET, RECT.062-IN-THK 3.14-LG 1.5W (PIN ON POWER SUPPLY MOTHER BOARD)	00000	OBD
MP57	0403-0026		GLIDE, NYLON (NEAR FM SHIELD)	28480	0403-0026
MP58 THRU MP61			NOT ASSIGNED		
MP62	08640-20057	8	INSULATOR, TRANSISTOR	28480	08640-20057
MP63 THRU MP66			NOT ASSIGNED		
MP67	1400-0017	1	CLAMP-CA .312-DIA .375-WD NYL	71616	CP3-1953-5B
MP68	08640-00072	1	BRACKET, FAN TOP	28480	08640-00072
MP69	08640-00073	1	BRACKET, FAN BOTTOM	28480	08640-00073
MP70	08640-00074	1	FOAM STRIP, BOTTOM COVER	28480	08640-00074
MP71 THRU MP75			NOT ASSIGNED		
MP76	8160-0245	1	RFI GASKET NI ALY 1.56-W 3.97-L	28480	8160-0245
MP77 THRU MP80			NOT ASSIGNED		
MP81	08640-00037	2	INSULATOR, BOTTOM COVER	28480	08640-00037
MP82	08640-00037		INSULATOR, BOTTOM COVER	28480	08640-00037
MP83			NOT ASSIGNED		
MP84	08640-40068	1	TRANSFORMER COVER, PROTECTIVE	28480	08640-40068
MP85	0380-0004	2	SPACER-RND .188LG .18ID .2500 BRS NI-PL	28480	0380-0005
P1 THRU P9			NOT ASSIGNED		
P10	1251-3537	1	CONNECTOR 10-PIN F POST TYPE	27264	09-50-7101
	1251-3897	1	CONTACT-CONN U/W POST TYPE FEM CRP	28480	1251-3897
Q1	1854-0063	4	TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0064
Q2	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0064
Q3	1854-0250	1	TRANSISTOR NPN SI TO-3 PD=115W	28480	1854-0250
Q4	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0064
Q5	1854-0063		TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0064

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
R1			NOT ASSIGNED		
R2			NOT ASSIGNED		
R3A	2100-3579	1	RESISTOR, VAR TRIMMER	28480	2100-3579
R3B			P/O R3A		
S1	3101-1941	1	SWITCH-TGL BASIC DPDT NS 20A 115VAC SCR	28480	3101-1941
S2	3101-1808	1	SWITCH, TOGGLE SM,SPDT,ON-N-ON 115VAC	09353	7101-D
	3101-1224	2	BOOT-TOGGLE .265-IN DA HGT; INTEGRAL NUT	97539	N5032B
S3	3101-0957	1	SWITCH-TGL SUBMIN DPDT NS 5A 115VAC	28480	3101-0957
	3101-1224		BOOT-TOGGLE .265-IN DA HGT; INTEGRAL NUT	97539	N5032B
S4	3101-1234	1	SWITCH-SL DPDT-NS STD 1.5A 250VAC SLDR	82389	11A-1242A
S5	3103-0042	1	SWITCH-THRM FXD +171F 2A OPN ON RISE	28480	3103-0042
S6	3103-0028	1	SWITCH-THRM FXD +52F 1A CL-ON-RISE	28480	3103-0028
T1	9100-3918	1	TRANSFORMER	28480	9100-3918
W1	8120-2401	1	CABLE, POWER	28480	8120-2401
W2	8120-1886	1	CABLE-COAX .086-OD	28480	8120-1886
W3	8120-1890	1	CABLE ASSY-COAX 5.253-LG	28480	8120-1890
W4	08640-60127	1	CABLE ASSEMBLY, MOD. INPUT/OUTPUT	28480	08640-60127
W5			NOT ASSIGNED		
W6	8120-1881	1	CABLE-COAX .086-OD	28480	8120-1881
W7	8120-1882	1	CABLE-COAX .086-OD	28480	8120-1882
W8	8120-0580	1	CABLE-COAX .085-OD	28480	8120-0580
W9			NOT ASSIGNED		
W10	8120-0581	1	CABLE-COAX .086-OD	28480	8120-0581
W11	08640-20245	1	CABLE ASSEMBLY, OUTPUT	28480	08640-20245
W12			NOT ASSIGNED		
W13	8120-1111	1	CABLE-COAX 50 OHM .11-OD 28AWG	28480	8120-1111
W13	1250-1193	1	CONNECTOR-RF SM SLD FEM UNMTD	98291	52-328-0019
W14	8120-0659	1	CABLE ASSY-COAX	28480	8120-0659
W15			NOT ASSIGNED		
W16	8120-1593	1	CABLE-SHLD 22AWG 5-CNDCT JGK-JKT .26-OD	28480	8120-1593
W17			NOT ASSIGNED		
W18			NOT ASSIGNED		
W19	08640-20244	1	CABLE ASSEMBLY, ATTENUATOR	28480	08640-20244
W20	8120-2116	1	CABLE SHLD 2-COND 22AWG	28480	8120-2116

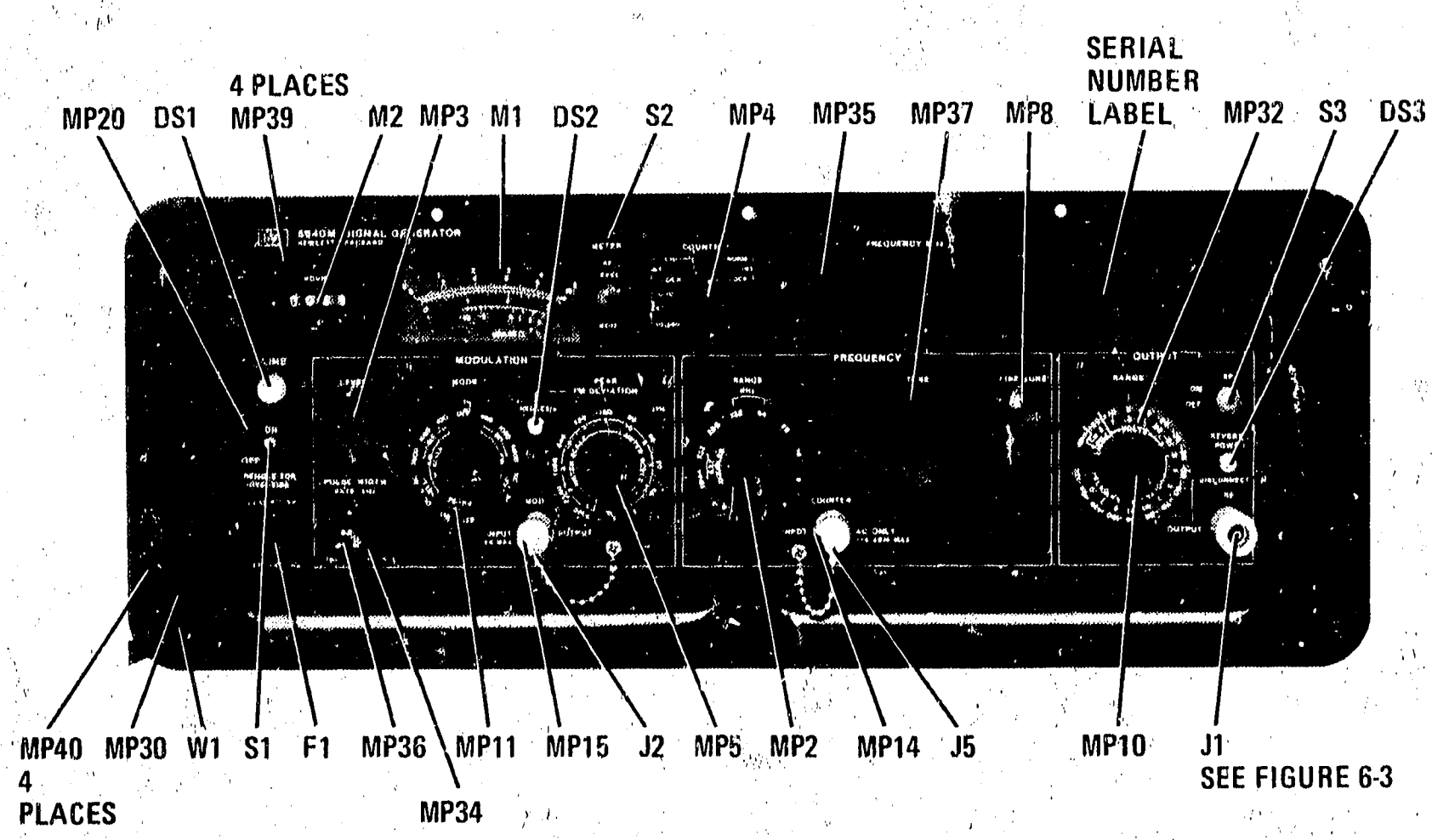


Figure 6-1. Front Panel Mechanical Parts

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			FIGURE 6-2. CABINET PARTS		
1	08641-20054	2	FRAME ASSY, 5 X 16	28460	08641-20054
	0510-0075	8	NUT-SHMET-U 6-32-THD .5-WD STL	78553	C11351-632-24B
2	08641-00043	1	FRONT PANEL	28480	08641-00043
3	08641-00050	1	PANEL, REAR	28480	08641-00050
4	5000-8705	2	COVER, SIDE	28480	5000-8705
5	5000-8707	2	COVER:FRONT SIDE	28480	5000-8707
6	08641-00002	1	COVER, TOP	28480	08641-00002
7	08641-00011	1	COVER, BOTTOM	28480	08641-00011
8	5000-8711	1	COVER, FRONT SIDE PLATE(PERFORATED)	28480	5000-8711
9	9211-1781	1	CASE, MOLDED	28480	9211-1781
10	08641-20229	2	HANDLE, FRONT PANEL	28480	08641-20229
11	08640-00109	1	FOAM STRIP, TOP COVER	28480	08640-00109
11	08640-00114	1	FOAM STRIP, TOP COVER	28480	08640-00114
12	08640-00074	1	FOAM STRIP, BOTTOM COVER	28480	08640-00074
13	08641-00013	1	COVER, SIDE, MODIFIED	28480	08641-00013

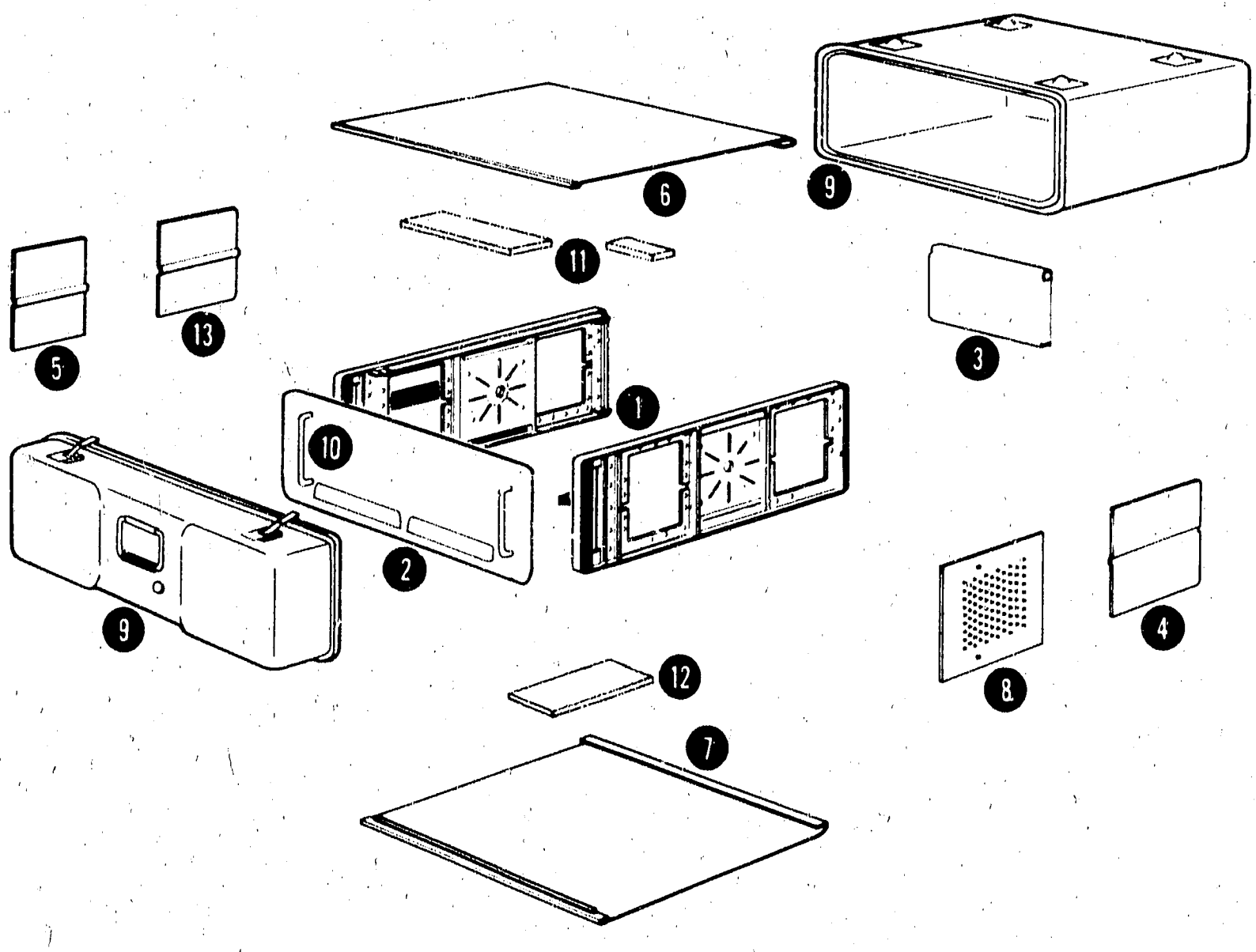


Figure 6-2. Cabinet Parts

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			FIGURE 6-3. TYPE N CONNECTOR		
J1MP1	1250-0914	1	CONNECTOR-RF APC-N FEM UNMTD 50-OHM	9D949	131-150
J1MP2	1250-0915	1	CONTACT, RF CONNECTOR, FEMALE CENTER	71785	131-149
J1MP3	2190-0104	1	WASHER-LK INTL T NO.-7/16 .439-IN-ID	78189	1922-04
J1MP4	2950-0132	1	NUT-HEX-DBL-CHAM 7/16-28-THD .094-THK	73734	76500NP
J1MP5	5040-0306	1	INSULATOR	28480	5040-0306
J1MP6	08555-20093	2	CENTER CONDUCTOR	28480	08555-20093
J1MP7	08555-20094	1	BODY, BULKHEAD	28480	08555-20094
J1MP8	08761-2027	1	INSULATOR	28480	08761-2027

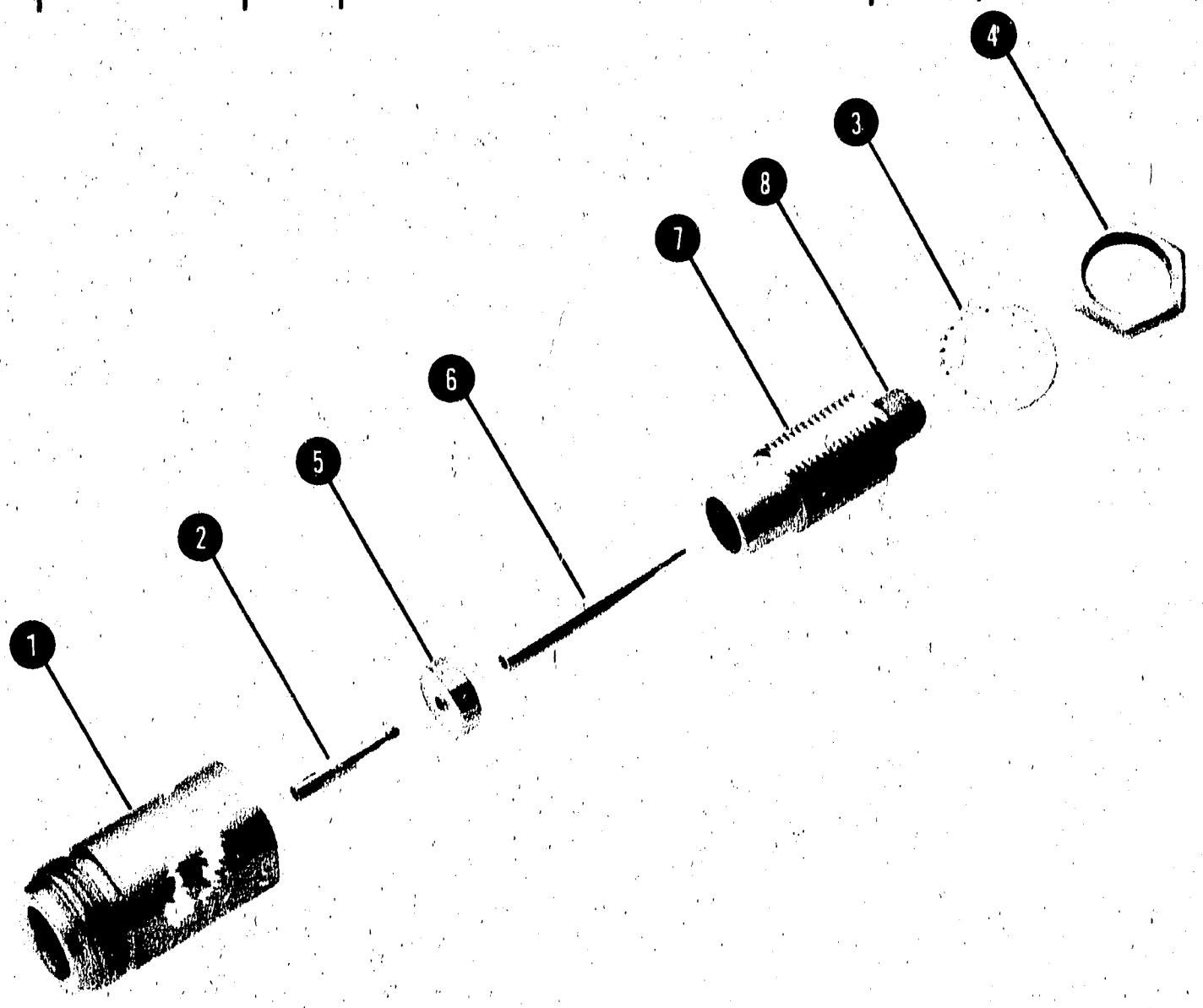


Figure 6-3. Type N Connector

			MISCELLANEOUS		
	0360-0040	1	TERMINAL-SLDR LUG LK-MTG FOR-#1/4-SCR	73734	1959
	0360-1155	1	TERMINAL-LUG-SLDR 12 SCR .25/.093 ID	79963	110
	1400-0090	1	WASHER:RUBBER 5/8" OD	00000	OBD
	08641-60197	1	WIRING HARNESS	28480	08641-60197
	2190-0104	1	WASHER-LK INTL T NO.-7/16 .439-IN-ID	78189	1922-04
	2200-0129	2	SCREW-MACH 4-40 2-IN-LG PAN-HD-POZI	28480	2200-0129
	2200-0512	3	SCREW-MACH 4-40 .312-IN-LG 82 DEG FL-HD	28480	2200-0512
	2200-0527	2	SCREW-MACH 4-40 .562-IN-LG 82 DEG FL-HD	28480	2200-0527
	2360-0180	3	SCREW-MACH 6-32 .188-IN-LG 82 DEG	28480	2360-0180
	2360-0181	3	SCREW-MACH 6-32 .25-IN-LG 82 DEG	28480	2360-0181
	2360-0191	1	SCREW-MACH 6-32 .188-IN-LG PAN-HD-POZI	28480	2360-0191
	2510-0198	6	SCREW-MACH 8-32 .625-IN-LG PAN-HD	28480	2510-0198
	2680-0118	6	SCREW-MACH 10-32 .5-IN-LG 82 DEG	28480	2680-0118
	2680-0187	6	SCREW-MACH 10-32 .75-IN-LG 82 DEG	28480	2680-0187
	2680-0194	4	SCREW-MACH 10-32 1-IN-LG PAN-HD-SLT	02310	NT34S91032AC16
	2950-0043	5	NUT-HEX-DBL-CHAM 3/8-32-THD .094-THK	73743	2X 28200
	2950-0052	2	NUT-HEX-DBL-CHAM 1/4-40-THD .062-THK	28480	2950-0054
	2950-0132	1	NUT-HEX-DBL-CHAM 7/16-28-THD .094-THK	73734	76500NP
	3050-0239	6	WASHER-FL NM NO.-8 .17-IN-ID .375-IN-OD	06540	2320-F121-30

Table 6-4. Code List of Manufacturers

Mfr Code	Manufacturer Name	Address	Zip Code
0G791	THOMPSON BREMER DIV VARE	CHICAGO IL	60622
00000	ANY SUPPLIER OF THE U.S.A.		
0004A	ARIZONA COIL INC	NOGALES AZ	85621
0018A	AR TECH PACKAGING CORP	LOWELL MA	01854
0050I	ILLUMINATED PRODUCTS INC	ANAHEIM CA	92803
00779	AMP INC	HARRISBURG PA	17105
00869	STETTNER-TRUSH INC	CAZENOVIA NY	13035
01121	ALLEN-BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	75231
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE NJ	08876
03888	KDI PYROFILM CORP	WHIPPANY NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
06776	ROBINSON NUGENT INC	NEW ALBANY IN	47150
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
07700	TECHNICAL WIRE PRODUCTS INC	CRANFORD NJ	07016
11236	CTS OF BERNE INC	BERNE IN	46711
11815	CHERRY RIVET DIV TOWNSEND CO	SANTA ANA CA	92707
15818	TELEDYNE SEMICONDUCTOR	MOUNTAIN VIEW CA	94040
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
2K497	CABLEX /E SYSTEMS INC	NORTH HAVEN CT	06473
22526	BERG ELECTRONIC INC	CUMBERLAND PA	17070
22753	U I D ELECTRONICS CORP	HOLLYWOOD FL	33021
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
24931	SPECIALTY CONNECTOR CO INC	INDIANAPOLIS IN	46227
26742	METHODE ELECTRONICS INC	CHICAGO IL	60656
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
3H768	SIEMENS CORP	ISELIN NJ	08830
30983	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BOURNS INC TRIMPOT PROD DIV	RIVERSIDE CA	92507
34335	ADVANCED MICRO DEVICES INC	SUNNYVALE CA	94086
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS MO	63017
71450	CTS CORP	ELKHART IN	46514
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72136	ELECTRO MOTIVE CORP SUB IEC	WILLIMANTIC CT	06226
72982	ERIE TECHNOLOGICAL PRODUCTS INC	ERIE PA	16512
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON CA	92634
73734	FEDERAL SCREW PRODUCTS CO	CHICAGO IL	60618
74143	PHELPS DODGE CORP	NEW YORK NY	10022
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
76854	OAK IND INC SW DIV	CRYSTAL LAKE IL	60014
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF	ELGIN IL	60126
78553	TINNERMAN PRODUCTS INC	CLEVELAND OH	44129
79727	C-W INDUSTRIES	WARMINSTER PA	18974
86928	SEASTROM MFG CO	GLENDALE CA	91201
9D949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZELWOOD MO	63042
91637	DALE ELECTRONICS INC	COLUMBUS NE	68601
95121	QUALITY COMPONENTS INC	ST MARYS PA	15857
95987	WECKESSER CO INC	CHICAGO IL	60641
97464	INDUSTRIAL RETAINING RING CO	IRVINGTON NJ	07111
98291	SEALECTRO CORP	MAMARONECK NY	10544
99800	AMER PRCN IND INC DELEVAN DIV	AURORA NY	14052

BACK DATING MANUAL

CHANGES

SECTION VII
MANUAL CHANGES

7-1. INTRODUCTION

7-2. This section normally contains information for adapting this manual to instruments for which the content does not apply directly. Since this manual does apply directly to instruments having serial numbers listed on the title page, no change information is given here. Refer to INSTRUMENTS COVERED BY MANUAL in Section I for additional important information about serial number coverage.

SERVICE INFO

SECTION VIII
SERVICE

8-1. INTRODUCTION

8-2. This section contains instructions for troubleshooting and repairing the Signal Generator.

8-3. Principles of operation and troubleshooting information are located opposite the block diagram on the foldout Service Sheets. The last two foldouts in this manual have top and bottom internal views of the instrument showing the locations of the major assemblies and some of the chassis parts. Also included are top and bottom internal views with the covers removed from the castings; these views show the locations of the sub-assemblies, the adjustments and most of the instrument's test points. The last foldout also shows a rear panel view of the instrument.

8-4. The rest of this section has general service information that should help you to quickly service and repair the Signal Generator.

8-5. PRINCIPLES OF OPERATION

8-6. Principles of operation appear on the foldout pages opposite the block diagrams and the schematics on the Service Sheets. Service Sheet 1 is an overall block diagram that briefly describes overall instrument operation. It is keyed, by the numbers in the lower right-hand corners of the blocks, to the detailed block diagrams. They provide an assembly-by-assembly description of instrument operation.

8-7. The detailed block diagrams, in turn, are keyed to the schematics on the Service Sheets that follow them. These Service Sheets provide a stage-by-stage description of the circuits on the schematics. The stages are keyed to the descriptions by the stage names that appear on the schematics.

NOTE

Table 8-4, Schematic Diagram Notes, explains any unusual symbols that appear on the schematics. The table also explains the switch-wafer numbering system.

8-8. TROUBLESHOOTING

8-9. This manual provides two methods to isolate a problem to a particular assembly. The first method is to use the results of the Basic Functional Checks and the performance tests (given in Section IV) and the table of Post-Repair Performance Tests and Adjustments, found in Section V. More information about this method is given in Section V.

8-10. Overall Troubleshooting. The second, and primary, troubleshooting method is to use the overall block diagram (found on Service Sheet 1) and the troubleshooting block diagrams that follow it to isolate a problem to a particular assembly or circuit. The troubleshooting information on Service Sheet 1 explains how to use the block diagrams.

8-11. Circuit-Level Troubleshooting. Once a problem has been isolated to a particular assembly or circuit, the schematic and component locators aid in circuit level troubleshooting.

8-12. RECOMMENDED TEST EQUIPMENT

8-13. Test equipment and test equipment accessories required to maintain the Signal Generator are listed in Tables 1-3 and 1-4. Equipment other than that listed may be used if it meets the listed critical specifications.

8-14. SERVICE AIDS

8-15. Pozidriv Screwdrivers. Many screws in the instrument appear to be Phillips, but are not. To avoid damage to the screw slots, Pozidriv screwdrivers should be used.

8-16. Service Kit. The following parts can be ordered for use in a service kit for the generator. (Before ordering, check to ensure that they are not on hand; most of them are common to service kits for other Hewlett-Packard instruments.)

1	SMC Adapter	HP 1250-0827
2	Test Cables SMC to BNC	HP 11592-60001
1	Extender Board 30 pins	HP 08640-60036
1	Extender Board — 20 pins	HP 5060-0256
1	Extender Board — 12 pins	HP 5060-0257
2	Bumpers (for Board)	HP 0403-0115

SERVICE AIDS (Cont'd)

8-17. Hardware Kit. The HP 08640-60095 Hardware Kit contains miscellaneous mechanical spare parts for the generator — such things as nuts, bolts, screws and washers.

8-18. Extender Board. An extender board (HP 08640-60036) is available that can be used to extend all circuit boards (except the A10A2 RF Divider Assembly, the A2 Meter Detector and Drive, and the A12 Rectifier Assembly) that are not accessible by removing a casting cover.

The RF Divider Assembly is self-extending -- just remove the riser board and insert the RF Divider Assembly into the riser's slot. Figure 8-1 shows the extender board in use and the RF Divider Assembly extended.

8-19. Wrench. A wrench is supplied with the generator. One end fits 7/32-inch connectors while the other end fits 1/4-inch connectors. Both of these SMC RF connector sizes are used in the generator. (See Service Sheet H for location.).

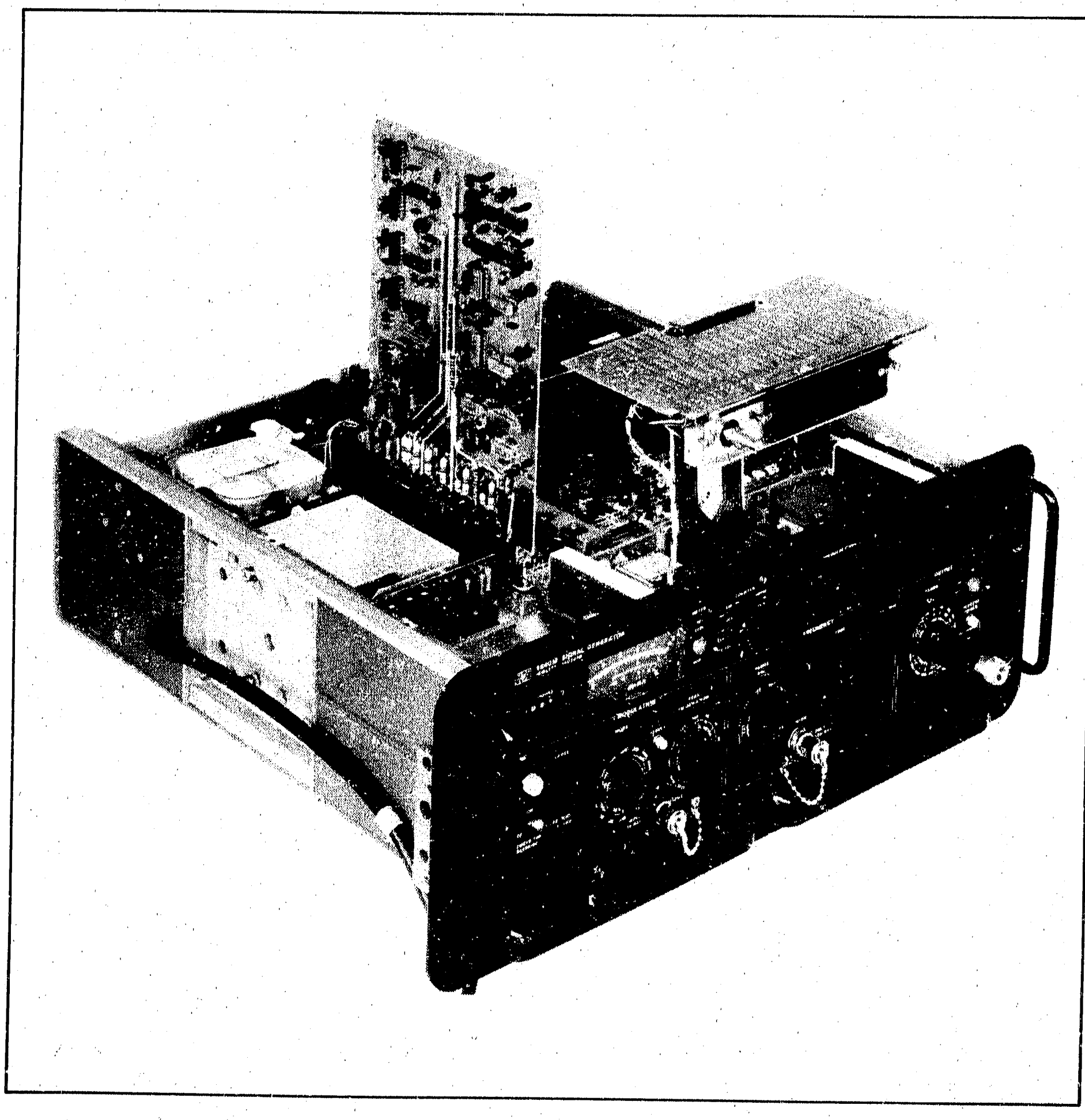


Figure 8-1. Signal Generator With Circuit Boards on Extenders

SERVICE AIDS (Cont'd)

8-20. Part Location Aids. The locations of some chassis-mounted parts and the major assemblies are shown on the last two foldouts in this manual. In addition, illustrated parts breakdowns located in Section VI and the alphabetical Service Sheets in Section VIII facilitate the identification of mechanical parts. The locations of individual components mounted on printed circuit boards or other assemblies are shown on the appropriate schematic diagram page or on the page opposite it. The part reference designator is the assembly designator plus the part designator (for example, A6R9 is R9 on the A6 assembly). For specific component description and ordering information refer to the parts list in Section VI.

8-21. Servicing Aids on Printed Circuit Boards. The servicing aids include test points, transistor and integrated circuit designations, adjustment callouts and assembly stock numbers.

8-22. REPAIR

8-23. Factory-Selected Components

8-24. Some component values are selected at the time of final checkout at the factory (see Table 5-1). Usually these values are not extremely critical; they are selected to provide optimum compatibility with associated components. These components are identified on individual schematics by an asterisk (*). The recommended procedure for replacing a factory-selected part is as follows:

a. Try the same value as the component just removed, then perform the calibration test specified for the circuit in the performance and adjustment sections of this manual.

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

c. If the test results are still not satisfactory, substitute various values within the tolerances specified in Table 5-1, until the desired result is obtained.

8-25. Etched Circuits

8-26. The etched circuit boards in the Signal Generator are of the plated-through type consisting of metallic conductors bonded to both sides of insulating material. The metallic conductors are extended through the component mounting holes by a plating process. Soldering can be done from either side of the board with equally good results. Table 8-1 lists recommendations and precautions pertinent to etched circuit repair work.

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

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

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

d. After soldering, remove excess flux from the soldered areas and apply a protective coating to prevent contamination and corrosion. (Avoid getting flux remover on the printed circuit board extractors.) See Table 8-1 for recommendation.

8-27. Etched Conductor Repair

8-28. A broken or burned section of conductor can be repaired by bridging the damaged section with a length of tinned copper wire. Allow adequate overlay and remove any varnish from etched conductor before soldering wire into place.

8-29. Component Replacement

8-30. Remove defective component from board.

NOTE

Although not recommended on boards with high-frequency signals or where both sides of a board are accessible, axial lead components, such as resistors and tubular capacitors, can be replaced without unsoldering. Clip leads near body of defective component, remove component and straighten leads left in board. Wrap leads of replacement component one turn around original leads. Solder wrapped connection and clip off excess lead.

8-31. If component was unsoldered, remove solder from mounting holes, and position component as original was positioned. DO NOT FORCE LEADS INTO MOUNTING HOLES; sharp lead ends may damage plated-through conductor.

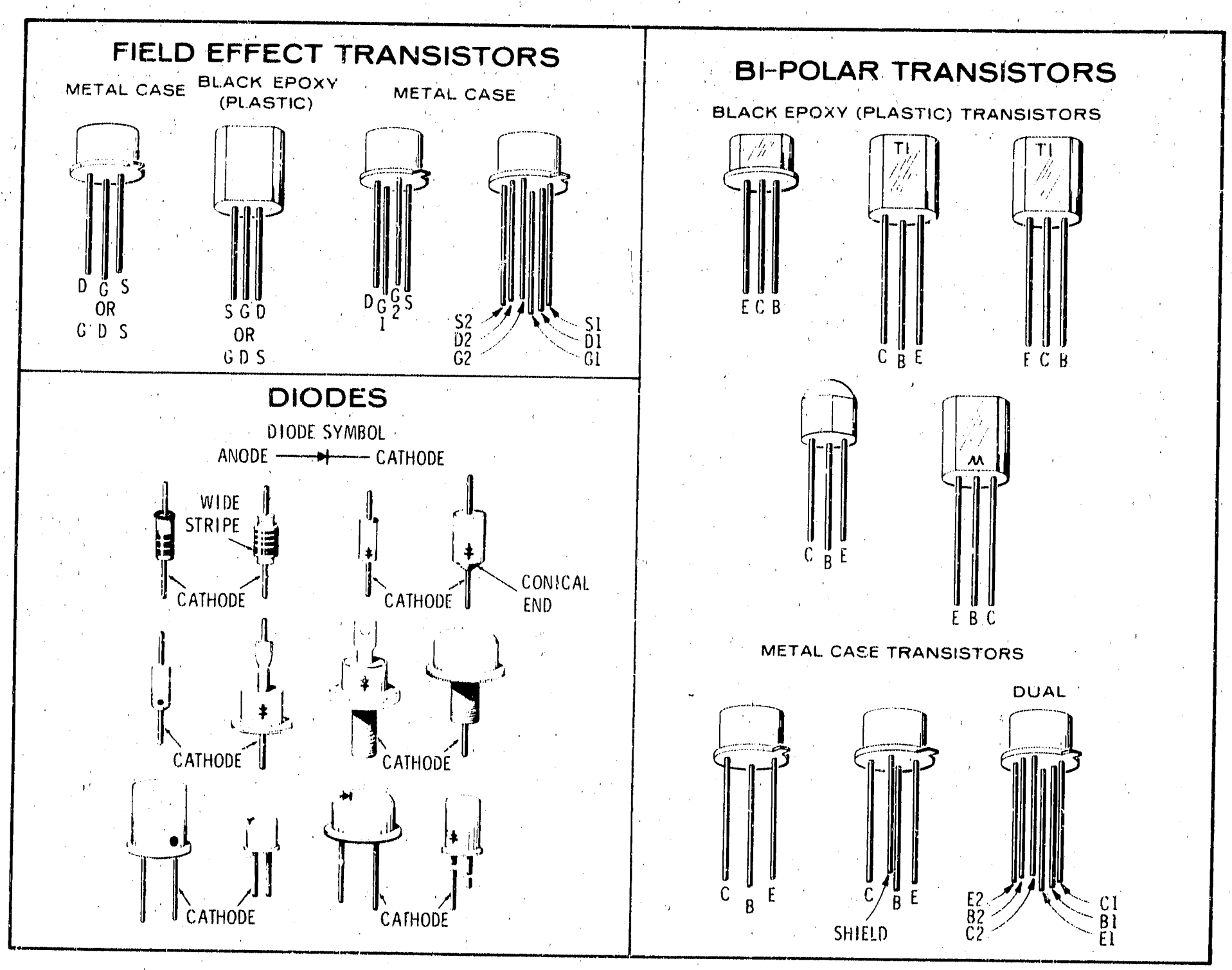


Figure 8-2. Examples of Diode and Transistor Marking Methods

Table 8-1. Etched Circuit Soldering Equipment

Item	Use	Specification	Item Recommended
Soldering tool	Soldering, unsoldering	Wattage range: 37-50; Tip Temp: 750-800°	Ungar #766 handle w/*Ungar #1237 heating unit
Soldering Tip	Soldering, unsoldering	*Shape: pointed	*Ungar #PL111
De-soldering Aid	To remove molten solder from connection	Suction device	Soldapullt by Edsyn Co., Arleta, California
Resin (flux) Solvent	Remove excess flux from soldered area before application of protective coating	Must not dissolve etched circuit base board	Freon; Acetone; Lacquer Thinner
Solder	Component replacement Circuit board repair Wiring	Resin (flux) core, high tin content (60/40 tin/lead), 18 gauge (SWG) preferred	— —
Protective	Contamination, corrosion protection	Good electrical insulation; corrosion-prevention properties	Silicone Resin such as GE DRI-FILM**88

* For working on circuit boards: for general purpose work, use Ungar No. 4037 Heating Unit (47½-56½W) tip temperature of 850-900 degrees) and Ungar No. PL113 1/8" chisel tip.

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

8-32. Transistor Replacement. Transistors are packaged in many physical forms. This sometimes results in confusion as to which lead is the collector, which is the emitter, and which is the base. Figure 8-2 shows typical epoxy and metal case transistors and the means of identifying the leads.

8-33. To replace a transistor, proceed as follows:

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

b. If possible, use long-nose pliers between transistor and hot soldering tools.

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

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

8-34. Some transistors are mounted on heat sinks for good heat dissipation. This requires good thermal contact with mounting surfaces. To assure good thermal contact for a replacement transistor, coat both sides of the insulator with Dow Corning No. 5 silicone compound or equivalent before fastening the transistor to the chassis. Dow Corning No. 5 compound is available in 8 oz. tubes from Hewlett-Packard; order HP 8500-0059.

8-35. Diode Replacement. Solid state diodes have many different physical forms. This sometimes results in confusion as to which lead is the anode (positive), since not all diodes are marked with the standard symbols. Figure 8-2 shows examples of some diode marking methods. If doubt exists as to polarity, an ohmmeter may be used to determine the proper connection. It is necessary to know the polarity of the ohms lead with respect to the common lead for the ohmmeter used. (For the HP Model 410B Vacuum Tube Voltmeter, the ohms lead is negative with respect to the common; for the HP Model 412A DC Vacuum Tube Voltmeter, the ohms lead is positive with respect to the common). When the ohmmeter indicates the least diode resistance, the cathode of the diode is connected to the ohmmeter lead which is negative with respect to the other lead.

NOTE

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

8-36. Illustrated Parts Breakdowns

8-37. Illustrated parts breakdowns for the generator's major assemblies are given on Service Sheets A through H. They are keyed to disassembly and removal instructions (given on the alphabetical service sheets) and to the replaceable parts list given in Section VI. In addition, Section VI contains illustrated parts breakdowns for the N Type output connector, the cabinet parts, and front panel mechanical parts.

8-38. BASIC CIRCUIT THEORY

8-39. Binary Circuits and Symbols

8-40. Introduction. The binary circuits and symbols used in this manual are as shown in Figure 8-3. This instrument uses three different families of logic circuits: TTL, ECL, and EECL. Most of the logic devices used in this instrument are TTL; there are notes on the Service Sheets that indicate what families the non-TTL devices belong to. Table 8-2 indicates the voltage levels that are associated with each family. The table also shows the effect that an open and a ground has on each family.

Table 8-2. Logic Levels

Logic Voltage Levels

LOGIC	TTL	ECL	EECL
High (1) Low (0)	≥2V ≤0.8V	≥−0.5V ≤−1.5V	≥ 0.1V ≤−0.6V

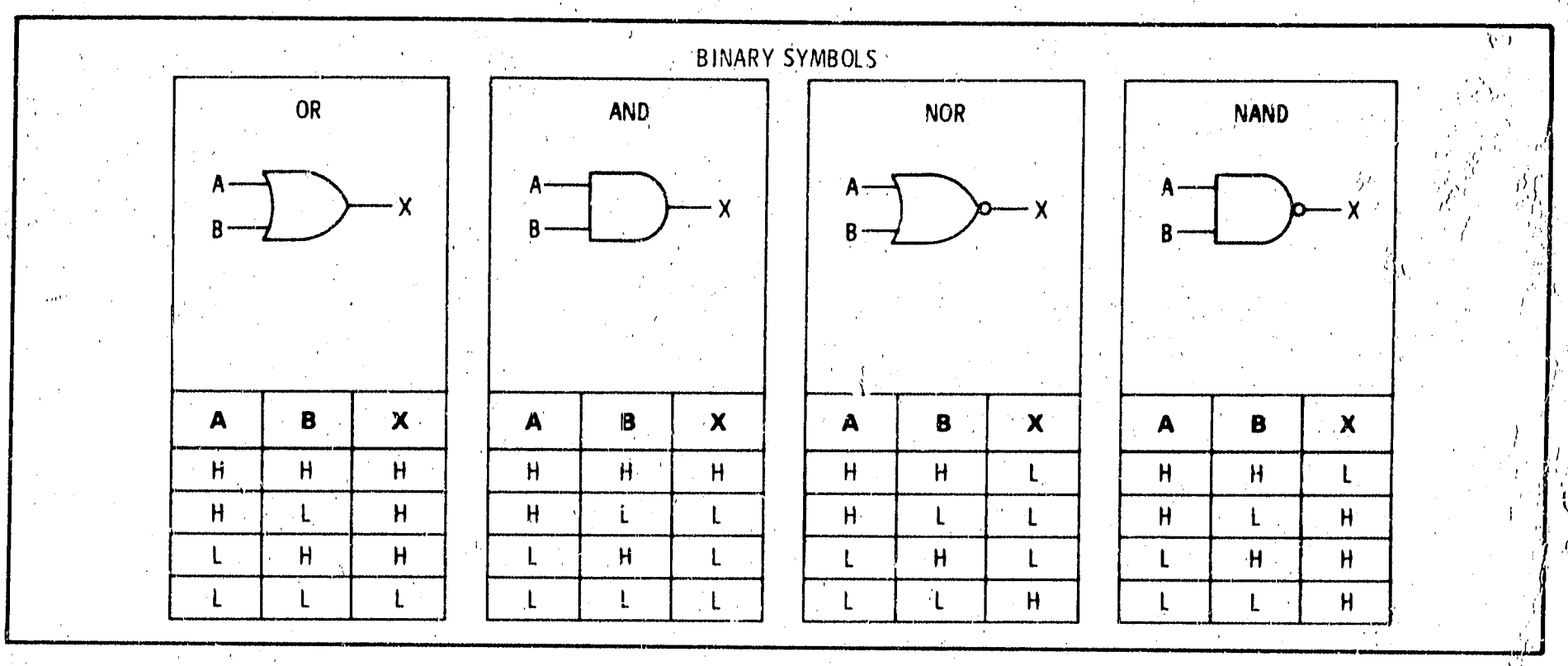
Input Conditioning

INPUT	TTL	ECL	EECL
Grounded Open	Low (0) High (1)	High (1) Low (0)	High (1) Low (0)

8-41. Symbols used to designate binary circuits in this manual should be interpreted according to the following general rules:

a. Signals that are active-low are indicated with an L in parenthesis (e.g., CLOCK (L) indicates a clock signal that is active low).

b. Signals that are active-high are indicated with an H in parenthesis.



A	B	X
H	H	H
H	L	H
L	H	H
L	L	L

A	B	X
H	H	H
H	L	L
L	H	L
L	L	L

A	B	X
H	H	L
H	L	L
L	H	L
L	L	H

A	B	X
H	H	L
H	L	H
L	H	H
L	L	H

Figure 8-3. Binary Symbols

Binary Circuits and Symbols (Cont'd)

c. A circle (○) at an input indicates that it is active low. A circle at an output indicates inversion or that the output is active-low.

d. A dynamic indicator symbol (⊣▷) at an input indicates that the input triggers (is active) only on the leading or trailing edge of an input signal. If a circle is present at the same input, it is sensitive to the trailing edge. If no circle is present, the input triggers on the leading edge. Inputs that are not edge sensitive are referred to as level sensetive and are shown without the dynamic indicator symbol.

e. Complementary outputs are usually designated with a not-bar (e.g., the complement of the J/K flip-flop's Q output is its $\overline{Q}$ output). Both Q and $\overline{Q}$ may be simultaneously high in some instances (e.g., when both SET and CLEAR are low on some D flip-flops).

NOTES

The term "binary coded decimal" (or BCD) refers to four-bit binary circuits that range from decimal 0 to 9 in 8421 code.

The term "binary", when applied to four-bit binary circuits, refers to circuits that range from decimal 0 to 15 in 8421 code.

8-42. Trigger (T) inputs are usually high-going (edge sensitive) unless there is a circle at the input (which would make them low-going). All other inputs are usually level sensitive.

8-43. Open collector TTL. Some TTL gates have open collector outputs. This feature is indicated by a note on the Service Sheet. In open collector logic the output stage is an NPN transistor with the emitter grounded and the collector connected directly to the output terminal (with no internal pull-up resistor or transistor) as shown in Figure 8-4. The output is low when the output transistor is saturated and is high when the transistor is off. (However, the output can only be high when the collector is connected to the positive supply through an external pull-up resistor.) Open collector gates are often used to switch in non-TTL devices such as lamps, relays, and capacitors.

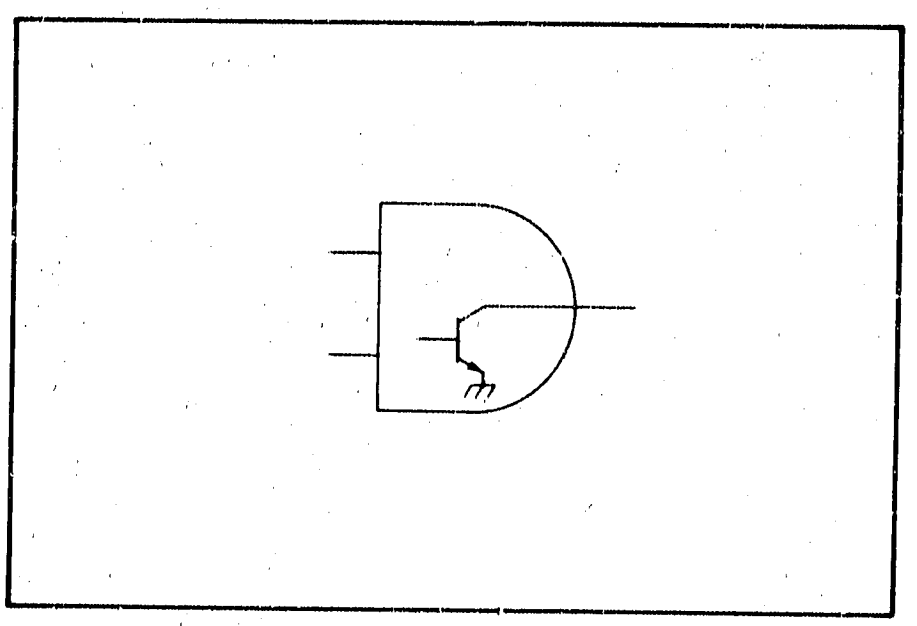


Figure 8-4. Open Collector Output Stage (AND Gate)

8-44. Triggered Flip-Flop. There are two kinds of triggered flip-flops. The bistable triggered flip-flop toggles (changes states) when triggered by a pulse at the T input (shown in Figure 8-5). This effectively divides the input by two, giving one output pulse at the Q output for every two input pulses.

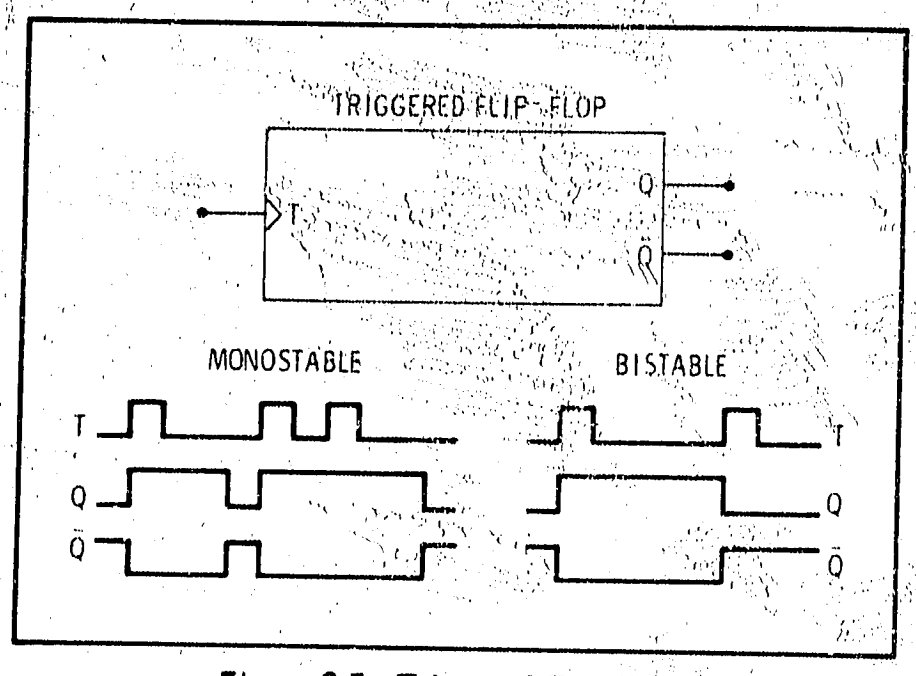
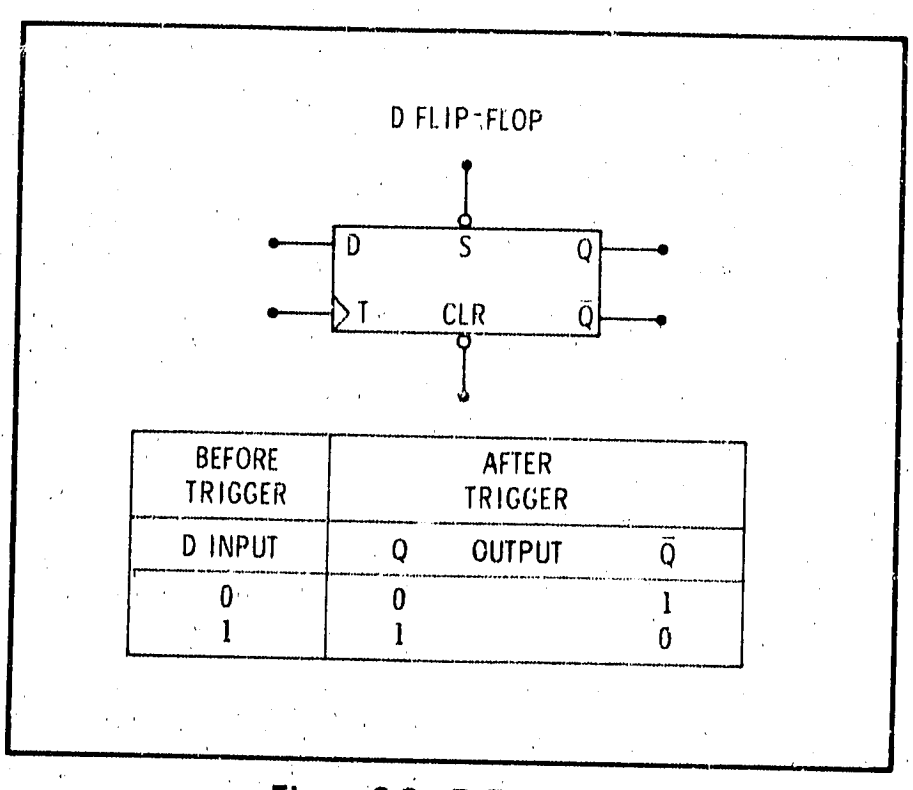


Figure 8-5. Triggered Flip-Flop

Binary Circuits and Symbols (Cont'd)

8-45. The monostable triggered flip-flop's Q output goes high when triggered at the T input. Unless disturbed by another input pulse, the Q output will automatically return to the original state after a set amount of time. This period of time is usually determined by external components. The monostable flip-flop (or one-shot) is used to stretch or shape pulses.

8-46. D Flip-Flop. The D-type flip-flop, shown in Figure 8-6, is used as a storage latch or buffer. The information at the data input (D) is transferred to the Q output when the trigger input (T) is high-going. Once the T input has passed its threshold, the D input is locked out and the Q outputs do not change until another high-going transition occurs at the T input.



BEFORE TRIGGER	AFTER TRIGGER		
D INPUT	Q	OUTPUT	Q̄
0	0		1
1	1		0

Figure 8-6. D Flip-Flop

8-47. The set (S) and clear (CLR) inputs override all other input conditions: when set is low, the Q output is forced high; when clear is low, the Q output is forced low. Although normally the $\overline{Q}$ output is the compliment of the Q output, simultaneous low inputs at S and CLR will force both Q and $\overline{Q}$ high on some D flip-flops.

8-48. Schmitt Trigger. A typical Schmitt Trigger is shown in Figure 8-7. Some Schmitt triggers have complementary outputs. The device initially triggers when the input signal passes a voltage reference called the upper trip point. It triggers back into its initial state when the input voltage passes a voltage reference called the lower trip point. One or both trip points may be indicated.

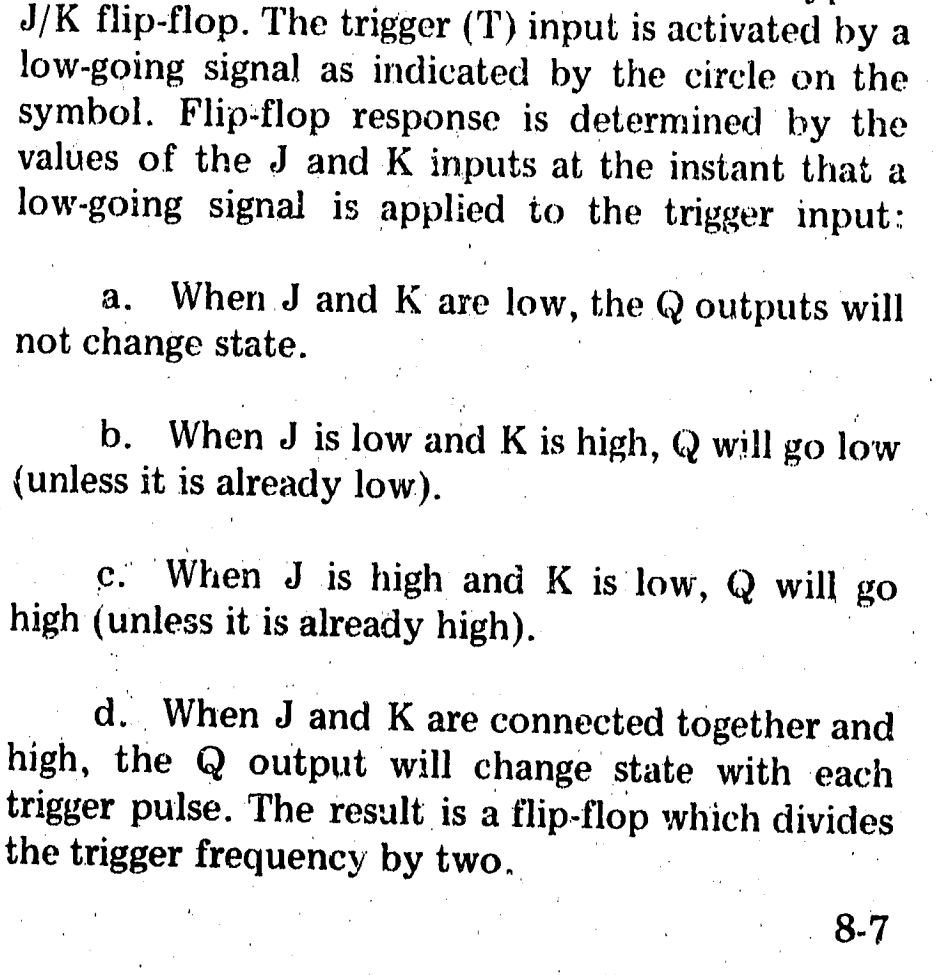


Figure 8-7. Schmitt Trigger

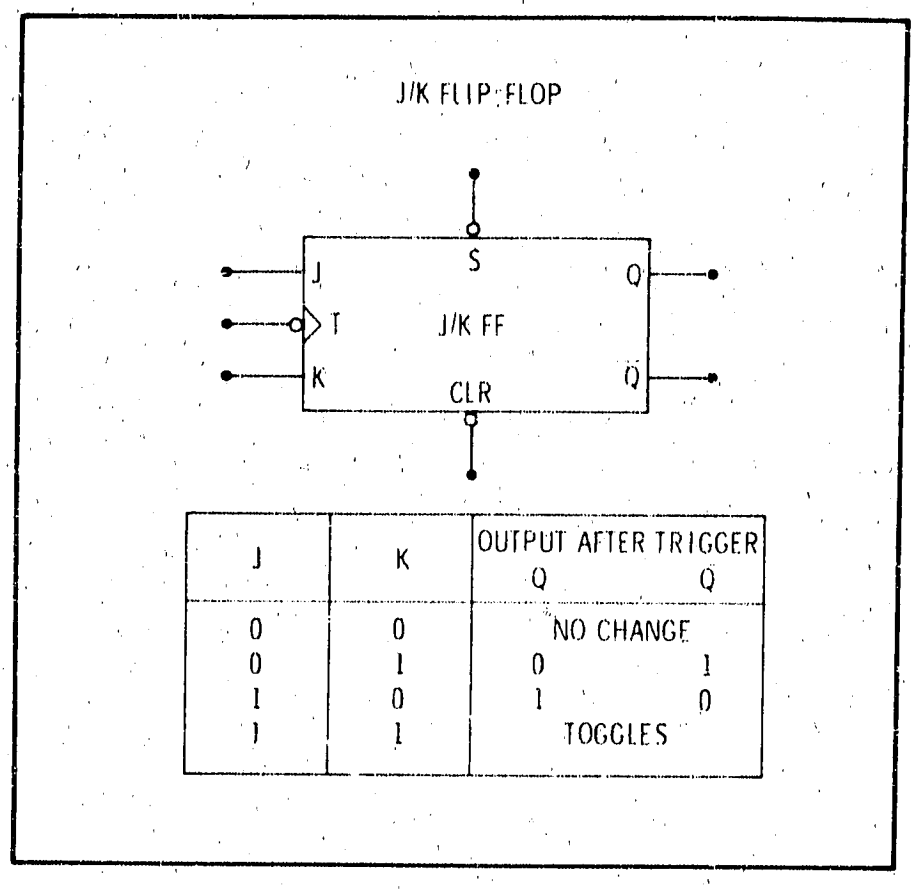
8-49. J/K Flip-Flop. Figure 8-8 shows a typical J/K flip-flop. The trigger (T) input is activated by a low-going signal as indicated by the circle on the symbol. Flip-flop response is determined by the values of the J and K inputs at the instant that a low-going signal is applied to the trigger input:

a. When J and K are low, the Q outputs will not change state.

b. When J is low and K is high, Q will go low (unless it is already low).

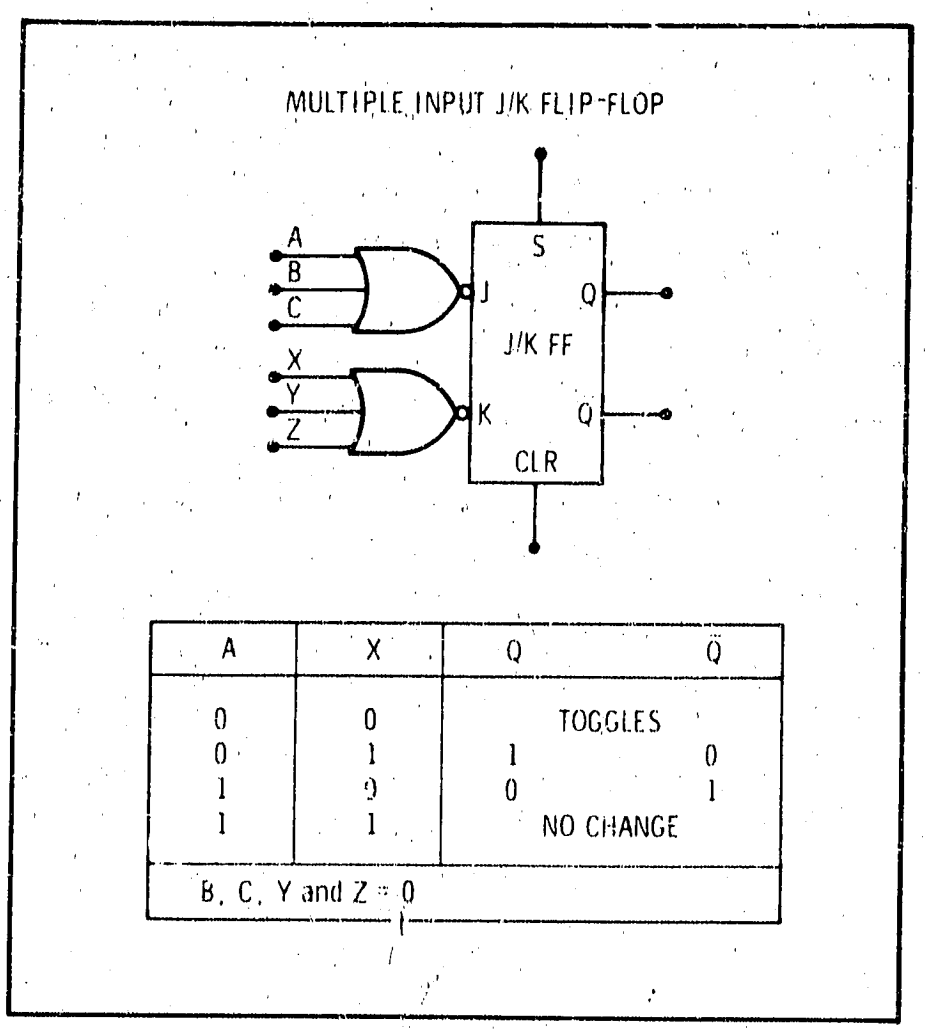
c. When J is high and K is low, Q will go high (unless it is already high).

d. When J and K are connected together and high, the Q output will change state with each trigger pulse. The result is a flip-flop which divides the trigger frequency by two.



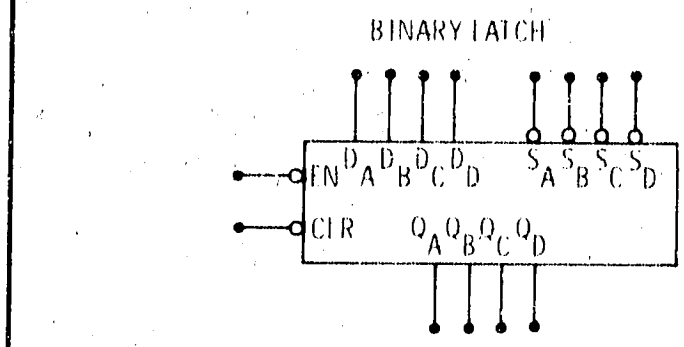
J	K	OUTPUT AFTER TRIGGER Q	Q̄
0	0	NO CHANGE	
0	1	0	1
1	0	1	0
1	1	TOGGLES	

Figure 8-8. J/K Flip-Flop



A	X	Q	Q̄
0	0	TOGGLES	
0	1	1	0
1	0	0	1
1	1	NO CHANGE	
B, C, Y and Z = 0			

Figure 8-9. Multiple Input J/K Flip-Flop



BEFORE CLOCK	AFTER CLOCK
INPUT D_n	OUTPUT Q_n
0	0
1	1

Figure 8-10. Binary Latch

Binary Circuits and Symbols (Cont'd)

8-50. The set (S) and clear (CLR) inputs override all other input conditions: when S is low, Q is forced high; when CLR is low, Q is forced low. Although normally the $\overline{Q}$ output is the compliment of the Q output, simultaneous low inputs at S and CLR will force both Q and $\overline{Q}$ high on some J/K flip-flops.

8-51. Multiple Input J/K Flip-Flop. A multiple input J/K flip-flop is shown in Figure 8-9. It behaves like a J/K flip-flop with NORed inputs: if A, B and C are low, J is high, if A, B or C is high, J is low. A J-related and a K-related input may be tied together to form a trigger input; in this case the trigger would be active-low (if all other inputs are low).

8-52. Binary Registers

8-53. Binary Latch. The four bit binary register shown in Figure 8-10 is used as a storage latch. Information data $(D_n)^1$ inputs are transferred to the respective $Q_n{}^1$ outputs when the enable (EN) input is low. When the enable goes high, the outputs are latched and are no longer affected by the data inputs.

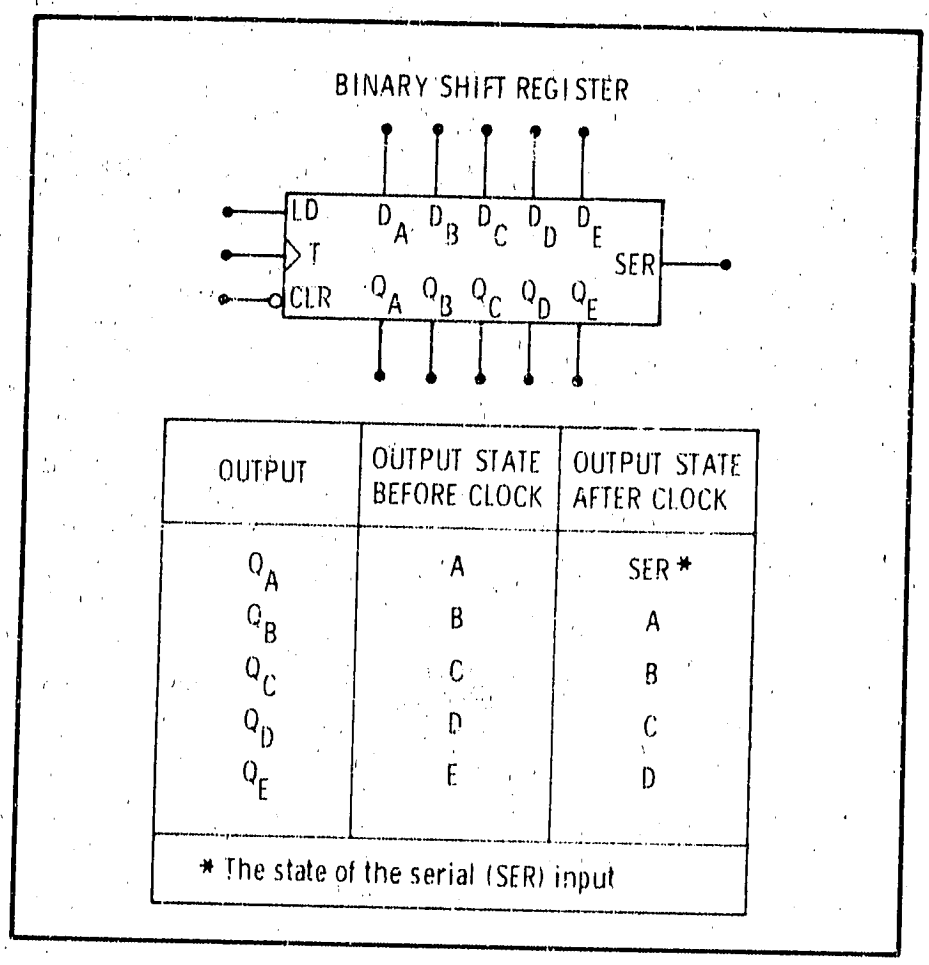
8-54. When enabled, any output may be set (to a high) by a low on the respective set (S_n) input which overrides the data input. When not enabled, the set inputs have no effect on the outputs.

8-55. A low on the master clear (CLR) input overrides all other conditions and forces all outputs low.

[1] n = A,B,C, or D

8-56. Binary Shift Register. A five bit binary shift register is shown in Figure 8-11. Information at the data $(D_n)^1$ inputs is transferred to the respective $Q_n{}^1$ outputs when the load (LD) input is high. The load input is independent of the clock (T) input.

8-57. If the load input is low, a high going clock pulse shifts the output to the next adjacent output (e.g., the output at Q_B now appears at the output of Q_C). Also, the input state at the serial (SER) input appears at the Q_A output.



OUTPUT	OUTPUT STATE BEFORE CLOCK	OUTPUT STATE AFTER CLOCK
Q_A	A	SER *
Q_B	B	A
Q_C	C	B
Q_D	D	C
Q_E	E	D

* The state of the serial (SER) input

Figure 8-11. Binary Shift Register

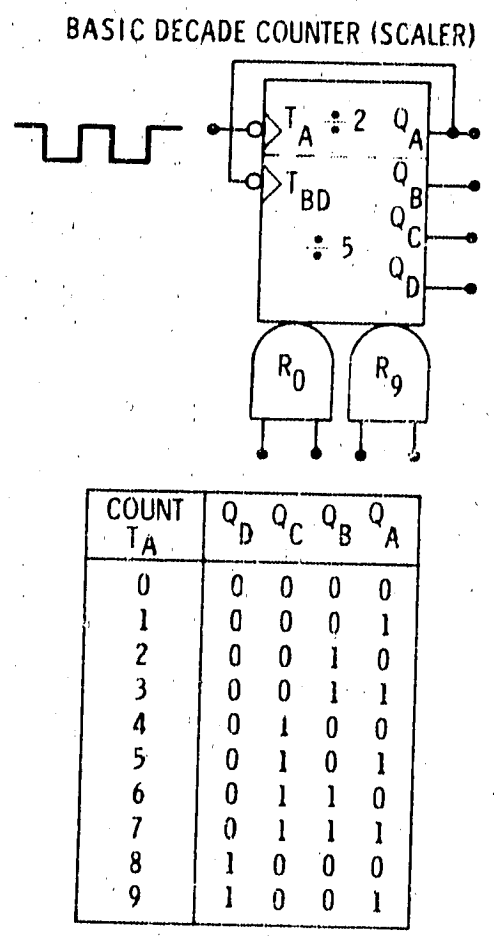
Binary Registers (Cont'd)

8-58. A low at the clear (CLR) input clears all outputs to a low independent of the clock. The clear input overrides the load input.

8-59. Decade Counters and Symbols

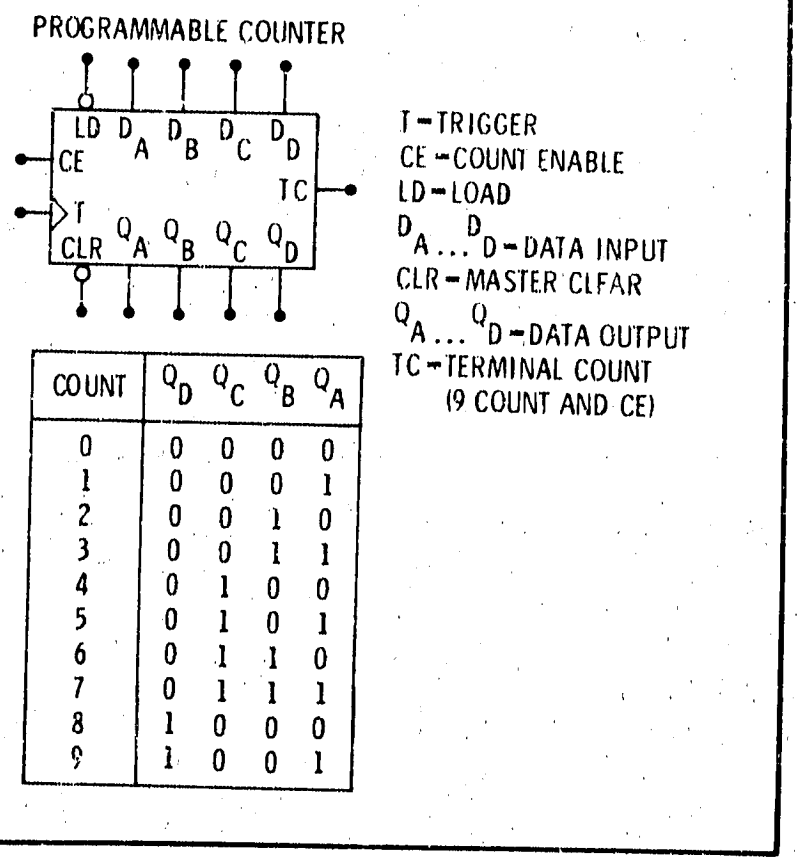
8-60. Basic Counter. The basic decade counter (or scaler or divider), shown in Figure 8-12, has ten logic states. The active-high outputs (Q_A, Q_B, Q_C, and Q_D) increment by one BCD count each time the trigger (T_A) or clock input goes from a high to a low. The count sequence is also shown in the figure. The counter may be subdivided into a divide-by-two and a divide-by-five counter. The two counters are connected in series (the Q_A output connected to the T_{BD} input) to obtain a divide-by-ten counter. The counter has two ANDed clear or reset-to-zero (R_0) inputs. When both R_0 inputs are high, the outputs clear to zero. The clear function overrides the clock. Similarly, the two ANDed set or reset-to-nine (R_9) inputs set the outputs to the nine count. If all reset-to-zero and reset-to-nine inputs are simultaneously high, the reset-to-nine overrides the reset-to-zero.

8-61. Programmable Counter. The programmable decade counter, shown in Figure 8-13, operates similarly to the basic decade counter when the load (LD) input is high. The counter shown has only a single clear (CLR) input which is active-low. When the load input is low, the information at the data (or preset) inputs (D_A, D_B, D_C, and D_D) is transferred to the outputs at the next high going clock (T) input. The outputs remain in the preset state until the load input returns to a high and the trigger (T) or clock input again goes high — at which time the count increments by one. The counter may be preset to a count greater than nine, but never counts beyond 9. If preset to a count of 10 to 15 it will return to its normal count sequence within two clock pulses.



COUNT T_A	Q_D	Q_C	Q_B	Q_A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Figure 8-12. Basic Decade Counter (Scaler)



COUNT	Q_D	Q_C	Q_B	Q_A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Figure 8-13. Programmable Counter

Decade Counters and Symbols (Cont'd)

8-62. If the counter has a count enable (CE) input, it must be held high for successive T inputs to cause the counter to increment (or count). When the counter reaches the nine count, a terminal-count or carry (in this case, a high) appears at the carry (TC) output.

8-63. A low on the clear (CLR) input clears all outputs to a low independent of any other input conditions.

8-64. Programmable Up/Down Counter. The programmable up/down counter, shown in Figure 8-14, operates similarly to the programmable counter (which could be called a programmable up counter). The up/down counter has two trigger or clock inputs, count up (CU) and count down (CD). A low-to-high transition of either count input (while the other count input is held high) increments the count up or down by one. If both CU and CD are high, the count does not increment.

8-65. The counter's outputs (Q_A, Q_B, Q_C, and Q_D) can be set to any count from zero to fifteen by entering the count at the data inputs (D_A, D_B, D_C, and D_D) while the load input (LD) is held low. Then the count can be incremented up or down by activating either the CU or CD input.

8-66. The borrow (BRW) output is low whenever the Q outputs are at BCD zero (0000). The carry (CRY) output is low whenever the Q outputs are at BCD nine (1001). The master clear input (CLR) overrides all other input conditions and forces the Q outputs to BCD zero.

8-67. Linear Integrated Circuits

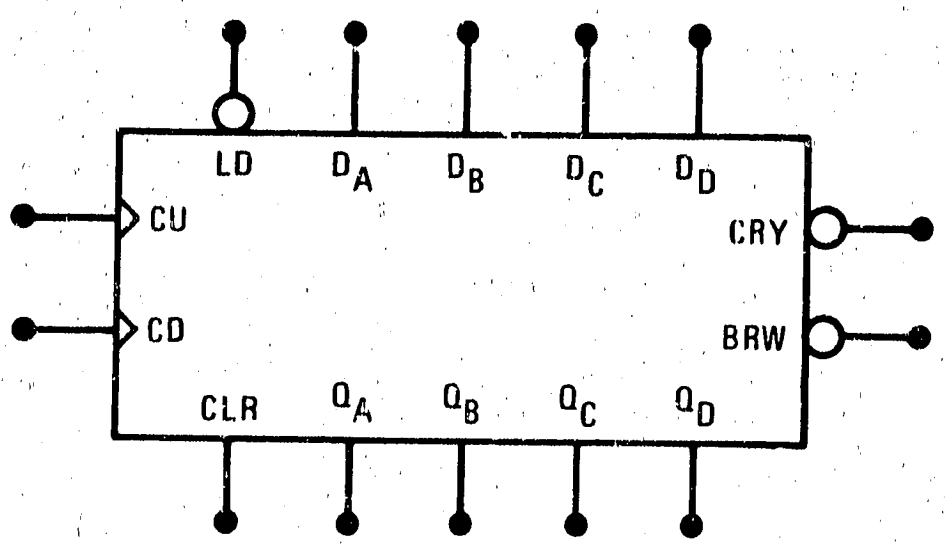
8-68. Operational Amplifier. Figure 8-15 shows a typical operational amplifier. Circuit A is a non-inverting buffer amplifier with a gain of 1. Circuit B is a non-inverting amplifier with gain determined by the impedance of R1 and R2. Circuit C is an inverting amplifier with gain determined by R2 and R1. Circuit D shows typical circuit connections and parameters. It is assumed that the amplifier has high gain, low output impedance, and high input impedance.

8-69. An operational amplifier can be characterized as an ideal voltage amplifier having low output impedance, high input impedance, and very high gain. Also the output voltage is proportional to the difference in the voltages applied to the two input terminals. In use, the amplifier output drives the input voltage difference close to zero through a negative feedback path.

8-70. When troubleshooting an operational amplifier, measure the voltages at the two inputs with no signal applied; the difference between these voltages should be less than 10 mV. A difference voltage much greater than 10 mV indicates trouble in the amplifier or its external circuitry. Usually this difference will be several volts and one of the inputs will be very close to an applied circuit operating voltage (for example, +20V, —12V).

8-71. Next, check the amplifier's output voltage. It will probably also be close to one of the applied circuit potentials: ground, +20V, —12V, etc. Check to see that the output conforms to the inputs. For example, if the inverting input is positive, the output should be negative; if the non-inverting input is positive, the output should be positive. If the output conforms to the inputs, check the amplifier's external circuitry. If the amplifier's output does not conform to its inputs, it is probably defective.

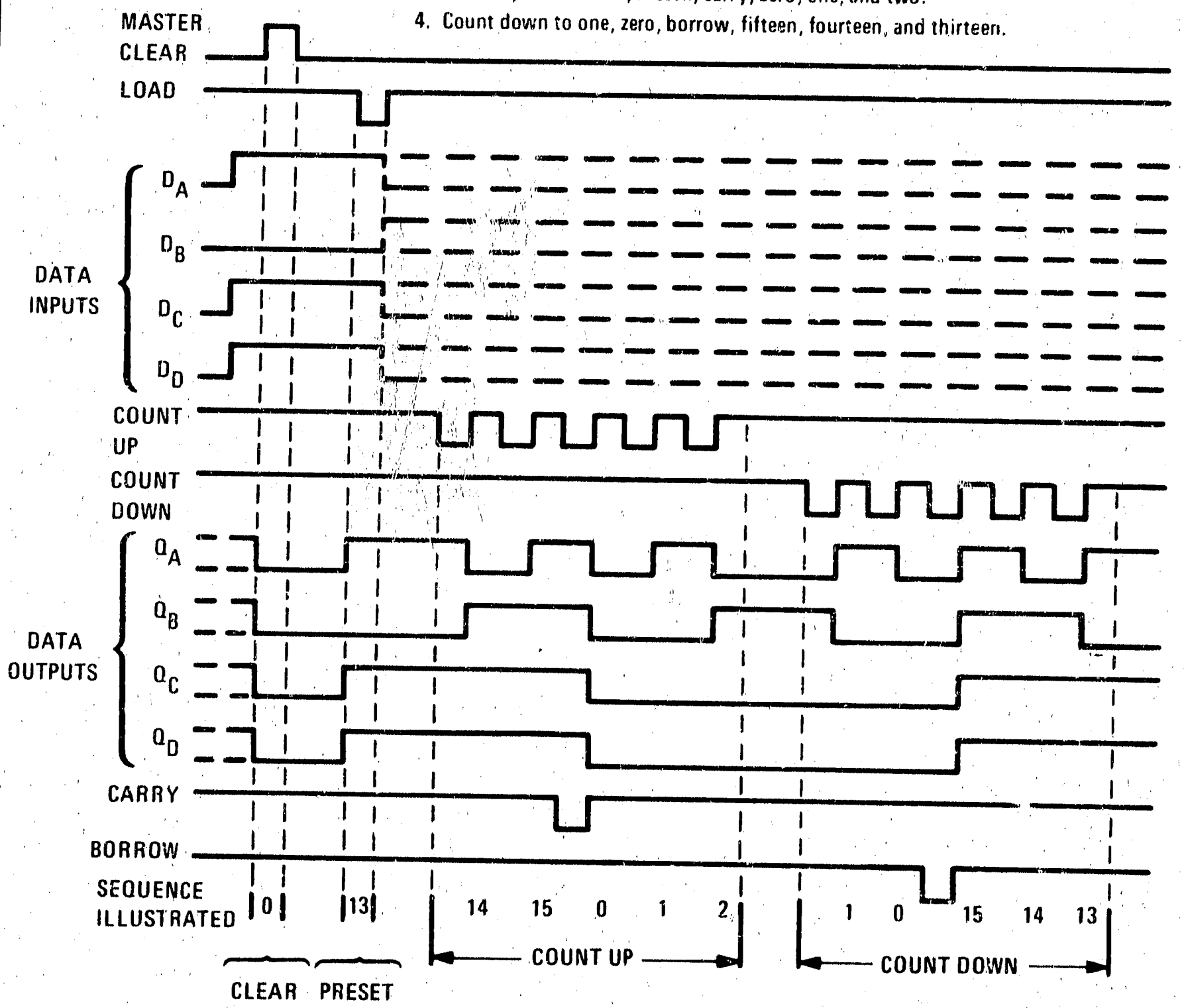
8-72. Comparator. Comparators are used as sense amplifiers, pulse height discriminators, and voltage comparators. A voltage reference is connected to one of the amplifier's inputs as shown in Figure 8-16. When the input signal voltage crosses the reference, the output goes positive; the output remains positive until the signal re-crosses the reference.



CU	=	COUNT UP
CD	=	COUNT DOWN
CLR	=	MASTER CLEAR
LD	=	LOAD
$D_A \ldots D_D$	=	DATA INPUT
$Q_A \ldots Q_D$	=	DATA OUTPUT
CRY	=	CARRY
BRW	=	BORROW

Illustrated below is the following sequence:

1. Clear outputs to zero
2. Load (preset) to BCD thirteen.
3. Count up to fourteen, fifteen, carry, zero, one, and two.
4. Count down to one, zero, borrow, fifteen, fourteen, and thirteen.



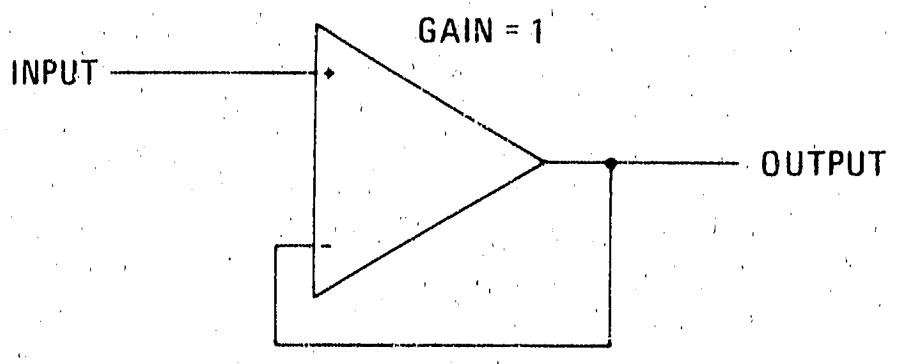
NOTES: A. Clear overrides load, data, and count inputs.

B. When counting up, count-down input is high: when counting down, count-up input is high.

Figure 8-14. Programmable Up/Down Counter

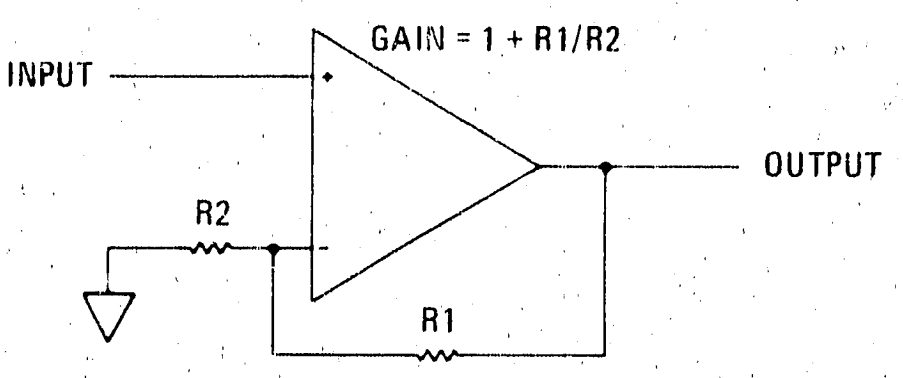
OPERATIONAL AMPLIFIER

A



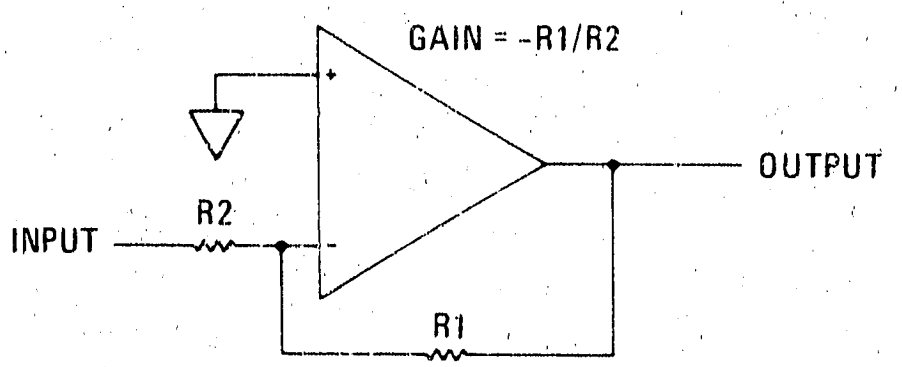
INPUT IMPEDANCE: VERY HIGH
OUTPUT IMPEDANCE: VERY LOW

B



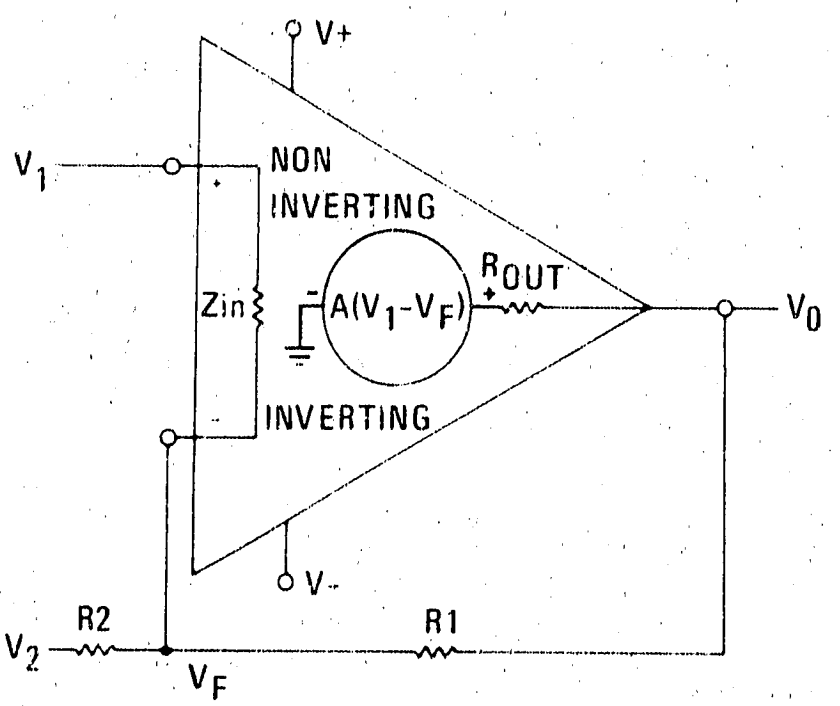
INPUT IMPEDANCE: VERY HIGH
OUTPUT IMPEDANCE: VERY LOW

C



INPUT IMPEDANCE: R2
OUTPUT IMPEDANCE: VERY LOW

D



IF "A" IS LARGE, $V_F = V_1$

(1) $$V_0 = V_1 \left(1 + \frac{R1}{R2}\right) - V_2 \left(\frac{R1}{R2}\right)$$

(2) IF $V_2 = 0$ (⏚), THEN $$V_0 = V_1 \left(1 + \frac{R1}{R2}\right)$$

(3) IF $V_1 = 0$ (⏚), THEN $$V_0 = -V_2 \left(\frac{R1}{R2}\right)$$

Figure 8-15. Operational Amplifier

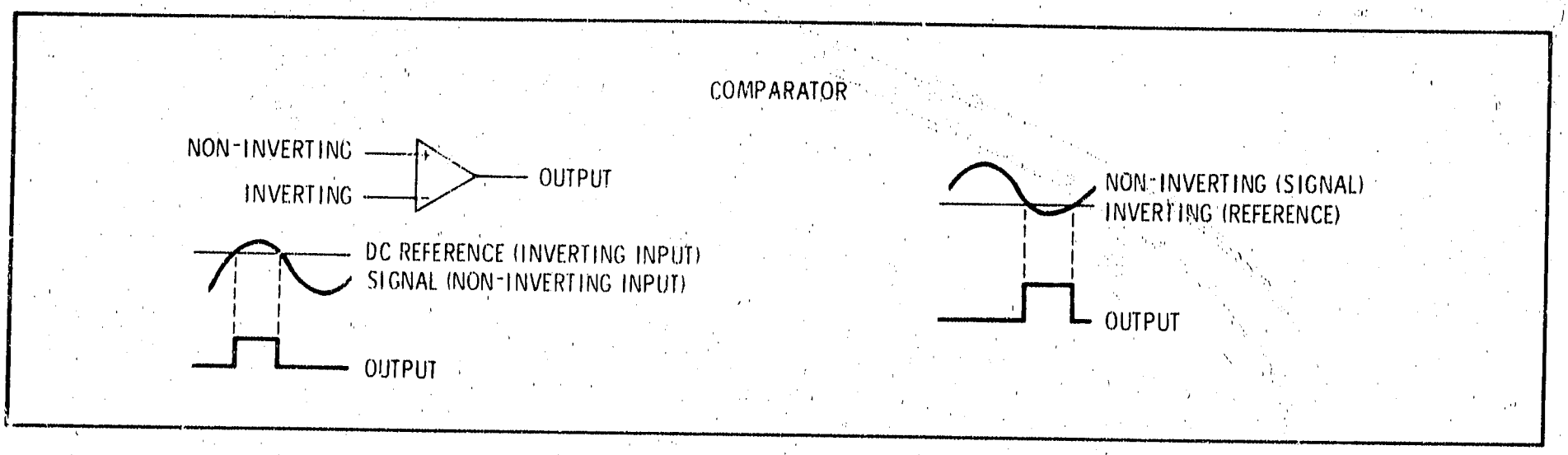


Figure 8-16. Comparator

Table 8-3. Assembly Information Index

Assembly[1]		Schematic[2]
A1	RF Output Range Assy[3]	Service Sheets 13, 13B, 16
A2	Meter Detector and Drive Assy	Service Sheet 17
A3	RF Oscillator Assy[4]	Service Sheets 5, 6
A5	FM Amplifier Assy	Service Sheet 6
A7	FM Shaping Assy	Service Sheet 7, 8
A8	Counter/Lock Assy[5]	Service Sheets 18, 19, 20, 21
A9	Peak Deviation and Range Switch Assy[6]	Service Sheets 6, 7, 8, 15, 19
A10	Divider/Filter Assy[7]	Service Sheets 10, 11
A11	Internal Modulation Oscillator Assy	Service Sheet 9
A12	Rectifier Assy	Service Sheet 22
A13	Modulation/Metering Mother Board Assy	Service Sheets 6, 9, 14, 25
A15	Riser Assy	Service Sheets 14, 15, 16
A16	Fan Motor Assy	Service Sheet 23
A17	Power Supply Mother Board Assy	Service Sheet 24
A18	−5.2V Regulator and Fan Drive Assy	Service Sheet 23
A20	+5.2 and +44.6V Regulator Assy	Service Sheet 22
A21	Reverse Power Protection Assy	Service Sheet 13B
A22	+20 and −20V Regulator Assy	Service Sheet 22
A23	Modulation Mode Frequency Switch	Service Sheet 9
A24	Series Regulator Socket Assy	Service Sheet 22
A26	AM/AGC and RF Amplifier Assy[8]	Service Sheets 12, 13, 14, 15, 16

[1] Odd numbered assemblies and sub-assemblies are accessible from bottom of instrument. Even numbered assemblies and sub-assemblies are accessible from top of instrument. See Service Sheets G and H for top and bottom internal views of instrument.

[2] Component location photographs are given on the service sheet with the schematic.

[3] A1 Assembly Illustrated Parts Breakdown is located on Service Sheet A.

[4] A3 Assembly Illustrated Parts Breakdown is located on Service Sheet B.

[5] A8 Assembly Illustrated Parts Breakdown is located on Service Sheet C.

[6] A9 Assembly Illustrated Parts Breakdown is located on Service Sheet D.

[7] A10 and A23 Assemblies Illustrated Parts Breakdowns are located on Service Sheet E.

[8] A26 Assembly (accessible from both top and bottom of instrument) Illustrated Parts Breakdown is located on Service Sheet F.

Table 8-4. Schematic Diagram Notes (1 of 3)

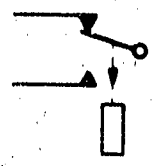
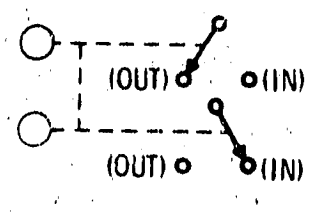
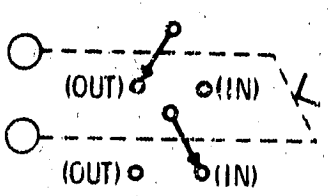
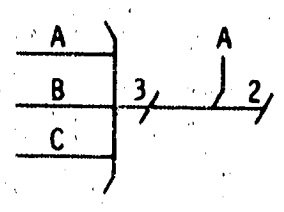
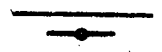
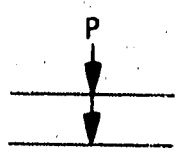
	Resistance in ohms, capacitance in picofarads, inductance in microhenries unless otherwise noted. Binary symbols explained beginning with paragraph 8-39.
⌀	Tool-aided adjustment.
○	Manual control.
▭	Enclosed front-panel designation.
▭ (dashed)	Encloses rear-panel designation.
—— - - ——	Circuit assembly borderline.
- - - - - -	Other assembly borderline. Also used to indicate mechanical interconnection (ganging) and RF shielding.
——→	Heavy line with arrows indicates path and direction of main signal.
- - -→	Heavy dashed line with arrows indicates path and direction of main feedback and also count down/phase lock signal flow.
CW	Wiper moves toward cw with clockwise rotation of control (as viewed from shaft or knob).
⏚	A direct conducting connection to the earth, or a conducting connection to a structure that has a similar function (e.g., the frame of an air, sea, or land vehicle).
	Relay Contact moves in direction of arrow when energized.
	Indicates interlocked pushbutton switches. Only one switch can be in (IN) at a time.
	Indicates interconnected pushbutton switches. Pushing one switch in (IN) releases the other.
	Indicates multiple paths represented by only one line. Letters or names identify individual paths. Numbers indicate number of paths represented by the line.
	Coaxial or shielded cable.

Table 8-4. Schematic Diagram Notes (2 of 3)



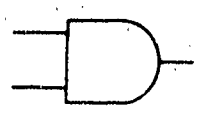
Stripline (i.e., RF transmission line above ground)

RF coupling by magnetic (H) field.

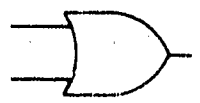


Indicates twisted wire pair. (T indicates twisted wire triplet.)

BINARY CIRCUIT SYMBOLS

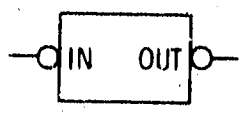


AND Gate

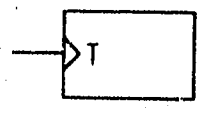


OR Gate

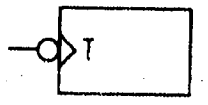
Inverter



Active-low input/output



High-going edge sensitive trigger



Low-going edge sensitive trigger

EXAMPLE: A3S1AR(2-1/2)

A3S1 = SWITCH S1 WITHIN ASSEMBLY A3

A = 1st WAFER FROM FRONT (A = 1st, ETC)

R = REAR OF WAFER (F = FRONT)

(2-1/2) = TERMINAL LOCATION (2-1/2) (VIEWED FROM FRONT)

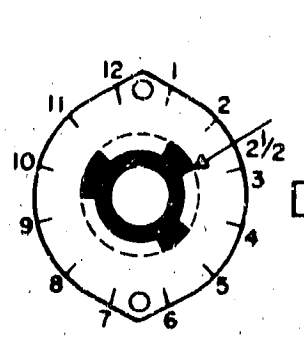
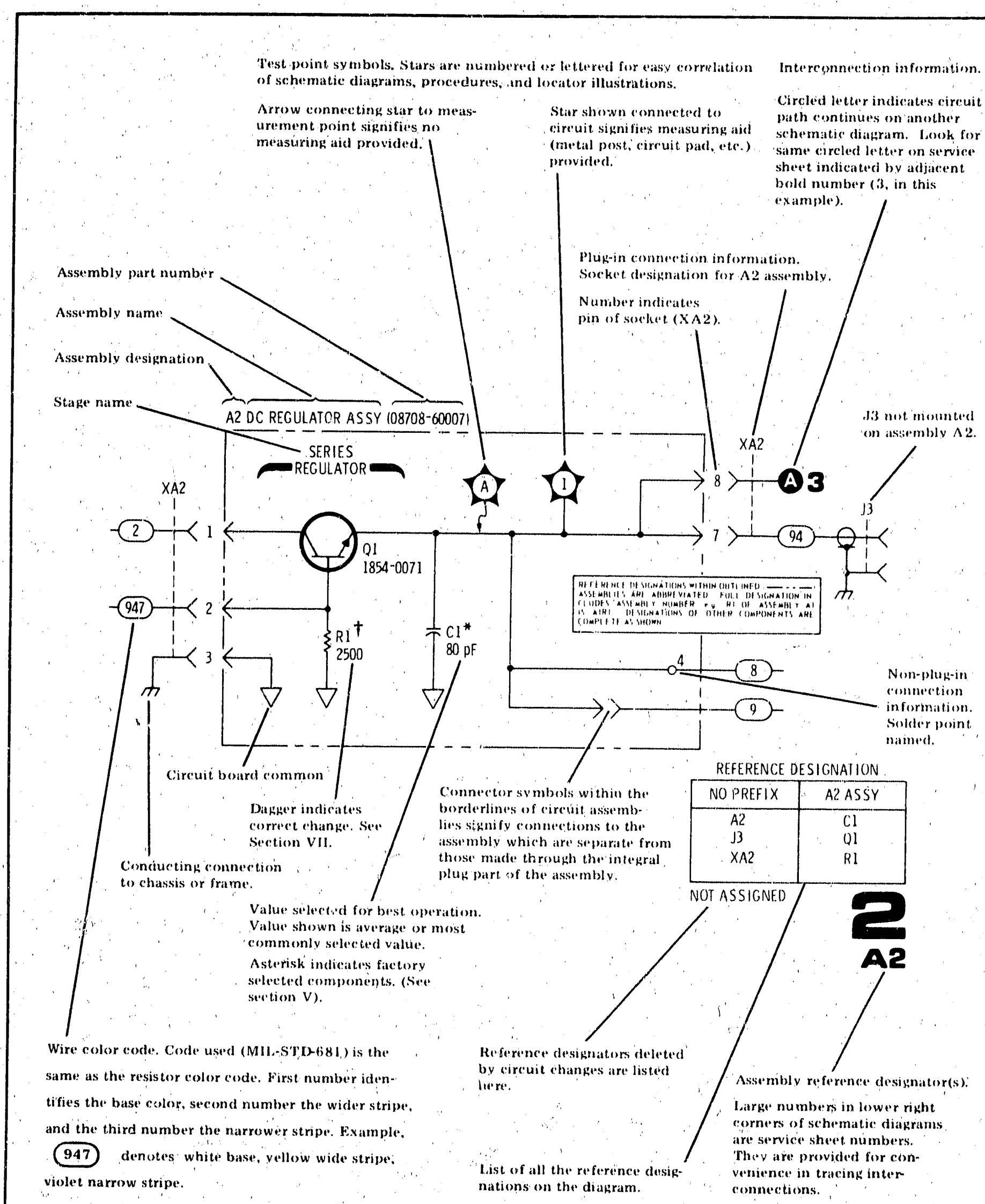


Table 8-4. Schematic Diagram Notes (3 of 3)



SERVICE SHEET 1

PRINCIPLES OF OPERATION

General

The Hewlett-Packard Model 8640M Signal Generator is a mechanically-tuned, solid-state RF source producing signals from 0.5 to 512 MHz. The RF oscillator produces a basic frequency range of 256 to 512 MHz. Nine lower ranges (0.5 to 256 MHz) are obtained by dividing down this range. The leveled output may be continuously varied over an 18 dB range or attenuated in 10 dB steps from +18 to −145 dBm. Calibrated AM, FM and PULSE, (either internal or external) modulation capabilities are provided. The RF output frequency is read on an internal counter which may also be used to count external signals up to 550 MHz or to phase lock the generator to a stable internal reference oscillator.

FM Circuits and RF Oscillator

The RF source is a 256 to 512 MHz cavity-tuned oscillator that is mechanically tuned by the FREQUENCY TUNE and FINE TUNE controls. The oscillator can also be electrically tuned over a smaller range by the FM circuits and the counter/lock circuits. The FM circuits amplify and shape the modulation input to provide linear, calibrated frequency modulation. The phase lock circuits tune the oscillator to phase lock it to a reference. FM inputs can be either external (ac or dc coupled), or internal from the modulation oscillator.

AM/AGC Circuit and Output Amplifier

The RF oscillator drives the RF dividers (a chain of binary dividers) which yield the RF for the lower nine frequency ranges. The RF filters remove the harmonics from the RF signal.

The AM/AGC circuits form a feedback system to control the amplitude of the output and to provide AM or pulse modulation. The detector senses the level of the RF signal from the RF output amplifier. A summing amplifier compares the detector output against an input reference and drives the modulator. The modulator acts as a current-controlled attenuator to control the RF level.

The reference to the summing amplifier consists of the level reference, which comes from the output level vernier, and the modulation signal, if present. The modulation signal can be either external (ac or dc coupled) or internal (from the modulation oscillator). In the pulse modulation mode, internal or external modulation pulses switch the modulator off and on. Amplitude leveling is maintained in this mode by storing the detector output between pulses.

The 10 dB RF step attenuator further controls the output level. The meter circuits monitor either the detector output (and hence the output level), the positive peak of the AM modulating signal (calibrated to give % AM), or the positive peak of the FM modulating signal (calibrated to give peak deviation).

Counter/Lock Circuits

In the internal count mode, the counter always counts the 256–512 MHz signal from the RF oscillator. In the external count modes, external input signals are counted directly. In the phase lock mode, the counter compares the count of the RF signal against the count just before acquisition of phase lock and adjusts the frequency of the RF oscillator to make the counts coincide. The counter time base reference is the internal 5 MHz crystal.

Reverse Power Protection

Reverse power protection consists of a power level sensor, limiter, and RF relay which opens the RF path to the output connector when excessive RF power is sensed. A front panel annunciator indicates this condition.

TROUBLESHOOTING

Use the overall block diagram to isolate the trouble to a specific section of the instrument. Then turn to the troubleshooting block diagram that covers that section of the instrument and use the information on the diagram to isolate the trouble to the defective assembly. Next, turn to the Service Sheet that covers that assembly and isolate the trouble to the defective component or replace the assembly. For example, suppose the AM functions are out of specification. The block diagram on Service Sheet 1 is keyed to the troubleshooting block diagrams that follow it — in this case, Service Sheet 3. Service Sheet 3 gives a list of generator control settings (the list is located in the box on the right-hand side of the sheet) and the voltages and waveforms that should be found at the test points and along the signal paths. To check a voltage at a test point, change the control settings as specified in the box associated with that test point, check the voltage, then reset the controls to the initial control settings specified in the box.

NOTE

The last two foldouts in this manual have top and bottom internal views of the instrument that show the locations of the test points, assemblies, and cables (all RF cables are accessible from the bottom of the instrument).

The blocks on Service Sheet 3 are keyed, by the numbers located in their lower right-hand corners, to the Service Sheets that have the circuit schematics. In our example, suppose the signals to the A26A3 Assembly are correct and the signals from A26A3 are incorrect. Turn to Service Sheet 12 and isolate the trouble to the component or replace A26A3.

NOTE

After repairs are complete, see Table 5-2 for appropriate post-repair tests and adjustments.

WARNINGS

The opening of covers or removal of parts, except those to which access can be gained by hand, is likely to expose live parts, and also accessible terminals may be live. Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, if inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

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

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

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

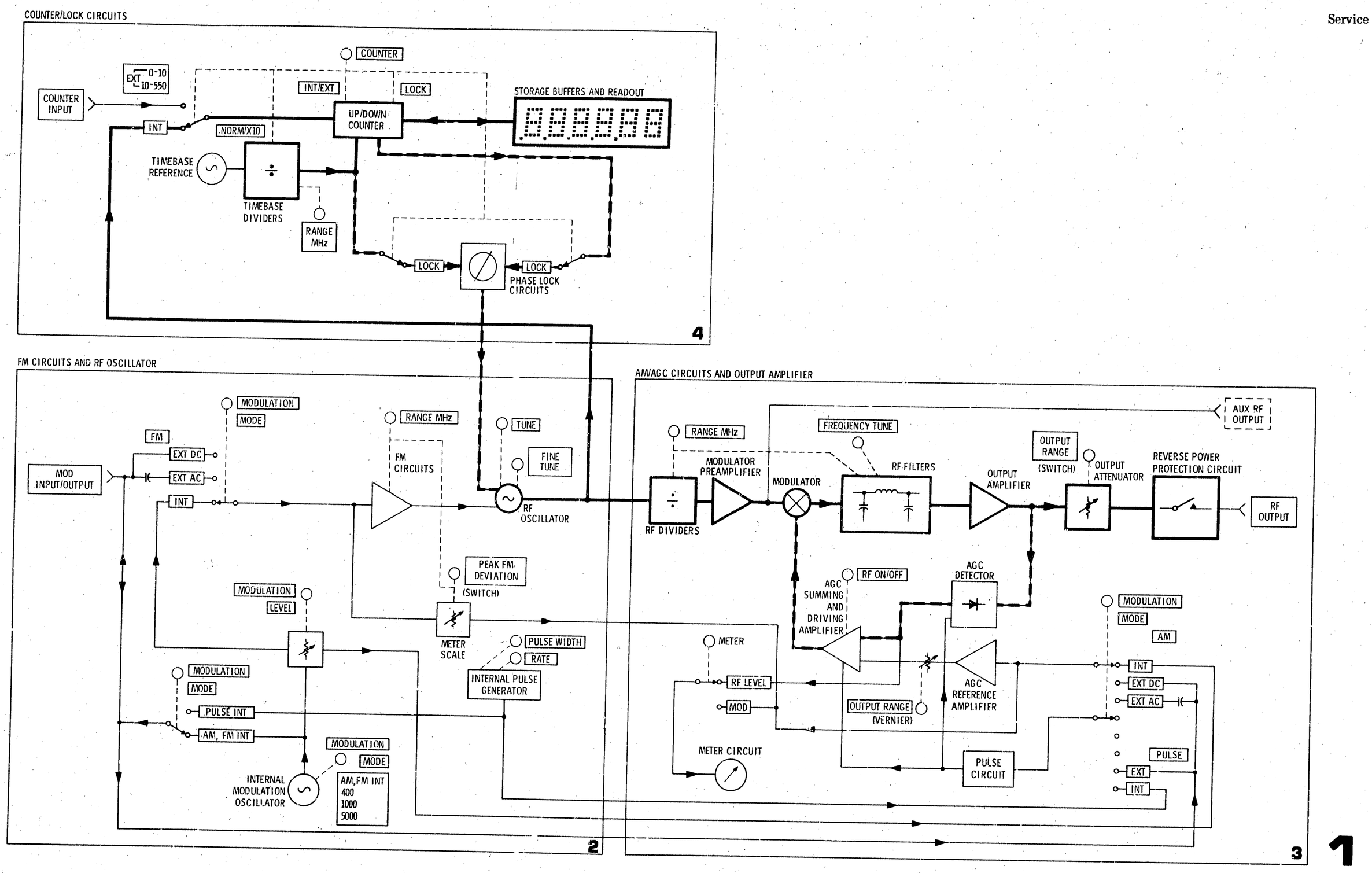


Figure 8-17. Overall Block Diagram

SERVICE SHEET 2

PRINCIPLES OF OPERATION

RF Oscillator

The full frequency range of the RF Oscillator is 230 to 550 MHz (nominally 256—512 MHz). The oscillator uses a single high-frequency transistor in a foreshortened cavity. Frequency is controlled by varying the capacitive loading of the cavity. The oscillator drives two output amplifiers. The Frequency Counter Buffer Amplifier drives the frequency counter; the Divider/Filter Buffer Amplifier drives the dividers which drive the amplitude modulating and leveling circuits. The oscillator's cavity has two varactor diodes that allow the capacitive loading to be varied by voltages (at the anode and cathode) to provide FM and phase lock.

FM Circuits

The RF oscillator's varactor cathode is driven by the FM Amplifier which provides accurate amplification or attenuation of the modulation signal and shapes the signal to compensate for the nonlinear characteristics of the varactor diodes. Separate shaping circuits are used for positive and negative voltage excursions. The PEAK FM DEVIATION switch, which controls basic FM amplifier gain, is mechanically linked to the RANGE MHz switch since, for a given amount of peak deviation, the percent deviation (i.e., the amount of deviation relative to the carrier frequency) changes as the frequency range is changed. Also, as the frequency is tuned, the FM deviation changes. An FM Gain Compensation circuit with a potentiometer, which is geared to the FREQUENCY TUNE control, adjusts for the change in FM sensitivity with tuning.

Inputs to the FM circuits are routed through the MODULATION MODE switch. External inputs are applied in AC and DC, and an internal modulation signal in INT. The MODULATION LEVEL adjusts the input into a unity gain Buffer Amplifier. In addition to driving the FM amplifier, the Buffer Amplifier drives the Over-Deviation Detector and the Meter Attenuator. In the event that the input signal exceeds ±1.1V, the Over-Deviation Detector turns on the REDUCE PEAK FM DEVIATION annunciator. The Meter Attenuator scales the input signal to give the correct reading on the meter.

Modulation Oscillator

Internal AM and FM is provided by the Modulation Oscillator. The oscillator drives either the AM modulation circuits and MOD OUTPUT jack or the FM modulation circuits and MOD OUTPUT jack. The internal modulation oscillator has three fixed frequencies; 400 Hz, 1 kHz, and 5 kHz. The oscillator frequencies are available whenever the MODULATION MODE switch is in the AM INT or FM INT position.

The internal pulse generator for pulse modulation is part of the Internal Modulation Oscillator Assembly. The pulse generator can be varied in WIDTH from 1 to 40 μs and in RATE from 0.05 to 5 kHz. This output is also available at the MOD OUTPUT jack when INT PULSE is selected.

Power Supplies and Fan

The instrument has five regulated supply voltages, +44.6V, +20V, —20V, +5.2V, —5.2V. All supplies are protected against overloading, over voltage, and reverse voltage. An LED annunciator on each supply indicates proper operation when on. The cooling fan is driven by a dc brushless motor controlled by the Fan Driver Circuits. Power is applied to or removed from the Fan Driver circuits through the cold sensing thermostat. The ac line voltage circuit has a heat sensing thermostat to open the line whenever an over-temperature condition exists.

TROUBLESHOOTING

It is assumed that a problem has been isolated to the FM circuits and RF oscillator as a result of using the overall block diagram. Troubleshoot by using the test equipment and procedures specified below.

Test Equipment

Digital Voltmeter . . . . . HP 3490A
Oscilloscope . . . . . .HP 180C/1801A/1820C

Initial Test Conditions

Top and bottom covers removed (see Service Sheet G).

Procedure

Set the generator's controls as listed in the box at the right-hand side of the diagram. To check a voltage at a test point, change the control settings as specified in the box associated with that test point, check the voltage, then reset the controls to the settings specified in the box at the right-hand side.

The blocks are keyed (to the Service Sheets that have the circuit schematics) by the numbers located in their lower right-hand corners.

NOTES

The last two foldouts in this manual have top and bottom internal views of the instrument that show the locations of the test points, assemblies, and cables accessible from the bottom of the instrument.

After repairs are complete, see Table 5-2 for appropriate post-repair test and adjustments.

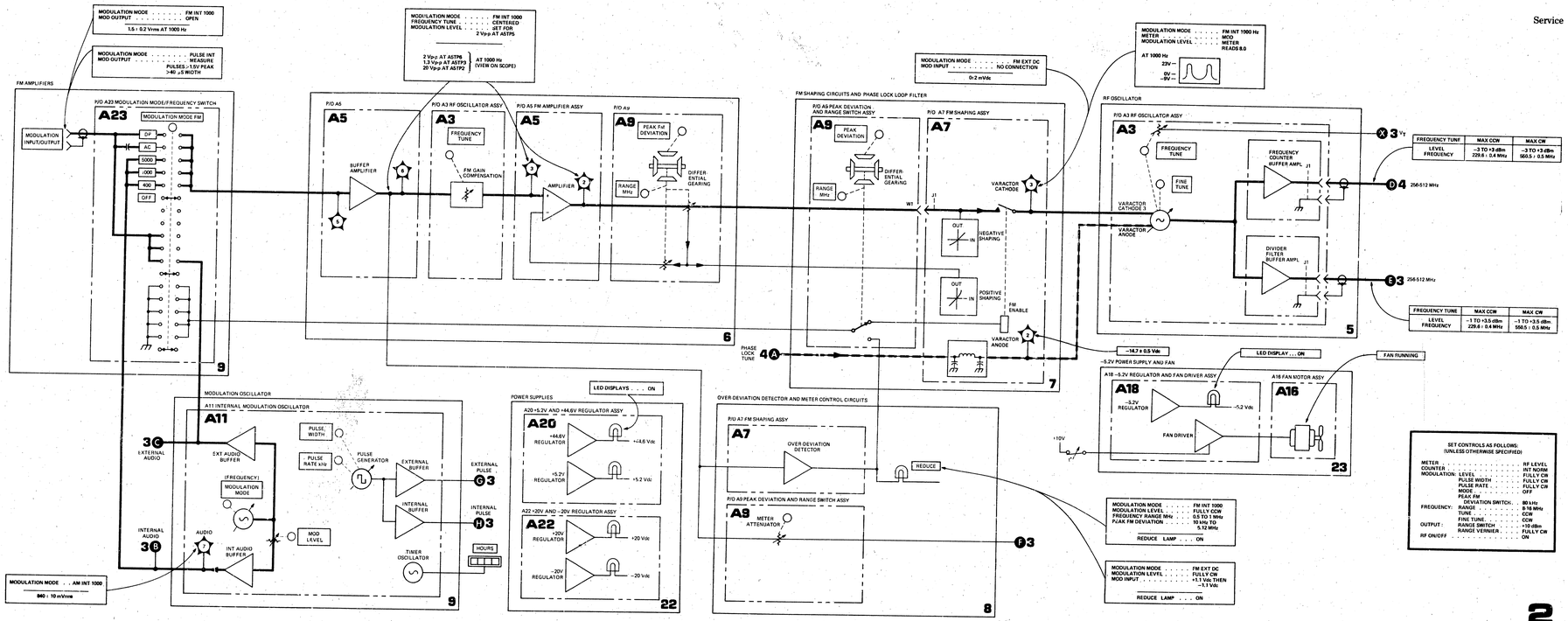


Figure 8-18. FM Circuits and RF Oscillator Block Diagram

SERVICE SHEET 3

PRINCIPLES OF OPERATION

Divider/Filters

Except for the 256—512 MHz and 512—1024 MHz frequency ranges, the RF signal from the Divider/Filter Buffer Amplifier (Service Sheet 2) is routed through a series of binary frequency dividers (i.e., ÷2) by slide switches on the filter section of the A10 Divider/Filter Assembly. The RF signal is divided to the selected range. This is also illustrated in the simplified logic diagram, Figure 8-42.

The divided signal passes through the Modulator Preamplifier, the Modulator, and then to the RF Filters. The filters remove unwanted harmonics from the signal (which is approximately a square wave after being divided). The upper frequency ranges have two filters per range — one for the lower half (Low-Band Filters) and one for the upper half (High-Band Filters) of the range. This is necessary to effectively remove the second harmonic on the lower half of the range. The midpoint of the range is sensed by a Schmitt Trigger which compares a reference voltage to a voltage proportional to the frequency tuning. On the four lowest frequency ranges the RF signal has little second harmonic content because of good waveform symmetry; therefore, each range has only one filter.

AM/AGC Circuits

The output of the RF Filters is amplified by the Output Amplifier located in the AM/AGC Assembly.

The amplified output is peak-detected and buffered by the Detector Buffer Amplifier. The detected voltage, which is negative, is summed (in the Summing Amplifier) with a positive AGC reference voltage from the OUTPUT RANGE vernier. The AGC reference may also have the amplitude modulation voltage superimposed on it. The sum of the detector and reference voltages is amplified by the Summing and Modulator Driver Amplifiers. The Modulator Driver Amplifier supplies control current to the Modulator which adjusts the RF output level.

In the pulse modulation mode, the Modulator Driver Amplifier is switched on and off by input pulses from the Schmitt Trigger. To maintain a constant detector voltage into the summing amplifier, the detected output voltage is sampled during the RF-on period and then stored in the Sample-And-Hold section of the Detector Buffer Amplifier when the RF is off. The Pulse Overload Detector senses any large errors in the leveling circuit which may occur when the OUTPUT RANGE vernier is reduced. In case of large errors, the hold function is defeated until equilibrium occurs. The Rate Detector senses pulses of low repetition rate and turns off the meter circuit when the rate is so low that the meter is no longer accurate.

The Meter Amplifier produces an output voltage proportional to the detected output voltage (and hence the output level) to drive the meter circuits. The AGC reference voltage originates in the AM Offset Amplifier where it is summed with any AM input signal. The voltage out of the amplifier then passes through the OUTPUT RANGE vernier to the modulation Summing Amplifier. The Modulator can be disabled (i.e., maximum modulator attenuation) by the RF ON/OFF switch.

Meter Circuits

The meter can be set to measure either percent AM, peak frequency deviation (FM), or RF LEVEL. In measuring AM and FM, the modulation signal is peak-detected by the Positive Peak Detector and amplified. For output level, the output of the Meter Amplifier, which is proportional to the detector output, is amplified by the Meter Drive Amplifier.

Reverse Power Protection Circuit

If high level reverse power is applied into the RF OUTPUT jack, this level is sensed by a comparator which drives an RF relay and opens the RF path. The Limiter protects the generator's output circuits during the time that elapses while the relay is de-energizing. The relay contacts are open when the generator is off.

TROUBLESHOOTING

It is assumed that a problem has been isolated to the AM/AGC circuits and output amplifier as a result of using the overall block diagram. Troubleshoot by using the test equipment and procedures specified below.

Test Equipment

Digital Voltmeter	HP 3490A
Oscilloscope	HP180C/1801A/1820C
Power Meter and Sensor	HP 435A/8482A
Frequency Counter	HP 5327C

Initial Test Conditions

Top and bottom covers removed (see Service Sheet G).

Procedure

Set the generator's controls as specified in the box at the right-hand side of the diagram. To check a voltage at a test point, change the control setting as specified in the box associated with that test point, check the voltage, then reset the controls to the settings specified in the box at the right-hand side.

The blocks are keyed, by the numbers located in their lower right-hand corners, to the Service Sheets that have the circuit schematics.

NOTES

The last two foldouts in this manual have top and bottom internal views of the instrument that show the locations of the test points, assemblies, and cables (all RF cables are accessible from the bottom of the instrument).

After repairs are complete, see Table 5-2 for appropriate post-repair tests and adjustments.

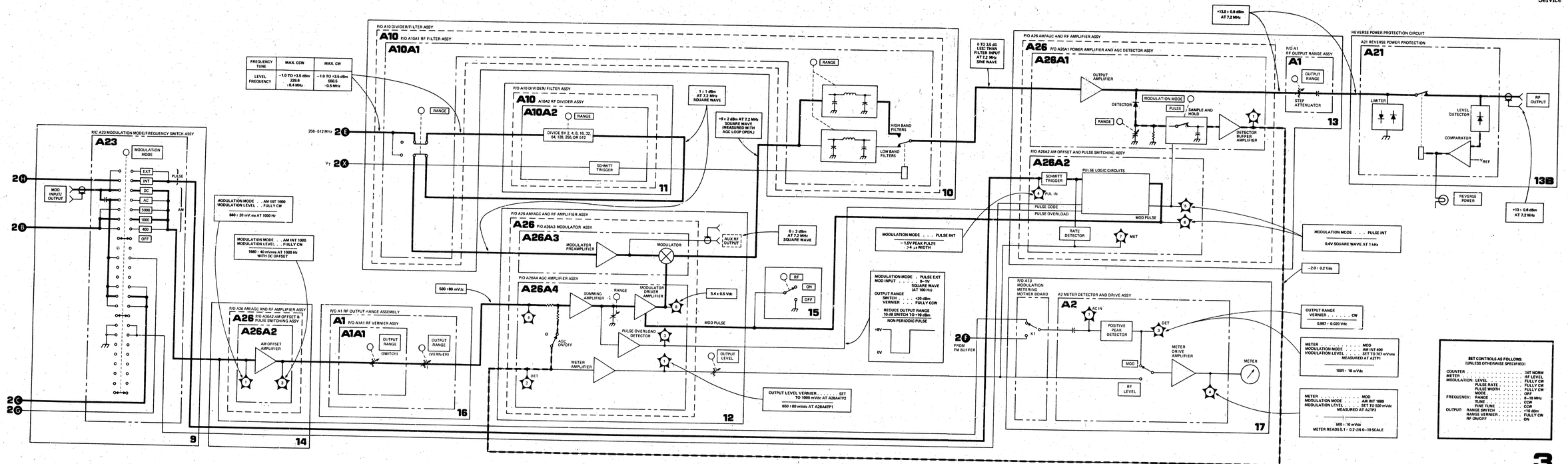


Figure 8-19. AM /AGC Circuits and Output Amplifier Block Diagram

SERVICE SHEET 4

PRINCIPLES OF OPERATION

Counter Time Base

The time base serves two functions: (1) in the unlocked mode, it gates the counter and determines the count period; (2) in the phase lock mode, it is the reference with which the divided-down RF signal is compared in the phase detector.

The time base is derived from the internal 5 MHz Reference Oscillator. The 5 MHz reference signal is then divided by 5.

The 1 MHz signal is then divided by N1 and N2. The N1 x N2 combination programs the gate period of the counter. This period compensates for the frequency division of the RF oscillator output by the RF dividers (see Service Sheet 3) since the counter input is from the RF oscillator itself (and not the divided-down output signal). Next, the Expand Decoder divides the time base signal by 1 (INT NORM) or 10 (INT X10 or EXT). The final divider (Lock Decoder) is either a ÷100 (INT LOCK) or ÷101 (INT NORM). When unlocked, the time base is high for 100 counts of the input and low for one count. This one count gives adequate time for the counter to transfer its count to the Display and to reset to zero between count cycles. When locked the ÷100 makes the time base period equal to the period of the high time when the counter was unlocked (i.e., the one-count low period is eliminated.

The Decimal Point Decoder positions the decimal properly in the display for a selected count mode.

RF Scaler

The RF Scaler is the counter front end. It conditions the RF input signal to be compatible with the Up/Down Counter. The RF signal comes from either the RF Oscillator or front panel COUNTER INPUT as selected by the COUNTER switch. The Amplifier/Trigger shapes the RF signal waveform for use by subsequent logic circuits.

With either INT or EXT 10—550 MHz COUNTER switch setting, the RF signal is divided by 64. For EXT 0—10 MHz COUNTER setting the ÷64 is bypassed. The signal frequency that is fed into the Up/Down Counter is always less than 10 MHz.

Up/Down Counter and Display — Unlocked Mode

In the unlocked mode, the Up/Down Counter is configured as a six-decade up-counter. The counter operation is controlled by the time base. When the time base is high, the counter counts the input signal, incrementing one count for each input pulse. When the time base goes low, the count input is inhibited, the counter outputs are transferred to the Storage Buffers, and the latest count appears on the Display. The Storage Buffers are then latched (i.e., they are no longer influenced by the counter outputs), and the counters are cleared to zero. When the time base returns to a high, the counter counts the input pulses beginning at zero, and the cycle repeats.

SERVICE SHEET 4 (Cont'd)

If the count exceeds 999999, a carry (CRY) pulse is generated. The Overflow Detector then turns on the OVERFLOW annunciator to warn that a significant digit is not shown on the Display.

Up/Down Counter and Phase Lock Circuits —Phase Lock Mode

In the phase lock mode the Up/Down Counter is configured as a six-decade down-counter. The counter is free running and is not controlled by the time base. When the COUNTER LOCK switch is first set, the counter continues to count up until the present count cycle is terminated. The count is then stored in the Storage Buffers for the Display and for the down-counter as Countdown Preset. The counter enters the phase lock mode and counts down beginning at the Countdown Preset Frequency. The counter counts to zero, then underflows (i.e., count is 999999) and a Counter Load pulse is generated. The counter is again preset to the same number and the cycle is repeated.

The time of occurrence of the underflow (the Counter Load pulse) is compared with the termination of the time base cycle in the null phase detector. The phase detector produces a voltage proportional to the phase (or time difference) between the two signals. The detector voltage, after low-pass filtering and conditioning, drives the varactor anode of the RF Oscillator (see Service Sheet 2). This voltage tunes the oscillator to synchronize the counter load pulses with the time base.

The phase lock circuits form a variation of an M/N phase lock loop. The time base reference (5 MHz) divided by M is compared in the Null Phase Detector to the RF Oscillator frequency divided by N. In operation, the two frequencies compared are 5 MHz ÷ 5 ÷ N1 ÷ N2 ÷ 100 and the RF Oscillator frequency ÷ 64 ÷ Countdown Preset.

NOTE

Countdown Preset is the complete number shown in Display (without decimal point). The down counter produces one Counter Load pulse each time it counts to zero from the preset number.

If the two frequencies differ, the RF oscillator is tuned to synchronize the signals. M is a fixed number and N is self-programmed since it is determined by the count just prior to entering phase lock.

If the phase detector voltage exceeds preset limits, an error condition occurs, and the counter reverts to the count-up mode. The error also switches on a 2 Hz Flash Oscillator causing the Display to blink (an indication that phase lock has been broken).

TROUBLESHOOTING

Description

A fault in the counter can usually be isolated to the functional level by following the steps in the troubleshooting table. The steps are simple and make maximum use of front panel controls and

SERVICE SHEET 4 (Cont'd)

display indications for diagnosis. The steps of the table should be followed in order. When the first abnormality is observed, turn to the service sheet indicated and begin troubleshooting. After a repair has been completed, return to this table and check the counter again by following the steps below to the conclusion.

Procedure

1. Remove instrument top cover (see Service Sheet G for top and bottom cover removal procedure).

2. Set controls as follows:

COUNTER	. . . . .	INT NORM
METER	. . . . .	RF LEVEL
LINE	. . . . .	OFF
MODULATION:	LEVEL	Fully ccw
	PULSE WIDTH	Fully cw
	PULSE RATE	Fully cw
	MODE	AM INT 5000
	PEAK FM DEVIATION . .	5 kHz
FREQUENCY:	RANGE	0.5—1 MHz
	TUNE	Fully ccw
	FINE TUNE.	Centered
OUTPUT:	RANGE Switch	0 dBm
	RANGE Vernier	Fully cw
	RF ON/OFF	ON

3. Follow the steps in the troubleshooting table below in sequence.

Counter/Lock Circuits Troubleshooting (1 of 4)

Step	Instruction	Normal Indication	If Indication Abnormal
1	Set LINE to ON.	Five power supply LED indicators on.	See Service Sheets 22 & 23: Check regulator circuits.
		Panel meter shows RF power at ≈ +3 dBm.	See Service Sheets 2 & 3: Check RF circuits beginning with AUX RF OUTPUT.
		Display not blinking.	(1) See Service Sheet 21: Lock Switching, Error Detector, Phase Detector Circuits (2) See Service Sheet 20: Flash Oscillator.
		All digits lighted.	If all digits are blank, (1) See Service Sheet 19: Time Base. (2) See Service Sheet 20: Flash Oscillator. If one or more digits are blank, (1) See Service Sheet 19: Time Base. (2) See Service Sheet 20: Counter—Count Up Mode

Counter/Lock Circuits Troubleshooting (2 of 4)

Step	Instructions		Normal Indication	If Indication Abnormal
2	Set controls as follows and note decimal position.			See Service Sheet 19: Decimal Point Decoder.
	FREQUENCY RANGE (MHz)	COUNTER	Display	
	0.5—1 1—16 16—128 128—1024	INT NORM	X●X X X X X X X●X X X X X X X●X X X X X X X●X X	
	0.5—1 1—16 16—128 128—1024	INT X10	●X X X X X X X●X X X X X X X●X X X X X X X●X X X	
	—	EXT 10—550	X X X●X X X	
	—	EXT 0—10	X●X X X X X	
3	Set COUNTER to EXT 10—550 MHz. Switch LINE between OFF and ON at least 5 times with 5 seconds between switchings.		Display blank in OFF. Display 000.000 in ON after a short wait.	If display other than 000.000 and remains the same for each ON, see Service Sheet 20: Counter—Count Up Mode. If display other than 000.000 (or one or more digits blank) and changes for each ON, see Service Sheet 19: Time Base.
4	Set LINE to ON. Connect MOD INPUT/OUTPUT to COUNTER INPUT. Set COUNTER to EXT		Display reads 0.00500.	If display is 0.00000, (1) See Service Sheet 18: Input Circuits, then Dividers. (2) See Service Sheet 20: Shaping, then Counter—Count Up Mode. If display constant (except 0.00000) but incorrect, (1) See Service Sheet 19: Time Base. (2) See Service Sheet 20: Counter—Count Up Mode.

Counter/Lock Circuits Troubleshooting (3 of 4)

Step	Instructions		Normal Indication	If Indication Abnormal
5	Set COUNTER to INT NORM. Adjust FREQUENCY TUNE for a display of approximately 0.5000 MHz. Switch RANGE as shown and note display.			See Service Sheet 19: Time Base.
		RANGE (MHz)	Displayed Frequency (MHz)	
		0.5—1	0.500	
		1—2	1.00	
		2—4	2.00	
		4—8	4.00	
		8—16	8.00	
		16—32	16.0	
		32—64	32.0	
		64—128	64.0	
		128—256	128	
		256—512	256	
		512—1024	512	
6	Set COUNTER to EXT 10—550 MHz. Connect RF OUTPUT to COUNTER INPUT. Switch RANGE as follows and note display. (Tune FREQUENCY TUNE cw to obtain the first reading.)			(1) See Service Sheet 18: Check external input circuits. (2) See Service Sheet D: Check Coupler (MP29) between A9 and A10. (3) See Service Sheet 11: Check switching of RF Dividers.
		RANGE (MHz)	Displayed Frequency (MHz)	
		512—1024	512	
		256—512	512	
		128—256	256	
		64—128	128	
		32—64	64.0	
		16—32	32.0	
		8—16	16.0	
		Set COUNTER to EXT 0—10.		
		4—8	8.0	
		2—4	4.0	
		1—2	2.0	
		0.5—1	1.0	
7	With FREQUENCY RANGE set to 0.5—1 MHz, set COUNTER to INT X10. Adjust FREQUENCY TUNE fully cw.		OVERFLOW lamp on.	See Service Sheet 20: Overflow Detector.

Counter/Lock Circuits Troubleshooting (4 of 4)

Step	Instructions	Normal Indication	If Indication Abnormal
8	Return frequency to approximately 0.7 MHz. Set COUNTER to INT LOCK.	Displayed count is steady and not blinking.	(1) See Service Sheet 21: Lock Switching then Phase Detector Circuits. (2) See Service Sheet 20: Counter—Count Down Mode. (3) See Service Sheet 19: Time Base. (4) See Service Sheet 7: Check Phase Lock Loop Filter. Check RF Oscillator's stability and ability to FM.
9	Tune FREQUENCY TUNE one turn cw.	Display blinks at a 2 Hz rate.	See Service Sheet 21: Error Detector then Lock Switching.
10	Set COUNTER to INT NORM, then back to INT LOCK. Tune FREQUENCY TUNE fully ccw.	Display blinks at a 2 Hz rate.	See Service Sheet 21: Error Detector.
11	Set COUNTER to INT NORM, then back to INT LOCK. Tune FINE TUNE one quarter turn cw, then one half turn ccw.	No change in display. No blinking of display.	See Service Sheet 21: Phase Detector and Error Detector.
12	Miscellaneous problems: Counter frequency slightly in error.	TIME BASE output A8A3J1 at bottom of A8, 5 MHz.	Perform paragraph 5-44, Internal Reference Frequency Adjustment.
	Excessive residual, FM only when locked.	Residual FM same as when unlocked.	See Service Sheet 21: Phase Detector Circuits.
	Count when locked disagrees significantly with that measured on external counter.	Both read the same (allowing for time base error and ±1 count of external counter).	See Service Sheet 20: Counter—Count Down Mode.
	Fails input sensitivity test.	Counts properly for levels down −7 dBm.	See Service Sheet 18: Input Circuits.

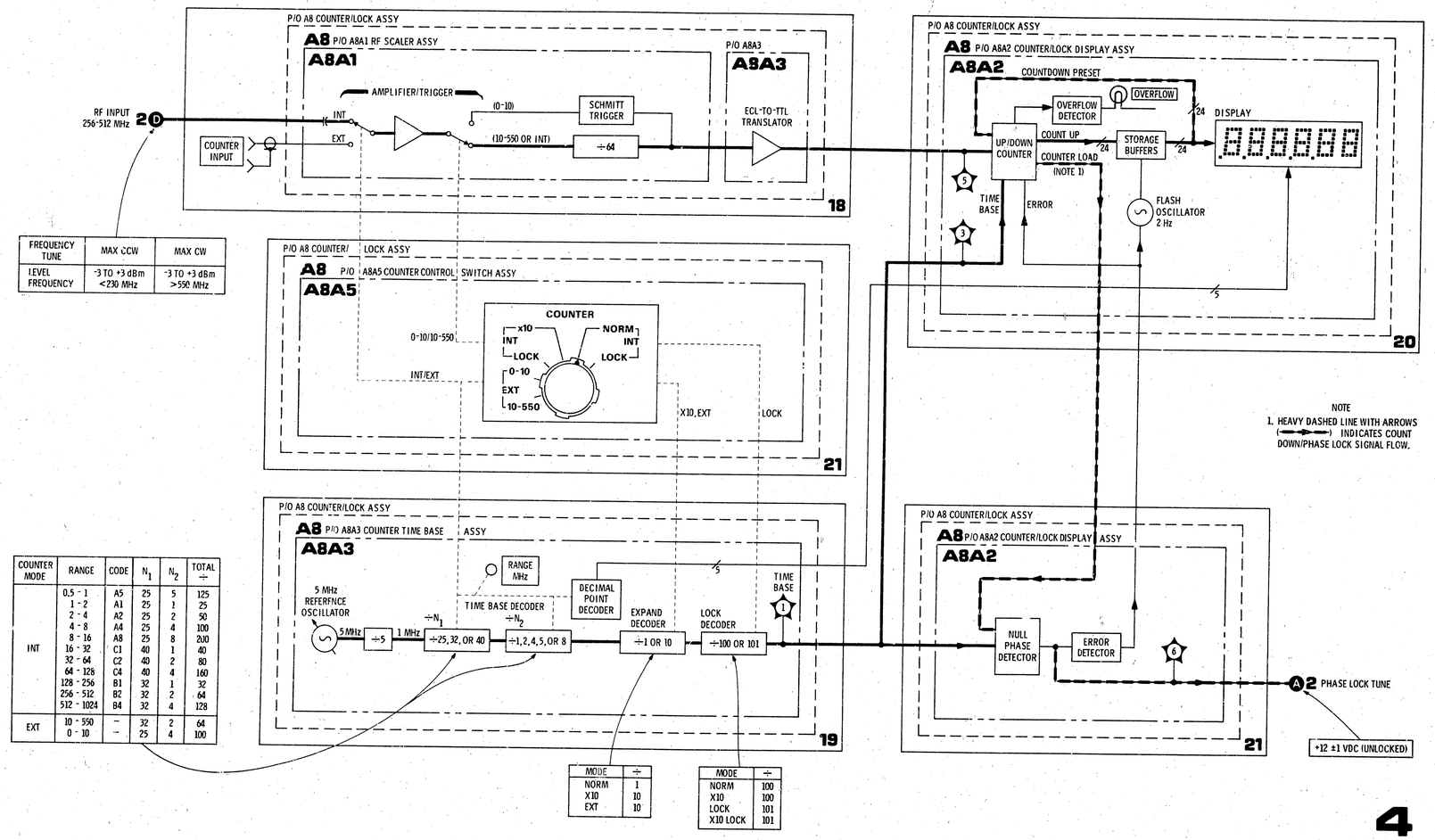


Figure 8-20. Counter/Lock Circuits Block Diagram

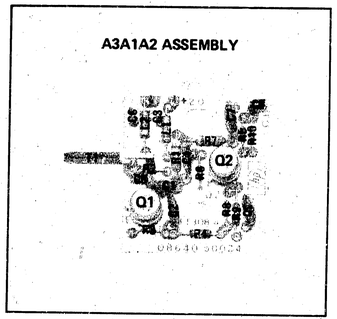


Figure 8-21. A3A1A2 Divider/Filter Buffer Amplifier Board Assembly

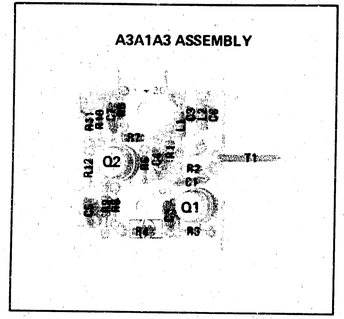


Figure 8-22. A3A1A3 Counter Buffer Amplifier Board Assembly

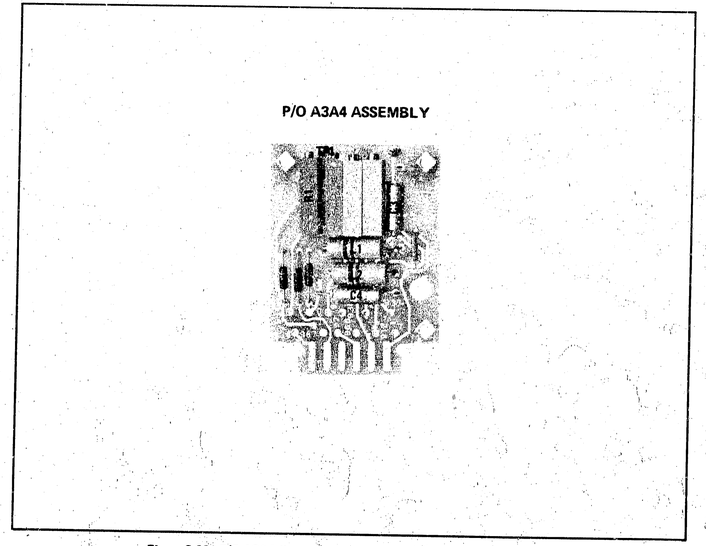


Figure 8-23. P/O A3A4 Connector Board Assembly Component Locations

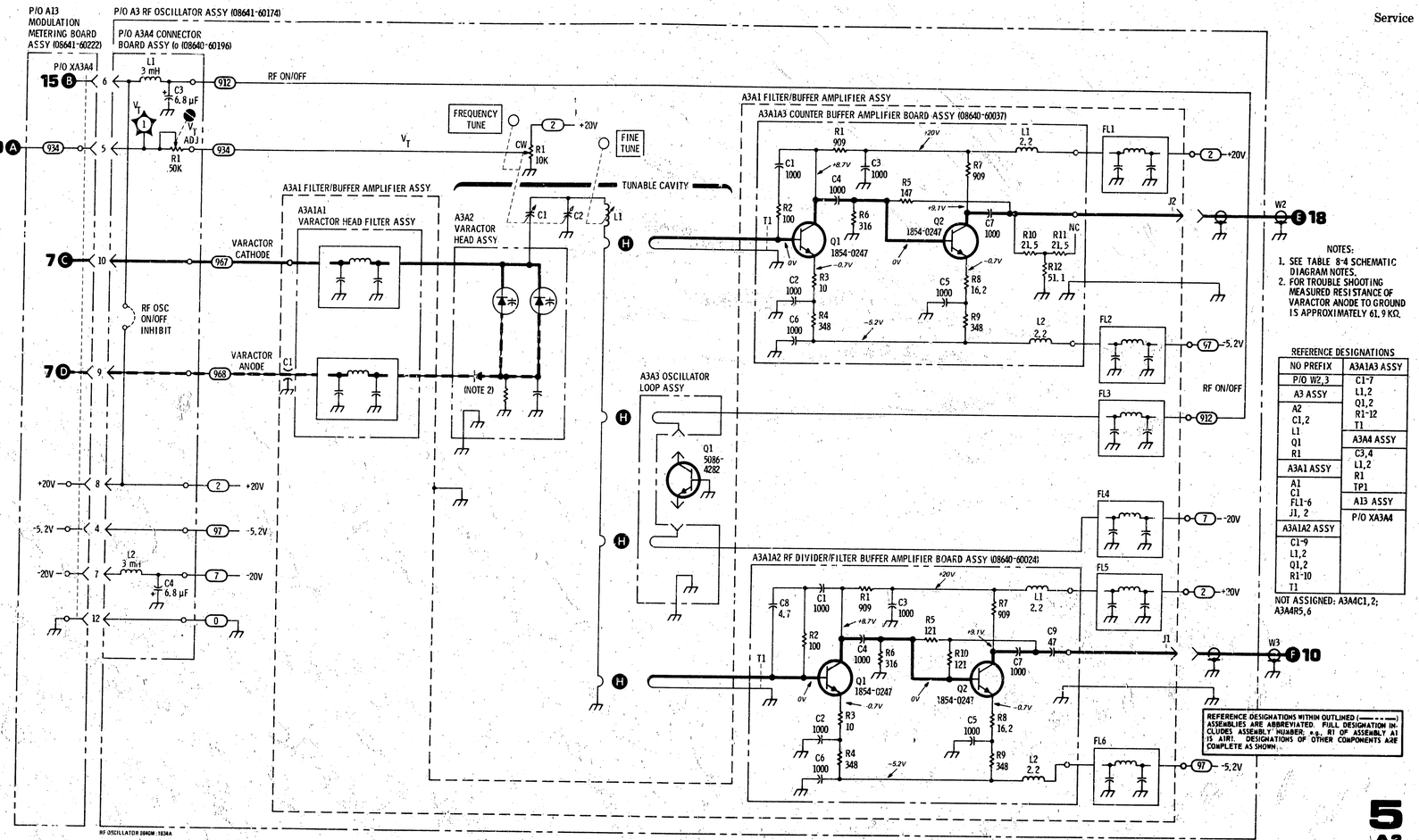


Figure 8-24. RF Oscillator Simplified Diagram

P/O A3A4 ASSEMBLY

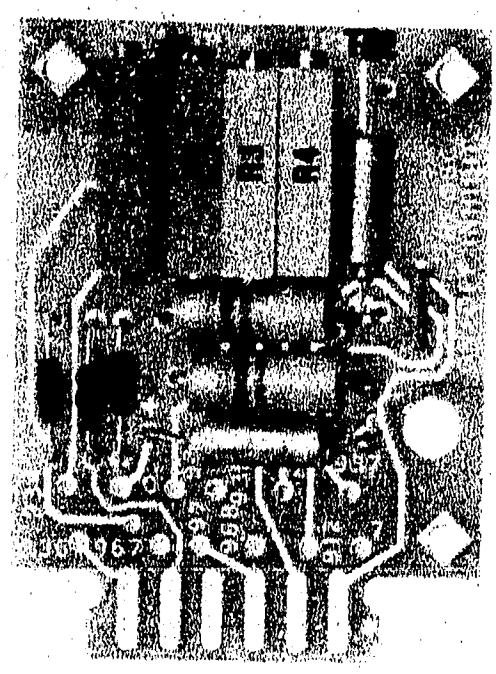


Figure 8-25. P/O A3A4 Connector Board Assembly Component Locations

A13

Component Locations For A13 Assembly are on Service Sheet 25.

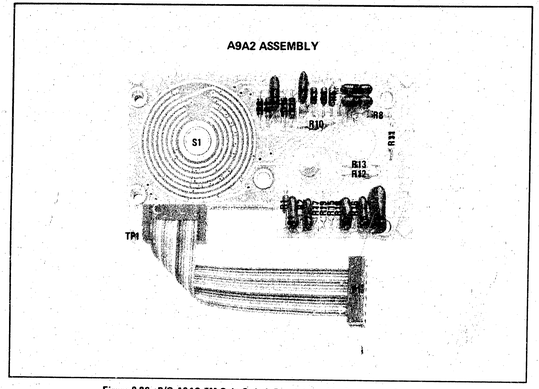


Figure 8-26. P/O A9A2 FM Gain Switch Board Assembly Component Locations

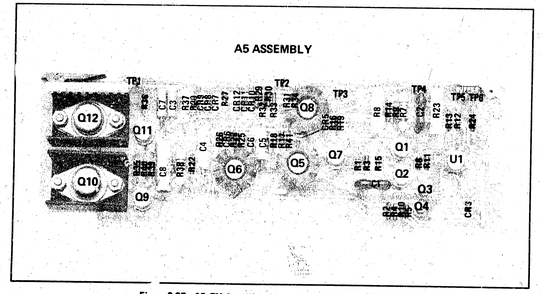
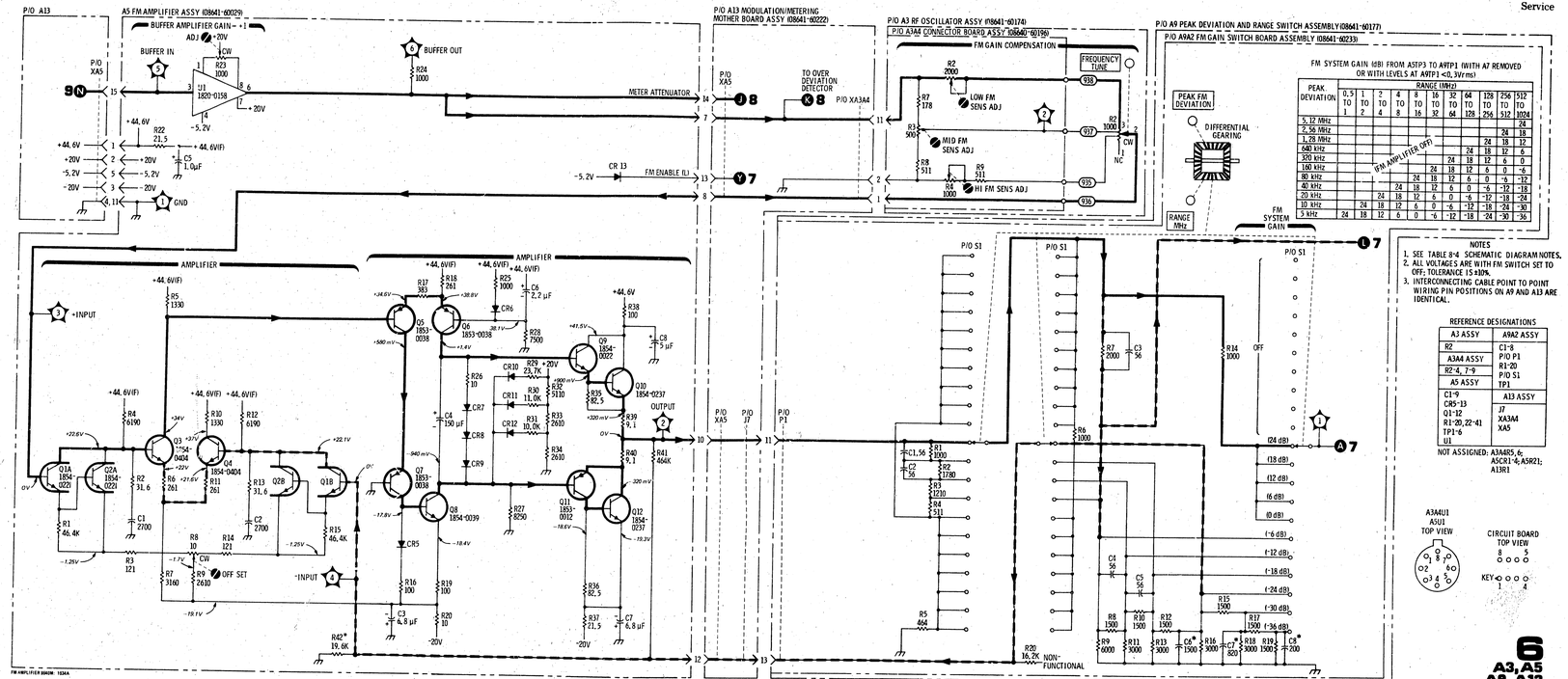


Figure 8-27. A5 FM Amplifier Assembly Component Locations



NOTES

1. SEE TABLE 8-5 SCHEMATIC DIAGRAM NOTES.
2. ALL VOLTAGES ARE WITH FM SWITCH SET TO OFF; TOLERANCE IS ±10%.
3. INTERCONNECTING CABLE POINT TO POINT WIRING PIN POSITIONS ON A9 AND A13 ARE IDENTICAL.

REFERENCE DESIGNATIONS

A3 ASSY	A9A2 ASSY
R2	C1-9
A3A4 ASSY	P/O P1
R2-4, 7-9	R1-20
A5 ASSY	P/O S1
	TP1
C1-9	A13 ASSY
CR5-13	J7
Q1-12	XA3A4
R1-20, 22-41	XA5
TP1-6	
U1	

NOT ASSIGNED: A3A685, 6; A5CR1-4; A5R21; A13R1

A3A4U1 ASU1 TOP VIEW

CIRCUIT BOARD TOP VIEW

KEY

Figure 8-28. FM Amplifiers Schematic Diagram

6 A3, A5 A9, A13

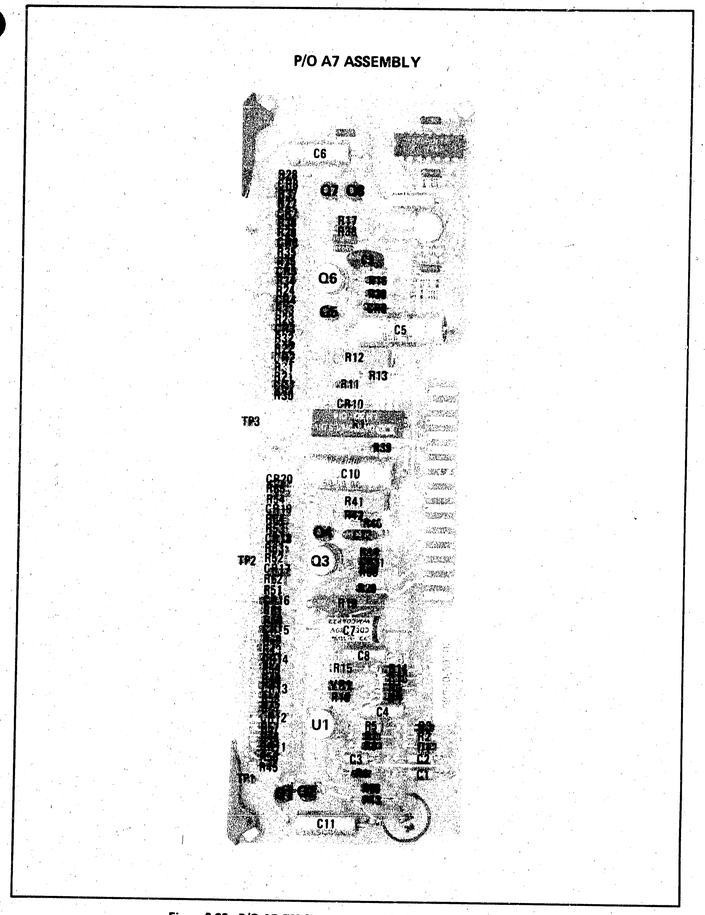


Figure 8-29. P/O A7 FM Shaping Assembly Component Locations

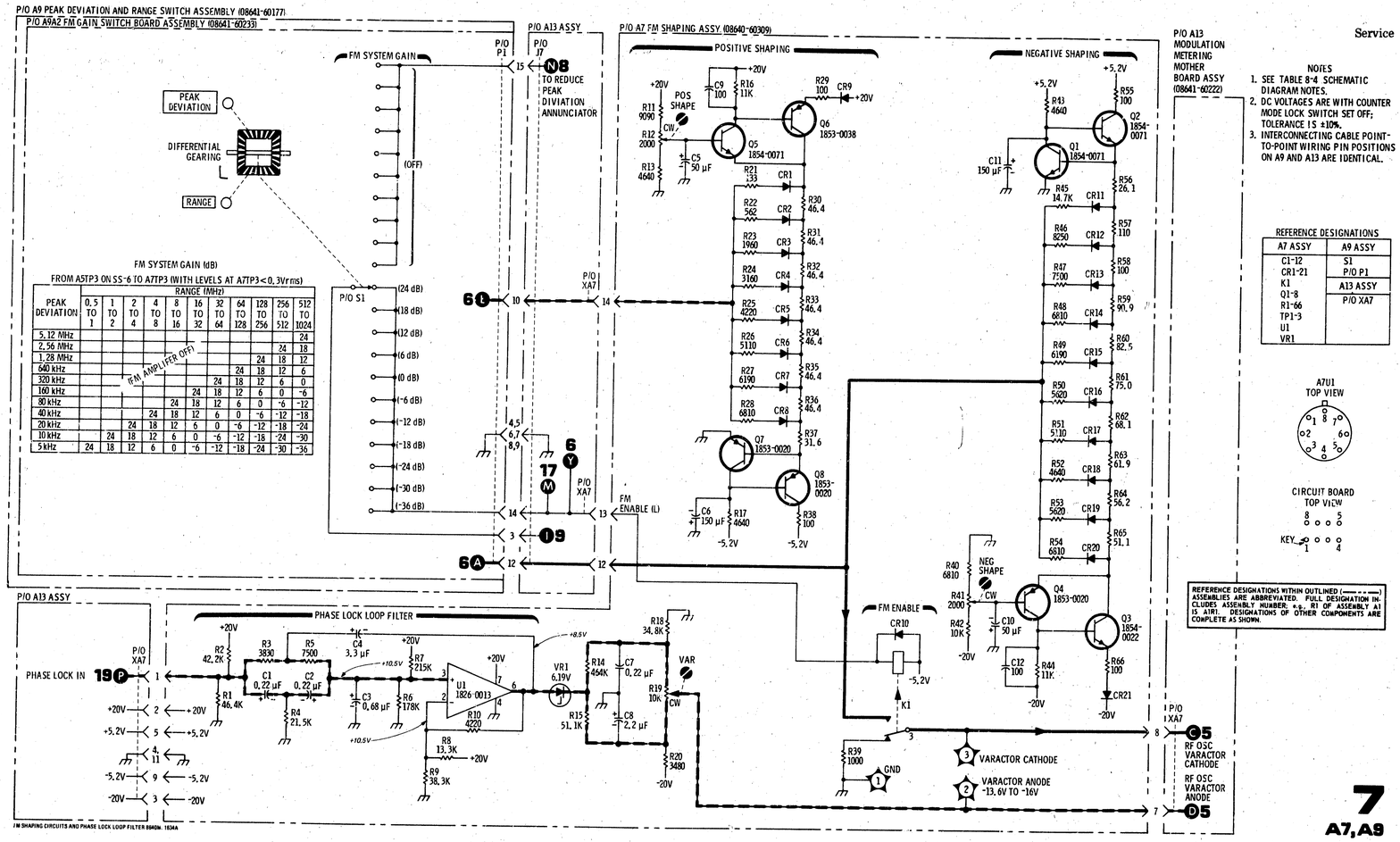


Figure 8-30. FM Shaping Circuits and Phase Lock Loop Filter Schematic Diagram

P/O A9A1 ASSEMBLY

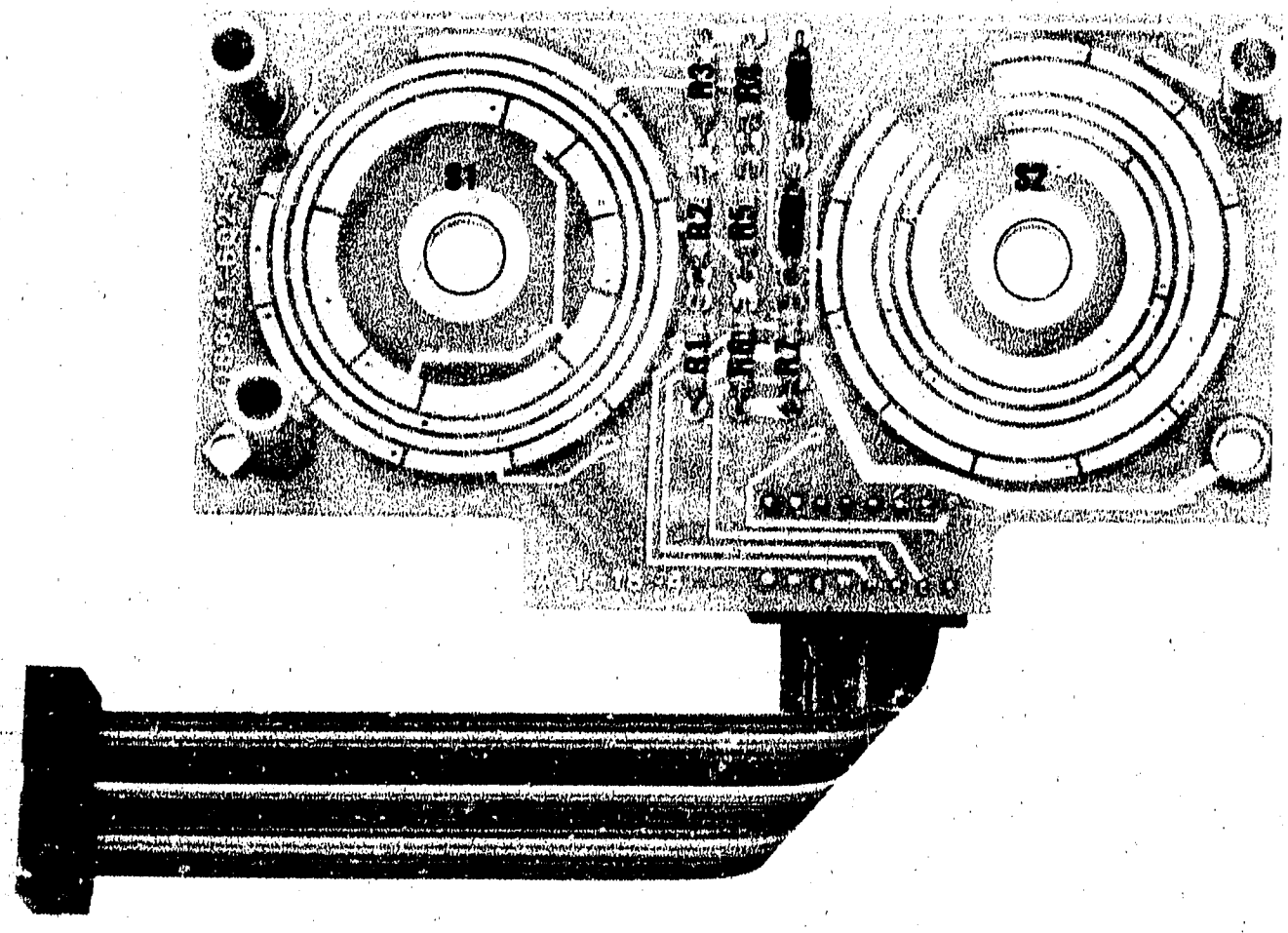


Figure 8-31. P/O A9A1 Peak Deviation Range Switch Board Assembly Component Locations

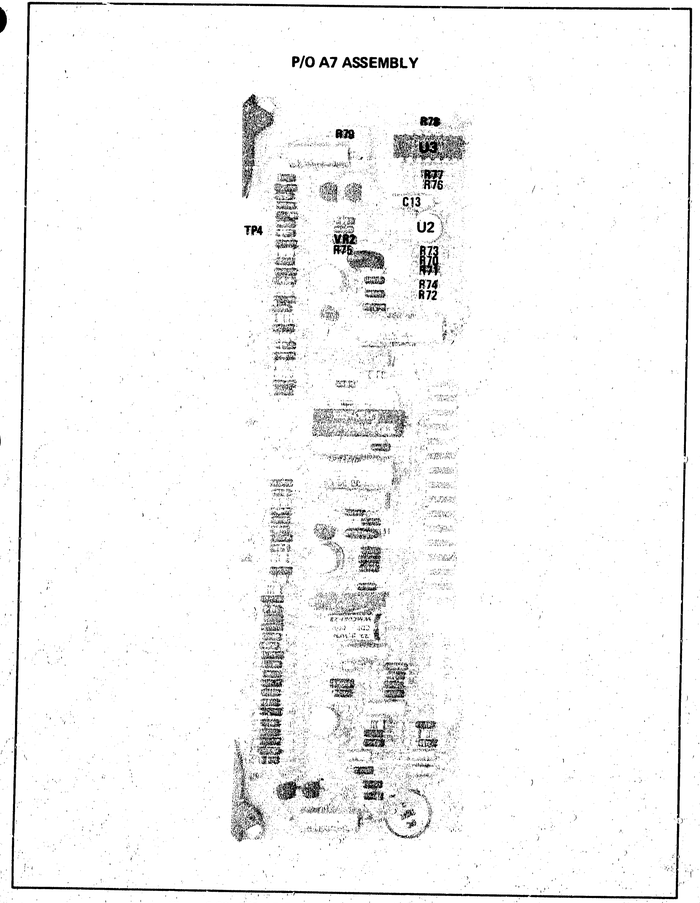


Figure 8-32. P/O A7 FM Shaping Assembly Component Locations

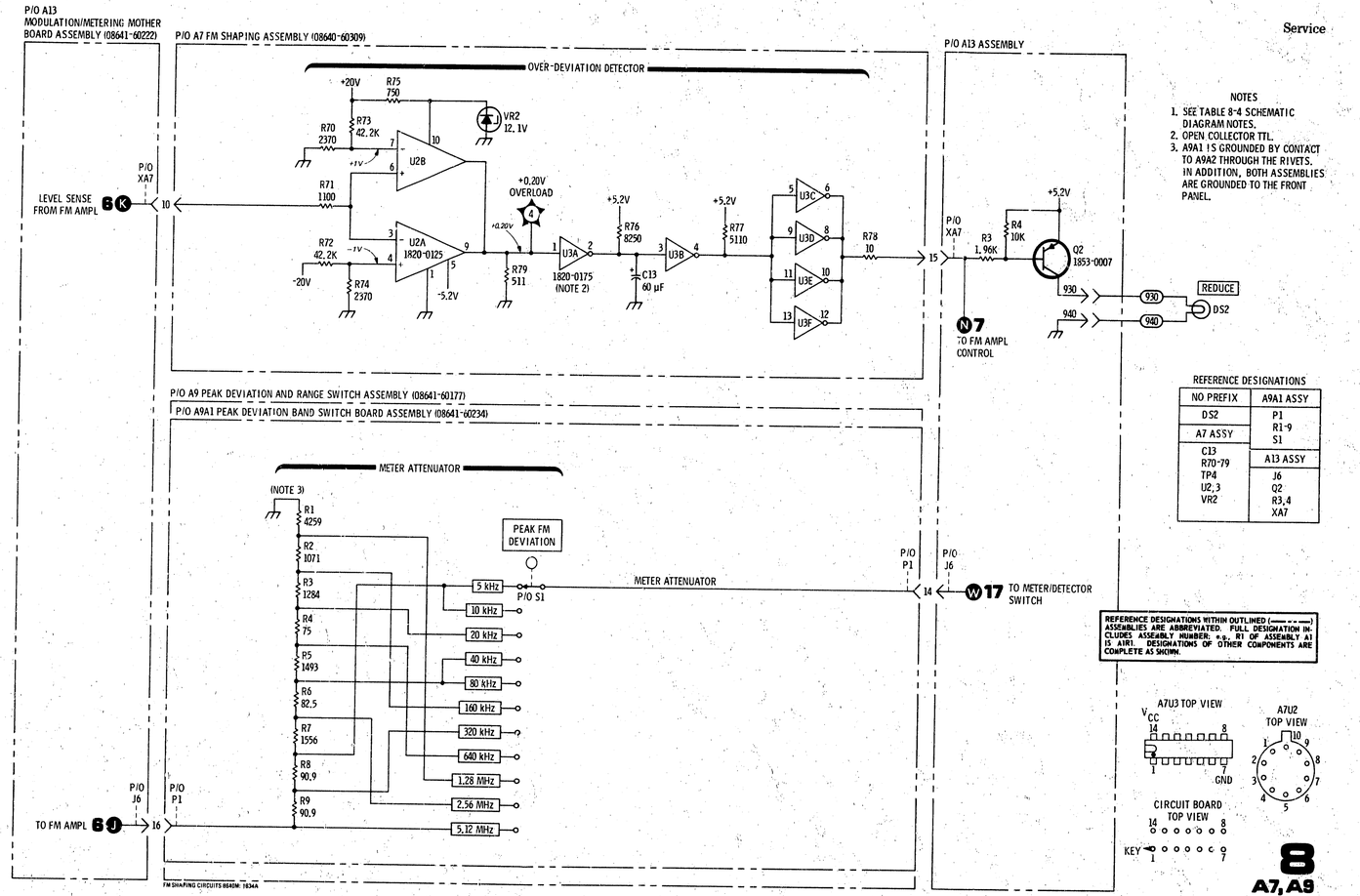


Figure 8-33. Over-Deviation Detector and Meter Control Circuits Schematic Diagram

8
A7, A9

A23A1 ASSEMBLY

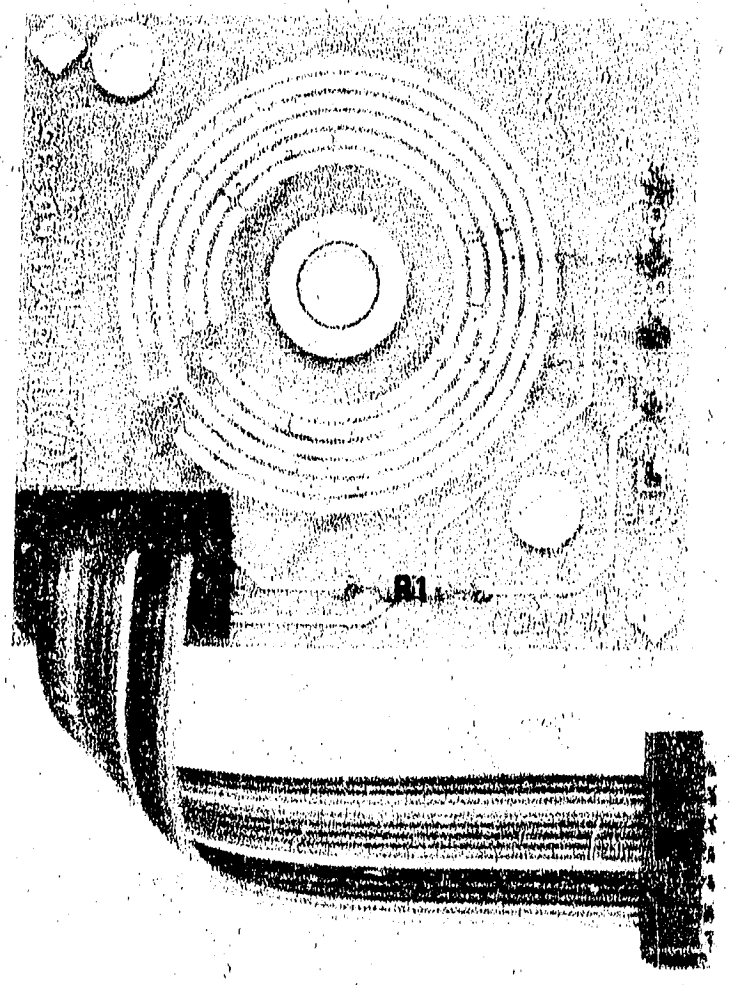


Figure 8-34. A23A1 Modulation Mode Select

A23A2 ASSEMBLY

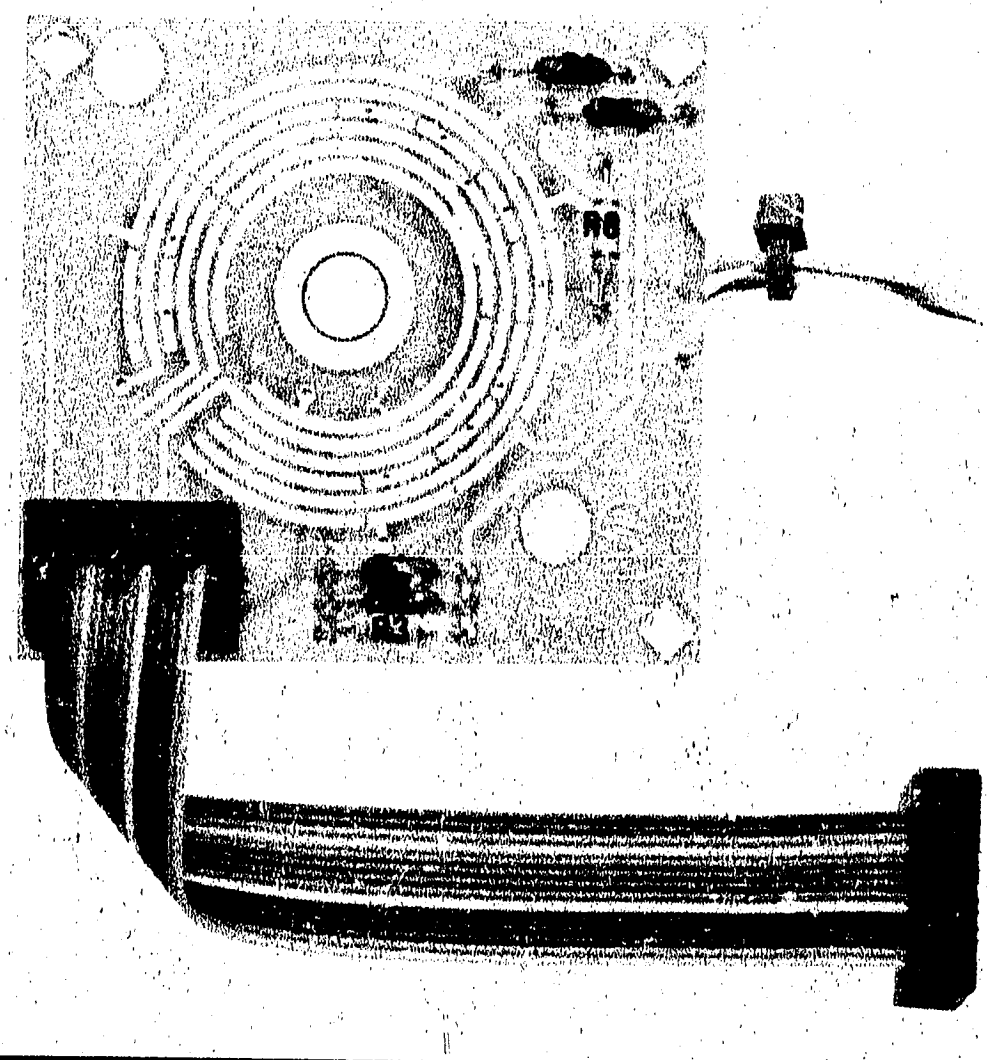


Figure 8-35. A23A2 Modulation Frequency Select

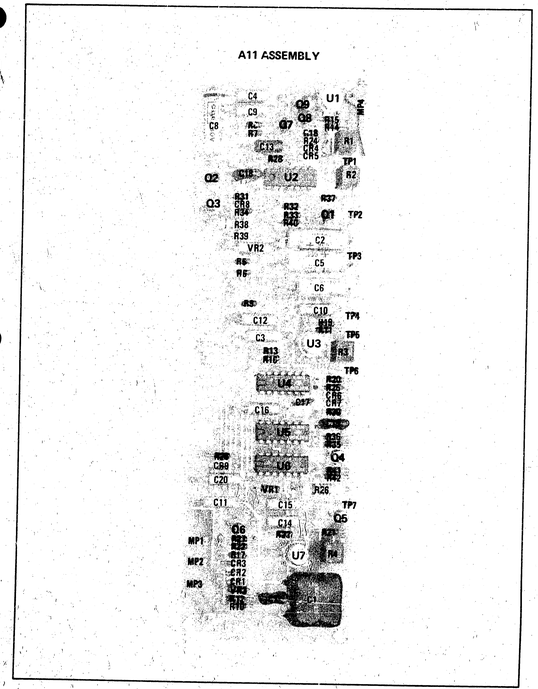
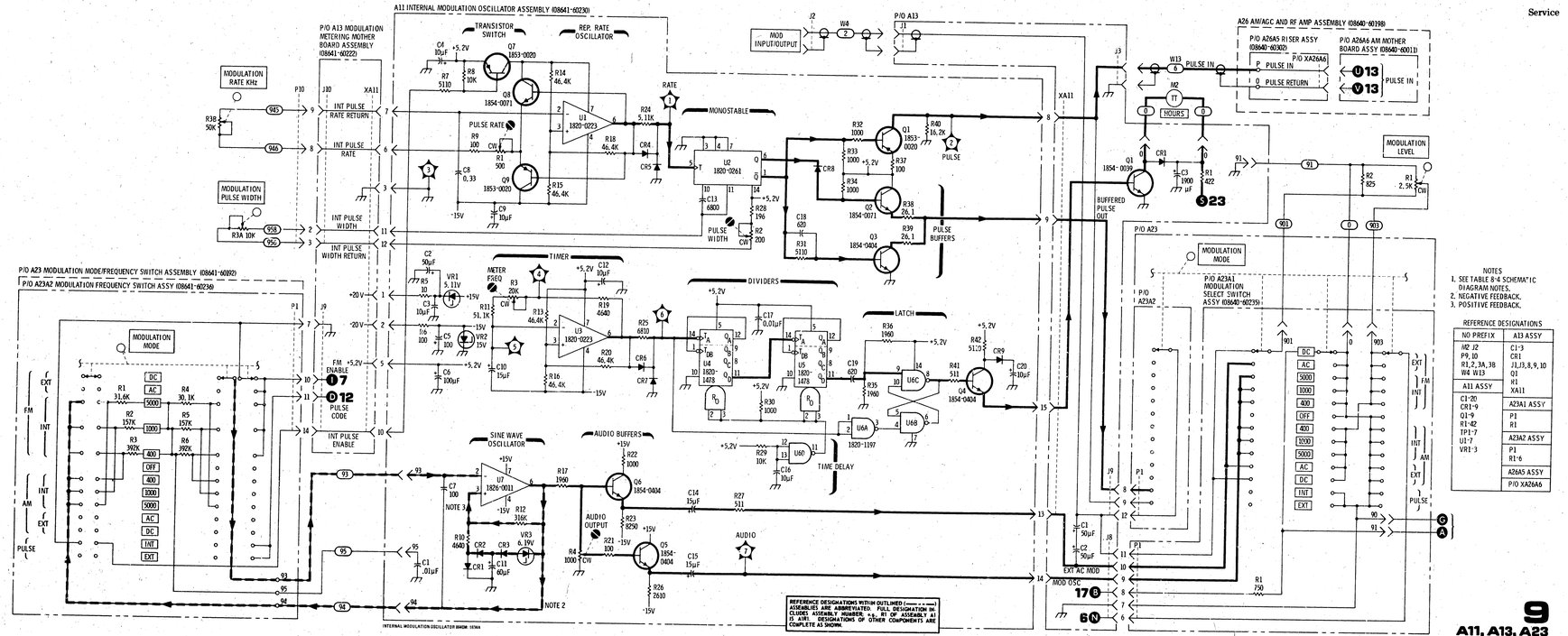


Figure 8-36. A11 Internal Modulation Oscillator Component Locations



NOTES
1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. NEGATIVE FEEDBACK.
3. POSITIVE FEEDBACK.

REFERENCE DESIGNATIONS

NO PREFIX	A13 ASSY
M2 J2 P9, 10 R1, 2, 3A, 3B W4 W13	C1-3 CR1 J1, 3, 8, 9, 10 Q1 R1 XA11
A11 ASSY	A23A1 ASSY
C1-20 CR1-9 Q1-9 R1-42 TP1-7 U1-7 VR1-3	P1 R1
	A23A2 ASSY
	P1 R1-6
	A26A5 ASSY
	P/O XA26A6

Figure 8-37. Internal Modulation Oscillator Schematic Diagram

9
A11, A13, A23

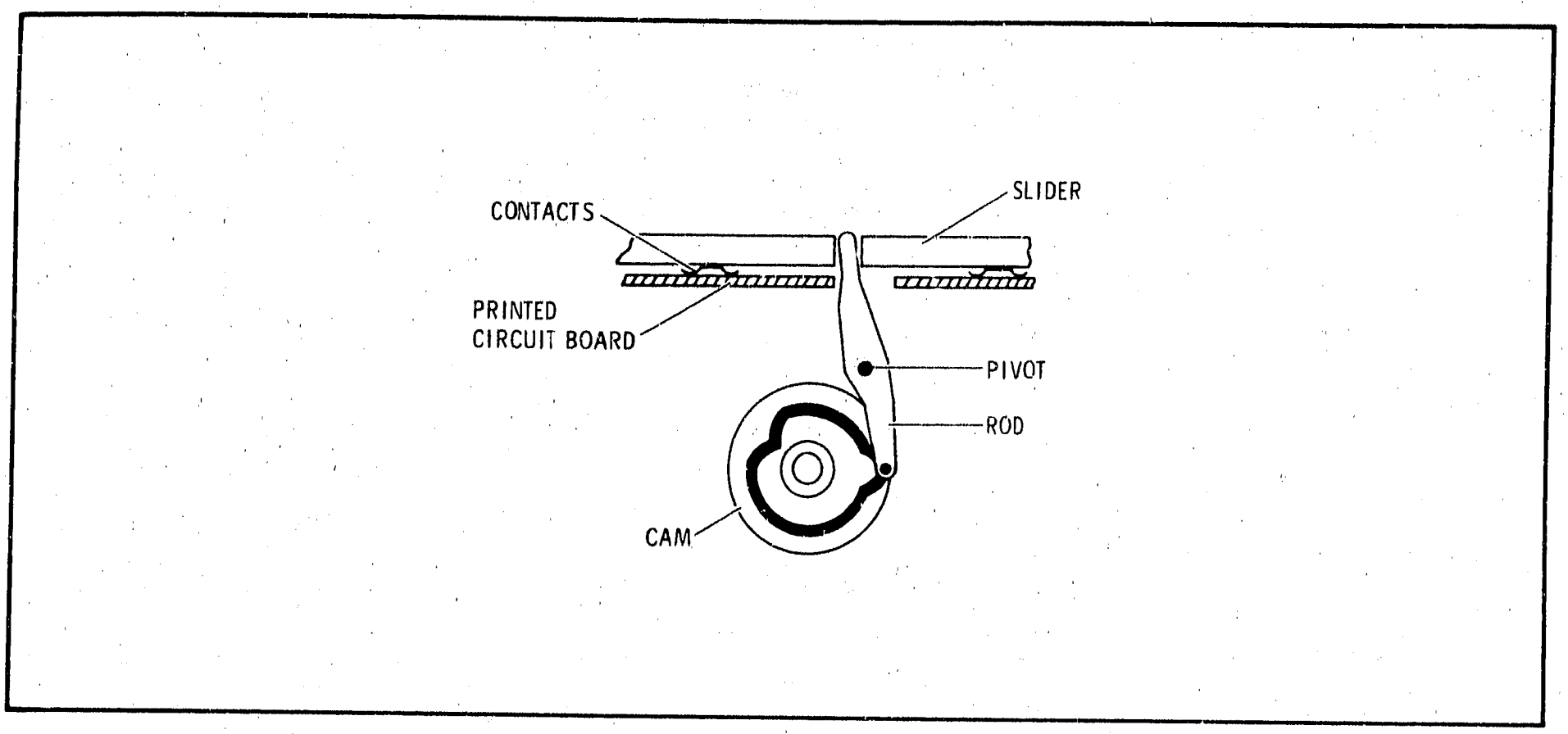


Figure 8-38. Action of RANGE Switch

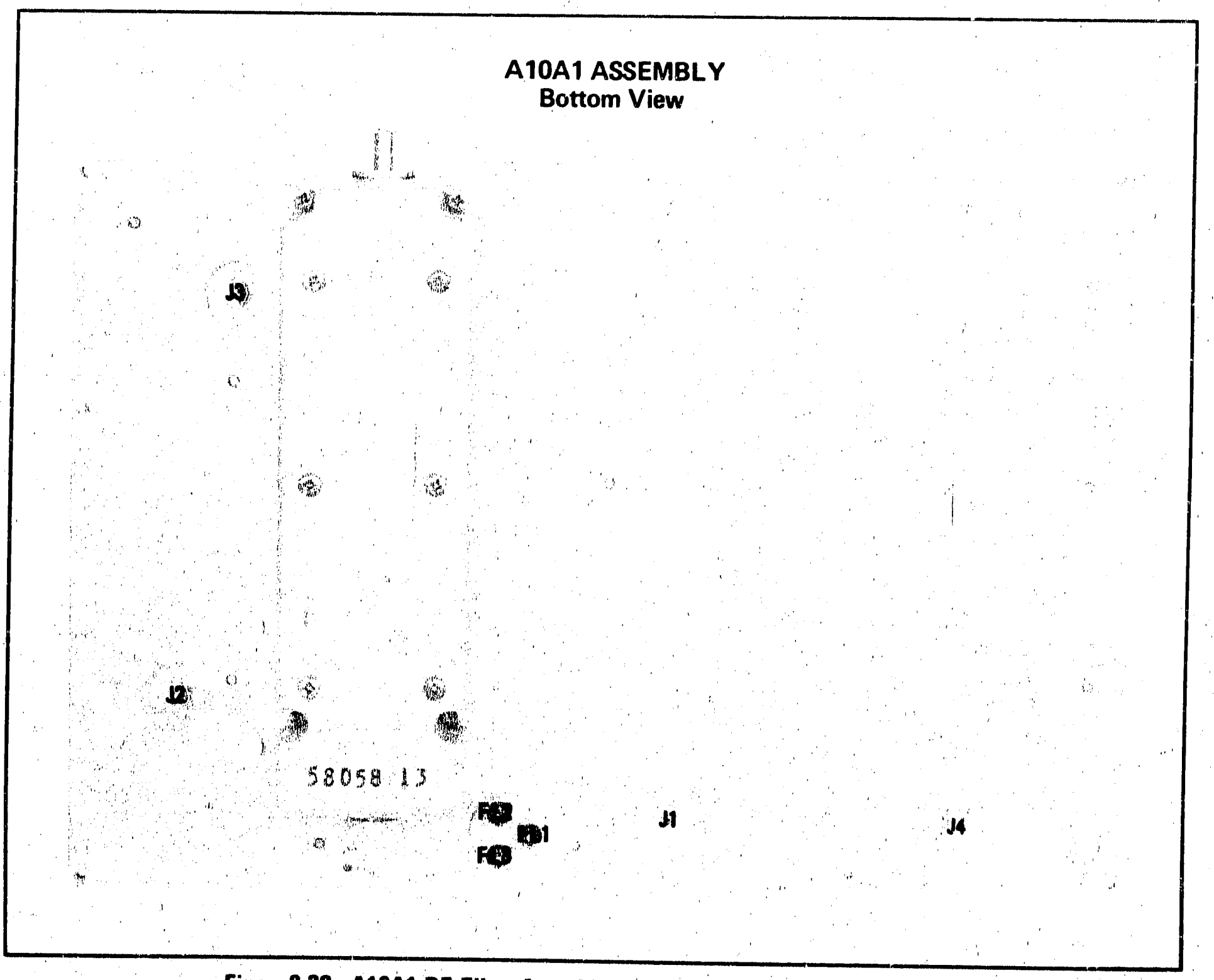


Figure 8-39. A10A1 RF Filter Assembly Component Locations (Bottom View)

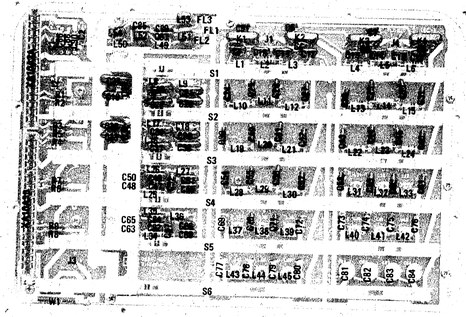
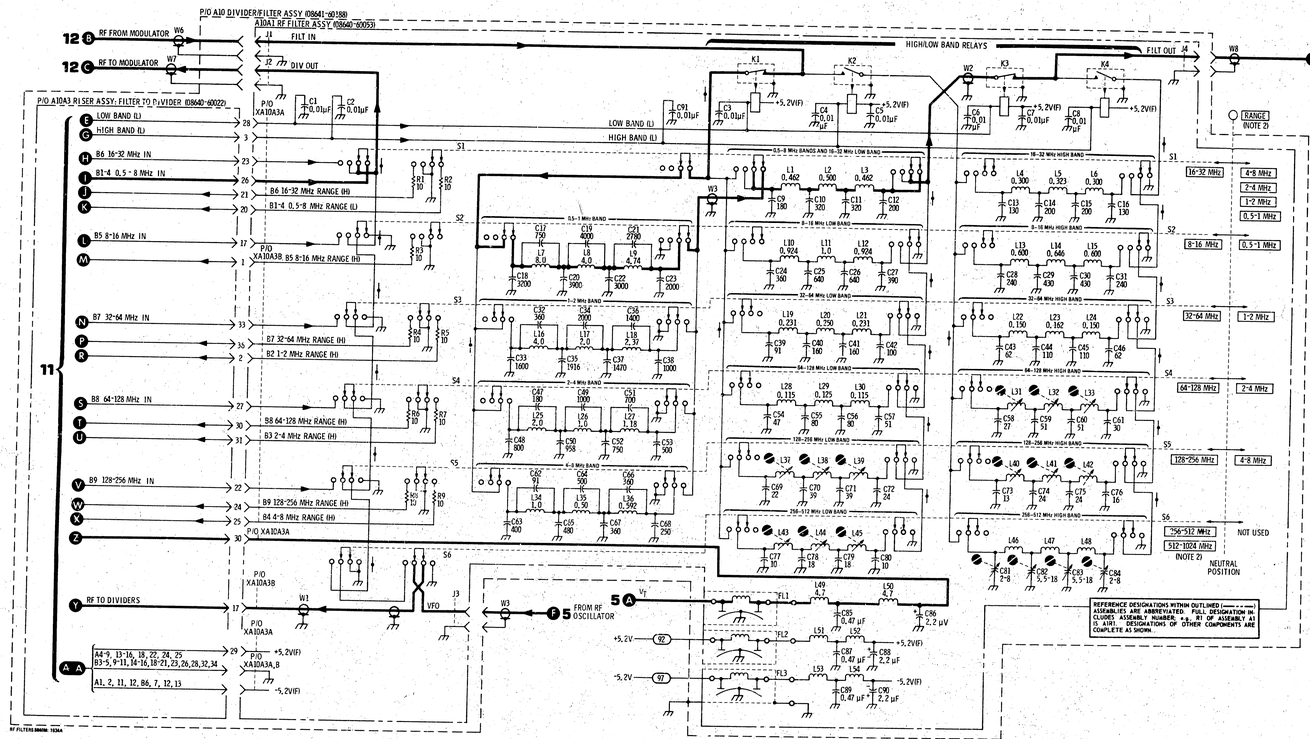


Figure 8-40. A10A1 RF Filter Assembly Component Locations (Top View)



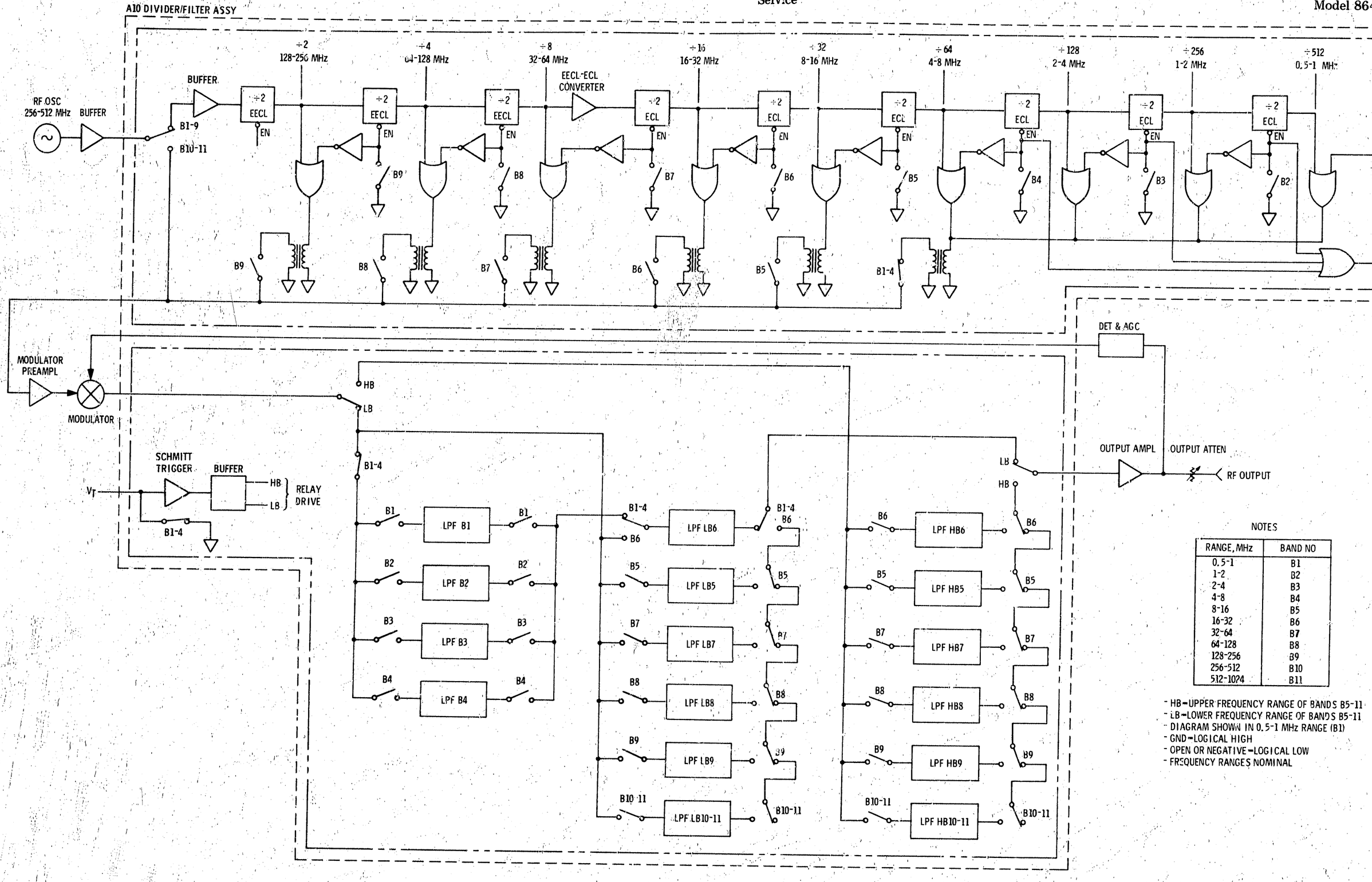
NOTES:
1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. ALL SWITCHES SHOWN SET FOR 0.5-1 MHz RANGE.
3. LOGIC LEVELS ON THIS SCHEMATIC BELONG TO ECL AND ECL FAMILIES. GROUND IS HIGH AND OPEN (NEGATIVE) IS LOW. EXCEPTIONS ARE LINES LABELED "LOW BAND" AT INPUT E, "HIGH BAND" AT INPUT G, AND "B1-4" AT OUTPUT K WHICH ARE TTL FOR WHICH OPEN (POSITIVE) IS HIGH AND GROUND IS LOW.

REFERENCE DESIGNATIONS

NO PREFIX	A10A1
P/O W3, W6	C1-91
P/O W7, W8	FL1-3
	J1-4
	K1-4
	L1-54
	R1-9
	S1-6
	W1-3
	XA10A3A/B

10
A10A1

Figure 8-41. RF Filters Schematic Diagram



NOTES

RANGE, MHz	BAND NO
0.5-1	B1
1-2	B2
2-4	B3
4-8	B4
8-16	B5
16-32	B6
32-64	B7
64-128	B8
128-256	B9
256-512	B10
512-1024	B11

- HB=UPPER FREQUENCY RANGE OF BANDS B5-11
- LB=LOWER FREQUENCY RANGE OF BANDS B5-11
- DIAGRAM SHOWN IN 0.5-1 MHz RANGE (B1)
- GND=LOGICAL HIGH
- OPEN OR NEGATIVE=LOGICAL LOW
- FREQUENCY RANGES NOMINAL

Figure 8-42. Simplified Logic Diagram of the Divider/Filter Assembly

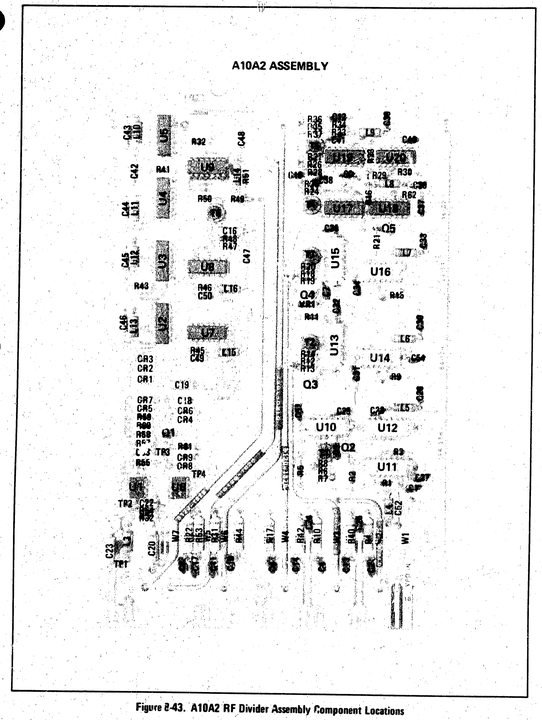


Figure 8-43. A10A2 RF Divider Assembly Component Locations

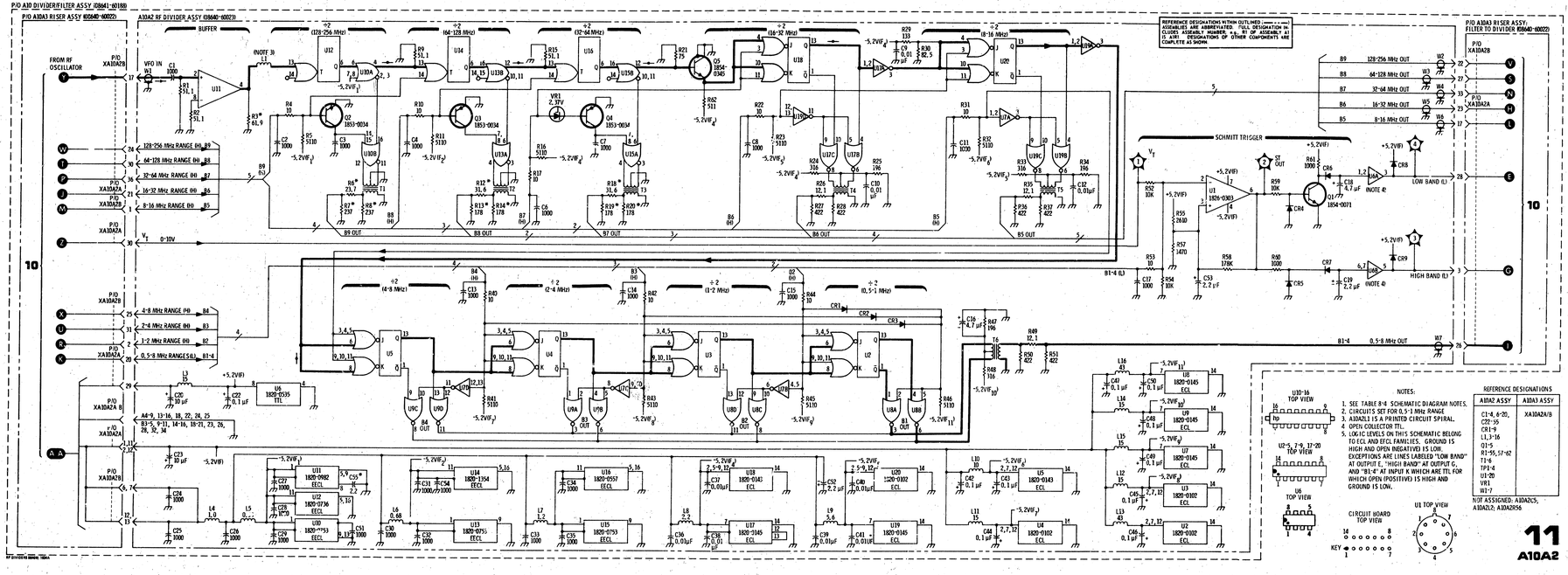


Figure 8-44. RF Dividers Schematic Diagrams

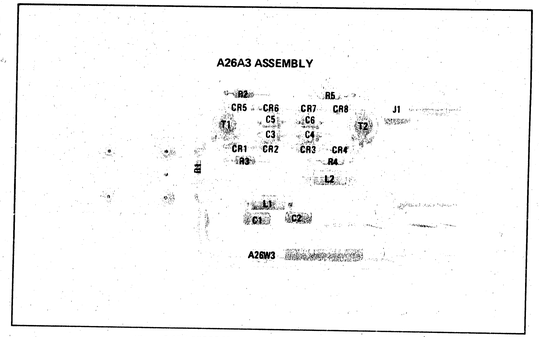


Figure 8-45. A26A3 Modulator Assembly Component Locations

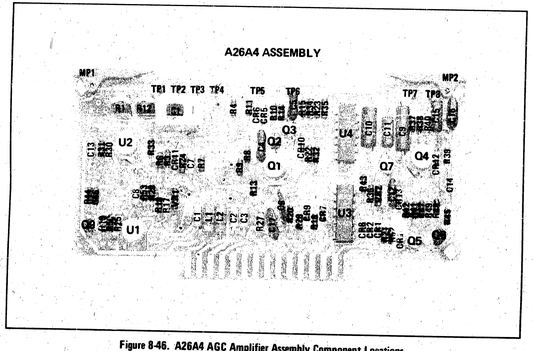


Figure 8-46. A26A4 AGC Amplifier Assembly Component Locations

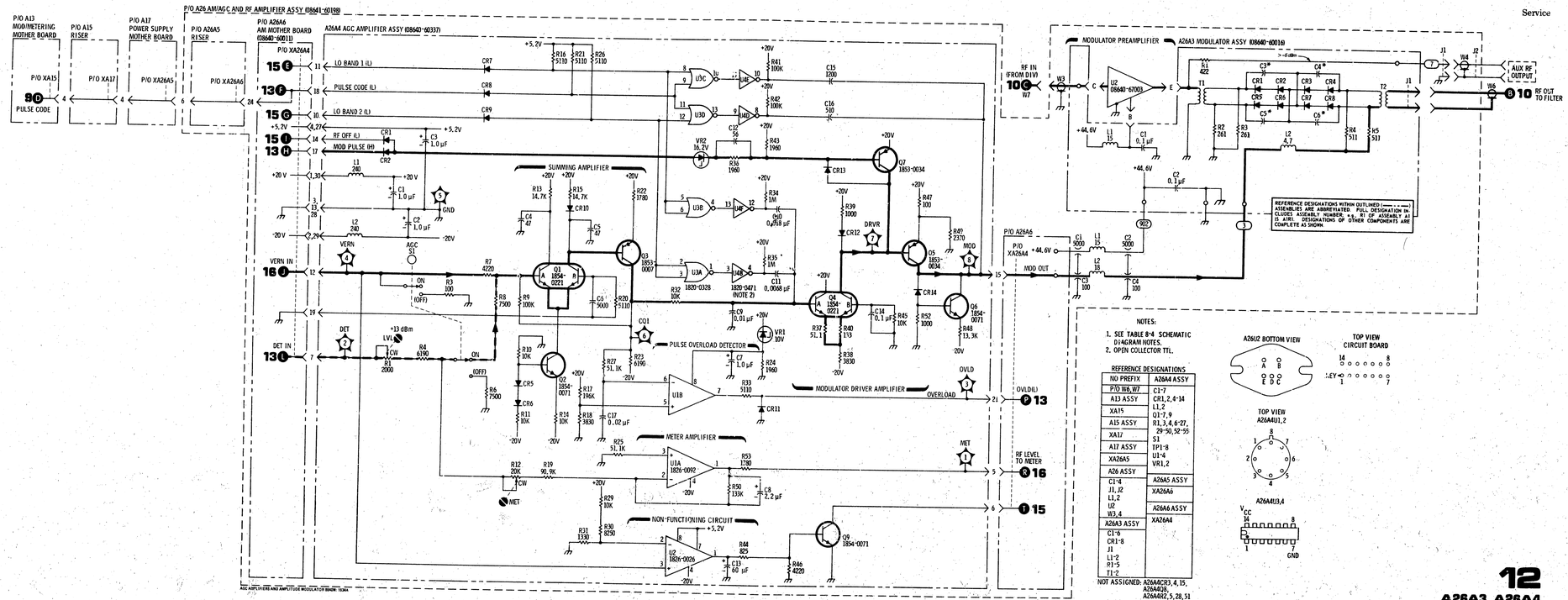


Figure 8-47. AGC Amplifiers and Amplitude Modulator Schematic Diagram

12
A26A3, A26A4

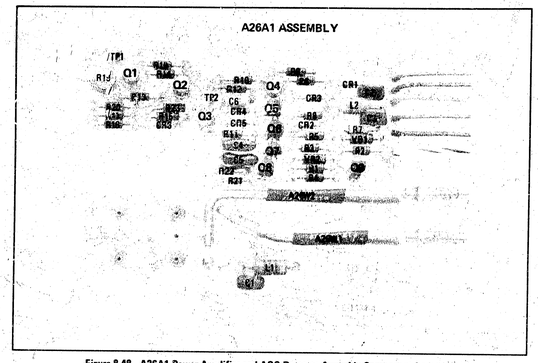


Figure 8-48. A26A1 Power Amplifier and AGC Detector Assembly Component Locations

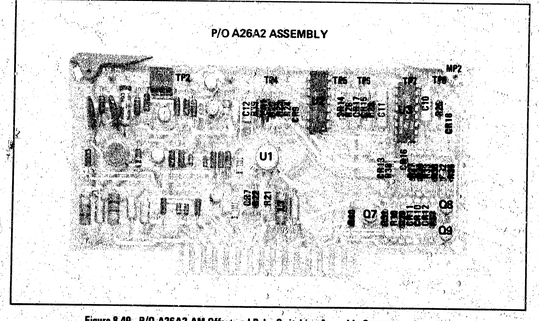
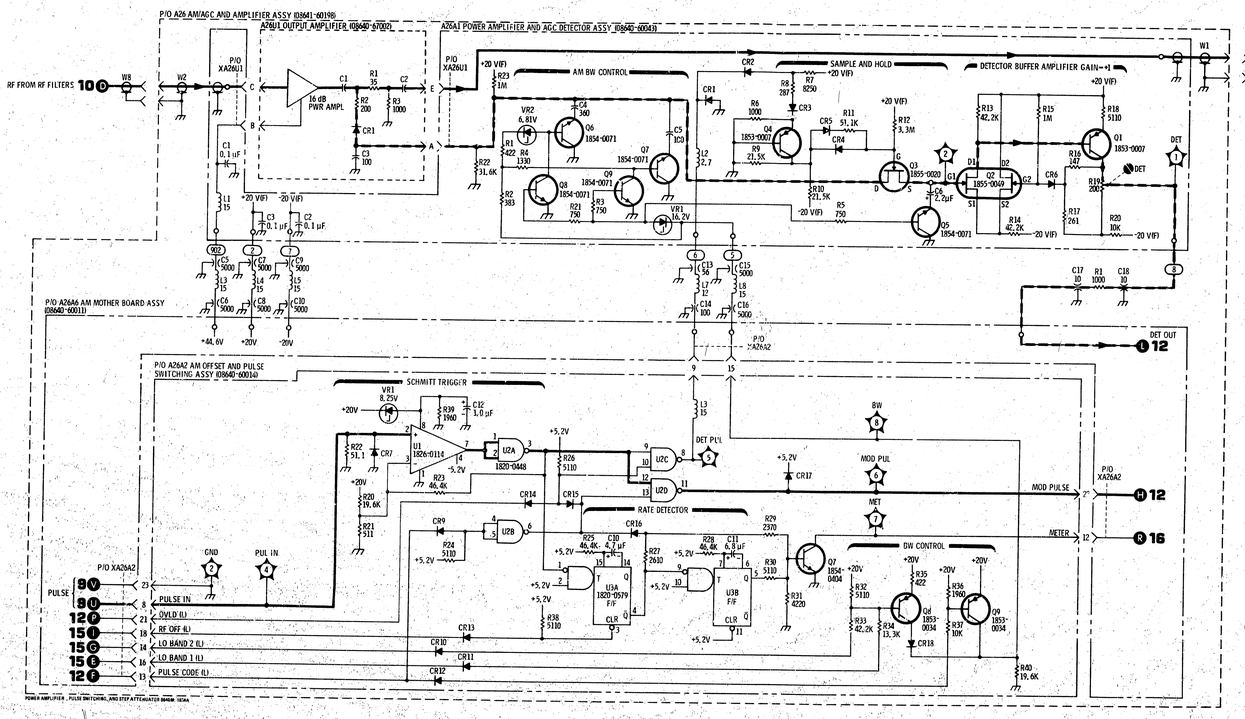
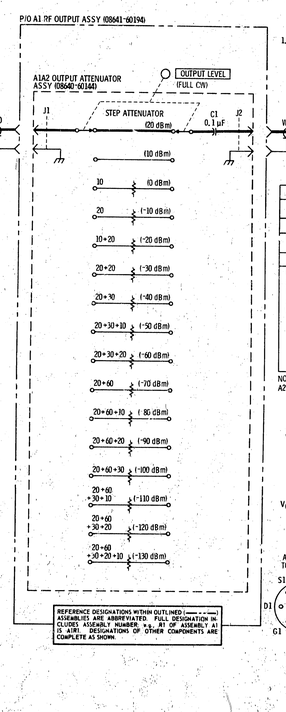


Figure 8-49. P/O A26A2 AM Offset and Pulse Switching Assembly Component Locations





NOTES:
1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.

REFERENCE DESIGNATIONS

NO PREFIX	A26A1 ASSY
W8, 10, 19	C1-6
A1A2 ASSY	CR1-6
C1, J1,2	L1,2
A26 ASSY	Q1-9
C5-10, 13-18	R1-23
L3-5, 7, 8	TP1,2
R1	VR1,2
U1	XA26U1
W1,2	A26A2 ASSY
	C10-12
	CR7,9-18
	L3
	Q7-9
	R20-40
	TP2, 4-8
	U1-3
	VR1

NOT ASSIGNED: A26C11, 12; A26L6; A26A2C9; A26A2CR5, 6, 8

A26A2U2 TOP VIEW

A26A2U3 TOP VIEW

A26A1 Q6 TOP VIEW

A26A2U1 TOP VIEW

Figure 8-50. RF Amplifier, Pulse Switching and Step Attenuators Schematic Diagram

SERVICE INFO

CON'T

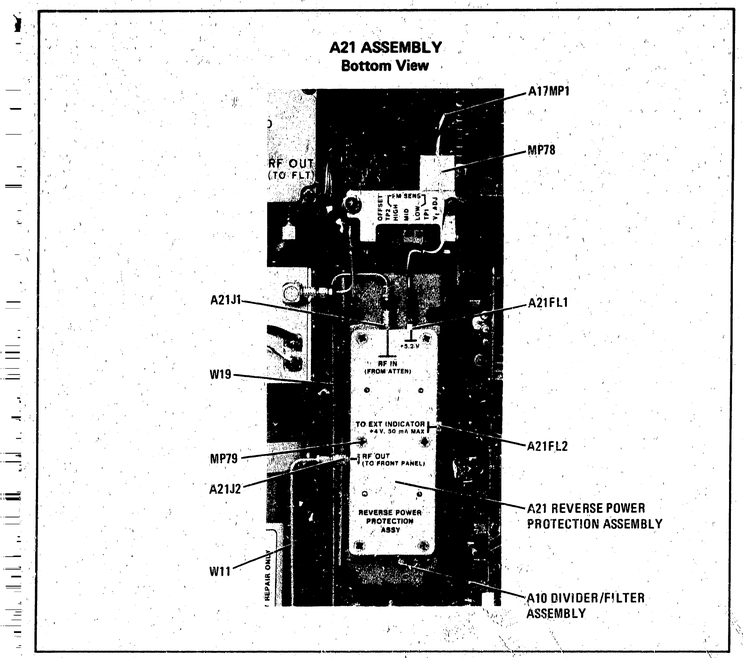


Figure 8-51. A21 Reverse Power Protection Assembly, Bottom View

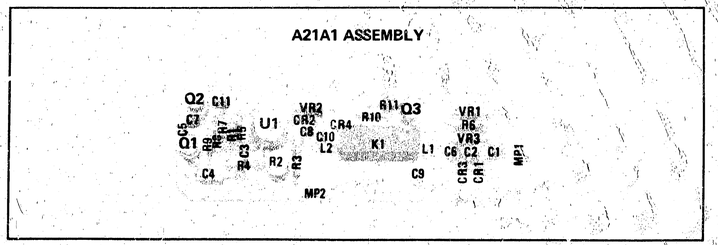


Figure 8-52. A21A1 Reverse Power Protection Board Assembly, Component Locations

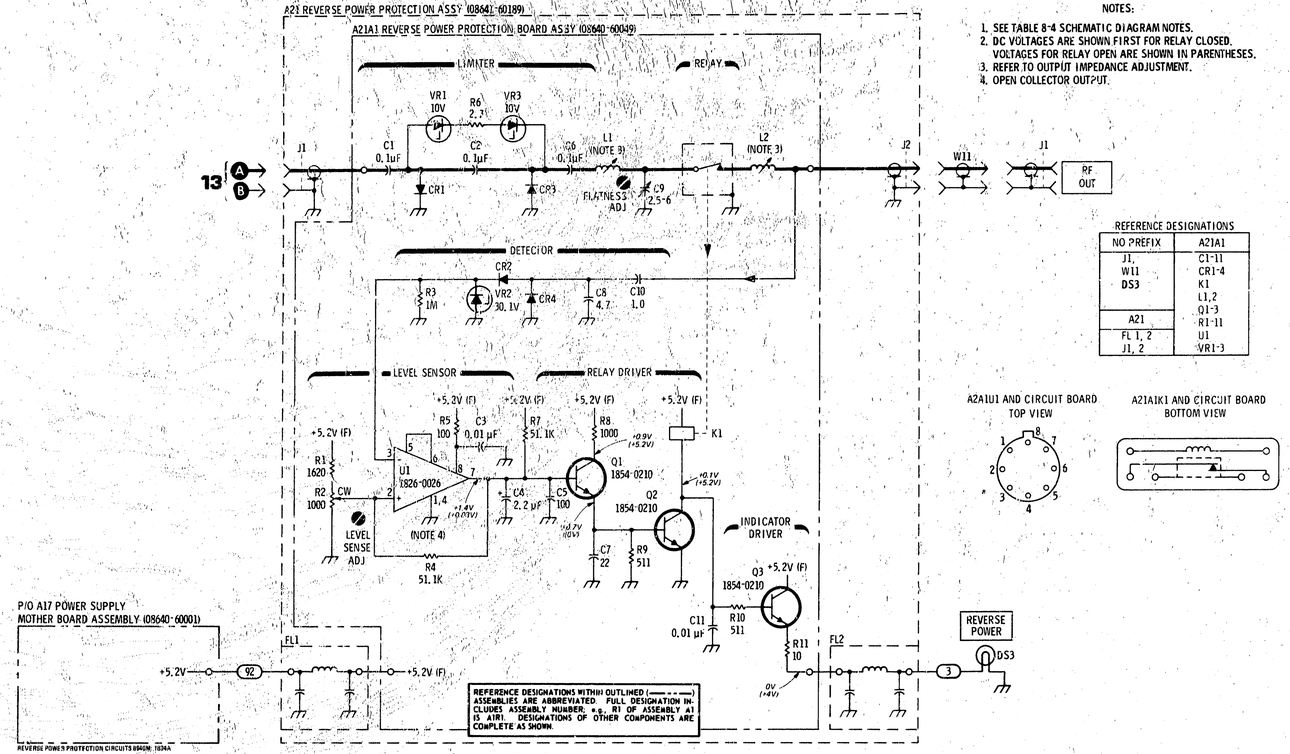


Figure 8-53. Reverse Power Protection Assembly Schematic Diagram

13B
A21, A21A1

P/O A26A2 ASSEMBLY

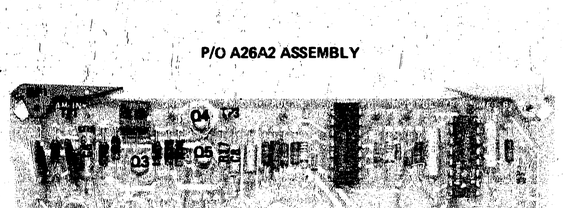
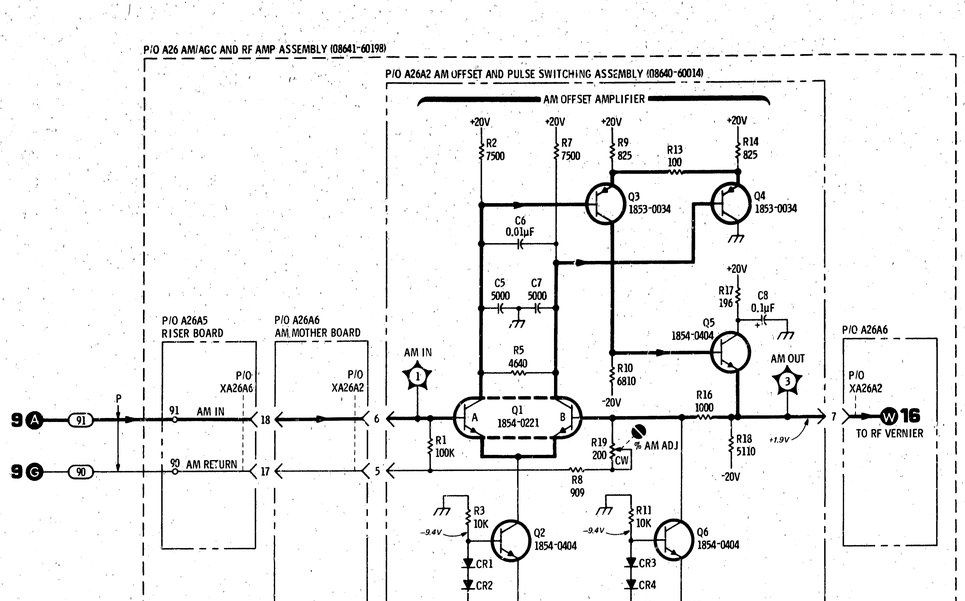


Figure 8-54. P/O A26A2 AM Offset and Pulse Switching Assembly Component Locations

A13

Component Locations for A13 Assembly are on Service Sheet 25.



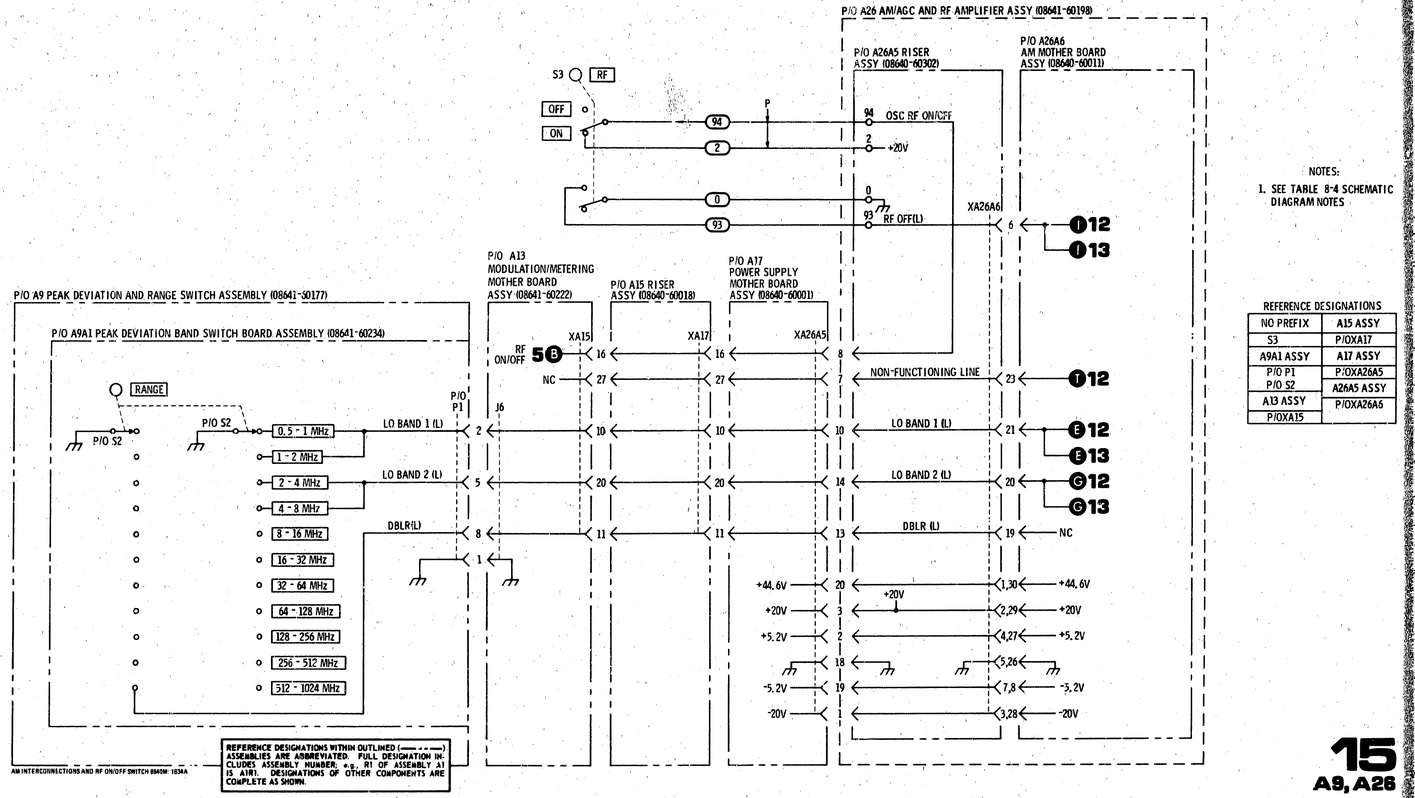
NOTES
1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.

REFERENCE DESIGNATIONS	
A26A2 ASSY	A26A5 ASSY
C1-8	P/O XA26A6
CR1-4	
L1,2	A26A6 ASSY
Q1-6	P/O XA26A2
R1-19	
TP1-3	

Figure 8-55. AM Preamplifier Schematic Diagram

A9A1

Component Locations for A9A1 Assembly are on Service Sheet 8.



REFERENCE DESIGNATIONS	
NO PREFIX	A15 ASSY
S3	P/OXA17
A9A1 ASSY	A17 ASSY
P/O P1 P/O S2	P/OXA26A5 A26A5 ASSY
A13 ASSY	P/OXA26A6
P/OXA15	

15
A9, A26

AM Interconnections and RF ON/OFF Switch Schematic Diagram

Figure 8-56. AM Interconnections and RF ON/OFF Switch Schematic Diagram

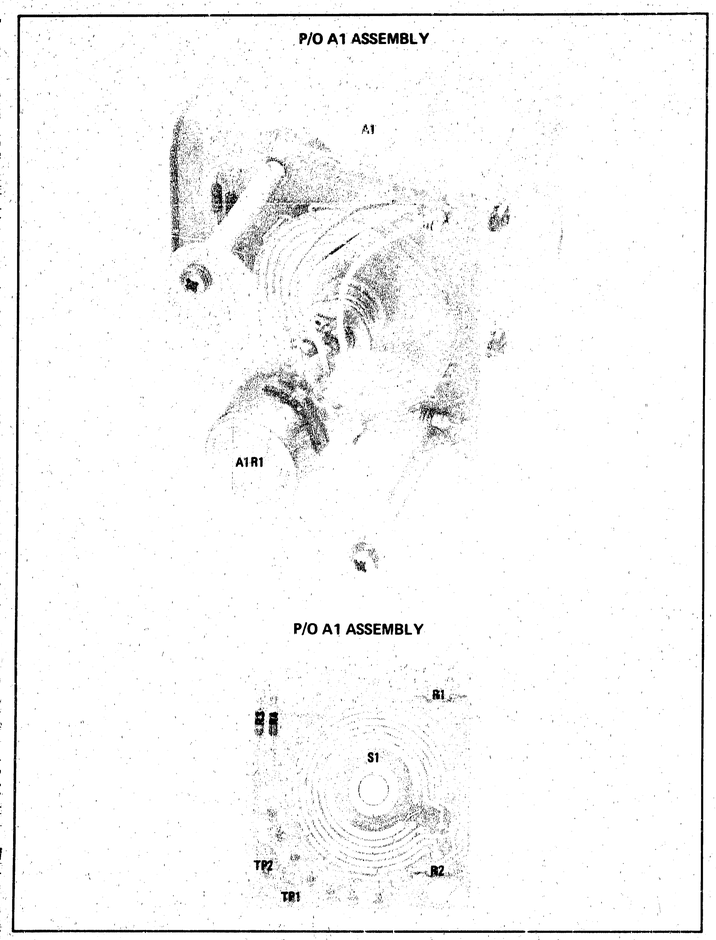


Figure 8-57. P/O A1 Output Range Assembly and A1A1 RF Vernier Component Locations

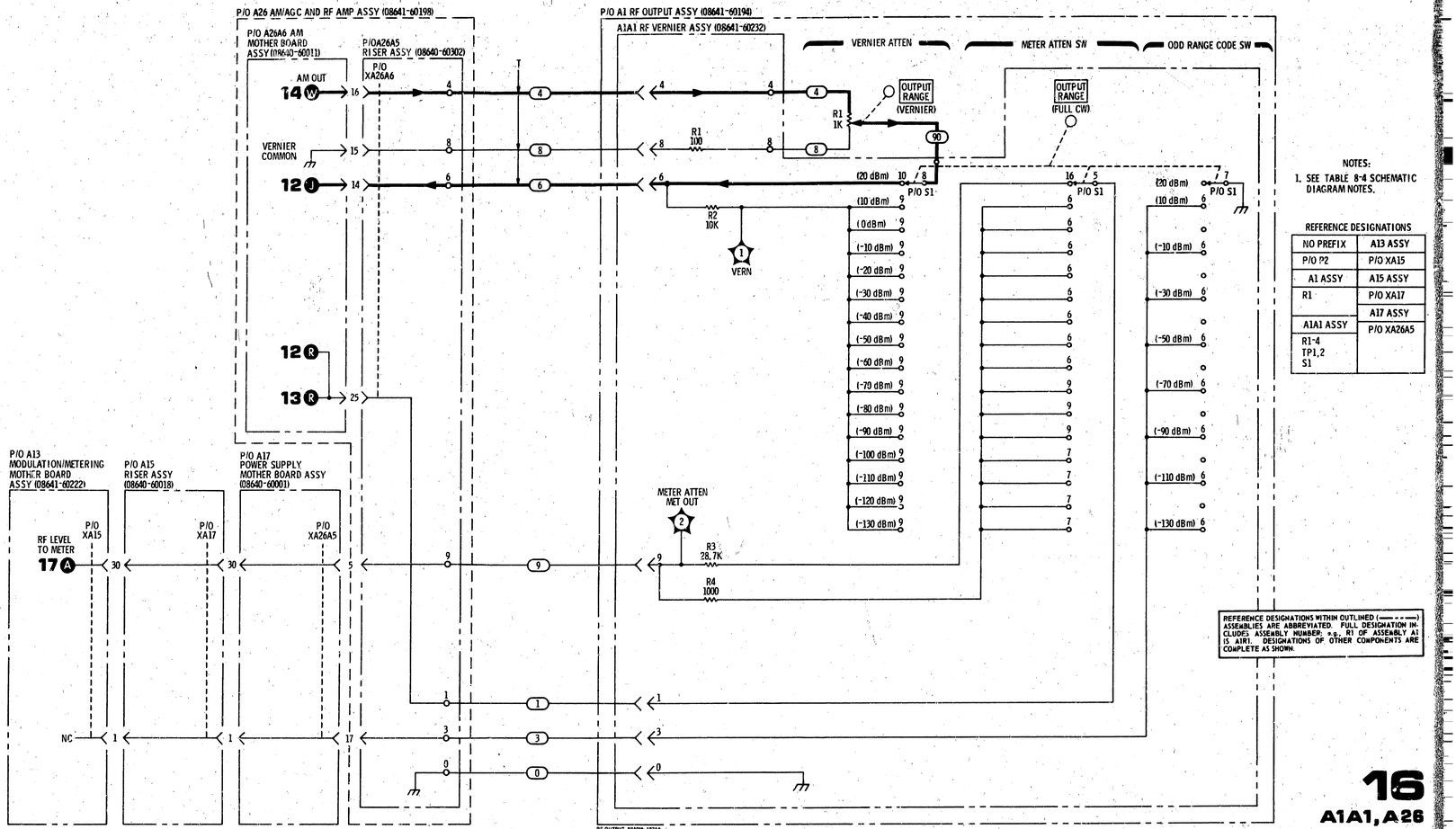


Figure 8-58. RF Vernier Schematic Diagram

A2 ASSEMBLY

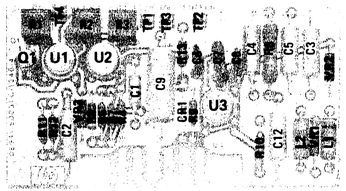
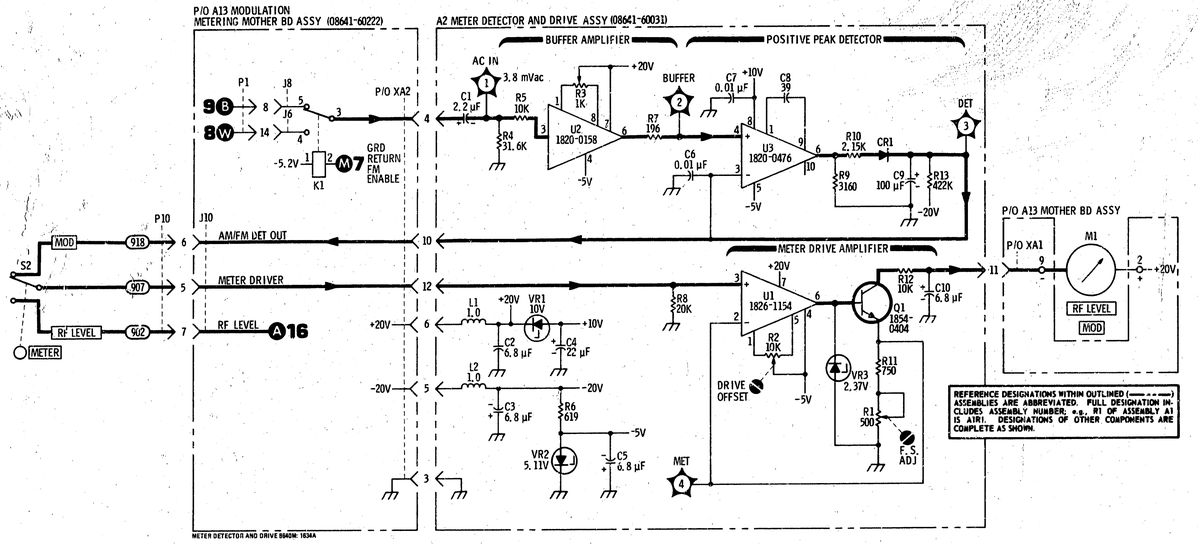


Figure 8-59. A2 Meter Detector and Drive Assembly Component Locations



REFERENCE DESIGNATIONS	
NO PREFIX	P/O A13 ASSY
M1	J6, 8, 10
P10	K1
S2	P1
A2 ASSY	XA1
C1-10	XA2
CR1	
L1, 2	
Q1	
R1-13	
TP1-3	
U1-3	
VR1-3	

17 A2

Figure 8-60. Meter Detector and Drive Schematic Diagram

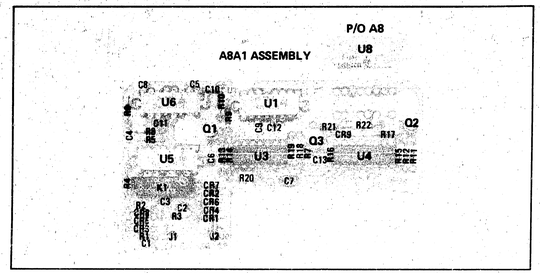


Figure 8-61. A8A1 RF Scaler Assembly Component Locations

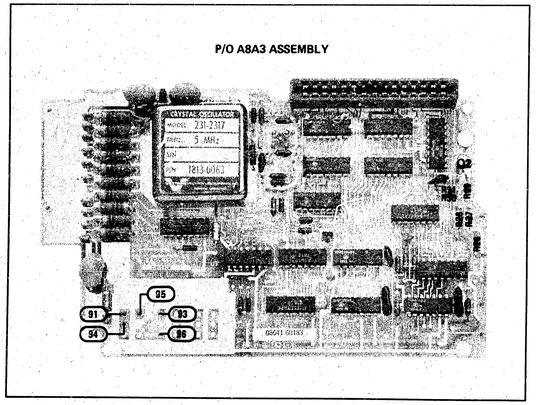
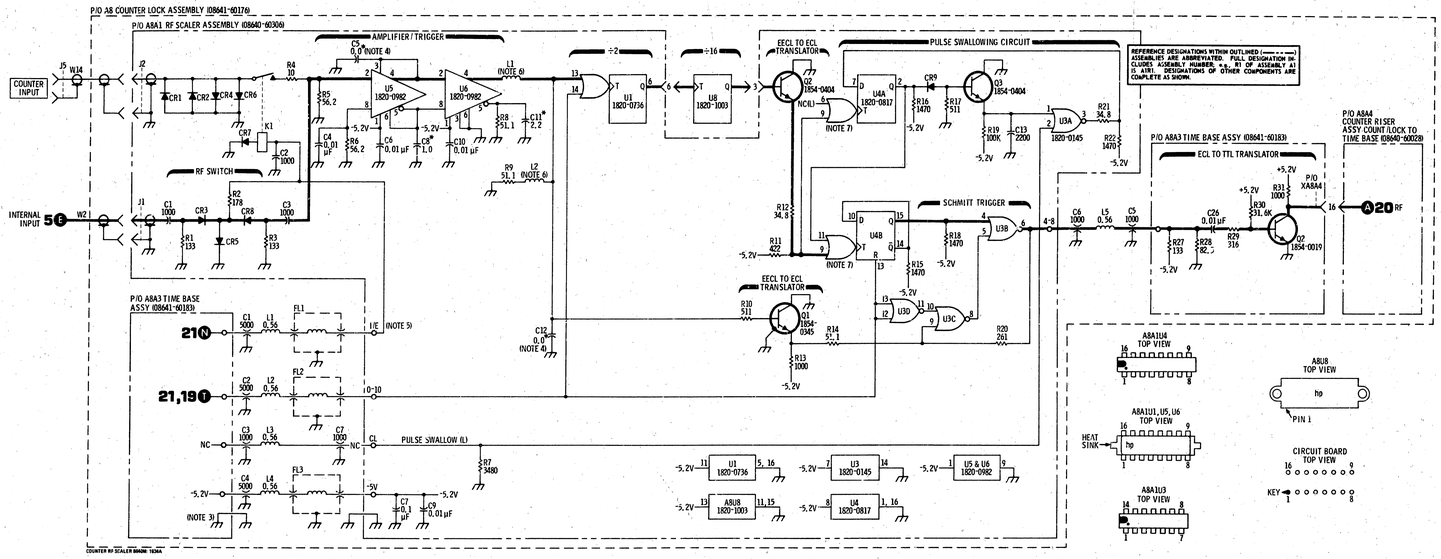


Figure 8-62. P/O A8A3 Time Base Assembly Component Locations



NOTES:

1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. V_{CC} AND GROUND DIAGRAMS FOR A8A1U1, 3-6 AND A8U8 SHOWN AT BOTTOM OF SCHEMATIC.
3. GROUND IS PROVIDED THROUGH MECHANICAL CONTACT WITH CASTING.
4. C5 AND C12 ARE TYPICALLY NOT PRESENT. REFER TO TABLE 5-1.
5. IN INTERNAL COUNT MODE THIS LINE IS AT -5.2V; IN EXTERNAL COUNT MODE THIS LINE IS AT +5.2V.
6. L1 & 2 ARE PRINTED CIRCUIT TRACES.
7. PIN 9 IS THE COMMON CLOCK INPUT FOR U4A AND U4B.

REFERENCE DESIGNATIONS

NO PREFIX	A8A1 ASSY
J5 P/O W2 W14	C1-13 CR1-9 J1, 2 K1
A8 ASSY	L1,2
C1-7 FL1-3 L1-5 U8	Q1-3 R1-22 U1,3-6
	A8A3 ASSY
	C26 Q2 R27-31 P/O A8J2

NOT ASSIGNED: A8A1U2

Figure 8-63. Counter RF Scaler Schematic Diagram

P/O A8A3 ASSEMBLY

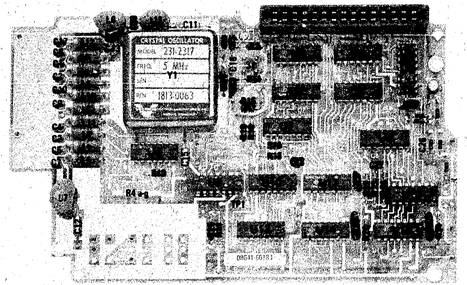
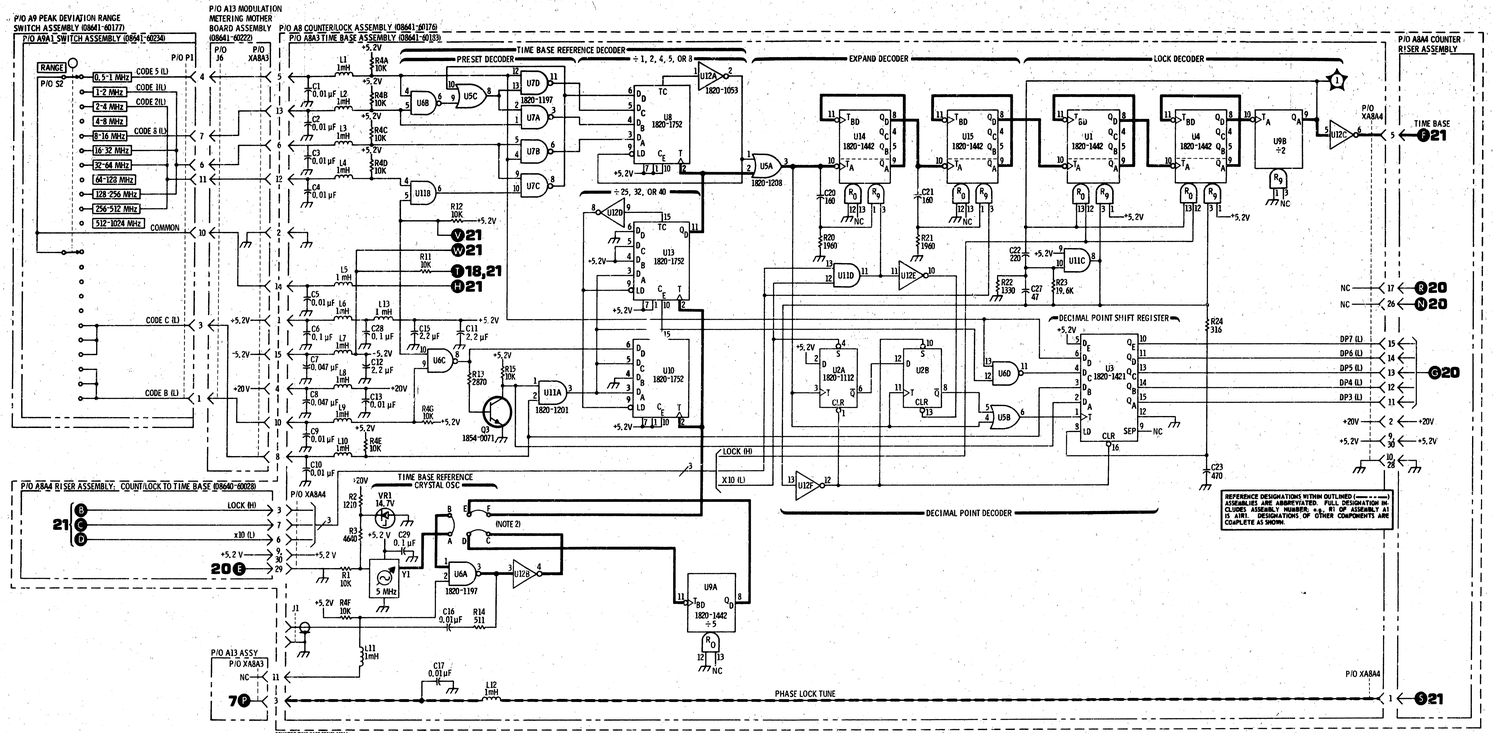


Figure 8-64. P/O A8A3 Time Base Assembly Component Locations

A9A1

Component Locations for A9A1 Assembly are on Service Sheet 8.



NOTES:

1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES

2.

RANGE	CODES (LOW-TRUE)	TIME BASE* PS(ms)	PRF(Hz)	DECIMAL POINT
0.5-1 MHz	A5	12.5	80	5
1-2 MHz	A1	2.5	400	4
2-4 MHz	A2	5.0	200	4
4-8 MHz	A4	10.0	100	4
8-16 MHz	A8	20.0	50	4
17-32 MHz	C1	4.0	250	3
32-64 MHz	C2	8.0	125	3
64-128 MHz	C4	16.0	62.5	3
128-256 MHz	B1	3.2	312.5	2
256-512 MHz	B2	6.4	156.25	2
512-1024 MHz	B4	12.8	78.125	2

TIME BASE: COUNT, LOCK — 1% OF PS — 0.5µS — PS

*PRF(Hz) SHOWN FOR LOCK MODE. PRF(Hz) FOR COUNT MODE IS 1% LESS THAN THAT SHOWN.

REFERENCE DESIGNATIONS

P/O A8 ASSY	P/OA9A1 ASSY.
P/O A8A4	P/O P1 P/O S2
P/O A8A3 ASSY	P/O A13 ASSY.
C1-13, 15-17 C20-23, 27, 29 J1 L1-13 Q3 R1-3, 11-15, 20-24 TP1 U1-15 VR1 XA8A4 Y1	J6 XA8A3

NOT ASSIGNED: A8A3R5-10

A8A3U1, 2, 4-7 9, 11, 12, 14, 15 TOP VIEW

A8A3U3 TOP VIEW

A8A3R4 A-G TOP VIEW

A8A3U8, 10, 13 TOP VIEW

CIRCUIT BOARD TOP VIEW

Figure 8-65. Counter Time Base Schematic Diagram

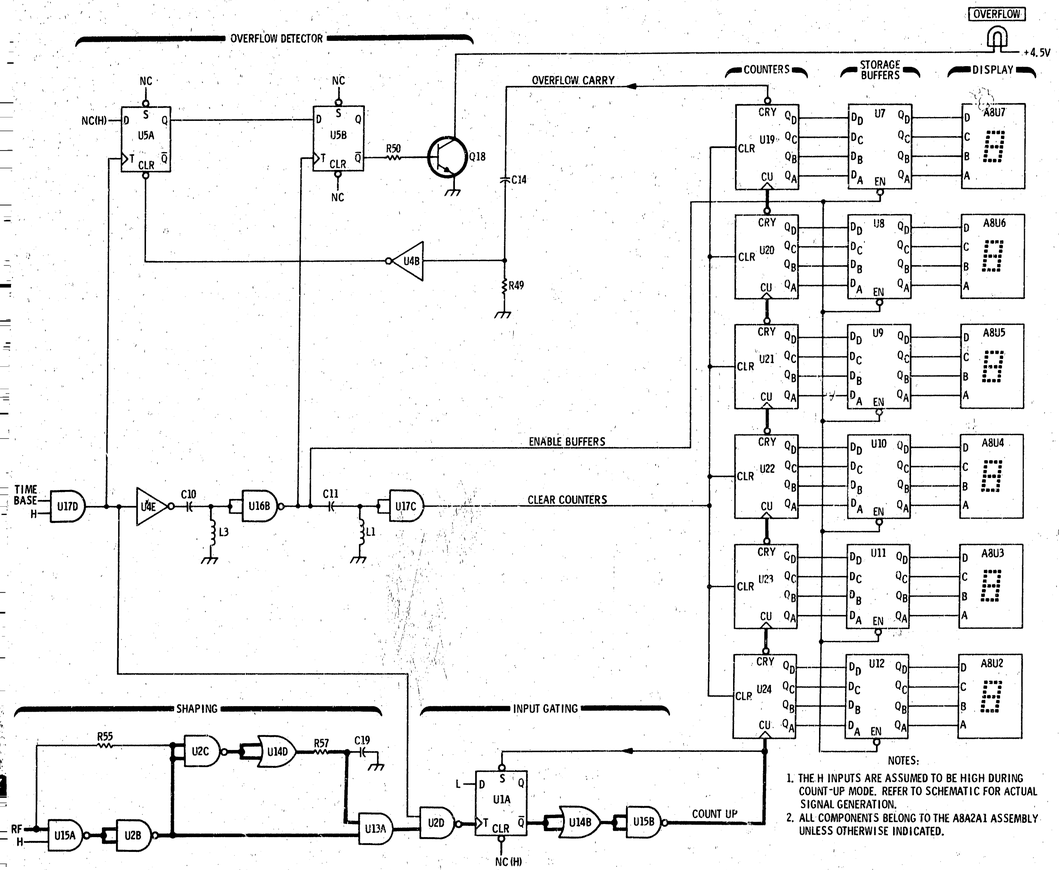


Figure 8-66. Up Counter (Count-up Mode) Simplified Diagram

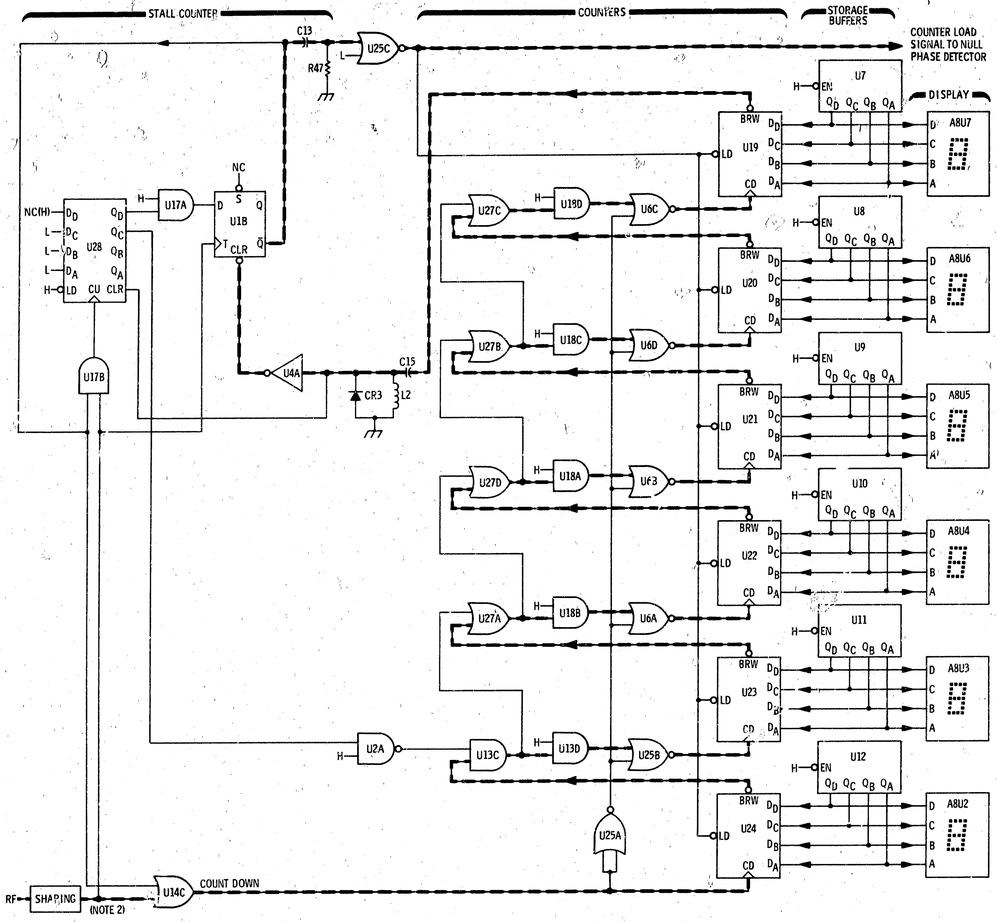


Figure 8-67. Down Counter (Count-down Mode) Simplified Diagram

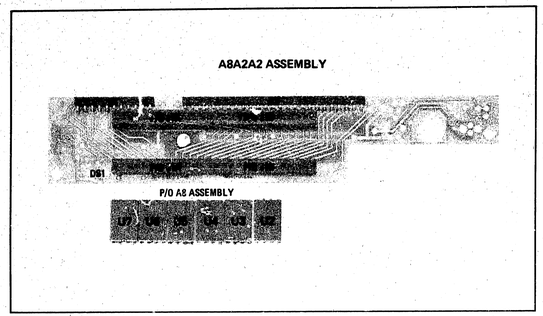


Figure 8-68. A8A2A2 Counter Display Assembly Component Locations

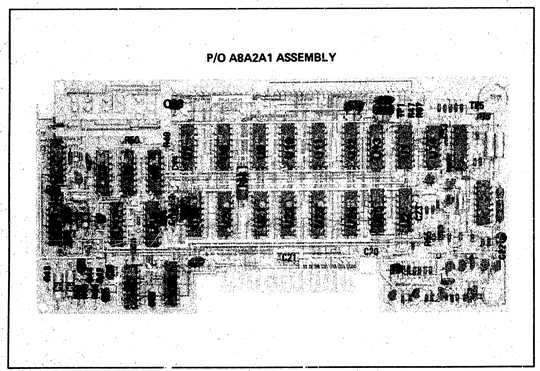
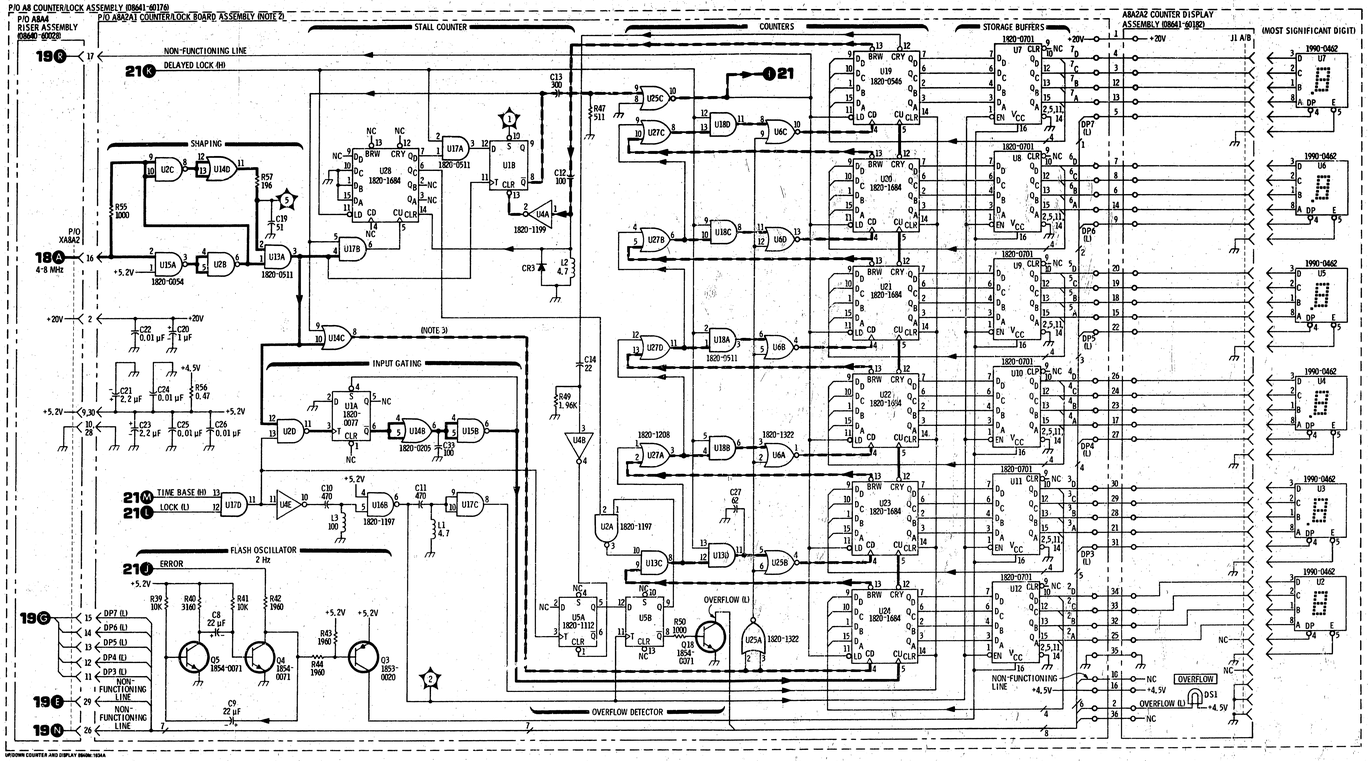


Figure 8-69. P/O A8A2A1 Counter/Lock Board Assembly Component Locations



NOTES:
1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. A8A2A1 IS ONLY REPLACEABLE AS A8A2 08641-60196 WHICH INCLUDES THE A8A2A2 COUNTER DISPLAY ASSEMBLY.
3. HEAVY DASHED LINE WITH ARROWS (►►►►) INDICATES COUNT DOWN/PHASE LOCK SIGNAL FLOW.

REFERENCE DESIGNATIONS

A8 ASSY	A8A2A1 ASSY
U2-7	C8-14, 19-27, 33
A8A4 ASSY	CR3
P/O XA8A2	L1-3
	Q3-5, 18
A8A2A2 ASSY	R39-44, 47, 49
	R90, 55-57
DS1	TP1, 2, 5
	U1, 2, 4-25
	U27, 28

NOT ASSIGNED: A8A2A1: C28, C29, C30
A8A2A1: R45, R46, R48

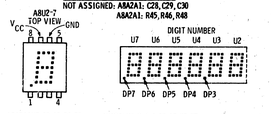


Figure 8-70. Up/Down Counter and Display Schematic Diagram

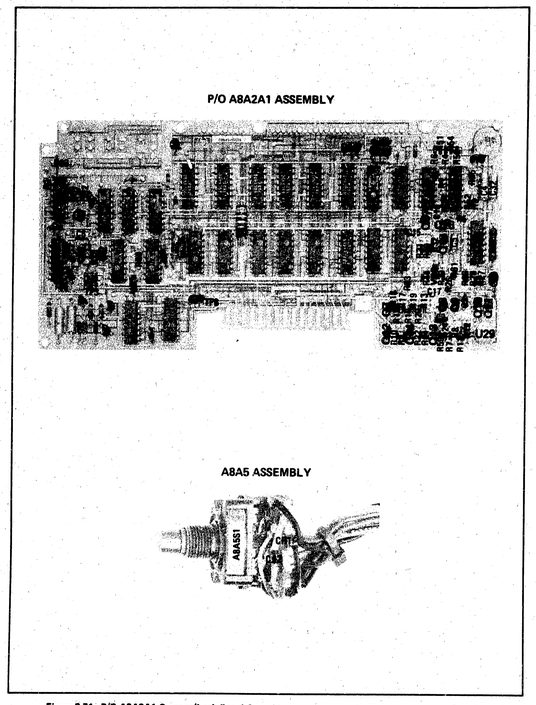
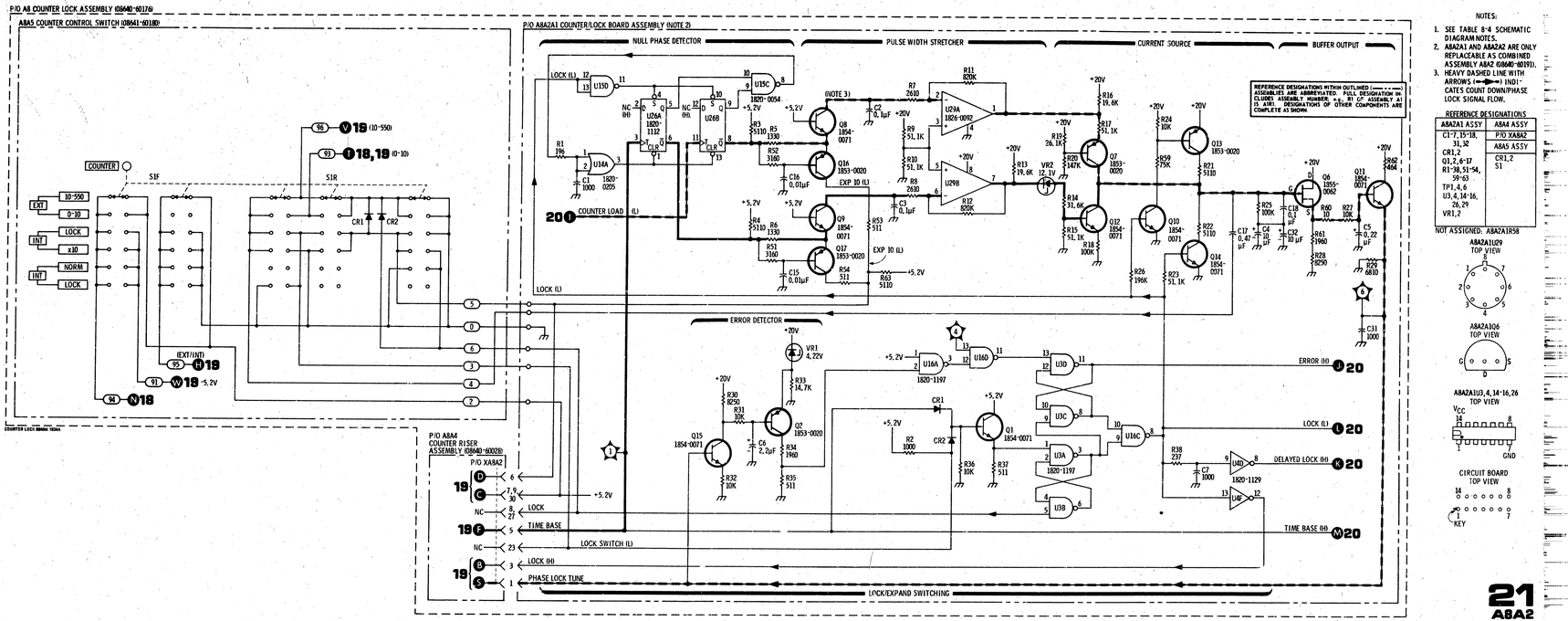


Figure 8-71. P/O A8A2A1 Counter/Lock Board Assembly and A8A5 Counter Switch Component Locations



NOTES:

1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. A8A2A1 AND A8A2A2 ARE ONLY REPLACEABLE AS COMBINED ASSEMBLY A8A2 (08640-60191).
3. HEAVY DASHED LINE WITH ARROWS (⟷) INDICATES COUNT DOWN/PHASE LOCK SIGNAL FLOW.

REFERENCE DESIGNATIONS

A8A2A1 ASSY	A8A4 ASSY
C1-7, 15-18, 31, 32	P/O XA8A2
CR1, 2	A8A5 ASSY
Q1,2,4-17	CR1, 2
R1-38, 51-54, 59-63	S1
TP1, 4, 6	
U3, 4, 14-16, 26, 29	
VR1, 2	

NOT ASSIGNED: A8A2A1R58

A8A2A1U29 TOP VIEW

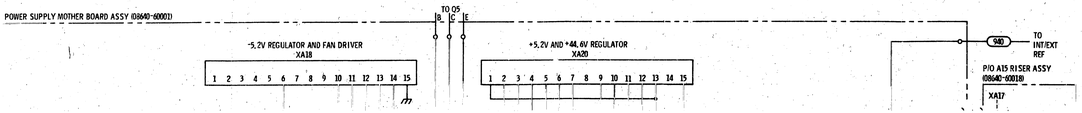
A8A2A1U6 TOP VIEW

A8A2A1U3, 4, 14-16, 26 TOP VIEW

CIRCUIT BOARD TOP VIEW

KEY

Figure 8-72. Counter Phase Lock Circuits Schematic Diagram



Service

Model 8640M

A12 ASSEMBLY

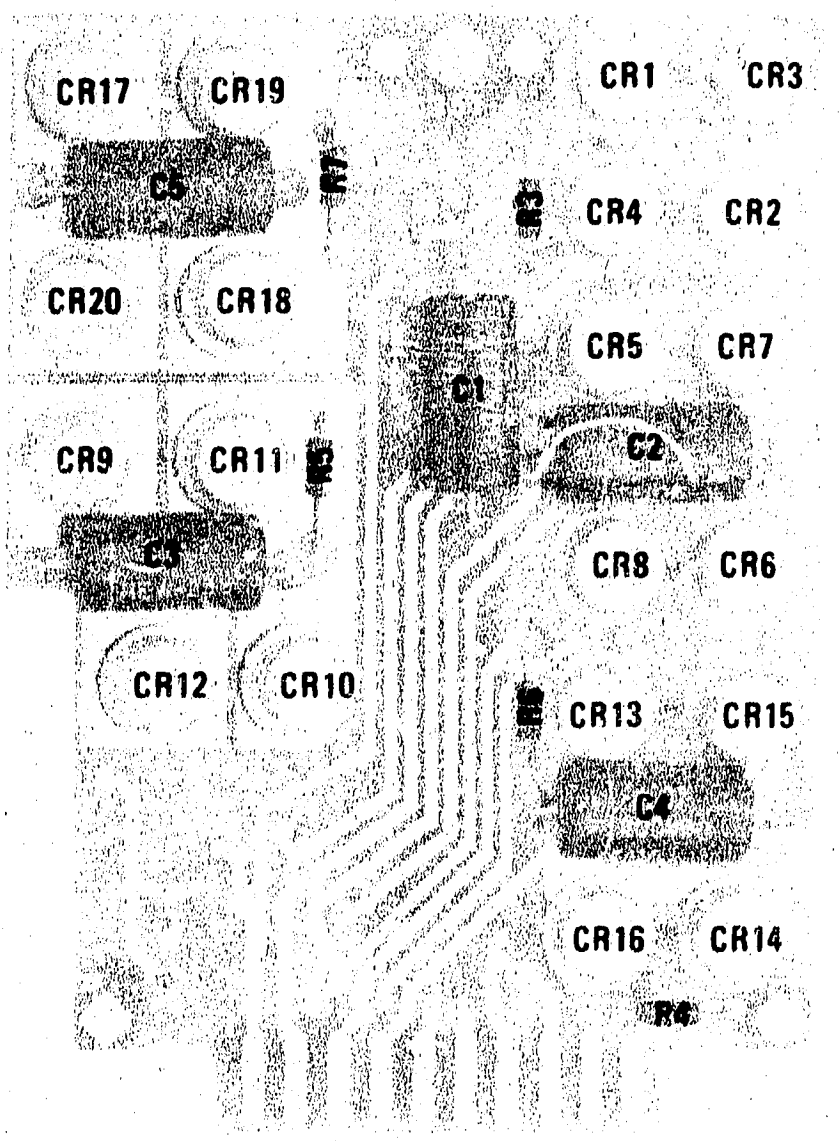


Figure 8-73. A12 Rectifier Assembly Component Locations

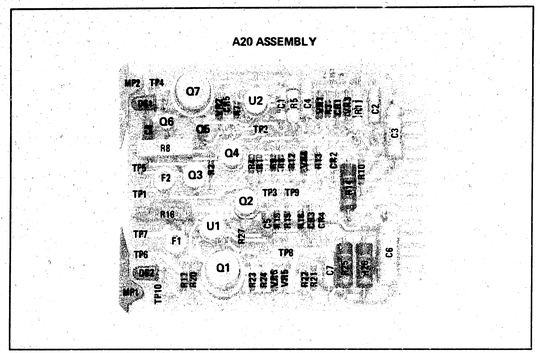


Figure 8-74. A20 +5.2 and +44.6V Regulator Assembly Component Locations

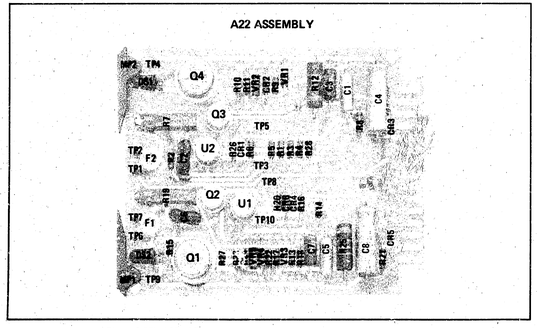
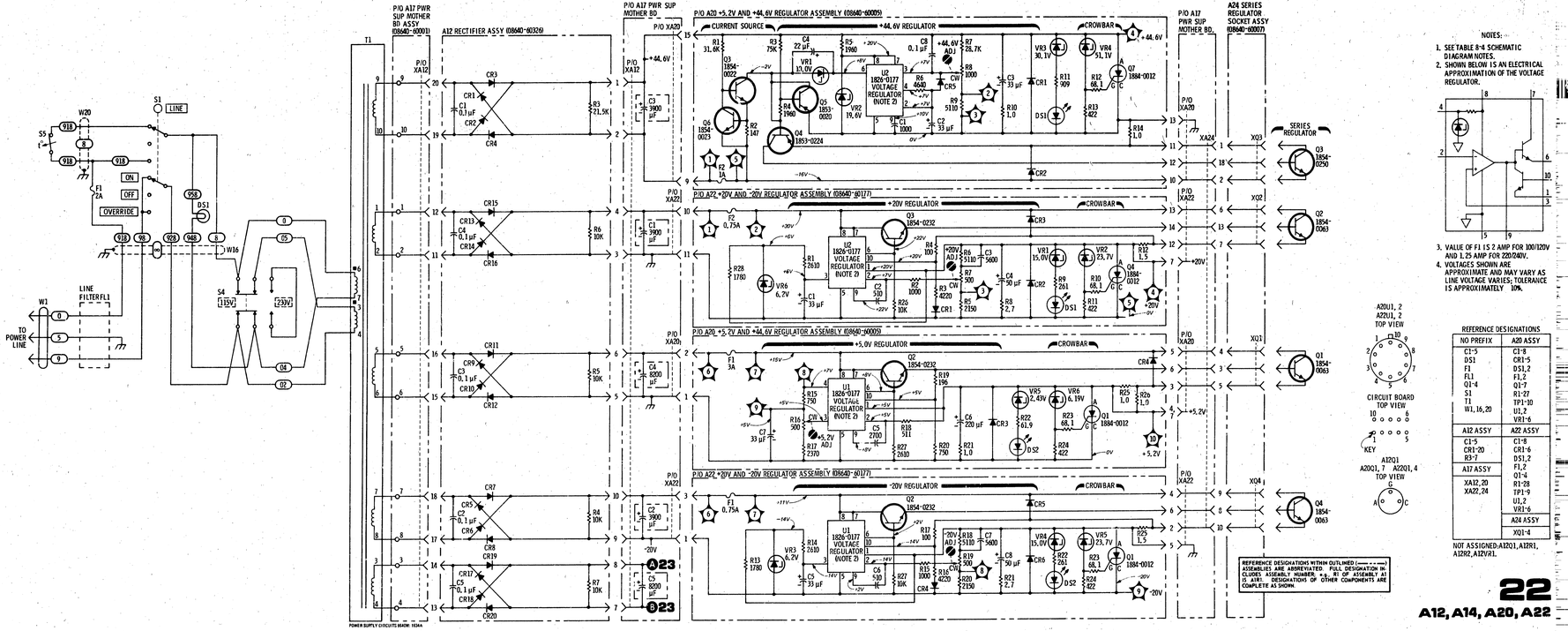


Figure 8-75. A22 +20V and –20V Regulator Assembly Component Locations



NOTES:

1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. SHOWN BELOW IS AN ELECTRICAL APPROXIMATION OF THE VOLTAGE REGULATOR.

3. VALUE OF F1 IS 2 AMP FOR 100/120V AND 1.25 AMP FOR 220/240V.
4. VOLTAGES SHOWN ARE APPROXIMATE AND MAY VARY AS LINE VOLTAGE VARIES; TOLERANCE IS APPROXIMATELY 10%.

A20U1, 2
A22U1, 2
TOP VIEW

CIRCUIT BOARD TOP VIEW

KEY

A12Q1
A20Q1, 7 A22Q1, 4
TOP VIEW

REFERENCE DESIGNATIONS	
NO PREFIX	A20 ASSY
C1-5	C1-8
DS1	CR1-5
F1	DS1,2
FL1	F1,2
Q1-4	Q1-7
S1	R1-27
T1	TP1-10
W1, 16, 20	U1,2
	VR1-6
A12 ASSY	A22 ASSY
C1-5	C1-8
CR1-20	CR1-6
R3-7	DS1,2
A17 ASSY	F1,2
XA12, 20	Q1-4
XA22, 24	R1-28
	TP1-9
	U1,2
	VR1-6
	A24 ASSY
	XQ1-4

NOT ASSIGNED-A12Q1, A12R1, A12R2, A12VR1.

Figure 8-76. Power Supply Circuits Schematic Diagram

A18 ASSEMBLY

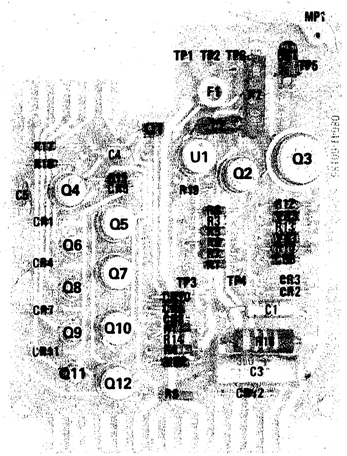
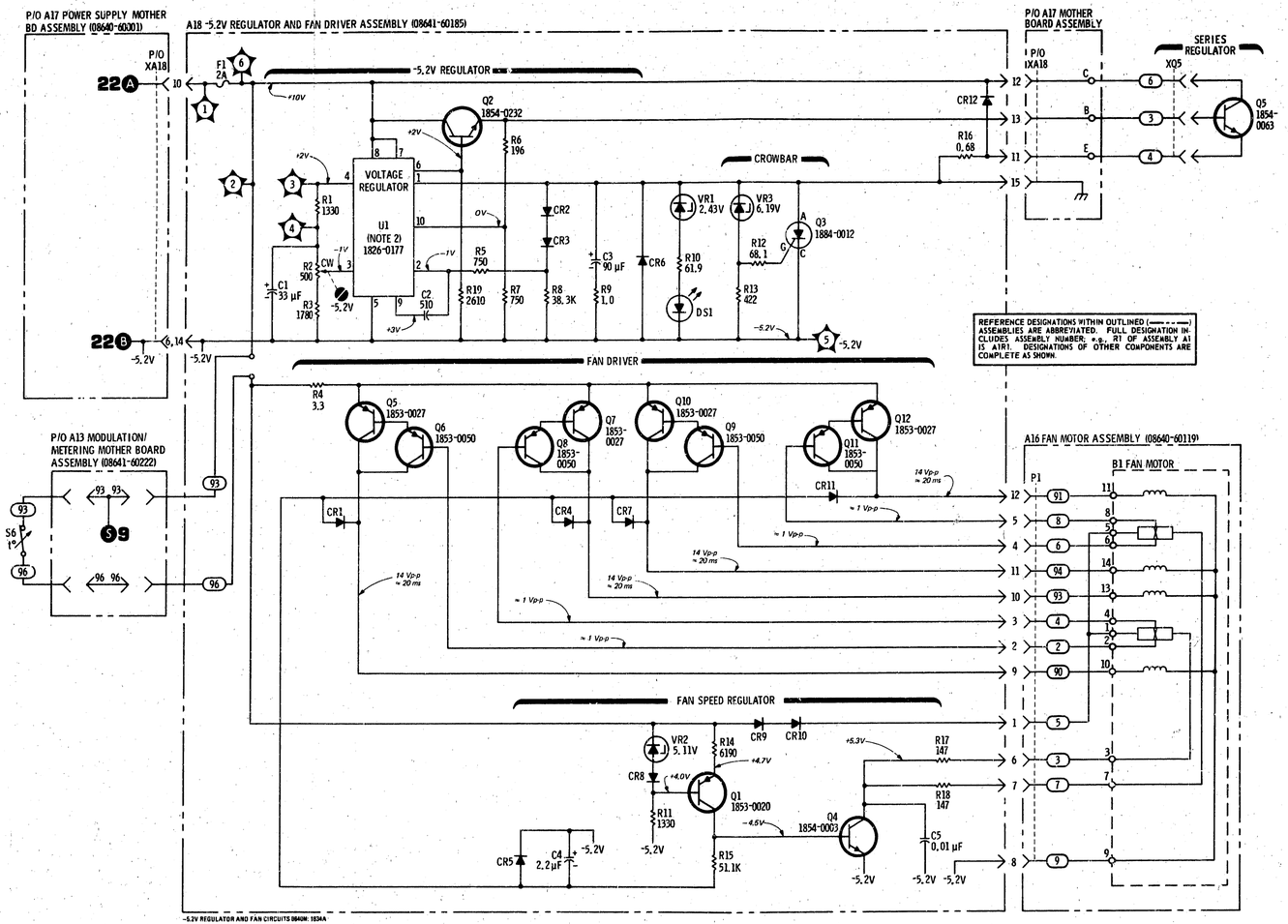


Figure 8-77. A18 –5.2V Regulator and Fan Driver Assembly Component Locations

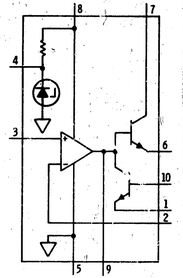


-5.2V REGULATOR AND FAN CIRCUITS 8640M: 1834A

Figure 8-78. –5.2V Regulator and Fan Circuits Schematic Diagram

NOTES:

1. SEE TABLE 8-4 SCHEMATIC DIAGRAM NOTES.
2. SHOWN BELOW IS AN ELECTRICAL APPROXIMATION OF THE VOLTAGE REGULATOR.



REFERENCE DESIGNATIONS

NO PREFIX	A18 ASSY
Q5	C1-5
S6	CR1-12
XQ5	DS1
	F1
A16 ASSY	Q1-12
B1	R1-19
P1	TP1-6
A17 ASSY	U1
XA18	VR1-3

CIRCUIT BOARD TOP VIEW

A18U1 TOP VIEW

A18Q3 TOP VIEW

A17 ASSEMBLY

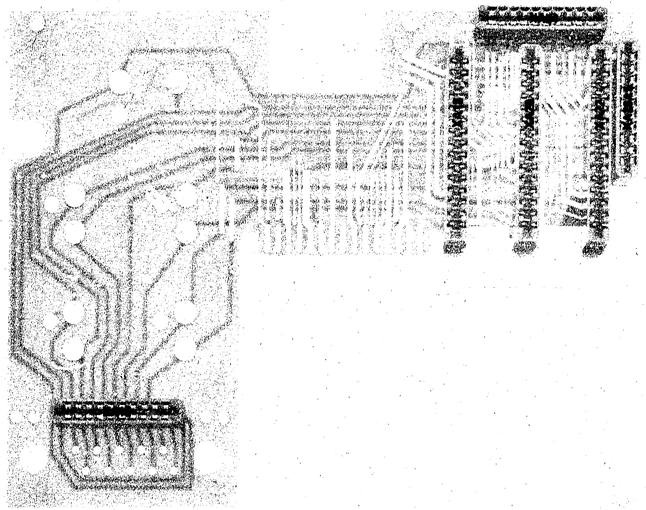


Figure 8-79. A17 Power Supply Mother Board Assembly Component Locations

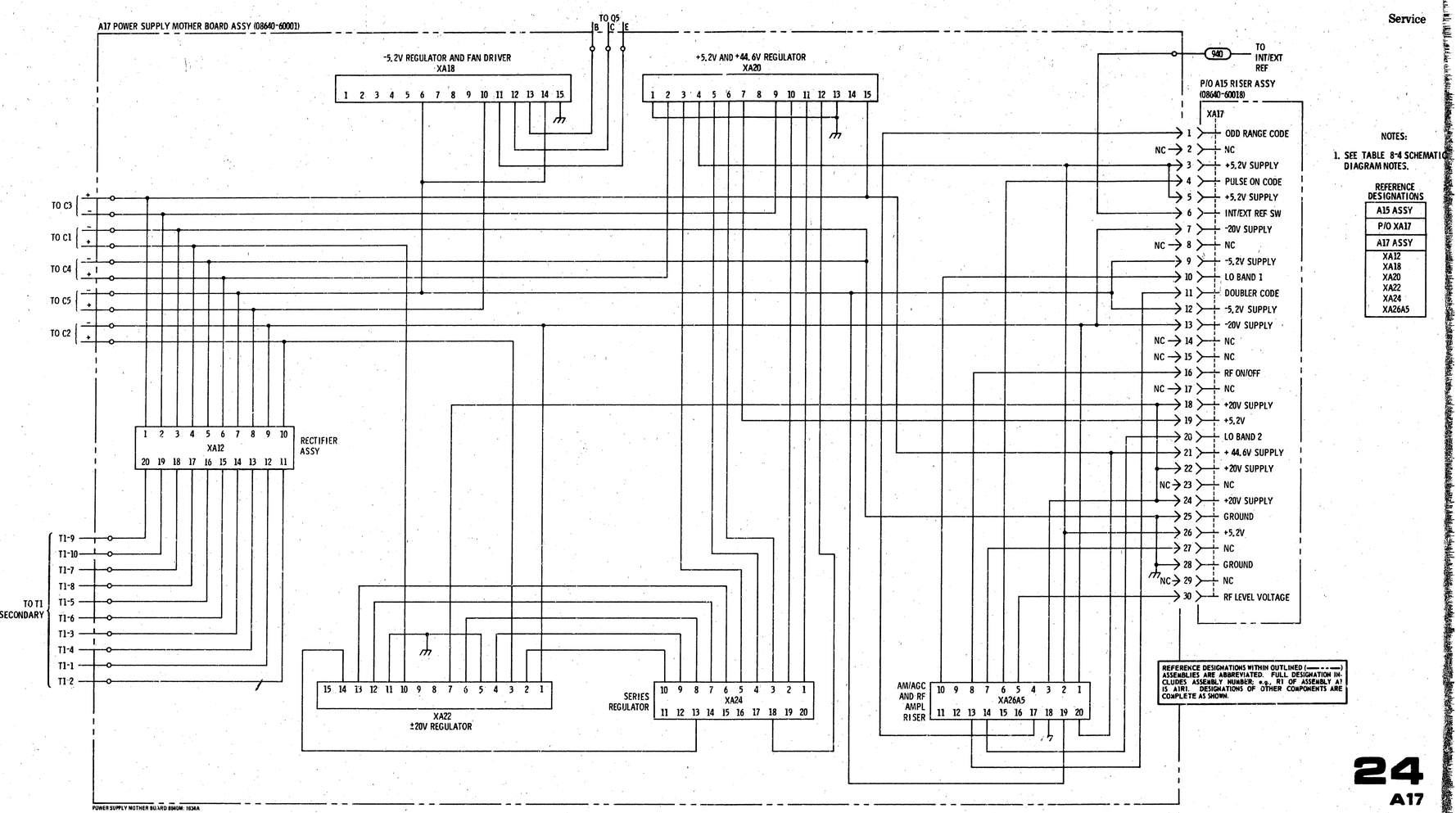


Figure 8-80. Power Supply Mother Board Interconnection Diagram

24
A17

A13 ASSEMBLY
Bottom View

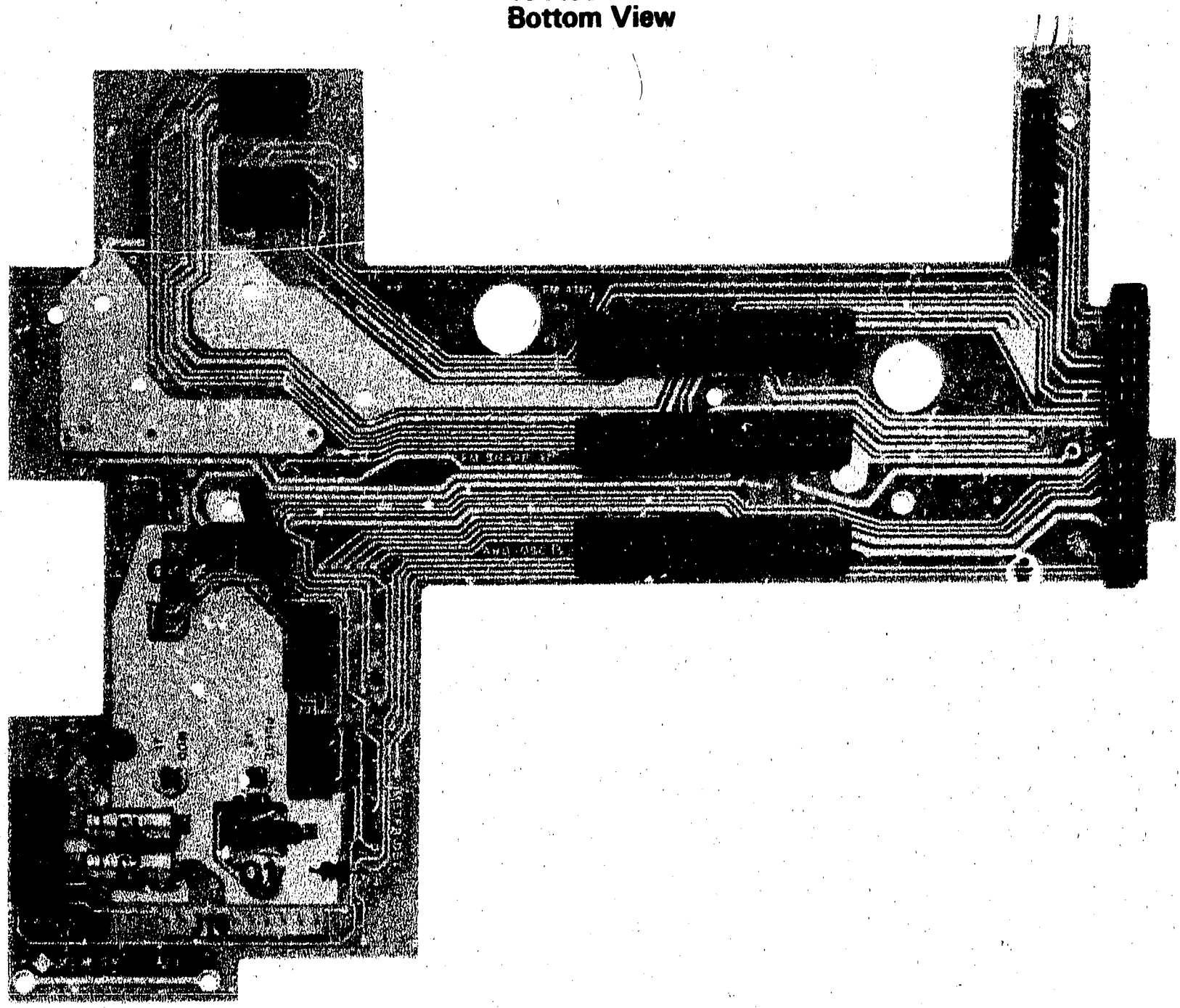


Figure 8-81. A13 Modulation/Metering Mother Board Assembly Component Locations (Bottom View)

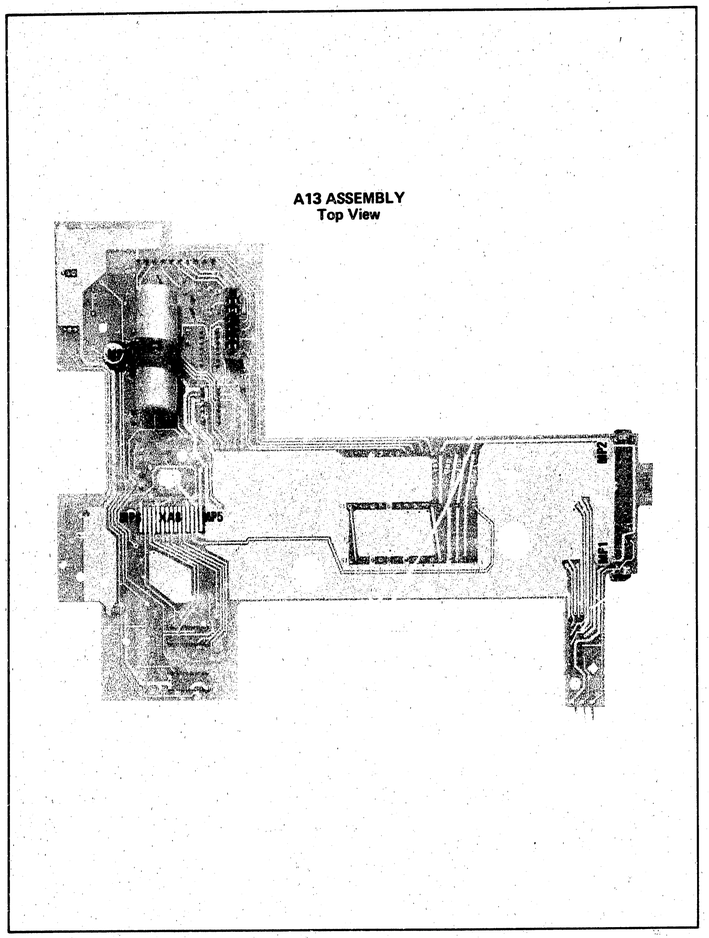


Figure 8-82. A13 Modulation/Metering Mother Board Assembly Component Locations (Top View)

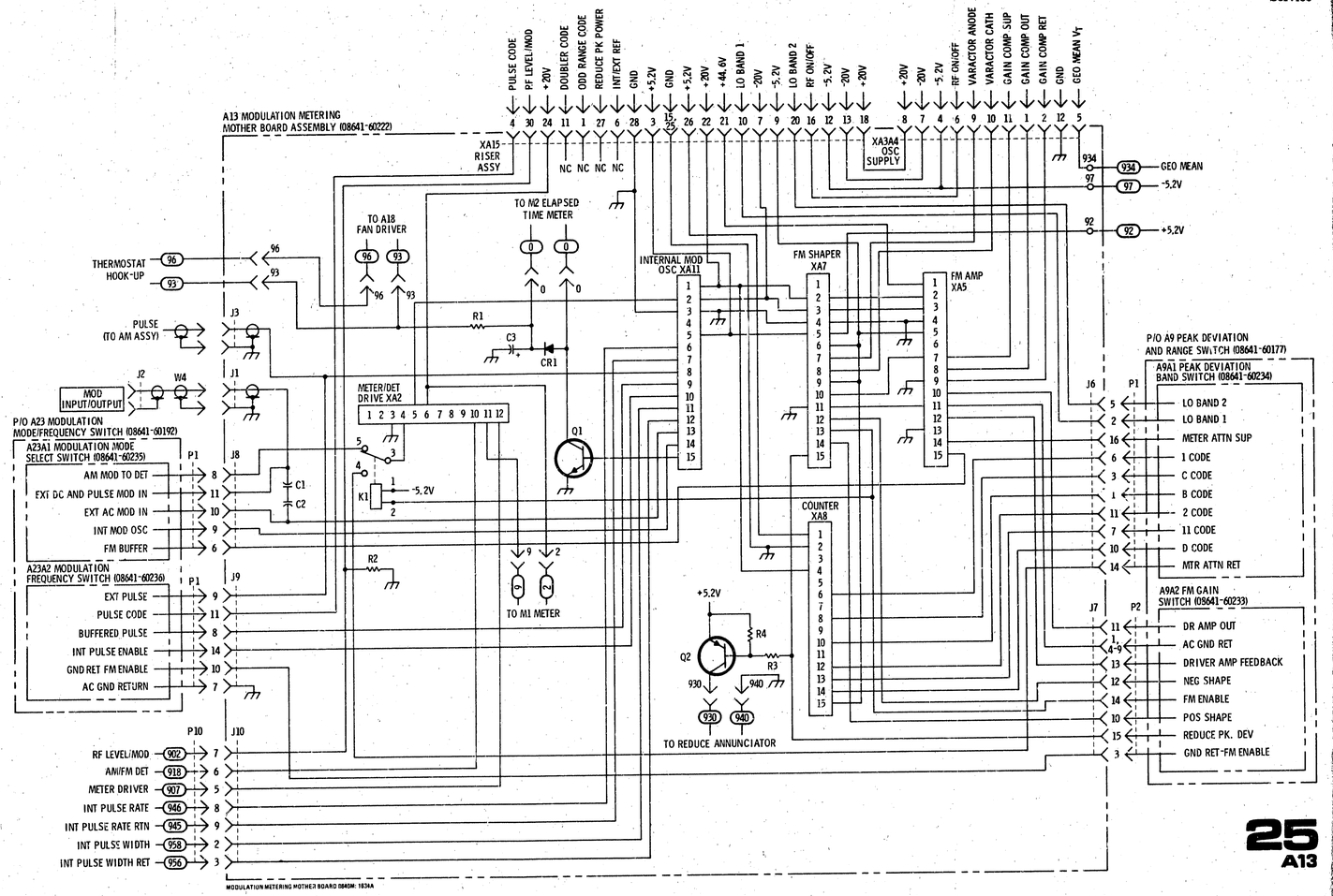


Figure 8-83. Modulation/Metering Mother Board Interconnection Diagram

SERVICE SHEET A

A1 Assembly Removal Procedure

1. Remove instrument from combination case, place instrument upside down, and remove bottom cover (Service Sheet G).

CAUTION

While working with and around the semi-rigid coaxial cables in the generator, do NOT bend the cables more than necessary. Do NOT torque the RF connectors to more than 5 inch-pounds.

2. Remove two OUTPUT RANGE knobs from front panel. The knobs are secured to concentric shafts with allen screws in the knobs.

3. Disconnect two semi-rigid coaxial cables from bottom of the A1A2 Output Attenuator Assy (cable W10 at A1A2J1 and cable W19 at A1A2J2).

4. Disconnect 7 push-on wire connections from A1A1 RF Vernier Assy (located at rear of A1 Output Range Assy.)

5. Disconnect two semi-rigid coaxial cables from bottom of A8 Counter/Lock Assy (cable W2 at A8A1J1 and cable W14 at A8A1J2).

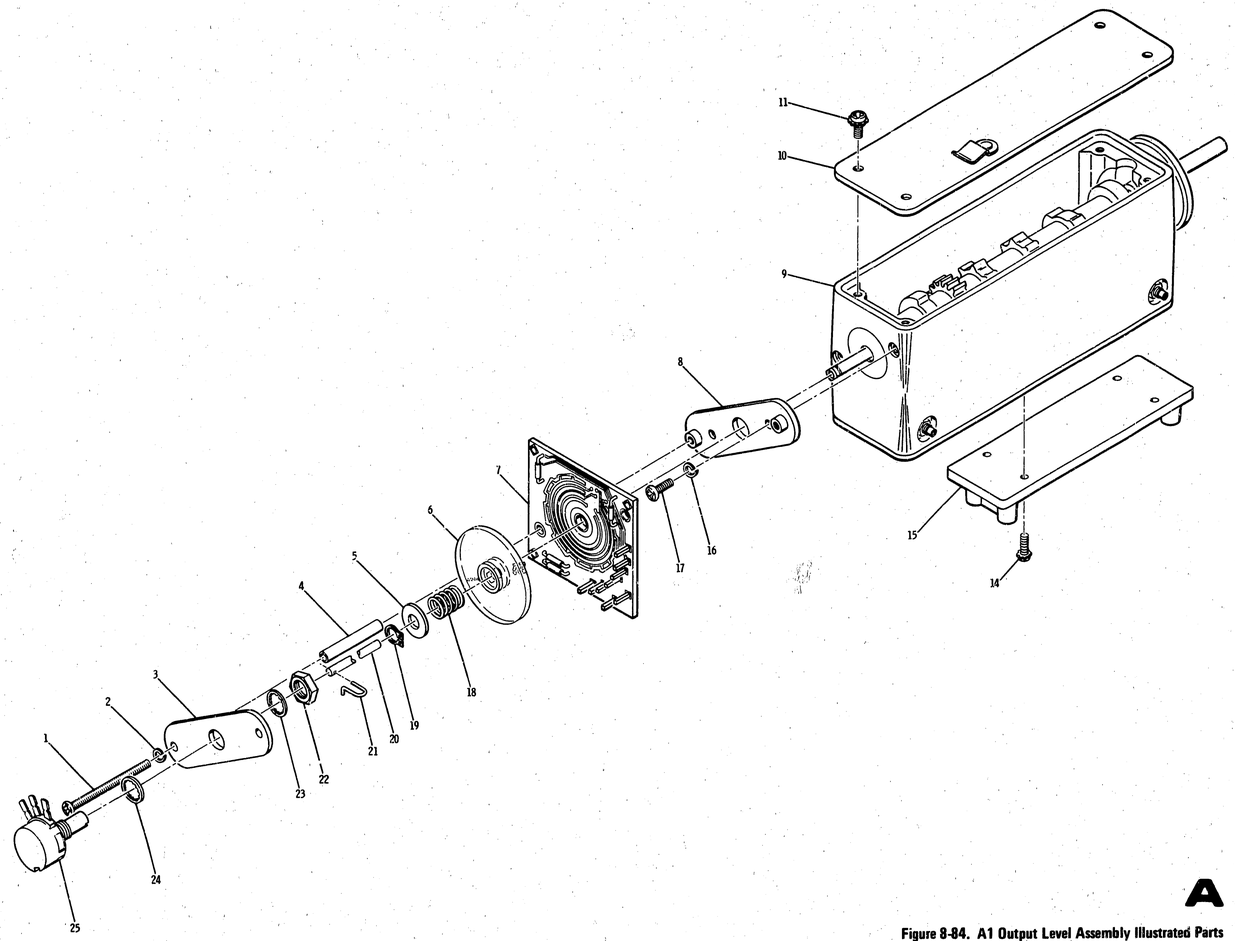
6. Remove front side plate cover from right-hand side frame by removing two flat-head screws.

7. Remove four pan-head screws (with lock-washers) that secure Attenuator to mounting plate (it is not necessary to remove the mounting plate). Remove assembly by sliding it to the rear and up; use care to avoid damage.

8. Reinstall assembly by reversing the procedure in steps one through seven.

A1 Output Range Assembly Legend

Item Number	Reference Designator	Description
1	A1MP13	Machine Screw
2	A1MP16	Lock Washer
3	A1MP1	Potentiometer Support
4	A1MP2	Spacer Post
5	A1MP5	Flat Washer
6	A1MP7	Switch Rotor
7	A1A1	RF Vernier Assembly
8	A1MP8	P.C. Board Support
9	A1A2	Output Attenuator Assembly
10	A1MP18	Attenuator Cover
11	A1MP15	Machine Screw
12	Deleted	Deleted
13	Deleted	Deleted
14	A1MP15	Machine Screw
15	A1MP9	Attenuator Support
16	A1MP17	Lockwasher
17	A1MP14	Machine Screw
18	A1MP6	Compression Spring
19	A1MP4	Retainer Ring
20	A1MP10	Inner Shaft
21	A1MP3	Coupler
22	A1MP12	Hex Nut
23	A1MP11	Lock Washer
24	A1MP11	Lock Washer
25	A1R1	Potentiometer



A

Figure 8-84. A1 Output Level Assembly Illustrated Parts Breakdown

SERVICE SHEET B

RF ON/OFF Switch Modification

The RF ON/OFF Switch function may be wired to:

a. switch off both the RF Oscillator and Modulator leaving the RF output completely off but requiring a stabilization period after turn on; or

b. switch off only the Modulator leaving the RF Oscillator on and warmed up, the Auxiliary RF Output on, and the counter and phase lock operating. In this case, however, the RF is not truly "off" but is reduced by an amount equal to the pulse on/off ratio (at least 40 dB down and dependent on OUTPUT LEVEL vernier setting).

Either configuration can be easily altered to the other as follows:

a. Remove instrument from combination case and remove bottom cover (see Service Sheet G).

b. Remove two nuts that secure A3A4 Connector Board Assembly, and remove board. The board is located directly behind the Range Switch cam housing.

c. To modify the circuitry to leave the RF Oscillator on at all times, add a jumper wire between the two holes labeled "RF OSC ON/OFF INHIBIT" (see Service Sheet 5). To modify the circuitry so the RF Oscillator is switched off, remove the existing jumper wire.

d. Reinstall board and bottom cover.

e. Check RF ON/OFF operation by observing counter or Auxiliary RF Output signal.

A3 Removal Procedure

1. Remove instrument from combination case, place instrument upside down, and remove bottom cover (Service Sheet G).

CAUTIONS

While working with and around the semi-rigid coaxial cables in the generator, do not bend the cables more than necessary. Do not torque the RF connectors to more than 5 inch-pounds.

SERVICE SHEET B (Cont'd)

2. Set Frequency to 230 MHz.
3. Remove front panel FREQUENCY TUNE and FINE TUNE control knobs.
4. On rear of oscillator assembly, disconnect coaxial connectors W2 at A3A1J2 (27), and W3 at A3A1J1 (32).
5. Remove two 8-32 nuts (35) that secure connector board assembly A3A4 to chassis. Lift out connector board assembly from mating connector.
6. Remove four 8-32 screws (51) securing oscillator to center plate of chassis.

CAUTION

Do not twist oscillator assembly while removing or inserting in chassis. Doing so may loosen the front section of the oscillator causing excessive RF leakage and poor frequency calibration.

7. Exert firm pressure on assembly toward the front panel and raise assembly about 1/4 inch to clear mounting studs. Ease the assembly back and upwards to clear the tuning shafts. This completes removal.

A3A1A2 Removal Procedure

1. Remove eight 4-40 screws (45) securing cover plate to buffer housing.
2. Unsolder three leads connecting buffer board and two feedthrough filters (30 and 31) and RF connector (32).
3. Remove two 6-32 screws (48) securing the buffer board to the housing.
4. Lift out buffer board, ensuring that attached probe does not bind in cavity opening.

NOTE

The buffer board has two adjustment slots for attaching to the housing. Refer to the adjustment procedure in Section V, paragraph 5-36, when reinstalling the buffer board.

SERVICE SHEET B (Cont'd)

A3A1A3 Removal Procedure

1. Remove eight 4-40 screws (16) securing cover plate to buffer housing.
2. Unsolder three leads connecting buffer board and two feedthrough filters (25 and 26) and RF connector (27).
3. Remove two 6-32 screws securing the buffer board to housing.
4. Lift out buffer board, ensuring that attached probe does not bind in cavity opening.

NOTE

The buffer board has two adjustment slots for attaching to the housing. Refer to the adjustment procedure in Section V, paragraph 5-36, when reinstalling the buffer board.

A3Q1 Replacement Procedure

1. Unscrew transistor cap (22).
2. Remove transistor (21).
3. Clip new transistor leads as shown in Figure 8-85.
4. Re-insert transistor as shown in Figure 8-86. Replace transistor cap (22) including the two RFI plugs (23 and 24).
5. Connect power meter and sensor (HP 435A/8482A) to the Divider/Filter Buffer Amplifier output, A3A1J1 (32). Measure output power while tuning oscillator across range — it should always be within −1.0 to +3.5 dBm. If not, perform adjustment in paragraph 5-36.
6. Connect power meter sensor to the Counter Buffer Amplifier output, A3A1J2 (27). Measure output power while tuning oscillator across band — it should always be within −3 to +3 dBm. If not, perform adjustment in paragraph 5-36.

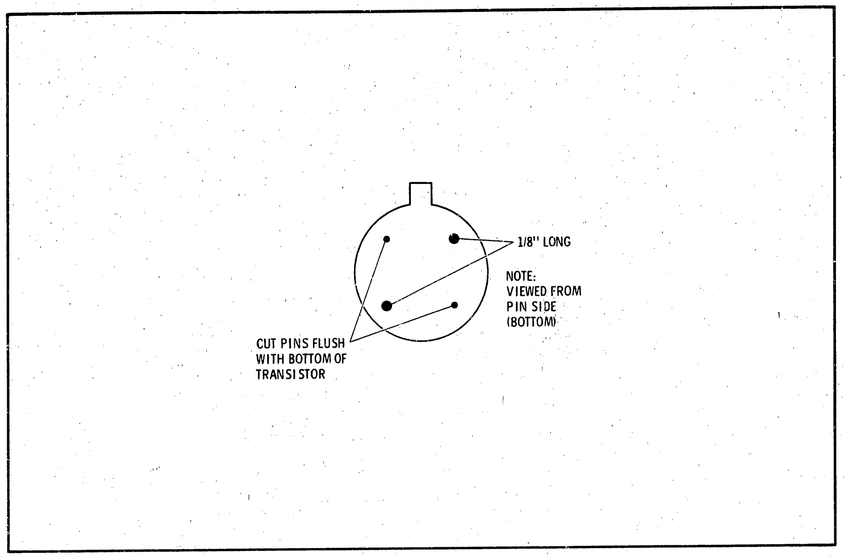


Figure 8-85. RF Oscillator Transistor Preparation

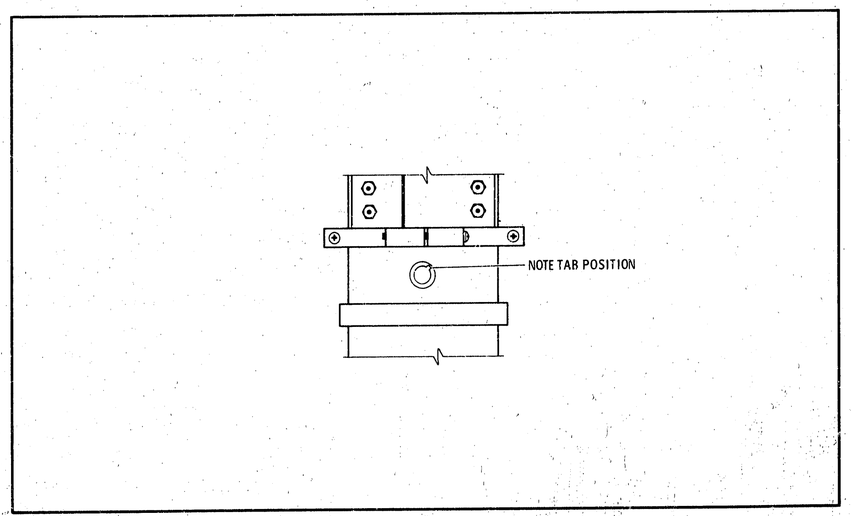


Figure 8-86. RF Oscillator Transistor Orientation

A3 RF Oscillator Assembly Legend

Item Number	Reference Designator	Description
1	A3MP1	Retainer Ring
2	A3MP3	Spur Gear
3	Deleted	Deleted
4	A3MP17	Setscrew
5	A3MP4	Spur Gear
6	MP60	Retaining Collar
7	MP74	Setscrew
8	A3MP19	Setscrew
9	A3MP16	Spur Gear
10	A3MP19	Setscrew
11	A3MP19	Setscrew
12	A3MP6	Potentiometer Bushing
13	A3R2	Potentiometer, FM Gain Compensation
14	A3MP8	Potentiometer Bushing
15	A3R1	Potentiometer, Frequency Tune
16	A3A1MP13	Machine Screw
17	A3A1MP14	Lockwasher
18	A3A1MP1	Buffer Board Cover
19	A3A1MP4	RFI Gasket
20	A3A1A3	Counter Buffer Amplifier Assembly
21	A3Q1	Transistor
22	A3MP9	Transistor Cap
23	A3MP7	RFI Plug
24	A3MP13	RFI Plug
25	A3A1FL2	Filter Capacitor
26	A3A1FL1	Filter Capacitor
27	A3A1J2	RF Connector
28	A3A1MP10	Lockwasher
29	A3A1MP9	Hex Nut
30	A3A1FL6	Filter Capacitor
31	A3A1FL5	Filter Capacitor
32	A3A1J1	RF Connector
33	A3A1MP12	Lockwasher
34	A3A1MP11	Hex Nut
35	MP96	Hex Nut
36	MP95	Lock Washer
37	MP94	Flat Washer
38	A3A4MP5	Hex Nut
39	A3A4MP1	P.C. Board Support
40	A3A4	Connector Board Assembly
41	A3A4MP3	Flatwasher
42	A3A4MP4	Lockwasher
43	A3A4MP2	Machine Screw
44	A3A1MP15	Lockwasher
45	A3A1MP16	Machine Screw
46	A3A1MP5	Buffer Board Cover
47	A3A1MP6	RFI Gasket
48	A3A1MP7	Machine Screw
49	A3A1MP8	Lockwasher
50	A3A1A2	RF Divider/Filter Buffer Amplifier Assembly

A3 RF Oscillator Assembly Legend (Cont'd)

Item Number	Reference Designator	Description
51	A3MP22	Machine Screw
52	A3MP24	Lockwasher
53	A3MP23	Flatwasher
54	A3MP5	RFI Gasket
55	A3MP10	Oscillator Fine Tune Assembly
56	A3MP12	Lockwasher
57	A3MP11	Machine Screw
58	A3MP25	Fine Tune Shaft
59	A3MP26	Retainer Ring
60	Deleted	Deleted

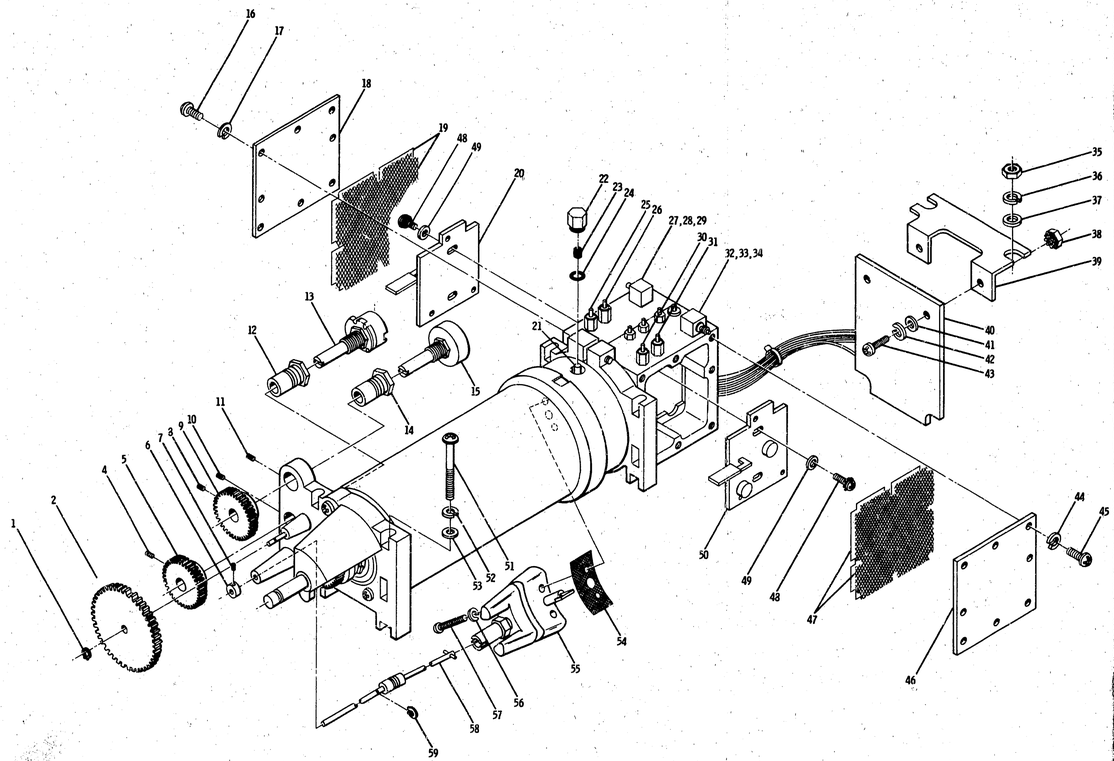


Figure 8-87. A3 RF Oscillator Illustrated Parts Breakdown

SERVICE SHEET C

A8 Assembly Removal and Disassembly Procedure

A8 Removal

NOTES

The entire A8 Assembly must be removed from the chassis to remove A8A1 A8A2, A8A3 and A8A5 Assemblies.

Do not attempt to replace components on the A8A1 and A8A3 Assemblies (except A8U8) without removing the boards.

1. Remove instrument from combination case, place instrument upside down and remove bottom cover (see Service Sheet G).

CAUTION

While working with and around the semi-rigid coaxial cables in the generator, do NOT bend the cables more than necessary. Do NOT torque the RF connectors to more than 5-inch pounds.

2. Disconnect two semi-rigid coaxial cables from bottom of A8 Assembly (cable W2 at A8A1J2 and cable W14 at A8A1J1).

3. Turn instrument right side up and remove top cover (see Service Sheet G).

4. Remove Counter knob with coupler (knob to switch shaft) and rubber o-ring from front panel.

5. Remove four pan-head screws (with lockwashers) at casting corners. These screws secure the A8 Assembly to the chassis.

6. Lift up and tilt assembly so that counter switch shaft clears front panel. Exercise some care to prevent damage to black connector with contacts on bottom of A8 Assembly.

A8 Casting Cover Removal

7. Place assembly right side up.

8. Remove three pan-head screws on front of casting. Remove eight pan-head screws (with lockwashers) that secure casting top cover to base.

SERVICE SHEET C (Cont'd)

9. Lift cover from two "honey comb" RF shields and base casting.

A8A2A1, A8A2A2 and A8A5 Removal

10. Remove two pan-head screws that secure the A8A2 Assembly. Remove A8A2A1 Counter/Lock Board Assembly and A8A4 Riser Assembly by lifting at the riser. The A8A2A2 Counter Display Assembly is attached to the A8A2A1 Assembly. Remove from sockets the wires that connect A8A5 Counter control switch to A8A3 Time Base Assembly.

NOTE

The A8A2A1 and A8A2A2 Assemblies can be extended for service by removing the A8A4 Riser Assembly from A8A2A1 and installing A8A2A1 on the extender board in the riser socket (A8A3XA8A4). This also gives access to the A8A3 Time Base Assembly.

A8A1 Access

WARNING

The edges of the RFI gasket may be sharp and may cause personal injury if not handled with care.

11. To gain access to the A8A1 RF Scaler Assembly, remove six pan-head screws (with lockwashers) that secure the cover shield. Remove the cover shield and gasket.

A8A1 Removal

12. Remove two nylon screws that secure A8U8. Remove A8U8 and two mica washers.

13. On bottom of A8 Assembly Casting, under A8A1 Assembly, remove two hex nuts and lockwashers that secure coaxial connectors A8A1J1 and J2.

14. Unsolder four wires from feedthroughs to left of A8A1 Assembly. Remove A8A1.

A8A3 Removal

15. On bottom of A8 Assembly casting, under A8A3 Assembly, remove hex nut and lockwasher that secure A8A3J1.

16. Unsolder four wires from feedthroughs to right of A8A3 Assembly.

17. Remove two board supports and pan-head screw. Remove A8A3.

Reassembly

18. Reassemble and reinstall A8 Assembly by reversing the procedures in steps 1 through 17.

NOTE

When replacing the casting top cover be sure that the curved, spring loaded, edges of the brass RFI shield are behind the casting wall.

A8 Counter/Lock Assembly Legend (1 of 2)

Item Number	Reference Designator	Description
1	A8MP47	Hex Nut
2	A8MP48	Lock Washer
3	A8MP31	Machine Screw
4	A8MP6	L.E.D. Shield
5	Deleted	Deleted
6	A8MP18	Light Pipe
7	A8MP11	Counter Heat Sink
8	A8MP39	Nylon Rivet
9	A8MP41	Heat Sink Insulator
10	A8MP9	Small Frame Shield
11	A8MP13	P.C. Board Support
12	Deleted	Deleted
13	Deleted	Deleted
14	Deleted	Deleted
15	MP25	RF Scaler Insulator
16	A8MP15	Counter Top Cover
17	A8MP44	Lock Washer
18	A8MP26	Machine Screw
19	A8MP40	Machine Screw
20	A8MP44	Lock Washer
21	Deleted	Deleted
22	A8MP33	Machine Screw
23	A8A4	Counter Riser Board Assembly
24	A8A2	Counter Lock/Display Assembly
25	A8MP27	Machine Screw
26	A8MP10	Counter Input Cover Shield
27	A8MP5	RFI Gasket
28	A8MP42	Machine Screw
29	A8MP46	Scaler Ground
30	A8MP1	Machine Screw
31	A8U8	Divide-by-16 Counter
32	A8A1	RF Scaler Board Assembly
33	A8MP8	Large Frame Shield
34	A8MP3	Flat Washer
35	A8MP31	Machine Screw
36	A8MP25	RF Scaler Insulator
37	A8MP2	Lock Washer
38	A8MP30	Hex Nut
39	A8MP7	Counter Filter Cover
40	A8MP29	Lock Washer
41	A8MP28	Machine Screw
42	A8MP27	Machine Screw
43	A8MP4	RFI Gasket
44	A8MP32	Counter Time Base Insulator
45	A8MP37	Machine Screw
46	A8MP31	Machine Screw
47	Deleted	Deleted
48	Deleted	Deleted
49	Deleted	Deleted
50	A8U2-7	Numerical Display
51	Deleted	Deleted
52	A8MP36	Machine Screw
53	A8MP43	Lock Washer
54	A8MP45	Hex Nut

A8 Counter/Lock Assembly Legend (2 of 2)

Item Number	Reference Designator	Description
55	A8A5S1	Counter Switch
56	A8A5CR2	Diode
57	A8A5CR1	Diode
58	A8L5	Inductor
59	A8C5	Feedthrough Capacitor
60	A8L4	Inductor
61	A8C4	Feedthrough Capacitor
62	A8C1	Feedthrough Capacitor
63	A8L1	Inductor
64	A8C2	Feedthrough Capacitor
65	A8L2	Inductor
66	A8FL2	Feedthrough Filter
67	A8FL1	Feedthrough Filter
68	A8FL3	Feedthrough Filter
69	A8C6	Feedthrough Capacitor
70	A8MP16	Counter Bottom Cover

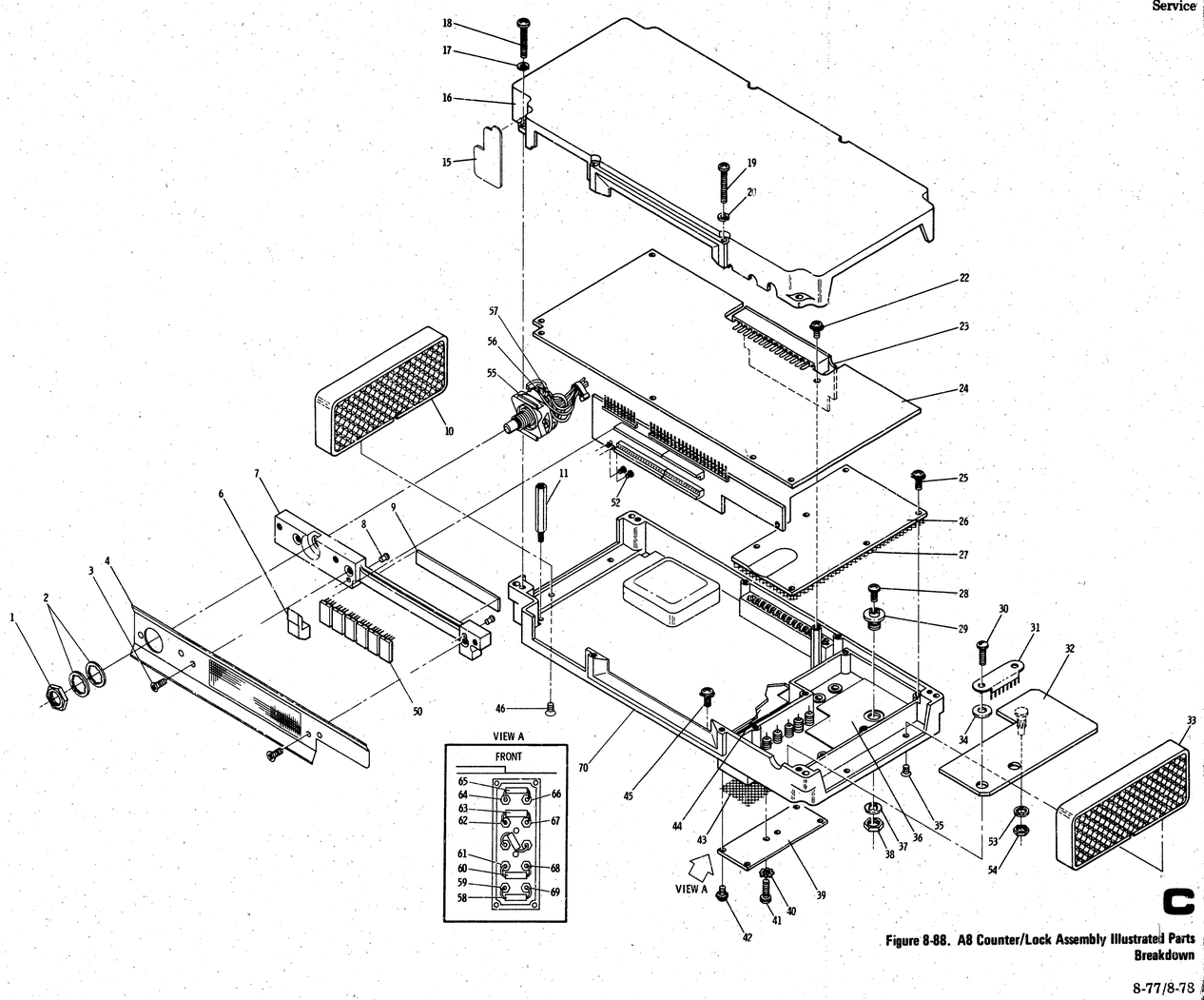


Figure 8-88. A8 Counter/Lock Assembly Illustrated Parts Breakdown

SERVICE SHEET D

A9 Assembly Removal and Disassembly Procedure

1. Set PEAK DEVIATION and RANGE switches fully ccw.
2. Remove PEAK DEVIATION and RANGE switch knobs. The knobs are secured with allen screws in the knobs.
3. Remove instrument from combination case, place instrument upside down and remove bottom cover (see Service Sheet G).
4. Remove two nuts that secure A9 Assembly to front panel (located at switch bushings).
5. Remove connectors A9A1P1 and A9A2P1 from jacks on A13 Assembly. Lift rear of A9 Assembly until coupler slides apart. Gently slide the assembly back and up to remove. Reinstall assembly by setting both switch shafts fully ccw and reversing the procedures in steps one through six.

NOTE

The detents of both A9 Assembly and A10 Assembly switches must align and correspond to the same positions. Check that the actual RF output frequency agrees with the counter indication on all ranges.

A9A1 and A9A2 Removal

NOTE

For the following steps, orient the switch assembly with A9A1W1 and A9A2W1 up. Numbers in parentheses refer to items in the accompanying illustrated parts breakdown.

6. Remove retainer ring (1), washer (24), spring (23), and 4-contact rotor (22) at rear of switch.
7. Remove machine screw (30) at right rear of switch.
8. Remove two machine screws (2 and 8) and accompanying spacers (18) located at front left of switch.
9. Slide A9A2 Assembly (33) and gear mounting plate (34) off of detent shafts.
10. Slide T-shaft (17) with its accompanying combination gear (19) and planet gears (15 and 38) off of shaft (part of 46).
11. Loosen setscrews and remove combination gear (13) from shaft.
12. Loosen setscrews and remove spur gear (36) from shaft (part of 43).
13. Remove two machine screws (42) at front right of detent mounting plate (4), and remove P.C. board support (37).
14. Slide A9A1 Assembly (11) off of detent shafts.

A9 Reassembly

15. Reassemble A9 Assembly by reversing steps 6 through 14 above, while observing the following points:
    a. If the shaft index assemblies (43 and 46) were removed, mount them with the index tab pointing to the top of the switch. Mount the shaft on the right side. When assembly is complete, check to be sure the shafts do not bind against the P.C. boards. If the shafts bind, loosen mounting screws (44) to adjust.
    b. Set detent shafts fully ccw.
    c. Install both the 3-contact rotor (9) and the 2-contact rotor (39) with contacts aligned vertically and toward the bottom of the switch.
    d. Set the rear, 4-contact rotor with contacts aligned vertically and pointing toward the top of the switch. This adjustment is made by loosening the set screws on the combination gear (13) to reset the rotor position.

A9 Peak Deviation and Range Switch Assembly Legend

Item Number	Reference Designator	Description
1	A9MP3	Retainer Ring
2	A9MP32	Screw
3	A9MP2	Star Washer
4	A9MP23	Detent Mounting Plate
5	A9MP34	Hex Nut
6	A9MP18	Flat Washer
7	A9MP14	Compression Spring
8	A9MP36	Machine Screw
9	A9MP30	Switch Rotor
10	A9MP39	Lock Washer
11	A9A1	Peak Deviation Band Switch Board Assy
12	A9A1W1	Cable Assembly
13	A9MP12	Combination Gear
14	A9MP8	Setscrew
15	A9MP11	Planet Gear
16	A9MP7	Retainer Ring
17	A9MP28	Switch Shaft
18	A9MP1	Spacer
19	A9MP13	Combination Gear
20	A9MP17	Flat Washer
21	A9A2W1	Cable Assembly
22	A9MP29	Switch Rotor
23	A9MP15	Compression Spring
24	A9MP19	Flat Washer
25	A9MP4	Set Screw
26	MP29	Shaft Coupler
27	A9MP5	Setscrew
28	Deleted	Deleted
29	Deleted	Deleted
30	A9MP33	Machine Screw
31	Deleted	Deleted
32	Deleted	Deleted
33	A9A2	FM Gain Switch Board Assembly
34	A9MP24	Gear Mounting Plate
35	A9MP27	Plastic Bushing
36	A9MP9	Spur Gear
37	A9MP26	PC Board Support
38	A9MP10	Planet Gear
39	A9MP31	Switch Rotor
40	A9MP16	Compression Spring
41	A9MP20	Flat Washer
42	A9MP38	Machine Screw
43	A9MP22	Shaft Index Assembly
44	A9MP37	Machine Screw
45	Deleted	Deleted
46	A9MP21	Shaft Index Assembly

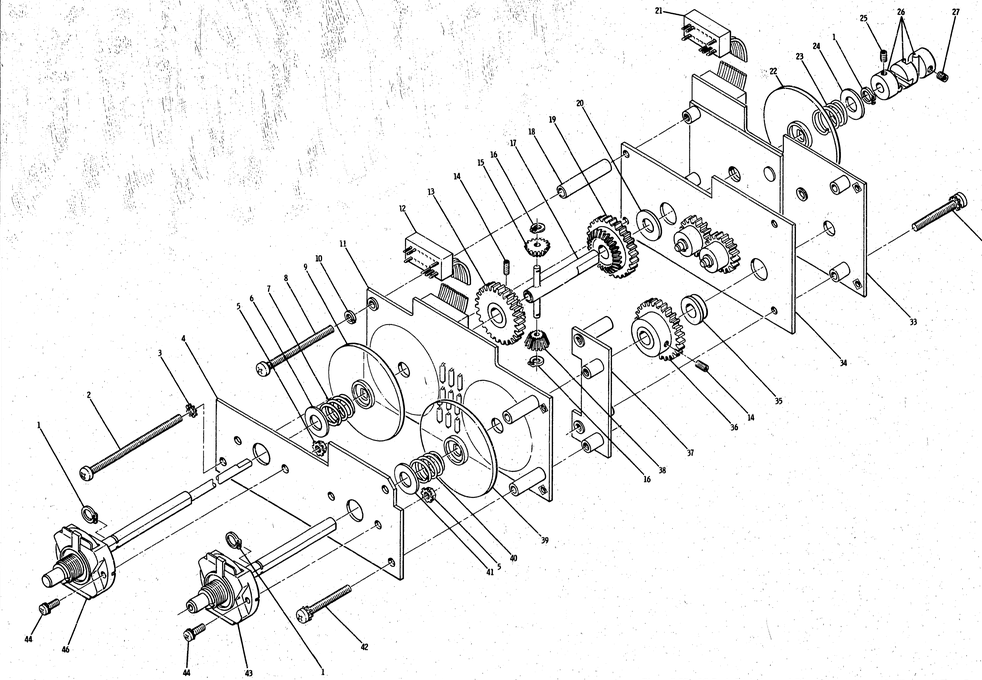


Figure 8-89. A9 Peak Deviation and Range Switch Assembly Illustrated Parts Breakdown

D

SERVICE SHEET E

A10 Assembly Removal and Disassembly Procedure

A10 Casting Cover Removal

1. Remove instrument from combination case, place instrument right side up and remove top cover (see Service Sheet G).

2. Remove fourteen pan-head screws (with lockwashers) that secure casting cover to casting (screws marked with asterisk —*— on cover).

NOTE

Note the location of the screws. The screws vary in length.

3. Lift cover from casting.

A10A2 Removal

4. Remove twelve pan-head screws (with lockwashers) that secure A10A2 Assembly to casting. Remove A10A2 RF Divider Assembly and A10A3 Riser Assembly by lifting at the riser.

NOTE

The A10A2 Assembly can be extended for service by removing the A10A3 Riser Assembly from A10A2 installing A10A2 in the riser socket (A10A1XA10A3A and B). Remove riser evenly to avoid cracking the connector.

When replacing transistors on A10A2, assure that the cans will not contact the casting top cover.

A10A1 Access

5. Remove four pan-head screws (with lockwashers) that secure casting center section to casting.

6. Remove three power supply circuit boards (A18, A20, and A22) that are between A10 Assembly and rear panel.

7. Remove casting center section.

NOTE

The A10A1 Assembly can be checked and adjusted by installing the A10A2 Assembly in the riser socket (A10A1XA10A3A and B) and reinstalling the power supply circuit boards (A18, A20 and A22).

A10A1 Removal

8. Remove instrument from combination case, turn instrument upside down and remove bottom cover (see Service Sheet G).

CAUTION

While working with and around the semi-rigid coaxial cables in the generator, do NOT bend the cables more than necessary. Do NOT torque the RF connectors to more than 5 inch-pounds.

9. Remove FM circuit boards (A5 and A7) and the A3A4 Connector Board Assembly (see Service Sheet F).

10. Disconnect four semi-rigid coaxial cables from bottom of A10 Assembly (cable W3 at A10A1J3, cable W7 and A10A1J2, cable W6 at A10A1J1, and cable W8 at A10A1J4). A10A1J2 and J3 are located in area occupied by FM circuit boards. A10A1J1 and J4 are located in front of A26 Assembly.

11. Remove four hex nuts and lockwashers that secure coaxial connectors A10A1J1 through J4.

12. Turn instrument right side up. Unsolder three feedthroughs at rear center of A10A1 Assembly (located to right of two toroid inductors and to left of relay.

CAUTION

Be sure the terminals have been completely desoldered.

13. Remove the ten pan-head screws (with lockwashers) that secure A10A1 Assembly to casting. Remove A10A1.

NOTE

If necessary, the bottom casting cover can be removed by removing four pan-head screws (with lockwashers), and

SERVICE SHEET E (Cont'd)

NOTE (Cont'd)

unsoldering three wires from feedthroughs on underside of instrument behind RF oscillator.

Reassembly

14. Reassemble A10 Assembly by reversing the procedures in steps 1 thorugh 13.

A23 Assembly Removal Procedure

1. Remove instrument from combination case, remove bottom cover from instrument (see Service Sheet G).
2. Remove Modulation Mode switch knob. Remove nut holding assembly to front panel.
3. Remove connectors A23A1P1 and A23A2P1 from A13J8 and A13J9.
4. Remove five push-on connected wires from A23A1 assembly and three push-on connected wires that go from A23A2 to A11 Internal Modulation Oscillator.
5. Move assembly to the rear to clear switch shaft from front panel.

A23 Reinstallation

6. Reinstall A23 Assembly by reversing the procedures in steps 1 through 5.

A10 Divider/Filter Assembly Legend

Item Number	Reference Designator	Description
1	A10MP14	Machine Screw
2	A10MP11	Lock Washer
3	A10A1MP7	Cam Housing Bushing
4	A10A1MP9	Cam Follower
5	A10MP12	Machine Screw
6	A10A1MP2	Detent Roller
7	A10A1MP3	Detent Spring
8	A10A1MP1	Detent Pin
9	A10A1MP8	Cam Cover
10	A10A1MP4	Cam Shaft
11	A10A1MP13	Setscrew
12	A10MP17	Hex Nut
13	A10MP16	Lock Washer
14	A10A1MP12	Clamp Support
15	A10A1FL1-3	Feed Thru Filter
16	A10A1MP10	Slider Clamp
17	A10MP12	Machine Screw
18	A10MP8	Spring Shield No. 4
19	A10MP12	Machine Screw
20	A10A3	Riser Assembly
21	A10A3XA10A2A	P.C. Edge Connector
22	A10A3XA10A2B	P.C. Edge Connector
23	A10MP1	Yellow P.C. Board Guide
24	A10MP2	Green P.C. Board Guide
25	A10MP3	Blue P.C. Board Guide
26	A10MP9	D/F Top Cover Casting
27	A10MP11	Lockwasher
28	A10MP18	Machine Screw
29	A10MP18	Machine Screw
30	A10MP11	Lock Washer
31	A10MP15	Machine Screw
32	A10MP11	Lock Washer
33	A10MP14	Machine Screw
34	A10MP11	Lock Washer
35	A10A1MP11	Machine Screw
36	A10MP4	RFI Braid
37	A10MP13	Machine Screw
38	A10MP11	Lock Washer
39	A10A2	RF Divider Assembly
40	A10MP10	D/F Center Casting
41	A10MP5	Spring Shield No. 1
42	A10MP12	Machine Screw
43	A10MP7	Spring Shield No. 3
44	A10MP12	Machine Screw
45	A10MP6	Spring Shield No. 2
46	A10A1MP11	Machine Screw
47	A10A1	RF Filter Assembly
48	A10MP4	RFI Braid
49	A10A1MP6	D/F Bottom Cover Casting
50	A10A1MP5	Cam Follower Shaft

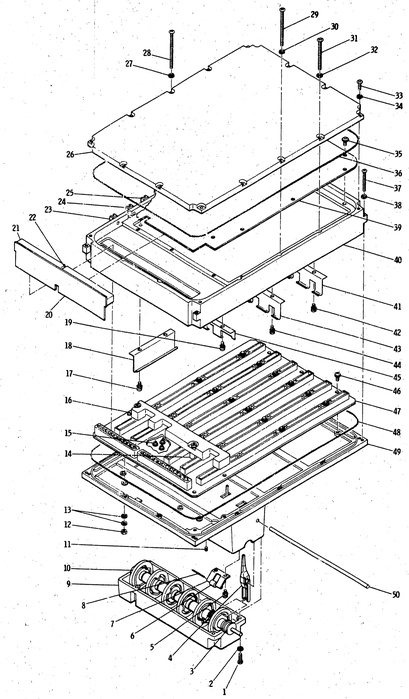


Figure 8-90. A10 Divider/Filter Assembly Illustrated Parts Breakdown

A23 Modulation Mode Switch Assembly Legend

Item Number	Reference Designator	Description
1	A23MP1	Machine Screw .625 long
2	A23MP2	Flat Washer # 4
3	A23MP3	Round Spacer .25" long
4	A23MP4	Round Spacer .75" long
5	A23MP5	Split Lock Washer
6	A23A2W1	Cable Assembly
7	A23A1W1	Cable Assembly
8	A23MP6	Machine Screw 2" long
9	A23MP7	Retainer Ring
10	A23MP8	Flat Washer #12
11	A23MP9	Compression Spring
12	A23MP10	Switch Rotor Contacts
13	A23A1MP1-5	Square Pin
14	A23A1	Modulation Select Board Assembly
15	A23A2MP1-3	Terminal Crimp Lug
16	A23A2	Modulation Frequency Board Assembly
17	A23MP11	Detent Plate
18	A23MP12	Shaft Index Assembly

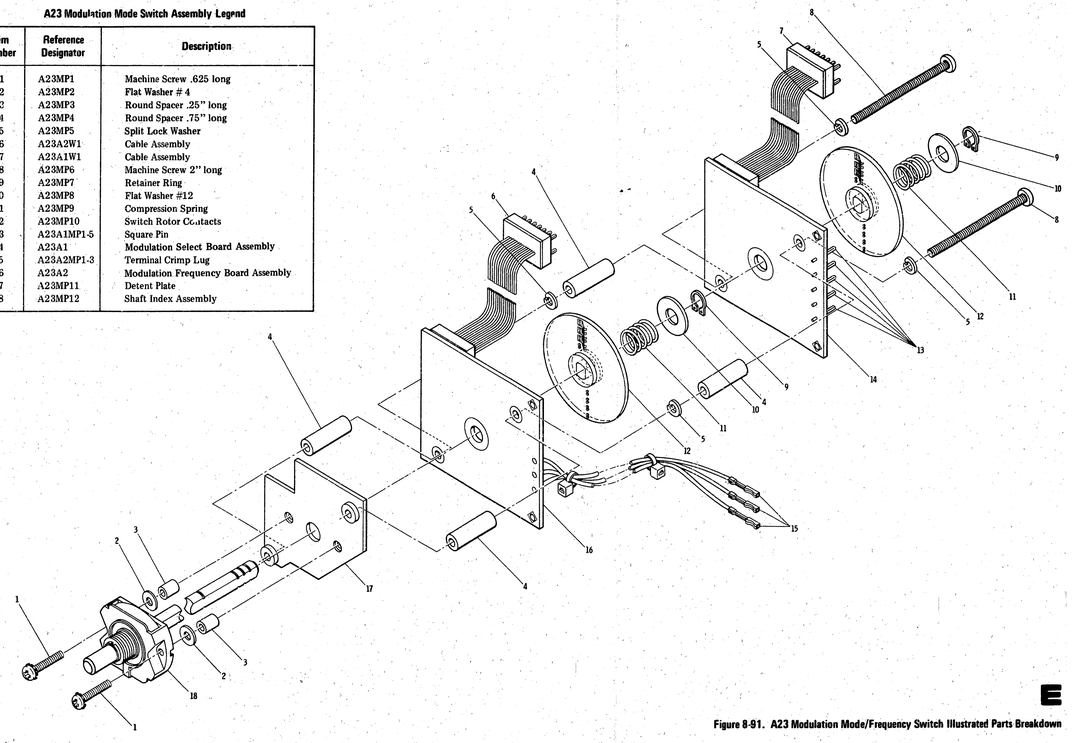


Figure 8-91. A23 Modulation Mode/Frequency Switch Illustrated Parts Breakdown

SERVICE SHEET F
A26 Assembly Removal and Disassembly Procedure

A26A2 and A26A4 Access

1. Remove instrument from combination case, place instrument right side up and remove top cover (see Service Sheet G).
2. To service either A26A2 or A26A4, gently lift board's extractors and reinstall it on extender board.
3. Reassemble by reversing procedures in steps one and two.

A26A1 and A26A3 Access

1. Remove instrument from combination case, place instrument upside down and remove bottom cover (see Service Sheet G).

CAUTION

While working with and around the semi-rigid coaxial cables in the generator, do NOT bend the cables more than necessary. Do NOT torque the RF connectors to more than 5 inch-pounds.

2. Remove ten pan-head screws (with lock-washers) that secure casting bottom cover to the casting.

WARNING

The RFI gasket on casting cover may have sharp edges and may cause personal injury if not handled with care.

3. Lift cover from casting, noting the orientation of the RFI gasket under the cover.

NOTE

Do not attempt to replace components on the A26A1 and A26A3 assemblies without removing them.

A26A1 and A26A3 Removal

4. Remove two pan-head screws (with washers) that secure microcircuit amplifier A26U1 or U2 to casting.
5. Remove A26U1 or U2.
6. Remove four pan-head screws (with lock-washers) that secure heat sink to the casting.
7. Remove pan-head screws (with lockwashers) that secure the circuit board to the casting.
8. Disconnect two coaxial cables from casting connectors and remove nuts and washers that secure cable connectors to casting.
9. To replace components mounted on the circuit board, tilt the board up while sliding it to the rear.
10. To replace or remove the circuit board, label the wires soldered to the board before unsoldering them.
11. Reassemble by reversing procedures in steps 1 through 10.

A26 Assembly Removal

1. Remove instrument from combination case, place instrument upside down and remove bottom cover (see Service Sheet G).

CAUTION

While working with and around the semi-rigid coaxial cables in the generator, do not bend the cables more than necessary. Do NOT torque the RF connectors to more than 5 inch-pounds.

2. Disconnect 4 semi-rigid coaxial cables (W6, W7, W8, and W10) from the front of the A26 Assembly.
3. Place instrument right side up and remove A26A2 and A26A4 assemblies by gently lifting their P.C. board extractors.
4. Remove six allen-head screws (with lock washers) from the inside of the A26 casting.
5. Disconnect A16P1, and remove A18, A20, and A22 Regulator Assemblies by gently lifting their board extractors.
6. Slide A26 casting toward top of instrument until A26A5 Riser Assembly no longer mates with its connector (A17XA26A5).
7. Remove the two pan-head screws holding the A26A5 Riser Assembly to the A26 casting module. Disconnect Riser by pulling it gently away from the casting.
8. Slide the A26 Assembly toward the top of the instrument until it is removed.
9. Reinstall the A26 Assembly by reversing the procedures in steps 1 through 8.

A26 AM/AGC and RF Amplifier Assembly Legend (1 of 2)

Item Number	Reference Designator	Description
1	A26MP34	Machine Screw
2	A26MP48	Machine Screw
3	A26MP25	Machine Screw
4	A26MP27	Machine Screw
5	A26MP28	Lock Washer
6	A26MP29	Flat Washer
7	A26U2	Amplifier
8	A26MP34	Machine Screw
9	A26MP33	Heat Sink
10	A26MP43	Machine Screw
11	A26A3	Modulator Assembly
12	A26W3	Coaxial Cable
13	A26MP25	Machine Screw
14	A26MP45	Machine Screw
15	A26MP6	Modulator Filter Cover
16	A26MP3	RFI Gasket
17	A26MP24	Machine Screw
18	A26MP9	Bottom Module Cover
19	A26MP4	RFI Gasket
20	A26MP16	Machine Screw
21	A26MP15	Coaxial Cap
22	A26MP17	Hex Nut
23	A26MP18	Lock Washer
24	A26MP8	Casting
25	A26MP19	Machine Screw
26	A26A5	Riser Assembly
27	A26MP20	PC Edge Connector
28	A26MP11	Brown P.C. Board Guide
29	A26MP47	Lock Washer
30	A26J1	RF Connector
31	A26W4	Coaxial Cable
32	A26A4	AGC Amplifier Assembly
33	A26MP22	P.C. Edge Connector
34	A26A2	AM Offset and Pulse Switching Assembly
35	A26MP21	Machine Screw
36	A26A6	AM Mother Board Assembly
37	A26MP13	Green P.C. Board Guide
38	A26MP12	Yellow P.C. Board Guide
39	A26MP41	Hex Nut
40	A26MP42	Lock Washer
41	A26MP39	Hex Nut
42	A26MP40	Lock Washer
43	A26MP46	Machine Screw
44	A26MP5	Access Cover
45	A26MP1	RFI Gasket
46	A26MP37	Hex Nut
47	A26MP38	Lock Washer
48	A26MP35	Hex Nut
49	A26MP36	Lock Washer

A26 AM/AGC andRF Amplifier Assembly Legend (2 of 2)

Item Number	Reference Designator	Description
50	A26MP2	RFI Gasket
51	A26MP10	Amplifier Filter Cover
52	A26MP44	Machine Screw
53	A26W1	Coaxial Cable
54	A26W2	Coaxial Cable
55	A26A1	Power Amplifier & AGC Detector Assy
56	A26MP33	Heat Sink
57	A26U1	Amplifier
58	A26MP32	Flat Washer
59	A26MP31	Lock Washer
60	A26MP30	Machine Screw
61	A26L6	Inductor
62	A26L3	Inductor
63	A26C12	Feed Thru Capacitor
64	A26L4	Inductor
65	A26C6	Feed Thru Capacitor
66	A26C8	Feed Thru Capacitor
67	A26L8	Inductor
68	A26L7	Inductor
69	A26C16	Feed Thru Capacitor
70	A26C14	Feed Thru Capacitor
71	A26C10	Feed Thru Capacitor
72	A26C17	Feed Thru Capacitor
73	A26C1	Feed Thru Capacitor
74	A26C3	Feed Thru Capacitor
75	A26L2	Inductor
76	A26L1	Inductor
77	A26R1	Resistor
78	A26C4	Feed Thru Capacitor
79	A26C2	Feed Thru Capacitor
80	A26L5	Inductor
81	A26C18	Feed Thru Capacitor
82	A26C9	Feed Thru Capacitor
83	A26C13	Feed Thru Capacitor
84	A26C15	Feed Thru Capacitor
85	A26C7	Feed Thru Capacitor
86	A26C5	Feed Thru Capacitor
87	A26C11	Feed Thru Capacitor

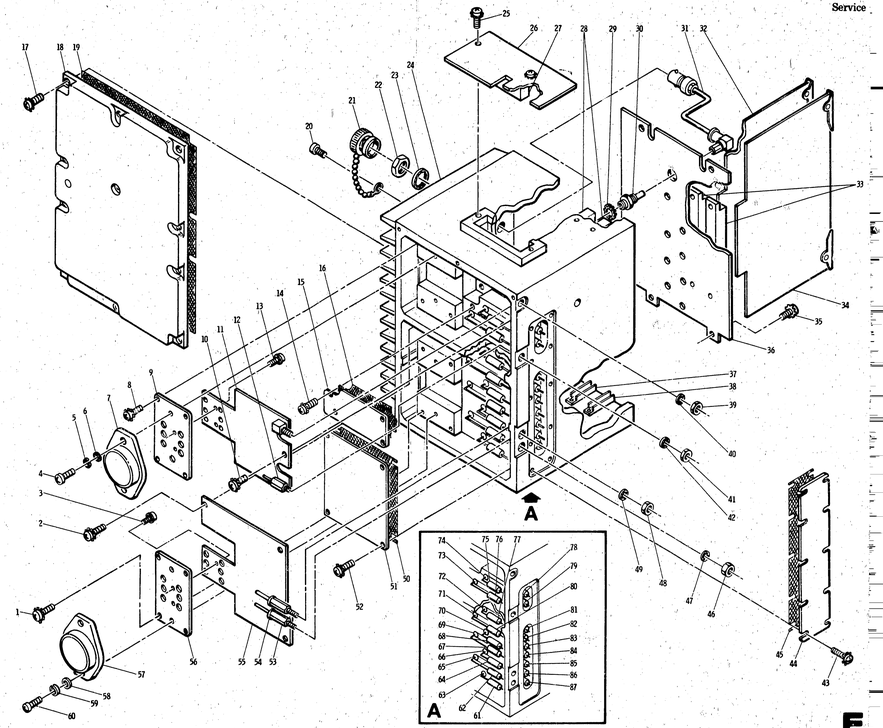


Figure 8-92. A26 AM/AGC and RF Amplifier Assembly Illustrated Parts Breakdown

F

SERVICE SHEET G

General Removal Procedures

Combination Case Removal

1. Place instrument with front panel up.
2. Remove 3 pozidriv screws each from the top and bottom of the front panel.
3. Remove 2 pan-head screws each from left and right sides of the combination case.
4. Lift instrument by the handles on the front panel while pressing downward on edge of combination case.
5. Lift instrument straight upward to remove from case.

Top and Bottom Cover Removal

WARNING

Before attempting to disassemble or remove any part of the generator, remove line power from the instrument by disconnecting the instrument's line power cable from the line power outlet.

1. Remove top cover by removing four screws. Slide cover to the rear approximately two inches to disengage it from flanges at the instrument's front and rear. Lift it off.
2. Remove bottom cover by removing four screws. Slide cover to the rear approximately two inches to disengage it from flanges at the instrument's front and rear. Lift it off.

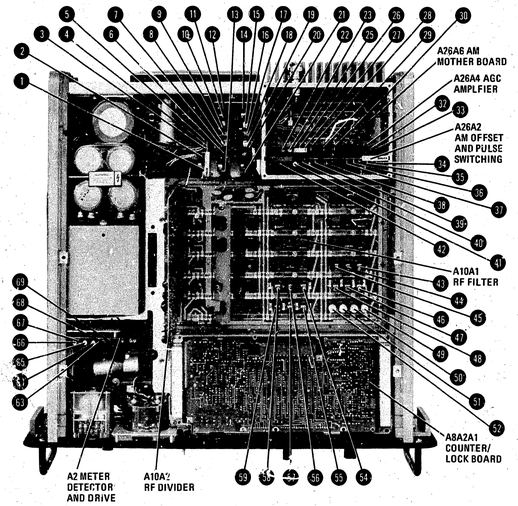
Circuit Board Removal

3. Remove any plug-in circuit board by gently lifting the board's extractors (the extractors are color-keyed to the guides at the board's edges).

M1 Removal

1. Remove top cover.
2. Remove Modulation Mode switch knob. Remove nut holding A23 Modulation Mode switch assembly to front panel, and slide to rear.
3. Remove three flat head screws holding meter M1 to front panel. Disconnect wires from meter to A13 Modulation Metering mother board.
4. Push top edge of meter to the rear and lift meter from chassis.
5. To install meter, reverse procedure given in steps 1 through 4.

A1A1R1	14	
A1A1TP1	30	VERN
A1A1TP2	31	MET OUT
A3R1	29	FREQUENCY TUNE
A3R2	28	FREQ TUNE
A3A4R1	5	V_T ADJ
A3A4R2	4	LOW FM SENS
A3A4R3	3	MID FM SENS
A3A4R4	2	HIGH FM SENS
A3A4TP1	5	V_T
A3A4TP2	1	
A5R9	33	AMPLIFIER OFFSET
A5R23	34	BUFFER ADJ
A5TP1	7	GND
A5TP2	37	OUTPUT
A5TP3	36	+ INPUT
A5TP4	32	−INPUT
A5TP5	10	FM BUFFER IN
A5TP6	29	BUFFER OUT
A7R12	23	POSITIVE SHAPING
A7R19	9	VARACTOR BIAS
A7R41	11	NEGATIVE SHAPING
A7TP1	8	GND
A7TP2	15	VARACTOR ANODE
A7TP3	21	VARACTOR CATHODE
A7TP4	26	+0.20 OVERLOAD
A7TP5	22	
A9A2TP1	35	
A11R28	18	OSCILLATOR LEVEL
A11R35	17	AM-FM DRIVE ADJ
A11R1	10	AUDIO OUTPUT
A11TP1	11	
A11R2	12	
A11TP2	13	
A11TP3	14	
A11TP4	15	
A11R3	19	
A11TP5	16	
A11TP6	20	
A11TP7	24	
A11R4	25	
A26U1	41	
A26U2	42	
A26W3	51	
A26A1J1	44	
A26A1R34	43	DET ADJ
A26A1TP1	50	DET
A26A1TP2	48	PK DET
A26A1W2	43	
A26A3J1	53	



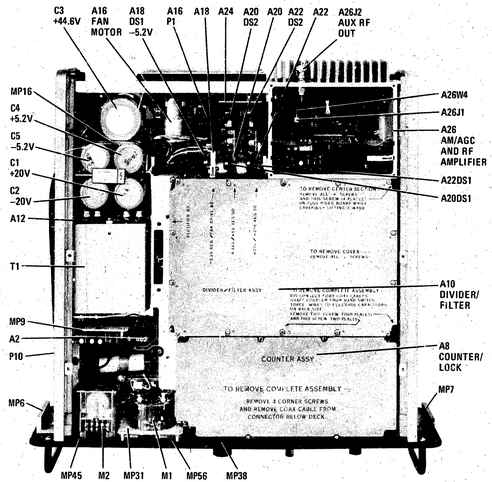


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Figure 8-93. Top Internal View

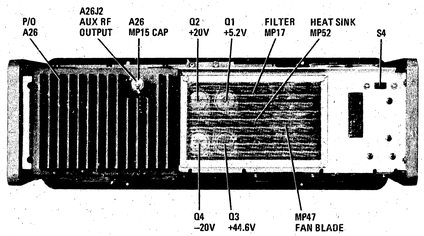
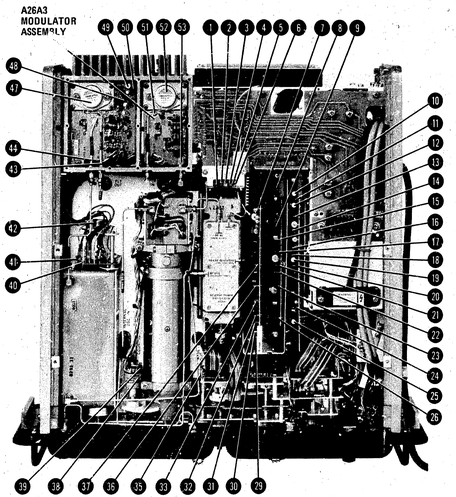


Figure 8-94. Rear Panel View

A2R1	66	F.S. ADJ
A2R3	64	
A2R2	65	DRIVE OFFSET
A2TP1	63	AC IN
A2TP2	69	BUFFER
A2TP4	67	MET
A2TP3	68	DET
A10A1C81	52	
A10A1C82	53	
A10A1C83	50	
A10A1C84	49	
A10A1L31	45	
A10A1L32	44	
A10A1L33	43	
A10A1L37	58	
A10A1L38	56	
A10A1L39	54	
A10A1L40	48	
A10A1L41	47	
A10A1L42	46	
A10A1L43	55	
A10A1L44	57	
A10A1L45	55	
A18R2	2	−5.2 ADJ
A18TP1	5	F1
A18TP2	3	TH1
A18TP5	1	−5.2
A18TP6	4	F1
A20R8	6	+44.6V ADJ
A20R16	9	+5.2V ADJ
A20TP1	8	F2
A20TP4	13	+44.6V
A20TP5	7	F2
A20TP6	11	F1
A20TP7	10	F1
A20TP10	12	+5.2V
A22R7	20	+20V ADJ
A22R19	17	−20V ADJ
A22TP1	18	F2
A22TP2	19	F2
A22TP4	21	+20V
A22TP6	15	F1
A22TP7	16	F1
A22TP9	14	−20V
A26A2R19	41	% AM
A26A2TP1	42	AM IN
A26A2TP2	40	GND
A26A2TP3	39	AM OUT
A26A2TP4	38	PUL IN
A26A2TP5	37	DET PUL
A26A2TP6	36	MOD PUL
A26A2TP7	35	MET
A26A2TP8	34	BW
A26A4R1	23	LVL
A26A4R2	22	DBLR LVL
A26A4TP1	25	MET
A26A4TP2	26	DET
A26A4TP3	27	OVLD
A26A4TP4	28	VERN
A26A4TP5	29	GND
A26A4TP6	30	CQ1
A26A4TP7	32	DRIVER
A26A4TP8	33	MOD



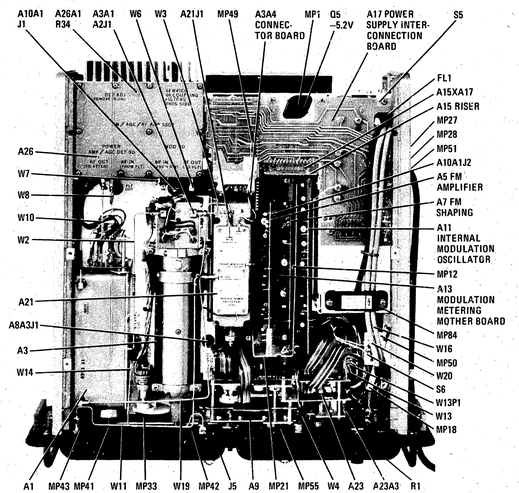


Figure 8-95. Bottom Internal View

MANUAL CHANGES

MANUAL CHANGES

MANUAL IDENTIFICATION
Model Number: 8640M
Date Printed: December 1976
Part Number: 08641-90008

SIGNAL GENERATOR

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections

Make all appropriate serial number related changes indicated in the tables below.

Serial Prefix or Number	Make Manual Changes
1716A	1
1729A	1, 2
1742A	1–3
1746A	1–4
1815A	1–5
1820A	1–6
1825A	1–7
1828A	1–8

Serial Prefix or Number	Make Manual Changes
1837A, 1845A	1–9
1903A	1–10
1913A	1–11
1929A	1–12
1937A	1–13
1941A	1–14
2017A	1–15
►2144A	1–16

► NEW ITEM

ERRATA

Page 1-9, Table 1-1:

Under **Pulse Modulation**, add the following footnote (3) to **Pulse Repetition Rate.**

[3]Pulse performance degrades below 500 Hz repetition rates.

Page 4-2, Table 4-1:

For the Spectrum Analyzer, under **Suggested Models**, delete "or HP 651B".

Page 4-33, Paragraph 4-29:

Under SPECIFICATION, add the following footnote to **Pulse Repetition Rate.**

Pulse performance degrades below 500 Hz repetition rates.

Page 4-34, paragraph 4-29:

Change the second sentence in step 2 to read as follows:

"Adjust generator's PULSE RATE for 500 Hz (or 2 ms period) as read on the oscilloscope."

Change the first sentence in step 5 to read as follows:

"Repeat steps 1 through 4 for the frequency ranges shown below."

Page 4-35, paragraph 4-29:

In the table at the top of the page change the first three **Pulse Rate (Hz)** entries to 500 Hz.

Change the first sentence in step 7 to read as follows:

"Repeat steps 1 through 4 (using the detector to monitor the pulse envelope) for the frequency ranges shown below."

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

January 1, 1982
33 Pages

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ERRATA (Cont'd)

Page 5-3, paragraph 5-21:
In paragraph f, change the last sentence to read:
"The following table indicates correct values of resistance for 1.7 to 6 dB of attenuation."
In the table at the top of the page, add the following entries:

Attenuation	Resistance		
1.7 dB	10Ω	511Ω	511Ω
2.0 dB	12.1Ω	422Ω	422Ω

Page 5-3, Table 5-1:
Add the following:

Component	Service Sheet	Range of Values	Basis of Selection
A10A2R49–51	11	———	See paragraph 5-21j
A23A2R1	9	28.0 kΩ–31.7 kΩ	See paragraph 5-21 l
A23A2R2		145 kΩ–160 kΩ	
A23A2R3		375 kΩ–400 kΩ	

Page 5-4, paragraph 5-21:
Add the following:

j. A10A2R49-51 Selection. If A26U2 has been replaced, the second harmonic level at RF OUTPUT may rise out of specification on the low end of the 0.5—8 MHz ranges with low vernier settings. If the second harmonic level is out of specification, increase the output attenuation pad formed by R49-51. To determine proper attenuation, insert a 1 dB step attenuator in place of W7, between A10A1J2 and A26W3, RF IN (FROM DIV). Increase attenuation until harmonics are just within specified limits. Add the value of attenuation on the step attenuator to that presently installed on the A10A2 assembly and replace R49-51 with the new values from the table below. Total attenuation greater than 6 dB is not recommended. Check harmonics, AUX RF OUTPUT, and maximum RF OUTPUT power.

Attenuation	Resistance		
	R49	R50	R51
2 dB	12.1	422	422
3 dB	17.8	287	287
4 dB	23.7	237	237
5 dB	31.6	178	178
6 dB	38.3	147	147

NOTE

Attenuation should be no higher than necessary to bring a range's second harmonic within specification. Excessive attenuation may reduce maximum RF output level below +18 dBm.

ERRATA (Cont'd)

► 8. **A23A2R1, R2, and R3 Selection.** If the A11 Internal Modulation Oscillator Assembly has been repaired or replaced, check the frequency of the internal modulation oscillator with the Signal Generator's MODULATION MODE switch set to INT AM 5000, INT AM 1000, and INT AM 400. Measure the frequency output at the MOD OUTPUT connector with a high input impedance counter. If the frequency is out of specification, change the value of A23A2R1 (for 5000 Hz), A23A2R2 (for 1000 Hz), and A23A2R3 (for 400 Hz). A percent of increase in frequency will result from a decrease in the resistance value of twice that percentage. For example, to increase the frequency by 1%, the value of resistance would have to be decreased by 2%. Similarly to decrease the frequency by 1%, the value of resistance would have to be increased by 2%.

Page 5-11, paragraph 5-31:
In step 1, change "AM INT 1000" to "AM EXT AC".

Page 6-2, Table 6-1:
Delete A1 RF Output Range Assy entry from the table.

►NOTE TO READER: The reference to CD in all section VI errata refers to the Check Digit in the table of Replaceable Parts (Table 6-3).

Page 6-5, Table 6-3:
A1MP10: The recommended replacement is 08640-80015 CD1 SHAFT, INNER 0.125" DIA 8 9.38 LG.
A1A1R1: For recommended replacement, refer to **Change 5.**

►Page 6-9, Table 6-3:
Change A5R42 to A5R42*.

Page 6-11, Table 6-3:
A8L5: For recommended replacement, refer to **Change 3.**

►Page 6-12, Table 6-3:
A8A1: For recommended replacement, refer to **Change 16.**
Change A8A1C5 to A8A1C5*.
Change A8A1C8 to A8A1C8*. (Refer to **Change 12**).
Change A8A1C11 to A8A1C11*.
Change A8A1C12 to A8A1C12*. (Refer to **Change 12**).

Page 6-13, Table 6-3:
A8A2A1C12: For recommended replacement, refer to **Change 3.**
A8A2A1Q6: For recommended replacement, refer to **Change 5.**

Page 6-15, Table 6-3:
A8A2A1U14 and **U15:** For recommended replacements, refer to **Change 3.**
►**A8A2A1U19:** For recommended replacement, refer to **Changes 3** and **16.**
A8A2A1U28: For recommended replacement, refer to **Change 14.**
A8A2A1U29: For recommended replacement, refer to **Change 15.**

Page 6-16, Table 6-3:
A8A3U8, U10 and U13: For recommended replacement, refer to **Change 15.**

►Page 6-17, Table 6-3:
Change A9MP21 to 3130-0503 CD8 SHAFT & INDEX ASSEMBLY 11 POS; 30 DEG.

ERRATA (Cont'd)

►Page 6-18, Table 6-3:
Change A9A2C6 to A9A2C6*.
Change A9A2C7 to A9A2C7*.
Change A9A2C8 to A9A2C8*.

Page 6-20, Table 6-3:
Change A10A1MP2 to 00355-20034.

Page 6-21, Table 6-3:
3130-0480: The recommended replacement is 08640-80013 CD9 CONTACT-SWITCH SWITCH CONTACT; 0.002-IN. The switch contacts are part of A10A1S1-S6, slide switches, and are listed under A10A1S1-S6.

►**A10A2:** For recommended replacement, refer to **Change 16.**

►**A10A2C6:** The recommended replacement is 0160-4584 CD3 CAPACITOR-FXD .1 UF ±20% 50 VDC CER.

►Change A10A2C8 to A10A2C8*. (Refer to **Change 12**).

►Page 6-22, Table 6-3:
Change A10A2R2 to A10A2R2*. (Refer to **Change 12**).
Change A10A2R3 to A10A2R3*. (Refer to **Change 12**).
Change A10A2R4 to A10A2R4*. (Refer to **Change 12**).
Change A10A2R9 to A10A2R9* 0698-7229 CD8 RESISTOR 511 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
Change A10A2R10 to A10A2R10* 0698-7188 CD8 RESISTOR 10 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
Change A10A2R12 to A10A2R12* 0698-7229 CD8 RESISTOR 511 1% .05W F TC=0 ± 100. (Refer to **Change 12**).
Change A10A2R18 to A10A2R18* 0698-7221 CD0 RESISTOR 237 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
Change A10A2R20 to A10A2R20* 0698-7197 CD9 RESISTOR 23.7 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
Change A10A2R21 to A10A2R21* 0698-7221 CD0 RESISTOR 237 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).

Page 6-23, Table 6-3:
►Change A10A2R26 to A10A2R26* 0698-7229 CD8 RESISTOR 511 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
►Change A10A2R28 to A10A2R28* 0698-7188 CD8 RESISTOR 10 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
►Change A10A2R29 to A10A2R29* 0698-7229 CD8 RESISTOR 511 1% .05W F TC = 0 ± 100. (Refer to **Change 12**).
►Change A10A2R69 to A10A2R69*. (Refer to **Change 12**).
►Change A10A2R70 to A10A2R70*. (Refer to **Change 12**).
►Change A10A2R72 to A10A2R72*. (Refer to **Change 12**).
Change A10A2T1—T5 to 08640-60355 TRANSFORMER RF (CODE BLUE) (Check Digit is 0).

NOTE

The above instruction regarding A10A2T1–T5 only applies to instruments with serial numbers prefixed 1634A to 1913A.

A10A2U12: For recommended replacement, refer to **Change 14.**

Page 6-27, Table 6-3:
►**A18CR6:** For recommended replacement, refer to **Change 16.**
Change A18Q6, A18Q8, A18Q9, and A18Q11 to 1853-0007 TRANSISTOR PNP 2N3251 SI TO-18 PD=360 MW.

ERRATA (Cont'd)

►Page 6-28, Table 6-3:
A20CR1 and CR3: For recommended replacements, refer to **Change 16.**

Page 6-29, Table 6-3:
A2A1C1, C2, and C6: For recommended replacements, refer to **Change 3.**
►**A22CR2:** For recommended replacement, refer to **Change 16.**

►Page 6-30, Table 6-3:
A22CR6: For recommended replacement, refer to **Change 16.**

Page 6-31, Table 6-3:
►Change A23A2R1 to A23A2R1*.
►Change A23A2R2 to A23A2R2*.
►Change A23A2R3 to A23A2R3*.
Under A26, delete "(DOES NOT INCLUDE A26U1, U2)".
A26C17 and C18: For recommended replacements, refer to **Change 4.**

Page 6-32, Table 6-3:
A26R1: For recommended replacement, refer to **Change 4.**

NOTE

When replacing A26R1, check the value of A26A4R4. It should be 7500Ω. If not, replace resistor. (Part number given in **Change 5**).

►Under A26A1, delete "(EXCEPT OPTION 002. FOR OPT 002, SEE SECOND A25 LISTING)".

►Page 6-35, Table 6-3:
Change A26A3C3 to A26A3C3*.
Change A26A3C4 to A26A3C4*.
Change A26A3C5 to A26A3C5*.
Change A26A3C6 to A26A3C6*.

Page 6-36, Table 6-3:
A26A4U1: For recommended replacement, refer to **Change 15.**

Page 6-38, Table 6-3:
Add F1 2110-0043 FUSE 1.50A 250V FAST-BLO 1.25 X .25 UL IEC (FOR 220/240V OPERATION).

Page 6-40, Table 6-3:
W7: For recommended replacement, refer to **Change 15.**

Page 6-41, Table 6-3:
►Add beneath item 2 entry (08641-00043), 2510-0198 (Qty 6) CD2 SCREW-MACH 8-32 .625-IN-LG PAN-HD-POZ1
Change Reference Designation 11 part number to 08641-00040 and increase the quantity to 2 (Check Digit is 5).

►Service Sheet 9 (schematic):
Add an asterisk (indicating factory selected value) to A23A2R1, R2, and R3.

Service Sheet 10 (schematic):
Change A10A1C66 to 350 pF.

ERRATA (Con't)

Service Sheet 11 (schematic):
►Change A10A2R9* to 511Ω. (Refer to **Change 12**).
►Change A10A2R10* to 10Ω. (Refer to **Change 12**).
►Change A10A2R12* to 511Ω. (Refer to **Change 12**).
►Change A10A2R18* to 237Ω. (Refer to **Change 12**).
►Change A10A2R20* to 23.7Ω. (Refer to **Change 12**).
►Change A10A2R21* to 237Ω. (Refer to **Change 12**).
►Change A10A2R26* to 511Ω. (Refer to **Change 12**).
►Change A10A2R28* to 10Ω. (Refer to **Change 12**).
►Change A10A2R29* to 511Ω. (Refer to **Change 12**).
Add an asterisk (indicating factory selected values) to A10A2R49, R50, and R51.

►Service Sheet 12 (schematic):
Add value of .22 pF to A26A3C3*, C4*, C5*, and C6*.

Service Sheet 17 (schematic);
Change the part number of A2U1 to 1826-0011.

Service Sheet 19 (schematic):
On the A8A3 assembly, change U9B pin number 3 to pin 1 and change pin 1 to pin 3.

Service Sheet 20 (schematic):
Change the part number of A8A2A1U13, U17, and U18 to 1820-1201.
Indicate the output of A8A2A1U25 as pin 1.
Change "NC" on pin 2 of A8A2A1U5A to "+5.2V".

Service Sheet 21 (schematic):
Change the part number of A8A2A1U4 to 1820-1199.

►Service Sheet 23 (schematic):
Change the part number of A18Q6, A18Q8, A18Q9, and A18Q11 to 1853-0007.

Service Sheet B (legend):
Change Item Number 13 to 15.
Change Item Number 15 to 13.

Service Sheet G (legend):
Change the reference designation corresponding to (33) to A5R8.
Change the reference designation corresponding to (48) to A26A1R19.
Swap entire legend with legend on Service Sheet H.

Service Sheet H (legend):
Swap entire legend with legend on Service Sheet G.

CHANGE 1

Page 5-32:
Add the attached paragraph 5-45.

5-45. PHASE LOCK ERROR VOLTAGE ADJUSTMENT

REFERENCE: Service Sheet 21.

DESCRIPTION: When the instrument is operating in the normal count mode, a nominal mid-range (phase lock error) voltage should exist at test point A8A2A1TP6. A mid-range voltage ensures that the generator will maintain phase lock when the oscillator shifts up or down in frequency.

EQUIPMENT: Digital Voltmeter . . . . . HP 3490A

PROCEDURE:

1. Set Signal Generator's controls as follows:

   COUNTER . . . . . INT NORM

2. Connect one lead of the voltmeter to test point A8A2A1TP6 and the other lead to ground. Adjust potentiometer A8A2A1R58 for a voltmeter reading of +11.5±1.0 Vdc.

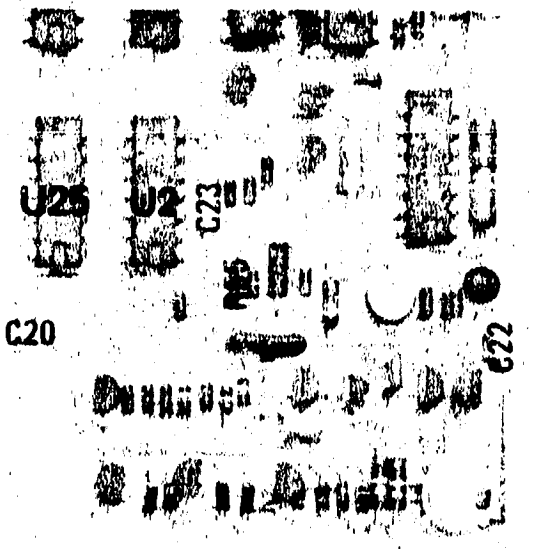
Page 6-14, Table 6-3:
Change A8A2A1R47 to 0698-3444 RESISTOR 316 1% .125W F TC=0±100.

Change A8A2A1R58 to 2100-2497 RESISTOR-TRMR 2K 10% C TOP-ADJ 1-TRN.

Delete A8A2A1R60 and R61.

Page 6-21, Table 6-3:
► Delete A10A2C7 part number and change the description to read NOT ASSIGNED.
► In the table of REFERENCE DESIGNATIONS under A10A2 ASSY, change C1—4, 6—20, 22—55 to read C1—14, 6, 8—20, 22—55.

Service Sheet 20 (component locations):
Replace appropriate portions of Figure 8-69 with the following partial Figure 8-69:

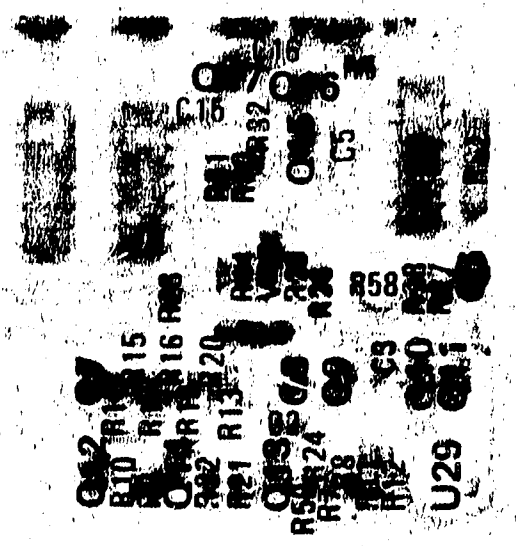


P/O Figure 8-69. P/O A8A2A1 Counter/Lock Board Assembly Component Locations (P/O Change 1)

CHANGE 1 (Cont'd)

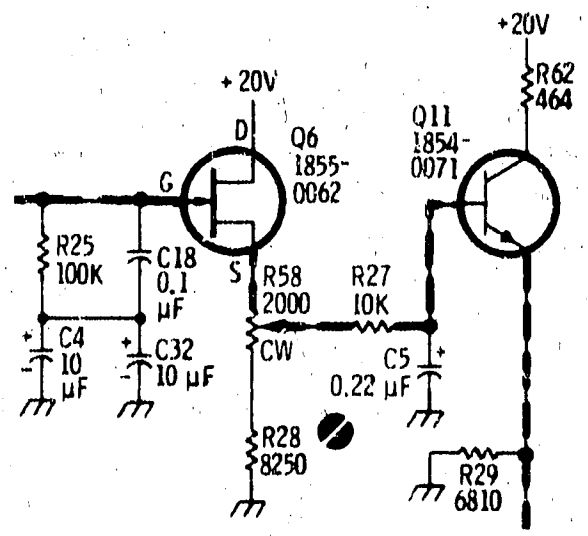
Service Sheet 20 (schematic):
Change A8A2A1R47 to 316Ω.

Service Sheet 21 (component locations):
Replace appropriate portions of Figure 8-71 with the following partial Figure 8-71:



P/O Figure 8-71. P/O A8A2A1 Counter/Lock Board Assembly Component Locations (P/O Change 1)

Service Sheet 21 (schematic):
Replace appropriate portion of schematic with the following partial schematic:



P/O Figure 8-72. Counter Phase Lock Circuits Schematic Diagram (P/O Change 1)

CHANGE 2

Page 6-13, Table 6-3:
Change A8A2A1C13 to 0160-3533 CAPACITOR-FXD 470 PF ±5% 300 VDC MICA 0+70.

Page 6-15, Table 6-3:
Change A8A2A1U27 to 1820-1449 IC GATE TTL S OR QUAD 2-INP SN74S32N.

CHANGE 2 (Cont'd)

Pages 6-35 and 6-36, Table 6-3:

Change A26A4 to 08640-60351.

Add the following to the A26A4 listing:

C19, C20 0180-2619 CAPACITOR-FXD 22 UF ±10% 15 VDCTA (C18 not assigned).

CR16 1901-0040 DIODE-SWITCHING 30V 50 MA 2NS DO-35 (CR15 not assigned).

Q10 1853-0007 TRANSISTOR PNP 2N3251 SI TO-18 PD=360 MW.

► R56, R59 0757-0442 RESISTOR 10K 1% 0.125W F TC=0±100. (R54 and R55 not assigned).

R58, 0757-0465 RESISTOR 100K 1% 0.125W F TC=0±100 (R57 not assigned).

Service Sheet 12 (component locations):

Replace Figure 8-46 with the attached figure 8-46:

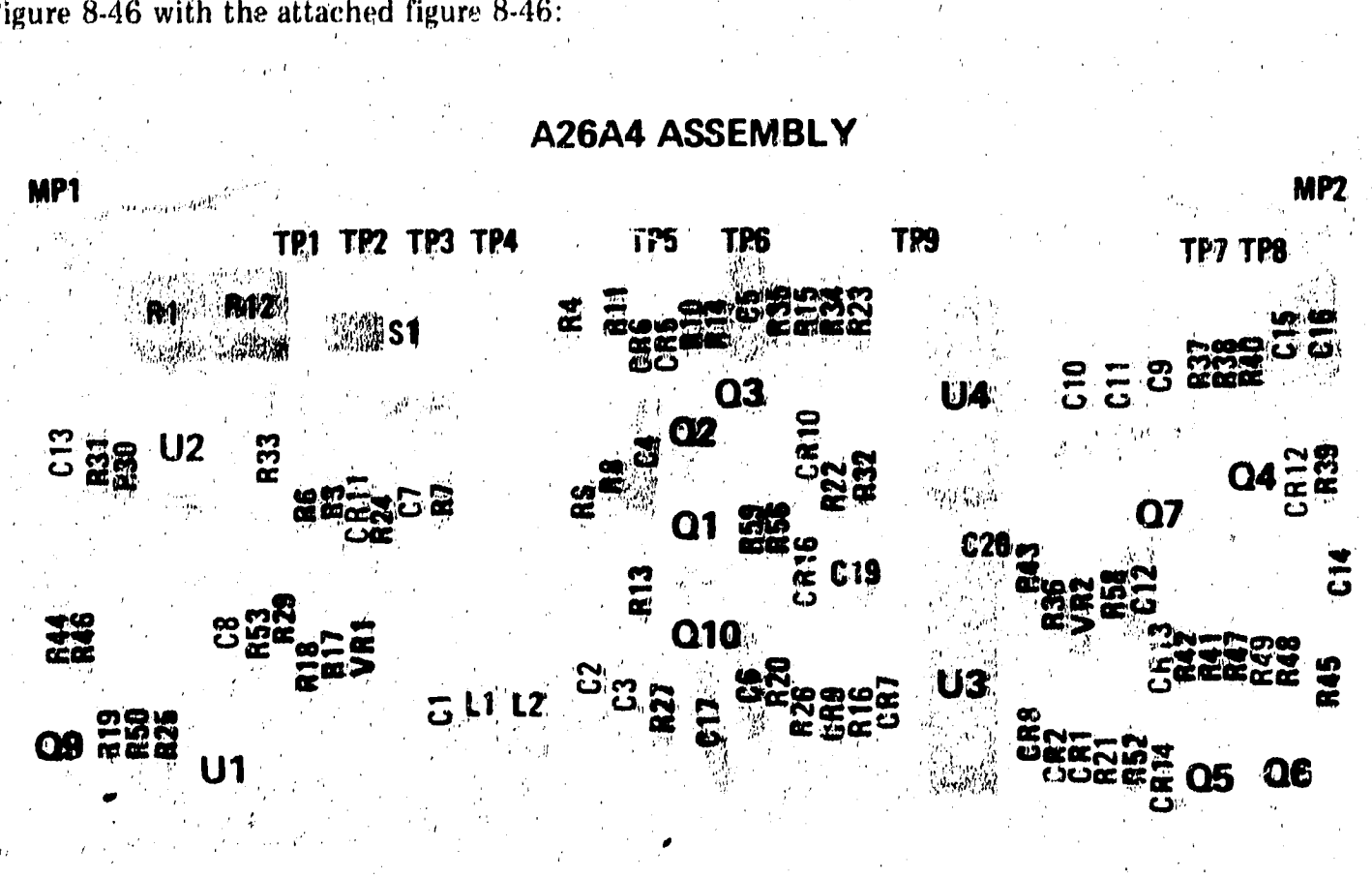


Figure 8-46. A26A4 AGC Amplifier Assembly Component Locations (P/O Change 2)

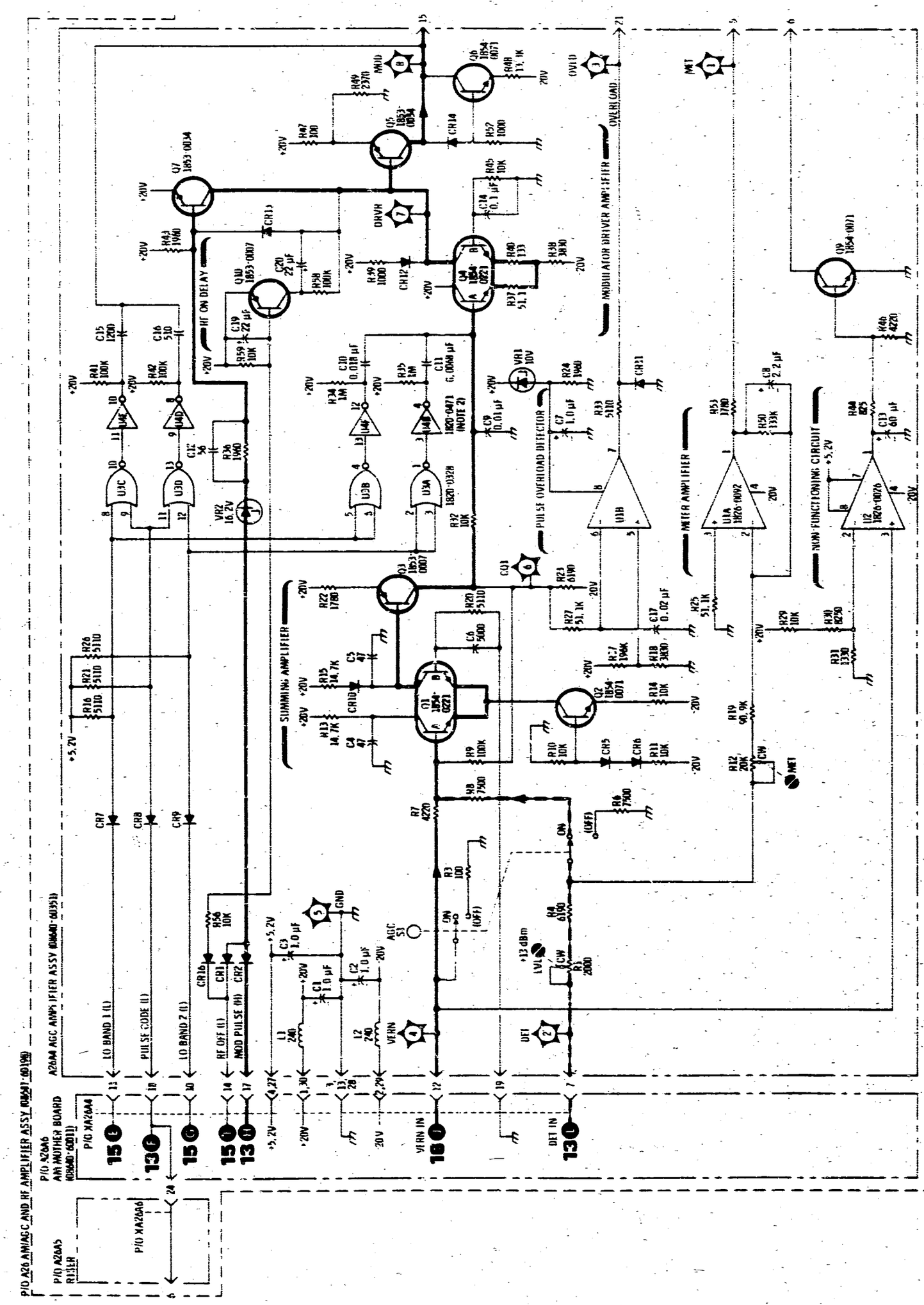
Service Sheet 12 (schematic):

Replace appropriate poriton of the schematic diagram with the attached partial schematic on next page.

Service Sheet 20 (schematic):

Change A8A2A1C13 to 470 pF.

Change A8A2A1U27 to 1820-1449.



P/O Figure 8-47. AGC Amplifiers and Amplitude Modulator Schematic Diagram (P/O Change 2)

CHANGE 3

Page 6-11, Table 6-3:
Change A8L5 to 9100-1612 COIL-MLD 330NH 20% Q = 45 .155DX .375 LG.

Page 6-12, Table 6-3:
Add A8A1C14 0160-3879 CAPACITOR-FXD 0.01 UF +20% 100 VDC CER.

Page 6-13, Table 6-3:
Change A8A2A1C12 to 0140-0196 CAPACITOR-FXD 150 PF ±5% 300 VDC MICA.

Page 6-15, Table 6-3:
Change the following A8A2A1 listings:
Change U14 to 1820-1208 IC GATE TTL LS OR QUAD 2-INP SN74LS32N.
Change U15 to 1820-1197 IC GATE TTL LS NAND QUAD 2-INP SN74LS00N.
Change U19 to 1820-1684 IC CNTR TTL LS BCD UP/DOWN ASYNCHRO 9LS192PC.

Page 6-24 and 6-25, Table 6-3:
Make the following changes to the A11 listings:
Change Q7 to 1854-0071 TRANSISTOR NPN SI PD=300 MW FT=200 MHZ.
Add Q10 1853-0001 TRANSISTOR PNP SI TO-39 PD=600 MW.
1200-0173 INSULATOR-XSTR DAP-GL.
Change R6 to 0757-0280 RESISTOR 1K 1% .125W F TC=0±100.
Add R43 0757-0442 RESISTOR 10K 1% .125W F TC=0±100.
Change VR2 to 1902-0184 DIODE-ZNR 16.2V 5% DO-7 PD=.4W TC=+.066%.

Page 6-29, Table 6-3:
Change A21A1C1, C2, and C6 to 0160-4584 CAPACITOR FXD .1 UF ±20% 50 WVDC CER.

Page 6-40, Table 6-3:
Change S4 to 3101-1740 SWITCH-SL DPDT-NS STD 2A 250VAC SLDR-LUG.

Continued . . .

CHANGE 3 (Cont'd)

Service Sheet 9, component locations:
Replace Figure 8-36 with the following figure:

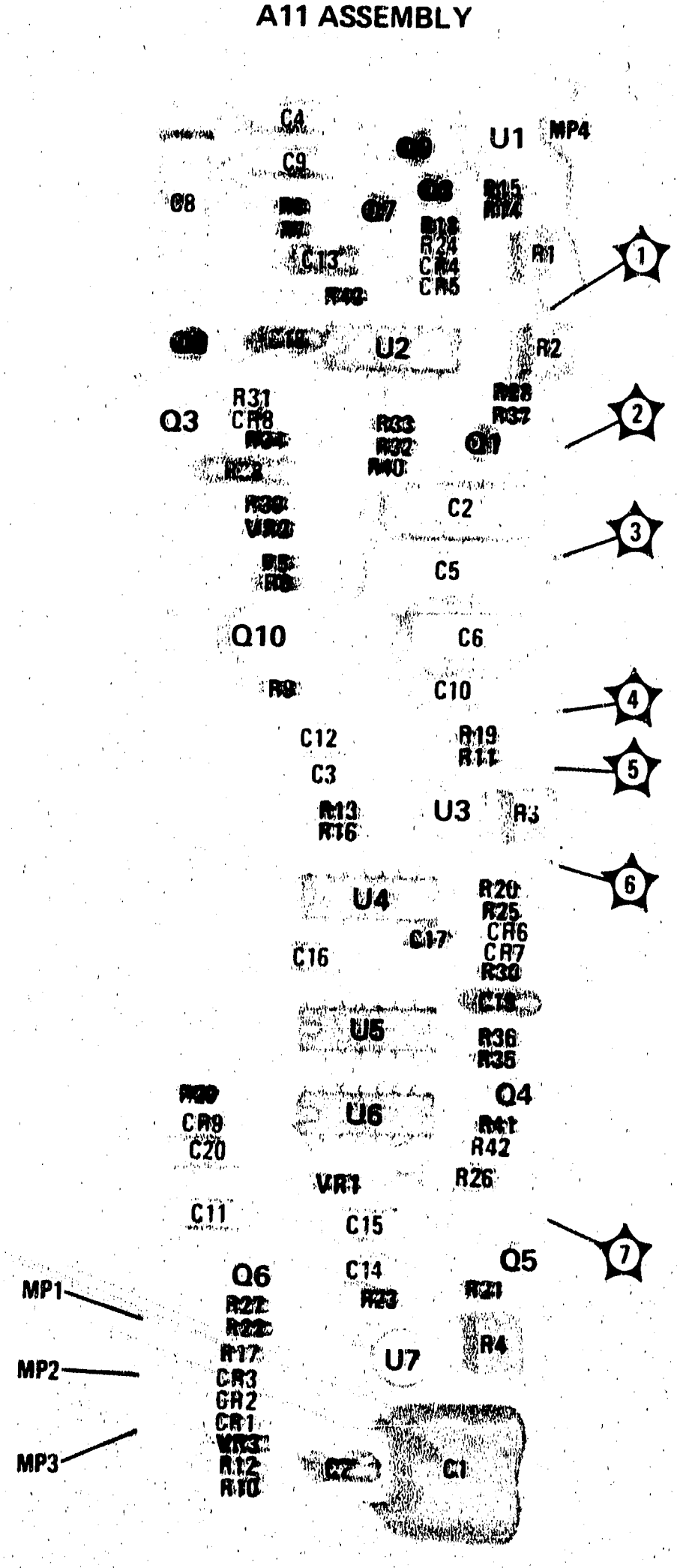
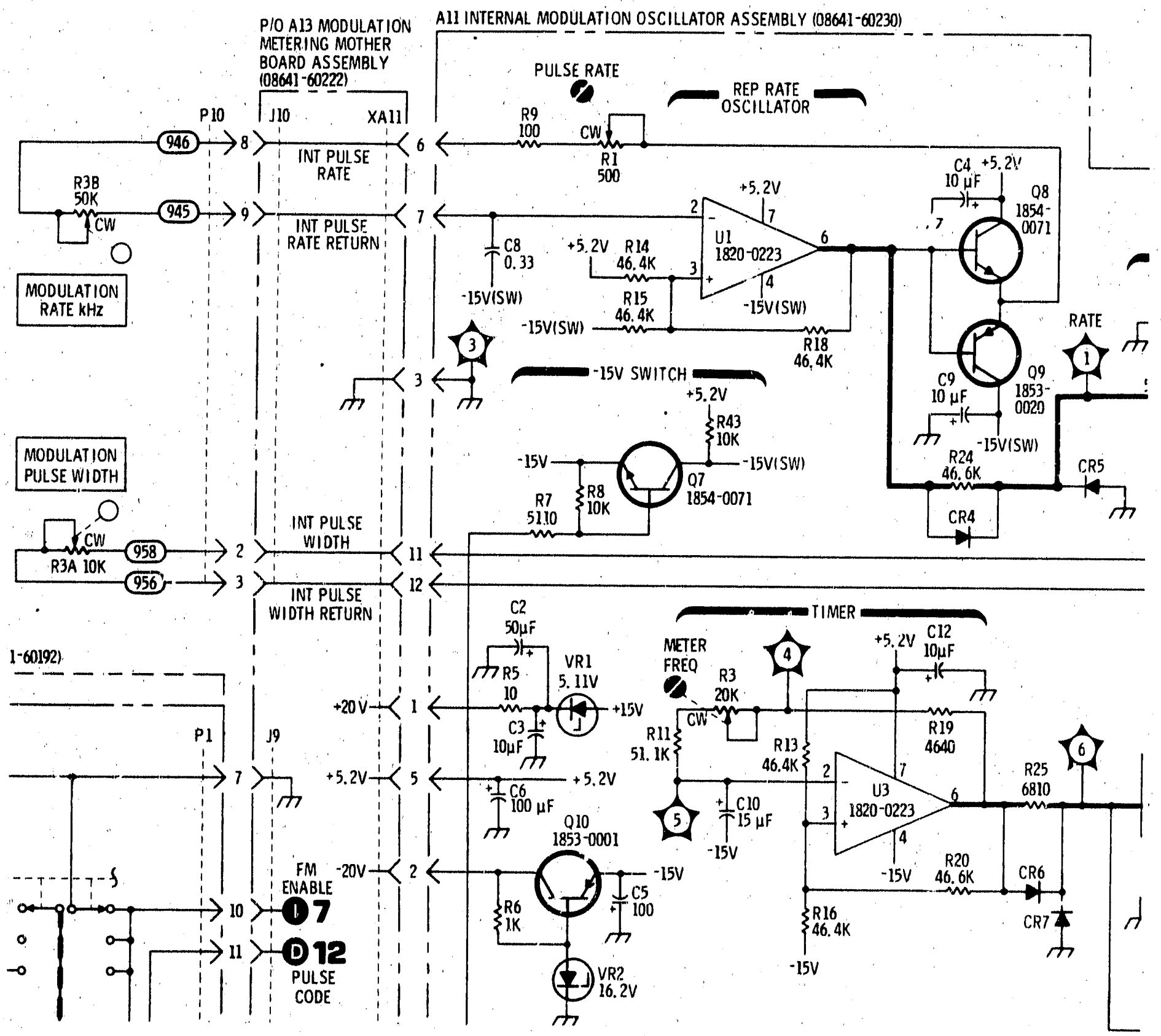


Figure 8-36. A11 Internal Modulation Oscillator Component Locations (P/O Change 3)

CHANGE 3 (Cont'd)

Service Sheet 9 (schematic):

Replace appropriate portion of schematic with the following partial schematic:



P/O Figure 8-37. Internal Modulation Oscillator Schematic Diagram (P/O Change 3)

Service Sheet 18 (schematic):

Change A8L5 to 0.33 µH.

On A8A1U5 draw in pin 7 and add C14, 0.01 µF, between pins 7 and 8.

► In the table of REFERENCE DESIGNATIONS under A8A1 ASSY, change C1–13 to read C1–14.

Service Sheet 20 (schematic):

Make the following changes to the A8A2A1 Assembly.

Change C12 to 150 pF.

Change the part number of U14 to 1820-1208.

Change the part number of U15 to 1820-1197.

Change the part number of U19 to 1820-1684.

CHANGE 4

Page 6-31 and 6-32, Table 6-3:

Make the following changes to the A26 listing.

Change C17 and C18 to 0160-3219 CAPACITOR-FDTHRU 100 PF 20% 500V CER.

Add L9 9140-0098 COIL-MLD 2.2 UH 10% Q=33 .155DX .375 LG-NOM.

Delete R1 part number and change description to read NOT ASSIGNED.

Service Sheet 13 (schematic):

Make the following changes to the A26 assembly.

Change C17 and C18 to 100 pF.

Change R1 to L9, 2.2 μH.

►In the table of REFERENCE DESIGNATIONS under A26 ASSY, change L3–5, 7, 8 to read L3–5, 7–9 and delete R1.

Service Sheet F (legend):

Change Item Number 77 (Reference Designator and Description) to A26L9 Inductor.

CHANGE 5

Page 6-5, Table 6-3:

Change A1A1R1 to 0757-0401 RESISTOR 100 1% .125W F TC=0±100.

Page 6-13, Table 6-3:

Change A8A2A1Q6 to 1855-0271 TRANSISTOR J-FET N-CHAN D-MODE SI.

Page 6-36, Table 6-3:

Change A26A4R4 to 0757-0440 RESISTOR 7500 1% .125W F TC = 0 ± 100.

Service Sheet 12 (schematic):

►Change A26A4R4 to 7500Ω. (Refer to **Change 2**).

Service Sheet 21 (schematic):

►Change the part number of A8A2A1Q6 to 1855-0271. (Refer to **Change 1**).

CHANGE 6

Page 6-9, Table 6-3:

Add A7C14 0180-0299 CAPACITOR-FXD 33UF ±10% 10 VDC TA.

Service Sheet 7 (schematic):

On the A7 Assembly, add C14, 33 μF, from the +5.2V input line (positive polarity) to the ground input line.

►In the table of REFERENCE DESIGNATIONS under A7 ASSY, change C1—12 to read C1—12, 14.

CHANGE 7

Page 6-24 and 6-25, Table 6-3:

Make the following changes to the A11 listing:

► Delete C5 part number and change description to read NOT ASSIGNED.

Add C21 and C22 0180-0058 CAPACITOR-FXD 50μF+75−10% 25 VCD AL (Check Digit is 0).

Add R44 0698-3400 RESISTOR 147 1% .5W F TC=0±100 (Check Digit is 9).

►Delete Q10 part number and change description to read NOT ASSIGNED. Delete INSULATOR (1200-0173). (Refer to **Change 3**).

►Delete R6 part number and change description to read NOT ASSIGNED. (Refer to **Change 3**).

Add R45 0698-3102 RESISTOR 237 1% .5W F TC=0±100 (Check Digit is 8).

►Change VR2 to 1902-0202 DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057% (Check Digit is 9). (Refer to **Change 3**).

Add VR4 1902-0202 DIODE-ZNR 15V 5% DO-15 PD=1W TC=+.057% (Check Digit is 9).

Page 6-39, Table 6-3:

Add MP86 08641-00064 INSULATOR, BARRIER BLOCK (Check Digit is 3).

Add MP87 7120-4295 LABEL-WARNING (Check Digit is 6).

CHANGE 7 (Cont'd)

Service Sheet 9 (component locations):

►Replace Figure 8-36 with the following figure (Refer to **Change 3**):

A11 ASSEMBLY

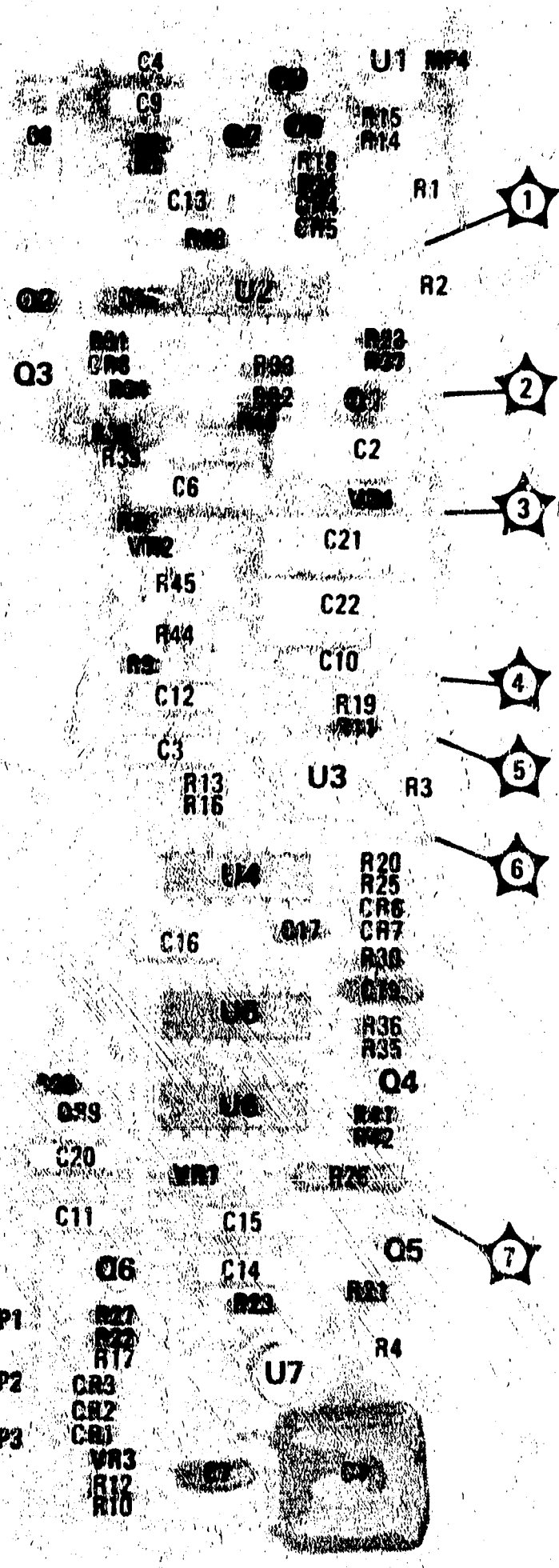
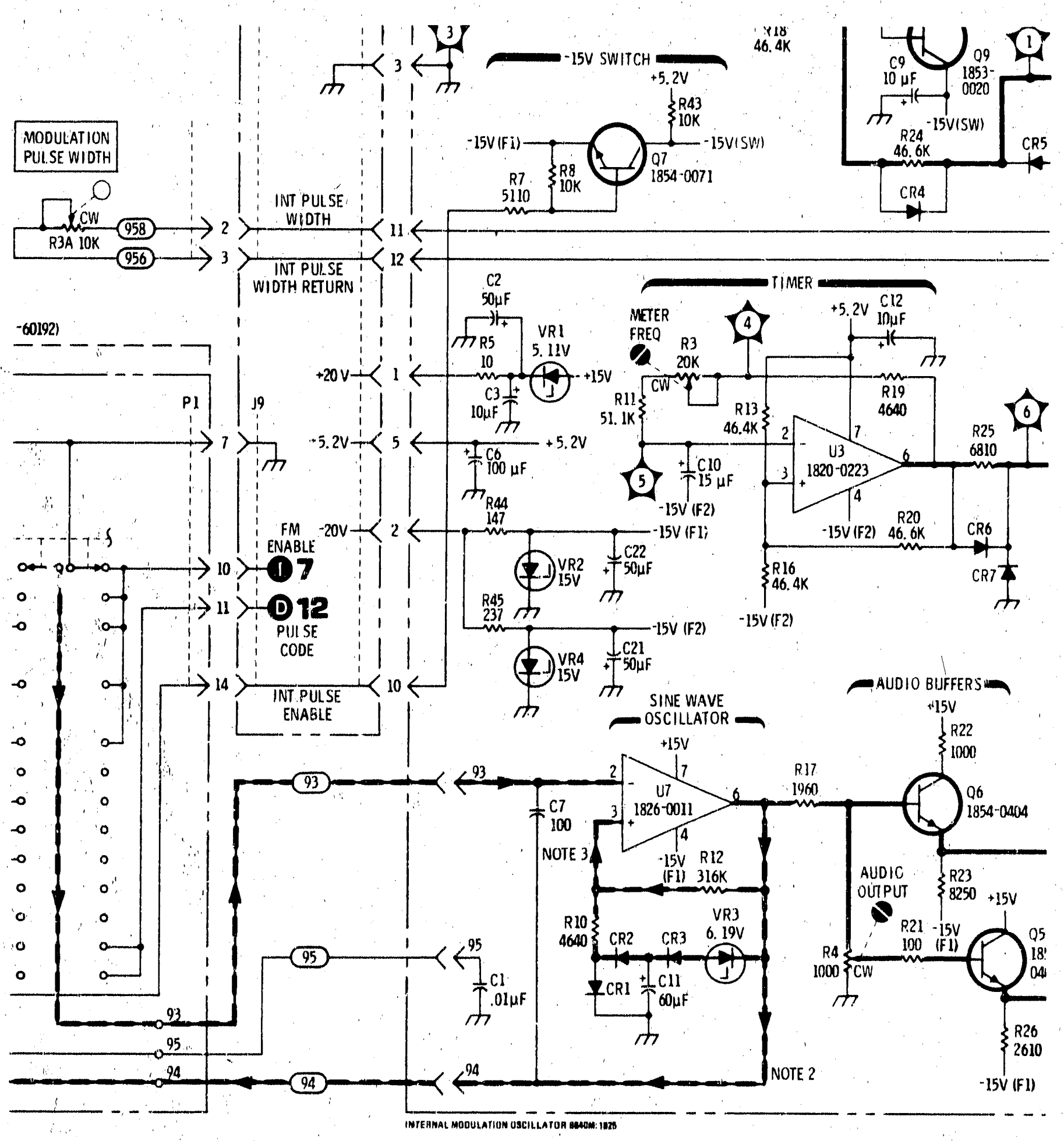


Figure 8-36. A11 Internal Modulation Oscillator Component Locations (P/O Change 7)

CHANGE 7 (Cont'd)

Service Sheet 9 (schematic):

► Replace appropriate portion of schematic with the following partial schematic (Refer to **Change 3**):



P/O Figure 8-37. Internal Modulation Oscillator Schematic Diagram (P/O Change 7)

CHANGE 8

Page 6-8, Table 6-3:

Add A5C10 0180-2617 CAPACITOR-FXD 6.8 UF ±10% 35VDC TA (A5C9 not Assigned) (Check Digit is 1).

Page 6-38, Table 6-3:

Make the following changes to the part listing under F1:

Delete 2110-0465.
Delete 2110-0467.
Delete 2110-0470.
Delete 2190-0037.
Delete 0900-0028.
Add 2110-0564 FUSEHOLDER BODY 12A MAX; 250V MAX (Check Digit is 8).
Add 2110-0565 FUSEHOLDER CAP BAYONET; 12A, 250V MAX (Check Digit is 9).
Add 2110-0569 NUT-HEX, PLASTIC (Check Digit is 3).
Add 1400-0090 WASHER: RUBBER 5/8" OD (Check Digit is 9).

Page 6-39, Table 6-3:

Add MP88 08640-00138 RETAINER (FOR A12 RECTIFIER ASSEMBLY) (Check Digit is 1).

Page 6-40, Table 6-3:

►Change S4 to 3101-2299 SWITCH-SL DPDT-NS STD 5A 250VAC SLDR-LUG (Check Digit is 2). (Refer to **Change 3**).

Service Sheet 6 (schematic):

On the A5 Assembly, add C10, 6.8μF, from the -20V input to the ground input line (positive polarity).
►In the table of REFERENCE DESIGNATIONS under A5 ASSY, change C1—9 to read C1—10.

CHANGE 9

Page 6-14, Table 6-3:

Add A8A2A1R64 0698-7260 CD7 RESISTOR 10K 1% .05W F TC=0±100 (A8A2A1R63 is not assigned).

Service Sheet 21 (schematic):

On the A8A2A1 Assembly add R64, 10k, from pin 5 of U3B to the +5.2V supply line.
►In the table of REFERENCE DESIGNATIONS under A8A2A1 ASSY, change R1—38, 51—54, 59—63 to read R1—38, 51—54, 59—64.

CHANGE 10

Page 6-9, Table 6-3:

Add A7C15 0160-3876 CAPACITOR-FXD 47 PF ±20% 200 VDC CER (Check Digit is 4).

Service Sheet 7 (schematic):

On the A7 Assembly, add C15, 47 pF, across the base and collector of Q2.
►In the table of REFERENCE DESIGNATIONS under A7 ASSY, change C1—12 to read C1—12, 14, 15 (Refer to **Change 6**).

CHANGE 11

Page 6-34, Table 6-3:

Change A26A2R19 to 2100-2574 RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN (Check Digit is 3).

Change A26A2U2 to 1820-0054 IC GATE TTL NAND QUAD 2-INP (Check Digit is 5).

Service Sheet 13 (schematic):

Change the part number of A26A2U2A to 1820-0054.

Service Sheet 14 (schematic):

Change the value of A26A2R19 to 500Ω.

CHANGE 12

Page 5-2, paragraph 5-21:

Delete the **A10A2R3 Selection** procedure.

Page 5-3, paragraph 5-21:

Under **A10A2R6-R8, R12-14, and R18-R20 Selection**, change the following reference designations:

Old Reference Designations	New Reference Designations
A10A2R6	A10A2R10
A10A2R7	A10A2R9
A10A2R8	A10A2R12
A10A2R12	A10A2R20
A10A2R13	A10A2R18
A10A2R14	A10A2R21
A10A2R18	A10A2R28
A10A2R19	A10A2R26
A10A2R20	A10A2R29

Page 5-3, Table 5-1:

Change the following reference designations:

Old Reference Designations	New Reference Designations
A10A2C55	A10A2C8
A10A2R6	A10A2R10
A10A2R7	A10A2R9
A10A2R8	A10A2R12
A10A2R12	A10A2R20
A10A2R13	A10A2R18
A10A2R14	A10A2R21
A10A2R18	A10A2R28
A10A2R19	A10A2R26
A10A2R20	A10A2R29
A10A2R49, A10A2R50, A10A2R51 (See Note)	A10A2R70, A10A2R69, A10A2R72

NOTE: Refer to the errata section of this Manual Changes Supplement.

Delete A10A2R3.

Add the following entry:

Component	Service Sheet	Range of Values	Basis of Selection
A10A2R2-4	11	—	See paragraph 5-21k

CHANGE 12 (Cont'd)

Page 5-4, paragraph 5-21:

Under **step i** change the reference designation of A10A2C55 to A10A2C8 **(1 place).**

Under **A10A2R49-51 Selection** change the reference designation of A10A2R49, R50, and R51 to A10A2R70, R69, and R72 respectively (4 places) **(Refer to the errata section of this Manual Changes Supplement)**

Add the following after the **A10A2R70, R69, and R72 Selection** procedure (see above change):

k. A10A2R2-R4 Selection. If the RF Divider EECL Bias Adjustment (paragraph **5-46)** cannot be performed successfully, it may be necessary to change the values of A10A2R2-R4. These resistors form an attenuator pad which sets the signal level into A10A2U11. For most cases, if the value of the pad is less than 2 dB, increase the attenuation of the pad. Refer to the following table for the resistor values. If increasing the attenuation does not correct the problem, try decreasing it.

Attenuation (dB)	Resistance (Ω)		
	R2	R3	R4
0	Open	Short	51.1
1	825	6.8	825
1.7	511	10	511
2	422	12	422
3	287	17.8	287

NOTE

The RF Divider EECL Bias Adjustment, paragraph 5-46, should be performed if the values of A10A2R2-R4 have been changed.

Page 5-32:

Add the following after **paragraph 5-45** (Refer to **Change 1**):

5-46. RF DIVIDER EECL BIAS ADJUSTMENT

REFERENCE: Service Sheet 11.

DESCRIPTION: The output signal at RF OUTPUT is observed with a spectrum analyzer. The bias level for divider U12 is adjusted to eliminate any signal irregularities (that is, erratic frequency, sub-harmonics, or increased level of the noise floor) as the Signal Generator is tuned across the 256-128 MHz and 128-64 MHz ranges. This procedure should be performed whenever the A3 RF Oscillator Assembly has been repaired or replaced (that is, any changes that affect the oscillator's output power level) or when A10A2U11 or U12 is replaced.

EQUIPMENT: Spectrum Analyzer HP 8554B/8552B/141T.

PROCEDURE:

1. Connect spectrum analyzer to the Signal Generator's RF OUTPUT after setting the Signal Generator's controls as follows:

COUNTER		INT NORM
METER		RF LEVEL
MODULATION MODE		OFF
FREQUENCY:	RANGE	256—512 MHz
	TUNE	256 MHz
OUTPUT:	RANGE Switch	—10 dBm
	RANGE Vernier	Fully cw

2. Set the spectrum analyzer's center frequency to 250 MHz, frequency span (scan width) to 50 MHz per division, resolution bandwidth to 300 kHz, input attenuation to 20 dB, and vertical scale to 10 dB per division.

CHANGE 12 (Cont'd)

3. While observing the RF OUTPUT signal with the spectrum analyzer, tune the Signal Generator across its frequency range. If the signal appears erratic or disappears or if the noise floor abruptly rises, adjust the BIAS adjustment, A10A2R6, until a clean and stable signal is again observed.

4. Turn the FREQUENCY RANGE switch to the 128—64 MHz range and repeat step 3.

5. If the BIAS adjustment, A10A2R6, requires readjustment on the 128—64 MHz range, check the 256—128 MHz range again for any signal irregularities.

NOTE

If the bias level cannot be adjusted for satisfactory operation on both ranges without readjustment, it may be necessary to select new values for A10A2R2-R4. Refer to paragraph 5-19, Factory Selected Components.

Page 6-12 and 6-13, Table 6-3:
Change A8A1 to 08640-60357 CD2 (Description remains the same).
Make the following changes to the A8A1 Assembly.
Change C8 and C12 to 0160-3872 CD0 CAPACITOR-FXD 2.2 PF ±.25 PF 200 VDC CER.
Change C13 to 0160-0573 CD2 CAPACITOR-FXD 4700 PF ±20% 100 VDC CER.
► Delete R21 part number and change description to read NOT ASSIGNED.
Add R23 to 0757-1094 CD9 RESISTOR 1.47K 1% .125W F TC=0±100.
Change U3 to 1820-0802 CD1 IC GATE ECL NOR QUAD 2-INP.

Page 6-21 through 6-24, Table 6-3:
Replace the entire A10A2 listing with the attached parts list.

Service Sheet 11 (simplified logic diagram):
Make the following changes to the A10 Divider/Filter Assembly simplified logic diagram.
Change the third ÷2 divider from "EECL" to "ECL".
Move the "EECL-ECL Converter" stage (located after the third ÷2 divider stage) to after the second ÷2 divider stage.

Service Sheet 11 (component locations):
Replace Figure 8-43 with the attached Figure 8-43.

Service Sheet 11 (schematic):
Replace Figure 8-44 with the attached Figure 8-44.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10A2	08640-60354	9	1	RF DIVIDER ASSEMBLY	28480	08640-60354
A10A2C1	0180-0374	3	2	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X9020B2
A10A2C2	0180-0374	3		CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	150D106X9020B2
A10A2C3	0160-3456	6	28	CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C4	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C5	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C6	0160-4084	5	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-4084
A10A2C7	0180-1743	2	7	CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C8				C8 IS TYPICALLY NOT PRESENT, REFER TO TABLE 5-1.		
A10A2C9	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C10	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C11	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C12	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C13	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C14	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C15	0160-3456	6	20	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C16	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C17	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C18	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C19	0160-2055	9		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C20	0160-3456	6		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C21	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C22	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C23	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C24	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C25	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C26	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C27	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C28	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C29	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C30	0160-2055	9	1	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C31	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C32	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C33	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C34	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C35	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C36	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C37	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C38	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C39	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C40	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C41	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C42	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C43	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C44	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C45	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C46	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C47	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C48	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C49	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C50	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C51	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C52	0180-1743	2		CAPACITOR-FXD .1UF+-10% 35VDC TA	56289	150D104X9035A2
A10A2C53	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C54	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C55	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C56	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C57	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2C58	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C59	0180-0100	3	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	150D475X903582
A10A2C60	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C61	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A10A2C62	0180-0100	3		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	150D475X903582
A10A2C63	0180-0197	8		CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A10A2C64	0160-3456	6		CAPACITOR-FXD 1000PF +-10% 1KVDC CER	28480	0160-3456
A10A2CR1	1901-0025	2	17	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR2	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR3	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR4	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR5	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025

Part Number 8220 3991

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10A2CR6	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR7	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR8	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR9	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR10	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR11	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR12	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR13	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR14	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR15	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR16	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2CR17	1901-0025	2		DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A10A2L1	9100-1620	5	4	COIL-MLD 15UH 10% Q=65 .155DX.375LG-NOM	28480	9100-1620
A10A2L2	9140-0096	1	2	COIL-MLD 1UH 10% Q=50 .155DX.375LG-NOM	28480	9140-0096
A10A2L3	9140-0096	1		COIL-MLD 1UH 10% Q=50 .155DX.375LG-NOM	28480	9140-0096
A10A2L4	9100-1612	5	1	COIL-MLD 330NH 20% Q=45 .155DX.375LG-NOM	28480	9100-1612
A10A2L5				PART OF ETCHED CIRCUIT BOARD		
A10A2L6	9140-0094	9	1	COIL-MLD 680NH 10% Q=50 .155DX.375LG-NOM	28480	9140-0094
A10A2L7	9100-1615	8	1	COIL-MLD 1.2UH 10% Q=33 .155DX.375LG-NOM	28480	9100-1615
A10A2L8	9140-0098	3	1	COIL-MLD 2.2UH 10% Q=33 .155DX.375LG-NOM	28480	9140-0098
A10A2L9	9140-0114	4	1	COIL-MLD 10UH 10% Q=55 .155DX.375LG-NOM	28480	9140-0114
A10A2L10	9100-1620	5		COIL-MLD 15UH 10% Q=65 .155DX.375LG-NOM	28480	9100-1620
A10A2L11	9100-1620	5		COIL-MLD 15UH 10% Q=65 .155DX.375LG-NOM	28480	9100-1620
A10A2L12	9100-1620	5		COIL-MLD 15UH 10% Q=65 .155DX.375LG-NOM	28480	9100-1620
A10A2L13	9100-1628	3	1	COIL-MLD 43UH 5% Q=60 .155DX.375LG-NOM	28480	9100-1628
A10A2Q1	1854-0071	7	1	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A10A2Q2	1853-0034	0	2	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A10A2Q3	1853-0034	0		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A10A2Q4				NOT ASSIGNED		
A10A2Q5	1854-0540	5	1	TRANSISTOR NPN SI TO-72 PD=200MW FT=1GHZ	04713	MM8006
A10A2Q6	1853-0326	3	2	TRANSISTOR PNP SI PD=1W FT=50MHZ	04713	MP8-U51
A10A2Q7	1853-0326	3		TRANSISTOR PNP SI PD=1W FT=50MHZ	04713	MP8-U51
A10A2R1	0757-1000	7	1	RESISTOR 51.1 1% .5W F TC=0+-100	28480	0757-1000
A10A2R2	0698-7229	8	2	RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A10A2R3	0698-7198	8	1	RESISTOR 10 1% .05W F TC=0+-100	24546	C3-1/8-T0-10R-G
A10A2R4	0698-7229	8		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-T0-511R-G
A10A2R5	0757-0394	0	20	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R6	2100-1984	7	1	RESISTOR-TRMR 100 10% C TOP-ADJ 1-TRN	73138	82PR100
A10A2R7	0757-0984	4	9	RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R8	0757-0438	3	4	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R9	0698-7221	0	2	RESISTOR 237 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-G
A10A2R10	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0+-100	24546	C3-1/8-T00-23R7-G
A10A2R11	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R12	0698-7221	0		RESISTOR 237 1% .05W F TC=0+-100	24546	C3-1/8-T0-237R-G
A10A2R13	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R14	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R15	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R16	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R17	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R18	0698-7218	5	4	RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R19	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R20	0698-7200	5	2	RESISTOR 31.6 1% .05W F TC=0+-100	24546	C3-1/8-T00-31R6-G
A10A2R21	0698-7218	5		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R22	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R23	0757-0416	7	1	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A10A2R24	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R25	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R26	0698-7218	5		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R27	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R28	0698-7200	5		RESISTOR 31.6 1% .05W F TC=0+-100	24546	C3-1/8-T00-31R6-G
A10A2R29	0698-7218	5		RESISTOR 178 1% .05W F TC=0+-100	24546	C3-1/8-T0-178R-G
A10A2R30	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R31	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R32	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R33	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R34	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R35	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A10A2R36	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R37	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R38	0698-7227	6	4	RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T00-422R-G
A10A2R39	0698-7190	2	2	RESISTOR 12.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-12R1-G
A10A2R40	0698-7227	6		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R41	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R42	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R43	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R44	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R45	0757-0984	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10A2R46	0757-0438	7		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R47	0757-0280	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0284
A10A2R48	0757-0438	7		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R49	0698-7227	6		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R50	0698-7196	2		RESISTOR 12.1 1% .05W F TC=0+-100	24546	C3-1/8-T00-12R1-G
A10A2R51	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R52	0698-7227	6		RESISTOR 422 1% .05W F TC=0+-100	24546	C3-1/8-T0-422R-G
A10A2R53	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R54	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R55	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R56	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R57	0757-0284	4		RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0284
A10A2R58	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R59	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R60	0698-0085	0	1	RESISTOR 2.61K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2611-F
A10A2R61	0757-1094	9	1	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A10A2R62	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A10A2R63	0698-3440	7	1	RESISTOR 196 1% .125W F TC=0+-100	24546	C4-1/8-T0-196R-F
A10A2R64	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A10A2R65	0698-3243	8	1	RESISTOR 178K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1783-F
A10A2R66	0698-3444	1	1	RESISTOR 316 1% .125W F TC=0+-100	24546	C4-1/8-T0-316R-F
A10A2R67	0757-0280	3	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A10A2R68	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A10A2R69	0698-3447	4	2	RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A10A2R70	0757-0379	1	1	RESISTOR 12.1 1% .125W F TC=0+-100	19701	MF4C1/8-T0-12R1-F
A10A2R71	0757-0280	3		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A10A2R72	0698-3447	4		RESISTOR 422 1% .125W F TC=0+-100	24546	C4-1/8-T0-422R-F
A10A2T1	08640-60355	0	5	TRANSFORMER, RF, BLUE	28480	08640-60355
A10A2T2	08640-60355	0		TRANSFORMER, RF, BLUE	28480	08640-60355
A10A2T3	08640-60355	0		TRANSFORMER, RF, BLUE	28480	08640-60355
A10A2T4	08640-60355	0		TRANSFORMER, RF, BLUE	28480	08640-60355
A10A2T5	08640-60355	0		TRANSFORMER, RF, BLUE	28480	08640-60355
A10A2T6	08640-80002	6	1	TRANSFORMER, RF 12-TURN	28480	08640-80002
A10A2TP1	1251-0600	0	4	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A10A2TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A10A2TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A10A2TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A10A2U1	1826-0303	9	1	IC OP AMP GP 8-DIP-P	01928	CA741G
A10A2U2	1820-0817	8	3	IC FF ECL D-M/S DUAL MC10131P	04713	MC10131P
A10A2U3	1820-0817	8		IC FF ECL D-M/S DUAL MC10131P	04713	MC10131P
A10A2U4	1820-0535	7	1	IC DRVR TTL AND DUAL 2-INP	01295	SN7545BP
A10A2U5	1820-0802	1	3	IC GATE ECL NOR QUAD 2-INP	04713	MC10102P
A10A2U6	1820-0802	1		IC GATE ECL NOR QUAD 2-INP	04713	MC10102P
A10A2U7	1820-0753	1	2	IC GATE ECL DUAL 3-INP	28480	1820-0753
A10A2U8	1820-0753	1		IC GATE ECL DUAL 3-INP	28480	1820-0753
A10A2U9	1820-0803	2	2	IC GATE ECL OR-NOR TPL	04713	MC10105P
A10A2U10	1820-0803	2		IC GATE ECL OR-NOR TPL	04713	MC10105P
A10A2U11	1820-0982	8	1	IC DIFF AMPL MS 16-DIP-C	28480	1820-0982
A10A2U12	1820-0736	0	1	IC CNTR ECL BIN DUAL	28480	1820-0736
A10A2U13	1820-1354	0	1	IC CNTR ECL BIN	28480	1820-1354
A10A2U14	1820-1225	4	1	IC FF ECL D-M/S DUAL	04713	MC10231P
A10A2U15	1820-0817	8		IC FF ECL D-M/S DUAL	04713	MC10131P
A10A2U16	1820-0802	1		IC GATE ECL NOR QUAD 2-INP	04713	MC10102P
A10A2VR1	1902-3002	3	2	DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=-.074%	28480	1902-3002
A10A2VR2	1902-3002	3		DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=-.074%	28480	1902-3002
A10A2W1	8120-1823	1	1	CABLE ASSY-COAX 50-OHM 1.9-IN-LG	28480	8120-1823
A10A2W2	8120-1824	2	1	CABLE ASSY-COAX 50-OHM 2.4-IN-LG	28480	8120-1824
A10A2W3	1820-1825	0	1	IC RCVR TTL BUS HEX	28480	1820-1825
A10A2W4	8120-1826	4	1	CABLE ASSY-COAX 50-OHM 5.6-IN-LG	28480	8120-1826
A10A2W5	8120-1827	5	1	CABLE ASSY-COAX 50-OHM 8.7-IN-LG	28480	8120-1827
A10A2W6	8120-2966	5	1	CABLE, COAX 50-OHM 9-IN-LG	28480	8120-2966
A10A2W7	8120-1829	7	1	CABLE ASSY-COAX 50-OHM 7.9-IN-LG	28480	8120-1829

See introduction to this section for ordering information

CHANGE 12 (Cont'd)

A10A2 ASSEMBLY

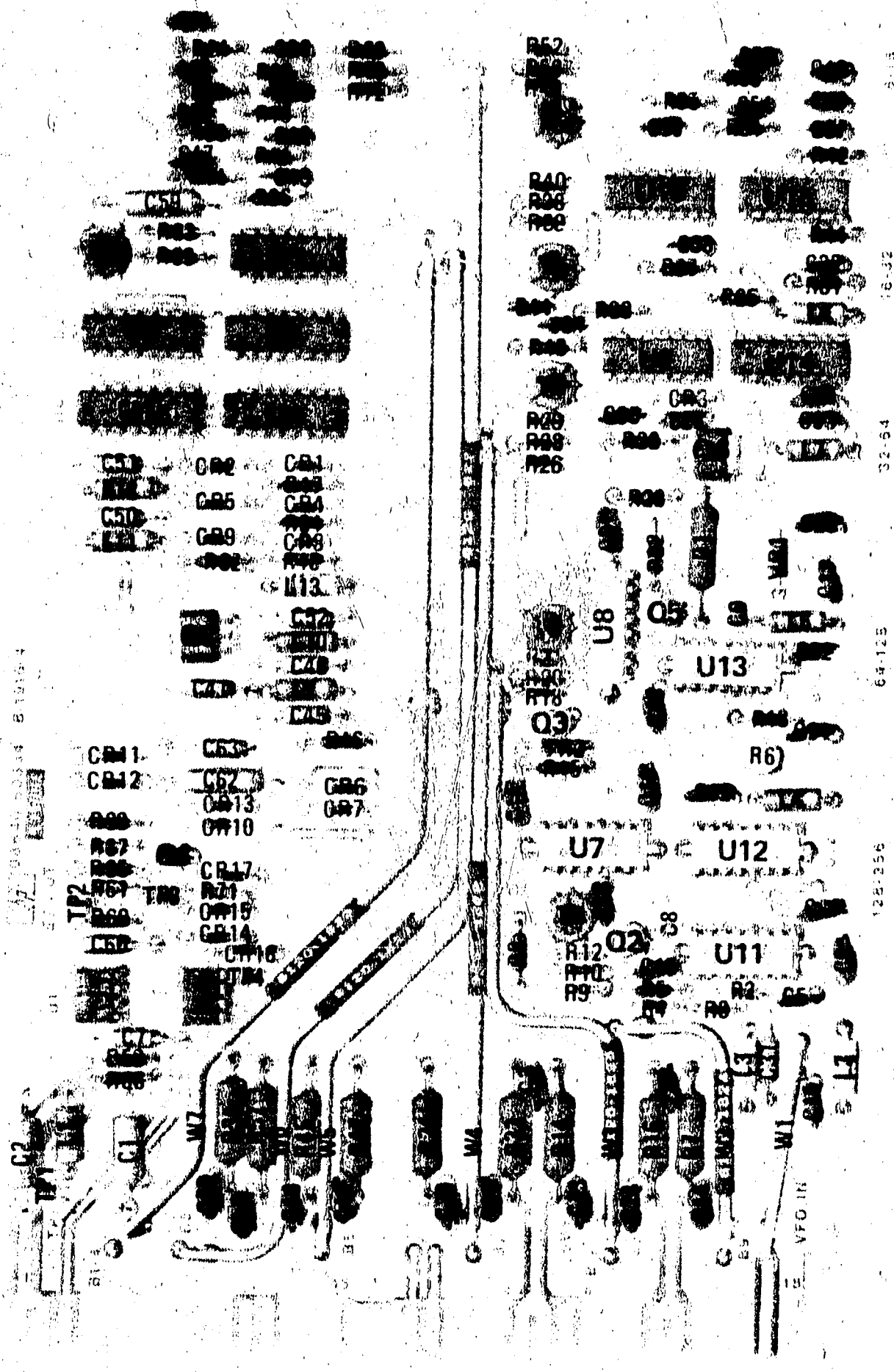


Figure 8-43. A10A2 RF Divider Assembly Component Locations (P/O Change 12)

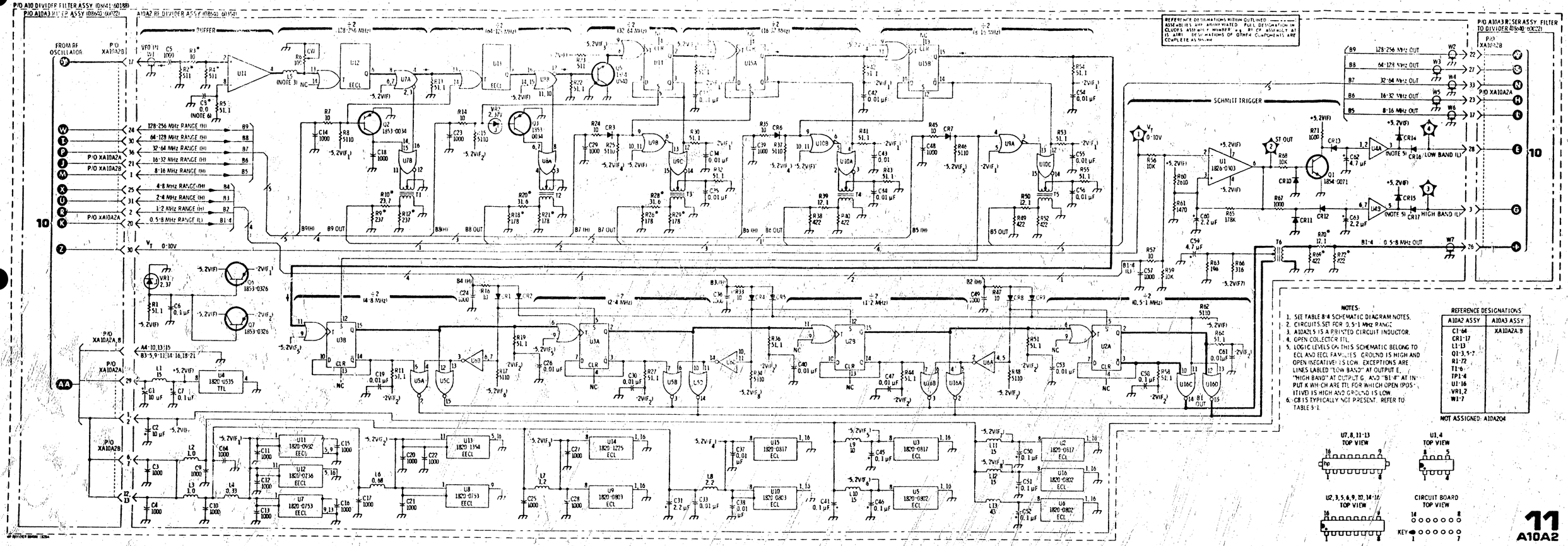


Figure 8-44. RF Divider Schematic Diagram (P/O Change 12)

CHANGE 12 (Cont'd)

Service Sheet 18 (component locations):

Replace Figure 8-61 with the attached Figure 8-61.

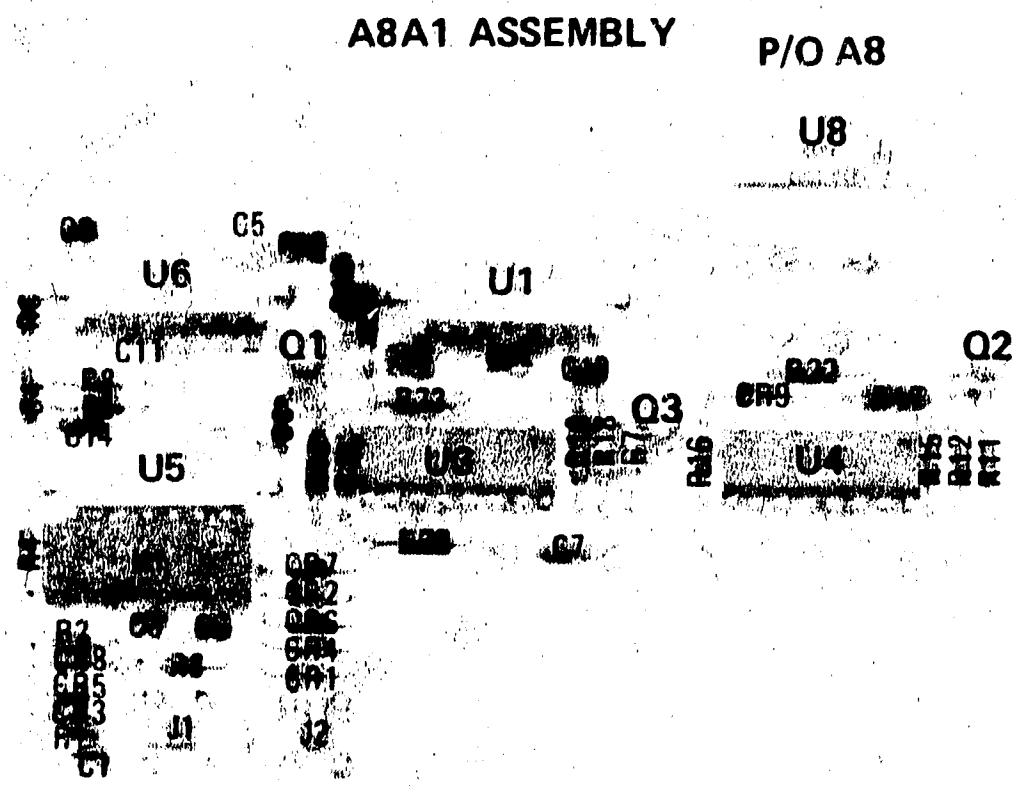


Figure 8-61. A8A1 RF Scaler Assembly Component Location (P/O of Change 12)

Service Sheet 18 (schematic):

Change the part number of the A8A1 RF Scaler Assembly to 08640-60357.

Change A8A1C8 and C12 to 2.2 pF.

Change A8A1C11 to 0.0.

Change A8A1U3 to 1820-0802.

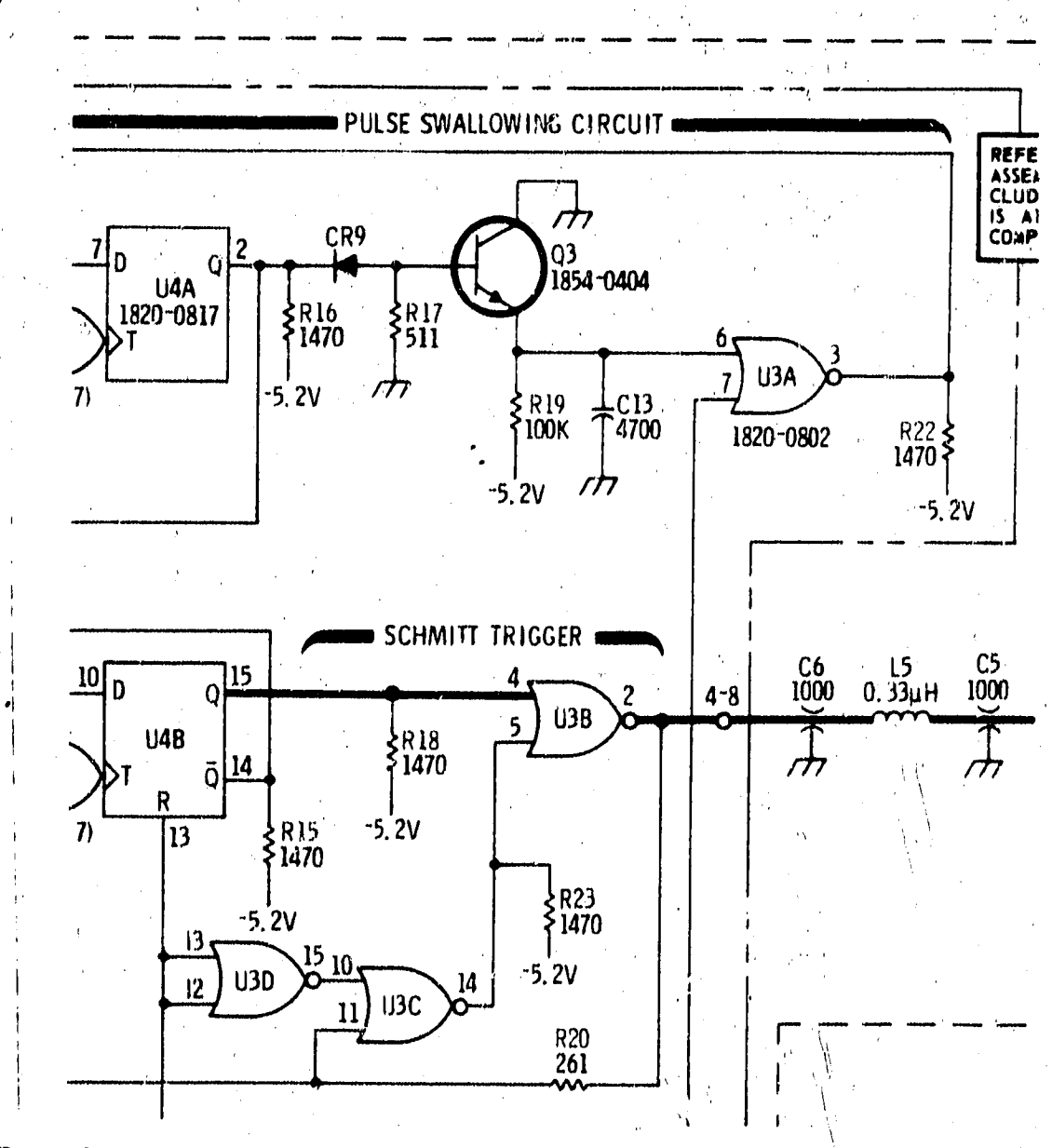
Change the pin numbers of A8A1U3 from "7" to "8" and from "14" to "1 and 16".

Replace appropriate portion of the schematic diagram with the attached partial schematic on the following page.

► In the table of REFERENCE DESIGNATIONS under A8A1 ASSY, change R1—22 to read R1—20, 22.

Continued . . .

CHANGE 12 (Cont'd)



Part of Figure 8-63. Counter RF Scaler Schematic Diagram (P/O Change 12)

CHANGE 13

Page 6-8, Table 6-3:
Change A5Q1 and Q2 to 1854-0475 CD5 TRANSISTOR-DUAL NPN PD=750 MW.

Page 6-9, Table 6-3:
Add A7C16 and C17 0180-2618 CD2 CAPACITOR-FXD 33 UF ±10% 10 VDC TA.

Page 6-10, Table 6-3:
Add A7L1 9140-0129 CD1 COIL-MLD 200 UH 5% Q=65 .155 DX .375 LG-NOM.

Service Sheet 6 (schematic):
Change the part number of A5Q1 and Q2 to 1854-0475.

Service Sheet 7 (component locations):
Replace Figure 8-29 with the attached Figure 8-29.

Service Sheet 7 (schematic):
Add A7L1 220 µH between XA7-pin 5 (+5.2V line) and A7C14 (added in **Change 6**).
►In the table of REFERENCE DESIGNATIONS under A7 ASSY, add L1.

Service Sheet 8 (component locations):
Replace Figure 8-32 with the attached Figure 8-32.

Service Sheet 8 (schematic):
Add A7C16, 33 µF, from U2A-4 (— polarity) to ground (+ polarity).
Add A7C17, 33 µF, from U2B-7 (+ polarity) to ground (— polarity).
►In the table of REFERENCE DESIGNATIONS under A7 ASSY, change C13 to read C13, 16, 17.

P/O A7 ASSEMBLY

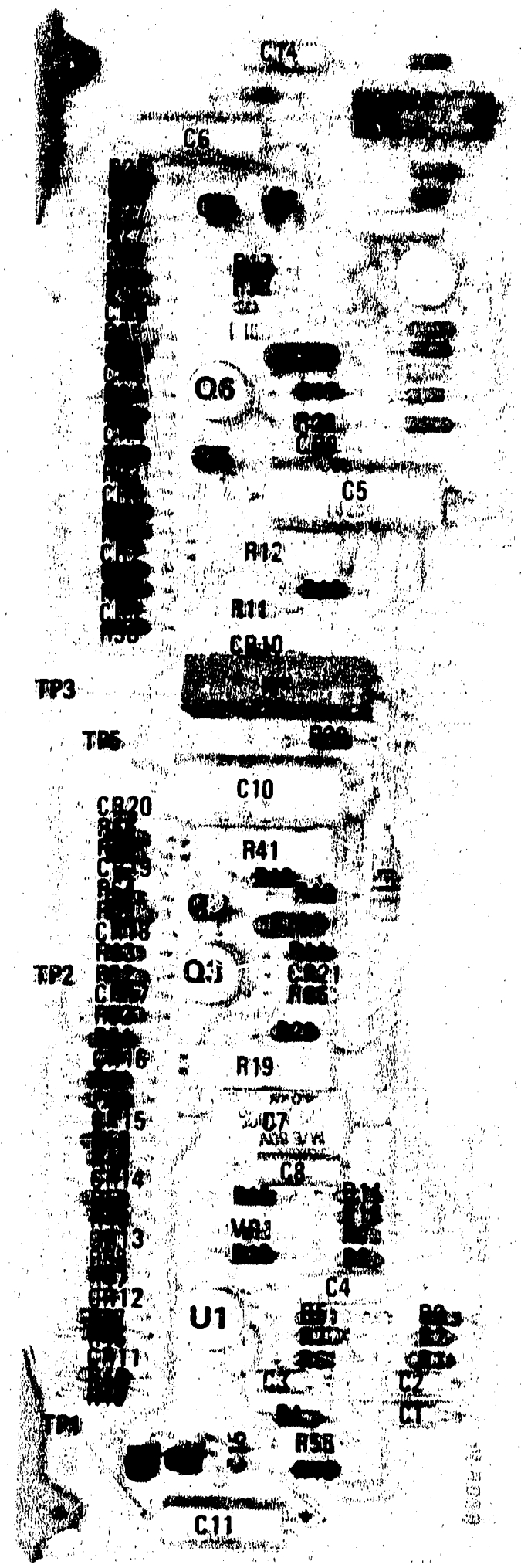


Figure 8-29. P/O A7 FM Shaping Assembly Component Locations (P/O Change 13)

P/O A7 ASSEMBLY

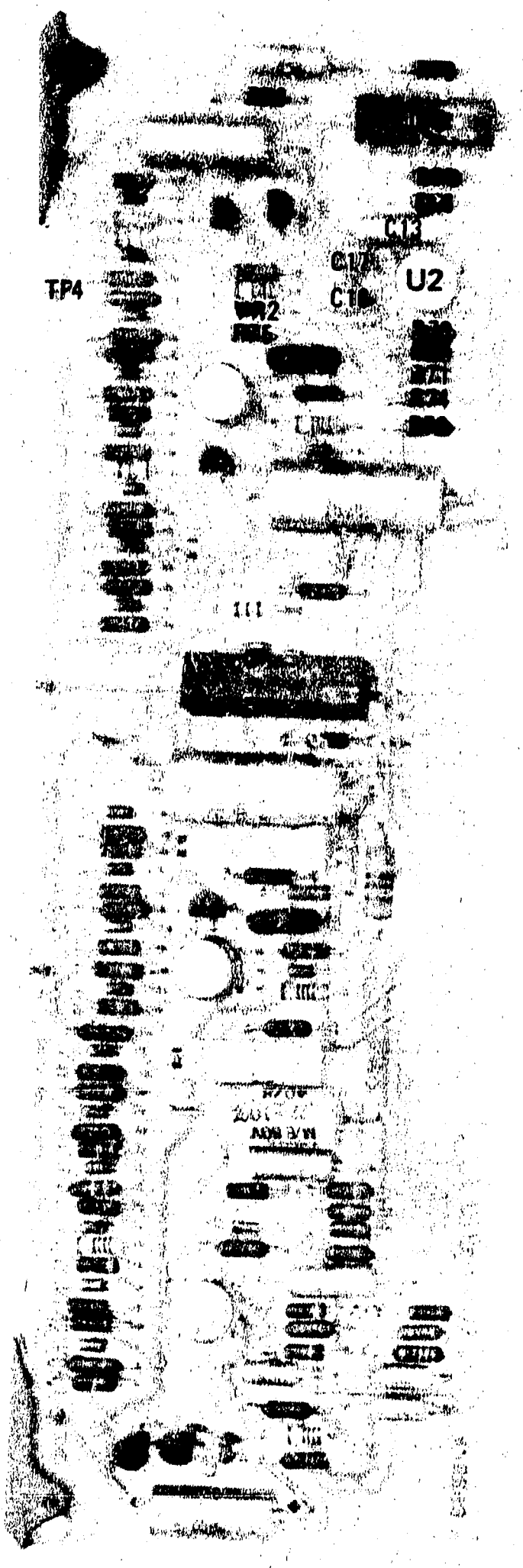


Figure 8-32. P/O A7 FM Shaping Assembly Component Locations (P/O Change 13)

CHANGE 14

Page 6-9, Table 6-3:
Add A7C18 0160-3451 CD1 CAPACITOR-FXD 0.01 UF +80 −20% 100 VDC CER.

Page 6-12, Table 6-3:
Change A8A1R7 to 0757-0428 CD0 RESISTOR 1.62K 1% .125W F TC=0±100.

Page 6-15, Table 6-3:
Change A8A2A1U28 to 1820-1277 CD6 IC CNTR TTL LS DEDC UP/DOWN SYNCHRO.

Page 6-23, Table 6-3:
Change A10A2U12 to 1820-2412 CD3 IC CNTR ECL BIN DUAL. (Refer to **Change 12**).

Page 6-25, Table 6-3:
►Change A11R27 to 0757-0447 CD4 RESISTOR 16.2K 1% .125W F TC=0±100.

Service Sheet 8 (schematic):
On A7 Assembly, add C18, 0.01 μF, across R77.
►In the table of REFERENCE DESIGNATIONS under A7 ASSY, change C13 to read C13, 16—18. (Refer to **Change 13**).

Service Sheet 9 (schematic):
Change A11R27 to 16.2 kΩ.

Service Sheet 11 (schematic):
Change the part number of A10A2U12 to 1820-2412. (Refer to **Change 12**).

Service Sheet 18 (schematic):
Change A8A1R7 to 1620Ω.

Service Sheet 20 (schematic):
Change the part number of A8A2A1U28 to 1820-1277.

CHANGE 15

Page 6-14, Table 6-3:
Add A8A2A1R65 0698-7260 CD7 RESISTOR 10K 1%. 05W F TC=0±100.

Page 6-15, Table 6-3:
Change A8A2A1U29 to 1826-0547 CD3 IC OP AMP DUAL 8-DIP-P.

Page 6-16, Table 6-3:
Change A8A3U8, U10 and U13 to 1820-1431 CD4 IC CNTR TTL LS DECD SYNCRO.

Page 6-36, Table 6-3:
Change A26A4U1 to 1826-0547 CD3 IC OP AMP DUAL 8-DIP-P.

Page 6-40, Table 6-3:
Change W7 to 08640-20363 CD6 CABLE ASSY-COAX 8.8-IN-LG.

Service Sheet 12 (schematic):
Change A26A4U1 to 1826-0547.

Service Sheet 19 (schematic):
Change A8A3U8, U10 and U13 to 1820-1431.

CHANGE 15 (Cont'd)

Service Sheet 20 (schematic):
On the A8A2A1 Assembly, add R65, 10k, from pin 4 of U28 to the +5.2V supply line.
► In the table of REFERENCE DESIGNATIONS under A8A2A1 ASSY, change R50, 55—57 to R50, 55—57, 65.

Service Sheet 21 (schematic):
Change A8A2A1U29 to 1826-0547.

► CHANGE 16

Page 5-3, Table 5-1:
Add the following (Refer to errata section and **Change 12** of this Manual Changes Supplement):

Component	Service Sheet	Range of Values	Basis of Selection
A26A4C10	12	.01—.018μF	See paragraph 5-21m—n
A26A4C11		4700—6800μF	
A8A1R9	18	42.2—51.1Ω	See paragraph 5-21o

Page 5-4, Table 5-1:
Add the following (Refer to errata section and **Change 12** of this Manual Changes Supplement):

m. A26A4C10 and C11 Selection. If the A26A4 AGC Amplifier Assembly has been repaired or replaced or if the instrument fails to pass its AM 3-dB Bandwidth (refer to paragraph 4-23), AM Distortion (refer to paragraph 4-24), or Pulse Modulation (refer to paragraph 4-29) performance tests for the 0.5—1 or 1—2 MHz ranges, decrease the value of A26A4C10 by approximately 20% and rerun all three tests.

n. Similarly, if the instrument fails to pass its AM 3-dB Bandwidth, AM Distortion, or Pulse Modulation performance tests for the 2—4 or 4—8 MHz ranges, decrease the value of A26A4C11 by approximately 20% and rerun all three tests.

o. A8A1R9 Selection. If the A8A1 RF Scaler Assembly has been repaired or replaced or if the counter should fail to pass its external sensitivity test (refer to paragraph 4-31) for the 100—400 MHz range but pass below 100 MHz or above 400 MHz, decrease the value of A8A1R9 by approximately 10% and rerun the test.

Page 6-5, Table 6-3:
Change A1R1 to 2100-3855 CD5 RESISTOR-VAR CONTROL CP 1K 10% LIN.

Page 6-6, Table 6-3:
Add A2VR3 1902-0943 CD5 DIODE-ZNR 2.40V 5% DO-7 PD=.4W TC= −.074%.
Change A3MP7 to 1460-1855 CD2 SPRING-EXT .08-IN-OD MUW ZN.
Change A3R1 to 2100-3856 CD6 RESISTOR-VAR CONTROL C 10K 10% LIN.

Page 6-12, Table 6-3:
Change A8U2 through A8U7 to 1990-0330 CD9 DISPLAY-NUM-DOT MAT 1-CHAR .29-H.
Change A8A1R9 to A8A1R9*. (Refer to **Change 12**).

Page 6-15, Table 6-3:
Change A8A2A1U19 through A8A2A1U24 to 1820-1277 CD6 IC CNTR TTL LS DECD UP/DOWN SYNCHRO.

CHANGE 16 (Con't)

Page 6-17, Table 6-3:
Change A9MP4 to 3030-0007 (Qty 2) CD5 SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT.
Change A9MP5 to 3030-0022 (Qty 2) CD4 SCREW-SET 6-32 .125-IN-LG SMALL CUP-PT.

Page 6-21, Table 6-3:
Change A10A2 to 08640-60370 CD9 RF DIVIDER ASSEMBLY. (Refer to **Change 12**).

Page 6-22, Table 6-3:
Change A10A2L5 description to read NOT ASSIGNED. (Refer to **Change 12**).

Page 6-23, Table 6-3:
Change A10A2U12 to 1820-2642 CD1 IC CNTR ECL BIN DUAL. (Refer to **Changes 12** and **14**).

Change A10A2VR1 and VR2 to 1902-0943 CD5 DIODE-ZNR 2.40V 5% DO-7 PD=.4W TC= −.074%. (Refer to **Change 12**).

Page 6-27, Table 6-3:
Change A18CR6 to 1901-0328 CD8 DIODE-PWR RECT 400V 1A 6US.

Page 6-28, Table 6-3:
Change A20CR1 and CR3 to 1901-0028 CD5 DIODE-PWR RECT 400V 750MA DO-29.

Pages 6-29 and 6-30, Table 6-3:
Change A22CR2 and CR6 to 1901-0028 CD5 DIODE-PWR RECT 400V 750MA DO-29.

Page 6-35, Table 6-3:
Change A26A4C10 to A26A4C10*.
Change A26A4C11 to A26A4C11*.

Page 6-39, Table 6-3:
Delete MP26 part number and change description to read NOT ASSIGNED.
Change MP29 to 1500-0589 (Qty 1) CD3 COUPLER-FLEX .66-LG NYL-BRS.

Service Sheet 11 (schematic):
Change A10A2 RF DIVIDER ASSY part number to (08640-60370). (Refer to **Change 12**).
Delete A10A2L5. Also, delete NOTE 3. In the table of REFERENCE DESIGNATIONS under A10A2 ASSY, change L1-13 to read L1-4, 6-13. (Refer to **Change 12**).
Change A10A2U12 part number to 1820-2642. (Refer to **Changes 12** and **14**.).
Change voltage rating on A10A2VR1 and VR2 to 2.40V. (Refer to **Change 12**).

Service Sheet 12 (schematic):
Change A8A1R9 to A8A1R9*. (Refer to **Change 12**).
Change A26A4C10 to A26A4C10*. (Refer to **Change 2**).
Change A26A4C11 to A26A4C11*. (Refer to **Change 2**).

Service Sheet 17 (schematic):
Change voltage rating on A2VR3 to 2.40V.

Service Sheet 20 (schematic):
Change A8U2 through A8U7 part number to 1990-0330.
Change A8A2A1U19 through A8A2A1U24 to 1820-1277.