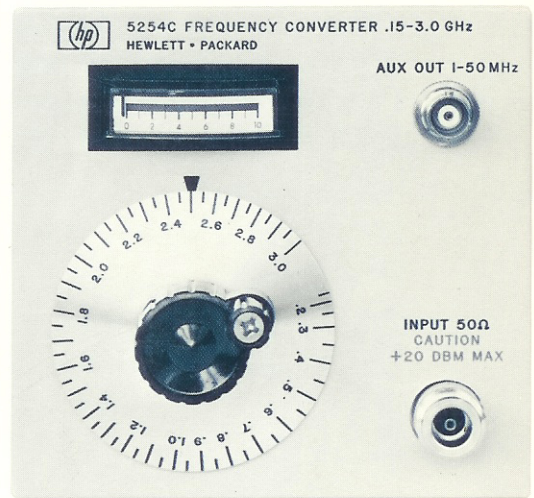


FREQUENCY CONVERTER

5254C



HEWLETT  PACKARD

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.

WARRANTY AND ASSISTANCE

All Hewlett-Packard products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the operating manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

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

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

FREQUENCY CONVERTER

5254C

SERIALS PREFIXED: 1124A

This manual applies directly to HP Model 5254C Frequency Converter having serial prefix number 1124A. See Paragraph 1-7.

MODELS 5254A & 5245B

This manual with information provided in Section VII also applies to Model 5254B Frequency Converter having serial prefix number 952-, 712-, 514-, 429-, and 415.

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5254C Frequency Converter

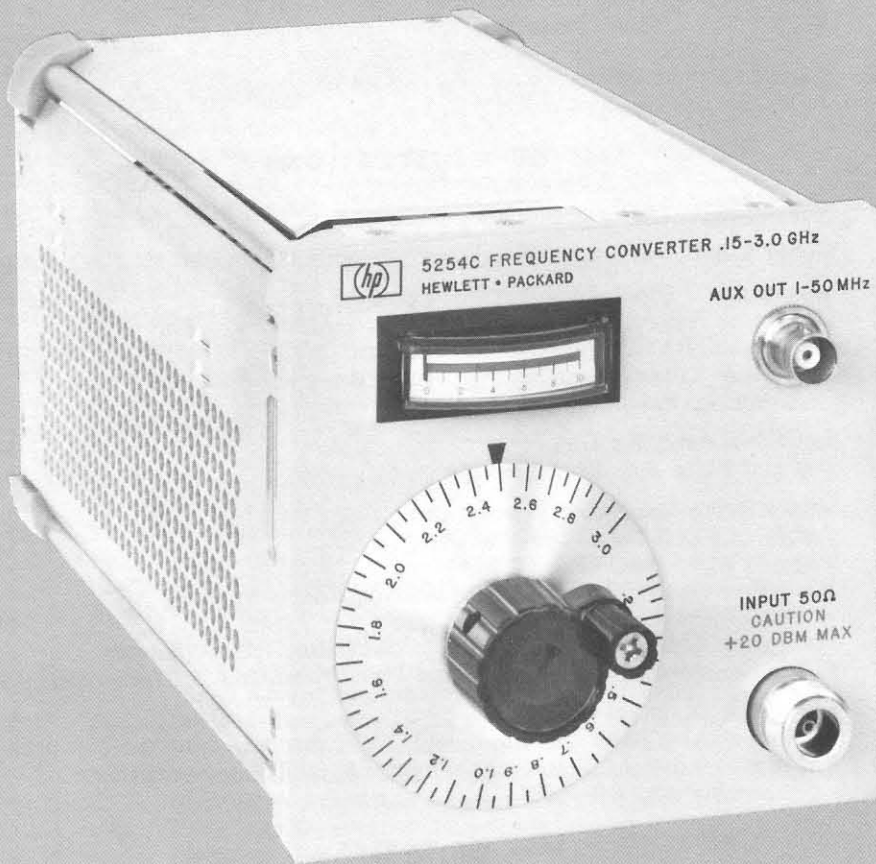


Figure 1-1. Model 5254C

SECTION I

GENERAL INFORMATION

1-1. DESCRIPTION.

1-2. The Hewlett-Packard Model 5254C Frequency Converter is a plug-in unit which extends the frequency measuring capability of an HP Electronic Counter from .15 to 3.0 GHz (150 MHz to 3000 MHz).

1-3. The stability and accuracy of the basic counter are retained by multiplying a 10-MHz signal, derived from the 1-MHz internal time base of the counter, to 50 MHz and selecting a harmonic frequency between 200 and 2950 MHz. This known harmonic of 50 MHz is then heterodyned with the INPUT signal. The resulting difference frequency, if between 1 MHz and 53 MHz (bandwidth of amplifier in plug-in) is counted and displayed by the counter. The frequency of the INPUT signal is then indicated by the combination of the MIXING FREQUENCY control (in gigahertz; front panel of plug-in) and the digital display of the counter (in megahertz).

1-4. A front panel meter, by monitoring the difference-frequency output of the plug-in to the counter, aids in selecting the desired MIXING FREQUENCY and also in determining if INPUT signal amplitude is adequate for accurate frequency measurement.

1-5. SPECIFICATIONS.

1-6. Table 1-1 contains all technical specifications for the Model 5254C when operated in the HP Electronic Counter.

1-7. INSTRUMENT IDENTIFICATION.

1-8. Hewlett-Packard uses a two-section serial number mounted on the rear panel. Earlier instruments use an 8-digit serial number (000-00000). The first three digits are a serial prefix number; the last five digits refer to the specific instrument. Later instruments use a 9-digit serial number (0000A00000). The first four digits are the serial prefix and the last five digits refer to the specific instrument. If the serial prefix of your instrument differs from that listed on the title page of this manual, there are differences between this manual and your instrument. Lower serial prefixes are documented in Section VII, and higher serial prefixes are covered with manual change sheets included with the manual. If the change sheet is missing, contact the nearest Hewlett-Packard Sales and Service Office listed on the inside rear cover of this manual.

1-9. COOLING.

1-10. The Model 5254B is cooled by the ventilation system of the counter in which it is installed. See the service manual of counter for cooling system and maintenance instructions.

Table 1-1. Specifications

OPERATING FREQUENCY RANGE: 0.15 to 3 GHz (0.2 to 3 GHz for 5254B).
MIXING FREQUENCIES: 0.15 to 3 GHz in 50 MHz steps (0.2 to 3 GHz for 5254B).
INPUT VOLTAGE RANGE: 50 mV (-13 dBm) to 1 V (+13 dBm) (min. to max. rms).
MAXIMUM INPUT OVERLOAD: 2.2V rms (+20 dBm) 125 V dc.
NOMINAL INPUT IMPEDANCE: 50 ohms.
INPUT COUPLING: AC.
RESOLUTION: 1 Hz in 1 sec., 10 Hz in 0.1 sec., etc.
ACCURACY: Maintains counter accuracy.
REGISTRATION: Counter display in MHz is added to converter dial reading.
LEVEL INDICATOR: Meter aids frequency selection and indicates usable signal level
AUXILIARY OUTPUT: 1 to 50 MHz on front panel.
INPUT CONNECTOR: Type N female.
WEIGHT: Net, 5 lbs (2,3 kg). Shipping, 7 lbs (3,2 kg).

SECTION II

INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information on unpacking, inspection, repacking, storage, and installation.

2-3. UNPACKING AND INSPECTION.

2-4. If the shipping carton is damaged, ask that the carrier's agent be present when the instrument is unpacked. Inspect the instrument for damage (scratches, dents, broken knobs, etc.). If the instrument is damaged or fails to meet specifications (Performance Check, Table 5-4), notify the carrier and the nearest Hewlett-Packard sales and service office immediately (offices are listed at the back of this manual). Retain the shipping carton and the padding material for the carrier's inspection. The sales and service office will arrange for the repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. STORAGE AND SHIPMENT.

2-6. **PACKAGING.** To protect your instrument during shipment or storage, use the best packaging methods available. Your Hewlett-Packard sales and service office can provide materials similar to those used for original factory packaging. Contract packaging companies can provide dependable custom packaging on short notice.

a. If possible, use the original container designed for the instrument. Otherwise, use a strong carton (350 lb/sq inch bursting strength) or wooden box to house the instrument.

b. Wrap the instrument in heavy paper or plastic before placing it in the shipping container.

c. Use plenty of packing material around all sides of the instrument and protect the front panel with cardboard strips.

d. Seal the package with strong tape or metal bands. Mark with "Delicate Instrument."

e. Refer to the address list at the rear of this manual and check with your Hewlett-Packard sales and service office for shipping instructions. All correspondence should refer to an instrument by Model number and the full eight-digit serial number.

2-7. **ENVIRONMENT.** Conditions during storage and shipment should normally be limited as follows:

- a. Maximum temperature 167°F (75°C).
- b. Minimum temperature -40°F (-40°C).

CAUTION

TURN COUNTER POWER OFF BEFORE INSTALLING OR REMOVING FREQUENCY CONVERTER.

2-8. INSTALLATION.

2-9. The Model 5254C plugs into the rectangular compartment at the right-hand side of the front panel of an HP Electronic Counter. To install unit in counter, first check that counter's retaining latch is turned fully counterclockwise, then push unit firmly into compartment until front panel of plug-in is flush with front panel of counter. Then turn retaining latch clockwise until it is tight.

2-10. To remove unit from counter, turn retaining latch counterclockwise to its stop. Then grasp mixing frequency selector and firmly pull unit from counter. If any difficulty is encountered with installation or removal, check that retaining latch is fully counterclockwise.

2-11. POWER REQUIREMENTS.

2-12. All electrical power required to operate the Model 5254C is supplied by the counter in which the unit is installed.

2-13. ELECTRICAL CONNECTIONS.

2-14. The two INPUT connectors on the front panel of plug-in (see Figure 3-1) are the only external electrical connections to the unit. All other connections are made through the 50-pin connector at the rear of the plug-in when installed in the counter.

SECTION III OPERATION

3-1. INTRODUCTION.

3-2. The Model 5254C Frequency Converter increases the range of an HP Electronic Counter to .15 through 3.0 GHz (150 through 3000 MHz). As a general rule to measure frequency, always start with the Mixing Frequency Control below .2 GHz and tune upward in frequency to obtain first response and tune for a maximum reading in the green portion of the meter scale. The input frequency is the sum of the counter reading and the dial frequency reading. This procedure will be valid whether there are responses in 1, 2, or 3 consecutive harmonic reference frequencies; see Figure 3-1. If the input signal level to the converter is high, the second, third and other harmonics of this signal may be generated. Therefore, tuning Mixing Frequency Control from the low end upward will enable the input fundamental frequency to be detected before its harmonics. In the 5254C, harmonics of the reference-frequency signals are held to such a low level that regardless of input signal level, their mixing effects are not observable, avoiding possible ambiguity. Figure 3-1 provides a step-by-step procedure to be used for measurement of frequencies from .15 to 3.0 GHz (150 MHz to 3000 MHz). The only exception is if the first response occurs at .15 GHz or .25 GHz. To avoid possible ambiguity in these cases, start from above .45 GHz and tune downward in frequency for the first response and subtract the counter reading from the dial frequency for the frequency of the input signal.

Note

If the input frequency is known approximately, the Mixing Frequency Control can be set a hundred megahertz below the input signal. Tune up for the first response and add the counter reading to the dial frequency.

3-3. CONTROLS AND INPUT.

3-4. GENERAL. The function of the front panel control, meter, connectors, and retaining screws are discussed in Paragraphs 3-5 through 3-8.

3-5. INPUT CONNECTOR. Signal input, 50 ohms input impedance, 50 mV (-13 dBm in 50 ohms) to 1 V rms (+13 dBm in 50 ohms) into Type N female connector.

3-6. MIXING FREQUENCY SELECTOR. Calibrated from .2 to 3.0 GHz (200 MHz to 3000 MHz), this control tunes the internal cavity to select a harmonic of 50 MHz to be heterodyned with the INPUT signal.

3-7. LEVEL INDICATOR METER. The meter circuit continuously monitors the level of the difference frequency output of the converter to the counter. When meter reads in the green portion of its scale, INPUT signal amplitude is adequate for accurate frequency measurement.

3-8. AUX OUT CONNECTOR. The 1 MHz to 50 MHz video amplifier output appears at AUX OUT BNC type connector.

3-9. MAXIMUM INPUT VOLTAGES.

3-10. Damage to the converter may result if an ac signal greater than +20 dBm in 50 ohms (2.2 V rms) or a dc voltage greater than 100V is applied to the converter INPUT connector.

3-11. FREQUENCY MEASUREMENT WITH AMPLITUDE LESS THAN 50 MV RMS.

3-12. The front panel level indicator meter indicates in the green portion of its scale only when converter

Table 3-1. Frequency Resolution

INPUT SIGNAL FREQUENCY = 2.4911223344 GHz MIXING FREQUENCY CONTROL set to 2.45 GHz		
Time Base Setting	Counter Display	Measurement Resolution
.1 μ s	*(no display)	
1 μ s	4 1 . MHz	2.4 9 1 GHz
10 μ s	4 1 1 MHz	2.4 9 1 1 GHz
.1 ms	4 1 1 2 MHz	2.4 9 1 1 2 GHz
1 ms	4 1 1 2 2 kHz	2.4 9 1 1 2 2 GHz
10 ms	4 1 1 2 2.3 kHz	2.4 9 1 1 2 2 3 GHz
.1 s	4 1 1 2 2.3 3 kHz	2.4 9 1 1 2 2 3 3 GHz
1 s	4 1 1 2 2.3 3 4 kHz	2.4 9 1 1 2 2 3 3 4 GHz
10 s	1 1 2 2.3 3 4 4 kHz	2.4 9 1 1 2 2 3 3 4 4 GHz

is properly tuned and amplitude of INPUT signal is adequate for accurate frequency measurement.

NOTE

Only when the level indicator meter is in the green zone will the display count be valid.

3-13. DOUBLE CHECKING FREQUENCY MEASUREMENT RESULT.

3-14. Because of the heterodyne action of the converter, frequency measurement results obtained at any one setting of the Mixing Frequency Control may be checked at other settings. In most cases these will be two consecutive responses: tune in the first response and add the counter display to the dial frequency reading; then tune up in frequency to the second response and subtract the counter display from the dial frequency reading (see Table 3-2). In some cases there will be three consecutive responses (see

Figure 3-1); in these cases the third response will be the one in which you subtract the counter display from the dial frequency reading.

3-15. A counter reading will only be obtained if the difference frequency between the MIXING FREQUENCY and the INPUT frequency is more than 1 MHz and less than 53 MHz (the bandwidth of the Video Amplifier Assembly A5).

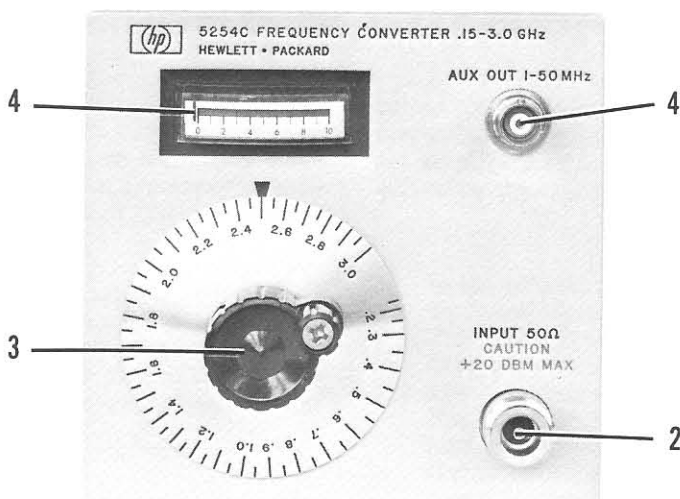
3-16. AID TO RAPID TUNING.

3-17. When using a counter with MANUAL START it is easy to obtain an indication of the proper MIXING FREQUENCY when rapidly tuning the Model 5254C through its frequency range in search of an unknown INPUT frequency. Set FUNCTION control to MANUAL START. This allows the counter to totalize each cycle of any difference frequency produced during rapid tuning. When the counter display changes, indicating that the MIXING FREQUENCY is heterodyning with the INPUT frequency and producing a difference frequency within the frequency range of the basic counter, set counter FUNCTION control to FREQUENCY and proceed with measurement.

Table 3-2. Typical Double-Check Frequency Measurement

Input Frequency	Counter Reading*	Mixing Frequency	Meter Indication	Response
1.2345678 GHz	34567.8 kHz	1.2 GHz	Peak	First Response: $1.200000 \text{ GHz} + 345678 \text{ kHz}$ 1.2345678 GHz
	15432.2 kHz	1.25 GHz	Peak	Second Response: $1.250000 \text{ GHz} - 154322 \text{ kHz}$ 1.2345678 GHz

* Counter in 10 ms Gate to give reading in kHz.



1. Refer to the Operating Section of your HP Electronic Counter Operating manual for counter settings as well as installation instructions when using the HP 5254C plug-in.
2. Connect signal whose frequency is to be measured to HP 5254C INPUT.
3. Set Mixing Frequency Control to read slightly less than 0.2 GHz.
4. Slowly turn Mixing Frequency Control counterclockwise to obtain first response, and tune for a maximum reading in the green portion of the Level Indicator Meter scale. (See below for examples of 1, 2, and 3 responses.)
5. Add counter display in (kHz) to Mixing Frequency Control reading (GHz) for frequency of INPUT signal.

Input Freq	Display	Meter	Dial	Response
EXAMPLE OF ONE RESPONSE				
3020 MHz	000000.00 MHz	Red	2.95 GHz (2950 MHz)	No response, difference frequency greater than 1 MHz to 53 MHz pass band of video ampl.
	000020.00 MHz	Green	3.0 GHz (3000 MHz)	First response 3000 MHz + 20 MHz = 3020 MHz
EXAMPLES OF TWO RESPONSES				
1020 MHz	000020.00 MHz	Green	1.0 GHz (1000 MHz)	First response 1000 MHz + 20 MHz = 1020 MHz
	000030.00 MHz	Green	1.05 GHz (1050 MHz)	Second response 1050 MHz - 30 MHz = 1020 MHz
900 MHz	000050.00 MHz	Green	.85 GHz (850 MHz)	First response 850 MHz + 50 MHz = 900 MHz
	000000.00 MHz	Red	.90 GHz (900 MHz)	No response, difference frequency less than 1 MHz to 53 MHz pass band of video amplifier
	000050.00 MHz	Green	.95 GHz (950 MHz)	Second response 950 MHz - 50 MHz = 900 MHz
EXAMPLE OF THREE RESPONSES				
851 MHz	000051.00 MHz	Green	.8 GHz (800 MHz)	First response 800 MHz + 51 MHz = 851 MHz
	000001.00 MHz	Green	.85 GHz (850 MHz)	Second response 850 MHz + 1 MHz = 851 MHz
	000049.00 MHz	Green	.9 GHz (900 MHz)	Third response 900 MHz - 49 MHz = 851 MHz

*Counter in .1 ms Gate to give reading in Megahertz in all examples.

Figure 3-1. Model 5254C Operating Procedure

SECTION IV

PRINCIPLES OF OPERATION

4-1. GENERAL.

4-2. The Model 5254C is a heterodyne frequency converter designed to extend the range of frequency measurement of an Electronic Counter to .15 GHz through 3 GHz (150 MHz through 3000 MHz).

4-3. The Converter contains five basic functional sections: multiplier amplifier, harmonic generator and harmonic selector cavity, mixer, filter, and video amplifier. (See Figure 4-1, and for circuit details refer to the schematic diagrams, Figures 8-2 and 8-3.)

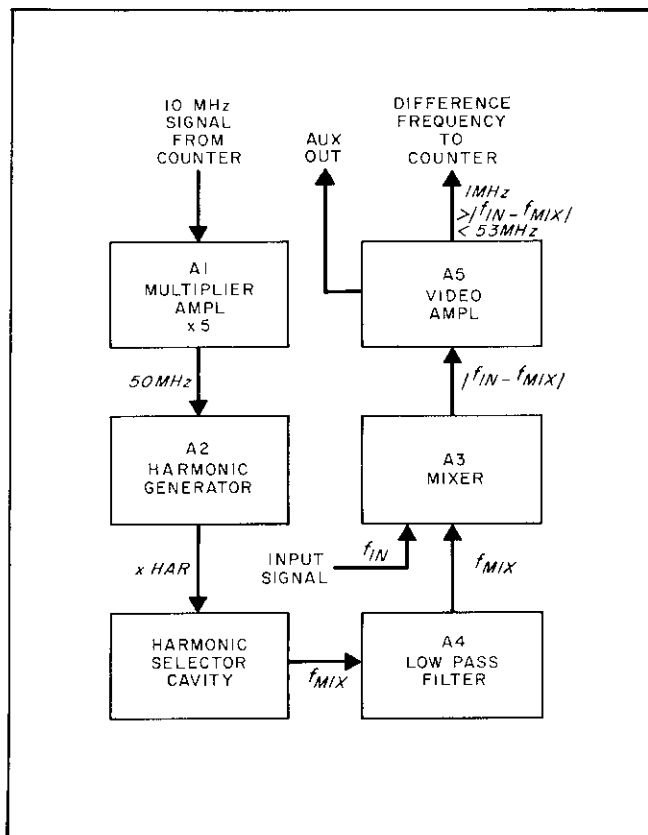


Figure 4-1. Model 5254C Block Diagram

4-4. In normal operation the harmonic generator produces all of the harmonics of 50 MHz between 150 MHz and 3000 MHz. The harmonic selector cavity is tuned to select one of these harmonics to be supplied through the low-pass filter to the mixer. The mixer output is the difference frequency produced by mixing of the input frequency and the frequency supplied by the harmonic selector cavity. This difference frequency is amplified by the video amplifier and supplied to the counter input circuit. A low-pass filter within the video amplifier prevents difference frequency signals above 53 MHz from reaching the counter input circuit. The

output of the video amplifier is monitored by a meter circuit which indicates when difference frequency output amplitude is greater than the minimum signal required by the counter input circuit.

Note

In the following discussion complete reference designations are used to identify components. This is to prevent confusion between reference designations of components located on the chassis and components located on an assembly. For example, "R1" would refer to a component located on the chassis, while "A1R1" would refer to a component located on the multiplier amplifier assembly A1 (see Table 5-2 for assembly designations).

4-5. MULTIPLIER AMPLIFIER A1. (see Figure 4-2).

4-6. A 10-megahertz signal from the counter is applied to buffer amplifier A1Q1. The buffer amplifier A1Q1 is a tuned amplifier providing a constant amplitude 10 MHz signal to the multiplier A1Q2, and provides isolation of converter from counter. The x 5 multiplier A1Q2 is a tuned class C amplifier with the input tuned to 10 MHz and the resonant output tuned to the fifth multiple of the input signal providing a 50 MHz output signal. The output of the multiplier is amplified by A1Q3 and applied to the crystal filter. The half lattice crystal filter (A1Y1 and A1C13) is a 50 megahertz band-pass filter. A1C13 is used to balance out crystal capacitance. A series of tuned power amplifiers A1Q4, A1Q5, and A1Q6 amplify the signal from the crystal filter to drive the harmonic generator.

4-7. HARMONIC GENERATOR A2 AND HARMONIC SELECTOR CAVITY. (See Figure 4-2).

4-8. The harmonic generator consists of a 50-MHz tuned circuit, driving the step recovery diode, A2CR1. The step recovery diode takes energy from the tuned circuit during a portion of each cycle of the 50 MHz oscillation and produces a sharp step in the current flowing through the diode. The diode forms a loop input coupling to the harmonic selector cavity and the step in the current through the diode makes available, inside the cavity, the harmonics of 50 MHz from 150 MHz (third harmonic) to 3000 MHz (sixtieth harmonic). The probe tunes the cavity to select the desired harmonic and provides coupling from the harmonic selector cavity through the filter assembly A4 to one of the two inputs of the mixer assembly A3.

4-9. FILTER ASSEMBLY A4. (See Figure 4-3)

4-10. The output signal of the harmonic selector cavity is applied to a Tschebyscheff low-pass filter (A4), with a cut-off frequency of 3 GHz, to limit

selected mixing frequency. The filter has a 50-ohm termination at both the input and output. The output signal from the filter (A4) is applied to one of the inputs of the mixer assembly (A3).

4-11. MIXER ASSEMBLY A3. (See Figure 4-3).

4-12. The mixer assembly uses two diodes in a balanced mixer circuit in order to minimize the generation of even order harmonics of both the input signal and the selected mixing frequency. The combination

of the terminating resistor A3R1 and the shunting effect of the diodes gives an input impedance of 50 ohms and provides a low standing wave ratio (typically below 1.5 up to 3.0 GHz). Capacitor A3C1 provides dc isolation up to 100 volts. A5R1, A5R2, and A5R3 control the bias currents of the mixer diodes (A3CR1 and A3CR2) and are adjusted for maximum common mode rejection within the video band (1 MHz to 53 MHz). The non-linearity of the diodes (A3CR1 and A3CR2) gives rise to signals with frequencies which are the sum and difference of the two mixing frequencies

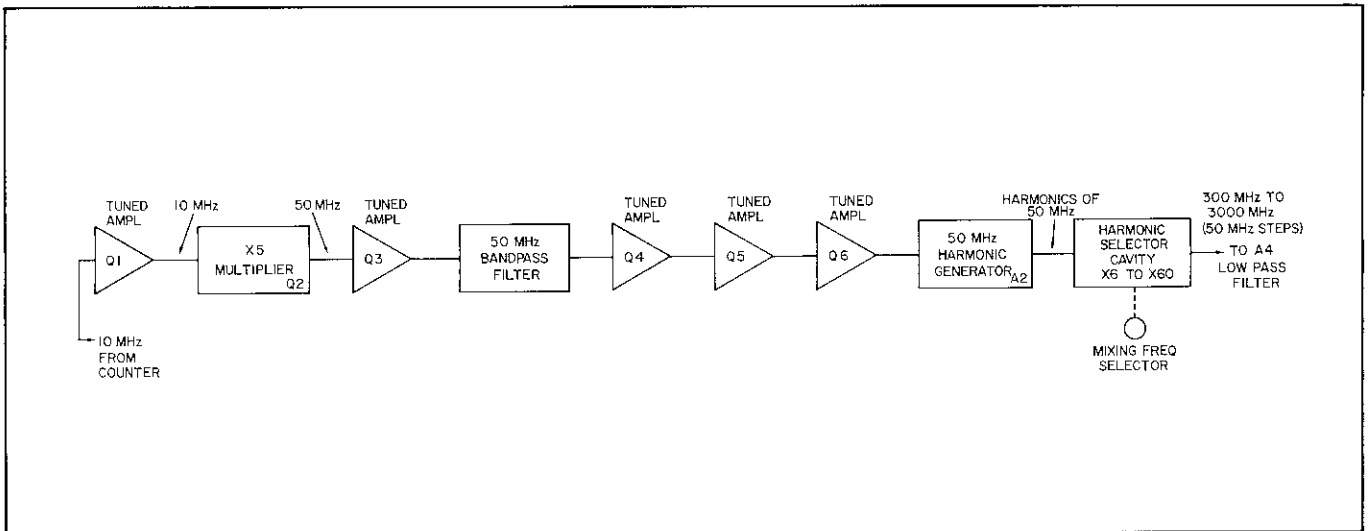


Figure 4-2. Multiplier Amplifier Assembly A1, Harmonic Generator Assembly A2, and Harmonic Selector Cavity, Block Diagram (5254C)

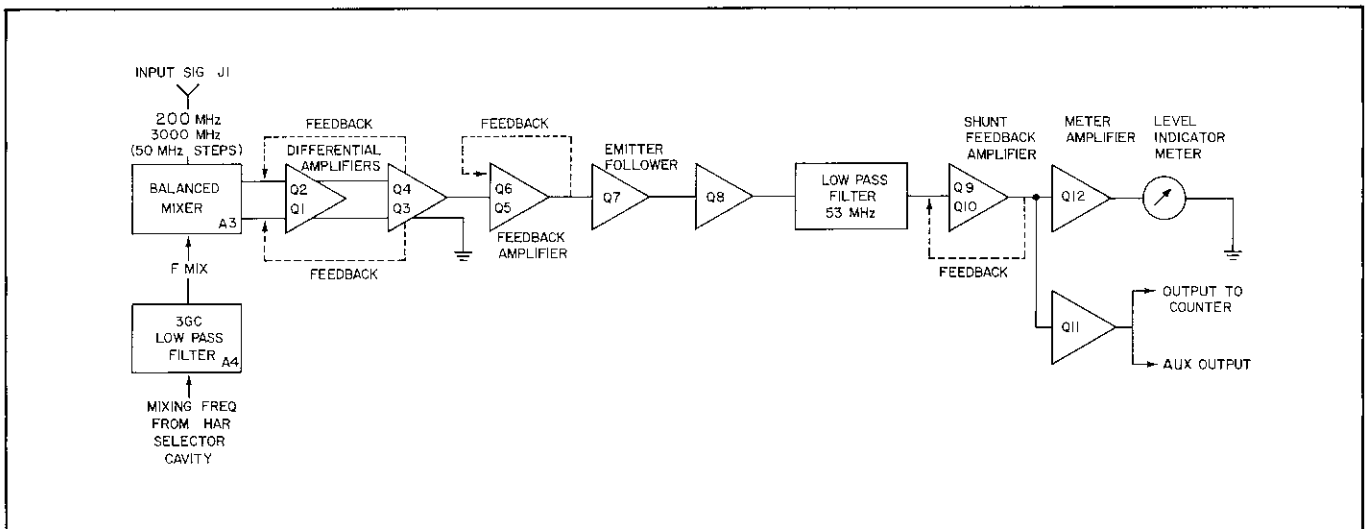


Figure 4-3. Low-Pass Filter Assembly A4, Mixer Assembly A3, and Video Amplifier Assembly A5, Block Diagram (5254C)

INPUT frequency and selected mixing frequency). The difference frequency signal in particular is coupled to the input of the differential amplifier (A5Q1 and A5Q2) through coupling resistors (A3R3 and A3R4) as a differential signal.

4-13. VIDEO AMPLIFIER A5. (See Figure 4-3)

4-14. The two signals from mixer A3 are applied to the bases of differential amplifier A5Q1 and A5Q2. A5Q1 and A5Q2 output is applied to the second stage of differential amplification (A5Q3 and A5Q4). A5Q3 collector output goes to ground through A5C4 and A5C5, and A5Q4 collector output is applied to the base of A5Q5. A5Q5 and A5Q6 form a feedback amplifier with a constant gain of 10. A5Q7 and A5Q8 limit the signal and provide a high impedance at the collector of A5Q8. This high impedance is shunted with 100 ohms (A5R24) to provide the input impedance required

by the low-pass filter. The low-pass filter, a three-section Tschebycheff filter, provides a 53-MHz cut-off frequency for the video amplifier. A5Q9 and A5Q10 form a shunt feedback amplifier providing a low impedance input at the base of A5Q9. This, in series with 91-ohm resistor A5R25 provides 100 ohms output impedance required by the low-pass filter. A5Q11 is a buffer amplifier with a resistive divider output providing the auxiliary output to J1. A5Q11 output also goes to trigger circuit A5Q13, A5Q14, and A5Q15. Tunnel diode A5CR3 shapes the signal into a rectangular pulse with very fast rise and fall times. This signal causes the trigger transistors A5Q14 and A5Q15 to switch quickly. With AUX OUT jack J1 terminated in 50 ohms, output to the counter is twice as large as the auxiliary output. There is sufficient isolation in the divider network to prevent the signal to the counter from being affected by termination at the auxiliary output.

Table 5-1. Recommended Test Equipment

Instrument	Required Characteristics	Use	Instrument Recommended
Electronic Counter		Supply Power, supplies 10 MHz signal Operational Indicator	<i>hp</i> Model 5245L
VHF Signal Generator	200 MHz to 480 MHz 10 mV to .1 V	Performance Check Circuit Adjustment	<i>hp</i> Model 608E
UHF Signal Generator	450 MHz to 1230 MHz 10 mV to .1 V	Performance Check	<i>hp</i> Model 612A
UHF Signal Generator	800 MHz to 2400 MHz 10 mV to .1 V	Performance Check	<i>hp</i> Model 614A or 8614A
UHF Signal Generator	1.8 GHz to 4.5 GHz 10 mV to .1 V	Performance Check	<i>hp</i> Model 616B or 8616A
DC VTVM and Ohmmeter	0 to + and -25 Vdc .1 V resolution 0 to 100 M ohms	Circuit Adjustment Troubleshooting	<i>hp</i> Model 412A
RF Millivoltmeter	1 MHz to 20 MHz 10 mV to 10 V rms 10 mV resolution	Circuit Adjustment	<i>hp</i> Model 411A <i>hp</i> 11025A Probe
Oscilloscope	1000 MHz bandwidth	Circuit Adjustment Troubleshooting	<i>hp</i> Model 140A with 1411A Plug-in; 1425A Plug-in & 1430A Sampler
Termination	50 ohms feedthrough	Circuit Adjustment	<i>hp</i> 10100A
R X Meter	60 MHz to 120 MHz	Circuit Adjustment	Boonton 250A
Spectrum Analyzer	3 GHz Frequency	Circuit Adjustment	<i>hp</i> 851B & 8551B
Male BNC Plug Connector		Circuit Adjustment	<i>hp</i> 1250-0052
BNC male to type N female adapter		Circuit Adjustment	<i>hp</i> 1250-0077
Extension Cable	50 pin straight-thru	Circuit Adjustment	<i>hp</i> 10506B
Oscillator Synchronizer		Performance Check	DY 2654A
Quartz Oscillator	1 MHz	Performance Check	<i>hp</i> 106A/B
Frequency Synthesizer	0 - 500 MHz 0 dBm level	Performance Check	<i>hp</i> 5105A/5110B
Frequency Sample Cable	Optional with DY 2654A	Performance Check	<i>hp</i> 5060-2597
Frequency Control Cable	Optional with DY 2654A	Performance Check	<i>hp</i> 5060-2598

SECTION V MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides maintenance and service information for the Model 5254C Frequency Converter. Included are a periodic maintenance procedure, a table of recommended test equipment, an in-cabinet performance check which may be used to verify proper operation of the frequency converter, troubleshooting procedure, and repair and adjustment procedure.

5-3. PERIODIC MAINTENANCE.

5-4. No special maintenance procedures are required when the converter is operated in normal environments. However, if unit is subjected to operation in extremely dusty environments, periodically clean all gears with a lint-free cloth and apply a coating of light, petroleum base, open-gear grease to all gear teeth.

5-5. TEST EQUIPMENT.

5-6. Recommended test equipment for performance checking, troubleshooting and circuit adjustment after repair is listed in Table 5-1. Other test instruments may be used if their specifications equal or exceed the required characteristics.

5-7. IN-CABINET PERFORMANCE CHECK.

5-8. The following performance check (Table 5-4) verifies proper operation of all circuits in the Model 5254C and may be used:

- a. as part of an incoming inspection check of instrument specifications;
- b. periodically, for instruments used in systems where maximum reliability is of utmost importance;
- c. as part of a troubleshooting procedure to locate malfunctioning circuits, and
- d. after any repairs or adjustments, before returning instrument to regular service.

5-9. TROUBLESHOOTING.

5-10. Refer to Section IV, Principles of Operation, for information on the operation of circuits. Table 5-2 gives the reference designations of assemblies used in the converter and their corresponding nomenclatures. Figure 5-2 shows the location of all assemblies used in the Model 5254C. Figures 8-2 and 8-3 show component location on the assemblies. Table 8-1, Troubleshooting Aids, gives information on waveforms and dc voltages which are present when circuits are operating properly. The waveforms are referenced to test points throughout the converter. These test points are keyed to the schematic diagrams, Figures 8-2 and 8-3.

Table 5-2. Assembly Designations

A1 MULTIPLIER AMPLIFIER
A2 HARMONIC GENERATOR
A3 MIXER
A4 LOW PASS FILTER
A5 VIDEO AMPLIFIER

5-11. MULTIPLIER AMPLIFIER ASSEMBLY A1.

5-12. If the Multiplier Amplifier Assembly is suspected of being faulty, use the test points on the schematic diagram, Figure 8-2, and the test points and dc voltages given in Troubleshooting Aids, Table 8-1, in the following order 7, 1, 2, 3, 4, 5, and 6 to help isolate the faulty circuit.

5-13. MIXER ASSEMBLY A3.

5-14. A faulty mixer assembly is usually indicated by poor sensitivity, noisy signal output from the video amplifier. If the mixer assembly is suspected of being faulty, remove amplifier side plate (MP12), see Figure 5-2, and perform the resistance check given in Table 5-3.

Table 5-3. Mixer Resistance Check

Check	Connect Ohmmeter (<i>412A</i> only)		Ohmmeter Scale	Reading
	Ohms Lead	Common Lead		
1	A3R3	Ground	X1K	Greater than 10K ohms
2	Ground	A3R3	X1K	600 - 1200 ohms
3	A3R4	Ground	X1K	600 - 1200 ohms
4	Ground	A3R4	X1K	Greater than 10K ohms

Note: These measurements can be made with the Mixer Assembly installed in the instrument and without unsoldering any wires.

a. If any reading for checks 1 thru 4 is 500 ohms, there is a short circuit in the mixer.

b. If checks 1 or 4 read less than 10K the diodes are defective.

c. If "infinity" is read there is an open circuit.

5-15. VIDEO AMPLIFIER ASSEMBLY A5.

5-16. A faulty video amplifier circuit can usually be detected by one simple check; short either input, base of A5Q1 or A5Q2 to ground and the amplifier should oscillate causing an increased level indicator meter reading. If it does not it may be presumed faulty. Use the test points in the schematic diagram, Figure 8-6 and the test points and dc voltages given in Troubleshooting Aids, Table 5-4.

5-17. REPAIR AND REPLACEMENT.

5-18. GENERAL.

5-19. Paragraphs 5-20 through 5-35 are replacement procedures to aid repair. No attempt should be made to repair: 1) the Harmonic Generator A2; 2) the Harmonic Selector Cavity; 3) the Mixer Assembly A3, or 4) the Filter Assembly A4. These assemblies should be replaced as a unit. For assistance contact your Hewlett-Packard sales and service office.

5-20. PRINTED CIRCUIT COMPONENT REPLACEMENT.

5-21. Component lead holes in the Model 5254C circuit boards have plated walls to ensure good electrical contact between conductors on the opposite sides of the board. To prevent damage to this plating and to the replacement component, apply heat sparingly and work carefully. The following replacement procedure is recommended:

a. Remove defective component.

b. Melt solder in component lead holes. Use clean dry soldering iron to remove excess solder. Clean holes with toothpick or wooden splinter. Do not use metal tool for cleaning as this may damage through-hole plating.

c. Bend lead of replacement component to the correct shape and insert component leads into component lead holes. Use heat and solder sparingly, solder leads in place. Heat may be applied to either side of board. A heat sink (longnose pliers, commercial heat-sink tweezers, etc) should be used when replacing transistors and diodes in order to prevent conduction of excessive heat from the soldering iron to the component.

d. Through-hole plating breaks are indicated by the separation from the board of the round conductor pad on either side of the board. To repair breaks, press conductor pads against board and solder replacement component lead to conductor pad on both sides of the board.

5-22. MULTIPLIER AMPLIFIER ASSEMBLY A1.

5-23. To remove the Multiplier Amplifier Assembly A1 see Figure 5-2 and proceed as follows:

a. Unscrew the four screws which secure left side plate (MP7) and remove left side plate.

b. Unscrew the four screws which secure top plate (MP6) and remove top plate.

c. Disconnect the following wires from Multiplier Amplifier Assembly A1 (see Figure 8-2):

	From
red	P6(13)
violet	P6(15)
green	P6(50)
red	A5L14
violet	A5L15

d. Disconnect black wire to meter from ground lug on MP14, and white wire to meter from capacitor C3 and MP14.

e. Remove screw securing aluminum spacer rod (MP10) to plug-in guide (MP9) on right side of instrument. Unscrew spacer (MP10) from front panel.

f. Remove the two screws that secure amplifier side plate (MP12) to front panel.

g. Remove the three screws that mount machined amplifier shield (MP14) and slide shield to rear and out the right side to clear board bracket (MP13) from Multiplier Amplifier Assembly A1.

h. Remove the two screws which secure Multiplier Amplifier Assembly to Harmonic Selector Cavity and remove assembly. Note: Harmonic Generator Assembly A2 is mounted to bottom of this assembly.

i. To replace this assembly, reverse the procedure used in steps a through h.

j. All replacement Multiplier Amplifier Assemblies are adjusted at the factory for optimum performance; however, if a general operation check is desired, an in-cabinet performance check is given in Table 5-4.

5-24. HARMONIC GENERATOR ASSEMBLY A2.

5-25. This assembly should be replaced as a unit and no attempt made to repair it. To remove this assembly see Figure 5-2 and proceed as follows:

a. Remove Multiplier Amplifier Assembly A1 as described in Paragraph 5-22.

b. Remove the two harmonic generator mounting screws.

c. Unsolder capacitor C25 from harmonic generator leads (see Figure 8-2).

d. Unsolder harmonic generator leads from Assembly A1 printed circuit board and remove harmonic generator (see Figure 8-2).

e. To replace this assembly reverse the procedure used in steps a through d.

f. The Multiplier Amplifier alignment procedure (Paragraph 5-37) should be performed after replacing Harmonic Generator Assembly.

5-26. HARMONIC SELECTOR CAVITY.

5-27. No attempt should be made to repair the Harmonic Selector Cavity; it should be replaced as a unit. To remove the cavity, see Figures 8-2 and 8-3 and proceed as follows:

- a. Remove Multiplier Amplifier Assembly as described in Paragraph 5-22.
- b. Remove the four screws that secure cavity plug assembly (MP3) and remove cavity plug and cavity output cable.
- c. Unscrew knob set screws and remove knob.
- d. Remove the four screws that secure mixing frequency dial and remove dial.
- e. Remove the five Harmonic Selector Cavity mounting screws. Remove cavity by sliding to rear and lifting it out through the left side.
- f. To replace this assembly reverse the procedure used in steps a through e.
- g. All replacement Harmonic Selector Cavities are adjusted at the factory for optimum performance. However, if a general operation check is desired, and in-cabinet performance check is given in Table 5-4.

5-28. MIXER ASSEMBLY A3.

5-29. No attempt should be made to repair this assembly; it should be replaced as a unit. To remove the assembly, see Figure 5-2 and proceed as follows:

- a. Remove the four screws which secure top plate (MP6) and remove top plate.
- b. Disconnect black wire to meter from ground lug on MP14 and white wire to meter from capacitor C3 on MP14.
- c. Remove screw securing aluminum spacer rod (MP10) to plug-in guide (MP9) on right side of instrument. Unscrew spacer (MP10) from front panel.
- d. Remove the twelve screws that secure amplifier side plate (MP12) and remove side plate.
- e. Disconnect orange wire from A3R4 and blue wire from A3R3.
- f. Slide machined amplifier shield to rear and out the right side to make mixer (A3) and mixer securing screws accessible. See Figure 8-4.
- g. Remove the four mixer securing screws. Remove mixer by carefully pulling it out of its cavity in MP14 (machined amplifier shield).

h. To replace the Mixer Assembly A3, reverse the procedure used in steps a through g.

i. The Mixer Balance adjustment, Paragraph 5-40, procedure should be performed after replacing the Mixer Assembly A3).

5-30. FILTER ASSEMBLY A4.

5-31. To remove Filter Assembly A4, see Figure 5-2 and proceed as follows:

- a. Remove Mixer Assembly A3 as described in Paragraph 5-28.
- b. Pull the Filter Assembly out of its cavity in MP14 with a pair of longnose pliers.
- c. To replace this assembly reverse the procedure used in steps a and b.

5-32. VIDEO AMPLIFIER ASSEMBLY A5.

5-33. To remove Video Amplifier Assembly A5, see Figure 5-2 and follow this procedure:

- a. Remove the twelve screws that secure the amplifier side plate (MP12) and remove side plate.
- b. Disconnect the following wires: 1) the white wire from capacitor C3; 2) the red wire from capacitor C1; 3) the violet wire from capacitor C2; and 4) the two leads from the video amplifier output cables.
- c. Remove the five Video Amplifier securing screws and remove the Video Amplifier Assembly A5.
- d. To replace the Video Amplifier Assembly A5 reverse the procedure used in steps a thru c.
- e. The Mixer Balance Adjust control is on the Video Amplifier Assembly. The replacement of the Video Amplifier Assembly necessitates the adjustment of the Mixer Balance in Paragraph 5-40.

f. All replacement Video Amplifier Assemblies are adjusted at the factory for optimum performance. However, if general operation check is desired, an in-cabinet performance check is given in Table 5-4.

5-34. METER REPLACEMENT PROCEDURE.

5-35. To remove level indicator meter, see Figure 5-2 and proceed as follows:

- a. Remove the four screws that secure the top plate (MP6) and remove the top plate.
- b. Remove the four screws that secure the side plate (MP7) and remove the side plate.
- c. Remove the three screws securing the three aluminum spacer rods (MP10).
- d. Unscrew the knob set screws and remove the knob.

e. Remove the four screws that secure the mixing frequency dial and remove dial.

f. Remove the two screws that secure front panel to bottom plate (MP8).

g. Cut connecting wires at meter terminals.

h. Remove panel from instrument to permit access to meter.

i. Remove the two screws from meter bezel at sides of meter. Push bezel forward as far as possible.

j. Grasp meter and gently pull (with bracket MP5) backwards out of front panel hole.

k. Remove meter bracket (MP5) and hardware from meter and install in identical manner on replacement meter.

l. Replace meter (with bracket) in unit by reversing procedure used in steps a through k. Strip 1/4 inch insulation from ends of each connecting wire and solder to meter terminals. White wire goes to inside terminal; black wire goes to outside terminal.

5-36. CIRCUIT ADJUSTMENTS.

5-37. MULTIPLIER AMPLIFIER ALIGNMENT PROCEDURE. Two procedures are given for multiplier amplifier alignment; Procedure a is to be used if the multiplier is working and just requires peaking; and Procedure b if the multiplier has no output (check output by measuring dc voltage at junction of C25 and R16; normal reading is 2 volts or more).

- a. 1) With counter power off, connect converter to counter with Extension Cable HP 10506B.
- 2) Remove four screws which secure MP6 (top plate) and remove MP6.
- 3) Set UHF Signal Generator to any frequency between 2 and 3 GHz at 50 mV and connect to converter INPUT.
- 4) Turn counter power on and set controls as shown in Figure 3-1. Tune converter for a maximum indication on Level Indicator Meter.
- 5) Adjust UHF Signal Generator output level for a reading on the red/green line of the converter Level Indicator Meter.

NOTE: If counter displays a difference frequency below 1 MHz, adjust UHF Signal slightly so counter display is between 1 to 50 MHz.

- 6) Adjust A1L2, A1L3, A1L5, A1L6, A1L8, A1L10 and A1C25 for a maximum indication on Level Indicator Meter.

NOTE: If the Level Indicator Meter reading increases to above 1/2 of full scale, readjust the UHF Signal Generator to keep indication near the red/green line.

- 7) Potentiometer A1R17 needs no adjusting providing input sensitivity is between 25 mV and 50 mV throughout the input frequency range.
- 8) Replace MP6 (top plate).

- b. 1) With counter power off, connect converter to counter with Extension Cable HP 10506B.
- 2) Remove four screws which secure MP6 (top plate) and remove MP6.
- 3) Turn counter power on.
- 4) Connect HP 140A with HP 1410A plug in (1000 MHz Oscilloscope), using an HP 10214A Divider and an HP 10217A Blocking Capacitor to collector of A1Q1. Set Oscilloscope vertical gain for 5 V/cm (with 10:1 Divider set to .5 V/cm) and horizontal to .05 μ s/cm, and trigger oscilloscope from counter OUTPUT STD FREQ 10 MHz (rear of counter).
- 5) Observe waveform and tune A1L2 for maximum. Waveform and amplitude should approximate that in test point 2, Table 8-1.
- 6) Connect oscilloscope probe to the collector of A1Q2. Set oscilloscope Vertical to 2 V/cm.
- 7) Observe waveform and adjust A1L3 for maximum; then adjust A1L5 for maximum. Waveform and amplitude should approximate that in test point 3, Table 8-1.
- 8) Connect oscilloscope probe to collector of A1Q3.
- 9) Observe waveform and adjust A1L6 for the approximate waveform and amplitude shown in test point 4, Table 8-1.
- 10) Connect oscilloscope probe to collector of A1Q4. Set oscilloscope Vertical to 1 V/cm.
- 11) Observe waveform and adjust A1L8 for maximum. Waveform and amplitude should approximate that shown in test point 5, Table 8-1.
- 12) Connect oscilloscope probe to collector of A1Q5. Set oscilloscope Vertical to 2 V/cm.
- 13) Observe waveform and adjust A1L10 for maximum. Waveform and amplitude should approximate that shown in test point 6, Table 8-1.
- 14) Connect oscilloscope probe to collector of A1Q6. Set oscilloscope Vertical to 10 V/cm.
- 15) Observe waveform and tune A1C25 for maximum. Note two maxima should be noted as the capacitor is turned through 360°. Waveform and amplitude should now approximate that in test point 7, Table 8-1. The output should be a sine wave of 50 Mc, approximately 20 volts amplitude; if not proceed to steps 16 through 19 and then repeat step 15.
- 16) Adjust capacitor A1C25 to the center of its range (notch perpendicular to axis of leads).
- 17) Unsolder from the board the end of A1L12 at its junction with A1L11 and A1C23.
- 18) Observe the waveform and tune A1L12 for a maximum by increasing or reducing the loop diameter. Resolder A1L12 to the board.
- 19) See Para. 5-37a for final peaking adjustment.

5-38. CRYSTAL FILTER ADJUSTMENT.

5-39. To adjust the crystal bandpass filter in the Multiplier Amplifier Assembly A1, proceed as follows:

- a. With counter power off, connect converter to counter with Extension Cable HP 10506B.
- b. Remove the four screws which secure MP6 (top plate) and remove MP6.
- c. Remove the four screws which secure MP7 (left side plate) and remove MP7.
- d. Remove Cavity Output Cable Assembly from MP14 (Machined Amplifier Shield). To prevent damage to the cable assembly, first remove the four screws that secure the Cavity Plug Assembly (MP3) and remove the cavity plug and output cable, then unscrew and remove the other end of the output cable from MP14. Replace the cavity plug (MP3) and the four screws that secure it to the cavity.

e. Connect a male BNC Plug connector (HP Stock No. 1250-0052) to the end of the cavity output cable.

f. Using BNC male to Type N female adapter (HP Stock No. 1250-0077), connect the output cable from Harmonic Selector Cavity to the HP Spectrum Analyzer.

g. Set Spectrum Analyzer Controls as follows:

```

VERTICAL DISPLAY . . . . . LOG
IF BANDWIDTH . . . . . 1 kHz
SWEEP TIME . . . . . 30 ms per cm
IF GAIN . . . . . 60 dB
SPECTRUM WIDTH . . . . . 100 kc per cm
SYNC . . . . . INT
FREQUENCY . . . . . 2-10 GHz
ATTENUATOR . . . . . 0 dB
SIGNAL IDENTIFIER . . . . . OFF
    
```

h. Turn counter power ON and turn Converter Mixing Frequency control to 2.95 GHz.

i. Tune Spectrum Analyzer until the converter signal is found.

j. Observe 100kHz sideband and adjust capacitor (A1C13) for minimum side bands (see Figure 5-1). Side bands should be 30 dB below 2.95 GHz reference.

5-40. MIXER BALANCE ADJUSTMENT.

a. With counter power off, connect converter to counter with Extension Cable HP 10506B.

b. Remove the twelve screws which secure MP12 (amplifier side plate) and remove .

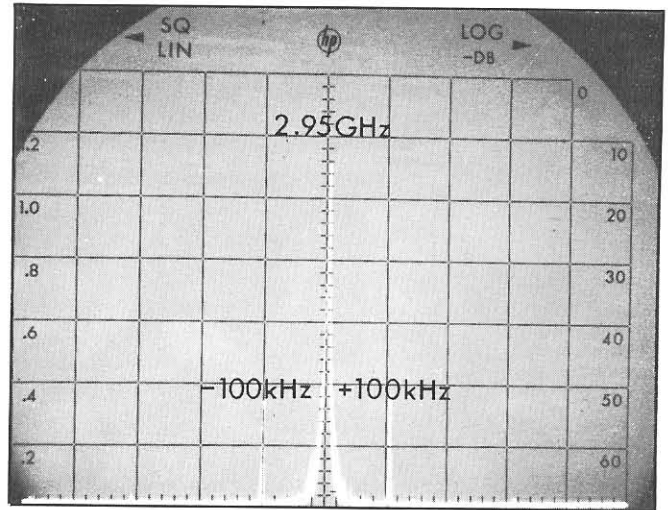


Figure 5-1. Spectrum Analyzer Display

c. Set 608E Signal Generator to 50 MHz at 30 mV rms and connect to INPUT of converter.

d. Turn counter power ON and adjust Mixer Balance Adjust A5R3 for a minimum reading on the level indicator meter.

5-41. LOW PASS FILTER ADJUSTMENT.

5-42. The Low Pass Filter in the Video Amplifier Assembly A5 consists of three resonant LC parallel circuits (see schematic diagram, Figure 8-6). These circuits are pre-tuned and sealed at the factory, and should need no further adjustment. The following procedure can be used to verify correct operation of the filter circuits (A5L1, A5L2, and A5L3) and to check the tuning of replacement circuits.

a. Remove circuits (A5L1, A5L2, and A5L3) from the Video Amplifier Assembly board.

b. Install clips on terminals of RX Meter. Clamp one leg of the circuit under test with the clip from the LO side. Bring other leg close to but not touching the clip on HI side.

c. Depending on which circuit is under test, the frequency should be set to the following:

- A5L1 117.3 MHz
- A5L2 71.9 MHz
- A5L3 63.2 MHz

d. Tune in instrument with "Detector tuning adjustments" and maximize response, with R_p and C_p set to arbitrary values.

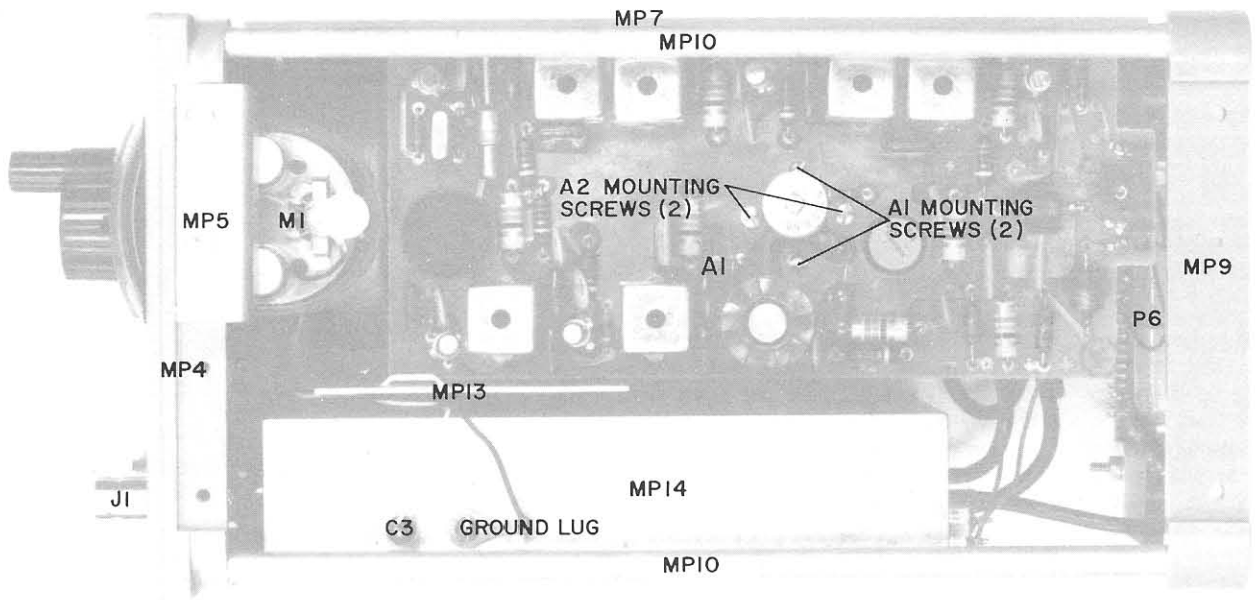
e. Set R_p to "infinity" and C_p to zero.

f. Null the response with the Zero Balance adjustments.

g. Clamp the other leg to the HI side clip.

h. Leave C_p at zero; alternately tune the circuit with tuning wand and adjust R_p dial until a null is obtained.

TOP VIEW



RIGHT VIEW

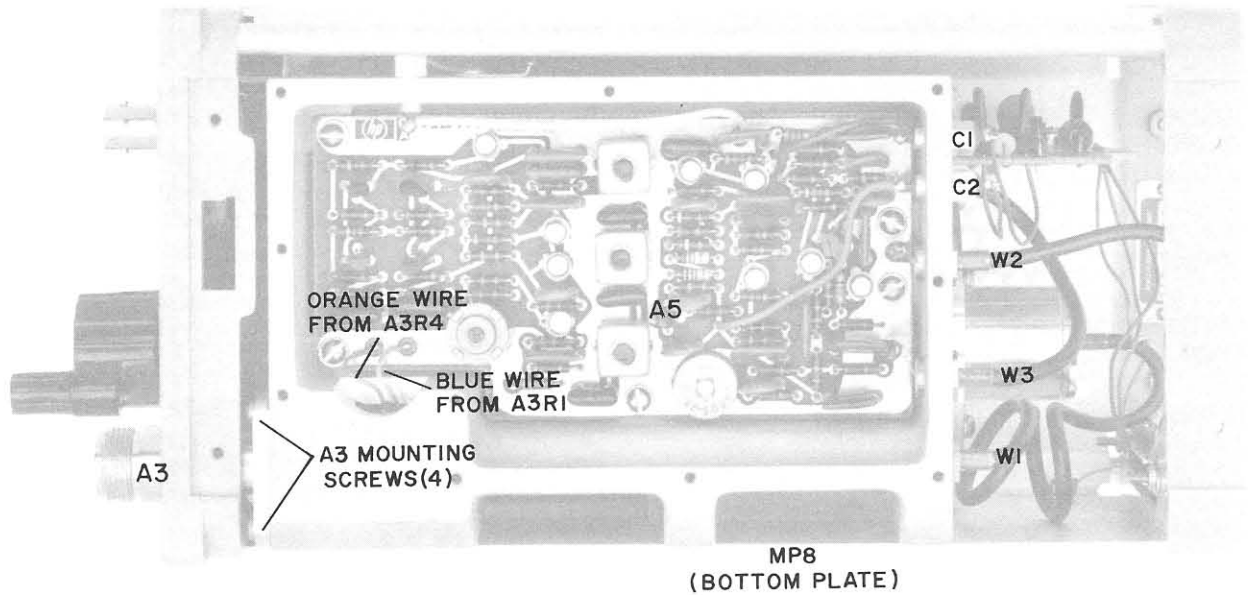


Figure 5-2. Top and Right Side View (5254C)

5-43. METER AMPLIFIER HIGH FREQUENCY ADJUSTMENT.

- a. With counter power off, connect converter to a HP Model 5245L with Extension Cable HP 10506B.
- b. Remove the twelve screws which secure MP12 (amplifier side plate) and remove MP12.
- c. Set 608E Signal Generator to 450 MHz at 50 mV and connect to INPUT of converter.
- d. Connect RF Millivoltmeter, through a 50-ohm feedthrough termination to the AUX OUT jack on converter front panel.

e. Turn counter power ON, and tune the converter for an indication at .4 GHz; the counter should display 50 MHz to 51 MHz. If not, adjust the Signal Generator frequency slightly so that it does.

f. Adjust the output level of the Signal Generator for a reading of 95 mV on the RF Millivoltmeter.

g. Adjust the Meter High Frequency adjust capacitor A5C21 until Level Indicator Meter reads on the red/green line.

Table 5-4. In-Cabinet Performance Check

1. RANGE: 150 to 3000 MHz (200 to 3000 MHz for 5254B).

a. Set Counter controls as follows:

SAMPLE RATE	slightly clockwise out of POWER OFF
SENSITIVITY	PLUG IN
TIME BASE	100 ms
FUNCTION	FREQUENCY
FREQUENCY CONVERTER DIAL	200 MHz

b. Connect VHF Signal Generator to plug-in. Set output level of Generator to 0.05V rms.

c. Vary frequency from 200 MHz to 450 MHz, keeping the output constant at 0.05V rms. Reading of plug-in dial and Counter display should be correct frequency. Tune Converter for maximum signal indication.

d. Substitute UHF Signal Generator for VHF Signal Generator.

e. Vary frequency from 450 to 1200 MHz, keeping output constant at 0.05V rms. Note frequency reading. Converter must be tuned for maximum signal indication.

f. Substitute the 800 MHz to 2400 MHz Generator for the 450 MHz to 1230 MHz Generator.

g. Vary frequency from 1200 MHz to 2400 MHz, keeping the output constant at 0.05V rms. Note frequency readings. Converter must be tuned for maximum signal indication.

h. Substitute 1.8 GHz to 4.6 GHz Generator for the 1200 MHz to 2400 MHz Generator.

i. Vary frequency from 2.4 to 3 GHz, keeping the output constant at 0.05 V rms. Record frequency range steps c, e, g, and i on test card.

2. INPUT SIGNAL LEVEL: 50 mV rms (-13 dBm in 50 ohms) to 1V rms (+13 dBm in 50 ohms).

a. Input signal level specification is verified by procedure 1, RANGE check.

PERFORMANCE CHECK TEST CARD

Hewlett-Packard Model 5254C Frequency
Converter Plug-In
Serial No. : _____ - _____

Tests Performed by _____
Date _____

CHECK

INDICATION

- | | | |
|-----------------------|--------------------------|---|
| 1. RANGE | <input type="checkbox"/> | 200 to 3000 MHz |
| 2. INPUT SIGNAL LEVEL | <input type="checkbox"/> | 50 mV rms (-13 dBm in 50 ohms) to 1V rms (+13 dBm in 50 ohms) |
| 3. ACCURACY | | Same as basic counter |

SECTION VI REPLACEABLE PARTS

6-1. INTRODUCTION.

6-2. This section contains information for ordering replacement parts. Table 6-1 lists parts in alpha-numerical order of their reference designators and indicates the description and $\frac{hp}{p}$ stock number of each part, together with any applicable notes. Table 6-2 lists parts in alpha-numerical order of their $\frac{hp}{p}$ stock number and provides the following information on each part:

- a. Description of the part (see list of abbreviations below).
- b. Typical manufacturer of the part in a five-digit code; see list of manufacturers in Table 6-3.
- c. Manufacturer's part number.
- d. Total quantity used in the instrument (TQ column).

6-3. Miscellaneous parts are listed at the end of Table 6-1.

6-4. ORDERING INFORMATION.

6-5. To order a replacement part, address order or inquiry to your local Hewlett-Packard Field Office (see lists at rear of this manual for addresses).

6-6. Specify the following information for each part:

- a. Model and complete serial number of instrument.
- b. Hewlett-Packard stock number.
- c. Circuit reference designator.
- d. Description.

6-7. To order a part not listed in Tables 6-1 and 6-2, give a complete description of the part and include its function and location.

REFERENCE DESIGNATORS

A = assembly	F = fuse	MP = mechanical part	V = vacuum, tube, neon bulb, photocell, etc.
B = motor	FL = filter	P = plug	VR = voltage regulator
BT = battery	IC = integrated circuit	Q = transistor	W = cable
C = capacitor	J = jack	R = resistor	X = socket
CP = coupler	K = relay	RT = thermistor	Y = crystal
CR = diode	L = inductor	S = switch	Z = tuned cavity, network
DL = delay line	LS = loud speaker	T = transformer	
DS = device signaling (lamp)	M = meter	TB = terminal board	
E = misc electronic part	MK = microphone	TP = test point	

ABBREVIATIONS

A = amperes	H = henries	N/O = normally open	RMO = rack mount only
AFC = automatic frequency control	HDW = hardware	NPO = negative positive zero (zero temperature coefficient)	RMS = root-mean square
AMPL = amplifier	HEX = hexagonal	NPN = negative-positive-negative	RWV = reverse working voltage
BFO = beat frequency oscillator	HG = mercury	NRF = not recommended for field replacement	S-B = slow-blow
BE CU = beryllium copper	HR = hour(s)	NSR = not separately replaceable	SCR = screw
BH = binder head	HZ = hertz	OBD = order by description	SE = selenium
BP = bandpass	IF = intermediate freq	OH = oval head	SECT = section(s)
BRS = brass	IMPG = impregnated	OX = oxide	SEMICON = semiconductor
BWO = backward wave oscillator	INCD = incandescent	P = peak	SI = silicon
CCW = counter-clockwise	INCL = include(s)	PC = printed circuit	SIL = silver
CER = ceramic	INS = insulation(ed)	PH BRZ = phosphor bronze	SL = slide
CMO = cabinet mount only	INT = internal	PHL = Phillips	SPG = spring
COEF = coefficient	K = kilo = 1000	PIV = peak inverse voltage	SPL = special
COM = common	LH = left hand	PNP = positive-negative-positive	SST = stainless steel
COMP = composition	LN = linear taper	P/O = part of	SR = split ring
COMPL = complete	LK WASH = lock washer	POLY = polystyrene	STL = steel
CONN = connector	LOG = logarithmic taper	PORC = porcelain	TA = tantalum
CP = cadmium plate	LPF = low pass filter	POS = position(s)	TD = time delay
CRT = cathode-ray tube	M = milli = 10 ⁻³	POT = potentiometer	TGL = toggle
CW = clockwise	MEG = meg = 10 ⁶	PP = peak-to-peak	THD = thread
DEPC = deposited carbon	MET FLM = metal film	PT = point	TI = titanium
DR = drive	MET OX = metallic oxide	PWV = peak working voltage	TOL = tolerance
ELECT = electrolytic	MFR = manufacturer	RECT = rectifier	TRIM = trimmer
ENCAP = encapsulated	MHZ = mega hertz	RF = radio frequency	TWT = traveling wave tube
EXT = external	MINAT = miniature	RH = round head or right hand	U = micro = 10 ⁻⁶
F = farads	MOM = momentary		VAR = variable
FH = flat head	MTG = mounting		VDCW = dc working volts
FIL H = fillister head	MY = "mylar"		W/ = with
FXD = fixed	N = nano (10 ⁻⁹)		W = watts
G = giga (10 ⁹)	N/C = normally closed		WIV = working inverse voltage
GE = germanium	NE = neon		WW = wirewound
GL = glass	NI PL = nickel plate		W/O = without
GRD = ground(ed)			

Table 6-1. Reference Designation Index

Reference Designation	Ⓢ Stock No.	Description #	Note
A1	05254-6022 05254-2058	BOARD ASSY: MULTIPLIER BOARD: BLANK MULTIPLIER	
A1C1	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C2	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C3	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C4	0140-0230	C:FXD MICA 420 PF 1% 300 VDCW	
A1C5	0140-0202	C:FXD MICA 15 PF 5% 500VDCW	
A1C6	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C7	0140-0156	C:FXD MICA 1500 PF 2% 300 VDCW	
A1C8	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C9	0140-0194	C:FXD MICA 110 PF 5% 300 VDCW	
A1C10	0140-0209	C:FXD MICA 5.0 PF 10% 500 VDCW	
A1C11	0140-0194	C:FXD MICA 110 PF 5% 300 VDCW	
A1C12	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C13	0132-0003	C:VAR POLY C.7-3.0 PF	
A1C14	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C15	0140-0145	C:FXD MICA 22 PF 5% 500 VDCW	
A1C16	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C17	0140-0219	C:FXD MICA 180 PF 2% 300 VDCW	
A1C18	0140-0195	C:FXD MICA 130 PF 5% 300VDCW	
A1C19	0160-0127	C:FXD CER 1 UF 20% 25VDCW	
A1C20	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C21	0140-0224	C:FXD MICA 280 PF 1% 300 VDCW	
A1C22	0140-0195	C:FXD MICA 130 PF 5% 300VDCW	
A1C23	0170-0083	C:FXD MY 0.022 UF 20% 50VDCW	
A1C24	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C25	0130-0018	C:VAR CER 1.5-7 PF	
A1C26	0160-0127	C:FXD CER 1 UF 20% 25VDCW	
A1C27	0160-0127	C:FXD CER 1 UF 20% 25VDCW	
A1C28	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C29	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1L1	9140-0107	COIL:FXD RF 27MH 10%	
A1L2	9140-0221	INDUCTOR:VAR 800NH TUNABLE	
A1L2	9170-0144	CORE:POWDERED IRON	
A1L3	9140-0220	INDUCTOR:VAR 175NH TUNABLE	
A1L3	9170-0144	CORE:POWDERED IRON	
A1L4	9140-0107	COIL:FXD RF 27MH 10%	
A1L5	9140-0218	INDUCTOR:VAR 80NH TUNABLE	
A1L5	9170-0144	CORE:POWDERED IRON	
A1L6	9140-0218	INDUCTOR:VAR 80NH TUNABLE	
A1L6	9170-0144	CORE:POWDERED IRON	
A1L7	9140-0107	COIL:FXD RF 27MH 10%	
A1L8	9140-0219	INDUCTOR:VAR 115NH TUNABLE	
A1L8	9170-0144	CORE:POWDERED IRON	
A1L9	9140-0107	COIL:FXD RF 27MH 10%	
A1L10	9140-0219	INDUCTOR:VAR 115NH TUNABLE	
A1L10	9170-0144	CORE:POWDERED IRON	
A1L11	9140-0107	COIL:FXD RF 27MH 10%	
A1L12	8151-0012	WIRE:#20 AWG(1-1/2)	
A1L13	9140-0031	COIL:RF 75MH	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
A1L14	9140-0018	COIL:RF 10H	
A1L15	9140-0018	COIL:RF 10H	
A1L16	9140-0107	COIL:FXD RF 27MH 10%	
A1L17	9140-0107	COIL:FXD RF 27MH 10%	
A1L18	9140-0031	COIL:RF 75MH	
A1Q1	1854-0005	TRANSISTOR:SILICON NPN 2N708	
A1Q2	1854-0005	TRANSISTOR:SILICON NPN 2N708	
A1Q3	1854-0005	TRANSISTOR:SILICON NPN 2N708	
A1Q4	1854-0019	TRANSISTOR:SILICON NPN	
A1Q5	1854-0019	TRANSISTOR:SILICON NPN	
A1Q6	1854-0035	TRANSISTOR:SILICON NPN	
A1Q6	1205-0011	HEAT SINK	
A1R1	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A1R2	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	
A1R3	0683-2205	R:FXD COMP 22 OHM 5% 1/4W	
A1R4	0758-0010	R:FXD MET CX 3300 OHM 5% 1/2W	
A1R5	0758-0044	R:FXD MET CX 2200 OHM 5% 1/2W	
A1R6	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A1R7	0758-0044	R:FXD MET CX 2200 OHM 5% 1/2W	
A1R8	0683-2725	R:FXD COMP 2700 OHM 5% 1/4W	
A1R9	0683-5105	R:FXD COMP 51 OHM 5% 1/4W	
A1R10	0758-0044	R:FXD MET CX 2200 OHM 5% 1/2W	
A1R11	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	
A1R12	0758-0017	R:FXD MET CX 1500 OHM 5% 1/2W	
A1R13	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A1R14	0683-3325	R:FXD COMP 3300 OHM 5% 1/4W	
A1R15	0758-0030	R:FXD MET CX 5100HM 5% 1/2W	
A1R16	0683-4725	R:FXD COMP 4700 OHM 5% 1/4W	
A1R17	2100-1776	R:VAR WW 10K OHM 10% LIN 1/2W	
A1T1	05254-6011	TOROID ASSY:WOUND	
A1Y1	0410-0089	CRYSTAL:50MC	
A2	05254-6012	HARMONIC GENERATOR ASSY NOT RECOMMENDED FOR FIELD REPLACEMENT	
A2C1	0160-0958	C:FXD MICA 390 PF 5% 300 VDCW	
A2C2	0160-0759	C:FXD MICA 1000 PF 5% 250VDCW	
A2CR1	1901-0153	DIODE:SILICON PICO-BOFF	
A2MP1	05254-2039	DIODE:MOUNT	
A2MP2	05254-0008	SUPPRESSOR:MODE	
A2R1	0758-0135	R:FXD CARBON FLM 6.8 OHM 10% 1/10W	
A3	05254-6006	MIXER ASSY NOT RECOMMENDED FOR FIELD REPLACEMENT	
	05254-2008	CAPACITOR MOUNT:MIXER	
	05254-2009	CONTACT:MIXER	
	05254-2038	RING:GROUND MIXER	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
	05254-2011 05254-2012	INSERT:MIXER OUTPUT CONNECTOR:REAR:MIXER	
	05254-2041 05254-4001	STUD:THREADED CAPACITOR ASSY:INPUT	
	05254-6015 0890-0297	TERMINATION ASSY:MIXER TUBING:TEFLON 6"/100	
A3C1 A3CR1	05254-2037 1900-0014	CONDUCTOR:CAPACITOR MIXER DIODE:POINT CONTACT SILICON MATCHED PR PART OF 05254-6014 ASSY	
A3J1	05254-2027	CONNECTOR:INPUT	
A3R1 A3R2 A3R3 A3R4	0757-0895 0757-0895 0758-0125 0758-0125	R:FXD MET FLM 62 OHM 2% 1/8W R:FXD MET FLM 62 OHM 2% 1/8W R:FXD MET CX 430 OHM 5% 1/4W(PART OF 05254-6014 ASSY) R:FXD MET CX 430 OHM 5% 1/4W(PART OF 05254-6014 ASSY)	
A4	05254-6013 05254-2050 1250-0020	FILTER ASSY:RF NOT RECOMMENDED FOR FIELD REPLACEMENT SPACER:FILTER TERMINATION CONTACT:BNC FEMALE RF CONNECTOR	
A4C1 A4C2 A4C3 A4C4 A4C5	05254-2045 05254-2047 05254-2046 05254-2047 05254-2045	FILTER SECTION 1 FILTER SECTION 3 FILTER SECTION 2 FILTER SECTION 3 FILTER SECTION 1	
A4MP1 A4MP2 A4MP3	05254-2010 05254-2004 05254-2048	INSERT:FRONT AMPLIFIER INSERT:REAR AMPLIFIER SLEEVE:RF FILTER	
A4L1 A4L2 A4L3 A4L4	360A-13 360A-13 360A-13 360A-13	WIRE:CENTER CONDUCTOR 18"/100 WIRE:CENTER CONDUCTOR 18"/100 WIRE:CENTER CONDUCTOR 18"/100 WIRE:CENTER CONDUCTOR 18"/100	
A5	05254-6021 05254-2060	BOARD ASSY:AMPLIFIER BOARD:BLANK AMPLIFIER	
A5C1 A5C2 A5C3 A5C4 A5C5	0140-0176 0140-0178 0160-0127 0150-0093 0150-0121	C:FXD MICA 560 PF 2% 300 VDCW C:FXD MICA 560 PF 2% 300 VDCW C:FXD CER 1 UF 20% 25VDCW C:FXD CER 0.01 UF +80-20% 100VDCW C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C6 A5C7 A5C8 A5C9 A5C10	0150-0093 0160-0127 0150-0121 0160-0740	C:FXD CER 0.01 UF +80-20% 100VDCW C:FXD CER 1 UF 20% 25VDCW C:FXD CER 0.1 UF +80-20% 50VDCW C:FXD MICA 39.6± 1/2 PF 500 VDCW C:FXD 5.57 PF NSR P/O L1	
A5C11 A5C12 A5C13 A5C14 A5C15	0160-0739 0160-0738 0160-0737	C:FXD MICA 56.2 ± 1/2 PF 500 VDCW C:FXD 17 PF NSR P/O L2 C:FXD MICA 44.3 ± 1/2 PF 500 VDCW C:FXD 35.3 PF NSR P/O L3 C:FXD MICA 29.3 1/2 PF 500 VDCW	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
A5C16	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C17	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C18	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C19	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C20	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C21	0130-0016	C:VAR CER 5-25 PF	
A5C22	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C23	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C24	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C25	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C26	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C27	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C28	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C29	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C30	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5CR1	1910-0022	DIODE:GERMANIUM 5 WIV	
A5CR2	1910-0022	DIODE:GERMANIUM 5 WIV	
A5CR3	05379-60013	DIODE TUNNEL:GERMANIUM 100MA 10%	
A5E1	9170-0016	BEAD:MAGNETIC SHIELDING	
A5L1	9140-0215	TUNED CIRCUIT 349.8NH	
A5L2	9140-0214	TUNED CIRCUIT 287.9NH	
A5L3	9140-0213	TUNED CIRCUIT 179.6NH	
A5L4	9140-0181	COIL:FXD RF 22UH 5%	
A5L5	9140-0181	COIL:FXD RF 22UH 5%	
A5Q1	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q2	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q3	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q4	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q5	1854-0019	TRANSISTOR:SILICON NPN	
A5Q6	1853-0009	TRANSISTOR:SILICON PNP	
A5Q7	1854-0019	TRANSISTOR:SILICON NPN	
A5Q8	1854-0019	TRANSISTOR:SILICON NPN	
A5Q9	1854-0019	TRANSISTOR:SILICON NPN	
A5Q10	1854-0019	TRANSISTOR:SILICON NPN	
A5Q11	1854-0019	TRANSISTOR:SILICON NPN	
A5Q12	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q13	1853-0015	TRANSISTOR:SILICON PNP 2N3640	
A5Q14	1854-0019	TRANSISTOR:SILICON NPN	
A5Q15	1854-0019	TRANSISTOR:SILICON NPN	
A5R1	0683-1345	R:FXD COMP 130K OHM 5% 1/4W	
A5R2	0683-1245	R:FXD COMP 120K OHM 5% 1/4W	
A5R3	2100-0723	R:VAR COMP 100K OHM 20% LIN 1/4W	
A5R4	0683-1825	R:FXD COMP 1800 OHM 5% 1/4W	
A5R5	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	
A5R6	0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	
A5R7	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	
A5R8	0683-1615	R:FXD COMP 160 OHM 5% 1/4W	
A5R9	0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	
A5R10	0683-1825	R:FXD COMP 1800 OHM 5% 1/4W	
A5R11	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	Ⓟ Stock No.	Description #	Note
A5R12	0683-2015	R:FXD COMP 200 OHM 5% 1/4W	
A5R13	0683-5615	R:FXD COMP 560 OHM 5% 1/4W	
A5R14	0683-5615	R:FXD COMP 560 OHM 5% 1/4W	
A5R15	0683-1325	R:FXD COMP 1300 OHM 5% 1/4W	
A5R16	0683-5105	R:FXD COMP 51 OHM 5% 1/4W	
A5R17	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R18	0683-6215	R:FXD COMP 620 OHM 5% 1/4W	
A5R19	0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	
A5R20	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	
A5R21	0683-2725	R:FXD COMP 2700 OHM 5% 1/4W	
A5R22	0683-4725	R:FXD COMP 4700 OHM 5% 1/4W	
A5R23	0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	
A5R24	0683-1015	R:FXD COMP 100 OHM 5% 1/4W	
A5R25	0683-9105	R:FXD COMP 91 OHM 5% 1/4W	
A5R26	0683-3925	R:FXD COMP 3900 OHM 5% 1/4W	
A5R27	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R28	0683-6815	R:FXD COMP 680 OHM 5% 1/4W	
A5R29	0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	
A5R30	0683-5105	R:FXD COMP 51 OHM 5% 1/4W	
A5R31	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	
A5R32	0683-1625	R:FXD COMP 1600 OHM 5% 1/4W	
A5R33	0683-1815	R:FXD COMP 180 OHM 5% 1/4W	
A5R34	0683-1015	R:FXD COMP 100 OHM 5% 1/4W	
A5R35	0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	
A5R36	0683-1215	R:FXD COMP 120 OHM 5% 1/4W	
A5R37	0683-1525	R:FXD COMP 1500 OHM 5% 1/4W	
A5R38	0683-1015	R:FXD COMP 100 OHM 5% 1/4W	
A5R39	0683-7505	R:FXD COMP 75 OHM 5% 1/4W	
A5R40	0683-5625	R:FXD COMP 5600 OHM 5% 1/4W	
A5R41	0683-8225	R:FXD COMP 8200 OHM 5% 1/4W	
A5R42	0683-6205	R:FXD COMP 62 OHM 5% 1/4W	
A5R43	0683-4715	R:FXD COMP 470 OHM 5% 1/4W	
A5R44	0683-1005	R:FXD COMP 10 OHM 5% 1/4W	
A5R45	0683-7505	R:FXD COMP 75 OHM 5% 1/4W	
A5R46	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R47	0683-3605	R:FXD COMP 36 OHM 5% 1/4W	
A5R48	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R49	0683-1825	R:FXD COMP 1800 OHM 5% 1/4W	
A5R50	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	
A5R51	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	
J1		PART OF W3	
M1	1120-0140	METER	
MP1	05254-6009	ASSY:FINGER MOUNT	
MP1	05254-6026	ASSY:PROBE DRIVE	
MP1	05254-6027	CAVITY ASSY	
MP1	05254-2065	CAVITY:MACHINED	
MP1	05254-2026	END CAP CAVITY	
MP1	05254-2055	GEAR:DIAL DRIVE	
MP1	05254-2032	GEAR:DIAL TRAIN #1	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	Stock No.	Description #	Note
MP1	05254-2033	GEAR:DIAL TRAIN #11	
MP1	05254-2054	GEAR:STOP	
MP1	05254-4004	GEAR:DIAL HUB	
MP1	05254-2067	SHAFT:IDLER GEAR	
MP1	3050-0381	WASHER:DELKIN	
MP2	05254-6019	DRIVE ASSY:PROBE INCLUDES:	
	1410-0004	BEARING:BALL	
	1410-0877	BALL RETAINER:THRUST BEARING	
	5020-0233	COLLAR	
	05254-2031	GEAR:DRIVER	
	05254-2032	GEAR:DIAL	
	05254-2033	GEAR:DIAL	
	1480-0288	PIN:STOP	
	05254-6018	PROBE ASSY	
	05254-2070	SCREW:LEAD	
	5000-0206	SPRING:WASHER	
	05254-2061	SUPPORT:BEARING	
	1410-0878	THRUST WASHER:BALL BEARING	
MP3	05254-2014	PLUG:CAVITY OUTPUT	
MP4	05254-2073	PANEL:FRONT OPTION A85 (LIGHT GRAY)	
MP5	05254-0015	BRACKET:METER	
MP6	05254-0012	PLATE:TOP	
MP7	05254-0016	PLATE:SIDE	
MP8	05254-0010	PLATE:BOTTOM	
MP9	5262A-83A	GUIDE:PLUG IN PLASTIC	
MP10	5262A-47A	SPACER:ALUMINUM ROD	
MP11		PART OF MP15	
MP12		PART OF MP15	
MP13		PART OF MP15	
MP14	05254-2057	AMPLIFIER SHIELD:MACHINED	
MP15		PREFIX THE FOLLOWING PARTS MP15	
C1	0160-0204	C: CER FEED THRU FILTER 200VDCW	
C2	0160-0204	C: CER FEED THRU FILTER 200VDCW	
C3	0160-0204	C: CER FEED THRU FILTER 200VDCW	
MP11	1250-0227	RING:RETAINER:RF CONNECTOR	
MP12	05254-0009	PLATE:AMPL SIDE	
MP13	05254-0018	BRACKET:BOARD	
MP16	05254-2076	PANEL: FRONT STANDARD (MINT GRAY)	
P6	1251-0099	CONNECTOR:RF 50 PIN	
W1	05254-6008	CABLE ASSY:CAVITY OUTPUT	
W2	05254-6005	CABLE ASSY:VIDEO AMPL OUTPUT	
W3	05254-6017	CABLE ASSY:AUX OUTPUT	
	0362-0013	TERMINAL CABLE	
	0590-0012	NUT:SWITCH KNURLED	
	1250-0050	CLAMP:NUT BNC	
	1250-0292	WASHER:CLAMP:RF CONNECTOR	
	1250-0293	GASKET:CLAMP:RF CONNECTOR	
	1250-0294	WASHER:FLAT:RF CONNECTOR	
	1250-0295	NUT:CLAMP:RF CONNECTOR	

See list of abbreviations in introduction to this section

Table 6-1. Reference Designation Index (Cont'd)

Reference Designation	④ Stock No.	Description #	Note
	1250-0762	INSULATOR BACK:RF CONNECTOR	
	1250-0763	BUSHING:RF CONNECTOR	
	1250-0803	CONTACT:FEMALE CENTER	
	1250-087U	BODY:RF CONNECTOR	
	8120-0046	CABLE:COAX 50 OHM(11-1/4 LONG)	
		<u>MISCELLANEOUS</u>	
	5040-0185	BEZEL:METER	
	1410-0033	BUSHING:KNOB	
	0370-0275	KNOB:CRANK ELK 1 DIA	
	0370-0050	KNOB:HANDLE	
	05254-2074	PIN ASSY:OUTPUT (COATED)	
	05254-0014	WASHER:CLAMP	

See list of abbreviations in introduction to this section

Table 6-2. Replaceable Parts

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
0130-0016	C:VAR CER 5-25 PF	28480	0130-0016	1
0130-0018	C:VAR CER 1.5-7 PF	28480	0130-0018	1
0132-0003	C:VAR POLY 0.7-3.0 PF	28480	0132-0003	1
0140-0145	C:FXD MICA 22 PF 5%	28480	0140-0145	1
0140-0156	C:FXD MICA 1500 PF 2%	28480	0140-0156	1
0140-0178	C:FXD MICA 560 PF 2%	28480	0140-0178	2
0140-0194	C:FXD MICA 110 PF 5%	28480	0140-0194	2
0140-0195	C:FXD MICA 130 PF 5% 300VDCW	04062	DM15F131J 300V	2
0140-0202	C:FXD MICA 15 PF 5% 500VDCW	28480	0140-0202	1
0140-0209	C:FXD MICA 5.0 PF 10%	28480	0140-0209	1
0140-0219	C:FXD MICA 180 PF 2%	28480	0140-0219	1
0140-0224	C:FXD MICA 280 PF 1%	28480	0140-0224	1
0140-0230	C:FXD MICA 420 PF 1%	28480	0140-0230	1
0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	91418	TA	19
0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	56289	5C50A	11
0160-0127	C:FXD CER 1 UF 20% 25VDCW	56289	5C13	5
0160-0204	C:CER FEED THRU FILTER 200VDCW	01121	SMFB-A2	3
0160-0737	C:FXD MICA 29.3 ± 1/2 PF	28480	0160-0737	1
0160-0738	C:FXD MICA 44.3 ± 1/2 PF	28480	0160-0738	1
0160-0739	C:FXD MICA 56.2 ± 1/2 PF	28480	0160-0739	1
0160-0740	C:FXD MICA 39.6+ 1/2 PF	28480	0160-0740	1
0160-0759	C:FXD MICA 1000 PF 5% 250VDCW	72982	2930-000-001A0-102J	1
0160-0958	C:FXD MICA 390 PF 5%	28480	0160-0958	1
0170-0083	C:FXD MY 0.022 UF 20% 50VDCW	84411	601 PE STYLE 1	1
0362-0013	TERMINAL CABLE	28480	0362-0013	1
0370-0050	KNOB:HANDLE	28480	0370-0050	1
0370-0275	KNOB:CRANK BLK 1" DIA	28480	0370-0275	1
0410-0089	CRYSTAL:50MC	28480	0410-0089	1
0590-0012	NUT:SWITCH KNURLED	04009	20994-NV	1
0683-1005	R:FXD COMP 10 OHM 5% 1/4W	01121	CB 1005	1
0683-1015	R:FXD COMP 100 OHM 5% 1/4W	01121	CB 1015	3
0683-1025	R:FXD COMP 1000 OHM 5% 1/4W	01121	CB 1025	6
0683-1215	R:FXD COMP 120 OHM 5% 1/4W	01121	CB 1215	1
0683-1245	R:FXD COMP 120K OHM 5% 1/4W	01121	CB 1245	1
0683-1325	R:FXD COMP 1300 OHM 5% 1/4W	01121	CB 1325	1
0683-1345	R:FXD COMP 130K OHM 5% 1/4W	01121	CB 1345	1
0683-1525	R:FXD COMP 1500 OHM 5% 1/4W	01121	CB 1525	1
0683-1615	R:FXD COMP 160 OHM 5% 1/4W	01121	CB 1615	1
0683-1625	R:FXD COMP 1600 OHM 5% 1/4W	01121	CB 1625	1
0683-1815	R:FXD COMP 180 OHM 5% 1/4W	01121	CB 1815	1
0683-1825	R:FXD COMP 1800 OHM 5% 1/4W	01121	CB 1825	3
0683-2015	R:FXD COMP 200 OHM 5% 1/4W	01121	CB 2015	1
0683-2205	R:FXD COMP 22 OHM 5% 1/4W	01121	CB 2205	1
0683-2405	R:FXD COMP 24 OHM 5% 1/4W	01121	CB 2405	4
0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	01121	CB 2425	3
0683-2725	R:FXD COMP 2700 OHM 5% 1/4W	01121	CB 2725	2
0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	01121	CB 3025	2
0683-3325	R:FXD COMP 3300 OHM 5% 1/4W	01121	CB 3325	1
0683-3605	R:FXD COMP 36 OHM 5% 1/4W	01121	CB 3605	1
0683-3925	R:FXD COMP 3900 OHM 5% 1/4W	01121	CB 3925	1

See list of abbreviations in introduction to this section

Table 6-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
0683-4715	R:FXD COMP 470 OHM 5% 1/4W	01121	CB 4715	1
0683-4725	R:FXD COMP 4700 OHM 5% 1/4W	01121	CB 4725	2
0683-5105	R:FXD COMP 51 OHM 5% 1/4W	01121	CB 5105	3
0683-5115	R:FXD COMP 510 OHM 5% 1/4W	01121	CB 5115	7
0683-5615	R:FXD COMP 560 OHM 5% 1/4W	01121	CB 5615	2
0683-5625	R:FXD COMP 5600 OHM 5% 1/4W	01121	CB 5625	1
0683-6205	R:FXD COMP 62 OHM 5% 1/4W	01121	CB 6205	1
0683-6215	R:FXD COMP 620 OHM 5% 1/4W	01121	CB 6215	1
0683-6815	R:FXD COMP 680 OHM 5% 1/4W	01121	CB 6815	1
0683-7505	R:FXD COMP 75 OHM 5% 1/4W	01121	CB 7505	2
0683-8225	R:FXD COMP 8200 OHM 5% 1/4W	01121	CB 8225	1
0683-9105	R:FXD COMP 91 OHM 5% 1/4W	01121	CB 9105	1
0757-0895	R:FXD MET FLM 62 OHM 2% 1/8W	28480	0757-0895	2
0758-0010	R:FXD MET OX 3300 OHM 5% 1/2W	28480	0758-0010	1
0758-0017	R:FXD MET OX 1500 OHM 5% 1/2W	28480	0758-0017	1
0758-0030	R:FXD MET OX 5100HM 5% 1/2W	28480	0758-0030	1
0758-0044	R:FXD MET OX 2200 OHM 5% 1/2W	28480	0758-0044	3
0758-0125	R:FXD MET OX 430 OHM 5% 1/4W	28480	0758-0125	2
0758-0135	R:FXD CARBON FLM 6.8 OHM 10% 1/10W	28480	0758-0135	1
0890-0297	TUBING:TEFLON 6*1/100	28480	0890-0297	1
1120-0140	METER	28480	1120-0140	1
1205-0011	HEAT SINK	98978	TX8F-032-025B	1
1250-0020	CONTACT:BNC FEMALE RF CONNECTOR	95712	088-8	2
1250-0050	CLAMP:NUT BNC	28480	1250-0050	1
1250-0227	RING:RETAINER:RF CONNECTOR	91737	492A-39	1
1250-0292	WASHER:CLAMP:RF CONNECTOR	95712	832-23	1
1250-0293	GASKET:CLAMP:RF CONNECTOR	95712	833-6	1
1250-0294	WASHER:FLAT:RF CONNECTOR	95712	2053-201	1
1250-0295	NUT:CLAMP:RF CONNECTOR	95712	834-36	1
1250-0762	INSULATOR BACK:RF CONNECTOR	95712	2624-9	1
1250-0763	BUSHING:RF CONNECTOR	95712	9520-9	1
1250-0803	CONTACT:FEMALE CENTER	95712	2631-6	1
1250-0870	BODY:RF CONNECTOR	95712	33062-1	1
1251-0099	CONNECTOR:50 PIN	28480	1251-0099	1
1410-0004	BEARING:BALL	21335	S1KDD-7F558115	1
1410-0033	BUSHING:KNOB	28480	1410-0033	1
1410-0877	BALL RETAINER:THRUST BEARING	28480	1410-0877	1
1410-0878	THRUST WASHER:BALL BEARING	28480	1410-0878	2
1480-0288	PIN:STOP	28480	1480-0288	1
1853-0009	TRANSISTOR:SILICON PNP	28480	1853-0009	1
1853-0015	TRANSISTOR:SILICON PNP 2N3640	28480	1853-0015	6
1854-0005	TRANSISTOR:SILICON NPN 2N708	07263	2N708	3
1854-0019	TRANSISTOR:SILICON NPN	28480	1854-0019	10
1854-0035	TRANSISTOR:SILICON NPN	28480	1854-0035	1
1900-0014	DIODE:POINT CONTACT SILICON MATCHED PR	28480	1900-0014	1
1901-0153	DIODE:SILICON PICO-BOFF	28480	1901-0153	1
1910-0022	DIODE:GERMANIUM 5 WIV	28480	1910-0022	2
1912-0023	DIODE TUNNEL:GERMANIUM 100MA 10%	28480	1912-0023	1
2100-0723	R:VAR COMP 100K OHM 20% LIN 1/4W	28480	2100-0723	1
2100-1776	R:VAR WW 10K OHM 10% LIN 1/2W	28480	2100-1776	1

≡ See list of abbreviations in introduction to this section

Table 6-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ
3050-0381	WASHER:DELTRIN	28480	3050-0381	1
5000-0206	SPRING:WASHER	28480	5000-0206	2
5020-0233	COLLAR	28480	5020-0233	2
5040-0185	BEZEL:METER	28480	5040-0185	1
8120-0046	CABLE:COAX 50 OHM(11-1/4 LONG)	28480	8120-0046	1
8151-0012	WIRE:#20 AWG(1-1/2)	28480	8151-0012	1
9140-0018	COIL:RF 1UH	99848	205-11-10	2
9140-0031	COIL:RF 75MH	28480	9140-0031	2
9140-0107	COIL:FXD RF 27MH 10%	99800	184C-38	7
9140-0181	COIL:FXD RF 22UH 5%	36196	1A2201M	2
9140-0213	TUNED CIRCUIT 179.6NH	36196	H-10693-A	1
9140-0214	TUNED CIRCUIT 287.9NH	36196	H-10692-A	1
9140-0215	TUNED CIRCUIT 349.8NH	36196	H-10691-A	1
9140-0218	INDUCTOR:VAR 80NH TUNABLE	04811	PC-80-L57-06	2
9140-0219	INDUCTOR:VAR 115NH TUNABLE	04811	PC-115-L57-06	2
9140-0220	INDUCTOR:VAR 175NH TUNABLE	04811	PC-175-L57-06	1
9140-0221	INDUCTOR:VAR 800NH TUNABLE	04811	PC-800-L57-06	1
9170-0016	BEAD:MAGNETIC SHIELDING	02114	56-590-65/3B	1
9170-0144	CORE:POWDERED IRON	04811	27-006S	6
05254-0008	SUPPRESSOR:MODE	28480	05254-0008	1
05254-0009	PLATE:AMPL SIDE	28480	05254-0009	1
05254-0010	PLATE:BOTTOM	28480	05254-0010	1
05254-0012	PLATE:TOP	28480	05254-0012	1
05254-0014	WASHER:CLAMP	28480	05254-0014	1
05254-0015	BRACKET:METER	28480	05254-0015	1
05254-0016	PLATE:SIDE	28480	05254-0016	1
05254-0018	BRACKET:BOARD	28480	05254-0018	1
05254-2004	INSERT:REAR AMPLIFIER	28480	05254-2004	1
05254-2008	CAPACITOR MOUNT:MIXER	28480	05254-2008	1
05254-2009	CONTACT:MIXER	28480	05254-2009	1
05254-2010	INSERT:FRONT AMPLIFIER	28480	05254-2010	1
05254-2011	INSERT:MIXER OUTPUT	28480	05254-2011	1
05254-2012	CONNECTOR:REAR:MIXER	28480	05254-2012	1
05254-2014	PLUG:CAVITY OUTPUT	28480	05254-2014	1
05254-2026	END CAP CAVITY	28480	05254-2026	1
05254-2027	CONNECTOR:INPUT	28480	05254-2027	2
05254-2031	GEAR:DRIVER	28480	05254-2031	1
05254-2032	GEAR:DIAL	28480	05254-2032	2
05254-2033	GEAR:DIAL	28480	05254-2033	2
05254-2037	CONDUCTOR:CAPACITOR MIXER	28480	05254-2037	2
05254-2038	RING:GROUND MIXER	28480	05254-2038	1
05254-2039	DIODE:MOUNT	28480	05254-2039	1
05254-2041	STUD:THREADED	28480	05254-2041	1
05254-2045	FILTER SECTION 1	28480	05254-2045	2
05254-2046	FILTER SECTION 2	28480	05254-2046	1
05254-2047	FILTER SECTION 3	28480	05254-2047	2
05254-2048	SLEEVE:RF FILTER	28480	05254-2048	1
05254-2050	SPACER:FILTER TERMINATION	28480	05254-2050	1
05254-2054	GEAR:STOP	28480	05254-2054	1
05254-2055	GEAR:DIAL DRIVE	28480	05254-2055	1

See list of abbreviations in introduction to this section

Table 6-2. Replaceable Parts (Cont'd)

Stock No.	Description #	Mfr.	Mfr. Part No.	TQ	RS
05254-2056	PANEL:FRONT (5254B)	28480	05254-2056	1	
05254-2057	AMPLIFIER SHIELD:MACHINED	28480	05254-2057	1	
05254-2058	BOARD:BLANK MULTIPLIER	28480	05254-2058	1	
05254-2060	BOARD:BLANK AMPLIFIER	28480	05254-2060	1	
05254-2061	SUPPORT:BEARING	28480	05254-2061	1	
05254-2063	SCREW:LEAD	28480	05254-2063	1	
05254-2065	CAVITY:MACHINED	28480	05254-2065	1	
05254-2067	SHAFT:IDLER GEAR	28480	05254-2067	1	
05254-2073	PANEL: FRONT OPTION A85 (LIGHT GRAY)	28480	05254-2073	1	
05254-2076	PANEL: FRONT STANDARD (MINT GRAY)	28480	05254-2076	1	
05254-4001	CAPACITOR ASSY:INPUT	28480	05254-4001	1	
05254-4003	PIN ASSY:OUTPUT	28480	05254-4003	1	
05254-4004	GEAR:DIAL HUB	28480	05254-4004	1	
05254-6005	CABLE ASSY:VIDEO AMPL OUTPUT	28480	05254-6005	1	1
05254-6006	MIXER ASSY	28480	05254-6006	1	1
05254-6008	CABLE ASSY:CAVITY OUTPUT	28480	05254-6008	1	
05254-6009	ASSY:FINGER MOUNT	28480	05254-6009	1	
05254-6011	TOROID ASSY:WOUND	28480	05254-6011	1	1
05254-6012	HARMONIC GENERATOR ASSY	28480	05254-6012	1	1
05254-6013	FILTER ASSY:RF	28480	05254-6013	1	
05254-6014	DIODE ASSY:MIXER	28480	05254-6014	1	
05254-6015	TERMINATION ASSY:MIXER	28480	05254-6015	1	
05254-6017	CABLE ASSY:AUX OUTPUT	28480	05254-6017	1	1
05254-6018	PROBE ASSY	28480	05254-6018	1	
05254-6019	ASSY:PROBE DRIVE (5254B)	28480	05254-6019	2	
05254-6021	BOARD ASSY:AMPLIFIER	28480	05254-6021	1	
05254-6022	BOARD ASSY:MULTIPLIER	28480	05254-6022	1	
05254-6023	CAVITY ASSY (5254B)	28480	05254-6023	1	
05254-6026	ASSY: PROBE DRIVE	28480	05254-6026	1	
05254-6027	CAVITY ASSY	28480	05254-6027	1	
360A-13	WIRE:CENTER CONDUCTOR 18"/100	28480	360A-13	4	1
5262A-47A	SPACER:ALUMINUM ROD	28480	5262A-47A	3	
5262A-83A	GUIDE:PLUG IN PLASTIC	28480	5262A-83A	1	

See list of abbreviations in introduction to this section

Table 6-3. Manufacturers Code List

The following code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) and their latest supplements. The date of revision and the date of the supplements used appear at the bottom of each page. Alphabetical codes have been arbitrarily assigned to suppliers not appearing in the H4 Handbooks.

Code No.	Manufacturer	Address	Code No.	Manufacturer	Address	Code No.	Manufacturer	Address
00000	U. S. A Common	Any supplier of U. S.	05347	Ultronix, Inc.	San Mateo, Cal.	11236	CTS of Berne, Inc.	Berne, Ind.
00136	McCoy Electronics	Mount Holly Springs, Pa.	05397	Union Carbine Corp., Elect.		11237	Chicago Telephone of California, Inc.	So. Pasadena, Cal.
00213	Sage Electronics Corp.	Rochester, N. Y.	05574	Viking Ind. Inc.	Canoga Park, Cal.	11242	Bay State Electronics Corp.	Waltham, Mass.
00287	Cemco, Inc.	Danielson, Conn.	05593	Isore Electro-Plastics Inc.	Sunnyvale, Cal.	11312	Teledyne Inc., Microwave Div.	Palo Alto, Cal.
00334	Humidial	Colton, Calif.	05616	Cosmo Plastic (c/o Electrical Spec. Co.)	Cleveland, Ohio	11314	National Seal	Downey, Cal.
00348	Mictron, Co., Inc.	Valley Stream, N. Y.	05624	Barber Colman Co.	Rockford, Ill.	11453	Precision Connector Corp.	Jamaica, N. Y.
00373	Garlock Inc.	Cherry Hill, N. J.	05728	Tiffen Optical Co.	Roslyn Heights, Long Island, N. Y.	11534	Duncan Electronics Inc.	Costa Mesa, Cal.
00656	Aerovox Corp.	New Bedford, Mass.	05729	Metro-Tel Corp.	Westbury, N. Y.	11711	General Instrument Corp., Semiconductor Division Products Group	Newark, N. J.
00779	Amp. Inc.	Harrisburg, Pa.	05783	Stewart Engineering Co.	Santa Cruz, Cal.	11717	Imperial Electronic, Inc.	Buena Park, Cal.
00781	Aircraft Radio Corp.	Boonton, N. J.	05820	Wakfield Engineering Inc.	Wakefield, Mass.	11870	Melabs, Inc.	Palo Alto, Cal.
00809	Croven, Ltd.	Whitby, Ontario, Canada	06004	Bassick Co., Div. of Stewart Warner Corp.	Bridgeport, Conn.	12136	Philadelphia Handle Co.	Camden, N. J.
00815	Northern Engineering Laboratories, Inc.	Burlington, Wis.	06090	Raychem Corp.	Redwood City, Cal.	12361	Grove Mfg. Co., Inc.	Shady Grove, Pa.
00853	Sangamo Electric Co., Pickens Div.	Pickens, S. C.	06175	Bausch and Lomb Optical Co.	Rochester, N. Y.	12574	Gulton Ind. Inc., Data System Div.	Albuquerque, N. M.
00866	Goe Engineering Co.	City of Industry, Cal.	06402	E. T. A. Products Co. of America	Chicago, Ill.	12697	Clarestar Mfg. Co.	Dover, N. H.
00891	Carl E. Holmes Corp.	Los Angeles, Cal.	06540	Amatonic Electronic Hardware Co., Inc.	New Rochelle, N. Y.	12728	Elmar Filter Corp.	W. Haven, Conn.
00929	Microlab Inc.	Livingston, N. J.	06555	Beebe Electrical Instrument Co., Inc.	Penacook, N. H.	12859	Nippon Electric Co., Ltd.	Tokyo, Japan
01002	General Electric Co., Capacitor Dept.	Hudson Falls, N. Y.	06666	General Devices Co., Inc.	Indianapolis, Ind.	12881	Metex Electronics Corp.	Clark, N. J.
01009	Alden Products Co.	Brockton, Mass.	06751	Components Inc., Ariz. Div.	Phoenix, Arizona	12930	Delta Semiconductor Inc.	Newport Beach, Cal.
01121	Allen Bradley Co.	Milwaukee, Wis.	06812	Torrington Mfg. Co., West Div.	Van Nuys, Cal.	12954	Dickson Electronics Corp.	Scottsdale, Arizona
01255	Litton Industries, Inc.	Beverly Hills, Cal.	06980	Varian Assoc. Etmac Div.	San Carlos, Cal.	13019	Airco Supply Co., Inc.	Wichita, Kansas
01281	TRW Semiconductors, Inc.	Lawndale, Cal.	07088	Kelvin Electric Co.	Van Nuys, Cal.	13061	Wilco Products	Detroit, Mich.
01295	Texas Instruments, Inc., Transistor Products Div.	Dallas, Texas	07126	Digitran Co.	Pasadena, Cal.	13103	Thermolytic	Dallas, Texas
01349	The Alliance Mfg. Co.	Alliance, Ohio	07137	Transistor Electronics Corp.	Minneapolis, Minn.	13327	Soliton Devices Inc.	Tappan, N. Y.
01538	Small Parts Inc.	Los Angeles, Cal.	07138	Westinghouse Electric Corp., Electronic Tube Div.	Elmira, N. Y.	13396	Telefunken (GmbH)	Hanover, Germany
01589	Pacific Relays, Inc.	Van Nuys, Cal.	07149	Filmohm Corp.	New York, N. Y.	13835	Midland-Wright Div. of Pacific Industries, Inc.	Kansas City, Kansas
01670	Gudrod Bros. Silk Co.	New York, N. Y.	07233	Cinch-Graphik Co.	City of Industry, Cal.	14099	Sem-Tech	Newbury Park, Cal.
01830	Amerock Corp.	Rockford, Ill.	07256	Silicon Transistor Corp.	Carle Place, N. Y.	14193	Calif. Resistor Corp.	Santa Monica, Cal.
01960	Pulse Engineering Co.	Santa Clara, Cal.	07261	Avnet Corp.	Culver City, Cal.	14298	American Components, Inc.	Conshohocken, Pa.
02114	Ferroxcube Corp. of America	Saugerties, N. Y.	07263	Fairchild Camera & Inst. Corp., Semiconductor Div.	Mountain View, Cal.	14433	ITT Semiconductor, a Div. of Int. Telephone and Telegraph Corporation	West Palm Beach, Fla.
02116	Wheelock Signals, Inc.	Long Branch, N. J.	07322	Minnesota Rubber Co.	Minneapolis, Minn.	14493	Hewlett-Packard Company	Loveland, Colo.
02286	Cole Rubber and Plastics Inc.	Sunnyvale, Cal.	07387	Birtcher Corp., The	Monterey Park, Cal.	14655	Cornell Dublier Electric Corp.	Newark, N. J.
02660	Amphenol-Borg Electronics Corp.	Broadview, Ill.	07397	Sylvania Elect. Prod. Inc., Mt. View Operations	Mountain View, Cal.	14674	Corning Glass Works	Corning, N. Y.
02735	Radio Corp. of America, Semiconductor and Materials Division	Somerville, N. J.	07700	Technical Wire Products Inc.	Cranford, N. J.	14752	Electro Cube Inc.	San Gabriel, Cal.
02771	Vocaline Co. of America, Inc.	Old Saybrook, Conn.	07829	Bodine Elect. Co.	Chicago, Ill.	14960	Williams Mfg. Co.	San Jose, Cal.
02777	Hopkins Engineering Co.	San Fernando, Cal.	07910	Continental Device Corp.	Hawthorne, Cal.	15106	The Sphere Co., Inc.	Little Falls, N. J.
02875	Hudson Tool & Die	Newark, N. J.	07933	Raytheon Mfg. Co., Semiconductor Div.	Mountain View, Cal.	15203	Webster Electronics Co.	New York, N. Y.
03296	Nylon Molding Corp.	Springfield, N. J.	07980	Hewlett-Packard Co., New Jersey Division	Rockaway, N. J.	15287	Seionics Corp.	Northridge, Cal.
03508	G. E. Semiconductor Prod. Dept.	Syracuse, N. Y.	08145	U. S. Engineering Co.	Los Angeles, Cal.	15291	Adjustable Bushing Co.	N. Hollywood, Cal.
03705	Apex Machine & Tool Co.	Dayton, Ohio	08289	Blihn, Delbert Co.	Pomona, Cal.	15558	Micron Electronics	Garden City, Long Island, N. Y.
03797	Eldemco Corp.	Compton, Calif.	08358	Burgess Battery Co.	Niagara Falls, Ontario, Canada	15566	Amprobe Inst. Corp.	Lynbrook, N. Y.
03818	Parker Seal Co.	Los Angeles, Cal.	08524	Deutseh Fastener Corp.	Los Angeles, Cal.	15631	Cabletronics	Costa Mesa, Cal.
03877	Transitron Electric Corp.	Wakefield, Mass.	08654	Bristol Co., The	Waterbury, Conn.	15772	Twentieth Century Coil Spring Co.	Santa Clara, Cal.
03888	Pyrofilm Resistor Co., Inc.	Cedar Knolls, N. J.	08717	Sloan Company	Sun Valley, Cal.	15801	Fenwal Elect. Inc.	Framingham, Mass.
03954	Singer Co., Diehl Div., FINDERNE Plant	Sumerville, N. J.	08718	ITT Cannon Electric Inc., Phoenix Div.	Phoenix, Arizona	15818	Amelco Inc.	Mountain View, Cal.
04009	Arrow, Hart and Hegeman Elect. Co.	Hartford, Conn.	08727	National Radio Lab. Inc.	Paramus, N. J.	16037	Spruce Pine Mica Co.	Spruce Pine, N. C.
04013	Tarus Corp.	Lambertville, N. J.	08792	CBS Electronics Semiconductor Operations, Div. of CBS Inc.	Lowell, Mass.	16179	Omni-Spectra Inc.	Detroit, Ill.
04062	Arco Electronic Inc.	Great Neck, N. Y.	08806	General Electric Co., Miniature Lamp Dept.	Cleveland, Ohio	16352	Computer Diode Corp.	Lodi, N. J.
04217	Essex Wire	Los Angeles, Cal.	08984	Mel-Rain	Indianapolis, Ind.	16554	Electroid Co.	Union, N. J.
04222	Hi-Q Division of Aerovox	Myrtle Beach, S. C.	09026	Babcock Relays Div.	Costa Mesa, Cal.	16585	Boots Aircraft Nut Corp.	Pasadena, Cal.
04354	Precision Paper Tube Co.	Wheeling, Ill.	09097	Electronic Enclosures Inc.	Los Angeles, Calif.	16688	Ideal Prec. Meter Co., Inc.	Brooklyn, N. Y.
04404	Palo Alto Division of Hewlett-Packard Co.	Palo Alto, Cal.	09134	Texas Capacitor Co.	Houston, Texas	16758	Delco Radio Div. of G. M. Corp.	Kokomo, Ind.
04651	Sylvania Electric Products, Microwave Device Div.	Mountain View, Cal.	09145	Tech. Ind. Inc. Atohm Elect.	Burbank, Cal.	17109	Thermometrics Inc.	Canoga Park, Cal.
04673	Dakota Engr. Inc.	Culver City, Cal.	09250	Electro Assemblies, Inc.	Chicago, Ill.	17474	Tranex Company	Mountain View, Cal.
04713	Motorola Inc. Semiconductor Prod. Div.	Phoenix, Arizona	09353	C & K Components Inc.	Newton, Mass.	17675	Hamlin Metal Products Corp.	Akron, Ohio
04732	Filtron Co., Inc. Western Div.	Culver City, Cal.	09569	Mallory Battery Co. of Canada, Ltd.	Toronto, Ontario, Canada	17745	Angstrom Prec. Inc.	No. Hollywood, Cal.
04773	Automatic Electric Co.	Northlake, Ill.	09795	Pennsylvania Fluorocarbon	Clifton Heights, Penn.	17856	Siliconix Inc.	Sunnyvale, Cal.
04796	Sequoia Wire Co.	Redwood City, Cal.	09922	Burdny Corp.	Norwalk, Conn.	17870	McGraw-Edison Co.	Manchester, N. H.
04811	Precision Coil Spring Co.	El Monte, Cal.	10214	General Transistor Western Corp.	Los Angeles, Cal.	18042	Power Design Pacific Inc.	Palo Alto, Cal.
04870	P. M. Motor Company	Westchester, Ill.	10411	Ti-Tal, Inc.	Berkeley, Cal.	18083	Cleivet Corp. Semiconductor Div.	Palo Alto, Cal.
04919	Component Mfg. Service Co.	W. Bridgewater, Mass.	10646	Carborundum Co.	Niagara Falls, N. Y.	18324	Sigmatex Corp.	Sunnyvale, Cal.
05006	Twentieth Century Plastics, Inc.	Los Angeles, Cal.				18478	Ty-Car Mfg. Co., Inc.	Holliston, Mass.
05277	Westinghouse Electric Corp. Semiconductor Dept.	Youngwood, Pa.				18486	TRW Elect. Comp. Div.	Des Plaines, Ill.

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Table 6-3. Manufacturers Code List (Continued)

Code No.	Manufacturer	Address	Code No.	Manufacturer	Address	Code No.	Manufacturer	Address
19644	LRC Electronics	Horseheads, N.Y.	71482	C. P. Clare & Co.	Chicago, Ill.	78452	Thompson-Bremer & Co.	Chicago, Ill.
19701	Electra Mfg. Co.	Independence, Kansas	71590	Centralab Div. of		78471	Tilley Mfg. Co.	San Francisco, Cal.
20183	General Atomics Corp.	Philadelphia, Pa.		Globe Union Inc.	Milwaukee, Wis.	78488	Stackpole Carbon Co.	St. Marys, Pa.
21226	Executone, Inc.	Long Island City, N.Y.	71616	Commercial Plastics Co.	Chicago, Ill.	78493	Standard Thomson Corp.	Waltham, Mass.
21355	Fafnir Bearing Co., The	New Britain, Conn.	71700	Cornish Wire Co., The	New York, N.Y.	78553	Tinnerman Products, Inc.	Cleveland, Ohio
21520	Fansteel Metallurgical Corp.	N. Chicago, Ill.	71707	Coto Coil Co., Inc.	Providence, R.I.	78790	Transformer Engineers	San Gabriel, Cal.
23020	General Reed Co.	Metuchen, N.J.	71744	Chicago Miniature Lamp Works	Chicago, Ill.	78947	Uelnite Co.	Newtonville, Mass.
23042	Texscan Corp.	Indianapolis, Ind.	71785	Cinch Mfg. Co.		79136	Waldes Kohinor Inc.	Long Island City, N.Y.
23763	British Radio Electronics Ltd.	Washington, D.C.		Howard B. Jones Div.	Chicago, Ill.	79142	Weeder Root, Inc.	Hartford, Conn.
24455	G. E. Lamp Division	Nela Park, Cleveland, Ohio	71984	Dow Corning Corp.	Midland, Mich.	79251	Wenco Mfg. Co.	Chicago, Ill.
24655	General Radio Co.	West Concord, Mass.	72136	Electro Motive Mfg. Co., Inc.		79727	Continental-Wirt Electronics Corp.	
24681	Memcor Inc., Comp. Div.	Huntington, Ind.			Willimantic, Conn.			Philadelphia, Pa.
26365	Gries Reproducer Corp.	New Rochelle, N.Y.	72619	Dialight Corp.	Brooklyn, N.Y.	79963	Zierick Mfg. Corp.	New Rochelle, N.Y.
26462	Grobert File Co. of America, Inc.	Carlstadt, N.J.	72656	Indiana General Corp.		80031	Mepec Division of Sessions Clock Co.	
26851	Compar Hollister Co.	Hollister, Cal.		Electronics Div.	Keasby, N.J.			Morrisstown, N.J.
26992	Hamilton Watch Co.	Lancaster, Pa.	72699	General Instrument Corp.		80033	Prestole Corp.	Toledo, Ohio
28480	Hewlett-Packard Co.	Palo Alto, Cal.		Cap Division	Newark, N.J.	80120	Schutzer Alloy Products Co.	Elizabeth, N.J.
28520	Heyman Mfg. Co.	Kenilworth, N.J.	72765	Drake Mfg. Co.	Harwood Heights, Ill.	80131	Electronic Industries Association	
30817	Instrument Specialties Co., Inc.	Little Falls, N.J.	72825	Hugh H. Eby Inc.	Philadelphia, Pa.		Standard tube or semi-conductor device, any manufacturer	
33173	G. E. Receiving Tube Dept.	Owensboro, Ky.	72928	Gudeman Co.	Chicago, Ill.	80207	Unimax Switch, Div. Maxon Electronics Corp.	Wallingford, Conn.
35434	Leetechrom Inc.	Chicago, Ill.	72962	Elastic Stop Nut Corp.	Union, N.J.	80223	United Transformer Corp.	New York, N.Y.
36196	Stawcyk Coil Products, Ltd.	Hawkesbury, Ontario, Canada	72964	Robert M. Hatley Co.	Los Angeles, Cal.	80248	Oxford Electric Corp.	Chicago, Ill.
36287	Coniingham, W. H. & Hill, Ltd.	Toronto, Ontario, Canada	72982	Ero Technological Products, Inc.	Eric, Pa.	80294	Bourns Inc.	Riverside, Cal.
37942	P. R. Mallory & Co., Inc.	Indianapolis, Ind.	73061	Hansen Mfg. Co., Inc.	Princeton, Ind.	80411	Arco Div. of Robertshaw Controls Co.	
39543	Mechanical Industries Prod. Co.	Akron, Ohio	73076	H. M. Harper Co.	Chicago, Ill.			Columbus, Ohio
40920	Miniature Precision Bearings Inc.	Keene, N.H.	73138	Helipot Div. of Beckman Inst., Inc.		80486	All Star Products Inc.	Defiance, Ohio
40931	Honeywell Inc.	Minneapolis, Minn.	73293	Hughes Products Division of Hughes Aircraft Co.	Newport Beach, Cal.	80509	Avery Label Co.	Monrovia, Cal.
42190	Muter Co.	Chicago, Ill.	73445	Amperex Elect. Co.	Hicksville, L. I. N.Y.	80583	Hammarlund Co., Inc.	Mars Hill, N.C.
43990	C. A. Norgren Co.	Englewood, Colo.	73500	Bradley Semiconductor Corp.		80646	Stevens, Arnold, Co., Inc.	Boston, Mass.
44655	Omnite Mfg. Co.	Skokie, Ill.	73559	Carling Electric, Inc.	Hartford, Conn.	80813	Dimeo Gray Co.	Dayton, Ohio
46384	Penn Eng. & Mfg. Corp.	Doylstown, Pa.	73586	Circle F Mfg. Co.	Trenton, N.J.	81030	International Inst. Inc.	Orange, Conn.
47904	Polaroid Corp.	Cambridge, Mass.	73682	George K. Garrett Co.		81073	Grayhill Co.	LaGrange, Ill.
48620	Precision Thermometer & Inst. Co.	Southampton, Pa.		Div. MSL Industries, Inc.	Philadelphia, Pa.	81095	Triad Transformer Corp.	Venice, Cal.
49956	Microwave & Power Tube Div.	Waltham, Mass.	73734	Federal Screw Products, Inc.	Chicago, Ill.	81312	Winchester Elec. Div. Litton Ind., Inc.	Oakville, Conn.
52099	Rowan Controller Co.	Westminster, Md.	73743	Fischer Special Mfg. Co.	Cincinnati, Ohio	81349	Military Specification	
52983	HP Co. Med. Elec. Div.	Waltham, Mass.	73793	General Industries Co., The	Ellyria, Ohio	81483	International Rectifier Corp.	El Segundo, Cal.
54294	Shalleross Mfg. Co.	Selma, N.C.	73846	Goshen Stamping & Tool Co.	Goshen, Ind.	81541	Airpac Electronics, Inc.	Cambridge, Maryland
55026	Simpson Electric Co.	Chicago, Ill.	73899	JFD Electronics Corp.	Brooklyn, N.Y.	81860	Barry Controls, Div. Barry Wright Corp.	
55933	Synthone Corp.	Elmsford, N.Y.	73955	Jennings Radio Mfg. Corp.	San Jose, Cal.			Watertown, Mass.
55938	Raytheon Co. Commercial Apparatus & System Div.	Su. Norwalk, Conn.	73957	Groove-Pin Corp.	Ridgefield, N.J.	82042	Cartier Precision Electric Co.	Skokie, Ill.
56137	Spaulding Fibre Co., Inc.	Tonawanda, N.Y.	74276	Signalite Inc.	Neptune, N.J.	82047	Spartan Faraday Inc., Copper Hewitt Electric Div.	Norwalk, N.J.
56289	Sprague Electric Co.	North Adams, Mass.	74455	J. H. Wmms. and Sons	Winchester, Mass.	82116	Electric Regulator Corp.	Hoboken, Conn.
58474	Superior Elect. Co.	Bristol, Conn.	74861	Industrial Condenser Corp.	Chicago, Ill.	82142	Jefferis Electronics Division of Speer Carbon Co.	Du Bois, Pa.
59446	Telex Corp.	Tulsa, Okla.	74868	R. F. Products Division of Amphelco-Borg Electronic Corp.		82170	Fairchild Camera & Inst. Corp.	
59730	Thomas & Betts Co.	Elizabeth, N.J.			Danbury, Conn.	82219	Spare & Defense Systems Div., Magurie Industries, Inc.	Paramus, N.J.
60741	Triplett Electrical Inst. Co.	Bluffton, Ohio	74970	E. F. Johnson Co.	Waseca, Minn.	82209	Sylvania Electric Prod., Inc. Electronic Tube Division	Emporium, Pa.
61775	Union Switch and Signal Div. of Westinghouse Air Brake Co.	Pittsburgh, Pa.	75042	International Resistance Co.	Philadelphia, Pa.	82376	Astron Corp.	East Newark, Harrison, N.J.
62119	Universal Electric Co.	Owosso, Mich.	75263	KeyStone Carbon Co., Inc.	St. Marys, Pa.	82389	Switchcraft, Inc.	Chicago, Ill.
63743	Ward-Leonard Electric Co.	Mt. Vernon, N.Y.	75378	CTS Knights, Inc.	Sandwich, Ill.	82647	Metals & Controls Inc., Spencer Products	Attleboro, Mass.
64959	Western Electric Co., Inc.	New York, N.Y.	75382	Kolka Electric Corp.	Mt. Vernon, N.Y.	82768	Phillips-Advance Control Co.	Joliet, Ill.
65092	Weston Inst. Inc.	Weston-Newark, Newark, N.J.	75818	Lenz Electric Mfg. Co.	Chicago, Ill.	82866	Research Products Corp.	Madison, Wis.
66295	Wittek Mfg. Co.	Chicago, Ill.	75915	Littelfuse, Inc.	Des Plaines, Ill.	82877	Rolton Mfg. Co., Inc.	Woodstock, N.Y.
66346	Minnesota Mining & Mfg. Co.		76005	Lord Mfg. Co.	Eric, Pa.	82893	Vector Electronic Co.	Glendale, Cal.
	Reverse Mincum Div.	St. Paul, Minn.	76210	C. W. Marwedel	San Francisco, Cal.	83058	Carr Fastener Co.	Cambridge, Mass.
70276	Allen Mfg. Co.	Hartford, Conn.	76433	General Instrument Corp.		83086	New Hampshire Ball Bearing, Inc.	Peterborough, N.H.
70309	Allied Control	New York, N.Y.		Micamold Division	Newark, N.J.			Darlington, S.C.
70318	Allmetal Screw Product Co., Inc.		76487	James Millen Mfg. Co., Inc.	Malden, Mass.	83148	ITT Wire and Cable Div.	Los Angeles, Cal.
		Garden City, N.Y.	76493	J.W. Miller Corp.	Los Angeles, Cal.	83186	Victory Eng. Corp.	Springfield, N.J.
70417	Amplex, Div. of Chrysler Corp.		76530	Cinch-Monadnock, Div. of United Carr Fastener Corp.	San Leandro, Cal.	83298	Bendix Corp., Red Bank Div.	Red Bank, N.J.
70485	Atlantic India Rubber Works, Inc.	Chicago, Ill.			Cleveland, Ohio	83315	Hubbell Corp.	Mondelcin, Ill.
70563	Amperite Co., Inc.	Union City, N.J.	76543	Muehler Electric Co.	Newark, N.J.	83324	Rosan Inc.	Newport Beach, Cal.
70674	ADC Products Inc.	Minneapolis, Minn.	76703	National Union	Crystal Lake, Ill.	83330	Smith, Herman H., Inc.	Brooklyn, N.Y.
70903	Belden Mfg. Co.	Chicago, Ill.	76854	Oak Manufacturing Co.		83332	Teeb Labs	Palisades Park, N.J.
70998	Bird Electric Corp.	Cleveland, Ohio	77068	The Bendix Corp.		83385	Central Screw Co.	Chicago, Ill.
71092	Birnbach Radio Co.	New York, N.Y.		Electrodynamics Div.	N. Hollywood, Cal.	83501	Gavitt Wire and Cable Co., Div. of Amerace Corp.	Brookfield, Mass.
71034	Bliley Electric Co., Inc.	Eric, Pa.	77075	Pacific Metals Co.	San Francisco, Cal.			Plaintfield, N.J.
71041	Boston Gear Works Div. of Murray Co. of Texas	Quincy, Mass.	77221	Phaostroan Instrument and Electronic Co.	So. Pasadena, Cal.	83777	Model Eng. and Mfg., Inc.	Huntington, Ind.
71218	Bud Radio, Inc.	Willoughby, Ohio	77252	Philadelphia Steel and Wire Corp.	Philadelphia, Pa.	83821	Loyd Scruggs Co.	Festus, Mo.
71279	Cambridge Thermionics Corp.	Cambridge, Mass.	77342	American Machine & Foundry Co.		83942	Aeronaual Inst. & Radio Co.	Lodi, N.J.
71286	Camloc Fastener Corp.	Paramus, N.J.		Potter & Brumfield Div.	Princeton, Ind.	84171	Arco Electronics Inc.	Great Neck, N.Y.
71313	Cardwell Condenser Corp.		77630	TRW Electronic Components Div. General Instrument Corp.	Camden, N.J.	84396	A. J. Glesener Co., Inc.	San Francisco, Cal.
		Lindenhurst, L. I., N.Y.	77638	Rectifier Division	Brooklyn, N.Y.	84411	TRW Capacitor Div.	Ogallala, Neb.
71400	Bussmann Mfg. Div. of McGraw-Edison Co.	St. Louis, Mo.	77764	Resistance Products Co.	Harrisburg, Pa.			New York, N.Y.
71436	Chicago Condenser Corp.	Chicago, Ill.	77969	Rubbercraft Div. of Calif. Shakeproof Division of Illinois Tool Works	Torrance, Cal.	83777	Model Eng. and Mfg., Inc.	Huntington, Ind.
71447	Calif. Spring Co., Inc.	Pico-Rivera, Cal.	78189	Shakeproof Division of Illinois Tool Works	Elgin, Ill.	83821	Loyd Scruggs Co.	Festus, Mo.
71450	CTS Corp.	Elkhart, Ind.	78277	Sigma	So. Braintree, Mass.	84171	Arco Electronics Inc.	Great Neck, N.Y.
71468	ITT Cannon Electric Inc.	Los Angeles, Cal.	78283	Signal Indicator Corp.	New York, N.Y.	84396	A. J. Glesener Co., Inc.	San Francisco, Cal.
71471	Cinema, Div. Aerovox Corp.	Burbank, Cal.	78290	Struthers-Dunn Inc.	Pitman, N.J.			Ogallala, Neb.

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Table 6-3. Manufacturers Code List (Continued)

Code No.	Manufacturer	Address	Code No.	Manufacturer	Address	Code No.	Manufacturer	Address
94870	Sarkes Tarzian, Inc.	Bloomington, Ind.	91929	Honeywell Inc., Micro Switch Division	Freeport, Ill.	96095	Hi-Q Div. of Aerovox Corp.	Olean, N. Y.
85454	Boonton Molding Company	Boonton, N.J.	91961	Nahm-Bros. Spring Co.	Oakland, Cal.	96256	Thordarson-Meissner Inc.	Mt. Carmel, Ill.
85471	A. B. Boyd Co.	San Francisco, Cal.	92180	Tru-Connector Corp.	Peabody, Mass.	96296	Solar Mfg. Co.	Los Angeles, Cal.
85474	R. M. Bracamonte & Co.	San Francisco, Cal.	92367	Elgeet Optical Co., Inc.	Rochester, N. Y.	96396	Microswitch, Div. of	
85660	Koiled Kords, Inc.	Hamden, Conn.	92607	Tensolite Insulated Wire Co., Inc.	Tarrytown, N. Y.		Minn.-Honeywell	Freeport, Ill.
85911	Seamless Rubber Co.	Chicago, Ill.	92702	IMC Magnetics Corp.	Westbury, L. I., N. Y.	96330	Carlton Screw Co.	Chicago, Ill.
86174	Fabrir Bearing Co.	Los Angeles, Calif.	92966	Hudson Lamp Co.	Westbury, L. I., N. Y.	96341	Microwave Associates, Inc.	Burlington, Mass.
86197	Clifton Precision Products Co., Inc.	Clifton Heights, Pa.	93332	Sylvania Electric Prod. Inc.	Woburn, Mass.	96501	Excel Transformer Co.	Oakland, Cal.
86579	Precision Rubber Products Corp.	Dayton, Ohio	93369	Robbins & Myers Inc.	Pallisades Park, N.J.	96508	Xcelite, Inc.	Orchard Park, N. Y.
86684	Radio Corp. of America, Electronic Corp. & Devices Division	Harrison, N.J.	93410	Stemco Controls, Div. of Essex	Wesley, Ohio	96733	San Fernando Elec. Mfg. Co.	San Fernando, Cal.
86928	Seastrom Mfg. Co.	Glendale, Cal.	93632	Waters Mfg. Co.	Culver City, Cal.	96881	Thomson Ind. Inc.	Long Island, N. Y.
87034	Marco Industries	Anaheim, Cal.	93929	G. V. Controls	Livingston, N.J.	97464	Industrial Retaining Ring Co.	Irvington, N.J.
87216	Philco Corporation (Lansdale Division)	Lansdale, Pa.	94137	General Cable Corp.	Bayonne, N.J.	97539	Automatic & Precision Mfg.	Englewood, N.J.
87473	Western Fibrous Glass Products Co.	San Francisco, Cal.	94144	Raytheon Co., Comp. Div.	Quincy, Mass.	97979	Reon Resistor Corp.	Yonkers, N. Y.
87664	Van Waters & Rogers Inc.	San Francisco, Cal.	94148	Scientific Electronics Products, Inc.	Loveland, Colo.	97983	Litton System Inc., Adler-Westrex	
87930	Tower Mfg. Corp.	Providence, R.I.	94154	Wagner Elect. Corp.	Newark, N.J.		Cummun. Div.	New Rochelle, N. Y.
88140	Cutler-Hammer, Inc.	Lincoln, Ill.	94179	Curtiss-Wright Corp.	East Patterson, N.J.	98141	R-Tronics, Inc.	Jamaica, N. Y.
88220	Gould-National Batteries, Inc.	St. Paul, Minn.	94222	South Chester Corp.	Chester, Pa.	98159	Rubber Teck, Inc.	Gardena, Cal.
88698	General Mills, Inc.	Buffalo, N. Y.	94330	Wire Cloth Products, Inc.	Bellwood, Ill.	98220	Hewlett-Packard Co., Medical Elec. Div.	Pasadena, Cal.
89231	Graybar Electric Co.	Oakland, Cal.	94375	Automatic Metal Products Co.	Brooklyn, N. Y.	98278	Microrodot, Inc.	So. Pasadena, Cal.
89473	G. E. Distributing Corp.	Schenectady, N. Y.	94682	Worcester Pressed Aluminum Corp.	Worcester, Mass.	98291	Sealctro Corp.	Mamaroneck, N. Y.
89479	Security Co.	Detroit, Mich.	94696	Magnecraft Electric Co.	Chicago, Ill.	98376	Zero Mfg. Co.	Burbank, Cal.
89665	United Transformer Co.	Chicago, Ill.	95023	George A. Philbrick Researchers, Inc.	Boston, Mass.	98410	Etc. Inc.	Cleveland, Ohio
90030	United Shoe Machinery Corp.	Beverly, Mass.	95146	Alco Elect. Mfg. Co.	Lawrence, Mass.	98731	General Mills Inc., Electronics Div.	Minneapolis, Minn.
90179	U. S. Rubber Co., Consumer Ind. & Plastics Prod. Div.	Passaic, N.J.	95236	Allies Products Corp.	Dania, Fla.	98734	Paceo Division of Hewlett-Packard Co.	Palo Alto, Cal.
90365	Belleville Speciality Tool Mfg., Inc.	Belleveille, Ill.	95238	Continental Connector Corp.	Woodside, N. Y.	98821	North Hills Electronics, Inc.	Glen Cove, N. Y.
90763	United Carr Fastener Corp.	Chicago, Ill.	95263	Leecraft Mfg. Co., Inc.	Long Island, N. Y.	98978	International Electronic Research Corp.	Burbank, Cal.
90970	Bearing Engineering Co.	San Francisco, Cal.	95265	National Coil Co.	Sheridan, Wyo.	99109	Columbia Technical Corp.	New York, N. Y.
91146	ITT Cannon Elect. Inc.	Salem, Mass.	95275	Vitramon, Inc.	Bridgeport, Conn.	99313	Varian Associates	Palo Alto, Cal.
91260	Connor Spring Mfg. Co.	San Francisco, Cal.	95348	Gordos Corp.	Bloomfield, N.J.	99378	Atlec Corp.	Winchester, Mass.
91345	Miller Dial & Nameplate Co.	El Monte, Cal.	95348	Methode Mfg. Co.	Rolling Meadows, Ill.	99515	Marshall Ind., Capacitor Div.	Monrovia, Cal.
91418	Radio Materials Co.	Chicago, Ill.	95566	Arnold Engineering Co.	Marengo, Ill.	99707	Control Switch Division, Controls Co. of America	El Segundo, Cal.
91506	Augat Inc.	Attleboro, Mass.	95566	Arnold Engineering Co.	Marengo, Ill.	99800	Delevan Electronics Corp.	East Aurora, N. Y.
91637	Dale Electronics, Inc.	Columbus, Nebr.	95712	Dage Electric Co., Inc.	Franklin, Ind.	99848	Wilco Corporation	Indianapolis, Ind.
91682	Elco Corp.	Willow Grove, Pa.	95984	Siemon Mfg. Co.	Wayne, Ill.	99928	Branson Corp.	Whippany, N.J.
91673	Epiphone Inc.	New York, N. Y.	95987	Werkesser Co.	Chicago, Ill.	99934	Rembrandt, Inc.	Boston, Mass.
91737	Greumar Mfg. Co., Inc.	Wakefield, Mass.	96087	Microwave Assoc. West, Inc.	Sunnyvale, Cal.	99942	Hoffman Electronics Corp., Semiconductor Division	El Monte, Cal.
91827	K F Development Co.	Redwood City, Cal.				99957	Technology-Instrument Corp. of California	Newbury Park, Cal.
91886	Malco Mfg., Inc.	Chicago, Ill.						

The following HP Vendors have no number assigned in the latest supplement to the Federal Supply Code for Manufacturers Handbook.

0000F	Malco Tool and Die	Los Angeles, Calif.	000CS	Hewlett-Packard Co., Colorado Springs Div.	Colorado Springs, Colorado	000QQ	Cooltron	Oakland, Cal.
0000Z	Willow Leather Products Corp.	Newark, N.J.	000MM	Rubber Eng. & Development	Hayward, Cal.	000WW	California Eastern Lab.	Burlington, Cal.
000AB	ETA	England	000NN	A "N" D Mfg. Co.	San Jose, Cal.	000YY	S. K. Smith Co.	Los Angeles, Cal.
000BB	Precision Instrument Comp. Co.	Van Nuys, Cal.						

SECTION VII

MODEL 5254A AND 5254B

7-1. INTRODUCTION

7-2. The HP Model 5254A is basically the same as the HP 5254B. The HP 5254B is an improved version of the HP 5254A. The differences are in the frequencies measured, and circuit changes in A1 Multiplier Assembly and A5 Video Amplifier Assembly. Also, MP1 Cavity Assembly has a slight gearing change. The video external output appears at plug-in connector P6(46) and is supplied to AUX A jack on counter rear panel.

7-3. To adapt this manual to Model 5254B proceed as follows:

- a. Change all 5254C model number references to 5254B.
- b. Change all low limit operating frequency references to 200 MHz.
- c. Page 6-7, Table 6-1: Change MP2 to 05254-2063.
- d. Page 6-6, Table 6-1: Change 05254-6026 to 05254-6019.
- e. Page 6-6, Table 6-1: Change 05254-6027 to 05254-6023.
- f. Page 6-7, Table 6-1: Change MP4 to 05254-2056.
- g. Page 6-8, Table 6-1: Change 05254-2074 to 05254-4003 and delete (COATED).
- h. Page 6-7, Table 6-1: Delete from MP4 05254-2073 description "OPTION A85". Delete MP16 05254-2076.

7-4. The balance of this section discusses the differences in the HP 5254A specifications, operating procedure, adjustments, troubleshooting, and circuits. Changes in parts list, schematic diagrams, and component location are also given. These apply for HP 5254A's with serial number prefix 514-.

7-5. For older HP 5254A converters with serial prefix number 429-, or 415-, Paragraph 7-18 outlines the changes required in this section.

7-6. DESCRIPTION

7-7. The HP 5254A converts a Hewlett-Packard Electronic counter into a direct reading counter from .3 to 3.0 GHz with an input voltage range of 50 mV to 1V rms. The stability and accuracy of the basic counter is retained by multiplying a 10-MHz signal, derived from the 1-MHz internal time base of the counter, to a selectable harmonic frequency between .3 to 3.0 GHz. This known harmonic of 50 MHz is then heterodyned with the input signal. If resulting difference frequency is between 1 MHz and 53 MHz (bandwidth of A5 Video Amplifier), it is counted and displayed by the counter. The frequency of the INPUT signal is then indicated by the combination of the MIXING

FREQUENCY control on the front panel of the plug-in, and the counter display in megahertz. A front panel Level Meter, by monitoring the difference frequency output to the counter, aids in selecting the desired MIXING FREQUENCY and also in determining if input signal amplitude is adequate for accurate frequency measurement.

7-8. SPECIFICATIONS

7-9. Table 7-1 contains all technical specifications for the HP 5254A when operating in an HP counter.

Table 7-1. Specifications for 5254A

RANGE:

As a converter for an HP Electronic Counter, 300 to 3000 MHz.

ACCURACY:

Retains accuracy of an HP Electronic Counter.

INPUT SIGNAL LEVEL:

50 mV rms (-13 dbm in 50 ohms) to 1 V rms (+13 dBm in 50 ohms).

INPUT OVERLOAD:

Input power in excess of 100 mW (+20 dBm or 2.2V rms) may damage the converter.

INPUT IMPEDANCE:

Approximately 50 ohms.

INPUT CONNECTOR:

Type N female

LEVEL INDICATOR:

Meter aids frequency selection; indicates output voltage level to counter.

REGISTRATION:

Counter display in MHz is added to the converter dial reading.

WEIGHT:

Net, 5 lbs (2, 5 kg); shipping 7 lb (3, 2 kg).

7-10. OPERATING PROCEDURE

7-11. Figure 7-1 shows the Frequency Measurement Procedure. Amplitude specifications for the HP 5254A and HP 5254B are the same.

7-12. ADJUSTMENTS

7-13. The circuit adjustments described in Paragraphs 5-36 through 5-43 are the same for both the 5254A and B. However, Meter High Frequency adjustment capacitor A5C19 in the HP 5254B is numbered A5C21 in the HP 5254A with A5R17 is not used.

A5R16 is a factory selected part with a typical value of 10k ohms. In Paragraph 5-43d, connect RF millivoltmeter to AUX A output on the rear of the HP 5245L.

7-14. IN-CABINET PERFORMANCE CHECK

7-15. The HP 5254B In-Cabinet Performance Check (Table 5-4) can be used for the HP 5254A. However, the HP 5254A frequency range check covers 300 MHz to 3000 MHz instead of 200 MHz to 3000 MHz.

7-16. TROUBLESHOOTING

7-17. Paragraphs 5-9 through 5-15 as well as Table 7-2 can be used in troubleshooting the HP 5254A. Figures 7-2, 7-3, and 7-4 show internal plug-in views with parts indicated, as well as the MP1 Cavity Assembly. Schematics in Figures 7-5 and 7-6 contain A1 through A5 Assembly circuits.

7-18. OLDER HP 5254A INSTRUMENTS.

7-19. This section applies directly to the 5254A Frequency Converter having serial prefix numbers 514-02175 and above. This section with the following changes also applies to 5254A Frequency Converter having serial numbers 514-02175 and below, 429 and 415.

<u>Instrument Serial No. Prefix</u>	<u>Change No.</u>
514-02175 and below	1
429, 415	2

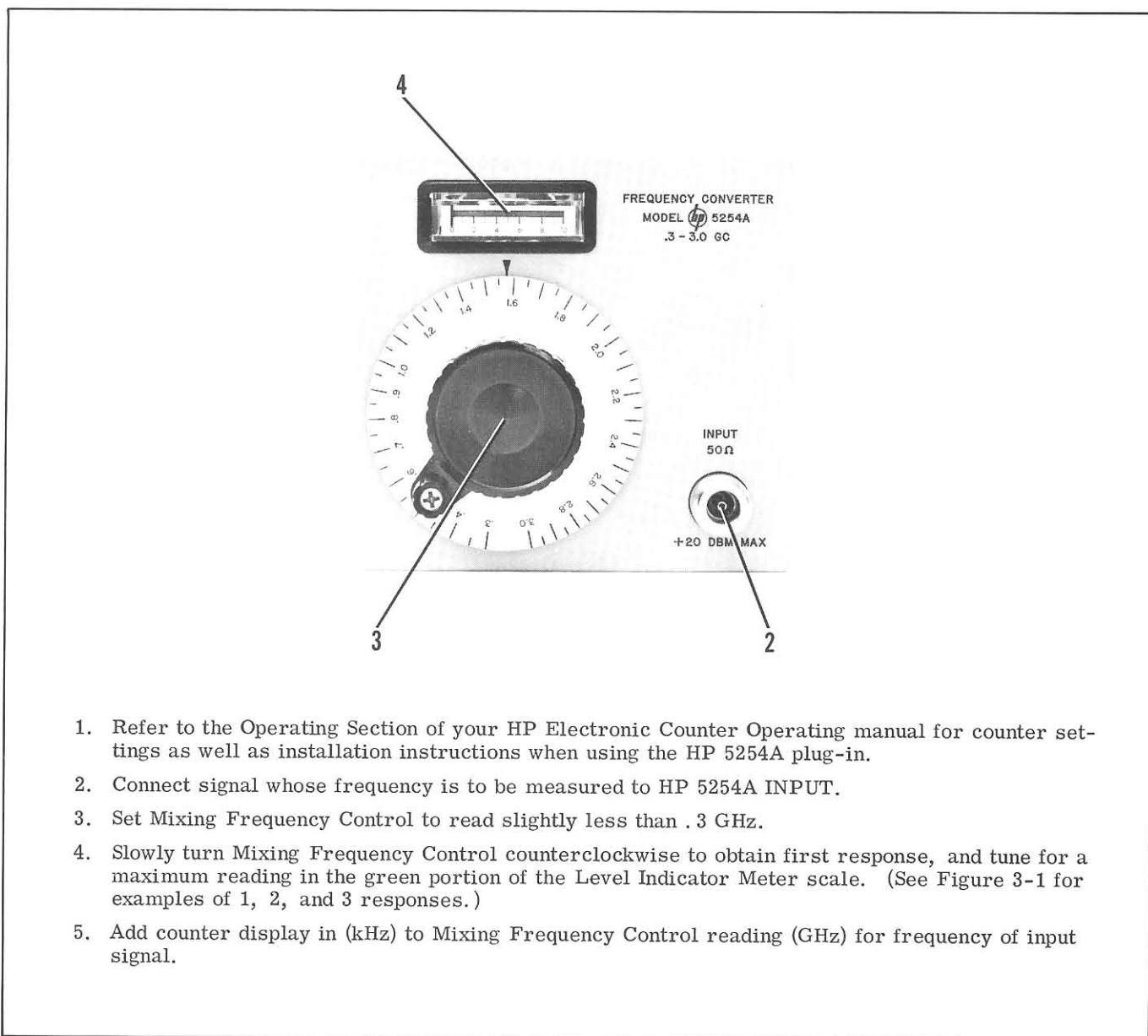
CHANGE 1:

Figure 7-2, A5 Video Amplifier Assembly.

Make the following changes:

A5R32: change to 2400 ohms*

A5E1: delete*.



1. Refer to the Operating Section of your HP Electronic Counter Operating manual for counter settings as well as installation instructions when using the HP 5254A plug-in.
2. Connect signal whose frequency is to be measured to HP 5254A INPUT.
3. Set Mixing Frequency Control to read slightly less than .3 GHz.
4. Slowly turn Mixing Frequency Control counterclockwise to obtain first response, and tune for a maximum reading in the green portion of the Level Indicator Meter scale. (See Figure 3-1 for examples of 1, 2, and 3 responses.)
5. Add counter display in (kHz) to Mixing Frequency Control reading (GHz) for frequency of input signal.

Figure 7-1. Model 5254A Operating Procedure

Table 7-1, A5 Video Amplifier Assembly

Make the following changes in parts list for A5:
 A5R32: change to R FXD 2400 OHM, HP
 PART NO. 0683-3925.
 A5E1: delete

CHANGE 2:

Figure 7-2 A5 Video Amplifier Assembly:

Make the following changes:

A5R2: change to: R FXD 100K

Table 7-1 A5 Video Amplifier Assembly:

Make the following changes:

A5R2: change to: R FXD 100K, HP PART
 NO. 0683-1045.

MP4: change to HP PART NO. 05254-2029

MP5: change to HP PART NO. 05254-0007

MP6: change to HP PART NO. 05254-0004

MP7: change to HP PART NO. 05254-0003

MP8: change to HP PART NO. 05254-0002

MP12: change to HP PART NO. 05254-0001

7-20. MULTIPLIER AMPLIFIER ASSEMBLY A1.

7-21. The Multiplier Amplifier is similar to that used in the 5254B. The main difference is that A1R17 is not used and A1R16 is changed to 10K ohms (a factory selected value, typical value shown). See Figure 7-5.

7-22. HARMONIC GENERATOR ASSEMBLY A2
AND HARMONIC SELECTOR CAVITY.

7-23. The Harmonic Generator and Harmonic Selector Cavity are the same as that in the Model 5254B. (See Figure 7-5.)

7-24. MIXER ASSEMBLY A3.

7-25. The Mixer Assembly is the same as that in the 5254B. (See Figure 7-6.)

7-26. FILTER ASSEMBLY A4.

7-27. The Filter Assembly is the same as that in the 5254B. (See Figure 7-6.)

7-28. VIDEO AMPLIFIER A5.

7-29. The Video Amplifier is similar to that used in the 5254B. (See Figure 7-6.) However, trigger circuit A5Q13, A5Q14, and A5Q15 has been eliminated. The output signal at A5Q10 emitter is applied to A5Q11 base. A5Q11 is a buffer amplifier with a resistive divider output providing the output to the counter and the external output. There is sufficient isolation in the divider network to prevent the signal to the counter from being affected by termination at the external output.

7-30. The signal for the meter amplifier is taken from A5Q10 emitter and applied to A5Q12 base. Meter amplifier A5Q12 is a current amplifier driving meter rectifier A5CR2. A5R39 and A5C22 provide damping for the meter. A5C19 adjusts the meter amplifier high frequency gain to make the level meter read at red-green border when converter output is more than the minimum 100 mV normally required at the counter input.

*Ferrite bead A5E1 was added to A5Q12 emitter to suppress oscillation caused when A5R32 was changed for improved A5Q12 operation.

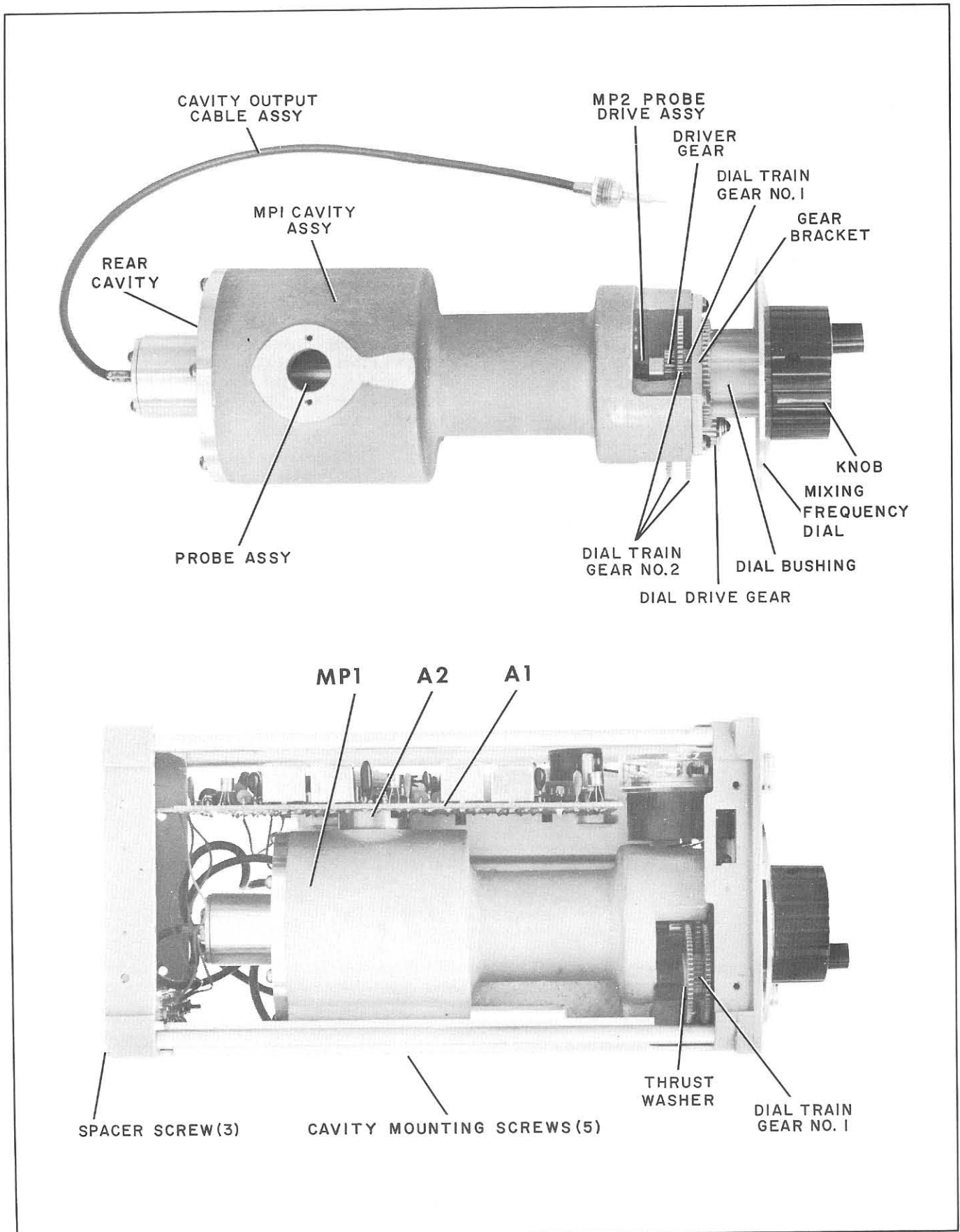


Figure 7-2. Cavity and Left Side View (5254A)

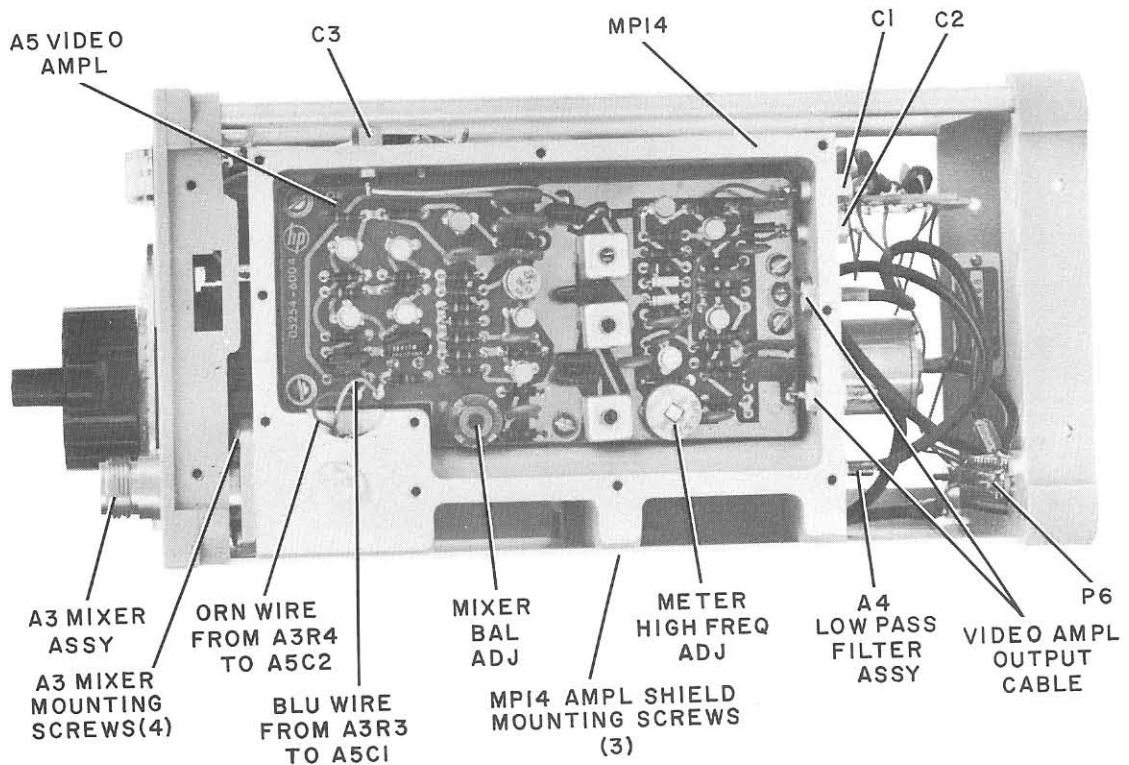
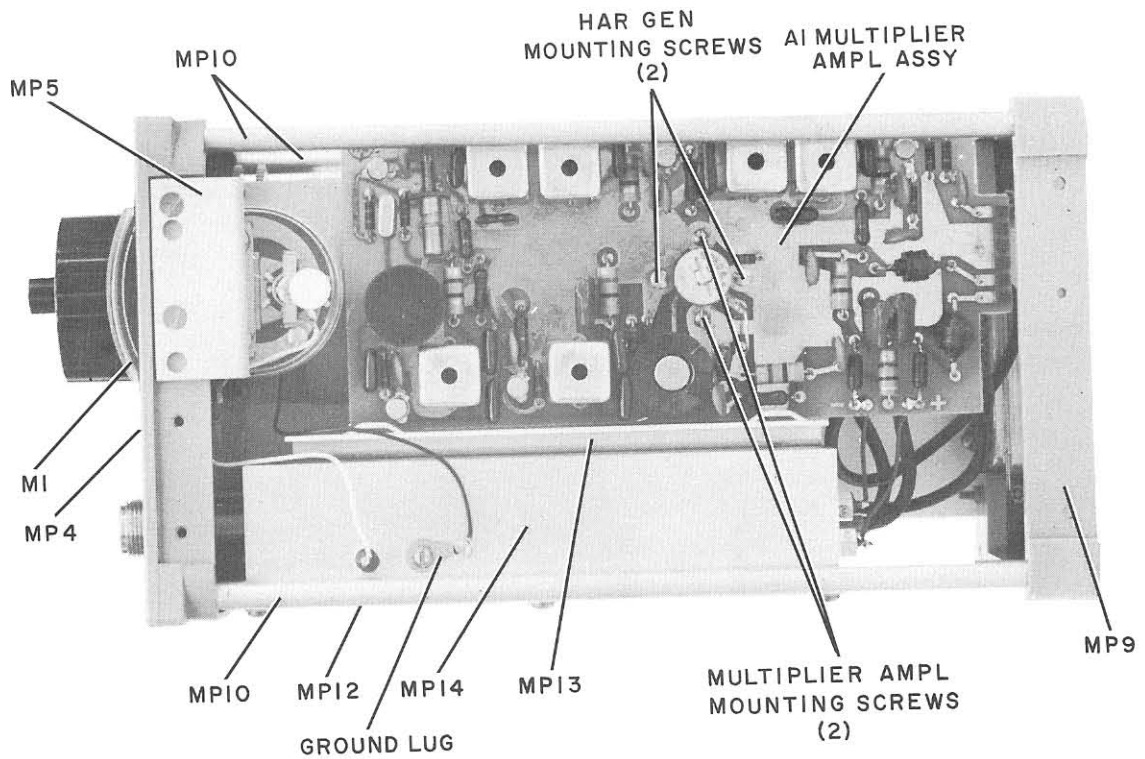


Figure 7-3. Top and Right Side View (5254A)

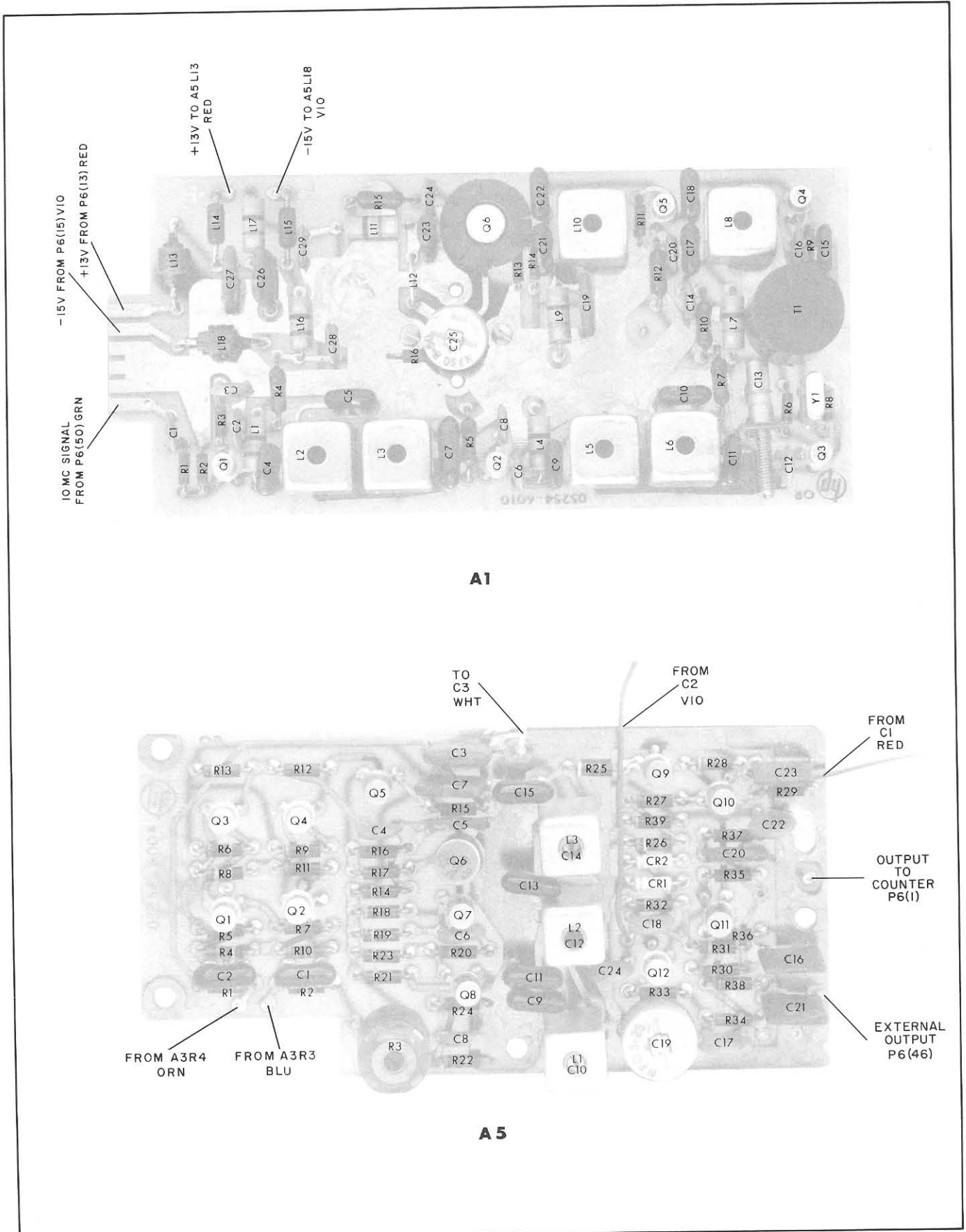


Figure 7-4. Multiplier Assembly A1, and Video Amplifier Assembly A5 Component Location (5254A)

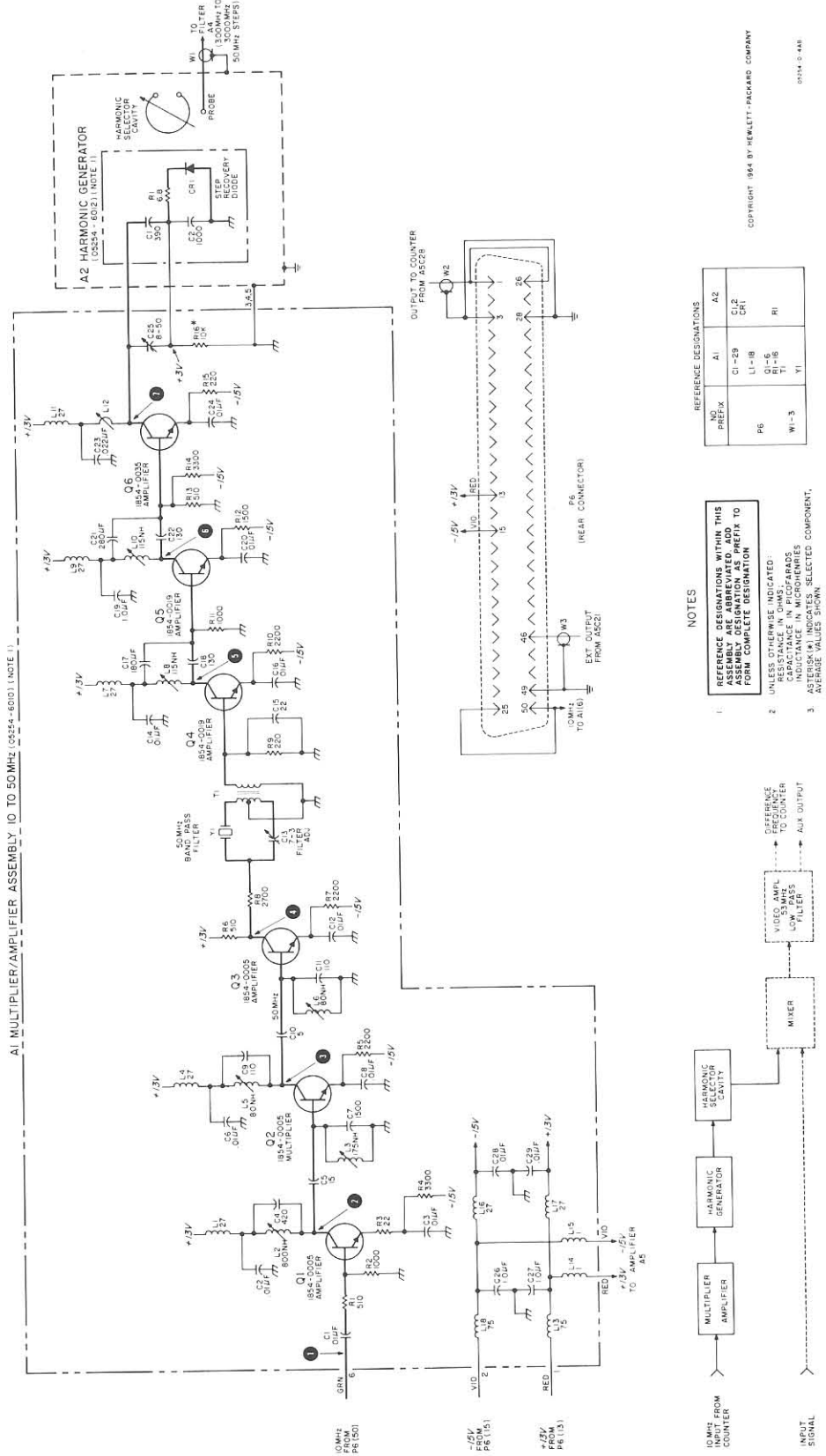


Figure 7-5. Multiplier Assembly A1, Harmonic Generator A2 Schematic Diagram (5254A)

TP	STAGE	AVERAGE DC VOLTAGE			APPROX. AMPLITUDE VOLTS P/P WAVEFORM	TP	STAGE	AVERAGE DC VOLTAGE			APPROX. AMPLITUDE VOLTS P/P WAVEFORM		
		E	C	B				E	C	B			
1	INPUT					11	A5Q8	-9.7	+2.8	-9			
2	A1Q1	+1.13	+12.4	-0.48		12	LOW PASS FILTER OUTPUT						
3	A1Q2	+2.7	+12.4	0		13	A5Q9	0	+5.9	+1.7			
4	A1Q3	+2.27	+9.1	0		14	A5Q10	+5.2	+12.5	+5.9			
5	A1Q4	-0.65	+12.4	0		15	A5Q11	+4.5	+11.0	+5.2			
6	A1Q5	-0.83	+12.4	-0.23		16	A5Q12	+5.5	-4.3	+5.2			
7	A1Q6	-2.84	12.3	-2.44		17	A5Q12	+5.5	-4.3	+5.2			
	A5Q1	+4.0	-1.6	+3.7		18	OUTPUT TO COUNTER	1 MHz DIFFERENCE SIGNAL AT 50mv					
	A5Q2	+4.0	-1.3	+3.7				50 MHz DIFFERENCE SIGNAL AT 50mv					
	A5Q3	-1.3	-9.0	-1.6				19	EXTERNAL OUTPUT	1 MHz DIFFERENCE SIGNAL AT 50mv			
	A5Q4	-1.05	-8.3	-1.35						50 MHz DIFFERENCE SIGNAL AT 50mv			
8	A5Q5	-9.0	-0.32	-8.3									
9	A5Q6	0	-9.7	-0.3									
10	A5Q7	-10.5	0	-9.7									

Table 7-2. Troubleshooting Aids Model 5254 A

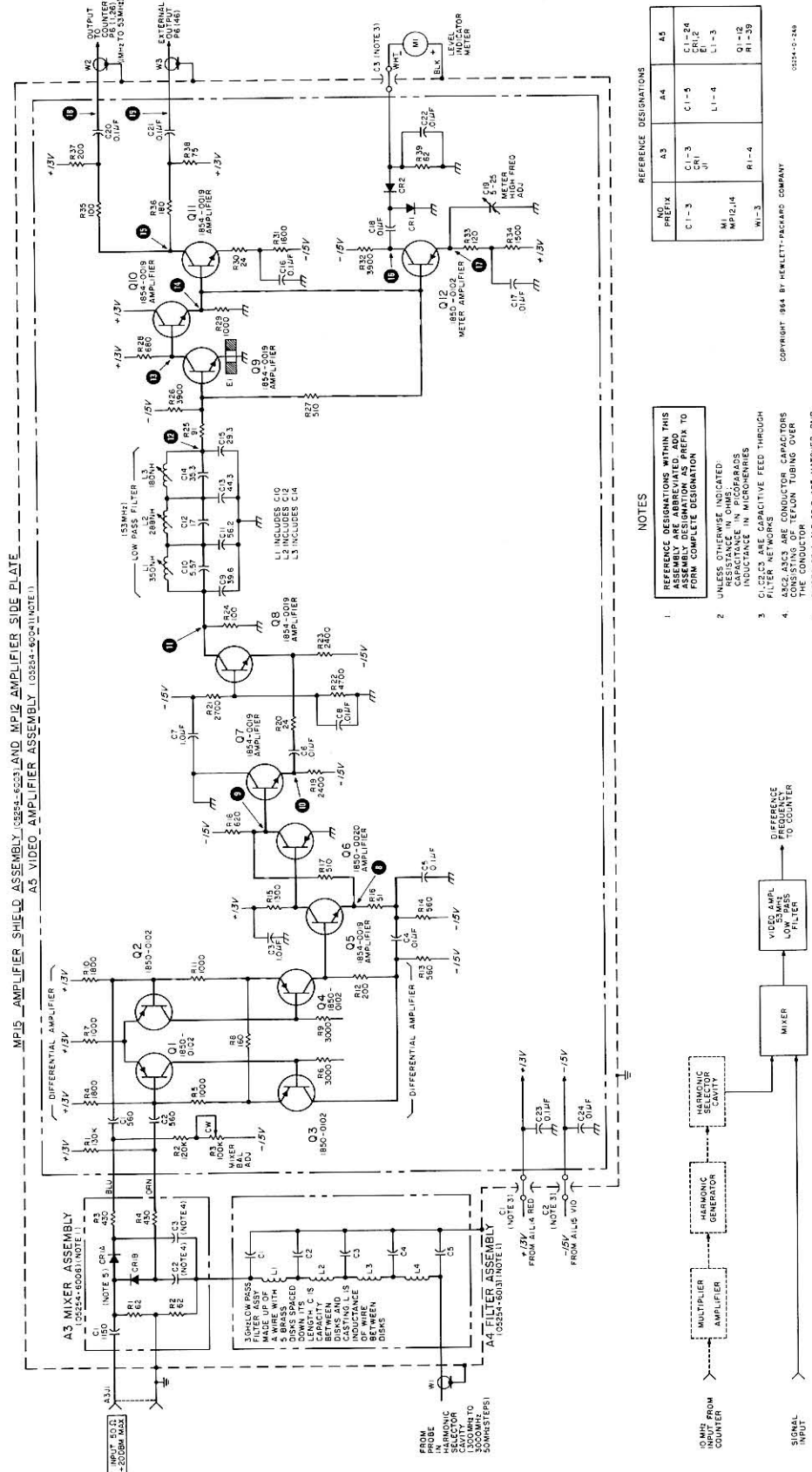


Figure 7-6. Filter Assembly A4, Mixer A3 and Video Amplifier A5 Schematic Diagram (5254A)

Table 7-3. Reference Designation Index

Circuit Reference	Ⓢ Stock No.	Description	Note
A1	05254-6010 05254-2044	MULTIPLIER AMPLIFIER ASSEMBLY (INCLUDES A2, 05254-6012) BLANK PRINTED CIRCUIT BOARD	
A1C1	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C2	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C3	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C4	0140-0230	C:FXD MICA 420 PF 1%	
A1C5	0140-0202	C:FXD MICA 15 PF 5% 500VDCW	
A1C6	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C7	0140-0156	C:FXD MICA 1500 PF 2% 300VDCW	
A1C8	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C9	0140-0194	C:FXD MICA 110 PF 5% 300VDCW	
A1C10	0140-0209	C:FXD MICA 5 PF 10%	
A1C11	0140-0194	C:FXD MICA 110 PF 5% 300VDCW	
A1C12	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C13	0132-0003	C:VAR TRIMMER 0.7-3.0 PF	
A1C14	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C15	0140-0145	C:FXD MICA 22 PF 5% 500VDCW	
A1C16	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C17	0140-0219	C:FXD MICA 180 PF 2%	
A1C18	0140-0195	C:FXD MICA 130 PF 5% 300VDCW	
A1C19	0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	
A1C20	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C21	0140-0224	C:FXD MICA 280 PF 1%	
A1C22	0140-0195	C:FXD MICA 130 PF 5% 300VDCW	
A1C23	0170-0083	C:FXD MY 0.022 UF 20% 50VDCW	
A1C24	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C25	0130-0017	C:VAR CER 8-50 UF N750	
A1C26	0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	
A1C27	0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	
A1C28	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1C29	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A1L1	9140-0107	COIL:FXD RF 27 UH	
A1L2	9140-0221	COIL:VAR TUNABLE 800 NH	
A1L3	9140-0220	COIL:VAR TUNABLE 175 NH	
A1L4	9140-0107	COIL:FXD RF 27 UH	
A1L5	9140-0218	COIL:VAR TUNABLE 80 NH	
A1L6	9140-0218	COIL:VAR TUNABLE 80 NH	
A1L7	9140-0107	COIL:FXD RF 27 UH	
A1L8	9140-0219	COIL:VAR TUNABLE 115 NH	
A1L9	9140-0107	COIL:FXD RF 27 UH	
A1L10	9140-0219	COIL:VAR TUNABLE 115 NH	
A1L11	9140-0107	COIL:FXD RF 27 UH	
A1L12	8151-0012	WIRE:#20 AWG (1-1/2")	
A1L13	9140-0031	COIL:RF 75 UH	
A1L14	9140-0018	COIL:RF 1 UH	
A1L15	9140-0018	COIL:RF 1 UH	
A1L16	9140-0107	COIL:FXD RF 27 UH	
A1L17	9140-0107	COIL:FXD RF 27 UH	
A1L18	9140-0031	COIL:RF 75 UH	

Table 7-3. Reference Designation Index (Cont'd)

Circuit Reference	Stock No.	Description	Note
A1Q1 THRU A1Q5 A1Q6	1854-0005 1854-0035 1205-0011	TRANSISTOR:SILICON NPN 2N708 TRANSISTOR:SILICON NPN HEAT SINK FOR T0-5 AND T0-9 CASE	
A1R1 A1R2 A1R3 A1R4 A1R5	0683-5115 0683-1025 0683-2205 0758-0010 0758-0044	R:FXD COMP 510 OHM 5% 1/4W R:FXD COMP 1K OHM 5% 1/4W R:FXD COMP 22 OHM 5% 1/4W R:FXD MET FLM 3300 OHM 5% 1/2W R:FXD MET OX 2.2K OHM 5% 1/2W	
A1R6 A1R7 A1R8 A1R9 A1R10	0683-5115 0758-0044 0683-2725 0683-2215 0758-0044	R:FXD COMP 510 OHM 5% 1/4W R:FXD MET OX 2.2K OHM 5% 1/2W R:FXD COMP 2.7K OHM 5% 1/4W R:FXD COMP 220 OHM 5% 1/4W R:FXD MET OX 2.2K OHM 5% 1/2W	
A1R11 A1R12 A1R13 A1R14 A1R15 A1R16	0683-1025 0758-0017 0683-5115 0683-3325 0758-0015 0683-1035	R:FXD COMP 1K OHM 5% 1/4W R:FXD MET FLM 1500 OHM 5% 1/2W R:FXD COMP 510 OHM 5% 1/4W R:FXD COMP 3.3K OHM 5% 1/4W R:FXD MET FLM 220 OHM 5% 1/2W R:FXD COMP 10K OHM 5% 1/4W	*
A1T1	05254-6011	TOROID ASSEMBLY:WOUND	
A1Y1	0410-0089	CRYSTAL:50 MC .004%	
MISC	0890-0001	TUBING:1/2"	
A2	05254-6012	HARMONIC GENERATOR ASSEMBLY:PARTS IN THIS ASSEMBLY NOT RECOMMENDED FOR FIELD REPLACEMENT	
A2C1 A2C2	0160-0958 0160-0759	C:FXD MICA 390 PF 5% 300VDCW C:FXD MICA 1000 PF 5% 250VDCW	* *
A2CR1	1901-0153	SEMICON DEVICE:DIODE SILICON	*
A2MP1 A2MP2	05254-2039 05254-0008	DIODE MOUNT SUPPRESSOR-MODE	* *
A2R1	0758-0135	R:FXD DEPC 6.8 OHM 10% 1/10W(PELLET RESISTOR)	*
A3	05254-6006	MIXER ASSEMBLY:PARTS IN THIS ASSEMBLY, NOT RECOMMENDED FOR FIELD REPLACEMENT	
A3C1 A3C2 A3C3	05254-4001 05254-2037 05254-2037 0890-0297	CAPACITOR ASSEMBLY:INPUT PART OF CONDUCTOR,CAPACITOR PART OF CONDUCTOR,CAPACITOR TUBING,TEFLON 1/2" P/O C2 &C3	* * * *
A3CR1	1900-0014	DIODE-POINT CONTACT,SILICON,MATCHED SET PART OF 05254-6014 ASSY	*
A3J1	05254-2027	CONNECTOR:INPUT	*
A3R1 A3R2 A3R3 A3R4	0757-0895 0757-0895 0758-0125 0758-0125	R:FXD MET OX 62 OHM 2% 1/8W R:FXD MET OX 62 OHM 2% 1/8W R:FXD MET FLM 430 OHM 5% 1/4W(P/O 05254-6014 ASSY) R:FXD MET FLM 430 OHM 5% 1/4W(P/O 05254-6014 ASSY)	* * * *
*NOT RECOMMENDED FOR FIELD REPLACEMENT			

Table 7-3. Reference Designation Index (Cont'd)

Circuit Reference	Stock No.	Description	Note
A3		<p>MISCELLANEOUS</p> <p>0460-0055 TAPE:TEFLON 1/2"</p> <p>0890-0009 TUBING:1/2"</p> <p>3030-0149 SET SCREW:#0-80 X 3/32"</p> <p>05254-2008 CAPACITOR MOUNT:MIXER</p> <p>05254-2009 CONTACT:MIXER</p> <p>05254-2011 INSERT:MIXER OUTPUT</p> <p>05254-2012 CONNECTOR:REAR,MIXER</p> <p>05254-2038 RING:MIXER GROUND</p> <p>05254-2041 STUD:THREADED</p>	* * * * * * * *
A4	05254-6013	RF FILTER ASSEMBLY:PARTS IN THIS ASSEMBLY, NOT RECOMMENDED FOR FIELD REPLACEMENT	
A4C1	05254-2045	FILTER SECTION I,METAL DISK	*
A4C2	05254-2047	FILTER SECTION III,METAL DISK	*
A4C3	05254-2046	FILTER SECTION II,METAL DISK	*
A4C4	05254-2047	FILTER SECTION III,METAL DISK	*
A4C5	05254-2045	FILTER SECTION I,METAL DISK	*
A4L1 THRU A4L4	360A-13	WIRE-CENTER CONDUCTOR	*
A4MP1	05254-2010	INSERT:FRONT AMPLIFIER	*
A4MP2	05254-2004	INSERT:REAR AMPLIFIER	*
A4MP3	05254-2048	SLEEVE:RF FILTER	*
	05254-2050 1250-0020	<p>MISCELLANEOUS</p> <p>SPACER:FILTER TERMINATION</p> <p>CONTACT:BNC FEMALE</p>	* *
A5	05254-6004 05254-2043	<p>VIDEO AMPLIFIER ASSEMBLY</p> <p>BLANK PRINTED CIRCUIT BOARD</p>	
A5C1	0140-0178	C:FXD MICA 560 PF 2% 300VDCW	
A5C2	0140-0178	C:FXD MICA 560 PF 2% 300VDCW	
A5C3	0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	
A5C4	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C5	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C6	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C7	0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	
A5C8	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C9	0160-0740	C:FXD MICA 39.6 PF 500VDCW	
A5C10		C:FXD 5.57 PF,N.S.R. PART OF L1	
A5C11	0160-0739	C:FXD MICA 56.2 PF	
A5C12		C:FXD 17 PF,N.S.R. PART OF L2	
A5C13	0160-0738	C:FXD MICA 44.3 PF	
A5C14		C:FXD 35.3 PF,N.S.R. PART OF L3	
A5C15	0160-0737	C:FXD MICA 29.3 PF	
A5C16	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C17	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C18	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C19	0130-0016	C:VAR CER 5-25 PF NPO	
A5C20	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
* NOT RECOMMENDED FOR FIELD REPLACEMENT			

Table 7-3. Reference Designation Index (Cont'd)

Circuit Reference	Stock No.	Description	Note
A5C21	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C22	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5C23	0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	
A5C24	0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	
A5CR1	1910-0022	SEMICON DEVICE:DIODE GERMANIUM	
A5CR2	1910-0022	SEMICON DEVICE:DIODE GERMANIUM	
A5E1	9170-0029	BEAD:FERRITE	
A5L1	9140-0215	COIL:VAR 349.8 NH (INCLUDES C10)	
A5L2	9140-0214	COIL:VAR 287.9 NH (INCLUDES C12)	
A5L3	9140-0213	COIL:VAR 179.6 NH (INCLUDES C14)	
A5Q1	THRU		
A5Q4	1850-0102	TRANSISTOR:GERMANIUM PNP 2N2455	
A5Q5	1854-0019	TRANSISTOR:SILICON NPN S6516	
A5Q6	1850-0020	TRANSISTOR:GERMANIUM PNP 2N1143	
A5Q7	THRU		
A5Q11	1854-0019	TRANSISTOR:SILICON NPN S6516	
A5Q12	1850-0102	TRANSISTOR:GERMANIUM PNP 2N2455	
A5R1	0683-1345	R:FXD COMP 130K OHM 5% 1/4W	
A5R2	0683-1245	R:FXD COMP 120K OHM 5% 1/4W	
A5R3	2100-0723	R:VAR COMP 100K OHM 20% LIN 1/4W	
A5R4	0683-1825	R:FXD COMP 1.8K OHM 5% 1/4W	
A5R5	0683-1025	R:FXD COMP 1K OHM 5% 1/4W	
A5R6	0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	
A5R7	0683-1025	R:FXD COMP 1K OHM 5% 1/4W	
A5R8	0683-1615	R:FXD COMP 160 OHM 5% 1/4W	
A5R9	0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	
A5R10	0683-1825	R:FXD COMP 1.8K OHM 5% 1/4W	
A5R11	0683-1025	R:FXD COMP 1K OHM 5% 1/4W	
A5R12	0683-2015	R:FXD COMP 200 OHM 5% 1/4W	
A5R13	0683-5615	R:FXD COMP 560 OHM 5% 1/4W	
A5R14	0683-5615	R:FXD COMP 560 OHM 5% 1/4W	
A5R15	0683-1325	R:FXD COMP 1300 OHM 5% 1/4W	
A5R16	0683-5105	R:FXD COMP 51 OHM 5% 1/4W	
A5R17	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R18	0683-6215	R:FXD COMP 620 OHM 5% 1/4W	
A5R19	0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	
A5R20	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	
A5R21	0683-2725	R:FXD COMP 2.7K OHM 5% 1/4W	
A5R22	0683-4725	R:FXD COMP 4.7K OHM 5% 1/4W	
A5R23	0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	
A5R24	0683-1015	R:FXD COMP 100 OHM 5% 1/4W	
A5R25	0683-9105	R:FXD COMP 91 OHM 5% 1/4W	
A5R26	0683-3925	R:FXD COMP 3.9K OHM 5% 1/4W	
A5R27	0683-5115	R:FXD COMP 510 OHM 5% 1/4W	
A5R28	0683-6815	R:FXD COMP 680 OHM 5% 1/4W	
A5R29	0683-1025	R:FXD COMP 1K OHM 5% 1/4W	
A5R30	0683-2405	R:FXD COMP 24 OHM 5% 1/4W	

Table 7-3. Reference Designation Index (Cont'd)

Circuit Reference	Stock No.	Description	Note
A5R31	0683-1625	R:FXD COMP 1600 OHM 5% 1/4W	
A5R32	0683-3925	R:FXD COMP 3900 OHM 5% 1/4W	
A5R33	0683-1215	R:FXD COMP 120 OHM 5% 1/4W	
A5R34	0683-1525	R:FXD COMP 1.5K OHM 5% 1/4W	
A5R35	0683-1015	R:FXD COMP 100 OHM 5% 1/4W	
A5R36	0683-1815	R:FXD COMP 180 OHM 5% 1/4W	
A5R37	0683-2015	R:FXD COMP 200 OHM 5% 1/4W	
A5R38	0683-7505	R:FXD COMP 75 OHM 5% 1/4W	
A5R39	0683-6205	R:FXD COMP 62 OHM 5% 1/4W MISCELLANEOUS	
C1 THRU C3	0160-0204	CAPACITOR-FXD CER 200VDCW(FEED-THRU)	
M1	1120-0140	METER:LEVEL INDICATOR	
MP1 CONSISTS OF MP1 & MP2	05254-6016	CAVITY ASSEMBLY :PARTS IN THIS ASSY.,N.R.F.R.	*
	3050-0381	WASHER:THRUST	*
	05254-2026	REAR CAVITY	*
	05254-2030	GEAR:DIAL DRIVE	*
	05254-2032	GEAR:DIAL TRAIN(#1)	*
	05254-2033	GEAR:DIAL TRAIN(#2)	*
	05254-2035	CAVITY:MACHINED	*
	05254-2040	SHAFT:IDLER GEAR	*
MP2	05254-4002	BUSHING:DIAL	*
	05254-6009	FINGER MOUNT ASSEMBLY	*
	05254-6002	PROBE DRIVE ASSEMBLY:CONSISTS OF:	*
	1410-0058	BEARING:BALL	*
	1460-0197	SPRING:ANTI-BACKLASH	*
	5000-0206	SPRING:WASHER	*
	5020-0233	COLLAR	*
	05254-2005	CAP:PROBE	*
	05254-2018	SUPPORT:BEARING	*
	05254-2019	SCREW:PROBE DRIVE	*
	3050-0381	WASHER:THRUST	*
	05254-2021	NUT:FLOATING BACKLASH	*
	05254-2031	GEAR:DRIVER	*
	05254-2032	GEAR:DIAL TRAIN(#1)	*
	05254-2033	GEAR:DIAL TRAIN(#2)	*
	05254-6001	ASSY:PROBE	*
MP3	05254-2014	PLUG:CAVITY OUTPUT	
MP4	05254-2051	PANEL:FRONT	
MP5	05254-0013	BRACKET:METER	
MP6	05254-0012	PLATE:TOP	
MP7	05254-0011	PLATE:SIDE	
MP8	05254-0010	PLATE:BOTTOM	
* NOT RECOMMENDED FOR FIELD REPLACEMENT			

Table 7-3. Reference Designation Index (Cont')

Circuit Reference	Stock No.	Description	Note
MP9 MP10 MP11 MP12 MP13	5262A-83A 5262A-47A 1250-0227 05254-0009 05254-0006	GUIDE:PLUG-IN(PLASTIC) SPACER(ALUMINUM) WASHER:SILVER PLATED BRASS SIDE PLATE:AMPLIFIER BRACKET:BOARD	
MP14 MP15	05254-2028 05254-6003	AMPLIFIER SHIELD:MACHINED SHIELD ASSY:AMPL INCL: A3,A4,A5, C1 THRU C3, MP11 THRU MP14, W2,W3.	
P6 W1 W2 W3	1251-0099 05254-6008 05254-6005 05254-6005	CONNECTOR:MALE 50 PIN CABLE ASSY:CAVITY OUTPUT CABLE ASSY:VIDEO AMPL OUTPUT CABLE ASSY:AUX OUTPUT	
	0370-0050 0370-0041 1410-0204 1410-0033 05254-6014 05254-2014 05254-4003 5040-0185	MISCELLANEOUS KNOB:HANDLE,PART OF KNOB KNOB BEARING,SLEEVE:PART OF KNOB BUSHING:BRASS DIODE ASSY:MIXER INCL:A3CR1,A3R3,A3R4. PLUG:CAVITY OUTPUT PIN ASSEMBLY:OUTPUT METER:BEZEL	

Table 7-4. Replaceable Parts

Stock No.	Description	Mfr.	Mfr. Part No.	TQ
0130-0016	C:VAR CER 5-25 PF NP0	28480	0130-0016	1
0130-0017	C:VAR CER 8-50 UF N750	28480	0130-0017	1
0132-0003	C:VAR TRIMMER 0.7-3.0 PF	28480	0132-0003	1
0140-0145	C:FXD MICA 22 PF 5% 500VDCW	04062	DM15C 220J	1
0140-0156	C:FXD MICA 1500 PF 2% 300VDCW	04062	DM19F 152G 300V	1
0140-0178	C:FXD MICA 560 PF 2% 300VDCW	04062	DM15F 561J 300V	2
0140-0194	C:FXD MICA 110 PF 5% 300VDCW	04062	DM15F 111J 300V	2
0140-0195	C:FXD MICA 130 PF 5% 300VDCW	04062	DM15F 131J 300V	2
0140-0202	C:FXD MICA 15 PF 5% 500VDCW	04062	DM15C 150J 500V	1
0140-0209	C:FXD MICA 5 PF 10%	28480	0140-0209	1
0140-0219	C:FXD MICA 180 PF 2%	28480	0140-0219	1
0140-0224	C:FXD MICA 280 PF 1%	28480	0140-0224	1
0140-0230	C:FXD MICA 420 PF 1%	28480	0140-0230	1
0150-0093	C:FXD CER 0.01 UF +80-20% 100VDCW	91418	TA	19
0150-0121	C:FXD CER 0.1 UF +80-20% 50VDCW	56289	5C 50A	5
0160-0127	C:FXD CER 1.0 UF 20% 25VDCW	56289	5C 13	5
0160-0204	CAPACITOR:FXD CER 200VDCW(FEED-THRU)	01121	SMFB-A2	3
0160-0737	C:FXD MICA 29.3 PF	28480	0160-0737	1
0160-0738	C:FXD MICA 44.3 PF	28480	0160-0738	1
0160-0739	C:FXD MICA 56.2 PF	28480	0160-0739	1
0160-0740	C:FXD MICA 39.6 PF 500VDCW	04062	DM15E(39.6 PF)D	1
0160-0759	C:FXD MICA 1000 PF 5% 250VDCW	72982	2930-000-001A0-102J	1
0160-0958	C:FXD MICA 390 PF 5% 300VDCW	28480	0160-0958	1
0170-0083	C:FXD MY 0.022 UF 20% 50VDCW	28480	0170-0083	1
360A-13	WIRE:CENTER CONDUCTOR(4")	28480	360A-13	1
0370-0041	KNOB	28480	0370-0041	1
0370-0050	KNOB:HANDLE	28480	0370-0050	1
0410-0089	CRYSTAL:50 MC .004%	28480	0460-0089	1
0460-0055	TAPE:TEFLON 1/2"	00136	0BD#	1
0683-1015	R:FXD COMP 100 OHM 5% 1/4W	28480	0460-0089	1
		01121	CB 1015	2
0683-1025	R:FXD COMP 1K OHM 5% 1/4W	01121	CB 1025	6
0683-1035	R:FXD COMP 10K OHM 5% 1/4W	01121	CB 1035	1
0683-1215	R:FXD COMP 120 OHM 5% 1/4W	01121	CB 1215	1
0683-1245	R:FXD COMP 120K OHM 5% 1/4W	01121	CB 1245	1
0683-1325	R:FXD COMP 1300 OHM 5% 1/4W	01121	CB 1325	1
0683-1345	R:FXD COMP 130K OHM 5% 1/4W	01121	CB 1345	1
0683-1525	R:FXD COMP 1.5K OHM 5% 1/4W	01121	CB 1525	1
0683-1615	R:FXD COMP 160 OHM 5% 1/4W	01121	CB 1615	1
0683-1625	R:FXD COMP 1600 OHM 5% 1/4W	01121	CB 1625	1
0683-1815	R:FXD COMP 180 OHM 5% 1/4W	01121	CB 1815	1
0683-1825	R:FXD COMP 1.8K OHM 5% 1/4W	01121	CB 1825	2
0683-2015	R:FXD COMP 200 OHM 5% 1/4W	01121	CB 2015	2
0683-2205	R:FXD COMP 22 OHM 5% 1/4W	01121	CB 2205	1
0683-2215	R:FXD COMP 220 OHM 5% 1/4W	01121	CB 2215	1
0683-2405	R:FXD COMP 24 OHM 5% 1/4W	01121	CB 2405	2
0683-2425	R:FXD COMP 2400 OHM 5% 1/4W	01121	CB 2425	3
0683-2725	R:FXD COMP 2.7K OHM 5% 1/4W	01121	CB 2725	2
0683-3025	R:FXD COMP 3000 OHM 5% 1/4W	01121	CB 3025	2
0683-3325	R:FXD COMP 3.3K OHM 5% 1/4W	01121	CB 3325	1
0683-3925	R:FXD COMP 3.9K OHM 5% 1/4W	01121	CB 3925	1

Table 7-4. Replaceable Parts (Cont'd)

Stock No.	Description	Mfr.	Mfr. Part No.	TQ
0683-4725	R:FXD COMP 4.7K OHM 5% 1/4W	01121	CB 4725	1
0683-5105	R:FXD COMP 51 OHM 5% 1/4W	01121	CB 5105	1
0683-5115	R:FXD COMP 510 OHM 5% 1/4W	01121	CB 5115	5
0683-5615	R:FXD COMP 560 OHM 5% 1/4W	01121	CB 5615	2
0683-6205	R:FXD COMP 62 OHM 5% 1/4W	01121	CB 6205	1
0683-6215	R:FXD COMP 620 OHM 5% 1/4W	01121	CB 6215	1
0683-6815	R:FXD COMP 680 OHM 5% 1/4W	01121	CB 6815	1
0683-7505	R:FXD COMP 75 OHM 5% 1/4W	01121	CB 7505	1
0683-9105	R:FXD COMP 91 OHM 5% 1/4W	01121	CB 9105	1
0757-0895	R:FXD MET OX 62 OHM 2% 1/8W	19701	MF 07C	2
0758-0010	R:FXD MET FLM 3300 OHM 5% 1/2W	07115	C20	1
0758-0015	R:FXD MET FLM 220 OHM 5% 1/2W	07115	C20	1
0758-0017	R:FXD MET FLM 1.5K OHM 5% 1/2W	07115	C20	1
0758-0044	R:FXD MET OX 2.2K OHM 5% 1/2W	07115	C20	3
0758-0125	R:FXD MET FLM 430 OHM 5% 1/4W	07115	C-07	2
0758-0135	R:FXD DEPC 6.8K OHM 10% 1/10W	28480	0758-0135	1
0890-0001	TUBING:1/2"	28480	0890-0001	
0890-0009	TUBING:1/2"	28480	0890-0009	
1120-0140	METER:LEVEL INDICATOR	60741	MODEL 120	1
1205-0011	HEAT SINK FOR T0-5 AND T0-9 CASE	28480	1205-0011	1
1250-0020	CONTACT:BNC FEMALE	91737	89-20	2
1250-0227	WASHER:SILVER PLATED BRASS	91737	492A-39	2
1251-0099	CONNECTOR:MALE 50 PIN	02660	57 10500	1
1410-0058	SPRING:COMPRESSION	28480	1410-0058	1
1410-0204	BEARING:SLEEVE	28480	1410-0204	2
1460-0197	SPRING:ANTI-BACKLASH	28480	1460-0197	1
1850-0020	TRANSISTOR:GERMANIUM PNP 2N1143	01295	2N1143	1
1850-0102	TRANSISTOR:GERMANIUM PNP 2N2455	93332	2N2455	5
1854-0005	TRANSISTOR:SILICON NPN 2N708	07263	2N708	5
1854-0019	TRANSISTOR:SILICON NPN S6516	07263	S-6516	6
1854-0035	TRANSISTOR:SILICON NPN	07263	S 6783	1
1900-0014	DIODE:POINT CONTACT,SILICON,MATCHED SET	96341	1N831M	1
1901-0153	SEMICON DEVICE:DIODE SILICON	28480	BE-0004	1
1910-0022	SEMICON DEVICE:DIODE GERMANIUM	73293	HD-1872	2
2100-0723	R:VAR COMP 100K OHM 20% LIN 1/4W	01121	FR-104-M	1
3030-0149	SET SCREW:#0-80 X 3/32"	28480	3030-0149	2
3050-0381	WASHER:THRUST	28480	3050-0381	2
5000-0206	SPRING:WASHER	28480	5000-0206	1
5020-0233	COLLAR	28480	5020-0233	2
5040-6185	METER:BEZEL	28480	5040-6185	1
05254-0006	BRACKET:BOARD	28480	05254-0006	1
05254-0008	SUPPRESSOR:MODE	28480	05254-0008	1
05254-0009	SIDE PLATE:AMPLIFIER	28480	05254-0009	1
05254-0010	PLATE:BOTTOM	28480	05254-0010	1
05254-0011	PLATE:SIDE	28480	05254-0011	1
05254-0012	PLATE:TOP	28480	05254-0012	1
05254-0013	BRACKET:METER	28480	05254-0013	1
05254-2004	INSERT:REAR AMPLIFIER	28480	05254-2004	1
05254-2005	CAP:PROBE	28480	05254-2005	1
05254-2008	CAPACITOR MOUNT:MIXER	28480	05254-2008	1
05254-2009	CONTACT:MIXER	28480	05254-2009	1
05254-2010	INSERT:FRONT AMPLIFIER	28480	05254-2010	1

Table 7-4. Replaceable Parts (Cont'd)

Stock No.	Description	Mfr.	Mfr. Part No.	TQ
05254-2011	INSERT:MIXER OUTPUT	28480	05254-2011	1
05254-2012	CONNECTOR:REAR,MIXER	28480	05254-2012	1
05254-2014	PLUG:CAVITY OUTPUT	28480	05254-2014	1
05254-2018	SUPPORT:BEARING	28480	05254-2018	1
05254-2019	SCREW:PROBE DRIVE	28480	05254-2019	1
05254-2021	NUT:FLOATING BACKLASH	28480	05254-2021	1
05254-2026	REAR:CAVITY	28480	05254-2026	1
05254-2027	CONNECTOR:INPUT	28480	05254-2027	1
05254-2028	AMPLIFIER SHIELD:MACHINED	28480	05254-2028	1
05254-2030	GEAR:DIAL DRIVE	28480	05254-2030	1
05254-2031	GEAR:DRIVER	28480	05254-2031	1
05254-2032	GEAR:DIAL TRAIN(#1)	28480	05254-2032	2
05254-2033	GEAR:DIAL TRAIN(#2)	28480	05254-2033	2
05254-2035	CAVITY:MACHINED	28480	05254-2035	1
05254-2037	PART OF CONDUCTOR,CAPACITOR	28480	05254-2037	2
05254-2038	RING:MIXER GROUND	28480	05254-2038	1
05254-2039	DIODE MOUNT	28480	05254-2039	1
05254-2040	SHAFT:IDLER GEAR	28480	05254-2040	1
05254-2041	STUD:THREADED	28480	05254-2041	1
05254-2043	BLANK PRINTED CIRCUIT BOARD	28480	05254-2043	1
05254-2044	BLANK PRINTED CIRCUIT BOARD	28480	05254-2044	1
05254-2045	FILTER SECTION I	28480	05254-2045	2
05254-2046	FILTER SECTION II	28480	05254-2046	1
05254-2047	FILTER SECTION III	28480	05254-2047	2
05254-2048	SLEEVE:RF FILTER	28480	05254-2048	1
05254-2049	BRACKET:GEAR	28480	05254-2049	1
05254-2050	SPACER:FILTER TERMINATION	28480	05254-2050	1
05254-2051	PANEL:FRONT	28480	05254-2051	1
05254-4001	CAPACITOR ASSEMBLY:INPUT	28480	05254-4001	1
05254-4002	BUSHING:DIAL	28480	05254-4002	1
05254-4003	PIN ASSEMBLY:OUTPUT	28480	05254-4003	1
05254-6001	PROBE ASSEMBLY	28480	05254-6001	1
05254-6002	PROBE DRIVE ASSEMBLY	28480	05254-6002	1
05254-6004	VIDEO AMPLIFIER ASSEMBLY	28480	05254-6004	1
05254-6005	CABLE ASSEMBLY:VIDEO AMPLIFIER OUTPUT	28480	05254-6005	2
05254-6006	MIXER ASSEMBLY	28480	05254-6006	1
05254-6008	CABLE ASSEMBLY:CAVITY OUTPUT	28480	05254-6008	1
05254-6009	FINGER MOUNT ASSEMBLY	28480	05254-6009	1
05254-6010	MULTIPLIER AMPLIFIER ASSEMBLY	28480	05254-6010	1
05254-6011	TOROID ASSEMBLY:WOUND	28480	05254-6011	1
05254-6012	HARMONIC GENERATOR ASSEMBLY	28480	05254-6012	1
05254-6013	RF FILTER ASSEMBLY	28480	05254-6013	1
05254-6014	DIODE ASSY:MIXER	28480	05254-6014	1
05254-6016	CAVITY ASSEMBLY	28480	05254-6016	1
5262A-47A	SPACER:ALUMINUM	28480	5262A-47A	3
5262A-83A	GUIDE:PLUG-IN(PLASTIC)	28480	5262A-83A	1
8151-0012	WIRE:#20 AWG(1 1/2")	28480	8151-0012	1
9140-0018	COIL:RF 1UH	99848	205-11-10	2
9140-0031	COIL:RF 75 UH	99848	1075-15-750	2
9140-0107	COIL:FXD RF 27 UH	28480	9140-0107	7
9140-0213	COIL:VAR 179.6 NH	36196	H-10693-A	1
9140-0214	COIL:VAR 287.9 NH	36196	H-10692-A	1
9140-0215	COIL:VAR 349.8 NH	36196	H-10691-A	1

Table 7-4. Replaceable Parts (Cont'd)

Stock No.	Description	Mfr.	Mfr. Part No.	TQ	
9140-0218	COIL:VAR TUNABLE 80 NH	04811	PC-80-L57-06	2	
9140-0219	COIL:VAR TUNABLE 115 NH	04811	PC-115-L57-06	2	
9140-0220	COIL:VAR TUNABLE 175 NH	04811	PC-L57-06	1	
9140-0221	COIL:VAR TUNABLE 800 NH	04811	PC-800-L57-06	1	

SECTION VIII CIRCUIT DIAGRAMS

8-1. INTRODUCTION.

8-2. This section includes the following:

- a. General Notes for Schematic Diagrams (Figure 8-1).
- b. Troubleshooting Aids (Table 8-1) with test points on schematic diagrams (Figures 8-2 and 8-3).
- c. Converter block diagram and schematic diagrams of A1 through A5 (Figures 8-2 and 8-3).
- d. Component locators of A1 through A5 Assemblies (Figures 8-2 and 8-3).

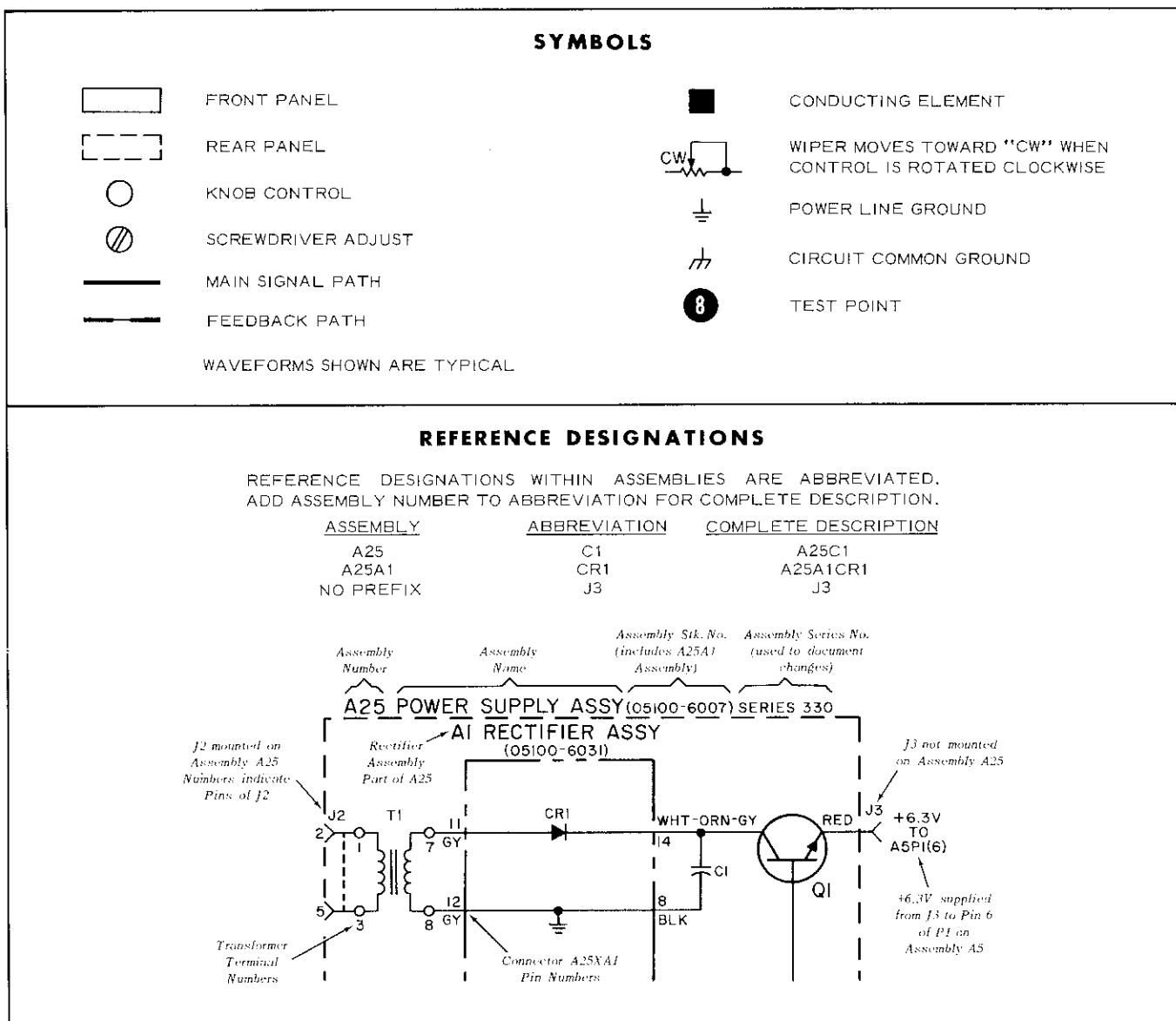


Figure 8-1. Schematic Diagram Notes

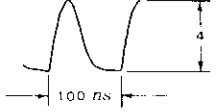
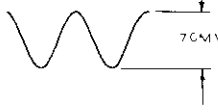
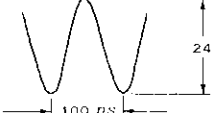
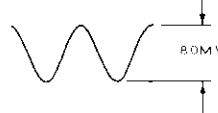
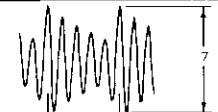
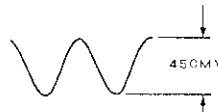
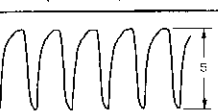
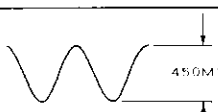
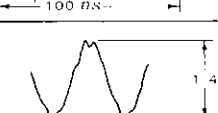
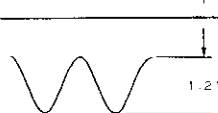
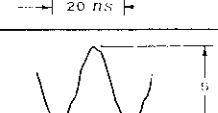
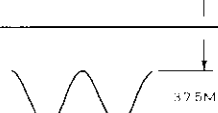
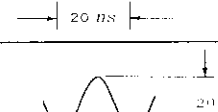
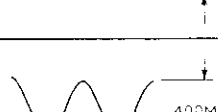
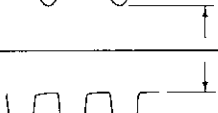
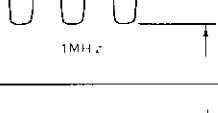
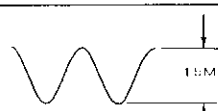
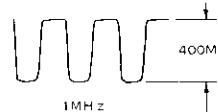
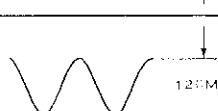
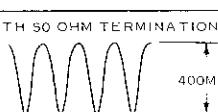
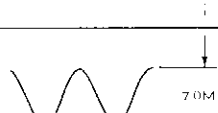
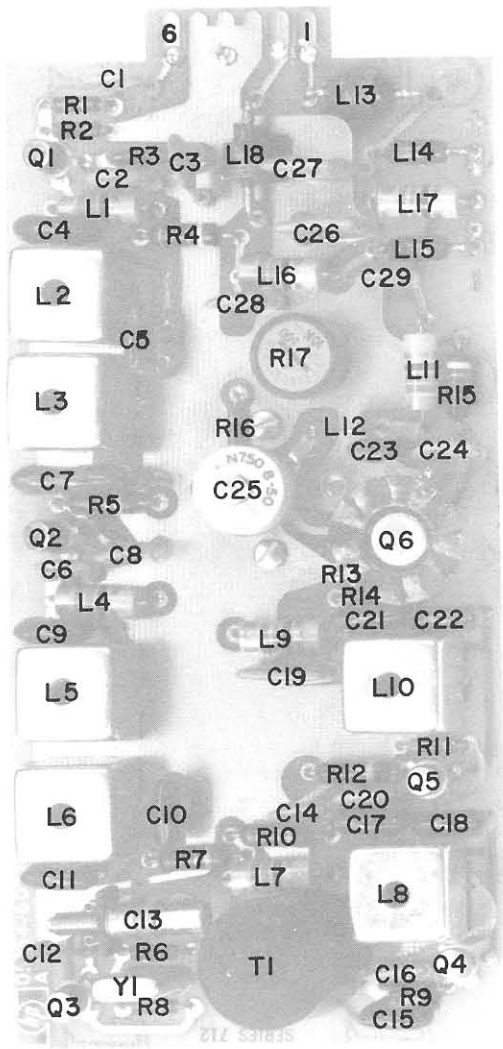
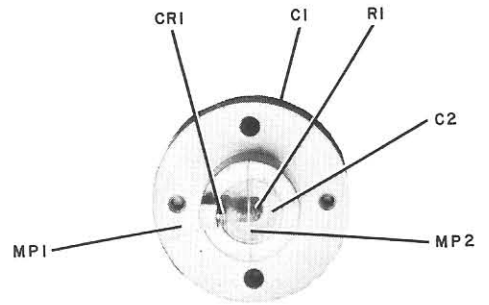
TP	STAGE	AVERAGE DC VOLTAGE			APPROX. AMPLITUDE VOLTS P/P WAVEFORM	TP	STAGE	AVERAGE DC VOLTAGE			APPROX. AMPLITUDE VOLTS P/P WAVEFORM
		E	C	B				E	C	B	
1	INPUT	DC VOLTAGE +7.5				11	A5Q8	-9.7	+2.8	-9	
2	A1Q1	+1.13	+12.4	-0.48		12	LOW PASS FILTER OUTPUT				
3	A1Q2	+2.7	+12.4	0		13	A5Q9	0	+5.9	+7	
4	A1Q3	+2.27	+9.1	0		14	A5Q10	+5.2	+12.5	+5.9	
5	A1Q4	-0.65	+12.4	0		15	A5Q11	+4.5	+11.0	+5.2	
6	A1Q5	-0.83	+12.4	-0.23		16	A5Q12	+5.5	-4.3	+5.2	
7	A1Q6	-2.84	12.3	-2.44		17	A5Q12	+5.5	-4.3	+5.2	
	A5Q1	+4.0	-1.6	+3.7		18	OUTPUT TO COUNTER	1 MHz DIFFERENCE SIGNAL AT 50mv			
	A5Q2	+4.0	-1.3	+3.7				50 MHz DIFFERENCE SIGNAL AT 50mv			
	A5Q3	-1.3	-9.0	-1.6							
	A5Q4	-1.05	-8.3	-1.35							
8	A5Q5	-9.0	-0.32	-8.3		19	EXTERNAL OUTPUT	1 MHz DIFFERENCE SIGNAL AT 50mv			
9	A5Q6	0	-9.7	-0.3				50 MHz DIFFERENCE SIGNAL AT 50mv			
10	A5Q7	-10.5	0	-9.7							

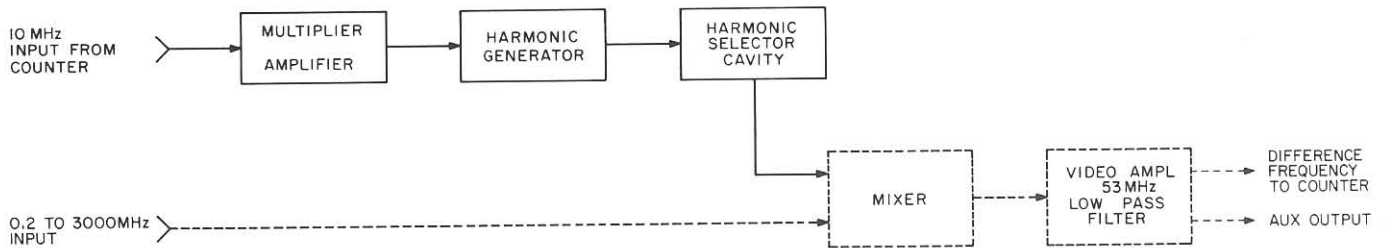
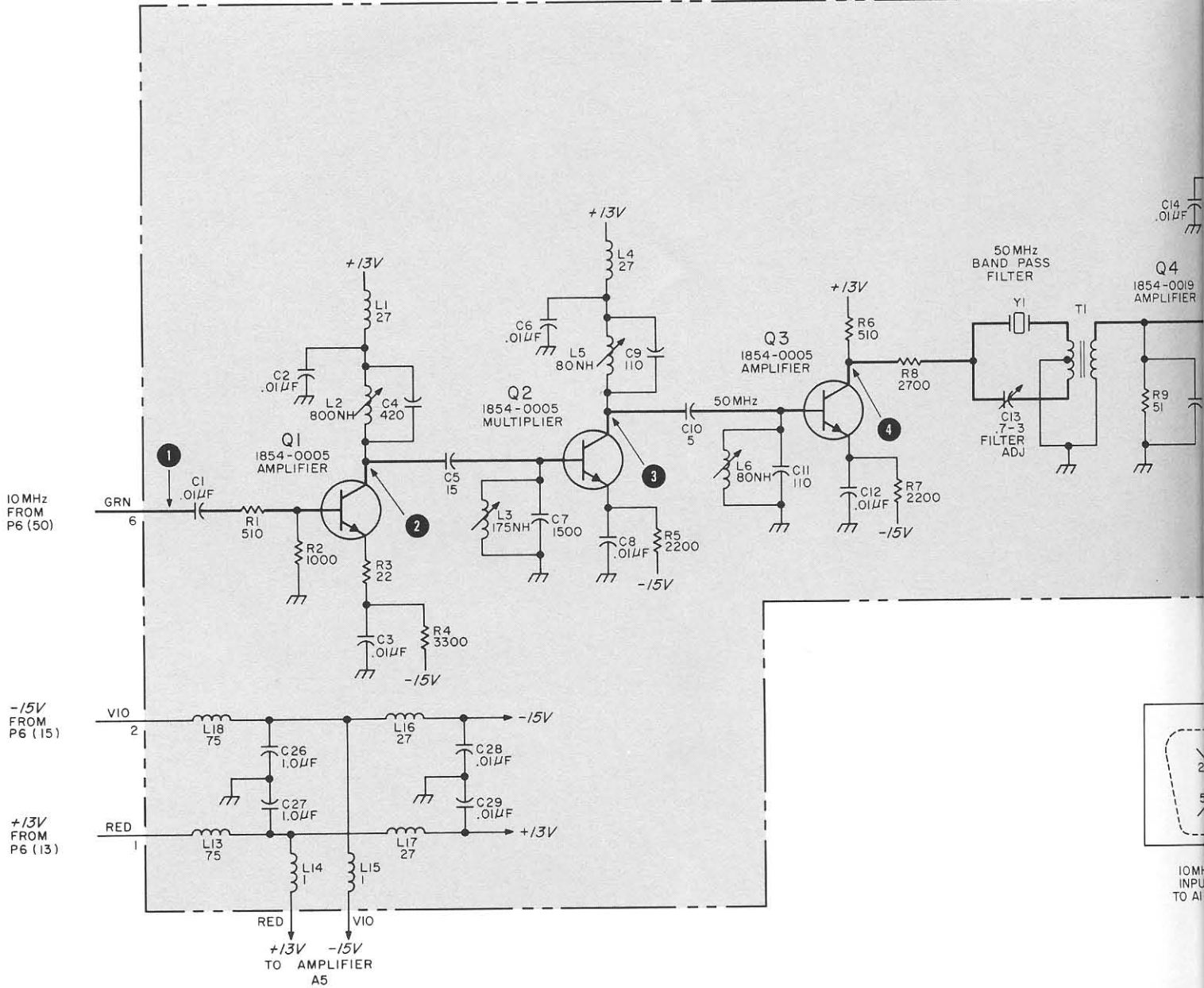
Table 8-1. Troubleshooting Aids Model 5254B



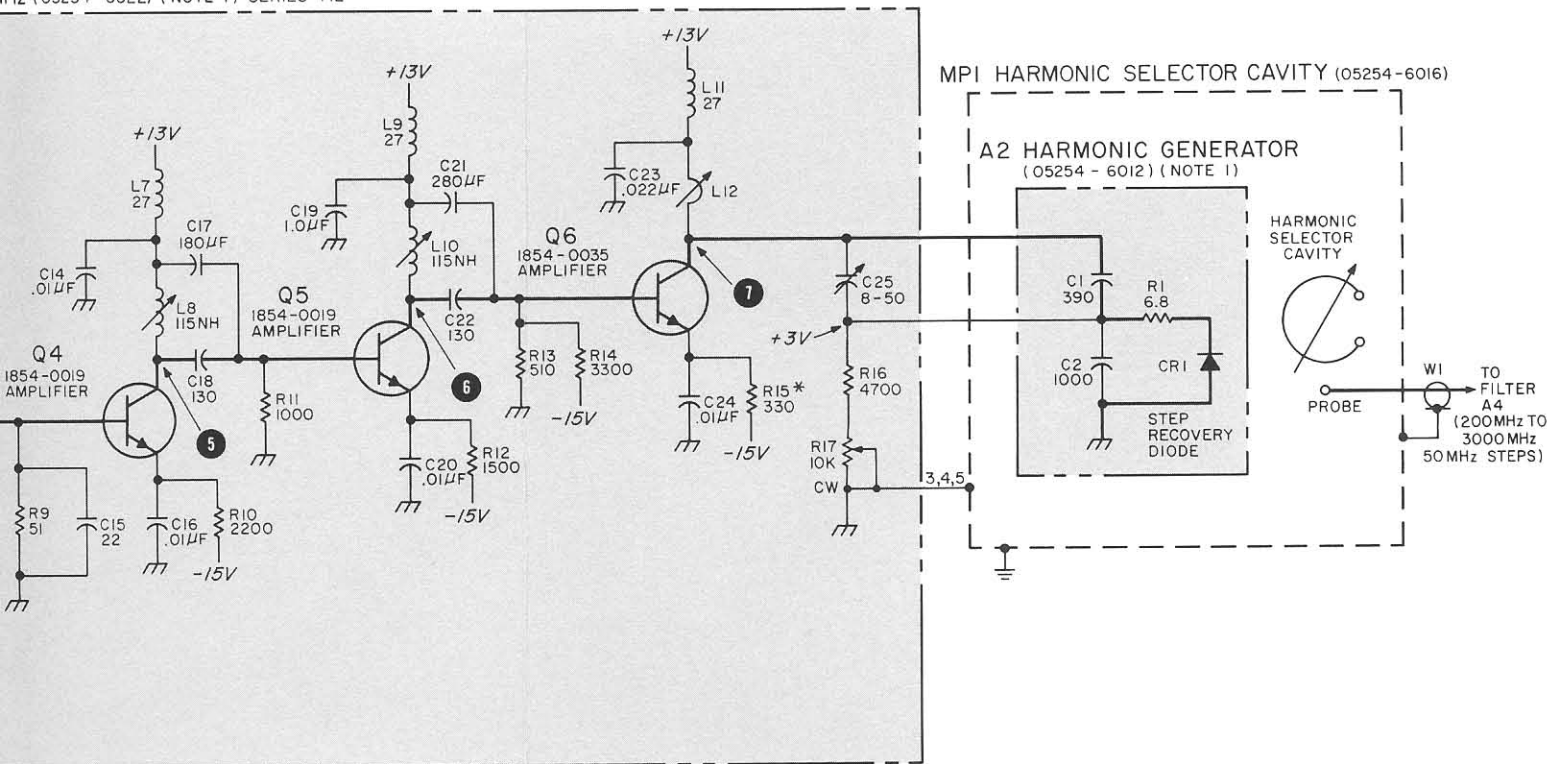
A1



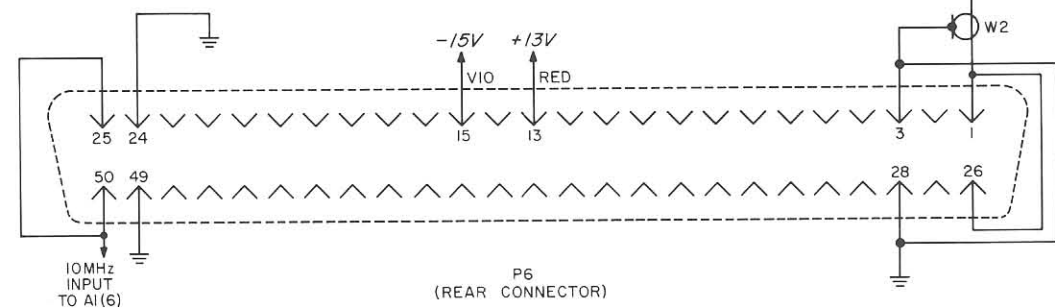
A2 (Bottom of A1)



MHz (05254 - 6022) (NOTE 1) SERIES 712



OUTPUT TO COUNTER FROM A5C28



NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY DESIGNATION AS PREFIX TO FORM COMPLETE DESIGNATION
2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS; INDUCTANCE IN MICROHENRIES
3. ASTERISK (*) INDICATES SELECTED COMPONENT, AVERAGE VALUES SHOWN.

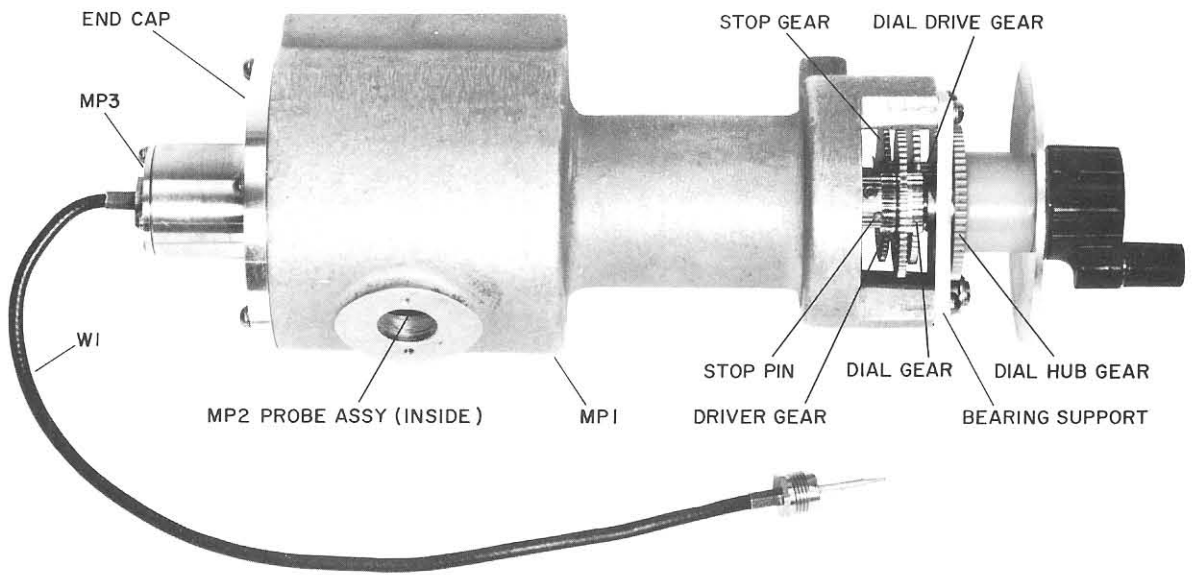
REFERENCE DESIGNATIONS

NO PREFIX	A1	A2
	C 1 - 29	C 1, 2 CR 1
P6	L 1 - 18	
W1, 2	Q1 - 6 R1 - 17 T1 Y1	R1

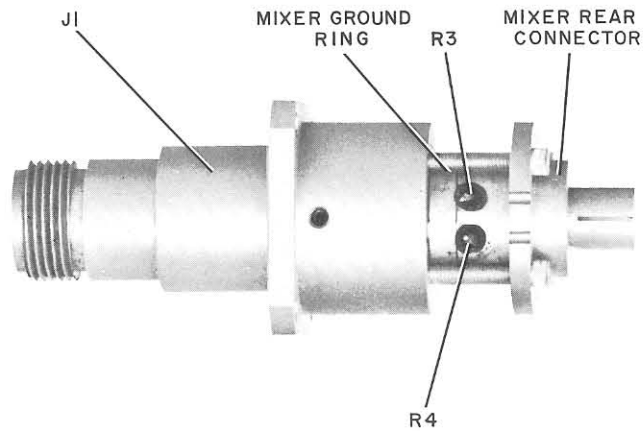
COPYRIGHT 1967 BY HEWLETT-PACKARD COMPANY

05254-D-1

Figure 8-2. Multiplier Amplifier A1, Harmonic Generator

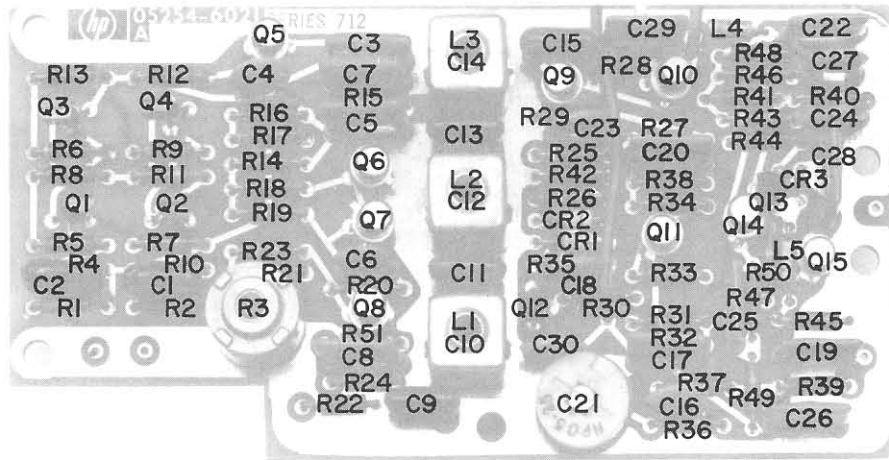


CAVITY ASSEMBLY

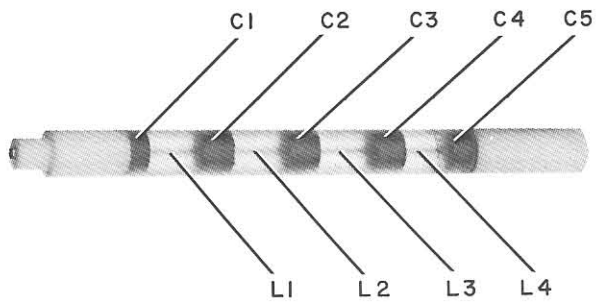


A3

MIXER ASSEMBLY



A5

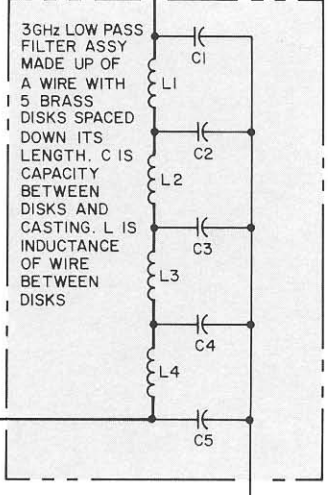
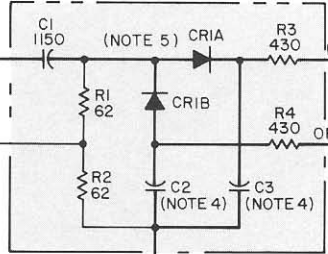


A4

50 Ω
100 MBM MAX

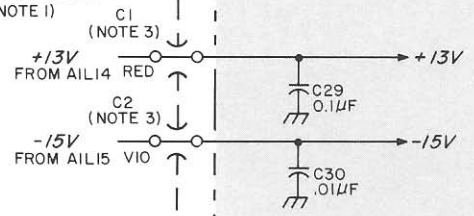
A3 MIXER ASSEMBLY

(05254-6006)(NOTE 1)

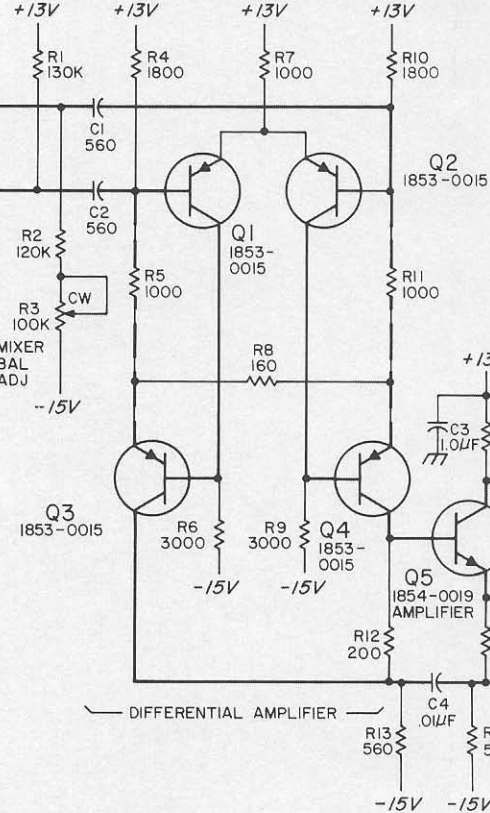


A4 FILTER ASSEMBLY

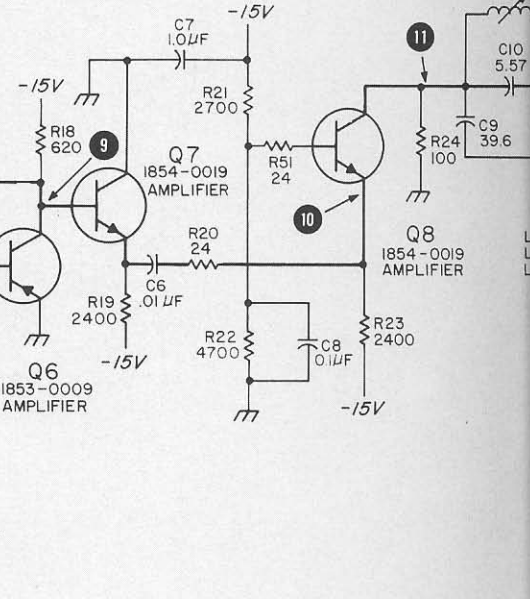
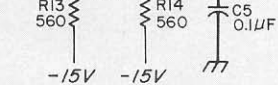
(05254-6013)(NOTE 1)



DIFFERENTIAL AMPLIFIER

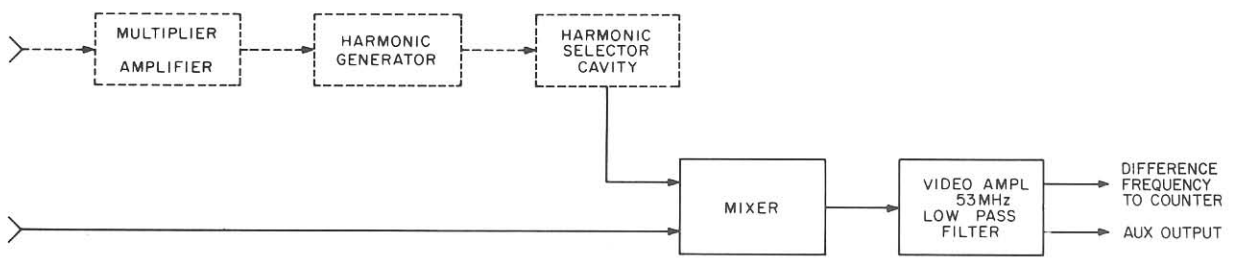


DIFFERENTIAL AMPLIFIER



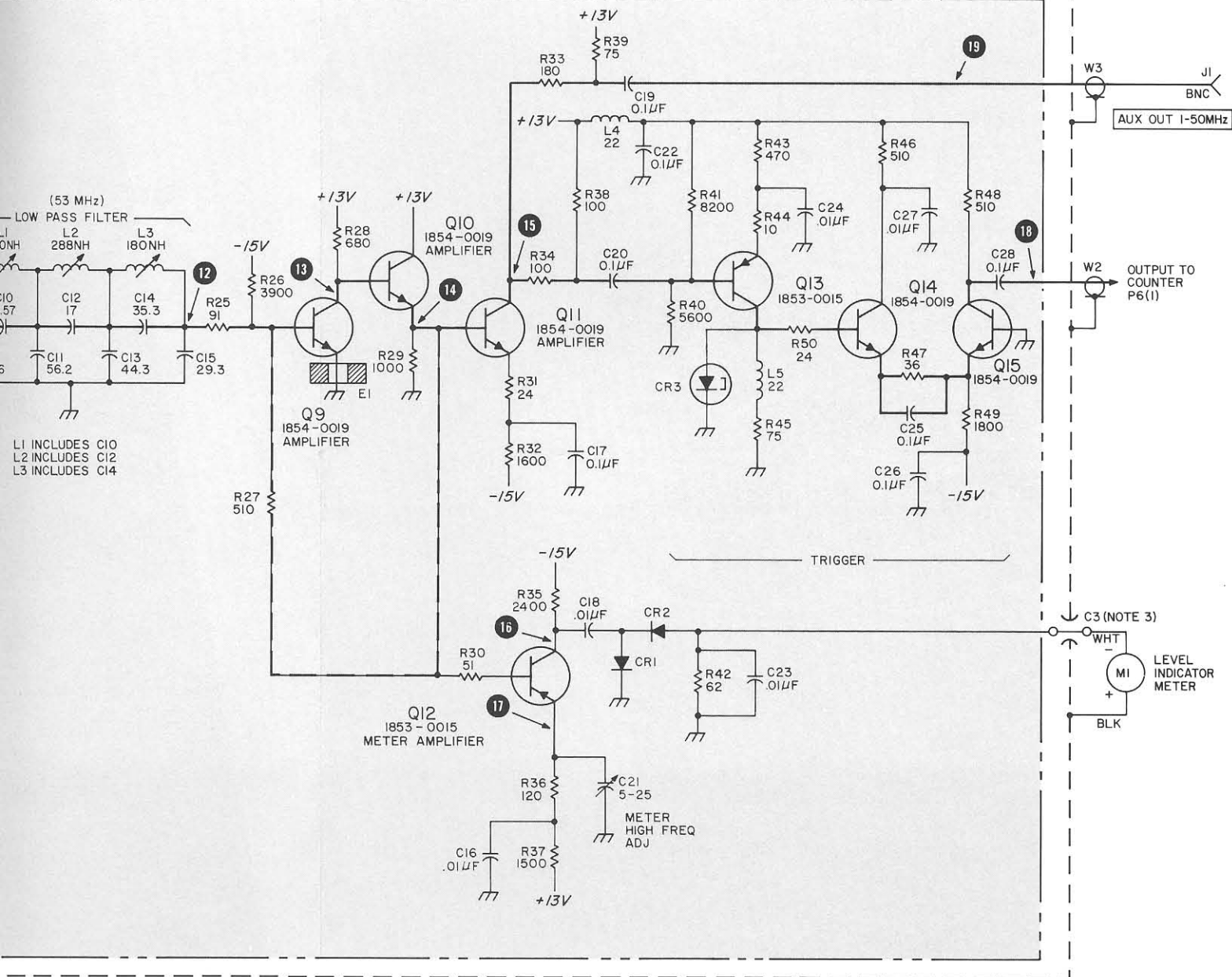
10 MHz INPUT FROM COUNTER

SIGNAL INPUT



12 AMPLIFIER SIDE PLATE

4 - 6021 (NOTE 1) SERIES 712



NOTES

1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY DESIGNATION AS PREFIX TO FORM COMPLETE DESIGNATION
2. UNLESS OTHERWISE INDICATED:
RESISTANCE IN OHMS;
CAPACITANCE IN PICOFARADS
INDUCTANCE IN MICROHENRIES
3. C1, C2, C3 ARE CAPACITIVE FEED THROUGH FILTER NETWORKS
4. A3C2, A3C3 ARE CONDUCTOR CAPACITORS CONSISTING OF TEFLON TUBING OVER THE CONDUCTOR
5. DIODES CRIA AND CRIB ARE MATCHED PAIR

REFERENCE DESIGNATIONS

NO PREFIX	A3	A4	A5
C1-3	C1-3	C1-5	C1-30
J1	CR1		CR1-3
MI		L1-4	E1
MP12,14			L1-5
W1-3	R1-4		Q1-15
			R1-51

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05254-0-3

Figure 8-3. Filter A4, Mixer A3, and Video Amplifier A5

HEWLETT  PACKARD
MANUAL CHANGES

MANUAL AFFECTED: 5254C
 FREQUENCY CONVERTER

DATE: July 7, 1972

SERIAL PREFIXED: 1124A
 PRINTED: SEP 1971
 PART NO.: 05254-9019

THIS SUPPLEMENT PROVIDES:

1. UPDATING INFORMATION TO CHANGE THE MANUAL TO REFLECT THE LATEST PRODUCT CONFIGURATION.
2. ERRATA TO CORRECT MANUAL ERRORS.

► NEW ITEM

IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL	IF YOUR INSTRUMENT HAS SERIAL PREFIX OR SERIAL NUMBER	MAKE THE FOLLOWING CHANGES TO YOUR MANUAL

ERRATA

Page 6-2, Table 6-1 :
 Change A1C1-3, 6, 8, 12, 14, 16, 20, 24, 28, 29 to 0160-2930

- Page 6-3, Table 6-1:
 Change A1R15 to 0758-0054 330 OHM; add to description "FACTORY SELECTED VALUE"

