INSTRUCTION MANUAL
FOR
TYPE RS-111-1B-12A
RECEIVING SYSTEM

INTRODUCTION

The RS-111-1B-12A Receiving System is basically a RS-111-1B-12B which is described in Sections I through VI of this manual. Section VII pertains exclusively to the RS-111-1B-12A. With exception of the differences covered in Section VII, the material in Sections I through VI is entirely applicable.

WATKINS-JOHNSON COMPANY
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20760

M/100/6/5/74/GH

WARNING

This equipment employs voltages which are dangerous and may be fatal if contacted. Extreme caution should be exercised in working with the equipment with any of the protective covers removed.

ADDENDA
RS-111-1B-12A

The following changes should be incorporated into the Instruction Manual for the RS-111-1B-12A Receiving System. (This is a supplementary addenda made to cover the unique modules of the RS-111-1B-12A covered in Section VII of the RS-111-1B-12B manual. With exception of the differences of the RS-111-1B-12A, the addenda for the RS-111-1B-12B is entirely applicable.)

1. Paragraph 7.6.1 RS-111-1B-12A Receiver Main Chassis Parts List

   a) Change C4 from: 250 pF, -10+75%, 40 V; Part No. 34D257G040FL4; Mfr. Code 56289 to: 1100 μF, -10+75%, 40 V; Part No. 39D118G040HL4; Mfr. Code 56289. (Page 7-13)

2. Paragraph 7.6.5; Type 71381 490-1000 MHz Tuner (A4) Parts List

   a) Change L12 from: INDUCTOR, FIXED; Qty. 1; Part No. 1975; Mfr. Code 14632 to: NOT USED. (Page 7-40)

3. Figure 7-23; Page 7-55; Type 71381 490-1000 MHz Tuner (A4) Schematic Diagram

   a) Delete L12.

4. Figure 7-27; Page 7-63; RS-111-1B-12A Receiver Main Chassis Schematic Diagram

   a) Change the value of C4 from: 250 μF to: 1100 μF.

INSTRUCTION MANUAL

FOR

TYPE RS-111-1B-12B

RECEIVING SYSTEM

WATKINS-JOHNSON COMPANY
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20760

BJ/200/2/22/74/GH

WARNING

This equipment employs voltages which are dangerous and may be fatal if contacted. Extreme caution should be exercised in working with the equipment with any of the protective covers removed.

ADDENDA
RS-111-1B-12B

The following changes should be incorporated into the Instruction Manual for the RS-111-1B-12B Receiving System.

1. Section V - Replacement Parts List

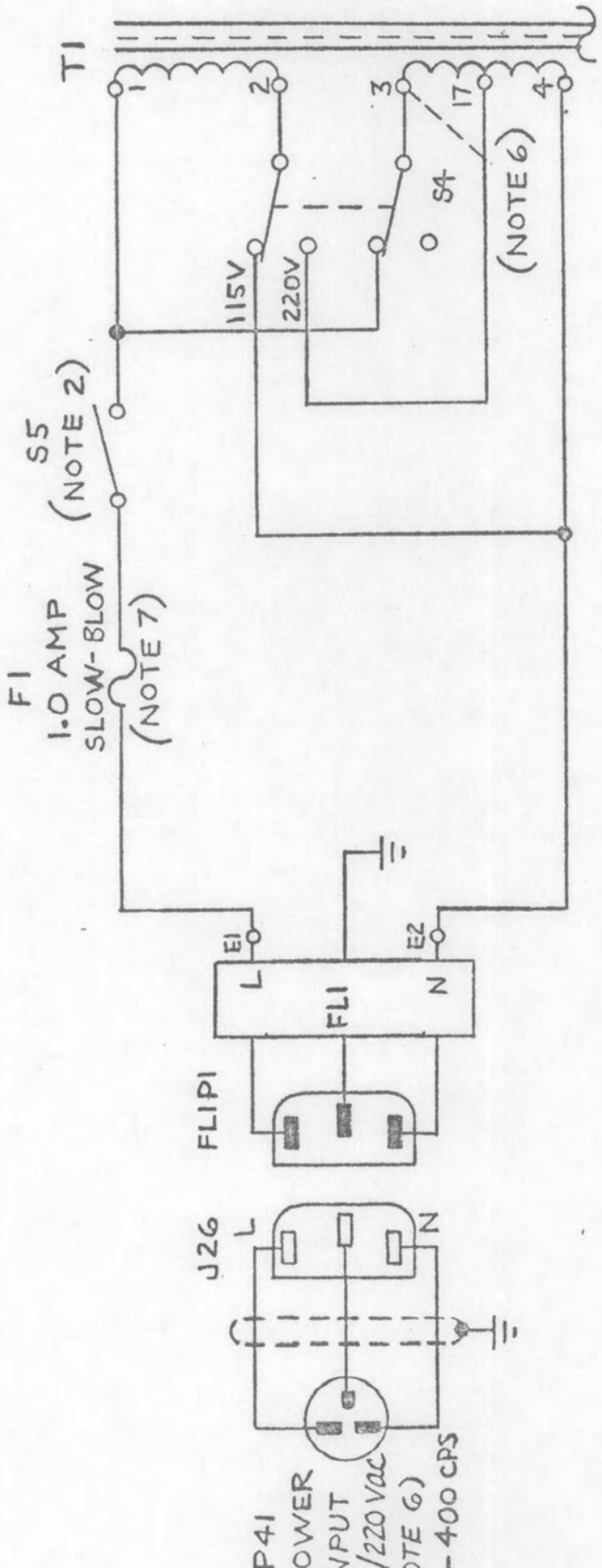
A. Paragraph 5.4.1; RS-111-1B-12B Main Chassis

1. Change C6 and C7 from: CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 1400 V; Qty. 2; Part No. U01M; Vendor Code 91418 to: NOT USED. (Page 5-5).
2. Add C10 and C11 as follows: NOT USED. (Page 5-5)
3. Add C12 as follows: Same as C8 (0.01 μF, 20%, 500 V; Part No. SM0.01μF, M)
4. Add C13 as follows: CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500 V; Qty. 13; Part No. FA5C-102W; Vendor Code 01121. (Page 5-5).
5. Add C14 through C18, C20 through C25 as follows: Same as C13. (Page 5-5)
6. Add C19 as follows: NOT USED. (Page 5-5)
7. DELETE F2. (FUSE, CARTRIDGE: 1/4 AMP, 3AG, Qty. 1; Part No. MDL 1/4; Vendor Code 71400). (Page 5-5)
8. Change F1 from: 1/2 AMP; Part No. MDL 1/2 to: 1 AMP; Part No. MDL 1. (Page 5-5)
9. Change P26 from: CORD, POWER; Qty. 1; Part No. 3598-181-007; Vendor Code 71700 to: NOT USED. (Page 5-9)
10. Add FL1 as follows: FILTER, POWER; Qty. 1; Part No. 1EF1; Vendor Code 05245. (Page 5-5)
11. Add J26 as follows: Part of W27. (Page 5-7)
12. Add P41 as follows: Part of W27. (Page 5-11)
13. Add W27 as follows: CORD/POWER; Qty. 1; Part No. .80-1245; Vendor Code 05245. (Page 5-12).
14. DELETE XF2. (Same as XF1). (Page 5-12)

2. Section VI - Schematic Diagrams

A. Figure 6-21; Page 6-43; RS-111-1B-12B Main Chassis

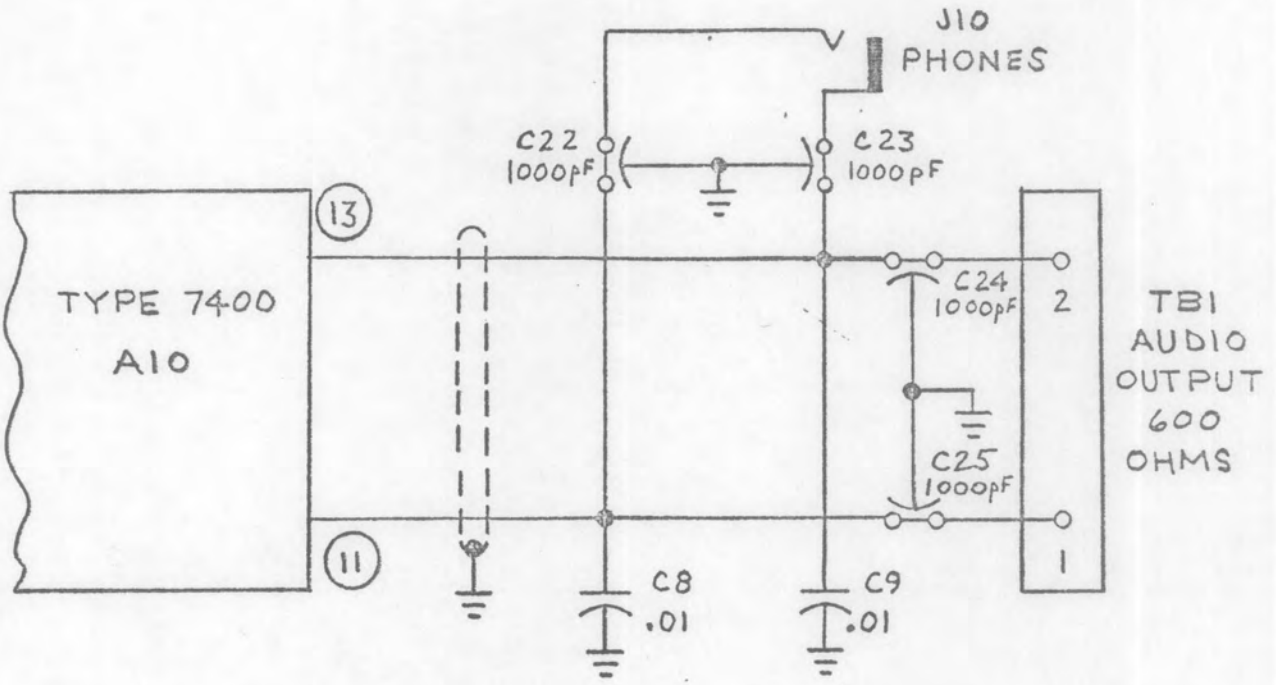
1. Change the power line configuration as shown below:



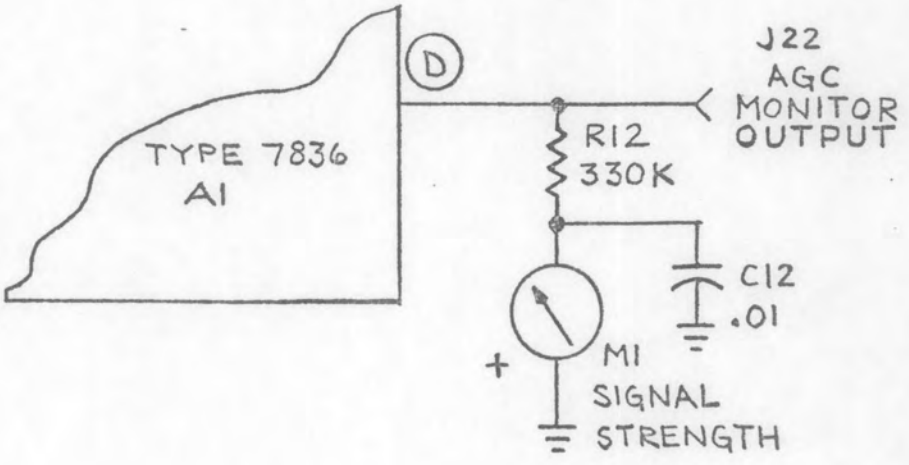
2. Add Note 7 as follows: Fuse should be changed to 1/2 Amp, 3 AG, MDL 1/2, 71400, Slow-Blow for 220 V or 230 V operation.

3. DELETE F2, C6, C7, and P26. (Refer to new configuration of the power line on page 2.)

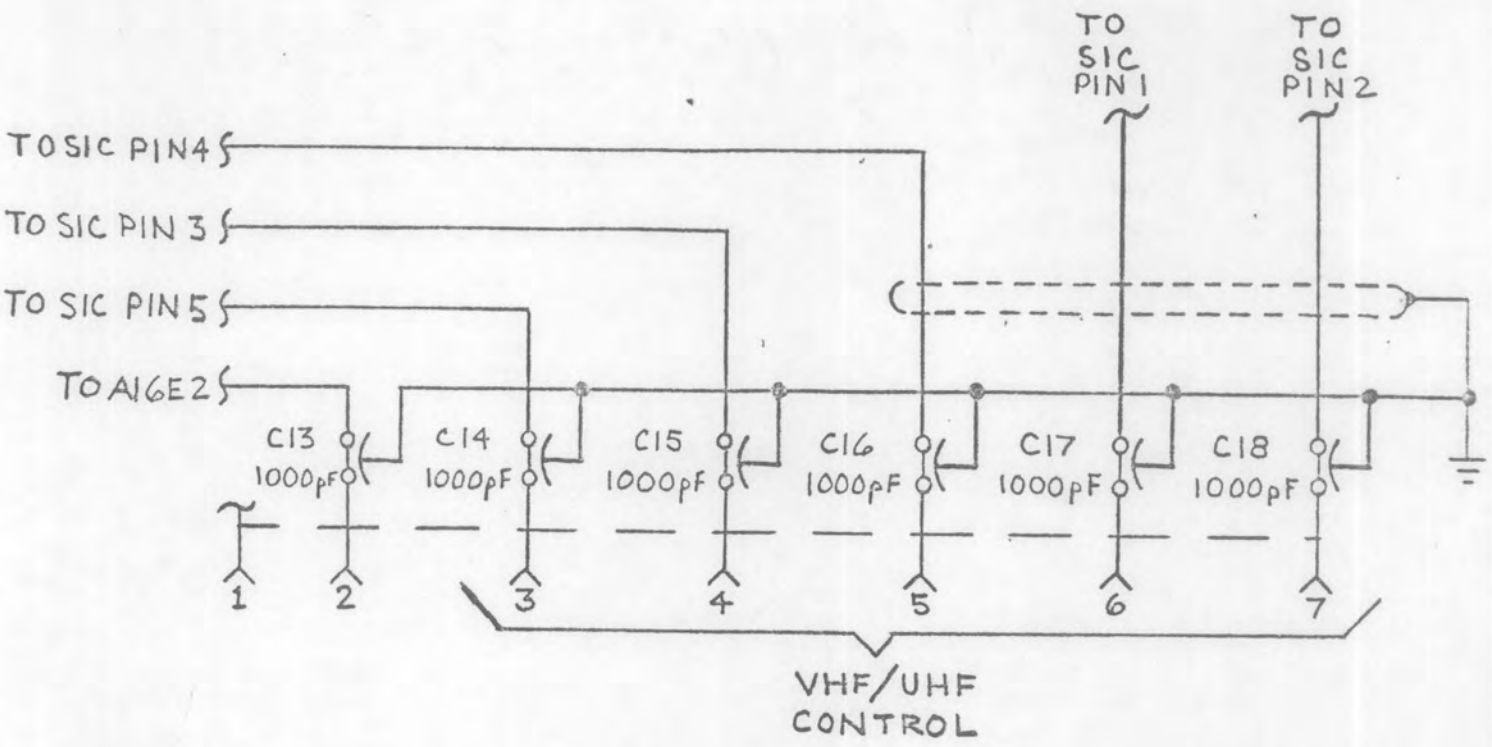
4. Add C22, C23, C24, and C25 as shown below:



5. Add C12 as shown below:



6. Add C13, C14, C15, C16, C17, and C18 as shown below:



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3. Section V - Replacement Parts List

A. Paragraph 5.4.6; Type 79358 Signal Monitor (A5)

1) Add FB7, FB8, and FB9 as follows: Same as FB1. (Page 5-35)

2) Change the quantity of FB1 from: 6 to: 9. (Page 5-35)

B. Paragraph 5.4.6.2; Type 8133 IF Amplifier Board No. 2 (A5A2)

1) Change the quantity of R4 from: 7 to: 5. (Page 5-43)

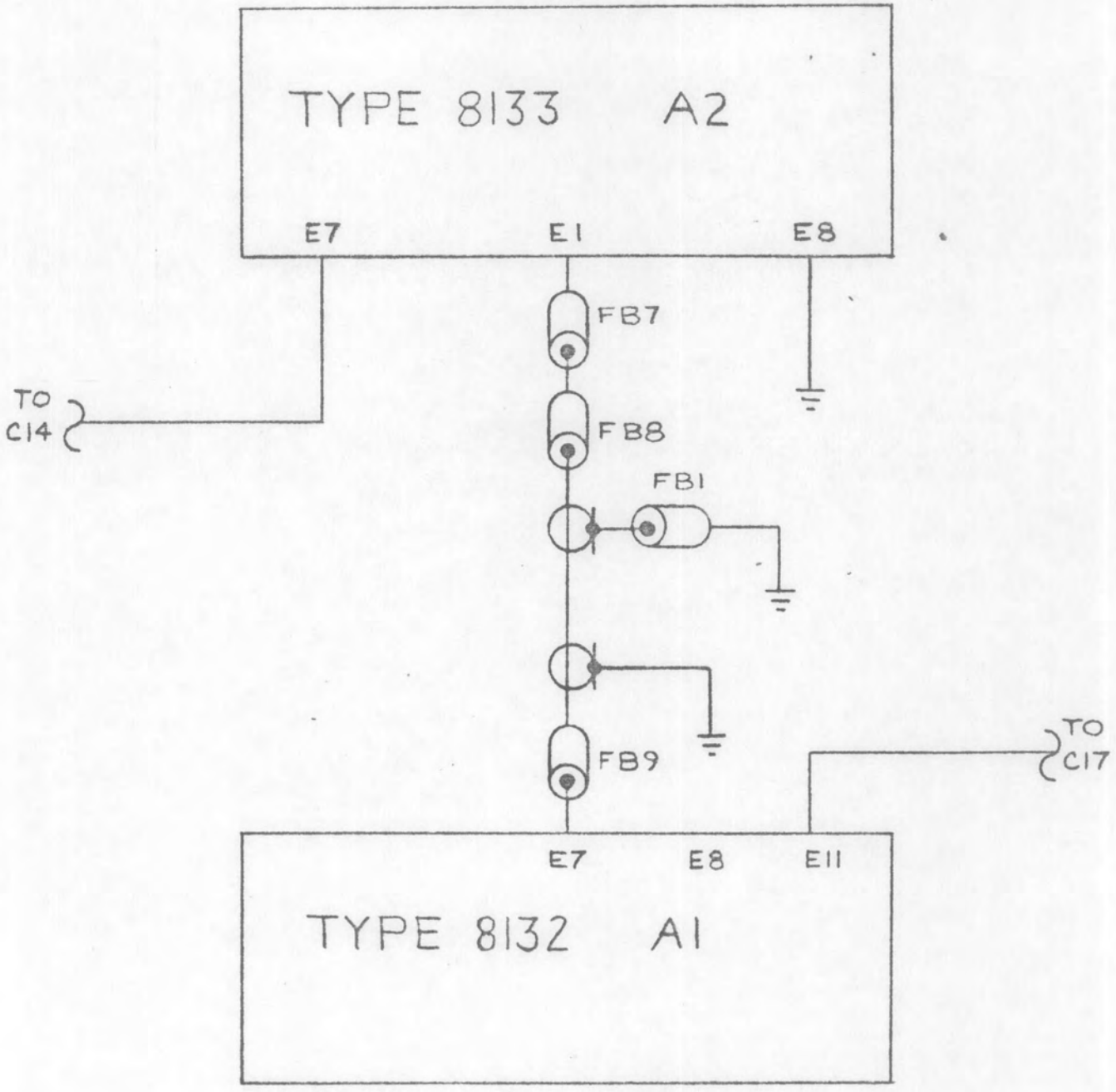
2) Change R22 from: Same as R4 (47 Ω) to: RESISTOR, FIXED, COMPOSITION: 20 Ω, 5%, 1/4W; Qty. 2; Part No. RCR07G200JS; Mfr. Code: 81349; Recm, Vendor: 01121. (Page 5-45)

3) Change R30 from: Same as R4 (47 Ω) to: Same as R22 (20 Ω). (Page 5-45)

4. Section VI - Schematic Diagrams

A. Figure 6-5; Page 6-11; Type 79358 Signal Monitor (A5)

1) Add FB7, FB8, and FB9 as shown below:



B. Figure 6-7; Page 6-15; Type 8133 IF Amplifier Board No. 2 (A5A2)

1. Change R22 and R30 from: 47 Ω to: 20 Ω.

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5. Section V - Replacement Parts List

A. Paragraph 5.4.6.1; Type 8132 IF Amplifier Board No. 1 (A5A1)

1) Change the quantity of C25 from: 2 to: 3. (Page 5-37)

2) Change C31 from: CAPACITOR, MICA, DIPPED: 75 pF, 5%, 500 V; Qty. 1; Part No. CM05ED750J03; Mfr. Code 81349; Recm. Vendor 72136 to: Same as C25 (68 pF; Part No. CM05ED680J03). (Page 5-37)

B. Paragraph 5.4.9; Type 72120 IF Amplifier (A8)

1) Add an asterisk (*) at R66, and at the bottom of page 5-75 add the supporting note as follows: * Nominal value; Final value to be factory selected.

6. Section VI - Schematic Diagrams

A. Figure 6-6; Page 6-13; Type 8132 IF Amplifier Board No. 1 (A5A1)

1) Change the value of C31 from: 75 pF to: 68 pF.

B. Figure 6-13; Page 6-27; Type 72120 IF Amplifier (A8)

1) Add (NOTE 3) at R66.

2) Add note 3 as follows: 3. Nominal value; Final value to be factory selected.

ADDENDA
RS-111-1B-12B

The following changes should be incorporated into the Instruction Manual for the RS-111-1B-12B Receiver.

7. Section I - Table 1-1 (Specifications)

A. Change Band B noise Figure from: 6.5 dB maximum to: 7.0 dB maximum.

B. Change Band B image rejection from: 50 dB minimum to: 47 dB minimum.

8. Section V - Replacement Parts List

A. Paragraph 5.4.1; RS-111-1B-12B Receiver, Main Chassis

1) Change C4 from: CAPACITOR, ELECTROLYTIC, ALUMINUM: 250 μF, -10+75%, 40 V; Part No. 34D257G040FL4; Mfr. Code 56289 to: CAPACITOR, ELECTROLYTIC, ALUMINUM: 1100 μF, -10+75%, 40 V; Part No. 39D118G040HL4; Mfr. Code 56289 (Page 5-5).

B. Paragraph 5.4.4; Type 7162 235-500 MHz RF Tuner.

1) Change C14 from: Same as C2 (2.0 pF) to: Same as C27 (2.7 pF) Page 5-23).

2) Change C27 from: CAPACITOR, CERAMIC, RUBBER: 2.7 pF, ±0.25 pF, 500 V; Part No. 301-000C0J0-279C; Mfr. Code 72982 to: Same as C2 (2.0 pF) (Page 5-23).

C. Paragraph 5.4.6; Type 79358 Signal Monitor

1) Change P5 from: CONNECTOR, PLUG; Part No. MRE9PG7H8, Mfr. Code 81312 to: CONNECTOR, PLUG; Part No. MRE7-2PG7H8; Mfr. Code 81312 (Page 5-35).

2) Change quantity of R5 (10 Ω) from: 1 to: 2 (Page 5-43).

D. Paragraph 5.4.7; Type 7120 60-21.4 MHz Converter

1) Change C21 from: CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500 V; Part No. QC0.82PFK; Mfr. Code 85121 to: CAPACITOR, COMPOSITION, TUBULAR: 10%, 500 V; Part No. QC0.12PFK; Mfr. Code 85121 (Page 5-52).

E. Paragraph 5.4.9; Type 72120 IF Amplifier

1) Add an asterisk (*) to R46 (R46*), with the following supporting note: * Nominal value; Final value factory selected (Page 5-75).

2) Change R68 from: NOT USED to: RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W; Part No. RCR07G120JS; Mfr. Code 81349 (Page 5-75).

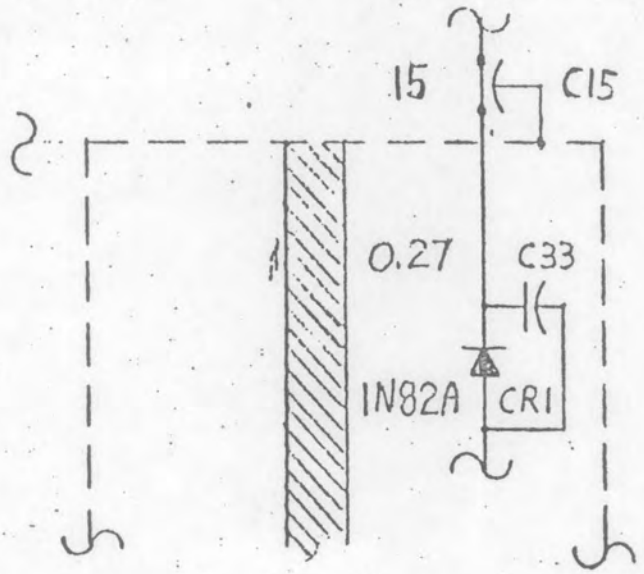
9. Section VI - Schematic Diagrams

A. Figure 6-3; Type 7162 235-500 MHz Tuner (A3).

1) Change C14 from: 2.0 pF to: 2.7 pF (Page 6-7).

B. Figure 6-4; Type 7163 490-1000 MHz Tuner (A4).

1) Change C15 as shown below:



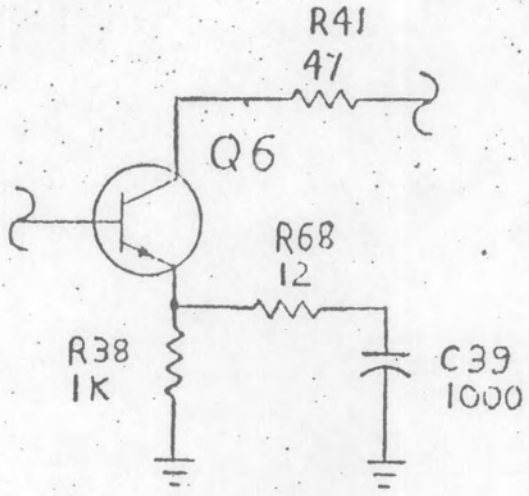
C. Figure 6-11; Type 7120 60-21.4 MHz Converter (A6).

1) Change C21 from: 0.82 pF to: 1.2 pF (Page 6-23).

D. Figure 6-13; Type 72120 20/75/300 KC Bandwidth IF Amplifier (A8).

1) Add (Note 3) to R46.

2) Add R68 (12 Ω, 1/4W) at emitter of Q6 as shown in diagram below:



E. Figure 6-21; Type RS-111-1B-12B Receiving System, Main Chassis, Schematic Diagram.

1) Change C4 from: 250 μF to: 1100 μF.

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Table 1-1. Type RS-111-1B-12B Receiving System, Specifications

Type of Reception	AM, FM, CW
Frequency Range	30-1000 mc in four bands: Band A, 30-60 mc; Band B, 60-300 mc; Band C, 235-500 mc; Band D, 490-1000 mc
Input Impedance	To operate from 50-ohm source
Noise Figure	Band A, 4 dB max; Band B, ~~6.5~~ 7dB, see Addenda 7.1.75 dB max; Band C, 10 dB max; Band D, 12 dB max
Image Rejection	Band A, 60 dB min; Band B, 50 dB min; Band C, 65 dB min; Band D, 75 dB min
IF Rejection	Band A, 54 dB min; Band B, 80 dB min; Band C, 80 dB min; Band D, 90 dB min
Oscillator to Antenna Conduction	Band A, 15 μV max; Band B, 15 μV max from 60-260 mc and 25 μV max from 260-300 mc; Band C, 8 μV max; Band D, 75 μV max
IF Bandwidths	Four total, two operating simultaneously: 2 mc and either 20 kc, 75 kc, or 300 kc selectable from front panel
Band A and Band B Sensitivity	
20-kc Bandwidth	AM: 1 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 2 μV input, modulated at 1 kc with 7-kc deviation, produces 21 dB (s plus n)/n min
75-kc Bandwidth	AM: 2 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 3 μV input, modulated at 1 kc with 25-kc deviation, produces 21 dB (s plus n)/n min
300-kc Bandwidth	AM: 4 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 6 μV input, modulated at 1 kc with 100-kc deviation, produces 21 dB (s plus n)/n min
2-mc Bandwidth	AM: 10 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 12 μV input, modulated at 1 kc with 750-kc deviation, produces 21 dB (s plus n)/n min
Band C and Band D Sensitivity	
20-kc Bandwidth	AM: 2 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 4 μV input, modulated at 1 kc with 7-kc deviation, produces 21 dB (s plus n)/n min
75-kc Bandwidth	AM: 8 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 6 μV input, modulated at 1 kc with 25-kc deviation, produces 21 dB (s plus n)/n min
300-kc Bandwidth	AM: 8 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 8 μV input, modulated at 1 kc with 100-kc deviation, produces 21 dB (s plus n)/n min
2-mc Bandwidth	AM: 22 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 24 μV input, modulated at 1 kc with 750-kc deviation, produces 21 dB (s plus n)/n min
Band A and Band B Output Stability	
20/75/300-kc Bandwidths	AM: Output varies less than 3 dB for input range of 2 to 10,000 μV. FM: Output varies less than 2 dB for input range of 1.5 to 10,000 μV.
2-mc Bandwidth	AM: Output varies less than 4 dB for input range of 4 to 10,000 μV. FM: Output varies less than 4 dB for input range of 4 to 10,000 μV
Band C and Band D Output Stability	
20/75/300-kc Bandwidths	AM: Output varies less than 4 dB for input range of 4 to 10,000 μV. FM: Output varies less than 2 dB for input range of 3 to 10,000 μV
2-mc Bandwidth	AM: Output varies less than 4 dB for input range of 8 to 10,000 μV. FM: Output varies less than 4 dB for input range of 8 to 10,000 μV

Table 1-1. Type RS-111-1B-12B Receiving System, Specifications (Continued)

Outputs from 20/75/300-kc Bandwidth	
Audio Amplifier Response	Within 3 dB from 100 cps to 20 kc
Audio Output Power	0.1 watt, min, into 600-ohm load, balanced or unbalanced
Video Amplifier Response	Within 3 dB from 50 cps to 150 kc
Video Output Level	5 volts rms across a 10 kΩ load
Narrow Band AM Video Output	100 mV, rms across 1 MΩ unbalanced load
Outputs from 2-mc Bandwidth	
FM Video Amplifier Response	Within 3 dB from dc to 200 kc
AM Video Amplifier Response	Within 3 dB from 30 cps to 1 mc
FM Video Output Level	0.5 volt rms across a 93 Ω load
AM Video Output Level	0.5 volt rms across a 93 Ω load
Fine Tuning	Operates on all bands
Beat Frequency Oscillator	Operates in CW mode on either 20, 75, or 300-kc bandwidths
Meter	Signal strength
Local Oscillator Outputs:	
Band A and Band B	30-300 mc, 50 mV minimum into 50-ohm load
Band C and Band D	235-1000 mc, 50 mV minimum into 50-ohm load
Frequency Display Section	
Sweep Linearity	Within 5% of sweep width
Sweep Width	Continuously adjustable from 0 to 3 mc
Sensitivity for Full Deflection	2.5 μV input to receiver
Resolution	Using approximately 100-kc sweep width, two signals 20 kc apart will be displayed with at least 6-dB valley between the peaks
Power Input	115/220# Volts ac, 48-420 cps
Power Consumption	45 watts, approximately
Weight	35 lbs., approximately
Size	5.25 inches high x 19 inches wide x 14.7 inches deep*

115/230 Volts with internal wiring change.

* Measured from back of front panel to rear panel.

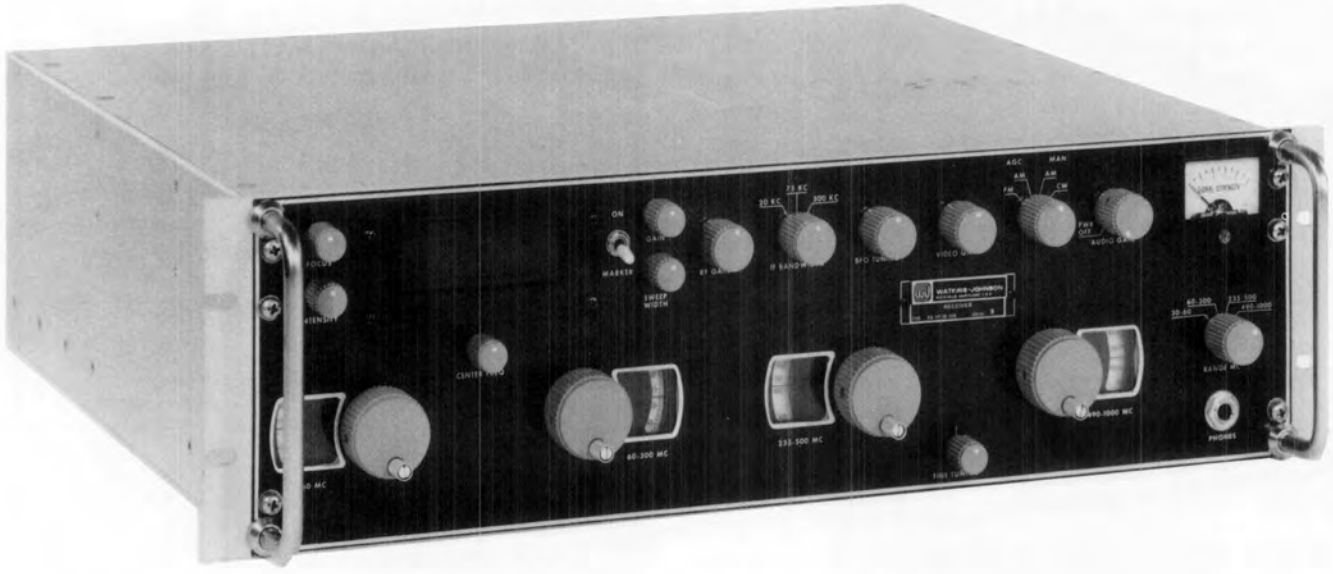


Figure 1-1. Type RS-111-1B-12B Receiving System

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL DESCRIPTION

The RS-111-1B-12B Receiving System provides AM, FM, and CW reception including a visual spectrum display over the 30 to 1000-mc frequency range in four bands: 30-60 mc, 60-300 mc, 235-500 mc, and 490-1000 mc. Switching of these four tuners is controlled by the RANGE switch on the front panel. A digital automatic frequency control (DAFC) circuit provides the capability of stabilizing these tuners to within ±1 kc by use of an external frequency counter. A single FINE TUNING control provides fine frequency adjustments for the operating tuner when the DAFC is not used. Two IF amplifiers are operating at all times. One is a 2 mc-bandwidth amplifier which provides simultaneous AM and FM video outputs. The other IF amplifier provides either 20 kc, 75 kc, or 300 kc bandwidth, depending on the setting of the front-panel IF BANDWIDTH switch. Predetection outputs are available from both these sources. From the 20/75/300-kc bandwidth IF amplifier, either an AM or FM video output also is available depending on the setting of the front-panel function switch. In either case, audio is available at a 600-ohm audio output and a headphone jack. The 20/75/300-kc bandwidth IF amplifier contains a beat frequency oscillator (bfo) which operates in the CW position of the function switch in all three bandwidths. A signal monitor, which is an integral part of the receiving system, provides the visual signal display. Center frequency indication is available for tuning when a 21.4 mc marker is turned on. Pertinent specifications for the RS-111-1B-12B are included in Table 1-1.

1.2 MECHANICAL DESCRIPTION

The RS-111-1B-12B Receiving System is packaged in a cabinet which is 5.25 inches high, 19 inches wide, and 15.5 inches deep. The unit weighs approximately 35 pounds.

1.2.1 Front Panel Features. - Refer to Figure 1-1 or 5-1 for a view of the front panel. There are four tuning dials and knobs: 30-60 mc, 60-300 mc, 235-500 mc, and 490-1000 mc. Variable controls include: FINE TUNING, RF GAIN, VIDEO GAIN, BFO TUNING, and the AUDIO GAIN control which has the PWR OFF switch ganged with it. Other switches include: Function, RANGE MC, and IF BANDWIDTH. Also located on the front panel are the PHONES jack and the SIGNAL STRENGTH meter. Controls for the signal monitor are grouped around the crt screen which is located towards the top left of the front panel. These controls include GAIN, SWEEP WIDTH, CENTER FREQ, INTENSITY, and FOCUS. The MARKER ON-OFF switch for the signal monitor is located immediately to the right of the CRT screen.

1.2.2 Rear Apron Features. - Input and output connections are made on the rear apron. Refer to Figure 5-2 for their locations and other features of the rear apron. AUDIO output is available at terminal strip TB1. Type N connectors are: 30-500 MC INPUT J1, 490-1000 MC INPUT J2, 30-300 MC LO OUTPUT A13J3, and 235-1000 MC LO OUTPUT A14J3. The remaining connectors are BNC-type and are marked as follows: FM VID OUTPUT J3, NB IF OUTPUT J2, AM-FM-VID OUTPUT J4, and AM VID OUTPUT J5. Also accessible on the rear apron are two ac line fuses and the 115 V/220 V power switch S4.

1.2.3 Assemblies. - Sixteen major assemblies are used in the receiver. One of these, the 490-1000 mc tuner, is constructed on a steel chassis. Nine other assemblies are constructed on plated brass chassis. These are: the three additional tuners, the signal monitor, the 60-21.4 mc converter, the 2-mc IF amplifier, the 20/75/300-kc IF amplifier, and the two identical coupling networks. The signal monitor assembly is hinged to the CRT shield which is secured to the rear of the front panel. This arrangement places the assembly above the receiver main deck. Opposite the hinged side of the signal monitor assembly are two posts on which the assembly rests. Two fastening devices lock the assembly to these posts thereby firmly securing the assembly. Depressing the fasteners loosens (or fastens) them and the signal monitor assembly can then be raised to a vertical position thereby providing access to the assemblies underneath. Five subassemblies make up the signal monitor. They are: IF amplifier circuit boards No. 1 and No. 2, the sweep generator, the bandpass filter, and the crystal marker oscillator—which is an aluminum can mounted on the side of the main assembly. Six of the main chassis assemblies are printed circuit boards. Three of these plug into connectors on top of the main chassis deck. They are: the video amplifier, the audio amplifier, and the low-voltage power supply regulator. The remaining three printed circuit board assemblies are fastened directly to the main

chassis. On the top side, the high voltage power supply regulator is fastened to the inside of the side panel. On the bottom side, near the rear panel, the agc monitor amplifier and the afc amplifier are fastened.

1.3 EQUIPMENT SUPPLIED

The equipment supplied consists of the Type RS-111-1B-12B Receiving System and a Watkins-Johnson, Gaithersburg, No. 16653 cable. This cable is for interconnection with a companion frequency counter.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

The RS-111-1B-12B operates independently, requiring only antenna inputs and a speaker or headphones at its output. Additionally, a frequency counter such as Watkins-Johnson Type DRO-309A or DRO-333 may be used to display the tuned frequency and provide DAFC.

Table 1-2. Type RS-111-1B-12B Receiving System, Tube and Transistor Complement

Ref. Desig.	Type	Function
	Main Chassis	
Q1	2N1544	Voltage Regulator
	30-60 mc-Tuner	
A1V1	6CW4	RF Amplifier
A1V2	6CW4	RF Amplifier
A1V3	7587	Mixer
A1V4	6CW4	Local Oscillator
	60-300-mc Tuner	
A2V1	8058	RF Amplifier
A2V2	8058	RF Amplifier
A2V3	7587	Mixer
A2V4	6CW4	Local Oscillator
	235-500-mc Tuner	
A3V1	7077	RF Amplifier
A3V2	7077	RF Amplifier
A3V3	7587	Mixer
A3V4	7486	Local Oscillator
	490-1000-mc Tuner	
A4V1	7486	Local Oscillator
A4V2	6CW4	IF Amplifier
A4V3	6CW4	IF Amplifier
	Signal Monitor Chassis	
A5V1	3ASP1	CRT
A5A1Q1	2N3478	Shaping Amplifier
A5A1Q2	2N3478	Shaping Amplifier
A5A1Q3	2N3478	Shaping Amplifier
A5A1Q4	3N128	First Mixer
A5A1Q5	2N3478	Sweep Oscillator
A5A2Q1	2N3478	13-mc IF Amplifier
A5A2Q2	2N3478	14-mc Oscillator
A5A2Q3	2N3478	Second Mixer
A5A2Q4	2N3478	1-mc IF Amplifier
A5A2Q5	2N3478	1-mc IF Amplifier
A5A2Q6	2N3478	1-mc Output Amplifier
A5A3Q1	2N2646	Sawtooth Generator
A5A3Q2	2N2270	Emitter Follower
A5A3Q3	2N4037	Constant Current Generator
A5A3Q4	2N2270	Emitter Follower
A5A3Q5	2N2270	Emitter Follower
A5A3Q6	2N3440	Differential Amplifier
A5A3Q7	2N3440	Differential Amplifier
A5A3Q8	2N2270	Emitter Follower
A5A3Q9	2N2270	DC Amplifier
A5A3Q10	2N4037	DC Amplifier
A5A3Q11	2N2270	Series Regulator
A5A4Q1	2N3478	Crystal Marker Oscillator

Ref. Desig.	Type	Function
	60-21.4-mc Converter	
A6V1	7587	IF Amplifier
A6V2	7587	IF Amplifier
A6V3	7587	Mixer
A6V4	6CW4	Local Oscillator
	2-mc Bandwidth IF Amplifier	
A7Q1	2N2708	IF Amplifier
A7Q2	2N2708	IF Amplifier
A7Q3	2N2708	IF Amplifier
A7A1Q1	2N706	First Limiter
A7A1Q2	2N706	First Limiter
A7A1Q3	2N706	Second Limiter
A7A1Q4	2N706	Second Limiter
A7A1Q5	2N2270	DC Amplifier
A7A1Q6	2N2270	DC Amplifier
A7A1Q7	2N2270	Emitter Follower
A7A2Q1	2N2270	AGC Amplifier
A7A2Q2	2N2270	AGC Amplifier
A7A2Q3	2N2270	Emitter Follower
A7A2Q4	2N2270	Emitter Follower
	20/75/300-kc Bandwidth IF Amplifier	
A8Q1	2N2708	300-kc BW IF Amp
A8Q2	2N2708	75-kc BW IF Amp
A8Q3	2N2708	20-kc BW IF Amp
A8Q4	2N2708	300-kc BW IF Amp
A8Q5	2N2708	75-kc BW IF Amp
A8Q6	2N2708	20-kc BW IF Amp
A8Q7	2N2708	IF Amplifier
A8Q8	2N2708	IF Amplifier
A8Q9	2N697	Emitter Follower
A8Q10	2N697	Emitter Follower
A8Q11	2N697	AGC Amplifier
A8Q12	2N697	DC Amplifier
A8Q13	2N1131	AGC Regulator
A8A1Q1	2N706	First Limiter
A8A1Q2	2N706	First Limiter
A8A1Q3	2N706	Second Limiter
A8A1Q4	2N706	Second Limiter
A8A1Q5	2N2222A	Emitter Follower
A8A1Q6	2N2222A	Emitter Follower
A8A2Q1	2N706	BFO
	Video Amplifier	
A9Q1	2N929	Video Amplifier
A9Q2	2N526	Video Amplifier
	Audio Amplifier	
A10Q1	2N929	Audio Amplifier
A10Q2	2N2270	Driver
A10Q3	2N2270	Power Amplifier

Table 1-2. Type RS-111-1B-12B Receiving System, Tube and Transistor Complement (Cont.)

Ref. Desig.	Type	Function
	CRT Power Supply Regulator	
A11V1	GV3A-1200	Voltage Regulator
	General Power Supply Regulator	
A12Q1	2N2270	Voltage Regulator
A12Q2	2N1038	Voltage Regulator
A12Q3	2N2270	Voltage Regulator
A12Q4	2N2270	Voltage Regulator
A12Q5	2N2270	Voltage Regulator
	AGC Monitor Amp.	
A15Q1	2N929	DC Amplifier
A15Q2	2N3251	DC Amplifier
	AFC Amplifier	
A16Q1	2N929	DC Amplifier

Figure 2-1

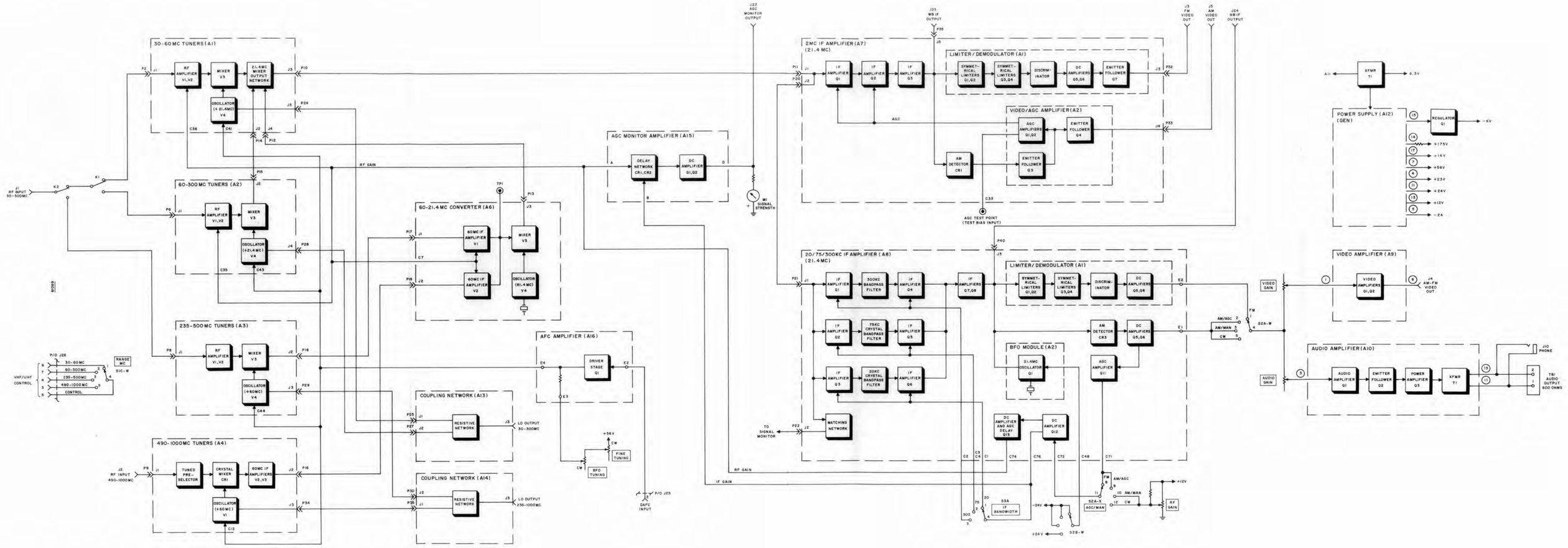


Figure 2-1. Type RS-111-1B-12B Receiving System, Receiving Circuits, Functional Block Diagram

Figure 2-2

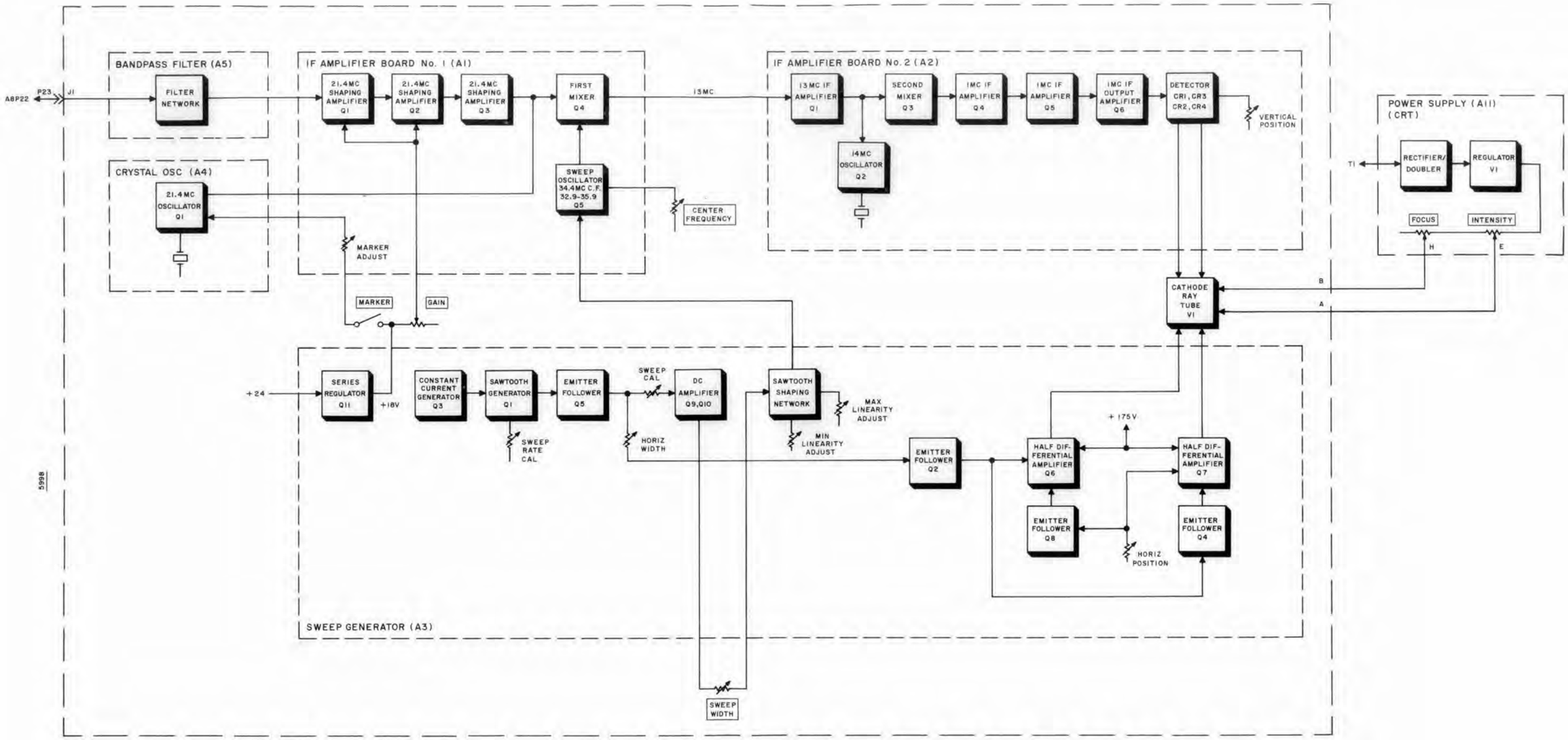


Figure 2-2. Type 79358 Signal Monitor, Functional Block Diagram

SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

An over-all description of the type RS-111-1B-12B Receiving System is presented in the following paragraphs using the functional block diagrams in this section and the schematic diagrams included at the back of the manual. Note that the unit numbering system is used for the electrical components, which means that parts on assemblies and subassemblies of the unit carry a prefix before the usual class letter and number of the item (such as A1R1 and A3C5). These prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

2.2 FUNCTIONAL DESCRIPTION

The RS-111-1B-12B has rf inputs for two frequency ranges: 30-500 mc (J1) and 490-1000 mc (J2). Signals from the 30-500 mc input are routed through K2 to either 235-500 mc tuner A3 or to relay K1. Relay K1 routes the signals to tuner A1 (30-60 mc) or A2 (60-300 mc). The two relays are controlled by front panel RANGE MC switch S1. Signals for the 490-1000 mc tuner (A4) are routed directly from input jack J2. Although not shown on the functional block diagram, power to energize the desired tuner is controlled by the RANGE MC switch.

2.2.1 Signals for the 490-1000 mc tuner are routed from rear panel jack J2 to jack J1 on the tuner via coaxial cable. Input signals applied to A4J1 couple to a tuned preselector stage in the tuner. Signals from the tuned preselector are combined in the crystal mixer with an injection signal from oscillator stage V1. This oscillator always operates 60 mc higher in frequency than the signals from the tuned preselector. A portion of the oscillator signal is coupled through jack J3 to coupling network A14. The 60 mc difference frequency from the crystal mixer is amplified by tubes V2 and V3 before being coupled through output jack A4J2. The 60 mc output signal is routed to input jack J2 of the 60-21.4 mc converter (A6).

2.2.2 Signals for the 235-500 mc tuner (A3) are routed from relay K2 to tuner input jack J1. Signals entering the tuner are amplified by RF amplifiers V1 and V2 before being combined with the local oscillator in mixer stage V3. Oscillator stage V4 operates 60 mc higher in frequency than the signals from the RF amplifiers. A portion of the oscillator signal is applied to coupling network A14. The 60 mc difference signals from the mixer are coupled through output jack J2 to the 60-21.4 mc converter (A6).

2.2.3 The converter contains two identical 60 mc input stages. Signals from the 235-500 mc tuner and the 490-1000 mc tuner enter the converter at jacks J1 and J2 respectively. Although not shown on the functional block diagram, the RANGE MC switch energizes the proper stage for the tuner in use. If neither one of these tuners has been selected the converter is disabled. The 60 mc output from either stage V1 or stage V2 is coupled to mixer stage V3. The 60 mc input to V3 is combined with an 81.4 mc signal from crystal controlled oscillator stage V4. The 21.4 mc difference frequency output from J3 is coupled to J4 of the 30-60 mc tuner (A1).

2.2.4 When the 60-300 mc tuner (A2) is selected by the RANGE MC switch, signals from the 30-500 mc rf input jack (J1) are routed through relays K1 and K2 to tuner jack J1. Signals from J1 in the range of 60-300 mc are amplified by tubes V1 and V2 before being combined with the local oscillator signal in mixer stage V3. This oscillator stage operates 21.4 mc higher in frequency than the signals from the rf amplifiers, V1 and V2. Also, a portion of the local oscillator signal is coupled through output jack J4 to coupling network A13. The 21.4 MHz difference signals from mixer stage V3 are routed through output jack J2 to the 30-60 tuner.

2.2.5 There are three rf inputs to the 30-60 mc tuner (A1); however, only one of these is an antenna input. When this tuner is selected by the RANGE MC switch, signals from the 30-500 mc rf input jack (J1) on the rear panel of the receiver are routed through relays K1 and K2 to tuner jack J1. Signals from J1 in the range of 30-60 mc are amplified by tubes V1 and V2 before being combined with the local oscillator signal in mixer stage V3. Oscillator stage V4 operates 21.4 mc higher in frequency than the signals from the rf amplifiers, V1 and V2. Also, a portion of the oscillator signal is coupled through output jack J5 to coupling network A13. The 21.4 mc difference signals from mixer V3 are coupled to the 21.4 mc mixer output network, from which

signals are routed to output jack J3. The other two rf inputs to the 30-60 mc tuner also couple into this output network. Input jack J4 receives 21.4 mc signals from jack J3 of the 60-21.4 mc converter (A6) when either tuner A3 or A5 is activated. The remaining rf input to the tuner is jack J2. This input accepts 21.4 mc signals from the mixer output jack (J2) of the 60-300 mc tuner when this tuner is activated. Therefore, the 21.4 mc IF output network of A1 receives the output from the mixer stages in the 30-60 mc tuner, 60-300 mc tuner and 60-21.4 mc converter, depending on the setting of the RANGE MC switch. This network provides impedance transformation to match the output of the tuners to the input of the IF amplifiers.

2.2.6 The 21.4 mc IF output from jack J3 of the 30-60 mc tuner is distributed to three assemblies. From J3 the signals are routed to input jack J1 of the 2 mc IF amplifier, A7. A portion of the signal to this IF amplifier is routed back out of the module through output jack J2 to the 21.4 mc input jack (J1) of the 20/75/300-kc IF amplifier (A8). A portion of the 21.4 mc signals entering this IF amplifier are routed through a matching network to output jack J2. From J2, the signals are routed to input jack J1 of the signal monitor assembly (A5). These three assemblies—the signal monitor, the 20/75/300-kc IF amplifier, and the 2 mc IF amplifier—receive 21.4 mc signals simultaneously.

2.2.7 The 2 mc IF amplifier provides three stages of amplification for the 21.4 mc IF entering at jack J1. These amplified signals from Q3 are routed to three circuits. A portion of the amplified IF is routed through output jack J5 to the wide band IF output (WB IF OUTPUT) jack, J23. A second portion of the IF is coupled to am detector stage CR1. The detected output from CR1 is coupled to emitter follower stage A2Q3, located on the Video/AGC amplifier circuit board (A2). The output of A2Q3 is coupled to two stages. A portion of the voltage is routed to agc amplifier stage A2Q1-A2Q2. A convenient test point from this stage is routed to the assembly exterior by way of feedthrough capacitor C33. This test point can be used to apply a fixed bias for test and alignment purposes. The remaining output of emitter follower stage A2Q3 drives emitter follower stage A2Q4. The output of this stage is routed through jack J4 to the AM Video Output jack, J5. The remaining portion of rf signals from IF amplifier stage Q3 couple to symmetrical limiter stage A1Q1-A1Q2 on the limiter/demodulator board. This stage in turn is coupled to symmetrical limiter stage A1Q3-A1Q4. These two limiter stages remove amplitude variations from the 21.4 mc IF passing through them. The output from limiter stage A1Q3-A1Q4 is applied to the discriminator stage which demodulates fm signals and applies them to dc amplifier stage A1Q5-A1Q6. The video signal from the dc amplifier stage is coupled to emitter follower stage A1Q7. The output of this stage is routed through output jack J2 to fm video output jack J3 located on the rear apron of the receiver.

2.2.8 Signals entering the 20/75/300-kc IF amplifier at jack J1 are routed to three IF stages. All three paths are similar, each containing two IF amplifiers separated by bandpass filters. The circuits in two paths are disabled by the IF BANDWIDTH switch while the circuits in the third path are activated, depending on whether this switch is placed in the 300 KC, 75 KC, or 20 KC position. The bandpass filter in the 300 kc bandwidth path is a conventional LC circuit. Crystal filters are used in the 75 kc and 20 kc paths. Signals from the path in operation receive additonal amplification in stage Q7-Q8. The amplified signals from this stage are routed to three circuits. A portion is routed through jack J3 to narrow band IF output (NB IF OUTPUT) jack J24. The other two portions connect to fm limiters and to an am detector stage.

2.2.9 Limiter/Discriminator subassembly A1 receives a portion of the amplified IF. Signals entering this subassembly are applied to symmetrical limiter stage Q1-Q2. This stage in turn is coupled to symmetrical limiter stage Q3-Q4. These two limiter stages remove amplitude variations from the 21.4 mc IF passing through them. The output from limiter stage Q3-Q4 is applied to the discriminator stage which demodulates fm signals and applies them to dc amplifier stage Q5-Q6. From this stage, the demodulated signals are routed through E2 to the fm contact of the (MODE) switch. The third portion of IF output from amplifier stage Q7-Q8 is routed to am detector stage CR3. The detected output from CR3 is applied to dc amplifier stage Q9-Q10. The output of this stage is routed to mode switch section S2A W and agc amplifier Q11. Thus, either am video or fm video signals from pin 4 (common) of the mode switch are routed to the video amplifier (A9) and the audio amplifier (A10). The second portion of detected signal from am detector stage CR3 is coupled to agc amplifier Q11. The agc amplifier output voltage is routed through feedthrough capacitor C71 to the fm and am/agc contacts of mode switch section S2A X. Contacts 10 and 12 of this switch (AM MAN and CW, respectively) are supplied with voltage from the RF GAIN control located on the front panel. When the mode switch is in the FM or AM/AGC positions, the voltage from agc amplifier Q11 is routed back into the IF assembly through feedthrough capacitor C72. The voltage entering the assembly at C72 is routed to dc amplifier stage Q12. A portion of the output voltage from this stage is routed out of the assembly through

feedthrough capacitor C76. The voltage from C76 is routed to input B of the agc monitor amplifier (A15) and to contact 4 of IF BANDWIDTH switch S3A, mounted on the front panel. Selection of either 20, 75, or 300 kc routes the voltage back into the IF assembly through feedthrough capacitors C1, C3-C4, or C2. Voltage from these capacitors supply gain control voltage to the 20 kc, 75 kc, and 300 kc IF amplifiers, respectively. The dc amplifier (Q12) also provides a portion of its output to dc amplifier and agc delay stage Q13. The output of this stage is routed by way of feedthrough capacitor C74 to four other assemblies: agc amplifier A15, 30-60 mc tuner A1, 60-300 mc tuner A2, and 60-21.4 mc converter A6.

2.2.10 Video from the arm of mode switch section S2A W is applied through the VIDEO GAIN and AUDIO GAIN controls to the video and audio amplifiers, A9 and A10 respectively. Signals entering the video amplifier at pin 1 are amplified by Q1 and Q2 before being routed through pin 8 to AM-FM VIDEO OUT jack J4.

2.2.11 Signals entering the audio amplifier at pin 3 are amplified by Q1 before being coupled to emitter follower stage Q2 which drives the power amplifier stage, Q3. The power amplifier output is applied to transformer T1, the output impedance of which is 600 ohms. This 600 ohm output is routed by way of pins 11 and 13 to terminal strip TB1 (AUDIO output 600 ohms) located on the rear apron and to the PHONES jack located on the front panel.

2.2.12 Coupling network assemblies A13 and A14 are identical. The first (A13) receives local oscillator signals from either the 30-60 mc tuner at J1 or the 60-300 mc tuner at J2, if one or the other tuners is in operation. Coupling network A14 receives local oscillator signals from the 235-500 mc tuner at J1 or the 490-1000 mc tuner at J2, if one or the other tuners is in operation. The output of A13 is J3. It is accessible on the rear apron of the receiver and is labeled LO OUTPUT 30-300 MC. The output of A14 is J3. It too is accessible on the rear apron of the receiver and is labeled LO OUTPUT 235-1000 MC.

2.2.13 AFC amplifier circuit board A16 provides FINE TUNING, BFO TUNING, and afc tuning voltage for the four tuners. Because the bfo is crystal controlled, local oscillator frequency in the operating tuner must be varied to provide a pitch change in the cw -audio signal. There are two inputs to the afc amplifier. Positive FINE TUNING and BFO TUNING voltage couples to E3 of the afc amplifier. Positive afc (dafc) voltage from pin 2 of rear apron connector J25 is routed to pin E2 of the afc amplifier. A voltage variation at either one of these two inputs changes the output voltage of the driver stage; however, if a dafc voltage is present, any voltage variation on the FINE TUNING/BFO TUNING input will be opposed by the afc/dafc voltage until it is finally pulled out of range. Voltage from driver stage Q1 is routed to the four oscillator stage inputs of the tuner--A1C41, A2C43, A3C44, and A4C12.

2.2.14 Signal monitor assembly A5 consists of the cathode ray tube (crt) and five subassemblies. These subassemblies are: IF amplifier board no. 1 (A1), IF amplifier board no. 2 (A2), sweep generator (A3), crystal oscillator (A4) and the bandpass filter (A5). The operation of the signal monitor can be summarized as follows: Signals centered near 21.4 mc are applied to the 1st mixer stage (A1Q1), Also coupled to the 1st mixer is a frequency from sweep oscillator A1Q5 that varies from 32.9 mc to 35.9 mc. The output of the mixer is coupled to IF amplifier A2Q1 which accepts only signals very close to 13 mc. As the sweep frequency applied to the 1st mixer increases from 32.9 mc to 35.9 mc, it beats in turn with each signal in the range of 19.9 mc to 22.9 mc to produce difference signals at 13 mc. Each one of these 13 mc signals is ultimately detected and applied to the vertical deflection plates of the crt. To have these detected vertical signals presented on the crt screen corresponding to the original signals present in the range of 19.9 mc to 22.9 mc, the horizontal plates of the crt must be sweep in relation to the sweep of 1st mixer A1Q4. This relationship is established by having sawtooth generator A3Q1 provide the sweep voltage for the sweep oscillator (A1Q5) and the sweep voltage for the horizontal plates of the crt. This synchronization provides a visual display on the crt corresponding to the input signals centered on 21.4 mc coupled to the signal monitor input. The following paragraphs contain a stage by stage description of the signal monitor circuits.

2.2.15 Signals enter the signal monitor assembly at jack J1 and are applied to bandpass filter circuit board A5. Its filter network has a virtually flat bandpass of 8 mc centered at 21.4 mc which aids in the rejection of the image frequency signals and the 13 mc first IF interference signals.

2.2.16 From the bandpass filter, signals are coupled to IF amplifier board no. 1 (A1). Signals entering this circuit board are amplified by three 21.4 mc shaping amplifier stages (Q1, Q2, and Q3). The gain of stages Q1 and Q2 is controlled by the front panel GAIN control. The three stages provide an overcoupled response

(dipped in the center) that combines with the peaked mixer response of the associated tuner to establish an overall response bandwidth of 3 mc at the 3 dB points. Signals from the shaping amplifiers are coupled to the 1st mixer stage (A1Q4).

2.2.17 Sweep oscillator stage A1Q5 also couples to 1st mixer A1Q4. The sweep oscillator operates on a center frequency of 34.4 mc. The sweep oscillator frequency is made to vary by the application of a sawtooth waveform from sweep generator circuit board A3. This sawtooth waveform causes the sweep oscillator to vary above and below its center frequency. The Sweep Rate Calibrate control determines the rate at which the oscillator is swept across its frequency range. The front-panel SWEEP WIDTH control determines the deviation from center frequency. With this control at its maximum sweep-width setting, the sweep oscillator varies from 32.9 mc to 35.9 mc then quickly reverts to just below 32.9 mc for the next sweep. This 3 mc sweep width provides complete coverage of the 3-mc input band. As the oscillator is swept across this frequency range it heterodynes with the input signal in the first mixer. When an input signal is 13 mc below the sweep oscillator frequency, an output is produced which is equal to the difference between the input and the sweep oscillator frequencies. For example, a signal at the high frequency end of the input band, 22.9 mc, will beat with the sweep oscillator signal and produce a 13 mc output when the sweep oscillator frequency is 35.9 mc. When the sweep oscillator frequency is 32.9 mc, an input signal at 19.9 mc will produce an output. Since the horizontal movement of the trace on the crt is controlled by the same sawtooth waveform that controls the sweep oscillator, the signals out of the first mixer ultimately appear as vertical pips on the face of the crt which corresponds to their original position in the input spectrum.

2.2.18 The sawtooth waveform originates in the sweep generator module A3. The sawtooth generator, A3Q1, produces a waveform which may be set to any frequency between 5 cps and 25 cps by the sweep rate cal potentiometer. This control is factory adjusted to set the sweep rate at approximately 20 cps. It is used to adjust the output voltage of constant current generator A3Q3 which supplies the sawtooth generator A3Q1. The sawtooth waveform from A3Q1 is coupled through emitter follower A3Q5 to both dc amplifiers A3Q9 and A3Q10 which ultimately drive the sweep oscillator, and to the horizontal amplifier section. The signal from emitter follower A3Q5 is coupled through the sweep calibrate potentiometer, a dc amplifier made up of transistors A3Q7 and A3Q8, the SWEEP WIDTH potentiometer, and the sawtooth shaping network to the sweep oscillator A1Q5.

2.2.19 The sawtooth shaping network modifies the sawtooth waveform to compensate for the nonlinear relation between the voltage applied to the varactor diode modulator in the sweep oscillator and the output frequency of the sweep oscillator. Shaping is necessary to obtain a linear frequency display on the crt over the entire 3 mc bandwidth.

2.2.20 The sawtooth waveform produced by A3Q1 is also used to drive the horizontal deflection plates on the crt. The horizontal deflection voltage is taken from the output of A3Q5 and is coupled through the horizontal width control and emitter follower A3Q2 to a differential amplifier consisting of A3Q6 and A3Q7. Emitter follower stages A3Q4 and A3Q8 provide ac and dc coupling, respectively, between the two differential stages. The use of a 175 V supply and high voltage transistors A3Q6 and A3Q7 permits direct drive of the horizontal deflection plates in the crt. The horizontal position control permits the entire trace to be moved to the left or right.

2.2.21 The 13 mc IF signal from the first mixer is coupled through IF amplifier A2Q1 and applied to the second mixer A2Q3. The output of the crystal-controlled 14 mc oscillator A2Q2 is also applied to the second mixer. The 1 mc difference frequency at the output of the mixer is coupled to IF amplifiers A2Q4 and A2Q5 before being applied to the 1 mc output amplifier A2Q6. This stage drives push-pull voltage doubling detectors A2CR1 through A2CR4. The output from the detectors consists of two equal signals of opposite polarity which are applied to opposing vertical deflection plates in the cathode ray tube.

2.2.22 The gain of the signal monitor is controlled by the front-panel GAIN control which varies the bias on the bases of the first two 21.4 mc shaping amplifiers. Controlling the gain of these stages sets the amplitude of the signal pips on the screen of the crt. The vertical center control, which functions in conjunction with the push-pull detector circuit and 175 V positioning voltage, adjusts the vertical position of the trace on the crt. The MARKER switch activates the 21.4 mc marker oscillator, A4, and results in a pip on the crt screen which represents the center of the signal monitor response. This aids in tuning and in determining the frequency of incoming signals. The marker adjust potentiometer sets the amplitude of the marker pip. The center frequency control varies the bias level on the varactor diode modulator to provide vernier control of the sweep oscillator center frequency.

2.2.23 High voltage for the signal monitor crt is provided by high voltage power supply regulator (A11). This power supply also provides a 175 V output which is applied to the collectors of horizontal amplifiers A3Q6 and A3Q7, and to the vertical deflection circuit for use in positioning the trace vertically. A +48 V output from this module supplies sweep amplifiers A3Q9 and A3Q10. The remaining voltages required for operation of the signal monitor are supplied by A12, the receiver power supply regulator (GEN). Both are designed to operate from primary power source of 115/220 (230) V ac, 48-420 cps.

2.3 TYPE 71292 30-60 MC TUNER

The Type 71292 tuner covers the 30 to 60 mc range. The tuner schematic is shown in Figure 6-1; the reference designation prefix is A1.

2.3.1 RF Amplifier. - The rf amplifier consists of two Nuvistor triodes, V1 and V2, in a cascode amplifier configuration. Input tuning is accomplished by inductor L2A, one section of a four-section Inductuner, in the grid circuit of V1. Output tuning is accomplished by Inductor L2B, another Inductuner section, in the plate circuit of V2. Neutralization is achieved by coupling a small out-of-phase signal from the plate to the grid of V1 through broadband transformer T1. To extend the dynamic range of the receiver, the rf amplifier signal handling capability is improved by application of a delayed gain control voltage. This voltage is derived in the 20/75/300-kc IF amplifier and coupled to the grid of V1 through resistors R2 and R3.

2.3.2 Local Oscillator. - The local oscillator, V4, is a Nuvistor triode operated in a Colpitts configuration with the plate at rf ground. The tank circuit is tuned by inductor L2D, a section of the Inductuner. Positive dc voltage applied at C41 couples through R20 to varactor CR1. Varying the voltage applied to this device changes its capacitance thereby changing the oscillator frequency. The frequency of operation is maintained 21.4 mc above the carrier. The output of the oscillator is coupled to the grid of the mixer through capacitor C18 and to the local oscillator output jack through capacitor C44.

2.3.3 Mixer. - The mixer, V3, is a Nuvistor tetrode with its input circuit tuned by Inductuner section L2C. Both the signal from the RF amplifier and the output of the local oscillator are applied to the grid of the mixer. The two signals are mixed to produce a 21.4 mc IF. Test point TP1 can be used to check oscillator injection and also to check rf alignment by means of an oscilloscope. This test point provides a dc voltage by means of grid leak detection. The mixer output is a plate circuit pi-network formed by capacitor C22 as one leg and variable inductor L5 and the mixer plate capacitance plus cable capacitance as the other leg. This network also serves as the mixer output network for the 60-21.4 mc converter mixer and the 60-300 mc tuner mixer. The common output to the IF amplifier is taken through coupling capacitor C24 and jack J3.

2.4 TYPE 71293 60-300 MC TUNER

The type 71293 tuner covers the frequency range of 60 to 300 mc. It contains an rf amplifier, mixer, and local oscillator stage. A schematic diagram of the tuner is included as Figure 6-2; the reference designation prefix is A2.

2.4.1 RF Amplifier. - The tuner employs Nuvistor triodes, V1 and V2, in a cascode configuration as the rf amplifier. The input to the tuner is applied through jack J1. The input is tuned by inductor L1A, one section of a four-section Inductuner. The amplifier is neutralized by the use of a bridge arrangement which balances the plate-to-grid capacitance of V1. The arms of the bridge are: capacitor C3, the combination of capacitors C4 and C5, the input capacitance of V1, and the plate-to-grid capacitance of V1. The gain of the rf amplifier is varied by a delayed gain control voltage which is derived in the 20/75/300-kc IF amplifier and applied to the stage through resistor R3.

2.4.2 Local Oscillator. - Nuvistor triode V4 is the oscillator tube. The tank circuit for this stage is split. Capacitor C26 in the grid circuit and capacitor C29 in the plate circuit form half the tank. Inductors L11, L9, and L10 comprise the other half along with Inductuner section L1D which is in parallel with L9. This Inductuner section provides tuning across the band. Varactor CR1 couples into the circuit at the tap on L10. As the voltage applied to this diode changes, its capacitance changes, thereby retuning the tank circuit. The tap on L10 also provides an out-of-phase oscillator signal to couple back to the signal path through C23 and C41. This signal cancels oscillator leakage from the grid of the mixer tube, V3, which might leak back through the signal path.

2.4.3 Mixer. - The mixer stage, V3, utilizes a Nuvistor tetrode. The interstage coupling network between the rf amplifier second stage and the mixer input is tuned by inductors L1B and L1C, two sections of the Inductuner. The mixer stage heterodynes the incoming rf signal and the local oscillator signal to produce a 21.4 mc IF signal in the plate circuit. The 21.4 mc signal in the plate circuit is coupled through blocking capacitor C39 and jack J2 to the common IF output network located in the 30-60 mc tuner.

2.5 TYPE 7162 235-500 MC TUNER

The operation of the type 7162 tuner is explained in the following paragraphs. Refer to the schematic diagram, Figure 6-3, and note that the reference designation prefix for this assembly is A3.

2.5.1 RF Amplifier. - The rf amplifier consists of two ceramic triodes, V1 and V2, both in grounded-grid configuration. The nominal input impedance at jack J1 is 50 ohms. The input circuit is a pi-network matching the antenna to the input of the first stage, V1. Interstage coupling and coupling from the second stage to the mixer is by means of double-tuned circuits. Tuning within the rf amplifier is by inductors L3A, L3B, L3C, L3D, and L3E, five sections of a six-section Inductuner. An improvement in stability is obtained by returning the cathode of V1 and V2 to a -6 V regulated source through resistors R1 and R3.

2.5.2 Local Oscillator. - The local oscillator, V4, is a ceramic triode operated in a Colpitts configuration. The tank circuit is tuned by inductor L3F, a section of the Inductuner. The operating frequency is maintained 60 mc above the carrier. Increased frequency stabilization is obtained by the use of a regulated -6.0 volt supply. The oscillator signal is coupled to the low band tuner mixer through capacitor C28. Fine tuning and bfo pitch control are accomplished by a varactor, CR1, which varies the capacitance of the tank circuit. The capacitance of CR1 is controlled by a dc voltage applied through resistors R13 and R15. The level of this voltage is controlled by the afc amplifier, A16.

2.5.3 Mixer. - The mixer, V3, is a Nuvistor tetrode with its input circuit tuned by inductuner section L3E. Both the signal from the rf amplifier and the output of the local oscillator are applied to its grid and the two signals are mixed to produce a 60 mc IF. An oscilloscope can be connected to test point TP1 in the mixer grid circuit to check oscillator injection and also to check the rf response. The mixer output is taken from the tuner and applied to the converter through double-tuned coupling whose primary is inductor L14 and whose secondary is inductor A6L1 in the converter. Capacitor A6C1 established the degree of coupling between L14 and A6L1.

2.6 TYPE 7163 490-1000 MC TUNER

The Type 7163 tuner consists of a preselector, local oscillator, mixer, and two IF amplifiers. The reference designation prefix is A4; The schematic diagram is Figure 6-4.

2.6.1 Quadruple-Tuned Preselector. - The rf input circuit in the 490-1000 mc tuner is designed for a 50-ohm antenna. The signal is coupled from the input to the quadruply-tuned preselector. Tuning is accomplished by four tuned cavities. The signal passes from cavity to cavity through coupling irises. The cavities are resonated to the carrier frequency by changing the capacitance between the inner conductor and ground. This action effectively produces quarter-wave tuning and is analagous to coaxial-line cavity tuning in which the resonant frequency is determined by the position of the plunger. From the fourth cavity, inductor L6 couples the signal to the crystal mixer.

2.6.2 Local Oscillator. - The local oscillator, V1, is a ceramic triode operated as a modified Colpitts oscillator. The tank circuit is a length of transmission line. Capacitor C1E, ganged with the high band tuning control, loads the transmission line so as to make its effective length one-half wavelength at the desired frequency. The oscillator is operated at a frequency 60 mc above the carrier. Increased frequency stabilization is obtained by the use of a regulated -6 V dc filament supply. Fine tuning and bfo pitch control are accomplished by the use of varactor diode CR2, in the same manner used for fine tuning of the other three tuners (see paragraph 2.5.2). The oscillator signal to the crystal mixer is picked up by Inductor L6 whose lower end reaches through a shield into the chamber where the oscillator stage is mounted.

2.6.3 Crystal Mixer. - The mixer, CR1, is a crystal diode. It receives both the incoming carrier and the oscillator injection signal through inductor L6. Jack J4 is present to facilitate checking the oscillator injection

level. The mixer output, a 60 mc IF signal, is applied to the 60 mc IF low-noise amplifier within the tuner.

2.6.4 60 mc IF Amplifier. - To compensate for the lack of gain in the quadruple-tuned preselector, the high band tuner has a 60 mc IF amplifier consisting of two triodes, V2 and V3, in cascode configuration. Coupling from the mixer is through inductors L13, L15, and capacitor C21. The first stage is neutralized by inductor L16. The output from the amplifier is through a double-tuned circuit, the primary of which is inductor L17 and the secondary of which is inductor A6L2 located in the 60-21.4 mc converter. Capacitor A6C2 fixes the degree of coupling between L17 and A6L2.

2.7 TYPE 7120 60 - 21.4 MC CONVERTER

The Type 7120 converter contains 60 mc IF buffer amplifiers, a mixer, and an 81.4 mc crystal-controlled oscillator. Figure 6-11 is the schematic diagram of the converter, A6 is the reference designation prefix.

2.7.1 60 mc IF Amplifiers. - The converter uses Nuvistor tetrodes (V1 and V2) to amplify the incoming 60 mc signal from the 235-500 mc tuner or the 490-1000 mc tuner. Tube V1 operates in conjunction with the 235-500 mc tuner and tube V2 with the 490-1000 mc tuner. As the RANGE control switches the source voltages to the tuners, it also switches B-plus to these two stages in the converter. Plate voltage for V3 and V4 is supplied through CR1 or CR2, one of which is forward biased by the voltage applied to C8 or C11. The output from the stage in operation is applied through double-tuned coupling (L3 and L4) to the grid circuit of the mixer stage.

2.7.2 81.4 mc Oscillator. - The oscillator in the converter, V4, is a Nuvistor triode. It is crystal controlled and operates at 81.4 mc

2.7.3 Mixer and IF Output Network. - The mixer stage employs a Nuvistor tetrode. The 81.4 mc output from the oscillator is coupled to the control grid of the mixer through capacitor C21. The mixer heterodynes this signal with the 60 mc incoming IF signal to produce a 21.4 mc second IF. The output from the plate of the mixer is taken through capacitor C29 to the common IF output network located in the 30-60 mc tuner.

2.8 BANDSWITCHING

Bandswitching is accomplished by switching the dc voltage sources to the tuners and the converter (see Figure 6-21). The RANGE switch, S1, is divided into five sections. Four of these five sections control the lamps behind the tuning dials, the coaxial relays which switch the tuner inputs, and the power supply voltages to the tuners and the converter. The fifth section, S1C-W, consists of four switchable and one common contact all of which are routed to jack J25 located on the rear apron of the receiver. This provides for switching of presets on an associated counter.

2.9 Type 7120 20/75/300-KC BANDWIDTH IF AMPLIFIER

The circuits in the 20/75/300-kc bandwidth IF amplifier are explained in the following paragraphs using the schematic diagram, Figure 6-13. Parts in this IF amplifier carry the reference designation prefix A8. The 21.4 mc input is connected to the IF amplifier through input jack J1. An impedance matching network consisting of resistors, R1, R2, and R3 couples the input signal to the SM output jack J2. The IF BANDWIDTH switch determines if the signal is passed through the 300 kc, 75 kc, or 20 kc bandpass amplifiers by supplying base bias from the agc amplifier to the IF amplifiers for the selected bandwidth.

2.9.1 300-kc Bandwidth IF Amplifiers. - Transistors Q1 and Q4 are the first and second IF amplifiers for the 300 kc bandwidth. The bandwidth is determined by the interstage coupling between Q1 and Q4, a double-tuned, over-coupled network. The tuned circuit in the collector of Q1, consisting of C22, C23, and L4, has the junction of C22 and C23 grounded to provide a signal voltage at the junction of C23 and L4 which is out of phase with the input signal. This voltage is coupled back to the base of Q1 through C14 to neutralize the stage. This same method of neutralization is used by the second IF amplifier, Q4. The gain of both stages is controlled by either the agc amplifier, when the function switch is in the FM or AM/AGC positions; or by the RF GAIN control, when the function switch is in AM/MAN or CW positions. Placing the IF BANDWIDTH switch in the 75 KC position removes the base bias from both Q1 and Q4, disabling these stages.

2.9.2 75 kc and 20 kc Bandwidth IF Amplifiers. - Transistors Q3 and Q6 are the first and second IF amplifiers

for the 20 kc bandwidth. The 20 kc bandpass is determined by crystal filter FL2 in the coupling network between Q3 and Q6. The tuned collector load of Q6 is shared with Q5 and Q4. Neutralization of Q6 is accomplished by feeding back an out-of-phase signal from the junction of C43 and L9 through C44 to the base of the transistor. Neutralization of A3 is not necessary as the heavy loading of the crystal filter in the collector circuit insures that oscillation will not occur. Operation of the 75 kc bandwidth path is identical to the operation of the 20 kc path. The 75 kc section includes stages Q2 and Q5 and filter FL1.

2.9.3 Third and Fourth IF Amplifiers. - The third and fourth IF amplifier, Q7 and Q8, are common to all three IF bandwidths. Double-tuned, over-coupled networks are used to connect the stages and also at the output circuit of Q8. Both transistors are neutralized using the same method described for the 300 kc IF amplifiers. The output of Q8 is coupled to the am detector, CR3, and through a capacitive voltage divider to the fm demodulator.

2.9.4 AM Detector and Output. - The 21.4 mc signal from the fourth IF amplifier is applied to the am detector, CR3. Capacitors C65 and C68, and resistor R55 form a filter to eliminate the rf signal components from the output of the detector. The audio-video output from the detector is coupled through cascaded emitter followers Q9 and Q10 to the agc amplifier, and to the am video output pin which provides the signal to section S2B of the function switch and to rear apron jack, J17, NB AM Video output. Series-connected silicon diodes CR1 and CR2 are used to compensate for the voltage drop across the base-emitter junction of silicon transistors Q9 and Q10. This configuration is included so that the AM video output will be zero volts with no signal input. Resistor R54 connects CR1 and CR2 to the plus 12-volt supply. Thus the junction of R54 and CR1 is clamped at 1.2 volt (0.6 volt drop across each diode). The base of Q9 is clamped at 1.2 volt through resistor R55 which compensates for the 0.6 volt drop across the base-emitter junction of each transistor. Note that the clamp voltage appears at both ends of the am detector, CR3, so that its operation is not affected.

2.9.5 FM Limiters. - The 21.4 mc signal from the IF Amplifiers is coupled to a symmetrical limiter stage, A1Q1 and A1Q2, from a capacitive voltage divider. The incoming signal swings about a dc level of approximately +3 volts, which is established by base-bias resistors A1R1 and A1R2. Similar networks are in the base circuits of A1Q2, A1Q3, and A1Q4. Transistors A1Q1 and A1Q2 share a common emitter resistor, A1R3. Under no-signal conditions the combined emitter currents of the two transistors develop a voltage across A1R3 which approaches +3 volts. When a signal is applied to the base of A1Q1, the positive-going half cycle causes increased conduction through A1Q1 which increases the voltage drop across A1R3. This action causes the collector A1Q2 to move rapidly toward the source voltage level. The negative-going half cycle of the incoming signal reverses the process, reducing the conduction through A1Q1, and increasing the conduction through A1Q2. The base of A1Q2 is held at rf ground potential by capacitor A1C2. Diodes A1CR1, A1CR2, and A1CR3 in the base circuit of A1Q1 prevent large positive-going signals from over-loading the limiter, and large negative-going signals from back biasing the base-emitter junction of A1Q1. If the input signal exceeds approximately 7 volts peak-to-peak, zener diode A1CR2 breaks down and clips positive-going excursions in excess of approximately 4 volts. Negative-going excursions in excess of approximately 4 volts forward bias A1CR3, shorting signal voltage greater than the clipping level to ground. Diode A1CR1 in series with A1CR2 blocks the zener on negative excursions, thereby preventing it from acting as an ordinary diode. Thr first limiter output is coupled to the second limiter through capacitor A1C3. Operation of the second limiter is identical to that of the first.

2.9.6 FM Discriminator and Output. - The FM discriminator is a modified Foster-Seeley circuit. Capacitor A1C5 couples the 21.4 mc signal from the second limiter to a resonant circuit consisting of capacitor A1C7, variable inductor A1L3, and the primary of the discriminator transformer, A1T1, which is tuned to the same frequency. An inductive voltage divider is formed by A1L3 and the primary of A1T1, with only a very small percentage of the limiter output appearing across the transformer primary. Capacitor A1C8 couples the reference voltage to the secondary of A1T1. Capacitive center-tapping of the secondary through A1C9 and A1C10 makes it possible to obtain a high degree of discriminator balance unaffected by coil characteristics or the position of the tuning slug. The fm video output from the discriminator is direct-coupled to cascaded emitter followers A1Q5 and A1Q6. The output from A1Q1 is coupled through section S2B of the function switch to the AUDIO GAIN and VIDEO GAIN controls.

2.9.7 Beat Frequency Oscillator. - The bfo is a subassembly mounted on the IF amplifier. Its reference designation is A8A2. In the cw mode of operation a 21.4 mc signal from the bfo is injected into the am detector through capacitor C64. This signal beats with the IF frequency to produce an audible note. The bfo is placed in operation by the application of +24 volts through switch section S2C on the main chassis. This

+24 volts biases diode CR2 into conduction which in turn applies dc voltage to the collector of transistor Q1. The bfo is a self-regulating Colpitts oscillator. The output signal is derived from the feedback divider circuit consisting of capacitors C1 and C3. With the bfo on, diode CR1 is back biased and has no effect on the circuit. When switch S2C is moved to any position other than the cw position, -24 volts is applied to CR1 and CR2. Diode CR1 is now forward biased and CR2 is back biased. When CR1 is conducting, a short circuit is effectively placed across crystal Y1. If this action were not taken, the crystal would be coupled to the IF amplifier through capacitors C3 and C64. This could cause undesirable effects in the IF response curve. Back-biasing CR2 protects transistor Q1 from having the negative voltage applied to its collector.

2.9.8 AGC Amplifier. - The agc amplifier controls the gain of two of the rf tuners, the converter and the 20/75/300-kc IF amplifier when the function switch is in the FM or AM/AGC position.

2.9.8.1 Input to the agc amplifier is the am video output from the emitter of Q10. Resistor R58 and capacitor C69 form a modulation filter to remove audio variations from the dc component present at the am detector output and at the emitter of Q10. A second modulation filter consists of resistor R62 and capacitor C70 in the collector circuit of Q11. Transistor Q11 is cut-off under no-signal conditions. As the output from the am detector increases in the positive direction, Q11 begins to conduct. The negative-going voltage on the collector is coupled to transistor Q12 through section S2A of the function switch. AGC voltage for the IF amplifier is obtained at the emitter of Q12. With no signal input, this point is approximately +10 volts. As the base of Q12 goes less positive (a result of the collector voltage of Q11 decreasing) the emitter also becomes less positive, thus decreasing the gain of the IF amplifier.

2.9.8.2 AGC voltage for the two tuners (A1 and A2) and the converter (A6) is obtained from the collector of Q13, a PNP transistor. This transistor is biased to saturation until the signal-to-noise ratio at the receiver output reaches approximately 30 dB, thus providing a delayed agc voltage for the tuner. Until this signal level is reached, the tuner agc output at the junction of resistors R66 and R67 is approximately zero and the tuner in use operates at maximum gain. This point is clamped by diode CR4 to prevent it from ever going more positive than 0.5 volts. When the signal-to-noise ratio reaches the proper level, the positive-going collector voltage of Q12 takes control of Q13, biasing it out of saturation. As the input signal strength increases, the collector of Q12 goes more positive, further decreasing the conduction through Q13. This results in the tuner agc voltage increasing in the negative direction from zero volts toward the minus 24 volt supply. Once the tuner agc voltage is obtained, the IF agc voltage remains fairly constant so that the receiver gain is now controlled by the tuner agc for stronger signals.

2.10 TYPE 72121 2 MC BANDWIDTH IF AMPLIFIER

Figure 6-12 is the schematic diagram for the 2 mc IF amplifier. Components in the amplifier carry the reference designation prefix A7. This IF amplifier contains an agc circuit, limiter stages, fm discriminator, and am and fm output stages.

2.10.1 IF Amplifiers. - There are three stages of IF amplification: transistors Q1, Q2, and Q3. The 2 mc IF bandwidth is determined by interstage coupling. Each stage is overcoupled to produce a dip in the over-all IF response curve. This compensates for the peaked output from the 30-60 mc tuner so that the over-all response will be essentially flat over the 2 mc bandwidth. The tuned circuit on the collector of Q1 has the junction of C4 and C5 grounded to provide a signal voltage at the junction of C5 and L2 which is out of phase with that at the input. This voltage is coupled back to the base through capacitor C2 to neutralize the stage. Both the second and third IF amplifiers use this same method of neutralization. The gain of Q1 and Q2 is controlled by A7A2Q2, the agc regulator transistor. Output from the third IF amplifier, Q3, is coupled to am detector CR1, and through a capacitive voltage divider, to the limiter stages.

2.10.2 AM Detector and Output. - Diode CR1 detects the am signal and couples it to emitter follower stage A2Q3. The output of A2Q3 is ac coupled through capacitor A2C2 to a second emitter follower, A2Q4. Transistor A2Q4 provides a low-impedance output through A7J4 to the AM VIDEO output jack, J5, on the rear apron of the receiver.

2.10.3 FM Limiters and Discriminator. - The fm limiter and discriminator circuits are nearly identical to those in the 20/75/300-kc IF amplifier except for component values. For a description of these circuits refer to paragraphs 2.9.5 and 2.9.6. The video output from the Foster-Seeley discriminator is direct-coupled to

cascaded emitter followers A1Q5, A1Q6, and A1Q7 which provide high current amplification to drive a low-impedance load.

2.10.4 AGC Amplifier. - The agc amplifier consists of a dc amplifier, A2Q1, and a series regulator, A2Q2. Input voltage to A2Q1 is obtained from the emitter of A2Q3. Resistor A2R1 and capacitor A2C1 form a filter which removes the modulation from the signal so that A2Q1 is supplied with a dc voltage which varies in proportion to the average level of the input carrier signal. This voltage is amplified by A2Q1 which in turn controls the current flow through A2Q2. The series regulator is connected between the +12-volt supply and the base-bias circuits of the first and second IF amplifier stages. If, for example, the detector output is increasing in the positive direction, the control voltage on the base of A2Q2 goes more negative, reducing the positive base bias on the first and second IF stages. This, in turn, decreases the gain of the IF amplifier. When the average detector output voltage is increasing in the negative direction, the control voltage on the base of A2Q2 goes more positive, resulting in increased IF gain.

2.11 TYPE 7312 VIDEO AMPLIFIER

The Type 7312 video module amplifies either the am or the fm output of the 20/75/300-kc bandwidth IF amplifier, A8. The reference designation prefix for this assembly is A9; a schematic diagram of the amplifier is shown in Figure 6-14. If the function switch is in the FM position, the fm video signal is applied to the VIDEO GAIN and AUDIO GAIN controls. In any of the remaining three function switch positions, the am video signal from the multiple-bandwidth IF amplifier is applied through switch section S2B to the gain controls. The am or fm video signal from the arm of potentiometer R9 enters the video amplifier on pin 1 and is coupled to the base of Q1 through capacitor C1. The video signal is amplified by Q1 and Q2 and coupled to the output through capacitor C2. This signal is present at rear-apron jack J4, marked AM/FM VID OUTPUT.

2.12 TYPE 7400 AUDIO AMPLIFIER

Figure 6-15 is the schematic diagram for this module; its reference designation prefix is A10. The Type 7400 audio amplifier is contained on a separate module and uses three-dc coupled transistors, Q1, Q2, and Q3. The first stage is a conventional current amplifier in a common emitter configuration. The input signal from the AUDIO GAIN potentiometer, R10, is applied to this stage through capacitor C1 and resistor R1. The second stage is an emitter follower used to match the high output impedance of the first stage to the low input impedance of the third stage, the power amplifier. An improvement in stability is obtained by a coupling network between the second and third stages. This coupling circuit consists of capacitor C2 and resistor R8 in parallel. Resistor R7 provides direct signal feedback from the third to the first stage. Resistor R10, in the emitter lead of the output stage, provides additional stability. The output is through transformer T1 which forms the collector load for Q3.

2.13 GAIN CONTROL SYSTEM

The over-all system of gain control used within the receiver sections of the receiving system can be understood using the block diagram, Figure 2-1, or the main chassis schematic diagram, Figure 6-21.

2.13.1 Both delayed and non-delayed gain control voltages are used in the receiver section of the unit. A delay network in the 20/75/300-kc bandwidth IF amplifier provides a delayed gain control voltage which is applied to the 30-60 mc tuner, the 60-300 mc tuner, and the converter (see paragraph 2.9.8). The non-delayed gain control voltage present at the arm of function switch section S2A is used to control the gain of certain stages in the multiple-bandwidth IF amplifier. The 2 mc bandwidth IF amplifier uses an internally developed agc voltage to control the gain of its first and second IF amplifiers.

2.13.2 In the FM or AM/AGC positions of the function switch, an agc voltage derived in the multiple-bandwidth IF amplifier is used for gain control in all receiver sections except the 2 mc bandwidth IF amplifier. In the CW or AM/MAN settings of the function switch, this agc voltage is replaced by a voltage from RF GAIN potentiometer R7.

2.14 TYPE 79358 SIGNAL MONITOR

The Type 79358 signal monitor section of the RS-111-1B-12B receiving system provides a visual display

of the received signal. The input to the signal monitor is the 21.4 mc IF from the tuner in operation. This signal is connected through a resistive pad in the multiple-bandwidth IF strip to jack A5J1 on the signal monitor chassis. Refer to the main chassis schematic diagram, Figure 6-21, and the signal monitor chassis schematic diagram, Figure 6-5, in conjunction with the individual subassembly schematics as necessary during the following paragraphs. The reference designation prefix for the signal monitor is A5.

2.14.1 Bandpass Filter. - The schematic diagram for the type 79326 bandpass filter is Figure 6-10; its reference designation prefix is A5A5. The module contains a three section bandpass filter with a flat bandwidth of 8 mc centered on 21.4 mc. It is included to improve the image rejection of the signal monitor and to reduce signal feedthru of the 13 mc first IF frequency.

2.14.2 IF Amplifier Board No. 1. - The signal monitor IF amplifier is divided into two sections: IF Amplifier Board No. 1 and IF Amplifier Board No. 2. The reference designation prefix for the type 8132 IF Amplifier Board No. 1 is A5A1; its schematic diagram is Figure 6-6. This board contains three shaping amplifiers, the sweep oscillator, and the first mixer.

2.14.2.1 The three shaping amplifiers are stagger-tuned and centered on 21.4 mc. They provide an essentially flat response curve 3 mc wide, when combined with the mixer output response of the tuners. The front-panel mounted GAIN control potentiometer controls the gain of the signal monitor by varying the bias level at the bases of A1Q1 and A1Q2. The incoming signal is coupled through dc-blocking capacitor A1C1 to the base of the first shaping amplifier, A1Q1. Resistor A1R1 provides a low impedance termination for the bandpass filter. The collector circuit of A1Q1 is tuned by variable inductor A1L1. The signal voltage at the junction of A1L1 and A1R8 is out of phase with the input. This signal is coupled back to the base of A1Q1 by A1C2 to neutralize the stage. Resistor A1R5 is a parasitic supressor. The signal from A1Q1 is taken through an impedance matching voltage divider consisting of A1C5 and A1C6. The second and third shaping amplifiers, A1Q2 and A1Q3, are similar to A1Q1. The collector circuit of Q3 is tuned to 21.4 mc. Transistor Q1 is tuned to the high side of the center frequency, and Q2 to the low side. Inductor L3 is heavily loaded by R22 to lower its Q in order to produce a dip in the center of the response through the shaping amplifiers.

2.14.2.2 The sweep oscillator, A1Q5, is basically a Clapp circuit that has its output frequency swept across a maximum range of 3 mc. The oscillator center frequency is 34.4 mc. The frequency is controlled by varactor diode A1CR1, whose capacitance varies inversely with the reverse voltage applied across its terminals. Thus, as the voltage across A1CR1 increases, its capacitance decreases; a decrease in voltage increases the capacitance. The varactor is connected in series with the oscillator tank circuit and controls the oscillator frequency by varying its tank circuit capacitance. The bias voltage for the varactor is obtained from the front-panel CENTER FREQ potentiometer, R3, and is approximately 14.5 volts with the control at midrange. This control is used to set the oscillator center frequency to 34.4 mc. The varying voltage applied to the anode terminal of the varactor is a modified sawtooth waveform. The sawtooth voltage is obtained from the sweep generator module, A3, and is coupled through SWEEP WIDTH control R2 and the sawtooth shaping network located on the same module. This network in effect distorts the linear sawtooth waveform to compensate for the non-linear changes in capacity of the varactor with respect to the applied voltage. By making the sawtooth voltage change at a non-linear rate, the sweep oscillator frequency is made to vary at a linear rate. The output of the sweep oscillator is taken from the junction of A1L6 and A1C25 and coupled through A1C24 to the gate of the first mixer, A1Q4.

2.14.2.3 The first mixer A1Q4 combines the input signal from the shaping amplifiers with the sweep oscillator signal to produce the 13 mc first IF. The mixer utilizes a MOS field-effect transistor (FET). A FET is used to minimize the generation of spurious signals in the mixing process. The IF signal is applied to the source element and the sweep oscillator signal is applied to the gate. The 13 mc first IF is taken from the drain and coupled through a double-tuned, under-coupled network to the base of the 13 mc IF amplifier A2Q1 located on IF amplifier board No. 2.

2.14.3 IF Amplifier Board No. 2. - This board contains a 13 mc IF amplifier, the 14 mc crystal oscillator, the second mixer, two 1 mc IF amplifiers, the output amplifier, and the vertical detectors. The schematic diagram for this module is Figure 6-7; its reference designation prefix is A5A2.

2.14.3.1 The 13 mc output from IF amplifier board No. 1 is coupled to the base of 13 mc IF amplifier A2Q1. The output of A2Q1 is coupled through a second double-tuned network to the base of the second mixer A2Q3.

The double-tuned networks provide the required selectivity at this point in the circuit; however, the resolution of the signal monitor is determined by the selectivity of the 1 mc IF amplifier stages.

2.14.3.2 The 14 mc oscillator, A2Q2, operates in a crystal-controlled Colpitts configuration. Regenerative emitter-to-base feedback to sustain oscillation is through A2R9 to the junction of A2C6 and A2C7 and back to the base. Resistor A2R9 linearizes the sinusoidal output from the oscillator. The output signal is taken from crystal A2Y1 and injected by means of A2C5 into the double-tuned circuit which couples 13 mc IF amplifier A2Q1, and the second mixer, A2Q3.

2.14.3.3 The second mixer, A2Q3, receives both the 13 mc IF signal and the 14 mc oscillator signal at its base. These two signals are mixed to produce the 1 mc second IF. The 1 mc output is coupled through a double-tuned network to the base of the first 1 mc IF amplifier, A2Q4.

2.14.3.4 The 1 mc IF amplifiers, A2Q4 and A2Q5, are narrow band stages providing additional amplification and the selectivity necessary for good resolution. Coupling between these stages is through a double-tuned network. The output from A2Q5 is applied to vertical output amplifier A2Q6.

2.14.3.5 The IF output amplifier, A2Q6, provides drive for the vertical deflection circuits. The stage is tuned to 1 mc by inductor A2L8. The collector of A2Q6 is directly coupled to the push-pull vertical detector circuit made up of diodes A2CR1 through A2CR4. This detector produces two signals of equal amplitude but of opposite polarity. The positive output is taken from A2CR4 and applied through A2R43 to one vertical deflection plate in the CRT; the negative output is taken from diode A2CR3 and coupled through A2R45 to the other vertical deflection plate. Half-wave voltage doubler detector circuits are used to obtain the approximately 26 volts, peak-to-peak, required for one inch of vertical deflection on the CRT. Considering the positive-output circuit, on the negative half-cycles of the input signal, A2CR3 is forward biased so that A2C30 charges to the peak value of the applied voltage less the drop across the diode. The current flow through the capacitor results in the end connected to the diodes being positive with respect to the other end. On the positive half-cycles, A2CR4 is forward biased so that current now flows charging A2C35. Since A2C30 is already charged to almost the peak applied voltage, and since it is in series with the input voltage, its potential is added to the peak value of the applied voltage. Thus, A2C35 charges to the peak value of the applied voltage, less the drop across A2CR4, plus the charge held by A2C30. As a result, the voltage across A2C35 is approximately twice the peak voltage of the applied RF signal, with the end connected to A2CR4 positive with respect to the other end. This positive voltage is taken at the No. 1 output for application to a vertical deflection plate of the crt. Similar circuitry provides a negative output at the No. 2 output. A dc positioning voltage is connected from the wiper of potentiometer A2R42 to the negative deflection plate to provide vertical positioning of the trace on the crt screen.

2.14.4 Sweep Generator. - The Type 8232 Sweep Generator generates and amplifies a recurrent sawtooth waveform which is used to drive the sweep oscillator A1Q5. This module also contains the horizontal sweep amplifier and the sawtooth shaping network, as well as a +18 V regulator circuit and a sweep oscillator reference voltage regulator. The latter two circuits are mounted on this module as a convenience only and serve no function with other circuitry in the module. A schematic diagram for this module appears in Figure 6-8; its reference designation prefix is A5A3.

2.14.4.1 Unijunction transistor Q1, in conjunction with capacitor C1, functions as a sawtooth generator. Transistor Q3 functions as a constant current generator to maximize the linearity of the sawtooth by insuring that the current flowing into C1 remains constant until discharged. The positive voltage on base 2 of Q1 causes a current flow from base 1 to base 2 placing a reverse bias on the PN junction, base 1 to emitter. Capacitor C1 charges from the positive voltage supplied by A3 until this voltage becomes greater than that of the PN junction. At this time, the junction becomes forward biased and provides a low-resistance discharge path to ground for C1. The voltage across C1 rapidly decreases to a level insufficient to maintain the forward current through the junction, causing a reverse bias condition to be re-established and the next cycle to begin. The relatively slow charge time produces the ramp, or leading edge, of the waveform across C1. The rapid discharge produces the drop-off, or trailing edge of the waveform. The repetition rate is controlled by adjusting the base 2 voltage of Q1, and thereby the point on the ramp where the emitter changes from a reverse to a forward bias condition. The sweep rate calibrate potentiometer, R1, controls the base 2 voltage of Q1. Emitter follower Q5 isolates the sawtooth generator circuit from changing load conditions.

2.14.4.2 The sawtooth waveform present on the emitter of Q5 is coupled through Sweep Cal potentiometer R20

to the base of sweep amplifier Q9. Transistors Q9 and Q10 are connected in a complimentary configuration with negative dc feedback from the collector of Q10 to the emitter of Q9 through resistor R31. The output at the collector of Q10 is coupled through C3 to SWEEP WIDTH potentiometer R2 located on the main chassis.

2.14.4.3 The sawtooth shaping network is located on the sweep generator module. The network modifies the shape of the sawtooth output of the sweep generator before it is applied to the varactor in the sweep oscillator circuit. This is done to compensate for the nonlinearity in the capacitance change of the varactor with a linear sawtooth applied. If an unmodified sawtooth were applied to the varactor, a signal which was, for example, 1 mc higher in frequency than the 21.4 mc center frequency would appear a different distance from the center of the crt screen than a signal which was 1 mc lower than the center frequency. Thus, by distorting the shape of the sawtooth applied to the varactor, the frequency sweep is made linear on both sides of the center frequency.

2.14.4.4 The sawtooth output from the sweep generator is coupled to the shaping network through the front-panel SWEEP WIDTH control. The SWEEP WIDTH control determines the maximum amplitude of the modified sawtooth waveform applied to the sweep oscillator, and thus the maximum frequency sweep of the oscillator. A reverse dc bias of approximately 14.0 volts is applied to the cathode of the varactor with the front-panel CENTER FREQ control at midrange. With no sawtooth input, the sweep oscillator output frequency would be 34.4 mc with this amount of varactor bias. At the time the sawtooth is at its most negative excursion, the reverse voltage across the varactor is at its maximum. As a result, the varactor capacitance is minimum, so that the sweep oscillator frequency is maximum. At this point, diodes CR4, CR5, and CR6 are biased into conduction, placing R36, R37, and R38 in parallel. This parallel combination forms a voltage divider with R39 which governs the output voltage for a given input. As the negative sawtooth voltage increases in a positive direction, a point is reached where it no longer maintains conduction through CR6. When this occurs, resistor R38 is effectively removed from the circuit so that only R36 and R37 are in parallel. This reduces the output voltage for a given input and changes the slope of the sawtooth waveform. As the sawtooth becomes progressively less negative, conduction through CR5 ceases, removing R37 from the circuit and causing a second change in the slope of the sawtooth. The sawtooth is not further modified until it has crossed the zero-volt axis and becomes sufficiently positive to cause CR7 to conduct. Conduction through CR7 places series resistors R40 and R41 in parellel with R39 to cause a third change in the slope of the sawtooth. The final break point occurs when the voltage is positive enough to cause CR8 to conduct, shunting R42 and R43 across R39. Controls are provided to adjust the slope of the sawtooth at the two positive break points to maximize the linearity of the sweep on the low frequency side of the oscillator dispersion range.

2.14.4.5 The horizontal sweep amplifier circuitry is also located on the sweep generator module. The sawtooth waveform from emitter follower Q5 is coupled through isolation resistor R14 to the Horizontal Width control, R5. This control varies the amplitude of the sawtooth input signal to the horizontal output amplifier to provide a means of adjusting the width of the sweep trace so that it extends across the entire face of the crt. Transistors Q6 and Q7 form a differential amplifier which directly drives the horizontal crt deflection plates. High voltage transistors are used in this circuit to provide sufficient output voltage to deflect the electron beam across the face of the crt without using a step-up transformer. Transistors Q4 and Q8 provide ac and dc coupling respectively between the two stages of the differential amplifier. This circuit arrangement makes it possible to vary the horizontal position control, R8, without changing the gain of the differential amplifier. Both Q4 and Q8 are connected as emitter followers. The sawtooth input to the amplifier is through Q2 which functions as a low-impedance source driver. The sawtooth developed across load resistor R4 is directly coupled to both Q4 and Q6. During the positive going ramp of the sawtooth, Q6 conducts harder causing an increase in the voltage developed across load resistor R12. Simultaneously, the sawtooth output from Q4 is coupled through R16 to the emitter of Q7. Since the base of this transistor is held at a fixed potential, the positive-going voltage applied to the emitter drives it toward cut off. As a result, the collector voltage swings positive approaching the +175 V source. Since the horizontal deflection plates are connected directly to the collectors of Q6 and Q7, the electron beam is attracted across the face of the crt toward the plate connected to Q7. Retrace of the beam occurs on the trailing edge of the sawtooth when the input voltage suddenly drops. The collector voltage of Q6 rises rapidly and that of Q7 drops as Q7 now conducts heavily. The resulting change of potential on the deflection plates returns the electron beam to the opposite side of the screen. By adjusting R25, the horizontal position of the sweep trace can be changed. This control determines the quiescent current through Q6 and Q7, and thus the no-signal voltage present on the deflection plates. Assuming R25 is rotated in the clockwise direction, the voltage on the bases of Q7 and Q8 goes more positive causing both transistors to conduct harder. This causes the collector voltage of Q7 to decrease and the emitter voltage of

Q8 to increase in the positive direction. This increasing voltage is applied through R15 to the emitter of Q6 causing the transistor to conduct less current, resulting in an increase in collector voltage. The sweep trace will now shift toward the deflection plate attached to the collector of Q6. Rotating R25 in the counterclockwise direction has the opposite effect causing the beam to shift in the direction of the deflection plate connected to the collector of Q7. Resistors R21, R22, and R23 form a current divider which maintains the emitter to base ac impedance of Q7 constant as R25 is varied, thus maintaining the gain of Q7 constant regardless of the horizontal position control.

2.14.4.6 Transistor Q11 is a series regulator which supplies a regulated +18 V output from the regulated +24 V source. The base bias is fixed by a voltage divider consisting of resistors R33 and R44 and diode CR3. A drop in output voltage increases the base-emitter voltage causing the transistor to increase conductance and returning the output voltage back to its nominal value. If the output tends to rise, the opposite effect will return the output to normal.

2.14.4.7 The sweep oscillator reference voltage applied across the main chassis center frequency control is obtained from a zener regulator circuit mounted on the sweep generator module. The regulator consists of dropping resistor R30 and the regulator diode CR1 connected to the +24 V supply.

2.14.5 Marker Oscillator. - The schematic diagram for the crystal marker oscillator is Figure 6-9; its reference designation prefix is A5A4. The oscillator is a crystal-controlled Colpitts circuit operating at 21.4 mc. The output provides a reference pip on the signal monitors crt trace which indicates the center of the receiver IF bandpass. Marker switch S1 on the front panel is used to energize the oscillator by switching the collector voltage to Q1. Marker adjust potentiometer A5A1R41 mounted on IF amplifier board No. 1 controls the amplitude of the marker pip by varying the supply voltage to Q1. Regenerative feedback to sustain oscillation is taken at the emitter and coupled through R3 to the junction of C1 and C2 and back to the base. When in operation, the marker signal is injected in to the first mixer, A5A1Q4, on IF amplifier board No. 1.

2.15 TYPE 7917 COUPLING NETWORK

Two of these type 7917 coupling networks provide distribution of local oscillator outputs from the four tuners. Their reference designation prefixes are A14 and A14. Figure 6-18 is the schematic diagram. Coupling network A13 receives oscillator signals from either the 30-60 mc tuner or the 60-300 mc tuner, at A13J1 and A13J2 respectively. These two inputs are isolated from each other by the resistive networks R1-R2 and R4-R5. Output signals appear at A13J3. In a similar manner coupling network A14 receives oscillator signals from the 235-500 mc tuner and the 490-1000 mc tuner, at A14J1 and A14J2 respectively. The output from this network is at A14J3. These two coupling networks are mounted on the inside of the receiver rear panel. The two output jacks (A13J3 and A14J3) protrude through holes in the rear panel thereby providing a direct connection to the output of the two networks. Output A13J3 provides LO for the 30-300 mc range; output A14J3 provides LO for the 490-1000 mc range.

2.16 TYPE 7836 AGC MONITOR AMPLIFIER

The Type 7836 agc Monitor Amplifier is used to drive the receiver signal strength meter. Figure 6-19 is the schematic diagram for this module; its reference designation prefix is A15. The IF agc signal is applied through isolation resistor R2 to the cathode of zener diode CR1. The rf agc signal is similarly applied to the same point through resistor R1. The voltage at the cathode of CR1 is the sum of the two agc inputs. Zener diodes CR1 and CR2 drop the dc level at the base of Q1 by 18.2 V. Potentiometer R3 adjusts the base bias on Q1 so that the output of the dc amplifier consisting of transistors Q1 and Q2 is set at zero volts with no signal input. The output from the monitor amplifier is zero volts under no-signal conditions and is driven in the negative direction with increasing signal strength. The output is applied through main chassis resistor R12 to the signal strength meter, M1.

2.17 TYPE 79407 AFC AMPLIFIER

The Type 79407 AFC Amplifier consists of a single stage transistor amplifier. Figure 6-20 is the schematic diagram for this module; its reference designation prefix is A16. AFC voltage applied to circuit board pin E2 couples through R6 to the base of Q1. Output from emitter follower Q1 couples through R4 and E4, the output of the AFC amplifier. Fine tune voltage enters the board at pin E3 and is applied through R5 to the

board output, pin E4. Pin E4, then, is a summing point for two voltages: the voltage from Q1 and the voltage from the fine tune input.

2.18 POWER SUPPLY

The RS-111-1B-12B power supply includes the ac input circuits (shown in Figure 6-21), the general power supply regulator (see Figure 6-17), and a regulator for the crt voltages (see Figure 6-16).

2.18.1 Input Circuit. - The ac input to the unit is connected through the power plug, P26, the line fuse, F1, and the on-PWR OFF switch which is ganged with the AUDIO GAIN control. The arrangement of the two primary windings on the power transformer is controlled by the 115 V/220 V switch, S4. In the 115 V setting of S4, the windings are in parallel; in 220 V, the windings are in series and fuse F2 is included in the circuit. Four of the six secondary windings on the power transformer operate in conjunction with one of the regulators. The functions of these windings will be explained in subsequent paragraphs. The other two windings, 7-8 and 15-16, provide 6.3 V ac to filaments and lamps, and the filament voltage to the crt, respectively.

2.18.2 General Regulator (A12). - Refer to Figure 6-17. The ac voltage at the 5-6 winding of T1 enters the regulator on pins 9 and 10 and is applied to a full-wave rectifier formed by CR5 and CR6. The output of the rectifier is connected through pin 14 to a capacitance-input filter formed by C3A, R13, and C3B. The output of the filter is the +175 volt supply. The 175 volt source is connected back to the regulator through pin 12 where zener diode CR20 and resistor R12 provide a regulated +56 volt source. The 13-14 winding on T1 is connected to full-wave rectifiers formed by CR1, CR2 and CR3, CR4. The output through R1 is filtered by capacitor C1 on the main chassis and is used as the plus 14 volt source. The output of the other rectifier (through pin 15) operates into a series regulator circuit which includes transistor Q1. The voltage at the emitter of Q1 is -6 volts regulated. The 9-10 secondary winding on transformer T1 operates into three full-wave rectifiers located on the general power supply regulator module. The output of this rectifier CR7-CR8 is filtered by C1 and is the plus 23 volt supply used for relay operation. The output of the second rectifier (CR9, CR10) is connected to a regulator which includes stages Q1, Q3, and Q4. Zener diode CR16 sets the base bias at Q1 which, in turn, sets the base bias at Q3 and Q4. Resistors R7 and R8, in conjunction with diodes CR14, CR15, and CR17 provide short-circuit protection for the transistors. The output of this regulator is +24 volts. The regulator formed by Q5 and CR19 operates from the 24-volt source to provide a plug 12-volt supply. A similar regulator (Q2, CR13, and CR21) operates from the CR11-CR12 rectifier to supply -24 volts.

2.18.3 CRT Regulator (A11). - Refer to Figure 6-16. The output of the 11-12 secondary winding of T1 is connected to the crt regulator assembly where a full-wave rectifier formed by diodes CR1 and CR2 provides a negative high-voltage source. Tube V1, in series with resistor R1, provides a -1200 volt supply at the output of the rectifier. A voltage divider consisting of resistors R2, R4, R6, and R7 and potentiometers R3 and R5 is connected between the -1200 volt source and ground. The potential at the arm of R3 is connected to the cathode of the crt. Potentiometer R3 functions as the INTENSITY control. Potentiometer R5 is the FOCUS control, the arm of which is connected to the crt first anode. The -1200 volt potential is connected to the crt control grid.

SECTION III

INSTALLATION AND OPERATION

3.1 UNPACKING AND INSPECTION

3.1.1 Examine the shipping carton for damage before the equipment is unpacked. If the carton has been damaged, try to have the carrier's agent present when the equipment is unpacked. If not, retain the shipping carton and padding material for the carrier's inspection if damage to the equipment is evident after it has been unpacked.

3.1.2 See that the equipment is complete as listed on the packing slip. Contact Watkins-Johnson, Gaithersburg, or your Watkins-Johnson representative with details of any shortage.

3.1.3 The unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. It is, therefore, ready for use upon receipt. After uncrating and checking contents against the packing slip, visually inspect all exterior surfaces for dents and scratches. If external damage is visible, inspect the internal components for apparent damage.

3.2 INSTALLATION

CAUTION

Do not attempt to make an installation using the mounting holes in the front panel as the only means of support.

3.2.1 Rack/Mounting Support. - Rack mount equipment, manufactured by WJ-Gaithersburg, is designed for installation in standard 19-inch racks in accordance with MIL-STD-189, or E.I.A. standard RS-310. The unit requires 5.25 inches of vertical space and will project 16.0 inches back into the rack. The unit should not be supported solely by the front panel. It is recommended that chassis slides be added for ease of installation, for access to the unit, and to provide additional support for general installations. Mobile installations of the equipment should be evaluated on an individual basis. Additional information, such as recommended mounting methods, may be found in WJ-Gaithersburg Application Note 1302.50.

3.2.2 Thermal Considerations. - WJ-Gaithersburg equipment is designed for operational temperatures between 0° C and +50° C (32° F to 122° F). The operational temperature range is further qualified for free, unrestricted ambient air at sea level pressure. Equipment installation should provide for free flow of air around and through ventilated units. Multiple stacking, in particular, close adjacent stacking of electronic equipment in a standard console can produce an appreciable increase in the ambient air temperature for the units as compared to the ambient air in the vicinity of the console. Forced-air ventilation may be necessary to maintain the proper ambient air temperature in a console which contains equipment that contributes to a high thermal density. Additional information may be obtained from your Watkins-Johnson representative.

3.2.3 Power Connection. - Before energizing the equipment, it is necessary to set the unit to match the input power source voltage to be used. The equipment can operate from either a 115 or 220 V ac, 50-400 cps source. A rear-panel switch must be set accordingly. Additionally, the unit has a tapped-primary main power transformer which can be reconnected for 230 V ac operation for use in areas where this line voltage is present. Consult Figure 6-21, the main chassis schematic diagram located in Section VI. After setting the unit for the proper input voltage, make sure that the POWER switch is off. Then plug in the unit. The third pin on the unit power plug supplies a safety ground connection. If the two-pin to three-pin adapter supplied with the unit must be used, be certain that the ground wire of the adapter is securely connected to a low resistance ground.

3.2.4 Audio Output Connection. - The 600-ohm audio output is available at terminals 1 and 2 of the terminal strip marked TB1 AUDIO on the rear apron, and at the PHONES jack on the front panel.

3.2.5 Video Outputs. - The FM Video output from the 2-mc bandwidth IF amplifier is available at the FM VID OUTPUT jack (J3); the AM video output from this amplifier is available at the AM VID OUTPUT jack (J5).

The video output from the 20/75/300-kc bandwidth IF amplifier is present at the AM-FM VID OUTPUT jack (J4).

3.2.6 IF Outputs. - Both IF amplifiers have pre-detection outputs simultaneously available which are routed to the rear apron of the receiver. A portion of the 21.4 mc signals from the 2 mc IF amplifier are available at the wide band IF output (WB IF OUTPUT, J23). Likewise, a portion of the 21.4 mc signals from the 20/75/300-kc IF amplifier are available at the narrow band IF output (NB IF OUTPUT, J24).

3.2.7 Local Oscillator Outputs. - Two Type N local oscillator output connectors are accessible on the receiver rear apron. These two output jacks are actually a part of the two coupling networks (A13 and A14) mounted inside the receiver on the rear panel. Jack A13J3 is labeled 30-300 MC LO OUTPUT; jack A14J3 is labeled 235-1000 MC LO OUTPUT.

3.2.8 AGC Monitor Output. - Negative voltage from the agc monitor amplifier is present at J22 when the 20/75/300-kc IF amplifier develops agc.

3.2.9 RF Inputs. - Two antenna input connectors are located on the rear panel. Both are type N connectors. These connectors are labeled: J1 30-500 MC INPUT and J2 490-1000 MC INPUT.

3.2.10 DAFC Input. - This rear panel connector is labeled J25 DAFC INPUT. Voltage from an external frequency counter should be applied here to lock the operating tuner to the frequency stability of the counter. This connector also contains four switched lines for control of the frequency counter presets. An interconnecting cable (Watkins-Johnson, Gaithersburg, No. 16653) is included for mating with a Type DRO-309A or Type DRO-333 Frequency Counter.

3.3 OPERATION

The front panel operating controls on the RS-111-1B-12B are explained in the following paragraphs.

3.3.1 Range Switch. - The RANGE MC switch selects the proper tuner for use as determined by the frequency of the incoming signal. A lamp will light behind the tuning dial of the tuner selected.

3.3.2 Audio Gain Control and Power Switch. - The combination AUDIO GAIN control and ac power switch turns on the receiving system when rotated clockwise from the PWR OFF position. Once the unit is operating, the control sets the audio level at the PHONES jack and at the rear apron AUDIO terminal strip (TB1).

3.3.3 Function Switch. - Set the function switch in one of the four positions before the receiver is tuned. This switch affects the 20/75/300-kc bandwidth IF amplifier. When this switch is in the AM/MAN or CW/MAN positions, the gain of the receiver must be manually controlled using the RF GAIN potentiometer. The bfo is automatically activated when the switch is placed in the CW mode.

3.3.4 BFO Tuning Control. - The BFO TUNING control allows the operator to change the pitch of the cw audio signal from the 20/75/300-kc bandwidth strip when the function switch is placed in the CW/MAN position. Place the BFO TUNING control at mid-position when tuning, the audio pitch can then be increased or decreased as desired.

3.3.5 IF Bandwidth Switch. - The IF BANDWIDTH switch controls the bandwidth of the 20/75/300-kc IF amplifier. Set this switch as desired depending on the characteristics of the signal to be received. When searching for signals, it is advisable to use the widest bandwidth.

3.3.6 RF Gain Control. - The RF GAIN control is used to manually control the gain of the receiver sections (except the 2-mc bandwidth IF amplifier) when the function switch is in the AM/MAN or the CW/MAN position. In the other two function switch positions, the RF GAIN control is inoperative.

3.3.7 Signal Strength Meter. - The signal strength meter indicates the relative incoming signal strength. The meter is not calibrated in any particular units.

3.3.8 Cathode Ray Tube. - The crt displays the signals present at the output of the tuner in operation.

3.3.9 Gain Control. - Use the GAIN control to adjust the amplitude of the display on the crt. Adjustment of this control does not affect the receiver sections of the unit.

3.3.10 Sweep Width Control. - The SWEEP WIDTH control varies the display bandwidth on the crt. Clockwise rotation of the control increases the bandwidth. When searching for a signal, place the control at the maximum clockwise position and then reduce the bandwidth as desired by counterclockwise rotation of the control after the signal has been located.

3.3.11 Center Frequency Control. - Use the CENTER FREQ control to move the displayed pips on the crt either right or left as desired or to place a particular pip on the center marker before reducing the displayed bandwidth.

3.3.12 Focus and Intensity Controls. - Adjust the FOCUS and INTENSITY controls for maximum sharpness and the desired brightness of the crt trace.

3.3.13 Marker Switch. - When used, the MARKER switch produces a pip on the crt at 21.4 mc. This pip indicates the center of the IF response.

3.4 PREPARATION FOR RESHIPMENT AND STORAGE

3.4.1 If the unit must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or will at a minimum provide excellent guidance for the repackaging effort.

3.4.2 Conditions during storage and shipment should normally be limited as follows:

(a) Maximum humidity: 95% (no condensation)

(b) Temperature range: -30° C to +85° C

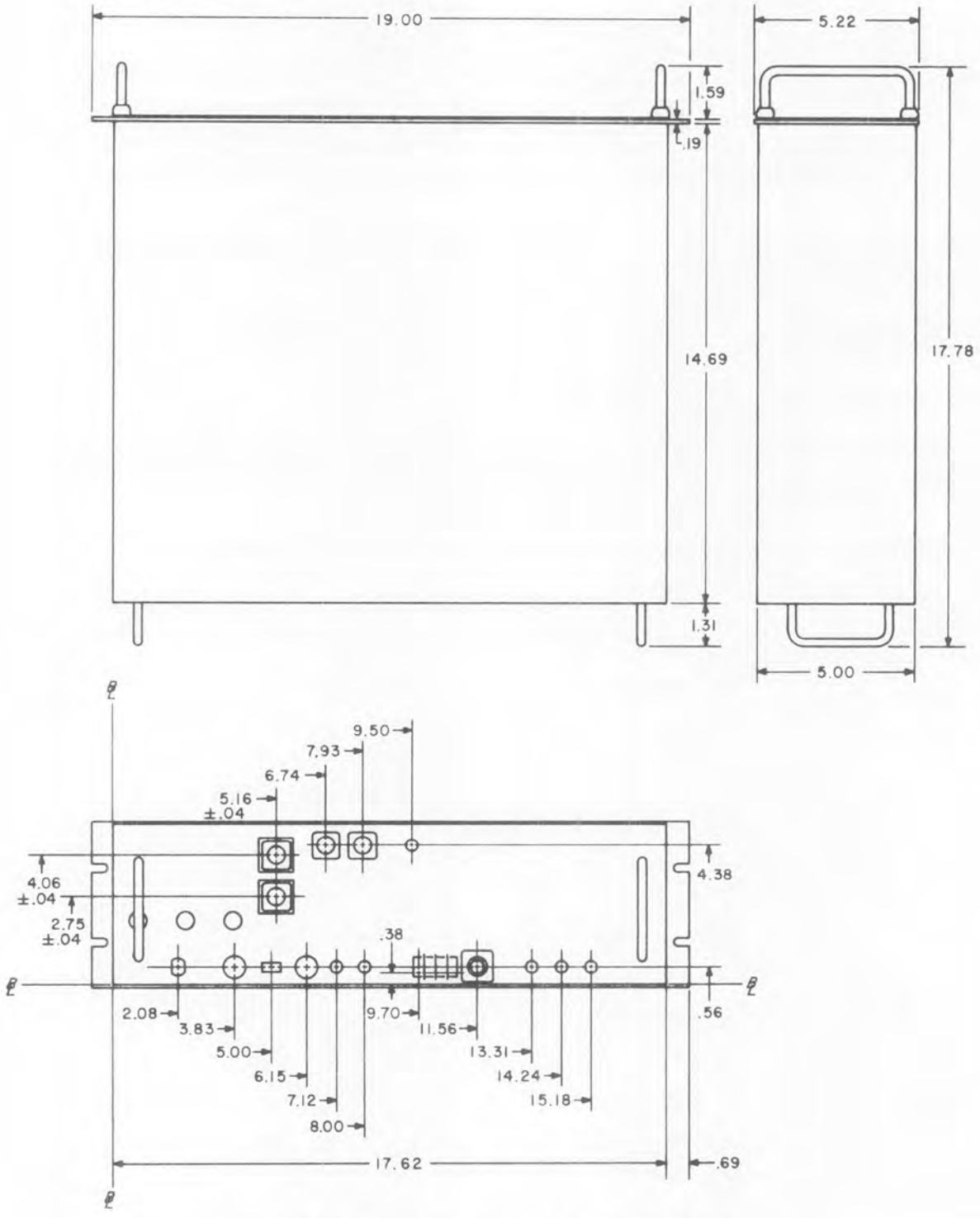


Figure 3-1. Type RS-111-1B-12B Receiving System, Critical Dimensions

SECTION IV
MAINTENANCE

4.1 GENERAL

The Type RS-111-1B-12B Receiving System has been conservatively designed to operate for extended periods of time with little or no routing maintenance. An occasional cleaning and inspection are the only preventive maintenance operations recommended. The intervals for these operations should be based on the operating environment. Should trouble occur repair time will be minimized if the maintenance technician is familiar with the circuit descriptions found in Section II. Reference should also be made to the block diagrams, Figures 2-1 and 2-2, and to the schematic diagrams found in Section VI. A complete parts list and illustrations showing part locations can be found in Section V.

4.2 CLEANING AND LUBRICATION

The unit should be kept free of dust, dirt, moisture, and other foreign matter. If available, use a vacuum cleaner to remove these materials from the exterior and interior of the unit. Also, low-velocity compressed air can be used to blow accumulated matter from the unit. In addition, a clean cloth or a soft bristled brush can be dampened with a cleaning solution such as Chloroethane VG and then used to clean the unit. The damp cloth or brust is especially useful for cleaning the tuning drive mechanisms; however, care should be taken so that excess solution does not flow into the bearings. When using any type of cleaning solution avoid wetting items such as plastic dials, plastic windows, and painted or lettered surfaces unless it is known the solution will not damage them. Do not lubricate gear teeth of the tuning drive assemblies. The only lubrication required for this receiver is a single drop of light machine oil on each bearing of the tuning drive assemblies. These lubrication points can be located by turning each of the four dials and observing the shafts rotating in the rear assembly plates. Even this lubrication should not be required more often than every few years under average conditions.

4.3 INSPECTION FOR DAMAGE OR WEAR

Many potential or existing troubles can be detected by a visual inspection of the unit. For this reason, a complete visual inspection should be made for indications of mechanical and electrical defects on a periodic basis or whenever the unit is inoperative. Electronic components that show signs of deterioration should be checked and a thorough investigation of the associated circuitry should be made to verify proper operation. Damage to parts due to heat is often the result of other less apparent troubles in the circuit. It is essential that the cause of overheating be determined and corrected before replacing the damaged parts. Mechanical parts, and front panel controls and switches should be inspected for excessive wear, looseness, misalignment, corrosion, and other signs of deterioration.

4.4 TEST EQUIPMENT REQUIRED

Each of the procedures within the maintenance section contains a listing of the equipment required for that particular test. The equipment listed in Table 4-1, however, is a complete list of all test equipment required for troubleshooting, performance testing, and alignment of the RS-111-1B-12B Receiving System.

4.5 TROUBLESHOOTING

Troubleshooting efforts should first be directed toward localizing the problem to a particular module or circuit group. As aids in this process, this manual contains troubleshooting tables (Table 4-2 and 4-3), response photographs taken at key points, functional block diagrams (Figures 2-1 and 2-2) and complete circuit descriptions (Section II). Once the faulty module has been located, the defective component(s) should be isolated using information obtained from the circuit descriptions, voltage measurements (Table 4-8), and detailed circuit diagrams (Figures 6-1 through 6-21).

4.5.1 Localizing Troubles. - The troubleshooting tables are designed to show the methods by which logical troubleshooting can be applied to the RS-111-1B-12B Receiving System. If the unit is totally inoperative, the problem is most likely associated with the input power supply regulators. Reference to the Functional Block

Table 4-1. Test Equipment Required

ITEM	INSTRUMENT NOMENCLATURE	REQUIRED CHARACTERISTICS	RECOMMENDED EQUIPMENT
1.	AC Voltmeter	Voltage Range: 10 mV to 5 V Frequency Range: 10 c/s to 1 mc Accuracy: ±2%	Hewlett-Packard Model 400H
2.	Attenuator	Impedance: 50 ohm Attenuation: 3 dB	Applied Research, Inc. Model HFA-50
3.	Frequency Counter	Frequency Range: 30 to 1060 mc Sensitivity: 50 mV, minimum	Hewlett-Packard Model 5245L with Heterodyne Converters Model 5253B and Model 5254C
4.	Oscilloscope	Vertical Sensitivity: 10 mV/cm, minimum (+ and - inputs) Horizontal Sensitivity: 1 V/cm (with external input)	Tektronix Model 503
5.	DC Power Supply	Range: 0 to 20 V dc Current: 25 mA, minimum	Hewlett-Packard Model 6206B
6.	RF Detector	Impedance: 50 ohm	Telonic Model XD-3A
7.	RF Voltmeter	Impedance: 50 ohm Range: 30 to 1060 mc Sensitivity: 50 mV, minimum	Boonton Electronics Model 91DA-S5 with Model 91-12F Model 91-8B accessories
8.	FM Signal Generator	Impedance: 50 ohm Frequency Range: 60 to 200 mc Output Level: 1.5 μV-10 μV Modulation: 240 kc deviation at 1 kc rate	Hewlett-Packard Model 202H
9.	FM Signal Generator	Impedance: 50 ohm Frequency: 260 mc Output Level: 3 μV-10 μV Modulation: 240 kc deviation at 1 kc rate	Hewlett-Packard Model 202J
10.	AM Signal Generator	Impedance: 50 ohm Frequency Range: 10-480 mc Output Level: 1 μV to 500 mV Modulation: 1 kc at 50%	Hewlett-Packard Model 608E
11.	AM Signal Generator	Impedance: 50 ohm Frequency Range: 450 mc to 900 mc Output Level: 4 μV, minimum Modulation: 1 kc at 50%	Hewlett-Packard Model 612
12.	Sweep Generator	Impedance: 50 ohm Frequency Range: 15 to 515 mc Output Level: +10 to -80 dBm	Wavetek Model 2000

Table 4-1. Test Equipment Required (Continued)

ITEM	INSTRUMENT NOMENCLATURE	REQUIRED CHARACTERISTICS	RECOMMENDED EQUIPMENT
13.	Variac	Voltage: 105 to 125 V ac Current: 0.5 A minimum	General Radio Model W5MT3A
14.	VTVM	Impedance: 11 MΩ Voltage Range: 0 to 1500 V dc	RCA Model WV-98C

Diagrams, Figures 2-1 and 2-2, should help to isolate most problems. A display of signals on the signal monitor cathode ray tube (CRT) indicates that the tuner in operation is functioning. If either of the high band tuners (A3 or A4) provide a display of signals on the signal monitor, the 60-21.4 mc converter (A6) also is functioning. Absence of output information from either one of the two IF amplifier assemblies will also isolate the problem area.

4.5.2 Failure Analysis. - Once the trouble has been localized, the unit can be returned to operating condition by substituting a spare circuit board or assembly known to be in good condition. Prior to performing corrective action on the faulty circuit, the procedures followed up to this point should be reviewed to determine exactly why the failure affected the equipment in the manner that it did. This review is necessary to make certain that the problem discovered is actually the cause and not just the result of the malfunction.

Table 4-2. Receiver Circuits Troubleshooting

ITEM	TROUBLE INDICATION	PROBABLE CAUSE	ISOLATION PROCEDURE
1.	Unit totally inoperative.	Fuse F1 (115V/220 V) or fuse F2 (220 V) blown; Switch S5 (115 V/220 V) in wrong position. Power supply regulator board A12 or associated components defective.	Inspect fuse(s) and switch position. Refer to performance checks in paragraphs 4.6.1 to locate defective stage(s).
2.	Tuners A3 and A4 both inoperative.	60-21.4 mc converter (A6) inoperative.	Couple 21.4 mc directly to A1J4 (30-60 mc tuner).
3.	No output from J3, J5, and J23 (FM VID OUTPUT, AM VID OUTPUT, and WB VID OUTPUT, respectively).	2 mc IF amplifier (A7) inoperative.	Measure A7 voltages.
4.	No audio output at TB1 and PHONES jack; also no video output from J4.	20/75/300-kc IF amplifier inoperative.	Check for output at A8E1 (AM) and A8E2 (FM). Measure A8 voltages.
5.	No AM-FM-VID output at J4 (AUDIO at TB1 and PHONES jack J10 functions normally).	Video amplifier (A9) inoperative.	Measure A9 voltages. Inject audio to A9 stages.

Table 4-2. Receiver Circuits Troubleshooting (Continued)

ITEM	TROUBLE INDICATION	PROBABLE CAUSE	ISOLATION PROCEDURE
6.	No audio output at TB1 or the PHONES jack, J10; (AM-FM-VID output J4 functions normally).	Audio amplifier (A10) inoperative.	Measure A10 voltages. Inject audio to A10 stages.
7.	FINE TUNING control, BFO TUNING control, and DAFC (AFC) input not functioning.	AFC (DAFC) amplifier (A16) inoperative.	Measure A16 voltages.

Table 4-3. Signal Monitor Troubleshooting

ITEM	TROUBLE INDICATION	PROBABLE CAUSE	ISOLATION PROCEDURE
1.	No vertical deflection	IF amplifier No. 1 defective.	Couple 13 mc signal to E1 of IF Amplifier No. 2
		IF amplifier No. 2 defective.	Couple 1 mc signal to internal stages of amplifier.
2.	No sweep	No sawtooth being generated.	Check for sawtooth at emitter of A5A3Q2.
		No sawtooth to horizontal plates of crt.	Check for sawtooth at A5C12 and A5C13
3.	No trace	crt anode cap not fully plugged in or lead broken.	Check connection of anode cap and inspect anode lead.
		crt filament dead.	Inspect neck of crt for filament glow
		Improper vertical positioning.	Check voltages on A5V1 pins 6 and 7.
		Improper horizontal sweep or positioning.	Check voltages on A5V1 pins 1 and 2.

4.6 PERFORMANCE TESTS

Selected performance tests are presented here which can be used to determine the performance of the Type RS-111-1B-12B Receiving System.

4.6.1 Power Supply Regulator Tests. - The following tests will ensure that the power supply regulators are performing within acceptable limits.

4.6.1.1 The following test equipment is required:

(1) Variac, General Radio, Model W5MT3A.

(2) VTVM, RCA, Model WV-98C.

4.6.1.2 Connect the receiver power input to the Variac output. Function: AM/MAN; RF Gain: Maximum clockwise. Place the receiver RANGE MC switch in the 60-300 position for all voltage measurements except for the +23 V dc reading. For this voltage reading,switch to the 235-500 position of the RANGE MC switch.

(1) With the line voltage maintained at 115 V ac, measure the power supply voltages listed in Table 4-4.

Table 4-4. Power Supply Voltage Limits

Power Supply	Measure at	Minimum Reading	Maximum Reading
+175 V dc	XA12 Pin 12	+170 V dc	+180 V dc
+56 V dc*	XA12 Pin 7	+51 V dc	+61 V dc
+24 V dc*	XA12 Pin 11	+22.5 V dc	+25.5 V dc
+23 V dc	XA12 Pin 4	+18.5 V dc	+27.5 V dc
+14 V dc	XA12 Pin 17	+11.5 V dc	+16.5 V dc
+12 V dc*	XA12 Pin 13	+11 V dc	+13 V dc
-24 V dc*	XA12 Pin 5	-22.5 V dc	-25.5 V dc
-6 V dc*	XQ1 Emitter Pin	-5.7 V dc	-6.3 V dc
-1200 V dc	Junction A11R1 A11V1	-1100 V dc	-1300 V dc
6.3 V ac	Transformer T1 Pin 7	6.0 V ac	6.6 V ac

* Record voltage for use in steps (2) and (3).

(2) Set the Variac to 105 V ac and verify that the voltage readings are within ±5% of those measurements recorded in step (1).

(3) Set the Variac to 125 V ac and verify that the voltage readings are within ±5% of those measurements recorded in step (1).

4.6.2 IF Bandwidth Performance Tests. - The following tests assure that the 2 mc IF amplifier and the 20/75/300-kc IF amplifier have the proper bandwidths. (The 2 mc IF amplifier is stagger tuned for a 5 dB dip; therefore, it is tested in conjunction with the 21.4 mc mixer output network of the 30-60 mc tuner.)

4.6.2.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) Heterodyne Converter, Hewlett Packard, Model 5253B

(4) RF Voltmeter, Boonton, Model 91DA-S5 with a Model 91-12F RF probe and a Model 91-8B 50 ohm Adapter.

(5) 3 dB Attenuator, Applied Research Inc., Model HFA-50

4.6.2.2 The tests are made as follows:

(1) Connect the equipment as shown in Figure 4-1. Use the 2 mc connections.

(2) Set the receiver controls as follows:

a. RANGE MC: 60-300; tuner dial to 155 mc

b. Function: AM/MAN

c. RF GAIN: maximum CW

(3) Set the signal generator output frequency to 155 mc, unmodulated. Set the output level for a -15 dBm (40 mV) reference on the rf voltmeter.

(4) Remove the 3 dB attenuator from the line and connect the signal generator directly to A2TP1.

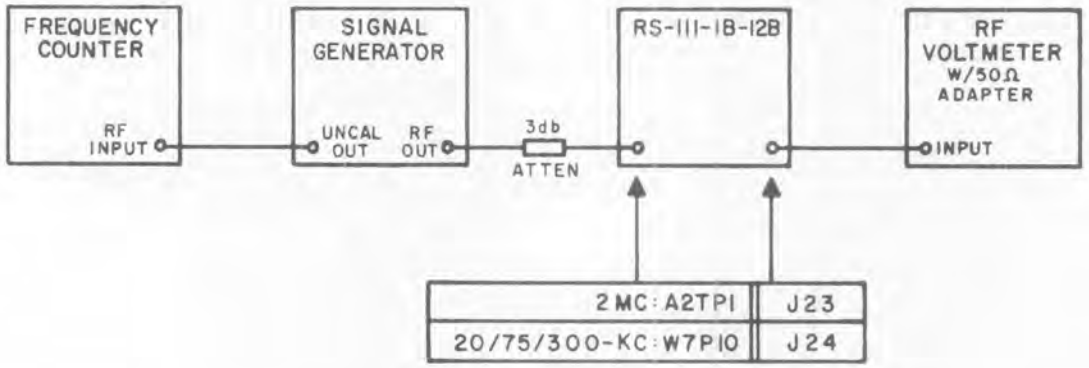


Figure 4-1. Test Setup, IF Bandwidths Performance Tests

(5) Increase the signal generator output frequency until the reference level set in step (3) is regained. Record the frequency counter indication.

(6) Reduce the signal generator output frequency until the reference level set in step (3) is regained. Record the frequency counter indication.

(7) Subtract the frequency recorded in step (6) from the frequency recorded in step (5). The difference should be at least 1.8 mc.

(8) Connect the rf voltmeter to J24.

(9) Set the receiver IF BANDWIDTH switch to 300 kc.

(10) Install the 3 dB attenuator in the line between the signal generator and W7P10. (W7P10 is the cable end connecting to A1J3.)

(11) Set the signal generator output frequency to 21.4000 mc. Set the output level for a -13 dBm (50 mV) reference on the rf voltmeter.

(12) Remove the 3 dB attenuator from the line and connect the signal generator directly to W7P10.

(13) Increase the signal generator output frequency until the reference level set in step (11) is regained. Record the frequency counter indication.

(14) Decrease the signal generator output frequency until the level set in step (11) is regained. Record the frequency counter indication.

(15) To obtain the IF bandwidth as measured at the 3 dB points, subtract the frequency recorded in step (14) from the frequency recorded in step (13). The difference should be in the range of 270 kc to 330 kc.

(16) Place the receiver IF BANDWIDTH switch in the 75 KC position.

(17) Repeat steps (10) through (15). The difference frequency should be in the range of 67.5 kc to 82.5 kc.

(18) Place the receiver IF BANDWIDTH switch in the 20 KC position.

(19) Repeat steps (10) through (15). The difference should be in the range of 18 kc to 22 kc.

4.6.3 Discriminator Center Frequency, Performance Tests. - The following tests ensure that the 2 mc IF amplifier discriminator and the 20/75/300-kc IF amplifier discriminator have the correct center frequencies.

4.6.3.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) VTVM, RCA, Model WV-98C

4.6.3.2 The tests are performed as follows:

(1) Connect the equipment as shown in Figure 4-2.

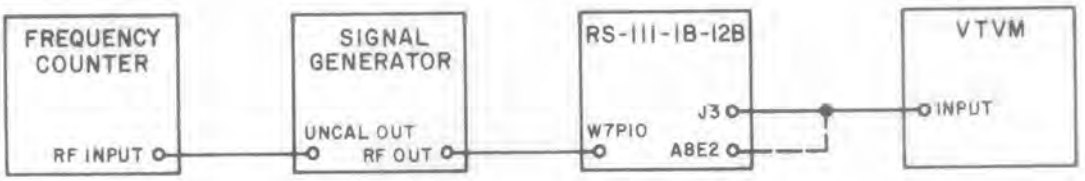


Figure 4-2. Test Setup, Discriminators Center Frequency Performance Test

(2) Set the signal generator output for 21.4 mc cw at a level of 1 mV.

(3) Set the VTVM controls for the 1.5 V dc range. Zero the meter indicator.

(4) Vary the signal generator frequency above and below 21.4 mc until the VTVM indicates zero volts. The frequency counter indication should be between 21.300 mc and 21.500 mc. This assures that the 2 mc IF amplifier discriminator has the proper center frequency.

(5) Connect the VTVM lead to A8E2.

(6) Vary the signal generator frequency above and below 21.4 mc until the VTVM indicates zero volts. The frequency counter indication should be between 21.385 mc and 21.415 mc. This assures that the 20/75/300-kc IF amplifier discriminator has the proper center frequency.

4.6.4 AM Sensitivity Performance Tests. - The following tests ensure that the four tuners, in conjunction with the 300-kc IF amplifier, have the proper am sensitivity.

4.6.4.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Signal Generator, Hewlett Packard, Model 612A

(3) AC Voltmeter, Hewlett Packard, Model 400H

4.6.4.2 The tests are performed as follows:

(1) Connect the equipment as shown in Figure 4-3. Signal generator No. 2 is used to test the 490-1000 tuner.

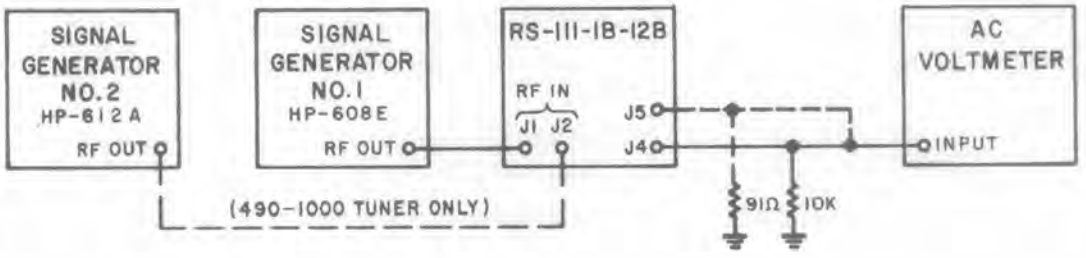


Figure 4-3. Test Setup, AM Sensitivity/Output Stability Performance Test

(2) For the remainder of this procedure refer to Table 4-5 according to the tuner selected to be tested.

Table 4-5. AM Sensitivity Performance Test Data

Selected Tuner	Signal Generator/ Receiver, Frequency	Signal Generator Output Level	AC Voltmeter Difference
30-60	60 mc	4 μV	11 dB
60-300	200 mc	4 μV	11 dB
235-500	260 mc	8 μV	10 dB
490-1000	900 mc	8 μV	10 dB

(3) Set the signal generator controls for 1 kc 50% modulation.

(4) Tune the signal generator and receiver to the frequency corresponding to the selected tuner in Table 4-5.

(5) Set the signal generator to the output level corresponding to the selected tuner in Table 4-5.

(6) Slowly vary the signal generator frequency to obtain a peak indication on the ac voltmeter.

(7) Adjust the receiver VIDEO GAIN control for a convenient reference on the ac voltmeter. This reference should be no greater than 5 V ac.

(8) Turn off the signal generator 1 kc, 50% modulation. The ac voltmeter indication should now be less than the level set in step (7). Refer to Table 4-5 for the minimum acceptable difference. If necessary, set the range selector to a more sensitive position to observe the new indication.

4.6.5 AM Output Stability Performance Test. - This am output stability test is used to evaluate the operation of a typical agc circuit condition under a wide range of input signal levels.

4.6.5.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) AC Voltmeter, Hewlett Packard, Model 400H

4.6.5.2 The test is performed as follows:

(1) Connect the equipment as shown in Figure 4-3.

(2) Set the receiver function switch to AM/AGC and the IF BANDWIDTH switch to 300 KC.

(3) Set signal generator No. 1 controls for a 1000 cycle, 50% modulated rf output.

(4) Set the receiver RANGE MC switch to select the 30-60 tuner. Set the tuner dial to 60.

(5) Set signal generator No. 1 output frequency to 60 mc and the output level to 2 μV.

(6) Use the receiver signal monitor to tune the receiver to the same frequency as the output of the signal generator No. 1.

(7) Use the receiver VIDEO GAIN control to set a convenient dB reference on the ac voltmeter. This reference should be no greater than 5 V ac.

(8) Slowly increase the output of signal generator No. 1 to 10,000 μV while observing the dB scale of the ac voltmeter. At no time during the increase should the indication on the ac voltmeter change more than a total of 3 dB.

(9) Set the receiver RANGE MC switch to select the 60-300 tuner. Set the tuner dial to 200.

(10) Set signal generator No. 1 output frequency to 200 mc and the output level to 2 μV.

(11) Repeat steps (6) through (8).

(12) Set the receiver RANGE MC switch to select the 235-500 tuner. Set the tuner dial to 260.

(13) Set signal generator No. 1 output frequency to 260 mc and the output level to 4 μV.

(14) Repeat steps (6) through (8) except that the indication on the ac voltmeter should not change more than a total of 4 dB.

(15) Set the receiver RANGE MC switch to select the 490-1000 tuner. Set the tuner dial to 900.

(16) Set signal generator No. 2 controls for a 1000 cycle, 50% modulated rf output.

(17) Set signal generator No. 2 output frequency to 900 mc and the output level to 4 μV.

(18) Repeat steps (6) through (8) except that the indication on the ac voltmeter should not change more than 4 dB.

4.6.6 Deviation Sensitivity Performance Tests. - These tests provide an indication of the typical FM operation of the selected tuners and IF amplifiers, depending on the tuner to be used for the test.

4.6.6.1 The following test equipment is required to perform these tests:

(1) Signal Generator, Hewlett Packard, Model 202H

(2) Signal Generator, Hewlett Packard, Model 202J

(3) AC Voltmeter, Hewlett Packard, Model 400H

4.6.6.2 Deviation sensitivity tests utilizing the 300-kc portion of the 20/75/300-kc IF amplifier are performed as follows:

(1) Connect the equipment as shown in Figure 4-4.

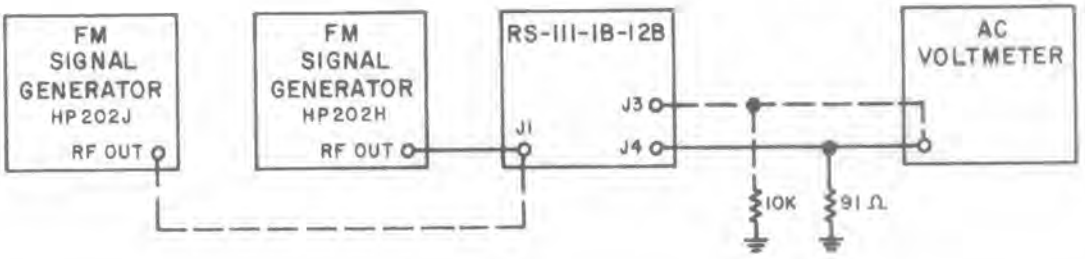


Figure 4-4. Test Setup, Deviation Sensitivity/FM Output Stability, Performance Tests.

(2) Set the receiver function switch to FM, the IF BANDWIDTH switch to 300 KC, and the RANGE MC switch to either the 30-60, 60-300, or 235-500 tuner. The test can be performed with any one of the tuners listed or, if desired, with all three of the tuners listed.

(3) Set the selected tuner to the related test frequency in Table 4-6.

(4) Set the FM signal generator deviation to 100 kc at a 1000 cycle rate. Set the output frequency and level to the conditions listed in Table 4-6 as determined by the tuner being tested.

Table 4-6. Deviation Sensitivity Performance Test Data

Tuner	Test Frequency (MHz)	Signal Generator Output Level	
		300 kc IF BW	2 mc IF BW
30-60	60	6 μV	12 μV
60-300	200	6 μV	12 μV
235-500	260	8 μV	24 μV

(5) Use the receiver signal monitor and marker to set the signal generator and receiver to the same frequency.

(6) Adjust the receiver VIDEO GAIN control for a convenient reference on the dB portion of the ac voltmeter scale. This reference should not be above 5 V ac.

(7) Turn off the signal generator modulation. The ac voltmeter indication should now be at least 21 dB less than the reference set in step (6). This assures that the selected tuner, in conjunction with the 300 kc IF amplifier, has the proper deviation sensitivity.

4.6.6.3 Deviation sensitivity tests utilizing the 2 mc IF amplifier are performed as follows:

(1) Connect the equipment as shown in Figure 4-4. Use the alternate connection (J3) and load for the ac voltmeter.

(2) On the receiver, select either the 30-60, 60-300, or 235-500 tuner.

(3) Set the selected tuner to the related test frequency listed in Table 4-6.

(4) Set the fm signal generator deviation to 240 kc at a 1000 cycle rate. Set the output frequency, and level to the conditions listed in Table 4-6 as determined by the tuner being tested.

(5) Use the receiver signal monitor and marker to set the signal generator and the receiver to the same frequency.

(6) Set the ac voltmeter range switch to a scale indicating 0.3 V ac. Observe the dB portion of the scale for a reference.

(7) Turn off the fm signal generator modulation. The new ac voltmeter indication should be at least 17 dB less than the reference obtained in step (6).

4.6.7 FM Output Stability Performance Tests. - These stability tests are used to evaluate the operation of the agc circuits under a wide range of input signal levels during fm modulation conditions. The tests can be performed with any one of the tuners listed, or if desired, all three of the tuners listed.

4.6.7.1 The following test equipment is required to perform these tests:

(1) Signal Generator, Hewlett Packard, Model 202H

(2) Signal Generator, Hewlett Packard, Model 202J

(3) AC Voltmeter, Hewlett Packard, Model 400H

4.6.7.2 This fm output stability test utilizes the 20/75/300-kc IF amplifier in conjunction with either the 30-60, 60-300, or 235-500 mc tuner to determine the relative stability of the combination. Proceed as follows:

(1) Connect the equipment as shown in Figure 4-4.

(2) Set the receiver controls as follows:

a. Function: FM

b. IF BANDWIDTH: 300 KC

c. RANGE MC: 30-60, 60-300, 235-500; as desired

d. Tuner Frequency: Refer to Table 4-7

(3) Set the appropriate fm signal generator modulation deviation to 100 kc at a 1000 cycle rate. Also, set the output frequency and level to the conditions listed in Table 4-7 as determined by the tuner selected in step (2).

Table 4-7. FM Output Stability Performance Test Data

Tuner	Test Frequency (mc)	Signal Generator Output Level	
		300 kc IF BW	2 mc IF BW
30-60	60	1.5 μV	4 μV
60-300	200	1.5 μV	4 μV
235-500	260	3.0 μV	8 μV

(4) Set the ac voltmeter range switch to a scale indicating 5 V ac.

(5) Adjust the receiver VIDEO GAIN control for a convenient reference on the dB portion of the ac voltmeter scale. This reference should be no greater than 4 V ac.

(6) Slowly increase the signal generator output level to 10,000 μV while observing the dB portion of the ac voltmeter scale. At no time during this increase should the indication on the ac voltmeter vary more than a total of 2 dB from the reference level set in step (5).

4.6.7.3 This fm output stability test utilizes the 2 mc IF amplifier in conjunction with either the 30-60, 60-300, or 235-500 mc tuner to determine the relative stability of the combination. Proceed as follows:

(1) Connect the equipment as shown in Figure 4-4. Connect the ac voltmeter to the alternate connector (J3) and load.

(2) Set the receiver function switch to either the AM/AGC or FM position. (Both of these positions provide agc voltage from the 20/75/300-kc IF amplifier to the two low-band tuners and the 60-21.4-mc converter.

(3) Refer to Table 4-7. Select the tuner to be used for the stability test (30-60, 60-300, or 235-500) and tune to the corresponding test frequency.

(4) Set the fm signal generator deviation to 240 kc. Set the output frequency and level to the conditions listed for the 2-mc IF bandwidth as determined by the selected tuner.

(5) Tune the signal generator to the same frequency as the receiver by using the marker on the signal monitor.

(6) Set the ac voltmeter range switch to a scale indicating 0.3 V ac. Note the dB indication.

(7) On the signal generator, slowly increase the output level to 10,000 μV while observing the dB scale on the ac voltmeter. At no time during this increase should the indication on the ac voltmeter vary more than a total of 4 dB from the reference level noted in step (6).

4.6.8 AFC Range, Performance Test. - This test assures that the afc circuit, in conjunction with the tuners, has sufficient control range.

4.6.8.1 The following test equipment is required:

(1) Frequency Counter, Hewlett Packard Model 5245L

(2) Heterodyne Converter, Hewlett Packard, Model 5253B

(3) Heterodyne Converter, Hewlett Packard, Model 5254C

(4) Power Supply, Hewlett Packard, Model 6206B

(5) Voltmeter, RCA, Model WV-98C

4.6.8.2 The test is performed as follows:

(1) Connect the equipment as shown in Figure 4-5.

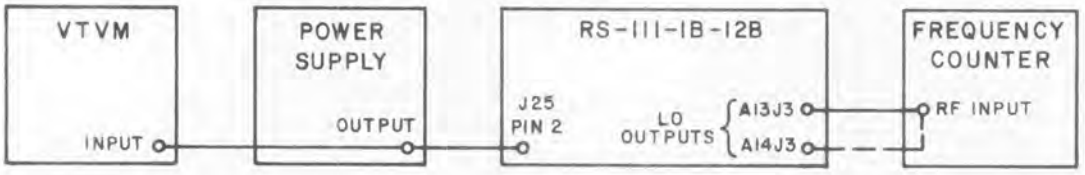


Figure 4-5. Test Setup, AFC (DAFC) Range Performance Test.

(2) Set the receiver RANGE MC switch in the 30-60 position and tune the dial to 45. Set the FINE TUNING control and BFO TUNING controls to mid-range.

(3) Set the power supply output voltage to +4.0 volts. Record the frequency counter indication.

(4) Set the power supply output voltage to +20 volts. Record the frequency counter indication.

(5) Subtract the frequency recorded in step (3) from the frequency recorded in step (4). This difference is the afc (dafc) range and should be at least 45 kc.

(6) Set the receiver RANGE MC switch in the 60-300 position, and tune the dial to 180. Repeat step (3) through (5). The range determined in step (5) should be a minimum of 180 kc.

(7) Set the receiver RANGE MC switch in the 235-500 position and tune the dial for this tuner to 400. On the rear apron of the receiver, move the cable from A13J3 to A14J3.

(8) Remove the power supply connection from J25 pin 2 and record the frequency counter indication.

(9) Reconnect the power supply to J25 pin 2 and set the output voltage to +4.0 V dc.

(10) Record the frequency counter indication.

(11) Subtract the frequency counter indication recorded in step (8) from that recorded in step (10). The difference should be at least 50 kc.

(12) Set the power supply output voltage to +20.0 V dc and record the frequency counter indication.

(13) Subtract the frequency counter indication recorded in step (8) from that recorded in step (12). The difference should be at least 50 kc.

(14) Set the receiver RANGE MC switch in the 490-1000 position and tune the related dial to 700 mc.

(15) Remove the power supply connection from J25 pin 2 and record the frequency counter indication.

(16) Reconnect the power supply to J25 pin 2 and set the output voltage to +4.0 V dc. Record the frequency counter indication.

(17) Subtract the frequency counter indication recorded in step (16) from that recorded in step (15). The difference should be at least 80 kc.

(18) Set the power supply voltage to +20.0 V dc and record the frequency counter indication.

(19) Subtract the frequency counter indication recorded in step (15) from that recorded in step (18). The difference should be at least 110 kc.

4.6.9 Fine Tuning Range, Performance Test. - The following test assures that the FINE TUNING control has sufficient range.

4.6.9.1 The following test equipment is required:

(1) Frequency Counter, Hewlett Packard, Model 5245L

(2) Heterodyne Converter, Hewlett Packard, Model 5253B

(3) Heterodyne Converter, Hewlett Packard, Model 5254C

4.6.9.2 The test is performed as follows:

(1) Connect the equipment as shown in Figure 4-6.

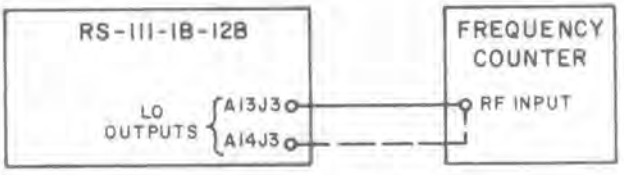


Figure 4-6. Test Setup, Fine Tuning Range Performance Test

(2) Set the receiver RANGE MC switch in the 30-60 position. Then set the related tuner dial to 30.

(3) Place the BFO TUNING control at mid-range. It should remain at mid-range throughout this procedure.

(4) Rotate the FINE TUNING control to maximum clockwise and record the frequency counter indication.

(5) Rotate the FINE TUNING control to maximum counterclockwise and record the frequency counter indication.

(6) Subtract the frequency recorded in step (5) from the frequency recorded in step (4). The difference should be at least 10 kc.

(7) Place the RANGE MC switch in the 60-300 position. Then set the related tuner dial to 60.

(8) Repeat steps (4) through (6).

(9) Move the cable from A13J3 to A14J3.

(10) Place the RANGE MC switch in the 235-500 position. Then set the related tuner dial to 250.

(11) Repeat steps (4) through (6).

(12) Place the RANGE MC switch in the 490-1000 position. Then set the related tuner dial to 500.

(13) Repeat steps (4) through (6).

4.6.10 Signal Monitor Performance Tests. - The following tests assure that the signal monitor is functioning correctly.

4.6.10.1 Tests in this sequence include sweep width, sweep linearity, marker oscillator frequency, and resolution.

4.6.10.1.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) Heterodyne Converter, Hewlett Packard, Model 5253B

4.6.10.1.2 The tests are performed as follows:

(1) Connect the equipment as shown in Figure 4-7.

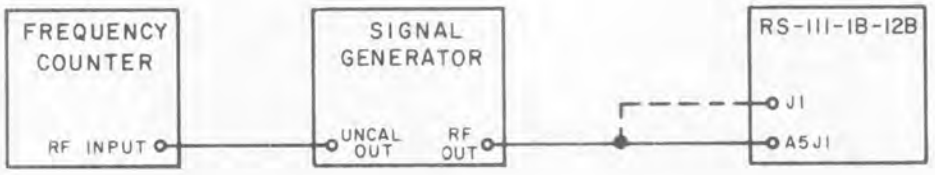


Figure 4-7. Test Setup, Signal Monitor Performance Tests

(2) Set the signal generator controls for a 21.4 mc cw output. Set the output level to approximately 20 μV.

(3) On the receiver, set the signal monitor controls as follows:

a. SWEEP WIDTH: maximum clockwise

b. GAIN: maximum counterclockwise

c. MARKER: ON

d. INTENSITY: for a visible trace

e. FOCUS: for a sharp trace

(4) Use the CENTER FREQ control to position the marker under the center graticule mark.

(5) Turn the MARKER switch off.

(6) Adjust the GAIN control for a full-scale deflection of the input signal.

(7) Decrease the signal generator output frequency until the pip on the crt is centered behind the sixth graticule mark to the left. Record the frequency counter indication.

(8) Increase the output frequency until the pip is centered behind the sixth graticule mark to the right of the center mark. Record the frequency counter indication.

(9) Subtract the frequency recorded in step (7) from the frequency recorded in step (8) to determine the maximum sweep width. The frequency difference should be in the range of 3.0 mc to 3.3 mc.

(10) To verify the proper sweep linearity, the frequency recorded in step (7) should be in the range of 19.750 mc to 20.050 mc; in step (8) it should be in the range of 22.750 mc to 23.050 mc.

(11) Turn the signal monitor GAIN control maximum counterclockwise. Turn the MARKER switch ON.

(12) Use the CENTER FREQ control to center the marker pip under the center mark.

(13) Use the SWEEP WIDTH control to expand the base of the marker pip until it is two divisions wide.

(14) Rotate the signal monitor GAIN control clockwise until the signal generator pip is the same height as the marker pip. Turn the marker off and then on again to observe the two heights.

(15) Adjust the signal generator frequency for a zero beat with the signal monitor marker.

(16) The indication on the frequency counter at zero beat should be 21.4 mc ±1.1 kc. This assures that the marker oscillator frequency is correct. Record the frequency for use in step (19).

(17) Increase the signal generator frequency until the resulting valley between the marker pip and the signal generator pip is midway between the baseline and the height of the two pips as shown in Figure 4-8.

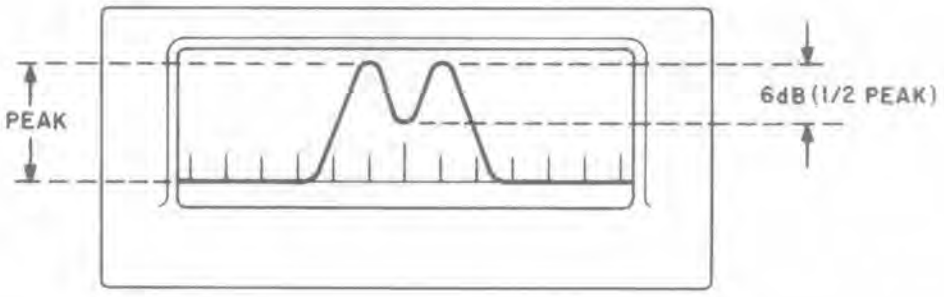


Figure 4-8. Typical Response, Signal Monitor Resolution Test

(18) Record the frequency counter indication.

(19) Subtract the frequency recorded in step (16) from the frequency recorded in step (18). This difference should be less than 20 kc. This assures that the signal monitor has the proper resolution.

(20) Reconnect cable end W14P23 to connector A5J1.

4.6.10.2 The tests in this sequence are for gain and flatness of response.

4.6.10.2.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) Heterodyne Converter, Hewlett Packard, Model 5253B

4.6.10.2.2 The tests are performed as follows:

(1) Connect the equipment as shown in Figure 4-7. Connect the signal generator RF Out to J1 on the RS-111-1B-12B.

(2) Set the receiver controls as follows:

a. SWEEP WIDTH: maximum clockwise
b. GAIN: maximum clockwise
c. MARKER: off
d. CENTER FREQ: mid-range
e. INTENSITY: for a visible trace
f. FOCUS: for a sharp trace
g. RANGE MC: 235-500
h. 235-500 mc tuner dial: 500
i. Function: AM/AGC

(3) Set the signal generator controls for a 500.00 mc cw output at a level of 2.5 μV.

(4) The height of this signal on the crt screen should be full scale or greater. This determines that the signal monitor in conjunction with the 235-500 tuner has sufficient gain.

(5) Reduce the output level of the signal generator until the signal on the crt screen is about 3/4-inch high.

(6) Vary the signal generator frequency 1.5 mc above and below 500 mc while observing the signal on the crt screen for maximum height.

(7) Set the signal generator output frequency so that the signal on the crt screen is at the maximum height observed.

(8) Set the signal generator output level for a full-scale indication on the crt.

(9) Record the signal generator output level.

(10) Vary the signal generator frequency in the range of 498.50 mc to 501.50 mc while observing the crt screen for minimum height of the input signal. Set the signal generator output frequency so that the signal on the crt screen is at the minimum height observed.

(11) Increase the signal generator output level until the maximum height of the signal on the crt screen is at full scale.

(12) Note the signal generator output level in dB. It should be a maximum of 4 dB greater than the level recorded in step (9). This assures that the signal monitor (in conjunction with the tuner stages) is sufficiently flat across its bandwidth.

4.7 ALIGNMENT AND ADJUSTMENT PROCEDURES

The following alignment procedures are suitable for making adjustments after replacing transistors or other components which could affect the alignment of a particular module or circuit. Only those controls referred to in each alignment procedure effect the alignment of that circuit. The remaining controls may be left in any position. Alignment of the receiver should be performed only with suitable test equipment by technicians thoroughly familiar with the unit. Tuner alignment, in particular, should be performed only by personnel experienced with the techniques of aligning these type circuits.

NOTE

Throughout the alignment procedures two signal generators are specified for generation of markers. If desired, a single generator can be tuned to the two marker frequencies, in turn, and the marker positions noted for use in alignment.

4.7.1 Adjustment of Tuning Drives and Tuning Dials. - Prior to the electrical alignment of any tuner, the tuning drive and dial for that tuner must first be checked for mechanical alignment. The tuning drive mechanisms use friction drive and rely on the stops of the Inductuners to halt the tuning - except in the case of the 490-1000 mc tuner. For this tuner the gear assembly itself has stops to halt the turning of the Inductuner and the gear assembly. Any tuner dial assembly that is not properly aligned should be adjusted according to the corresponding procedure as follows.

4.7.1.1 30-60 mc Tuning Drive Mechanical Check and Adjustment Procedures.

Proceed as follows:

(1) Rotate the tuning dial fully clockwise.

(2) The second mark past 62 should be under the dial window hairline. If it is not, proceed to step (3).

(3) Release the allen head set screws on each side of the coupler located between the tuning drive shaft and the Inductuner shaft.

(4) Rotate the Inductuner shaft to the maximum clockwise position.

(5) Turn the dial knob until the second mark above 62 is under the hairline.

(6) Retighten the allen head set screws on the coupler.

(7) Check the operation by turning the dial crank counterclockwise until the Inductuner and dial no longer turn. On the dial, the second mark below 30 should be under the hairline.

4.7.1.2 60-300 mc Tuning Drive Mechanical Check and Adjustment Procedure.

Proceed as follows:

(1) Rotate the tuning dial fully clockwise.

(2) The mark just past 300 should be under the dial window hairline. If it is not, proceed to step (3).

(3) Release the allen head set screws on each side of the coupler located between the gear train shaft and the Inductuner shaft.

(4) Rotate the Inductuner shaft to the maximum clockwise position.

(5) Turn the dial knob until the mark just past 300 is under the hairline.

(6) Retighten the allen head set screws on the coupler.

(7) Check the operation by turning the dial crank counterclockwise until the Inductuner and dial no longer turn. The mark just before 60 should now be under the hairline.

4.7.1.3 235-500 mc Tuning Drive Mechanical Check and Adjustment Procedure.

Proceed as follows:

(1) Rotate the tuning dial fully clockwise.

(2) The mark just past 500 should be under the dial window hairline. If it is not, proceed to step (3).

(3) Release the allen head set screws on each side of the coupler located between the tuning drive shaft and the Inductuner shaft.

(4) Rotate the Inductuner shaft to the maximum clockwise position.

(5) Turn the dial knob until the mark just past 500 is under the dial window hairline.

(6) Retighten the allen head set screws on the coupler.

(7) Check the operation by turning the dial crank counterclockwise until the Inductuner shaft and dial no longer turn. The dial should now read at the fifth mark before 235.

4.7.1.4 490-1000 mc Tuning Drive Mechanical Check and Adjustment Procedure.

Proceed as follows:

(1) Rotate the tuning dial fully clockwise.

(2) The mark just past 490 should be under the dial window hairline. If it is not, proceed to step (3).

(3) Release the allen head set screws on each side of the coupler located between the tuning drive shaft and the Inductuner shaft.

(4) Rotate the Inductuner shaft to the maximum counterclockwise position.

(5) Turn the dial knob until the mark just past 490 is under the dial window hairline.

(6) The tuning drive stop pin should be against its stop at this time. Refer to items 21 and 39 in Figure 5-44 for a view of these two items.

(7) Retighten the allen head set screws on the coupler.

(8) Check the operation by turning the dial crank clockwise until the Inductuner shaft and the dial no longer turn. The dial should now read midway between 1000 and the mark just past 1000.

4.7.2 20/75/300-kc IF Amplifier Alignment. - The steps in this procedure include information for alignment of the discriminator stage and the 20/75/300-kc amplifier stages. To remove the 20/75/300-kc IF Amplifier from the chassis, raise the hinged Signal Monitor assembly to a vertical position. Use masking tape to hold the assembly in this position. Then remove the coaxial cables from A8J1, A8J2, and A8J3. Also, unplug the multipin connector from J7 on the main deck. Remove the four screws holding the IF Assembly to the rear panel and, by rotating it, lift the Amplifier out of the chassis. To reinstall the Amplifier in the chassis, simply reverse this procedure.

4.7.2.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Signal Generator, Hewlett Packard, Model 608E (two required)*

(4) Frequency Counter, Hewlett Packard, Model 5245L

4.7.2.2 The discriminator alignment is performed as follows:

(1) Remove the 20/75/300-kc IF amplifier assembly from the chassis. Reconnect multipin plug A8P1 to jack J7 on the main chassis.

(2) Remove the two bottom plates from the 20/75/300-kc amplifier.

(3) Remove transistor Q8 from its socket.

(4) Connect the equipment as shown in Figure 4-9.

(5) Set the receiver function switch to AM/MAN.

(6) Rotate the receiver RF GAIN control maximum clockwise.

(7) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 2.0 V/CM

b. HORIZONTAL INPUT: 1.0 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disable

d. VERTICAL POSITION: for baseline on X axis

* See note in paragraph 4.7.

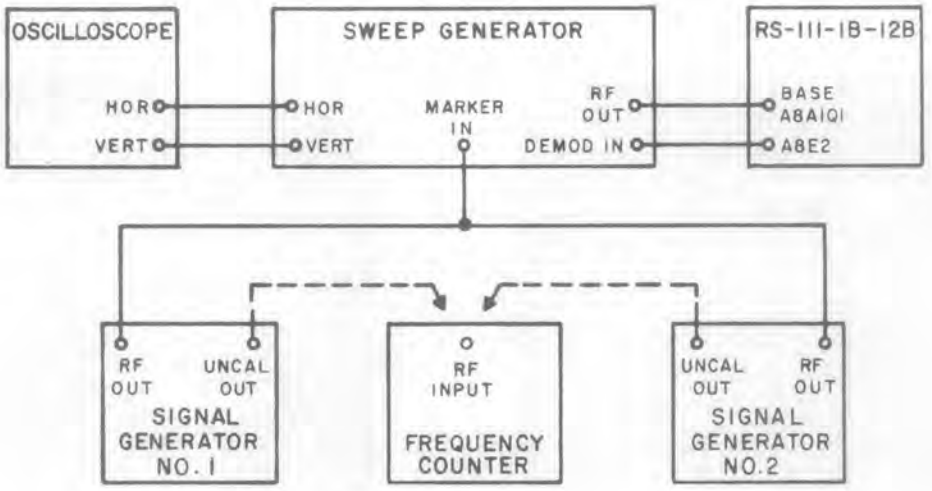


Figure 4-9. Test Setup, 20/75/300-kc IF Amplifier Alignment

(8) Set the sweep generator controls as follows:

a. BAND: 1 (for a 21.4 mc center frequency output)

b. CENTER FREQ: to approximately 21.4 mc

c. SWEEP WIDTH: to approximately 1.0 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(9) Tune signal generator No. 1 to 21.050 mc. Adjust the output level for a convenient marker size on the oscilloscope.

(10) Set the output frequency of signal generator No. 2 to 21.750 mc. Adjust the output level for a convenient marker size on the oscilloscope.

(11) Readjust the controls on the sweep generator to display the markers and response on the oscilloscope.

(12) Adjust A8A1L3 for amplitude symmetry. The 700-kc markers should appear at the peaks of the response.

(13) Tune signal generator No. 2 to 21.40 mc.

(14) Adjust A8A1T1 so that the 21.40 mc marker is on the baseline.

(15) Tune signal generator No. 2 to 21.750 mc. Repeat setp (12); then perform step (16).

(16) Repeat steps (12) through (15) until the response on the oscilloscope resembles Figure 4-10.

(17) Replace transistor Q8 in its socket.

4.7.2.3 The 300-kc portion of the IF amplifier alignment is performed as follows:

(1) The equipment should be left connected as in step (17) of procedure 4.7.2.2 except:

a. Connect the sweep generator output to the junction of L13 and C55.

b. Connect the sweep generator Demod In cable to A8E1.

(2) Tune signal generator No. 1 to 21.4 mc. Adjust the output level for a convenient marker size on the oscilloscope.

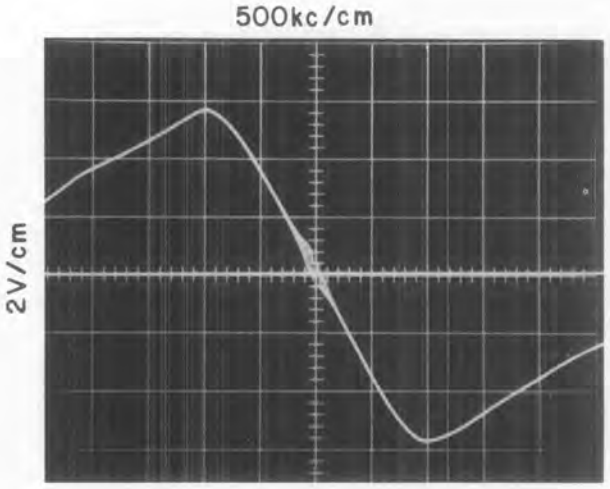


Figure 4-10. Typical Response, 20/75/300-kc IF Amplifier FM Discriminator Stage

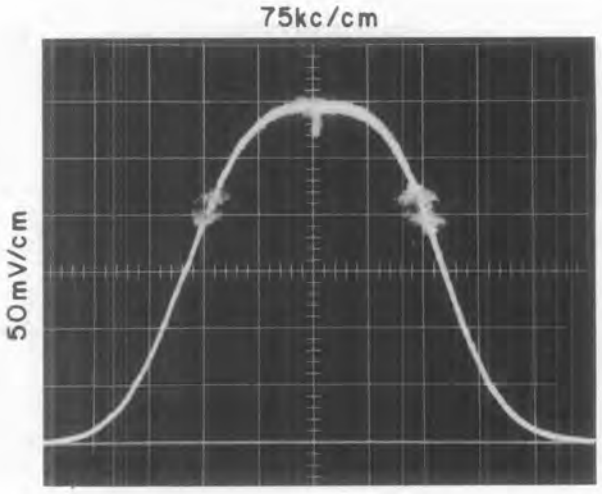


Figure 4-11. Typical Response, 300-kc IF Amplifier Stage

(3) Set the output level of signal generator No. 2 to less than -80 dBm. (This prevents a marker from being generated by this generator.)

(4) Adjust the sweep generator controls to display the response on the oscilloscope.

(5) Adjust coils L15 and L16 for a symmetrical response of maximum amplitude centered on the 21.40 mc marker.

(6) Connect the sweep generator RF Output to A8J7.

(7) Set the IF BANDWIDTH switch to 300 KC.

(8) In the order given, adjust coils L13, L12, L10, L9, L5 and L4 for a symmetrical response or maximum gain centered on the 21.40-mc marker. Refer to Figure 4-11 for a typical response.

(9) Tune signal generator No. 1 to 21.250 mc. Adjust the output level for a convenient marker size.

(10) Tune signal generator No. 2 to 21.550 mc. Adjust the output level for a convenient marker size.

(11) Reduce the sweep generator output level 3 dB by use of the vernier attenuator.

(12) Observe the level of the waveform peak. This level is the 3 dB reference level.

(13) Increase the sweep generator output level 3 dB by use of the vernier attenuator.

(14) The 21.250 mc and 21.550 mc markers should now be at the 3 dB reference level established in step (12).

(15) Repeat steps (8) through (14) until the response is correct.

4.7.2.4 The 75-kc portion of the IF amplifier alignment is performed as follows:

(1) The equipment should be left connected as in the last step of the previous procedure-except set generator No. 1 to 21.400 mc and disconnect generator No. 2.

(2) Set the IF BANDWIDTH switch to 75 KC.

(3) Set the sweep generator controls to obtain the marker and response display.

(4) Adjust coils L2 and L6 to obtain a response similar to Figure 4-12.

Figure 4-12
Figure 4-13

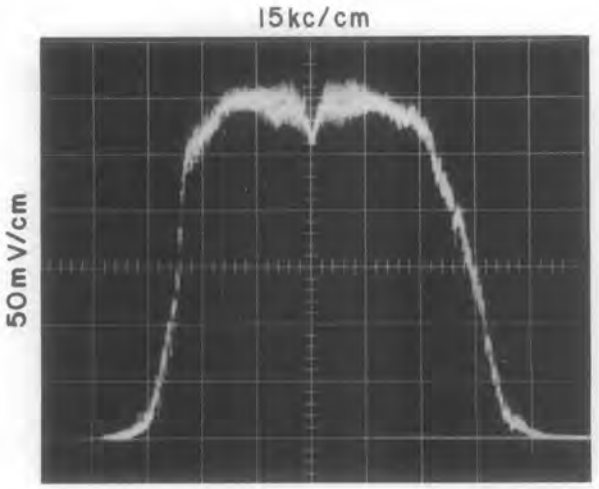


Figure 4-12. Typical Response, 75-kc IF Amplifier Stage

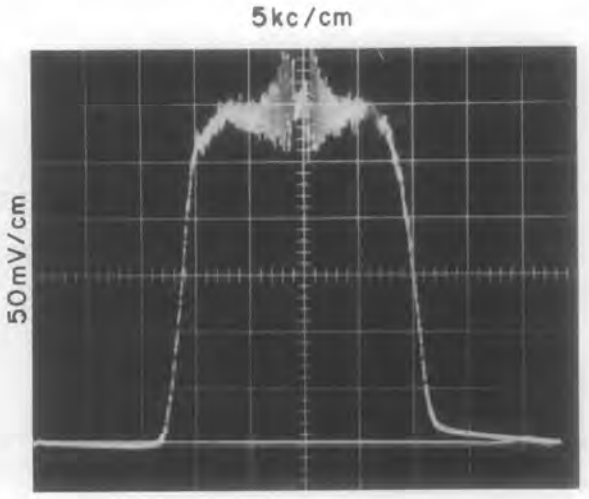


Figure 4-13. Typical Response, 20-kc IF Amplifier Stage

4.7.2.5 The 20-kc portion of the IF amplifier alignment is performed as follows:

(1) The equipment should be left connected as in step (4) of the previous procedure.

(2) Set the IF BANDWIDTH switch to 20 KC.

(3) Set the sweep generator controls to obtain the marker and response display.

(4) Adjust coils L7 and L3 to obtain a response similar to Figure 4-13.

4.7.3 2 mc IF Amplifier Alignment. - The steps in this procedure include information for the alignment of the discriminator stage and the amplifier stages. The amplifier stages should be given a final touch up alignment in conjunction with the tuners according to the procedures in paragraph 4.7.10. Access to the bottom covers of the 2 mc IF amplifier requires the removal of the 20/75/300-kc IF amplifier from the receiver. Refer to paragraph 4.7.2 for instructions on removing this IF amplifier.

4.7.3.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Signal Generator, Hewlett Packard, Model 608E (two required)*

(3) Oscilloscope, Tektronix, Model 503

(4) Frequency Counter, Hewlett Packard, Model 5245L

(5) Power Supply, Hewlett Packard, Model 6206B

(6) VTVM, RCA, Model WV-98C

(7) RF Detector, Telonic, Model XD-3A

4.7.3.2 The discriminator alignment is performed as follows:

(1) Remove the 20/75/300-kc IF amplifier from the receiver chassis.

(2) Remove the bottom covers from the 2 mc IF amplifier.

(3) Connect the equipment as shown in Figure 4-14 — except the power supply and voltmeter are not required.

* See note in paragraph 4.7

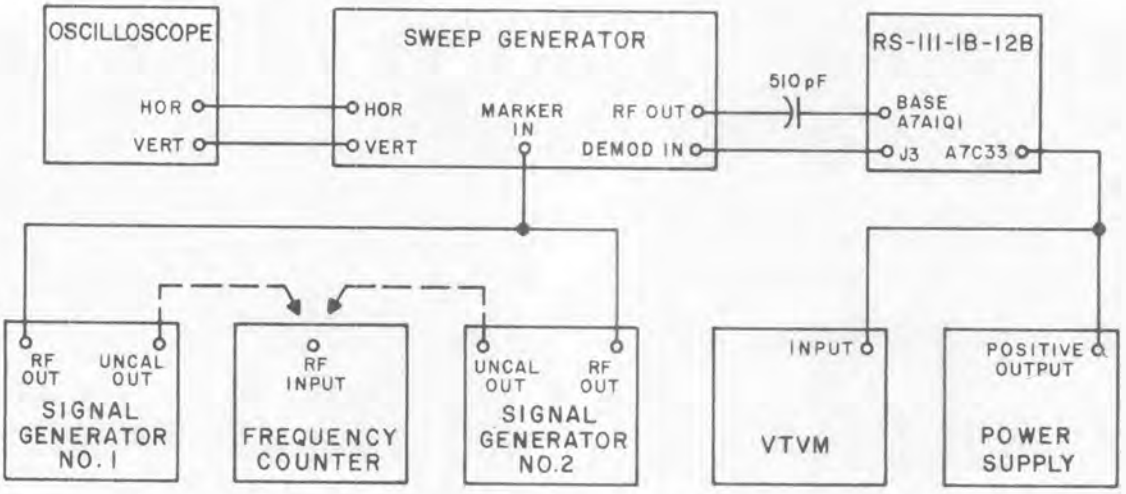


Figure 4-14. Test Setup, 2-mc IF Amplifier Alignment

(4) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 0.5 V/CM, +, DC

b. HORIZONTAL INPUT: 1.0 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep disable

d. VERTICAL POSITION: for baseline on X axis

(5) Set the sweep generator controls as follows:

a. BAND: 1 (for a 21.4 mc center frequency output)

b. CENTER FREQ: to approximately 21.4 mc

c. SWEEP WIDTH: to approximately 6 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(6) Set the output frequency of signal generator No. 1 to 20.40 mc. Adjust the output level for a convenient marker size on the oscilloscope.

(7) Set the output frequency of signal generator No. 2 to 22.40 mc. Adjust the output level for a convenient marker size on the oscilloscope.

(8) Readjust the controls on the sweep generator to display the markers and waveform on the oscilloscope.

(9) Adjust A7A1L3 for amplitude symmetry. The 2-mc markers should appear at the peaks of the response.

(10) Set signal generator No. 2 to 21.40 mc.

(11) On the receiver, adjust A7A1T1 so that the 21.40 mc marker is on the base line.

(12) Return signal generator No. 2 to 22.90 mc. Readjust A7A1T1.

(13) Repeat steps (9) through (12) until the response on the oscilloscope resembles Figure 4-15.

Figure 4-15
Figure 4-16

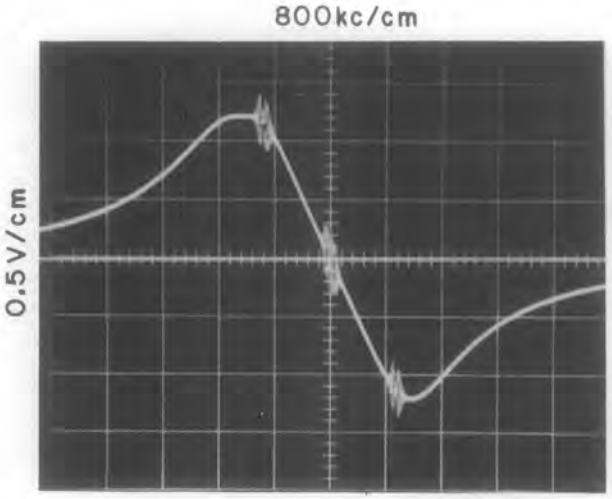


Figure 4-15. Typical Response, 2-mc IF Amplifier FM Discriminator Stage

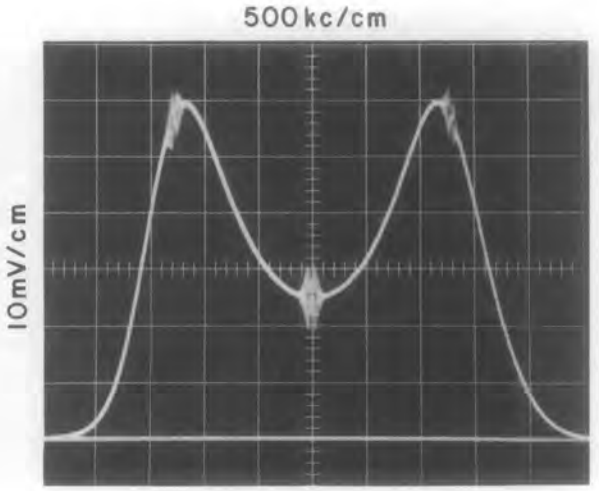


Figure 4-16. Typical Response, 2-mc IF Amplifier

4.7.3.3 The IF stages alignment is performed as follows:

(1) Leave the equipment connected as in the previous procedure—except:

a. Connect the sweep generator RF Output to A7J1 of the receiver. (Remove the interconnecting cable from A1J3 and couple to the cable end.)

b. Connect the Demod In of the sweep generator to the wide band IF output, J23. Insert the 50 ohm detector in the line.

c. Connect the power supply and voltmeter as shown in Figure 4-14. Set the voltage to +4.0 V dc.

(2) Set signal generator No. 1 to 20.4 mc.

(3) Set signal generator No. 2 to 22.4 mc.

(4) Set the sweep generator frequency controls and the output level controls to display the markers and waveform response on the oscilloscope.

(5) In the order given, adjust coils L9, L8, L6, L5, L3 and L2 for maximum amplitude and symmetrical response centered on 21.4 mc. Refer to Figure 4-16 for a typical response.

(6) Reduce the output level of the sweep generator 5 dB by use of the vernier attenuator.

(7) Observe the level of the response peaks. This level is the 5 dB reference level

(8) Increase the output level of the sweep generator 5 dB by use of the vernier attenuator.

(9) The valley in the response center should now be no more than 1 dB below the 5 dB reference level.

(10) Repeat steps (5) through (9) until the response is correct.

4.7.4 60-21.4 mc Converter Alignment. - The initial alignment of the 60-21.4 mc converter is described in the following procedure. Refer to paragraph 4.7.9 for the "overall" alignment procedure of the converter in conjunction with the 235-500 tuner and the 490-1000 tuner.

4.7.4.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Signal Generator, Hewlett Packard, Model 608E

(4) Frequency Counter, Hewlett Packard, Model 5245L

(5) Bias Supply (see Figure 4-17)

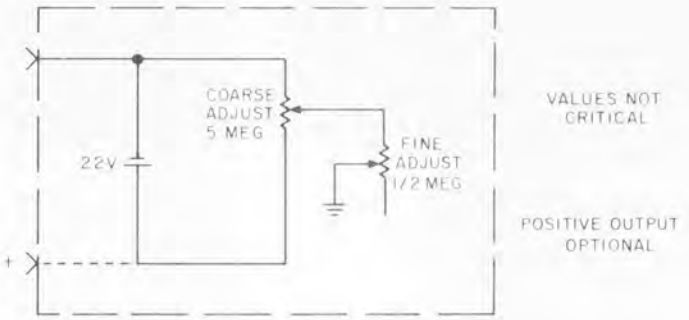


Figure 4-17. Bias Supply Schematic Diagram

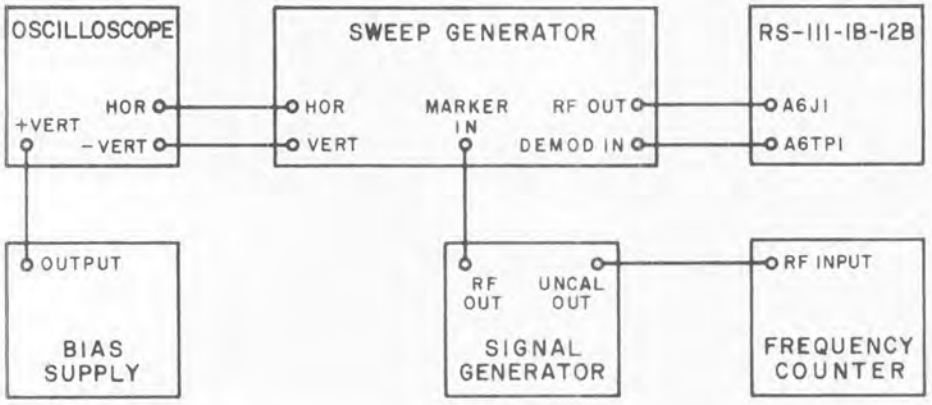


Figure 4-18. Test Setup, 60-21.4 mc Converter Alignment

4.7.4.2 The alignment is performed as follows:

(1) Connect the equipment as shown in Figure 4-18

(2) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 50 mV/CM, -, DC

b. HORIZONTAL INPUT: 1.0 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disable

d. VERTICAL POSITION: for baseline near bottom of crt.

(3) Set the sweep generator controls as follows:

a. BAND: 1 (for a 60 mc center frequency output)

b. CENTER FREQ: to approximately 60 mc

c. SWEEP WIDTH: to approximately 8 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(4) Set the receiver controls as follows:

a. RANGE MC: 235-500

b. FUNCTION: AM/MAN

c. RF GAIN: maximum clockwise

(5) Tune the signal generator to 60.0 mc cw. Adjust the output level for a convenient marker size throughout the following procedure.

(6) Readjust the controls on the sweep generator to display the marker and the response on the oscilloscope.

(7) Adjust A6L1 for a response centered on the 60.0 mc marker.

(8) Adjust A6L3 and A6L4 for a maximum amplitude double-tuned response centered on the 60.0 mc marker. Refer to Figure 4-19 for a typical response.

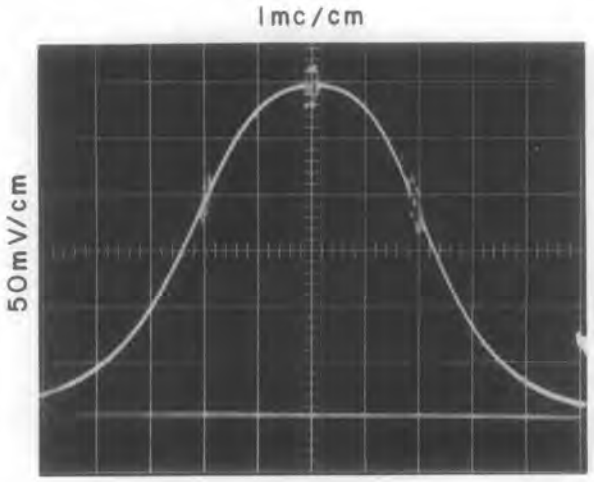


Figure 4-19. Typical Response, 60-21.4 mc Converter

(9) Move the cable on A6J1 to A6J2.

(10) Set the RANGE MC switch on the receiver to 490-1000.

(11) Adjust A6L2 for a peaked response centered on the 60.0 mc marker as in step (8).

(12) Refer to paragraph 4.7.9 for the "overall" alignment procedure of the converter in conjunction with the 235-500 tuner and the 490-1000 tuner.

4.7.5 30-60 mc Tuner Alignment. - This paragraph provides alignment instructions for the oscillator stage, the interstage, and the rf stage. The mixer output network is aligned in conjunction with the 2 mc IF amplifier. That procedure is given in paragraph 4.7.10.

4.7.5.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Frequency Counter, Hewlett Packard, Model 5245L

(4) Heterodyne Converter, Hewlett Packard, Model 5253B

(5) VTVM, RCA, Model WV-98C

(6) RF Detector, Telonic, Model XD-3A

(7) Bias Supply (see Figure 4-17)

4.7.5.2 The oscillator stage alignment is performed as follows:

(1) Check the tuning drive for correct mechanical adjustment according to the instructions given in paragraph 4.7.1.1.

(2) Connect the equipment as shown in Figure 4-20 with the counter connected to A13J3.

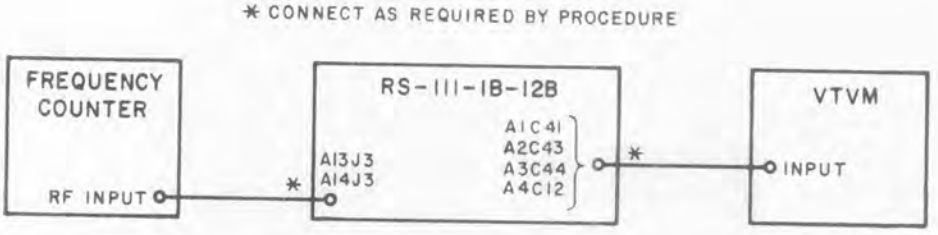


Figure 4-20. Test Setup, Tuner Oscillator Stage Alignment

(3) Set the receiver controls as follows:

a. RANGE MC: 30-60

b. 30-60 MC dial: as required by procedure

c. BFO TUNING: mid-range

d. FINE TUNING: for +8.0 V dc at A1C41

(4) Set the 30-60 dial to 30.

(5) Adjust C27 for an indication on the frequency counter in the range of 29.70 mc to 30.30 mc.

(6) Set the 30-60 dial to 60.

(7) Adjust the turns spacing of L6 for an indication on the frequency counter in the range of 59.4 mc to 60.60 mc.

(8) Repeat steps (4) through (7) until no further adjustments are required.

4.7.5.3 The interstage alignment is performed as follows:

(1) Carefully unsolder C4 from C3. In the next step the RF Out of the sweep generator should be connected to the free end of C4. Also, a short direct connection of the coax cable shield should be made to the tuner chassis.

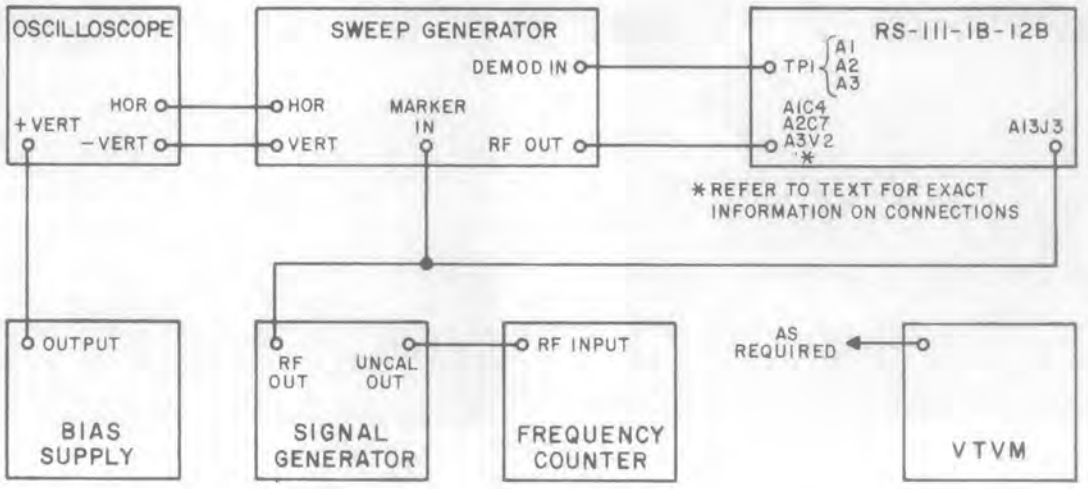


Figure 4-21. Test Setup, Tuners Interstage Alignment

(2) Connect the equipment as shown in Figure 4-21.

(3) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 10 mV/CM, -, DC

b. HORIZONTAL INPUT: 1V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disable

d. VERTICAL POSITION: for baseline near bottom of crt

(4) Set the sweep generator controls as follows:

a. BAND: 1 (for a 30 mc center frequency output)

b. CENTER FREQ: to approximately 30 mc

c. SWEEP WIDTH: to approximately 6 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(5) Set the output frequency of the signal generator to 21.40 mc; set the output level for a convenient marker size on the oscilloscope.

(6) Set the receiver controls as follows:

a. RANGE MC: 30-60

b. 30-60 MC dial: as required

c. Function: AM/MAN

d. RF GAIN: for 1.5 V dc at A1C38

e. BFO TUNING: mid-range

f. FINE TUNING: for 8.0 V dc at A1C41

(7) Tune the 30-60 mc dial to 30.

(8) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

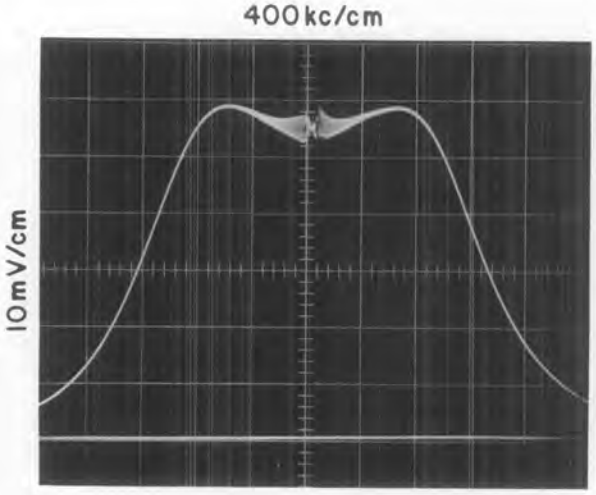


Figure 4-22. Typical Response, 30-60 mc Tuner Interstage and RF Responses

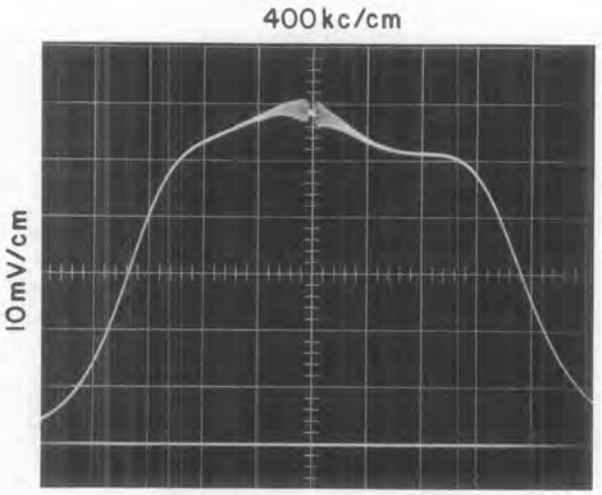


Figure 4-23. Typical Response, 30-60 mc Tuner RF Stage, 30 mc Response

(9) Adjust C13 and C15 for a double-tuned response centered on the 30 mc marker as shown in Figure 4-22.

(10) Check for correct tuning by adjusting each capacitor in turn and noting that in both cases the marker is at maximum amplitude.

(11) Tune the 30-60 MC dial to 60.

(12) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(13) Adjust the wide-spaced turns of inductors L3 and L4 for a double-tuned response centered on the 60 mc marker.

(14) Position L3 and L4 relative to each other to obtain an overcoupled response as shown in Figure 4-22. (Responses for 30 mc and 60 mc similar.)

(15) Repeat steps (7) through (14) until the responses appear as shown.

(16) Tune the dial from 30 to 60 mc while observing the marker. At no time should it travel down either skirt more than 1 dB.

(17) Disconnect the sweep generator lead from C4. Then solder C4 neatly to C3.

4.7.5.4 RF stage alignment information is provided in this paragraph. If this alignment is being performed after the interstage alignment in the preceding paragraph it should be noted that the equipment setup and conditions are nearly identical to those required for this procedure. Proceed as follows:

(1) Perform steps (2) through (8) of paragraph 4.7.5.3 except the sweep generator RF Out should be connected to J1 of the RS-111-1B-12B.

(2) Adjust C3 for a response similar to that shown in Figure 4-23.

(3) Tune the 30-60 MC dial to 60.

(4) Set the sweep generator controls to sweep 60 mc so that the marker and the responses are displayed on the oscilloscope.

(5) Adjust the turns on L1 for a double-tuned symmetrical response.

(6) The response should be similar to that shown in Figure 4-22.

(7) Tune the 30-60 MC dial to 30.

(8) Set the sweep generator controls to sweep 30 mc so that the marker and the response are displayed on the oscilloscope.

(9) Repeat steps (2) through (8) until the two responses are optimized.

4.7.6 60-300 mc Tuner Alignment. - This paragraph provides information for alignment of the various stages of the tuner.

4.7.6.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Frequency Counter, Hewlett Packard, Model 5254L

(4) Heterodyne Converter, Hewlett Packard, Model 5253B

(5) Heterodyne Converter, Hewlett Packard, Model 5254C

(6) VTVM, RCA, Model WV-98C

(7) RF Detector, Telonic, Model XD-3A

(8) Bias Supply (see Figure 4-17)

4.7.6.2 The oscillator stage alignment is performed as follows:

(1) Check the tuning drive for correct mechanical adjustment according to the instructions given in paragraph 4.7.1.2.

(2) Connect the equipment as shown in Figure 4-20.

(3) Set the receiver controls as follows:

a. RANGE MC: 60-300

b. 60-300 MC dial: as required by procedure

c. BFO TUNING: mid-range

d. FINE TUNING: for +8.0 V dc at A2C43

(4) Set the dial to 100. 200

(5) Adjust C29 for a reading of 121.40 on the frequency counter. If this is not possible continue to step (6).

(6) Set the tuner dial to 60.

(7) Adjust the turns spacing of L9 for a reading of 81.40 mc on the frequency counter.

(8) Set the tuner dial to 100.

(9) Adjust C29 for a reading of 121.40 mc on the frequency counter. If this is not possible proceed to step (10)—otherwise continue with step (12).

(10) If C29 is at its minimum capacitance replace C26 with the next smaller value. If C29 is at its maximum capacitance replace C26 with the next larger value.

(11) Repeat steps (6) through (10) until C29 can be adjusted for a 121.40 mc indication on the frequency counter.

(12) Set the tuner dial to 300.

(13) Adjust the physical positioning of capacitor C26 to obtain an indication of 321.40 mc on the frequency counter. (On some units it may be necessary to unsolder the capacitor from L11 and to resolder it to a slightly different position.)

(14) Repeat the procedure beginning with step (4) until no further adjustments are required.

4.7.6.3 Interstage alignment information is provided in this paragraph. Proceed as follows:

(1) Connect the equipment as shown in Figure 4-21; unsolder C7 from L3 for the rf connection.

(2) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 10 mV/CM, -, DC

b. HORIZONTAL INPUT: 1.0 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disable

d. VERTICAL POSITION: for baseline near bottom of crt

(3) Set the sweep generator controls as follows:

a. BAND: 1 (for a 100 mc center frequency output)

b. CENTER FREQ: to approximately 100 mc

c. SWEEP WIDTH: to approximately 6 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(4) Set the signal generator frequency to 21.4 mc; set the level for a convenient marker.

(5) Set the receiver controls as follows:

a. RANGE MC: 60-300

b. 60-300 MC dial: as required

c. Function: AM/MAN

d. RF GAIN: maximum clockwise

e. BFO TUNING: mid-range

f. FINE TUNING: for +8.0 V dc at A2C43

(6) Set the 60-300 MC dial to 100.

(7) Readjust the sweep generator controls for a convenient marker and response display.

(8) Adjust C11 and C18 for an overcoupled response with the marker as shown in Figure 4-24.

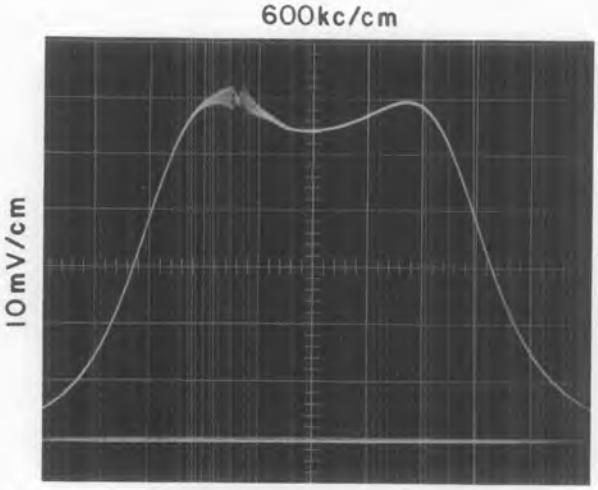


Figure 4-24. Typical Response, 60-300 mc Tuner Interstage/RF Stage, 100 mc Response

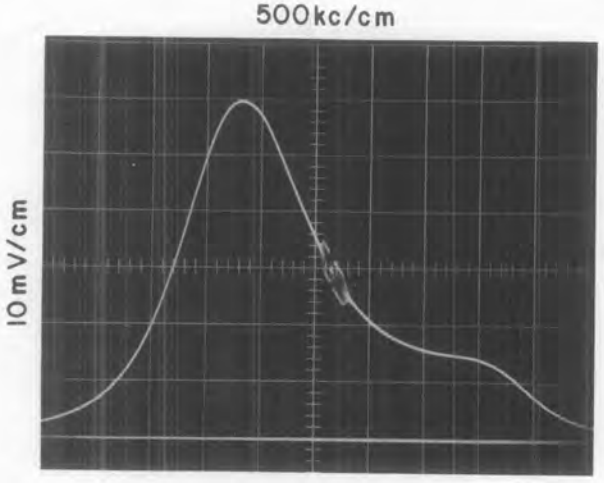


Figure 4-25. Typical Response, 60-300 mc Tuner Interstage, 60 mc Response

(9) Tune the 60-300 MC dial to 60.

(10) Set the sweep generator controls to sweep 60 mc so that the marker and the response are displayed on the oscilloscope

(11) Adjust C15 for a response similar to Figure 4-25 with the marker positioned as shown. This capacitor should not require readjustment.

(12) Repeat steps (6) through (8). Then continue with step (13).

(13) Set the 60-300 MC dial to 200.

(14) Note the marker position. It should be positioned as shown in Figure 4-26. If it is not, the response must be shifted to place the marker as shown. Note the direction the RESPONSE must move. Then proceed to step (15) for the procedure to move the response.

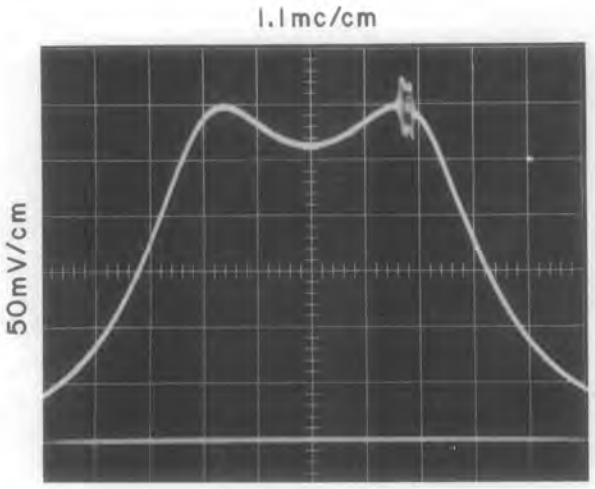


Figure 4-26. Typical Response, 60-300 mc Tuner Interstage, 200 mc Response

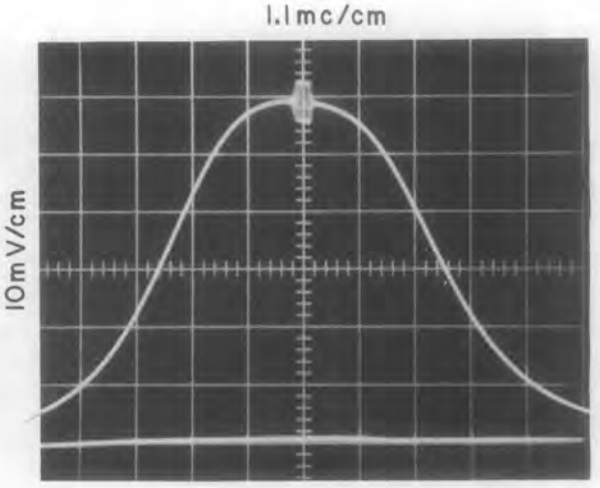


Figure 4-27. Typical Response, 60-300 mc Tuner Interstage, 300 mc Response

(15) Set the 60-300 MC dial to 100.

(16) Readjust the controls of the sweep generator to display the marker and the waveform on the oscilloscope.

(17) Adjust C11 and C18 to shift the response a slight amount in the direction required by step (14).

(18) Repeat steps (13) through (17) until the 200 mc response appears as in Figure 4-26 with the marker in the position shown.

(19) Set the 60-300 MC dial to 300.

(20) Readjust the sweep generator controls to display the marker and the response on the oscilloscope.

(21) Compare the response with that shown in Figure 4-27. Read the three conditions listed in this step. Then proceed to step (22).

a. If the marker is to the left, L6 needs more inductance.

b. If the marker is to the right, L6 needs less inductance.

c. If the marker is near the center of the response adjust C11 a slight amount to obtain a peaking action of the response. If C11 was turned clockwise to obtain a peaking action L6 needs more inductance. If C11 was turned counterclockwise to obtain a peaking action L6 needs less inductance.

(22) Set the 60-300 MC dial to 100.

(23) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(24) Note the response and the marker position.

(25) Adjust L6 a slight amount for the inductance change determined in step (21) and note the shift in the response.

(26) Adjust C11 to return the response to the condition noted in step (24).

(27) Set the 60-300 MC dial to 300.

(28) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(29) Note the response. It should now resemble Figure 4-27 more closely than in previous steps.

(30) Repeat steps (21) through (29) to improve the response.

(31) For step (32) set the 60-300 MC dial to 300 and readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(32) Compare the response with that shown in Figure 4-27. Read the three conditions listed in this step. Then proceed to step (33) to adjust L8.

a. If the marker is to the left L8 needs more inductance.

b. If the marker is to the right L8 needs less inductance.

c. If the marker is near the center of the response adjust C18 a slight amount to obtain a peaking action of the response. If C18 was turned clockwise to obtain a peaking action L8 needs more inductance. If C18 was turned counterclockwise to obtain a peaking action L8 needs less inductance.

(33) Set the 60-300 MC dial to 100.

(34) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(35) Note the response and the marker position.

(36) Adjust L8 a slight amount for the inductance change determined in step (32) and note the shift in the response.

(37) Adjust C18 to return the response to the condition noted in step (35).

(38) Set the 60-300 MC dial to 300.

(39) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(40) Note the response. It should now resemble Figure 4-27. If not, repeat steps (19) through (39) until the 100 mc and 300 mc responses are like those shown in their respective photographs Figures 4-24 and 4-27 respectively.

(41) As a check on proper tuning of the two circuits (C11, L6 and C18, L8) at 300 mc, adjust C11 and C18 back and forth a slight amount and observe the response. In both cases it should "rock" on the marker. If either capacitor tends to peak the response, repeat the adjustments of steps (19) through (39) until the proper "rocking" action is obtained.

(42) As a final check on the interstage adjustments, tune the 60-300 MC dial from 60 to 300 while tracking with the sweep generator. At no time should the marker drop down on either skirt more than 0.5 dB.

(43) Reconnect C7 to the junction of L4 and L3.

4.7.6.4 RF stage alignment information is provided in this paragraph. If this alignment is being performed after the interstage alignment procedure in the preceding paragraph, note that the equipment setup and conditions are nearly identical to those required for that procedure. Proceed as follows:

(1) Perform steps (1) through (7) of paragraph 4.7.6.3—except in step (1), the sweep generator output should be connected to J1 of the RS-111-1B-12B.

(2) Adjust C5 for a symmetrical response as shown in Figure 4-28.

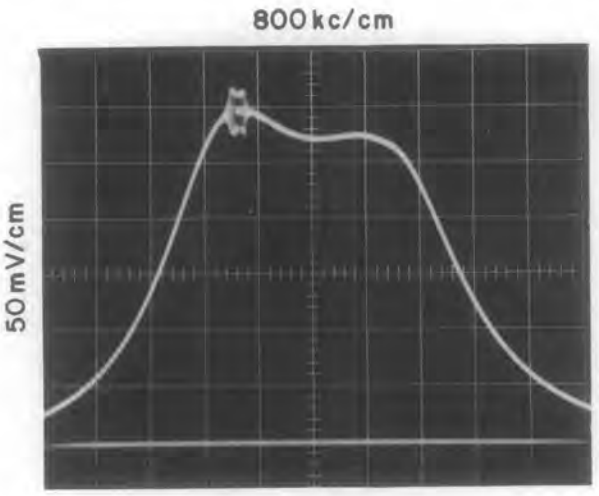


Figure 4-28. Typical Response, 60-300 mc Tuner RF Stage, 100 mc Response

4.7.7 235-500 mc Tuner Alignment. - This paragraph provides alignment instructions for the oscillator stage and the interstage/rf stages of the tuner.

4.7.7.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Frequency Counter, Hewlett Packard, Model 5245L

(4) Heterodyne Converter, Hewlett Packard, Model 5253B

(5) Heterodyne Converter, Hewlett Packard, Model 5254C

(6) Signal Generator, Hewlett Packard, Model 612A

(7) VTVM, RCA, Model WV-98C

(8) RF Detector, Telonic, Model XD-3A

(9) Bias Supply (see Figure 4-17)

4.7.7.2 The oscillator stage alignment is performed as follows:

(1) Check the tuning drive for correct mechanical adjustment according to the instructions given in paragraph 4.7.1.3.

(2) Connect the equipment as shown in Figure 4-20.

(3) Set the receiver controls as follows:

a. RANGE MC: 235-500

b. 235-500 MC dial: as required by procedure

c. BFO TUNING: mid-range

d. FINE TUNING: for +8.0 V dc at A3C44

(4) Set the 235-500 dial to 500.

(5) Adjust C39 for an indication on the frequency counter in the range of 495 mc to 505 mc.

(6) Set the tuner dial to 235.

(7) Adjust the turns spacing of L16 for an indication on the frequency counter in the range of 232.65 mc to 237.35 mc.

(8) Repeat steps (4) through (7) until the conditions of steps (5) and (7) are met with no further adjustments required.

(9) Set the tuner dial to 270.

(10) The frequency counter indication should be in the range of 266.3 mc to 273.7 mc.

(11) If the requirement of step (10) is not met the point where capacitor C36 is soldered to the Inductuner tab should be changed to a slightly different position.

(12) Repeat steps (4) through (11) until all conditions are met with no further adjustments required.

4.7.7.3 Figure 4-29 shows several inductor configurations used in this tuner. Their adjustment procedures are explained here:

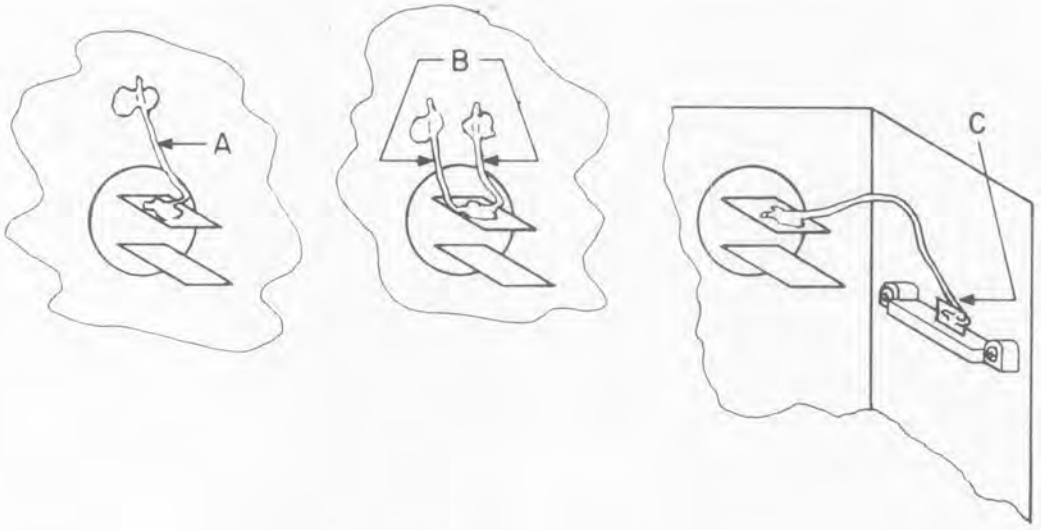


Figure 4-29. Inductor Configurations, 235-500 mc Tuner

a. Inductor L8 is an "L" shaped piece of #20 bus wire soldered to Inductuner section L3C and ground. This inductor is tuned by varying the length of the bus wire between the Inductuner tab and ground. To do this either press more of the bus wire down onto the ground at point A or, conversely, lift a portion of it off the ground at point A.

b. Inductor L13 is similar to L8; however, it is "U" shaped. The adjustment procedure for this inductor, therefore, consists of changing the length of two sections of bus wire. This is done by either pressing down or lifting up the bus wire at points B.

c. Inductors L7 and L12 each consist of a length #20 bus wire containing a "U" shaped bend. These wires are routed between their respective Inductuner tabs and tube sockets. This type of inductor also is adjusted by varying the length of the bus wire. To do this unsolder the wire from the tube socket at "C". Then either wrap or unwrap a portion of the wire on the tube pin before resoldering the connection. The resulting change in length provides the inductance change.

4.7.7.4 The interstage alignment is performed as follows:

(1) Unsolder C14 from the tube pin of V2. Capacitor C14 will be reconnected to the pin of V2 in the following steps.

(2) In the next step connect the sweep generator RF Out to the tube pin of V2. Use a 510 pF capacitor with short leads for the connection. Also, the ground shield connection to the tuner chassis must be as direct as possible.

(3) Connect the equipment as shown in Figure 4-21.

(4) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 10 mV/CM, -, DC

b. HORIZONTAL INPUT: 1 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disabled

d. VERTICAL POSITION: for baseline near bottom of crt.

(5) Set the sweep generator controls as follows:

a. BAND: 1 (for a 260 mc center frequency output)

b. CENTER FREQ: to approximately 260 mc

c. SWEEP WIDTH: to approximately 6 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(6) Set the output frequency of the signal generator to 60.0 mc; set the output level for a convenient marker size on the oscilloscope.

(7) Set the receiver controls as follows:

a. RANGE MC: 235-500

b. 235-500 MC dial: as required

c. Function: AM/MAN

d. BFO TUNING: to mid-range

e. FINE TUNING: for +8.0 V dc at A3C44

(8) Tune the 235-500 dial to 260.

(9) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(10) Adjust capacitors C17 and C24 for an overcoupled response with the 260 mc marker positions as shown in Figure 4-30. Also the response should be 4 mc wide at the peaks.

(11) Tune the 235-500 MC dial to 500.

(12) Set the sweep generator controls to sweep 500 mc so that the marker and the response are displayed on the oscilloscope.

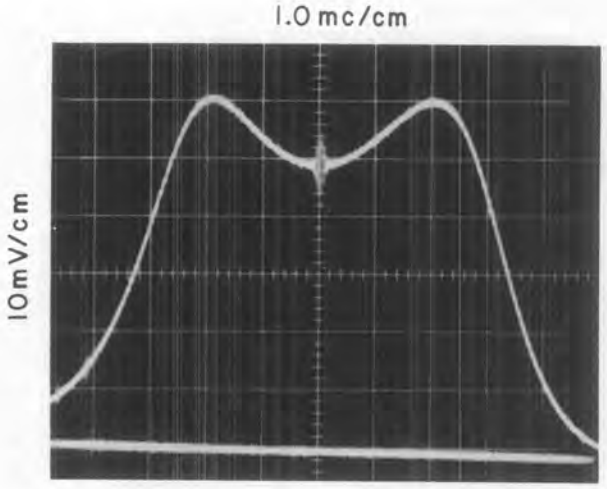


Figure 4-30. Typical Response, 235-500 Tuner Interstage and RF Stage, 260 mc Response

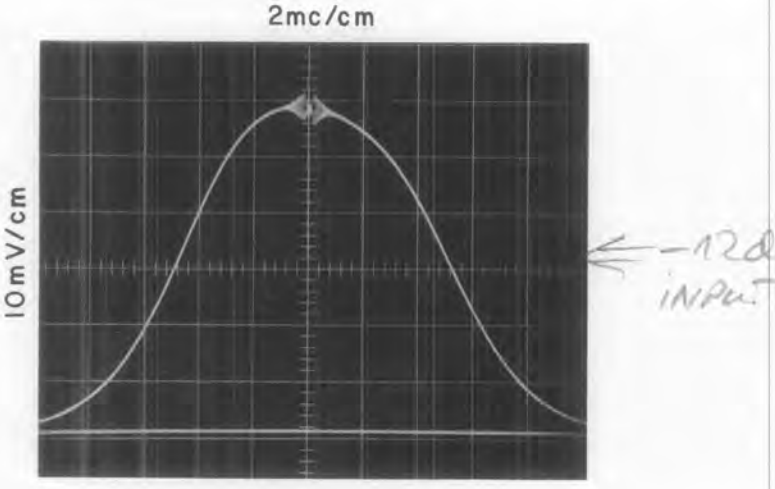


Figure 4-31. Typical Response, 235-500 Tuner Interstage and RF Stage, 500 mc Response

(13) Adjust inductors L12 and L13 for a response as shown in Figure 4-31. Slight adjustments can be made by moving C20 up or down. The bandwidth at the 3 dB points should be 4 mc with the 500 mc marker positioned as shown.

(14) Repeat steps (8) through (13) to obtain the best possible responses.

(15) Tune the dial from 500 to 235 while tracking with the controls of the sweep generator. The marker should not go down either skirt more than 1 dB. If it does, repeat steps (8) through (13) until the condition of this step is met.

(16) Remove the 510 pF capacitor and coax cable from V2 and reconnect C14 to the tube pin.

(17) Connect the sweep generator RF Out to J1 on the rear apron.

(18) Tune the 235-500 dial to 260.

(19) Adjust C6 and C13 for an overcoupled symmetrical response centered on the marker. Refer to Figure 4-30 for a typical response.

(20) Tune the 235-500 dial to 500.

(21) Adjust L7 and L8 for a flat, symmetrical, response centered on the marker. Slight adjustments can be made by changing the physical placement of C11.

(22) Repeat steps (18) through (21) until the interaction is minimized.

(23) Tune the 235-500 dial to 500.

(24) Adjust C1 for maximum amplitude of the response.

(25) Tune the dial from 500 to 235 while tracking with the controls of the sweep generator. The following conditions should be evident:

a. The marker should not go down either skirt more than 1 dB.

b. The response should change from a flat response to an overcoupled response as the dial is tuned towards 235.

(26) Remove the coax cable from A3TP1. Insert the 50 Ω detector in the line and connect the cable to A3J2.

(27) Tune the 235-500 dial to 500.

(28) Adjust L14 for a symmetrical response of maximum amplitude centered on the marker. The response should be similar to Figure 4-31, but of less bandwidth.

(29) Refer to Paragraph 4.7.9 for final alignment of L14 in conjunction with the 60-21.4 mc converter.

4.7.8 490-1000 mc Tuner Alignment. - Under no circumstances should adjustment be made in the rf section of this tuner. The tuned circuits are factory aligned, and they cannot be aligned in the field. If the receiver is unusually noisy check all cable connections. The most likely cause of trouble in the tuner will be a defective tube or a damaged crystal mixer. Replacement will usually restore the original performance. The local oscillator alignment procedures are described in paragraph 4.7.8.1.

4.7.8.1 Oscillator stage alignment is performed as follows:

(1) Inspect the tuning drive for correct mechanical adjustment according to the instructions given in paragraph 4.7.1.4.

(2) Refer to Figure 4-20. Connect the frequency counter to A14J3; connect the voltmeter to A4C12.

(3) Set the receiver controls as follows:

a. RANGE MC: 490-1000

b. 490-1000 MC dial: as required by procedure

c. BFO TUNING: mid-range

d. FINE TUNING: for +8.0 V dc at A4C12

(4) Set the dial to 500.

(5) Adjust A4C7 for an indication on the frequency counter in the range of 495-505.0 mc.

(6) Set the dial to 1000.

(7) Adjust A4C6 for an indication on the frequency counter in the range of 990-1010 mc.

(8) Repeat steps (4) through (7) until no further adjustments are required.

4.7.8.2 Oscillator injection current is measured as follows: Connect the 0-5 ma meter to a miniature (3 mm) phone plug with the + lead to the tip. Insert this plug into jack J4. This places the meter in series with the crystal mixer dc ground return. Normal current is in the range of 0.5 to 2.5 mA. A complete lack of current could be caused by a defective mixer diode (CR1) or a dead oscillator tube (V1). A low current indication would indicate a weak tube.

4.7.9 60-21.4 mc Converter/235-500, 490-1000 Final Alignment. - This paragraph provides information for alignment of the two converter input stages in conjunction with the output stages of the two related tuners.

4.7.9.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Signal Generator, Hewlett Packard, Model 608E

(4) Frequency Counter, Hewlett Packard, Model 5245L

(5) Heterodyne Converter, Hewlett Packard, Model 5253B

4.7.9.2 The alignment is performed as follows:

(1) Connect the equipment as shown in Figure 4-32.

(2) Set the oscilloscope controls as follows:

a. VERTICAL ATTENUATOR: 10 mV/CM, -, DC

b. HORIZONTAL ATTENUATOR: 1 V/CM, +, DC

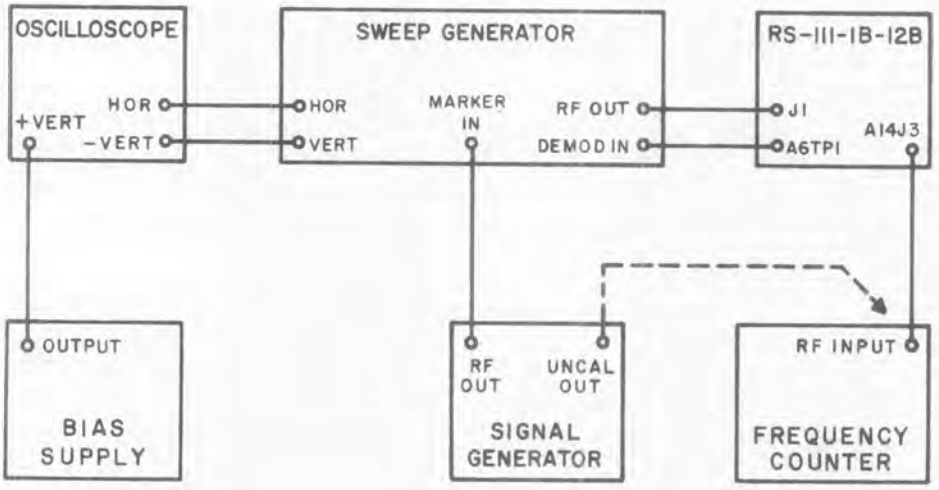


Figure 4-32. Test Setup, Converter/Tuners Final Alignment

c. HORIZONTAL DISPLAY: Sweep disabled

d. VERTICAL POSITION: for baseline near bottom of crt

(3) Set the sweep generator controls as follows:

a. BAND: 2 (for a 325 mc center frequency output)

b. CENTER FREQ: to approximately 325 mc

c. SWEEP WIDTH: to approximately 8 mc

d. MODE: Δf

e. OUTPUT: as required for stage being aligned

(4) Set the receiver controls as follows:

a. RANGE MC: 235-500

b. 235-500 MC dial: set to 325

c. Function: AM/MAN

d. BFO TUNING: center of range

e. FINE TUNING: center of range

f. RF GAIN: maximum clockwise

(5) Reset the 235-500 MC dial and the FINE TUNING control for an indication of exactly 385.0 mc (325 + 60) on the frequency counter.

(6) Connect the frequency counter to the Uncal Out jack of the signal generator.

(7) Set the signal generator output frequency to 325.00 mc cw. Adjust the output level for a convenient marker size throughout the following procedure.

(8) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(9) Adjust A3L14 and A6L1 for a maximum amplitude response centered on the 325 mc marker. Refer to Figure 4-33 for a typical response.

(10) Reset the sweep generator controls as follows:

a. BAND: 1 (for a 500 mc center frequency output)

b. CENTER FREQ: to approximately 500 mc

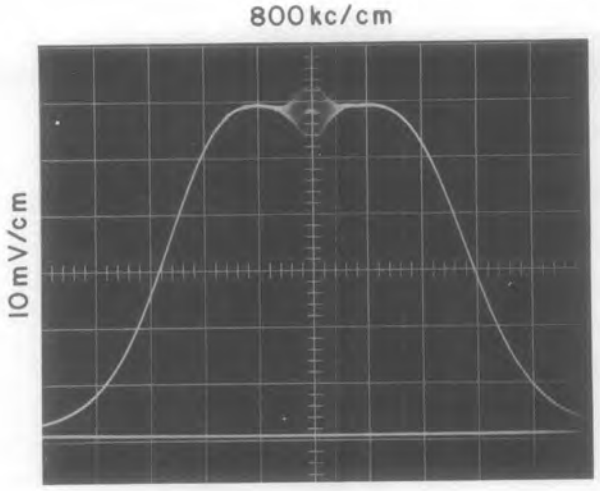


Figure 4-33. Typical Response, Converter/235-500 mc and 490-1000 mc Tuner Response

c. SWEEP WIDTH: to approximately 8 mc

(11) Reset the signal generator output frequency to 500.0 mc cw. Adjust the output level for a convenient marker size throughout the following procedure.

(12) Move the sweep generator rf output cable from J1 to J2.

(13) Connect the frequency counter to A14J3.

(14) Reset the RANGE MC switch to 490-1000.

(15) Set the 490-1000 MC dial to 500. Then adjust the dial and FINE TUNING control for an indication of 560.0 mc (500 + 60) on the frequency counter.

(16) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(17) Adjust A4L17 and A6L2 for a maximum amplitude response centered on the 500.0 mc marker. Refer to Figure 4-34 for a typical response.

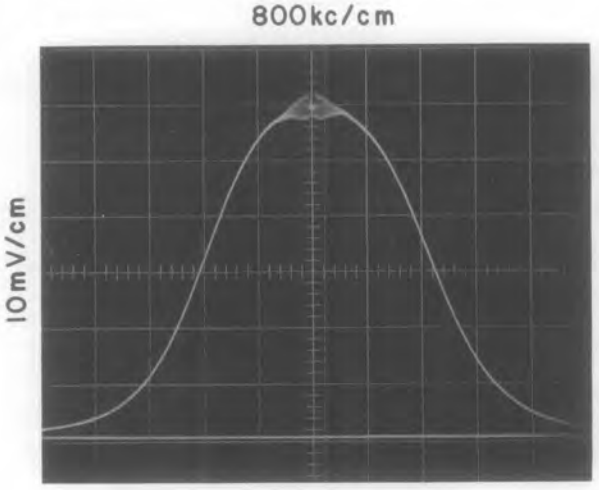


Figure 4-34. Typical Response, Converter/490-1000 mc Tuner Response

4.7.10 2 mc IF Amplifier/30-60 mc Tuner, Final Alignment. - This paragraph provides information for the alignment of the 2 mc IF amplifier in conjunction with the 21.4 mc mixer output network of the 30-60 mc tuner.

4.7.10.1 The following test equipment is required:

(1) Sweep Generator, Wavetek, Model 2000

(2) Signal Generator, Hewlett Packard, Model 608E (two required)*

(3) Oscilloscope, Tektronix, Model 503

(4) Frequency Counter, Hewlett Packard, Model 5245L

(5) Power Supply, Hewlett Packard, Model 6206B

(6) VTVM, RCA, Model WV-98C

4.7.10.2 This alignment procedure provides for an "overall" alignment of the stagger tuned 2 mc IF amplifier in conjunction with the "peaked" response of the 21.4 mc mixer output network of the 30-60 mc tuner. The composite of the two responses is a relatively flat topped response. Proceed as follows:

(1) Connect the equipment as shown in Figure 4-35.

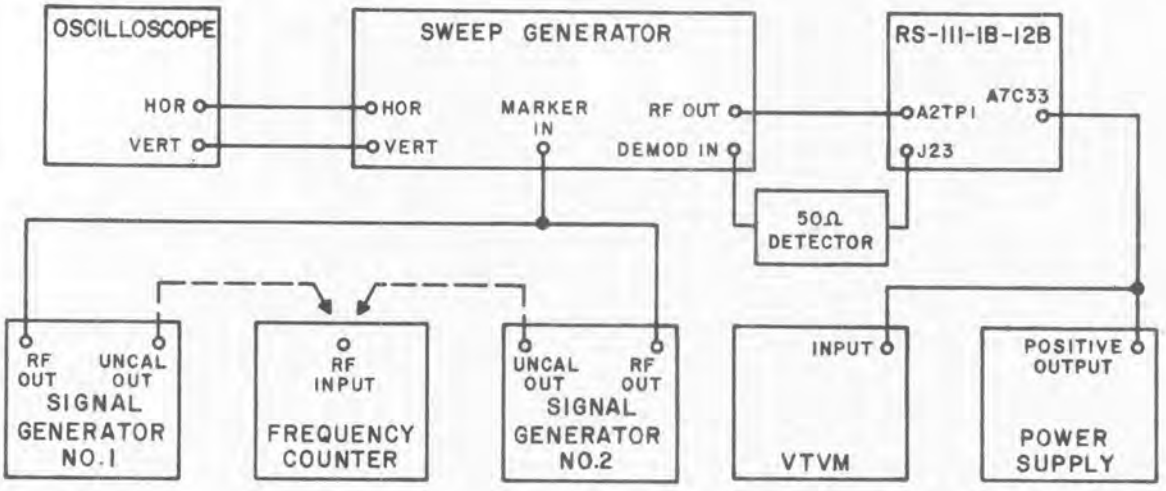


Figure 4-35. Test Setup, 2 mc IF Amplifier/30-60 mc Tuner, Final Alignment

(2) Set the oscilloscope controls as follows:

a. VERTICAL ATTENUATOR: 10 mV/CM, -, DC

b. HORIZONTAL ATTENUATOR: 1.0 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disabled

d. VERTICAL POSITION: for baseline near bottom of crt.

(3) Set the sweep generator controls as follows:

a. BAND: 1 (for a 21.4 mc center frequency output)

b. CENTER FREQ: to approximately 21.4 mc

c. SWEEP WIDTH: to approximately 4 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

* See note in paragraph 4.7.

(4) Set the output frequency of signal generator No. 1 to 20.40 mc. Throughout this procedure adjust the output level for a convenient marker size on the oscilloscope.

(5) Set the output frequency of signal generator No. 2 to 22.40 mc. Throughout this procedure adjust the output level for a convenient marker size on the oscilloscope.

(6) Set the power supply voltage to +4.0 V dc.

(7) Set the receiver controls as follows:

a. Function: AM/MAN

b. RF GAIN: maximum counterclockwise

c. RANGE MC: 60-300

(8) Readjust the controls of the sweep generator to display the marker and the response on the oscilloscope.

(9) Adjust A1L5 for a response on the oscilloscope similar to Figure 4-36.

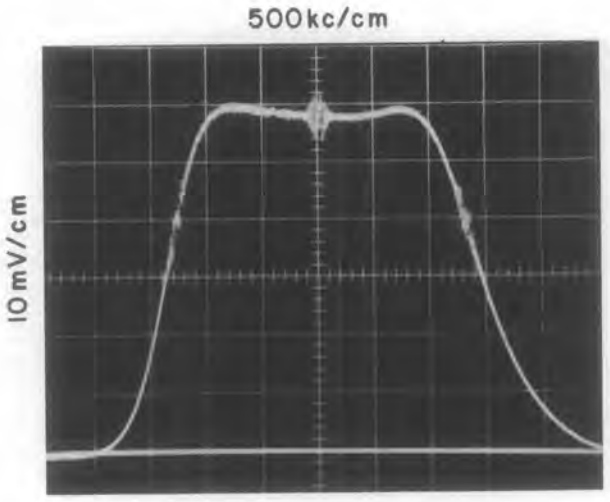


Figure 4-36. Typical Response, 2 mc IF Amplifier/30-60 mc Tuner, Composite Response

(10) In the order given adjust coils A7L9, A7L8, A7L6, A7L5, A7L3, and A7L2 for a response similar to Figure 4-36.

(11) Repeat steps (9) and (10) until no further adjustments are required.

4.7.11 Signal Monitor Alignment. - The alignment procedure for the signal monitor section of the receiving system is presented in the following paragraphs.

4.7.11.1 The following test equipment is required for the complete alignment.

(1) Sweep Generator, Wavetek, Model 2000

(2) Oscilloscope, Tektronix, Model 503

(3) Signal Generator, Hewlett Packard, Model 608E

4.7.11.2 For the 1-mc and 13-mc IF alignment proceed as follows:

(1) Connect the equipment as shown in Figure 4-37.

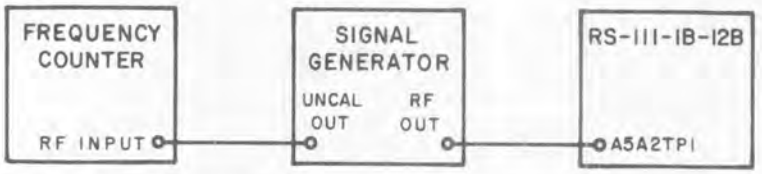


Figure 4-37. Test Setup, Signal Monitor, IF Alignment

(2) Set the signal generator output frequency to 1.0 mc. Temporarily set the output level to less than -90 dBm.

(3) Set the receiver controls as follows:

a. CENTER FREQ: mid-range

b. SWEEP WIDTH: fully counterclockwise

c. MARKER: off

d. GAIN: fully counterclockwise

e. INTENSITY: for a visible trace

f. FOCUS: for a sharp trace

g. Vertical centering control A5A2R42: for positioning of trace behind graticule base line

(4) Increase the signal generator output level until the base line trace deflects upward about 1/4 inch.

(5) Adjust A5A2L3 through A5A2L8 for maximum upward deflection of the base line trace. Reduce the signal generator output level as necessary to keep the base line trace on the crt screen.

(6) Repeat step (5) for maximum deflection of the base line trace.

(7) Move the cable on A5A2TP1 to A5A1TP2.

(8) Set the signal generator output frequency to 13.0 mc.

(9) Set the signal generator output level so that the base line trace on the crt is about 1/4 inch above its resting position.

(10) In this step note that the coils are located on two circuit boards. Adjust A5A1L4, A5A1L5, A5A2L1 and A5A2L2 for maximum upward deflection of the base line trace. Reduce the signal generator output level as necessary to keep the base line trace on the crt screen.

(11) Repeat step (10) for maximum deflection of the base line trace.

4.7.11.3 For the 21.4 mc shaping amplifier alignment proceed as follows:

(1) Connect the equipment as shown in Figure 4-38.

(2) Set the oscilloscope controls as follows.

a. VERTICAL ATTENUATOR: 10 mV/CM

b. HORIZONTAL ATTENUATOR: 1 V/CM, +, DC

c. HORIZONTAL DISPLAY: Sweep Disabled

d. VERTICAL POSITION: for baseline near bottom of crt

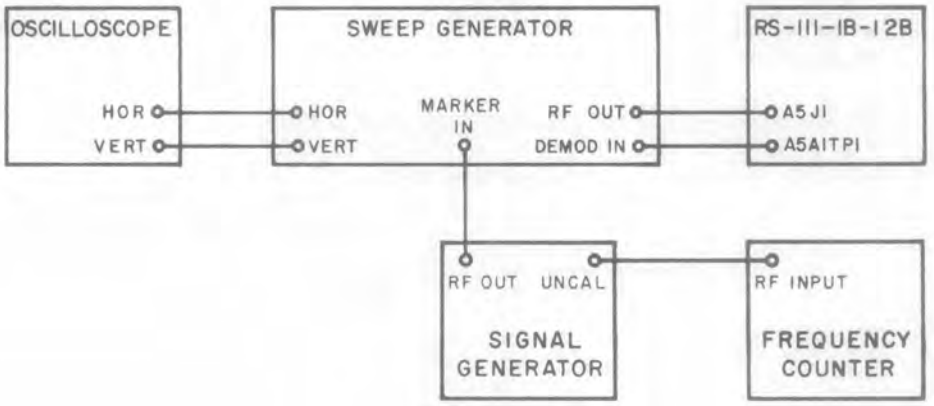


Figure 4-38. Test Setup, Signal Monitor 21.4 mc Shaping Amplifier

(3) Set the sweep generator controls as follows:

a. BAND: 1 (for a 21.4 mc center frequency output)

b. CENTER FREQ: to approximately 21.4 mc

c. SWEEP WIDTH: to approximately 6 mc

d. MODE: Δ f

e. OUTPUT: as required for stage being aligned

(4) Set the signal generator output frequency to 21.40 mc. Adjust the output level for a convenient marker size throughout the following procedure.

(5) Rotate the signal monitor GAIN control fully clockwise.

(6) Readjust the sweep generator controls to display the 21.4 mc marker and response.

(7) Adjust A5A1L1, A5A1L2, and A5A1L3 for a response like that in Figure 4-39. The shaping amplifiers are stagger tuned with L3 affecting the middle of the response, L1 affecting the high frequency side, and L2 affecting the low frequency side.

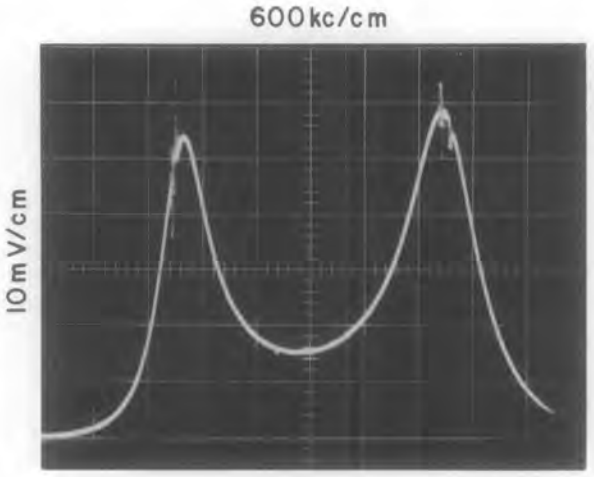


Figure 4-39. Typical Response, Signal Monitor 21.4 mc Shaping Amplifier

(8) Refer to paragraph 4.7.12 for the "overall" alignment procedure of the signal monitor shaping amplifier in conjunction with the 235-500 tuner.

4.7.11.4 For the sweep oscillator and marker alignment proceed as follows:

(1) Connect the equipment as shown in Figure 4-40.

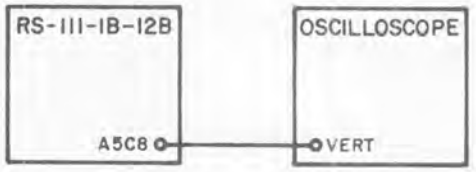


Figure 4-40. Test Setup, Sweep Oscillator and Marker Alignment

(2) Set the oscilloscope controls as follows:

a. VERTICAL INPUT: 5.0 V/CM, +, DC

b. HORIZONTAL DISPLAY: Normal (X1)

c. SWEEP TIME/CM: 10 mSEC

d. TRIGGER: internal, AC, +

e. VERTICAL POSITION: for convenient display

(3) Set the receiver controls as follows:

a. CENTER FREQ: mid-range

b. SWEEP WIDTH: fully clockwise

c. MARKER: off

d. GAIN: fully clockwise

e. INTENSITY: for a visible trace

f. FOCUS: for a sharp trace

g. Vertical Centering Control A5A2R42: for positioning of trace behind graticule base line.

(4) Adjust the sweep rate calibrate potentiometer, A5A3R1, for a sawtooth period of 45.5 milliseconds (22 Hz). (With the oscilloscope horizontal sweep time set to 10 ms/cm each sawtooth should have a horizontal length of 4.55 centimeters on the oscilloscope crt .) Refer to Figure 4-41.

(5) Adjust the horizontal width control, A5A3R5, fully clockwise.

(6) Use the horizontal position control, A5A3R25, to center the trace.

(7) Adjust the horizontal width control, A5A3R5, to expand the trace across the full graticule.

(8) Turn the marker ON.

(9) Adjust A5A1L6 to center the marker pip behind the center graticule mark.

(10) Adjust the horizontal position control, A5A3R25, to move the pip one division to the left.

(11) Adjust the horizontal width control, A5A3R5, to expand the right edge of the sweep trace to the last graticule division to the right.

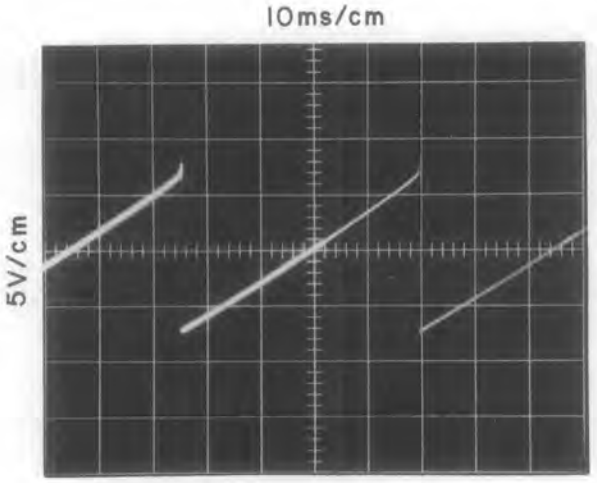


Figure 4-41. Typical Waveform, Sweep Oscillator Sawtooth

(12) Adjust the horizontal position control, A5A3R25, to center the marker pip behind the center graticule.

(13) Perform the next two steps together.

(14) Turn the SWEEP WIDTH control counterclockwise until the marker starts to disappear.

(15) Adjust A5A1L6 to keep the marker centered.

(16) Adjust A5A1L6 for maximum upward deflection of the trace. If the trace goes off the screen, adjust the marker amplitude potentiometer, A5A1R41, to bring the trace back on screen. Then readjust A5A1L6 until the trace is about one-fourth inch from the top of the screen.

(19) Return the SWEEP WIDTH control to the full clockwise position. If marker pip is not centered behind the middle graticule mark adjust the horizontal position control, A5A3R25, until it is centered.

NOTE

Do not adjust either the front panel CENTER FREQ control or A5A1L6 to center the marker pip at this point in the alignment. The horizontal position control must be used.

4.7.11.5 For the linearity adjustments proceed as follows:

(1) Connect the equipment as shown in Figure 4-42.

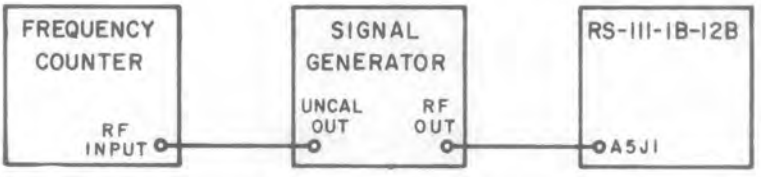


Figure 4-42. Test Setup, Signal Monitor Linearity

(2) Set the receiver controls as in step (3) of paragraph 4.7.11.4.

(3) Set the signal generator output frequency to 22.90 mc cw; set the output level for a three-fourth inch pip on the signal monitor crt .

(4) Adjust the sweep calibrate control, A5A3R20 to place the 22.9-mc pip from the signal generator on the fifth vertical graticule to the right of center.

(5) Change the signal generator frequency to 20.0 mc.

(6) Adjust the nominal linearity control, A5A3R41, and if necessary, the maximum linearity control, A5A3R43, to place the 20.0-mc pip on the fourth graticule to the left of center.

(7) Decrease the signal generator frequency to 19.9 mc.

(8) Adjust the maximum linearity control, A5A3R43, to place the 19.9-mc pip on the fifth graticule to the left of center.

(9) Return the signal generator to 20.0 mc and recheck the linearity at this point.

(10) Due to the interaction between A5A3R41 and A5A3R43 it may be necessary to repeat steps (5) through (9) several times to achieve optimum linearity at the low-frequency extremes of the sweep oscillator dispersion.

(11) Refer to paragraph 4.6.10 for signal monitor performance checks.

4.7.12 Signal Monitor Final Alignment. - This paragraph provides information for a touch up alignment of the stagger-tuned stages of the signal monitor in conjunction with the output network of the 30-60 mc tuner.

4.7.12.1 The following test equipment is required:

(1) Signal Generator, Hewlett Packard, Model 608E

(2) Frequency Counter, Hewlett Packard, Model 5245L

(3) Heterodyne Converter, Hewlett Packard, Model 5253B

4.7.12.2 The tests are performed as follows:

(1) Connect the equipment as shown in Figure 4-7. Connect the signal generator RF Out to J1 on the RS-111-1B-12B.

(2) On the receiver, set the controls as follows:

a. SWEEP WIDTH: maximum clockwise

b. GAIN: maximum clockwise

c. MARKER: ON

d. CENTER FREQ: mid-range

e. INTENSITY: for a visible trace

f. FOCUS: for a sharp trace

g. RANGE MC: 235-500

h. 235-500 MC tuner dial: 500

i. Function: AM/AGC

(3) On the signal generator, set the controls for a 500.00 mc cw output at a level of 2.5 μV.

(4) On the receiver, adjust the tuner frequency until the signal generator signal zero beats with the marker as observed on the crt screen.

(5) Turn the MARKER off.

(6) Reduce the output level of the signal generator until the signal on the crt screen is about 3/4-inch high.

(7) On the signal generator, vary the output frequency 1.50 mc above and below 500.00 mc while observing the signal on the crt screen for maximum height.

(8) Set the signal generator output frequency so that the signal on the crt screen is at the maximum height observed in step (7).

(9) Set the signal generator output level so that the maximum height of the signal on the crt screen is at full scale.

(10) Record the output level of the signal generator in dB.

(11) On the signal generator, vary the output frequency in the range of 498.50 mc to 501.50 mc while observing the crt screen for minimum height of the signal generator signal.

(12) Set the signal generator output frequency so that the signal on the crt screen is at the minimum height observed in step (11).

(13) Increase the signal generator output level until the maximum height of the signal on the crt screen is at full scale.

(14) Note the output level of the signal generator in dB.

(15) The output level of the signal generator established in step (14) should be a maximum of 4 dB greater than the level recorded in step (10).

(16) If the requirement of step (15) is not met tune the signal generator between 498.50 mc and 501.50 mc while observing the crt screen for minimum and maximum signal heights. At the same time adjust the shaping amplifier coils, A5A1L1, A5A1L2, and A5A1L3, to minimize the variations in heights of the signal. (The shaping amplifiers are stagger-tuned with A5A1L3 affecting the middle of the response, A5A1L1 affecting the high-frequency side, and A5A1L2 affecting the low-frequency side.)

(17) Repeat steps (6) through (16) until the requirement of step (15) is met.

Table 4-8. Tube and Transistor Element Voltages

Ref Desig.	Type	2	4 Grid	8 Cathode	10 Heater	12 Heater	Plate	Emitter	Base	Collector
Q1	2N1544							-5.8	-6.0	-13.0
A1Q1	6CW4	82.0	0.14	0.72	6.3 ac	0				
A1Q2	6CW4	144.0	76.0	82.0	6.3 ac	0				
A1Q3	7587	66.0	0	0	0	6.3 ac	110			
A1Q4	6CW4	92.0	46.0*#	46.0*#	6.3 ac	0				
A2Q1	8058	0	0	0	0	6.3 ac	102			
A2Q2	8058	0.5	0.5	0.5	0	6.3 ac	108			
A2Q3	7587	20.0	-0.9	0	0	6.3 ac	110			
A2Q4	6CW4	73.0	10.9#	11.8#	0	6.3 ac				
A3Q1	7077		0	0	0	6.3 ac	118.0			
A3Q2	7077		0	0.6	0	6.3 ac	118.0			
A3Q3	7587	14.0	-0.96	0	6.3 ac	0	180.0			
A3Q4	7486		-1.6*#	0	0	6.3 ac	86.0			
A4Q1	7486		-0.5*#	0	0	6.3 ac	100.0			
A4Q2	6CW4	92.0	0	0	0	6.3 ac				
A4Q3	6CW4	170	83.0	92.0	0	6.3 ac				
A5A1Q1	2N3478							2.0	2.7	14.0
A5A1Q2	2N3478							2.9	3.6	14.1
A5A1Q3	2N3478							3.6	4.3	13.3
A5A1Q4	3N128							2.2(1)	0 (2)	17.6(3)
A5A1Q5	2N3478							7.6	8.3	17.4
A5A2Q1	2N3478							4.9	5.6	16.3
A5A2Q2	2N3478							2.0	2.7	6.4
A5A2Q3	2N3478							5.0	5.7	16.2
A5A2Q4	2N3478							4.9	5.6	16.3
A5A2Q5	2N3478							4.8	5.5	16.3
A5A2Q6	2N3478							3.2	3.9	22.7
A5A3Q1	2N2646							0	6.7(4)	16.0(5)
A5A3Q2	2N2270							4.8	5.4	22.4
A5A3Q3	2N4037							6.7	6.5	19.3
A5A3Q4	2N2270							4.2	4.8	22.4
A5A3Q5	2N2270							4.2	4.8	22.4
A5A3Q6	2N3440							6.2	6.7	22.4
A5A3Q7	2N3440							4.2	4.8	115
A5A3Q8	2N2270							4.1	4.6	114
A5A3Q9	2N2270							4.5	5.0	22.4
A5A3Q10	2N4037							7.3	7.7	44.0
A5A3Q11	2N2270							6.7	44.0	44.5
A5A4Q1	2N3478							15.8	16.3	22.4
A6Q1	7587	1.38	0.9	0	0	6.3 ac	180			
A6Q2	7587	36	-0.94	0.24	0	6.3 ac	180			
A6Q3	7587	21.0	-0.7	0	0	6.3 ac	130			
A6Q4	6CW4	84.0	-4.4	0	0	6.3 ac				
A7Q1	2N2708							2.5	3.1	12.0
A7A2	2N2708							2.3	3.0	11.2
A7Q3	2N2708							2.0	2.8	10.4
A7A1Q1	2N706							2.7	3.3	11.2
A7A1Q2	2N706							2.7	3.4	11.4
A7A1Q3	2N706							2.7	10.2	11.6
A7A1Q4	2N706							2.7	3.2	11.6
A7A1Q5	2N2270							1.6	2.1	12.0
A7A1Q6	2N2270							1.4	1.6	12.0
A7A1Q7	2N2270							0.1	0.5	9.7

Table 4-8. Tube and Transistor Element Voltages (Cont.)

Ref. Desig.	Type	2	4	8	10	12	Plate	Emitter	Base	Collector
			Grid	Cathode	Heater	Heater				
A7A2Q1	2N2270							0	-.06	10
A7A2Q2	2N2270							9.4	9.9	10.7
A7A2Q3	2N2270							-.06	.5	10.7
A7A2Q4	2N2270							-.06	.40	10.5
A8Q1	2N2708							2.0	2.8	11.9
A8Q2	2N2708							1.9	2.7	11.8
A8Q3	2N2708							2.0	2.8	11.7
A8Q4	2N2708							2.0	2.8	11.9
A8Q5	2N2708							1.8	2.6	11.8
A8Q6	2N2708							1.9	2.7	11.8
A8Q7	2N2708							2.1	2.8	10.9
A8Q8	2N2708							2.6	3.4	11.6
A8Q9	2N697							0.7	1.2	12.2
A8Q10	2N697							0	0.6	12.2
A8Q11	2N697							1.44	-.04	12.2
A8Q12	2N697							10.8	11.4	11.0
A8Q13	2N1131							8.2	9.0	11.6
A8A1Q1	2N706							2.7	3.2	11.4
A8A1Q2	2N706							2.7	3.3	11.3
A8A1Q3	2N706							3.0	3.1	11.5
A8A1Q4	2N706							3.0	3.1	11.5
A8A1Q5	2N2222A							0.68	1.2	12
A8A1Q6	2N2222A							-24	0.68	12
A8A2Q1	2N706							17.0	16.0	23.0
A9Q1	2N929							1.37	2.0	25.0
A9Q2	2N526							25.0	25.0	16.0
A10Q1	2N929							0.6	1.25	6.0
A10Q2	2N2270							4.7	5.4	24.0
A10Q3	2N2270							1.2	1.5	22.5
A11Q1	GV3A1220						1100			
A12Q1	2N2270							23.6	24.1	31.
A12Q2	2N1038							-23.6	-23.8	-33.5
A12Q3	2N2270							23.0	23.7	31
A12Q4	2N2270							23.0	23.7	31
A12Q5	2N2270							11.4	12.1	21
A15Q1	2N929							-15.5	-14.3	8.7
A15Q2	2N3251							9.3	8.6	-7.3
A16Q1	2N929							8.4	9.0	23.0

Cathode Ray Tube

Ref Desig.	Type	1	2	3	4	5	6	7	8	CAP
A5V1	3ASP1	113	110	-1420(6)	-1440	-740	86	95	-1420(6)	48

Table 4-8. Tube and Transistor Element Voltages (Cont.)

Test Conditions: All voltages are positive dc with respect to chassis unless otherwise indicated. Readings taken with RCA WV-98C VTVM with 115 V ac applied to the receiving system. Control settings as follows: FOCUS, INTENSITY, CENTER FREQ, GAIN, SWEEP WIDTH, RF GAIN, BFO TUNING, VIDEO GAIN, AUDIO GAIN, and FINE TUNING at max cw and no signal input; RANGE MC switch set to tuner being measured; IF BANDWIDTH to IF amplifier being measured; function switch to CW.

NOTES:

* - indicates 1 meg resistor used in series with probe

\# - indicates reading which may vary with tuning

(1) - Source

(2) - Gate

(3) - Drain

(4) - Base 1

(5) - Base 2

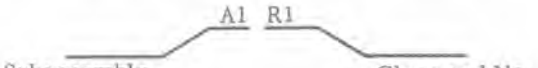
(6) - A5V1 pin 3 to 8 potential is 6.3 V ac (filament)

SECTION V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules), and parts. An example of the unit method follows:



Subassembly Designation	Class and No. of item
Identify from right to left as:	First (1) resistor (R) of first (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parenthesis within the figure titles.

5.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, Wisconsin 53212
01281	TRW Semiconductors, Inc. 14520 Aviation Boulevard Lawndale, California 90260
01351	Dynamic Gear Company, Inc. 175 Dixon Avenue Amityville, New York 11701
02114	Ferroxcube Corporation P.O. Box 359 Mt. Marion Road Saugerties, New York 12477
02735	RCA Corporation Solid State Division Route 202 Somerville, New Jersey 08876
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530
04435	Jettron Products, Inc. 56 Route 10 P.O. Box 7 Hanover, New Jersey 07936
04713	Motorola Semiconductor Products, Inc. 5005 East McDowell Road Phoenix, Arizona 85008
05820	Wakefield Engineering, Inc. Audobon Road Wakefield, Massachusetts 01881
06001	General Electric Company Capacitor Department P.O. Box 158 Irmo, South Carolina 29063

Mfr. Code	Name and Address
07387	The Birtcher Corporation 4371 Valley Boulevard Los Angeles, California 90032
11139	Deutsch Company Electronic Component Division Municipal Airport Banning, California 92220
11293	GTE Sylvania Incorporated Electronic Systems Group Communications Systems Division 189 B Street Needham Heights, Maine 02194
12672	RCA Corporation Receiving Tube Division 1550 St. George Avenue Avenel, New Jersey 07001
14099	Semtech Corporation 652 Mitchell Road Newbury Park, California 91320
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, Maryland 20760
18469	Servometer Corporation 82 Industrial East Clifton, New Jersey 07012
19505	Applied Engineering Products Company Division of Samarius Inc. 26 E. Main Street Ansonia, Connecticut 06401
54753	General Instrument Corporation F.W. Sickles Division 165 Front Street Chicopee, Massachusetts 01014
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
63060	The Victoreen Instrument Company, Inc. 10101 Woodland Avenue Cleveland, Ohio 44104
71279	Cambridge Thermionic Corporation 445 Concord Avenue Cambridge, Massachusetts 02138
71400	Bussman Manufacturing Division of McGraw-Edison Company 2536 W. University Street St. Louis, Missouri 63107
71590	Centralab Electronics Division of Globe-Union Inc. 5757 North Green Bay Avenue Milwaukee, Wisconsin 53201
71700	General Cable Corporation Cornish Wire Company Division 101 Water Street Williamstown, Massachusetts 01267
71744	Chicago Miniature Lamp Works 4433 Ravenswood Avenue Chicago, Illinois 60640
71785	Cinch Manufacturing Company Howard B. Jones Division 1026 South Homan Avenue Chicago, Illinois 60624
72136	Electro Motive Manufacturing Company, Inc. South Park & John Streets Willimantic, Connecticut 06226
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
73138	Beckman Instruments, Inc. Helipot Division 2500 Harbor Boulevard Fullerton, California 92634
73734	Federal Screw Products, Inc. 3917 North Kenzie Avenue Chicago, Illinois 60618
73899	JFD Electronics Company Division of Stratford Retreat House 15th at 62nd Street Brooklyn, New York 11219

Mfr. Code	Name and Address
74306	Piezo Crystal Company 100 K Street Carlisle, Pennsylvania 17013
74868	Bunker Ramo Corporation The Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
75042	IRC Division of TRW Incorporated 401 North Broad Street Philadelphia, Pennsylvania 19108
75915	Littelfuse, Incorporated 800 E. Northwest Highway Des Plaines, Illinois 60016
76055	Mallory Controls, Division of P.R. Mallory and Company, Inc. State Road 28 W Frankfort, Indiana 46041
80058	Joint Electronic Type Designation System
80131	Electronic Industries Association 2001 Eye Street, N.W. Washington, D.C. 20006
80205	National Aerospace Standards
81073	Grayhill Incorporated 561 Hillgrove Avenue LaGrange, Illinois 60525
81312	Winchester Electronics Division Litton Industries, Incorporated Main Street & Hillside Avenue Oakville, Connecticut 06779
81349	Military Specifications
82389	Switchcraft, Inc. 5555 North Elston Avenue Chicago, Illinois 60630
83086	New Hampshire Ball Bearings, Inc. Peterborough, New Hampshire 03458
88245	Litton Industries USECO Division 13536 Saticoy Street Van Nuys, California 91402
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646
91506	Augat, Incorporated 33 Perry Avenue Attleboro, Massachusetts 02703
91662	Elco Corporation Maryland Road & Computer Avenue Willow Grove, Pennsylvania 19090
92830	Wallace Barnes, Division of Associated Spring Corporation 18 Main Street Bristol, Connecticut 06012
93332	Sylvania Electric Products, Inc. Semiconductor Products Division 100 Sylvan Road Woburn, Massachusetts 01801
95121	Quality Components, Inc. P.O. Box 113 St. Mary's, Pennsylvania 15857
95146	Alco Electronics Products, Inc. 3 Wolcott Avenue Lawrence, Massachusetts 01843
95263	Leecraft Mfg. Co., Inc. 21-16 44th Road Long Island, New York 11101

Mfr. Code	Name and Address
96906	Military Standards
97464	Industrial Retaining Ring Company 57 Cordier Street Irvington, New Jersey 07111
99800	American Precision Industries Delevan Electronics Division 270 Quaker Road East Aurora, New York 14052
99848	Wilco Corporation 4030 West 10th Street P.O. Box 22248 Indianapolis, Indiana 46222

5.4 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from the Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in paragraph 5.3 and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment, however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semiconductors become available it is the policy of Watkins-Johnson to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

5.4.1 Type RS111-1B-12B Receiver, Main Chassis

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	30-60 MHz TUNER	1	71292	14632	
A2	60-300 MHz RF TUNER	1	71293	14632	
A3	235-500 MHz TUNER	1	7162	14632	
A4	490-1000 MHz TUNER	1	7163	14632	
A5	SIGNAL MONITOR	1	79358	14632	
A6	60-21.4 MHz CONVERTER	1	7120	14632	
A7	IF AMPLIFIER	1	72121	14632	
A8	IF AMPLIFIER	1	72120	14632	
A9	VIDEO AMPLIFIER	1	7312	14632	
A10	AUDIO AMPLIFIER	1	7400B	14632	
A11	POWER SUPPLY REGULATOR	1	7633	14632	
A12	POWER SUPPLY REGULATOR	1	7631	14632	
A13	COUPLING NETWORK	2	7917	14632	
A14	Same as A13				
A15	AGC MONITOR AMPLIFIER	1	7836	14632	
A16	AFC AMPLIFIER	1	79407	14632	
CR1	DIODE	1	1N753A	80131	04713
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM: 500 μF, -10+75%, 15V	1	34D507G015FJ4	56289	
C2	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 μF, -10+75%, 12V	1	30D506G012CB2	56289	
C3	CAPACITOR, ELECTROLYTIC, ALUMINUM: 40 μF, -10+75%, 250V	1	TVL2520	56289	
C4	CAPACITOR, ELECTROLYTIC, ALUMINUM: 250 μF, -10+75%, 40V	1	34D257G040FL4	56289	
C5	CAPACITOR, ELECTROLYTIC, ALUMINUM: 1000 μF, -10+75%, 15V	1	34D108G015GL4	56289	
C6	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 1400V	2	U01M	91418	
C7	Same as C6				
C8	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 500V	2	SM0.01 μFM	91418	
C9	Same as C8				
DS1	LAMP, INCANDESCENT	4	47	71744	
DS2	Same as DS1				
DS3	Same as DS1				
DS4	Same as DS1				
F1	FUSE, CARTRIDGE: 1/2 AMP, 3AG	1	MDL1/2	71400	
F2	FUSE, CARTRIDGE: 1/4 AMP, 3AG	1	MDL1/4	71400	
J1	CONNECTOR, RECEPTACLE	2	UG-1052/U	80058	74868

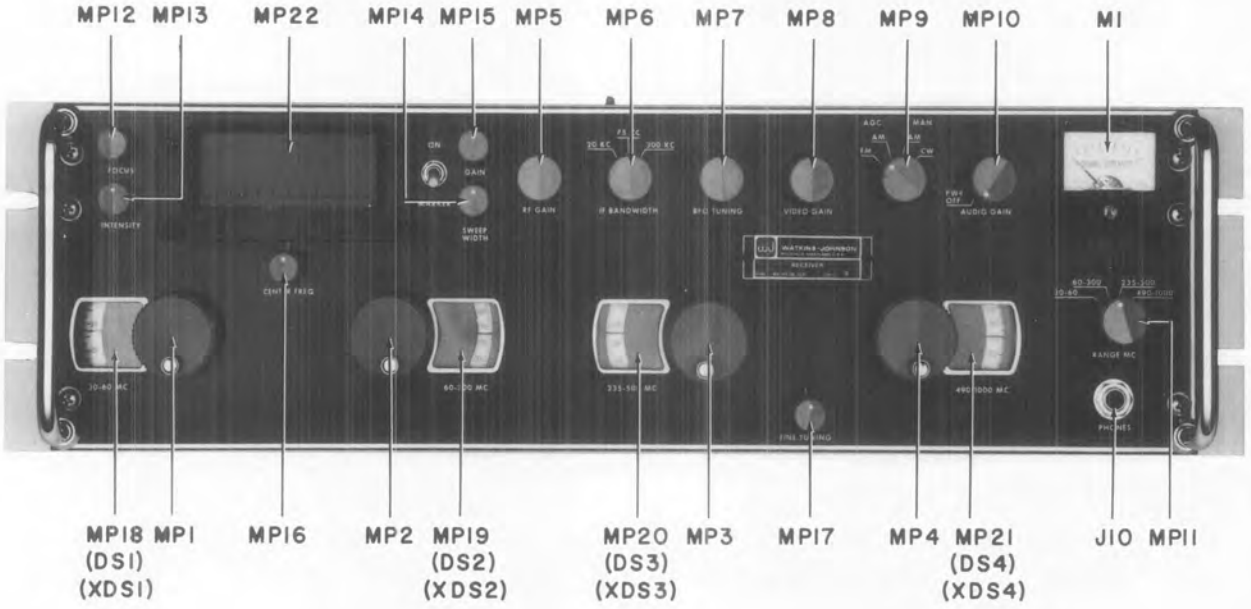


Figure 5-1. Type RS-111-1B-12B Receiving System, Front View, Location of Components

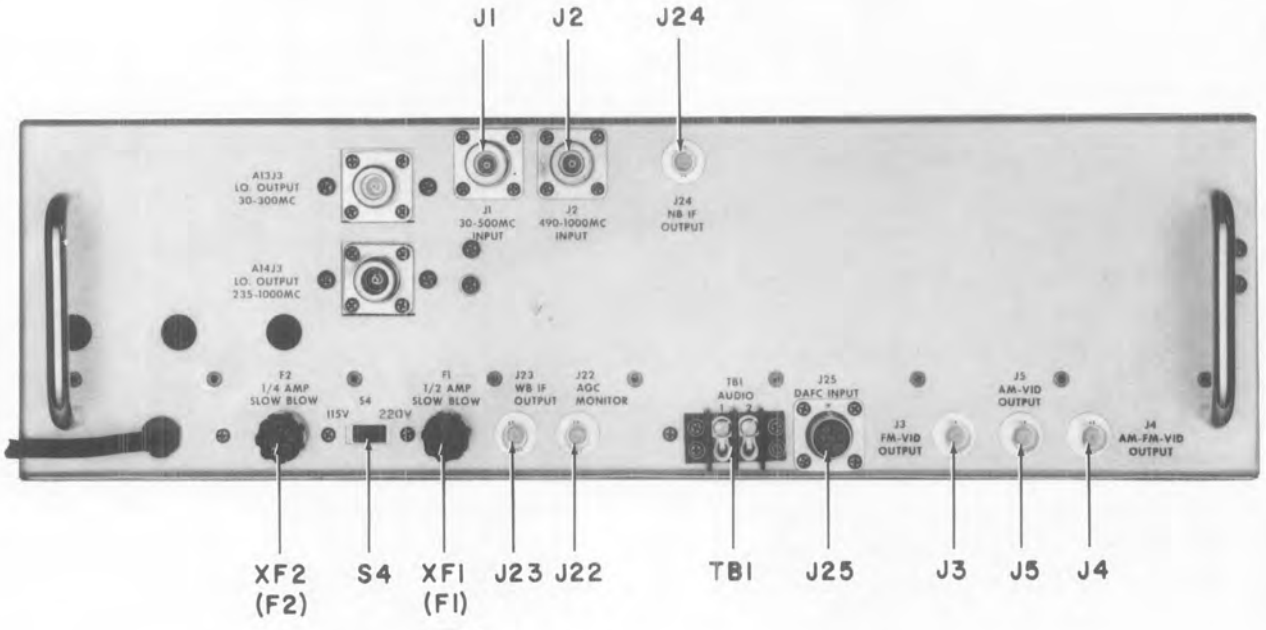


Figure 5-2. Type RS-111-1B-12B Receiving System, Rear View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
J2	Same as J1				
J3	CONNECTOR, RECEPTACLE	6	17825-1002	74868	
J4	Same as J3				
J5	Same as J3				
J6	CONNECTOR, RECEPTACLE	1	MRE-14SG7	81312	
J7	CONNECTOR, RECEPTACLE	1	MRE-7-2SG7	81312	
J8	CONNECTOR, RECEPTACLE	1	MRE-18SG7	81312	
J9	CONNECTOR, RECEPTACLE	1	MRE-9SG7	81312	
J10	JACK, TELEPHONE	1	L11	82389	
J11	CONNECTOR, RECEPTACLE Part of K1				
J12	CONNECTOR, RECEPTACLE Part of K1				
J13	CONNECTOR, RECEPTACLE Part of K1				
J14	CONNECTOR, RECEPTACLE Part of K2				
J15	CONNECTOR, RECEPTACLE Part of K2				
J16	CONNECTOR, RECEPTACLE Part of K2				
J17 Thru J21	NOT USED				
J22	Same as J3				
J23	Same as J3				
J24	Same as J3				
J25	CONNECTOR, RECEPTACLE	1	DS00-7S	11139	
K1	RELAY, COAXIAL	2	318-10382-3	74868	
K2	Same as K1				
M1	METER, SIGNAL STRENGTH	1	1632-1	14632	
MP1 Thru MP4	CRANK ASSEMBLY	4	1914-1	14632	
MP5 Thru MP11	KNOB	7	1073-1	14632	
MP12 Thru MP17	KNOB	6	~~1073-6~~ PS50 d1/LG	14632	
MP18 Thru MP21	WINDOW	4	1052-1	14632	
MP22	FILTER, CRT	1	1662-1	14632	
P1	CONNECTOR, PLUG	15	UG-88/U	80058	74868

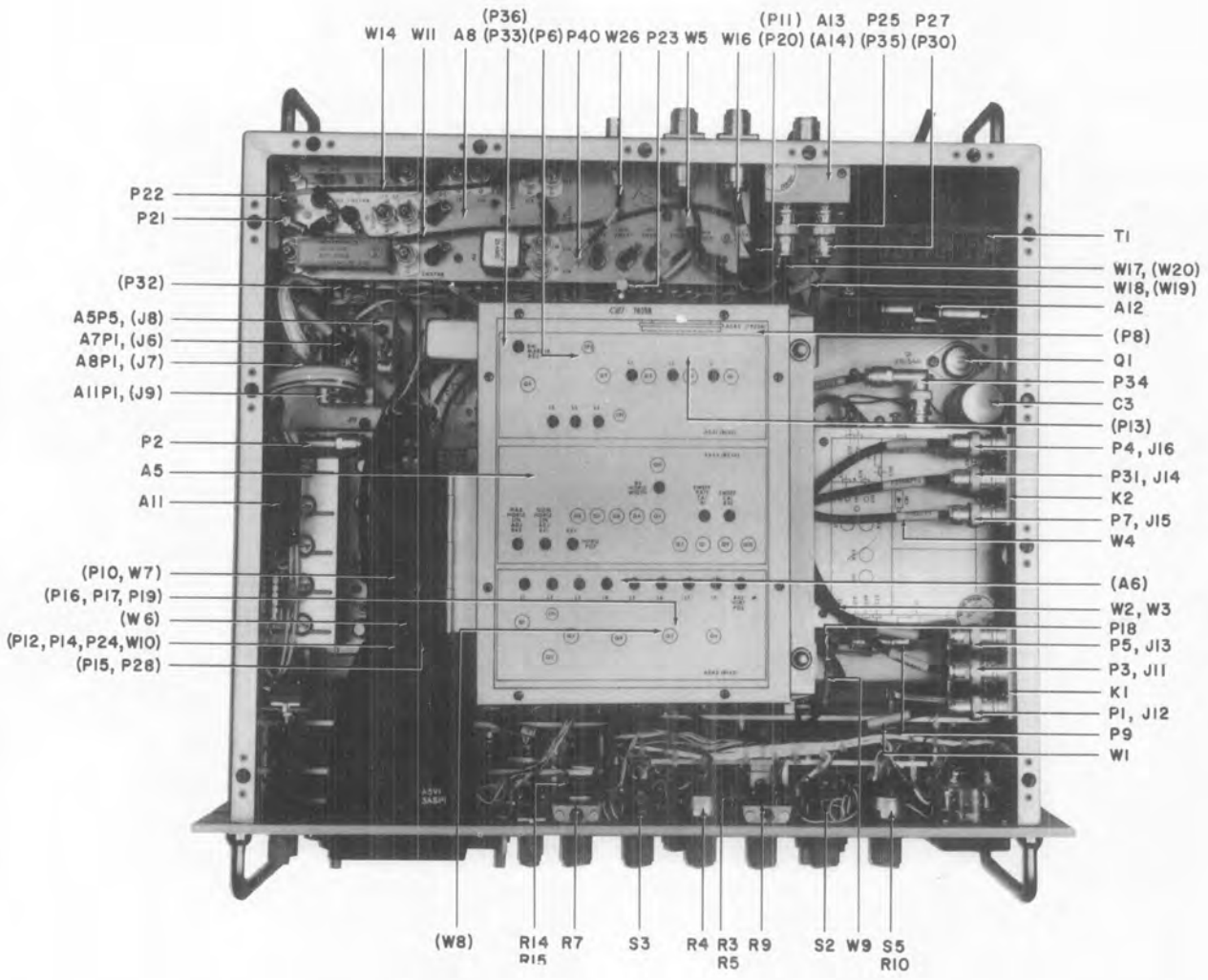


Figure 5-3. Type RS-111-1B-12B, Top View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
P2	CONNECTOR, PLUG	3	UG-913A/U	80058	74868
P3	Same as P1				
P4	Same as P1				
P5	Same as P1				
P6	Same as P2				
P7	Same as P1				
P8	Same as P1				
P9	Same as P1				
P10	CONNECTOR, PLUG	10	UG-1466/U	80058	74868
P11	Same as P10				
P12	Same as P10				
P13	CONNECTOR, PLUG	8	UG-1465/U	80058	74868
P14	Same as P13				
P15	Same as P13				
P16	Same as P10				
P17	Same as P13				
P18	Same as P13				
P19	Same as P13				
P20	Same as P10				
P21	Same as P10				
P22	Same as P13				
P23	Same as P10				
P24	Same as P1				
P25	Same as P1				
P26	CORD, POWER	1	3598-181-007	71700	
P27	Same as P1				
P28	Same as P1				
P29	Same as P1				
P30	Same as P1				
P31	Same as P1				
P32	Same as P10				
P33	Same as P10				
P34	Same as P2				
P35	Same as P1				
P36	Same as P10				
P37	NOT USED				

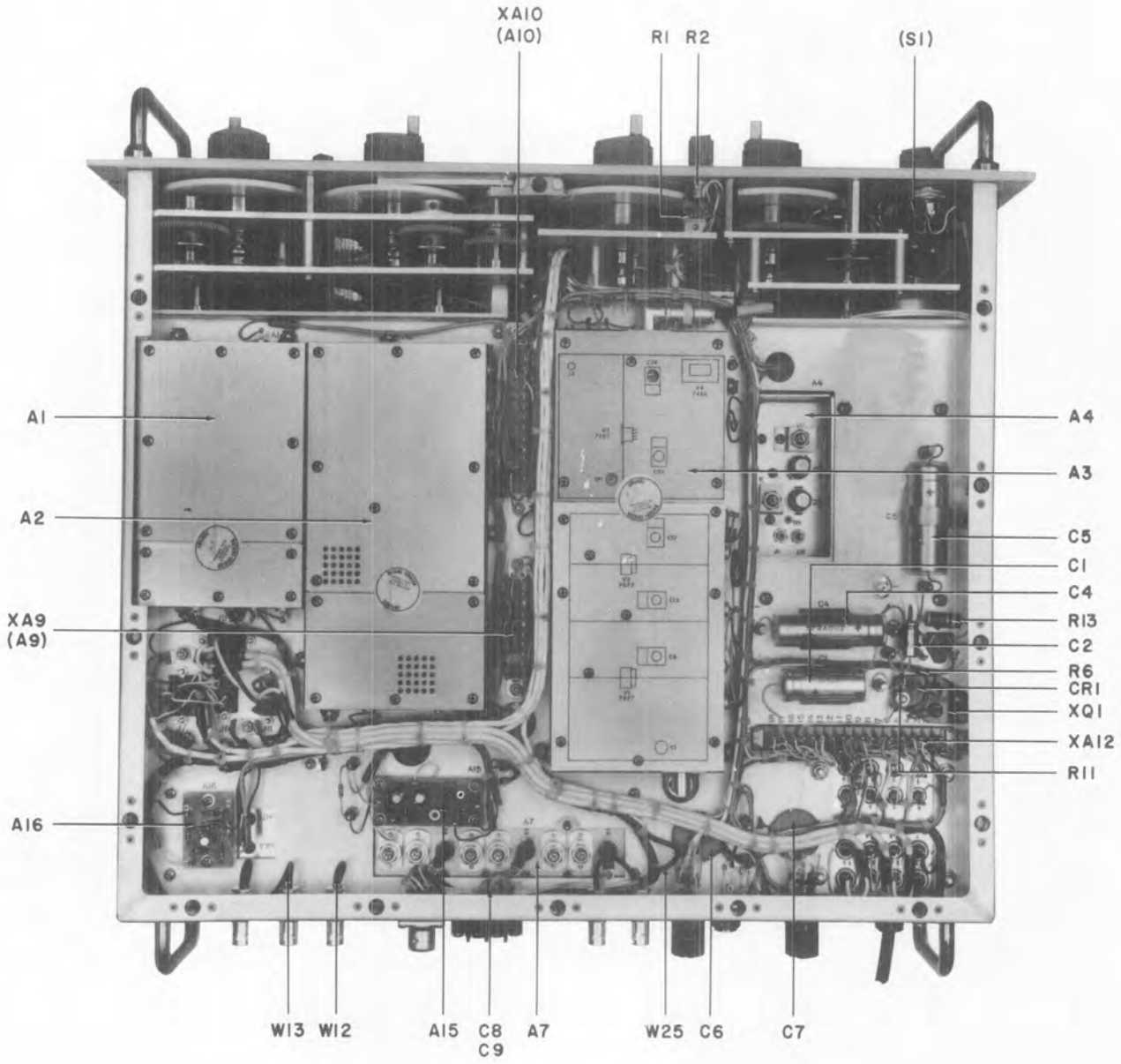


Figure 5-4. Type RS-111-1B-12B, Bottom View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
P38	NOT USED				
P39	NOT USED				
P40	Same as P13				
Q1	TRANSISTOR	1	2N1544	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 51 kΩ, 5%, 1/4W	1	RCR07G513JS	81349	01121
R2	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 1/2W	1	RV6NAYSD104A	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 1.0 MΩ, 5%, 1/4W	1	RCR07G105JS	81349	01121
R4	RESISTOR, VARIABLE, COMPOSITION: 500 kΩ, 10%, 2W	1	RV4NAYSD504A	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 180 kΩ, 5%, 1/4W	1	RCR07G184JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	2	RCR07G151JS	81349	01121
R7	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1W	1	RV4NAYSD103C	81349	01121
R8	NOT USED				
R9	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1W	1	70A3N056L103U	01121	
R10	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 2W	1	RV4NBYSD104A	81349	01121
R11	Same as R6				
R12	RESISTOR, FIXED, COMPOSITION: 240 kΩ, 5%, 1/4W	1	RCR07G244JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 2W	1	RCR42G471JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 62 kΩ, 5%, 1/4W	1	RCR07G623JS	81349	01121
S1	SWITCH, ROTARY	1	1128-02	14632	
S2	SWITCH, ROTARY	1	1128-03	14632	
S3	SWITCH, ROTARY	1	1128-22	14632	
S4	SWITCH, SLIDE	1	11A1211	82389	
S5	SWITCH Part of R10				
TB1	TERMINAL BOARD	1	353-18-02-001	71785	
T1	TRANSFORMER, POWER	1	10775	14632	
W1	CABLE ASSEMBLY	1	2126-235	14632	
W2	CABLE ASSEMBLY	1	2126-236	14632	
W3	CABLE ASSEMBLY	1	2126-237	14632	
W4	CABLE ASSEMBLY	1	2126-238	14632	
W5	CABLE ASSEMBLY	1	2126-239	14632	
W6	CABLE ASSEMBLY	1	2126-240	14632	
W7	CABLE ASSEMBLY	1	2126-241	14632	

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
W8	CABLE ASSEMBLY	1	2126-242	14632	
W9	CABLE ASSEMBLY	1	2126-243	14632	
W10	CABLE ASSEMBLY	1	2126-244	14632	
W11	CABLE ASSEMBLY	1	2126-245	14632	
W12	CABLE ASSEMBLY	1	2126-246	14632	
W13	CABLE ASSEMBLY	1	2126-247	14632	
W14	CABLE ASSEMBLY	1	2126-248	14632	
W15	NOT USED				
W16	CABLE ASSEMBLY	1	2126-249	14632	
W17	CABLE ASSEMBLY	1	2126-250	14632	
W18	CABLE ASSEMBLY	1	2126-251	14632	
W19	CABLE ASSEMBLY	1	2126-252	14632	
W20	CABLE ASSEMBLY	1	2126-253	14632	
W21	NOT USED				
W22	NOT USED				
W23	NOT USED				
W24	NOT USED				
W25	CABLE ASSEMBLY	1	30020-1130	14632	
W26	CABLE ASSEMBLY	1	30020-1131	14632	
XA9	CONNECTOR PRINTED CIRCUIT CARD	1	00-5002-008-103 -002	91662	
XA10	CONNECTOR PRINTED CIRCUIT CARD	1	00-5002-013-103 -002	91662	
XA12	CONNECTOR PRINTED CIRCUIT CARD	1	00-5006-018-189 -005	91662	
XDS1	LAMPHOLDER	4	7-02	95263	
XDS2	Same as XDS1				
XDS3	Same as XDS1				
XDS4	Same as XDS1				
XF1	FUSEHOLDER	2	342004	75915	
XF2	Same as XF1				
XQ1	SOCKET TRANSISTOR	1	8038-1G1	91506	
	Accessory Item Furnished with Equipment:				
--	CABLE	1	16653	14632	

5.4.2 Type 71292 30-60 MHz Tuner REF. DESIGNATION PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	V27E	01281	
CR2	DIODE	1	1N3044B	80131	04713
C1	CAPACITOR, MICA, DIPPED: 15 pF, 2%, 500V	1	CM04ED150J03	81349	72136
C2	CAPACITOR, MICA, DIPPED: 22 pF, 5%, 500V	2	CM04ED220J03	81349	72136
C3	CAPACITOR, VARIABLE, GLASS: 0.7-9 pF, 750V	4	VC26G	73899	
C4	CAPACITOR, MICA, DIPPED: 270 pF, 2%, 500V	2	CM05FD271G03	81349	72136
C5	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	15	SM1000PFP	91418	
C6	CAPACITOR, COMPOSITION, TUBULAR: 0.33 pF, 10%, 500V	1	QC0.33PFK	95121	
C7	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C8	Same as C5				
C9	Same as C5				
C10	Same as C5				
C11	Same as C4				
C12	CAPACITOR, MICA, DIPPED: 18 pF, 5%, 500V	1	CM04ED180J03	81349	72136
C13	Same as C3				
C14	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF, ±0.25 pF, 500V	1	301-000C0J0-229C	72982	
C15	Same as C3				
C16	CAPACITOR, MICA, DIPPED: 12 pF, 5%, 500V	2	CM04ED120J03	81349	72136
C17	CAPACITOR, MICA, DIPPED: 47 pF, 2%, 500V	1	CM04ED470J03	81349	72136
C18	CAPACITOR, CERAMIC, TUBULAR: 1.2 pF, ±0.25 pF, 500V	1	301-000C0K0-129C	72982	
C19	Same as C5				
C20	Same as C5				
C21	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	2	SS5D102W	01121	
C22	CAPACITOR, CERAMIC, FEEDTHRU: 330 pF, 10%, 500V	1	FA5C3311	01121	
C23	Same as C5				
C24	Same as C5				
C25	Same as C21				
C26	Same as C5				
C27	Same as C3				
C28	CAPACITOR, MICA, DIPPED: 10 pF, ±0.5 pF, 500V	2	CM04CD100D03	81349	72136
C29	Same as C2				
C30	Same as C28				

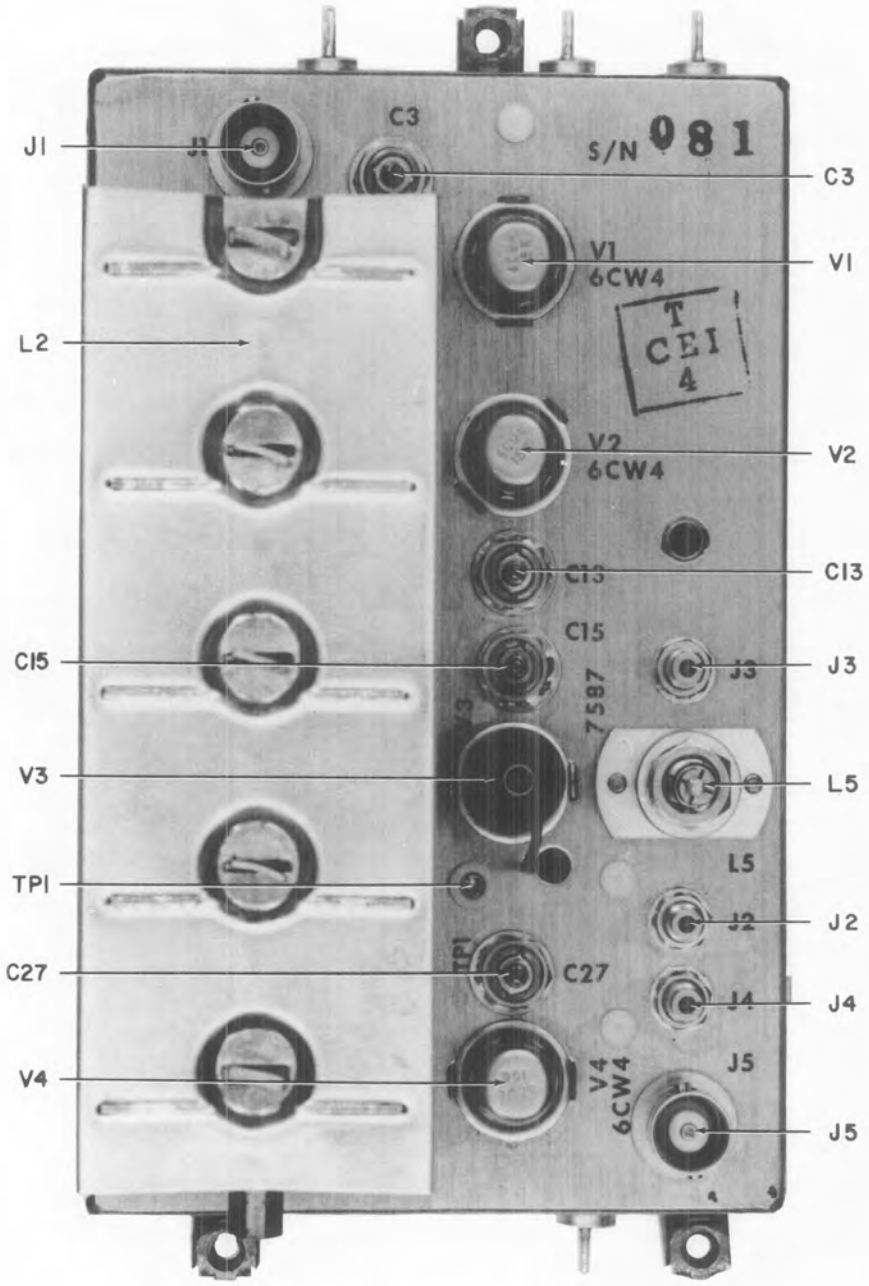


Figure 5-5. Type 71292 30-60 MC Tuner, Location of Components

REF. DESIGNATION PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C31	Same as C5				
C32	Same as C5				
C33	Same as C5				
C34	Same as C5				
C35	Same as C5				
C36	Same as C5				
C37	NOT USED				
C38	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	4	FA5C102W	01121	
C39	Same as C38				
C40	Same as C38				
C41	Same as C38				
C42	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF, ±0.25 pF, 500V	1	301-000C0J0-249C	72982	
C43	Same as C16				
C44*	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF, ±0.25 pF, 500V	1	301-000C0J0-249C	72982	
FB1 Thru FB7	FERRITE BEAD	7	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	2	UG-1094/U	80058	74868
J2	CONNECTOR, RECEPTACLE	3	10-0104-002	19505	
J3	Same as J2				
J4	Same as J2				
J5	Same as J1				
L1	INDUCTOR	3	1131-06	14632	
L2	INDUCTUNER	1	2026-1	14632	
L3	Same as L1				
L4	Same as L1				
L5	COIL, VARIABLE: 1.7-3.5 μH	1	1472-3	14632	
L6	INDUCTOR	1	1131-07	14632	
L7	INDUCTOR	1	1131-08	14632	
L8	COIL, FIXED: 3.3 μH, 10%	1	211-11	99848	
MP1	COVER	1	1051-1	14632	
MP2	COVER	1	2009-3	14632	
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	3	RCR07G473JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 270 kΩ, 5%, 1/4W	1	RCR07G274JS	81349	01121

* Nominal value. Final value factory selected.

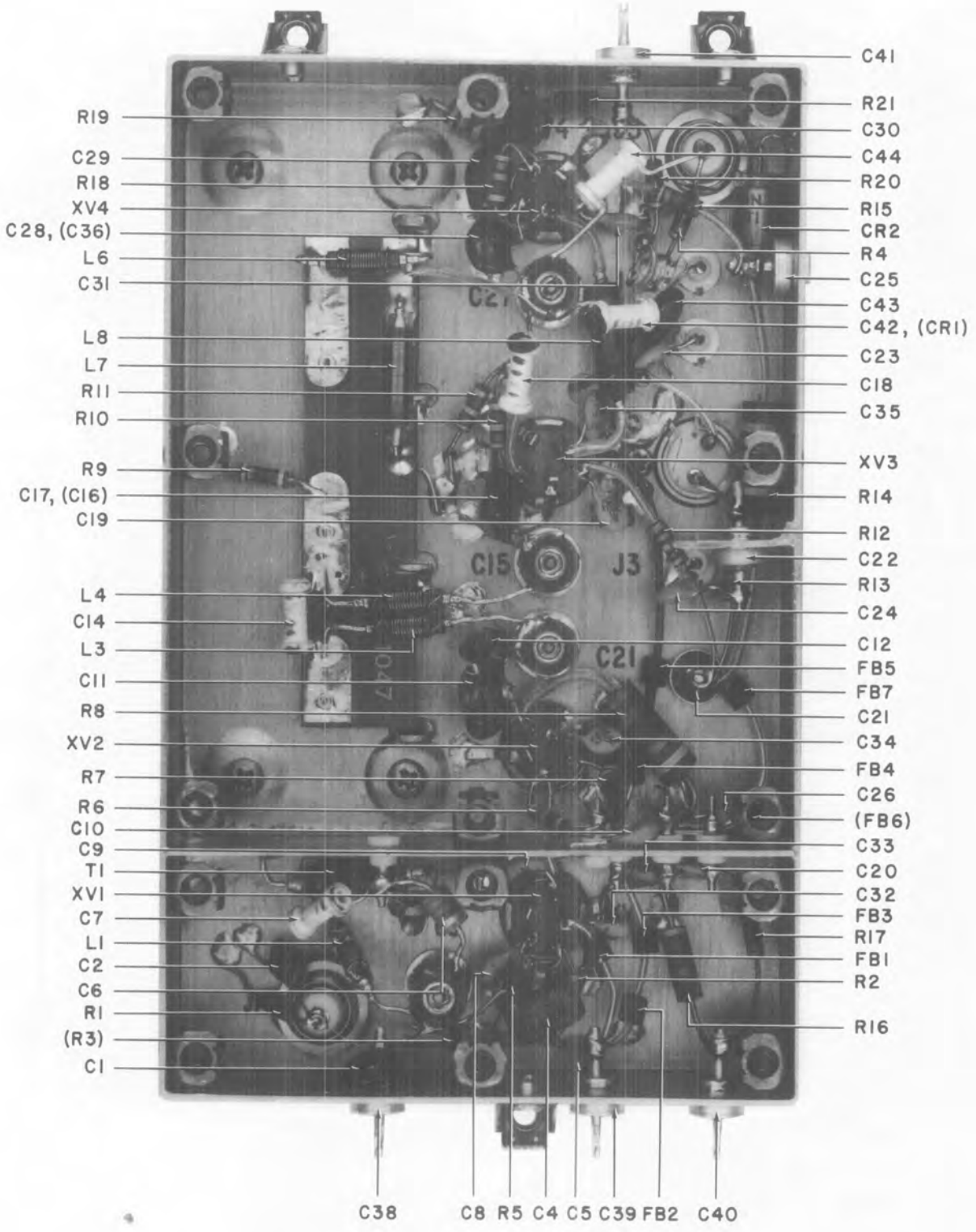


Figure 5-6. Type 71292 30-60 MC Tuner (A1), Location of Components

REF. DESIGNATION PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R4	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	1	RCR07G151JS	81349	01121
R6	Same as R2				
R7	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1W	1	RCR32G682JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	RCR07G472JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	RCR07G474JS	81349	01121
R11	Same as R10				
R12	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/2W	1	RCR20G472JS	81349	01121
R17	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	RCR07G222JS	81349	01121
R18	Same as R2				
R19	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/2W	1	RCR20G223JS	81349	01121
R20	Same as R1				
R21	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	1	RCR07G155JS	81349	01121
TP1	JACK, TIP	1	TJ6	04013	
T1	TRANSFORMER	1	1134	14632	
V1	ELECTRON TUBE	3	6CW4	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	Same as V1				
XV1	SOCKET, NUVISTOR	4	133-65-10-001	71785	
XV2	Same as XV1				
XV3	Same as XV1				
XV4	Same as XV1				

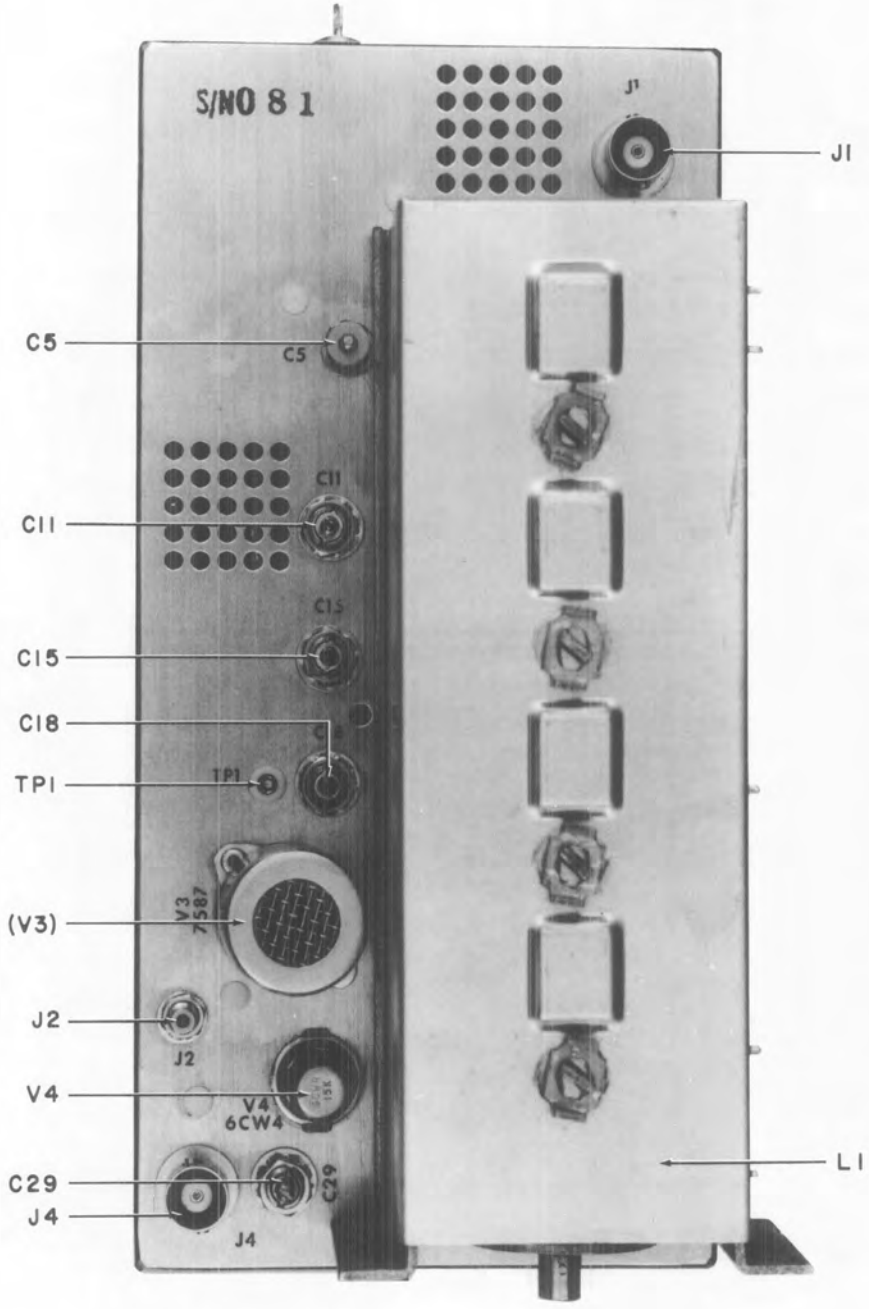


Figure 5-7. Type 71293 60-300 MC Tuner (A2), Location of Components

5.4.3 Type 71293 60-300 MHz Tuner REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	V27E	01281	
CR2	DIODE	1	1N3044B	80131	04713
C1	CAPACITOR, CERAMIC, TUBULAR: 5.6 pF, ±0.25 pF, 500V	1	301-000C0H0-569C	72982	
C2	CAPACITOR, CERAMIC, TUBULAR: 8.2 pF, ±0.5 pF, 500V	1	301-000C0H0-829D		72982
C3	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ±0.25 pF, 500V	4	301-000C0K0-109C	72982	
C4	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±0.5 pF, 500V	1	301-000C0H0-629D	72982	
C5	CAPACITOR, VARIABLE, CERAMIC: 0.5-4.5 pF, 500V	1	2068-01	71279	
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	4	SS5D102W	01121	
C7	CAPACITOR, MICA, DIPPED: 510 pF, 5%, 500V	1	DM15-511J	72136	
C8	Same as C6				
C9	CAPACITOR, COMPOSITION, TUBULAR: 0.47 pF, 10%, 500V	1	QC0.47PFK	95121	
C10	NOT USED				
C11	CAPACITOR, VARIABLE, GLASS: 0.7-9 pF, 750V	4	VC26G	73899	
C12	CAPACITOR, CERAMIC, TUBULAR: 47 pF, 5%, 500V	2	308-000C0G0-470J	72982	
C13	Same as C12				
C14	Same as C3				
C15	Same as C11				
C16	Same as C3				
C17*	CAPACITOR, COMPOSITION, TUBULAR: 0.22 pF, 10%, 500V	1	QC0.22PFK	95121	
C18	Same as C11				
C19	CAPACITOR, CERAMIC, TUBULAR: 5.1 pF, ±0.5 pF, 500V	1	301-000C0H0-519D	72982	
C20	Same as C3				
C21	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM1000PFP	91418	
C22	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C23*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±0.25 pF, 500V	1	301-000C0J0-279C	72982	
C24	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	6	FA5C102W	01121	
C25	NOT USED				
C26*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±0.25 pF, 500V	1	301-000T2J0-279C	72982	

* Nominal value. Final value to be factory selected.

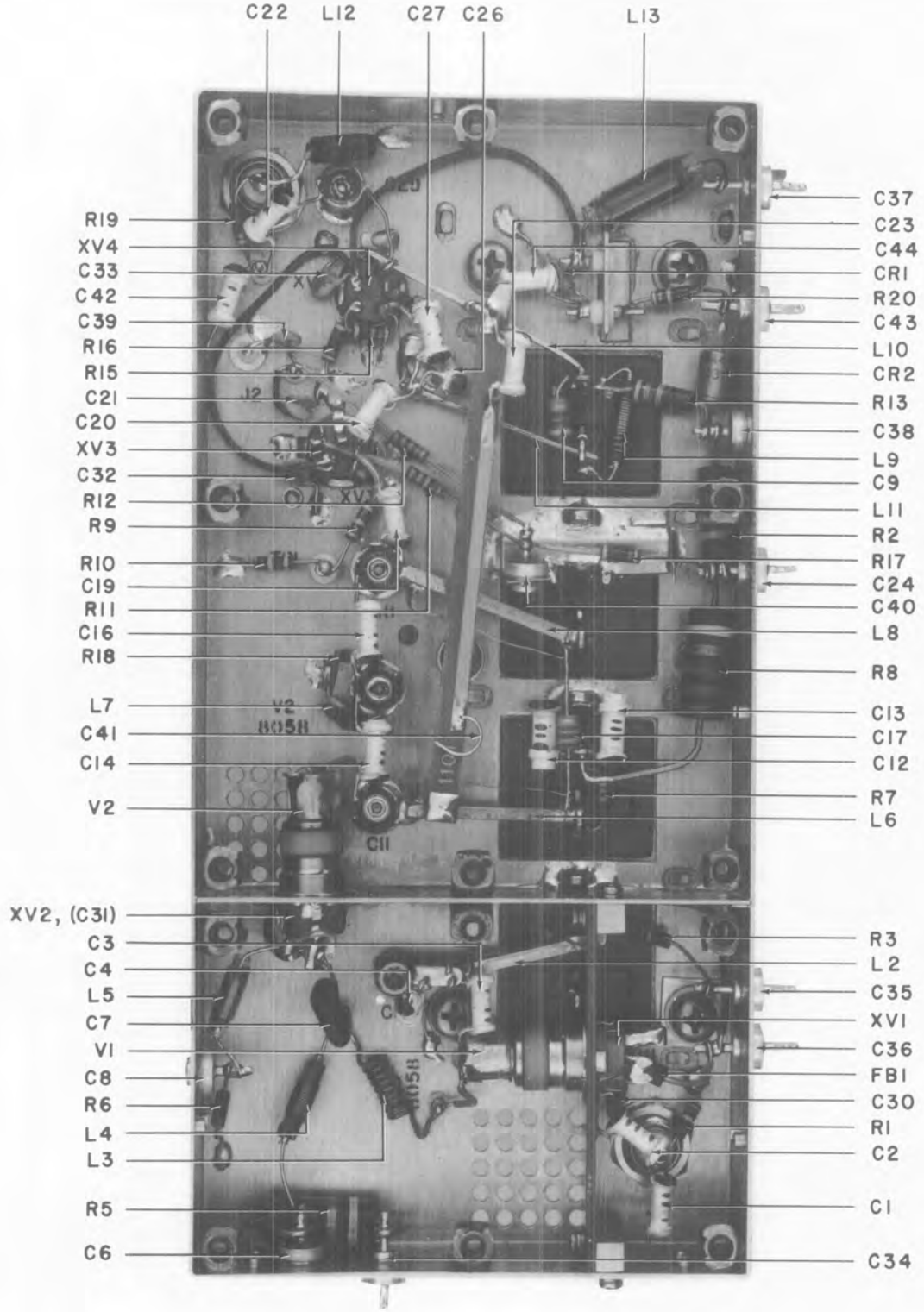


Figure 5-8. Type 71293 60-300 MC Tuner (A2), Location of Components

REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C27*	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±0.25 pF, 500V	1	301-000C0J0-339C	72982	
C28	NOT USED				
C29	Same as C11				
C30	Same as C21				
C31	Same as C21				
C32	Same as C21				
C33	Same as C21				
C34	Same as C24				
C35	Same as C24				
C36	Same as C24				
C37	Same as C24				
C38	Same as C6				
C39	Same as C21				
C40	Same as C6				
C41	PART OF CIRCUIT BOARD				
C42	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±0.25 pF, 500V	1	301-000C0H0-479C	72982	
C43	Same as C24				
C44*	CAPACITOR, CERAMIC, TUBULAR: 3.6 pF, ±0.25 pF, 500V	1	301-000C0J0-369C	72982	
FB1	FERRITE BEAD	1	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	2	UG-1094/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	NOT USED				
J4	Same as J1				
L1	INDUCTOR	1	2027-3	14632	
L2	INDUCTOR	1	10167	14632	
L3	COIL, FIXED	1	1129-01	14632	
L4	INDUCTOR	1	1131-36	14632	
L5	INDUCTOR	1	1131-1	14632	
L6	INDUCTOR	1	10166	14632	
L7	INDUCTOR	1	1131-2	14632	
L8	INDUCTOR	1	1200-2	14632	
L9	INDUCTOR	1	1131-27	14632	
L10	INDUCTOR	1	1107-2	14632	
L11	INDUCTOR	1	10169	14632	

* Nominal value. Final value factory selected.

REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L12*	COIL, FIXED: 27 μH, 10%	1	W270	99848	
L13	INDUCTOR	1	1131-5	14632	
MP1	COVER	1	1999	14632	
MP2	COVER	1	2297	14632	
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 680 kΩ, 5%, 1/4W	1	RCR07G684JS	81349	01121
R4	NOT USED				
R5	RESISTOR, FIXED, COMPOSITION: 6.2 kΩ, 5%, 2W	1	RCR42G622JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	1	RCR07G153JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 2W	1	RCR42G682JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	RCR07G474JS	81349	01121
R10	Same as R9				
R11	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R12	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/2W	1	RCR20G103JS	81349	01121
R14	NOT USED				
R15	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	2	RCR07G472JS	81349	01121
R17	Same as R16				
R18	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R19	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R20	Same as R1				
TP1	JACK, TIP	1	TJ6	04013	
V1	ELECTRON TUBE	2	8058	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	ELECTRON TUBE	1	6CW4	80131	12672
XV1	SOCKET, NUVISTOR	4	133-65-10-001	71785	
XV2	Same as XV1				
XV3	Same as XV1				
XV4	Same as XV1				

* Nominal value. Final value factory selected.

5.4.4 Type 7162 235-500 MHz RF Tuner REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	PC115	01281	
CR2	DIODE	1	1N3044B	80131	04713
C1	CAPACITOR, VARIABLE, CERAMIC: 0.5-4.5 pF, 500V	1	2068-01	71279	
C2	CAPACITOR, COMPOSITION, TUBULAR: 2.0 pF, 10%, 500V	2	QC2PFK	95121	
C3	CAPACITOR, CERAMIC, STANDOFF: 470 pF, 20%, 500V	7	SS5D4712	01121	
C4	Same as C3				
C5	CAPACITOR, CERAMIC, FEEDTHRU: 470 pF, 20%, 500V	17	FA5C4712	01121	
C6	CAPACITOR, VARIABLE, GLASS: 0.8-4.5 pF, 750V	5	VC21GY	73899	
C7	Same as C3				
C8	Same as C5				
C9	Same as C5				
C10	Same as C5				
C11	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, 10%, 500V	2	QC0.68PFK	95121	
C12	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	2	QC1.0PFK	95121	
C13	Same as C6				
C14	Same as C2				
C15	Same as C3				
C16	Same as C5				
C17	Same as C6				
C18	Same as C3				
C19	Same as C5				
C20	CAPACITOR, COMPOSITION, TUBULAR: 0.51 pF, 10%, 500V	1	QC0.51PFK	95121	
C21	Same as C5				
C22	Same as C5				
C23	Same as C12				
C24	Same as C6				
C25	Same as C5				
C26	Same as C5				
C27	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±0.25 pF, 500V	1	301-000C0J0-279C	72982	
C28	CAPACITOR, COMPOSITION, TUBULAR: 1.8 pF, 10%, 500V	1	QC1.8PFK	95121	
C29	Same as C3				

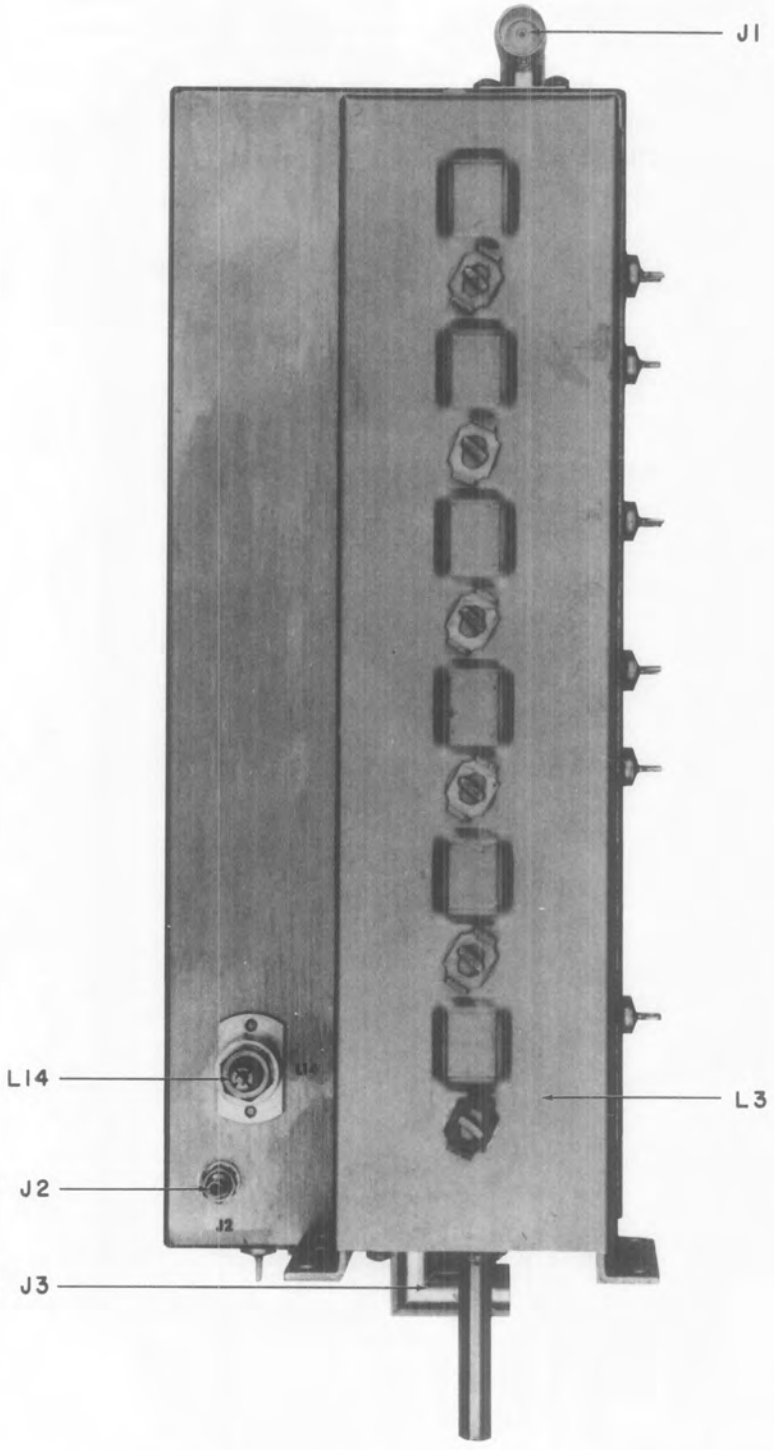


Figure 5-9. Type 7162 235-500 MC Tuner (A3), Location of Components

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C30*	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±0.25 pF, 500V	1	301-000C0H0-479C	72982	
C31	CAPACITOR, CERAMIC, DISC: 470 pF, 20%, 1000V	2	B470PFM	91418	
C32	CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500V	1	QC0.82PFK	95121	
C33	Same as C5				
C34	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±0.5 pF, 500V	1	301-000C0H0-629D	72982	
C35	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±0.5 pF, 500V	1	301-000U2J0-629D	72982	
C36	CAPACITOR, COMPOSITION, TUBULAR: 0.47 pF, 10%, 500V	1	QC0.47PFK	95121	
C37	NOT USED				
C38	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ±0.25 pF, 500V	1	301-000C0K0-109C	72982	
C39	Same as C6				
C40	Same as C5				
C41	Same as C31				
C42	Same as C5				
C43	Same as C5				
C44	Same as C5				
C45	Same as C5				
C46	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±0.25 pF, 500V	1	301-000C0J0-339C	72982	
C47	Same as C11				
C48	Same as C5				
C49	NOT USED				
C50	Same as C3				
J1	CONNECTOR, RECEPTACLE	2	UG-535/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	Same as J1				
L1	INDUCTOR, FIXED	1	1966	14632	
L2	INDUCTOR	11	1131-21	14632	
L3	INDUCTUNER	1	2403-1	14632	
L4	INDUCTOR	1	1967	14632	
L5	Same as L2				
L6	Same as L2				
L7	INDUCTOR	1	1968	14632	

* Nominal value. Final value factory selected.

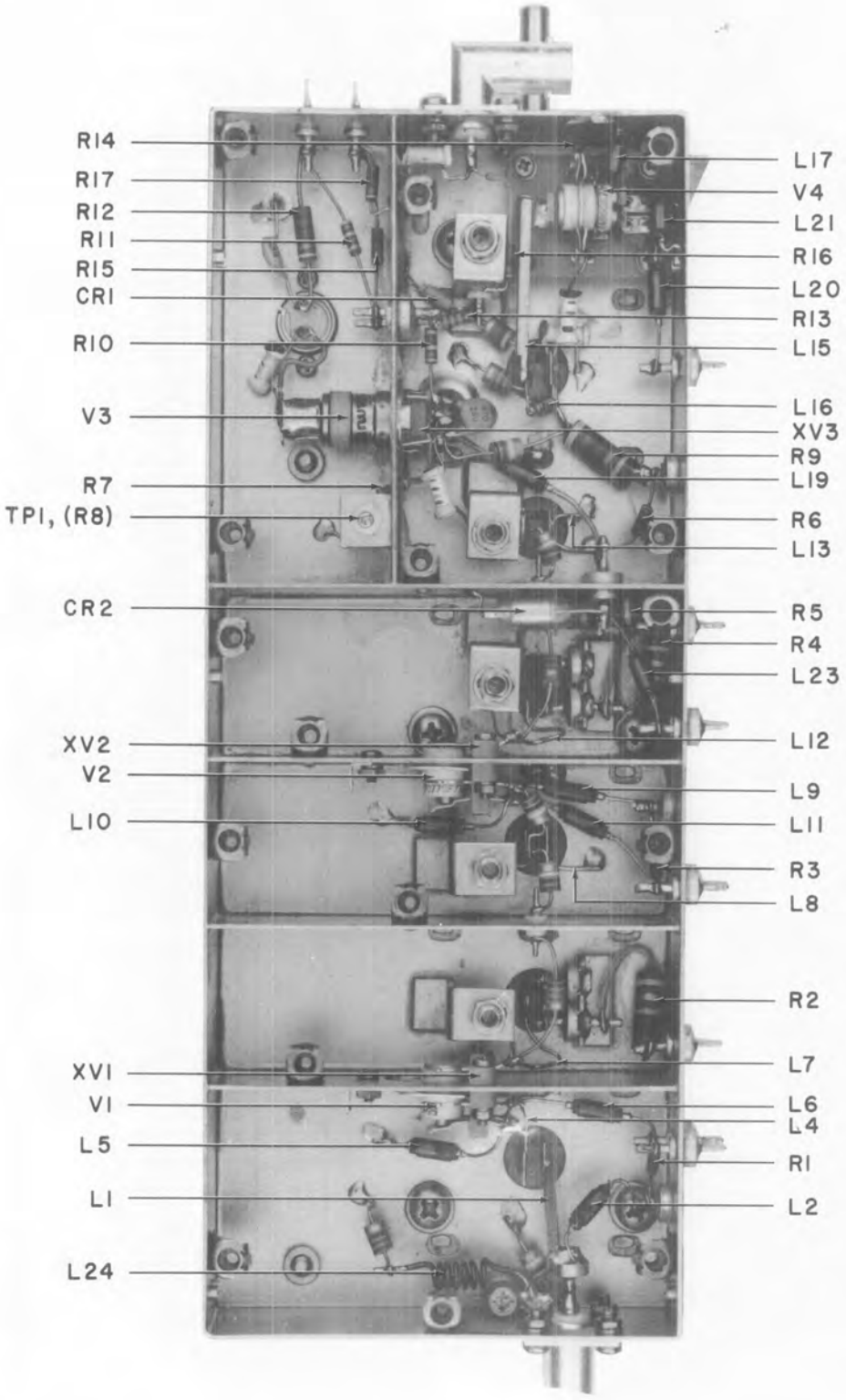


Figure 5-10. Type 7162 235-500 MC Tuner (A3), Location of Components

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L8	INDUCTOR	1	1969	14632	
L9	Same as L2				
L10	Same as L2				
L11	Same as L2				
L12	INDUCTOR	1	1970	14632	
L13	INDUCTOR	1	1971	14632	
L14	COIL, VARIABLE: 0.65-0.94 μH	1	1472-13	14632	
L15	INDUCTOR	1	1097-1	14632	
L16	INDUCTOR	1	1131-34	14632	
L17	Same as L2				
L18	NOT USED				
L19	Same as L2				
L20	Same as L2				
L21	Same as L2				
L22	NOT USED				
L23	Same as L2				
L24	COIL, FIXED	1	1129-4	14632	
MP1	COVER	1	2400	14632	
MP2	COVER	1	2104	14632	
R1	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1W	2	RCR32G103JS	81349	01121
R3	Same as R1				
R4	Same as R2				
R5	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	4	RCR07G474JS	81349	01121
R8	Same as R7				
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1W	1	RCR32G472JS	81349	01121
R10	Same as R7				
R11	Same as R7				
R12	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/2W	1	RCR20G272JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 1.5 kΩ, 5%, 1/4W	1	RCR07G152JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R17	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	1	RCR07G155JS	81349	01121

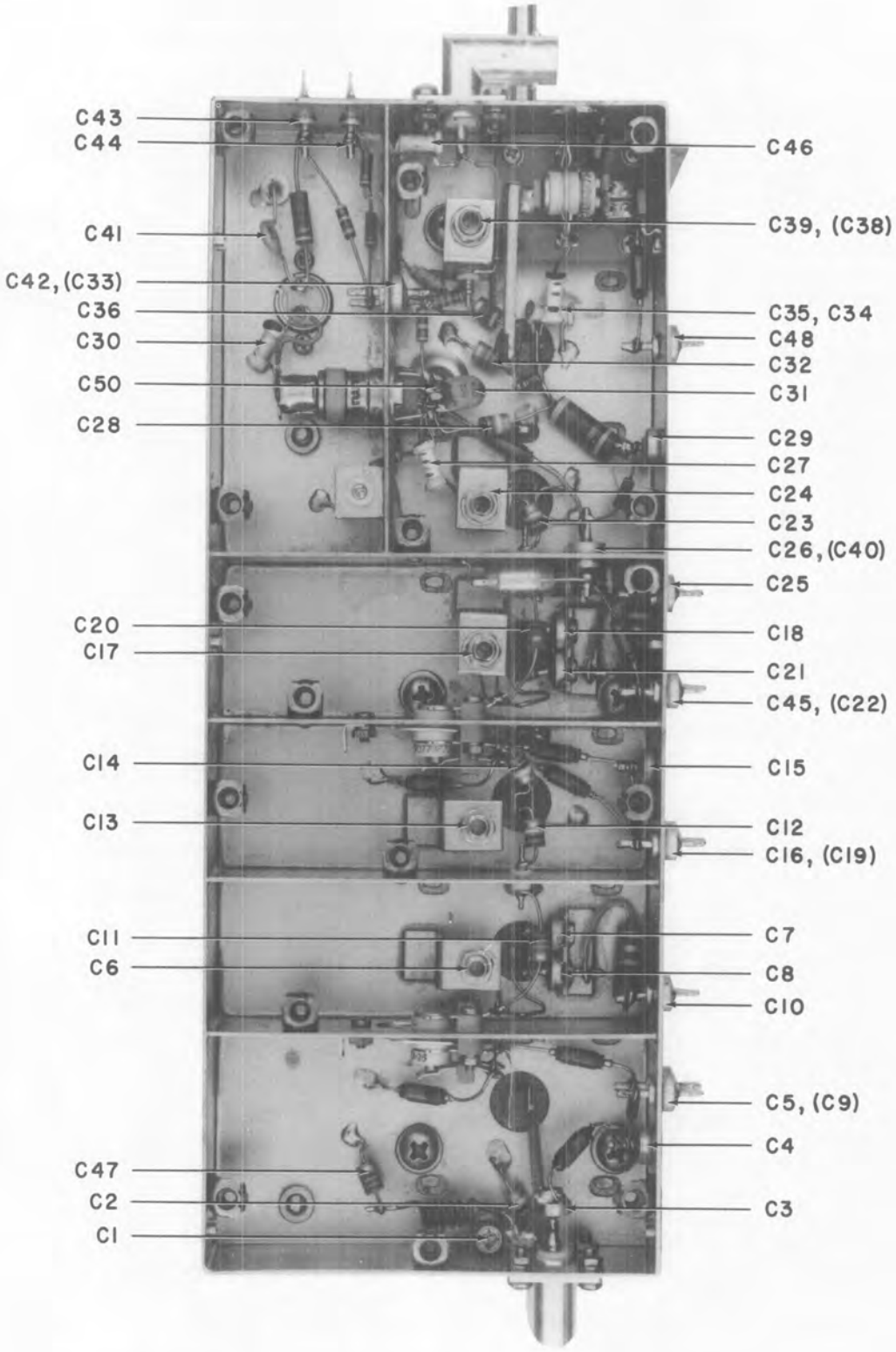


Figure 5-11. Type 7162 235-500 MC Tuner (A3), Location of Components

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
TP1	JACK, TIP	1	TJ6	04013	
V1	ELECTRON TUBE	2	7077	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	ELECTRON TUBE	1	7486	80131	12672
XV1	SOCKET, NUVISTOR	2	86-040	04435	
XV2	Same as XV1				
XV3	SOCKET, NUVISTOR	1	133-65-10-001	71785	
XV4	SOCKET, NUVISTOR	1	86-085	04435	

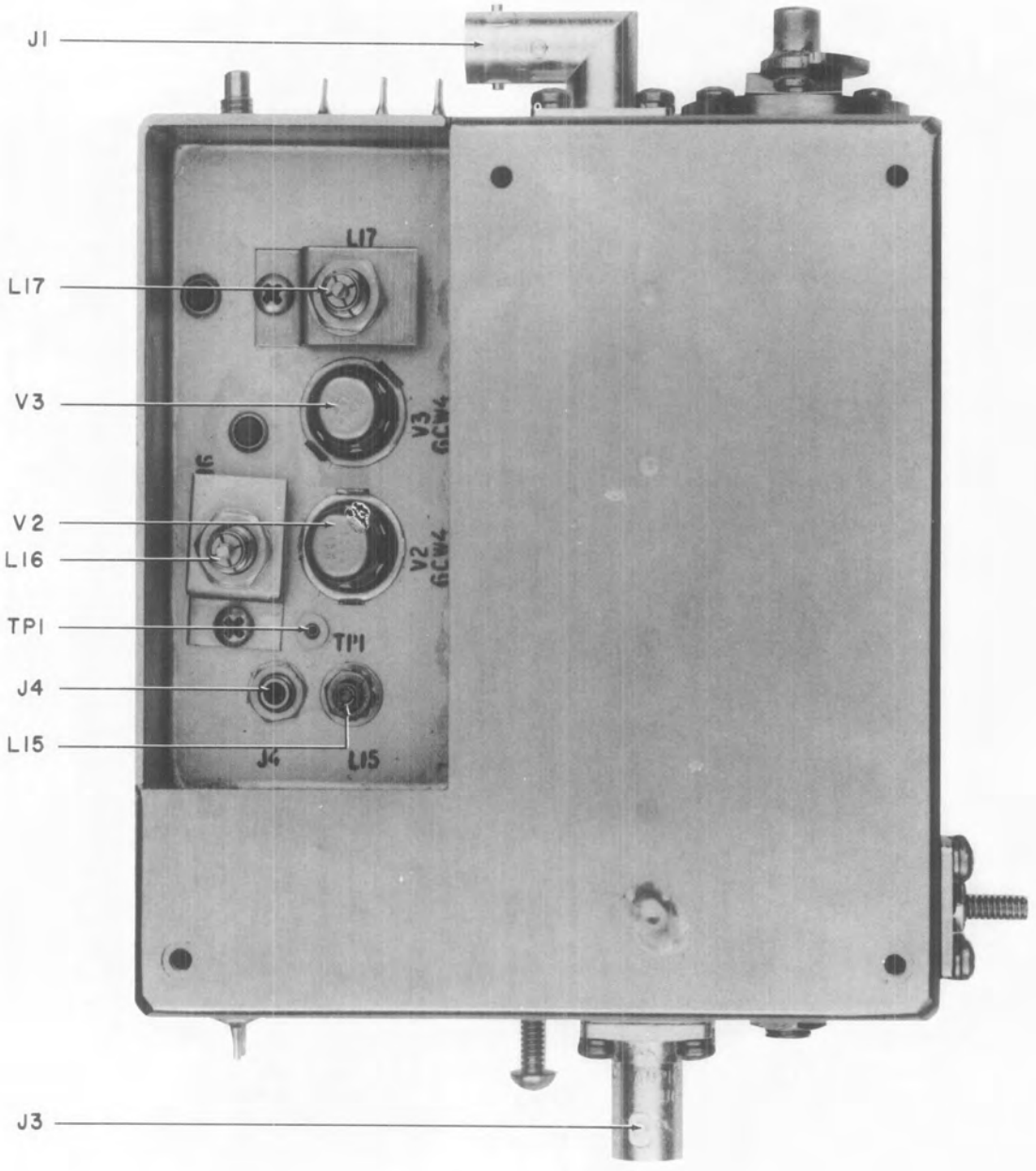


Figure 5-12. Type 7163 490-1000 MC Tuner (A4), Location of Components

5.4.5 Type 7163 490-1000 MHz Tuner REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	1N82AG	80131	93332
CR2	DIODE, VARICAP	1	PC115	01281	
CR3	DIODE	1	1N3044B	80131	04713
C1	TUNER SHAFT ASSEMBLY	1	1271-1	14632	
C2	RF TRIMMER PLATE	4	1261	14632	
C3	Same as C2				
C4	Same as C2				
C5	Same as C2				
C6	TRIMMER DISC ASSEMBLY	1	1276-1	14632	
C7	CAPACITOR, VARIABLE, CERAMIC: 0.5-3 pF, 500V	1	829-3	72982	
C8	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ±0.1 pF, 500V	1	301-000C0K0-109B	72982	
C9	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C10	CAPACITOR, COMPOSITION, TUBULAR: 0.27 pF, 10%, 500V	2	QC0.27PFK	95121	
C11	NOT USED				
C12	CAPACITOR, CERAMIC, FEEDTHRU: 470 pF, 20%, 500V	6	FA5C4712	01121	
C13	CAPACITOR, CERAMIC, STANDOFF: 137 pF, 20%, 500V	1	32-252394-1	54753	
C14	Same as C12				
C15	CAPACITOR, FIXED, MICA: 15 pF, 10%, 500V	1	654-017-150K	72982	
C16	CAPACITOR, MICA, DIPPED: 56 pF, 2%, 500V	1	CM04ED560G03	81349	72136
C17	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	1	SS5D102W	01121	
C18	Same as C12				
C19	Same as C12				
C20	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM1000PFP	91418	
C21	Same as C20				
C22	Same as C20				
C23	Same as C20				
C24	Same as C17				
C25	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C102W	01121	
C26	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF, ±0.25 pF, 500V	1	301-000C0J0-229C	72982	
C27	Same as C20				
C28	Same as C20				

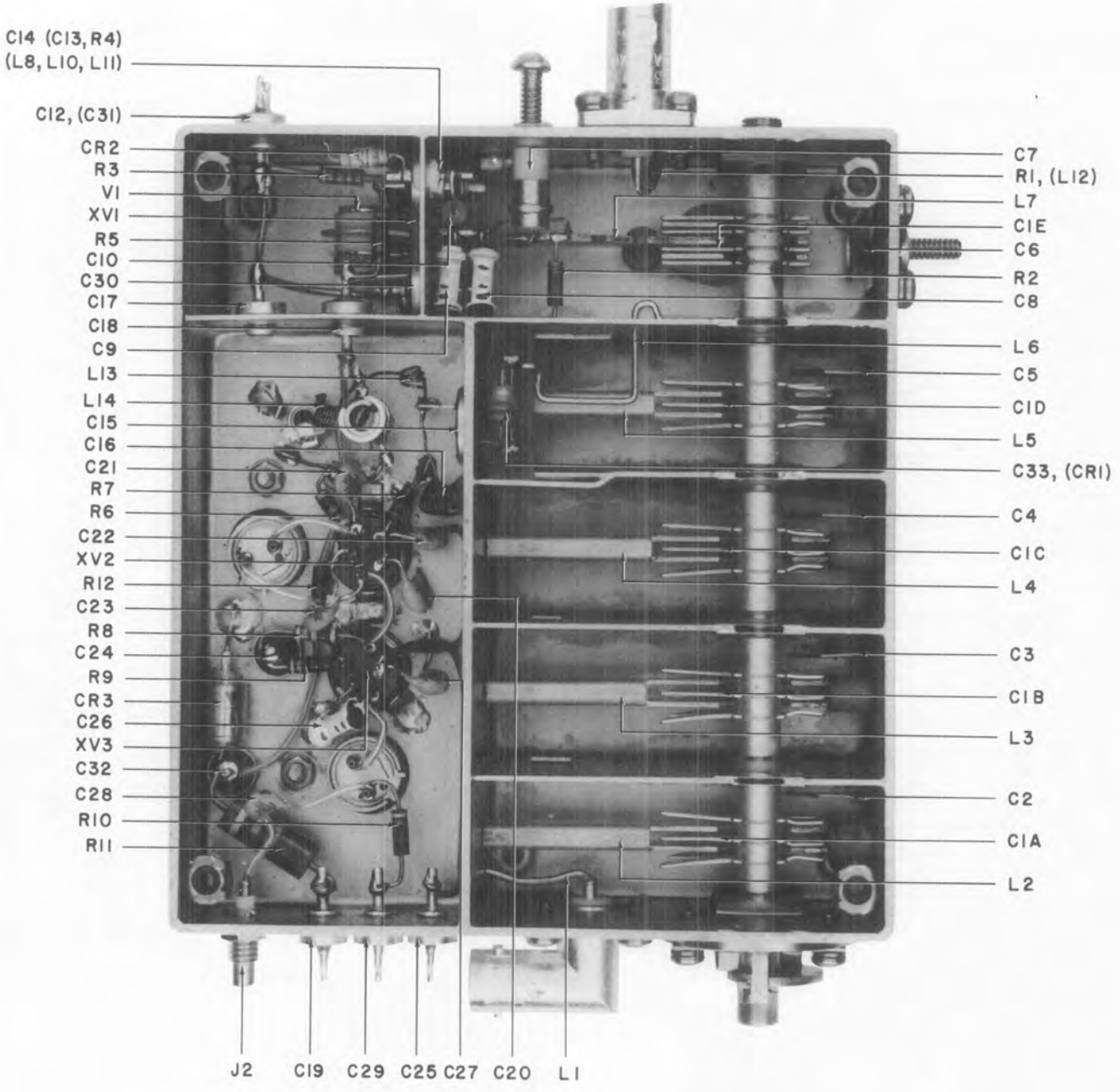


Figure 5-13. Type 7163 490-1000 MC Tuner (A4), Location of Components

REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C29	Same as C25				
C30	Same as C12				
C31	Same as C12				
C32	Same as C17				
C33	Same as C10				
J1	CONNECTOR, RECEPTACLE	1	UG-535/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	CONNECTOR, RECEPTACLE	1	31-203-1004	74868	
J4	TEST JACK	1	TR2A	82389	
L1	COIL	1	1461-1	14632	
L2	RF STATOR	4	1265	14632	
L3	Same as L2				
L4	Same as L2				
L5	Same as L2				
L6	COIL	1	1462-1	14632	
L7	OSC STATOR ASSEMBLY	1	1301-1	14632	
L8	INDUCTOR	1	1973	14632	
L9	COIL	1	1466-4	14632	
L10	COIL	2	1466-3	14632	
L11	Same as L10				
L12	INDUCTOR	1	1975	14632	
L13	COIL	1	1466-1	14632	
L14	COIL	1	1466-2	14632	
L15	COIL FORM ASSEMBLY	1	1471-2	14632	
L16	COIL, VARIABLE: 3.8-5.4 μH	1	1472-12	14632	
L17	COIL, VARIABLE: 0.65-0.94 μH	1	1472-13	14632	
MP1	COVER	1	2446-1	14632	
R1	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	1	RCR07G562JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	2	RCR07G473JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	1	RCR07G680JS	81349	01121
R8	Same as R6				
R9	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121

REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R10*	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	RCR07G272JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 11 kΩ, 5%, 1W	1	RCR32G113JS	81349	01121
R12	Same as R5				
TP1	JACK, TIP	1	TJ6	04013	
V1	ELECTRON TUBE	1	7486	80131	12672
V2	ELECTRON TUBE	2	6CW4	80131	12672
V3	Same as V2				
XV1	SOCKET, NUVISTOR	1	86-000	04435	
XV2	SOCKET, NUVISTOR	2	133-65-10-001	71785	
XV3	Same as XV2				

* Nominal Value. Final value to be factory selected.

5.4.6 Type 79358 Signal Monitor REF. DESIGNATION PREFIX A5

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	IF AMPLIFIER BOARD NO. 1	1	8132	14632	
A2	IF AMPLIFIER BOARD NO. 2	1	8133	14632	
A3	SWEEP GENERATOR	1	8232	14632	
A4	CRYSTAL OSCILLATOR	1	8306	14632	
A5	BANDPASS FILTER	1	79326	14632	
C1 Thru C11	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	13	FA5C102W	01121	
C12	CAPACITOR, CERAMIC, FEEDTHRU: 33 pF, 10%, 500V	4	FA5C3301	01121	
C13	Same as C12				
C14	Same as C12				
C15	Same as C12				
C16	Same as C1				
C17	Same as C1				
C18	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	1	SS5D102W	01121	
C19	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 μF, -10+75%, 50V	1	30D506G050DD2	56289	
C20	CAPACITOR, CERAMIC, DISC: 0.1 μF, 20%, 100V	2	8131M100-651-104M	72982	
C21	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 200V	1	8131A200Z5U0-103M	72982	
C22	Same as C20				
FB1 Thru FB6	FERRITE BEAD	6	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
P1	CONNECTOR, PLUG Part of W1	1	UG-1466/U	80058	74868
P2	CONNECTOR, PLUG Part of W1	1	UG-1465/U	80058	74868
P3	NOT USED				
P4	NOT USED				
P5	CONNECTOR, PLUG	1	MRE9PG7H8	81312	
R1	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1W	1	70A3N056L103U	01121	
R2	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 1W	1	70A3N056L104U	01121	
R3	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1/2W	1	RV6NAYSD103A	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 2.4 kΩ, 5%, 1/4W	1	RCR07G242JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	1	RCR07G470JS	81349	01121

REF. DESIGNATION PREFIX A5

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R6	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
S1	SWITCH, TOGGLE	1	MST115D	95146	
V1	TUBE, CRT	1	3ASP1	93332	
W1	CABLE ASSEMBLY	1	30020-884	14632	
XV1	SOCKET, CRT	1	9859-2	11293	

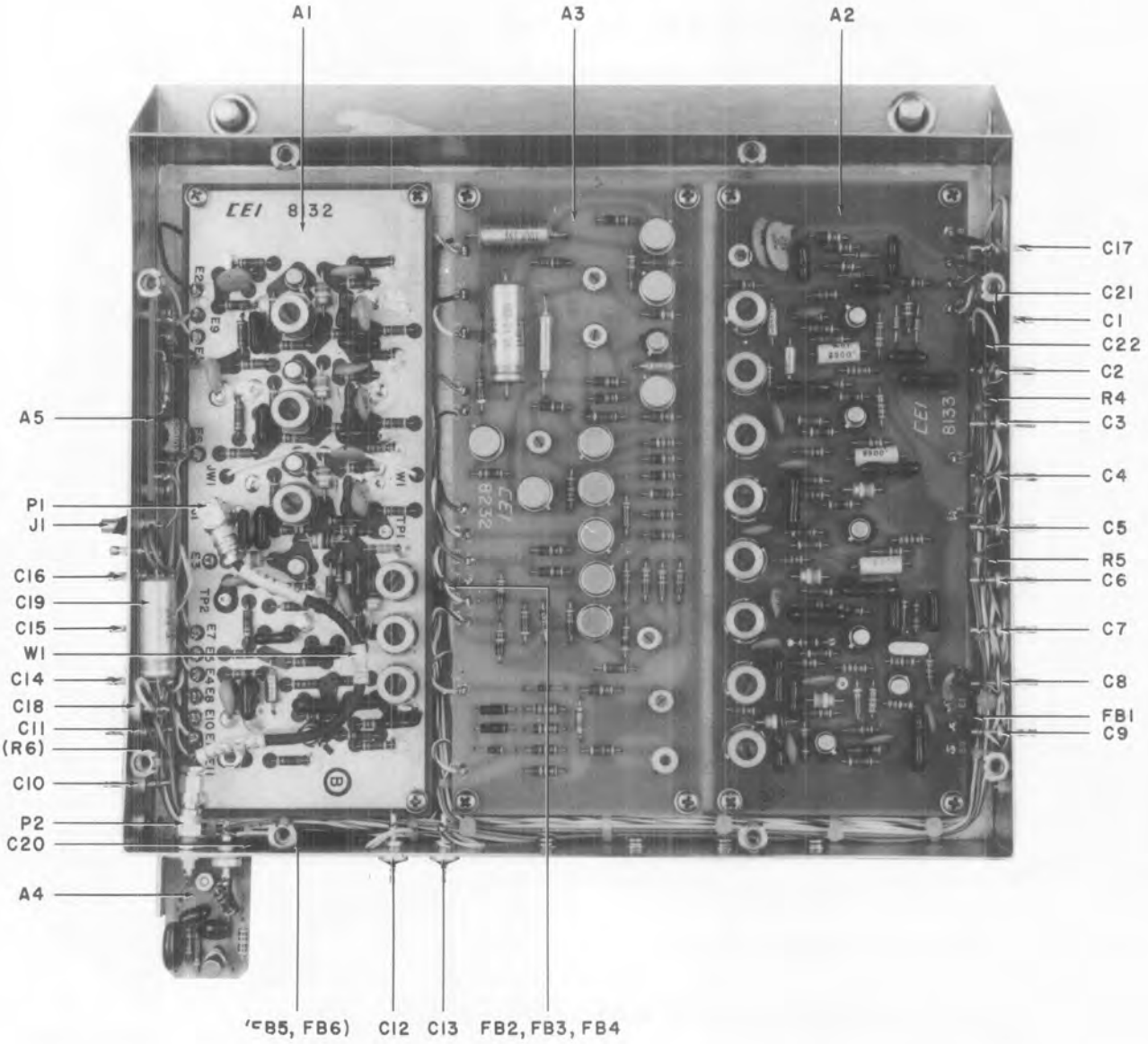


Figure 5-14. Type 79358 Signal Monitor (A5), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	MV832	04713	
CR2	DIODE	1	1N198A	80131	93332
C1	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 500V	11	SM5000PFM	91418	
C2	CAPACITOR, COMPOSITION, TUBULAR: 2.7 pF, 10%, 500V	2	QC2.7PFK	95121	
C3	CAPACITOR, MICA, DIPPED: 220 pF, 5%, 500V	4	CM05FD221J03	81349	72136
C4	Same as C1				
C5	CAPACITOR, MICA, DIPPED: 43 pF, 5%, 500V	1	CM05ED430J03	81349	72136
C6	CAPACITOR, MICA, DIPPED: 330 pF, 5%, 500V	3	CM05FD331J03	81349	72136
C7	Same as C1				
C8	CAPACITOR, COMPOSITION, TUBULAR: 4.3 pF, 10%, 500V	2	QC4.3PFK	95121	
C9	Same as C3				
C10	Same as C1				
C11	Same as C1				
C12	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	1	CM05ED470J03	81349	72136
C13	Same as C6				
C14	Same as C2				
C15	Same as C3				
C16	Same as C1				
C17	Same as C8				
C18	CAPACITOR, MICA, DIPPED: 30 pF, 5%, 500V	1	CM05ED300J03	81349	72136
C19	Same as C3				
C20	Same as C1				
C21	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	2	QC1.0PFK	95121	
C22	Same as C6				
C23	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	CS13BF105K	81349	56289
C24	CAPACITOR, MICA, DIPPED: 24 pF, 5%, 500V	1	CM05ED240J03	81349	72136
C25	CAPACITOR, MICA, DIPPED: 68 pF, 5%, 500V	2	CM05ED680J03	81349	72136
C26	Same as C25				
C27	Same as C1				
C28	CAPACITOR, MICA, DIPPED: 39 pF, 5%, 500V	2	CM05ED390J03	81349	72136
C29	Same as C28				
C30	Same as C21				
C31	CAPACITOR, MICA, DIPPED: 75 pF, 5%, 500V	1	CM05ED750J03	81349	72136

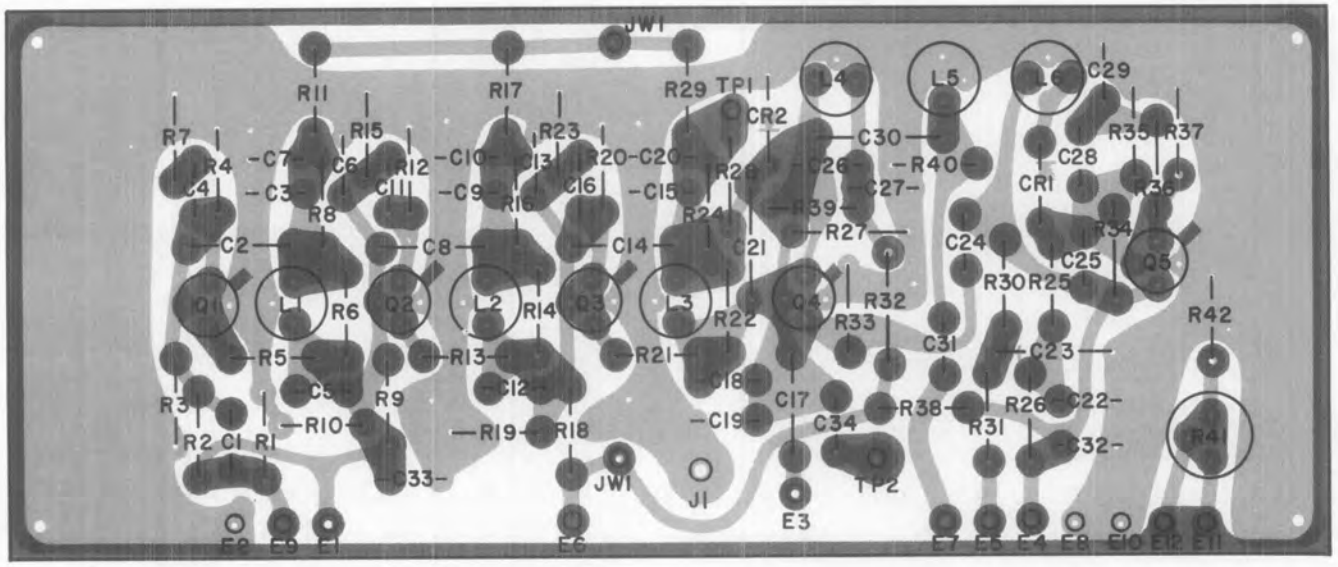


Figure 5-15. Type 8132 IF Amplifier Board No. 1 (A5A1), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C32	Same as C1				
C33	Same as C1				
C34	Same as C1				
E1 Thru E12	TERMINAL, FORKED	12	140-1941-02-01	71279	
J1	CONNECTOR, RECEPTACLE	1	27-800	74868	
L1	COIL, VARIABLE: 1.35-1.65 μH	2	31662-1	14632	
L2	Same as L1				
L3	COIL, VARIABLE: 1.98-2.42 μH	3	31662-3	14632	
L4	Same as L3				
L5	COIL, VARIABLE: 1.65-1.98 μH	1	31662-2	14632	
L6	Same as L3				
Q1	TRANSISTOR	4	2N3478	80131	02735
Q2	Same as Q1				
Q3	Same as Q1				
Q4	TRANSISTOR	1	3N128	80131	02735
Q5	Same as Q1				
R1	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 27 kΩ, 5%, 1/4W	2	RCR07G273JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	3	RCR07G682JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	9	RCR07G102JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	3	RCR07G470JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	2	RCR07G223JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 15 Ω, 5%, 1/4W	2	RCR07G150JS	81349	01121
R8	Same as R4				
R9	Same as R2				
R10	Same as R3				
R11	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	3	RCR07G471JS	81349	01121
R12	Same as R4				
R13	Same as R5				
R14	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	RCR07G123JS	81349	01121
R15	Same as R7				
R16	Same as R4				
R17	Same as R11				
R18	Same as R6				
R19	Same as R3				

REF. DESIGNATION PREFIX A5A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R20	Same as R4				
R21	Same as R5				
R22	RESISTOR, FIXED, COMPOSITION: 430 Ω, 5%, 1/4W	1	RCR07G431JS	81349	01121
R23	RESISTOR, FIXED, COMPOSITION: 3.6 Ω, 5%, 1/4W	1	RCR07G3R6JS	81349	01121
R24	Same as R4				
R25	RESISTOR, FIXED, COMPOSITION: 2.7 Ω, 5%, 1/4W	1	RCR07G2R7JS	81349	01121
R26	RESISTOR, FIXED, COMPOSITION: 30 kΩ, 5%, 1/4W	1	RCR07G303JS	81349	01121
R27	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	RCR07G222JS	81349	01121
R28	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	3	RCR07G104JS	81349	01121
R29	Same as R11				
R30	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	1	RCR07G224JS	81349	01121
R31	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R32	Same as R4				
R33	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	1	RCR07G474JS	81349	01121
R34	Same as R28				
R35	Same as R28				
R36	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	1	RCR07G220JS	81349	01121
R37	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	RCR07G472JS	81349	01121
R38	Same as R4				
R39	RESISTOR, FIXED, COMPOSITION: 1.0 MΩ, 5%, 1/4W	2	RCR07G105JS	81349	01121
R40	Same as R39				
R41	RESISTOR, VARIABLE, FILM: 10 kΩ, 10%, 1/2W	1	62PR10K	73138	
R42	Same as R4				
TP1	TEST POINT	2	2010B1	88245	
TP2	Same as TP1				

5.4.6.2 Type 8133 IF Amplifier Board No. 2 REF. DESIGNATION PREFIX A5A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	4	1N4449	80131	93332
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Same as CR1				
C1	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 100V	9	C023B101F103M	56289	
C2	CAPACITOR, MICA, DIPPED: 68 pF, 5%, 500V	1	CM05ED680J03	81349	72136
C3	Same as C1				
C4	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC1.0PFK	95121	
C5	CAPACITOR, COMPOSITION, TUBULAR: 4.3 pF, 10%, 500V	1	QC4.3PFK	95121	
C6	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	2	CM05ED470J03	81349	72136
C7	Same as C6				
C8	CAPACITOR, MICA, DIPPED: 75 pF, 5%, 500V	1	CM05ED750J03	81349	72136
C9	CAPACITOR, MICA, DIPPED: 560 pF, 5%, 500V	1	CM06FD561J03	81349	72136
C10	Same as C1				
C11	Same as C1				
C12	Same as C1				
C13	CAPACITOR, COMPOSITION, TUBULAR: 4.3 pF, 10%, 500V	2	QC4.3PFK	95121	
C14	CAPACITOR, MICA, DIPPED: 680 pF, 5%, 500V	3	CM06FD681J03	81349	72136
C15	CAPACITOR, PLASTIC, TUBULAR: 6800 pF, 10%, 100V	3	61F10AA682	06001	
C16	Same as C1				
C17	CAPACITOR, MICA, DIPPED: 620 pF, 5%, 500V	3	CM06FD621J03	81349	72136
C18	Same as C1				
C19	Same as C13				
C20	Same as C14				
C21	Same as C15				
C22	Same as C1				
C23	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	2	CS13BF105K	81349	56289
C24	Same as C14				
C25	Same as C15				
C26	Same as C1				
C27	Same as C23				
C28	Same as C17				

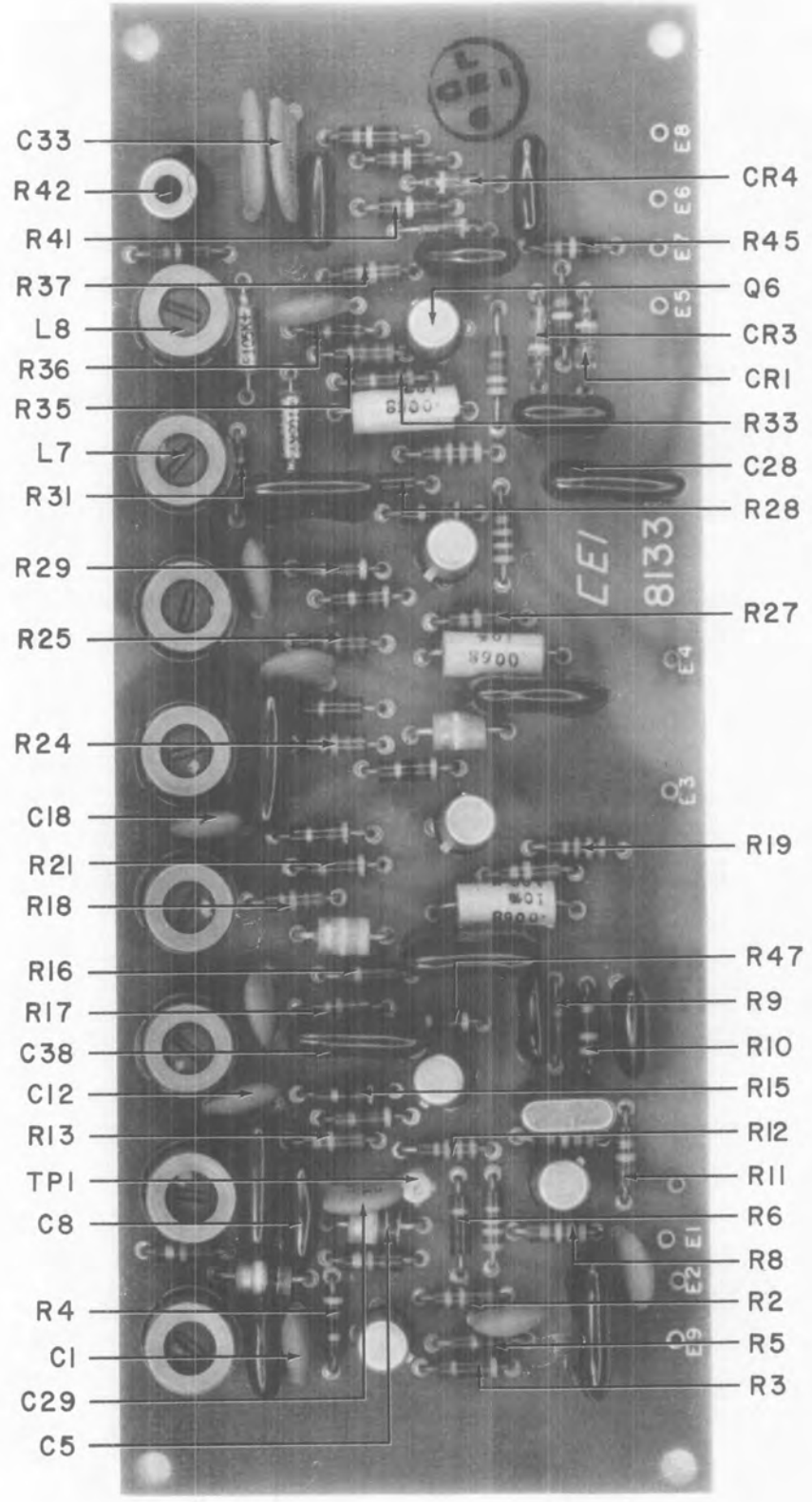


Figure 5-16. Type 8133 IF Amplifier Board No. 2 (A5A2), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C29	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 500V	1	SM5000PFM	91418	
C30	CAPACITOR, MICA, DIPPED: 270 pF, 5%, 500V	2	CM05FD271J03	81349	72136
C31	Same as C30				
C32	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 500V	2	SM01UFM	91418	
C33	Same as C32				
C34	CAPACITOR, MICA, DIPPED: 100 pF, 5%, 500V	2	CM05FD101J03	81349	72136
C35	Same as C34				
C36	NOT USED				
C37	CAPACITOR, MICA, DIPPED: 820 pF, 5%, 500V	1	CM06FD821J03	81349	72136
C38	Same as C17				
E1 Thru E9	TERMINAL, FORKED	9	140-1941-02-01	71279	
L1	COIL, VARIABLE: 1.98-2.42 μH	2	31662-3	14632	
L2	Same as L1				
L3 Thru L8	COIL, VARIABLE: 40.0-54.0 μH	6	31662-7	14632	
Q1 Thru Q6	TRANSISTOR	6	2N3478	80131	02735
R1	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	5	RCR07G333JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	4	RCR07G153JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	4	RCR07G472JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	7	RCR07G470JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	4	RCR07G222JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	2	RCR07G334JS	81349	01121
R8	Same as R7				
R9	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	RCR07G221JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	RCR07G332JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 18 kΩ, 5%, 1/4W	2	RCR07G183JS	81349	01121
R12	Same as R1				
R13	Same as R2				
R14	Same as R3				
R15	Same as R4				
R16	Same as R6				
R17	RESISTOR, FIXED, COMPOSITION: 1.0 MΩ, 5%, 1/4W	1	RCR07G105JS	81349	01121

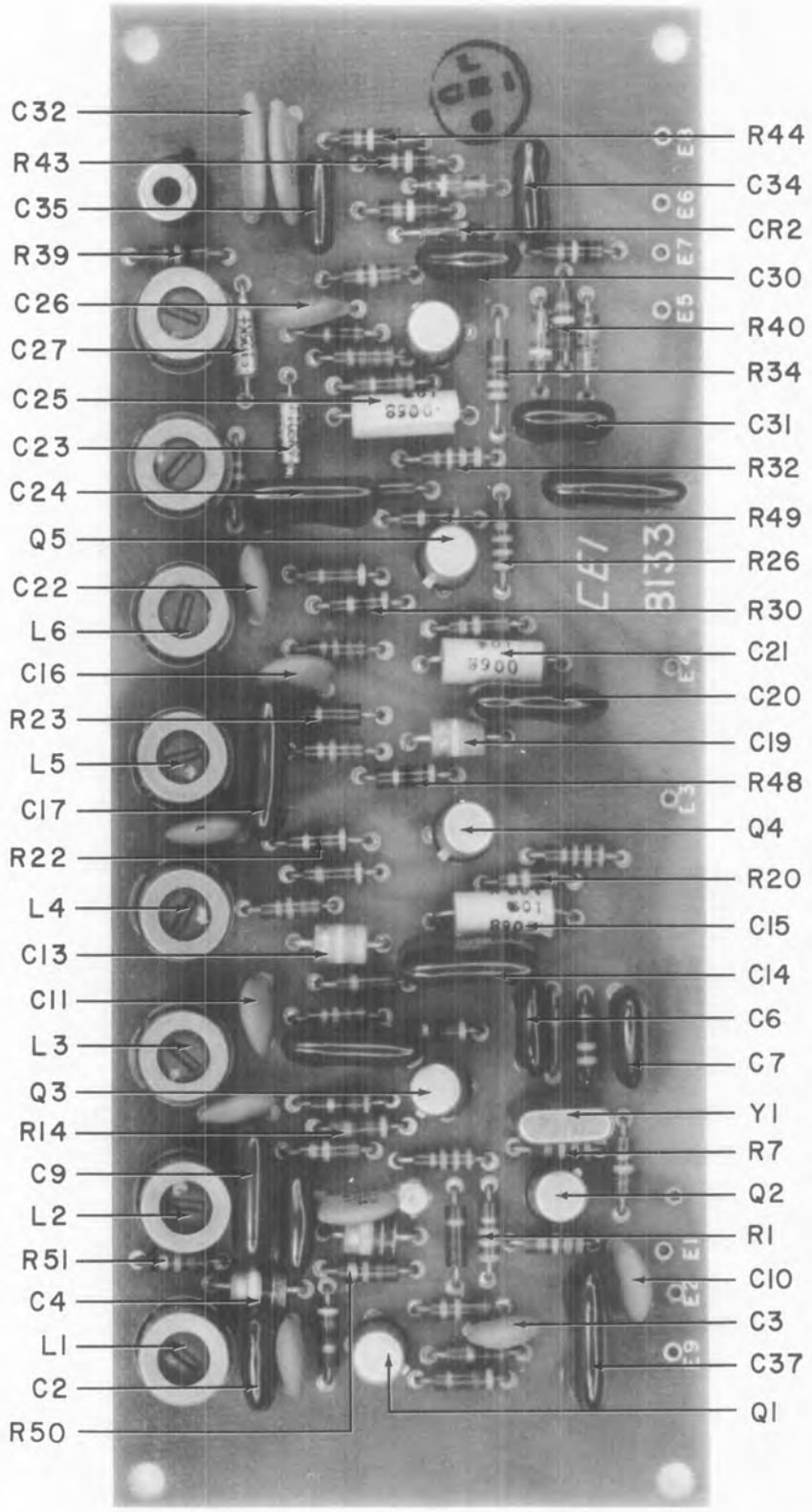


Figure 5-17. Type 8133 IF Amplifier Board No. 2 (A5A2), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R18	RESISTOR, FIXED, COMPOSITION: 16 kΩ, 5%, 1/4W	4	RCR07G163JS	81349	01121
R19	Same as R1				
R20	Same as R2				
R21	Same as R3				
R22	Same as R4				
R23	Same as R6				
R24	Same as R18				
R25	Same as R18				
R26	Same as R1				
R27	Same as R2				
R28	Same as R6				
R29	Same as R3				
R30	Same as R4				
R31	Same as R18				
R32	Same as R1				
R33	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	1	RCR07G682JS	81349	01121
R34	RESISTOR, FIXED, COMPOSITION: 330 Ω, 5%, 1/4W	1	RCR07G331JS	81349	01121
R35	RESISTOR, FIXED, COMPOSITION: 680 Ω, 5%, 1/4W	1	RCR07G681JS	81349	01121
R36	Same as R5				
R37	Same as R11				
R38	NOT USED				
R39	RESISTOR, FIXED, COMPOSITION: 200 kΩ, 5%, 1/4W	1	RCR07G204JS	81349	01121
R40	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	2	RCR07G224JS	81349	01121
R41	Same as R40				
R42	RESISTOR, VARIABLE, FILM: 50 kΩ, 10%, 1/2W	1	62PR50K	73138	
R43	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R44	RESISTOR, FIXED, COMPOSITION: 150 kΩ, 5%, 1/4W	1	RCR07G154JS	81349	01121
R45	Same as R43				
R46	NOT USED				
R47	Same as R4				
R48	Same as R4				
R49	Same as R4				
R50	RESISTOR, FIXED, COMPOSITION: 27 kΩ, 5%, 1/4W	2	RCR07G273JS	81349	01121
R51	Same as R50				
TP1	TEST POINT	1	2010B1	88245	
Y1	CRYSTAL, QUARTZ	1	CR64U, 14.000MHz	81349	74306

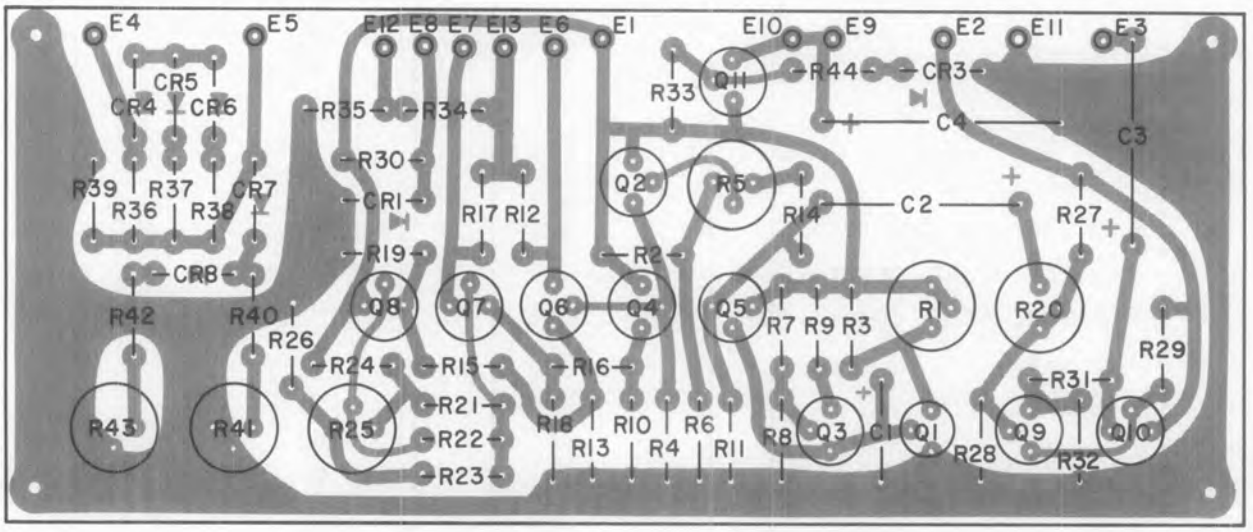


Figure 5-18. Type 8232 Sweep Generator (A5A3), Location of Components

5.4.6.3 Part 8232 Sweep Generator REF. DESIGNATION PREFIX A5A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	1N967B	80131	04713
CR2	NOT USED				
CR3	DIODE	3	1N462A	80131	93332
CR4	Same as CR3				
CR5	DIODE	1	1N746A	80131	04713
CR6	DIODE	1	1N749A	80131	04713
CR7	Same as CR3				
CR8	DIODE	1	1N751A	80131	04713
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	CS13BF105K	81349	56289
C2	CAPACITOR, ELECTROLYTIC, ALUMINUM: 2.3 μF, 10%, 10V	1	151D235X9010W2	56289	
C3	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 μF, 10%, 35V	1	CS13BF106K	81349	56289
C4	CAPACITOR, ELECTROLYTIC, ALUMINUM: 100 μF, -10+75%, 25V	1	30D107G025DD2	56289	
Q1	TRANSISTOR	1	2N2646	80131	04713
Q2	TRANSISTOR	6	2N2270	80131	02735
Q3	TRANSISTOR	2	2N4037	80131	02735
Q4	Same as Q2				
Q5	Same as Q2				
Q6	TRANSISTOR	2	2N3440	80131	04713
Q7	Same as Q6				
Q8	Same as Q2				
Q9	Same as Q2				
Q10	Same as Q3				
Q11	Same as Q2				
R1	RESISTOR, VARIABLE, FILM: 10 kΩ, 10%, 1/2W	2	62PR10K	73138	
R2	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	7	RCR07G153JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	5	RCR07G104JS	81349	01121
R5	RESISTOR, VARIABLE, FILM: 200 kΩ, 10%, 1/2W	2	62PR200K	73138	
R6	Same as R4				
R7	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	4	RCR07G472JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	4	RCR07G223JS	81349	01121
R9	Same as R3				
R10	Same as R7				

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R11	RESISTOR, FIXED, COMPOSITION: 24 kΩ, 5%, 1/4W	1	RCR07G243JS	81349	01121
R12	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	2	RCR07G224JS	81349	01121
R13	Same as R3				
R14	Same as R4				
R15	Same as R3				
R16	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	2	RCR07G682JS	81349	01121
R17	Same as R12				
R18	Same as R3				
R19	Same as R3				
R20	Same as R5				
R21	Same as R8				
R22	Same as R8				
R23	Same as R8				
R24	RESISTOR, FIXED, COMPOSITION: 30 kΩ, 5%, 1/4W	1	RCR07G303JS	81349	01121
R25	Same as R1				
R26	Same as R7				
R27	RESISTOR, FIXED, COMPOSITION: 680 kΩ, 5%, 1/4W	1	RCR07G684JS	81349	01121
R28	RESISTOR, FIXED, COMPOSITION: 150 kΩ, 5%, 1/4W	1	RCR07G154JS	81349	01121
R29	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R30	Same as R7				
R31	Same as R3				
R32	Same as R16				
R33	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	RCR07G332JS	81349	01121
R34	Same as R4				
R35	Same as R4				
R36	RESISTOR, FIXED, COMPOSITION: 130 kΩ, 5%, 1/4W	1	RCR07G134JS	81349	01121
R37	RESISTOR, FIXED, COMPOSITION: 240 kΩ, 5%, 1/4W	2	RCR07G244JS	81349	01121
R38	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R39	Same as R37				
R40	RESISTOR, FIXED, COMPOSITION: 510 kΩ, 5%, 1/4W	1	RCR07G514JS	81349	01121
R41	RESISTOR, VARIABLE, FILM: 1 MΩ, 10%, 1/2W	1	62PR1M	73138	
R42	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R43	RESISTOR, VARIABLE, FILM: 500 kΩ, 10%, 1/2W	1	62PR500K	73138	
R44	RESISTOR, FIXED, COMPOSITION: 9.1 kΩ, 5%, 1/4W	1	RCR07G912JS	81349	01121

Figure 5-19

5.4.6.4 Type 8306 Crystal Oscillator

REF. DESIGNATION PREFIX A5A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	CRYSTAL OSCILLATOR	1	13991	14632	
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	1	FA5C102W	01121	
J1	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
R1	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	RCR07G332JS	81349	01121

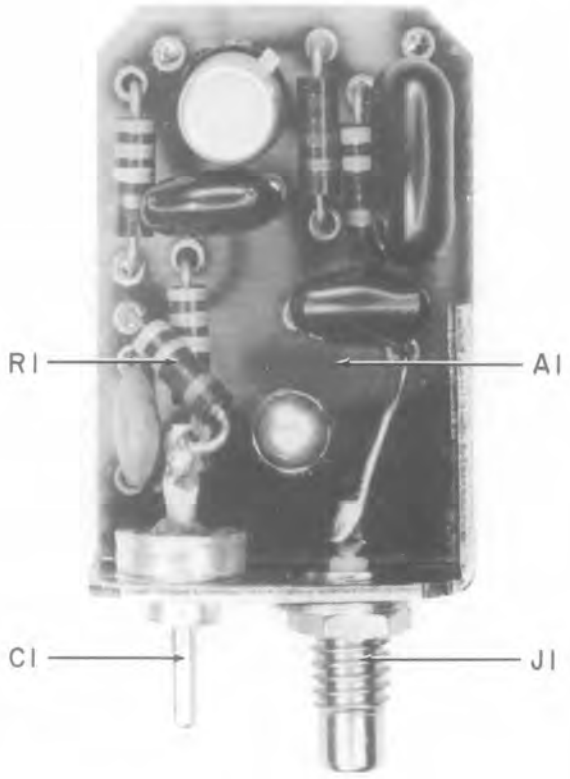


Figure 5-19. Type 8306 Crystal Oscillator (A5A4), Location of Components

5.4.6.4.1 Part 13991 Crystal Oscillator REF. DESIGNATION PREFIX A5A4A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, MICA, DIPPED: 51 pF, 5%, 500V	2	CM04ED510J03	81349	72136
C2	Same as C1				
C3	CAPACITOR, MICA, DIPPED: 470 pF, 5%, 500V	1	DM15-471J	72136	
C4	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 100V	1	C023B101E502M	56289	
Q1	TRANSISTOR	1	2N3478	80131	02735
R1	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	2	RCR07G334JS	81349	01121
R2	Same as R1				
R3	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	RCR07G221JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	1	RCR07G332JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	1	RCR07G470JS	81349	01121
Y1	CRYSTAL, QUARTZ	1	96402-1	14632	

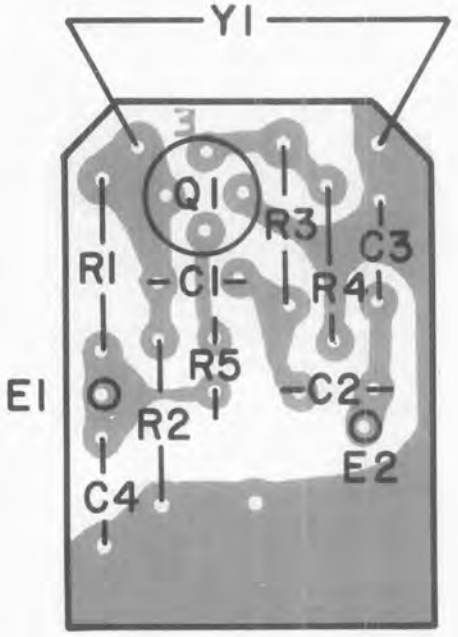


Figure 5-20. Part 13991 Crystal Oscillator (A5A4A1), Location of Components

5.4.6.5 Type 79326 Bandpass Filter REF. DESIGNATION PREFIX A5A5

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, MICA, DIPPED: 500 pF, 5%, 500V	2	DM15-501J	72136	
C2	CAPACITOR, MICA, DIPPED: 56 pF, 5%, 500V	1	CM05ED560J03	81349	72136
C3	Same as C1				
L1	COIL, FIXED	2	1131-95	14632	
L2	COIL, FIXED	1	1131-92	14632	
L3	Same as L1				

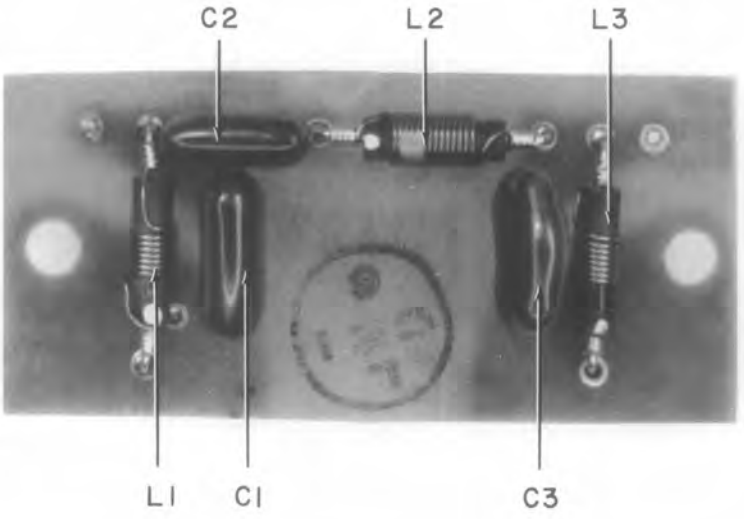


Figure 5-21. Type 79326 Bandpass Filter (A5A5), Location of Components

5.4.7 Type 7120 60-21.4 MC Converter REF. DESIGNATION PREFIX A6

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	2	1N4003	80131	04713
CR2	Same as CR1				
C1	CAPACITOR, MICA, DIPPED: 82 pF, 5%, 500V	2	CM04ED820J03	81349	72136
C2	Same as C1				
C3	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF ± 0.25 pF, 500V	2	301-000C0J0-229C	72982	
C4	Same as C3				
C5	CAPACITOR, MICA, DIPPED: 12 pF, 5%, 500V	2	CM04CD120J03	81349	72136
C6	Same as C5				
C7	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	4	FA5C102W	01121	
C8	Same as C7				
C9	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF ± 0.25 pF, 500V	1	301-000C0H0-479C	72982	
C10	CAPACITOR, CERAMIC, DISC: 470 pF, 20%, 1000V	1	B470PFM	91418	
C11	Same as C				
C12	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	9	SM1000PFP	91418	
C13	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	2	SS5D102W	01121	
C14	Same as C12				
C15	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC1.0PFK	95121	
C16	Same as C12				
C17	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF ± 0.1 pF, 500V	1	301-000C0K0-159B	72982	
C18	Same as C7				
C19	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF ± 0.25 pF, 500V	1	301-000C0J0-339C	72982	
C20	CAPACITOR, CERAMIC, TUBULAR: 6.8 pF ± 0.5 pF, 500V	1	301-000C0H0-689D	72982	
C21	CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500V	1	QC0.82PFK	85121	
C22	Same as C12				
C23	Same as C12				
C24	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF ± 0.25 pF, 500V	1	301-000C0J0-279C	72982	
C25	Same as C12				
C26	Same as C12				
C27	Same as C12				
C28	NOT USED				

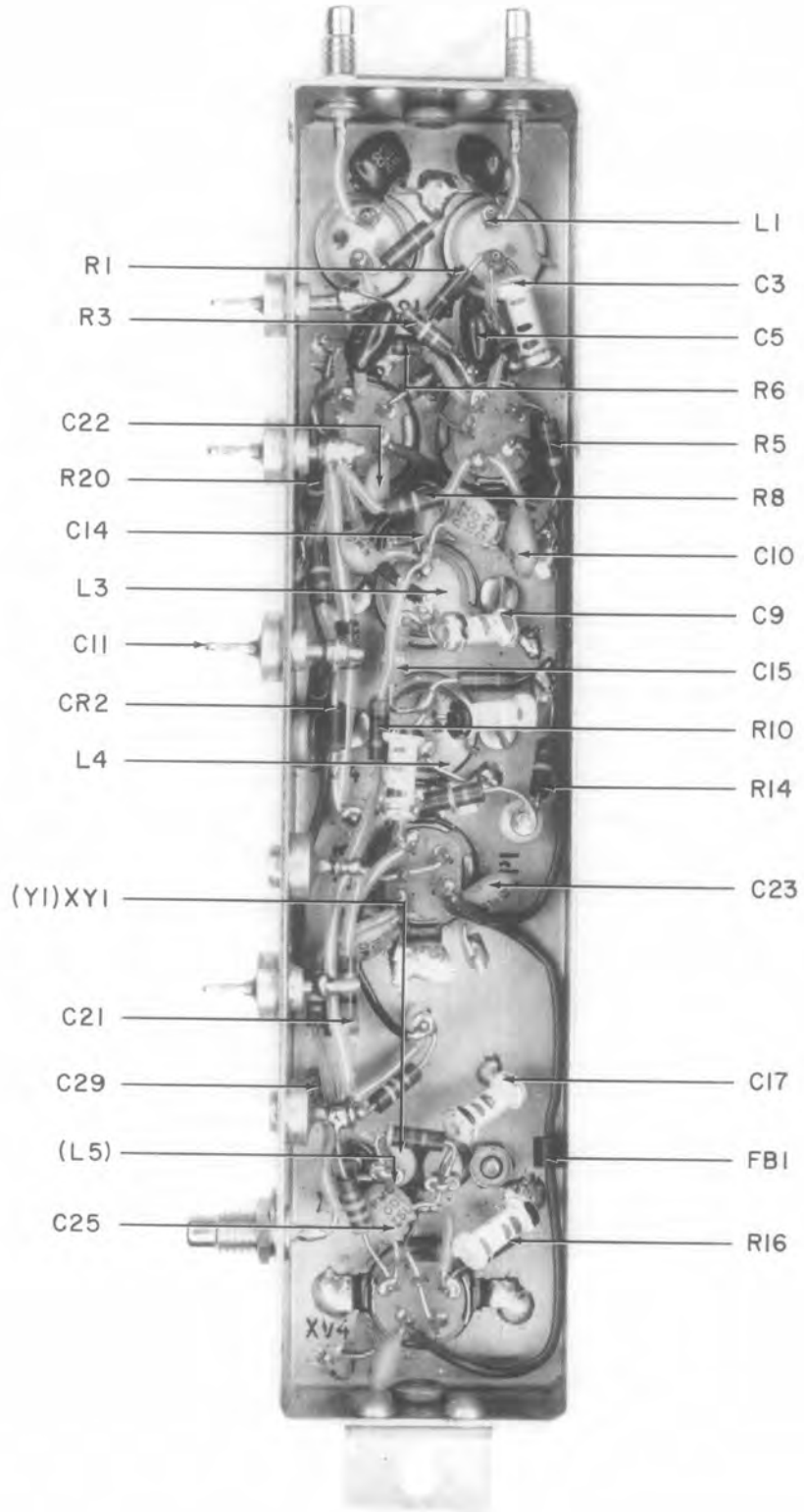


Figure 5-22. Type 7120 60-21.4 MC Converter (A6), Location of Components

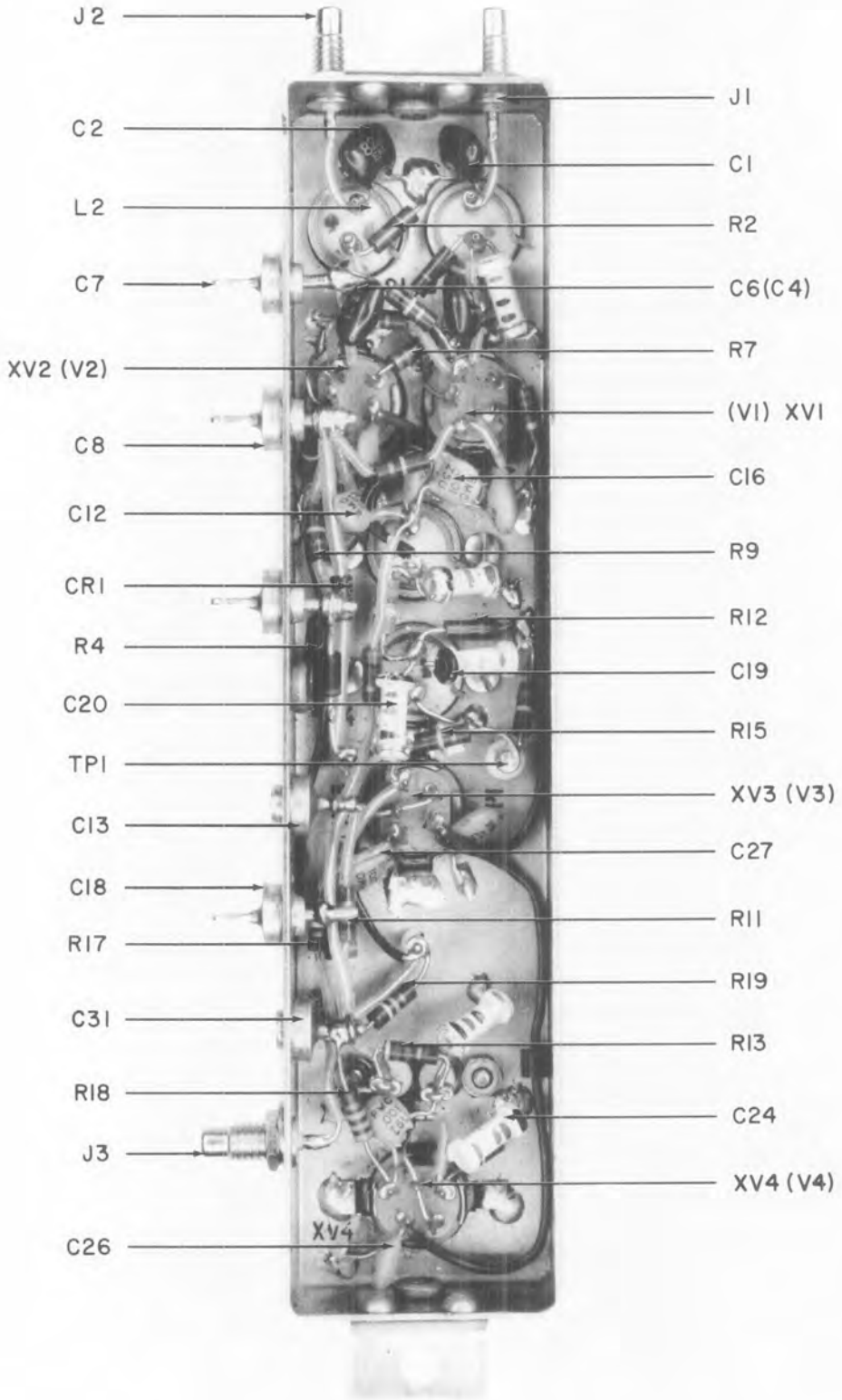


Figure 5-23. Type 7120 60-21.4 MC Converter (A6), Location of Components

REF. DESIGNATION PREFIX A6

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C29	Same as C12				
C30	NOT USED				
C31	Same as C13				
FB1	FERRITE BEAD	1	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	3	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
L1	COIL, VARIABLE: 0.65-0.94 μH	2	1472-13	14632	
L2	Same as L1				
L3	COIL, VARIABLE: 0.35-0.65 μH	1	1472-11	14632	
L4	COIL, VARIABLE: 0.55-1 μH	1	1472-1	14632	
L5	COIL, FIXED: 0.82 μH, 15%	1	204-11	99848	
MP1	COVER	1	2443	14632	
R1	RESISTOR, FIXED, COMPOSITION: 3.3 kΩ, 5%, 1/4W	2	RCR07G332JS	81349	01121
R2	Same as R1				
R3	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	3	RCR07G104JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	6	RCR07G224JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	2	RCR07G680JS	81349	01121
R6	Same as R3				
R7	Same as R5				
R8	Same as R4				
R9	Same as R4				
R10	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R12	RESISTOR, FIXED, COMPOSITION: 3.0 kΩ, 5%, 1/4W	1	RCR07G302JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	1	RCR07G471JS	81349	01121
R14	Same as R4				
R15	Same as R4				
R16	Same as R3				
R17	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R18	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R19	RESISTOR, FIXED, COMPOSITION: 24 kΩ, 5%, 1/4W	1	RCR07G243JS	81349	01121
R20	Same as R4				
TP1	JACK, TIP	1	TJ6	04013	
V1	ELECTRON TUBE	3	7587	80131	
V2	Same as V1				

REF. DESIGNATION PREFIX A6

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
V3	Same as V1				
V4	ELECTRON TUBE	1	6CW4	80131	
XV1	SOCKET, TUBE	4	133-65-10-001	71785	
XV2	Same as XV1				
XV3	Same as XV1				
XV4	Same as XV1				
XY1	SOCKET, CRYSTAL	1	8004-1G13	91506	
Y1	CTYSTAL, QUARTZ	1	98204-4	14632	

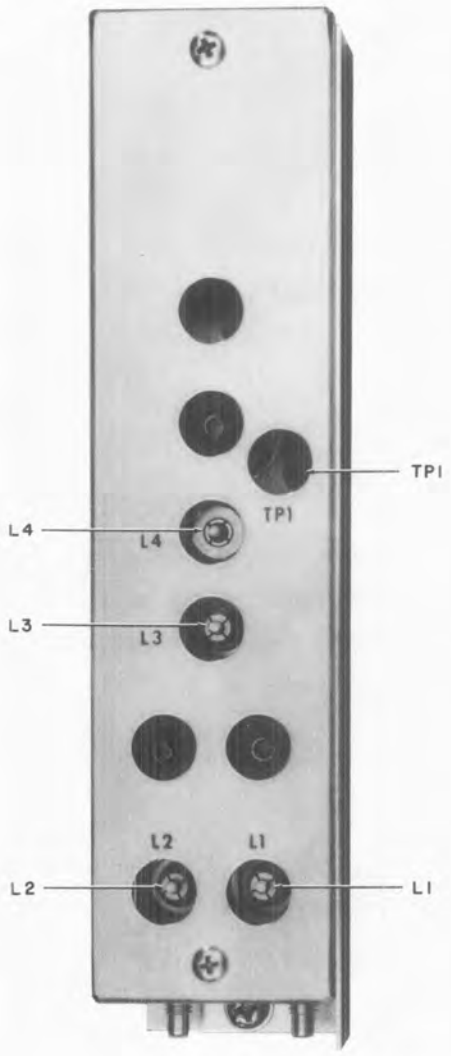


Figure 5-24. Type 7120 60-21.4 MC Converter (A6), Location of Components

5.4.8 Type 72121 IF Amplifier

REF. DESIGNATION PREFIX A7

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	FM LIMITERS/DEMODULATOR	1	10523-1	14632	
A2	VIDEO/AGC AMPLIFIER	1	10527	14632	
CR1	DIODE	1	1N198A	80131	93332
C1	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	2	SM1000PFP	91418	
C2	CAPACITOR, CERAMIC, TUBULAR: 1.8 pF ± 0.25 pF, 500V	2	301-000C0K0-189C	72982	
C3	CAPACITOR, CERAMIC, DISC: 1500 pF, 10%, 1000V	2	DD152	71590	
C4	CAPACITOR, MICA, DIPPED: 33 pF, 5%, 500V	2	CM04ED330J03	81349	72136
C5	CAPACITOR, MICA, DIPPED: 100 pF, 5%, 500V	4	CM04FD101J03	81349	72136
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	4	SS5D102W	01121	
C7	CAPACITOR, CERAMIC, TUBULAR: 3.9 pF ± 0.25 pF, 500V	2	301-000C0J0-399C	72982	
C8	CAPACITOR, MICA, DIPPED: 24 pF, 5%, 500V	3	CM04ED240J03	81349	72136
C9	Same as C5				
C10	Same as C1				
C11	Same as C2				
C12	Same as C12				
C13	Same as C5				
C14	Same as C6				
C15	Same as C7				
C16	Same as C8				
C17	Same as C5				
C18	Same as C3				
C19	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, 10%, 500V	1	QC0.68PFK	95121	
C20	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	2	CM04ED470J03	81349	72136
C21	Same as C20				
C22	Same as C6				
C23	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF ± 0.5 pF, 500V	1	301-000C0H0-629D	72982	
C24	Same as C8				
C25	CAPACITOR, MICA, DIPPED: 130 pF, 5%, 500V	2	CM05FD131J03	81349	72136
C26	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	10	FA5C102W	01121	
C27	Same as C26				
C28	Same as C26				
C29	Same as C26				

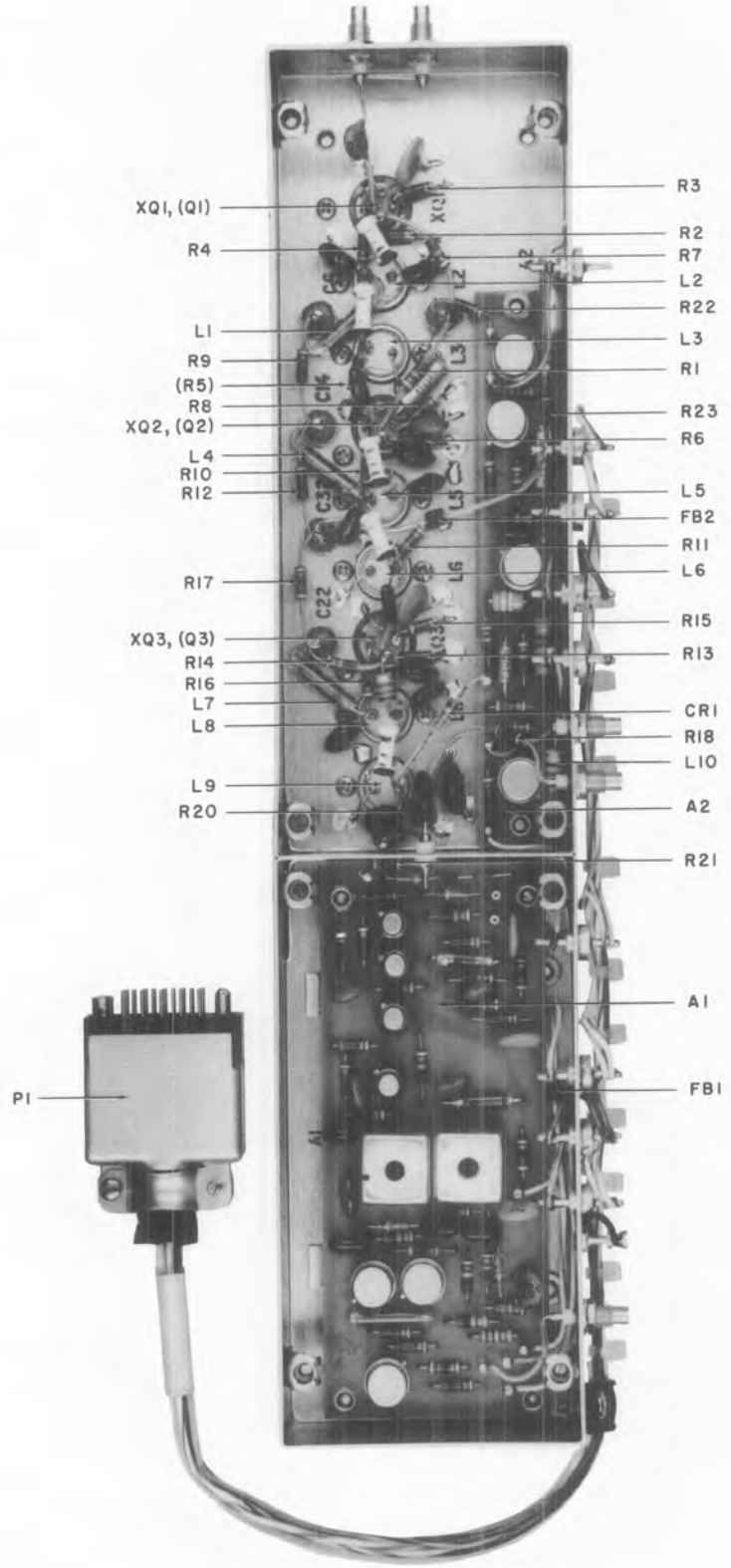


Figure 5-25. Type 72121 IF Amplifier (2 MC Bandwidth)(A7), Location of Components

REF. DESIGNATION PREFIX A7

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C30	Same as C25				
C31	CAPACITOR, ELECTROLYTIC, TANTALUM: 47 μF, 10%, 6V	1	CS13BB476K	81349	56289
C32	Same as C6				
C33	Same as C26				
C34	Same as C26				
C35	Same as C26				
C36	Same as C26				
C37	Same as C26				
C38	Same as C26				
C39	CAPACITOR, ELECTROLYTIC, TANTALUM: 200 μF, 20%, 15V	1	MTP207M015P1C	76055	
E1	TERMINAL, FEEDTHRU, INSULATED	1	SFU16	04013	
FB1	FERRITE BEAD	2	56-590-65-4A	02114	
FB2	Same as FB1				
J1 Thru J5	CONNECTOR, RECEPTACLE	5	10-0104-002	19505	
L1	COIL, FIXED	3	1131-37	14632	
L2	COIL, VARIABLE: 1.7-3.5 μH	6	1472-3	14632	
L3	Same as L2				
L4	Same as L1				
L5	Same as L2				
L6	Same as L2				
L7	Same as L1				
L8	Same as L2				
L9	Same as L2				
L10	COIL, FIXED: 22 μH, 10%	1	1537-44	99800	
MP1	COVER	1	10538-1	14632	
MP2	COVER	1	10538-2	14632	
P1	CONNECTOR, PLUG	1	MRE14PG7H1	81312	
Q1	TRANSISTOR	3	2N2708	80131	02735
Q2	Same as Q1				
Q3	Same as Q1				
R1	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	3	RCR07G123JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	3	RCR07G512JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121

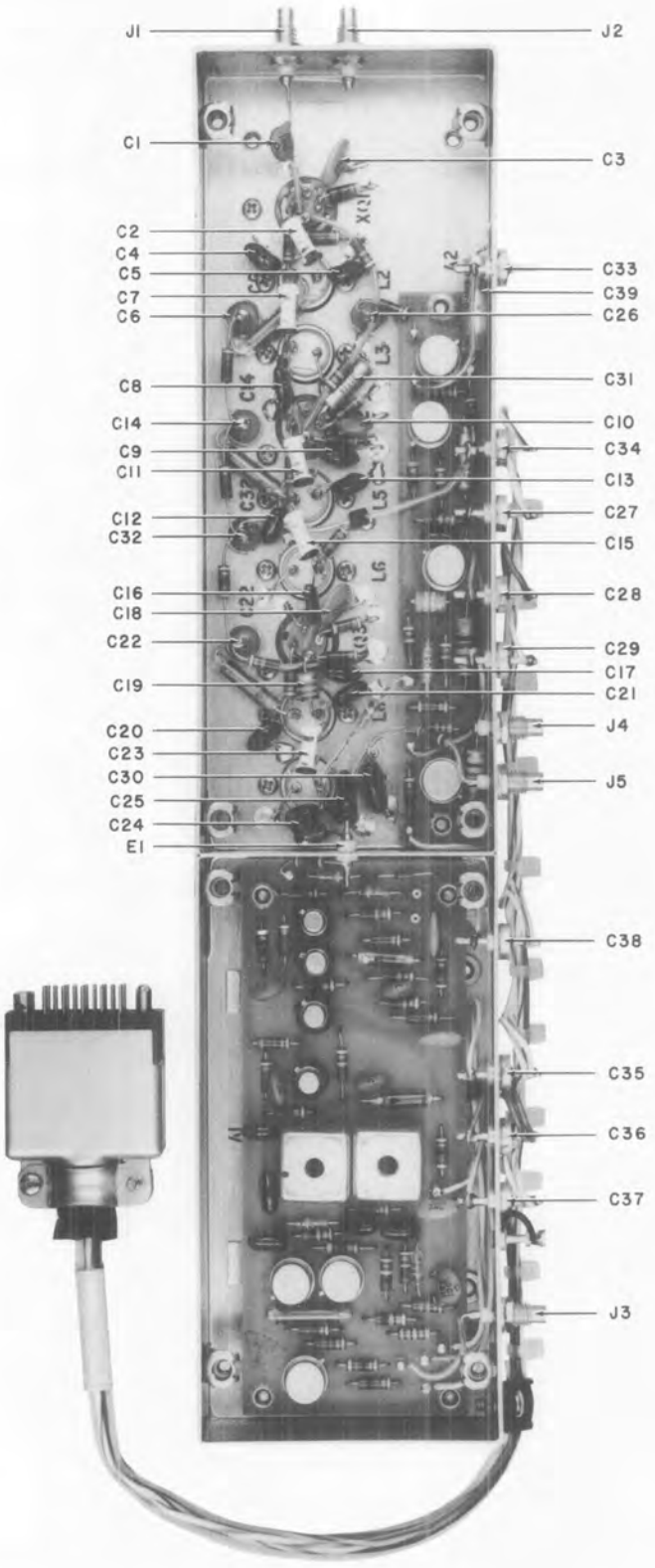
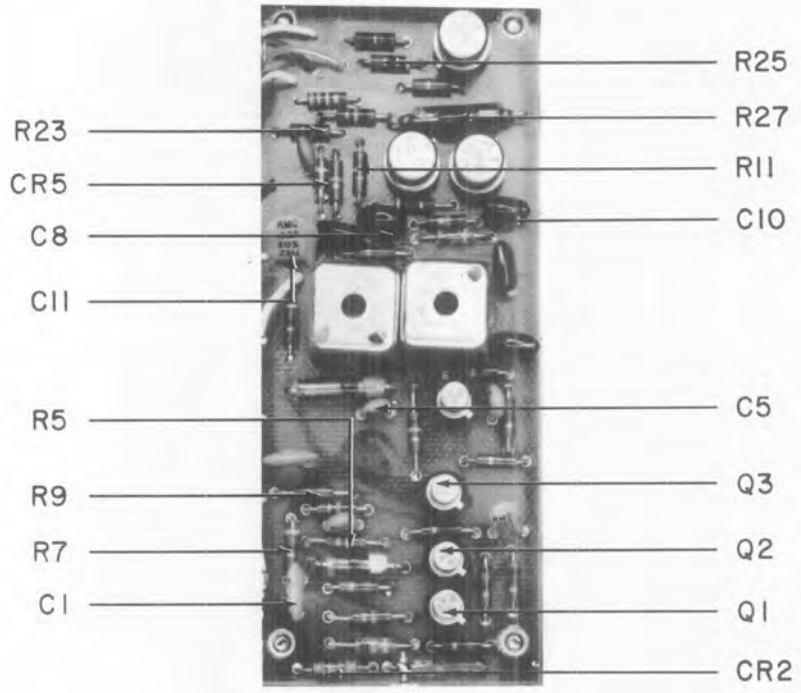


Figure 5-26. Type 72121 IF Amplifier (2 MC Bandwidth)(A7), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R4	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	5	RCR07G470JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	2	RCR07G562JS	81349	01121
R6	Same as R2				
R7	Same as R1				
R8	Same as R3				
R9	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	3	RCR07G101JS	81349	01121
R10	Same as R4				
R11	Same as R5				
R12	Same as R9				
R13	Same as R2				
R14	Same as R1				
R15	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	2	RCR07G471JS	81349	01121
R16	Same as R4				
R17	Same as R4				
R18	Same as R4				
R19	NOT USED				
R20	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	1	RCR07G682JS	81349	01121
R21	Same as R15				
R22	RESISTOR, FIXED, COMPOSITION: 200 Ω, 5%, 1/4W	1	RCR07G201JS	81349	01121
R23	Same as R9				



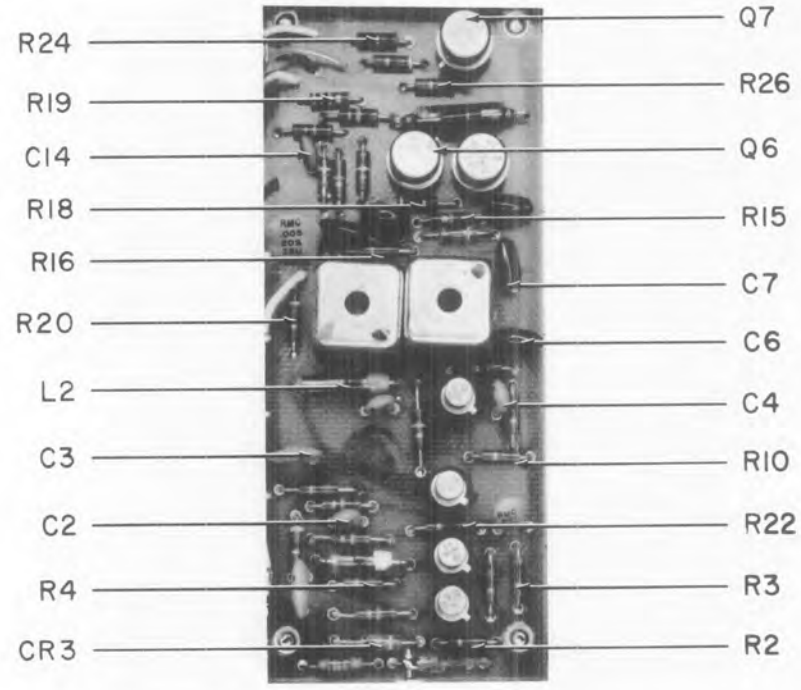


Figure 5-27. Part 10523-1 FM Limiter/Demodulator (A7A1), Location of Components

5.4.8.1 Part 10523-1 FM Limiters/Demodulator REF. DESIGNATION PREFIX A7A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	4	1N198A	80131	93332
CR2	DIODE	1	1N753A	80131	04713
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Same as CR1				
C1	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 500V	3	SM5000PFM	91418	
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	5	SM1000PFP	91418	
C3	Same as C1				
C4	Same as C2				
C5	Same as C2				
C6	CAPACITOR, MICA, DIPPED: 15 pF, 5%, 500V	1	CM04CD150J03	81349	72136
C7	CAPACITOR, MICA, DIPPED: 10 pF ± 0.5 pF, 500V	1	CM04CD100D03	81349	72136
C8	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	2	CM04ED470J03	81349	72136
C9	Same as C8				
C10	CAPACITOR, MICA, DIPPED: 20 pF, 5%, 500V	1	CM04ED200J03	81349	72136
C11	Same as C1				
C12	Same as C2				
C13	NOT USED				
C14	Same as C2				
L1	COIL, FIXED	1	1131-41	14632	
L2	COIL, FIXED	1	1131-40	14632	
L3	COIL, VARIABLE	1	3476-19	14632	
L4	COIL, FIXED	1	1131-37	14632	
Q1	TRANSISTOR	4	2N706	80131	04713
Q2	Same as Q1				
Q3	Same as Q1				
Q4	Same as Q1				
Q5	TRANSISTOR	3	2N2270	80131	02735
Q6	Same as Q6				
Q7	Same as Q5				
R1	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	4	RCR07G123JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	5	RCR07G512JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R4	Same as R2				
R5	Same as R1				
R6	Same as R2				

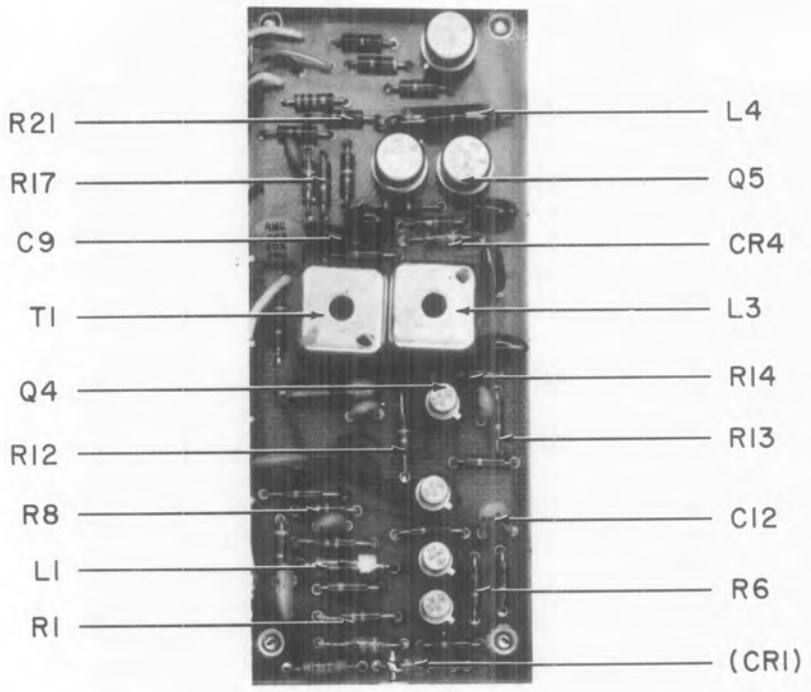


Figure 5-28. Type 10523-1 Limiter/Demodulator (A7A1), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R7	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	3	RCR07G470JS	81349	01121
R8	Same as R1				
R9	Same as R2				
R10	RESISTOR, FIXED, COMPOSITION: 620 Ω, 5%, 1/4W	1	RCR07G621JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121
R12	Same as R1				
R13	Same as R2				
R14	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	2	RCR07G220JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 75 kΩ, 5%, 1/4W	2	RCR07G753JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	2	RCR07G272JS	81349	01121
R17	Same as R15				
R18	RESISTOR, FIXED, COMPOSITION: 4.7 MΩ, 5%, 1/4W	1	RCR07G475JS	81349	01121
R19	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R20	Same as R7				
R21	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R22	Same as R14				
R23	RESISTOR, FIXED, COMPOSITION: 18 kΩ, 5%, 1/4W	1	RCR07G183JS	81349	01121
R24	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R25	Same as R7				
R26	RESISTOR, FIXED, COMPOSITION: 270 Ω, 5%, 1/4W	1	RCR07G271JS	81349	01121
R27	Same as R16				
T1	TRANSFORMER	1	3476-18	14632	

5.4.8.2 Part 10527 Video/AGC Amplifier REF. DESIGNATION PREFIX A7A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 4.7 μF, 10%, 35V	1	CS13BF475K	81349	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	CS13BF105K	81349	56289
C3	CAPACITOR, MICA, DIPPED: 33 pF, 5%, 500V	1	CM04ED330J03	81349	72136
C4	CAPACITOR, COMPOSITION, TUBULAR: 3.9 pF, 10%, 500V	1	QC3.9PFK	95121	
L1	COIL, FIXED: 12 μH, 10%	1	1840-32	99800	
Q1	TRANSISTOR	4	2N2270	80131	02735
Q2	Same as Q1				
Q3	Same as Q1				
Q4	Same as Q1				
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R5	NOT USED				
R6	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	RCR07G123JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	1	RCR07G471JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 51 kΩ, 5%, 1/4W	1	RCR07G513JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	1	RCR07G470JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 270 Ω, 5%, 1/4W	1	RCR07G271JS	81349	01121
R12	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121

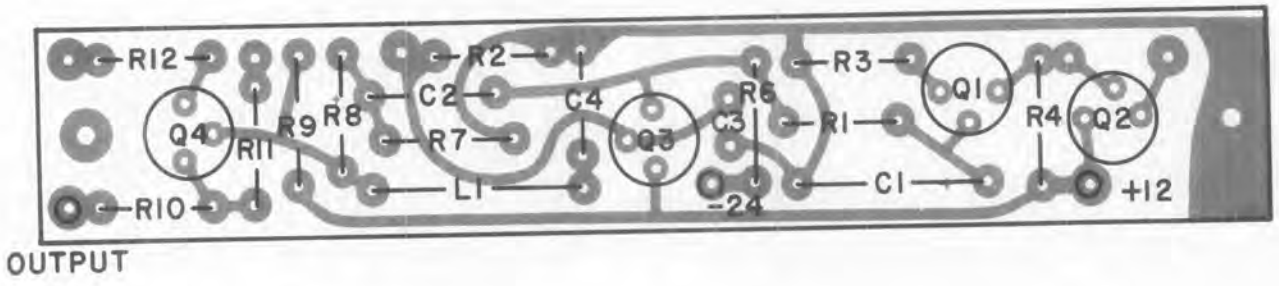


Figure 5-29. Part 10527 Video/AGC Amplifier (A7A2), Location of Components

5.4.9 Type 72120 IF Amplifier REF. DESIGNATION PREFIX A8

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	LIMITER, DEMODULATOR	1	10710	14632	
A2	BEAT FREQUENCY OSCILLATOR	1	1769-3	14632	
CR1	DIODE	3	1N462A	80131	93332
CR2	Same as CR1				
CR3	DIODE	1	1N198A	80131	93332
CR4	Same as CR1				
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	16	FA5C102W	01121	
C2	Same as C1				
C3	Same as C1				
C4	Same as C1				
C5	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	9	SM1000PFP	91418	
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	7	SS5D102W	01121	
C7	Same as C5				
C8	Same as C5				
C9	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 500V	4	SM5000PFM	91418	
C10	Same as C1				
C11	Same as C1				
C12	Same as C6				
C13	Same as C5				
C14	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, 10%, 500V	3	QC0.68PFK	95121	
C15	NOT USED				
C16	CAPACITOR, MICA, DIPPED: 200 pF, 5%, 500V	2	CM04FD201J03	81349	72136
C17	Same as C5				
C18	Same as C9				
C19	CAPACITOR, MICA, DIPPED: 39 pF, 5%, 500V	6	CM04ED390J03	81349	72136
C20	Same as C5				
C21	Same as C6				
C22	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	9	CM04ED470J03	81349	72136
C23	Same as C22				
C24	CAPACITOR, MICA, DIPPED: 43 pF, 5%, 500V	1	CM04ED430J03	81349	72136
C25	Same as C19				
C26	Same as C1				
C27	CAPACITOR, COMPOSITION, TUBULAR: 0.75 pF, 10%, 500V	3	QC0.75PFK	95121	

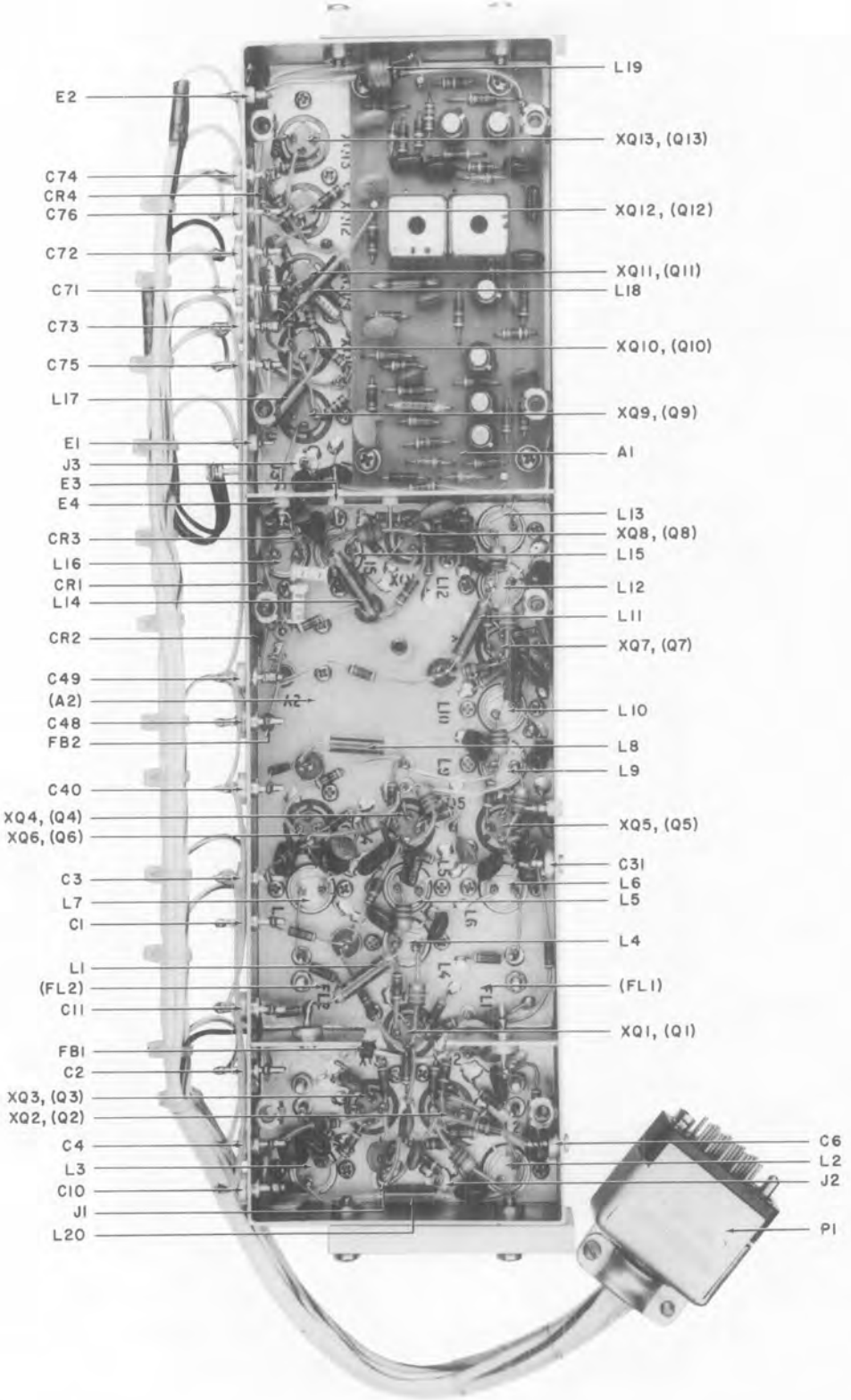


Figure 5-30. Type 72120 IF Amplifier (20/75/300-KC Bandwidth)(A8), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C28	CAPACITOR, MICA, DIPPED: 24 pF, 5%, 500V	4	CM04ED240J03	81349	72136
C29	CAPACITOR, MICA, DIPPED: 360 pF, 5%, 500V	3	CM05FD361J03	81349	72136
C30	Same as C19				
C31	Same as C6				
C32	Same as C19				
C33	Same as C19				
C34	NOT USED				
C35	Same as C5				
C36	CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500V	3	QC0.82PFK	95121	
C37	Same as C5				
C38	Same as C36				
C39	Same as C5				
C40	Same as C1				
C41	Same as C6				
C42	Same as C22				
C43	Same as C22				
C44	Same as C36				
C45	Same as C27				
C46	Same as C28				
C47	Same as C29				
C48	Same as C1				
C49	Same as C1				
C50	Same as C6				
C51	CAPACITOR, CERAMIC, DISC: 1500 pF, 10%, 1000V	1	DD152	71590	
C52	Same as C14				
C53	Same as C22				
C54	Same as C22				
C55	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC1.0PFK	95121	
C56	Same as C28				
C57	Same as C29				
C58	Same as C6				
C59	Same as C9				
C60	Same as C14				
C61	Same as C22				
C62	Same as C22				

REF. DESIGNATION PREFIX A8

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C63	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF ± 0.25 pF, 500V	1	301-000C0J0-249C	72982	
C64	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF ± 0.25 pF, 500V	1	301-000C0J0-339C	72982	
C65	Same as C9				
C66	Same as C28				
C67	CAPACITOR, MICA, DIPPED: 100 pF, 5%, 500V	1	CM04FD101J03	81349	72136
C68	CAPACITOR, MICA, DIPPED: 33 pF, 5%, 500V	1	CM04ED330J03	81349	72136
C69	CAPACITOR, ELECTROLYTIC, TANTALUM: 2.2 µF, 10%, 20V	1	CS13BE225K	81349	56289
C70	CAPACITOR, ELECTROLYTIC, TANTALUM: 4.7 µF, 10%, 35V	1	CS13BF475K	81349	56289
C71	Same as C1				
C72	Same as C1				
C73	Same as C1				
C74	Same as C1				
C75	Same as C1				
C76	Same as C1				
C77	Same as C19				
C78	Same as C16				
C79	CAPACITOR, MICA, DIPPED: 2000 pF, 5%, 500V	1	CM06FD202J03	81349	72136
C80	Same as C22				
C81	Same as C27				
E1	TERMINAL, FEEDTHRU, INSULATED	4	SFU16	04013	
E2	Same as E1				
E3	Same as E1				
E4	Same as E1				
FB1	FERRITE BEAD	2	56-590-65-4A	02114	
FB2	Same as FB1				
FL1	FILTER, BAND PASS	1	4065527	74306	
FL2	FILTER, BAND PASS	1	~~4065526~~ 92032	74306	
J1	CONNECTOR, RECEPTACLE	3	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
L1	COIL, FIXED	7	1131-37	14632	
L2	COIL, VARIABLE: 1.7-3.5 µH	12	1472-3	14632	
L3	Same as L2				

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L4	Same as L2				
L5	Same as L2				
L6	Same as L2				
L7	Same as L2				
L8	Same as L1				
L9	Same as L2				
L10	Same as L2				
L11	Same as L1				
L12	Same as L2				
L13	Same as L2				
L14	Same as L1				
L15	Same as L2				
L16	Same as L2				
L17	Same as L1				
L18	Same as L1				
L19	COIL, FIXED: 500 μH, 10%	1	1500-15	99848	
L20	Same as L1				
MP1	COVER	1	10715-1	14632	
MP2	COVER	1	10715-2	14632	
P1	CONNECTOR, PLUG	1	MRE18PG7H8	81312	
Q1 Thru Q8	TRANSISTOR	8	2N2708	80131	02735
Q9	TRANSISTOR	3	2N697	80131	02735
Q10	Same as Q9				
Q11	Same as Q9				
Q12	TRANSISTOR	1	2N929	80131	04713
Q13	TRANSISTOR	1	2N1131	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 24 Ω, 5%, 1/4W	3	RCR07G240JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 33 Ω, 5%, 1/4W	1	RCR07G330JS	81349	01121
R3	Same as R1				
R4	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	6	RCR07G101JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	7	RCR07G153JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	9	RCR07G512JS	81349	01121
R7	Same as R4				
R8	Same as R5				
R9	Same as R6				

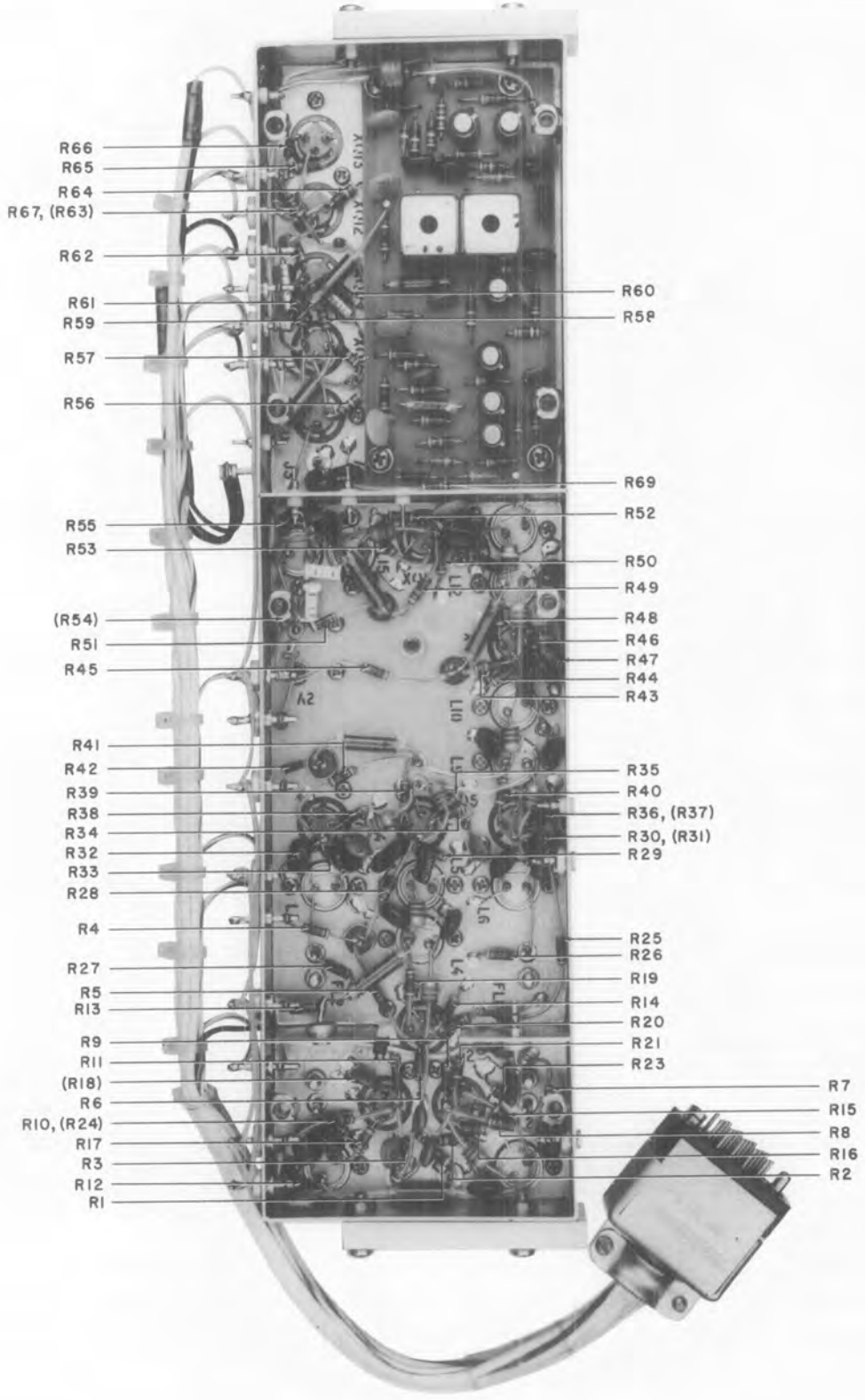


Figure 5-31. Type 72120 IF Amplifier (20/75/300-KC Bandwidth)(A8), Location of Components

REF. DESIGNATION PREFIX A8

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R10	Same as R5				
R11	Same as R6				
R12	Same as R4				
R13	Same as R4				
R14	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	7	RCR07G102JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	9	RCR07G470JS	81349	01121
R16	Same as R14				
R17	Same as R15				
R18	Same as R14				
R19	Same as R15				
R20	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	2	RCR07G220JS	81349	01121
R21	Same as R1				
R22	NOT USED				
R23	RESISTOR, FIXED, COMPOSITION: 8.2 kΩ, 5%, 1/4W	1	RCR07G822JS	81349	01121
R24	RESISTOR, FIXED, COMPOSITION: 750 Ω, 5%, 1/4W	2	RCR07G751JS	81349	01121
R25	Same as R4				
R26	Same as R6				
R27	Same as R24				
R28	Same as R5				
R29	Same as R6				
R30	Same as R5				
R31	Same as R6				
R32	Same as R5				
R33	Same as R6				
R34	Same as R20				
R35	Same as R14				
R36	Same as R20				
R37	Same as R14				
R38	Same as R14				
R39	Same as R15				
R40	Same as R15				
R41	Same as R15				
R42	Same as R4				
R43	Same as R5				
R44	Same as R6				
R45	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	3	RCR07G471JS	81349	01121

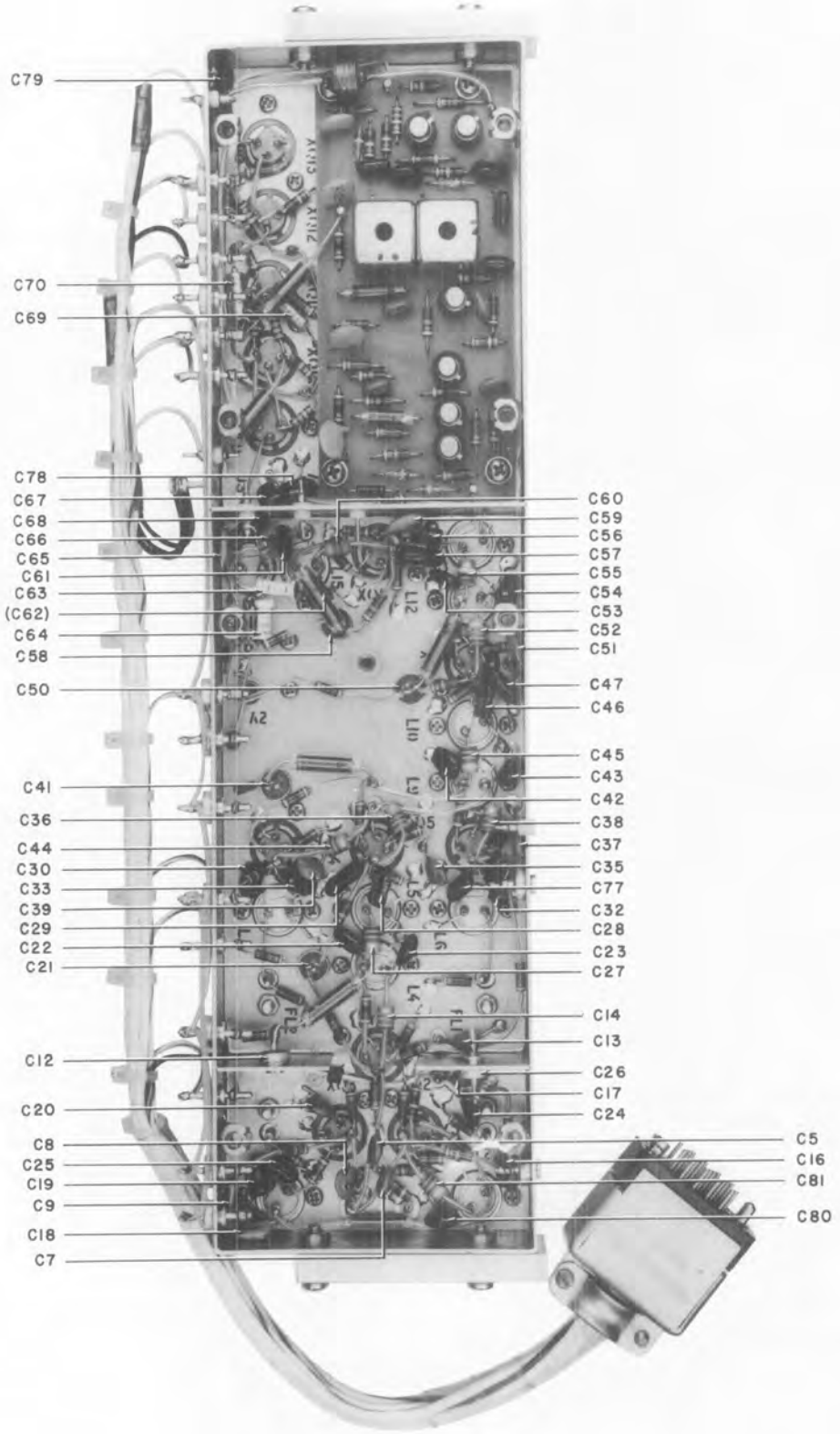


Figure 5-32. Type 72120 IF Amplifier (20/75/300-KC Bandwidth)(A8), Location of Components

REF. DESIGNATION PREFIX A8

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R46	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R47	Same as R14				
R48	Same as R15				
R49	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	RCR07G123JS	81349	01121
R50	Same as R6				
R51	Same as R15				
R52	Same as R45				
R53	Same as R15				
R54	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R55	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R56	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R57	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R58	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	2	RCR07G333JS	81349	01121
R59	Same as R58				
R60	RESISTOR, FIXED, COMPOSITION: 1.5 kΩ, 5%, 1/4W	1	RCR07G152JS	81349	01121
R61	RESISTOR, FIXED, COMPOSITION: 11 kΩ, 5%, 1/4W	2	RCR07G113JS	81349	01121
R62	RESISTOR, FIXED, COMPOSITION: 910 Ω, 5%, 1/4W	1	RCR07G911JS	81349	01121
R63	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	RCR07G272JS	81349	01121
R64	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121
R65	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	RCR07G221JS	81349	01121
R66	Same as R61				
R67	RESISTOR, FIXED, COMPOSITION: 24 kΩ, 5%, 1/4W	1	RCR07G243JS	81349	01121
R68	NOT USED				
R69	Same as R45				
XQ1 Thru XQ8	SOCKET, TRANSISTOR	8	22-16-4	81073	
XQ9 Thru XQ13	SOCKET, TRANSISTOR	5	22-16-3	81073	

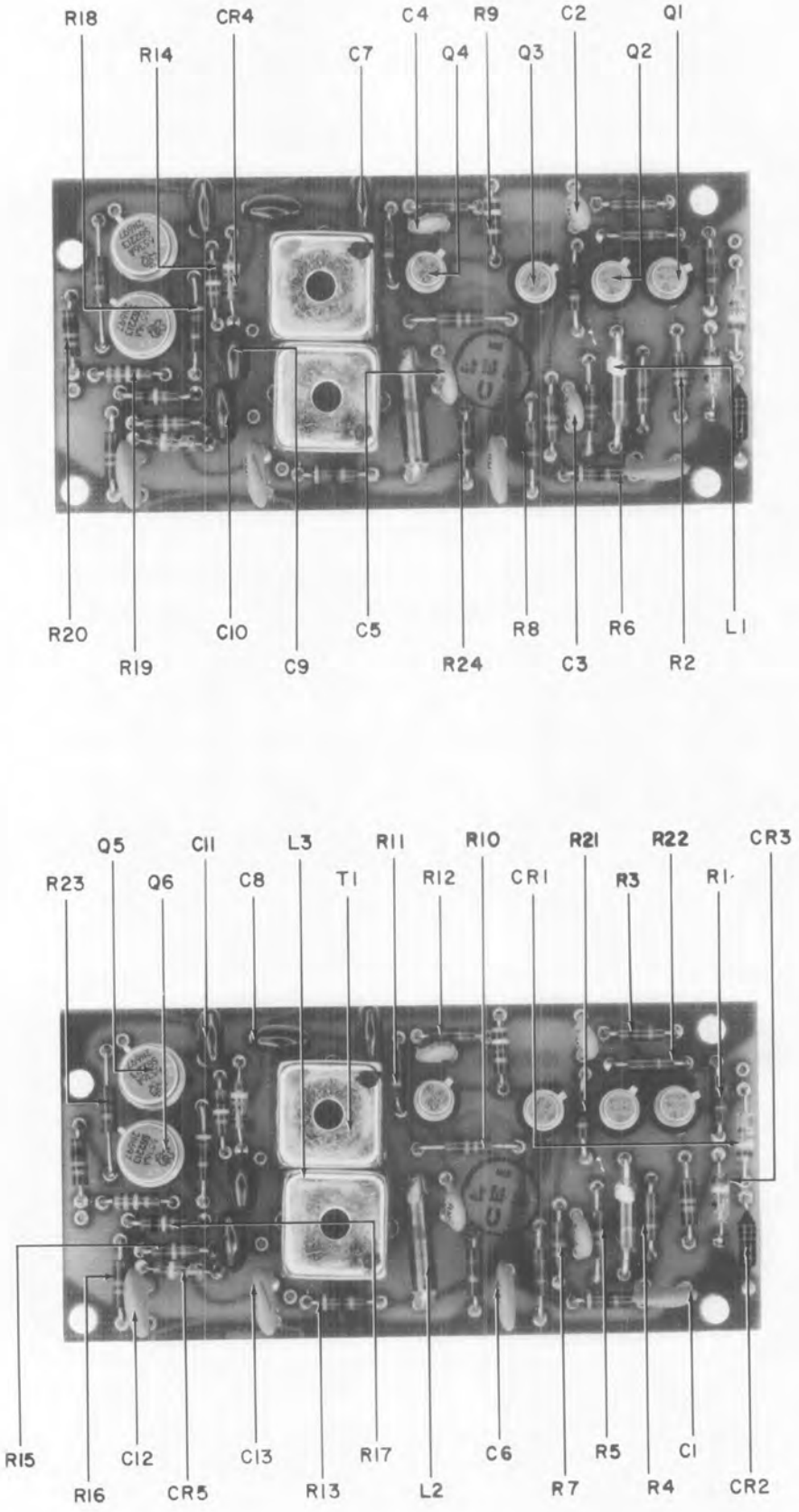


Figure 5-33. Part 10710 Limiter/Demodulator (A8A1), Location of Components

5.4.9.1 Part 10710 Limiter/Demodulator

REF. DESIGNATION PREFIX A8A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	4	1N198A	80131	93332
CR2	DIODE	1	1N753A	80131	04713
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Same as CR1				
C1	CAPACITOR, CERAMIC, DISC: 5000 pF, 20%, 500V	4	SM5000PFM	91418	
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	4	SM1000PFP	91418	
C3	Same as C2				
C4	Same as C2				
C5	Same as C2				
C6	Same as C1				
C7	CAPACITOR, MICA, DIPPED: 15 pF, 5%, 500V	1	CM04CD150J03	81349	72136
C8	CAPACITOR, MICA, DIPPED: 20 pF, 5%, 500V	1	CM04ED200J03	81349	72136
C9	CAPACITOR, MICA, DIPPED: 75 pF, 5%, 500V	2	CM04ED750J03	81349	72136
C10	Same as C9				
C11	CAPACITOR, MICA, DIPPED: 33 pF, 5%, 500V	1	CM04ED330J03	81349	72136
C12	Same as C1				
C13	Same as C1				
L1	COIL, FIXED	1	1131-41	14632	
L2	COIL, FIXED	1	1131-40	14632	
L3	COIL, VARIABLE	1	3476-20	14632	
Q1	TRANSISTOR	4	2N706	80131	04713
Q2	Same as Q1				
Q3	Same as Q1				
Q4	Same as Q1				
Q5	TRANSISTOR	2	2N2222A	80131	04713
Q6	Same as Q5				
R1	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	5	RCR07G512JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	5	RCR07G123JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R4	Same as R1				
R5	Same as R2				
R6	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	2	RCR07G470JS	81349	01121
R7	Same as R2				
R8	Same as R1				
R9	RESISTOR, FIXED, COMPOSITION: 390 Ω, 5%, 1/4W	1	RCR07G391JS	81349	01121

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R10	Same as R2				
R11	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	2	RCR07G220JS	81349	01121
R12	Same as R1				
R13	Same as R6				
R14	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	3	RCR07G104JS	81349	01121
R15	Same as R14				
R16	Same as R2				
R17	Same as R14				
R18	RESISTOR, FIXED, COMPOSITION: 4.7 MΩ, 5%, 1/4W	1	RCR07G475JS	81349	01121
R19	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R20	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R21	Same as R11				
R22	Same as R1				
R23	RESISTOR, FIXED, COMPOSITION: 560 Ω, 5%, 1/4W	1	RCR07G561JS	81349	01121
R24	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	1	RCR07G562JS	81349	01121
T1	TRANSFORMER	1	3476-21	14632	

Figure 5-34

5.4.9.2 Part 1769-3 Beat Frequency Oscillator

REF. DESIGNATION PREFIX A8A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	2	1N462A	80131	93332
CR2	Same as CR1				
C1	CAPACITOR, MICA, DIPPED: 43 pF, 5%, 500V	1	CM04ED430J03	81349	72136
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	1	SM1000PFP	91418	
C3	CAPACITOR, MICA, DIPPED: 68 pF, 5%, 500V	1	CM04ED680J03	81349	72136
C4	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	1	FA5C102W	01121	
E1	TERMINAL, FEEDTHRU, INSULATED	1	SFU16	04013	
Q1	TRANSISTOR	1	2N706	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 240 kΩ, 5%, 1/4W	1	RCR07G244JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
Y1	CRYSTAL, QUARTZ	1	91803-1	14632	

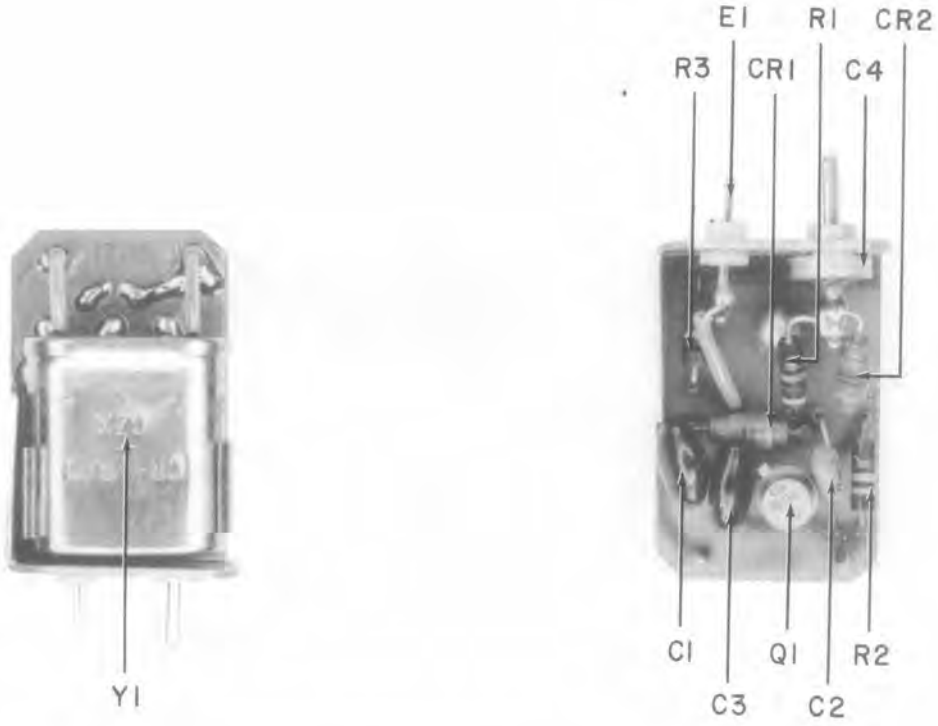


Figure 5-34. Part 1769-3 Beat Frequency Oscillator (A8A2), Location of Components

5.4.10 Type 7312 Video Amplifier REF. DESIGNATION PREFIX A9

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	CS13BF105K	81349	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 μF, 10%, 20V	1	CS13BE106K	81349	56289
Q1	TRANSISTOR	1	2N929	80131	04713
Q2	TRANSISTOR	1	2N526	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	1	RCR07G224JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 20 kΩ, 5%, 1/4W	1	RCR07G203JS	81349	01121
R4	Same as R1				
R5	RESISTOR, FIXED, COMPOSITION: 160 Ω, 5%, 1/4W	2	RCR07G161JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 2.0 kΩ, 5%, 1/4W	1	RCR07G202JS	81349	01121
R7	Same as R5				
R8	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	1	RCR07G470JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121

Figure 5-35. Type 7312 Video Amplifier (A9), Location of Components

Figure 5-36

5.4.11 Type 7400B Audio Amplifier

REF. DESIGNATION PREFIX A10

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	1N759A	80131	04713
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 µF, 10%, 35V	1	CS13BF474K	81349	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 µF, 10%, 20V	1	CS13BE106K	81349	56289
Q1	TRANSISTOR	1	2N929	80131	04713
Q2	TRANSISTOR	2	2N2270	80131	02735
Q3	Same as Q2				
RA1	HEATSINK	1	207CB	05820	
R1	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R2	RESISTOR, FIXED, FILM: 75.0 kΩ, 1%, 1/4W	1	RN60D7502F	81349	75042
R3	RESISTOR, FIXED, FILM: 10.0 kΩ, 1%, 1/4W	1	RN60D1002F	81349	75042
R4	RESISTOR, FIXED, COMPOSITION: 6.2 kΩ, 5%, 1/4W	1	RCR07G622JS	81349	01121
R5	RESISTOR, FIXED, FILM: 619 Ω, 1%, 1/4W	1	RN60D6190F	81349	75042
R6	RESISTOR, FIXED, COMPOSITION: 3.9 kΩ, 5%, 1/4W	1	RCR07G392JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 51 kΩ, 5%, 1/4W	1	RCR07G513JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 820 Ω, 5%, 1/4W	1	RCR07G821JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 620 Ω, 5%, 1/4W	1	RCR07G621JS	81349	01121
R10	RESISTOR, FIXED, FILM: 68.1 Ω, 1%, 1/4W	1	RN60D68R1F	81349	75042
T1	TRANSFORMER, AUDIO	1	1170	14632	

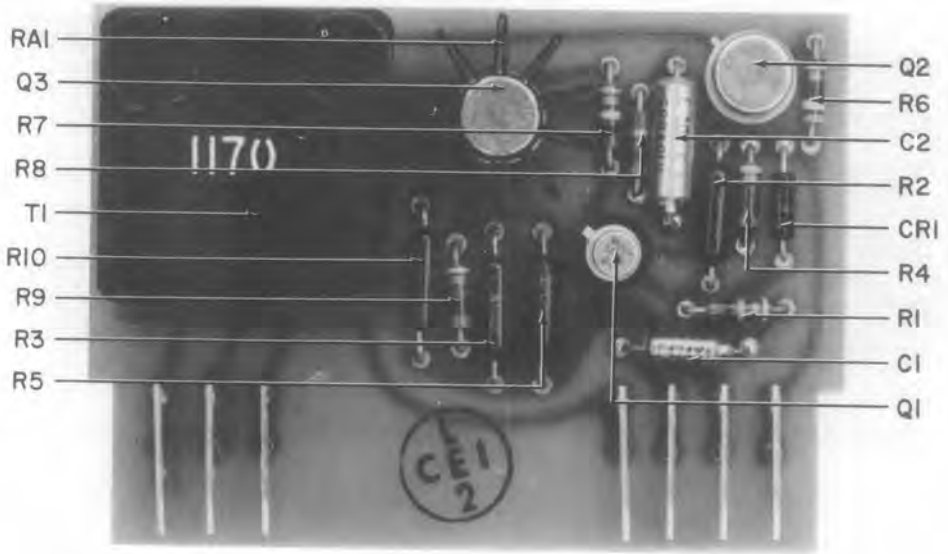


Figure 5-36. Type 7400B Audio Amplifier (A10), Location of Components

5.4.12 Type 7633 Power Supply Regulator REF. DESIGNATION PREFIX A11

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	2	M20	14099	
CR2	Same as CR1				
C1	CAPACITOR, FIXED, PAPER: 0.1 μF, 10%, 1000V	2	10TMP10	56289	
C2	Same as C1				
C3	CAPACITOR, CERAMIC, DISC: 0.1 μF, -20+80%, 100V	1	TA0-1UFZ	91418	
P1	CONNECTOR, PLUG	1	MRE9PG7H8	81312	
R1	RESISTOR, FIXED, COMPOSITION: 750 kΩ, 5%, 1/2W	1	RCR20G754JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/2W	1	RCR20G104JS	81349	01121
R3	RESISTOR, VARIABLE, COMPOSITION: 500 kΩ, 10%, 1W	1	70A3N056L504U	01121	
R4	RESISTOR, FIXED, COMPOSITION: 2.7 MΩ, 5%, 1/2W	1	RCR20G275JS	81349	01121
R5	RESISTOR, VARIABLE, COMPOSITION: 2.5 MΩ, 20%, 1/2W	1	70A3N056L255M	01121	
R6	RESISTOR, FIXED, COMPOSITION: 6.8 MΩ, 5%, 1/2W	1	RCR20G685JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 4.7 MΩ, 5%, 1/2W	1	RCR20G475JS	81349	01121
V1	ELECTRON TUBE	1	GV3A1200	63060	

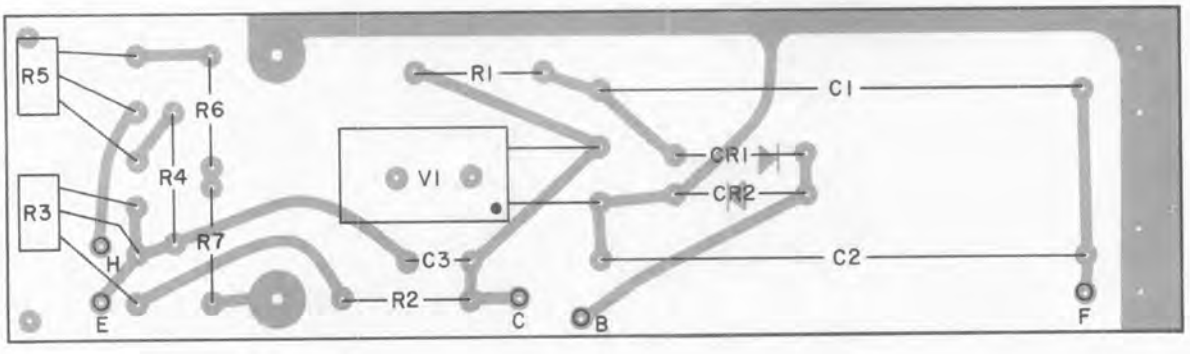
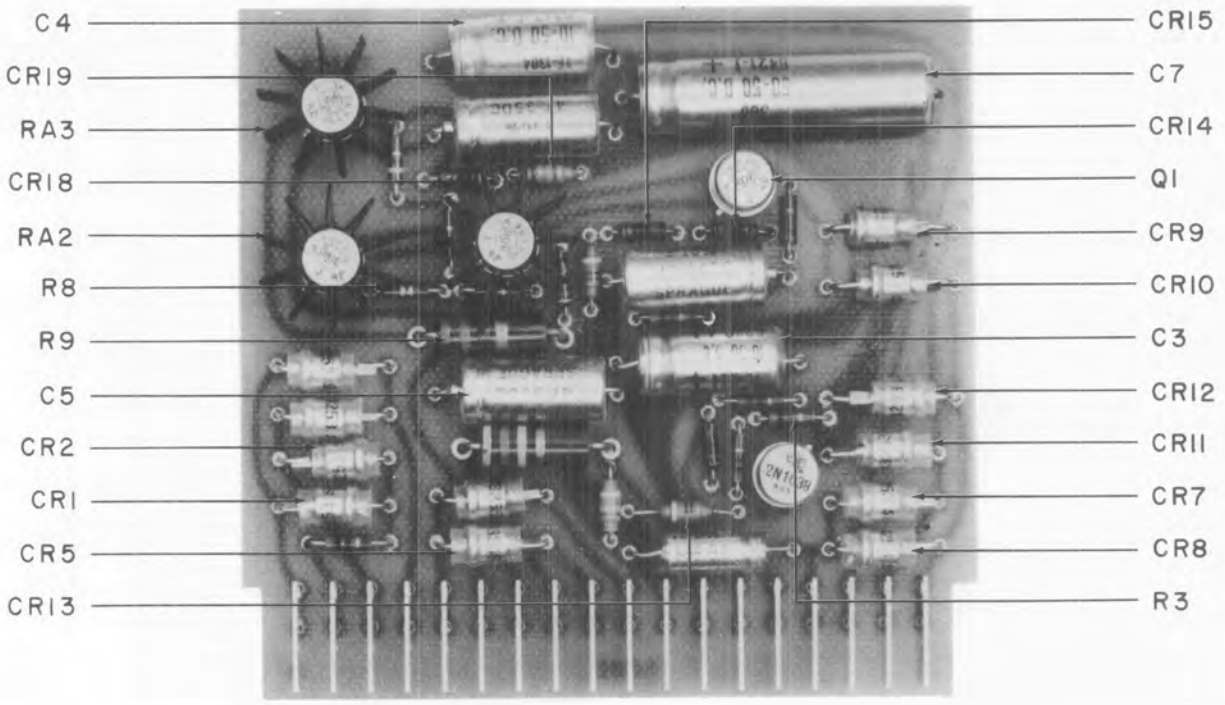


Figure 5-37. Type 7633 Power Supply Regulator (A11), Location of Components

5.4.13 Type 7631 Power Supply Regulator REF. DESIGNATION PREFIX A12

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	10	1N3253	80131	02735
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Same as CR1				
CR5	DIODE	2	1N3255	80131	02735
CR6	Same as CR5				
CR7 Thru CR12	Same as CR1				
CR13	DIODE	2	1N970B	80131	04713
CR14	DIODE	5	1N462A	80131	93332
CR15	Same as CR14				
CR16	Same as CR13				
CR17	Same as CR14				
CR18	Same as CR14				
CR19	DIODE	1	1N759A	80131	04713
CR20	DIODE	1	1N979A	80131	04713
CR21	Same as CR14				
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM: 1 μF, -10+75%, 50V	1	30D105G050BA2	56289	
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 47 μF, 10%, 35V	3	CS13BF476K	81349	56289
C3	CAPACITOR, ELECTROLYTIC, ALUMINUM: 10 μF, -10+75%, 50V	2	30D106G050CB2	56289	
C4	Same as C3				
C5	Same as C2				
C6	Same as C2				
C7	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 μF, -10+75%, 50V	1	30D506G050DD2	56289	
Q1	TRANSISTOR	4	2N2270	80131	02735
Q2	TRANSISTOR	1	2N1038	80131	04713
Q3	Same as Q1				
Q4	Same as Q1				
Q5	Same as Q1				
RA1	HEATSINK	2	207CB	05820	
RA2	Same as RA1				
RA3	HEATSINK	1	3AL635-2R	07387	
R1	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	2	RCR07G100JS	81349	01121



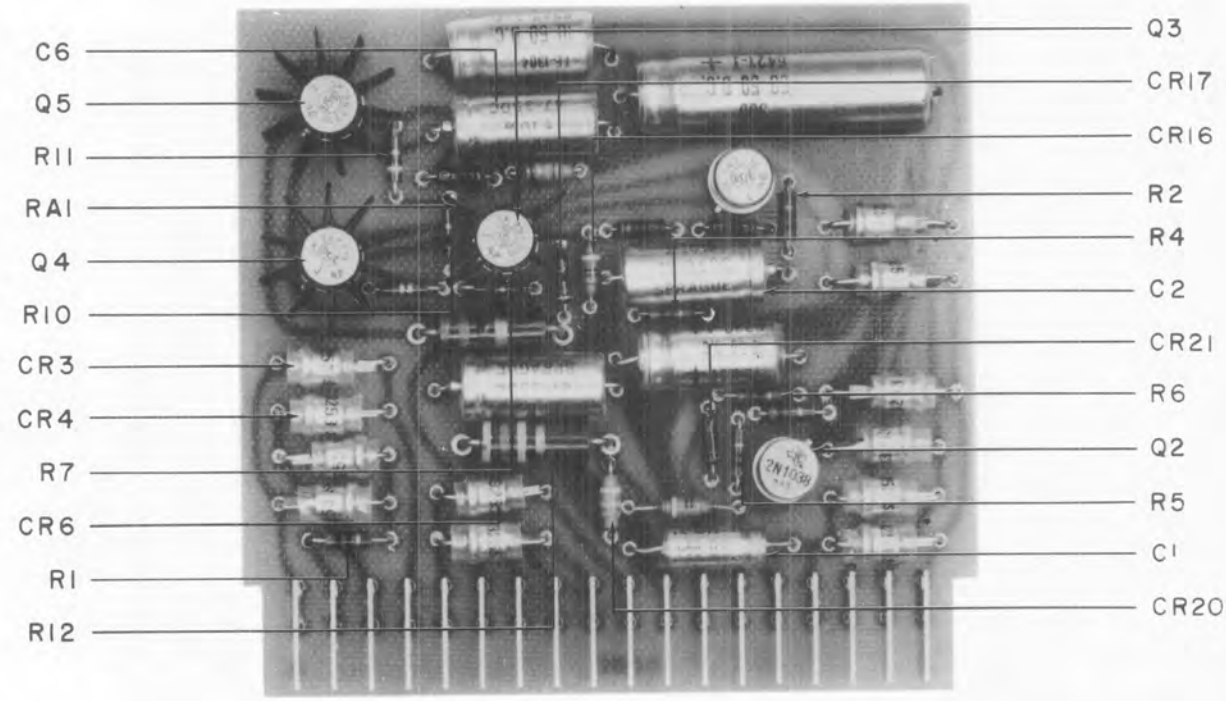


Figure 5-38. Type 7631 Power Supply Regulator (A12), Location of Components

REF. DESIGNATION PREFIX A12

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R2*	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	4	RCR07G102JS	81349	01121
R3	Same as R2				
R4	Same as R2				
R5	Same as R2				
R6	Same as R1				
R7	RESISTOR, FIXED, COMPOSITION: 5.1 Ω, 5%, 1/4W	2	RCR07G5R1JS	81349	01121
R8	Same as R7				
R9	RESISTOR, FIXED, COMPOSITION: 62 Ω, 5%, 1W	1	RCR32G620JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 2.4 kΩ, 5%, 1/4W	2	RCR07G242JS	81349	01121
R11	Same as R10				
R12	RESISTOR, FIXED, COMPOSITION: 36 kΩ, 5%, 1W	1	RCR32G363JS	81349	01121

* Nominal value. Final value factory selected.

5.4.14 Type 7917 Coupling Network REF. DESIGNATION PREFIX A13 AND A14

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
J1	CONNECTOR, RECEPTACLE	2	UG-1094/U	80058	74868
J2	Same as J1				
J3	CONNECTOR, RECEPTACLE	1	UG-58A/U	80058	74868
R1	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	2	RCR07G101JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	2	RCR07G680JS	81349	01121
R3	NOT USED				
R4	Same as R2				
R5	Same as R1				

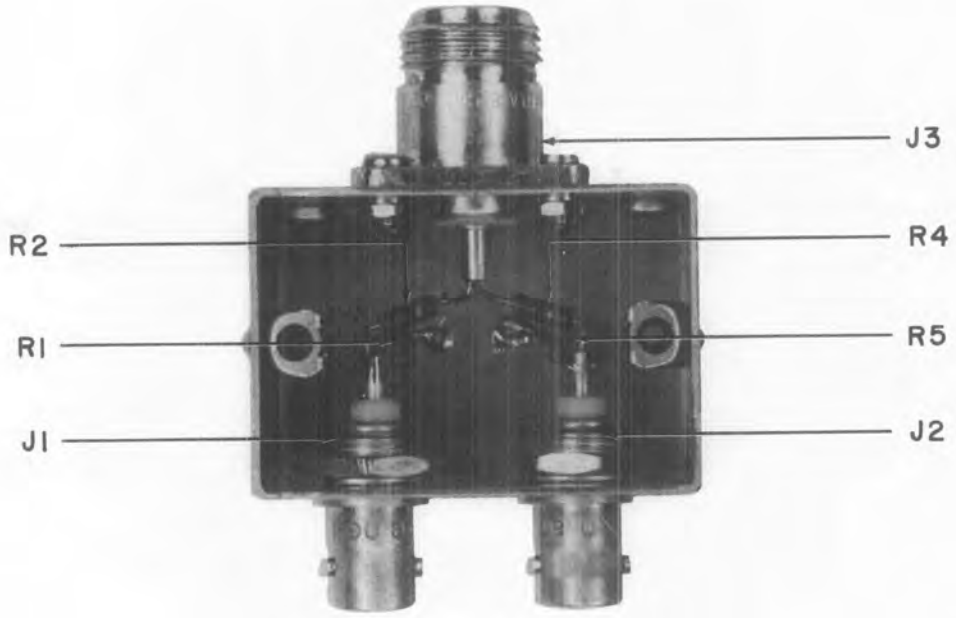


Figure 5-39. Type 7917 Coupling Network (A13 and A14), Location of Components

Figure 5-40

5.4.15 Type 7836 AGC Monitor Amplifier

REF. DESIGNATION PREFIX A15

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	1N759A	80131	04713
CR2	DIODE	1	1N753A	80131	04713
Q1	TRANSISTOR	1	2N929	80131	04713
Q2	TRANSISTOR	1	2N3251	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	1	RCR07G474JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 220 kΩ, 5%, 1/4W	1	RCR07G224JS	81349	01121
R3	RESISTOR, VARIABLE, FILM: 500 kΩ, 10%, 1/2W	1	62PR500K	73138	
R4	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	RCR07G123JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	1	RCR07G512JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 2.4 kΩ, 5%, 1/4W	1	RCR07G242JS	81349	01121

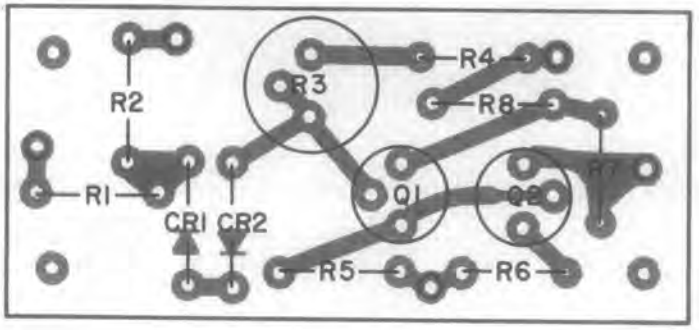


Figure 5-40. Type 7836 AGC Monitor Amplifier (A15), Location of Components

5.4.16 Type 79407 AFC Amplifier REF. DESIGNATION PREFIX A16

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
Q1	TRANSISTOR	1	2N929	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 150 kΩ, 5%, 1/4W	1	RCR07G154JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	RCR07G472JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	1	RCR07G123JS	81349	01121
R5	Same as R2				
R6	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121

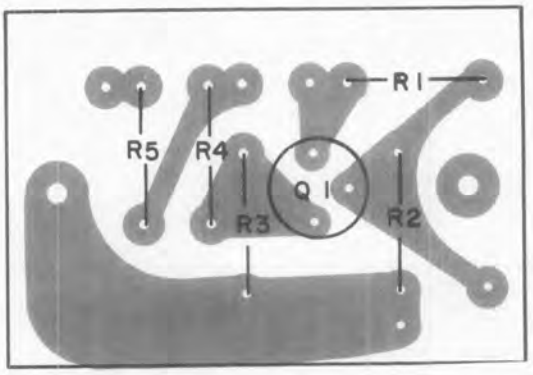


Figure 5-41. Type 79407 AFC Amplifier (A16), Location of Components

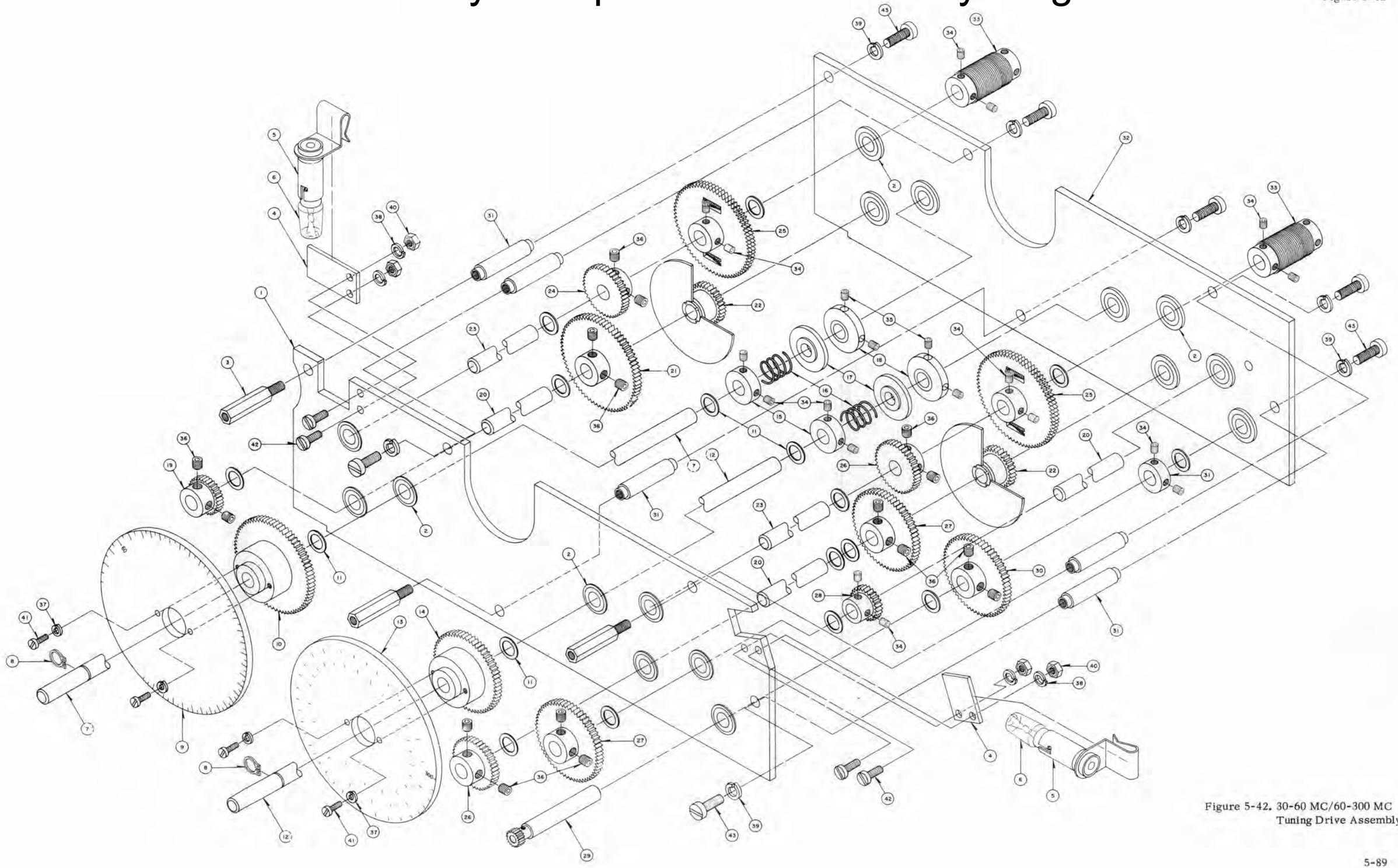


Figure 5-42. 30-60 MC/60-300 MC Tuning Drive Assembly

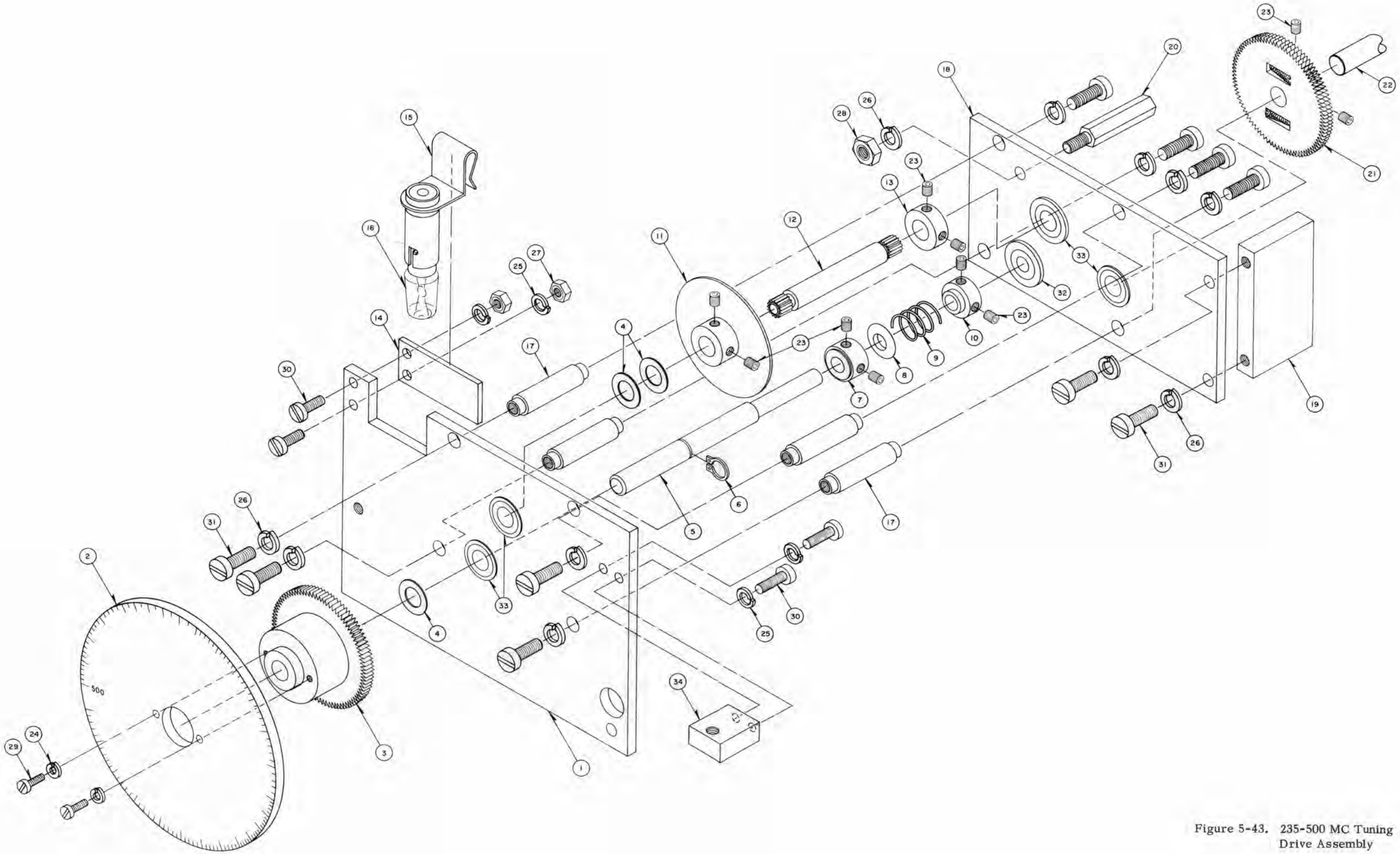


Figure 5-43. 235-500 MC Tuning Drive Assembly

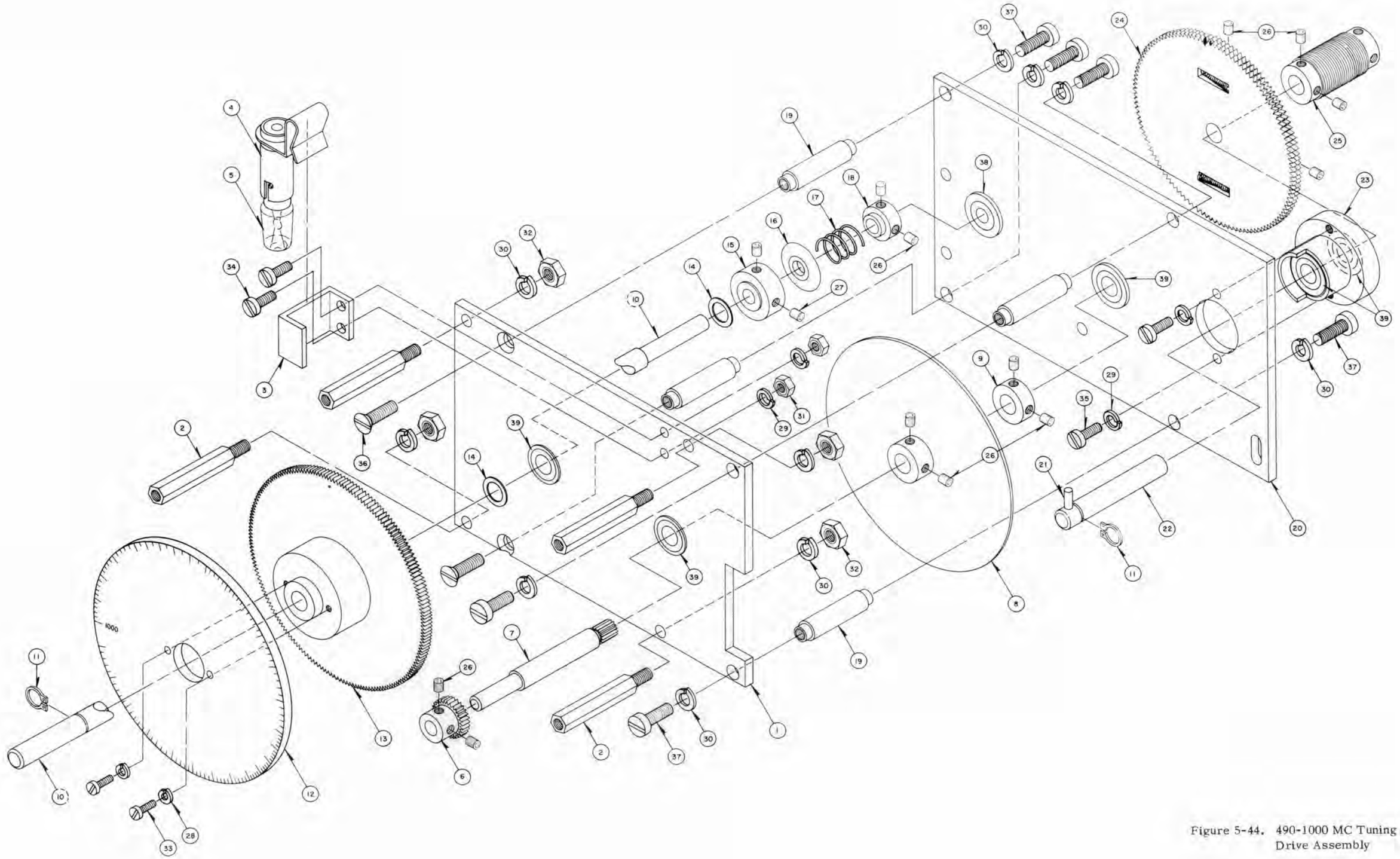
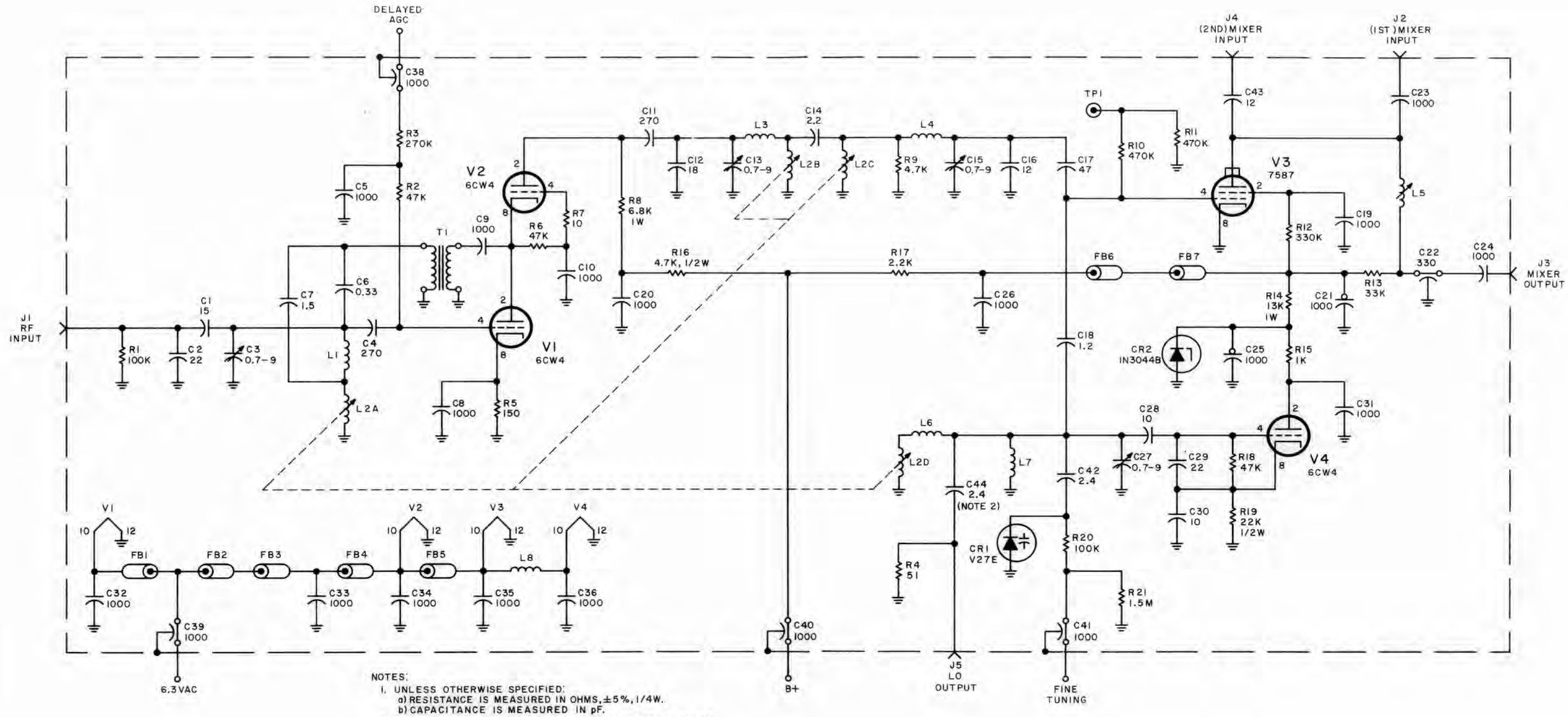


Figure 5-44. 490-1000 MC Tuning Drive Assembly

SECTION VI

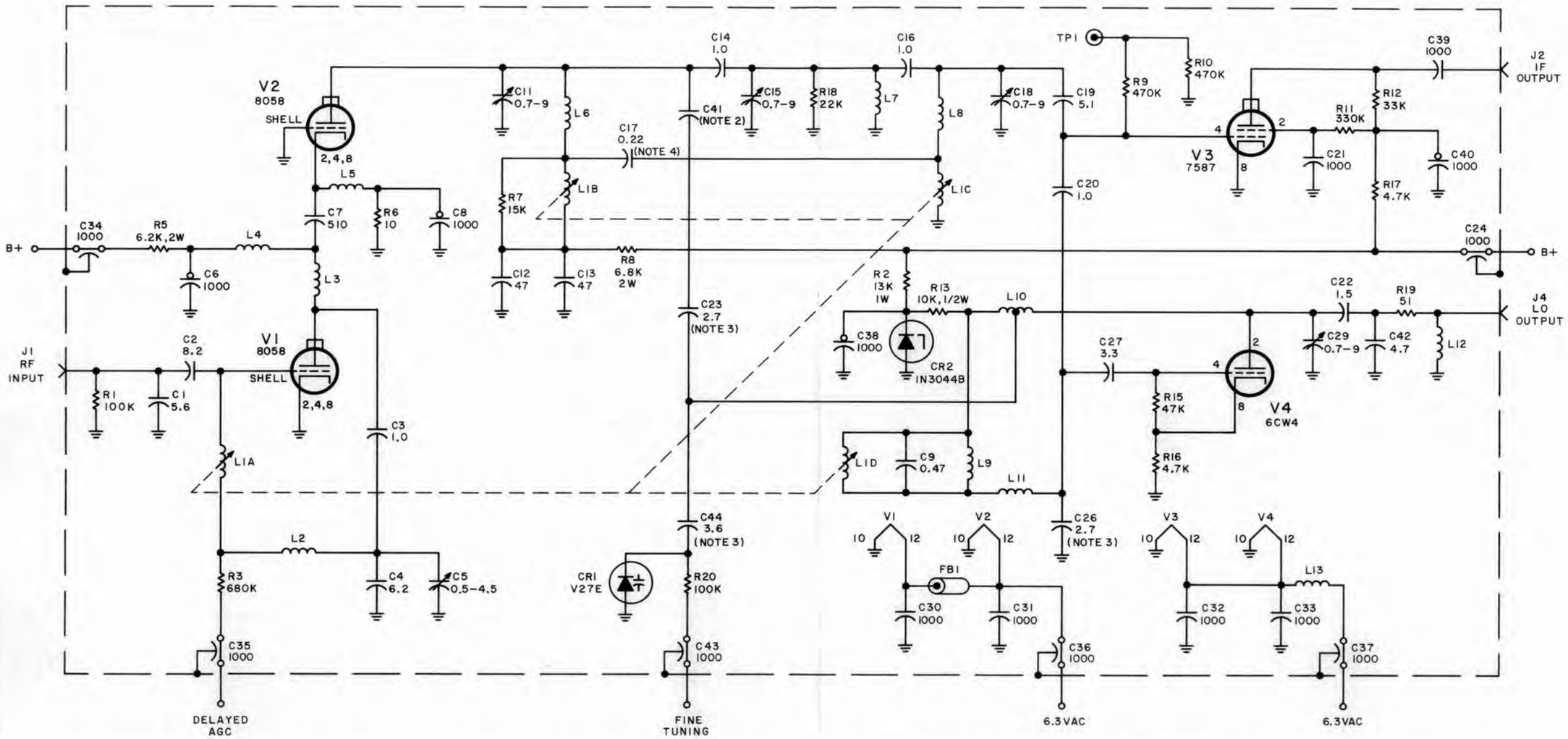
SCHEMATIC DIAGRAMS

Figure 6-1



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. NOMINAL VALUE; FINAL VALUE TO BE FACTORY SELECTED.

Figure 6-1. Type 71292 30-60 MC Tuner (A1), Schematic Diagram

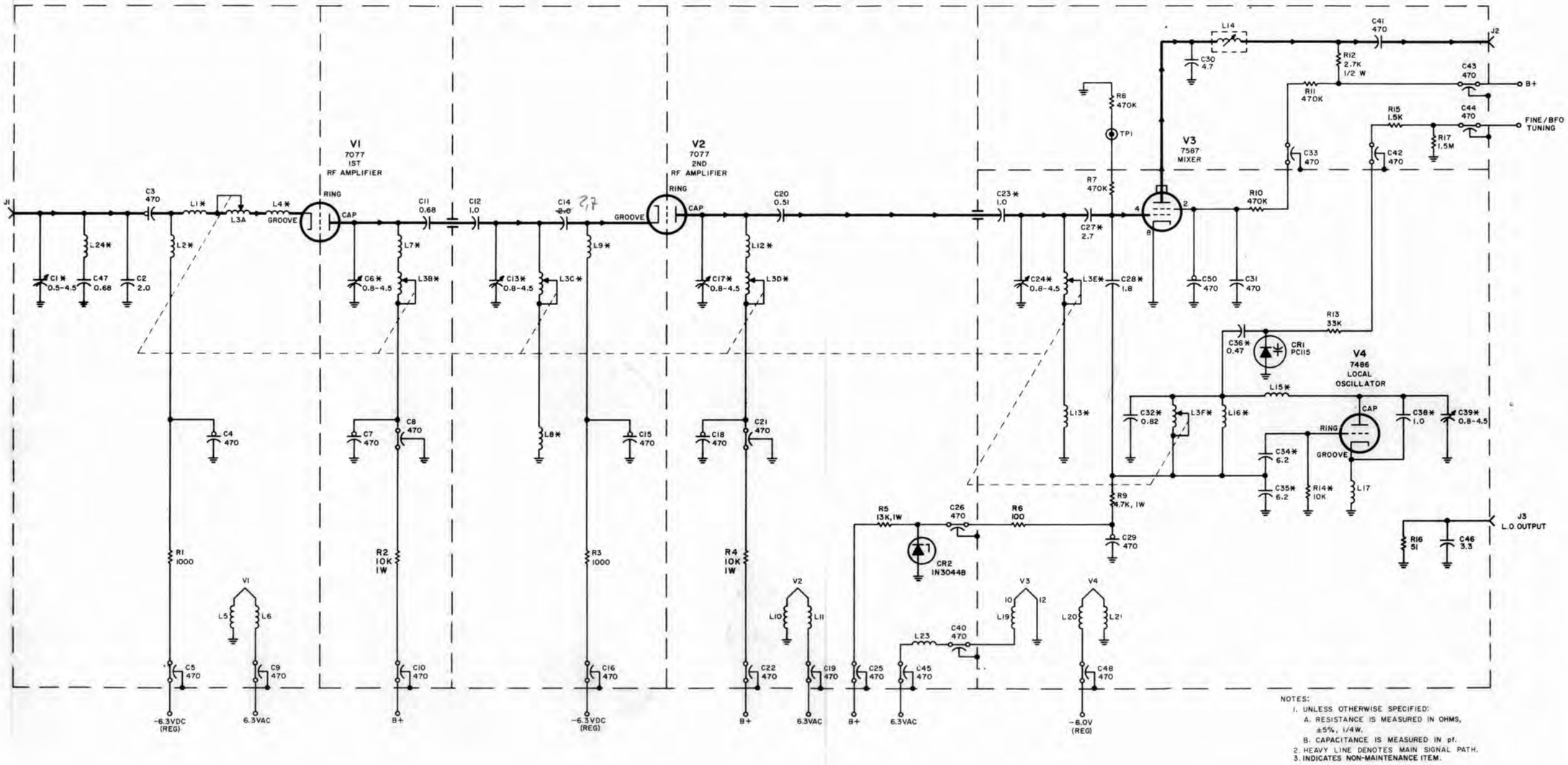


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. PART OF CIRCUIT BOARD, CEI TYPE 1101.
3. NOMINAL VALUE; FINAL VALUE TO BE FACTORY SELECTED.
4. NOMINAL VALUE; FINAL VALUE TO BE DETERMINED AT TIME OF ALIGNMENT.

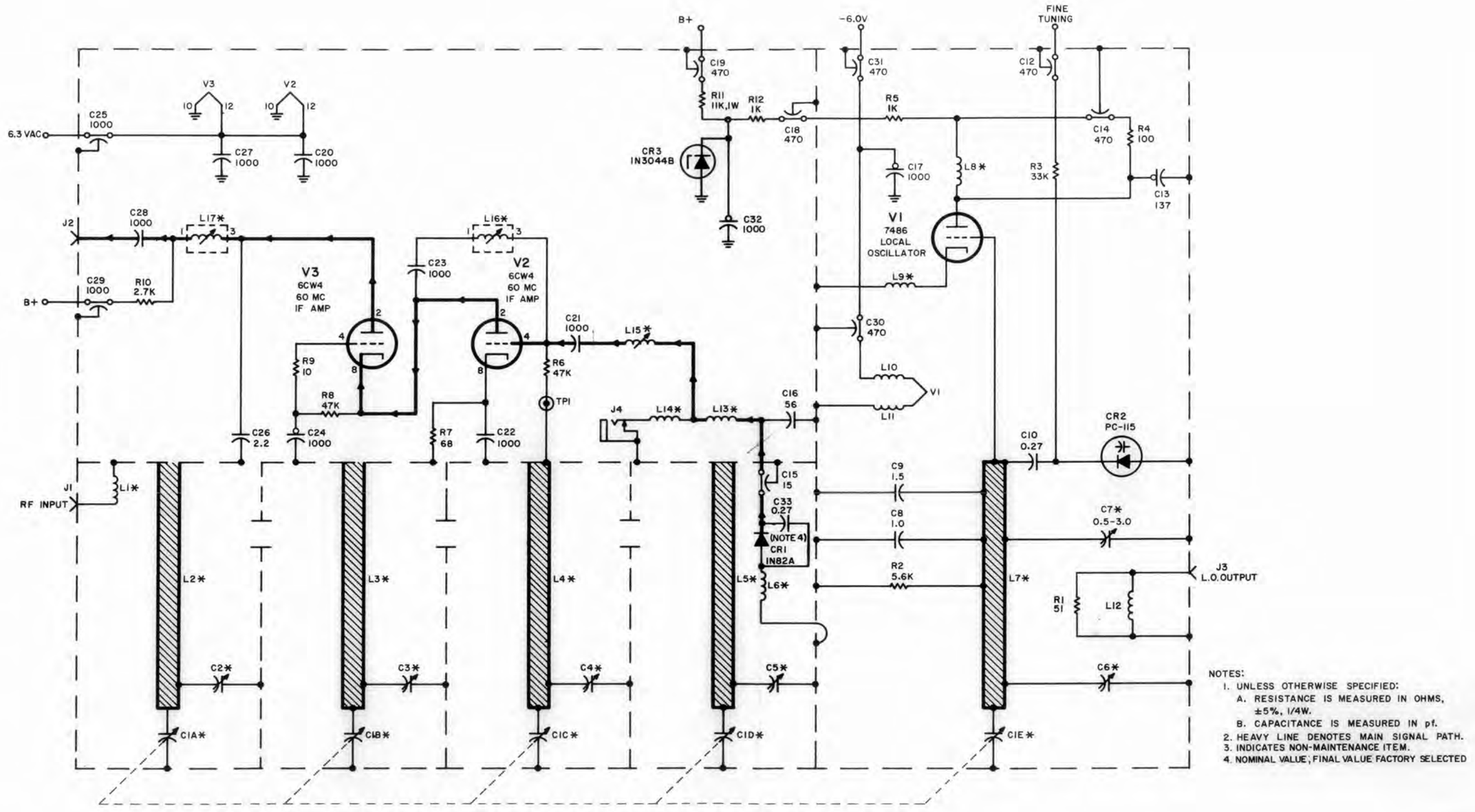
RF- IF 24 db min (28-30)
MF 6.8 dB

Figure 6-2. Type 71293 60-300 MC Tuner (A2), Schematic Diagram



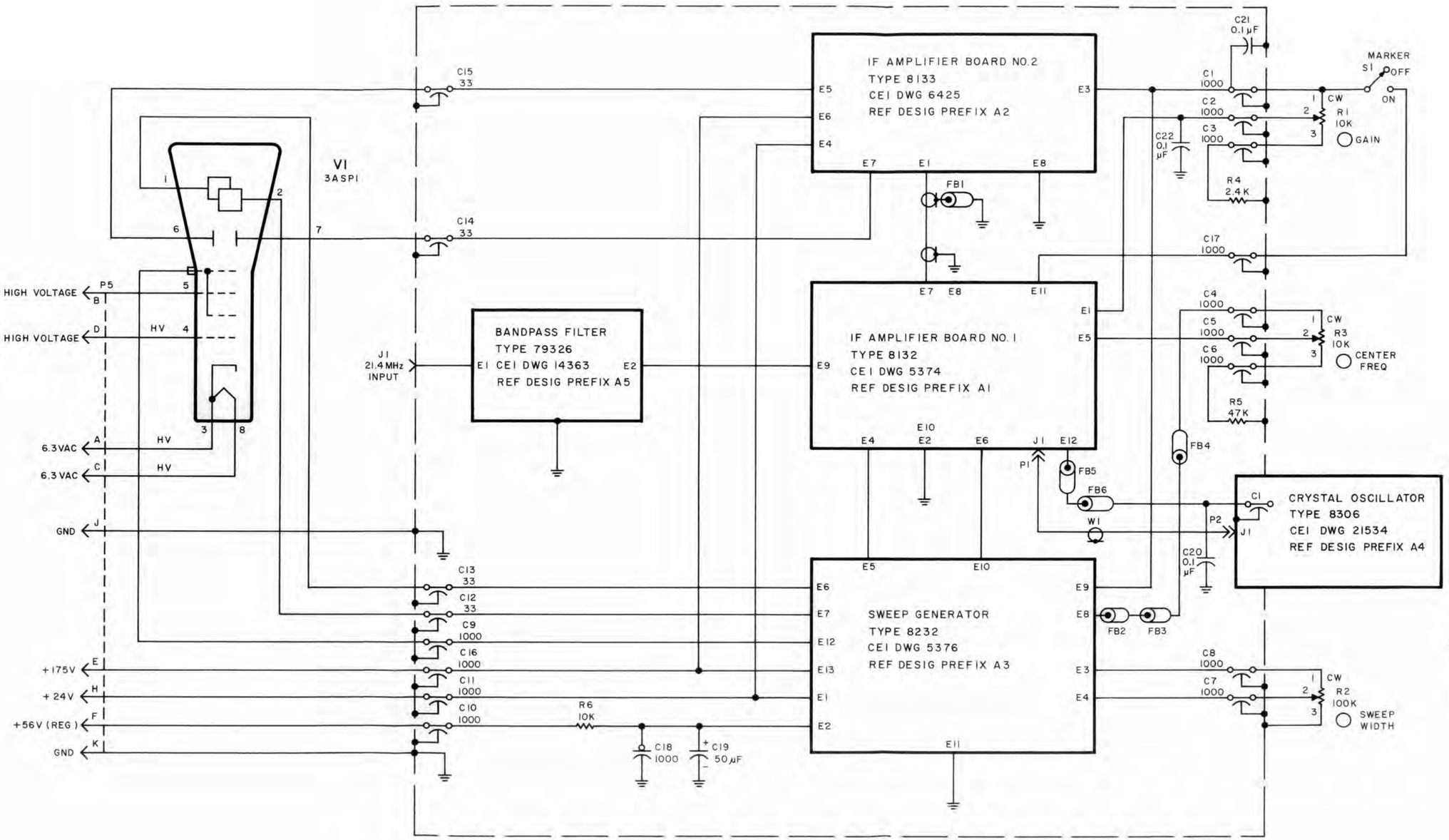
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.
3. INDICATES NON-MAINTENANCE ITEM.

Figure 6-3. Type 7162 235-500 MC Tuner (A3), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.
3. INDICATES NON-MAINTENANCE ITEM.
4. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED

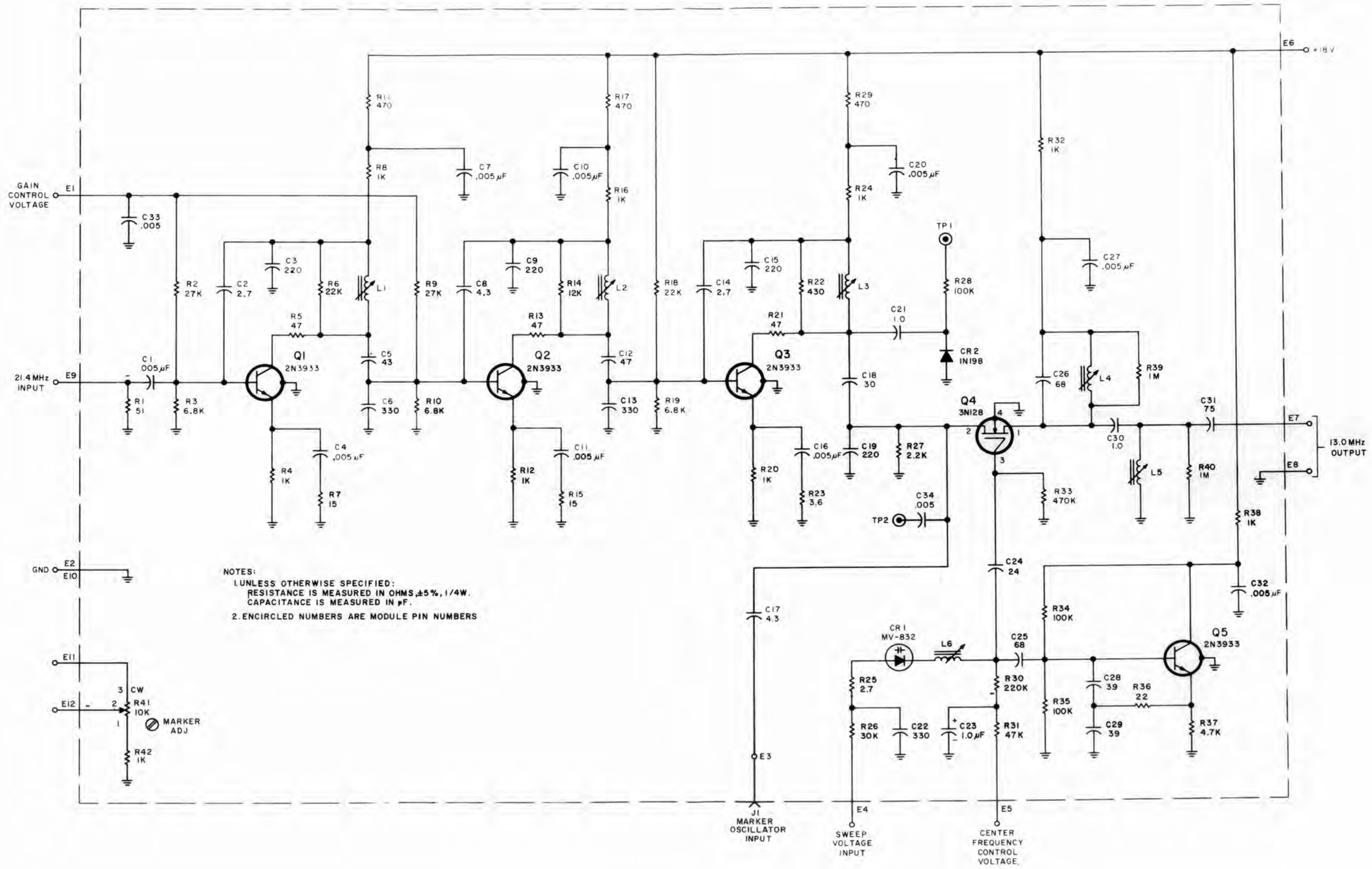
Figure 6-4. Type 7163 490-1000 MC Tuner (A4), Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   CAPACITANCE IS MEASURED IN pF.
2. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
   ○ INDICATES FRONT PANEL CONTROL.

Figure 6-5. Type 79358 Signal Monitor (A5), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   CAPACITANCE IS MEASURED IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS

Figure 6-6. Type 8132 IF Amplifier Board No. 1 (A5A1), Schematic Diagram

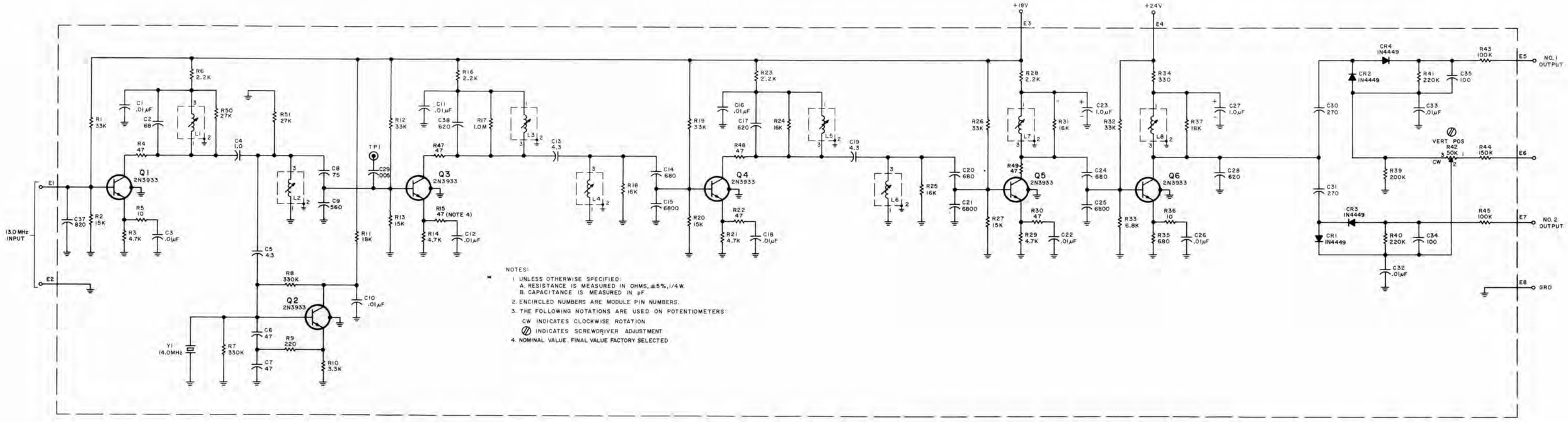
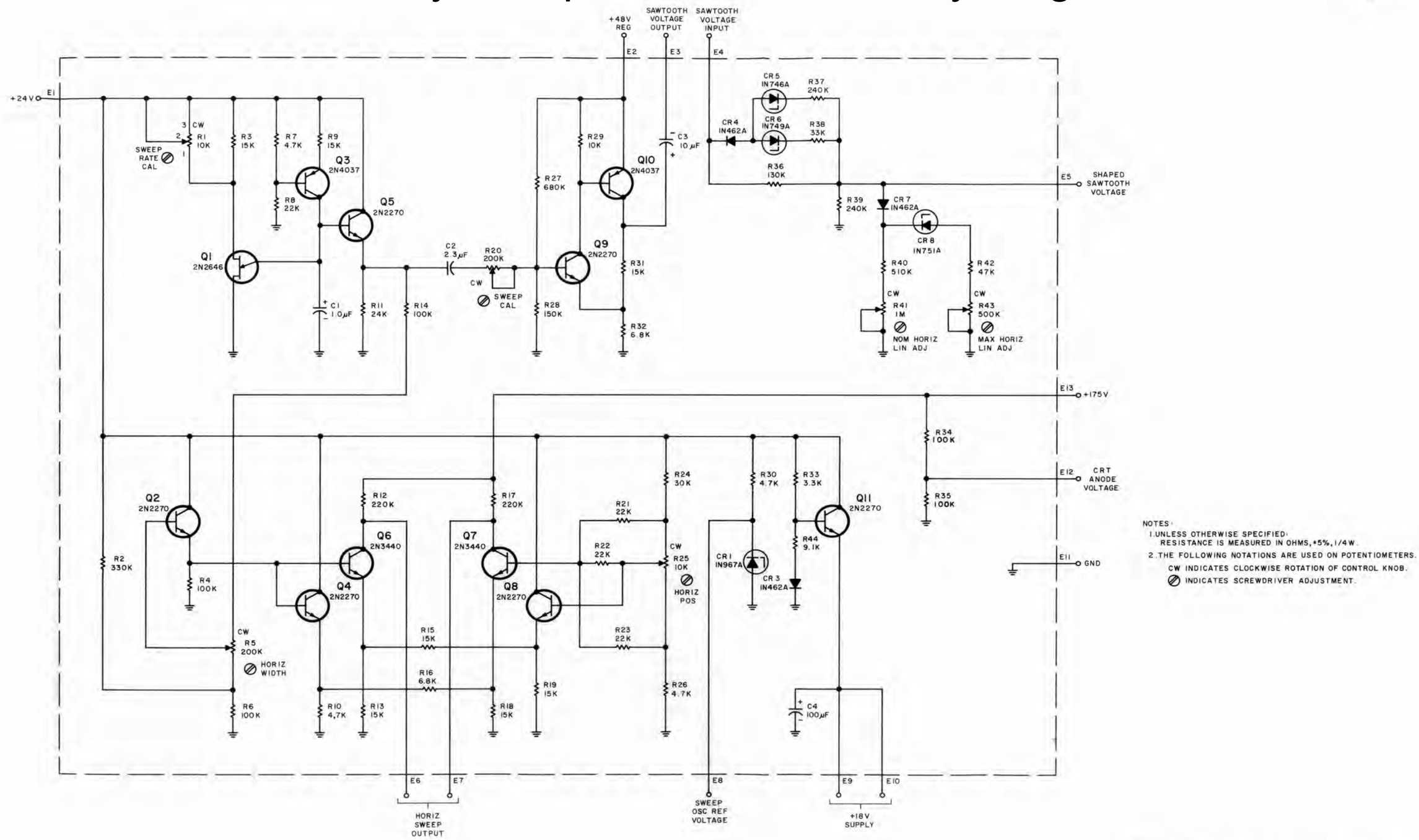
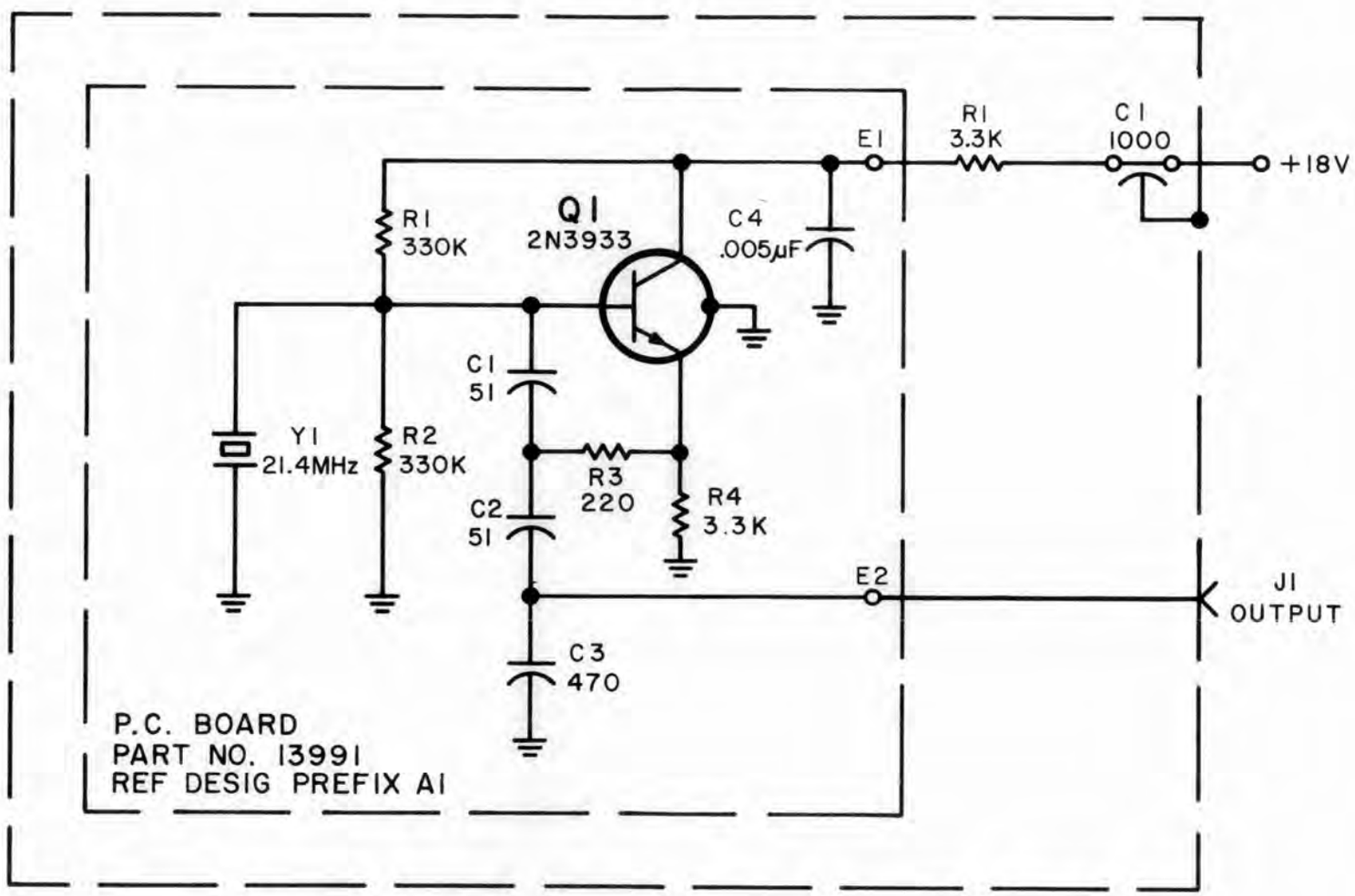


Figure 6-7. Type 8133 IF Amplifier Board No. 2 (A5A2), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
2. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS.
   CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.

Figure 6-8. Type 8232 Sweep Generator (A5A3), Schematic Diagram



NOTES:
1. UNLESS OTHER SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4 W.
   B. CAPACITANCE IS MEASURED IN pF.

Figure 6-9. Type 8306 Crystal Oscillator (A5A4), Schematic Diagram

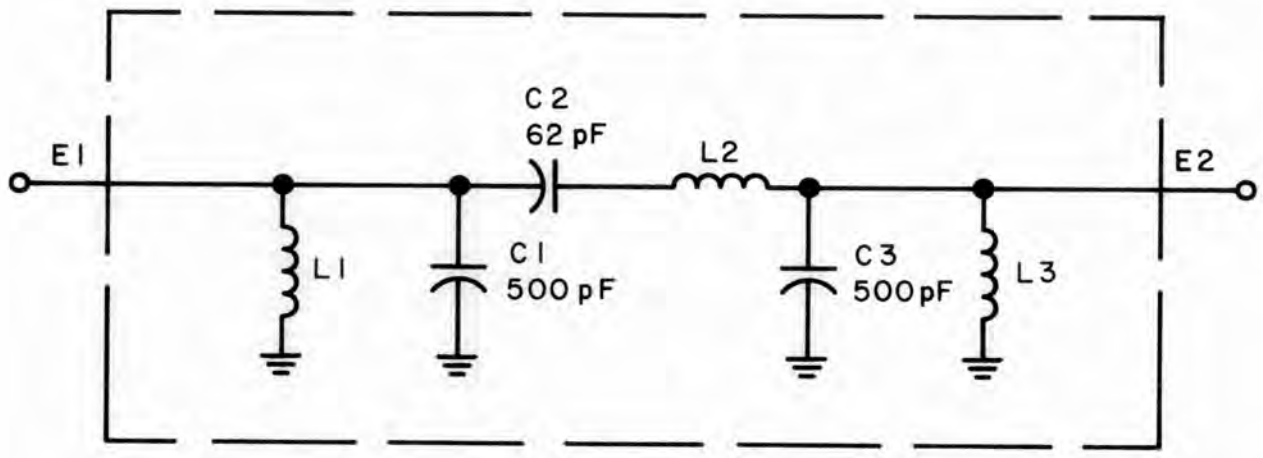
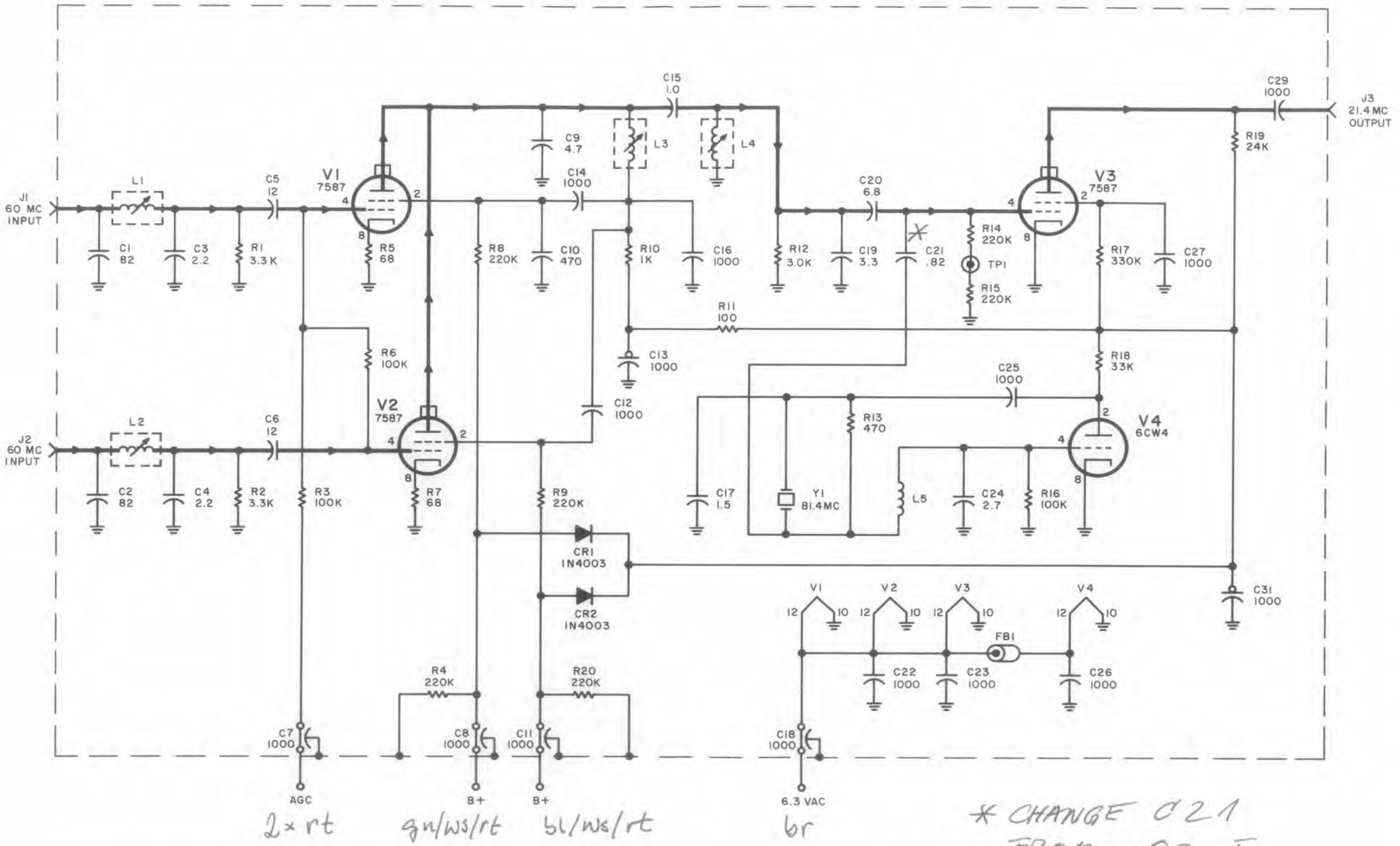


Figure 6-10. Type 79326 Bandpass Filter (A5A5), Schematic Diagram



* CHANGE C21 FROM .82 pF TO 1.2 pF

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-11. Type 7120 60-21.4 MC Converter (A6), Schematic Diagram

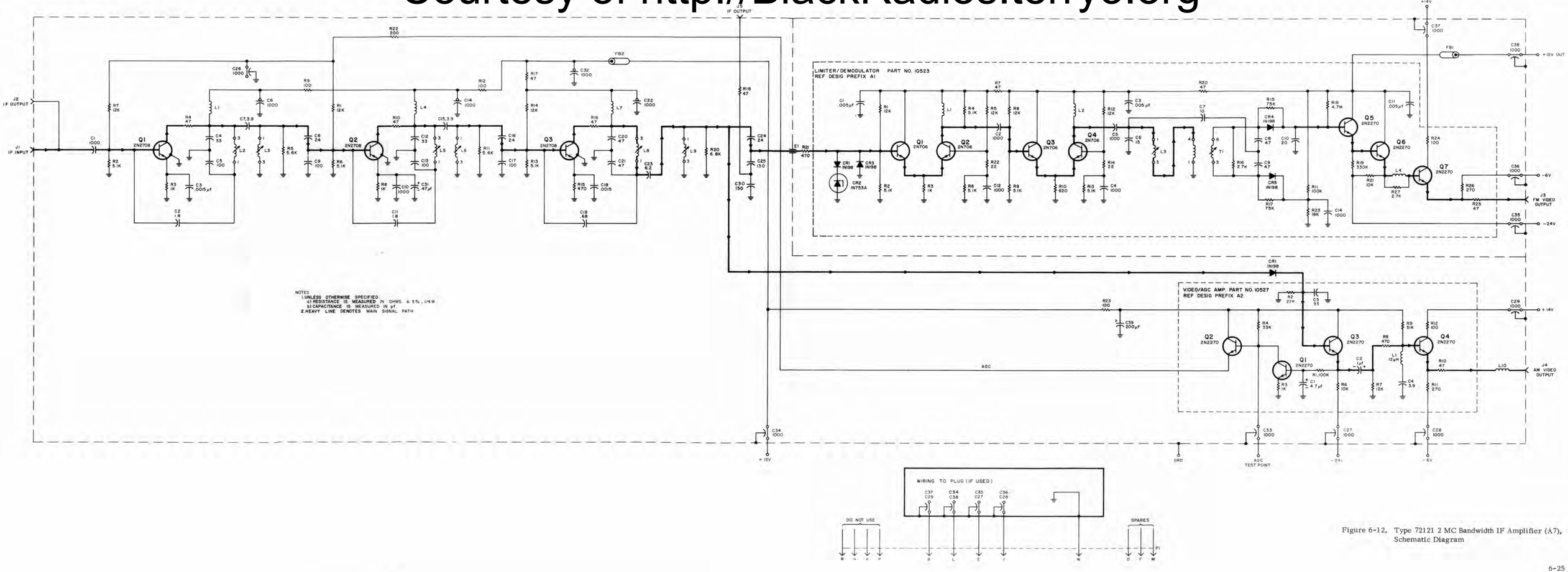


Figure 6-12. Type 72121 2 MC Bandwidth IF Amplifier (A7), Schematic Diagram

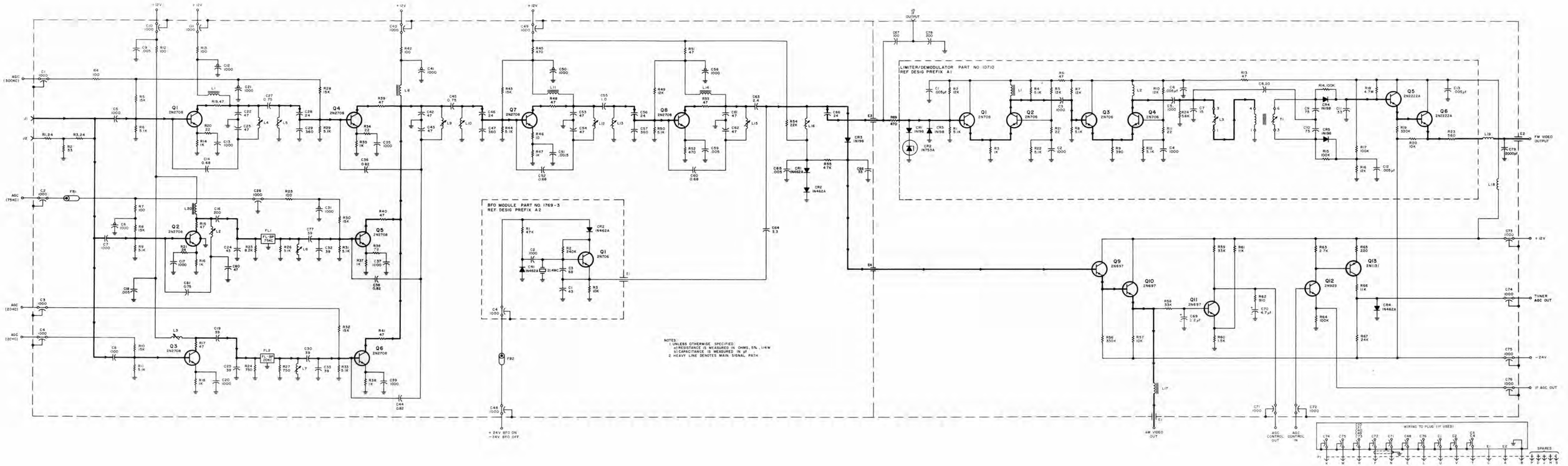


Figure 6-13. Type 72120 20/75/300-KC Bandwidth IF Amplifier (A8), Schematic Diagram

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. HEAVY LINE DENOTES MAIN SIGNAL PATH.

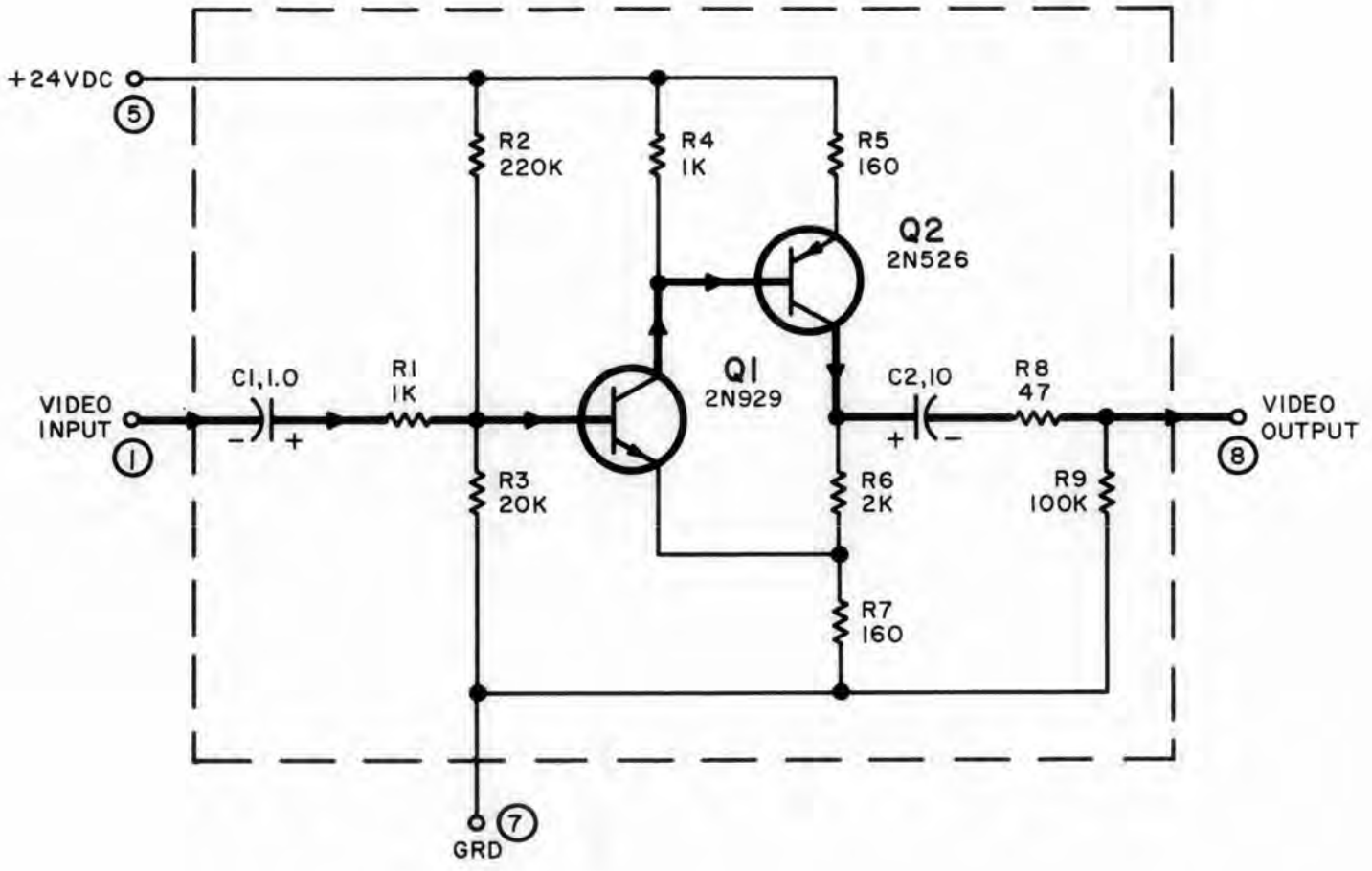


Figure 6-14. Type 7312 Video Amplifier (A9), Schematic Diagram

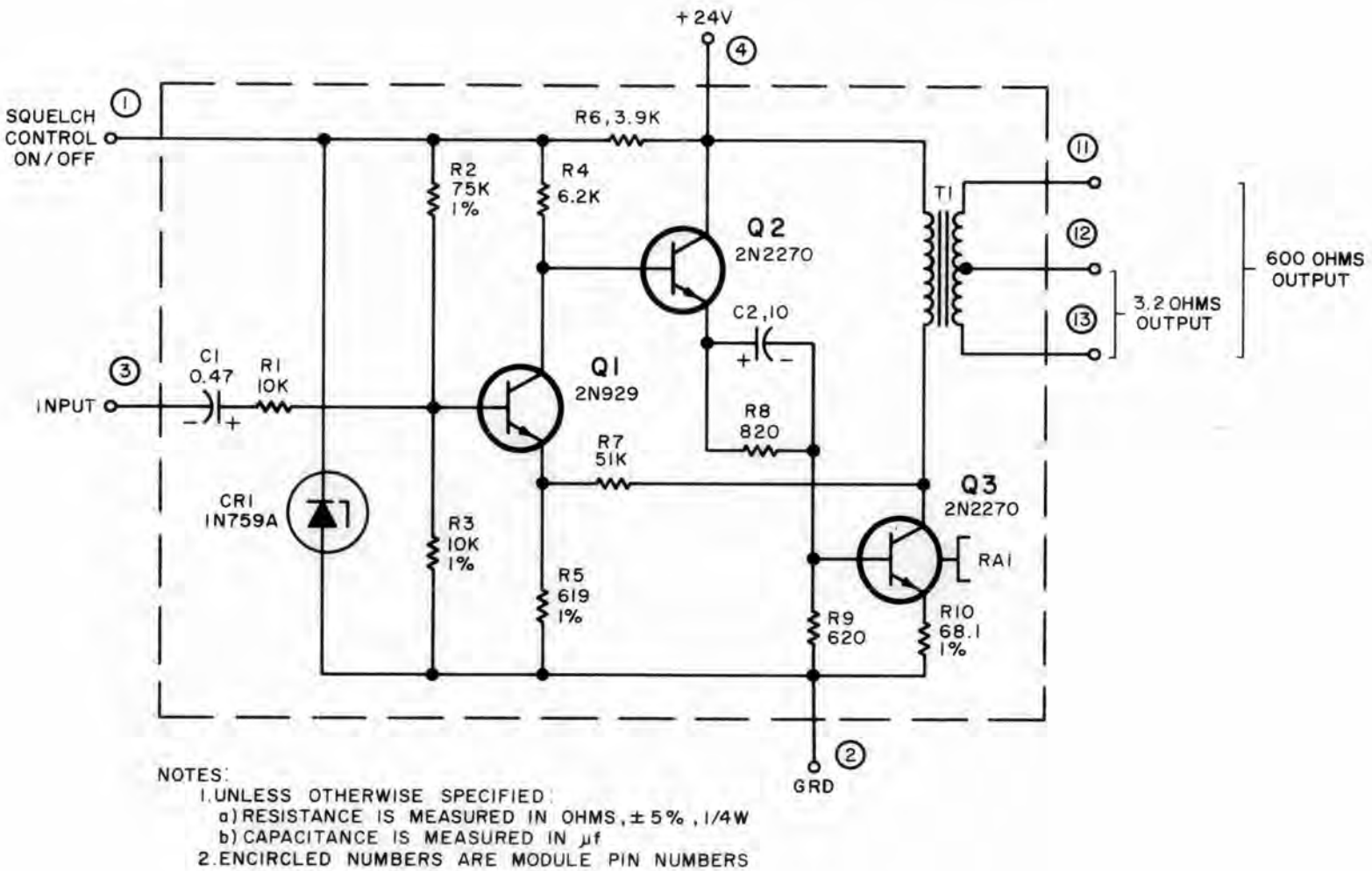
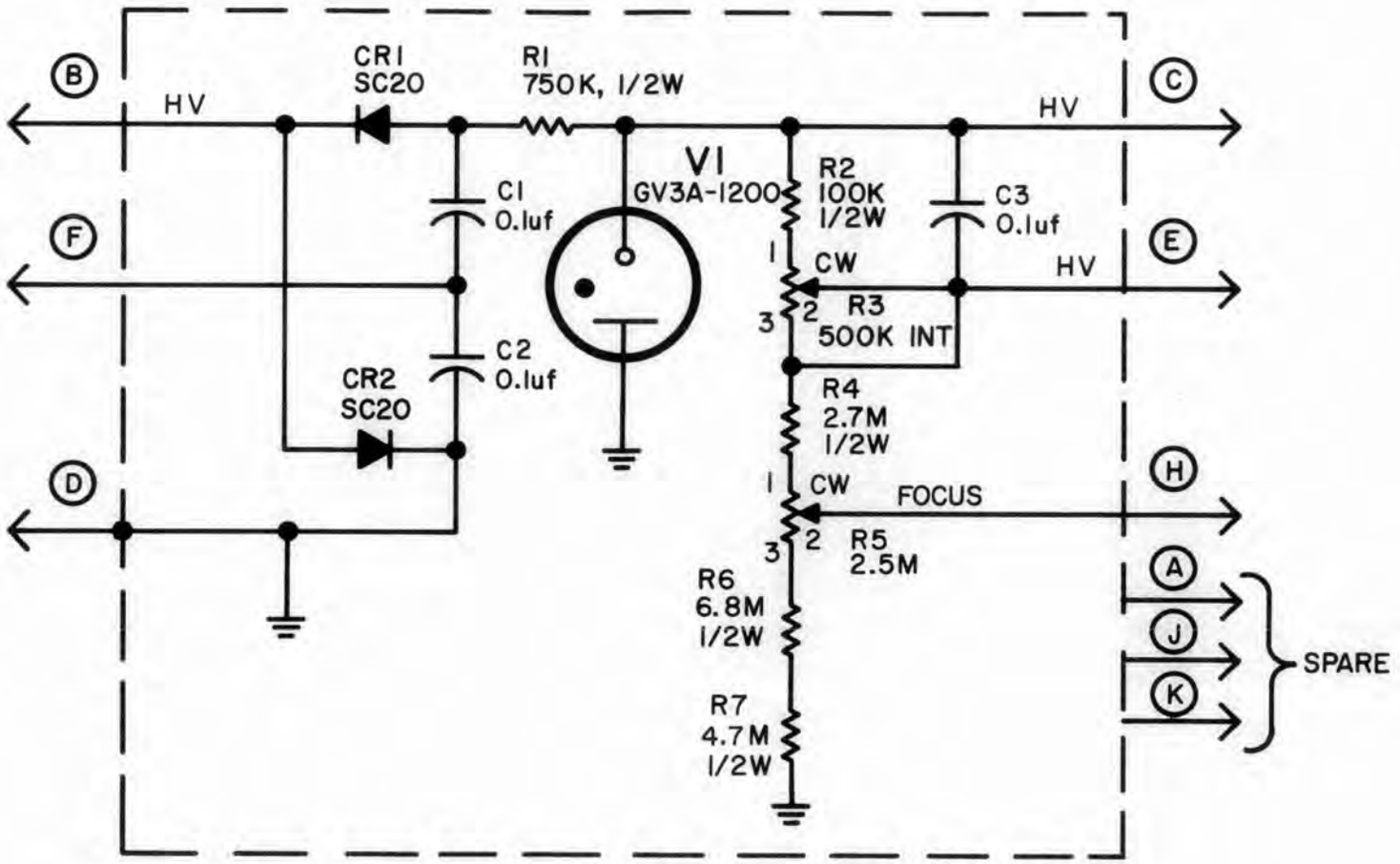
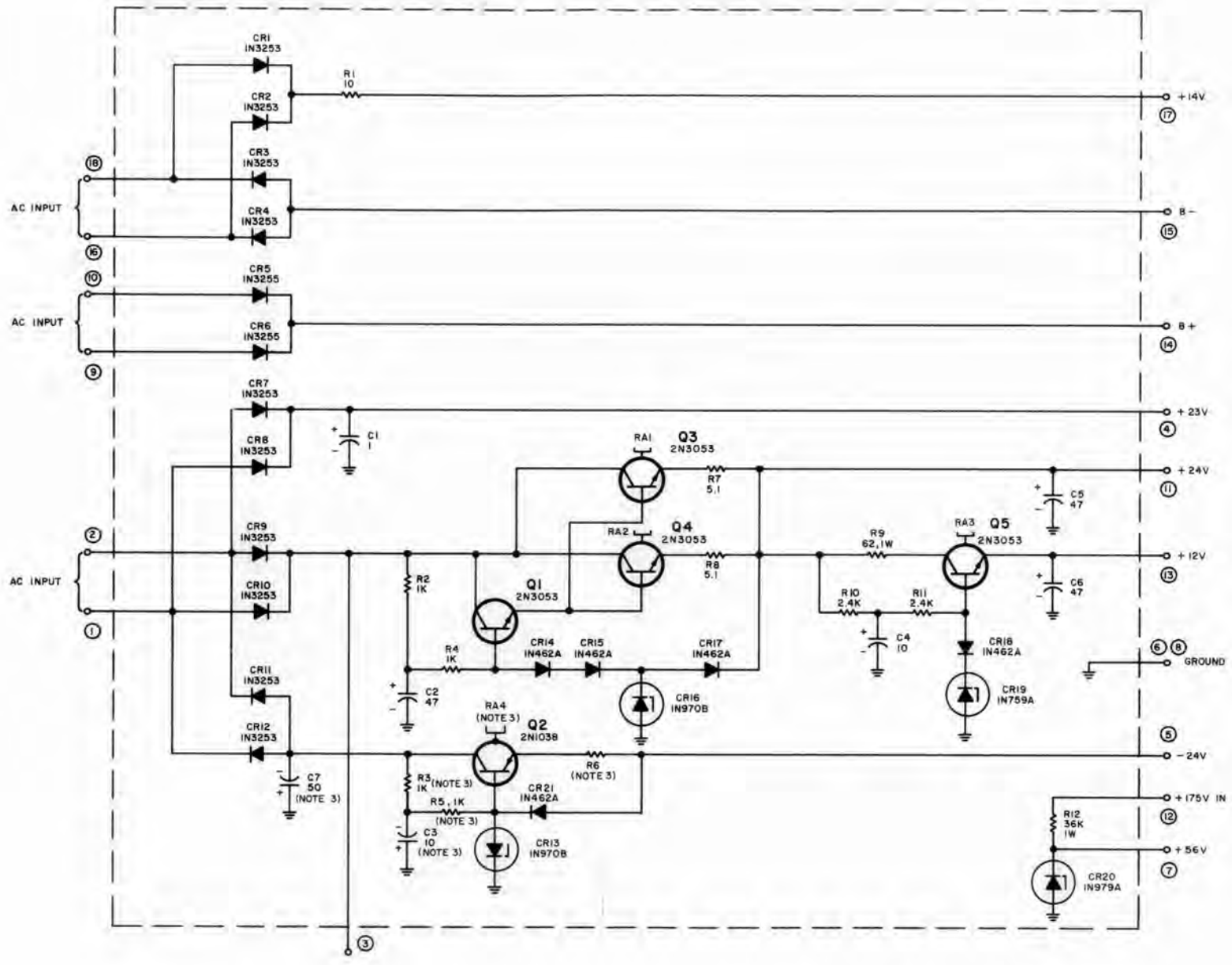


Figure 6-15. Type 7400B Audio Amplifier (A10), Schematic Diagram



NOTES:
1. RESISTORS ARE MEASURED IN OHMS ±5%, 1/4W.
2. ENCIRCLED NUMBERS ARE PIN NUMBERS IN PLUG P1.

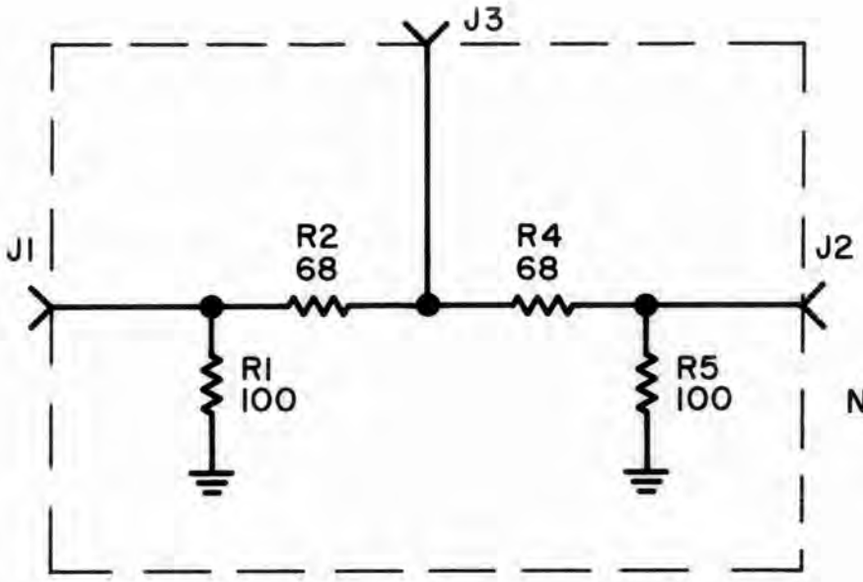
Figure 6-16. Type 7633 Power Supply Regulator (CRT) (A11), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. DIFFERENCE BETWEEN TYPES IS SHOWN BELOW:

TYPE NUMBER	RA4 USED	R6 VALUE	R3 VALUE	R5 VALUE	C3 VALUE	C7 VALUE
7631-1	NO	10	1K	1K	10	50
7631-2	YES	5.1	510	510	78	200

Figure 6-17. Type 7631A Power Supply Regulator (GEN) (A12), Schematic Diagram



NOTE:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS MEASURED IN OHMS ±5%, 1/4W.

Figure 6-18. Type 7917 Coupling Network (A13, A14), Schematic Diagram

NOTES:
1. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W UNLESS OTHERWISE SPECIFIED
2. ENCIRCLED LETTERS ARE FOR REFERENCE ONLY
3. ⊘ INDICATES SCREWDRIVER ADJUSTMENT

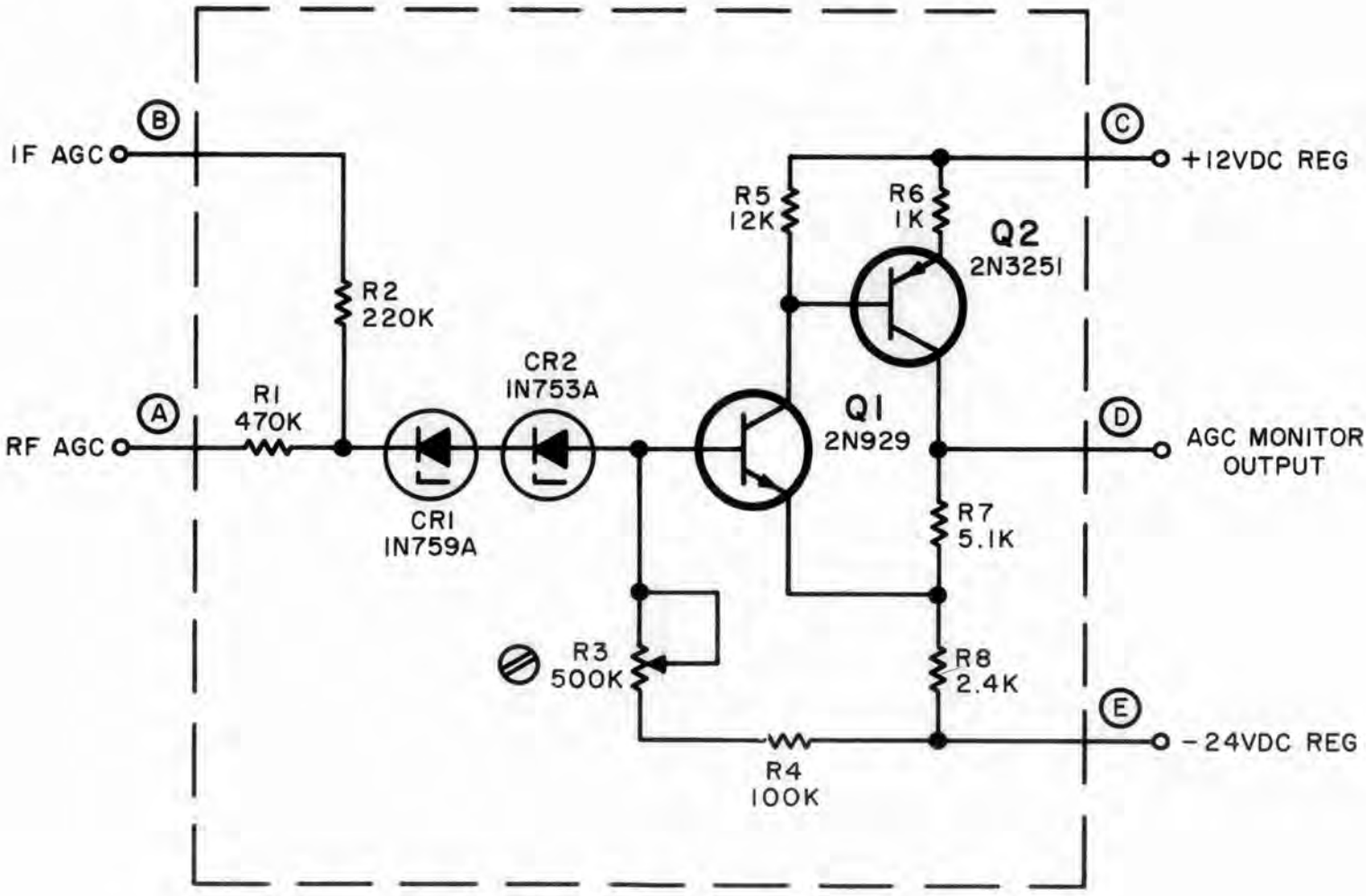
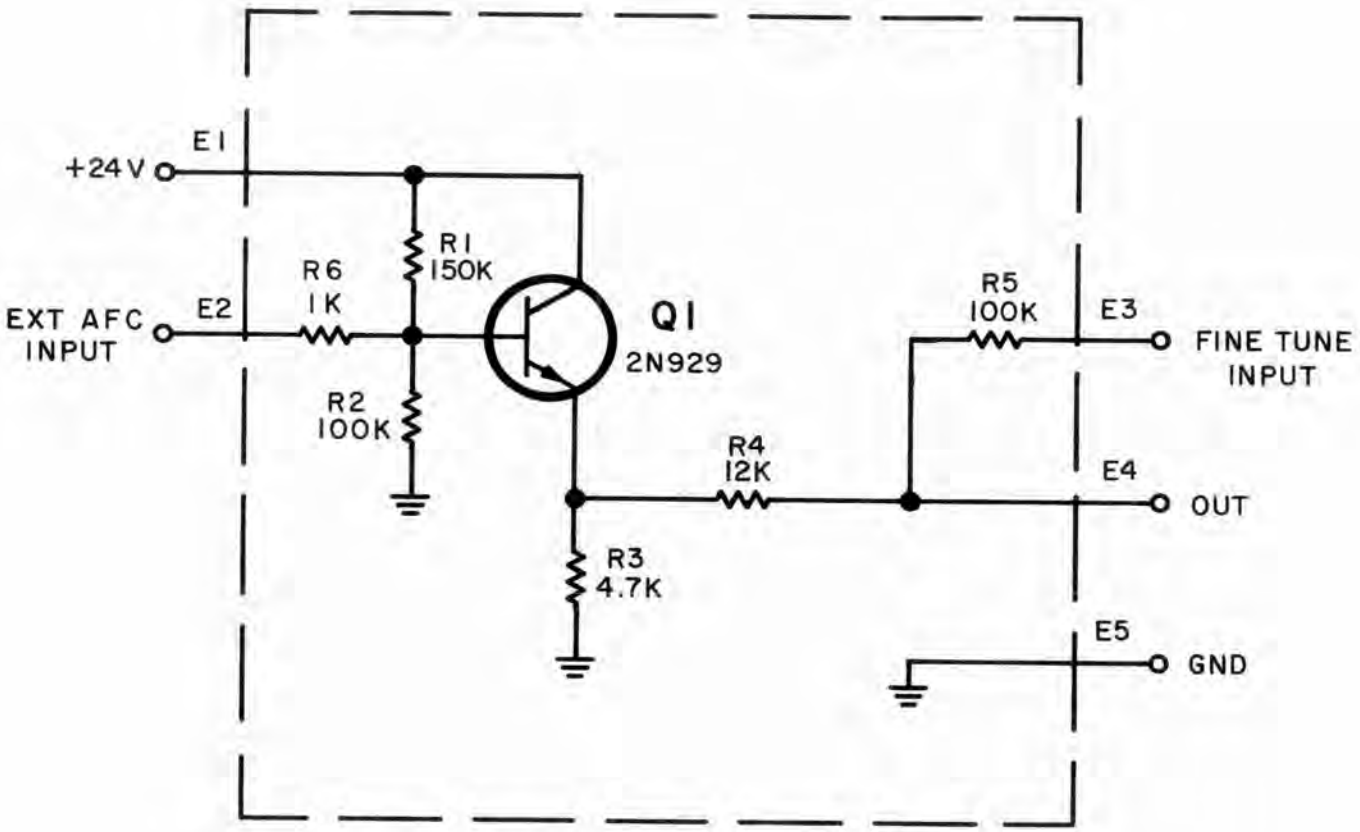


Figure 6-19. Type 7836 AGC Monitor Amplifier (A15), Schematic Diagram



NOTE: RESISTANCE IS IN OHMS, ±5%, 1/4W.

Figure 6-20. Type 79407 AFC Amplifier (A16), Schematic Diagram

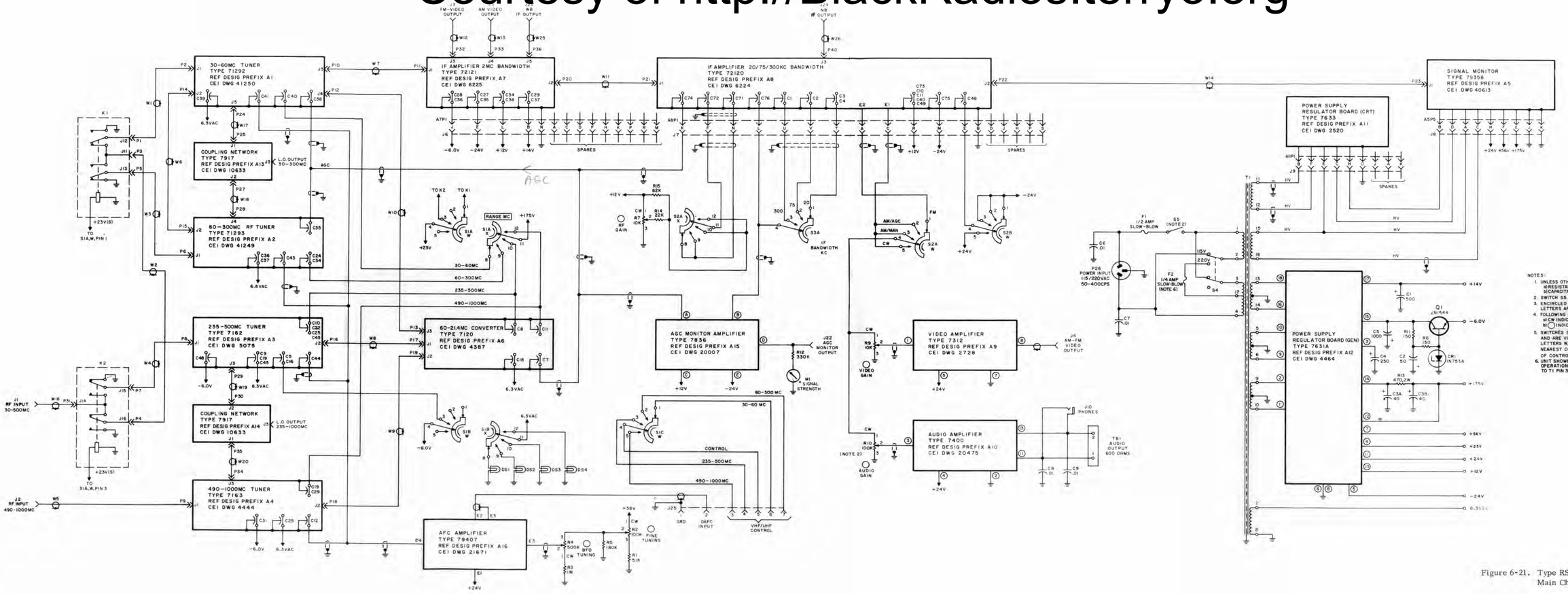


Figure 6-21. Type RS-111-1B-12B Receiving System, Main Chassis, Schematic Diagram

NOTES:
1. UNLESS OTHERWISE SPECIFIED :
   a) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. SWITCH S5 IS GANGED WITH AUDIO GAIN CONTROL, R10.
3. ENCIRCLED NUMBER ARE MODULE PIN NUMBERS. ENCIRCLED LETTERS ARE FOR REFERENCE ONLY.
4. FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   a) CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
   b) ( ) INDICATES FRONT PANEL CONTROL.
5. SWITCHES S1, S2, S3 ARE SHOWN IN EXTREME CCW POSITION AND ARE VIEWED FROM END OPPOSITE CONTROL KNOB. LETTERS W, X, Y DENOTE SEGMENTS OF WAFER. SECTION A IS NEAREST CONTROL KNOB. ARROW INDICATES CW ROTATION OF CONTROL KNOB.
6. UNIT SHOWN WIRED FOR 115/220V OPERATION; FOR 115/230V OPERATION DISCONNECT FUSE F2 FROM T1-PIN 17, & CONNECT IT TO T1 PIN 3. CHANGE THE REFERENCE AT P26 & S4 TO 115/230V.

SECTION VII

SUPPLEMENT FOR TYPE RS-111-1B-12A RECEIVING SYSTEM

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Table 7-1. Type RS-111-1B-12A Receiving System, Specifications

Type of Reception	AM, FM, CW
Frequency Range	30-1000 mc in four bands: Band A, 30-60 mc; Band B, 60-300 mc; Band C, 235-500 mc; Band D, 490-1000 mc
Input Impedance	To operate from 50-ohm source
Noise Figure	Band A, 4.0 dB max; Band B, 6.5 dB max; Band C, 10 dB max; Band D, 12 dB max
Image Rejection	Band A, 60 dB min; Band B, 50 dB min; Band C, 65 dB min; Band D, 75 dB min
IF Rejection	Band A, 54 dB min; Band B, 80 dB min; Band C, 80 dB min; Band D, 90 dB min
Oscillator to Antenna Conduction	Band A, 15 μV max; Band B, 15 μV max from 60-260 mc and 25 μV max from 260-300 mc; Band C, 8 μV max; Band D, 75 μV max
IF Bandwidths	Four total, two operating simultaneously: 2 mc and either 20 kc, 75 kc, or 300 kc selectable from front panel
Band A and Band B Sensitivity	
20-kc Bandwidth	AM: 1 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 2 μV input, modulated at 1 kc with 7-kc deviation, produces 21 dB (s plus n)/n min
75-kc Bandwidth	AM: 2 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 3 μV input, modulated at 1 kc with 25-kc deviation, produces 21 dB (s plus n)/n min
300-kc Bandwidth	AM: 4 μV input, modulated 50%, produces 11 dB (s plus n)/n min. FM: 6 μV input, modulated at 1 kc with 100-kc deviation, produces 21 dB (s plus n)/n min
2-mc Bandwidth	AM: 11 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 12 μV input, modulated at 1 kc with 750-kc deviation, produces 21 dB (s plus n)/n min
Band C and Band D Sensitivity	
20-kc Bandwidth	AM: 2 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 4 μV input, modulated at 1 kc with 7-kc deviation, produces 21 dB (s plus n)/n min
75-kc Bandwidth	AM: 8 μV input, modulated 50%, produces 17 dB (s plus n)/n min. FM: 6 μV input, modulated at 1 kc with 25-kc deviation, produces 21 dB (s plus n)/n min
300-kc Bandwidth	AM: 8 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 8 μV input, modulated at 1 kc with 100-kc deviation, produces 21 dB (s plus n)/n min
2- mc Bandwidth	AM: 22 μV input, modulated 50%, produces 10 dB (s plus n)/n min. FM: 24 μV input, modulated at 1 kc with 750 -kc deviation, produces 21 dB (s plus n)/n min
Band A and Band B Output Stability	
20/75/300-kc Bandwidths	AM: Output varies less than 3 dB for input range of 2 to 10,000 μV. FM: Output varies less than 2 dB for input range of 1.5 to 10,000 μV.
2-mc Bandwidth	AM: Output varies less than 4 dB for input range of 4 to 10,000 μV. FM: Output varies less than 4 dB for input range of 4 to 10,000 μV.
Band C and Band D Output Stability	
20/75/300-kc Bandwidths	AM: Output varies less than 4 dB for input range of 4 to 10,000 μV. FM: Output varies less than 2 dB for input range of 3 to 10,000 μV
2-mc Bandwidth	AM: Output varies less than 4 dB for input range of 8 to 10,000 μV. FM: Output varies less than 4 dB for input range of 8 to 10,000 μV

Table 7-1. Type RS-111-1B-12A Receiving System, Specifications (Continued)

Outputs from 20/75/300-kc Bandwidth	
Audio Amplifier Response	Within 3 dB from 100 cps to 20 kc
Audio Output Power	0.1 watt, min, into 600-ohm load, balanced or unbalanced
Video Amplifier Response	Within 3 dB from 50 cps to 150 kc
Video Output Level	0.2 volt, rms, across a 93-ohm load
Narrow Band AM Video Output	100 mV, rms across 1 MΩ unbalanced load
Outputs from 2-mc Bandwidth	
FM Video Amplifier Response	Within 3 dB from dc to 1 mc
AM Video Amplifier Response	Within 3 dB from 30 cps to 1 mc
FM Video Output Level	0.7 volt rms across a 93 Ω load
AM Video Output Level	0.7 volt rms across a 93 Ω load
Fine Tuning	Operates on all bands
Beat Frequency Oscillator	Operates in CW mode on either 20, 75, 0r 300-kc bandwidths
Meter	Signal strength
Local Oscillator Outputs	A) 50 mV min into 50 ohm load, each band. This output is band split for operation with a DRO-309A or similar series counter. Split is 30-300 mc combined on one connector designated "30-300 mc, (Counter)" and 235-1000 mc combined on another connector designated "235-1000 mc (Counter)." B) 20 mV ±10 mV into 50 ohm load, each band. This output is completely separate from those outputs referred to in "A." All local oscillator 2nd harmonics are supressed 20 dB or greater on these outputs.
Frequency Display Section	
Sweep Linearity	Within 5% of sweep width
Sweep Width	Continuously adjustable from 0 to 3 mc
Sensitivity for Full Deflection	2.5 μV input to receiver
Resolution	Using approximately 100-kc sweep width, two signals 20 kc apart will be displayed with at least 6-dB valley between the peaks
External Equipment Control Outputs:	
Counter Control	Provides preset control for DRO-309A series equipment
ND-210/260 Control	Provides band switching information for use with Rohde-Schwarz ND-210/260 equipment
Power Input	115/220# volts ac, 48-420 cps
Power Consumption	45 watts, approximately
Weight	35 lbs, approximately
Size	5.25 inches high x 19 inches wide x 14.7 inches deep*

\# 115/230 volts with internal wiring change

* Measured from back of front panel to rear panel

7.1 ELECTRICAL CHARACTERISTICS

With the exception of the local oscillator outputs and the fine tuning range of the four tuners, the RS-111-1B-12A performance is identical to RS-111-1B-12B performance. To obtain these new performance characteristics, however, seven assemblies and the main chassis of the basic -12B receiver were changed; they are summarized below.

a. Each oscillator stage of the four tuners has been slightly modified and new type numbers assigned.

b. The oscillator output of each tuner is connected to a new power splitter assembly, A13, which routes the signal to two of four outputs.

c. A new afc/dafc board, A16, is used. DAFC mode 2 of the DRO-309A series counters must be used with the dash 12A. The associated fine tuning and bfo tuning networks also are changed.

d. Power supply regulator board A12 is a new type.

e. A portion of the RANGE MC switch is wired to a new multipin control jack, J26, on the rear panel.

7.2 MECHANICAL CHARACTERISTICS

This receiver is mechanically similar to the RS-111-1B-12B except that a new rear-panel layout is used which accommodates two additional BNC jacks and a seven-pin Deutsch connector.

7.3 CIRCUIT DESCRIPTIONS

Information in these paragraphs, for the most part, pertains to minor differences in the various assemblies and circuit boards. The three exceptions to this are the complete circuit description for the power supply regulator board, A12; the power splitter assembly, A13; and the afc/dafc circuit board, A16.

7.3.1 Type 71382 30-60 MC Tuner (A1). - The schematic diagram for this assembly is Figure 7-20. This tuner is the same as the tuner described in paragraph 2.3 except for varactor CR1 in the oscillator stage. This diode is changed to a new type to provide the required dafc characteristic.

7.3.2 Type 71383 60-300 MC RF Tuner (A2). - The schematic diagram for this assembly is Figure 7-21. This tuner is the same as the tuner described in paragraph 2.4 except for two items. Varactor CR1 in the oscillator stage is changed to a new type to provide the required dafc characteristic and a ferrite bead is added to a zener diode lead to reduce noise.

7.3.3 Type 71380 235-500 MC Tuner (A3). - The schematic diagram for this assembly is Figure 7-22. This tuner is the same as the tuner described in paragraph 2.5 except for three changes involving capacitors in the oscillator stage. A capacitor to ground was deleted from the junction of L3F and C36. Capacitor C36 was changed in value as was C46 at the LO output, J3. Some reference designations also differ.

7.3.4 Type 71381 490-1000 MC RF Tuner (A4). - The schematic diagram for this assembly is Figure 7-23. This tuner is the same as the tuner described in paragraph 2.6 except for changes in the oscillator stage. Varactor CR3 and inductor L18 now provide for fine frequency adjustments in place of a 0.27 pF capacitor previously used. As a part of that change, R4 was decreased in value to 4.7 kΩ. At LO output J3, an inductor was replaced with a capacitor, C11.

7.3.5 Type 76237 Power Supply Regulator (A12). - The schematic diagram for this circuit board is Figure 7-24.

7.3.5.1 Negative 24 volts is provided by stage Q2. This stage obtains its voltage from diode module U4. A volgage divider made up of R3, R5, and voltage regulator diode VR1 provides negative 24 volts at the base of Q1. Regulated voltage at the emitter is 0.2 volts less negative than the base voltage. If excessive current is drawn, the voltage drop across R6 combines with the 0.2 volt base-emitter drop and forward biases diode CR2. This diode, being forward biased, represents a low impedance source which supplies a turn-off voltage to the base.

7.3.5.2 Positive 24 volts is supplied by stages Q1, Q3, and Q4. Note that these stages also provide current for stage Q5 which is the positive 12 volt output. That stage is described in the next paragraph. Positive voltage from diode module U4 is partially filtered by an external capacitor connected to pin 3. A divider network made up of R2, R4, CR1, CR3, and voltage regulator diode VR2 establish 25.2 volts at the base of Q1. The emitter of Q1, them, is 24.6 volts. This is also the base voltage of Q3 and Q4. The 0.6 volt base-emitter drop of Q3 and Q4 establishes 24 volts at the positive 24 volt output, pin 11. If excessive current is drawn from Q3 and Q4, the voltage drop across R7-R8 forward biases CR4 which pulls the base of Q1 low, thereby turning it off.

7.3.5.3 Positive 12 volts at module pin 13 is provided by stage Q5. This stage obtains its operating current from Q3 and Q4, which is also the positive 24 volt output. A voltage divider consisting of R10, R11, CR5, and VR3 establish 12.6 volts at the base of Q5. This transistor, in conjunction with R9, drops the 24 volts to 12 volts which appears at module pin 13.

7.3.5.5 The remaining outputs of this regulator board are derived directly from diode rectifiers except for a 56 volt output at pin 7. For this output, 175 volts from the main chassis is applied to pin 12 and then regulated at 56 volts by R12 and VR4.

7.3.6 Type 791157 Power Splitter (A13). - The schematic diagram for this assembly is Figure 7-25. There are four inputs to the assembly — one for each of the local oscillator (LO) outputs of the tuners. There are also four outputs from the power splitter assembly. Two of these (J5 and J7) are counter outputs. Output J5 (30-300 mc) supplies only the LO output from the 30-60 mc tuner and the 60-300 mc tuner. Output J7 (235-1000 mc) supplies only the output from the 235-500 mc tuner and the 490-1000 mc tuner. The remaining two outputs (J6 and J8) are marker outputs. The output from J8 (490-1000 mc) consists of only the LO output from the 490-1000 mc tuner. The marker output from J6 (30-500 mc), however, receives LO output from either the 60-300 mc tuner or the 235-500 mc tuner — depending on which of the two tuners is selected. In addition, the output level of the counter outputs (J5 and J7) is a minimum of 50 mV into a 50 ohm load. The marker outputs (J6 and J8) have a nominal output of 20 mV into a 50 ohm load.

7.3.6.1 Diode Switching - Five diodes are used in the power splitter to route the local oscillator signals to the proper output jacks. These five diodes are switched by +24 volts and -24 volts which are applied to two control lines. The input terminals (no. 1 and no. 2) for these two lines are paralleled by external input wiring. Control voltage on these two paralleled lines, therefore, is always either positive or negative. Table 7-2 lists the diode status for the positive and negative control voltages. Positive voltage is supplied to the diodes except when the 235-500 mc tuner is selected. Only then is negative voltage supplied to the diodes.

Table 7-2. Power Splitter Diode Status

Diode	Control Line Voltage	
	+	-
CR1	On	Off
CR2	Off	On
CR3	On	Off
CR4	Off	On
CR5	On	Off

Note:

On = Conduction (Low Impedance)
Off = No Conduction (High Impedance)

7.3.6.2 When +24 volts is applied to control line number 1 at C1, the following situation occurs. Diode CR5 is forward biased with resistor R15 acting as a current limiter. The voltage at the junction of R15, CR4, and CR5 is then about +0.6 volts. Positive voltage applied through resistor R14 applies a high positive voltage to the cathode of diode CR4. Since the anode of CR4 is held at +0.6 volts the diode is reverse biased and, therefore, represents a high impedance. The positive voltage applied through R14 to the anode of diode CR3 forward biases this diode since its cathode is connected to ground through resistor R13.

7.3.6.3 When positive voltage is applied to control line number 2 at C2, the following situation occurs. The voltage applied to resistor R9 forms a voltage divider with resistor R24. These voltages at the junction of these two resistors is about one-half of the voltage applied at the input. This voltage reverse biases diode CR2 pro-

viding a very high impedance to ground. This diode, then, is effectively out of the circuit. The positive voltage applied through resistor R10 to the anode of diode CR1 establishes a forward bias condition for this diode. Resistor R10 limits the current through diode CR1 and a nominal 0.6 volt forward bias is developed across the diode. This forward biased diode represents a very low impedance in the circuit.

7.3.6.4 When a negative voltage is applied to control line number 1 at C1, the following situation occurs. Resistors R15 and R18 form a voltage divider. The voltage at the junction of the two is about one-half of the negative voltage applied at the input. This voltage reverse biases diode CR5 which makes it a high impedance and, therefore, effectively out of the circuit. Negative voltage applied through resistor R14 forward biases diode CR4 — since its anode is held at approximately one-half of the supply voltage. Resistor R14 limits the current through CR4 and a nominal 0.6 volt forward bias is maintained on the diode. Diode CR3 is reverse biased by the negative voltage and is effectively out of the circuit.

7.3.6.5 When a negative voltage is applied to control line number 2 at C2, the following situation occurs. Resistor R9 supplies negative voltage to the cathode of diode CR2. This forward biases the diode and it becomes a low impedance path to ground with current through the diode limited by resistor R9. The junction of resistor R9 and diode CR2 is held at -0.6 volts. Diode CR1 is reverse biased and, therefore, is effectively out of the circuit.

7.3.6.6 Signal Paths. - Input and output jacks on the power splitter are labeled according to the tuning range of the four related tuners. Power splitter circuits, however, process the local oscillator outputs of the tuners. For the 30-60 mc and 60-300 mc tuners, the local oscillator outputs are 21.4 mc higher in frequency than the tuner dial settings. Local oscillator outputs for the 235-500 mc and 490-1000 mc tuners are 60 mc higher in frequency than the tuner dial settings. For the purposes of the circuit description, the tuner dial frequency references will be maintained. The signal paths throughout this assembly, and the input and output jacks, are nominally 50 ohms.

Table 7-3. Local Oscillator Distribution

Tuners A1, A2, A3, A4		Power Splitter A13			
Tuned Freq. Range (MC)	LO Output Freq. Range (MC)	Input	Output	Output Freq. Range (MC)	Output Level
30 - 60	51.4 - 81.4	J1	J5	51.4 - 321.4	(50 mV, min)
60 - 300	81.4 - 321.4	J2	J6	51.4 - 560	(20 mV, nom)
235 - 500	295 - 560	J3	J7	295 - 1060	(50 mV, min)
490 - 1000	550 - 1060	J4	J8	550 - 1060	(20 mV, nom)

7.3.6.7 When either the 30-60 mc tuner or the 60-300 mc tuner is selected, local oscillator signal enters the power splitter at jack J1 or J2 respectively and is routed to power divider U1. This device as used here isolates the "C" and "D" ports from each other, but allows signals from either one of these two inputs to pass virtually unattenuated to output port "W". From this output, a portion of the signal is routed through impedance matching resistor R5 to counter output jack J5. The remainder of the signal is routed through two resistive T networks (R6, R6, and R11; and R19, R20, and R23) to marker output jack J6.

7.3.6.8 When the 235-500 mc tuner is selected, negative voltage is supplied to the two control lines. The local oscillator signal from this tuner enters the power splitter assembly at jack J3. The input network consists primarily of capacitor C11, the parallel combination of resistors R3 and R25, the parallel combination of resistors R16 and R27, resistor R17, and the parallel combination of capacitors C13 and C14. Capacitors C13 and C14 compensate for stray inductance inherent in the input stages, J3 and J4. A portion of the signal entering the input network at jack J3 is routed to marker output jack J6 by way of capacitor C9, diode CR4, capacitor C10, and the pi-network made up of resistors R19, R20, and R23. The other part of the signal from jack J3 is coupled through the four paralleled resistors (R28, R21, R29, and R30) to counter output jack J7.

7.3.6.9 When the 490-1000 mc tuner is selected, positive voltage is supplied to the two control lines. The local oscillator signal from this tuner enters the power splitter assembly at jack J4. The input network consists primarily of capacitor C12, the parallel combination of R4 and R26, the parallel combination of R16 and R27,

resistor R17, and the parallel combination of C13 and C14. Capacitors C13 and C14 compensate for stray inductance inherent in the J3 and J4 input stages. A part of the signal entering the input network at jack J4 is routed through the four paralleled resistors (R28, R21, R29, and R30) to counter output jack J7. The other part of the signal is routed to marker output jack J7. This path is through the parallel resonant network (inductor L6 and capacitor C15), through diode CR1, and through capacitor C8 to the output jack. The impedance characteristic of the parallel resonant network combines with the tuner local oscillator output characteristic. The composite of the two is an output response that is flatter than if the tuned network were not in the circuit.

7.3.7 Type 791209 AFC/DAFC Amplifier (A16). - The schematic diagram for this circuit board is Figure 7-26. The output of this board at E9 is applied to local oscillator stages in the four tuners to provide small frequency changes. This output voltage is a nominal positive 8 volts and typically varies from 2 to 16 volts. Input voltages to this board are applied at E1 and E2. Voltage at E1 is from the FINE TUNING and BFO TUNING potentiometers. With these two controls centered, the voltage at E1 is about minus 2.5 volts. The maximum range of this voltage is from minus 1.2 to minus 4.5 volts. There is no input to E2 unless one of the DRO-309A series counters is connected to the receiver. Be sure the counter rear panel DAFC switch is in mode 2. In that case the voltage is nominally zero volts and can vary in the range of plus 2.5 volts to minus 3 volts with dafc turned on. Assuming that no counter is connected to the receiver, minus 2.5 volts at E1 should establish the nominal 8 volts at the output, E9. Potentiometer R12 is adjusted for this condition. If the input at E1 becomes more negative the output of U1 becomes more positive. This turns Q1 on harder which causes the collector to become less positive. At the dafc input, E2, a positive going voltage will result in the same situation.

7.3.8 RS-111-1B-12A Main Chassis. - The schematic diagram for the main chassis is Figure 7-27. The FINE TUNING/BFO TUNING networks have been redesigned for compatability with the new afc/dafc board, A16. Also, two additional wafer portions of the RANGE MC switch, S1, are used. One portion (S1DW) controls the power splitter assembly and the other portion (S1CX) is for control of external equipment. The power line cord is detachable and a sealed line filter, FL1, has been added. Also, bypass capacitors have been added to the audio outputs, J10 and TB1, and to the wiring associated with rear panel connector J25.

7.4 INSTALLATION AND OPERATION

Procedures for the -12A are the same as those found in Section III of this manual except for the differences explained in these paragraphs.

7.4.1 Power Connection. - After setting the rear panel power switch to match the source voltage (115/220 Vac), check the fuse to be sure it is a 1 amp slow-blow for 115 volts or 1/2-amp slow-blow for 220 volts. If the internal wiring change is made for 230 volt operation, also use a 1/2-amp slow-blow fuse. After ensuring that the receiver is set up for operating power, install the removable line cord, W27, and proceed to operate the receiver.

7.4.2 Local Oscillator Outputs. - There are two pairs of local oscillator outputs. One pair (A13J5, A13J7) has a minimum output level of 50 mV into 50 ohms; the other pair (A13J6, A13J8) provides a nominal 20 mV into 50 ohms. Second harmonic suppression at the 20 mV outputs is a minimum of 20 dB. The four jacks are a TNC type: Amphenol No. 79775. They can be mated with an Amphenol No. 36925 connector. Table 7-3 summarizes the information pertaining to these outputs.

7.4.3 Range Switch. - Wafer S1CX of this switch controls the lines at jack J26 located on the rear panel. This multipin connector is for control of Rohde and Schwarz model ND 210/260 equipment.

7.5 MAINTENANCE

With exception of the test and alignment procedures presented in the following paragraphs, the maintenance information contained in Section IV of the manual is entirely applicable to the RS-111-1B-12A.

7.5.1 Type 71382 30-60 MC Tuner (A1). - Alignment for this tuner is the same as that presented in Section IV, with exception of paragraph 4.7.5.2 (oscillator alignment) which requires the following changes:

a. Connect the frequency counter to A13J5.

b. Add the following step: (9) Connect an rf voltmeter to A1J5 and tune from 30 to 60 mc. The level should be in the range of 160 to 320 mV. If it is not, change C44 to the next closest value to bring the level within the range.

-3 ~~to~~ + 3dbm

7.5.2 Type 71383 60-300 MC Tuner (A2). - Alignment for this tuner is the same as that presented in Section IV, with exception of paragraph 4.7.6.2 (oscillator alignment) which requires the following changes:

a. Connect the frequency counter to A13J5.

-3 to +3 dbm

b. Add the following step: (15) Connect an rf voltmeter to A2J4 and tune from 60 to 300 mc. The level should be in the range of 160 to 320 mV. If it is not, there are two adjustments. Reposition C22 closer to or farther away from the LO output jack, J4. The other adjustment is to reposition L12 closer to or farther away from adjustable capacitor C29.

7.5.3 Type 71380 235-500 MC Tuner (A3). - Alignment for this tuner is the same as that presented in Section IV, with exception of paragraph 4.7.7.2 (oscillator alignment) which requires the following changes:

a. Connect the frequency counter to A13J7.

0 to +6dbm

b. Add the following step: (13) Connect the rf voltmeter to A3J3 and tune from 235 to 500 mc. The level should be in the range of 225 to 445 mV. If it is not, adjust the physical positioning of R16 and recheck the level.

7.5.4 Type 71381 490-1000 MC Tuner (A4). - Alignment for this tuner is limited to the oscillator section. Make the following changes to paragraph 4.7.8.1.

a. Connect the frequency counter to A13J7.

0 to +6dbm

b. Add the following step: (9) Connect an rf voltmeter to A4J3 and tune from 490 to 1000 mc. The level should be in the range of 225 to 445 mV. If it is not, set the dial to 490 mc and reposition R1 and C11 for 225 mV output. Then recheck across the band for levels in the range of 225 to 445 mV.

7.5.6 Type 791157 Power Splitter, Performance Test and Alignment. - Steps in this sequence include both performance tests and alignment instructions for the power splitter. To make adjustments, the power splitter assembly must be removed from the main chassis. The test setup shown in Figure 7-1 assumes the assembly has been removed from the main chassis for these adjustments. However, if the power splitter assembly is being tested in the main chassis, connections to J1 through J4 must be made by removing their cables from the tuners and coupling into the cable ends. Also, with the assembly in the main chassis, the power supply is not required. To remove the assembly from the main chassis, first disconnect the cables to J1 through J4 and unsolder the wire to C1-C2. Then remove the four rear panel screws holding the assembly in place and lift it out. With the assembly out of the chassis, the test setup as it is shown in Figure 7-1 should be used. Terminations and adapters are available from the following manufacturers:

Termination: SMC Male, 51 Ω
Type 60-001-0101

(Manufacturer's Code 98291)
Sealectro Corporation
RF Component Division
225 Hoyt Street
Mamaroneck, New York 10543

Adapter: SMC female/SMC female
Type 50-072-0000

Adapter: BNC female/SMC male
Type 50-077-6801

Termination: TNC male, 50 Ω
Type 3101-6100

(Manufacturer's Code 26805)
Americon Microwave Industries
87 Rumford Avenue
Waltham, Massachusetts 02154

Adapter: BNC female/SMC female
Type 503

(Manufacturer's Code 19505)
Applied Engineering Products, Company
Division of Samarius, Inc.
26 East Main Street
Ansonia, Connecticut 06401

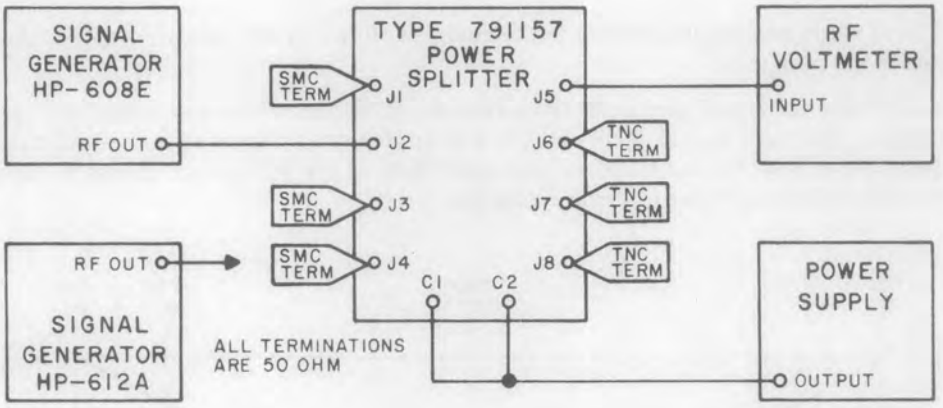


Figure 7-1. Test Setup, Power Splitter Test and Alignment

(1) Connect the equipment as shown in Figure 7-1, or use the alternate setup described in paragraph 7.5.6.

(2) Set the HP-608E to 321.4 mc at a level of -2 dBm.

(3) Connect the power supply for a positive 24 volts output or place the RANGE MC switch in the 30-60 position if the assembly is being tested within the unit.

(4) The rf voltmeter should indicate -12 dBm ±0.5 dB. If it does not, perform the following:

a. Adjust C4 for a peak indication the peak should be approximately -10 dBm.

b. Adjust C4 clockwise until the rf voltmeter indicates -12 dBm.

(5) Slowly tune the signal generator to 81.4 mc while observing the rf voltmeter. At no time should the meter indication be less than -13 dBm.

(6) Connect the rf voltmeter to J6 and terminate J5.

(7) Slowly tune the signal generator to 321.4 mc while observing the rf voltmeter. It should remain in the range of 10 to 30 mV.

(8) Connect the signal generator to J1 and terminate J2.

(9) Set the signal generator to 81.4 mc with the output level still at -2 dBm.

(10) Connect the rf voltmeter to J5 and terminate J6.

(11) Slowly tune the signal generator from 81.4 mc to 51.4 mc while observing the rf voltmeter. At no time should the meter indicate less than -13 dBm.

(12) Connect the rf voltmeter to J6 and terminate J5.

(13) Slowly tune the signal generator from 51.4 to 81.4 mc while observing the rf voltmeter. It should remain in the range of 10 to 30 mV.

(14) Disconnect the HP-608E from J1; then terminate J1.

(15) Connect the HP-612A signal generator to J4. Set the controls for a 1000 mc output at a level of 0 dBm.

(16) Connect the rf voltmeter to J7 and terminate J6.

(17) The rf voltmeter should indicate greater than -13 dBm. If it does not adjust C13 for a peak indication on the rf voltmeter.

(18) Slowly tune the signal generator to 550 mc while observing the rf voltmeter. At no time should the reading be less than -13 dBm.

(19) Retune the signal generator to 1060 mc.

(20) Connect the rf voltmeter to J8 and terminate J7.

(21) The rf voltmeter should indicate in the range of 10 to 15 mV. Record the level for use in the next step.

(22) Slowly tune the signal generator from 1060 mc to 550 mc while observing the rf voltmeter. The level should decrease 3 to 4 dB at 750 mc (referenced to the 1000 mc level recorded in step 21) and increase to greater than 10 mV at 550 mc. Refer to Figure 7-2 for an idealized drawing of these conditions.

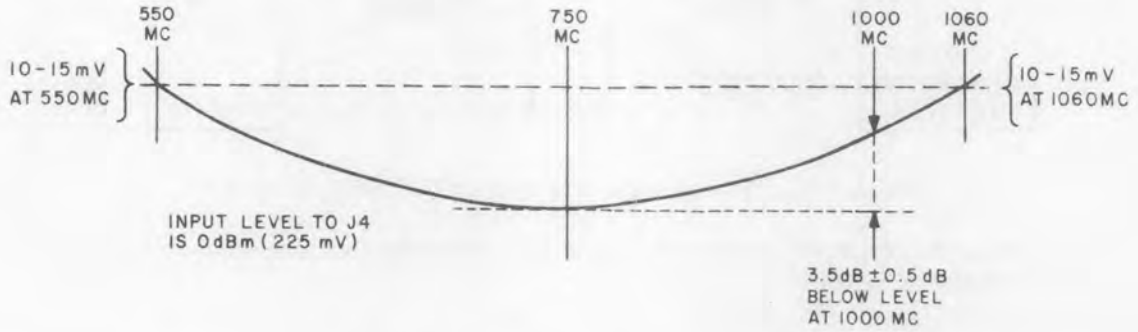


Figure 7-2. Response Sketch, Power Splitter Output J8

NOTE

If the conditions specified in step (22) are not met, adjust the turns spacing of L6 to improve the response while performing step (22) (this is a critical adjustment and should only be performed when absolutely necessary). Then repeat steps (16) through (22) until all of the required conditions are met.

(23) Connect the power supply for a minus 24 volts output or place the RANGE MC switch in the 235-500 position if the assembly is being tested within the unit.

(24) Connect the rf voltmeter to J7 and terminate J8.

(25) Connect the HP-612A signal generator to J3 and terminate J4. Set the generator to 560 mc at a level of 0 dBm.

(26) Slowly tune the generator to 450 mc while observing the rf voltmeter. At no time should the level be less than -13 dBm.

(27) Connect the HP-608E signal generator to J3. Set the frequency to 450 mc and the level to 0 dBm.

(28) Slowly tune the signal generator to 295 mc while observing the rf voltmeter. At no time should the level be less than -13 dBm.

(29) Connect the rf voltmeter to J6 and terminate J7.

(30) Slowly tune the signal generator from 295 mc to 450 mc while observing the rf voltmeter. It should remain in the range of 10 to 30 mV.

(31) Connect the HP-612A signal generator to J3. With its level at 0 dBm, slowly tune from 450 to 560 mc while observing the rf voltmeter. The voltmeter indication should remain in the range of 10 to 30 mV.

7.5.7 Type 791209 AFC/DAFC Amplifier (A16)/Tuners, Performance Test.

Figure 7-3
Figure 7-4
Table 7-4

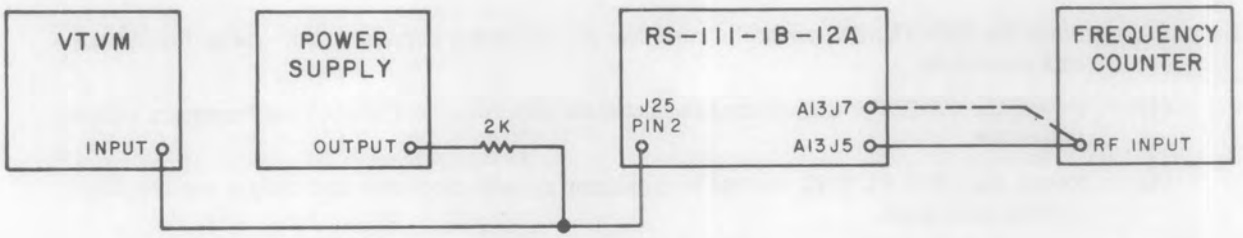


Figure 7-3. Test Setup, AFC/DAFC Range Performance Test

7.5.7.1 DAFC Tests. -

(1) Connect the equipment as shown in Figure 7-3.

(2) Set the receiver BFO TUNING and FINE TUNING controls to mid-range.

(3) For each tuner and related dial frequencies listed in Table 7-4, connect the power supply fot +4.0 volts and then -4.0 volts at J25 pin 2. Record the frequency counter indication at each voltage.

(4) The difference in the two readings should be at least the amount given in the afc/dafc column of Table 7-4.

Table 7-4. AFC/DAFC Ranges

Tuner	Dial Frequency (mc)	AFC/DAFC Range (kc)	LO Output
A	30	300	A13J5
	60	600	A13J5
B	60	200	A13J5
	200	400	A13J5
	300	500	A13J5
C	250	500	A13J7
	500	1000	A13J7
D	500	1000	A13J7
	700	700	A13J7
	1000	1000	A13J7

7.5.7.2 Fine Tuning Range/BFO Tuning Range Performance Test. -

The following test assures that the FINE TUNING control and the BFO TUNING control has sufficient range. Proceed as follows:

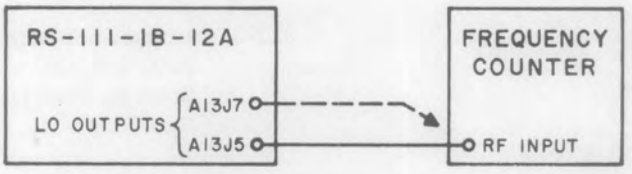


Figure 7-4. Test Setup, Fine Tuning Range

(1) Connect the equipment as shown in Figure 7-4.

(2) Set the receiver RANGE MC switch in the 30-60 position. Then set the related tuner dial to 30.

(3) Place the BFO TUNING control at mid-range. It should remain at mid-range throughout this procedure.

(4) Rotate the FINE TUNING control to maximum clockwise and record the frequency counter indication.

(5) Rotate the FINE TUNING control to maximum counterclockwise and record the frequency counter indication.

(6) Subtract the frequency recorded in step (5) from the frequency recorded in step (4).

(7) The difference should be at least 25 kc.

(8) Place the RANGE MC switch in the 60-300 position. Then set the related tuner dial to 60.

(9) Repeat steps (4) through (6). The difference should be at least 20 kc.

(10) Move the cable from A13J5 to A13J7.

(11) Place the RANGE MC switch in the 235-500 position. Then set the related tuner dial dial to 250.

(12) Repeat steps (4) through (6). The difference should be at least 50 kc.

(13) Place the RANGE MC switch in the 490-1000 position. Then set the related tuner dial to 500.

(14) Repeat steps (4) through (6). The difference should be at least 100 kc.

(15) To test the BFO Range, repeat steps (1) through (14) - except place the FINE TUNING control at mid-range and vary the BFO TUNING control. The difference for steps (7), (9), (12), and (14) should be 12 kc, 10 kc, 25 kc, and 100 kc respectively.

7.6 REPLACEMENT PARTS LIST AND SCHEMATIC DIAGRAMS

The following list of manufacturers, parts lists, and schematic diagrams are a supplement for the RS-111-1B-12A and are to be used in conjunction with Sections V and VI of this manual.

Mfr. Code	Name and Address
05245	Components Corporation 2857 North Halsted Street Chicago, Illinois 60657
07263	Fairchild Camera and Instrument Corp. Semiconductor Division 464 Ellis Street Mountain View, California 94040
13103	Thermalloy Company 8717 Diplomacy Row Dallas, Texas 75247
21912	Anzac Electronics Division of Adams-Russell Company, Inc. 39 Green Street Waltham, Massachusetts 02154
25088	Siemens America, Inc. 350 5th Avenue New York, New York 10001
28480	Hewlett Packard Company 1501 Page Mill Road Palo Alto, California 94304
91293	Johanson Manufacturing Company P.O. Box 329 Boonton, New Jersey 07005

7.6.1 Type RS-111-1B-12A Receiver, Main Chassis

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	30-60 MHz TUNER	1	71382	14632	
A2	60-300 MHz RF TUNER	1	71383	14632	
A3	235-500 MHz TUNER	1	71380	14632	
A4	490-1000 MHz TUNER	1	71381	14632	
A5	SIGNAL MONITOR	1	79358	14632	
A6	60-21.4 MHz CONVERTER	1	7120	14632	
A7	IF AMPLIFIER	1	72121	14632	
A8	IF AMPLIFIER	1	72120	14632	
A9	VIDEO AMPLIFIER	1	7312	14632	
A10	AUDIO AMPLIFIER	1	7400B	14632	
A11	POWER SUPPLY REGULATOR	1	7633	14632	
A12	POWER SUPPLY REGULATOR	1	76237	14632	
A13	POWER SPLITTER	1	791157	14632	
A14	NOT USED				
A15	AGC MONITOR AMPLIFIER	1	7836	14632	
A16	DAFC/AFC AMPLIFIER	1	791209	14632	
CR1	DIODE	1	1N753A	80131	04713
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM: 500 µF, -10+75%, 15V	1	34D507G015FJ4	56289	
C2	CAPACITOR, ELECTROLYTIC, ALUMINUM: 50 µF, -10+75%, 12V	1	30D506G012CB2	56289	
C3	CAPACITOR, ELECTROLYTIC, ALUMINUM: 40 µF-40 µF, -10+75%, 250/250V	1	TVL2520	56289	
C4	CAPACITOR, ELECTROLYTIC, ALUMINUM: 250 µF, -10+75%, 40V	1	34D257G040FL4	56289	
C5	CAPACITOR, ELECTROLYTIC, ALUMINUM: 1000 µF, -10+75%, 15V	1	34D108G015GL4	56289	
C6	NOT USED				
C7	NOT USED				
C8	CAPACITOR, CERAMIC, DISC: 0.01 µF, 20%, 500V	3	SM01UFM	91418	
C9	Same as C8				
C10	CAPACITOR, ELECTROLYTIC, TANTALUM: 100 µF, 20%, 35V	2	MTP107M035P1C	76055	
C11	Same as C10				
C12	Same as C8				
C13 Thru C25	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	13	FA5C102W	01121	
DS1	LAMP, INCANDESCENT	4	47	71744	

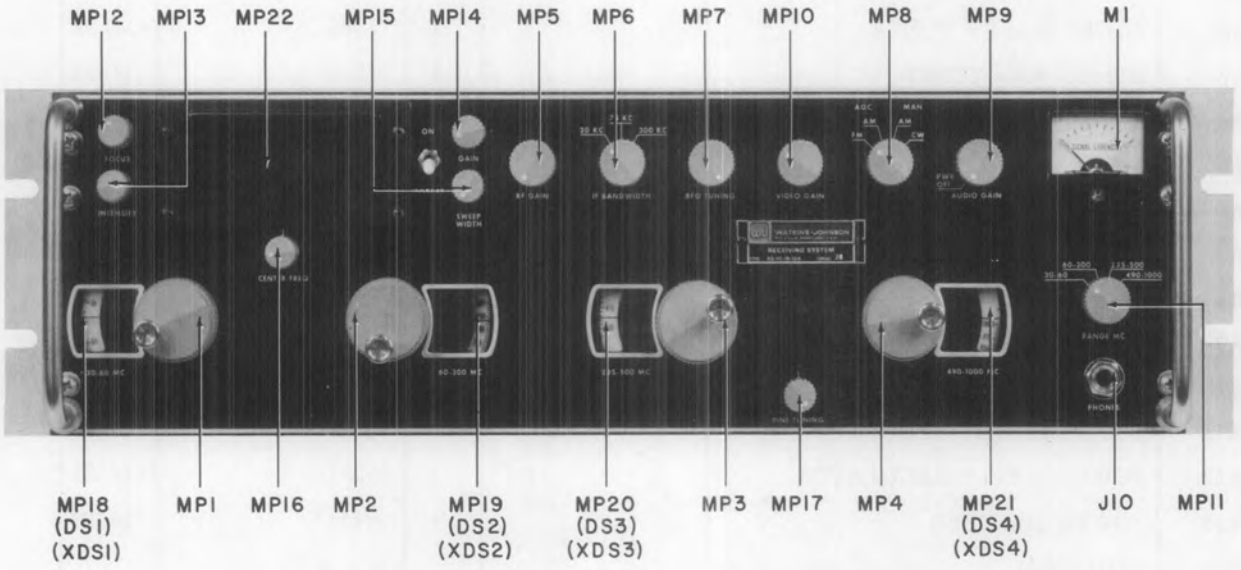


Figure 7-5. Type RS-111-1B-12A Receiving System, Front View, Location of Components

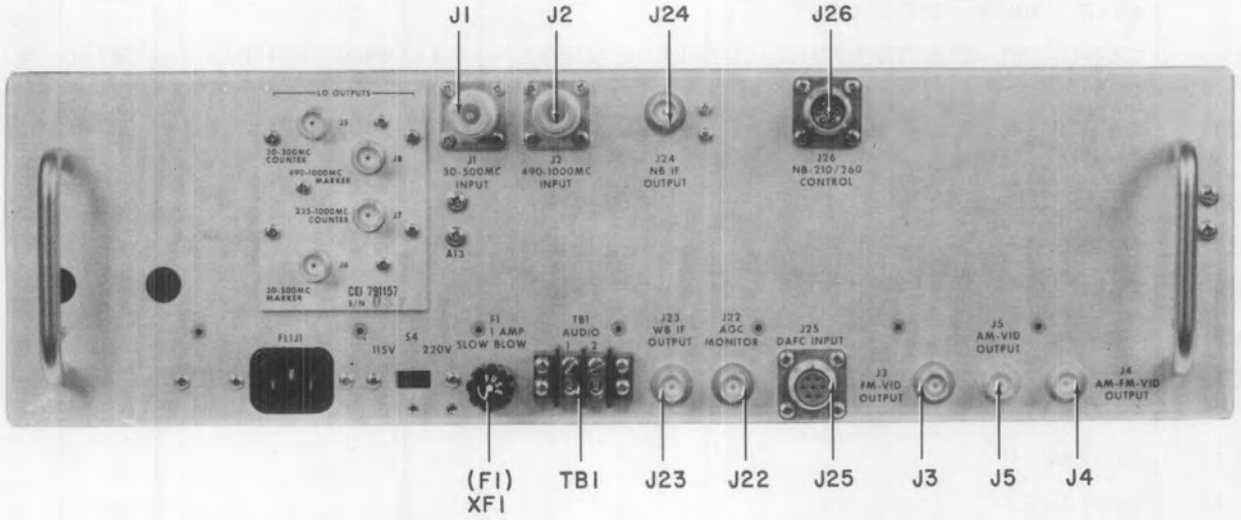


Figure 7-6. Type RS-111-1B-12A Receiving System, Rear View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
DS2	Same as DS1				
DS3	Same as DS1				
DS4	Same as DS1				
F1	FUSE, CARTRIDGE: 1 AMP, 3AG	1	MDL1	71400	
FL1	POWER LINE FILTER	1	1EF1	05245	
J1	CONNECTOR, RECEPTACLE	2	UG-1052/U	80058	74868
J2	Same as J1				
J3	CONNECTOR, RECEPTACLE	6	17825-1002	74868	
J4	Same as J3				
J5	Same as J3				
J6	CONNECTOR, RECEPTACLE	1	MRE14SG7	81312	
J7	CONNECTOR, RECEPTACLE	1	MRS18SG7	81312	
J8	CONNECTOR, RECEPTACLE	1	MRE7-2SG7	81312	
J9	CONNECTOR, RECEPTACLE	1	MRE9SG7	81312	
J10	JACK, TELEPHONE	1	L11	82389	
J11	CONNECTOR, RECEPTACLE Part of K1				
J12	CONNECTOR, RECEPTACLE Part of K1				
J13	CONNECTOR, RECEPTACLE Part of K1				
J14	CONNECTOR, RECEPTACLE Part of K2				
J15	CONNECTOR, RECEPTACLE Part of K2				
J16	CONNECTOR, RECEPTACLE Part of K2				
J17 Thru J21	NOT USED				
J22	Same as J3				
J23	Same as J3				
J24	Same as J3				
J25	CONNECTOR, RECEPTACLE	1	DS00-7S	11139	
J26	CONNECTOR, RECEPTACLE	1	DS00-7P	11139	
J27	CONNECTOR, RECEPTACLE Part of W27				
K1	RELAY, COAXIAL	2	318-10382-3	74868	
K2	Same as K1				
M1	METER, SIGNAL STRENGTH	1	1632-1	14632	
MP1 Thru MP4	CRANK ASSEMBLY	4	1914-1	14632	

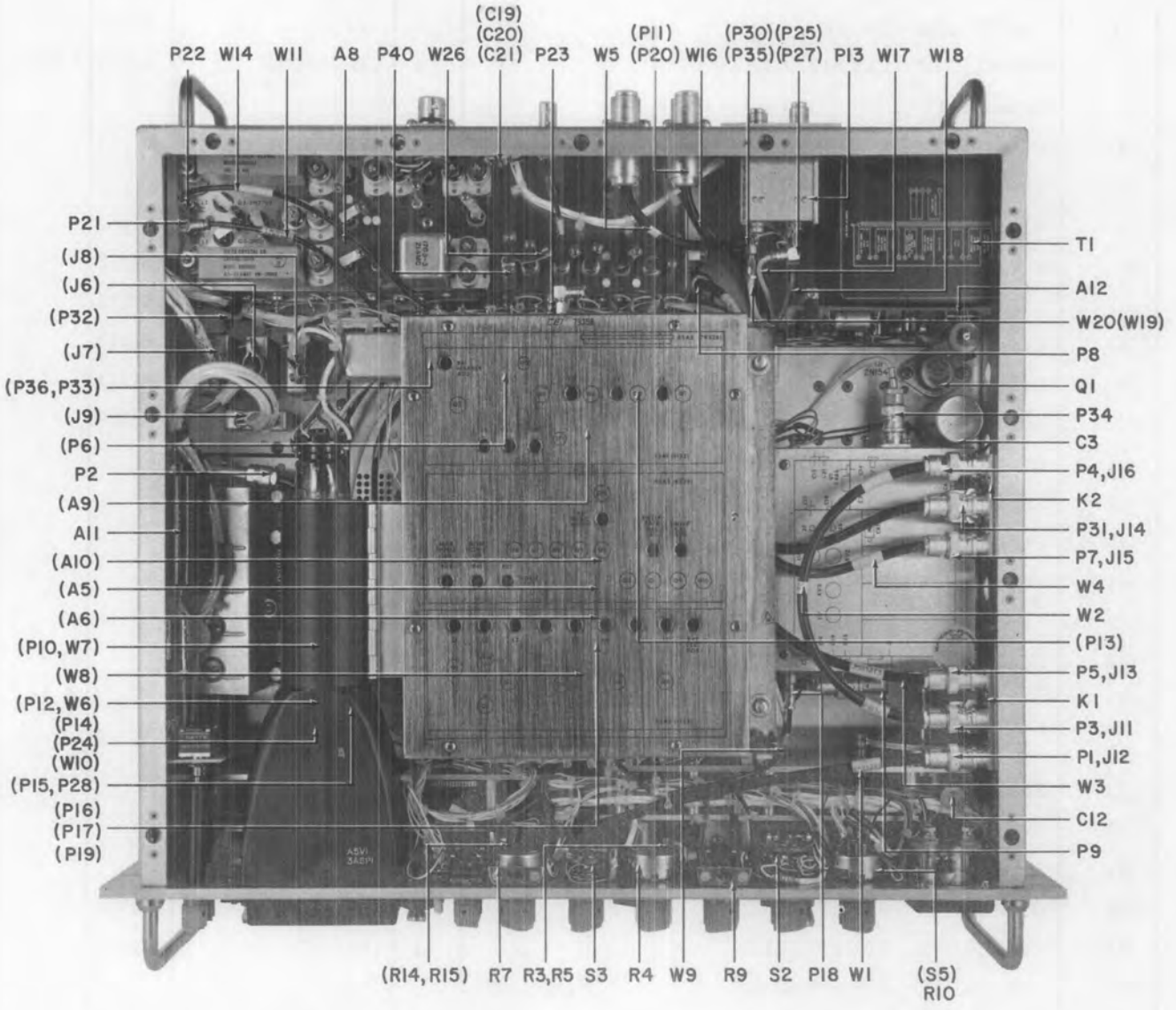


Figure 7-7. Type RS-111-1B-12A Receiving System, Top View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
MP5 Thru MP9	KNOB	6	1073-1	14632	
MP10	KNOB	1	1073-2	14632	
MP11	Same as MP5				
MP12 Thru MP17	KNOB	6	1073-6	14632	
MP18 Thru MP21	WINDOW	4	1052-1	14632	
MP22	FILTER, CRT	1	1662-1	14632	
P1	CONNECTOR, PLUG	12	UG-88/U	80058	74868
P2	CONNECTOR, PLUG	2	UG-913A/U	80058	74868
P3	Same as P1				
P4	Same as P1				
P5	Same as P1				
P6	Same as P1				
P7	Same as P1				
P8	Same as P1				
P9	Same as P1				
P10	CONNECTOR, PLUG	12	UG-1466/U	80058	74868
P11	Same as P10				
P12	Same as P10				
P13	CONNECTOR, PLUG	10	UG-1465/U	80058	74868
P14	Same as P13				
P15	Same as P13				
P16	Same as P10				
P17	Same as P13				
P18	Same as P13				
P19	Same as P13				
P20	Same as P10				
P21	Same as P10				
P22	Same as P13				
P23	Same as P10				
P24	Same as P1				
P25	Same as P10				
P26	NOT USED				

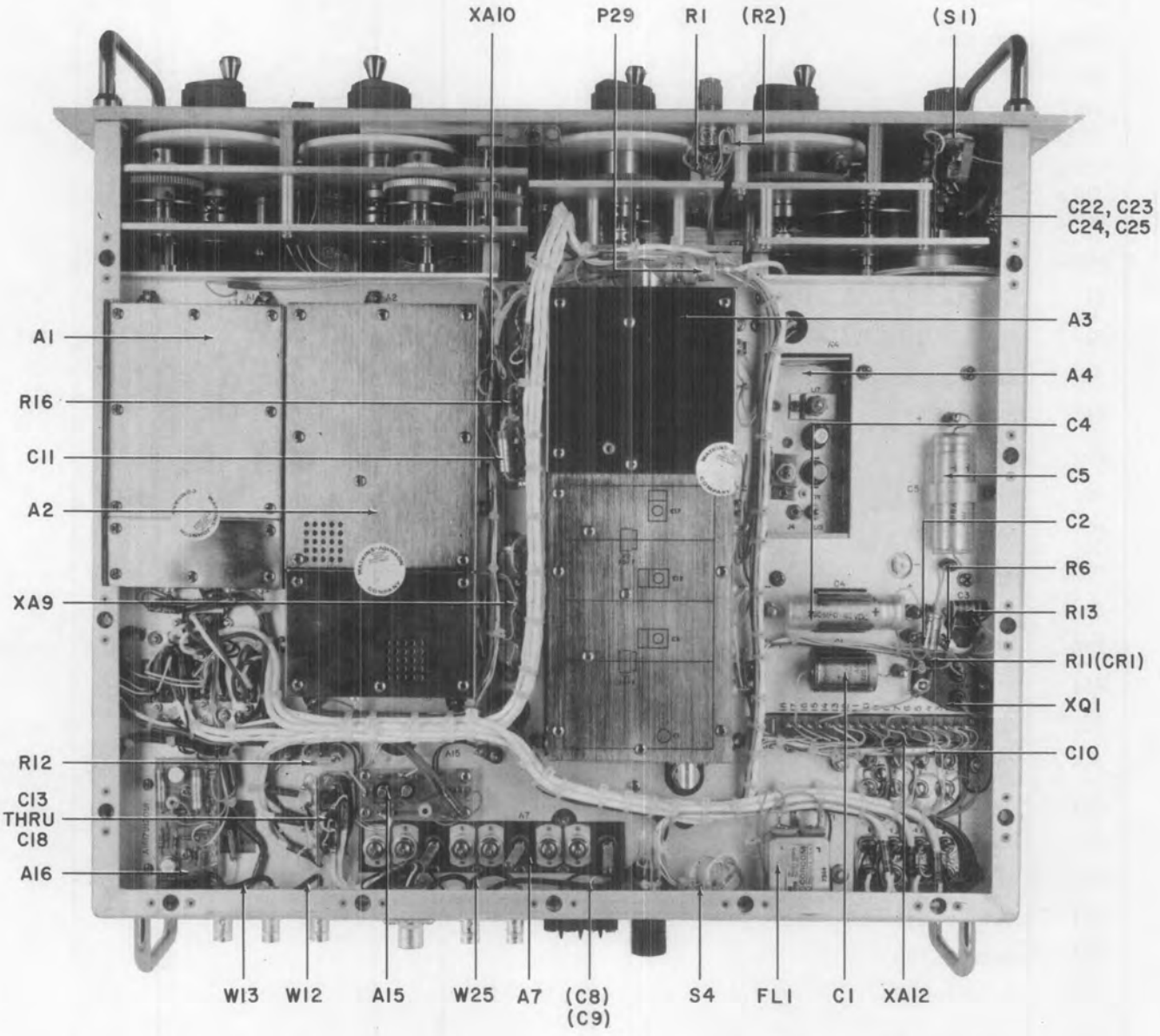


Figure 7-8. Type RS-111-1B-12A Receiving System, Bottom View, Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
P27	Same as P10				
P28	Same as P1				
P29	Same as P1				
P30	Same as P13				
P31	Same as P1				
P32	Same as P10				
P33	Same as P10				
P34	Same as P2				
P35	Same as P13				
P36	Same as P10				
P37	NOT USED				
P38	NOT USED				
P39	NOT USED				
P40	Same as P13				
P41	CONNECTOR Part of W27				
Q1	TRANSISTOR	1	2N1544	80131	04713
R1	RESISTOR, FIXED, COMPOSITION: 510 Ω, 5%, 1/4W	1	RCR07G511JS	81349	01121
R2	RESISTOR, VARIABLE, COMPOSITION: 1 kΩ, 10%, 1/2W	1	RV6NAYSD102A	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	1	RCR07G562JS	81349	01121
R4	RESISTOR, VARIABLE, COMPOSITION: 5 kΩ, 10%, 2W	1	RV4NAYSD502A	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 1.8 kΩ, 5%, 1/4W	1	RCR07G182JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	2	RCR07G151JS	81349	01121
R7	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1W	1	RV4NAYSD103C	81349	01121
R8	NOT USED				
R9	RESISTOR, VARIABLE, COMPOSITION: 10 kΩ, 10%, 1W	1	70A3N056L103U	01121	
R10	RESISTOR, VARIABLE, COMPOSITION: 100 kΩ, 10%, 2W	1	RV4NBYSD104A	81349	01121
R11	Same as R6				
R12	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 2W	1	RCR42G471JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 62 kΩ, 5%, 1/4W	1	RCR07G623JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
S1	SWITCH, ROTARY	1	1128-55	14632	

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
S2	SWITCH, ROTARY	1	1128-03	14632	
S3	SWITCH, ROTARY	1	1128-22	14632	
S4	SWITCH, SLIDE	1	46256LFR	82389	
S5	SWITCH Part of R10				
TB1	TERMINAL BOARD	1	353-18-02-001	71785	
T1	TRANSFORMER, POWER	1	10775	14632	
W1	CABLE ASSEMBLY	1	2126-235	14632	
W2	CABLE ASSEMBLY	1	2126-236	14632	
W3	CABLE ASSEMBLY	1	2126-237	14632	
W4	CABLE ASSEMBLY	1	2126-238	14632	
W5	CABLE ASSEMBLY	1	2126-239	14632	
W6	CABLE ASSEMBLY	1	2126-240	14632	
W7	CABLE ASSEMBLY	1	2126-241	14632	
W8	CABLE ASSEMBLY	1	2126-242	14632	
W9	CABLE ASSEMBLY	1	2126-243	14632	
W10	CABLE ASSEMBLY	1	2126-244	14632	
W11	CABLE ASSEMBLY	1	2126-245	14632	
W12	CABLE ASSEMBLY	1	2126-246	14632	
W13	CABLE ASSEMBLY	1	2126-247	14632	
W14	CABLE ASSEMBLY	1	2126-248	14632	
W15	NOT USED				
W16	CABLE ASSEMBLY	1	2126-249	14632	
W17	CABLE ASSEMBLY	1	30020-1991	14632	
W18	CABLE ASSEMBLY	1	30020-1992	14632	
W19	CABLE ASSEMBLY	1	30020-1993	14632	
W20	CABLE ASSEMBLY	1	30020-1994	14632	
W21	NOT USED				
W22	NOT USED				
W23	NOT USED				
W24	NOT USED				
W25	CABLE ASSEMBLY	1	30020-1130	14632	
W26	CABLE ASSEMBLY	1	30020-1131	14632	
W27	LINE CORD	1	80-1245	05245	
XA9	CONNECTOR, PRINTED CIRCUIT CARD	1	00-5002-008-103-002	91662	
XA10	CONNECTOR, PRINTED CIRCUIT CARD	1	00-5002-013-103-002	91662	

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
XA12	CONNECTOR, PRINTED CIRCUIT CARD	1	00-5006-018-189-005	91662	
XDS1	LAMPHOLDER	4	7-02	95263	
XDS2	Same as XDS1				
XDS3	Same as XDS1				
XDS4	Same as XDS1				
XF1	FUSEHOLDER	1	342004	75915	
XQ1	SOCKET, TRANSISTOR	1	8038-1G1	91506	
	Accessory Items Furnished With Equipment:				
--	CABLE	1	16653	14632	
--	ANTENNA	1	2830	14632	
--	CONNECTOR, RECEPTACLE	1	DS07-7S059	11139	

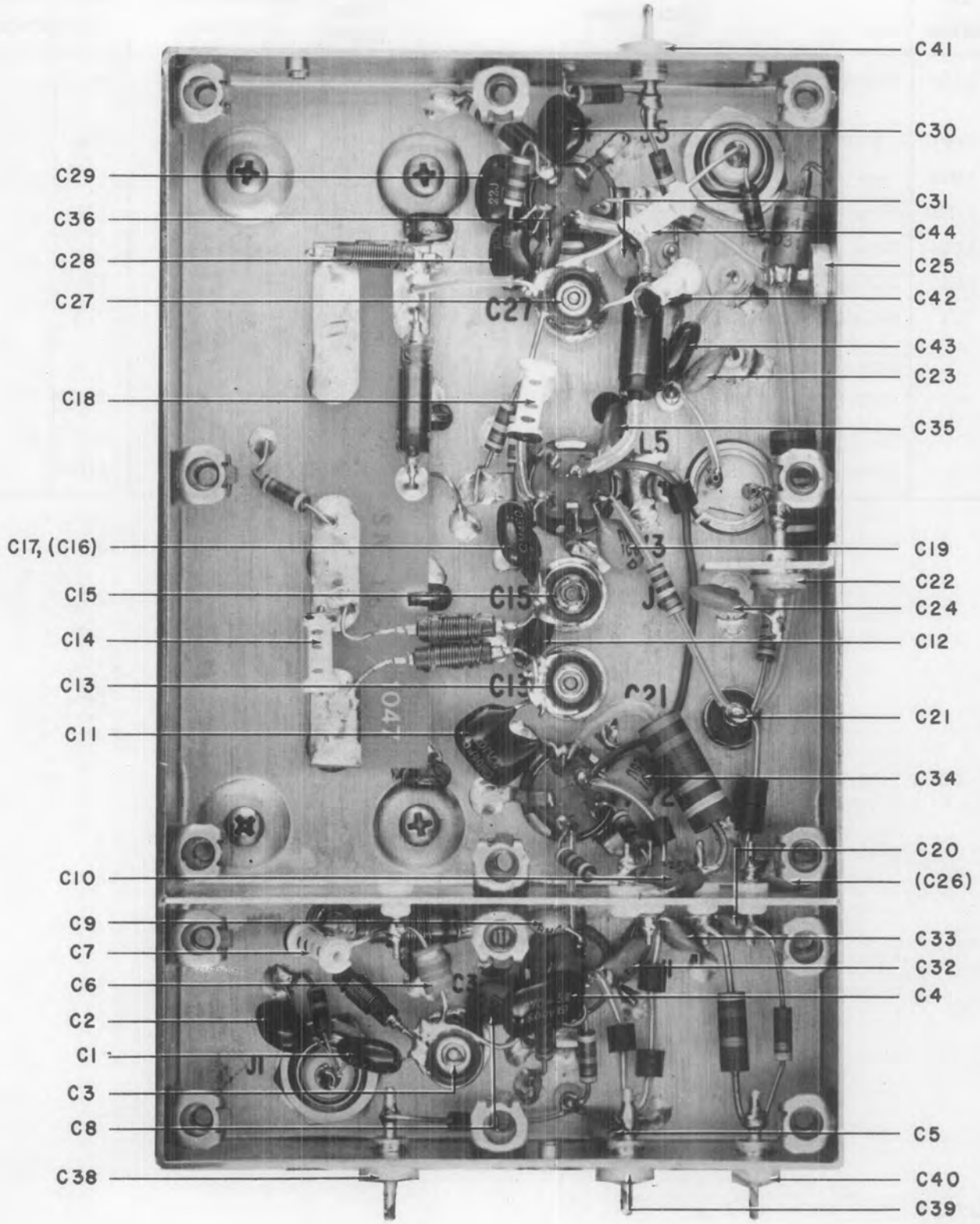


Figure 7-9. Type 71382 30-60 MC Tuner (A1), Location of Components

7.6.2 Type 71382 30-60 MHz Tuner

REF. DESIGNATION PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	BB109	25088	
C1	CAPACITOR, MICA, DIPPED: 15 pF, 5%, 500V	1	CM04CD150J03	81349	72136
C2	CAPACITOR, MICA, DIPPED: 22 pF, 5%, 500V	2	CM04ED220J03	81349	72136
C3	CAPACITOR, VARIABLE, GLASS: 0.7-9 pF, 750V	4	VC26G	73899	
C4	CAPACITOR, MICA, DIPPED: 270 pF, 5%, 500V	2	CM05FD271J03	81349	72136
C5	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	15	SM1000PFP	91418	
C6	CAPACITOR, COMPOSITION, TUBULAR: 0.33 pF, 10%, 500V	1	QC0.33PFK	95121	
C7	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C8	Same as C5				
C9	Same as C5				
C10	Same as C5				
C11	Same as C4				
C12	CAPACITOR, MICA, DIPPED: 18 pF, 5%, 500V	1	CM04CD180J03	81349	72136
C13	Same as C3				
C14	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF ±0.25 pF, 500V	1	301-000C0J0-229C	72982	
C15	Same as C3				
C16	CAPACITOR, MICA, DIPPED: 12 pF, 5%, 500V	2	CM04CD120J03	81349	72136
C17	CAPACITOR, MICA, DIPPED: 47 pF, 5%, 500V	1	CM04ED470J03	81349	72136
C18	CAPACITOR, CERAMIC, TUBULAR: 1.2 pF ±0.25 pF, 500V	1	301-000C0K0-129C	72982	
C19	Same as C5				
C20	Same as C5				
C21	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	2	SS5D102W	01121	
C22	CAPACITOR, CERAMIC, FEEDTHRU: 330 pF, 10%, 500V	1	FA5C3311	01121	
C23	Same as C5				
C24	Same as C5				
C25	Same as C21				
C26	Same as C5				
C27	Same as C3				
C28	CAPACITOR, MICA, DIPPED: 10 pF, ±0.5 pF, 500V	2	CM04CD100D03	81349	72136
C29	Same as C2				
C30	Same as C28				
C31	Same as C5				

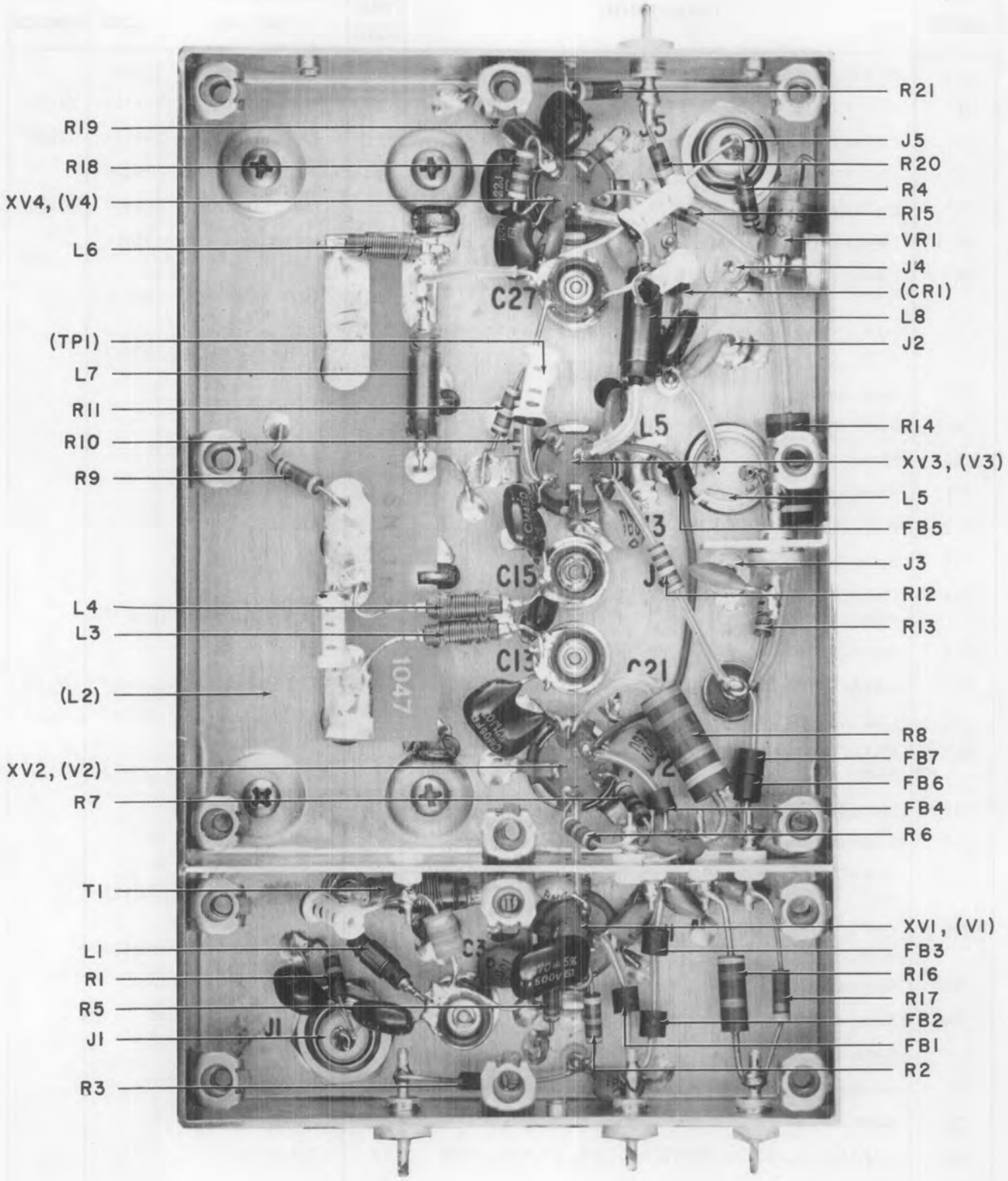


Figure 7-10. Type 71382 30-60 MC Tuner (A1), Location of Components

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C32	Same as C5				
C33	Same as C5				
C34	Same as C5				
C35	Same as C5				
C36	Same as C5				
C37	NOT USED				
C38	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	4	FA5C102W	01121	
C39	Same as C38				
C40	Same as C38				
C41	Same as C38				
C42	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF ±0.25 pF, 500V	1	301-000C0J0-249C	72982	
C43	Same as C16				
C44*	CAPACITOR, CERAMIC, TUBULAR: 2.4 pF ±0.25 pF, 500V	1	301-000C0J0-249C	72982	
FB1 Thru FB7	FERRITE BEAD	7	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	2	UG-1094/U	80058	74868
J2	CONNECTOR, RECEPTACLE	3	10-0104-002	19505	
J3	Same as J2				
J4	Same as J2				
J5	Same as J1				
L1	COIL, FIXED	3	1131-06	14632	
L2	INDUCTUNER	1	2026-1	14632	
L3	Same as L1				
L4	Same as L1				
L5	COIL, VARIABLE: 1.7-3.5 μH	1	1472-3	14632	
L6	COIL, FIXED	1	1131-07	14632	
L7	COIL, FIXED	1	1131-08	14632	
L8	COIL, FIXED: 3.3 μH, 10%	1	211-11	99848	
MP1	COVER	1	1051-1	14632	
MP2	COVER	1	2009-3	14632	
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	3	RCR07G473JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 270 kΩ, 5%, 1/4W	1	RCR07G274JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121

* Nominal value. Final value factory selected.

REF. DESIGNATION PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R5	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	1	RCR07G151JS	81349	01121
R6	Same as R2				
R7	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1W	1	RCR32G682JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	RCR07G472JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	RCR07G474JS	81349	01121
R11	Same as R10				
R12	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	1	RCR07G102JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/2W	1	RCR20G472JS	81349	01121
R17	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	RCR07G222JS	81349	01121
R18	Same as R2				
R19	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR20G223JS	81349	01121
R20	Same as R1				
R21	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	1	RCR07G155JS	81349	01121
TP1	JACK, TIP	1	TJ6	04013	
T1	TRANSFORMER	1	1134	14632	
VR1	DIODE	1	1N3044B	80131	04713
V1	ELECTRON TUBE	3	6CW4	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	Same as V1				
XV1	SOCKET, NUVISTOR	4	133-65-10-001	71785	
XV2	Same as XV1				
XV3	Same as XV1				
XV4	Same as XV1				

7.6.3 Type 71383 60-300 MHz Tuner

REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	BB109	25088	
C1	CAPACITOR, CERAMIC, TUBULAR: 5.6 pF ±0.25 pF, 500V	1	301-000C0H0-569C	72982	
C2	CAPACITOR, CERAMIC, TUBULAR: 8.2 pF ±0.5 pF, 500V	1	301-000C0H0-829D	72982	
C3	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF ±0.25 pF, 500V	4	301-000C0K0-109C	72982	
C4	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF ±0.5 pF, 500V	1	301-000C0H0-629D	72982	
C5	CAPACITOR, VARIABLE, CERAMIC: 0.5-4.5 pF, 500V	1	CST6	71279	
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	4	SS5D102W	01121	
C7	CAPACITOR, MICA, DIPPED: 510 pF, 5%, 500V	1	DM15-511J	72136	
C8	Same as C6				
C9	CAPACITOR, COMPOSITION, TUBULAR: 0.47 pF, 10%, 500V	1	QC0.47PFK	95121	
C10	NOT USED				
C11	CAPACITOR, VARIABLE, GLASS: 0.7-9 pF, 750V	4	VC26G	73899	
C12	CAPACITOR, CERAMIC, TUBULAR: 47 pF, 5%, 500V	2	308-000C0G0-470J	72982	
C13	Same as C12				
C14	Same as C3				
C15	Same as C11				
C16	Same as C3				
C17*	CAPACITOR, COMPOSITION, TUBULAR: 0.22 pF, 10%, 500V	1	QC0.22PFK	95121	
C18	Same as C11				
C19	CAPACITOR, CERAMIC, TUBULAR: 5.1 pF ±0.5 pF, 500V	1	301-000C0H0-519D	72982	
C20	Same as C3				
C21	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM1000PFP	91418	
C22	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C23*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF ±0.25 pF, 500V	1	301-000C0J0-279C	72982	
C24	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	6	FA5C102W	01121	
C25	NOT USED				
C26*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF ±0.25 pF, 500V	1	301-000T2J0-279C	72982	

* Nominal Value. Final value factory selected.

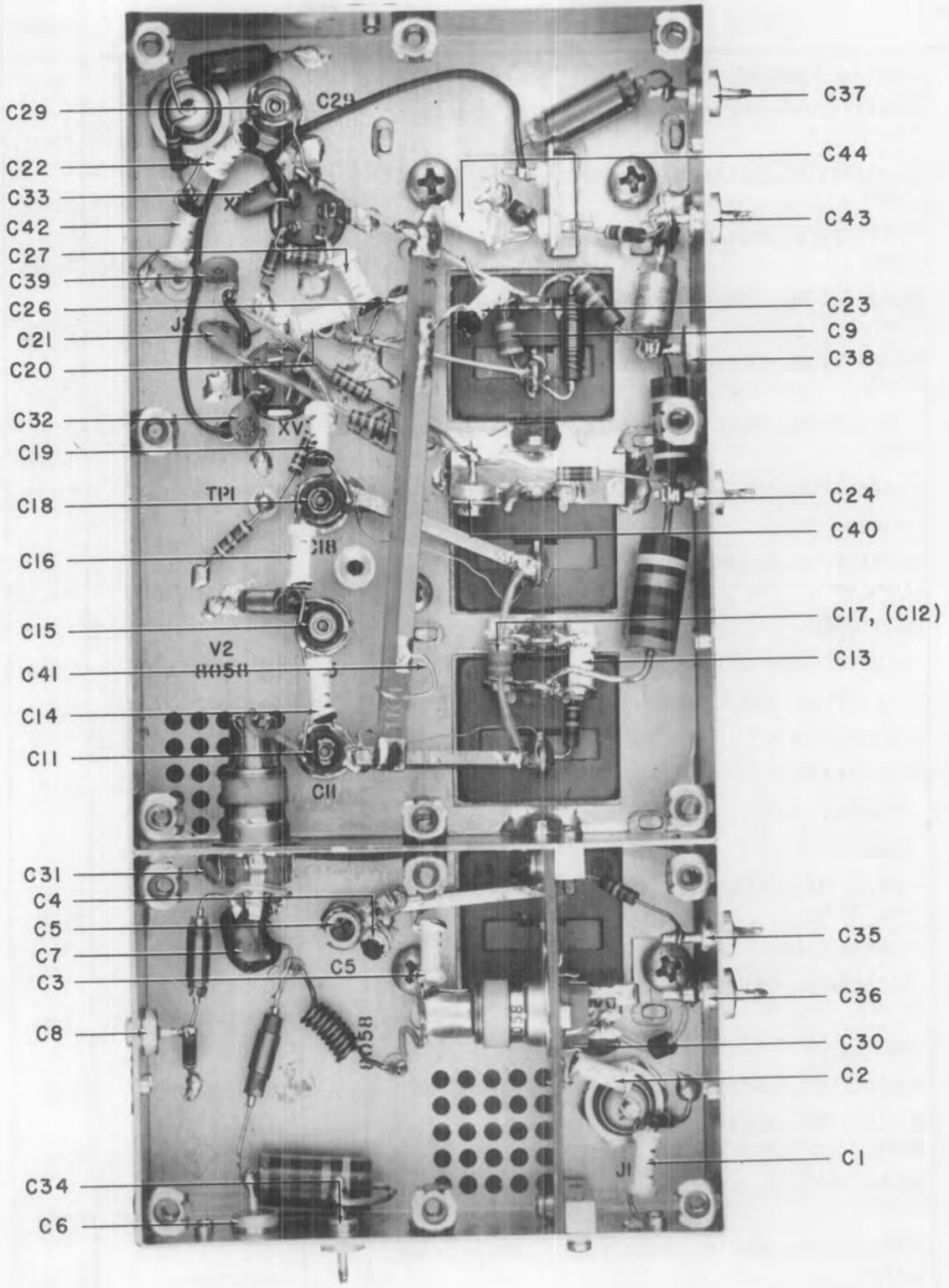


Figure 7-11. Type 71383 60-300 MC Tuner (A2), Location of Components

REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C27	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±0.25 pF, 500V	1	301-000C0J0-339C	72982	
C28	NOT USED				
C29	Same as C11				
C30	Same as C21				
C31	Same as C21				
C32	Same as C21				
C33	Same as C21				
C34	Same as C24				
C35	Same as C24				
C36	Same as C24				
C37	Same as C24				
C38	Sameas C6				
C39	Same as C21				
C40	Same as C6				
C41	PART OF CIRCUIT BOARD				
C42	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±0.25 pF, 500V	1	301-000C0H0-479C	72982	
C43	Same as C24				
C44*	CAPACITOR, CERAMIC, TUBULAR: 3.6 pF, ±0.25 pF, 500V	1	301-000C0J0-369C	72982	
FB1	FERRITE BEAD	2	56-590-65-4A	02114	
FB2	Same as FB1				
J1	CONNECTOR, RECEPTACLE	2	UG-1094/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	NOT USED				
J4	Same as J1				
L1	INDUCTUNER	1	2027-3	14632	
L2	INDUCTOR	1	10167	14632	
L3	COIL, FIXED	1	1129-01	14632	
L4	COIL, FIXED	1	1131-36	14632	
L5	COIL, FIXED	1	1131-1	14632	
L6	INDUCTOR	1	10166	14632	
L7	COIL, FIXED	1	1131-2	14632	
L8	INDUCTOR	1	1200-2	14632	
L9	COIL, FIXED	1	1131-27	14632	
L10	INDUCTOR	1	1107-2	14632	

* Nominal value. Final value factory selected.

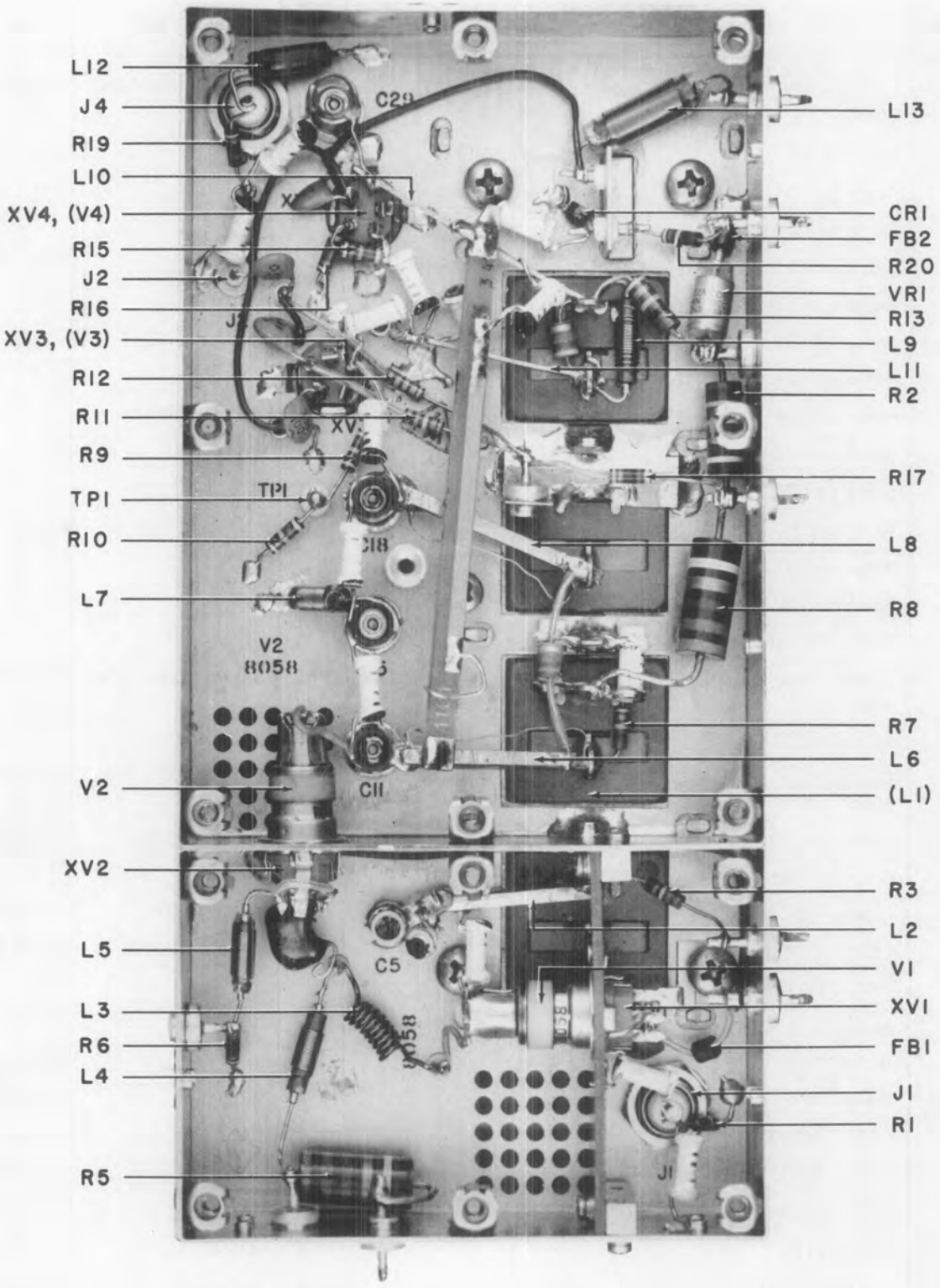


Figure 7-12. Type 71383 60-300 MC Tuner (A2), Location of Components

REF. DESIGNATION PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L11	INDUCTOR	1	10169	14632	
L12	COIL, FIXED: 27 μH, 10%	1	W270	99848	
L13	COIL, FIXED	1	1131-5	14632	
MP1	COVER	1	1999	14632	
MP2	COVER	1	2297	14632	
R1	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	RCR07G104JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 680 kΩ, 5%, 1/4W	1	RCR07G684JS	81349	01121
R4	NOT USED				
R5	RESISTOR, FIXED, COMPOSITION: 6.2 kΩ, 5%, 2W	1	RCR42G622JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	1	RCR07G153JS	81349	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 2W	1	RCR42G682JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	2	RCR07G474JS	81349	01121
R10	Same as R9				
R11	RESISTOR, FIXED, COMPOSITION: 330 kΩ, 5%, 1/4W	1	RCR07G334JS	81349	01121
R12	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/2W	1	RCR20G103JS	81349	01121
R14	NOT USED				
R15	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	1	RCR07G473JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	2	RCR07G472JS	81349	01121
R17	Same as R16				
R18	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	1	RCR07G223JS	81349	01121
R19	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R20	Same as R1				
TP1	JACK, TIP	1	TJ6	04013	
VR1	DIODE	1	1N3044B	80131	04713
V1	ELECTRON TUBE	2	8058	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	ELECTRON TUBE	1	6CW4	80131	12672
XV1	SOCKET, NUVISTOR	4	133-65-10-001	71785	
XV2	Same as XV1				
XV3	Same as XV1				
XV4	Same as XV1				

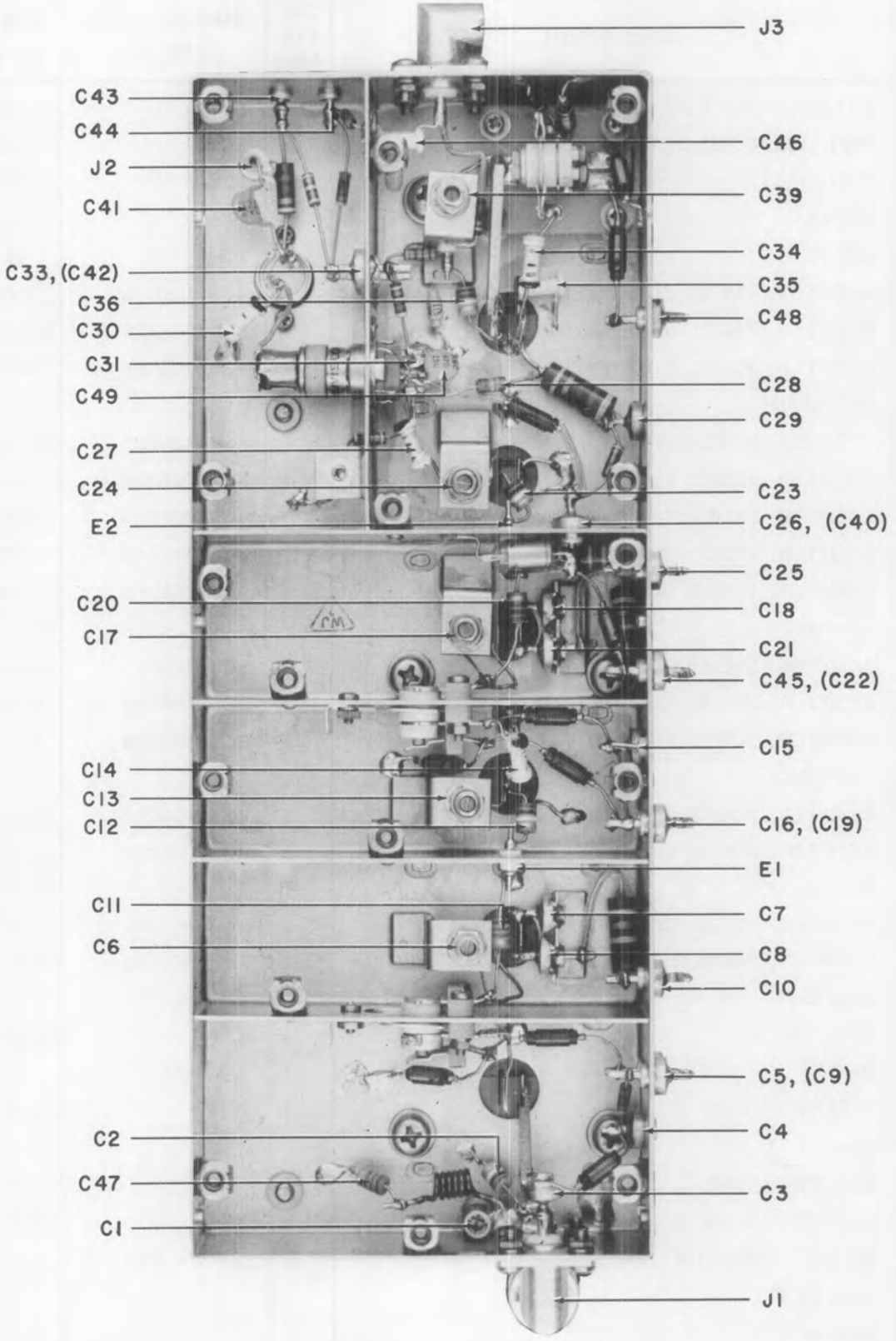


Figure 7-13. Type 71380 235-500 MC Tuner (A3), Location of Components

7.6.4 Type 71380 235-500 MHz Tuner REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE, VARICAP	1	PC115	01281	
C1	CAPACITOR, VARIABLE, CERAMIC: 0.5-4.5 pF, 500V	1	CST6	71279	
C2	CAPACITOR, COMPOSITION, TUBULAR: 2.0 pF, 10%, 500V	1	QC2PFK	95121	
C3	CAPACITOR, CERAMIC, STANDOFF: 470 pF, 20%, 500V	7	SS5D4712	01121	
C4	Same as C3				
C5	CAPACITOR, CERAMIC, FEEDTHRU: 470 pF, 20%, 500V	17	FA5C4712	01121	
C6	CAPACITOR, VARIABLE, GLASS: 0.8-4.5 pF, 750V	5	VC21GY	73899	
C7	Same as C3				
C8	Same as C5				
C9	Same as C5				
C10	Same as C5				
C11	CAPACITOR, COMPOSITION, TUBULAR: 0.68 pF, 10%, 500V	2	QC0.68PFK	95121	
C12	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	2	QC1.0PFK	95121	
C13	Same as C6				
C14	CAPACITOR, CERAMIC, TUBULAR: 2.0 pF ± 0.25 pF, 500V	1	301-000C0K0-209C	72982	
C15	Same as C3				
C16	Same as C5				
C17	Same as C6				
C18	Same as C3				
C19	Same as C5				
C20	CAPACITOR, COMPOSITION, TUBULAR: 0.51 pF, 10%, 500V	1	QC0.51PFK	95121	
C21	Same as C5				
C22	Same as C5				
C23	Same as C12				
C24	Same as C6				
C25	Same as C5				
C26	Same as C5				
C27	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF ±0.25 pF, 500V	1	301-000C0J0-279C	72982	
C28	CAPACITOR, COMPOSITION, TUBULAR: 1.8 pF, 10%, 500V	1	QC1.8PFK	95121	

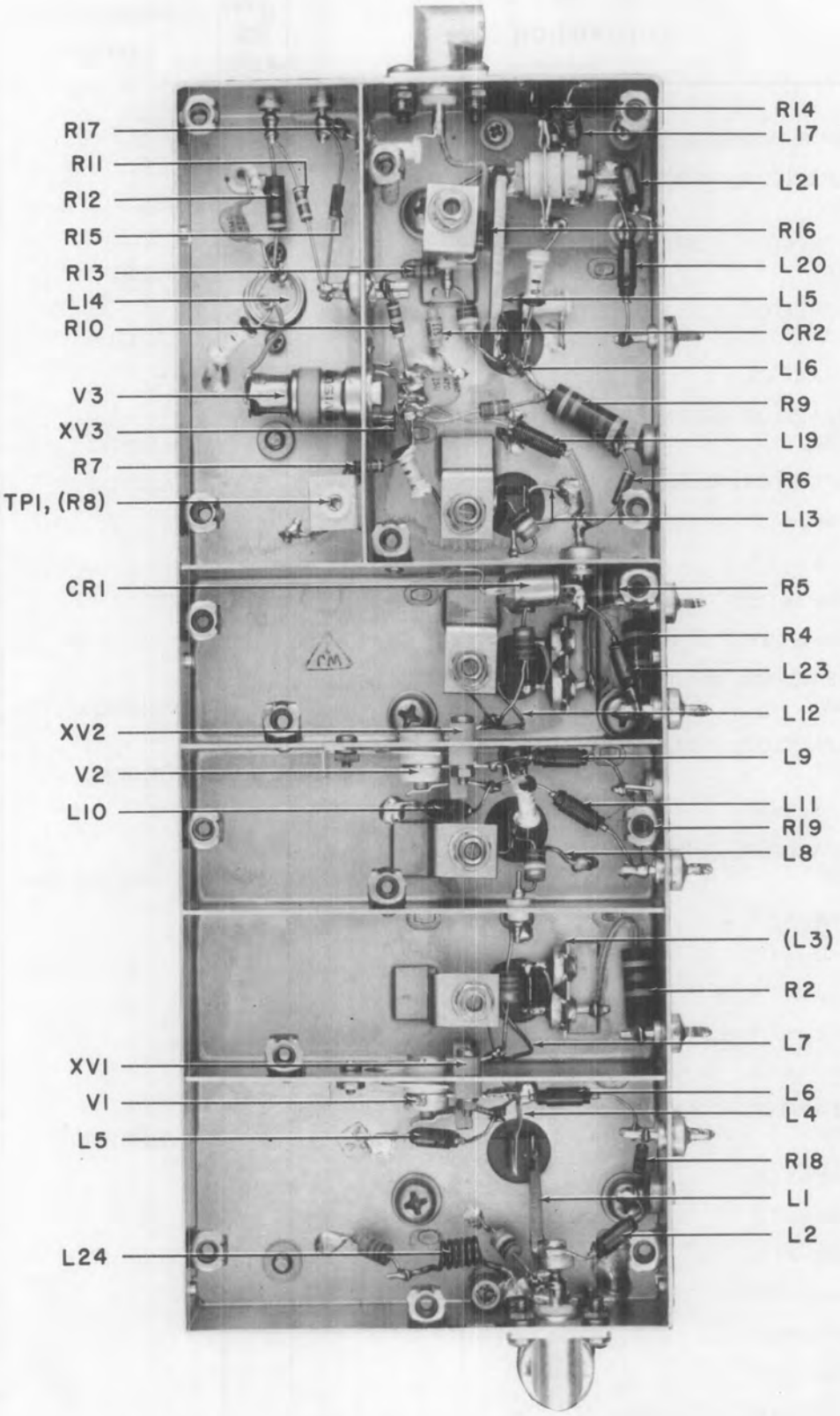


Figure 7-14. Type 71380 235-500 MC Tuner (A3), Location of Components

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C29	Same as C3				
C30	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ± 0.25 pF, 500V	1	301-000C0H0-479C	72982	
C31	Same as C3				
C32	NOT USED				
C33	Same as C5				
C34	CAPACITOR, CERAMIC, TUBULAR: 6.0 pF ± 0.25 pF, 500V	1	301-000C0H0-609C	72982	
C35	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF ± 0.5 pF, 500V	1	301-000U2J0-629D	72982	
C36	CAPACITOR, COMPOSITION, TUBULAR: 1.5 pF, 10%, 500V	1	QC1.5PFK	95121	
C37	NOT USED				
C38	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF ± 0.1 pF, 500V	1	301-000C0K0-109B	72982	
C39	Same as C6				
C40	Same as C5				
C41	CAPACITOR, CERAMIC, DISC: 470 pF, 20%, 1000V	2	B470PFM	91418	
C42	Same as C5				
C43	Same as C5				
C44	Same as C5				
C45	Same as C5				
C46	CAPACITOR, CERAMIC, TUBULAR: 4.3 pF ± 0.25 pF, 500V	1	301-000C0H0-439C	72982	
C47	Same as C11				
C48	Same as C5				
C49	Same as C41				
E1	TERMINAL, FEEDTHRU, INSULATED	2	SFU16	04013	
E2	Same as E1				
J1	CONNECTOR, RECEPTACLE	2	UG-535/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	Same as J1				
L1	INDUCTOR, FIXED	1	1966	14632	
L2	COIL, FIXED	11	1131-21	14632	
L3	INDUCTUNER	1	2403-1	14632	
L4	INDUCTOR, FIXED	1	1967	14632	
L5	Same as L2				
L6	Same as L2				

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L7	INDUCTOR, FIXED	1	1968	14632	
L8	INDUCTOR, FIXED	1	1969	14632	
L9	Same as L2				
L10	Same as L2				
L11	Same as L2				
L12	INDUCTOR, FIXED	1	1970	14632	
L13	INDUCTOR, FIXED	1	1971	14632	
L14	COIL, VARIABLE: 0.65-0.94 μH	1	1472-13	14632	
L15	INDUCTOR	1	1234	14632	
L16	COIL, FIXED	1	1131-34	14632	
L17	Same as L2				
L18	NOT USED				
L19	Same as L2				
L20	Same as L2				
L21	Same as L2				
L22	NOT USED				
L23	Same as L2				
L24	COIL	1	1129-04	14632	
MP1	COVER	1	2104	14632	
MP2	COVER	1	2400	14632	
R1	NOT USED				
R2	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1W	2	RCR32G103JS	81349	01121
R3	NOT USED				
R4	Same as R2				
R5	RESISTOR, FIXED, COMPOSITION: 13 kΩ, 5%, 1W	1	RCR32G133JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 470 kΩ, 5%, 1/4W	4	RCR07G474JS	81349	01121
R8	Same as R7				
R9	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1W	1	RCR32G472JS	81349	01121
R10	Same as R7				
R11	Same as R7				
R12	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/2W	1	RCR20G272JS	81349	01121
R13	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	RCR07G103JS	81349	01121
R15	RESISTOR, FIXED, COMPOSITION: 1.5 kΩ, 5%, 1/4W	1	RCR07G152JS	81349	01121
R16	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121

REF. DESIGNATION PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R17	RESISTOR, FIXED, COMPOSITION: 1.5 mΩ, 5%, 1/4W	1	RCR07G155JS	81349	01121
R18	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R19	Same as R18				
TP1	JACK, TIP	1	TJ6	04013	
VR1	DIODE	1	1N3044B	80131	04713
V1	ELECTRON TUBE	2	7077	80131	12672
V2	Same as V1				
V3	ELECTRON TUBE	1	7587	80131	12672
V4	ELECTRON TUBE	1	7486	80131	12672
XV1	SOCKET, NUVISTOR	2	86-040	04435	
XV2	Same as XV1				
XV3	SOCKET, NUVISTOR	1	133-65-10-001	71785	
XV4	SOCKET BOARD ASSEMBLY	1	10898-1	14632	

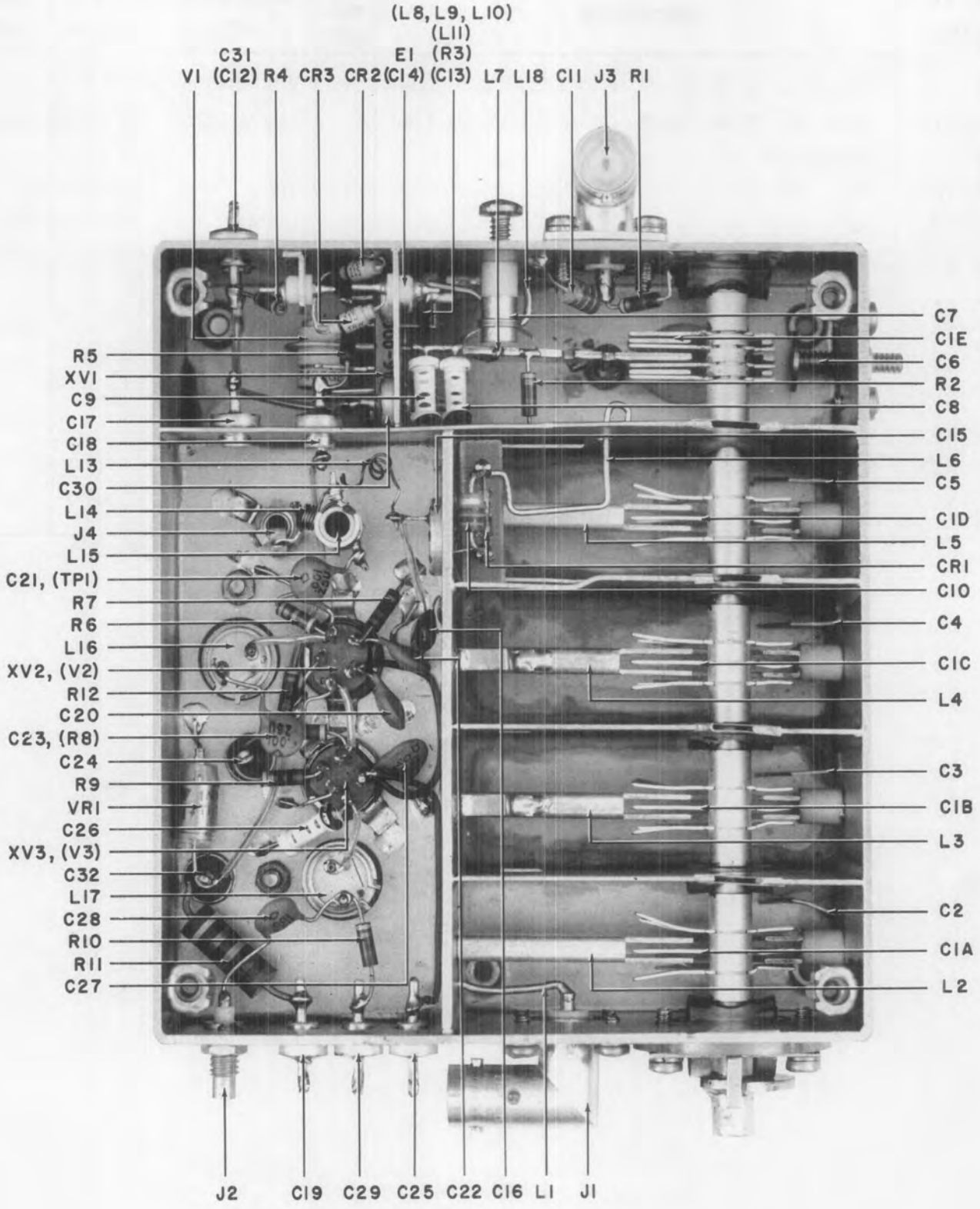


Figure 7-15. Type 71381 490-1000 MC Tuner (A4), Location of Components

7.6.5 Type 71381 490-1000 MHz Tuner REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	1	1N82AG	80131	93332
CR2	DIODE, VARICAP	2	PC115	01281	
CR3	Same as CR2				
C1	TUNER SHAFT ASSEMBLY	1	1271-1	14632	
C2	RF TRIMMER PLATE	4	1261	14632	
C3	Same as C2				
C4	Same as C2				
C5	Same as C2				
C6	TRIMMER DISC ASSEMBLY	1	1276-1	14632	
C7	CAPACITOR, VARIABLE, CERAMIC: 0.5-3 pF, 500V	1	829-3	72982	
C8	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF ± 0.1 pF, 500V	1	301-000C0K0-109B	72982	
C9	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF ±0.25 pF, 500V	1	301-000C0K0-159C	72982	
C10*	CAPACITOR, COMPOSITION, TUBULAR: 0.27 pF, 10%, 500V	2	QC0.27PFK	95121	
C11	Same as C10				
C12	CAPACITOR, CERAMIC, FEEDTHRU: 470 pF, 20%, 500V	6	FA5C4712	01121	
C13	CAPACITOR, CERAMIC, STANDOFF: 137 pF, 20%, 500V	1	32-252394-1	54753	
C14	Same as C12				
C15	CAPACITOR, FIXED, MICA: 15 pF, 10%, 500V	1	654-017-150K	72982	
C16	CAPACITOR, MICA, DIPPED: 56 pF, 5%, 500V	1	CM04ED560J03	81349	
C17	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	1	SS5D102W	01121	
C18	Same as C12				
C19	Same as C12				
C20	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM1000PFP	91418	
C21	Same as C20				
C22	Same as C20				
C23	Same as C20				
C24	Same as C17				
C25	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C102W	01121	
C26	CAPACITOR, CERAMIC, TUBULAR: 2.2 pF ±0.25 pF, 500V	1	301-000C0J0-229C	72982	
C27	Same as C20				
C28	Same as C20				

* Nominal value. Final value factory selected.

REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C29	Same as C25				
C30	Same as C12				
C31	Same as C12				
C32	Same as C17				
E1	TERMINAL, FEEDTHRU, INSULATED	1	SFU16	04013	
J1	CONNECTOR, RECEPTACLE	1	UG-535/U	80058	74868
J2	CONNECTOR, RECEPTACLE	1	10-0104-002	19505	
J3	CONNECTOR, RECEPTACLE	1	31-203-1004	74868	
J4	TEST JACK	1	TR2A	82389	
L1	COIL	1	1461-1	14632	
L2	RF STATOR	4	1265	14632	
L3	Same as L2				
L4	Same as L2				
L5	Same as L2				
L6	COIL	1	1462-2	14632	
L7	OSC STATOR ASSEMBLY	1	1301-1	14632	
L8	INDUCTOR, FIXED	1	1973	14632	
L9	COIL	1	1466-4	14632	
L10	COIL	2	1466-3	14632	
L11	Same as L10				
L12	INDUCTOR, FIXED	1	1975	14632	
L13	COIL	1	1466-1	14632	
L14	COIL	1	1466-2	14632	
L15	COIL FORM ASSEMBLY	1	1471-2	14632	
L16	COIL, VARIABLE: 3.8-5.4 μH	1	1472-12	14632	
L17	COIL, VARIABLE: 0.65-0.94 μH	1	1472-13	14632	
L18	INDUCTOR, FIXED	1	17282-1	14632	
MP1	COVER	1	2446-1	14632	
R1	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	RCR07G510JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.6 kΩ, 5%, 1/4W	1	RCR07G562JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	1	RCR07G101JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 4.7 kΩ, 5%, 1/4W	1	RCR07G472JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	2	RCR07G473JS	81349	01121
R7	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	1	RCR07G680JS	81349	01121
R8	Same as R6				

REF. DESIGNATION PREFIX A4

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R9	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	RCR07G272JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 11 kΩ, 5%, 1W	1	RCR32G113JS	81349	01121
R12	Same as R5				
TP1	JACK, TIP	1	TJ6	04013	
VR1	DIODE	1	1N3044B	80131	04713
V1	ELECTRON TUBE	1	7486	80131	12672
V2	ELECTRON TUBE	2	6CW4	80131	12672
V3	Same as V2				
XV1	SOCKET, NUVISTOR	1	86-000	04435	
XV2	SOCKET, NUVISTOR	2	133-65-10-001	71785	
XV3	Same as XV2				

7.6.6 Type 76237 Power Supply

REF. DESIGNATION PREFIX A12

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, ELECTROLYTIC, ALUMINUM: 1 μF, -10+75%, 50 V	1	30D105G050BA2	56289	
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 47 μF, 10%, 35 V	3	CS13BF476K	81349	56289
C3	CAPACITOR, ELECTROLYTIC, TANTALUM: 78 μF, 20%, 50 V	1	MTP786M050P1C	76055	
C4	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 μF, 50 V	1	30D106G050CB2	56289	
C5	Same as C2				
C6	Same as C2				
C7	CAPACITOR, ELECTROLYTIC, ALUMINUM: 200 μF, -10+75%, 50 V	1	39D207G050FJ4	56289	
CR1 thru CR5	DIODE	5	1N462A	80131	93332
Q1	TRANSISTOR	4	2N2270	80131	02735
Q2	TRANSISTOR	1	2N1038	80131	04713
Q3	Same as Q1				
Q4	Same as Q1				
Q5	Same as Q1				
RA1	HEATSINK	1	2227B	13103	
RA2	HEATSINK	3	2225B	13103	
RA3	Same as RA2				
RA4	Same as RA2				
R1	RESISTOR, FIXED, COMPOSITION: 10 Ω, 5%, 1/4W	1	RCR07G100JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 1.0 k, 5%, 1/4W	2	RCR07G102JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 510 Ω, 5%, 1/4W	2	RCR07G511JS	81349	01121
R4	Same as R2				
R5	Same as R3				
R6	RESISTOR, FIXED, COMPOSITION: 5.1 Ω, 5%, 1/4W	3	RCR07G5R1JS	81349	01121
R7	Same as R6				
R8	Same as R6				
R9	RESISTOR, FIXED, COMPOSITION: 62 Ω, 5%, 1W	1	RCR32G620JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 2.4 kΩ, 5%, 1/4W	2	RCR07G242JS	81349	01121
R11	Same as R10				
R12	RESISTOR, FIXED, COMPOSITION: 36 k, 5%, 1W	1	RCR32G363JS	81349	01121
U1	DIODE ASSEMBLY	2	MDA920A3	04713	
U2	RECTIFIER ASSEMBLY	1	MDA940A7	04713	

REF. DESIGNATION PREFIX A12

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
U3	RECTIFIER ASSEMBLY	1	MDA940A3	04713	
U4	Same as U1				
VR1	DIODE, ZENER	2	1N970B	80131	04713
VR2	Same as VR1				
VR3	DIODE, ZENER	1	1N759A	80131	04713
VR4	DIODE, ZENER	1	1N979A	80131	04713

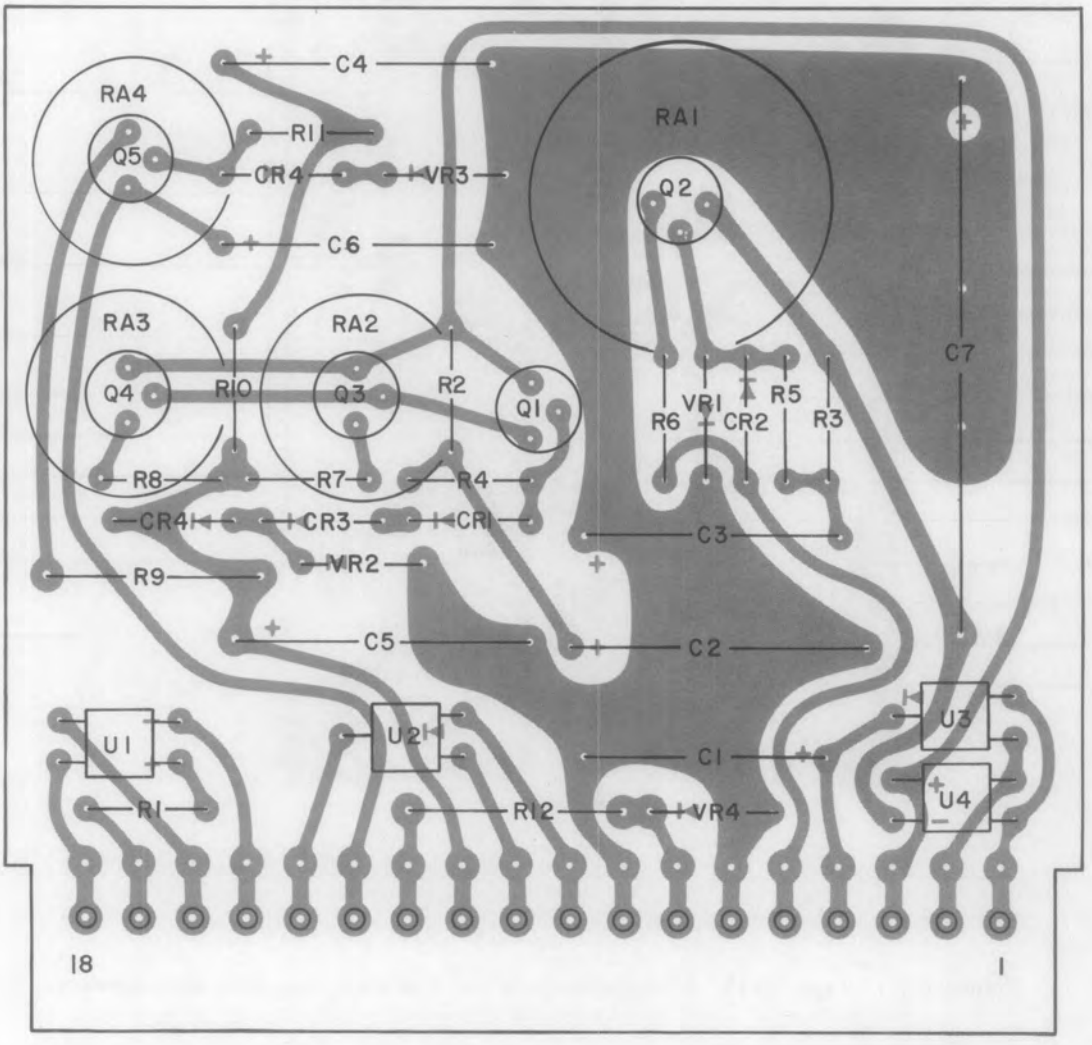


Figure 7-16. Type 76237 Power Supply Regulator Board (Gen) (A12), Location of Components

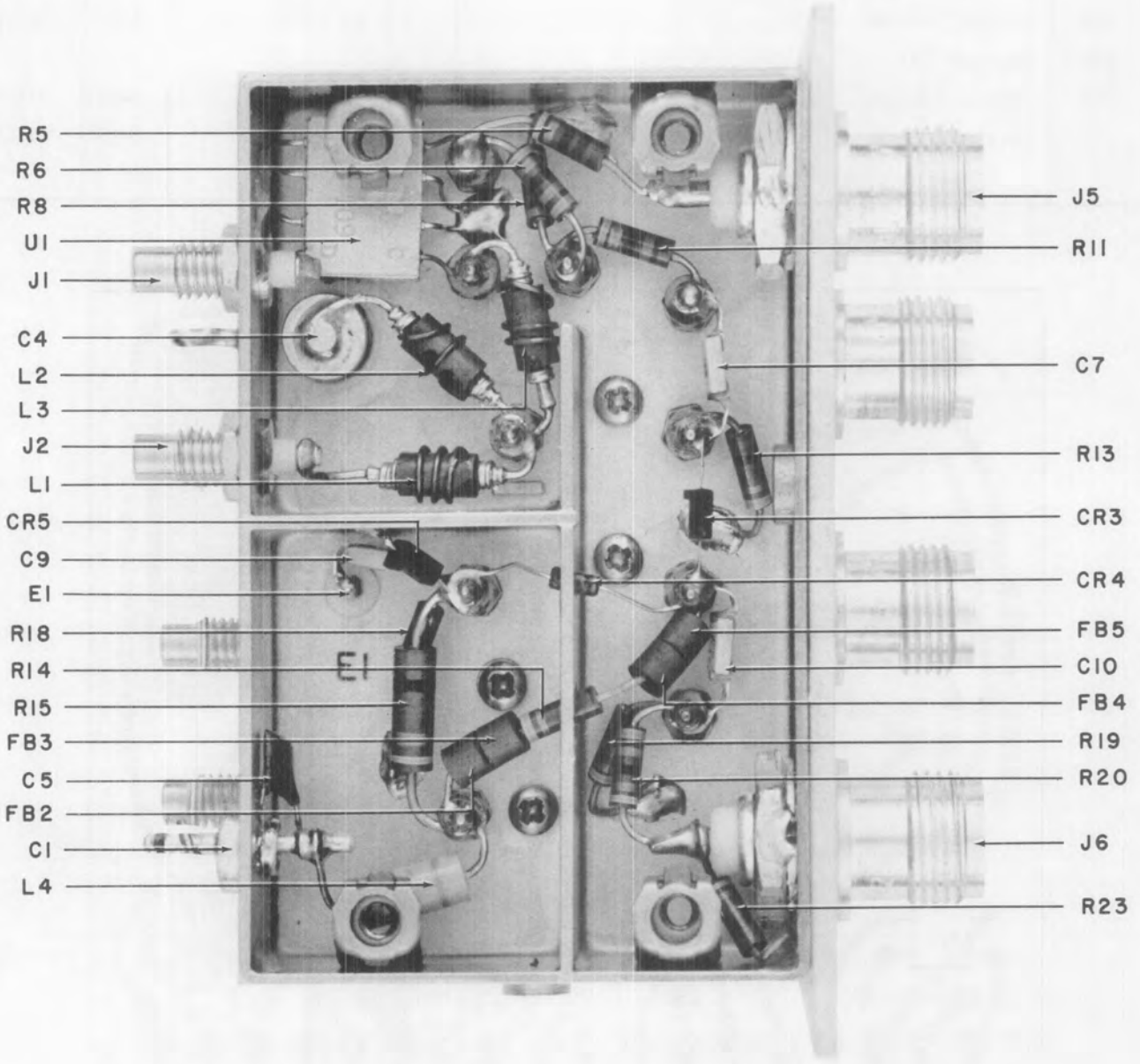


Figure 7-17. Type 791157 Power Splitter (A13), Top View, Location of Components

7.6.7 Type 791157 Power Splitter REF. DESIGNATION PREFIX A13

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	DIODE	2	5082-3039	28480	
CR2	DIODE	3	MPN3401	04713	
CR3	Same as CR2				
CR4	Same as CR1				
CR5	Same as CR2				
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C102W	01121	
C2	Same as C1				
C3	CAPACITOR, CERAMIC, DISC: 0.01 μF, 20%, 200V	2	8131A200Z5U0-103M	72982	
C4	CAPACITOR, VARIABLE, AIR: 0.8-10.0 pF, 250V	2	5202	91293	
C5	Same as C3				
C6 Thru C10	CAPACITOR, CERAMIC, DISC: 470 pF, 5%, 300V	5	UY03471J	73899	
C11	CAPACITOR, COMPOSITION, TUBULAR: 1.2 pF, 10%, 500V	1	QC1.2PFK	95121	
C12	CAPACITOR, COMPOSITION, TUBULAR: 0.43 pF, 10%, 500V	1	QC0.43PFK	95121	
C13	Same as C4				
C14	CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500V	1	QC0.82PFK	95121	
C15	CAPACITOR, COMPOSITION, TUBULAR: 0.75 pF, 10%, 500V	1	QC0.75PFK	95121	
E1	TERMINAL, FEEDTHRU, INSULATED	2	SFU16	04013	
E2	Same as E1				
FB1 Thru FB5	FERRITE BEAD	5	56-590-65-4A	02114	
J1	CONNECTOR, RECEPTACLE	4	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
J4	Same as J1				
J5	CONNECTOR, RECEPTACLE	4	79775	74868	
J6	Same as J5				
J7	Same as J5				
J8	Same as J5				
L1	INDUCTOR	2	21210-58	14632	
L2	INDUCTOR	1	21210-150	14632	
L3	Same as L1				

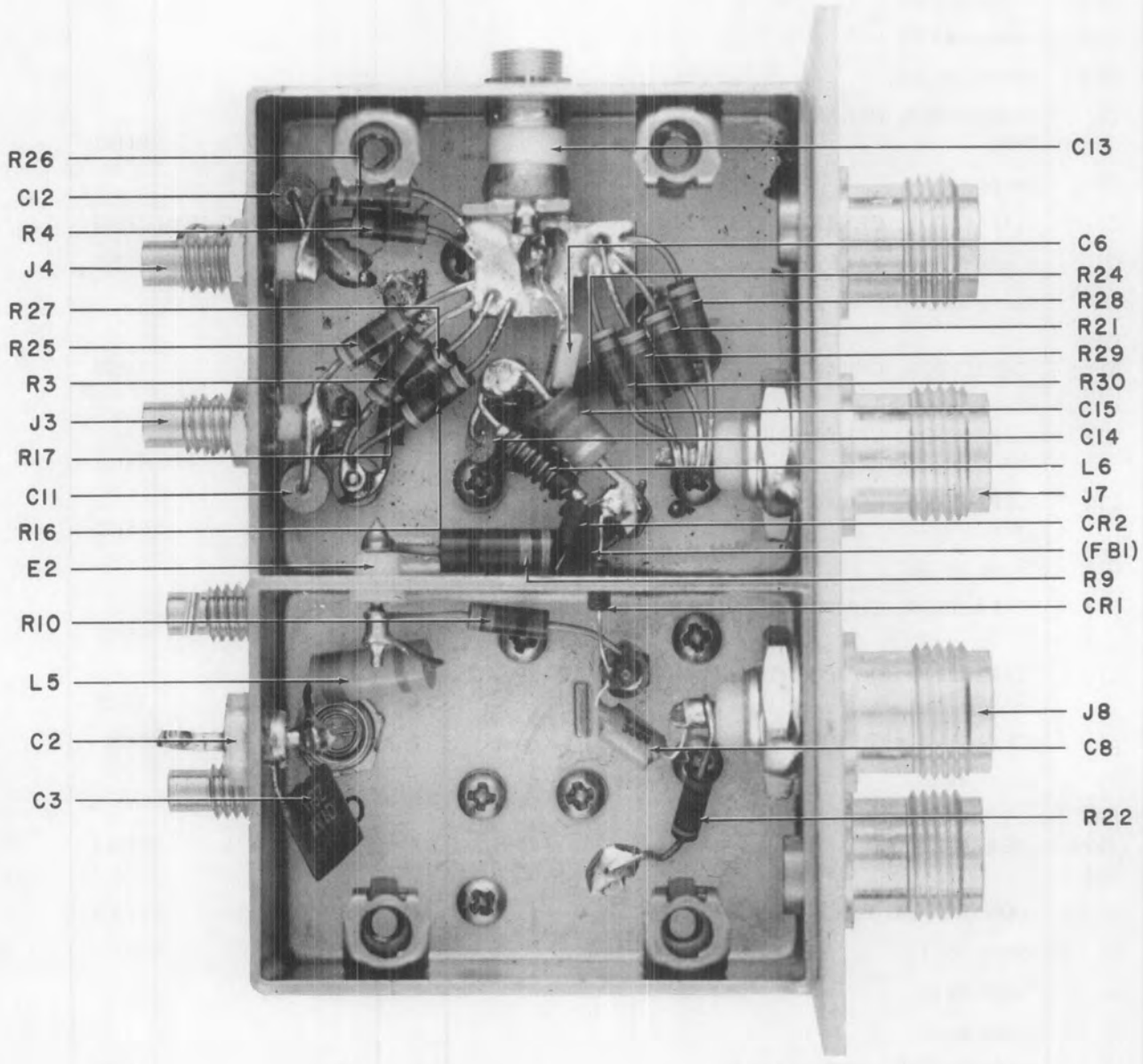


Figure 7-18. Type 791157 Power Splitter (A13), Bottom View, Location of Components

REF. DESIGNATION PREFIX A13

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
L4	COIL, FIXED: .47 μH, 10%	2	1537-06	99800	
L5	Same as L4				
L6*	INDUCTOR	1	21209-28	14632	
MP1	COVER	1	17247-1	14632	
R1	NOT USED				
R2	NOT USED				
R3	RESISTOR, FIXED, COMPOSITION: 62 Ω, 5%, 1/4W	4	RCR07G620JS	81349	01121
R4	Same as R3				
R5	RESISTOR, FIXED, COMPOSITION: 20 Ω, 5%, 1/4W	1	RCR07G200JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 36 Ω, 5%, 1/4W	2	RCR07G360JS	81349	01121
R7	NOT USED				
R8	RESISTOR, FIXED, COMPOSITION: 68 Ω, 5%, 1/4W	2	RCR07G680JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/2W	2	RCR20G102JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	5	RCR07G102JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 16 Ω, 5%, 1/4W	1	RCR07G160JS	81349	01121
R12	NOT USED				
R13	Same as R10				
R14	Same as R10				
R15	Same as R9				
R16	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	2	RCR07G470JS	81349	01121
R17	RESISTOR, FIXED, COMPOSITION: 24 Ω, 5%, 1/4W	1	RCR07G240JS	81349	01121
R18	Same as R10				
R19	RESISTOR, FIXED, COMPOSITION: 150 Ω, 5%, 1/4W	2	RCR07G151JS	81349	01121
R20	Same as R6				
R21	RESISTOR, FIXED, COMPOSITION: 120 Ω, 5%, 1/4W	4	RCR07G121JS	81349	01121
R22	Same as R8				
R23	Same as R19				
R24	Same as R10				
R25	Same as R3				
R26	Same as R3				
R27	Same as R16				
R28	Same as R21				
R29	Same as R21				
R30	Same as R21				
U1	DIVIDER, POWER	1	DS109	21912	

* Nominal value. Final value factory selected.

7.6.8 Type 791209 AFC/DAFC Amplifier REF. DESIGNATION PREFIX A16

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 100 µF, 20%, 35V	2	MTP107M035P1C	76055	
C2	CAPACITOR, CERAMIC, DISC: 0.1 µF, 20%, 100V	1	8131M100-651-104M	72982	
C3	Same as C1				
E1 Thru E10	TERMINAL, FORKED	10	140-1941-02-01	71279	
Q1	TRANSISTOR	1	2N2270	80131	02735
R1	RESISTOR, FIXED, COMPOSITION: 68 kΩ, 5%, 1/4W	1	RCR07G683JS	81349	01121
R2	RESISTOR, FIXED, COMPOSITION: 200 kΩ, 5%, 1/4W	1	RCR07G204JS	81349	01121
R3	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	1	RCR07G104JS	81349	01121
R4	RESISTOR, FIXED, COMPOSITION: 56 kΩ, 5%, 1/4W	1	RCR07G563JS	81349	01121
R5	RESISTOR, FIXED, COMPOSITION: 33 kΩ, 5%, 1/4W	1	RCR07G333JS	81349	01121
R6	RESISTOR, FIXED, COMPOSITION: 1.0 kΩ, 5%, 1/4W	2	RCR07G102JS	81349	01121
R7	Same as R6				
R8	RESISTOR, FIXED, COMPOSITION: 2.2 kΩ, 5%, 1/4W	1	RCR07G222JS	81349	01121
R9	RESISTOR, FIXED, COMPOSITION: 2.7 kΩ, 5%, 1/4W	1	RCR07G272JS	81349	01121
R10	RESISTOR, FIXED, COMPOSITION: 620 Ω, 5%, 1/4W	1	RCR07G621JS	81349	01121
R11	RESISTOR, FIXED, COMPOSITION: 240 kΩ, 5%, 1/4W	1	RCR07G244JS	81349	01121
R12	RESISTOR, VARIABLE, FILM: 1 MΩ, 10%, 1/2W	1	62PR1M	73138	
R13	RESISTOR, FIXED, COMPOSITION: 510 Ω, 5%, 1/4W	2	RCR07G511JS	81349	01121
R14	RESISTOR, FIXED, COMPOSITION: 20 kΩ, 5%, 1/4W	1	RCR07G203JS	81349	01121
R15	Same as R13				
U1	INTEGRATED CIRCUIT	1	U5B7741393	07263	
VR1	DIODE	2	1N967B	80131	04713
VR2	Same as VR1				

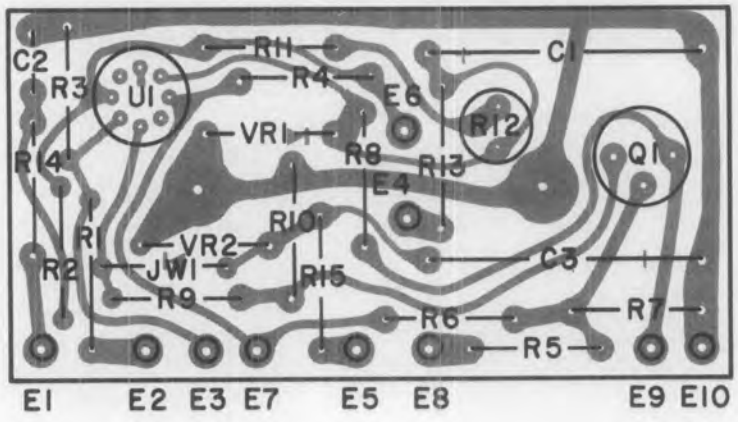
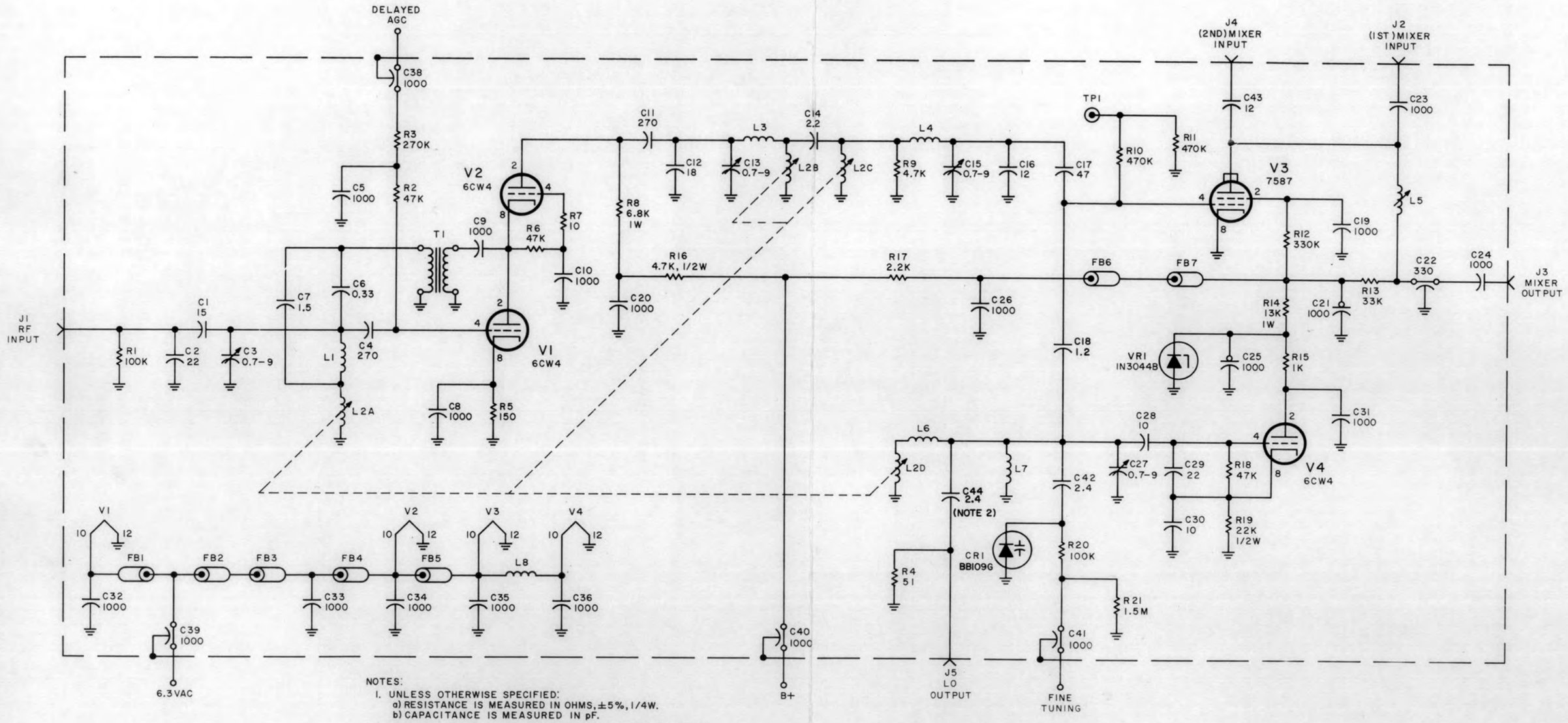
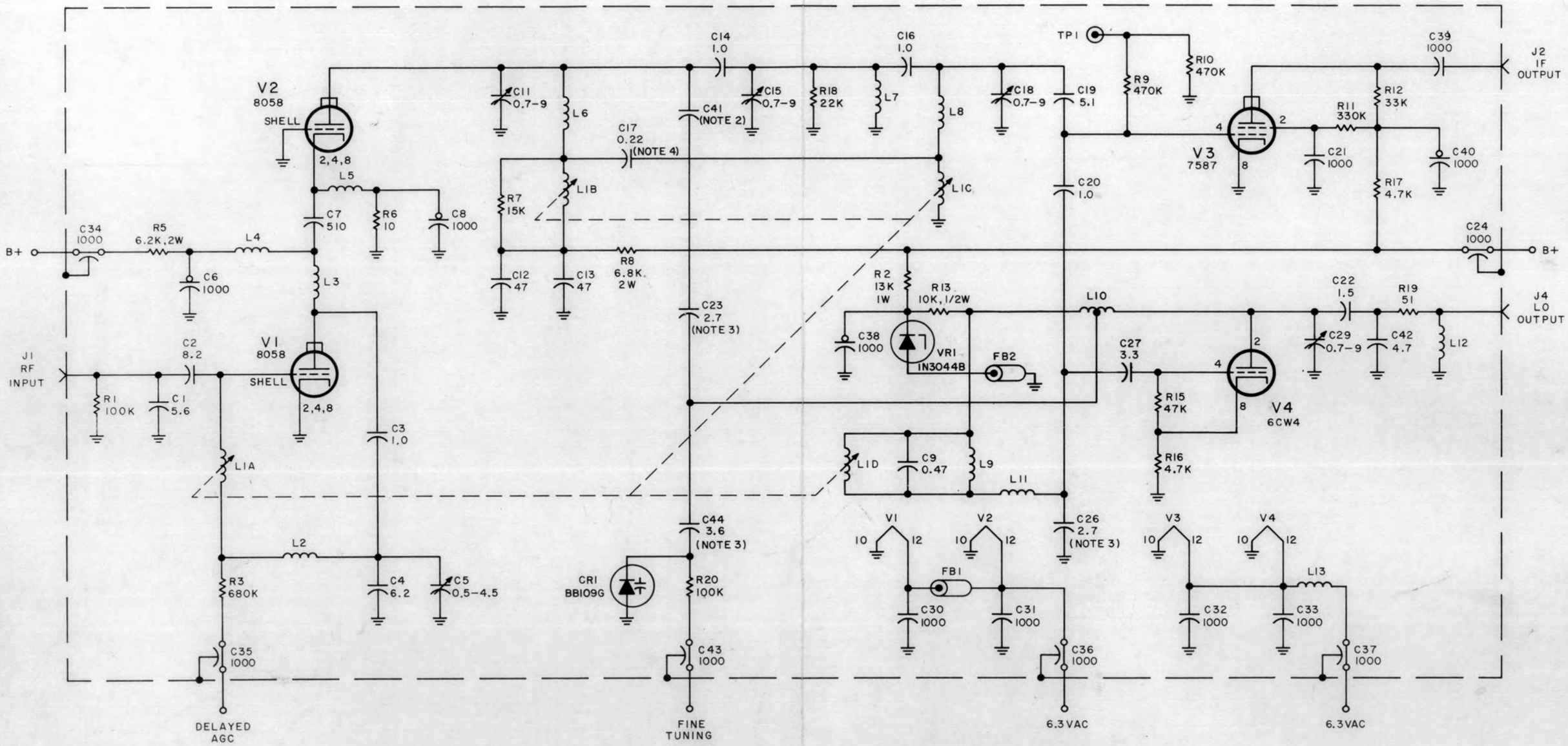


Figure 7-19. Type 791209 AFC/DAFC Amplifier (A16), Location of Components



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. NOMINAL VALUE; FINAL VALUE TO BE FACTORY SELECTED.

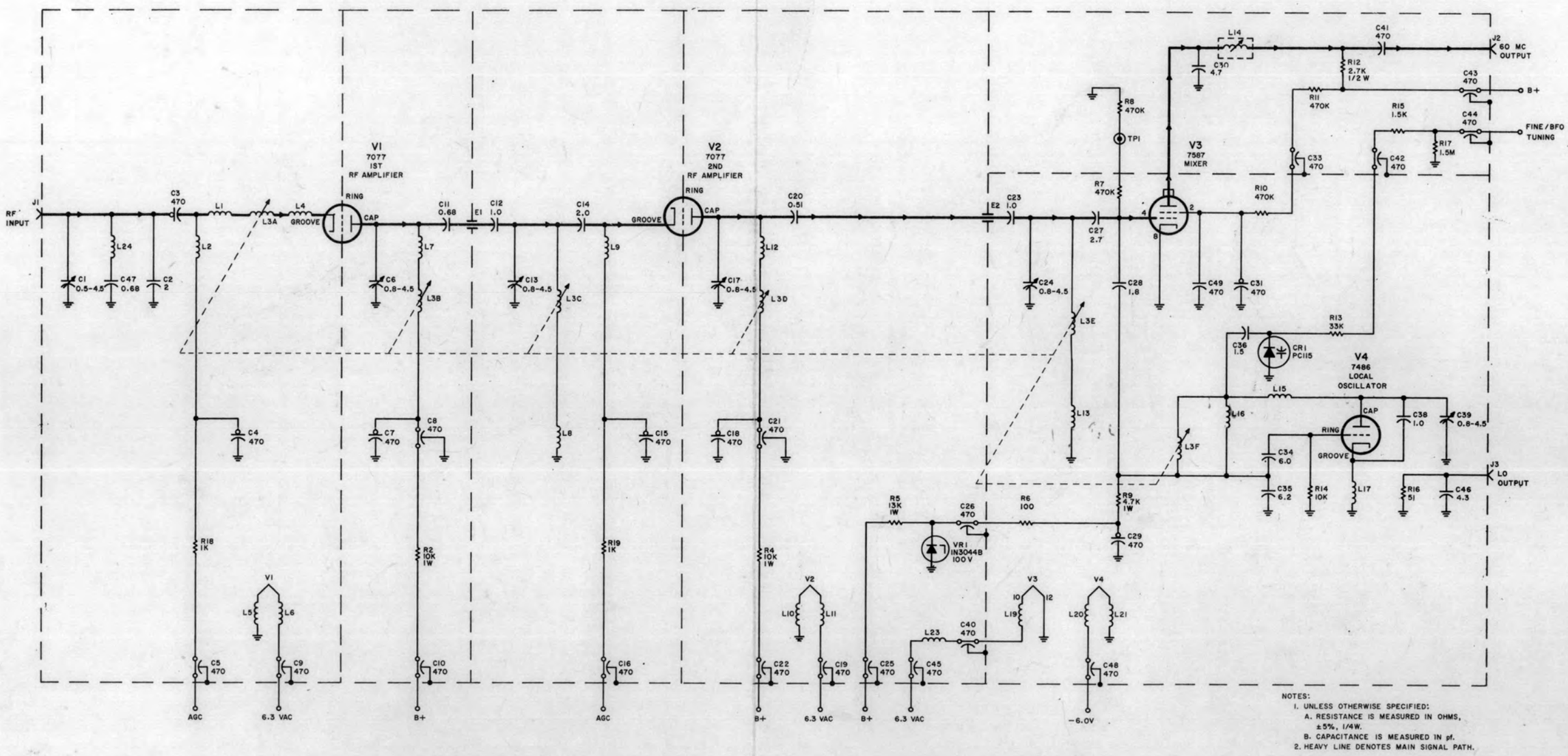
Figure 7-20. Type 71382 30-60 MC Tuner (A1), Schematic Diagram



NOTES:

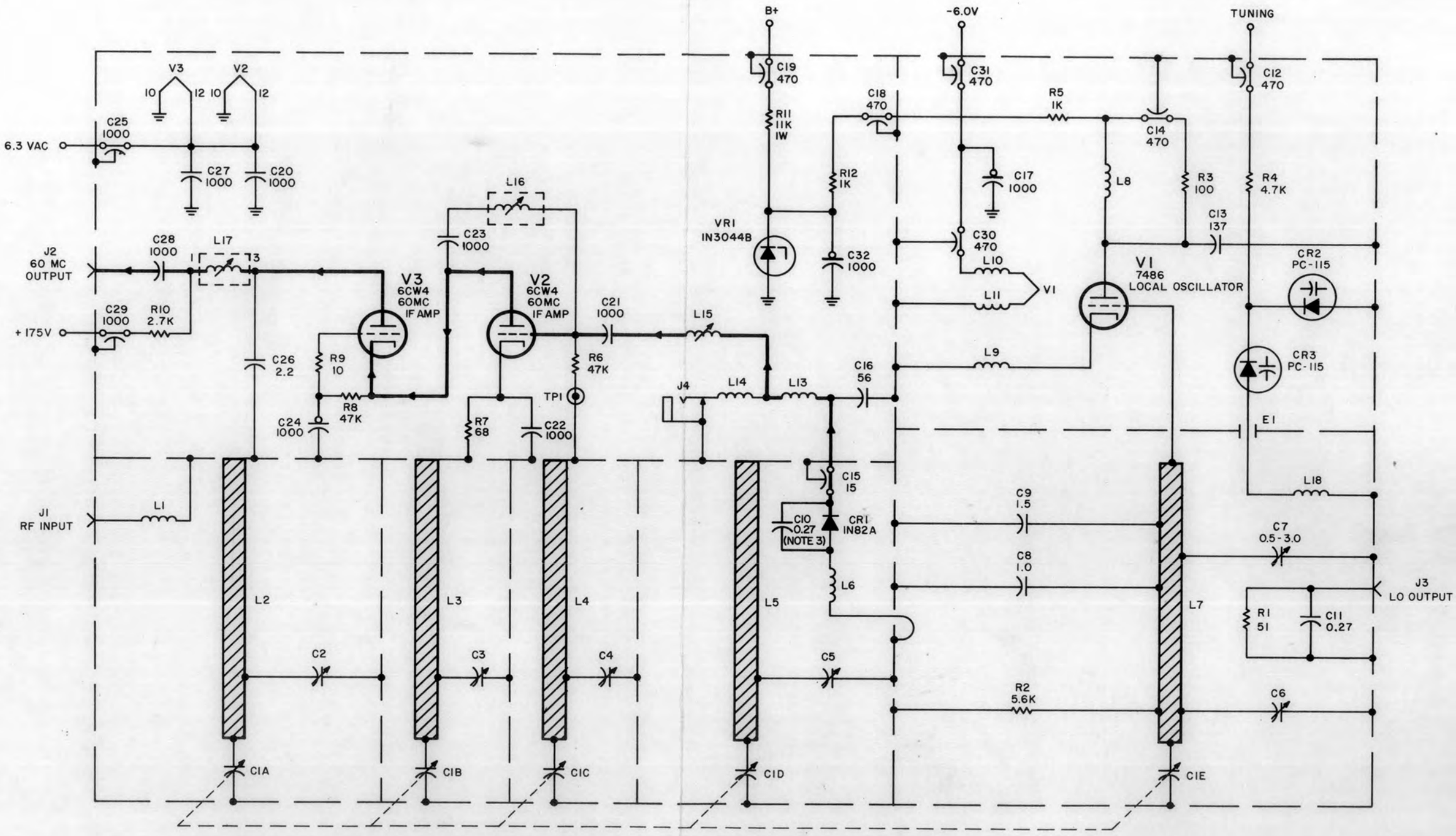
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. PART OF CIRCUIT BOARD, CEI TYPE 1101.
3. NOMINAL VALUE; FINAL VALUE TO BE FACTORY SELECTED.
4. NOMINAL VALUE; FINAL VALUE TO BE DETERMINED AT TIME OF ALIGNMENT.

Figure 7-21. Type 71383 60-300 MC Tuner (A2), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 7-22. Type 71380 235-500 MC Tuner (A3), Schematic Diagram

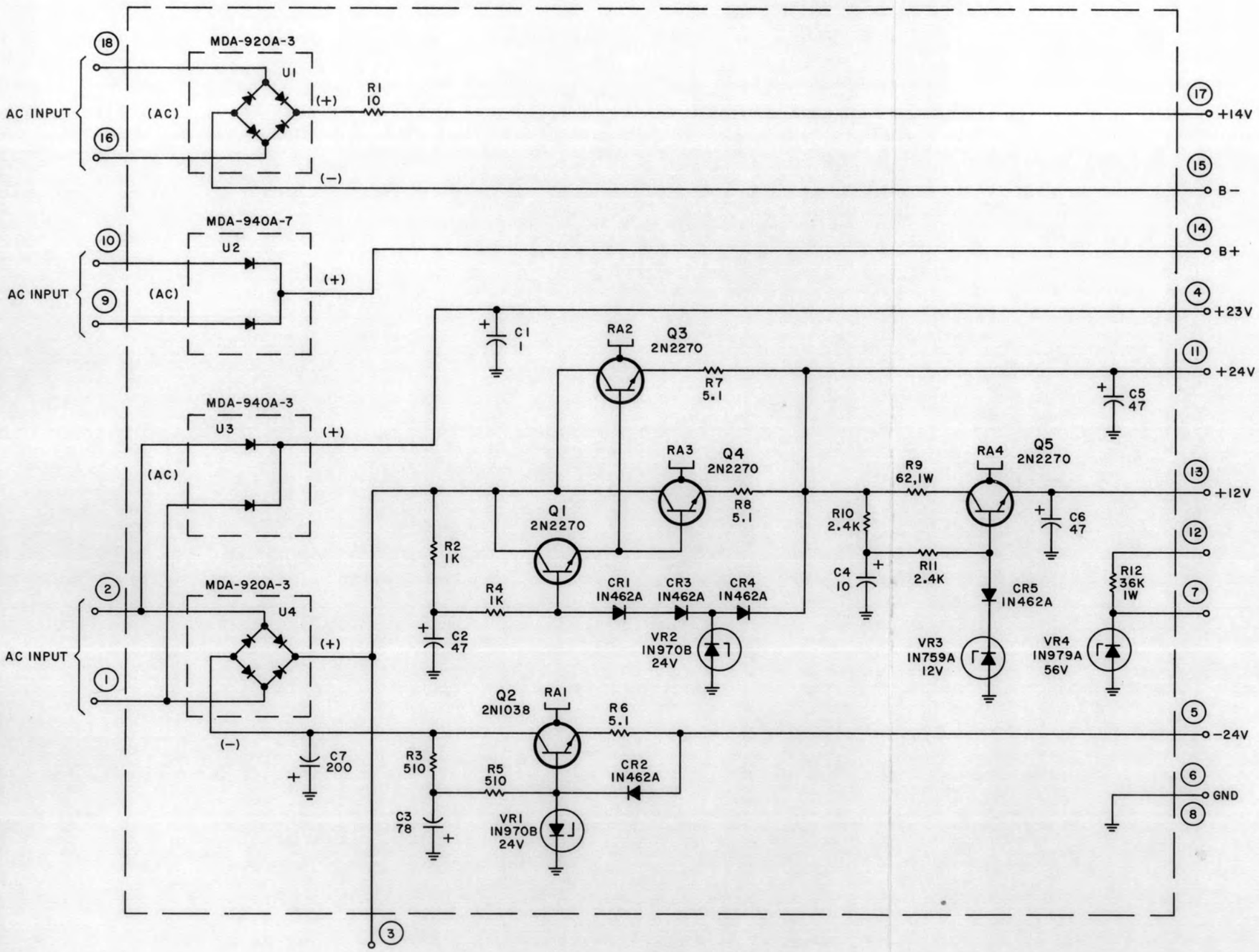


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a. RESISTANCE IS MEASURED IN OHMS ±5%, 1/4 W.
   b. CAPACITANCE IS MEASURED IN pF.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.
3. NOMINAL VALUE, FINAL VALUE TO BE FACTORY SELECTED

Figure 7-23. Type 71381 490-1000 MC Tuner (A4), Schematic Diagram

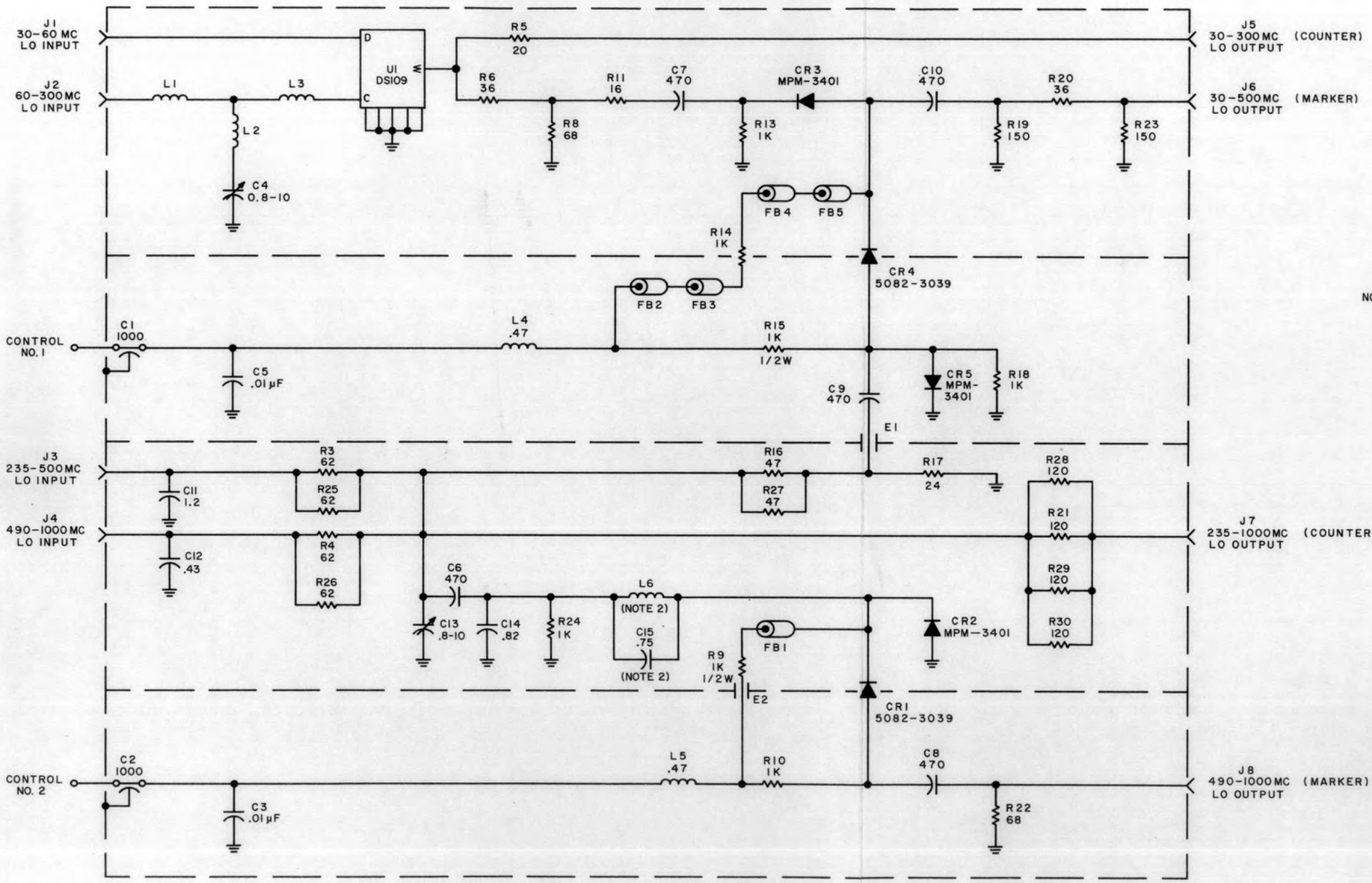
Figure 7-24



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.

HIGHEST REF DESIG USED		REF DESIG NOT USED
C7	CR5	
R12	Q5	
VR4	U4	

Figure 7-24. Type 76237 Power Supply Regulator Board (Gen)(A12), Schematic Diagram

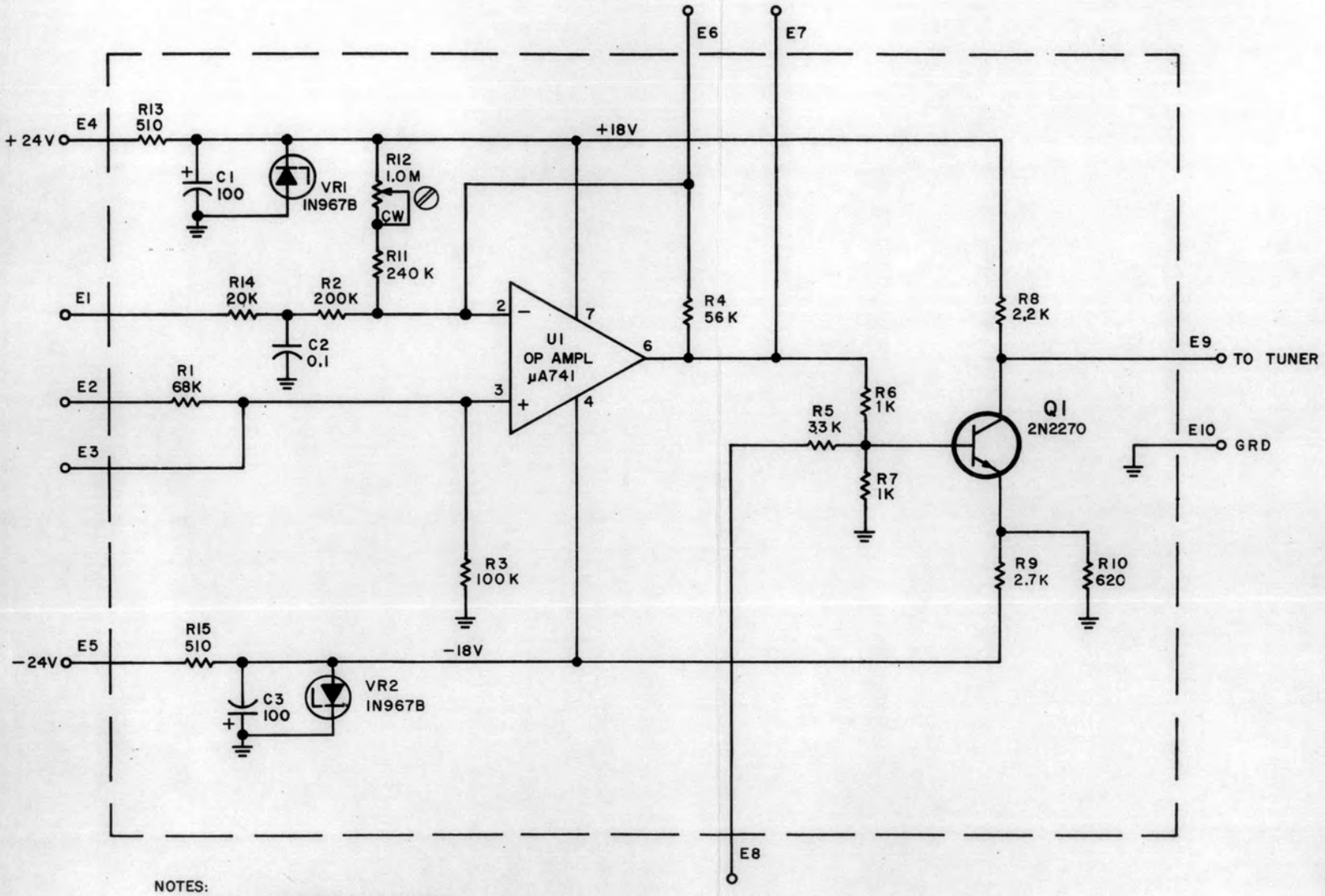


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4 W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

HIGHEST REF DESIG USED	REF DESIG NOT USED
C15	
CR5	
FB5	
J8	
L6	
R30	R1, 2, 12, 7
U1	

Figure 7-25. Type 791157 Power Splitter (A13), Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS MEASURED IN μF.
   b) RESISTANCE IS MEASURED IN OHMS, 1/4 W, 5 %.
2. FOR U1 PIN ARRANGEMENT SEE DETAIL A.
3. CW ON POTENTIOMETER INDICATES CLOCKWISE ROTATION OF ACTUATOR. ⊘ INDICATES SCREWDRIVER ADJUSTMENT.

Figure 7-26. Type 791209 AFC/DAFC Amplifier (A16), Schematic Diagram

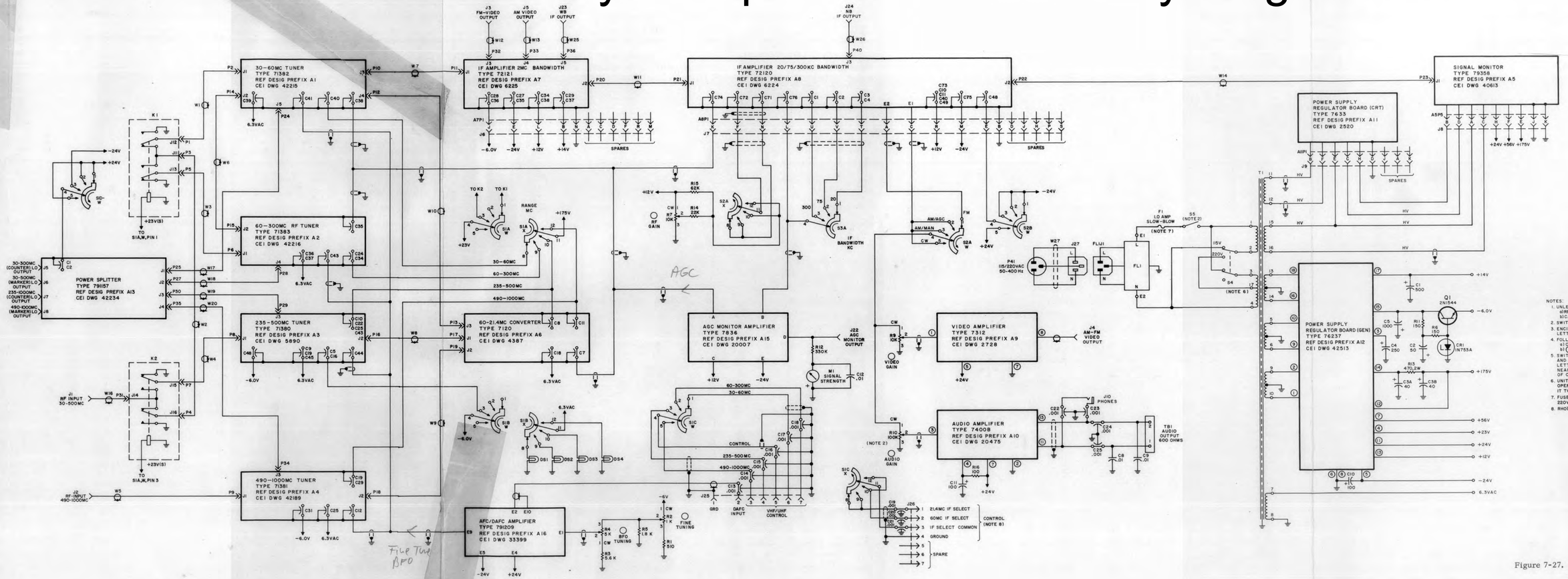


Figure 7-27. RS-111-1B-12A Receiving System, Main Chassis Schematic Diagram