OPERATING AND SERVICE INSTRUCTIONS

HF RECEIVER
MODEL MSR-1A

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FOR

HF RECEIVER

MODEL MSR-1A

The Hallicrafters Co.
5th And Kostner Avenues
Chicago, Illinois 60624

094-903973

Printed in U.S.A.

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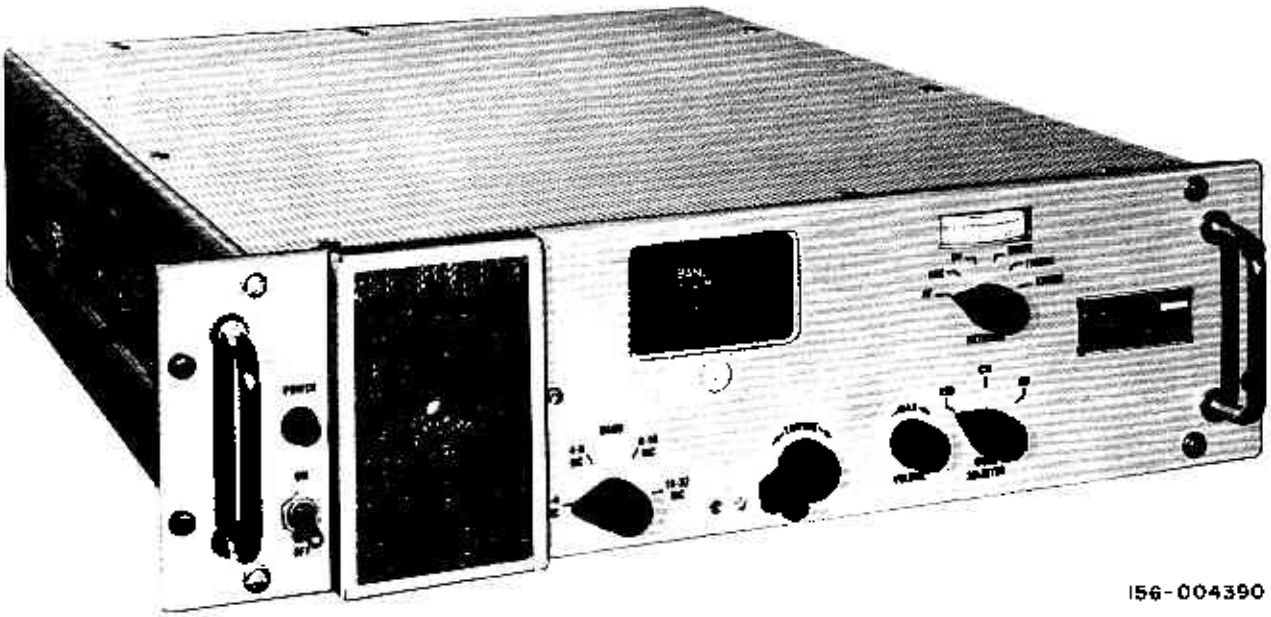


Figure 1-1. Receiver, MSR-1A.

OPERATING AND SERVICE

INSTRUCTIONS

FOR

ELECTRICAL FREQUENCY

SYNTHESIZER

MODEL MHS 402

Printed in U.S.A.

21 OCTOBER 1964
094-903999

SECTION I

INTRODUCTION

1-1. GENERAL.

1-2. This publication contains operation and service instructions for Receiver Model MSR-1A designed and manufactured by The Hallicrafters Co., Chicago, Illinois.

1-3. PURPOSE.

1-4. Receiver Model MSR-1A is an extremely sensitive, high stability superheterodyne receiver used for the reception of single sideband (upper sideband only), AM, CW, and tone-shift FSK. The receiver covers the 2 MC to 32 MC frequency range in four bands. The receiver is designed to function with Manson Laboratories Frequency Synthesizer Model 402 which generates conversion oscillator, mixer and BFO frequencies.

1-5. This receiver is designed for operation from a 220-volt AC, 47 to 60 CPS, single-phase power source, and will operate for long periods with constant control settings. It differs from ordinary communications receivers in that its stability is derived from the stability of the frequency synthesizer. The receiver is shown in figure 1-1.

1-6. The modes of operation are selectable at the front panel of the receiver. The three positions of the control knob are: SSB for single sideband (USB only), CW for continuous wave reception, and AM for amplitude modulation reception. The BFO (beat frequency oscillator) is operational in both the SSB and CW positions. The sideband crystal filter is effective only in the SSB position. The BFO is disabled when the mode switch is in the AM position.

1-7. The audio output is available at the rear panel of the receiver. This provides a 600-ohm, with center tap, balanced line output. The output level is adjustable from less than -20 DBM to +2 DBM. Loudspeaker operation is obtained with a separate, external power amplifier which raises the level to +30 DBM or 1 watt.

1-8. Modular construction has been employed in the nineteen-inch rack mounted receiver. Any of the following modules can be quickly removed and replaced with ease.

1. RF Deck, Assembly A1
2. IF and Audio Amplifier, Assembly A2
3. Second Converter, Assembly A3
4. 1300 KC Generator Card, Assembly A4
5. 300 KC Generator Card, Assembly A5
6. Power Supply, Assembly A6

1-9. The receiver is mounted on a tilt-slide mechanism which allows the receiver to be slid from its rack mounting and tilted up on end to expose the bottom chassis wiring. The receiver can be locked in any position maintenance personnel find most convenient to use.

1-10. TECHNICAL CHARACTERISTICS.

1-11. The technical characteristics of the Model MSR-1A receiver are listed in table 1-1. Performance of the receiver is based upon use with a Manson Laboratories Frequency Synthesizer Model 402.

1-12. PRELIMINARY CONNECTIONS.

1-13. All connections to and from the receiver are accomplished through mating jacks and plugs located at the rear of the receiver (see figure 1-2).

1. The primary power (220 volts AC ±10%, 47-60 CPS) is connected to power jack J7.

2. The antenna is connected to antenna jack J5 through 50-ohm impedance coaxial cable.

3. The audio output (600 ohms impedance, centertapped and balanced) is acquired at jack J6. The receiver is muted by applying a 24-volt potential between pin 5 and ground of this audio output connector.

4. The frequency synthesizer supplies four different signals which are connected in the following manner:

   a. The tunable frequency output (2.450 to 33.750 MC) of the synthesizer is connected to jack J1 through 50-ohm impedance coaxial cable.

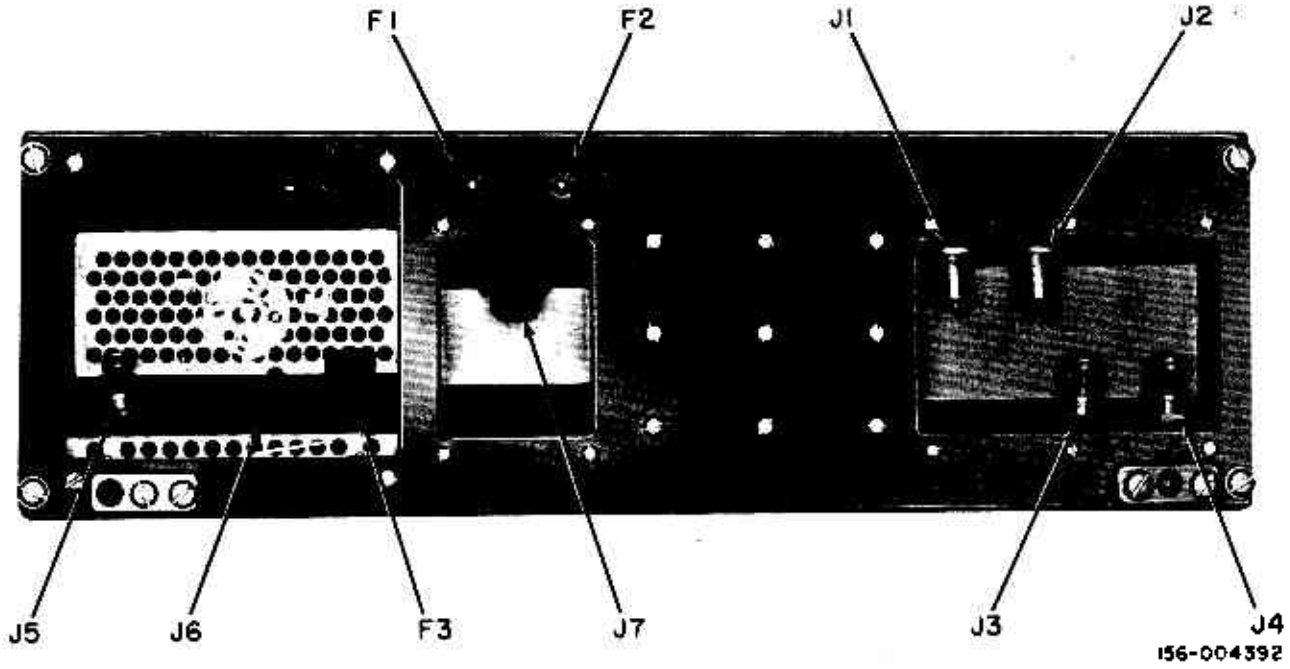


Figure 1-2. Rear Panel View of Receiver MSR-1A.

b. The 1750 KC BFO output of the synthesizer is connected to jack J2 through 50-ohm coaxial cable.

c. The 1 MC output of the synthesizer is connected to jack J3 through 50-ohm coaxial cable.

d. The 100 KC output of the synthesizer is connected to jack J4 through 50-ohm coaxial cable.

TABLE 1-1. TECHNICAL CHARACTERISTICS.

Reception	SSB (USB Only), CW, and AM
Frequency Coverage	2.0 MC through 32 MC in four bands Band 1: 2.0 MC - 4.0 MC Band 2: 4.0 MC - 8.0 MC Band 3: 8.0 MC - 16.0 MC Band 4: 16.0 MC - 32.0 MC
Intermediate Frequency	Bands 3 and 4, single conversion - 1750 KC Bands 1 and 2, dual conversion - 450 KC 1st IF, 1750 KC 2nd IF.
Sensitivity	SSB, less than 0.2 microvolt for 10 DB signal plus noise-to-noise ratio.
Selectivity	SSB, approximately 2700 CPS with unwanted sidebands rejected greater than 60 DB.
AGC	Holds constant output within 3 DB with input levels from 1 to 1,000,000 microvolts
Receiver Muting	Receiver can be muted by applying a 24-volt DC potential between pin 5 and ground of audio output connector J6.
Power Source	220 volts AC ±10%, 47 to 60 CPS
Power Consumption	125 watts
Number of Tubes	14
Audio Output	600 ohms impedance, balanced with center tap at 0 DBM (1 milliwatt).
Antenna Input	50 ohms, unbalanced, nominal impedance
Weight	56 pounds
Mounting Dimensions	Standard 19-inch rack, 5-1/8 inch high panel, and depth from front panel to rear panel surfaces is 20-1/2 inches.

SECTION II

OPERATION

2-1. GENERAL.

2-2. This section describes the operating procedures, controls, and indicators used in the operation of Receiver MSR-1A.

2-3. CONTROLS AND INDICATORS.

2-4. All operating controls and indicators of the receiver are located on the front panel except for the AGC-MGC switch A2S2 and manual gain control A2R33 which are located on the IF and audio amplifier assembly A2. The front panel of Receiver MSR-1A is shown in figure 2-1. The function of the controls and indicators are outlined in table 2-1.

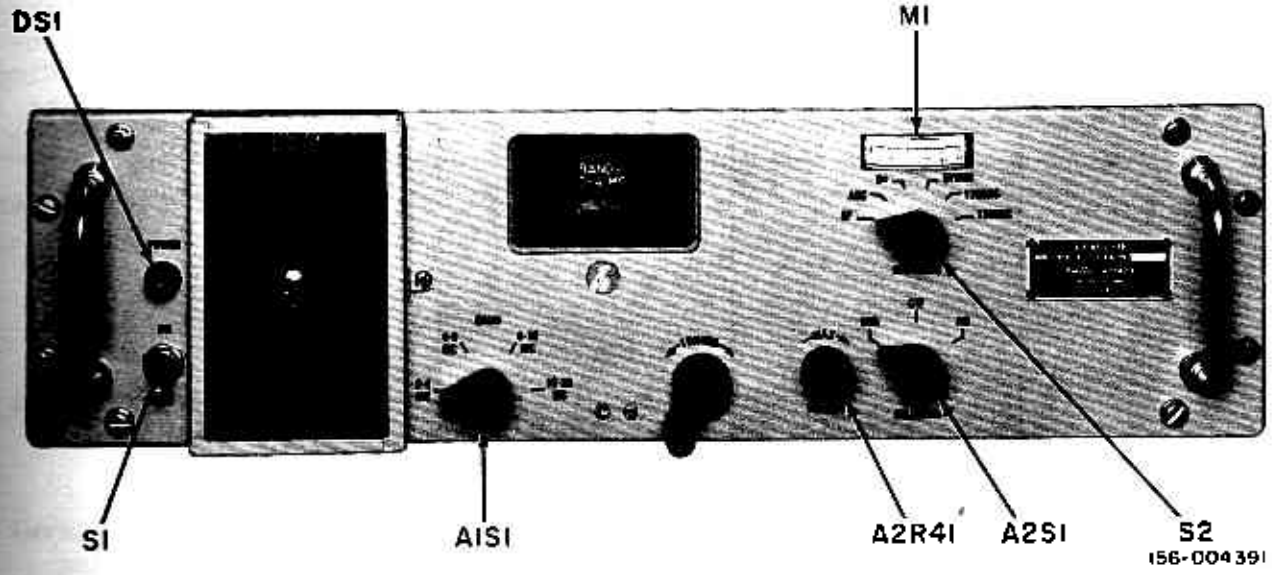


Figure 2-1. Front Panel View of Receiver MSR-1A.

TABLE 2-1. FUNCTION OF CONTROLS

Item	Reference Designation	Positions	Function
POWER switch	S1	ON OFF	Applies primary power to the receiver.
Indicator light	DS1	-	Illuminates to show primary power is applied.
BAND switch	A1S1	2-4 MC 4-8 MC 8-16 MC 16-32 MC	Switches receiver for operation on one of four bands.
MODE SELECTOR switch	A2S1	SSB CW AM	Switches receiver for operation in one of three modes.
TUNING control	-	-	Tunes the coils in the RF deck for a specific frequency within one of the four bands.
VOLUME control	A2R41	MAX	Adjusts the level of signal being fed to the audio amplifier to control output level. Clockwise rotation produces maximum output.
METERING switch	S2		Position of switch determines which of the following relative levels will be displayed on meter M1.
		AF	Displays relative level of AF voltage out of receiver.
		AGC	Displays relative level of AGC voltage being applied to IF amplifier.
		B+	Displays relative level of B+ voltage out of power supply.
		SYNTH	Displays relative level of the variable frequency input from the frequency synthesizer.

TABLE 2-1. FUNCTION OF CONTROLS (CONT).

Item	Reference Designation	Positions	Function
		1750 KC	Displays relative level of the 1750 KC BFO input from the frequency synthesizer.
		1300 KC	Displays relative level of the 1300 KC input to the second converter.
AGC-MGC switch	A2S2	AGC MGC	Position determines whether the voltage from AGC amplifier A2V5 or from MGC control A2R37 will control the gain of the IF amplifier.
MGC control	A2R37	—	Position determines a fixed level of bias to control the IF amplifier gain.
AGC control	A2R33	—	Position determines back-bias applied to IF AGC detector for proper AGC control range.

2-5. OPERATION

2-6. The following steps outline the procedure for operating Receiver MSR-1A.

1. Place POWER switch S1 in the ON position and allow five minutes for the receiver to warm up. Indicator DS1 should light to indicate primary power is applied.

2. Place BAND switch A1S1 in the band position in which operation is desired.

3. Adjust TUNING control until the desired operating frequency appears under the calibrate line cursor in the dial window.

4. Adjust the external frequency synthesizer input to obtain the correct operating frequency.

5. Place METERING switch S1 in the 1300 KC, 1750 KC and SYNTH positions. Adjust the frequency synthesizer input to obtain approximately two-thirds deflection on meter in each position of METERING switch.

6. Place METERING switch S1 in the AF position and adjust the TUNING control for maximum deflection on the meter.

2-7. The system is normally operated with AGC-MGC switch A2S2 in the AGC position.

SECTION III

THEORY OF OPERATION

3-1. GENERAL.

3-2. Receiver Model MSR-1A is an extremely sensitive, high stability superheterodyne used for the reception of single sideband (upper sideband only), AM, CW, and tone shift FSK. The receiver covers the 2 MC to 32 MC frequency range in four octave bands (2 to 4 MC; 4 to 8 MC; 8 to 16 MC; and 16 to 32 MC) and functions with an external frequency synthesizer which generates conversion oscillator, mixer and BFO frequencies. The stability of the receiver is derived from the stability of the frequency synthesizer.

3-3. RF AMPLIFIER AND SECOND CONVERTER.

3-4. The antenna signal is applied through a 50-ohm unbalanced input circuit to an RF amplifier consisting of four tuned circuits and pentode A1V1. A block diagram of the receiver is shown in figure 4-1.

3-5. The output of RF amplifier A1V1 feeds first mixer amplifier A1V2 along with the variable local oscillator input from the external frequency synthesizer. The local oscillator input from the external frequency synthesizer is fed to first mixer A1V2 through injection amplifier A1V3.

3-6. When operating on bands 1 and 2, the frequency input from the synthesizer is set to obtain a difference output frequency of 450 KC from mixer A1V2. When operating on bands 3 and 4, the frequency input from the synthesizer is set to obtain a difference output frequency of 1750 KC from mixer A1V2. The 1750 KC output from the mixer when operating on bands 3 and 4 is applied directly to the IF amplifier through wafer G of bandswitch A1S1. The 450 KC output from the mixer when operating on bands 1 and 2 is applied to second converter chassis A3 where it is mixed with a 1300 KC signal to obtain the IF frequency of 1750 KC.

3-7. 1300 KC GENERATOR.

3-8. In the 1300 KC generator, a 300 KC signal from the 300 KC generator is fed to a balanced modulator with a 1 MC input from the frequency synthesizer. The 1300 KC output from the balanced modulator is amplified by buffer amplifier A4Q1 and driver amplifier A4Q2 and is then fed to the second converter.

3-9. 300 KC GENERATOR.

3-10. The 300 KC generator develops its 300 KC signal from a 100 KC input from the frequency synthesizer. The 100 KC input is multiplied three times by frequency multiplier A5Q1 and is fed to buffer amplifier A5Q2 which feeds the balanced modulator in the 300 KC generator.

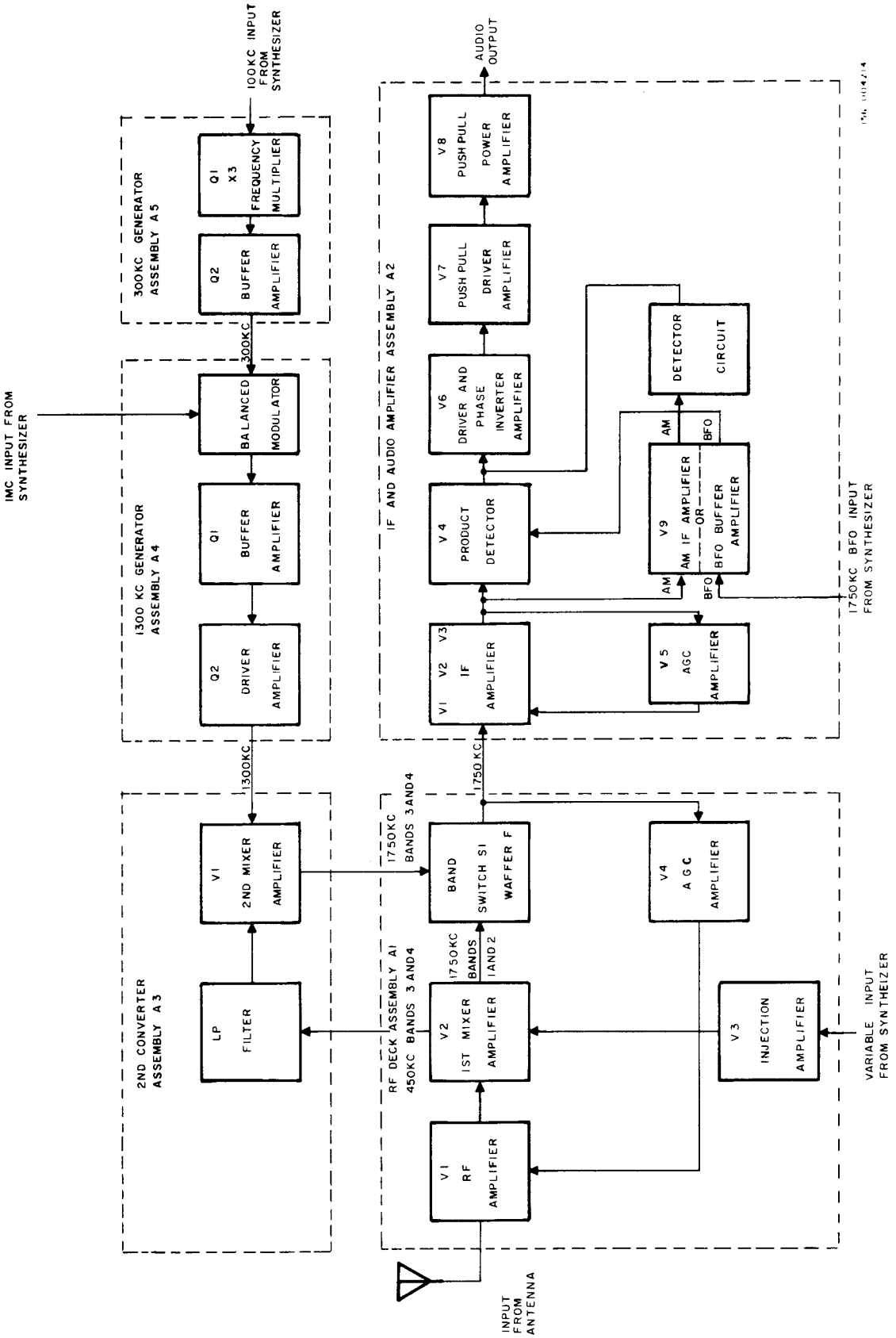


Figure 3-1. Block Diagram of Receiver MSR-1A.

3-11. IF AMPLIFIER.

3-12. The IF amplifier receives its 1750 KC input from the RF amplifier chassis. The incoming signal is amplified by first IF amplifier A2V1. The CW and AM output of first IF amplifier A2V1 is coupled to second IF amplifier A2V2; SSB signals pass through SSB filter A2FL1 before being applied to the second IF amplifier. Additional amplification is provided by third IF amplifier A2V3. Tube A2V9 serves as a buffer amplifier for the 1750 KC BFO injection signal when MODE SELECTION switch A2S1 is in the SSB or CW position. When MODE SELECTION switch A2S1 is in the AM position, A2V9 serves as a fourth IF amplifier for AM signals.

3-13. DETECTION CIRCUITS.

3-14. The upper sideband and CW output of the third IF amplifier is fed to grid number one (pin 1) of product detector A2V4 through capacitive diode A2CR1. Grid number two (pin 7) of product detector A2V4 receives a 1750 KC input from the BFO buffer amplifier A2V9 through MODE SELECTION switch wafer A2S1Da. The resultant output of product detector A2V4 is coupled through capacitor A2C24 and MODE SELECTION switch wafer A2S1Ea to the audio amplifier section.

3-15. BFO buffer amplifier A2V9 receives its 1750 KC input from the frequency synthesizer. The output of buffer amplifier A2V9 is taken from the plate circuit between capacitors A2C28 and A2C29.

3-16. The AM output of the third IF amplifier is fed to the grid of buffer amplifier A2V9 through MODE SELECTION switch wafer A2S1C. The output of buffer amplifier A2V9 is taken from the plate and is coupled to a detector circuit through capacitor A2C27. The output of the detector circuit is fed to the audio amplifier section through MODE SELECTION switch wafer A2S1Db.

3-17. AUDIO AMPLIFIER.

3-18. The audio amplifier consists of a conventional three-stage push-pull amplifier. The first stage serves as an audio amplifier and phase inverter. The output of the first stage is coupled to A2V7 which drives power amplifier A2V8. A separate winding on output transformer A2T4 is used to obtain a negative feedback signal to improve the performance of the audio amplifier. The amplifier delivers a 1 milliwatt output at 600 ohms impedance, balanced with center tap. The receiver can be muted by applying a 24-volt potential between pin 5 and ground of audio output connector J6.

3-19. AGC AMPLIFIERS.

3-20. Two independent AGC amplifier circuits are used in receiver MSR-1A for control of the RF amplifier and the IF amplifier.

3-21. The 1750 KC IF output frequency of the RF amplifier chassis is also fed internally to AGC amplifier A1V4. The output of the amplifier is rectified and the resultant DC voltage is applied as bias to the grid of RF amplifier A1V1 to control

the RF amplifier gain. This AGC is delayed until the signal at the antenna reaches an amplitude of 5000 microvolts. This level is preset by adjusting back bias potentiometer A1R20.

3-22. The IF amplifier develops its AGC signal from the output of the third IF amplifier. The output of the third IF amplifier is fed to AGC amplifier A2V5. The output of the AGC amplifier is detected and the resultant DC voltage is fed to the grids of the three IF amplifier stages (A2V1, A2V2, and A2V3) to control their gain. The resultant DC control voltage is also fed to capacitive diode A2CR1 located between third IF amplifier A2V3 and product detector A2V4. The level of voltage on capacitive diode A2CR1 determines the degree of coupling of the diode and helps augment the action of the conventional AGC circuits for SSB and CW signals. The threshold level (0.6 microvolts) of the AGC control is preset by back bias potentiometer A2R33.

3-23. The resultant action of all the AGC circuits holds the output of Receiver MSR-1A constant within 3 DB with input levels that may vary from 1 to 1,000,000 microvolts. Because of the delay in AGC control (0.6 microvolts) the receiver has effectively no AGC applied when weak signals are received. If desired, the gain of the IF amplifier can then be set with manual gain control A2R37, however, the AGC will no longer be operative.

3-24. POWER SUPPLY.

3-25. The power supply operates off a 220-volt AC, 47 to 60 CPS input. Three regulated outputs are provided: -24 volts DC at 15 milliamperes maximum, +24 volts DC at 8 milliampers maximum; and +185 volts DC at 350 milliamperes maximum. Two AC filament outputs are provided: 6.3 volts AC at 6 amperes, and 6.3 volts at 3 amperes. The DC regulated sections of the power supply have been completely transistorized for longer life and reliability.

SECTION IV

MAINTENANCE

4-1. GENERAL.

4-2. Instructions outlined in this section are directed mainly to personnel familiar with electronic equipment. Testing techniques will depend in many cases on the variety of test equipment available. The ingenuity of maintenance personnel is also a factor in adapting the equipment on hand for testing with preventive and corrective maintenance in mind.

4-3. Preventive maintenance differs from corrective maintenance in that its objective is to prevent trouble from occurring. Preventive maintenance is work performed on equipment to keep it in good working order and prevent needless breakdowns and interruptions in service. Corrective maintenance is required when a malfunction of the equipment becomes apparent and an electrical or mechanical adjustment or replacement of components is necessary.

4-4. PREVENTIVE MAINTENANCE.

4-5. Periodic mechanical and electrical checks should be performed by maintenance personnel to minimize equipment failure and maintain continuity of service. The following procedure should be of aid in checking the system for items which may result either in equipment breakdown or in shortening the time of its useful service:

1. Remove all dirt, corrosion, and moisture from receptacles, plugs, cases, and especially in and around RF transmission line connectors.

2. Check the action of all controls for binding, scraping, misalignment, excessive looseness, and positive operation.

3. Examine all plugs and receptacles for firm seating and positive contact.

4. Inspect all cables for signs of breaks, kinks, improper connections, and burned or frayed insulation.

5. Clean the receivers air intake.(See paragraph 4-6.)

6. Inspect all plug-in units, such as tubes, generator cords, and modules, for breakage, loose mounting, and improper seating.

7. Check blower for free rotation.

8. Inspect internal flexible wiring for signs of breaks, improper dress, and burned or frayed insulation.

4-6. CLEANING AIR FILTER.

4-7. Remove the air filter from the front panel. Remove all dirt and dust by washing the filter with a suitable dry cleaning solvent. Dry the filter thoroughly and immerse in a pan of light, clean petroleum oil type SAE 10 or equivalent. After soaking, hang the filter over the oil bath until the droplets cease falling. Replace

air filter in equipment.

4-8. CORRECTIVE MAINTENANCE.

4-9. When the equipment fails to function properly, the trouble may be corrected by mechanical or electrical adjustment, or if necessary, by replacement of one or more defective parts. When a malfunction occurs in a system, the normal procedure is to identify the trouble and localize the source to a particular stage or component by means of the voltage and resistance chart, and schematic diagram.

4-10. The meter on the front panel of Receiver MSR-1A will also be found helpful in many cases for making quick checks on the operation of many critical circuits in the receiver. By rotating METERING switch S2 through its positions, a malfunction may be indicated which would lead maintenance personnel to examine the circuit indicated by the position of the switch. The meter gives relative readings only; once the equipment is installed and operating normally a log should be kept of normal indications. Table 4-1 is provided for this purpose.

TABLE 4-1. NORMAL INDICATIONS FOR METER M1

AF	AGC	B+	SYNTH	1750 KC	1300 KC

4-11. VOLTAGE AND RESISTANCE MEASUREMENTS.

4-12. Voltage and resistance readings taken at the pins of tube sockets in RF deck assembly A1, and IF and audio amplifier assembly A2 are given in tables 4-3 through 4-6. Voltage and resistance readings taken at various points of 2nd converter assembly A3 are given in tables 4-7 and 4-8.

4-13. All voltage and resistance measurements were taken with a Rowan Model 477 VOM. All voltage measurements were made with power applied to the system and under the conditions indicated in the notes listed below each table. All resistance measurements were made with the assemblies removed from the receiver and with no power applied.

4-14. SCHEMATIC DIAGRAMS.

4-15. Schematic diagrams of Receiver MSR-1A are contained in figures 4-3 through 4-9. The reference designation system used in the diagrams represents a unit numbering system. All modules, and cards in the receiver have been assigned an assembly number from A1 through A6. Within each assembly, the parts of a particular group have been assigned consecutive numbers beginning with the number one. For example, each of the assemblies contain a resistor with the designation R1, but these desig-

nations are abbreviated. To obtain the complete reference designation of a part, prefix the number found on the schematic diagram with the assembly number. Hence the complete numbers of the first resistor in each assembly would be A1R1, A2R1, A3R1, A4R1, A5R1, and A6R1. The same would hold true for the capacitors, transformers, etc. Parts which are mounted on the basic chassis and front panel are not prefixed with an assembly number.

4-16. ALIGNMENT PROCEDURE.

4-17. The following paragraphs describe the alignment procedure for the various circuits of Receiver MSR-1A. They should only be performed if a critical component has been repaired or replaced or if the circuit is not operating properly. If the entire receiver requires alignment, all stages must be aligned in the same sequence as they appear in the following paragraphs. If only one circuit requires alignment, refer only to the procedure listed under that particular circuit. The location of all adjustment points for the alignment procedures are illustrated in figures 4-1 and 4-2.

4-18. RF AND RF AGC AMPLIFIER ALIGNMENT.

4-19. The following steps describe the procedures for aligning the RF and RF AGC amplifier:

1. Connect a Hewlett-Packard Model 606A, or equivalent, signal generator to antenna input connector J5 on the rear of the receiver.

2. Connect a General Radio Co. Type 583A, or equivalent, audio output power meter to pins 1 and 2 of connector J6 located on the rear panel of the receiver.

3. All of the inputs from the frequency synthesizer should be connected to the receiver; the frequency synthesizer should be operating.

4. Place MODE SELECTOR switch A2S1 in the SSB position.

5. Place AGC-MGC switch A2S2 located on IF amplifier assembly A2 in the MGC position.

6. Set BAND switch A1S1 to the band that is to be adjusted.

7. Set the TUNING control to the lowest point in the band (2 MC, 4 MC, 8 MC, or 16 MC).

8. Adjust the cores of all inductors ganged to the tuning mechanism so that the cores are flush with the bottom of the coil forms. The cores are adjustable with an Allen wrench by turning the screw shaft in or out on top of the chassis.

9. Set all of the trimmer capacitors to approximate mid-range.

10. Set the TUNING control to read the highest frequency in the band (4 MC, 8 MC, 16 MC, or 32 MC).

11. Set the frequency synthesizer to the highest frequency in the band in which the receiver is set (4 MC, 8 MC, 16 MC, or 32 MC).

12. Set the frequency generator to the highest frequency in the band in which the receiver is set (4 MC, 8 MC, 16 MC, or 32 MC).

13. Adjust the output of the frequency generator to obtain a slight reading on the audio output meter.

14. Adjust the cores of the coils for the band being adjusted (See table 4-2.) to obtain maximum reading on the audio output meter. Continually adjust the output of the signal generator to maintain as close to a one milliwatt reading on the power meter as possible.

NOTE

After making an adjustment of the cores on any of the inductors, the two screws which secure the support for the threaded shaft of the core should be loosened and then retightened to ensure alignment of the threaded shaft with the tuning mechanism.

15. Set the TUNING control of the receiver, the frequency synthesizer, and the frequency generator to the lowest frequency in the band in which the receiver is set (2 MC, 4 MC, 8 MC, or 16 MC).

16. Note the reading on the audio output power meter.

17. Adjust the first trimmer capacitor to determine if a higher peak can be obtained on the audio output power meter. If no greater peak can be obtained, the first tank circuit is aligned. Return the capacitor to its original position and proceed to check the second trimmer capacitor. If a higher peak can be obtained by adjusting the trimmer capacitor, note the difference that exists between the peak obtained by adjusting the capacitor and the reading obtained in step 16.

18. Adjust the trimmer capacitor to return the audio output power meter to its original reading noted in step 16.

19. Adjust the coil associated with the trimmer capacitor just adjusted so as to decrease the reading on the audio output power meter by half the amount of the difference observed in step 17.

20. Adjust the trimmer capacitor for peak indication on the audio output power meter.

21. Repeat steps 16 through 20 for each of the other trimmer capacitors in the band.

22. Return the operating frequency of the receiver, frequency synthesizer, and frequency generator to the high end of the band.

23. Note the reading on the audio output power meter.

TABLE 4-2. COIL AND CAPACITOR BAND ASSOCIATION FOR RF DECK

Band NO.	——— Adjust in this order ——→					
Band 1	Coil	L7	L8	L16	L17	L29
2-4 MC	Capacitor	C22	C24	C55	C57	C74
Band 2	Coil	L1	L2	L10	L11	L20
4-8 MC	Capacitor	C3	C5	C35	C37	C65
Band 3	Coil	L5	L6	L14	L15	L26
8-16 MC	Capacitor	C16	C18	C49	C51	C71
Band 4	Coil	L3	L4	L12	L13	L23
16-32 MC	Capacitor	C9	C11	C42	C44	C69

24. Adjust the first trimmer capacitor to determine if a higher peak can be obtained on the audio output power meter. If no greater peak can be obtained the first tank circuit is aligned. Return the capacitor to its original position and proceed to check the second trimmer capacitor. If a higher peak can be obtained by adjusting the trimmer capacitor, return the trimmer capacitor to the reading observed in step 23.

25. Adjust the coil associated with the trimmer capacitor just adjusted to obtain a peak indication on the audio output power meter.

26. Note the reading on the audio output power meter.

27. Adjust the coil to obtain a reading on the audio output power meter halfway between the level observed in step 23 and step 26.

28. Adjust the trimmer capacitor to obtain a peak indication on the audio output power meter.

29. Repeat steps 15 through 28 until the sum of the changes caused by all of the trimmer capacitors in a given band equal 3 DB or less.

30. Repeat steps 6 through 29 for the other three bands.

31. Set BAND switch A1S1 in one of the bottom two bands.

32. Set the frequency synthesizer and frequency generator to the same frequency as the receiver.

33. Adjust A1L32 and A1L33 to obtain a peak indication on the audio output power meter.

34. Set BAND switch A1S1 in one of the top two bands.

35. Adjust A1L34 to obtain a peak indication on the audio output power meter.

36. Set BAND switch A1S1 in one of the bottom two bands.

37. Turn control A1R20 fully clockwise.

38. Adjust the frequency generator for an output of 3000 microvolts.

39. Adjust VOLUME control A2R41 to maintain a one milliwatt indication on the audio output power meter.

40. Connect the Rowan Model 477 VOM to the junction of A1C28 and A1R18. Set the meter to read a negative voltage.

41. Adjust A1L37 and A1T1 to obtain a peak indication on the VOM.

42. Adjust A1R20 for an indication of approximately 0.2 volt DC on the VOM.

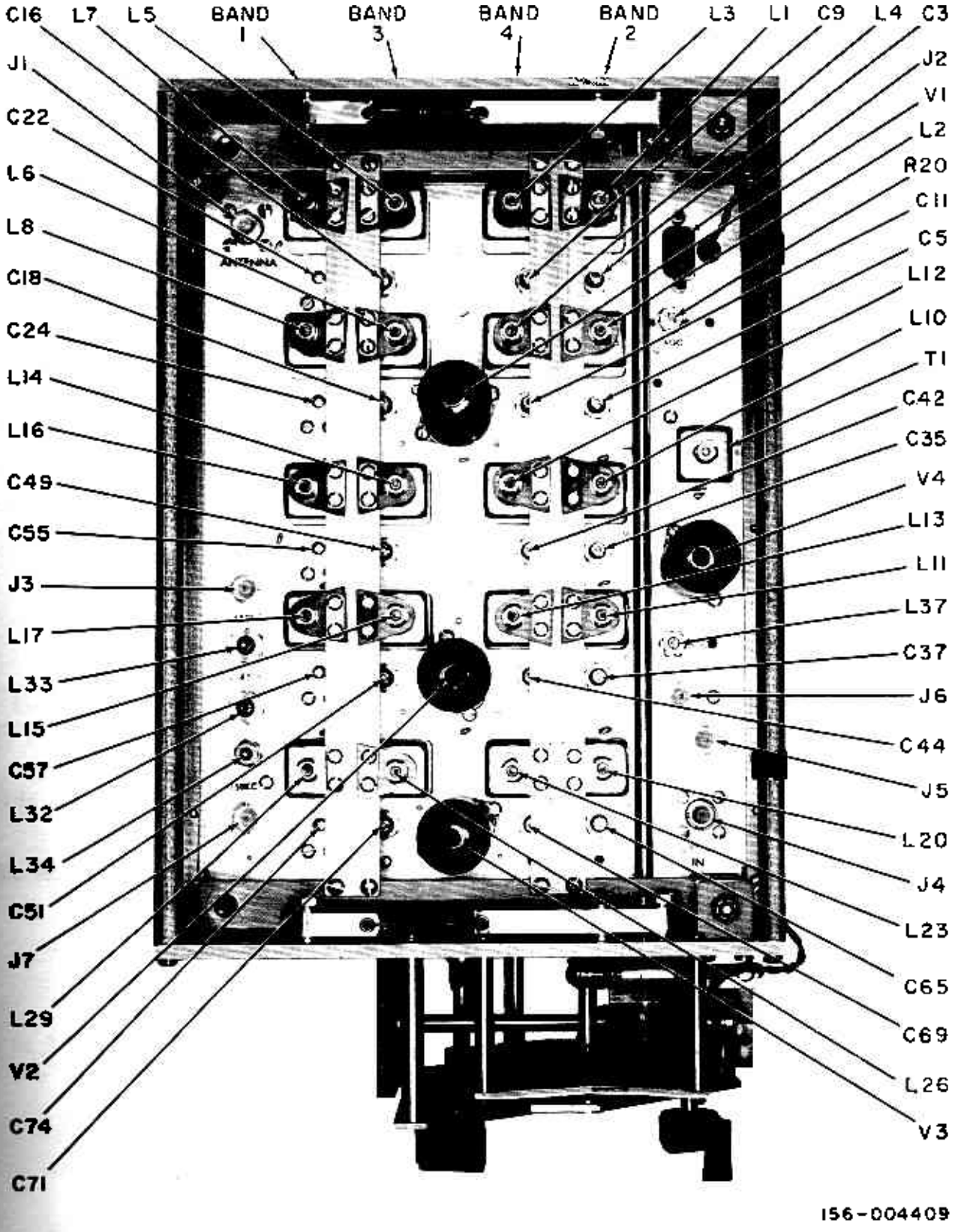


Figure 4-1. Top View of RF Deck.
(NOTE: The reference designations shown are abbreviated. Prefix all reference designations shown with A1 to obtain the complete reference designation.)

4-20. 300 KC GENERATOR ALIGNMENT.

4-21. The following steps describe the procedures for aligning 300 KC generator assembly A5.

1. The 100 KC input from the frequency synthesizer should be connected to J4 on the rear panel of the receiver; the frequency synthesizer should be operating.

2. Connect an oscilloscope to connector J2 on the 300 KC generator assembly A5.

3. Adjust A5T1, A5L1, A5T2, and A5T3 respectively for a maximum output indication on the oscilloscope.

4. Adjust A5R1 for maximum undistorted output signal on the oscilloscope.

NOTE

A final adjustment of the 300 KC generator is made in the 1300 KC generator alignment procedure.

4-22. 1300 KC ALIGNMENT PROCEDURE.

4-23. The following steps describe the procedures for aligning 1300 KC generator assembly A4.

1. The 1 MC input from the frequency synthesizer should be connected to J3 on the rear panel of the receiver; the frequency synthesizer should be operating.

2. Connect an oscilloscope to connector J3 on the 1300 KC generator assembly A4.

3. Adjust A4T1, A4T2, A4L1, A4T3, A4I2 and A4I4 respectively for maximum output indication on the oscilloscope.

4. Adjust A4R1 for maximum undistorted output signal on the oscilloscope.

5. Place METERING switch S2 in the 1300 KC position.

6. Adjust A5R1 on 300 KC generator assembly A5 for a maximum reading of 30 on meter M1 of the receiver.

4-24. SECOND CONVERTER ALIGNMENT PROCEDURE.

4-25. The following steps describe the procedure for aligning second converter assembly A3.

1. All of the inputs from the frequency synthesizer should be connected to the receiver; the frequency synthesizer should be operating.

2. Set BAND switch A1S1 to the 2-4 MC band.

3. Set the TUNING control to read 2 MC in the frequency readout window.

4. Set the frequency synthesizer to 2 MC.

5. Place METERING switch S2 in the 1300 KC position.

6. Adjust A3L1 for maximum meter reading.

7. Place METERING switch S2 in the AF position.

8. Adjust A3L2 for maximum meter reading.

--26. IF AND IF AGC AMPLIFIER ALIGNMENT.

--27. The following steps describe the procedures for aligning the IF and IF AGC amplifier.

1. Connect a Hewlett-Packard Model 606A or equivalent signal generator to connector J1 on the IF chassis.

2. Connect a General Radio Co. Type 583-A or equivalent audio output power meter to pins 1 and 2 of connector J6 located on the rear panel of the receiver.

3. The 1750 KC BFO input from the frequency synthesizer should be connected to connector J2 on the rear panel of the receiver; the frequency synthesizer should be operating.

4. Place MODE SELECTOR switch A2S1 in the AM position.

5. Place AGC-MGC switch A2S2 in the MGC position.

6. Adjust VOLUME control A2R41 for maximum output.

7. Adjust the signal generator for an output of 1750 KC modulated 30% with a 1000-cycle signal.

8. Adjust the output of the signal generator to obtain 1 milliwatt on the audio output power meter.

9. Adjust the top and bottom cores of transformers A2T1 and A2T2 to obtain maximum reading on the audio output power meter. Continually adjust the output of the signal generator to maintain as close to a 1 milliwatt reading on the audio output power meter as possible. The adjustment of the top and bottom cores of transformers A2T1 and A2T2 may react with each other. Consequently, continue to adjust the cores until no further increase of the audio output power meter is observed.

10. Adjust coil L10 to obtain maximum reading on the audio output power meter. Continue to adjust the output of the signal generator to maintain as close to a 1 milliwatt reading on the audio output power meter as possible.

11. Place MODE SELECTOR switch A2S1 in the SSB position and retune the signal generator slightly until an audio signal appears on the audio output power meter.

12. Turn the modulation of the signal generator off. Adjust the signal generator (in clockwise direction) for peak in audio output, maintaining approximately one millivolt output on the audio output power meter.

13. Adjust capacitor A2C32 to obtain a maximum reading on the audio output power meter. Continue to adjust the output of the signal generator to maintain as close to a 1 milliwatt reading on the audio output power meter as possible.

14. Place AGC-MGC switch A2S2 in the AGC position. Connect the AC probe of the Hewlett-Packard 410B VTVM between the diode pin of A2T3 and ground.

15. Adjust the top and bottom cores of transformer A2T3 to obtain maximum output on the VTVM.

16. Disconnect AC probe from A2T3 and connect the DC lead from the 410B VTVM between any point along the AGC line and ground (set meter to read negative).

17. Turn AGC control A2R33 fully counterclockwise.

18. Retune the top and bottom cores of transformer A2T3 for maximum meter reading on the 410B VTVM.

19. Disconnect the 410B VTVM and rotate AGC control A2R33 approximately 90° clockwise.

20. Adjust AGC control A2R33 to obtain no more than a 3 DB variance in output on the audio output power meter while varying the input from the signal generator over a range of from 3 microvolts to 0.3 volts.

4-28. AUDIO AMPLIFIER BALANCE ADJUSTMENT.

4-29. For peak performance, audio amplifier balance adjustment control A2R50 should be adjusted each time a critical component or tube is replaced in the audio amplifier. However, this adjustment should not be attempted unless a distortion analyzer instrument is available. If a distortion analyzer is available proceed as described in the following steps. If a distortion analyzer is not available, adequate performance will be obtained by leaving balance control A2R50 in the position set at the factory.

1. Disconnect cabled plug from connector A2J1 on the IF chassis.

2. Connect a Hewlett-Packard Model 606A or equivalent signal generator to connector A2J1 on the IF chassis.

3. Connect a General Radio Co. Type 583-A or equivalent audio output power meter and a Hewlett-Packard Model 330D or equivalent distortion analyzer to pins 1 and 2 of connector J6 located on the rear panel of the receiver.

4. The 1750 KC BFO input from the frequency synthesizer should be connected to connector J2 on the rear panel of the receiver; the frequency synthesizer should be operating.

5. Place MODE SELECTOR switch A2S1 in the SSB position.

6. Place AGC-MGC switch A2S2 in the AGC position.

7. Adjust VOLUME control A2R41 to obtain 2 milliwatt reading on the audio output power meter as the signal generator input level is increased to 3000 microvolts (0.003 volts) level. (Note - Signal generator is offset from 1750 KC to provide an audio output)

8. Adjust balance control A2R50 to obtain minimum distortion on the distortion analyzer at a 2 milliwatt reading on the audio output power meter.

9. Disconnect the test equipment and reconnect the receiver cable plug back on connector A2J1 of the IF chassis.

4-30. No instructions are given for the alignment of capacitors A2C7 and A2C8 which are associated with the sideband filter A2FL1. (Adjustment of these two capacitors should not be attempted unless a frequency counter and sweep generator are available.)

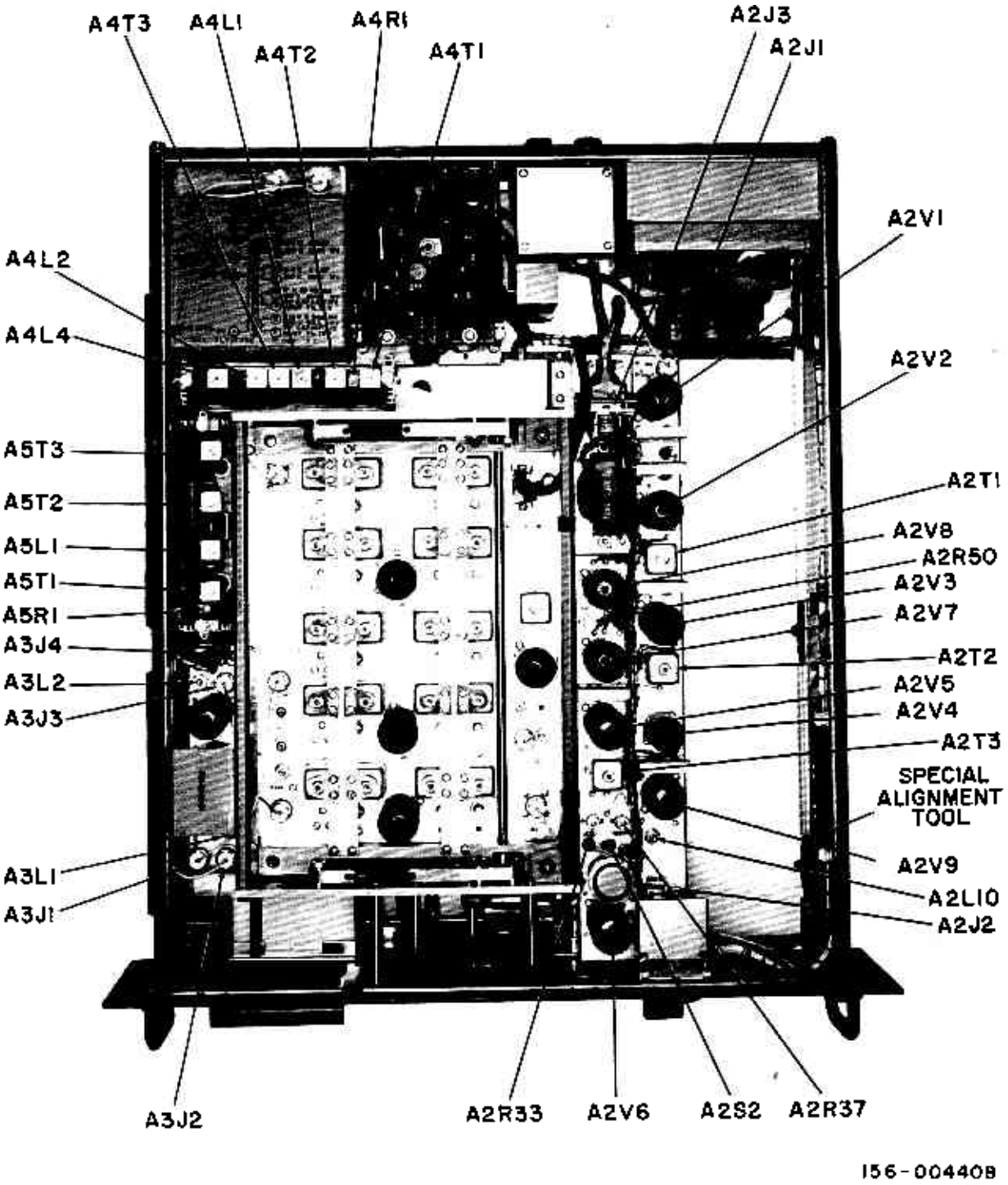


Figure 4-2. Top View of Receiver MSR-1A.

TABLE 4-3. RF DECK ASSEMBLY A1 TUBE SOCKET VOLTAGE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	+1.9	0	+1.9	0	6.3 VAC	0	+185	+90	0
V2	+3.4	0	+3.4	0	6.3 VAC	0	+185	+120	0
V3	+4.9	0	+4.9	0	6.3 VAC	0	+185	+135	0
V4	+4.8	0	+4.8	0	6.3 VAC	0	+185	+135	0

1. Voltage readings taken with no signal input.
2. All voltage readings are in volts DC unless otherwise specified.
3. Voltages are read to ground.

TABLE 4-4. RF DECK ASSEMBLY A1 TUBE SOCKET RESISTANCE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	142	1M	142	0	0.5	0	∞	∞	0
V2	330	240K	330	0	0.5	0	∞	∞	0
V3	680	47	680	0	0.5	0	∞	∞	0
V4	680	2	680	0	0.5	0	∞	∞	0

1. All resistance readings are in ohms and measured to ground.
2. Disconnect power connector from RF Deck before taking resistance readings.

TABLE 4-5. IF AND AUDIO AMPLIFIER ASSEMBLY A2 TUBE SOCKET VOLTAGE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	+1.8	-0.8	+1.8	6.1AC	6.1AC	0	+183	+86	0
V2	+1.75	0	+1.75	6.1AC	6.1AC	0	+183	+86	0
V3	+1.75	0	+1.75	6.0AC	6.0AC	0	+175	+87	0
V4	0	1.3	6.1AC	6.1AC	+120	+26.5	0	-	-
V5	+1.75	0	+1.75	6.1AC	6.1AC	0	+175	+81	0
V6	+122	0	+0.95	6.1AC	6.1AC	+120	0	+0.95	6.1AC
V7	+70	0	+2.35	6.1AC	6.1AC	+70	0	+2.35	6.1AC
V8	+174	0	+5	6.1AC	6.1AC	+174	0	+5	6.1AC
V9	6.1AC	-	-	-	-	+177	0	+3.3	6.1AC

NOTES: 1. Voltage readings taken with no signal input, BFO disconnected, and AGC-MGC switch A2S2 in the AGC position.

2. All voltage readings are in volts DC unless otherwise specified.

3. Voltages are read to ground except V1 through V8 which are taken between pins 4 and 5, and V9 which are taken between pins 1 and 9.

TABLE 4-6. IF AND AUDIO AMPLIFIER ASSEMBLY A2 TUBE SOCKET RESISTANCE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	120	1M	120	1.4K	1.4K	0	500K	450K	0
V2	120	1M	120	1.4K	1.4K	0	500K	450K	0
V3	120	1M	120	1.4K	1.4K	0	500K	450K	0
V4	95K	470	1.4K	1.4K	600K	750K	100K	-	-
V5	120	100K	120	1.4K	1.4K	0	600K	650K	0
V6	700K	10K	1.8K	1.4K	1.4K	700K	100K	1.8K	1.4K
V7	600K	270K	470	1.4K	1.4K	550K	250K	470	1.4K
V8	475K	101K	270	1.4K	1.4K	450K	101K	270	1.4K
V9	1.4K	-	-	-	-	600K	100K	560	1.4K

NOTES:
1. All resistance readings are in ohms and measured to ground.
2. Disconnect power connector from IF chassis before taking resistance readings.

TABLE 4-7. SECOND CONVERTER ASSEMBLY A3 TUBE SOCKET VOLTAGE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	+6	0	+6	6.4 AC	6.4 AC	0	+185	+150	0

NOTE:
1. Voltage readings taken with no signal input.
2. All voltage readings are in volts DC unless otherwise specified.
3. Voltages are read to ground except pins 4 and 5, which are taken between pins 4 and 5.

TABLE 4-8. SECOND CONVERTER ASSEMBLY A3 TUBE SOCKET RESISTANCE READINGS

TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1	1K	100	1K	∞	∞	0	∞	∞	0

NOTE:
1. All resistance readings are in ohms and measured to ground.
2. Disconnect power connecter from second converter before taking resistance readings.

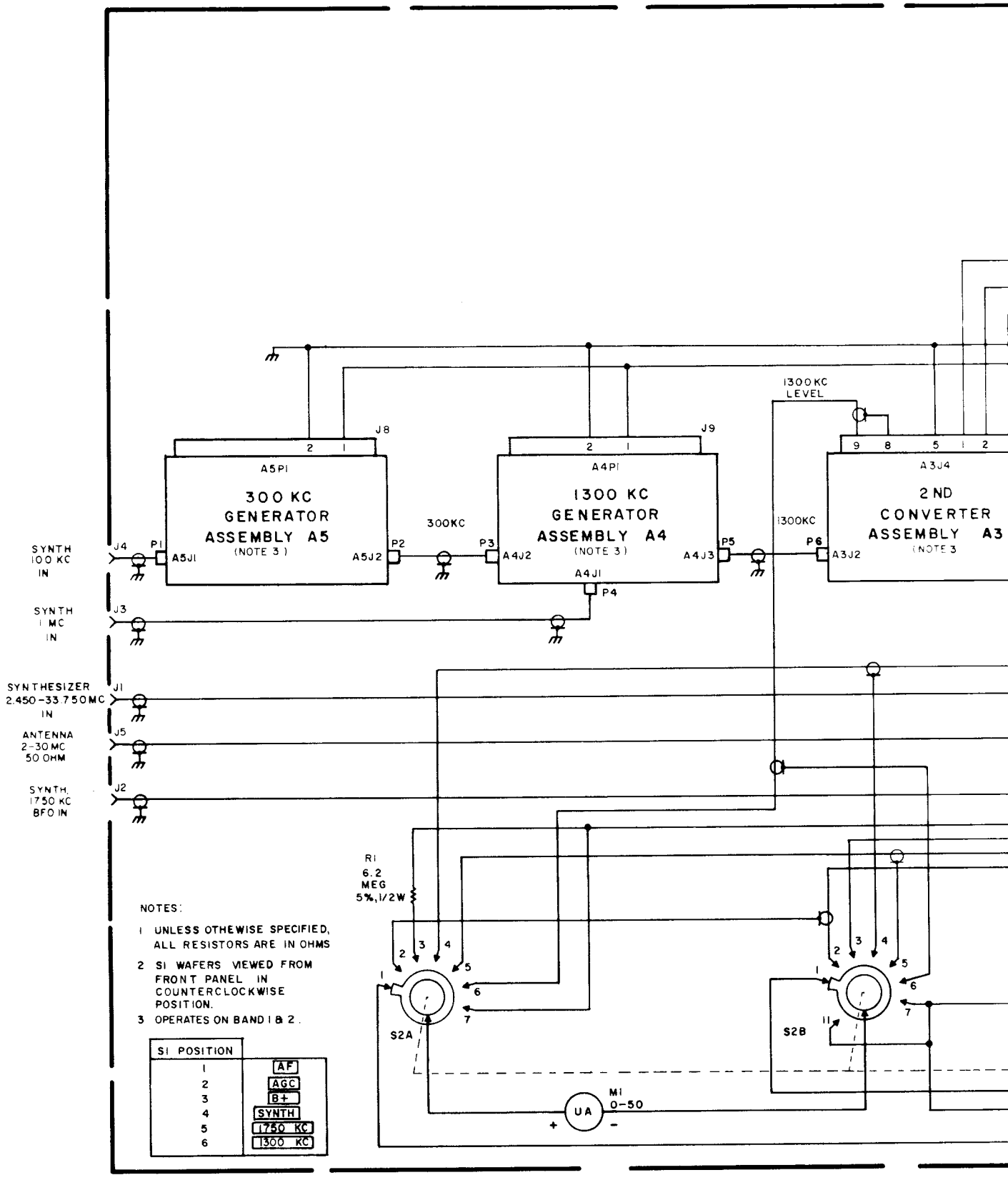
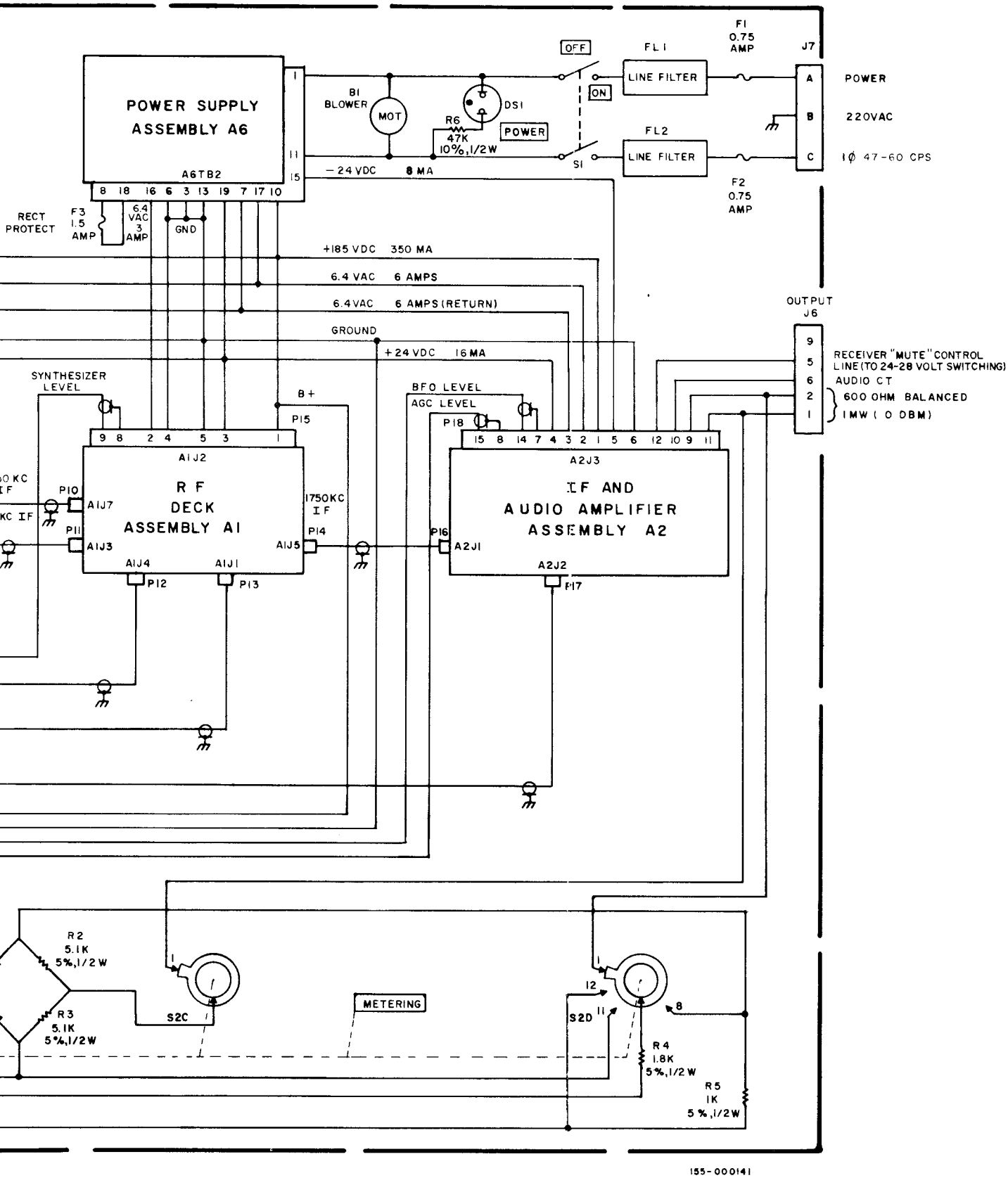


Figure 4-3. Interconnecti



ng Diagram, Receiver MSR-1A.

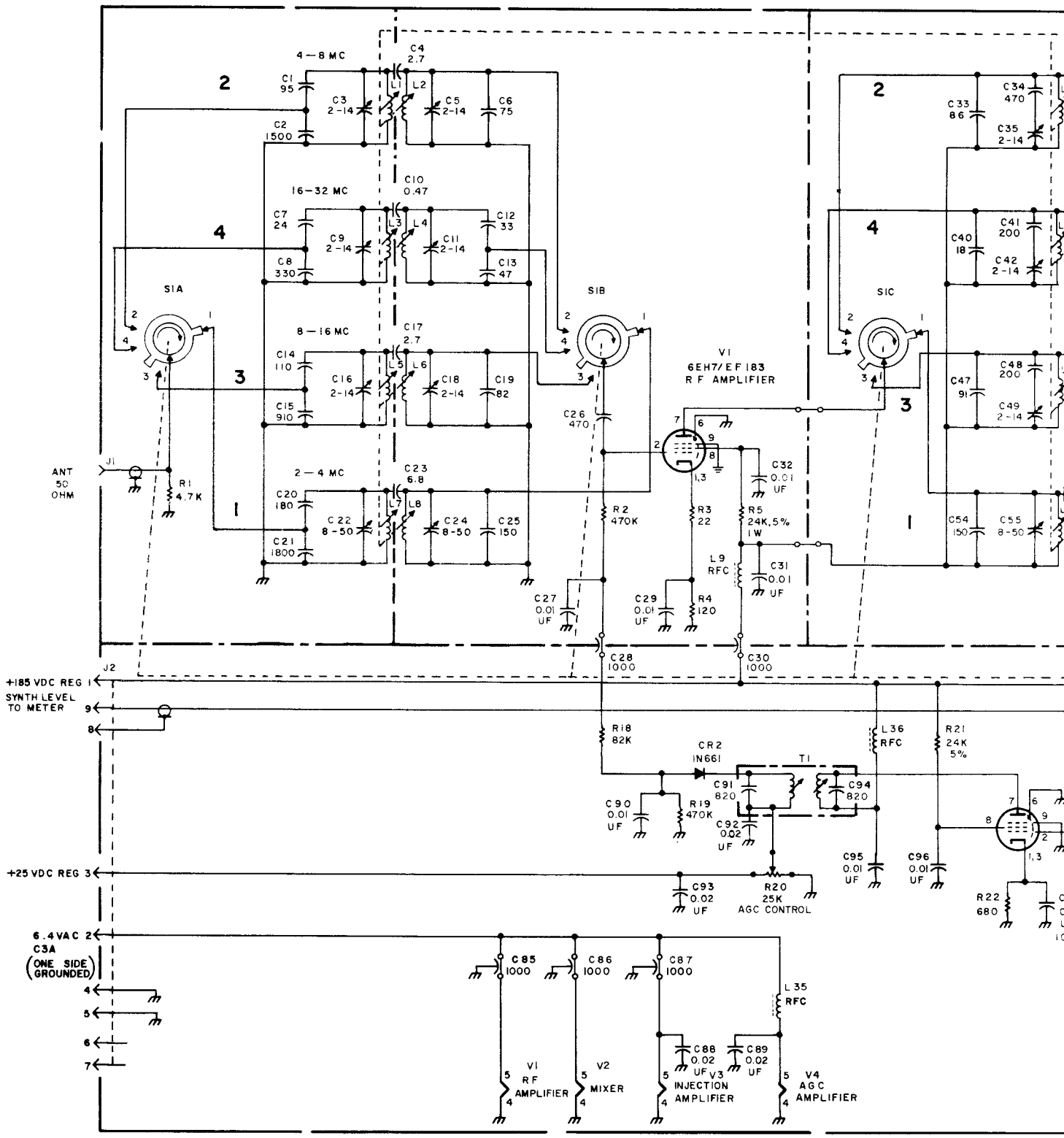
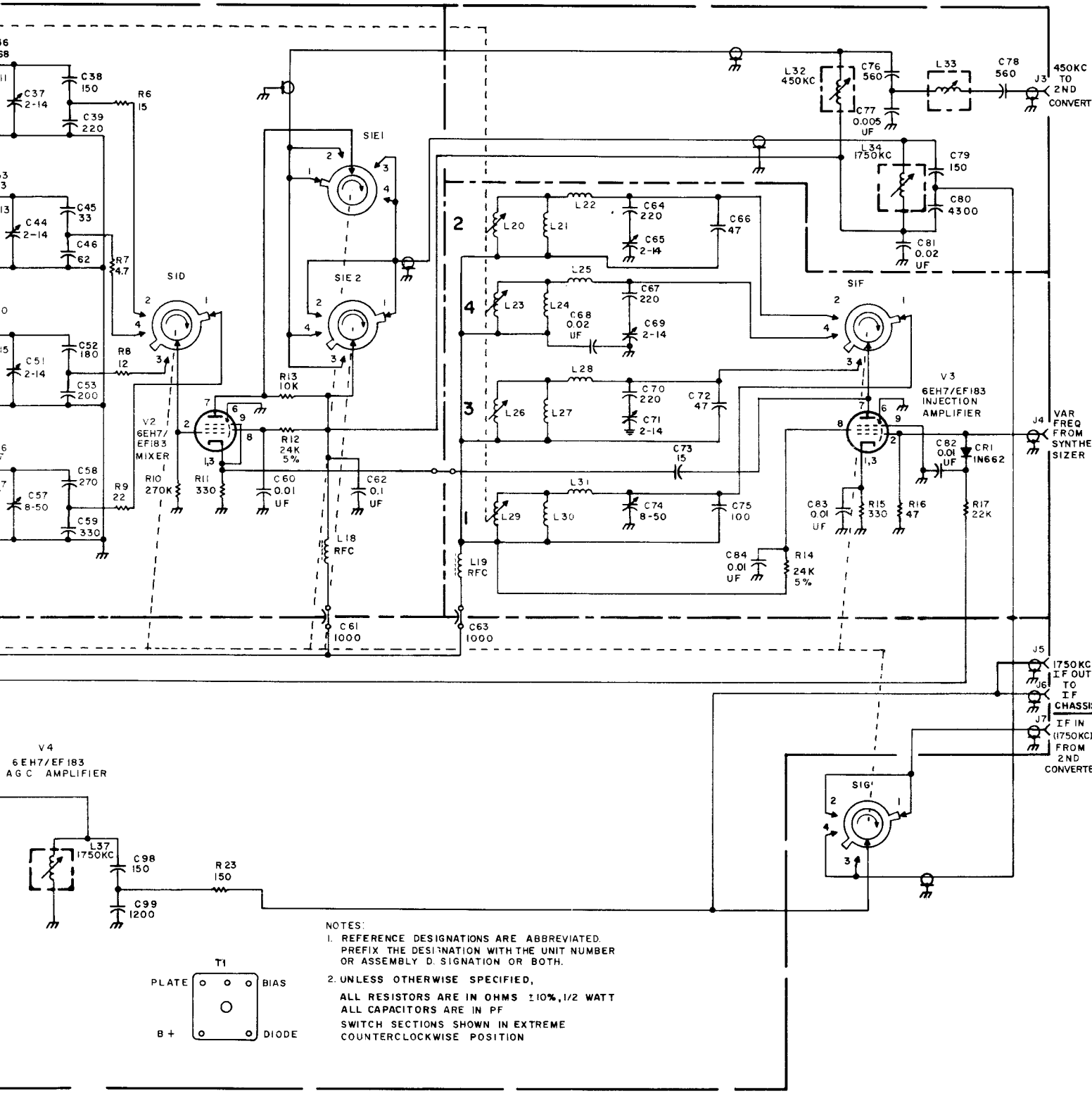


Figure 4-4. Schematic



NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH THE UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
2. UNLESS OTHERWISE SPECIFIED,
   ALL RESISTORS ARE IN OHMS ±10%, 1/2 WATT
   ALL CAPACITORS ARE IN PF
   SWITCH SECTIONS SHOWN IN EXTREME COUNTERCLOCKWISE POSITION

Diagram, RF Deck Assembly A1.

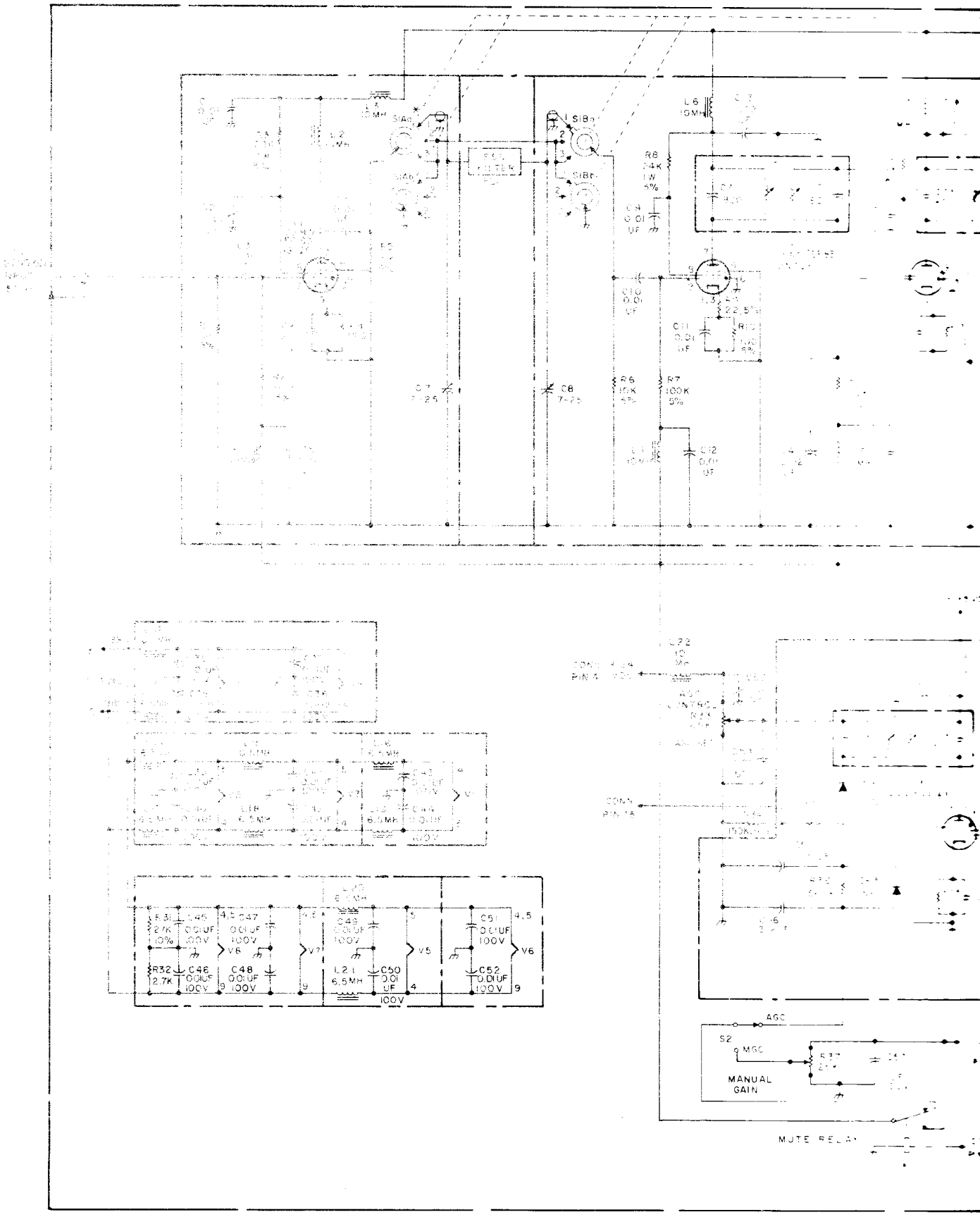
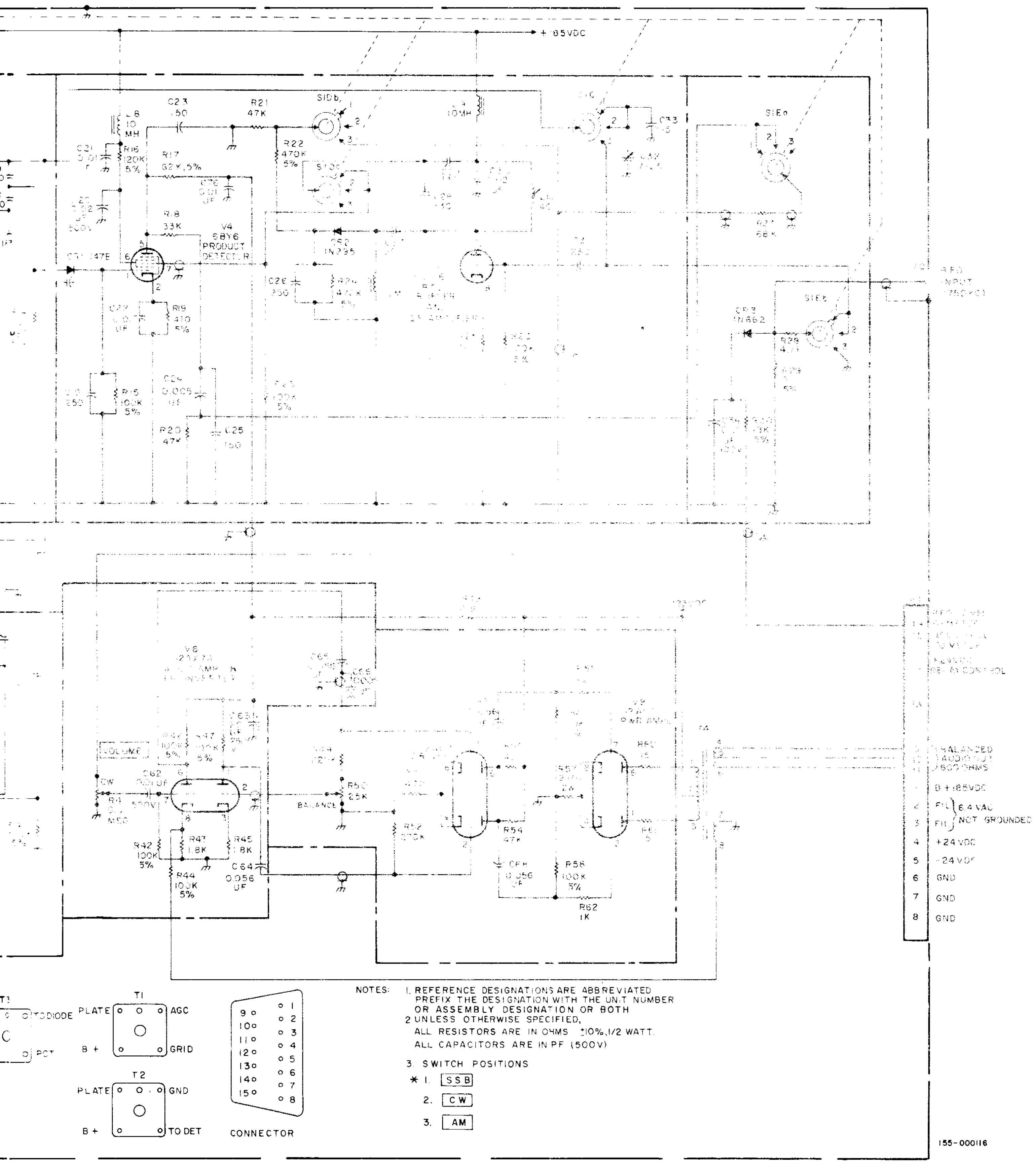


Figure 4-5. Schematic Diagra



NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH THE UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH
2. UNLESS OTHERWISE SPECIFIED,
   ALL RESISTORS ARE IN OHMS ±10%, 1/2 WATT.
   ALL CAPACITORS ARE IN PF (500V)
3. SWITCH POSITIONS
   * 1. SSB
   2. CW
   3. AM

F and Audio Amplifier Assembly A2.

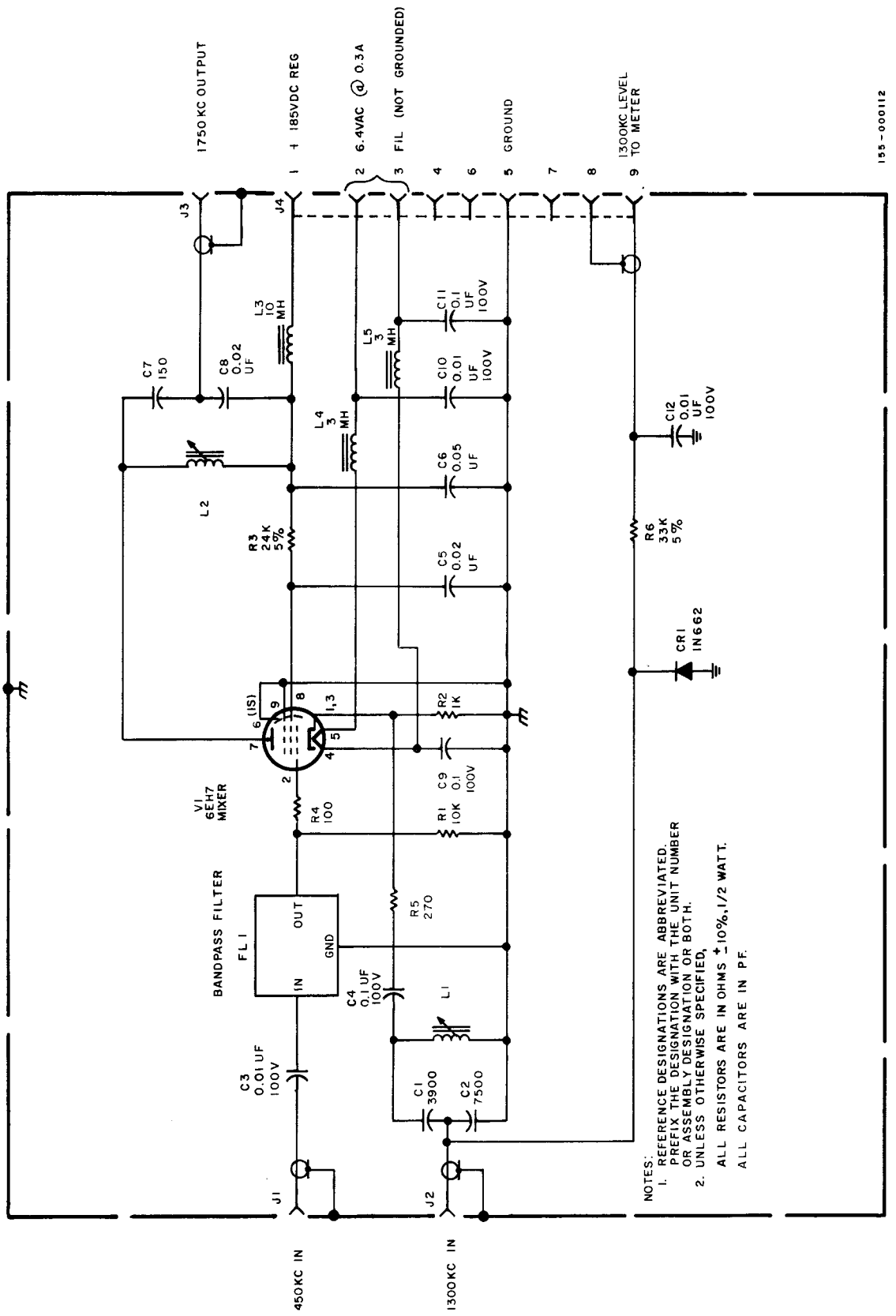


Figure 4-6. Schematic Diagram, 2nd Converter Assembly A3.

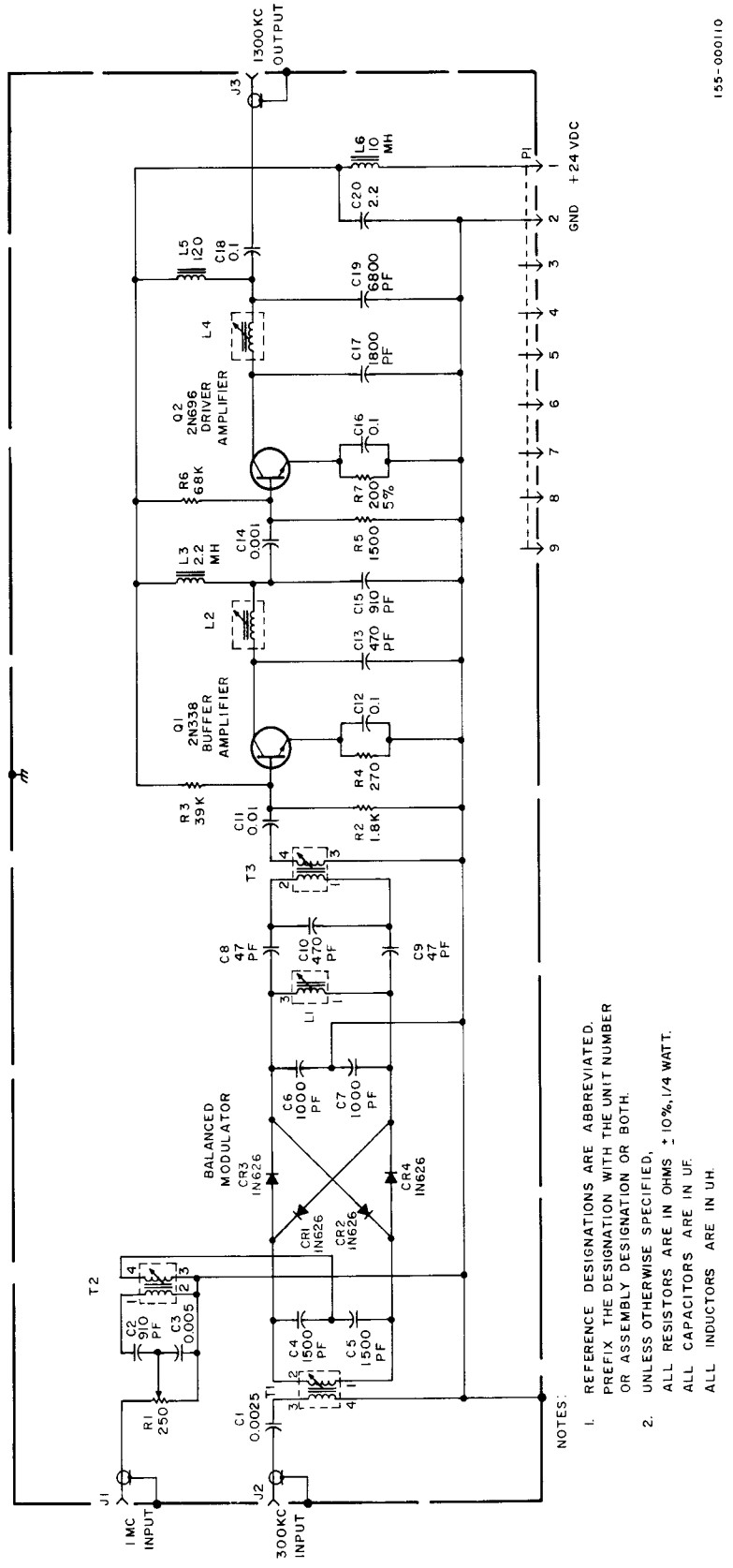


Figure 4-7. Schematic Diagram, 1300 KC Generator Assembly A4.

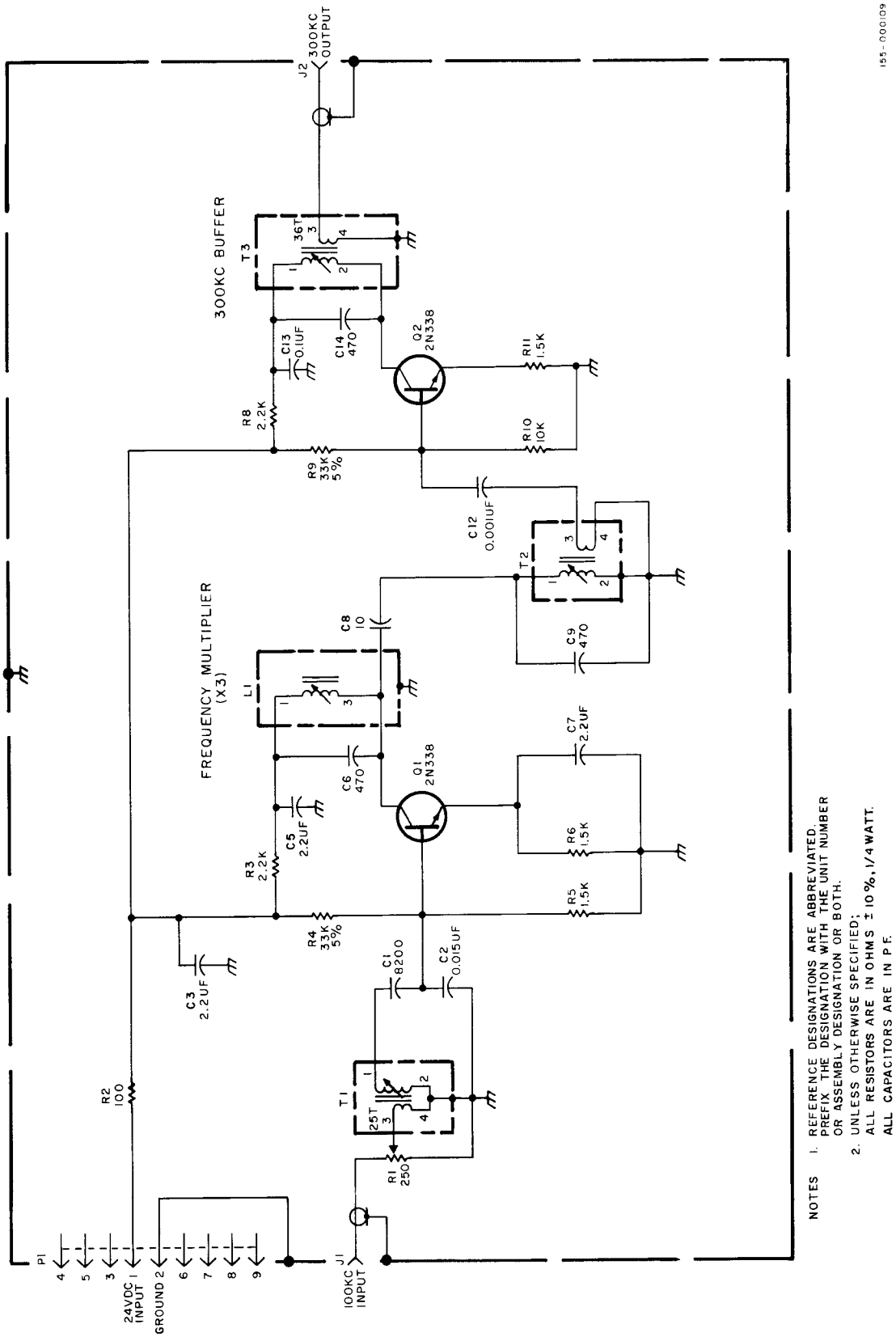


Figure 4-8. Schematic Diagram, 300 KC Generator Assembly A5.

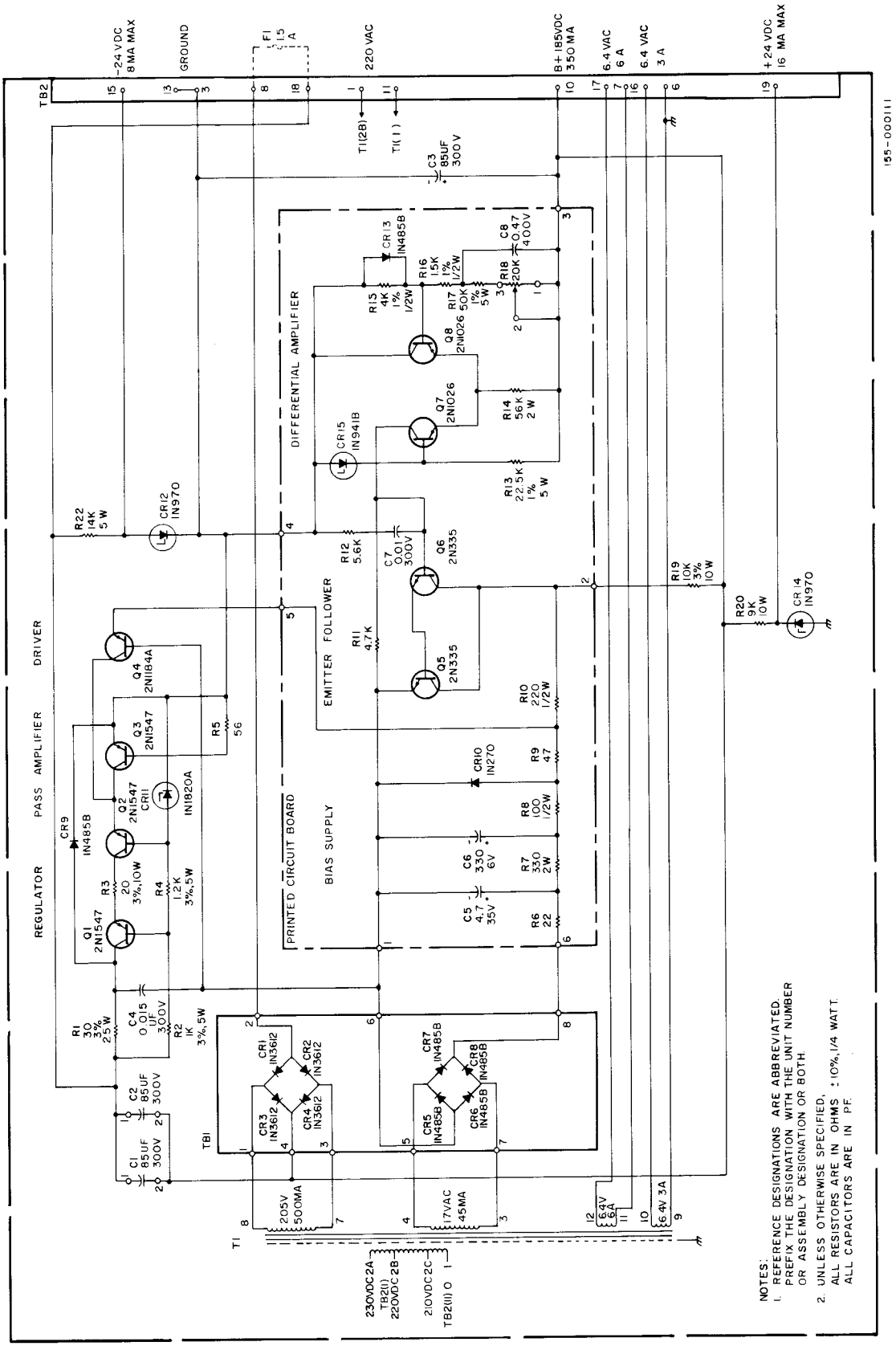


Figure 4-9. Schematic Diagram, Power Supply Assembly A6.

SECTION V

REPLACEABLE PARTS LIST

5-1. GENERAL

5-2. This section contains a description and part number of the replaceable parts of the receiver. The tables are arranged in the following order:

5-3. MANUFACTURER'S CODE.

5-4. The following codes are used in the Replaceable Parts List to denote manufacturer of specific parts:

Code	Name and Address
00656	Aerovox Corp., New Bedford, Mass.
01121	Allen-Bradley Co., Milwaukee, Wis.
01281	Pacific Semiconductors, Inc., Culver City, Calif.
01295	Texas Instruments, Inc., Semiconductor-Components Div., Dallas, Texas
03508	General Electric Co., Semiconductor Products Dept., Syracuse, N. Y.
05432	Jaidinger Manufacturing Co., Chicago, Ill.
24455	General Electric Co., Lamp Division, Nela Park, Ohio
26916	The Hallicrafters Co., Chicago, Ill.
49956	Raytheon Co., Lexington, Mass.
55026	Simpson Electric Co., Chicago, Ill.
56289	Sprague Electric Co., North Adams, Mass.
71279	Cambridge Thermionic Corp., Cambridge, Mass.
71468	Cannon Electric Co., Los Angeles, Calif.
72136	Electro Motive Mfg. Co., Willimantic, Conn.
72982	Erie Resistor Corp., Erie, Pa.
72983	Essex Wire Corp., Fort Wayne, Ind.
74970	Johnson, E. F. Co., Waseca, Minn.
75042	International Resistance Co., Philadelphia, Pa.
75915	Littelfuse, Inc., Des Plaines, Ill.
76854	Oak Mfg. Co., Crystal Lake, Ill.
80058	Joint Electronic Type Designation System
80131	Electronic Industries Association, Washington, D. C.
80142	Howard Industries, Inc., Racine, Wis.
81349	Military Specifications
81640	Control Switch Division, Controls Co. of America, Folcroft, Pa.

Code	Name and Address
91418	Radio Materials Co., Chicago, Ill.
91637	Dale Electronics, Inc., Columbus, Nebr.
91737	Gremar Mfg. Co., Inc., Wakefield, Mass.
93332	Sylvania Electric Products, Inc., Woburn, Mass.
96733	San Fernando Electric Mfg. Co., San Fernando, Calif.
96906	Military Standards
98291	Sealectro Corp., Mamaroneck, N. Y.

TABLE 5-1. REPLACEABLE PARTS LIST FOR RECEIVER MSR-1A

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	ASSEMBLIES			
A1	RF Deck Assembly	26916		150-007987
A2	IF and Audio Amplifier Assembly	26916		150-007977
A3	2nd Converter Assembly	26916		150-007979
A4	1300 KC Generator Assembly	26916		150-007972
A5	300 KC Generator Assembly	26916		150-007969
A6	Power Supply Assembly	26916		150-007983
	FANS			
B1	Fan	81042	8010	020-000393
	SEMICONDUCTORS			
CR1	Semiconductor Device, Diode	80131	1N662	019-003471
CR2	Same as CR1			
	LAMPS			
DS1	Lamp, Incandescent (28V, 40 MA)	96906	MS25237.327	039-100042
	FUSES			
F1	Fuse, Cartridge (0.75 AMP, 125V, Slow-Blow)	75915	313.750	039-100570
F2	Same as F1			
F3	Fuse, Cartridge (1.5 AMP, 250V)	75915	31201.5	039-000608
	FILTERS			
FL1	Filter, Radio Interference	56289	1JX130	049-000308
FL2	Same as FL1			
	CONNECTORS			
J1	Receptacle, Electrical	71737	11205	010-003057
J2	Same as J1			

TABLE 5-1. REPLACEABLE PARTS LIST FOR RECEIVER MSR-1A (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CONNECTORS (CONT)			
J3	Same as J1			
J4	Same as J1			
J5	Same as J1			
J6	Receptacle, Electrical	96906	MS3102R-10SL -3P	010-003058
J7	Receptacle, Electrical	71468	DE-9P	010-101729
J8	Receptacle, Electrical	71468	DEF-9S	010-003030
J9	Same as J8			
P1	Plug, Electrical	71737	6955	010-003060
P2	Same as P1			
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	Plug, Electrical	71468	DE-9S	010-001837
P10	Same as P1			
P11	Same as P1			
P12	Same as P1			
P13	Same as P1			
P14	Same as P1			
P15	Same as P9			
P16	Same as P1			
P17	Same as P1			
P18	Plug, Electrical	71468	DAM-15S	010-003059
	METERS			
M1	Ammeter (0-50 UA)	55026	Model 120	082-000645
	RESISTORS			
R1	Fixed, Composition (6.2 Megohms, 5%, 1/2W)	81349	RC20GF625J	450-241625
R2	Fixed, Composition (5100 ohms, 5%, 1/2 W)	81349	RC20GF512J	450-241512

TABLE 5-1. REPLACEABLE PARTS LIST FOR RECEIVER MSR-1A (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	RESISTORS (CONT)			
R3	Same as R2			
R4	Fixed,Composition (1800 ohms, 5%, 1/2 W)	81349	RC20GF182J	450-241182
R5	Fixed,Composition (1000 ohms, 5%, 1/2 W)	81349	RC20GF102J	450-241102
R6	Fixed,Composition (10K ohm, 10%, 1/2 W)	81349	RC20GF103K	450-242103
	SWITCHES			
S1	Switch, Toggle (DPST)	81349	ST52K	510-000922
S2A	Switch Section, Rotary	76854	399-033A	062-000237
S2B	Same as S2A			
S2C	Same as S2A			
S2D	Same as S2A			
	INDICATORS			
XDS1	Light, Indicator, Red	96906	MS25257-4	086-000671
	FUSEHOLDERS			
XF1	Fuseholder	81349	FHN20G	006-000942
XF2	Same as XF1			
XF3	Same as XF1			
	MISCELLANEOUS			
	Handle Qty 2	96906	MS39087-5	030-000939-005
	Ferrule, Handle Qty 4	71279	1988-1	077-002889
	Knob, Pointer Qty 2	49956	70-5-2G	015-001619
	Knob, Crank Qty 1	49956	90-6-2G	015-001866
	Knob, Round Qty 1	49956	70-2-2G	015-100977
	Knob, Dial Qty 1	49956	70-3-2G	015-001088
	Detent, Switch Index	76854	399-022A	061-000059
	Filter, Air	26916		014-000504
	Window, Clear Plex-O-Glass	26916		022-000726

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1

ITEM NO.	REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
		CAPACITORS			
	C1	Fixed, Mica Dielectric (95 PF, 2%, 500V)	72136	DM15F950G	493-110950-33-
	C2	Fixed, Mica, Dielectric (1500 PF, 2%, 500V)	72136	DM19F152G	493-310152-33-
	C3	Variable (2-14PF)	74970	160-107	048-200261
	C4	Fixed, Ceramic Dielectric (2.7 PF, 10%, 500V)	26916		047-000403-01-
	C5	Same as C3			
	C6	Fixed, Mica Dielectric (75 PF, 2%, 500V)	72136	DM15F750G	493-110750-334
	C7	Fixed, Mica Dielectric (24 PF, 2%, 500V)	72136	DM15F240G	493-110240-334
	C8	Fixed, Mica Dielectric (330 PF, 2%, 500V)	72136	DM15F331G	493-110331-334
	C9	Same as C3			
	C10	Fixed, Ceramic Dielectric (0.47 PF, 10%, 500V)	26916		047-000403-015
	C11	Same as C3			
	C12	Fixed, Mica Dielectric (33 PF, 2%, 500V)	72136	DM15F330G	493-110330-334
	C13	Fixed, Mica Dielectric (47 PF, 2%, 500V)	72136	DM15F470G	493-110470-334
	C14	Fixed, Mica Dielectric (110 PF, 2%, 500V)	72136	DM15F111G	493-110111-334
	C15	Fixed, Mica Dielectric (910 PF, 2%, 100V)	72136	DM15F911G	493-110911-314
	C16	Same as C3			
	C17	Same as C4			
	C18	Same as C3			
	C19	Fixed, Mica Dielectric (82 PF, 2%, 500V)	72136	DM15F820G	493-110820-334
	C20	Fixed, Mica Dielectric (180 PF, 2%, 500V)	72136	DM15F181G	493-110181-334
	C21	Fixed, Mica Dielectric (1800 PF, 2%, 500V)	72136	DM19F182G	493-310182-334
	C22	Variable, Ceramic Dielectric (8-50 PF)	72982	557-000-U2P0-34R	044-000629
	C23	Fixed, Ceramic Dielectric (6.8 PF, 10%, 500V)	26916		047-000403-008
	C24	Same as C22			
	C25	Fixed, Mica Dielectric (150 PF, 2%, 500V)	72136	DM15F151G	493-110151-334
	C26	Fixed, Mica Dielectric (470 PF, 2%, 500V)	72136	DM15F471G	493-110471-334
	C27	Fixed, Ceramic Dielectric (0.01 UF, 20%, 500V)	56289	19C241A2	047-001949
	C28	Fixed, Feedthru (1000 PF, 500V)	56289	513C21	047-001948
	C29	Same as C27			
	C30	Same as C28			

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS (CONT)			
C31	Same as C27			
C32	Same as C27			
C33	Fixed, Mica Dielectric (86 PF, 2%, 500V)	72136	DM15F860G	493-110860-334
C34	Same as C26			
C35	Same as C3			
C36	Fixed, Ceramic Dielectric (0.68 PF, 10%, 500V)	26916		047-000403-001
C37	Same as C3			
C38	Same as C25			
C39	Fixed, Mica Dielectric (220 PF, 2%, 500V)	72136	DM15F221G	493-110221-334
C40	Fixed, Mica Dielectric (18 PF, 2%, 500V)	72136	DM15F180G	493-110180-334
C41	Fixed, Mica Dielectric (200 PF, 2%, 500V)	72136	DM15F201G	493-110201-334
C42	Same as C3			
C43	Fixed, Ceramic Dielectric (0.33 PF, 10%, 500V)	26916		047-000403-016
C44	Same as C3			
C45	Same as C12			
C46	Fixed, Mica Dielectric (62 PF, 2%, 500V)	72136	DM15F620G	493-110620-334
C47	Fixed, Mica Dielectric (91 PF, 2%, 500V)	72136	DM15F910G	493-110910-334
C48	Same as C41			
C49	Same as C3			
C50	Fixed, Ceramic Dielectric (1.0 PF, 10%, 500V)	26916		047-000403-002
C51	Same as C3			
C52	Same as C20			
C53	Same as C41			
C54	Same as C25			
C55	Same as C22			
C56	Fixed, Ceramic Dielectric (4.7 PF, 10%, 500V)	26916		047-000403-006
C57	Same as C22			
C58	Fixed, Mica Dielectric (270 PF, 2%, 500V)	72136	DM15F271G	493-110271-334
C59	Same as C8			
C60	Same as C27			
C61	Same as C28			

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS (CONT)			
C62	Fixed, Ceramic Dielectric (0.1 UF, 20%, 500V)	56289	41C92A10	047-001950
C63	Same as C28			
C64	Fixed, Ceramic Dielectric (220 PF, 10%, 500V)	26916		478-016221
C65	Same as C3			
C66	Same as C13			
C67	Same as C64			
C68	Fixed, Ceramic Dielectric (0.02 UF +80 -20%, 500V)	26916		047-001169
C69	Same as C3			
C70	Same as C64			
C71	Same as C3			
C72	Same as C13			
C73	Fixed, Mica Dielectric (15 PF, 5%, 500V)	72136	DM15F150J	493-110150-234
C74	Same as C22			
C75	Fixed, Mica Dielectric (100 PF, 2%, 500V)	72136	DM15F101G	493-110101-334
C76	Fixed, Mica Dielectric (560 PF, 2%, 300V)	72136	DM15F561G	493-110561-324
C77	Fixed, Ceramic Dielectric (5000 PF)	91418	SM-.005	047-001383
C78	Same as C76			
C79	Same as C25			
C80	Fixed, Mica Dielectric (4300 PF, 5%, 500V)	72136	DM1GF432J	493-310432-234
C81	Same as C68			
C82	Same as C27			
C83	Same as C27			
C84	Same as C27			
C85	Same as C28			
C86	Same as C28			
C87	Same as C28			
C88	Same as C68			
C89	Same as C68			
C90	Same as C27			
C91	Fixed, Mica Dielectric (820 PF, 2%, 300V)	72136	DM15F821G	493-110821-324
C92	Same as C68			

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS (CONT)			
C93	Same as C68			
C94	Same as C91			
C95	Same as C27			
C96	Same as C27			
C97	Fixed, Ceramic Dielectric (0.1 UF, +80-20%, 100V)	91418	TA-.1	047-001951
C98	Same as C25			
C99	Fixed, Mica Dielectric (1200 PF, 5%, 500V)	72136	DM19F122J	493-310122-234
	SEMICONDUCTOR DEVICE			
CR1	Diode	80131	1N662	019-003426
CR2	Diode	80131	1N661	019-002891
	LAMPS			
DS1	Lamp, Incandescent	24455	47	039-000763
	CONNECTORS			
J1	Receptacle, Electrical	91737	6954	010-003040
J2	Receptacle, Electrical	71468	DE-9P	010-001729
J3	Receptacle, Electrical	80058	UG-1094/U	010-100877
J4	Same as J1			
J5	Same as J3			
J6	Same as J3			
J7	Same as J3			
	INDUCTORS			
L1	Coil, RF, Band 2	26916		050-001662
L2	Same as L1			
L3	Coil, RF, Band 4	26916		050-001663
L4	Same as L3			
L5	Coil, RF Band 3	26916		050-001664

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	INDUCTORS (CONT)			
L6	Same as L5			
L7	Coil, RF, Band 1	26916		050-001661
L8	Same as L7			
L9	Choke, RF	76493	70F102AT	050-001783
L10	Same as L1			
L11	Same as L1			
L12	Same as L3			
L13	Same as L3			
L14	Same as L5			
L15	Same as L5			
L16	Same as L7			
L17	Same as L7			
L18	Same as L9			
L19	Same as L9			
L20	Same as L1			
L21	Coil, RF,Shunt Tracking # 2	26916		050-001822-002
L22	Coil, RF, Series Tracking # 2	26916		050-001821-002
L23	Same as L3			
L24	Coil, RF, Shunt Tracking # 4	26916		050-001822-004
L25	Coil, RF, Series Tracking # 4	26916		050-001821-005
L26	Same as L5			
L27	Coil, RF, Shunt Tracking # 3	26916		050-001822-003
L28	Coil, RF, Series Tracking # 3	26916		050-001821-003
L29	Same as L7			
L30	Coil, RF, Shunt Tracking # 1	26916		050-001822-001
L31	Coil, RF, Series Tracking # 1	26916		050-001821-001
L32	Coil, RF, 450 KC	26916		051-002911
L33	Same as L32			
L34	Coil, RF, 1750 KC	26916		050-000972
L35	Choke, RF	26916		053-000608
L36	Same as L9			
L37	Same as L34			

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	RESISTORS			
R1	Fixed, Composition (4700 ohms, 10%, 1/2W)	81349	RC20GF472K	450-242472
R2	Fixed, Composition (470K ohms, 10%, 1/2W)	81349	RC20GF474K	450-242474
R3	Fixed, Composition (22 ohms, 10%, 1/2W)	81349	RC20GF220K	450-242220
R4	Fixed, Composition (120 ohms, 10%, 1/2W)	81349	RC20GF121K	450-242121
R5	Fixed, Composition (24K ohms, 5%, 1W)	81349	RC32GF243J	450-441243
R6	Fixed, Composition (15 ohms, 10%, 1/2 W)	81349	RC20GF150K	450-242150
R7	Fixed, Composition (4.7 ohms, 10%, 1/2W)	81349	RC20GF4R7K	450-242047
R8	Fixed, Composition (12 ohms, 10%, 1/2W)	81349	RC20GF120K	450-242120
R9	Same as R3			
R10	Fixed, Composition (270K ohms, 10%, 1/2W)	81349	RC20GF274K	450-242274
R11	Fixed, Composition (330 ohms, 10%, 1/2W)	81349	RC20GF331K	450-242331
R12	Fixed, Composition (24K ohms, 5%, 1/2W)	81349	RC20GF243J	450-241243
R13	Fixed, Composition (10K ohms, 10%, 1/2W)	81349	RC20GF103K	450-242103
R14	Same as R12			
R15	Same as R11			
R16	Fixed, Composition (47 ohms, 10%, 1/2W)	81349	RC20GF470K	450-242470
R17	Fixed, Composition (22K ohms, 10%, 1/2W)	81349	RC20GF223K	450-242223
R18	Fixed, Composition (82K ohms, 10%, 1/2W)	81349	RC20GF823K	450-242823
R19	Same as R2			
R20	Variable (25K ohms, 10%, 1/2W)	81349	RV6LAYSA253A	504-321253-221
R21	Same as R12			
R22	Fixed, Composition (680 ohms, 10%, 1/2W)	81349	RC20GF681K	450-242681
R23	Fixed, Composition (150 ohms, 10%, 1/2W)	81349	RC20GF151K	450-242151
	SWITCHES			
S1A	Switch Section, Rotary	76854	237958A	062-000236
S1B	Same as S1A			
S1C	Same as S1A			
S1D	Same as S1A			
S1E	Switch Section, Rotary	26916		062-000242
S1F	Same as S1A			
S1G	Same as S1A			

TABLE 5-2. REPLACEABLE PARTS LIST FOR RF DECK ASSEMBLY A1 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	TRANSFORMERS			
T1	Transformer, IF	26916		050-001780
	ELECTRON TUBES			
V1	Electron Tube	80131	6EH7/EF183	090-001558
V2	Same as V1			
V3	Same as V1			
V4	Same as V1			
	SOCKETS			
XDS1	Lampholder	96906	MS90282-1	006-001157
XV1	Socket, Electron Tube	81349	TS103C01	006-100830
XV2	Same as XV1			
XV3	Same as XV1			
XV4	Same as XV1			
	MISCELLANEOUS			
	Shield, Electron Tube	96906	MS24233-5	069-001396
	Terminal, Feedthru	98291	FT-SM-1TUR-L4	011-001460
	Grommet, Rubber	76385	Z-3081	005-001319
	Shaft, Switch	26916		074-002966
	Detent, Switch Index	76854	240348A	061-000060

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS			
C1	Fixed, Ceramic Dielectric (0.01 UF, 20%, 500V)	91418	SM-.01	047-001943
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	Same as C1			
C6	Same as C1			
C7	Variable (7-25 PF)	72982	538-002N30093R	044-000628
C8	Same as C7			
C9	Same as C1			
C10	Same as C1			
C11	Same as C1			
C12	Same as C1			
C13	Fixed, Ceramic Dielectric (0.02UF, +80-20%, 500V)	91418	SM-.02	047-001941
C14	Same as C13			
C15	Same as C1			
C16	Same as C1			
C17	Same as C1			
C18	Same as C13			
C19	Fixed, Mica Dielectric (250 PF, 2%, 500V)	72136	DM15F251G	493-110251-334
C20	Same as C13			
C21	Same as C1			
C22	Same as C1			
C23	Fixed, Mica Dielectric (150 PF, 5%, 500V)	72136	DM15F151J	493-110151-234
C24	Fixed, Ceramic Dielectric (0.005 UF, 20%, 500V)	91418	SM-.005	047-001944
C25	Same as C23			
C26	Same as C19			
C27	Same as C19			
C28	Fixed, Mica Dielectric (330 PF, 2%, 500V)	72136	DM15F331G	493-110331-334
C29	Same as C28			
C30	Same as C13			
C31	Same as C19			
C32	Same as C7			

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS (CONT)			
C33	Fixed, Mica Dielectric (15 PF, 5%, 500V)	72136	DM10F150J	493-910150-234
C34	Fixed, Ceramic Dielectric (0.01 UF, +80-20%, 100V)	91418	TA- .01	047-001516
C35	Same as C34			
C36	Same as C34			
C37	Same as C34			
C38	Same as C34			
C39	Same as C34			
C40	Same as C34			
C41	Same as C34			
C42	Same as C34			
C43	Same as C34			
C44	Same as C34			
C45	Same as C34			
C46	Same as C34			
C47	Same as C34			
C48	Same as C34			
C49	Same as C34			
C50	Same as C34			
C51	Same as C34			
C52	Same as C34			
C53	Same as C1			
C54	Same as C1			
C55	Fixed, Ceramic Dielectric (0.015UF, 20%, 500V)	91418	SM- .015	047-001942
C56	Fixed, Ceramic Dielectric (2.2UF, 20%, 25V)	56289	5C15	047-001939
C57	Same as C34			
C58	Same as C13			
C59	Same as C1			
C60	Same as C1			
C61	Fixed, Mica Dielectric (47 PF, 2%, 500V)	72136	DM15F470G	493-110470-334
C62	Same as C1			
C63	Fixed, Electrolytic (20 UF, 250V)	00656	AFH1-27	045-001238
C64	Fixed, Paper Dielectric (0.056UF, 400V)	96733	16K4563	046-001586
C65	Same as C64			

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2 (CON

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS (CONT)			
C66	Fixed, Paper Dielectric (0.005UF, 400V)	00656	Type P123ZN	046-001585
C67	Same as C64			
C68	Same as C64			
C69	Fixed, Mica Dielectric (1600 PF, 2%, 500V)	72136	DM19F162G	493-310162-334
C70	Same as C69			
C71	Fixed, Mica Dielectric (820 PF, 2%, 500V)	72136	DM15F821G	493-110821-334
C72	Same as C71			
C73	Same as C71			
C74	Same as C71			
C75	Same as C71			
C76	Same as C1			
	SEMICONDUCTOR DEVICES			
CR1	Varactor	01281	J47E	048-100458
CR2	Diode	80131	1N295	019-002834
CR3	Diode	80131	1N662	019-003426
CR4	Diode	01295	1N661	019-002891
CR5	Same as CR4			
	FILTERS			
FL1	Filter, SSB	26916		056-000679
	CONNECTORS			
J1	Receptacle, Electrical	80058	UG-1094/U	010-100877
J2	Same as J1			
J3	Receptacle, Electrical	71468	DAM-15P	010-002929
	RELAYS			
K1	Relay	05432	MR61-234A	021-000651

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2 (CON'

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	INDUCTORS			
L1	Coil, RF, 10 MH	26916		050-001777
L2	Same as L1			
L3	Same as L1			
L4	Same as L1			
L5	Same as L1			
L6	Same as L1			
L7	Same as L1			
L8	Same as L1			
L9	Same as L1			
L10	Coil, RF, 40 UH	71279	1505-7	050-000972
L11	Same as L1			
L12	Coil, RF, 6-5 MH	26916		053-000608
L13	Same as L12			
L14	Same as L12			
L15	Same as L12			
L16	Same as L12			
L17	Same as L12			
L18	Same as L12			
L19	Same as L12			
L20	Same as L12			
L21	Same as L12			
L22	Same as L1			
L23	Same as L1			
	RESISTORS			
R1	Fixed, Composition (51 ohm, 5%, 1/2W)	81349	RC20GF510J	450-241510
R2	Fixed, Composition (100K ohm, 5%, 1/2W)	81349	RC20GF104J	450-241104
R3	Fixed, Composition (24K ohm, 5%, 1W)	81349	RC32GF243J	450-441224
R4	Fixed, Composition (120 ohm, 10%, 1/2W)	81349	RC20GF121K	450-242121
R5	Fixed, Composition (10K ohm, 5%, 1/2W)	81349	RC20GF103J	450-241103
R6	Same as R5			
R7	Same as R2			
R8	Same as R3			
R9	Fixed, Composition (22 ohm, 5%, 1/2W)	81349	RC20GF220J	450-241220

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2 (CONT

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	RESISTORS (CONT)			
R10	Fixed, Composition (100 ohm, 5%, 1/2W)	81349	RC20GF101J	450-241101
R11	Same as R2			
R12	Same as R3			
R13	Same as R4			
R14	Fixed, Composition (2.2 megohm, 5%, 1/2W)	81349	RC20GF225J	450-241225
R15	Same as R2			
R16	Fixed, Composition (120K ohm, 5%, 1/2W)	81349	RC20GF124J	450-241124
R17	Fixed, Composition (62K ohm, 5%, 1/2W)	81349	RC20GF623J	450-241623
R18	Fixed, Composition (33K ohm, 10%, 1/2W)	81349	RC20GF333K	450-242333
R19	Fixed, Composition (470 ohm, 10%, 1/2W)	81349	RC20GF471K	450-242471
R20	Fixed, Composition (47K ohm, 10%, 1/2W)	81349	RC20GF473K	450-242473
R21	Same as R20			
R22	Fixed, Composition (470K ohm, 5%, 1/2W)	81349	RC20GF474J	450-241474
R23	Same as R2			
R24	Same as R22			
R25	Fixed, Composition (560 ohm, 10%, 1/2W)	81349	RC20GF561K	450-242561
R26	Same as R2			
R27	Fixed, Composition (68K ohm, 10%, 1/2W)	81349	RC20GF683K	450-242683
R28	Fixed, Composition (4700 ohm, 10%, 1/2W)	81349	RC20GF472K	450-242472
R29	Same as R1			
R30	Fixed, Composition (18K ohm, 5%, 1/2W)	81349	RC20GF183J	450-241183
R31	Fixed, Composition (2700 ohm, 10%, 1/2W)	81349	RC20GF272K	450-242272
R32	Same as R31			
R33	Variable (25K ohm, 10%, 1/2W)	81349	RV6LAYSA253A	504-321253-221
R34	Fixed, Composition (150K ohm, 5%, 1/2W)	81349	RC20GF154J	450-241154
R35	Fixed, Composition (270K ohm, 10%, 1/2W)	81349	RC20GF274K	450-242274
R36	Fixed, Composition (560K ohm, 10%, 1/2W)	81349	RC20GF564K	450-242564
R37	Same as R33			
R38	Same as R4			
R39	Same as R3			
R40	Same as R2			
R41	Variable (500K ohm, 10%, 2W)	01121	JA1N056P504UA	025-002447
R42	Same as R2			
R43	Fixed, Composition (1800 ohm, 10%, 1/2W)	81349	RC20GF182K	450-242182

TABLE 5-3. IF CHASSIS AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2(CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	RESISTORS (CONT)			
R44	Same as R2			
R45	Same as R43			
R46	Same as R2			
R47	Same as R2			
R48	Fixed, Composition (6800 ohm, 10%, 1/2W)	81349	RC20GF682K	450-242682
R49	Fixed, Composition (220K ohm, 10%, 1/2W)	81349	RC20GF224K	450-242224
R50	Same as R33			
R51	Same as R19			
R52	Same as R35			
R53	Same as R20			
R54	Same as R20			
R55	Fixed, Composition (1000 ohm, 10%, 1/2W)	81349	RC20GF102K	450-242102
R56	Same as R2			
R57	Fixed, Composition (270 ohm, 10%, 2W)	81349	RC42GF271K	450-542271
R58	Same as R2			
R59	Not Used			
R60	Fixed, Composition (15 ohm, 10%, 1/2W)	81349	RC20GF150K	450-242150
R61	Same as R60			
R62	Same as R55			
	SWITCHES			
S1A	Switch Section, Rotary	76854	242435-A	062-000235
S1B	Switch Section, Rotary	76854	242436-A	062-000232
S1C	Same as S1B			
S1D	Switch Section, Rotary	76854	242455-A	062-000234
S1E	Switch Section, Rotary	76854	242454-A	062-000233
S2	Switch, Toggle	81640	T3103	060-002608
	TRANSFORMERS			
T1	Transformer, RF	26916		050-001780
T2	Transformer, RF	26916		050-001856
T3	Same as T1			
T4	Transformer, Audio	26916		055-000548

TABLE 5-3. REPLACEABLE PARTS LIST FOR IF AND AUDIO AMPLIFIER CHASSIS ASSEMBLY A2 (CONT

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	ELECTRON TUBES			
V1	Electron Tube	80131	6EH7/EF-183	090-001558
V2	Same as V1			
V3	Same as V1			
V4	Electron Tube	80131	6BY6	090-901114
V5	Same as V1			
V6	Electron Tube	80131	12AX7A	090-001458
V7	Electron Tube	80131	12AU7	090-900036
V8	Same as V7			
V9	Electron Tube	80131	5670	090-001570
	SOCKETS			
XV1	Socket, Electron Tube	81349	TS103C01	006-100830
XV2	Same as XV1			
XV3	Same as XV1			
XV4	Socket, Electron Tube	81349	TS102C01	006-000937
XV5	Same as XV1			
XV6	Same as XV1			
XV7	Same as XV1			
XV8	Same as XV1			
XV9	Same as XV1			
	MISCELLANEOUS			
	Shaft, Rotary Switch	26916		074-002964
	Shaft, Rotary Switch	26916		074-002965
	Switch, Detent Assembly	26916		061-000058
	Shield, Electron Tube	96906	MS24233-2	069-001397
	Shield, Electron Tube	96906	MS24233-4	069-001998
	Shield, Electron Tube	96906	MS24233-5	069-001396

TABLE 5-4. REPLACEABLE PARTS LIST FOR 2nd CONVERTER ASSEMBLY A3.

ITEM NO.	REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
		CAPACITORS			
	C1	Fixed, Mica Dielectric (3900 PF, 5%, 500V)	72136	DM19F392J	493-310392-234
	C2	Fixed, Mica Dielectric (7500 PF, 5%, 300V)	72136	DM19F752J	493-310752-224
	C3	Fixed, Ceramic Dielectric (0.01 UF, +80-20%, 100V)	91418	TA-.01	047-001516
	C4	Fixed, Ceramic Dielectric (0.1 UF, +80-20%, 100V)	91418	BT-.1	047-001959
	C5	Fixed, Ceramic Dielectric (0.02 UF, +80-20%, 500V)	91418	B-.02	047-101154
	C6	Fixed, Ceramic Dielectric (0.05 UF, +80-20%, 500V)	91418	B-.05	047-001960
	C7	Fixed, Mica Dielectric (150 PF, 2%, 500V)	72136	DM15F151G	493-110151-334
	C8	Same as C5			
	C9	Same as C4			
	C10	Same as C3			
	C11	Same as C4			
	C12	Same as C3			
		SEMICONDUCTOR DEVICE			
	CR1	Diode	80131	1N662	019-003471
		FILTERS			
	FL1	Filter, Bandpass, 450 KC	26916		056-000734
		CONNECTORS			
	J1	Receptacle, Electrical	80058	UG-1094/U	010-100877
	J2	Same as J1			
	J3	Same as J1			
	P1	Plug, Electrical	71468	DE-9P	010-101729
		INDUCTORS			
	L1	Coil, Variable	71279	1505-4	050-001828
	L2	Coil, Variable	71279	1505-7	050-000972

TABLE 5-4. REPLACEABLE PARTS LIST FOR 2nd CONVERTER ASSEMBLY A3 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	INDUCTORS (CONT)			
L3	Choke, 10 MH	76493	70F102AT	050-001783
L4	Choke, RF, 3 MH	26916		053-000608
L5	Same as L4			
	RESISTORS			
R1	Fixed, Composition (10K ohms, 10%, 1/2W)	81349	RC20GF103K	450-242103
R2	Fixed, Composition (1000 ohms, 10%, 1/2W)	81349	RC20GF102K	450-242102
R3	Fixed, Composition (24K ohms, 5%, 1/2W)	81399	RC20GF243J	450-241243
R4	Fixed, Composition (100 ohms, 10%, 1/2W)	81349	RC20GF101K	450-242101
R5	Fixed, Composition (270 ohms, 10%, 1/2W)	81349	RC20GF271K	450-242271
R6	Fixed, Composition (33K ohms, 5%, 1/2W)	81349	RC20GF333J	450-241333
	ELECTRON TUBES			
V1	Electron Tube	80131	6EH7	090-001558
	SOCKETS			
XV1	Socket, Electron Tube	81349	TS103C01	006-100830
	MISCELLANEOUS			
	Shield, Electron Tube	96906	MS24233-5	069-001396

TABLE 5-5. REPLACEABLE PARTS LIST FOR 1300 KC GENERATOR ASSEMBLY A4.

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS			
C1	Fixed, Mica Dielectric (2500 PF, 5%, 500V)	72136	DM19F252J	493-310252-234
C2	Fixed, Mica Dielectric (910 PF, 2%, 100V)	72136	DM15F911G	493-110911-314
C3	Fixed, Mica Dielectric (5000 PF, 2%, 500V)	72136	DM19F502G	493-310502-334
C4	Fixed, Mica Dielectric (1500 PF, 5%, 500V)	72136	DM19F152J	493-310152-234
C5	Same as C4			
C6	Fixed, Mica Dielectric (1000 PF, 5%, 100V)	72136	DM15F102J	493-110102-214
C7	Same as C6			
C8	Fixed, Mica Dielectric (47 PF, 5%, 500V)	72136	DM10F470J	493-910470-234
C9	Same as C8			
C10	Fixed, Mica Dielectric (470 PF, 5%, 500V)	72136	DM15F471J	493-110471-234
C11	Fixed, Ceramic Dielectric (0.01 UF, 20%, 100V)	91418	TA- .01	047-001940
C12	Fixed, Ceramic Dielectric (0.1 UF, 20%, 50V)	56289	5C50	047-001841
C13	Same as C10			
C14	Same as C6			
C15	Same as C2			
C16	Same as C12			
C17	Fixed, Mica Dielectric (1800 PF, 5%, 500V)	72136	DM19F182J	493-310182-234
C18	Same as C12			
C19	Fixed, Mica Dielectric (6800 PF, 5%, 300V)	72136	DM19F682J	493-310682-224
C20	Fixed, Ceramic Dielectric (2.2 UF, 20%, 25V)	56289	5C15	047-001939
	SEMICONDUCTOR DEVICES			
CR1	Diode	80131	1N626	019-003425
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
	CONNECTORS			
J1	Receptacle, Electrical	80058	UG-1094/U	010-100877
J2	Same as J1			
J3	Same as J1			

TABLE 5-5. REPLACEABLE PARTS LIST FOR 1300 KC GENERATOR ASSEMBLY A4 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CONNECTORS (CONT)			
P1	Plug, Electrical	71468	DE-9P	010-101729
	INDUCTORS			
L1	Coil, Variable (28-63 UH)	71279	CCD-2837REV-0	050-001829
L2	Coil, Variable (30-73 UH)	71279	CDD-2970-7	050-001831
L3	Choke, RF (2.2 MH, 10%)	72983	WEE-2200	050-001776
L4	Coil, Variable	71279	CDD-2970-5	050-001830
L5	Choke, RF (120 UH, 5%)	72983	WEE-120	050-001775
L6	Choke, RF (10 MH)	76493	70F102AT	050-001783
	TRANSISTORS			
Q1	Transistor	03508	2N338	112-000048
Q2	Transistor	93332	2N696	112-000198
	RESISTORS			
R1	Variable, (250 ohm, 10%, 1/4W)	01121	RP-251U	025-002409
R2	Fixed, Composition (1800 ohms, 10%, 1/4W)	81349	RC07GF182K	450-842182
R3	Fixed, Composition (39K ohms, 10%, 1/4W)	81349	RC07GF393K	450-842393
R4	Fixed, Composition (270 ohms, 10%, 1/4W)	81349	RC07GF271K	450-842271
R5	Fixed, Composition (1500 ohms, 10%, 1/4W)	81349	RC07GF152K	450-842152
R6	Fixed, Composition (68K ohms, 10%, 1/4W)	81349	RC07GF683K	450-842683
R7	Fixed, Composition (200 ohms, 5%, 1/4W)	81349	RC07GF201J	450-841201
	TRANSFORMERS			
T1	Transformer, RF	71279	CCD2836-REV-0	050-001832
T2	Transformer, RF	71279	CCD2839-REV-0	050-001834
T3	Transformer, RF	71279	CCD2838-REV-0	050-001833

TABLE 5-6. REPLACEABLE PARTS LIST FOR 300 KC GENERATOR ASSEMBLY A5

ITEM NO.	REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
		CAPACITORS			
	C1	Fixed, Mica Dielectric (8200 PF, 5%, 100V)	72136	DM19F822J	493-310822-214
	C2	Fixed, Mica Dielectric (0.015 UF, 5%, 200V)	96733	RH07CX153J	047-001938
	C3	Fixed, Ceramic Dielectric (2.2 UF, 20%, 25V)	56289	5C15	047-001939
	C4	Not Used			
	C5	Same as C3			
	C6	Fixed, Mica Dielectric (470 PF, 5%, 500V)	72136	DM15F471J	493-110471-234
	C7	Same as C3			
	C8	Fixed, Ceramic Dielectric (10 PF, ±0.25 PF, 500V)	81349	CC20CH100C	474-011100-023
	C9	Same as C6			
	C10	Not Used			
	C11	Not Used			
	C12	Fixed, Mica Dielectric (1000 PF, 5%, 300V)	72136	DM15F102J	See 493-310102-234 493-110102-234
	C13	Fixed, Ceramic Dielectric (0.1 UF, 20%, 50V)	56289	5C50	047-001841
	C14	Same as C6			
		CONNECTORS			
	J1	Receptacle, Electrical	80058	UG-1094/U	010-100877
	J2	Same as J1			
	P1	Plug, Electrical	71468	DE-9P	010-101729
		INDUCTORS			
	L1	Coil, Variable (440-800 UH)	71279	CCD-2834-REV-0	050-001774
		TRANSISTORS			
	Q1	Transistor	03508	2N338	112-000048
	Q2	Same as Q1			

TABLE 5-6. REPLACEABLE PARTS LIST FOR 300 KC GENERATOR ASSEMBLY A5 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	RESISTORS			
R1	Variable (250 Ohms, 10%, 1/4W)	01121	RP-251U	025-002409
R2	Fixed, Composition (100 ohms, 10%, 1/4W)	81349	RC07GF101K	450-842101
R3	Fixed, Composition (2200 ohms, 10%, 1/4W)	81349	RC07GF222K	450-842222
R4	Fixed, Composition (33K ohms, 5%, 1/4W)	81349	RC07GF333J	450-841333
R5	Fixed, Composition (1500 ohms, 10%, 1/4W)	81349	RC07GF152K	450-842152
R6	Same as R5			
R7	Not Used			
R8	Same as R3			
R9	Same as R4			
R10	Fixed, Composition (10K ohms, 10%, 1/4W)	81349	RC07GF103K	450-842103
R11	Same as R5			
	TRANSFORMERS			
T1	Transformer, Variable, RF	71279	CCD-2835-REV-0	050-001835
T2	Transformer, Variable, RF	71279	CCD-2836-REV-0	050-001832
T3	Same as T2			

TABLE 5-7. REPLACEABLE PARTS LIST FOR POWER SUPPLY ASSEMBLY A6.

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	CAPACITORS			
C1	Fixed, Electrolytic (85 UF, 300V)	56289	D29484	045-001255
C2	Same as C1			
C3	Same as C1			
C4	Fixed, Paper (0.015 UF, 10%, 300V)	56289	158P15393	046-001617
C5	Fixed, Electrolytic (4.7 UF, 20%, 35V)	56289	150D475X0035B2	045-000747
C6	Fixed, Electrolytic (330 UF, 20%, 6V)	56289	150D337X0006S2	045-000996
C7	Fixed, Paper (0.01 UF, 10%, 300V)	56289	158P10393	046-001618
C8	Fixed, Paper Dielectric (0.47 UF, 400V)	56289	121P47494T15	046-001613
	SEMICONDUCTOR DEVICES			
CR1	Diode	80131	1N3612	019-003477
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Diode	80131	1N485B	019-003314
CR6	Same as CR5			
CR7	Same as CR5			
CR8	Same as CR5			
CR9	Same as CR5			
CR10	Diode	80131	1N270	019-002938
CR11	Diode, Zener	80131	1N1820A	019-003475
CR12	Diode, Zener	80131	1N970A	019-003476
CR13	Diode, Zener	80131	1N941B	019-003478
CR14	Same as CR12			
	TRANSISTORS			
Q1	Transistor	80131	2N1547	019-003473
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Transistor	80131	2N1184A	019-003474
Q5	Transistor	80131	2N335	019-003479
Q6	Same as Q5			
Q7	Transistor	80131	2N1026	019-003480

TABLE 5-7. REPLACEABLE PARTS LIST FOR POWER SUPPLY ASSEMBLY A6 (CONT)

REF SYM	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.
	TRANSISTORS (CONT)			
Q8	Same as Q7			
	RESISTORS			
R1	Fixed, Wire Wound (30 ohms, 3%, 25W)	91637	RH25G300H	454-012300
R2	Fixed, Wire Wound (1000 ohms, 3%, 5W)	91637	RS-5-102H	446-046102-000
R3	Fixed, Wire Wound (20 ohms, 3%, 10W)	91637	RH10G200H	454-102200-000
R4	Fixed, Wire Wound (1200 ohms, 3%, 5W)	91637	RS-5-122H	446-046122-000
R5	Fixed, Composition (56 ohms, 5%, 1/4W)	81349	RC07GF560J	450-841560
R6	Fixed, Composition (22 ohms, 10%, 1/4W)	81349	RC07GF220K	450-842220
R7	Fixed, Composition (330 ohms, 10%, 2W)	81349	RC42GF331K	450-542331
R8	Fixed, Composition (100 ohms, 10%, 1/2W)	81349	RC20GF101K	450-242101
R9	Fixed, Composition (47 ohms, 5%, 1/4W)	81349	RC07GF470J	450-841470
R10	Fixed, Composition (220 ohms, 10%, 1/2W)	81349	RC20GF221K	450-242221
R11	Fixed, Composition (4700 ohms, 10%, 1/4W)	81349	RC07GF472K	450-842472
R12	Fixed, Composition (5600 ohms, 10%, 1/4W)	81349	RC07GF562K	450-842562
R13	Fixed, Wire Wound (22,500 ohms, 1%, 5W)	91637	RS-5-2252F	446-045225-29
R14	Fixed, Composition (56K ohms, 10%, 2W)	81349	RC42GF563K	450-542563
R15	Fixed, Wire Wound (4000 ohms, 1%, 1/2W)	91637	Type MRS-1/2	023-000583
R16	Fixed, Wire Wound (1500 ohms, 1%, 1/2W)	91637	Type MRS-1/2	023-000584
R17	Fixed, Wire Wound (50K ohms, 1%, 5W)	91637	RS-5-503F	446-045503-00
R18	Variable (20K ohms, 1W)	75042	Type 100	025-002435
R19	Fixed, Wire Wound (10K ohms, 3%, 10W)	91637	RH10G103H	454-102103-000
R20	Fixed, Wire Wound (9000 ohms, 5%, 10W)	44655	1754A	024-001528
R21	Not Used			
R22	Fixed, Wire Wound (14K ohms, 5%, 5W)	56289	452E143J	024-001527
	TRANSFORMERS			
T1	Transformer, Power Step-up and Step-down	26916		850-001