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INSTRUCTION MANUAL FOR TYPES SM-8512 AND SM-8513 SIGNAL MONITORS

COMMUNICATION ELECTRONICS, INC.

6006 EXECUTIVE BOULEVARD ROCKVILLE, MARYLAND, 20852

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Change 1
200/4/6/65

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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.

CHANGE 1

Change 1 reflects the incorporation of the type 8200A Sweep Generator/Deflection Module into the parts list and schematic diagrams. This assembly is an improved version which is entirely interchangeable with the previous item. When ordering spare or replacement modules, the type 8200A should be specified.

NOTE

The value given for R8 in the main chassis parts list, paragraph 5.4.1, and on the main chassis schematic diagram, Figure 6-6, is a nominal value. The final value is factory selected to obtain proper range of the focus control.

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

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TABLE OF CONTENTS

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Table 1-1. Types SM-8512 and SM-8513 Signal Monitors, Specifications

Number of Inputs	SM-8512, one; SM-8513, two
Input Center Frequency	455 kc
Range of Center Frequency Control	±20 kc
Input Bandwidth	Suitable to work with a receiver which has an RF bandwidth of at least 50 kc
Input Impedance	50 ohms
Sweep Widths	5, 20, and 50 kc selectable by front-panel control
Resolution	
5-kc Sweep Width	Minimum 6-db valley between signals 250-cps apart
20-kc Sweep Width	Minimum 6-db valley between signals 1.2-kc apart
50-kc Sweep Width	Minimum 6-db valley between signals 2.5-kc apart
Sweep Rates	
5-kc Sweep Width	4 cps ±1 cps
20-kc Sweep Width	8 cps ±2 cps
50-kc Sweep Width	12 cps ±2.5 cps
Sweep Linearity	Linear over-all to within 5% of the total sweep width
Amplitude Scales-Linear	A signal 20 db down from the value that produces 100% vertical deflection will produce 10% deflection
-Logarithmic	A signal 40 db down from the value that produces 100% vertical deflection will produce 10% deflection
Image Rejection	50 db minimum
IF Rejection	60 db minimum
Power Input	115 or 230 volts, 50 to 400 cps
Power Consumption	SM-8512, 30 watts, approximately SM-8513, 60 watts, approximately
IF Frequencies	280 kc and 40 kc
Oscillator Frequencies	
1st Local Oscillator	735 kc ±1/2 sweep width
2nd Local Oscillator	320 kc
Sensitivity	5 microvolts input at 455 kc produces at least one inch deflection on the CRT
Gain Control Range	60 db, minimum
Crystal Marker	
Frequency	455 kc
Tolerance	.01%
Crystal Marker Radiation	The radiation of the crystal marker oscillator through the input connector is not more than 10 microvolts.
Size	SM-8512, 3-1/2" high x 19" wide x 15" deep SM-8513, 5-1/4" high x 19" wide x 15" deep
Weight	SM-8512, 18 lbs, approximately; SM-8513, 30 lbs, approximately

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Figure 1-1. Types SM-8512 (top) and SM-8513 (bottom) Signal Monitors, Front Views

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SECTION I

GENERAL DESCRIPTION

1.1 GENERAL

This Instruction Manual covers the type SM-8512 and type SM-8513 Signal Monitors. These two units are nearly identical electrically, differing only in the design of the filter chassis. From a physical standpoint, the SM-8513 consists of two SM-8512 Signal Monitors built into a single chassis. This manual has been prepared for the SM-8512, with appropriate notations included to explain any areas which are not identical with the type SM-8513.

1.2 ELECTRICAL CHARACTERISTICS

The CEI Type SM-8512 Signal Monitor is designed for use in conjunction with a receiver to provide a visual display of all signals present within a frequency range adjustable in steps of 5 kilocycles, 20 kilocycles and 50 kilocycles, about a center frequency of 455 kilocycles. Such displays are an aid in analyzing signals intercepted by the receiver and can be used in studying the amplitude, type of modulation, etc., of the signals. The sensitivity is such that 5 microvolts at the signal monitor input will produce full vertical deflection. Resolution at 5-kc sweep width is such that any two signals 300 cps apart show on the screen as separate traces with a 6-db valley between them. The power supply provides +100 vdc regulated and -6.3 vdc regulated to make operation relatively independent of line voltage fluctuations. Specifications for the unit are listed in Table 1-1; the tube and semiconductor complement is presented in Table 1-2.

1.3 MECHANICAL CHARACTERISTICS

As shown in Figure 1-1, the front panel mounts the cathode-ray tube (CRT) screen; the MARKER switch; the CENTER FREQ. control; the SWEEP WIDTH switch; the GAIN control; the INTENSITY control; the FOCUS control; the VERT. DISPLAY switch; the POWER switch, with ON position marked; and a pilot lamp with a red cover which indicates power on.

1.3.1 The chassis rear apron (see Figure 1-2) mounts a type BNC receptacle marked SIGNAL INPUT J2; fuseholders marked F1 3/8 AMP and F2 3/16 AMP; and toggle switch S2 marked 230 VAC- 150 VAC. The power cord is permanently connected through the rear of the signal monitor.

1.3.2 The panel and main chassis are constructed of aluminum. The main chassis top and bottom are covered with aluminum dust covers. The front panel is overlaid with a black-anodized etched plate. Subassemblies within the main chassis have been gold flashed to prevent tarnishing. The sawtooth generator module, an etched circuit board, is mounted plug-in fashion on top of the main chassis.

Figure 1-2. Type SM-8512 Signal Monitor, Rear View

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Table 1-2. SM-8512 Signal Monitor, Tube and Semiconductor Complement

Designation	Type	Function
	Main Chassis	
CR1	SC20	Rectifier
CR2	SC20	Rectifier
CR3	1N3254	Rectifier
CR4	1N3254	Rectifier
CR5	1N3254	Rectifier
CR6	1N3254	Rectifier
CR7	1N3005B	Voltage Regulator
CR8	1N3253	Rectifier
CR9	1N3253	Rectifier
CR10	1N753	Voltage Regulator
Q1	2N1544	Series Regulator
V1	3XP2	CRT
	IF Sweep Chassis	
A1Q1	2N335	Marker Oscillator
A1Q2	2N335	320-kc Oscillator
A1V1	7587	Shaping Amplifier
A1V2	7587	Shaping Amplifier
A1V3	6CW4	Sweep Oscillator
A1V4	7587	1st Mixer
A1V5	7587	Reactance Modulator
A1V6	7587	2nd Mixer
	Sweep Generator/Deflection Module	
A2CR1	1N972A	Voltage Regulator
A2Q1	2N489	Sawtooth Generator
A2Q2	2N335	Emitter Follower
A2Q3	2N335	Paraphase Amplifier
A2V1	6CW4	Horizontal Deflection Amplifier
A2V2	6CW4	Horizontal Deflection Amplifier
	IF Output Chassis	
A4CR1	1N198A	AGC Detector
A4CR2	1N198A	Push-Pull Detector
A4CR3	1N198A	Push-Pull Detector
A4V1	7587	1st IF Amplifier
A4V2	6CW4	2nd IF Amplifier

NOTE: This complement is employed twice in each type SM-8513 Signal Monitor

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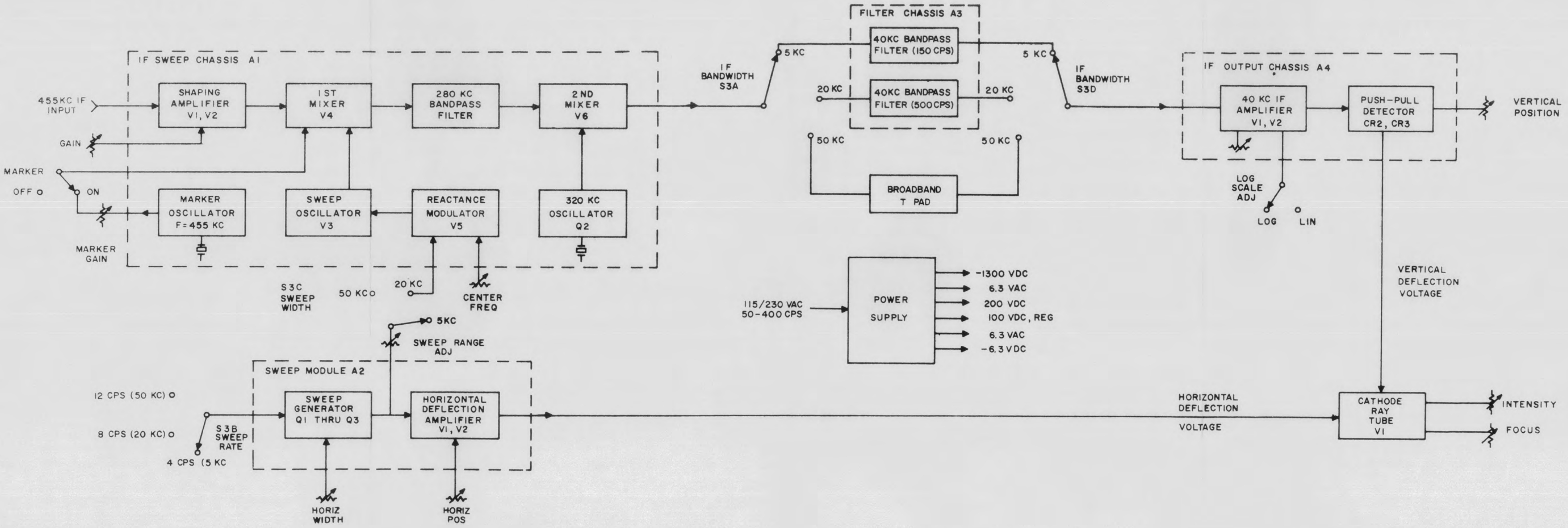

Figure 2-1. Type SM-8512 Signal Monitor, Functional Block Diagram

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SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

The SM-8512 Signal Monitor is operated with an appropriate receiver to provide a panoramic visual display of the IF signal from the receiver's signal monitor output. The frequency range under view at one time may be adjusted to either 5 kc, 20 kc or 50 kc. The sensitivity of the SM-8512 Signal Monitor is such that 5 microvolts at the signal monitor input will give a minimum of one inch deflection. Its resolution is such that signals 250 cps apart will appear as separate traces with a 6-db valley between them when the 5-kc sweep width is used.

2.2 FUNCTIONAL ANALYSIS

The circuitry of the SM-8512 is explained in the following paragraphs using the functional block diagram, Figure 2-1. Schematic diagrams for the unit are included at the back of this manual and they should be referred to as necessary. Note that the unit numbering system is used for the electrical components, which means that parts on subassemblies and modules carry a prefix before the usual class letter and number of the item (such as A1R1 and A2CR3). These subassembly prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

2.2.1 The 455-kc center-frequency signal from the receiver is fed to the shaping amplifier. The function of the shaping amplifier is to provide a response curve of such a shape that, when combined with the response at the receiver's intermediate frequency output, the sum of the two will be an amplitude vs. frequency response sufficiently flat to obtain proper signal monitor operation over the desired sweep width.

2.2.2 From the shaping amplifier the signal is passed to the first mixer where it is mixed with the signal from the sweep oscillator. The sweep oscillator frequency varies above and below its center frequency 4, 8, or 12 times each second, the frequency change being produced by the action of a reactance modulator. The extent of the frequency sweep is set by the SWEEP WIDTH control at 50 kc, 20 kc, or 5 kc. The sweep oscillator center frequency is 735 kc, making the output of the first mixer a 280-kc IF frequency. The output of the first mixer is applied to a 280-kc bandpass filter. Thus, a signal passes out from the first mixer only at those times when the interaction of the sweep oscillator signal with the incoming signal produces a beat frequency which lies within the bandpass of the 280-kc filter.

2.2.3 The signal is next applied to the second mixer, in which the signal is mixed with a 320-kc signal from a crystal-controlled oscillator. The result is a 40-kc signal which is amplified by two 40-kc IF amplifier stages and then applied to a push-pull detector. The push-pull detector output is a video signal which is applied to the vertical deflection plates of the cathode ray tube.

2.2.4 The horizontal deflection plates of the cathode ray tube receive a horizontal deflection signal developed by a sawtooth generator and applied to the cathode ray tube through the horizontal deflection amplifier. The sawtooth voltage from the sawtooth generator is also applied to the reactance modulator, through the Sweep Range control and the SWEEP WIDTH control. The use of the same sawtooth wave to control both horizontal deflection and sweep oscillator action synchronizes the left-to-right trace deflection on the cathode ray tube screen with the sweep oscillator frequency variations. This fact is of fundamental importance in understanding the operation of the device.

2.2.5 An understanding of exactly how a signal at the receiver produces a trace on the screen is most easily gained by considering a case in which the receiver is tuned to a continuous wave. In such a case, the receiver produces a steady 455-kc IF signal. During that instant of each sweep when the sweep oscillator is at 735-kc, 240-kc and 40-kc beat frequencies are produced and the result is a signal which passes through the unit to the vertical deflection plates. Thus, a pip is produced on the screen. In all other regions of the sweep oscillator's output frequency range, no pip is produced because the difference-beat-frequency becomes too great to lie within the over-all bandpass of the unit. Assuming a constant setting of the GAIN control, which functions by controlling the gain of the shaping amplifier, the height of the resultant vertical pip depends on the amplitude of the incoming signal from the receiver. Also, since the sweep oscillator's frequency changes are synchronized with the horizontal movements of the cathode ray tube beam, the moment at which the sweep oscillator's heterodyning action causes a signal to leave the first mixer will always occur at the same point in the left-to-right movement of the cathode ray tube beam. Thus, a continuous wave coming into the receiver will produce a vertical trace at a given position on the screen and at a height varying with the strength of the received carrier.

2.2.6 If the receiver is tuned to a signal move complex than a continuous wave, its IF will contain various frequencies above and below the 455-kc center frequency. Signals whose frequency differences exceed the resolution limits will

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each produce a vertical pip at a different horizontal point along the screen's base line. The width of the frequency spectrum under display at one time depends on the frequency range across which the sweep oscillator sweeps. Setting the SWEEP WIDTH control to 5 kc, 20 kc, or 50 kc sets the width of the spectrum under display. Pips within the display represent the signals present within the RF spectrum to which the receiver is tuned, with pips being produced for all signals present within a bandwidth a bandwidth equal to the sweep width of the signal monitor.

2.2.7 The width of the display of any given carrier appearing as a single vertical pip is determined by the over-all signal monitor bandwidth. In effect, each individual trace on the screen is a picture of the unit's IF response to the signal causing the trace.

2.2.8 Control of the over-all bandwidth is accomplished by the use of three paths through which the signal is conducted from the second mixer to the first 40-kc IF amplifier. A 150-cycle bandwidth is used with a 5-kc sweep width; a 400-cycle bandwidth is used with a 20-kc sweep width; and a 2.0-kc bandwidth is used with a 50-kc sweep width. To achieve a 150-cycle or a 400-cycle bandwidth, LC filters with appropriate bandpass characteristics are used. To achieve a 2.0-kc bandwidth, the coupling is through a broadband attenuator, and the bandwidth is determined by all the tuned circuits from the first mixer to the detector.

2.2.9 The VERT DISPLAY switch is used to vary the relationship of the height of a signal pip to the amplitude of the carrier received. When this switch is in the LIN position, the vertical height of a pip varies linearly with the amplitude of the carrier (if the GAIN control is held constant). When the switch is in the LOG position, a feedback from the second to the first 40-kc IF amplifier compresses the gain so that the vertical height of a trace varies logarithmically with the amplitude of the incoming signal. The Log Scale Adjust control is used to calibrate the unit during operation with the switch at LOG position.

2.2.10 The marker oscillator can be turned on by the use of the MARKER switch, in which case a crystal-controlled 455-kc signal is injected into the display. This produces a pip which marks the exact center of the spectrum under view, regardless of the sweep width in use. The Marker Gain control is used to adjust the height of the marker pip.

2.2.11 The power supply operates on 115 or 230 vac, 50 to 400 cps. It produces all the voltage sources required by the unit.

2.3 IF SWEEP CHASSIS

Figure 6-1 is a schematic diagram of the IF Sweep Chassis. Components on this chassis have the prefix A1.

2.3.1 Shaping Amplifier.- The shaping amplifier, V1 and V2, provides a response curve such that, when added to the response at the receiver's IF output, the sum of the two will be an essentially flat amplitude vs. frequency response. The input to the stage is a tuned pi-network. Double-tuned couplings are used between the shaping amplifiers and the first mixer. The response curve peak produced by the pi-network combines with the dip produced by the double-tuned couplings to produce the desired flat response. The stages are gain controlled by the GAIN potentiometer, R12, located in the cathode circuits.

2.3.2 Sweep Oscillator and Reactance Modulator.- The sweep oscillator, V3, produces a 735-kc center frequency signal which is periodically swept across a frequency range 50, 20, or 5 kc wide according to the sweep width selected. The sweeping action is produced by means of the reactance modulator, V4, whose effective capacitance as seen by the oscillator tank circuit varies with the bias applied to its control grid. This bias voltage consists of a fixed dc voltage with a sawtooth wave superimposed on it. The bias is applied to the reactance modulator from a voltage divider through SWEEP WIDTH switch section S3C. The CENTER FREQ potentiometer R17, part of the voltage divider, can be used to control the sweep oscillator's center frequency by fixing the voltage level from which the sawtooth varies the reactance modulator grid bias. The sawtooth wave portion of the bias is generated in the sawtooth module. The Sweep Range potentiometer, R22, is used to calibrate the extent of frequency excursions by making fine adjustments of the sawtooth voltage amplitude.

2.3.3 First Mixer.- The first mixer, V4, is a tetrode which receives both the signal from the shaping amplifier and the signal from the sweep oscillator on its control grid. It mixes them, producing a 280-kc center frequency IF signal. The output of the second mixer is coupled through a 280-kc bandpass filter to the grid circuit of the second mixer.

2.3.4 Marker Oscillator.- The marker oscillator consists of transistor Q1 and associated circuitry. The oscillator is crystal-controlled to produce 455 kc. It is turned on by the MARKER switch, S4, which applies a dc voltage to the circuit. Its output reaches the first mixer control grid through capacitors C12 and C32. The Marker Gain control potentiometer , R15, controls the height of the marker pip by varying the level of the dc voltage applied

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to the circuit.

2.3.5 320-kc Oscillator.- The 320-kc oscillator consists of transistor Q2 operated in a crystal-controlled circuit. It is maintained in constant operation and its output is applied to the second mixer grid through capacitor C44.

2.3.6 Second Mixer.- The second mixer, V6, is a tetrode which receives both the signal from the second mixer and the signal from the 320-kc oscillator on its control grid. It mixes them, producing 40-kc IF signal. Its output is coupled to the first 40-kc IF amplifier (A4V1) through one of three paths. The path used depends on the position of switch sections S3A and S3D which are ganged with the SWEEP WIDTH switch. Two of these paths are through tuned filters located on the filter chassis (A3). The third path is a resistive T-pad, consisting of resistors R21, R28, and R29, which attenuates the signal to compensate for the loss introduced by the bandpass filters.

2.4 IF OUTPUT CHASSIS

The IF Output Chassis is shown schematically in Figure 6-4. Components on this chassis carry the prefix A4.

2.4.1 40-kc IF Amplifiers.- The first 40-kc IF amplifier V1, is a tetrode; the second, V2, is a triode. The two stages are coupled by a single-tuned circuit. When it is desired to make the height of a vertical pip vary logarithmically with the amplitude of received signals, the gain of the first stage is compressed. To do this a portion of the V2 output is detected by diode CR1 and fed back to the V1 control grid. The feedback circuit includes potentiometer R3 which is used to calibrate the pip-height to signal-strength relationship. To obtain a gain such that the height of the vertical pips vary linearly with the amplitude of received signals, the VERT DISPLAY switch, S5, is thrown to the LIN position, grounding the feedback voltage.

2.4.2 Push-Pull Detector.- The push-pull detector rectifies and filters the 40-kc IF signal, obtaining a dc voltage which varies according to the average signal amplitude at the circuit's input. The detector applies the dc voltage to the vertical deflection plates of the cathode ray tube, with the result that the vertical height of a signal pip varies with the input signal amplitude (subject, however, to GAIN control and VERT DISPLAY switch settings). The circuit is effectively two shunt diode detectors, CR2 and CR3, with opposite output voltage polarities. The trace is positioned vertically by a network which establishes a dc voltage across the vertical deflection plates. The network is connected from +200 volts through resistor R14, the Vert Pos potentiometer, R17, and resistor R19 to ground.

2.5 SWEEP GENERATOR/DEFLECTION MODULE

Refer to Figure 6-2 for a schematic of the Sweep Generator/Deflection Module. The reference designation prefix is A2.

2.5.1 Sawtooth Generator.- The module contains a sawtooth generator, and a horizontal deflection amplifier. The sawtooth generator stage consists of unijunction transistor Q1. The sawtooth voltage is developed across capacitor C2. Capacitor C2 charges from a 100-vdc source through resistor R2, until the voltage across it reaches a level sufficient to cause Q1 to conduct. Such conduction quickly discharges C2 and the cycle is repeated. Switch section S3B changes the resistance in series with C2, thereby controlling the time constant of the charging circuit and hence setting the sawtooth wave frequency. From Q1, the sawtooth wave is applied to transistor Q2, an emitter follower whose emitter load includes the Horiz Width control, R25. This potentiometer controls the extent of the horizontal deflection of the cathode ray tube's beam by controlling the amplitude of the sawtooth wave prior to its application to the horizontal output amplifier. From R25 the sawtooth wave is applied to transistor Q3, a phase inverter which drives the push-pull horizontal deflection amplifier.

2.5.2 Horizontal Deflection Amplifier.- The horizontal deflection amplifier is a conventional push-pull amplifier made up of triodes, V1 and V2. The Horiz Pos potentiometer R26 changes the cathode-to-ground voltage of V2. This changes the relative plate voltage of V1 to V2 and thus moves the horizontal deflection to the left or right of center.

2.6 CATHODE RAY TUBE

The cathode ray tube uses a -1300 vdc acceleration voltage. This source is connected across a voltage-divider-to-ground composed of resistor R3, potentiometer, R4, resistor R5, potentiometer R6, resistor R7, and resistor R8. Potentiometer R4 functions as the INTENSITY control by controlling the voltage to the cathode. Potentiometer R6 functions as the FOCUS control by controlling the voltage to the first anode. Horizontal positioning of the trace is accomplished by means of potentiometer R26 (see paragraph 2.5.2). Vertical positioning of the trace is accomplished by potentiometer R17 (see paragraph 2.4.2).

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2.7 POWER SUPPLY

The power supply operates from 115/230 volts, 50-400 cps, and furnishes all the power requirements of the signal monitor. The power transformer, T1, has five secondary windings. One of these is a 6.3-vac source for the filaments of the cathode ray tube. A second 6.3-vac winding powers the pilot light and filaments. Another winding powers a full-wave voltage-doubler circuit producing -1300 vdc. The fourth winding powers a full-wave rectifier from which two voltage sources are obtained. One of these, taken off from the output of a pi-type filter, is +200 vdc. The other, obtained by a connection from the +200-volt line, is a +100 vdc, regulated by Zener diode CR7. The output of the fifth winding is applied to a full-wave rectifier and then regulated at -6.3 vdc by Zener diode CR10. This -6.3 volt source operates the filaments of A1V3 and A1V5.

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SECTION III
INSTALLATION AND OPERATION

3.1 INSTALLATION

The type SM-8512 Signal Monitor is designed for mounting in a standard 19-inch rack. It requires 3-1/2 inches of vertical space (5-1/4 inches for type SM-8513) and will extend 15 inches back into the rack. The rack should be adequately ventilated.

3.1.1 Power Connections.- The power cord is permanently connected to the signal monitor and is equipped with a three-pin plug. When used with an appropriate receptacle, the third pin grounds the chassis. For use with a two-pin receptacle, use the adapter supplied with the device. Before installation, place switch S2 on the chassis rear apron in either the 230 VAC or 115 VAC position, depending on the power input source to be used.

3.1.2 Signal Input Connection.- Using the mating plug supplied, connect a 50-ohm coaxial cable to the SIGNAL INPUT receptacle (J2) and connect the other end of the cable to the signal monitor output from the receiver.

3.2 OPERATION

The operating controls are described in the following paragraphs. Front panel controls are shown in Figure 1-1; chassis controls are shown in Figure 5-1.

3.2.1 Power Switch.- The POWER switch applies ac to the equipment and should be turned on several minutes prior to using the equipment in order to allow a thorough warm up.

3.2.2 Gain Control.- The GAIN control governs the height of the signal trace and should be set to give the trace a height of about one inch.

3.2.3 Center Frequency Control.- The CENTFR FREQ. control moves the trace left or right so that the center frequency of the bandwidth to which the receiver is tuned will correspond exactly to the center of the CRT screen. The best way to adjust this control is to tune in a signal of known frequency, preferably one with a simple display such as a CW signal, and turn the CENTER FREQ. control until the center of the display falls exactly on the center of the screen. If the signal does not stay at the center marker for all positions of the SWEEP WIDTH control, the Horiz Pos control needs readjustment.

3.2.4 Sweep Width Switch.- The SWEEP WIDTH switch governs the width of the frequency spectrum which is being viewed on the screen. When searching for signals, set this control at maximum clockwise (50 KC). Then, to narrow down the width to inspect certain signals more closely, this switch may be set to either 20 KC or 5 KC.

3.2.5 Intensity Control.- The INTENSITY control should be set to give the trace the desired brightness.

3.2.6 Vertical Display Switch.- Set the VERT DISPLAY switch to either the LIN or LOG position, depending on the type of vertical response desired (the operation of this control is described in Section II).

3.2.7 Focus Control.- The FOCUS control should be set to give the trace maximum sharpness.

3.2.8 Marker Switch.- When the MARKER switch is at the ON position, a marker pip is placed in the CRT trace which indicates the exact center of the SM display unit bandpass. Normal use of the crystal marker oscillator is to turn it on and then adjust the CENTER FREQ control until the center of the signal under display coincides with the position of the marker pip.

3.2.9 Chassis Controls.- The Sweep Range, Horiz Width, Horiz Pos, Mkr Gain, vertical position (R17) and log scale adjust (R3) controls are located on the top of the chassis. For adjustment of these controls see alignment instructions in Section IV. Most of these controls normally do not require adjustment when operating the signal monitor, but the vertical position (R17) and Horiz Pos control adjustments should be occasionally checked as follows:

(1) Using a 5-kc sweep width, tune in a signal and position its pip to the exact center of the base line.
(2) The pip should rest slightly above the base line or the vertical position (R17) control needs adjustment.
(3) Increase the sweep width to 200 kc. If the signal pip does not remain at center, the Horiz Pos control needs adjustment.

3.3 INTERPRETATION OF SIGNALS

The following are some of the guides to interpreting the signal patterns.

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(1) A constant carrier appears as a deflection of fixed height.
(2) An amplitude-modulated signal appears as a deflection of variable height.
For example, an MCW signal appears like a CW signal of periodically varying height. If the modulation rate is high, sidebands may appear.
(3) A single tone-modulated FM signal will appear as a group of spikes corresponding to the center frequency and the sidebands.
(4) Transient disturbances which are periodic, such as automobile ignitions, vibrators, or buzzers, appear as signals moving along the base line; random transients appear as irregular deflections and flashes.
(5) Noise appears as varying irregularities or "grass" along the base line and may sometimes be eliminated by gain reduction.
(6) Image signals, if passed through the receiver, are distinguishable because they move in the opposite direction with respect to normal signals on the screen when the receiver is tuned.

3.4 MODIFICATION OF R-390 RECEIVER

The R-390 Receiver, frequently used in conjunction with the types SM-8512 and SM-8513 Signal Monitors, requires a slight modification to provide an IF output with wide-bandwidth characteristics. This modification is performed as outlined in the following paragraphs.

3.4.1 Material Required for Modification.- The following materials are used in the modification.

(1) Type 6BE6 tube, qty. 1
(2) Carbon Resistor, 150K ±5% 1/2W, qty. 1
(3) Carbon Resistor, 240K ±5% 1/2W, qty. 1
(4) Carbon Resistor, 24K ±5% 1/2W, qty. 1
(5) Carbon Resistor, 2.2K ±5% 1/2W, qty. 1
(6) Capacitor, Ceramic disc, 0.005 μf ±20% 500V, qty. 2
(7) Capacitor, Ceramic disc, 470 pf ±20% 500V, qty. 1
(8) Connector, BNC, UG-1094/U, qty. 1
(9) Ground Lug, 3/8" (IRC Type QCL), qty. 1
(10) RG-174/U Coaxial Cable, 3 ft.

3.4.2 Modification Instructions.- Proceed as follows:

(1) Remove the RF subchassis as described in the unit Technical Manual.
(2) Remove the type 6C4 third mixer tube and replace with a type 6BE6 tube.
(3) Change the wiring around the third mixer tube socket as shown in the modified circuit diagram, Figure 3-1. The existing 2.2K resistor and 0.005 μf capacitor on pin 7 of the third mixer tube socket should be removed and discarded. New components of the same value should be installed on pin 2.
(4) Route the RG-174/U coax through the openings in the chassis divider sections and out the grommet of the RF subchassis with the other cables.
(5) Drill the connector mounting hole in the rear apron of the receiver as shown in Figure 3-2.
(6) Install the BNC type (UG-1094/U) connector with the ground lug in the mounting hole.
(7) Replace the RF subchassis in the receiver as described in the unit Technical Manual.
(8) Connect the inner conductor of the RG-174/U cable to the BNC connector. Connect the outer shield to the ground lug.
(9) Make all necessary changes in the receiver Technical Manual to reflect the work performed in this modification.
(10) The modification is now complete. The receiver should not require an alignment as a result of these changes.

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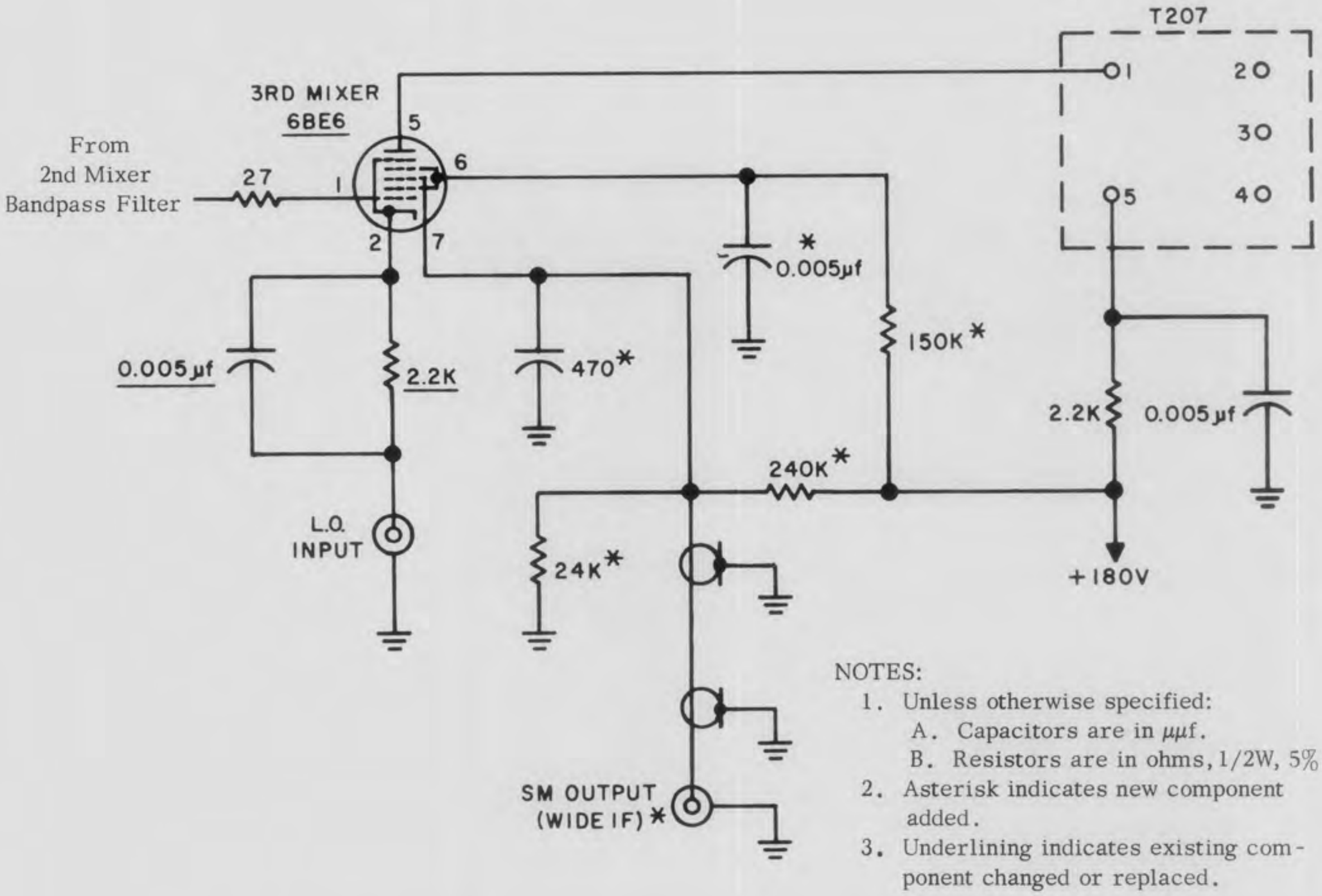

Figure 3-1. R390 Receiver, Modifications to Third Mixer Stage

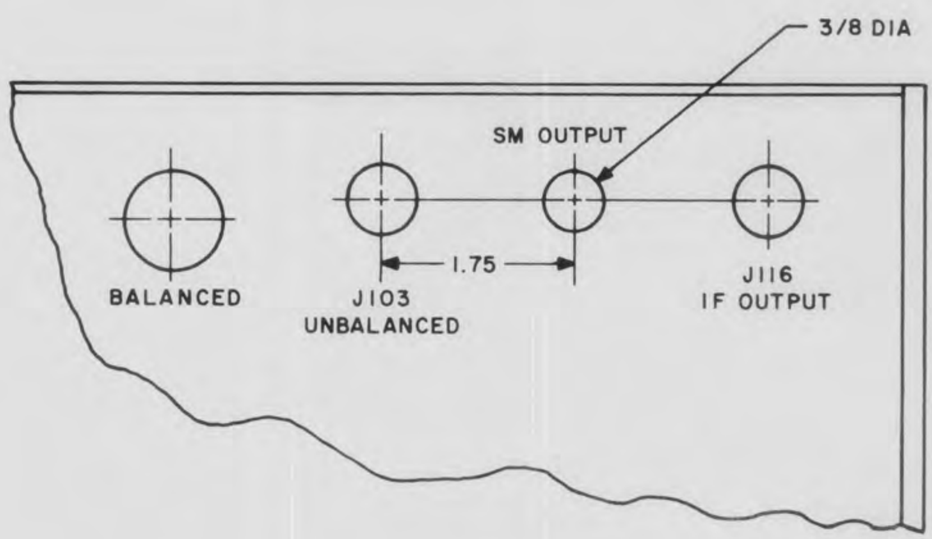

Figure 3-2. R390 Receiver, Modifications to Rear Apron

Courtesy of http://BlackRadios.terryo.org

SECTION IV
MAINTENANCE

4.1 GENERAL

The SM-8512 Signal Monitor is designed to give trouble-free performance, presents no special maintenance problems, and normally requires no care beyond being kept clean. Should trouble occur, it is important that maintenance be performed by trained technicians familiar with Section II, in which the circuits are described. In addition, they should use Figure 6-1 through 6-6, the schematic diagrams; and Tables 4-1 and 4-2 in which the tube socket voltages and resistances are listed. Field maintenance should be confined to cleaning and replacement of the fuses, tubes, or plug-in module. All other maintenance and repair work should be carried on in a well-equipped shop and performed only by trained and experienced personnel.

4.2 CRT REMOVAL

To remove the CRT, first remove the bezel by taking out the four front panel screws. After this the tube can be drawn out of the equipment. If this seems difficult, apply a slight pressure against the center pin of the tube by pushing with a blunt instrument through the center hole of the CRT socket.

4.3 MODULE REMOVAL

The plug-in module can be easily removed by pulling it out of the receptacle into which it is fitted. The numbers on the pins coming out of the module correspond to the numbers indicated on the schematic diagram at the points where the connecting leads pass through the lines outlining each module.

4.4 TROUBLESHOOTING

The greatest percentage of troubles will be caused by failures of the fuses, tubes, or the semiconductors. The proper functioning of all these parts should be assured either by test or by replacement with parts known to be good before any further troubleshooting is carried out. Initial troubleshooting should be directed toward localizing the problem to a specific portion of the signal monitor. The power supply should always be one of the first circuits suspected, and voltage measurements should be taken to assure its proper functioning before other circuits are checked. Once the power supply is known to be operating properly, the best means to locate the faulty circuit is to feed in a signal at the input, and using an oscilloscope, trace the signal from point to point through the device. The plug-in module can be easily replaced with a spare known to be good, thus quickly checking the entire sweep generator circuit. Table 4-3 is included to furnish a guide for trouble localization and is intended only to illustrate methods which may be used in more detailed troubleshooting procedures.

WARNING

Due to the extremely high voltage present across capacitors C3A and C3B, special care should always be taken to discharge them prior to carrying out any work on the chassis underside. Do not rely on the bleeder circuit to discharge them. An open circuit may have occurred which leaves these capacitors charged with a lethal voltage.

4.5 ALIGNMENT

The alignment procedures listed are suitable for use in the field when making periodic performance checks, or when making adjustments after replacing tubes or components. The alignment of the signal monitor should be performed only with suitable equipments by technicians thoroughly familiar with their use.

4.5.1 Equipment Required.- The following equipments, or their equivalents, are required to perform the complete alignment:

(1) Signal Generator, Hewlett-Packard Type 606A
(2) Oscilloscope, Tectronix Type 503
(3) Signal Generator, Boonton Type 202E
(4) Univerter, Boonton Type 207E

Courtesy of http://BlackRadios.terryo.org

Table 4-1. Tube Socket and Module Pin Voltages

Ref. Desig.	Type	Tube Socket Pin Numbers										Anode	Plate Cap
		1	2	3	4	5	6	7	8	10	12		
V1	3XP2	40*	32*	-1300°	-1300	-740	100	86	-1300°			100	
A1V1	7587		30		0				5.3	0	6.3 ac		210
A1V2	7587		31.5		0				5.3	0	6.3 ac		210
A1V3	6CW4		95		62				66	0	-6.3		
A1V4	7587		20		-.93				0	0	6.3 ac		200
A1V5	7587		61		1.5*				1.3*	0	-6.3		95
A1V6	7587		22		-1.25				0	0	6.3 ac		195
A4V1	7587		33		0				.9	0	6.3 ac		200
A4V2	6CW4		180		0				2.4	0	6.3 ac		

Sweep Generator Module Pin Numbers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	96	96	4.0*	-	0	40*	0	0	0	210	4.0*	6.3 ac	32*	0	0	92	4.0*

Notes: All voltages are positive direct current measured with respect to ground unless otherwise indicated. All readings taken with no signal input using RCA WV-98B voltohmmeter, primary power source 115 vac, 60 cps, no signal input.

* Sawtooth voltage measured root-mean-square.

° V1 pin 3 to pin 8 potential is 6.3 vac (filament).

Controls are as follows:

SWEEP WIDTH at 50 KC position
VERT DISPLAY at LIN position
GAIN control maximum counterclockwise
CENTER FREQ control approximately midrange
MARKER switch OFF
INTENSITY maximum clockwise
FOCUS maximum clockwise
Horiz Pos approximately midrange
Horiz Width control maximum counterclockwise

Courtesy of http://BlackRadios.terryo.org

Table 4-2. Tube Socket and Module Pin Resistances to Ground

Ref. Desig.	Type	Tube Socket Pin Numbers										Anode	Plate Cap
		1	2	3	4	5	6	7	8	10	12		
V1	3XP2	110K	110K	14M	14M	10M	800K	850K	14M			130K	
A1V1	7587		39K		100K				10.5K	0	*		13K
A1V2	7587		39K		16 Ω				10.5K	0	*		13K
A1V3	6CW4		10K		280K				130K	0	*		
A1V4	7587		500K		470K				0	0	*		13K
A1V5	7587		47K		200K				2.7K	0	*		6.2K
A1V6	7587		500K		1M				0	0	*		13K
A4V1	7587		18K		560K				200 Ω	0	*		9.25K
A4V2	6CW4		14K		1M				510 Ω	0	*		

Sweep Generator Module Pin Numbers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	6.2K	6.2K	18K	-	0	110K	0	0	0	8.25K	18.5K	*	110K	0	0	6.2K	450K

Notes: Unit not connected to primary power source.

All resistances measured with RCA WV-98B voltohmmeter, referenced to ground.

* Less than one ohm

Controls are as follows:

SWEEP WIDTH at 50 KC position
VERT DISPLAY at LIN position
GAIN control maximum counterclockwise
CENTER FREQ control approximately midrange
MARKER switch OFF
INTENSITY maximum clockwise
FOCUS control maximum clockwise
Horiz Pos control approximately midrange
Horiz Width control maximum counterclockwise

Courtesy of http://BlackRadios.terryo.org

(5) Audio Generator, Hewlett-Packard Type 200CD
(6) VTVM, RCA Type WV98B
(7) Assorted leads and connectors

4.5.2 Initial Control Settings.- Make the following initial settings:

(1) Turn POWER switch to ON position at least 15 minutes prior to beginning alignment.
(2) SWEEP WIDTH control at the 50 KC position.
(3) GAIN control fully clockwise.
(4) MARKER switch OFF
(5) VERT DISPLAY switch at LIN position.

4.5.3 280-kc IF, 40-kc IF and 40-kc Filter Alignment.- Proceed as follows:

(1) Set up equipment as shown in Figure 4-1.
(2) Set the VTVM to the 15-volt range.
(3) Adjust the vertical position control (A4R17) for zero volts as indicated on the VTVM with no signal input.
(4) Adjust the signal generator to produce a continuous wave output of exactly 280 kc with an output level sufficient to produce a reading of 10 volts on the VTVM.

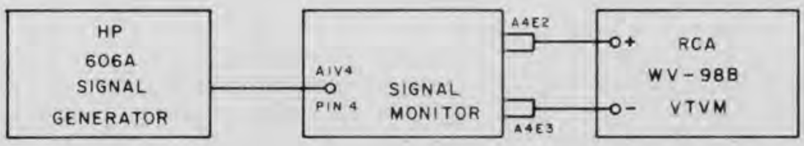

Figure 4-1. Test Equipment Setup, IF Alignment

(5) Reducing the signal generator output as necessary to maintain the VTVM reading at approximately 10 volts, adjust the tuned circuits for maximum output in the following order: A4L3, A4L2, A4L1, A1L11, A1L10, A1L9, A1L8, and A1L7. Repeat the sequence except for A4L3 until no further improvement can be made. (Note: A4L3 is heavily loaded and tunes very broadly.)
(6) Turn the SWEEP WIDTH control to the 20 KC position.
(7) Reducing the signal generator output level as necessary to maintain the VTVM reading at approximately 10 volts, adjust in the order given: A3L10, A3L9, A3L8, A3L7, and A3L6 for maximum output. Repeat the sequence until no further improvement can be made.
(8) Turn the SWEEP WIDTH control to the 5 KC position.
(9) Reducing the signal generator output level as necessary to maintain the VTVM reading at approximately 10 volts, adjust in the order given: A3L5, A3L4, A3L3, A3L2, and A3L1 for maximum output. Repeat the sequence until no further improvement can be made.

4.5.4 Shaping Amplifier Alignment.- Proceed as follows:

(1) Set up equipment as shown Figure 4-2.
(2) Connect signal generator output (455 kc) to pin 4 of A1V2.
(3) Adjust A1L5 and A1L4 for overcoupled response centered at 455 kc.
(4) Connect signal generator output to pin 4 of A1V1.
(5) Adjust A1L3 and A1L2 for overcoupled response centered at 455 kc.
(6) Set up equipment as shown in Figure 4-3.
(7) Adjust A1L1 for symmetrical response curve centered at 500 kc.
(Note: Use internal 500 kc marker to define response curve center.)

Courtesy of http://BlackRadios.terryo.org

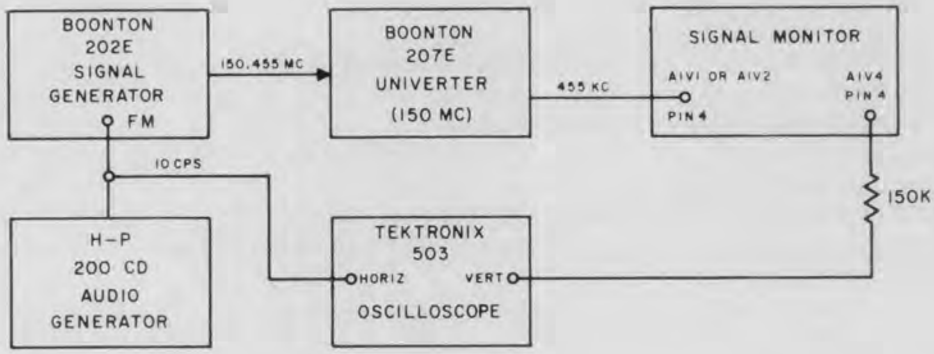

Figure 4-2. Test Equipment Setup, Shaping Amplifier Alignment

4.5.5 Sweep Oscillator Alignment.- Proceed as follows:

(1) Set the CENTER FREQ control to midrange.
(2) Set the SWEEP WIDTH control to the 50 KC position.
(3) Turn the MARKER switch to the ON position.
(4) Adjust A1L6 as necessary to keep the signal pip exactly at the center of the base line, while changing the SWEEP WIDTH switch to 20 KC and 5 KC respectively.

4.5.6 Control Adjustments.- Proceed as follows:

(1) Adjust the vertical position control, A4R17, so that the trace rests slightly above the base line.
(2) Adjust the Horiz Width control so that the horizontal trace reaches across the full width of the screen.
(3) Set the SWEEP WIDTH control to the 5 KC position and turn the MARKER switch ON.

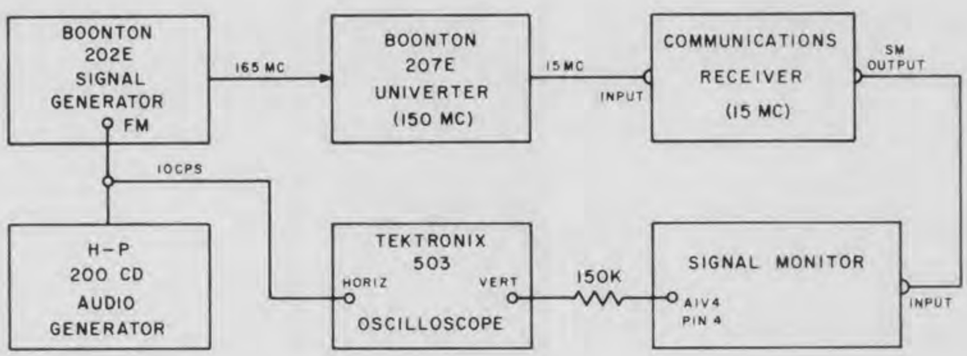

Figure 4-3. Test Equipment Setup, Over-all Alignment

(4) Adjust the CENTER FREQ control so that the signal pip is centered.
(5) Turn the SWEEP WIDTH switch to the 50 KC position and use the Horiz Pos control to center the signal pip.
(6) Connect a signal generator set to 455 kc to the SIGNAL INPUT jack J2.
(7) Set the SWEEP WIDTH control to the 50 KC position and center the signal pip.
(8) Reduce the frequency of the input signal to 430 kc and adjust the SWEEP RANGE control, R22, until the signal pip is over the last base line marker on the right end.
(9) Check adjustment of the SWEEP RANGE control by increasing the signal frequency to 480 kc and observing if the signal pip falls within one-half division from the last base line marker on the left end.

Courtesy of http://BlackRadios.terryo.org

(10) Set the SWEEP WIDTH control to 50 KC position and turn the MARKER switch ON.
(11) Adjust the Mkr Gain control, R15, to give a full vertical deflection of the marker signal pip.
(12) Set the SWEEP WIDTH control to the 20 KC position and adjust A3R3 to give a full vertical deflection of the marker signal pip (SM-8512 only).
(13) Set the SWEEP WIDTH control to the 5 KC position and adjust A3R1 to give a full vertical deflection of the marker signal pip (SM-8512 only).
(14) Set the VERT DISPLAY switch to the LIN position.
(15) Connect a signal generator set to 455 kc to the signal monitor input and adjust the generator output level for full scale vertical deflection of the signal pip.
(16) Set the VERT DISPLAY switch to the LOG position.
(17) Increase the signal generator output 20 db and adjust the log scale control, A4R3, for full-scale vertical deflection of the signal pip.

Courtesy of http://BlackRadios.terryo.org

Table 4-3. Type SM-8512 Signal Monitor, Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	REMEDY
No power.	a. Blown 3/8 amp or 3/16 fuse.	a. Locate cause of blown fuse, correct, and replace fuse. Check setting of 115V/230V toggle switch.
Power is applied but no trace is visible on CRT.	a. Intensity control misadjusted.	a. Turn Intensity control maximum CW.
	b. Power supply voltages inoperative.	b. Check +200V and -1300V supplies; check filament voltage at terminals 9-10 of T1.
	c. Defective CRT.	c. Replace CRT.
No horizontal deflection on CRT.	a. Defective horizontal deflection amplifier.	a. Replace A2V1 and A2V2.
	b. Defective sweep generator/horizontal deflection module.	b. Replace module.
CRT deflection normal, but no pips visible except marker pip.	a. Defective shaping amplifier.	a. Replace A1V1 and A1V2.
	b. No IF output from receiver.	b. Use substitute signal source from signal generator to input of signal monitor.
Signal pips are visible but marker pip is not visible.	a. Defective marker oscillator.	a. Check transistor A1Q1 and associated components.
CRT deflection normal, but neither signal nor marker pips are visible.	a. Defective amplifier, mixer, or oscillator.	a. Make substitution test of all tubes in IF Sweep Chassis and IF Output chassis.
	b. No IF output from receiver.	b. Use substitute signal from signal generator to input of signal monitor.

Courtesy of http://BlackRadios.terryo.org

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:

A1R1

Subassembly Designation — Class and No. of item

Read 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. Prefixes are provided on drawings and illustrations following the notation "REF DESIG PREFIX".

5.3 LIST OF MANUFACTURERS

Abbreviation	Name and Address	Abbreviation	Name and Address
AB	Allen-Bradley Co. 136 W. Greenfield Avenue Milwaukee, Wisconsin	CTC	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, Massachusetts
FXR	Amphenol-Borg Electronics 33 E. Franklin Street Danbury, Connecticut	Centralab	Centralab 900 E. Keefe Avenue Milwaukee, Wisconsin
Arco	Arco Electronics, Inc. Community Drive Great Neck, New York	CM	Chicago Miniature Lamp Works 1500 N. Ogden Avenue Chicago 10, Illinois
CEI	Communication Electronics, Inc. 4908 Hampden Lane Bethesda 14, Maryland	Oak	Oak Manufacturing Co. Crystal Lake, Illinois
CD	Continental Devices Corp. 12515 Chadion Avenue Hawthorne, California	QC	Quality Components, Inc. St. Marys, Pennsylvania
Cornish	Cornish Wire Co. 50 Church Street New York, New York	RCA	Radio Corp. of America 415 S. Fifth Street Harrison, New Jersey
C-H	Cutler-Hammer, Inc. 321 N. 12th Street Milwaukee, Wisconsin	RMC	Radio Materials Corp. 4242 W. Bryn Mawr Avenue Chicago 46, Illinois
Dale	Dale Electronics, Inc. P.O. Box 488 Columbus, Nebraska	Semtech	Semtech Corp. 652 Mitchell Road Newbury Park, California
Erie	Erie Resistor Corp. 644 W. 12th Street Erie, Pennsylvania	Sprague	Sprague Electric Co. 91 Marshall Street N. Adams, Massachusetts

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Abbreviation	Name and Address	Abbreviation	Name and Address
GE	General Electric Co. 777 14th Street, N.W. Washington, D.C.	Sylvania	Sylvania Electric Products, Inc. 1740 Broadway New York, New York
Littelfuse	Littelfuse, Inc. 1865 Miner Street Des Plaines, Illinois	TI	Texas Instruments, Inc. 6000 Lemmon Avenue Dallas, Texas
Motorola	Motorola Semiconductor Prods. 5005 E. McDowell Road Phoenix, Arizona	Waterman	Waterman Products Co. 2445-63 Emerald Street Philadelphia, Pennsylvania
McCoy	McCoy Electronics Co. Mt. Holly Spring Pennsylvania		

5.4 PARTS LIST

When ordering replacement parts from CEI, specify the type and serial number of the equipment, and the reference designation and description of each part ordered. The Vendors and Vendor Part Numbers listed are included as a guide to the user of the equipment in the field and do not necessarily agree with the parts installed in the equipment. Except in those cases specifically noted, the replacement part may be obtained from any vendor as long as the physical and electrical parameters of the part selected agree with the original part. Since the type SM-8513 is a dual unit, each side of the unit contains those parts listed in paragraphs 5.4.1, 5.4.2, 5.4.3, 5.4.5, and 5.4.6. The parts listed in paragraph 5.4.4 are applicable to the type SM-8512 Signal Monitor only.

Courtesy of http://BlackRadios.terryo.org

5.4.1 Main Chassis

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A1	ASSEMBLY, IF SWEEP CHASSIS	8002	CEI
A2	ASSEMBLY, SWEEP GENERATOR/DEFLECTION MODULE	8200	CEI
A3	ASSEMBLY, FILTER CHASSIS (Type SM-8512) ASSEMBLY, FILTER CHASSIS (Type SM-8513)	7904 7905	CEI CEI
A4	ASSEMBLY, IF OUTPUT CHASSIS	8100	CEI
C1	CAPACITOR, CERAMIC DISC: 0.01 μf, 1400V	Type U	RMC
C2	Same as C1		
C3A,B	CAPACITOR, DUAL METALIZED: 0.5-0.5 μf, 1000V	90P228	Sprague
C4A,B	CAPACITOR, DUAL ELECTROLYTIC: 15-15 μf, 350V	43F2299BB1	GE
C5	CAPACITOR, METALIZED: 1.0 μf, 20%, 200V	121P1050-2T-15	Sprague
C6	CAPACITOR, CERAMIC DISC: 0.1 μf, +80-20%, 100V	Type TA	RMC
C7	NOT USED		
C8	NOT USED		
C9	NOT USED		
C10	CAPACITOR, ELECTROLYTIC: 1000 μf, 25V	43F2468BA1	GE
C11	Same as C1		
CR1	DIODE, RECTIFIER	SC20	Semtech
CR2	Same as CR1		
CR3	DIODE, SILICON	1N3254	RCA
CR4	Same as CR3		
CR5	Same as CR3		
CR6	Same as CR3		
CR7	DIODE, ZENER: 100V	1N3005B	Motorola
CR8	DIODE, SILICON	1N3253	RCA
CR9	Same as CR8		
CR10	DIODE, ZENER: 6.3V	1N753	CD
DS1	LAMP: 0.04 amp, 6V, T-1-3/4 bulb	345	CM
F1	FUSE: 3/8 amp, Slow Blow	313.375	Littelfuse
F2	FUSE: 3/16 amp, Slow Blow	313.187	Littelfuse
J1	NOT USED		
J2	JACK: Type BNC, p/o W1	17825	FXR
L1	CHOKE, FILTER	1070	CEI
P1	PLUG AND LINE CORD ASSEMBLY	01753-001	Cornish
P2	CONNECTOR, PLUG: p/o W1	27-7	FXR
P3	Same as P2, p/o W2		
P4	Same as P2, p/o W3		

Courtesy of http://BlackRadios.terryo.org

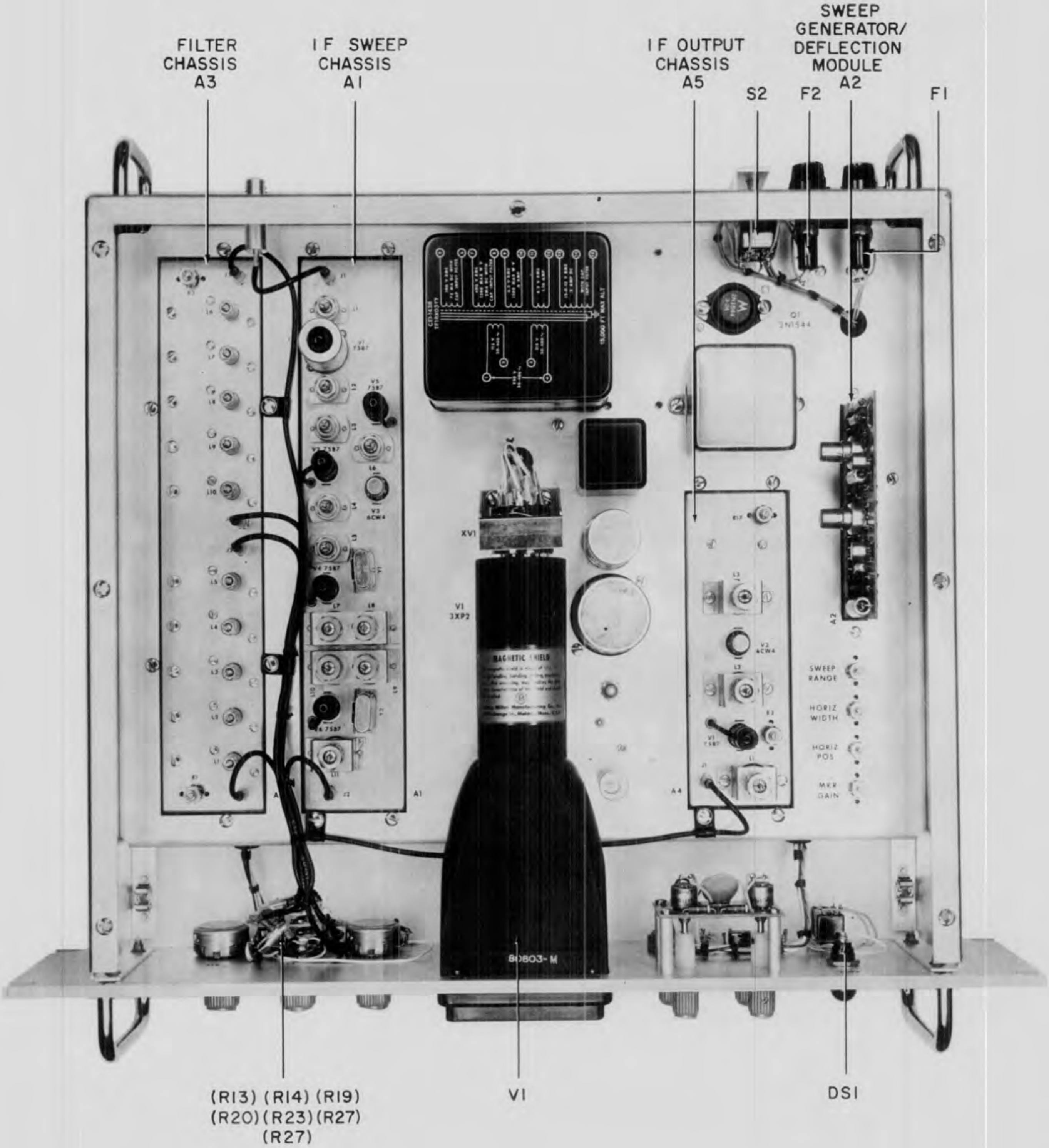


Figure 5-1. Type SM-8512 Signal Monitor, Top View

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
P5	Same as P2, p/o W4		
P6	Same as P2, p/o W5		
P7	Same as P2, p/o W6		
P8	Same as P2, p/o W7		
Q1	TRANSISTOR	2N1544	Motorola
R1	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/2W	EB2205	AB
R2	RESISTOR, WIREWOUND: 3.3K, 3%, 5W	RH5	Dale
R3	RESISTOR, FIXED, COMPOSITION: 100K, 5%, 1/4W	CB1045	AB
R4	POTENTIOMETER: 500K, 10%, 1/2W	GA1G048P-504UA	AB
R5	RESISTOR, FIXED, COMPOSITION: 4.7 meg, 5%, 1/2W	EB4755	AB
R6	POTENTIOMETER: 2.5 meg, 10%, 1/2W	GA1G048P-255UA	AB
R7	Same as R5		
R8	Same as R5		
R9	RESISTOR, FIXED, COMPOSITION: 220K, 5%, 1/2W	EB2245	AB
R10	RESISTOR, FIXED, COMPOSITION: 150K, 5%, 1/2W	EB1545	AB
R11	RESISTOR, FIXED, COMPOSITION: 430 Ω, 5%, 1/2W	EB4315	AB
R12	POTENTIOMETER: 10K, 10%, 2W	JA1N056P-103UA	AB
R13	RESISTOR, FIXED, FILM: 182K, 1%, 1/8W	RN60B1823F	TI
R14	RESISTOR, FIXED, FILM: 60.4K, 1%, 1/8W	RN60B6042F	TI
R15	POTENTIOMETER: 500K, 10%, 1/2W	GA1M032S-504UC	AB
R16	RESISTOR, FIXED, COMPOSITION: 10K, 5%, 1/4W	CB1035	AB
R17	POTENTIOMETER: 50K, 10%, 2W	JA1N056P-503UA	AB
R18	RESISTOR, FIXED, COMPOSITION: 220K, 5%, 1/4W	CB2245	AB
R19	RESISTOR, FIXED, FILM: 20K, 1%, 1/8W	RN60B2002F	TI
R20	RESISTOR, FIXED, FILM: 60.4K, 1%, 1/8W	RN60B6042F	TI
R21	RESISTOR, FIXED, FILM: 121K, 1%, 1/8W	RN60B1213F	TI
R22	Same as R15		
R23	RESISTOR, FIXED, COMPOSITION: 4.7K, 5%, 1/4W	CB4725	AB
R24	RESISTOR, FIXED, COMPOSITION: 8.2K, 5%, 1/4W	CB8225	AB
R25	POTENTIOMETER: 10K, 10%, 1/2W	GA1M032S-103UC	AB
R26	Same as R25		
R27	RESISTOR, FIXED, FILM: 20 Ω, 1%, 1/8W	RN60B20R0F	TI
R28	RESISTOR, FIXED, FILM: 909 Ω, 1%, 1/8W	RN60B9090F	TI

Courtesy of http://BlackRadios.terryo.org

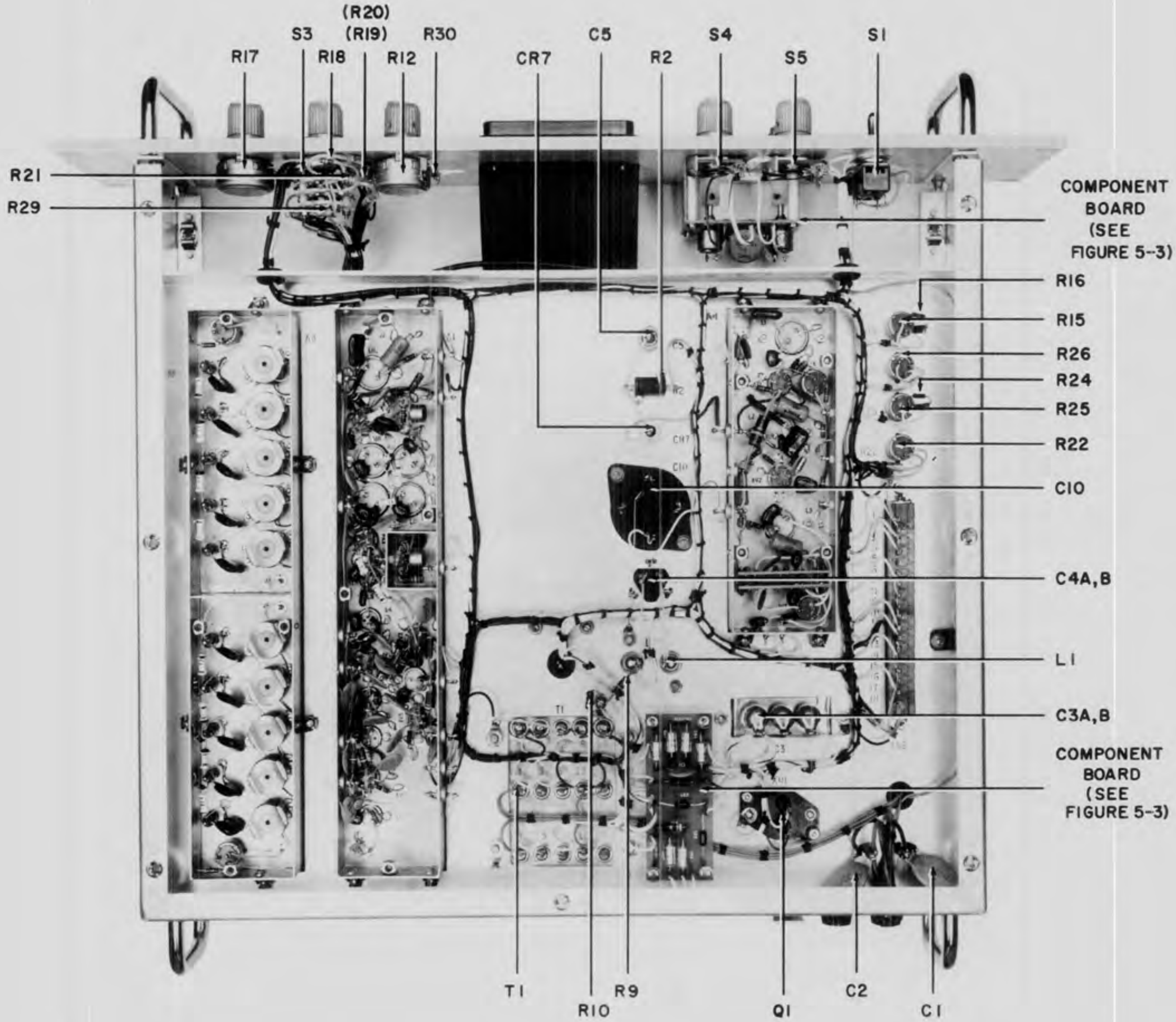
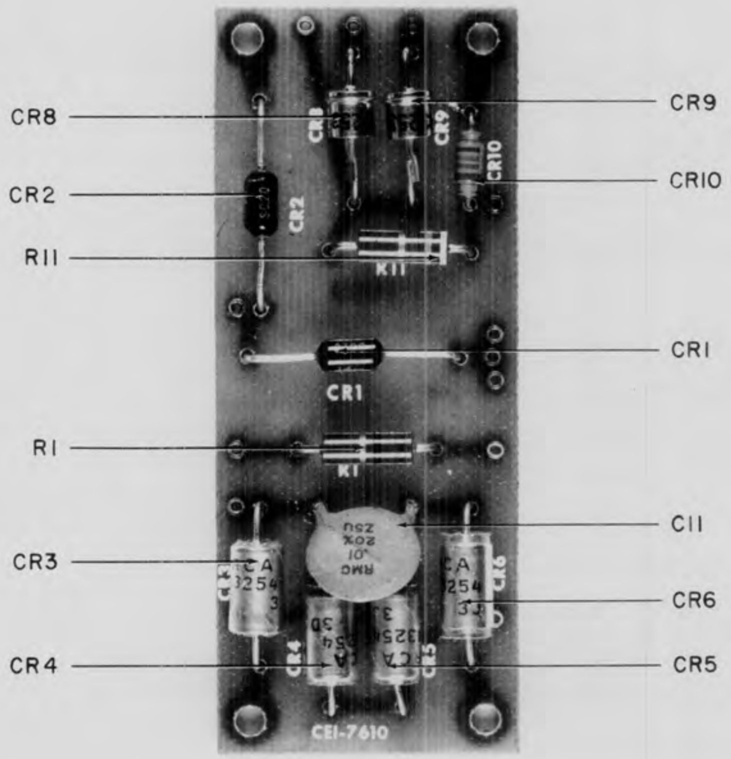


Figure 5-2. Type SM-8512 Signal Monitor, Bottom View

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
R29	Same as R28		
R30	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	CB1015	AB
S1	SWITCH, TOGGLE: SPST	8282-K14	C-H
S2	SWITCH, TOGGLE: DPDT	8363-K7	C-H
S3	SWITCH, ROTARY: 6 pole, 6 position; non-shorting	399227A	Oak
S4	SWITCH, ROTARY: 1 pole, 2 position; shorting	1460	Centralab
S5	Same as S4		
T1	TRANSFORMER, POWER	1438	CEI
V1	TUBE, ELECTRON: CRT	3XP2	Waterman
	----------For SM-8512----------		
W1	CABLE AND CONNECTOR ASSEMBLY	2126-75	CEI
W2	CABLE AND CONNECTOR ASSEMBLY	2126-76	CEI
W3	CABLE AND CONNECTOR ASSEMBLY	2126-76	CEI
W4	CABLE AND CONNECTOR ASSEMBLY	2126-77	CEI
W5	CABLE AND CONNECTOR ASSEMBLY	2126-78	CEI
W6	CABLE AND CONNECTOR ASSEMBLY	2126-78	CEI
W7	CABLE AND CONNECTOR ASSEMBLY	2126-79	CEI
	-----For SM-8513 as viewed from front-----		
W1	CABLE AND CONNECTOR ASSEMBLY	2126-90 (left) 2126-91 (right)	CEI CEI
W2	CABLE AND CONNECTOR ASSEMBLY	2126-92 (left) 2126-77 (right)	CEI CEI
W3	CABLE AND CONNECTOR ASSEMBLY	2126-91 (left) 2126-92 (right)	CEI CEI
W4	CABLE AND CONNECTOR ASSEMBLY	2126-92 (left) 2126-91 (right)	CEI CEI
W5	CABLE AND CONNECTOR ASSEMBLY	2126-78 (both)	CEI
W6	CABLE AND CONNECTOR ASSEMBLY	2126-78 (both)	CEI
W7	CABLE AND CONNECTOR ASSEMBLY	2126-92 (both)	CEI

Courtesy of http://BlackRadios.terryo.org



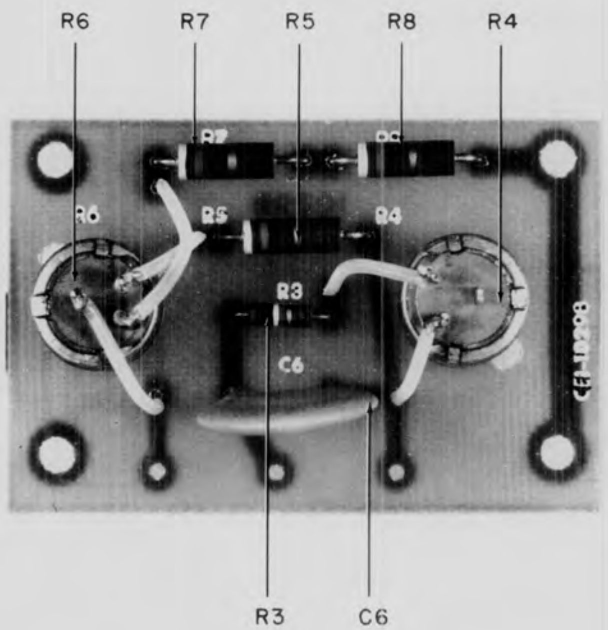


Figure 5-3. Main Chassis Component Boards

Courtesy of http://BlackRadios.terryo.org

5.4.2 IF Sweep Chassis Type 8002

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A1C1	CAPACITOR, CERAMIC DISC: 470 pf, 20%, 500V	Type SM	RMC
A1C2	CAPACITOR, DIPPED MICA: 160 pf, 5%	DM10-161J	Arco
A1C3	CAPACITOR, CERAMIC DISC: 1000 pf, 20%, 500V	Type SM	RMC
A1C4	CAPACITOR, CERAMIC DISC: 0.01 μf, 20%, 500V	Type SM	RMC
A1C5	Same as A1C2		
A1C6	Same as A1C4		
A1C7	Same as A1C4		
A1C8	CAPACITOR, DIPPED MICA: 39 pf, 5%	DM10-390J	Arco
A1C9	Same as A1C2		
A1C10	Same as A1C4		
A1C11	NOT USED		
A1C12	CAPACITOR, CERAMIC TUBULAR: 0.15 pf, 10%	Type QC	QC
A1C13	CAPACITOR, DIPPED MICA: 75 pf, 5%	DM10-750J	Arco
A1C14	CAPACITOR, DIPPED MICA: 120 pf, 5%	DM10-121J	Arco
A1C15	Same as A1C4		
A1C16	Same as A1C4		
A1C17	Same as A1C2		
A1C18	Same as A1C8		
A1C19	Same as A1C2		
A1C20	Same as A1C4		
A1C21	CAPACITOR, DIPPED MICA: 56 pf, 5%	DM10-560J	Arco
A1C22	CAPACITOR, CERAMIC DISC: 100 pf, 20%, N1500 temperature compensated	Type C	RMC
A1C23	CAPACITOR, DIPPED MICA: 270 pf, 5%	DM10-271J	Arco
A1C24	CAPACITOR, CERAMIC DISC: 470 pf, 20%	Type B	RMC
A1C25	CAPACITOR, DIPPED MICA: 10 pf, 5%	DM10-100J	Arco
A1C26	CAPACITOR, CERAMIC DISC: 2200 pf, 20%	Type JF	RMC
A1C27	Same as A1C4		
A1C28	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pf	301-000-C0J0-339C	Erie
A1C29	Same as A1C4		
A1C30	Same as A1C4		
A1C31	CAPACITOR, CERAMIC STANDOFF: 0.001 μf, GMV	SS5A-102W	AB
A1C32	CAPACITOR, CERAMIC TUBULAR: 0.3 pf, 10%	Type QC	QC
A1C33	CAPACITOR, DIPPED MICA: 4.7 ±0.25 pf	301-000-C0H0-479C	Erie
A1C34	Same as A1C4		

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A1

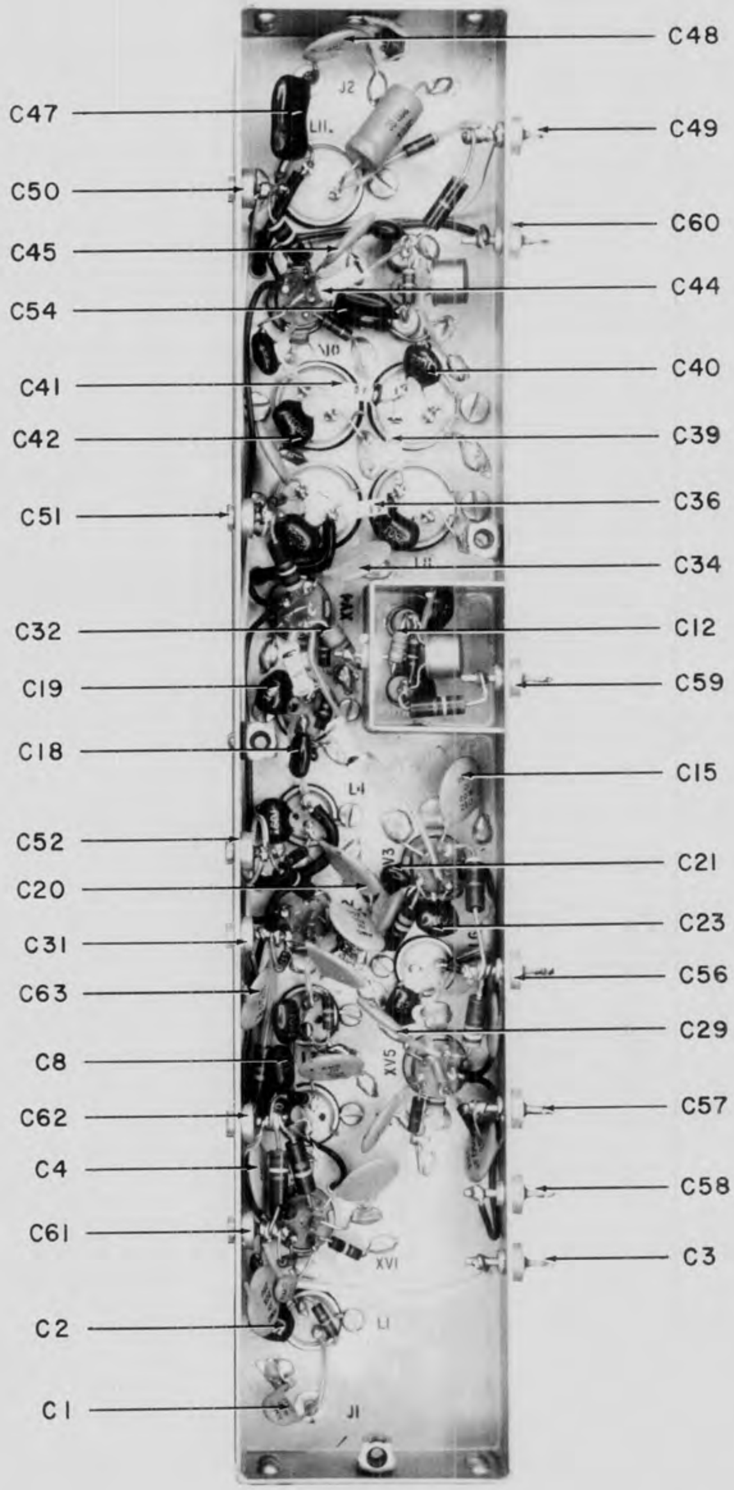


Figure 5-4. Type 8002 IF Sweep Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A1C35	CAPACITOR, DIPPED MICA: 250 pf, 5%	DM10-251J	Arco
A1C36	CAPACITOR, CERAMIC TUBULAR: 5.6 ±0.5 pf	301-000-C0H0-569D	Erie
A1C37	Same as A1C4		
A1C38	Same as A1C35		
A1C39	Same as A1C33		
A1C40	Same as A1C35		
A1C41	Same as A1C36		
A1C42	Same as A1C35		
A1C43	CAPACITOR, DIPPED MICA: 12 pf, 5%	DM10-120J	Arco
A1C44	Same as A1C28		
A1C45	Same as A1C4		
A1C46	CAPACITOR: 0.1 μf, 10%, 200V	192P10492	Sprague
A1C47	CAPACITOR, DIPPED MICA: 1200 pf, 5%	DM19-122J	Arco
A1C48	Same as A1C4		
A1C49	CAPACITOR, CERAMIC FEEDTHRU: 1000 pf, GMV	FA5C-102W	AB
A1C50	Same as A1C31		
A1C51	Same as A1C31		
A1C52	Same as A1C31		
A1C53	CAPACITOR, DIPPED MICA: 33 pf, 5%	DM10-330J	Arco
A1C54	Same as A1C47		
A1C55	Same as A1C49		
A1C56	Same as A1C49		
A1C57	Same as A1C49		
A1C58	Same as A1C49		
A1C59	Same as A1C49		
A1C60	Same as A1C49		
A1C61	Same as A1C31		
A1C62	Same as A1C31		
A1C63	Same as A1C4		
A1C64	Same as A1C4		
A1C65	Same as A1C4		
A1J1	CONNECTOR, JACK	27-9	FXR
A1J2	Same as A1J1		
A1L1	INDUCTOR, VARIABLE	1472-10	CEI
A1L2	Same as A1L1		
A1L3	Same as A1L1		
A1L4	Same as A1L1	1472-9	CEI

Courtesy of http://BlackRadios.terryo.org

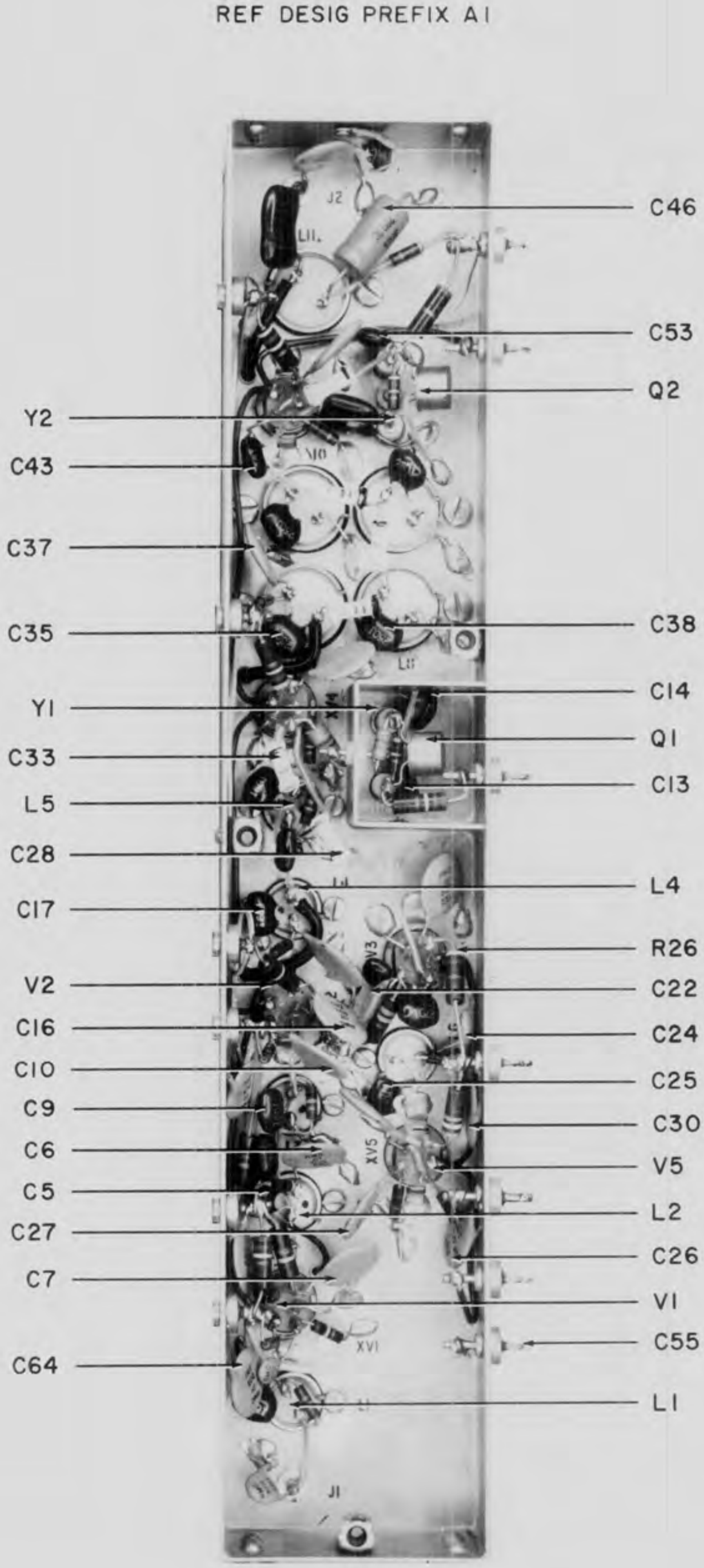


Figure 5-5. Type 8002 IF Sweep Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A1L5	Same as A1L1		
A1L6	INDUCTOR, VARIABLE	1472-9	CEI
A1L7	INDUCTOR, VARIABLE: 1-2.2 mh	1506-1	CTC
A1L8	Same as A1L7		
A1L9	Same as A1L7		
A1L10	Same as A1L7		
A1L11	INDUCTOR, VARIABLE: 9-22 mh	1506-4	CTC
A1Q1	TRANSISTOR	2N335	TI
A1Q2	Same as A1Q1		
A1R1	RESISTOR, FIXED, COMPOSITION: 51K, 5%, 1/4W	CB5135	AB
A1R2	RESISTOR, FIXED, COMPOSITION: 100K, 5%, 1/4W	CB1045	AB
A1R3	RESISTOR, FIXED, COMPOSITION: 200 Ω, 5%, 1/4W	CB2015	AB
A1R4	RESISTOR, FIXED, COMPOSITION: 220K, 5%, 1/2W	EB2245	AB
A1R5	RESISTOR, FIXED, COMPOSITION: 4.7K, 5%, 1/4W	CB4725	AB
A1R6	RESISTOR, FIXED, COMPOSITION: 390K, 5%, 1/2W	EB3945	AB
A1R7	RESISTOR, FIXED, COMPOSITION: 20K, 5%, 1/4W	CB2035	AB
A1R8	RESISTOR, FIXED, COMPOSITION: 200 Ω, 5%, 1/2W	EB2015	AB
A1R9	Same as A1R4		
A1R10	Same as A1R5		
A1R11	Same as A1R7		
A1R12	RESISTOR, FIXED, COMPOSITION: 470K, 5%, 1/4W	CB4745	AB
A1R13	NOT USED		
A1R14	RESISTOR, FIXED, COMPOSITION: 470K, 5%, 1/2W	EB4745	AB
A1R15	Same as A1R5		
A1R16	RESISTOR, FIXED, COMPOSITION: 1 meg, 5%, 1/4W	CB1055	AB
A1R17	Same as A1R14		
A1R18	Same as A1R5		
A1R19	RESISTOR, FIXED, COMPOSITION: 1.5 meg, 5%, 1/4W	CB1555	AB
A1R20	Same as A1R12		
A1R21	RESISTOR, FIXED, COMPOSITION: 39K, 5%, 1/2W	EB3935	AB
A1R22	RESISTOR, FIXED, COMPOSITION: 2.7K, 5%, 1/4W	CB2725	AB
A1R23	RESISTOR, FIXED, COMPOSITION: 2K, 5%, 1/4W	CB2025	AB
A1R24	RESISTOR, FIXED, COMPOSITION: 150K, 5%, 1/4W	CB1545	AB
A1R25	RESISTOR, FIXED, COMPOSITION: 130K, 5%, 1/2W	EB1345	AB
A1R26	Same as A1R5		
A1R27	Same as A1R12		
A1R28	RESISTOR, FIXED, COMPOSITION: 160K, 5%, 1/2W	EB1645	AB

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A1

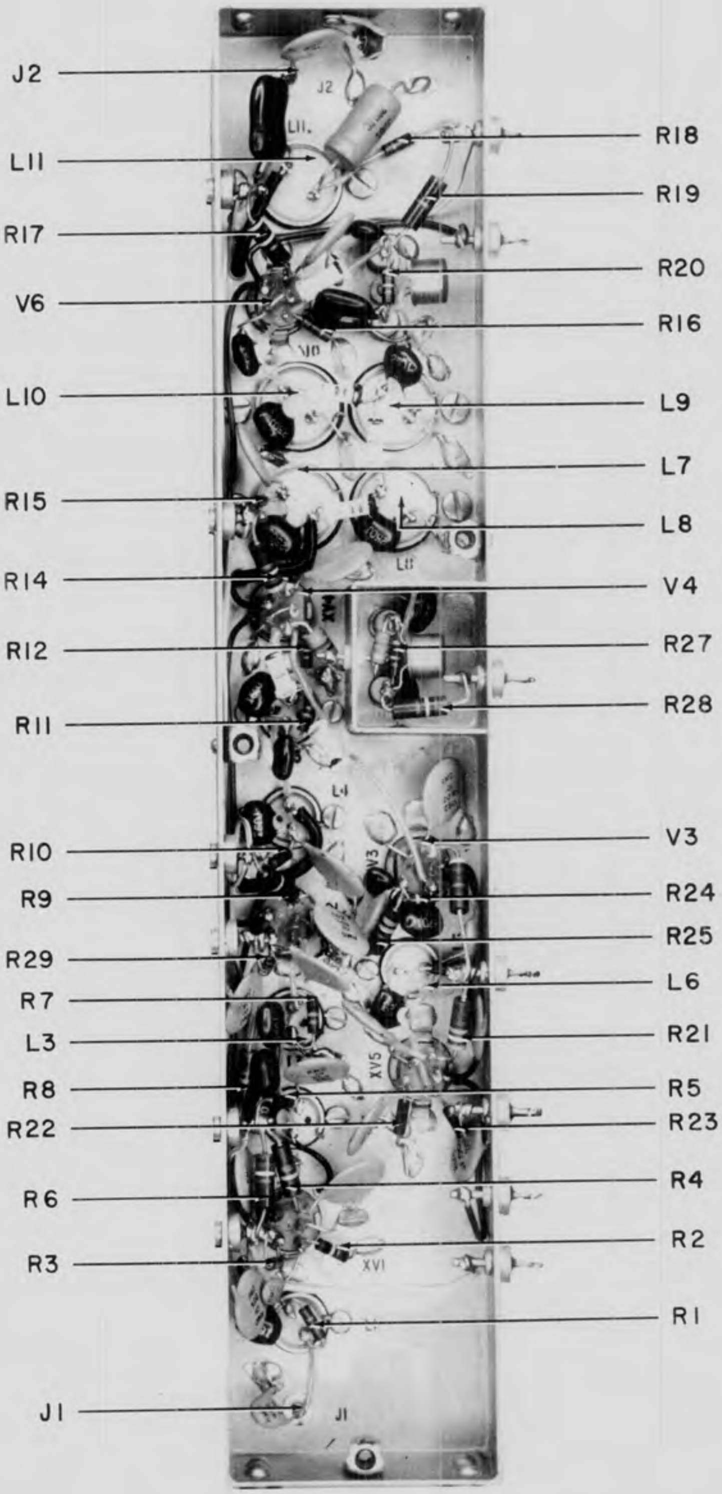


Figure 5-6. Type 8002 IF Sweep Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A1R29	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	CB4705	AB
A1R30	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	CB5105	AB
A1R31	RESISTOR, FIXED, COMPOSITION: 39K, 5%, 1/4W	CB3935	AB
A1R32	Same as A1R31		
A1V1	TUBE, ELECTRON: Nuvistor tetrode	7587	RCA
A1V2	Same as A1V1		
A1V3	TUBE, ELECTRON: Nuvistor triode	6CW4	RCA
A1V4	Same as A1V1		
A1V5	Same as A1V1		
A1V6	Same as A1V1		
A1Y1	CRYSTAL, QUARTZ: 455 kc	CR-46/U	McCoy
A1Y2	CRYSTAL, QUARTZ: 320 kc	CR-46/U	McCoy

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A2

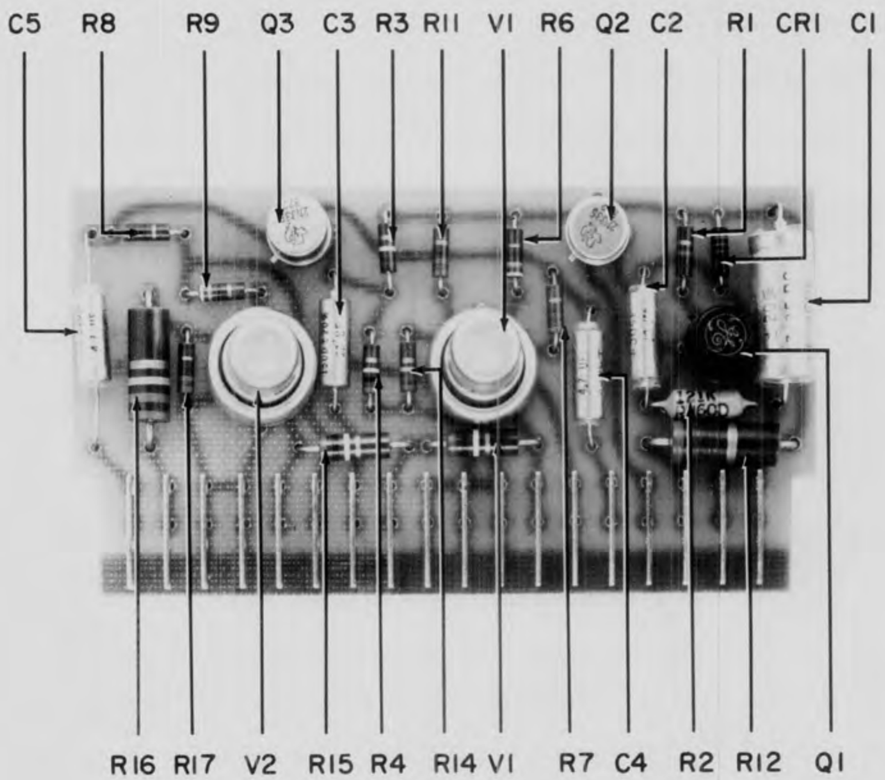


Figure 5-7. Type 8200 Sweep Generator/Deflection Module, Component Locations

Courtesy of http://BlackRadios.terryo.org

5.4.3 Sweep Generator/Deflection Module Type 8200 (Some units use type 8200A, see 5.4.7)

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A2C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 47 μf, 20%, 35V	150D476X-0035S2	Sprague
A2C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 4.7 μf, 20%, 35V	150D475X-0035B2	Sprague
A2C3	CAPACITOR, ELECTROLYTIC, TANTALUM: 22 μf, 20%, 15V	150D226X-0015B2	Sprague
A2C4	Same as A2C2		
A2C5	Same as A2C2		
A2CR1	DIODE, ZENER	1N972A	CD
A2Q1	TRANSISTOR: Unijunction	2N489	GE
A2Q2	TRANSISTOR	2N335	TI
A2Q3	Same as A2Q2		
A2R1	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	CB2215	AB
A2R2	RESISTOR, FIXED, FILM: 121K, 1%, 1/8W	RN60B1213F	TI
A2R3	RESISTOR, FIXED, COMPOSITION: 220K, 5%, 1/4W	CB2245	AB
A2R4	RESISTOR, FIXED, COMPOSITION: 100K, 5%, 1/4W	CB1045	AB
A2R5	NOT USED		
A2R6	RESISTOR, FIXED, COMPOSITION: 4.3K, 5%, 1/4W	CB4325	AB
A2R7	RESISTOR, FIXED, COMPOSITION: 6.2K, 5%, 1/4W	CB6225	AB
A2R8	Same as A2R7		
A2R9	Same as A2R6		
A2R10	NOT USED		
A2R11	RESISTOR, FIXED, COMPOSITION: 1.1K, 5%, 1/4W	CB1125	AB
A2R12	RESISTOR, FIXED, COMPOSITION: 8.2K, 5%, 1W	GB8225	AB
A2R13	RESISTOR, FIXED, COMPOSITION: 100K, 5%, 1/2W	EB1045	AB
A2R14	RESISTOR, FIXED, COMPOSITION: 18K, 5%, 1/4W	CB1835	AB
A2R15	Same as A2R13		
A2R16	RESISTOR, FIXED, COMPOSITION: 16K, 5%, 1W	GB1635	AB
A2R17	Same as A2R11		
A2V1	TUBE, ELECTRON: Nuvistor triode	6CW4	RCA
A2V2	Same as A2V1		

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A3

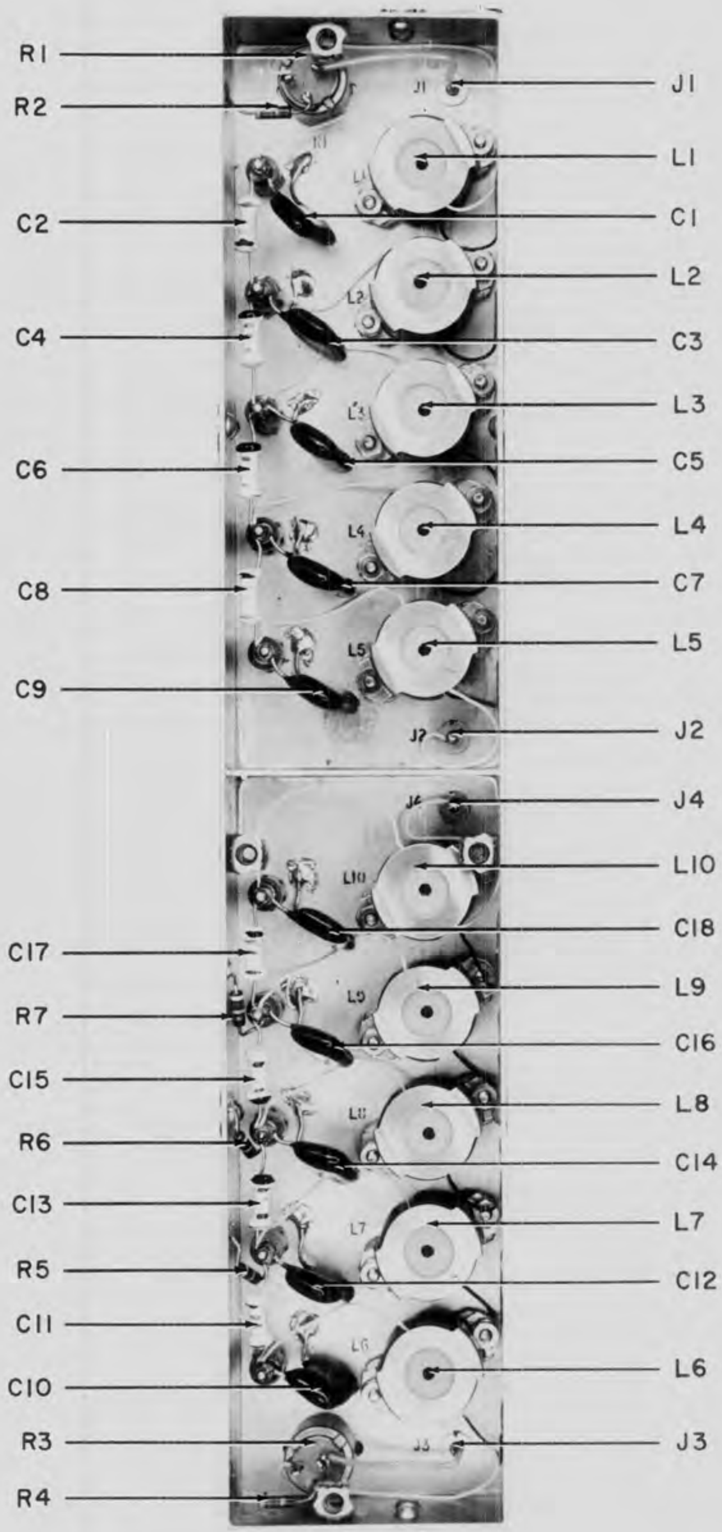


Figure 5-8. Type 7904 Filter Chassis, Component Locations

REF DESIG PREFIX A3

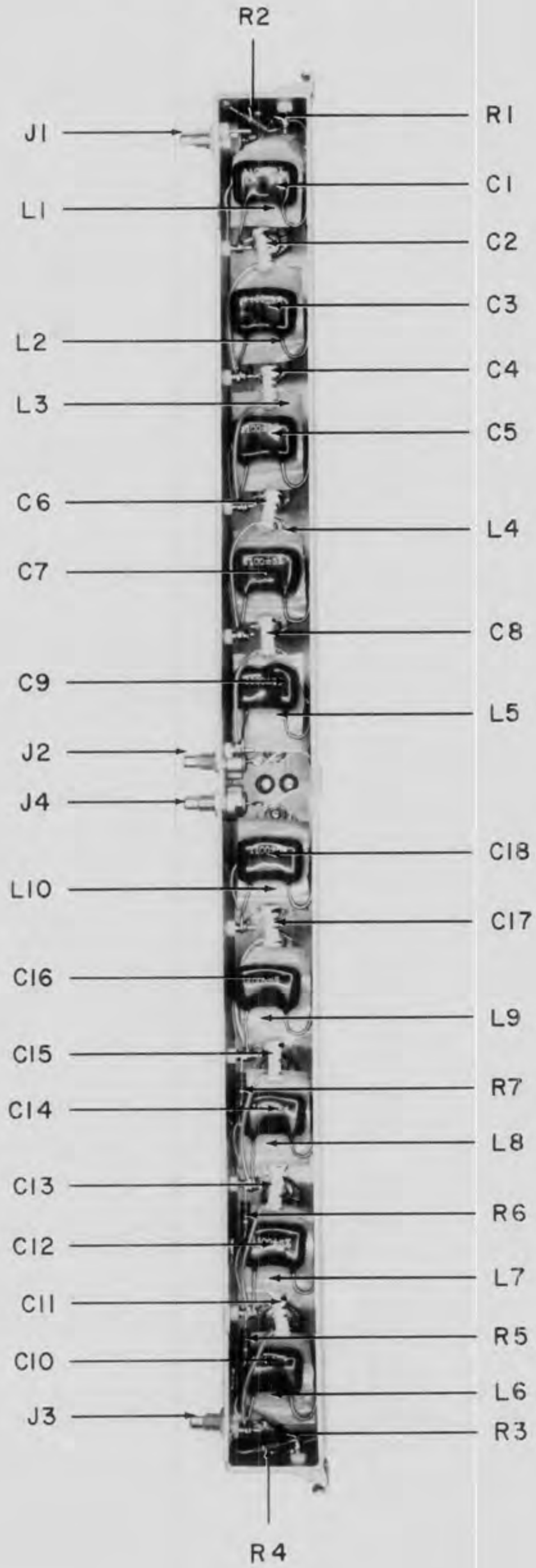


Figure 5-9. Type 7905 Filter Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

5.4.4 Filter Chassis Type 7904.- (Type SM-8512 only)

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A3C1	CAPACITOR, DIPPED MICA: 1100 pf, 5%	DM19-112J	Arco
A3C2	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pf	301-000-C0J0-339C	Erie
A3C3	Same as A3C1		
A3C4	CAPACITOR, CERAMIC TUBULAR: 2.7 ±0.25 pf	301-000-C0J0-279C	Erie
A3C5	Same as A3C1		
A3C6	Same as A3C4		
A3C7	Same as A3C1		
A3C8	Same as A3C2		
A3C9	Same as A3C1		
A3C10	Same as A3C1		
A3C11	CAPACITOR, CERAMIC TUBULAR: 7.5 ±0.5 pf	301-000-C0H0-759D	Erie
A3C12	Same as A3C1		
A3C13	CAPACITOR, CERAMIC TUBULAR: 6.2 ±0.5 pf	301-000-C0H0-629D	Erie
A3C14	Same as A3C1		
A3C15	Same as A3C13		
A3C16	Same as A3C1		
A3C17	Same as A3C11		
A3C18	Same as A3C1		
A3J1	CONNECTOR, JACK	27-9	FXR
A3J2	Same as A3J1		
A3J3	Same as A3J1		
A3J4	Same as A3J1		
A3L1	INDUCTOR, VARIABLE	1339-2	CEI
A3L2	INDUCTOR, VARIABLE	1339-1	CEI
A3L3	Same as A3L2		
A3L4	Same as A3L2		
A3L5	Same as A3L1		
A3L6	INDUCTOR, VARIABLE	1339-3	CEI
A3L7	Same as A3L2		
A3L8	Same as A3L2		
A3L9	Same as A3L2		
A3L10	Same as A3L6		
A3R1	POTENTIOMETER: 1K, 10%, 1/2W	GA1M032S-102UC	AB

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A3R2	RESISTOR, FIXED, COMPOSITION: 360 Ω, 5%, 1/4W	CB3615	AB
A3R3	Same as A3R1		
A3R4	Same as A3R2		
A3R5	RESISTOR, FIXED, COMPOSITION: 910K, 5%, 1/4W	CB9145	AB
A3R6	Same as A3R5		
A3R7	Same as A3R5		

Courtesy of http://BlackRadios.terryo.org

5.4.5 Filter Chassis Type 7905. - (Type SM-8513)

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A3C1	CAPACITOR, DIPPED MICA: 1100 pf, 5%	DM19-112J	Arco
A3C2	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pf	301-000-C0J0-339C	Erie
A3C3	Same as A3C1		
A3C4	CAPACITOR, CERAMIC TUBULAR: 2.7 ±0.25 pf	301-000-C0J0-279C	Erie
A3C5	Same as A3C1		
A3C6	Same as A3C4		
A3C7	Same as A3C1		
A3C8	Same as A3C2		
A3C9	Same as A3C1		
A3C10	Same as A3C1		
A3C11	CAPACITOR, CERAMIC TUBULAR: 7.5 ±0.5 pf	301-000-C0H0-759D	Erie
A3C12	Same as A3C1		
A3C13	CAPACITOR, CERAMIC TUBULAR: 6.2 ±0.5 pf	301-000-C0H0-629D	Erie
A3C14	Same as A3C1		
A3C15	Same as A3C13		
A3C16	Same as A3C1		
A3C17	Same as A3C11		
A3C18	Same as A3C1		
A3J1	CONNECTOR, JACK	27-9	FXR
A3J2	Same as A3J1		
A3J3	Same as A3J1		
A3J4	Same as A3J1		
A3L1	INDUCTOR, VARIABLE	1339-2	CEI
A3L2	INDUCTOR, VARIABLE	1339-1	CEI
A3L3	Same as A3L2		
A3L4	Same as A3L2		
A3L5	Same as A3L1		
A3L6	INDUCTOR, VARIABLE	1339-3	CEI
A3L7	Same as A3L2		
A3L8	Same as A3L2		
A3L9	Same as A3L2		
A3L10	Same as A3L6		
A3R1	RESISTOR, FIXED, COMPOSITION: 2.2K, 5%, 1/4W	CB2225	AB
A3R2	RESISTOR, FIXED, COMPOSITION: 1.5K, 5%, 1/4W	CB1525	AB

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A3R3	RESISTOR, FIXED, COMPOSITION: 1.1K, 5%, 1/4W	CB1125	AB
A3R4	Same as A3R2		
A3R5	RESISTOR, FIXED, COMPOSITION: 910K, 5%, 1/4W	CB9145	AB
A3R6	Same as A3R5		
A3R7	Same as A3R5		

Courtesy of http://BlackRadios.terryo.org

5.4.6 IF Output Chassis Type 8100

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A4C1	CAPACITOR, DIPPED MICA: 1200 pf, 5%	DM19-122J	Arco
A4C2	CAPACITOR, CERAMIC DISC: 0.01 μf, 200V	4835-000-Z5U0-103M	Erie
A4C3	CAPACITOR, DIPPED MICA: 68 pf, 5%	DM10-680J	Arco
A4C4	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 μf, 20% 35V	150D474X-0035A2	Sprague
A4C5	CAPACITOR, CERAMIC DISC: 2200 pf, 20%, 1000V	Type JF	RMC
A4C6	CAPACITOR, CERAMIC DISC: 470 pf, 20%, 1000V	Type B	RMC
A4C7	CAPACITOR, CERAMIC DISC: 0.1 μf, 10%, 200V	192P10492	Sprague
A4C8	Same as A4C7		
A4C9	Same as A4C1		
A4C10	CAPACITOR, DIPPED MICA: 22 pf, 5%	DM10-220J	Arco
A4C11	Same as A4C4		
A4C12	CAPACITOR, DIPPED MICA: 620 pf, 5%	DM15-621J	Arco
A4C13	Same as A4C12		
A4C14	Same as A4C7		
A4C15	CAPACITOR, CERAMIC FEEDTHRU: 1000 pf, GMV	FA5C-102W	AB
A4C16	Same as A4C12		
A4C17	Same as A4C2		
A4C18	Same as A4C15		
A4C19	Same as A4C12		
A4C20	Same as A4C2		
A4C21	CAPACITOR, DIPPED MICA: 270 pf, 5%	DM10-271J	Arco
A4C22	Same as A4C21		
A4C23	CAPACITOR, CERAMIC STANDOFF: 1000 pf, GMV	SS5A-102W	AB
A4CR1	DIODE, GERMANIUM	1N198	Sylvania
A4CR2	Same as A4CR1		
A4CR3	Same as A4CR1		
A4E1	FEEDTHRU, TEFLON	SFU-16	Taurus
A4E2	Same as A4E1		
A4E3	Same as A4E1		
A4J1	CONNECTOR, JACK	27-9	FXR
A4L1	INDUCTOR, VARIABLE: 9.0 to 22.0 mh	1506-4	CTC
A4L2	Same as A4L1		
A4L3	INDUCTOR, VARIABLE: 20 to 40 mh	1506-5	CTC
A4R1	RESISTOR, FIXED, COMPOSITION: 470K, 5%, 1/4W	CB4745	AB
A4R2	RESISTOR, FIXED, COMPOSITION: 200 Ω, 5%, 1/4W	CB2015	AB

Courtesy of http://BlackRadios.terryo.org

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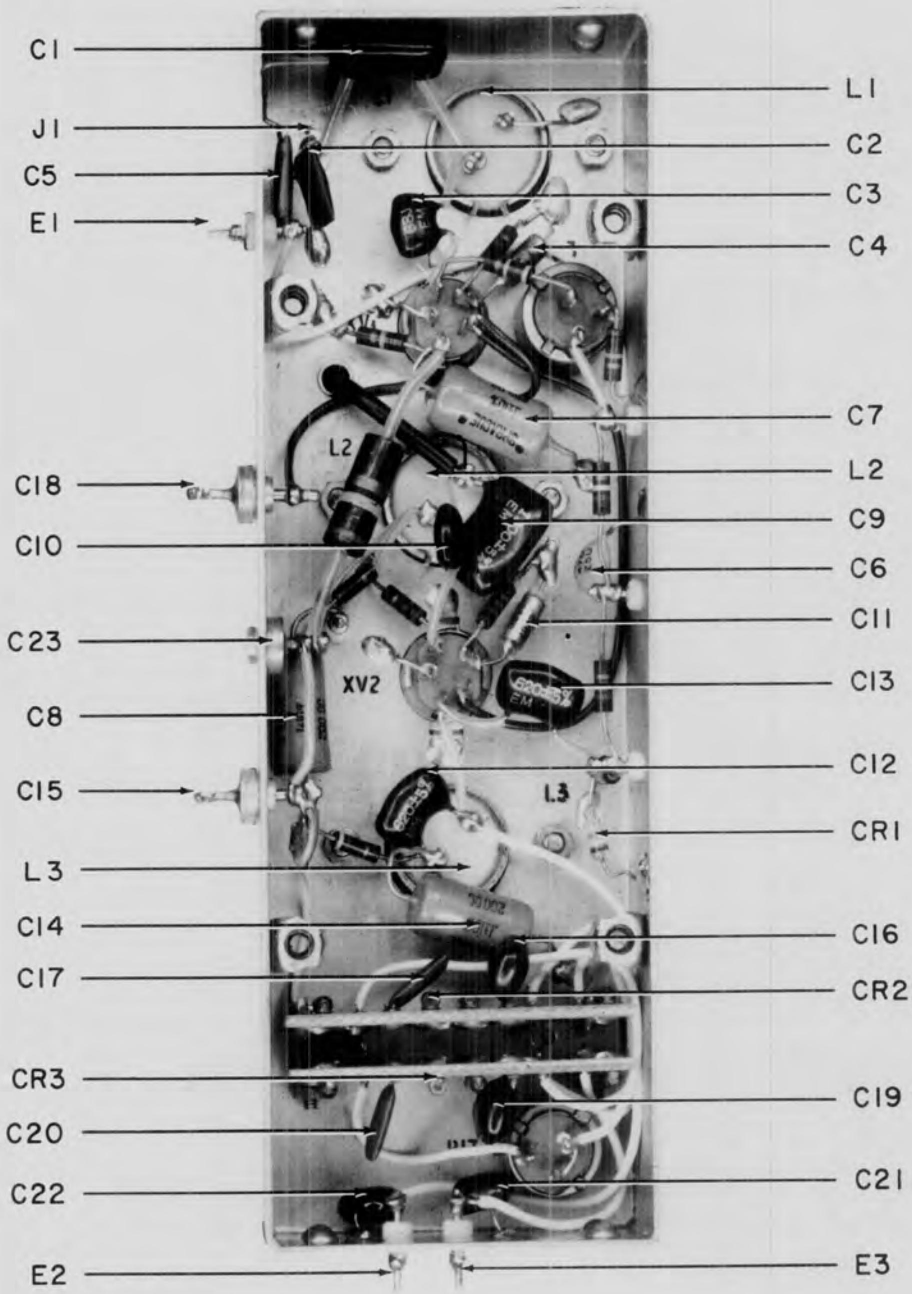


Figure 5-10. Type 8100 IF Output Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A4R3	POTENTIOMETER: 250K, 10%, 1/2W	GA1M032S-254UC	AB
A4R4	RESISTOR, FIXED, COMPOSITION: 82K, 5%, 1/4W	CB8235	AB
A4R5	RESISTOR, FIXED, COMPOSITION: 270K, 5%, 1/4W	CB2745	AB
A4R6	Same as A4R5		
A4R7	Same as A4R5		
A4R8	RESISTOR, FIXED, COMPOSITION: 22K, 5%, 1/4W	CB2235	AB
A4R9	RESISTOR, FIXED, COMPOSITION: 75K, 5%, 1W	GB7535	AB
A4R10	RESISTOR, FIXED, COMPOSITION: 1K, 5%, 1/4W	CB1025	AB
A4R11	RESISTOR, FIXED, COMPOSITION: 1 meg, 5%, 1/4W	CB1055	AB
A4R12	RESISTOR, FIXED, COMPOSITION: 510 Ω, 5%, 1/4W	CB5115	AB
A4R13	RESISTOR, FIXED, COMPOSITION: 4.7K, 5%, 1/4W	CB4725	AB
A4R14	Same as A4R11		
A4R15	RESISTOR, FIXED, COMPOSITION: 330K, 5%, 1/4W	CB3345	AB
A4R16	RESISTOR, FIXED, COMPOSITION: 220K, 5%, 1/4W	CB2245	AB
A4R17	POTENTIOMETER: 500K, 10%, 1/2W	GA1M032S-504UC	AB
A4R18	Same as A4R15		
A4R19	Same as A4R11		
A4R20	Same as A4R16		
A4V1	TUBE, ELECTRON: Nuvistor tetrode	7587	RCA
A4V2	TUBE, ELECTRON: Nuvistor triode	6CW4	RCA

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A4

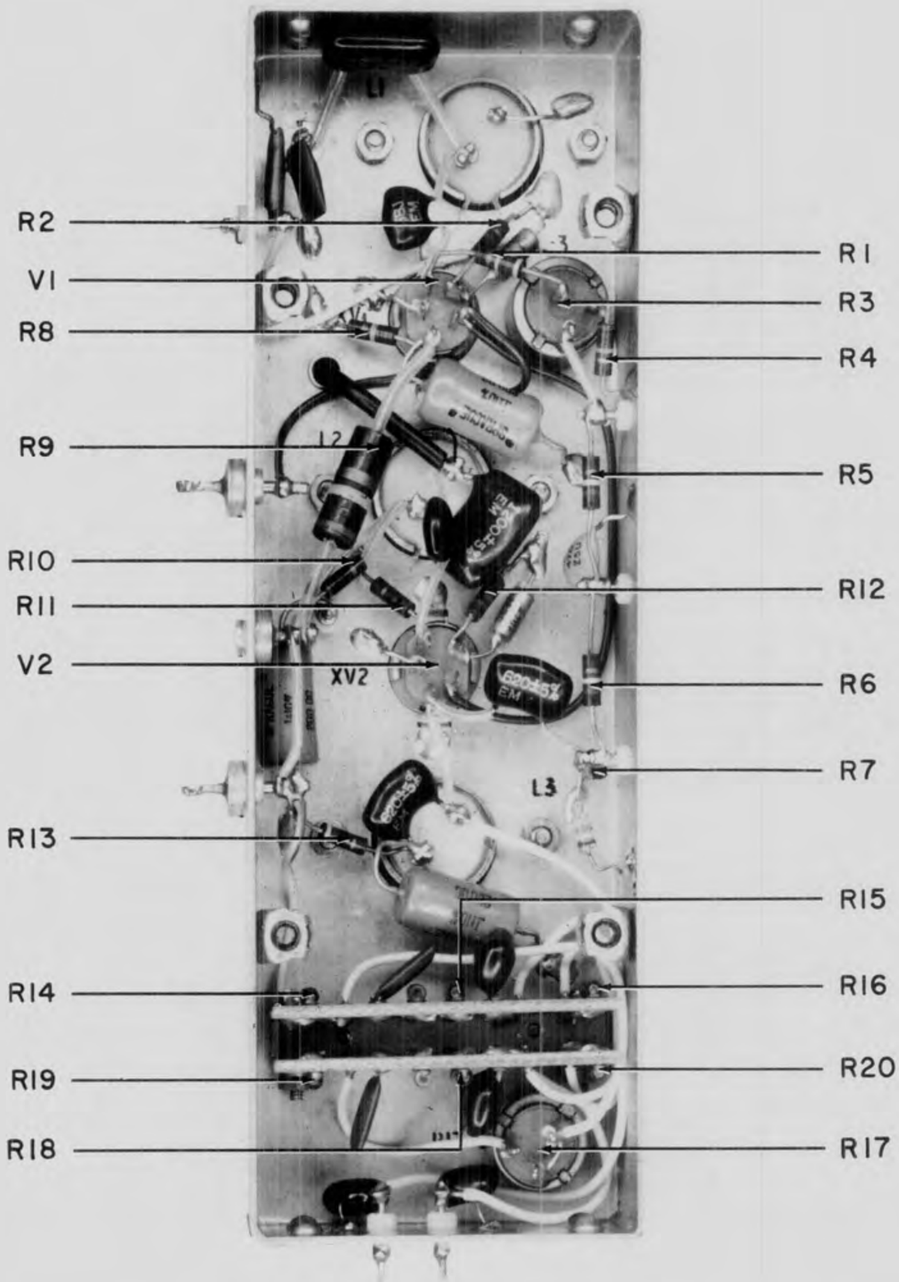


Figure 5-11. Type 8100 IF Output Chassis, Component Locations

Courtesy of http://BlackRadios.terryo.org

5.4.7 Sweep Generator/Deflection Module Type 8200A (Some units use type 8200, see 5.4.3)

Ref. Desig.	Description	Vendor Part No.	Vendor Name
A2C1	CAPACITOR, ELECTROLYTIC: 47 µf, 20%, 35V	150D476X-0035S2	Sprague
A2C2	CAPACITOR, ELECTROLYTIC: 4.7 µf, 20%, 35V	150D475X-0035B2	Sprague
A2C3	Same as A2C2		
A2C4	CAPACITOR, ELECTROLYTIC: 22 µf, 20%, 15V	150D226X-0015B2	Sprague
A2CR1	DIODE, ZENER	1N972B	CD
A2Q1	TRANSISTOR	2N489	GE
A2Q2	TRANSISTOR	2N697	TI
A2R1	RESISTOR, FIXED, COMPOSITION: 220Ω, 5%, 1/4W	CB2215	AB
A2R2	RESISTOR, DEPOSITED CARBON: 121K, 1%, 1/8W	RN60B1213F	TI
A2R3	RESISTOR, FIXED, COMPOSITION: 10K, 5%, 1/4W	CB1035	AB
A2R4	RESISTOR, FIXED, COMPOSITION: 8.2K, 5%, 1W	GB8225	AB
A2R5	RESISTOR, DEPOSITED CARBON: 562K, 1%, 1/8W	RN60B5623F	TI
A2R6	RESISTOR, FIXED, COMPOSITION: 100K, 5%, 1/2W	EB1045	AB
A2R7	Same as A2R6		
A2R8	RESISTOR, DEPOSITED CARBON: 75K, 1%, 1/8W	RN60B7502F	TI
A2R9	RESISTOR, FIXED, COMPOSITION: 8.2K, 5%, 1/4W	CB8225	AB
A2R10	RESISTOR, FIXED, COMPOSITION: 22K, 5%, 2W	HB2235	AB
A2R11	RESISTOR, DEPOSITED CARBON: 3.65K, 1%, 1/8W	RN60B3651F	TI
A2V1	ELECTRON TUBE, NUVISTOR	6CW4	RCA
A2V2	Same as A2V1		

Courtesy of http://BlackRadios.terryo.org

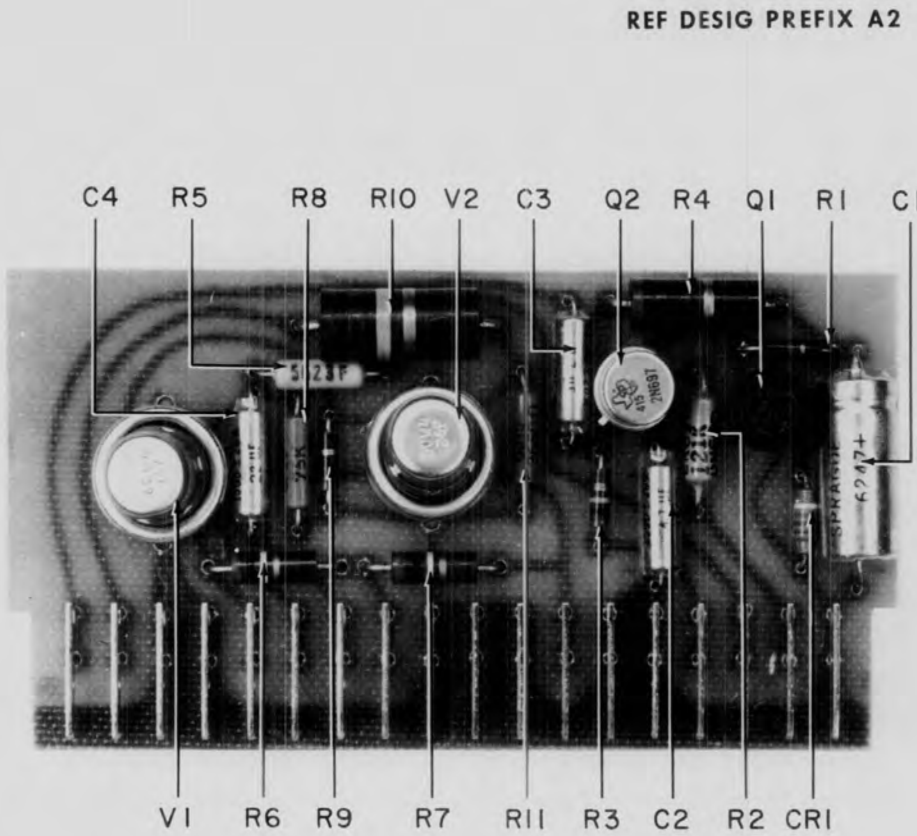


Figure 5-12. Type 8200A Sweep Generator/Deflection Module, Component Locations

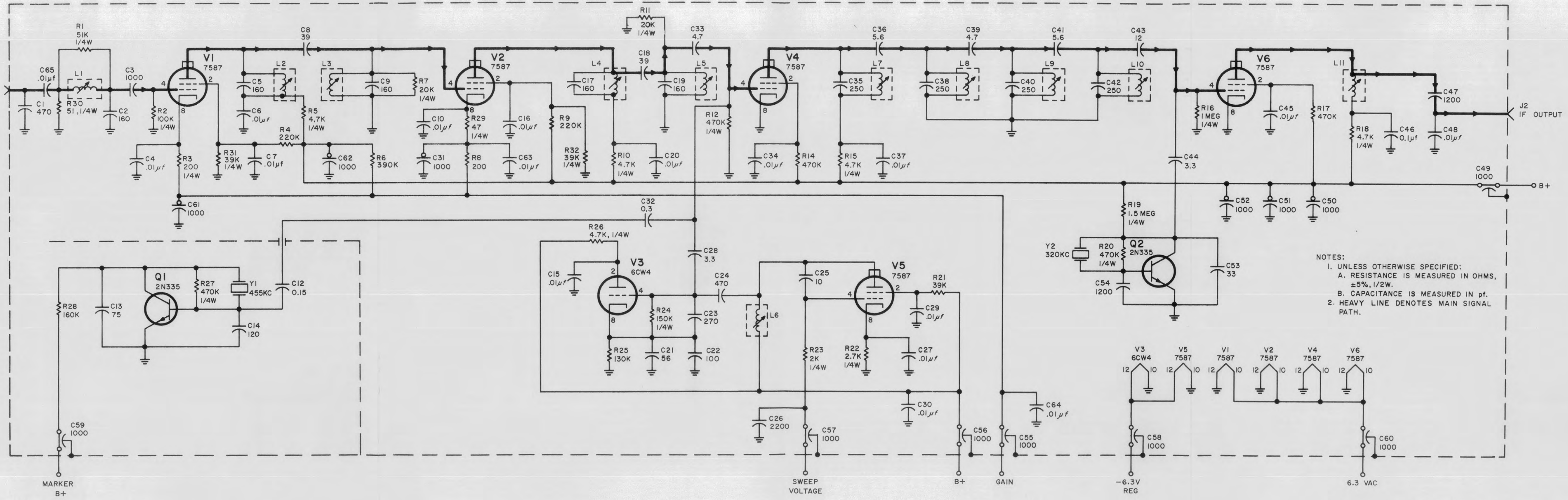
Courtesy of http://BlackRadios.terryo.org

SECTION VI

SCHEMATICS

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A1

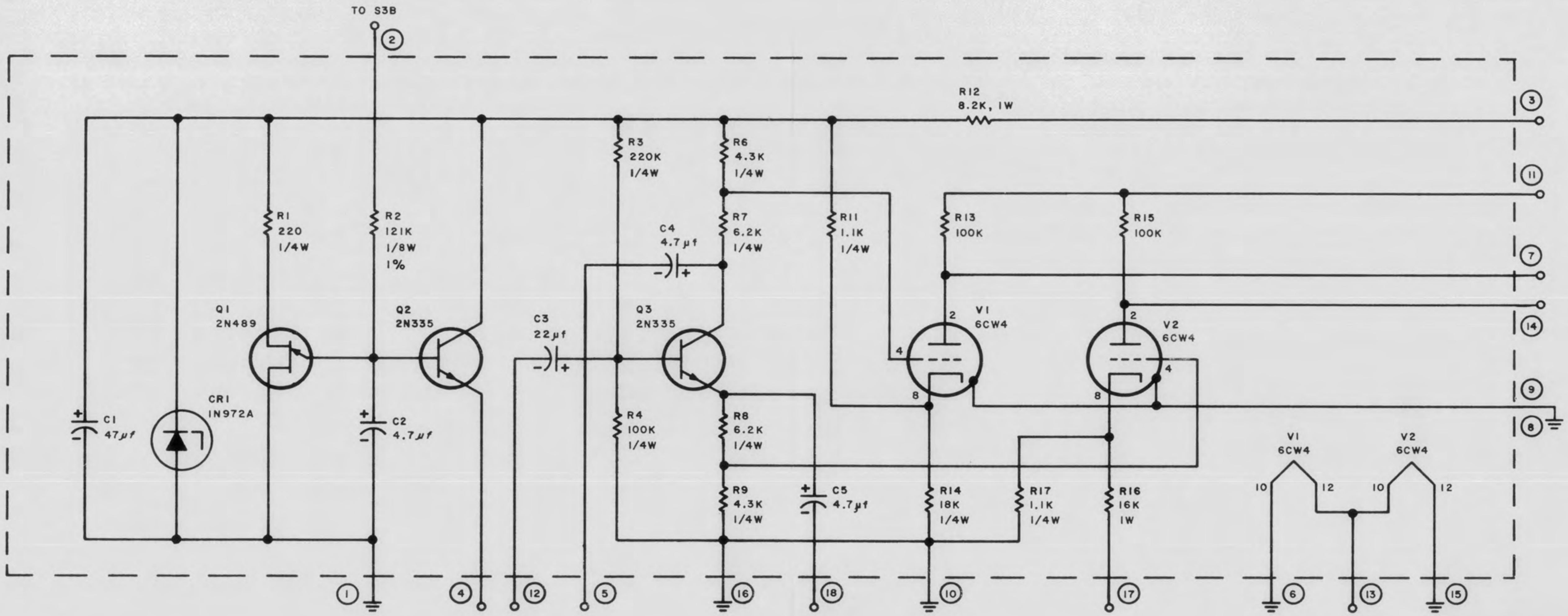


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/2W.
   B. CAPACITANCE IS MEASURED IN pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-1. Type 8002 IF Sweep Chassis, Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A2

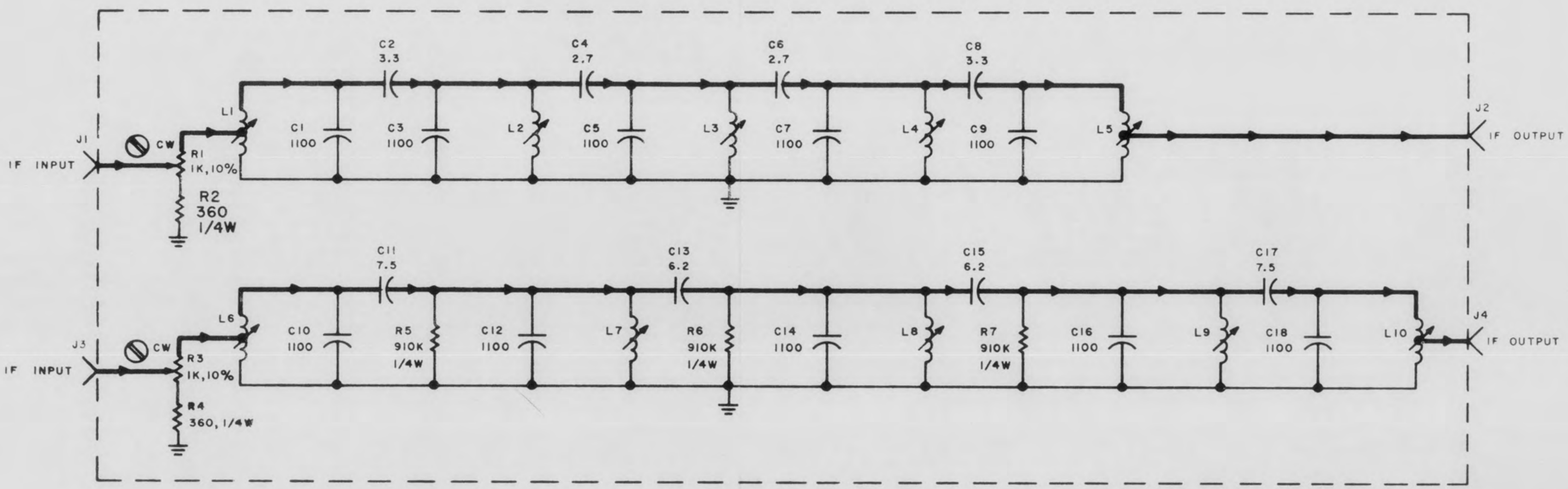


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, 5%, 1/2W.
   B. CAPACITANCE IS MEASURED IN Pf.
2. PIN NUMBERS ARE ENCIRCLED.

Figure 6-2. Type 8200 Sweep Generator/Deflection Module, Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A3

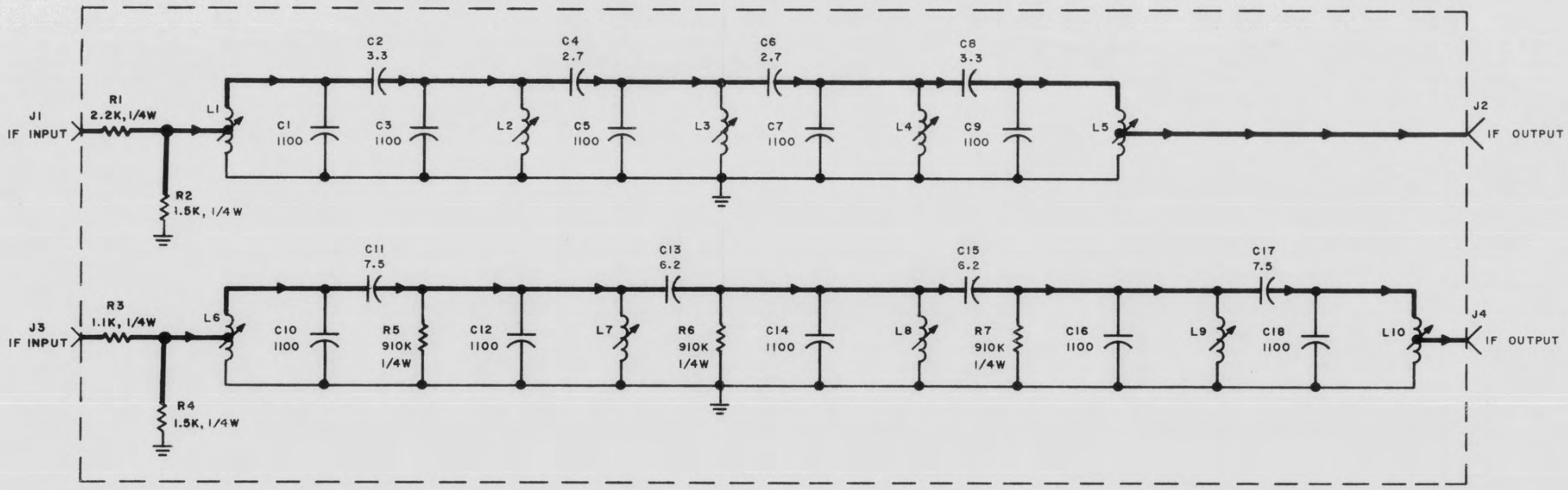


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, 5%, 1/2 W.
   B. CAPACITANCE IS MEASURED IN Pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-3. Type 7904 Filter Chassis, Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A3



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, 5%, 1/2 W.
   B. CAPACITANCE IS MEASURED IN Pf.
2. HEAVY LINE DENOTES MAIN SIGNAL PATH.

Figure 6-4. Type 7905 Filter Chassis, Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A4

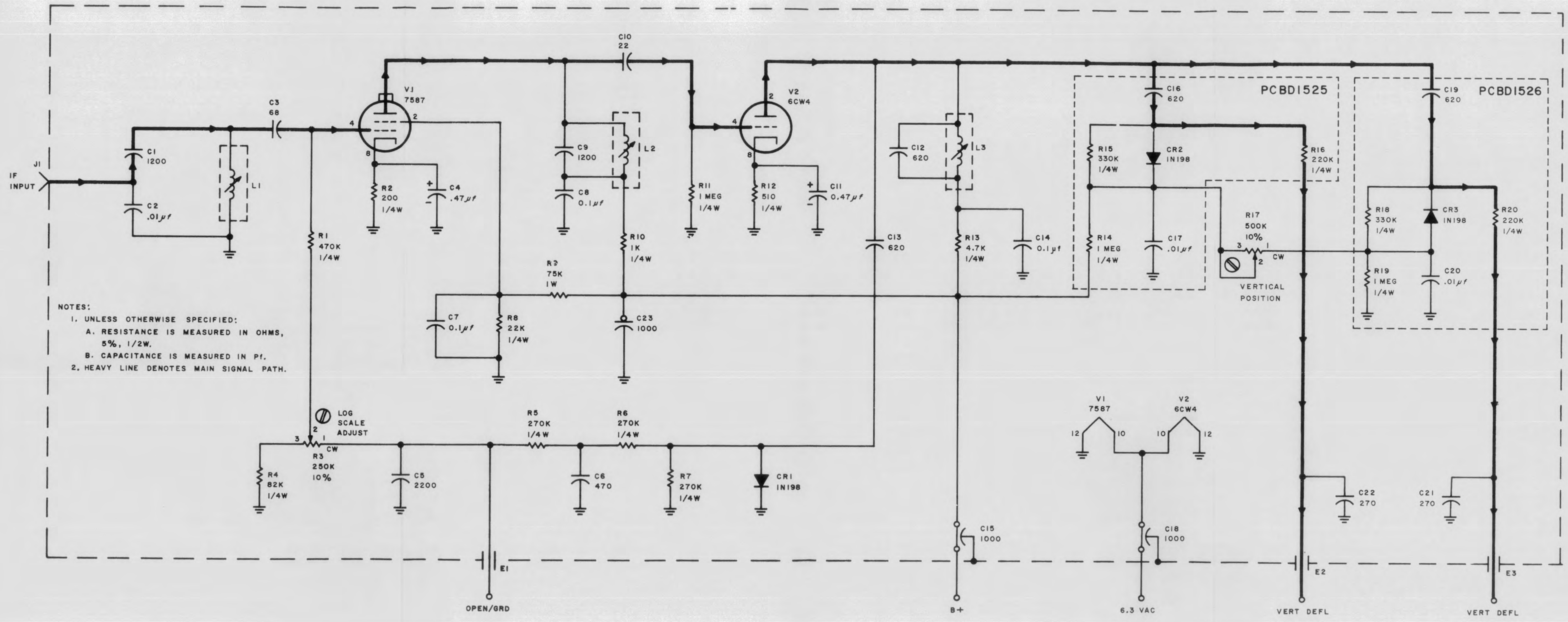


Figure 6-5. Type 8100 IF Output Chassis, Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

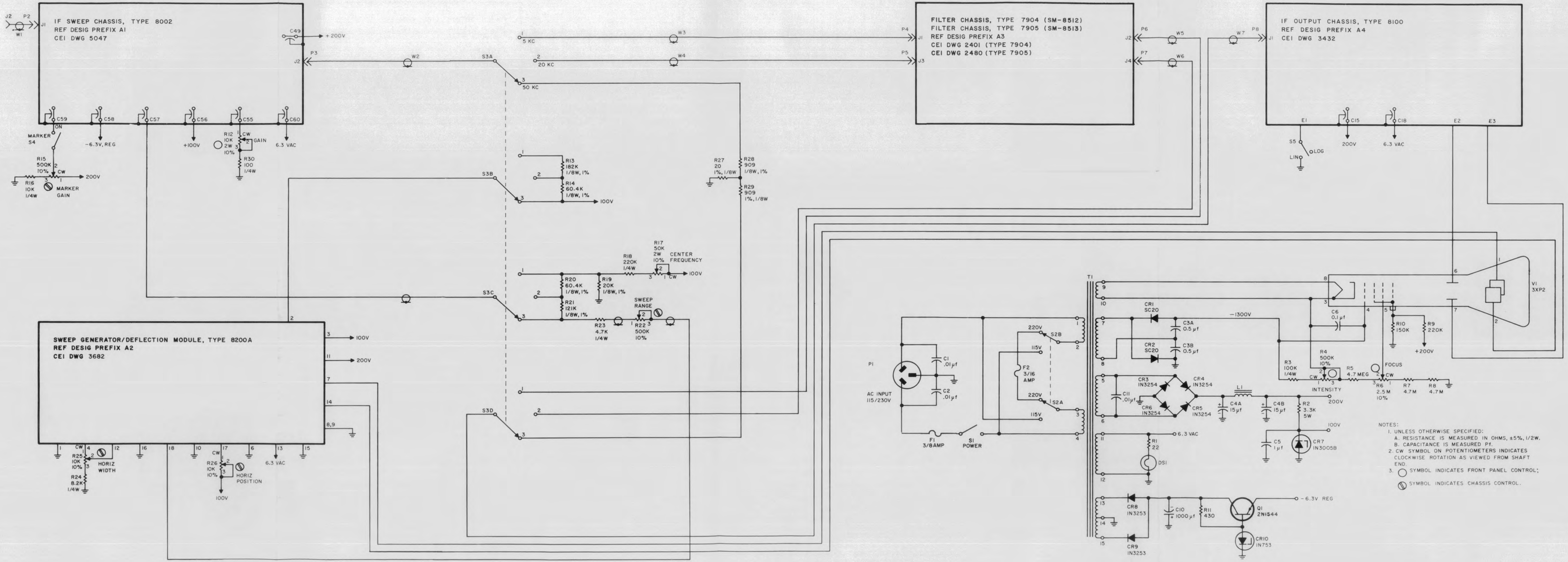
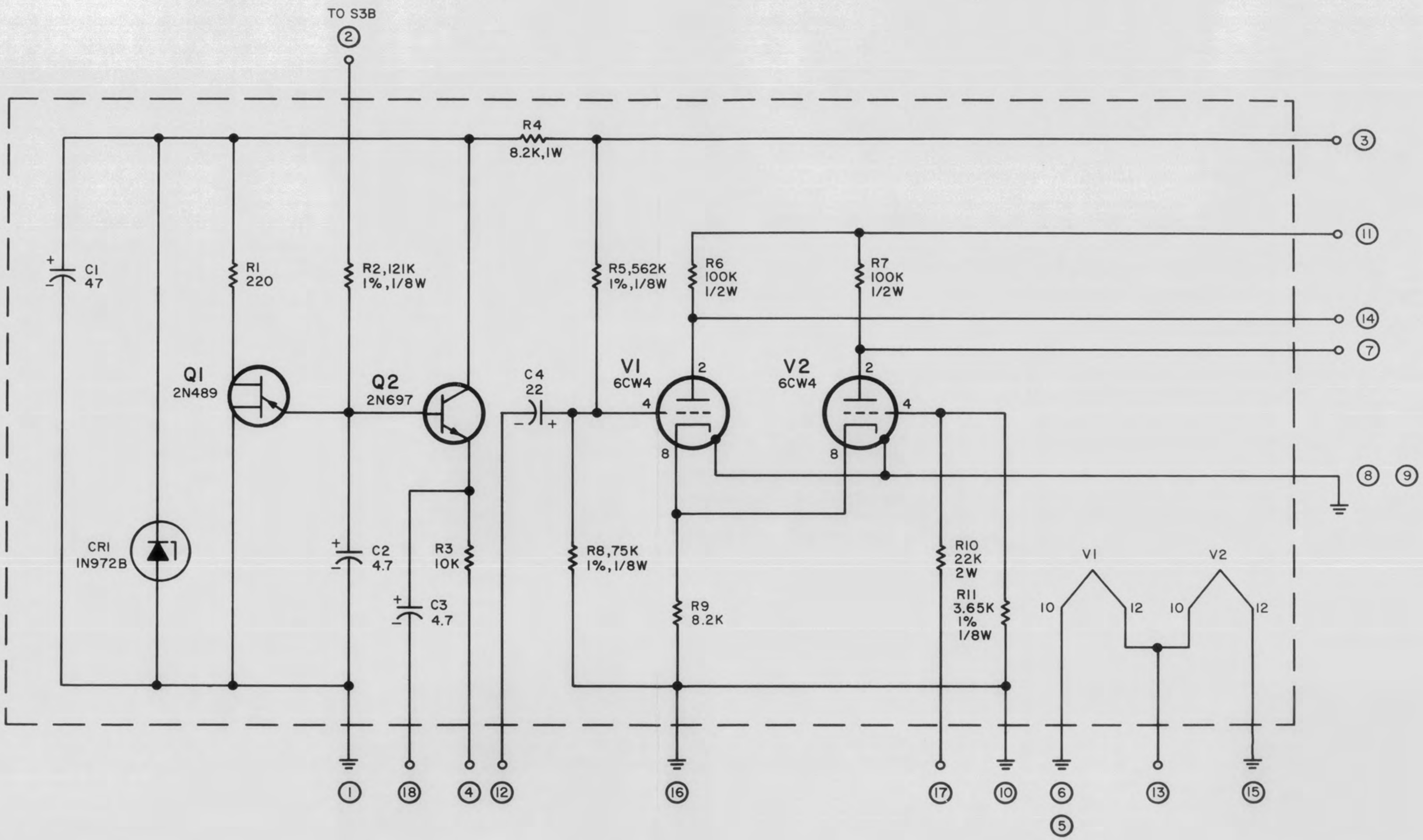


Figure 6-6. Type SM-8512 Signal Monitor, Main Chassis Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

REF DESIG PREFIX A2



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.

Figure 6-7. Type 8200A Sweep Generator/Deflection Module, Schematic Diagram