INSTRUCTION MANUAL

FOR

TYPES SM-8510 AND SM-8511 SIGNAL MONITOR

WATKINS-JOHNSON

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ADDENDA

The following changes are required for the Type SM-8510 Serial No. 22 and up, and the Type SM-8511 Serial No. 203 and up.

Type 8200A Sweep Generator/Deflection Module

Part	FROM	TO	Part No.	Mfr
R6	100 kΩ	91 kΩ, 5%, 1/2W	EB 9135	01121
R7	100 kΩ	110 kΩ, 5%, 1/2W	EB 1145	01121
R9	8.2 kΩ	10 kΩ, 5%, 1/4W	CB 1035	01121

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Number of Inputs	One, type BNC
Input Impedance	50 ohms
Input Center Frequency	500 kc
Flatness of Response	Determined by RF response of receiver being employed; particulars available on request
Sweep Width	200 kc, 50 kc, 20 kc, or 5 kc, switched by front-panel control (200 kc only on SM-8511)
Sweep Linearity	Linear over-all to within 5% of the total sweep width
Sweep Rate	
200-kc Sweep Width	12 cps ±2.5 cps
50-kc Sweep Width	12 cps ±2.5 cps
20-kc Sweep Width	8 cps ±2.0 cps
5-kc Sweep Width	4 cps ±1.0 cps
Resolution	
200-kc Sweep Width	Minimum 6-db valley between signals 6.0-kc apart
50-kc Sweep Width	Minimum 6-db valley between signals 2.5-kc apart
20-kc Sweep Width	Minimum 6-db valley between signals 1.2-kc apart
5-kc Sweep Width	Minimum 6-db valley between signals 250-cps apart
Image Rejection	50 db, minimum
Sensitivity	5 μv input at 500 kc produces at least one inch deflection on the CRT
Gain Control Range	60 db, minimum
Crystal Marker	
Frequency	500 kc
Tolerance	±0.01%
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% deflection will produce 10% deflection
CRT Display Type	3XP2
Front Panel Controls	Signal Input; Center Frequency; Sweep Width; Marker On/Off; Vertical Display Lin/Log; Power; Intensity; Focus; Gain
Power Input	115/230 volts, 50-400 cps
Power Consumption	30 watts, approximately
Weight	15 lbs, approximately
Size	3.5-inches high, 19-inches wide, 15-inches deep

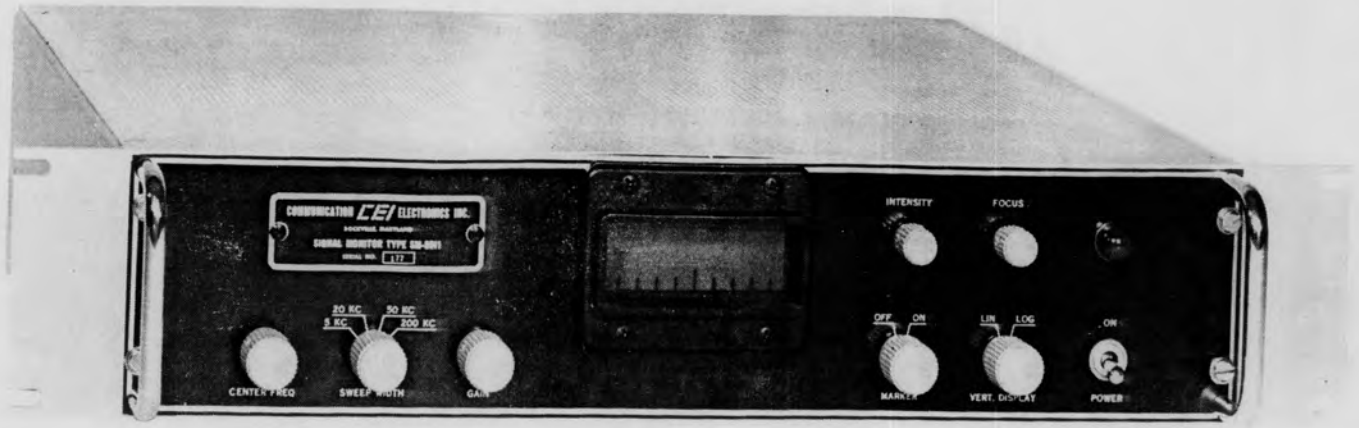


Figure 1-1. Type SM-8511 Signal Monitor, Front View

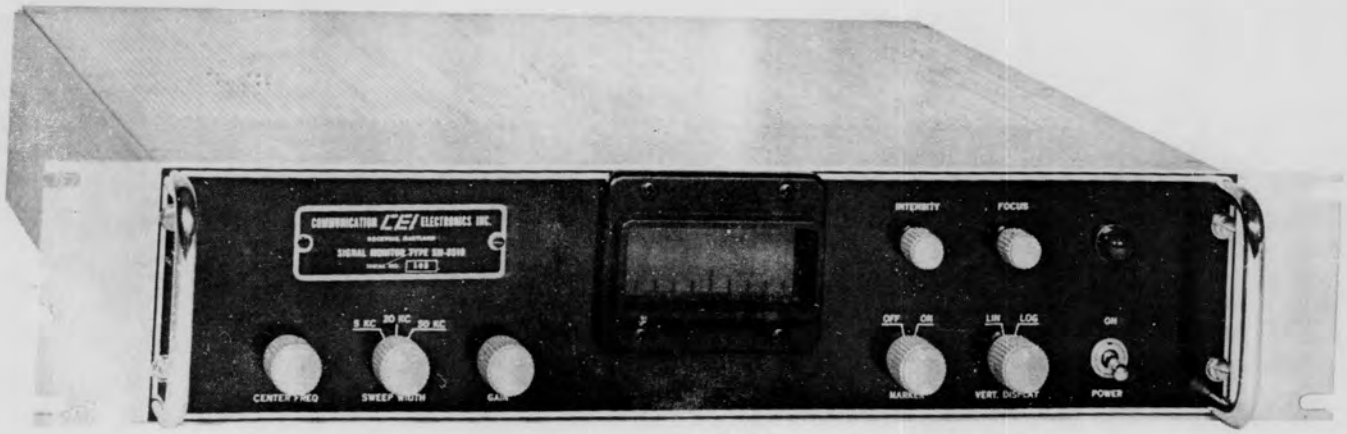


Figure 1-2. Type SM-8510 Signal Monitor, Front View

SECTION I

GENERAL DESCRIPTION

1.1 DIFFERENCES IN MODELS

The Types SM-8510 and SM-8511 Signal Monitors differ only in the number of sweep widths available. The SM-8510 has three sweep widths: 5 kc, 20 kc, and 50 kc; the SM-8511 has these sweep widths plus an additional one of 200 kc. As a result of the sweep width differences the SM-8510 uses a Type 8000 IF Sweep Chassis and the SM-8511 uses a Type 8001. This instruction manual is written in terms of the SM-8511; however, a main chassis parts list and schematic diagram are included for the SM-8510, as well as a parts list, parts location illustrations, and a schematic diagram for the Type 8000 IF Sweep Chassis.

1.2 ELECTRICAL CHARACTERISTICS

The Type SM-8511 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, 50 kilocycles and 200 kilocycles, about a center frequency of 500 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 250 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 1-3) mounts a BNC-type receptacle used for the signal input; fuseholders marked F1 3/8 AMP and F2 3/16 AMP; and switch S2 marked 230 VAC - 150 VAC.

1.3.2 The front 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.

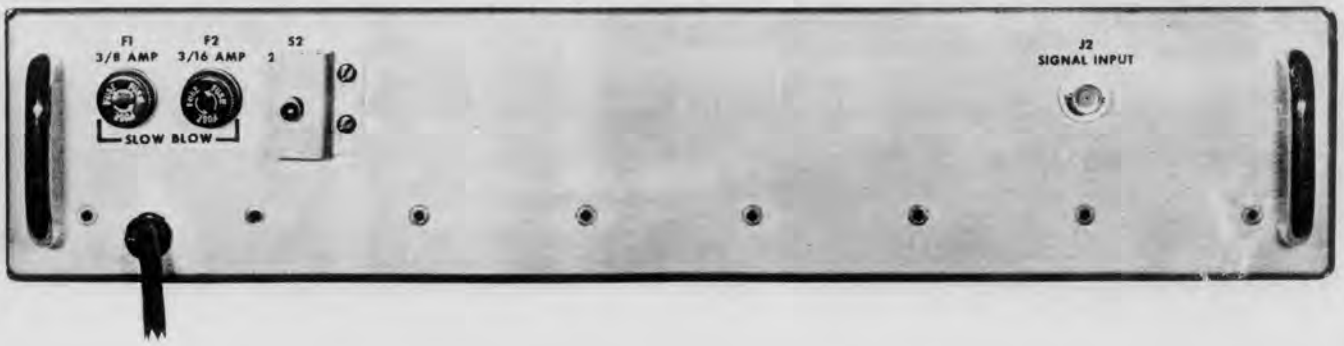


Figure 1-3. Type SM-8511 Signal Monitor, Rear View

Table 1-2. Types SM-8510 and SM-8511 Signal Monitors, 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	1N753A	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	1N972B	Voltage Regulator
A2Q1	2N489	Sawtooth Generator
A2Q2	2N697	Emitter Follower
A2V1	6CW4	Horizontal Deflection Amplifier
A2V2	6CW4	Horizontal Deflection Amplifier
	IF Output Chassis	
A4CR1	1N198	AGC Detector
A4CR2	1N198	Push-Pull Detector
A4CR3	1N198	Push-Pull Detector
A4V1	7587	1st IF Amplifier
A4V2	6CW4	2nd IF Amplifier

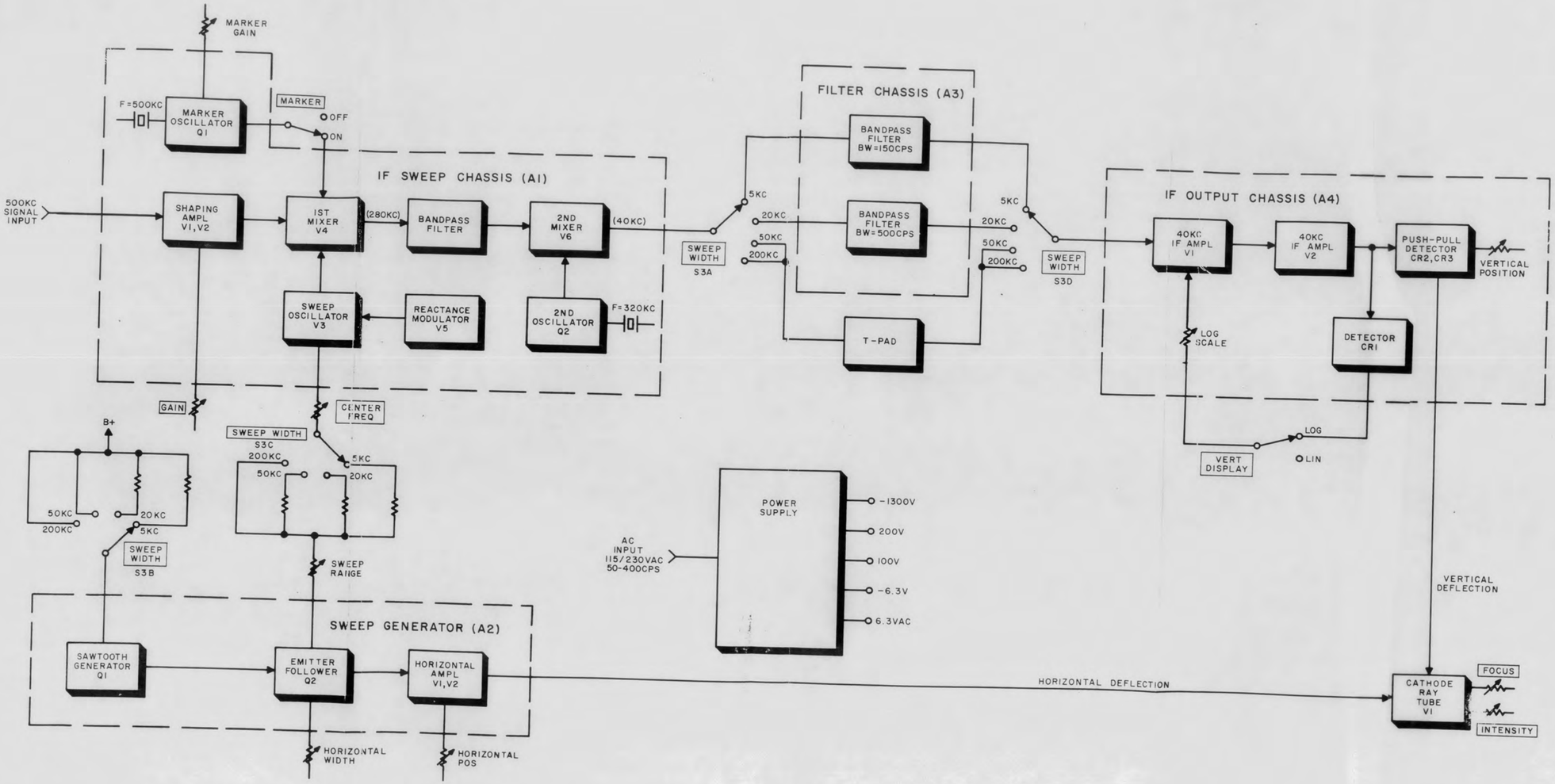


Figure 2-1. Type SM-8511 Signal Monitor, Functional Block Diagram

SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

The Type SM-8511 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, 50 kc or 200 kc. The sensitivity of the 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 unit 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 A2CR2). 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 500-kc center-frequency signal from the receiver is fed to a two-stage shaping amplifier consisting of A1V1 and A1V2. 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, A1V4, where it is mixed with the signal from the sweep oscillator, A1V3. 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 reactance modulator, A1V5. The extent of the frequency sweep is set by the SWEEP WIDTH control at 200 kc, 50 kc, 20 kc, or 5 kc. The sweep oscillator frequency is 780 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, A1V6, in which the signal is heterodyned with a 320-kc signal from crystal-controlled oscillator A1Q2. The result is a 40-kc signal which is amplified by two 40-kc IF amplifier stages, A4V1 and A4V2, 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 CRT screen is most easily gained by considering the case in which the receiver is tuned to a CW signal. In such a case, the receiver produces a steady 500-kc IF signal. During that instant of each sweep when the sweep oscillator frequency is at 780-kc, a 280-kc beat frequency is 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 more complex than a continuous wave, its IF will contain various frequencies above and below the 500-kc center frequency. Signals whose frequency differences exceed the resolution limits will 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, 50 kc, or 200 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 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 filter is used with a 5-kc sweep width; a 500-cycle bandwidth is used with a 20-kc sweep width; and a 2.0-kc bandwidth is used with a 50-kc or 200-kc sweep width. To achieve a 150-cycle or a 500-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, 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 500-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, 50-400 cps. It produces all the voltage sources required by the unit.

2.3 IF SWEEP CHASSIS

Figure 6-2 is a schematic diagram of the type 8001 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 780-kc center frequency signal which is periodically swept across a frequency range 200, 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 500-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 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 280-kc signal from the second mixer and the signal from the 320-kc oscillator on its control grid. It mixes them, producing a 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 R27, R28 and R29, which attenuates the signal to compensate for the loss introduced by the bandpass filters, thus equalizing the signal amplitude through all three paths.

2.4 IF OUTPUT CHASSIS

The type 8100 IF Output Chassis is shown schematically in Figure 6-5. 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 the V2 output through C13 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 6-3 for a schematic of the type 8200A 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.

2.5.2 Horizontal Deflection Amplifier. - The horizontal deflection amplifier is a differential amplifier made up of triodes, V1 and V2. The Horiz Pos potentiometer R26 changes the grid-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).

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 bridge 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 and series regulator Q1. This -6.3 volt source operates the filaments of A1V3 and A1V5.

SECTION III

INSTALLATION AND OPERATION

3.1 INSTALLATION

The signal monitor is designed for mounting in a standard 19-inch rack. It requires 3-1/2 inches of vertical space 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 Connections. - The 500-kc signal input connects to BNC-type jack J2 on the rear apron. Use 50-ohm coaxial cable for the connection.

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 CENTER 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 turn on the MARKER switch and turn the CENTER FREQ control until the center of the marker pip falls exactly on the center mark of the CRT 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 (200 KC). Then, to narrow down the width to inspect certain signals more closely, this switch may be set to either 50 KC, 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 (A4R17) and log scale adjust (A4R3) 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 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 control (A4R17) 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:

(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 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.

SECTION IV

MAINTENANCE

4.1 GENERAL

The 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 mainteneance be performed by trained technicians familiar with Section II, in which the circuits are described. In addition, they should use Figure 6-1 through 6-5, 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 experience 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, Tektronix Type 503
(3) Signal Generator, Boonton Type 202E
(4) Univerter, Boonton Type 207E
(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. Equipment Setup, Interstage 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. - Alignment of the shaping amplifier should not normally be attempted in the field. If maintenance personnel, after replacing a component in a tuned circuit, have determined that an alignment is required the equipment setup shown in Figure 4-2 must be used. This includes alignment of the signal monitor in conjunction with the associated communication receiver. Proceed as follows:

(1) Set up equipment as shown in Figure 4-2.
(2) Adjust the signal generator and univerter combination to produce a 15-mc signal output at a level of about 10 μv.
(3) Tune the receiver to the 15-mc signal.
(4) Adjust oscilloscope and signal generator controls until a response curve is displayed.
(5) Turn the signal monitor MARKER switch ON.
(6) Using the internal 500-kc marker to define the response curve center, adjust A1L5, A1L4, A1L3, A1L2, and A1L1 for a flat response, centered at 500 kc, with a bandwidth of 200 kc.

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 200 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 50 KC, 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.

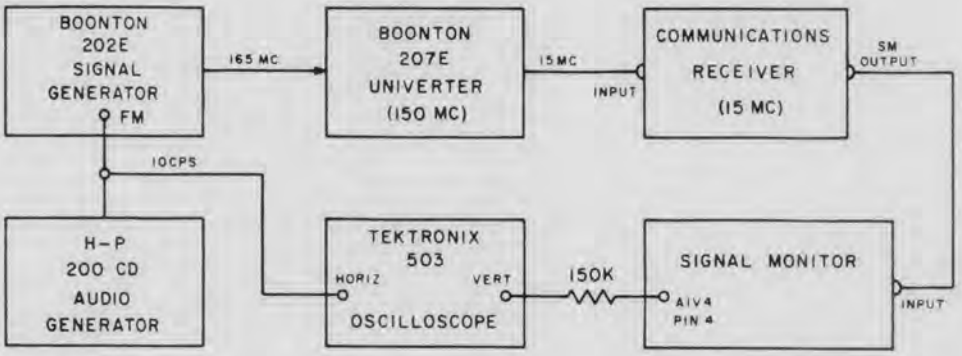


Figure 4-2. Equipment Setup, Shaping Amplifier Alignment

(4) Adjust the CENTER FREQ control so that the signal pip is centered.
(5) Turn the SWEEP WIDTH switch to the 200 KC position and use the Horiz Pos Control to center the signal pip.
(6) Connect a signal generator set to 500 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 475 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 525 kc and observing if the signal pip falls within one-half division from the last base line marker on the left end.
(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.
(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.

(14) Set the VERT DISPLAY switch to the LIN position.
(15) Connect a signal generator set to 500 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.

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

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

Table 4-3. Troubleshooting Chart

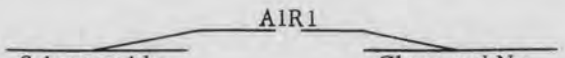
SYMPTOM	PROBABLE CAUSE	REMEDY
No power.	a. Blown 3/8 amp or 3/16 fuse.	a. Locate cause of blown fuse, correct, and replace fuse. Check setting of 115V/230V switch.
Power is applied but no trace is visible on CRT.	a. Intensity control misadjusted.	a. Turn Intensity control maximum cw.
	b. Power supply 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 asscciated 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.

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:



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

Vendor Code	Name and Address	Vendor Code	Name and Address
01121	Allen-Bradley Company 136 West Greenfield Avenue Milwaukee, Wisconsin	56289	Sprague Electric Company 91 Marshall Street North Adams, Massachusetts
02660	Amphenol Connector Division Chicago, Illinois	71279	Cambridge Thermionic Corporation 455 Concord Avenue Cambridge, Massachusetts
06001	General Electric Capacitor Division Irmo, South Carolina	71590	Centralab 900 East Keefe Avenue Milwaukee, Wisconsin
07688	Joint Electron Device Engineering Council Washington, D. C.	71700	Cornish Wire Company 50 Church Street New York, New York
14099	Semtech Corporation 652 Mitchell Road Newbury Park, California	71744	Chicago Miniature Lamp Works 1500 North Ogden Avenue Chicago 10, Illinois
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, Maryland 20760	72136	Electro Motive Manufacturing Company South Park and John Streets Willimantic, Connecticut
15605	Cutler-Hammer, Inc. 321 North 12th Street Milwaukee, Wisconsin	72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania

Vendor Code	Name and Address
74306	Piezo Crystal Company 265 East Pomfret Street Carlisle, Pennsylvania
75915	Littelfuse, Inc. 1865 Miner Street Des Plaines, Illinois
80131	Electronic Industries Association Washington, D. C.
81349	Military Specifications Promulgated by Standardization Div. Directorate of Logistic Services DSA, Washington, D. C.
81716	Oak Manufacturing Company Crystal Lake, Illinois
86684	Radio Corporation of America 415 South Fifth Street Harrison, New Jersey
91418	Radio Materials Corporation 4242 West Bryn Mawr Avenue Chicago 46, Illinois
91637	Dale Electronics, Inc. P.O. Box 488 Columbus, Nebraska
95121	Quality Components, Inc. St. Marys 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.

NOTE

As improved semiconductors become available it is the policy of CEI to incorporate them in proprietary products. For this reason some transistors and diodes installed in an equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

5.4.1 Main Chassis, SM-8510 Signal Monitor

Ref. Desig.	Description	Vendor Part No.	Vendor Code
A1	ASSEMBLY, IF SWEEP CHASSIS	8000	14632
A2	ASSEMBLY, SWEEP GENERATOR/DEFLECTION MODULE	8200A	14632
A3	ASSEMBLY, FILTER CHASSIS	7904	14632
A4	ASSEMBLY, IF OUTPUT CHASSIS	8100	14632
C1	CAPACITOR, CERAMIC DISC: 0.01 μF, 1400V	U	91418
C2	Same as C1		
C3A,B	CAPACITOR, DUAL METALIZED: 0.5-0.5 μF, 1000V	90P228	56289
C4A,B	CAPACITOR, DUAL ELECTROLYTIC: 15-15 μF, 350V	43F2299BB1	06001
C5	CAPACITOR, METALIZED: 1.0 μF, 20%, 200V	121P1050-2T-15	56289
C6	CAPACITOR, CERAMIC DISC: 0.1 μF, +80 -20%, 100V	TA	91418
C7	NOT USED		
C8	NOT USED		
C9	NOT USED		
C10	CAPACITOR, ELECTROLYTIC: 1000 μF, 25V	43F2468BA1	06001
C11	Same as C1		
CR1	DIODE, RECTIFIER	SC20	14099
CR2	Same as CR1		
CR3	DIODE, SILICON	1N3254	07688
CR4	Same as CR3		
CR5	Same as CR3		
CR6	Same as CR3		
CR7	DIODE, ZENER: 100V	1N3005B	07688
CR8	DIODE, SILICON	1N3253	07688
CR9	Same as CR8		
CR10	DIODE, ZENER: 6.3V	1N753A	07688
DS1	LAMP: 0.04 A, 6V, T-1-3/4 Bulb	345	71744
F1	FUSE: 3/8A, Slow-Blow	313.375	75915
F2	FUSE: 3/16A, Slow-Blow	313.187	75915
J1	NOT USED		
J2	JACK: Type BNC, Part of W1	17825	02660
L1	CHOKE, FILTER	1070	14632
P1	PLUG AND LINE CORD ASSEMBLY	01753-001	71700
P2	CONNECTOR, PLUG: Part of W1	27-7	02660
P3	Same as P2, Part of W2		

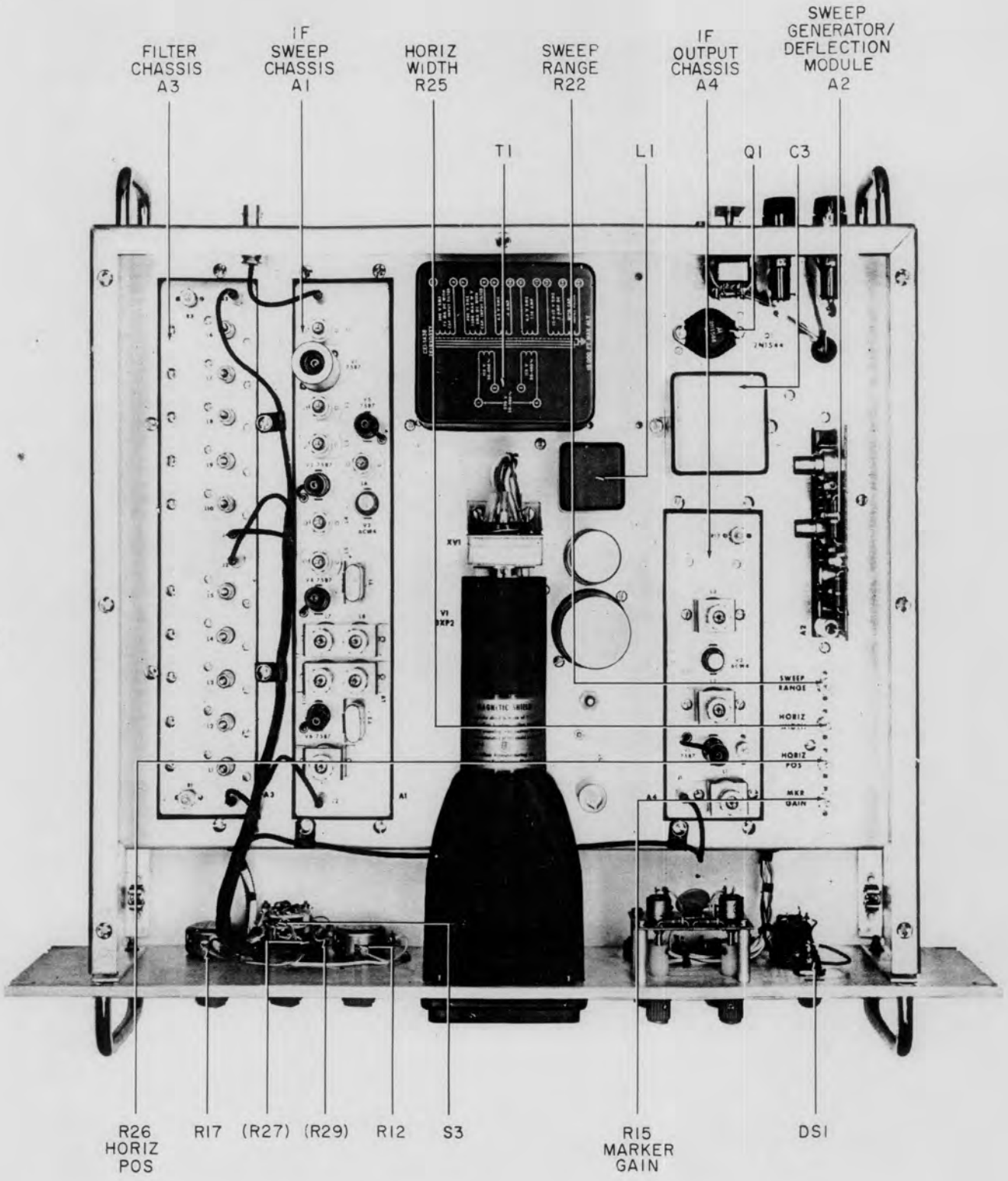


Figure 5-1. Type SM-8511 Signal Monitor, Top View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
P4	Same as P2, Part of W3		
P5	Same as P2, Part of W4		
P6	Same as P2, Part of W5		
P7	Same as P2, Part of W6		
P8	Same as P2, Part of W7		
Q1	TRANSISTOR	2N1544	07688
R1	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/2W	EB2205	01121
R2	RESISTOR, WIRE-WOUND: 3.3k, 3%, 5W	RH5	91637
R3	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	CB1045	01121
R4	POTENTIOMETER: 500K, 10%, 1/2W	GA1G032P504UA	01121
R5	RESISTOR, FIXED, COMPOSITION: 4.7 MΩ, 5%, 1/2W	EB4755	01121
R6	POTENTIOMETER: 2.5 MΩ, 10%, 1/2W	GA1G032P255UA	01121
R7	Same as R5		
R8*	Same as R5		
R9	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/2W	EB2245	01121
R10	RESISTOR, FIXED, COMPOSITION: 150k, 5%, 1/2W	EB1545	01121
R11	RESISTOR, FIXED, COMPOSITION: 430Ω, 5%, 1/2W	EB4315	01121
R12	RESISTOR, VARIABLE: 10k, 10%, 2W	RV4NAYSD103A	81349
R13	RESISTOR, FIXED, FILM: 182k, 1%, 1/8W	RN60B1823F	81349
R14	RESISTOR, FIXED, FILM: 60.4k, 1%, 1/8W	RN60B6042F	81349
R15	POTENTIOMETER: 500k, 10%, 1/2W	GA1M032S504UC	01121
R16	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	CB1035	01121
R17	POTENTIOMETER: 50k, 10%, 2W	JA1N056P503UA	01121
R18	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/4W	CB2245	01121
R19	RESISTOR, FIXED, FILM: 20k, 1%, 1/8W	RN60B2002F	81349
R20	RESISTOR, FIXED, FILM: 60.4k, 1%, 1/8W	RN60B6042F	81349
R21	RESISTOR, FIXED, FILM: 121k, 1%, 1/8W	RN60B1213F	81349
R22	Same as R15		
R23	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	CB4725	01121
R24	RESISTOR, FIXED, COMPOSITION: 8.2k, 5%, 1/4W	CB8225	01121
R25	POTENTIOMETER: 10k, 10%, 1/2W	GA1M032S103UC	01121
R26	Same as R25		
R27	RESISTOR, FIXED, FILM: 20Ω, 1%, 1/8W	RN60B20R0F	81349
R28	RESISTOR, FIXED, FILM: 909Ω, 1%, 1/8W	RN60B9090F	81349
R29	Same as R28		

*Nominal value; may be selected by Test Department to center focus control.

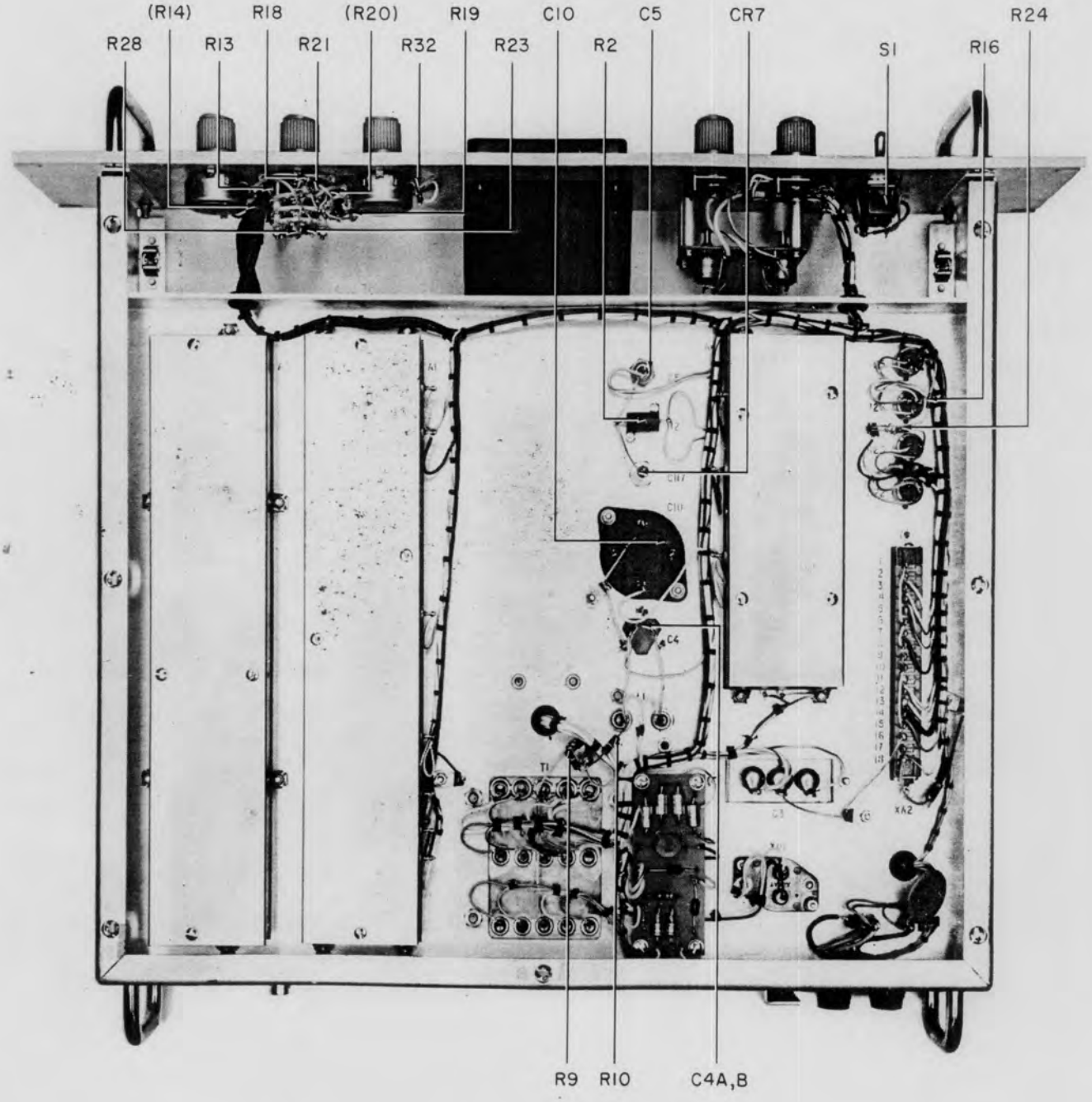


Figure 5-2. Type SM-8511 Signal Monitor, Bottom View

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R30	RESISTOR, FIXED, FILM: 100Ω, 5%, 1/4W	CB1015	01121
S1	SWITCH, TOGGLE: SPST	8280K16	15605
S2	SWITCH, TOGGLE: DPDT	8363-K7	15605
S3	SWITCH, ROTARY: 6 Pole, 6 Position, Non-Shorting	399227A	81716
S4	SWITCH, ROTARY: 1 Pole, 2 Position, Shorting	1460	71590
S5	Same as S4		
T1	TRANSFORMER, POWER	1438	14632
V1	TUBE, ELECTRON: CRT	3XP2	80131
W1	CABLE AND CONNECTOR ASSEMBLY	2126-75	14632
W2	CABLE AND CONNECTOR ASSEMBLY	2126-76	14632
W3	Same as W2		
W4	CABLE AND CONNECTOR ASSEMBLY	2126-77	14632
W5	CABLE AND CONNECTOR ASSEMBLY	2126-78	14632
W6	Same as W5		
W7	CABLE AND CONNECTOR ASSEMBLY	2126-79	14632

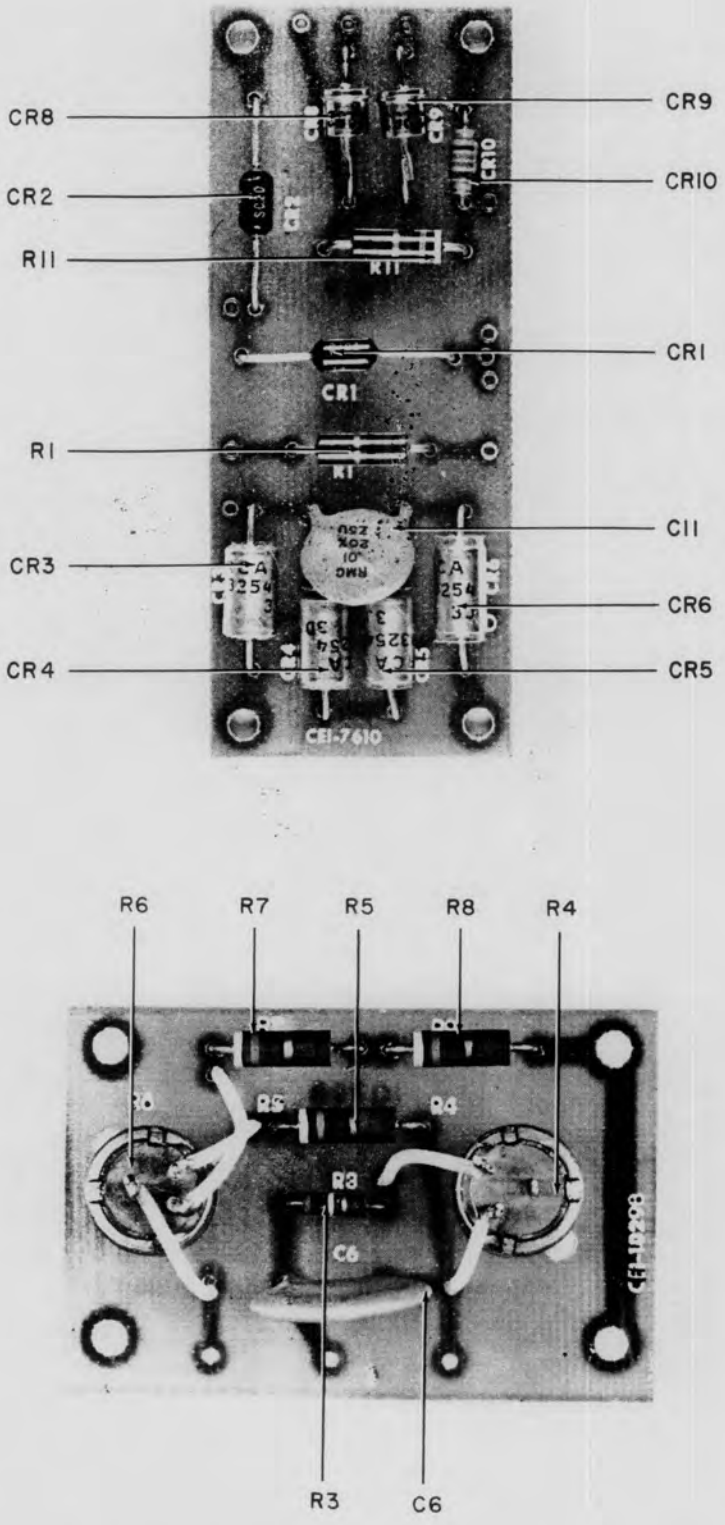


Figure 5-3. Main Chassis Component Boards, Type 7610 (top) and Part 10298 (bottom)

5.4.2 Main Chassis, SM-8511 Signal Monitor

Ref. Desig.	Description	Vendor Part No.	Vendor Code
A1	ASSEMBLY, IF SWEEP CHASSIS	8001	14632
A2	ASSEMBLY, SWEEP GENERATOR/DEFLECTION MODULE	8200A	14632
A3	ASSEMBLY, FILTER CHASSIS	7904	14632
A4	ASSEMBLY, IF OUTPUT CHASSIS	8100	14632
C1	CAPACITOR, CERAMIC DISC: 0.01 μF, 1400V	U	91418
C2	Same as C1		
C3A,B	CAPACITOR, DUAL METALIZED: 0.5-0.5 μF, 1000V	90P228	56289
C4A,B	CAPACITOR, DUAL ELECTROLYTIC: 15-15 μF, 350V	43F2299BB1	06001
C5	CAPACITOR, METALIZED: 1.0 μF, 20%, 200V	121P1050-2T-15	56289
C6	CAPACITOR, CERAMIC DISC: 0.1 μF, +80 -20%, 100V	TA	91418
C7	NOT USED		
C8	NOT USED		
C9	NOT USED		
C10	CAPACITOR, ELECTROLYTIC: 1000 μF, 25V	43F2468BA1	06001
C11	Same as C1		
CR1	DIODE, RECTIFIER	SC20	14099
CR2	Same as CR1		
CR3	DIODE, SILICON	1N3254	07688
CR4	Same as CR3		
CR5	Same as CR3		
CR6	Same as CR3		
CR7	DIODE, ZENER: 100V	1N3005B	07688
CR8	DIODE, SILICON	1N3253	07688
CR9	Same as CR8		
CR10	DIODE, ZENER: 6.3V	1N753A	07688
DS1	LAMP: 0.04A, 6V, T-1-3/4 Bulb	345	71744
F1	FUSE: 3/8A, Slow-Blow	313.375	75915
F2	FUSE: 3/16A, Slow-Blow	313.187	75915
J1	NOT USED		
J2	JACK, Type BNC, Part of W1	17825	02660
L1	CHOKE, FILTER	1070	14632
P1	PLUG AND LINE CORD ASSEMBLY	01753-001	71700
P2	CONNECTOR, PLUG: Part of W1	27-7	02660
P3	Same as P2, Part of W2		

Ref. Desig.	Description	Vendor Part No.	Vendor Code
P4	Same as P2, Part of W3		
P5	Same as P2, Part of W4		
P6	Same as P2, Part of W5		
P7	Same as P2, Part of W6		
P8	Same as P2, Part of W7		
Q1	TRANSISTOR	2N1544	07688
R1	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/2W	EB2205	01121
R2	RESISTOR, WIRE-WOUND: 3.3k, 3%, 5W	RH5	91637
R3	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	CB1045	01121
R4	POTENTIOMETER: 500k, 10%, 1/2W	GA1G048P-504UA	01121
R5	RESISTOR, FIXED, COMPOSITION: 4.7 MΩ, 5%, 1/2W	EB4755	01121
R6	POTENTIOMETER: 2.5 MΩ, 10%, 1/2W	GA1G048P-255UA	01121
R7	Same as R5		
R8*	Same as R5		
R9	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/2W	EB2245	01121
R10	RESISTOR, FIXED, COMPOSITION: 150k, 5%, 1/2W	EB1545	01121
R11	RESISTOR, FIXED, COMPOSITION: 430Ω, 5%, 1/2W	EB4315	01121
R12	RESISTOR, VARIABLE: 10k, 10%, 2W	RV4NAYSD103A	81349
R13	RESISTOR, FIXED, FILM: 182k, 1%, 1/8W	RN60B1823F	81349
R14	RESISTOR, FIXED, FILM: 60.4k, 1%, 1/8W	RN60B6042F	81349
R15	POTENTIOMETER: 500k, 10%, 1/2W	GA1M032S-504UC	01121
R16	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	CB1035	01121
R17	POTENTIOMETER: 100k, 10%, 2W	JA1N056P104UA	01121
R18	RESISTOR, FIXED, COMPOSITION: 510k, 5%, 1/4W	CB5145	01121
R19	RESISTOR, FIXED, FILM: 4.99k, 1%, 1/8W	RN60B4991F	81349
R20	RESISTOR, FIXED, FILM: 30.1k, 1%, 1/8W	RN60B3012F	81349
R21	RESISTOR, FIXED, FILM: 150k, 1%, 1/8W	RN60B1503F	81349
R22	Same as R15		
R23	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	CB4725	01121
R24	RESISTOR, FIXED, COMPOSITION: 8.2k, 5%, 1/4W	CB8225	01121
R25	POTENTIOMETER: 10k, 10%, 1/2W	GA1M032S-103UC	01121
R26	Same as R25		
R27	RESISTOR, FIXED, FILM: 20Ω, 1%, 1/8W	RN60B20R0F	81349
R28	RESISTOR, FIXED, FILM: 909Ω, 1%, 1/8W	RN60B9090F	81349
R29	Same as R28		

*Nominal value; may be selected by Test Department to center focus control.

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R30	RESISTOR, FIXED, FILM: 15k, 1%, 1/8W	RN60B1502F	81349
R31	RESISTOR, FIXED, COMPOSITION: 30k, 5%, 1/4W	CB3035	01121
R32	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	CB1015	01121
S1	SWITCH, TOGGLE: SPST	8280-K16	15605
S2	SWITCH, TOGGLE: DPDT	8363-K7	15605
S3	SWITCH, ROTARY: 6 Pole, 6 Position, Non-Shorting	1128-02	14632
S4	SWITCH, ROTARY: 1 Pole, 2 Position, Shorting	1128-19	14632
S5	Same as S4		
T1	TRANSFORMER, POWER	1438	14632
V1	TUBE, ELECTRON: CRT	3XP2	80131
W1	CABLE AND CONNECTOR ASSEMBLY	2126-75	14632
W2	CABLE AND CONNECTOR ASSEMBLY	2126-76	14632
W3	Same as W2		
W4	CABLE AND CONNECTOR ASSEMBLY	2126-77	14632
W5	CABLE AND CONNECTOR ASSEMBLY	2126-78	14632
W6	Same as W5		
W7	CABLE AND CONNECTOR ASSEMBLY	2126-79	14632

5.4.3 Type 8000 IF Sweep Chassis

REF DESIG PREFIX A1

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC DISC: 1000 pF, GMV, 500V	SM	91418
C2	CAPACITOR, DIPPED MICA: 160 pF, 5%	DM10-161J	72136
C3	Same as C1		
C4	CAPACITOR, CERAMIC DISC: 0.01 μF, 20%, 500V	SM	91418
C5	Same as C2		
C6	Same as C4		
C7	Same as C4		
C8	CAPACITOR, DIPPED MICA: 39 pF, 5%	DM10-390J	72136
C9	Same as C2		
C10	Same as C4		
C11	NOT USED		
C12	CAPACITOR, CERAMIC TUBULAR: 0.15 pF, 10%	QC	95121
C13	CAPACITOR, DIPPED MICA: 75 pF, 5%	DM10-750J	72136
C14	CAPACITOR, DIPPED MICA: 120 pF, 5%	DM10-121J	72136
C15	Same as C4		
C16	Same as C4		
C17	CAPACITOR, DIPPED MICA: 220 pF, 5%	DM15-221J	72136
C18	CAPACITOR, DIPPED MICA: 50 pF, 5%	DM10-500J	72136
C19	Same as C2		
C20	Same as C4		
C21	CAPACITOR, DIPPED MICA: 56 pF, 5%	DM10-560J	72136
C22	CAPACITOR, CERAMIC DISC: 100 pF, 20%, N-1500 T.C.	C	91418
C23	CAPACITOR, DIPPED MICA: 270 pF, 5%	DM10-271J	72136
C24	CAPACITOR, CERAMIC DISC: 470 pF, 5%	B	91418
C25	CAPACITOR, DIPPED MICA: 10 pF, 5%	DM10-100J	72136
C26	CAPACITOR, CERAMIC DISC: 2200 pF, 20%	JF	91418
C27	Same as C4		
C28	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pF	301-000-COJO-339C	72982
C29	Same as C4		
C30	Same as C4		
C31	CAPACITOR, CERAMIC STANDOFF: 0.001 μF, GMV	SS5A-102W	01121
C32	CAPACITOR, CERAMIC TUBULAR: 0.3 pF, 10%	QC	95121
C33	CAPACITOR, CERAMIC TUBULAR: 1.5 ±0.25 pF	301-000-COKO-159C	72982

REF DESIG PREFIX A1

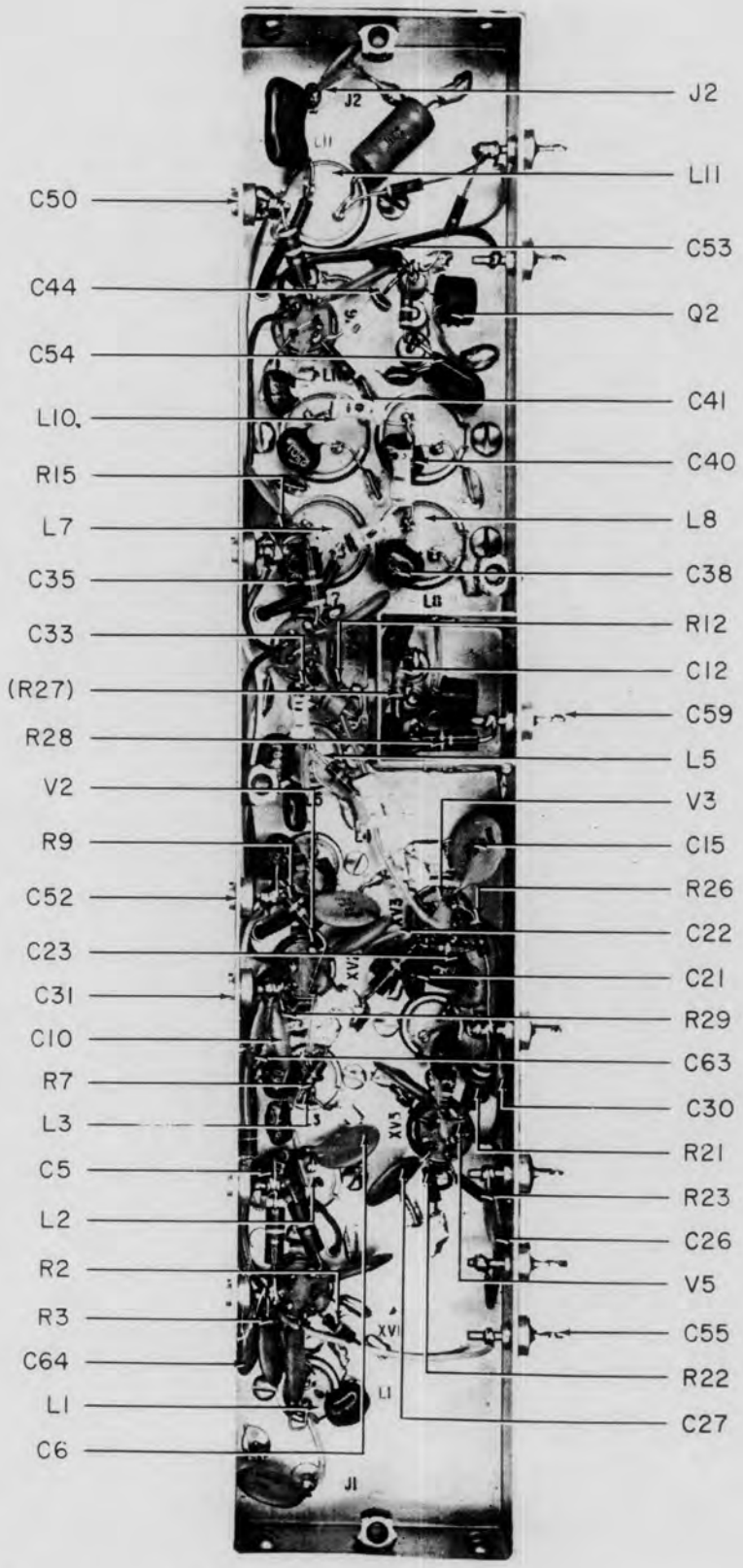


Figure 5-4. Type 8000 IF Sweep Chassis, Component Locations

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C34	Same as C4		
C35	CAPACITOR, DIPPED MICA: 250 pF, 5%	DM10-251J	72136
C36	CAPACITOR, CERAMIC TUBULAR: 5.6 ±0.5 pF	301-000-COHO-569D	72982
C37	Same as C4		
C38	Same as C35		
C39	CAPACITOR, CERAMIC TUBULAR: 4.7 ±0.25 pF	301-000-COHO-479C	72982
C40	Same as C35		
C41	Same as C36		
C42	Same as C35		
C43	CAPACITOR, DIPPED MICA: 12 pF, 5%	DM10-120J	72136
C44	Same as C28		
C45	Same as C4		
C46	CAPACITOR: 0.1 μF, 10%, 200V	192P10492	56289
C47	CAPACITOR, DIPPED MICA: 1200 pF, 5%	DM19-122J	72136
C48	Same as C4		
C49	CAPACITOR, CERAMIC FEEDTHRU: 1000 pF, GMV	FA5C-102W	01121
C50	Same as C31		
C51	Same as C31		
C52	Same as C31		
C53	CAPACITOR, DIPPED MICA: 33 pF, 5%	DM10-330J	72136
C54	Same as C47		
C55	Same as C49		
C56	Same as C49		
C57	Same as C49		
C58	Same as C49		
C59	Same as C49		
C60	Same as C49		
C61	Same as C31		
C62	Same as C31		
C63	Same as C4		
C64	Same as C4		
J1	CONNECTOR, JACK	27-9	02660
J2	Same as J1		
L1	INDUCTOR, VARIABLE	1472-10	14632
L2	Same as L1		
L3	Same as L1		

REF DESIG PREFIX A1

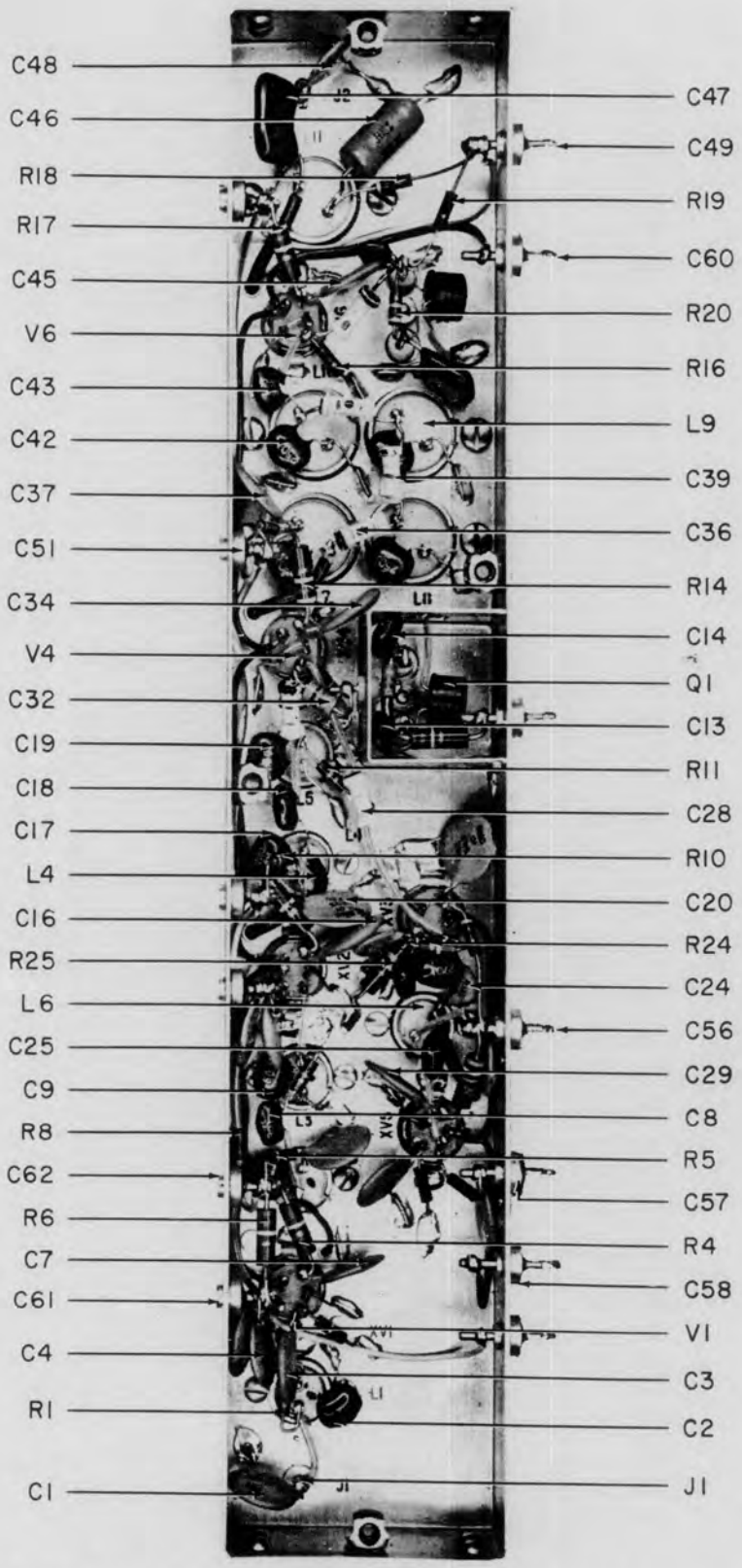


Figure 5-5. Type 8000 IF Sweep Chassis, Component Locations

Ref. Desig.	Description	Vendor Part No.	Vendor Code
L4	INDUCTOR, VARIABLE	1472-9	14632
L5	Same as L4		
L6	Same as L4		
L7	INDUCTOR, VARIABLE: 1-2.2 mH	1506-1	71279
L8	Same as L7		
L9	Same as L7		
L10	Same as L7		
L11	INDUCTOR, VARIABLE: 9-22 mH	1506-4	71279
Q1	TRANSISTOR	2N335	07688
Q2	Same as Q1		
R1	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	CB1035	01121
R2	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	CB1045	01121
R3	RESISTOR, FIXED, COMPOSITION: 200Ω, 5%, 1/4W	CB2015	01121
R4	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/2W	EB2245	01121
R5	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	CB4725	01121
R6	RESISTOR, FIXED, COMPOSITION: 160k, 5%, 1/2W	EB1645	01121
R7	RESISTOR, FIXED, COMPOSITION: 20k, 5%, 1/4W	CB2035	01121
R8	RESISTOR, FIXED, COMPOSITION: 200Ω, 5%, 1/2W	EB2015	01121
R9	Same as R4		
R10	Same as R5		
R11	Same as R1		
R12	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	CB4745	01121
R13	NOT USED		
R14	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/2W	EB4745	01121
R15	Same as R5		
R16	RESISTOR, FIXED, COMPOSITION: 1 MΩ, 5%, 1/4W	CB1055	01121
R17	Same as R14		
R18	Same as R5		
R19	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	CB1555	01121
R20	Same as R12		
R21	RESISTOR, FIXED, COMPOSITION: 39k, 5%, 1/2W	EB3935	01121
R22	RESISTOR, FIXED, COMPOSITION: 2.7k, 5%, 1/4W	CB2725	01121
R23	RESISTOR, FIXED, COMPOSITION: 2k, 5%, 1/4W	CB2025	01121
R24	RESISTOR, FIXED, COMPOSITION: 150k, 5%, 1/4W	CB1545	01121
R25	RESISTOR, FIXED, COMPOSITION: 130k, 5%, 1/2W	EB1345	01121
R26	Same as R5		

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R27	Same as R12		
R28	Same as R6		
R29	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	CB4705	01121
V1	TUBE, ELECTRON: Nuvistor Tetrode	7587	86684
V2	Same as V1		
V3	TUBE, ELECTRON: Nuvistor Triode	6CW4	86684
V4	Same as V1		
V5	Same as V1		
V6	Same as V1		
Y1	CRYSTAL, QUARTZ: 500 kc	CR46/U	74306
Y2	CRYSTAL, QUARTZ: 320 kc	CR46/U	74306

5.4.4 Type 8001 IF Sweep Chassis

REF DESIG PREFIX A1

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC DISC: 1000 pF, 20%, 1000V	JL	91418
C2	CAPACITOR, DIPPED MICA: 160 pF, 5%	DM10-161J	72136
C3	CAPACITOR, CERAMIC DISC: 1000 pF, GMV, 500V	SM	91418
C4	CAPACITOR, CERAMIC DISC: 0.01 μF, 20%, 500V	SM	91418
C5	Same as C2		
C6	Same as C4		
C7	Same as C4		
C8	CAPACITOR, DIPPED MICA: 75 pF, 5%	DM10-750J	72136
C9	Same as C2		
C10	Same as C4		
C11	NOT USED		
C12	CAPACITOR, CERAMIC TUBULAR: 0.15 pF, 10%	QC	95121
C13	Same as C8		
C14	CAPACITOR, DIPPED MICA: 120 pF, 5%	DM10-121J	72136
C15	Same as C4		
C16	Same as C4		
C17	CAPACITOR, DIPPED MICA: 220 pF, 5%	DM15-221J	72136
C18	CAPACITOR, DIPPED MICA: 150 pF, 5%	DM10-151J	72136
C19	Same as C17		
C20	Same as C4		
C21	CAPACITOR, DIPPED MICA: 82 pF, 5%	DM10-820J	72136
C22	NOT USED		
C23	CAPACITOR, DIPPED MICA: 130 pF, 5%	DM10-131J	72136
C24	CAPACITOR, CERAMIC DISC: 470 pF, 20%	B	91418
C25	CAPACITOR, DIPPED MICA: 10 pF, 5%	DM10-100J	72136
C26	CAPACITOR, CERAMIC DISC: 2200 pF, 20%	JF	91418
C27	Same as C4		
C28	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pF	301-000-COJO-339C	72982
C29	Same as C4		
C30	Same as C4		
C31	CAPACITOR, CERAMIC STANDOFF: 0.001 μF, GMV	SS5A-102W	01121
C32	CAPACITOR, CERAMIC TUBULAR: 0.3 pF, 10%	QC	95121
C33	CAPACITOR, DIPPED MICA: 12 pF, 5%	DM10-120J	72136
C34	Same as C4		

REF DESIG PREFIX A1

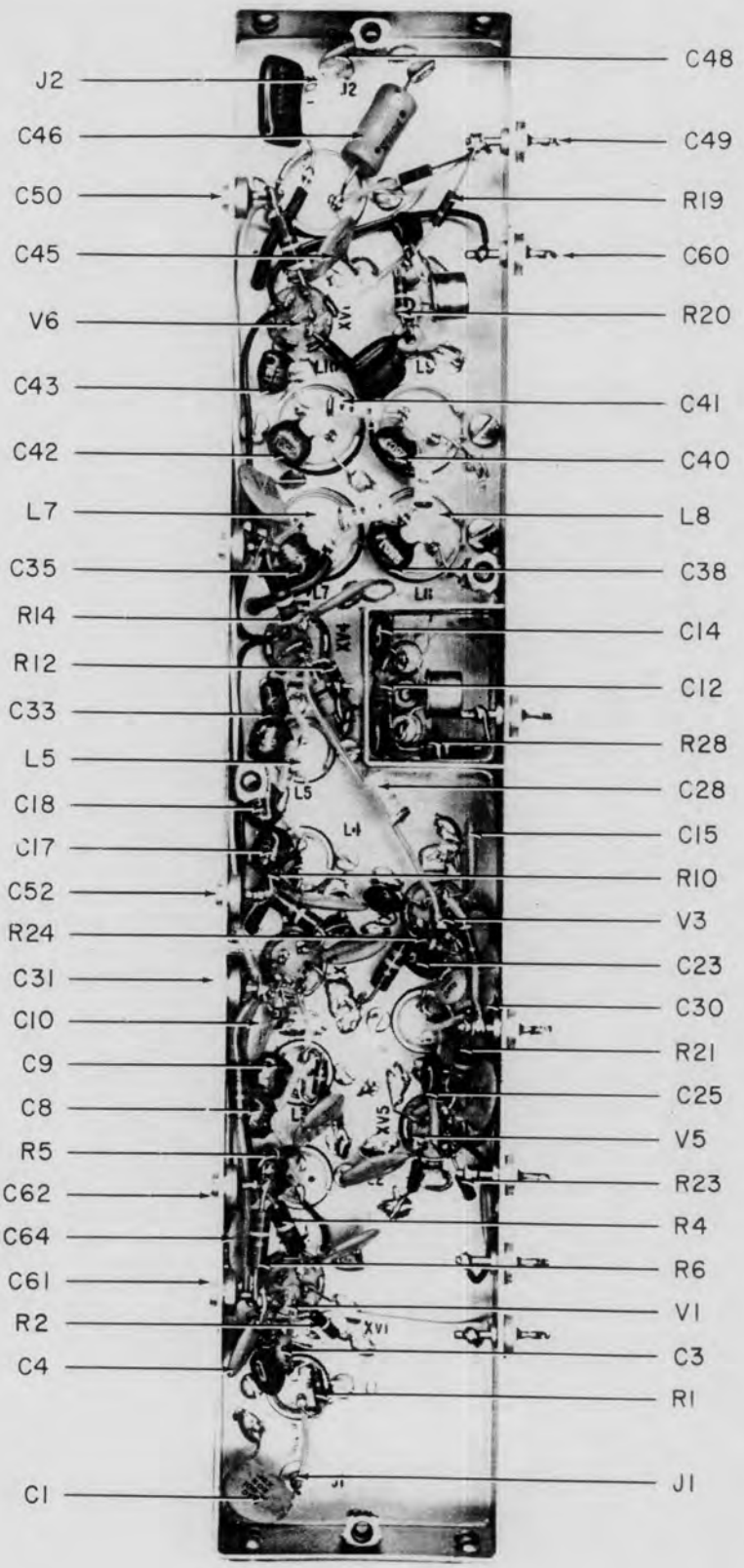


Figure 5-6. Type 8001 IF Sweep Chassis, Component Locations

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C35	CAPACITOR, DIPPED MICA: 250 pF, 5%	DM10-251J	72136
C36	CAPACITOR, CERAMIC TUBULAR: 5.6 ±0.5 pF	301-000-COHO-569D	72982
C37	Same as C4		
C38	Same as C35		
C39	CAPACITOR, CERAMIC TUBULAR: 4.7 ±0.25 pF	301-000-COHO-479C	72982
C40	Same as C35		
C41	Same as C36		
C42	Same as C35		
C43	Same as C33		
C44	Same as C28		
C45	Same as C4		
C46	CAPACITOR: 0.1 μF, 10%, 200V	192P10492	56289
C47	CAPACITOR, DIPPED MICA: 1200 pF, 5%	DM19-122J	72136
C48	Same as C4		
C49	CAPACITOR, CERAMIC FEEDTHRU: 1000 pF, GMV	FA5C-102W	01121
C50	Same as C31		
C51	Same as C31		
C52	Same as C31		
C53	CAPACITOR, DIPPED MICA: 33 pF, 5%	DM10-330J	72136
C54	Same as C47		
C55	Same as C49		
C56	Same as C49		
C57	Same as C49		
C58	Same as C49		
C59	Same as C49		
C60	Same as C49		
C61	Same as C31		
C62	Same as C31		
C63	Same as C4		
C64	Same as C4		
J1	CONNECTOR, JACK	27-9	02660
J2	Same as J1		
L1	INDUCTOR, VARIABLE	1472-10	14632
L2	Same as L1		
L3	Same as L1		
L4	INDUCTOR, VARIABLE	1472-9	14632

REF DESIG PREFIX A1

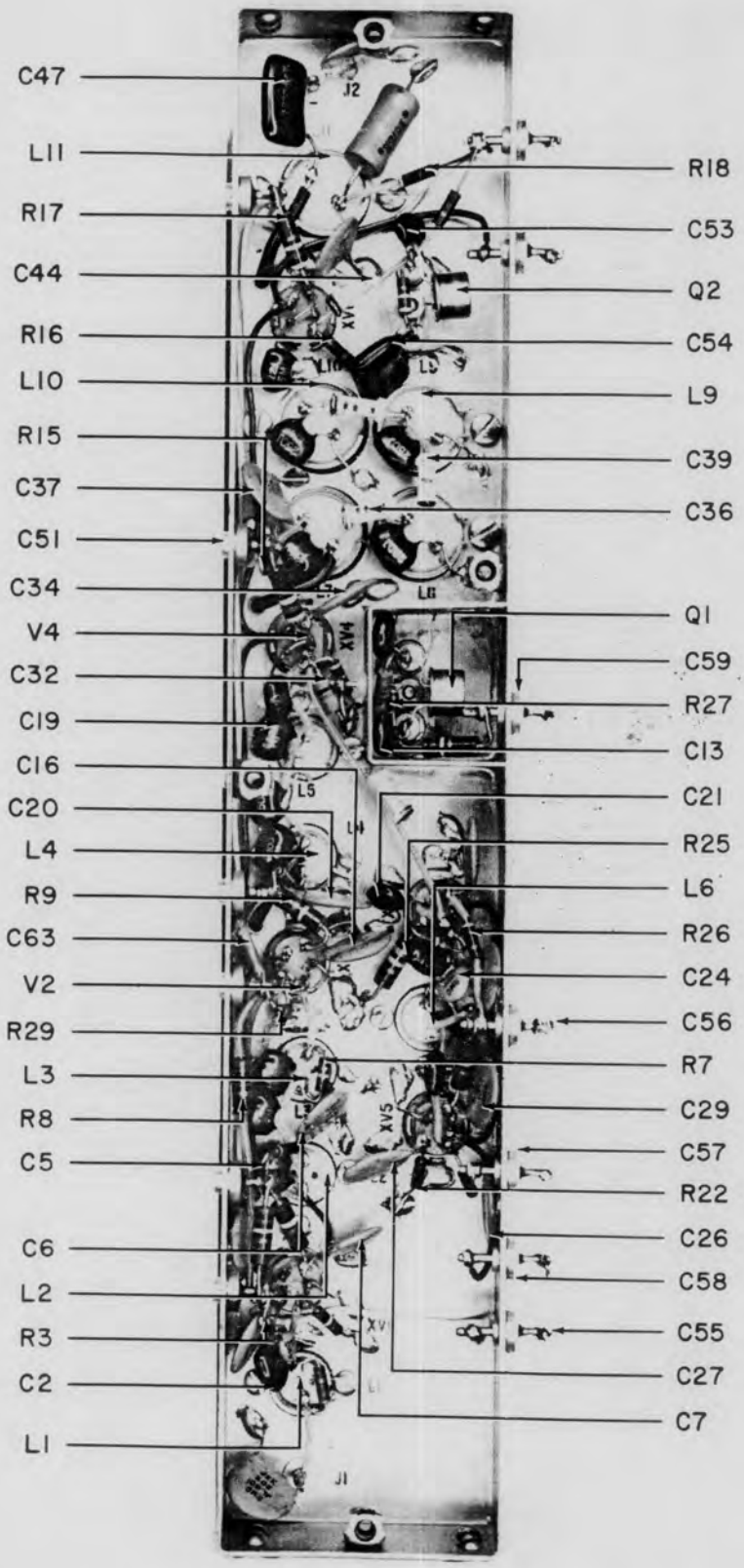


Figure 5-7. Type 8001 IF Sweep Chassis, Component Locations

Ref. Desig.	Description	Vendor Part No.	Vendor Code
L5	Same as L4		
L6	Same as L4		
L7	INDUCTOR, VARIABLE: 1-2.2 mH	1506-1	71279
L8	Same as L7		
L9	Same as L7		
L10	Same as L7		
L11	INDUCTOR, VARIABLE: 9-22 mH	1506-4	71279
Q1	TRANSISTOR	2N335	07688
Q2	Same as Q1		
R1	RESISTOR, FIXED, COMPOSITION: 3.6k, 5%, 1/4W	CB3625	01121
R2	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	CB1045	01121
R3	RESISTOR, FIXED, COMPOSITION: 200Ω, 5%, 1/4W	CB2015	01121
R4	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/2W	EB2245	01121
R5	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	CB4725	01121
R6	RESISTOR, FIXED, COMPOSITION: 160k, 5%, 1/2W	EB1645	01121
R7	RESISTOR, FIXED, COMPOSITION: 20k, 5%, 1/4W	CB2035	01121
R8	RESISTOR, FIXED, COMPOSITION: 200Ω, 5%, 1/2W	EB2015	01121
R9	Same as R4		
R10	Same as R5		
R11	NOT USED		
R12	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	CB4745	01121
R13	NOT USED		
R14	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/2W	EB4745	01121
R15	Same as R5		
R16	RESISTOR, FIXED, COMPOSITION: 1 MΩ, 5%, 1/4W	CB1055	01121
R17	Same as R14		
R18	Same as R5		
R19	RESISTOR, FIXED, COMPOSITION: 1.5 MΩ, 5%, 1/4W	CB1555	01121
R20	Same as R12		
R21	RESISTOR, FIXED, COMPOSITION: 51k, 5%, 1/2W	EB5135	01121
R22*	RESISTOR, FIXED, COMPOSITION: 1.5k, 5%, 1/4W	CB1525	01121
R23	RESISTOR, FIXED, COMPOSITION: 2k, 5%, 1/4W	CB2025	01121
R24	RESISTOR, FIXED, COMPOSITION: 150k, 5%, 1/4W	CB1545	01121
R25	RESISTOR, FIXED, COMPOSITION: 130k, 5%, 1/2W	EB1345	01121
R26	Same as R5		

*Nominal value listed; final value is factory selected to meet specifications.

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R27	Same as R12		
R28	Same as R6		
R29	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	CB4705	01121
V1	TUBE, ELECTRON: Nuvistor Tetrode	7587	86684
V2	Same as V1		
V3	TUBE, ELECTRON: Nuvistor Triode	6CW4	86684
V4	Same as V1		
V5	Same as V1		
V6	Same as V1		
Y1	CRYSTAL, QUARTZ: 500 kc	CR46/U	74306
Y2	CRYSTAL, QUARTZ: 320 kc	CR46/U	74306

5.4.5 Type 8200A Sweep Generator/Deflection Module

REF DESIG PREFIX A2

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 47 μF, 20%, 35V	150D476X0035S2	56289
C2	CAPACITOR, ELECTROLYTIC: 4.7 μF, 20%, 35V	150D475X0035B2	56289
C3	Same as C2		
C4	CAPACITOR, ELECTROLYTIC: 22 μF, 20%, 15V	150D226X0015B2	56289
CR1	DIODE, ZENER	1N972B	07688
Q1	TRANSISTOR	2N489	07688
Q2	TRANSISTOR	2N697	07688
R1	RESISTOR, FIXED, COMPOSITION: 220Ω, 5%, 1/4W	CB2215	01121
R2	RESISTOR, DEPOSITED CARBON: 121k, 1%, 1/8W	RN60B1213F	81349
R3	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	CB1035	01121
R4	RESISTOR, FIXED, COMPOSITION: 8.2k, 5%, 1W	GB8225	01121
R5	RESISTOR, DEPOSITED CARBON: 562k, 1%, 1/8W	RN60B5623F	81349
R6	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/2W	EB1045	01121
R7	Same as R6		
R8	RESISTOR, DEPOSITED CARBON: 75k, 1%, 1/8W	RN60B7502F	81349
R9	RESISTOR, FIXED, COMPOSITION: 8.2k, 5%, 1/4W	CB8225	01121
R10	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 2W	HB2235	01121
R11	RESISTOR, DEPOSITED CARBON: 3.65k, 1%, 1/8W	RN60B3651F	81349
V1	ELECTRON TUBE, Nuvistor	6CW4	80131
V2	Same as V1		

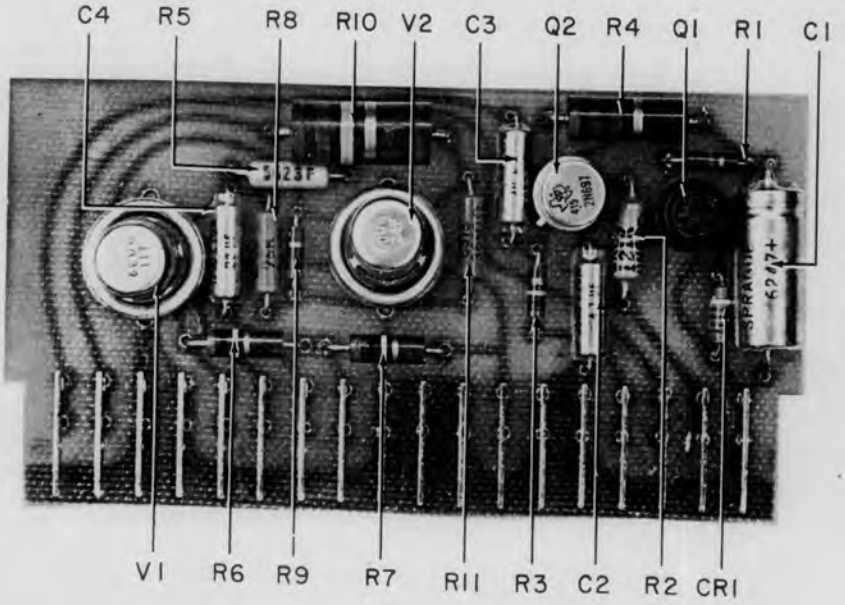


Figure 5-8. Type 8200A Sweep Generator/Deflection Module, Component Locations

5.4.6 Type 7904 Filter Chassis

REF DESIG PREFIX A3

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 1100 pF, 5%	DM19-112J	72136
C2	CAPACITOR, CERAMIC TUBULAR: 3.3 ±0.25 pF	301-000-COJO-339C	72982
C3	Same as C1		
C4	CAPACITOR, CERAMIC TUBULAR: 2.7 ±0.25 pF	301-000-COJO-279C	72982
C5	Same as C1		
C6	Same as C4		
C7	Same as C1		
C8	Same as C2		
C9	Same as C1		
C10	Same as C1		
C11	CAPACITOR, CERAMIC TUBULAR: 7.5 ±0.5 pF	301-000-COHO-759D	72982
C12	Same as C1		
C13	CAPACITOR, CERAMIC TUBULAR: 6.2 ±0.5 pF	301-000-COHO-629D	72982
C14	Same as C1		
C15	Same as C13		
C16	Same as C1		
C17	Same as C11		
C18	Same as C1		
J1	CONNECTOR, JACK	27-9	02660
J2	Same as J1		
J3	Same as J1		
J4	Same as J1		
L1	INDUCTOR, VARIABLE	1339-2	14632
L2	INDUCTOR, VARIABLE	1339-1	14632
L3	Same as L2		
L4	Same as L2		
L5	Same as L1		
L6	INDUCTOR, VARIABLE	1339-3	14632
L7	Same as L2		
L8	Same as L2		
L9	Same as L2		
L10	Same as L6		
R1	POTENTIOMETER: 1k, 10%, 1/2W	GA1M032S-102UC	01121
R2	RESISTOR, FIXED, COMPOSITION: 360Ω, 5%, 1/4W	CB3615	01121

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R3	Same as R1		
R4	Same as R2		
R5	RESISTOR, FIXED, COMPOSITION: 910k, 5%, 1/4W	CB9145	01121
R6	Same as R5		
R7	Same as R5		

REF DESIG PREFIX A3

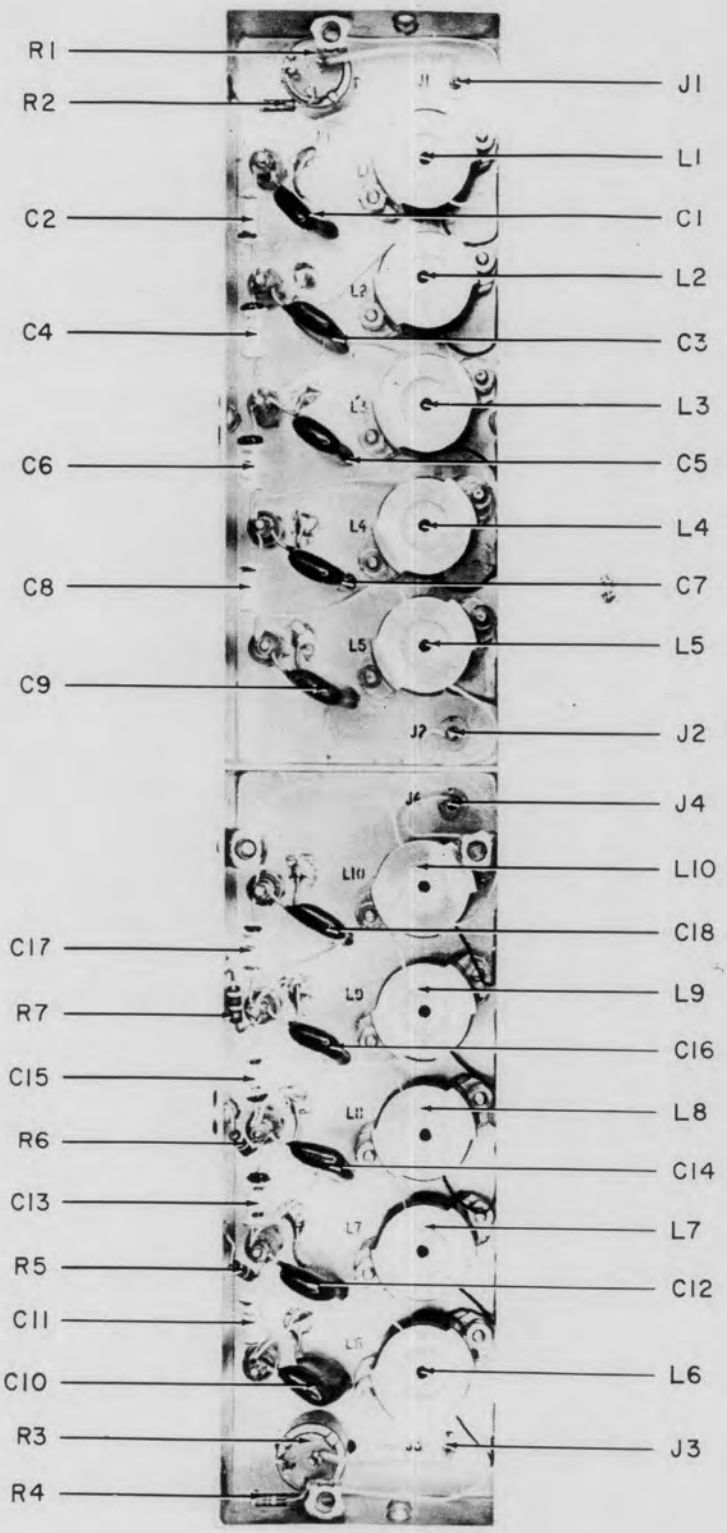


Figure 5-9. Type 7904 Filter Chassis, Component Locations

5.4.7 Type 8100 IF Output Chassis

REF DESIG PREFIX A4

Ref. Desig.	Description	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 1200 pF, 5%	DM19-122J	72136
C2	CAPACITOR, CERAMIC DISC: 0.01 μF, 200V	4835-000-Z5UO-103M	72982
C3	CAPACITOR, DIPPED MICA: 68 pF, 5%	DM10-680J	72136
C4	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 μF, 20% 35V	150D474X0035A2	56289
C5	CAPACITOR, CERAMIC DISC: 2200 pF, 20%, 1000V	JF	91418
C6	CAPACITOR, CERAMIC DISC: 470 pF, 20%, 1000V	B	91418
C7	CAPACITOR, FILM, TUBULAR: 0.1 μF, 10%, 200V	192P10492	56289
C8	Same as C7		
C9	Same as C1		
C10	CAPACITOR, DIPPED MICA: 22 pF, 5%	DM10-220J	72136
C11	Same as C4		
C12	CAPACITOR, DIPPED MICA: 620 pF, 5%	DM15-621J	72136
C13	Same as C12		
C14	Same as C7		
C15	CAPACITOR, CERAMIC FEEDTHRU: 1000 pF, GMV	FA5C-102W	01121
C16	Same as C12		
C17	Same as C2		
C18	Same as C15		
C19	Same as C12		
C20	Same as C2		
C21	CAPACITOR, DIPPED MICA: 270 pF, 5%	DM10-271J	72136
C22	Same as C21		
C23	CAPACITOR, CERAMIC STANDOFF: 1000 pF, GMV	SS5A-102W	01121
CR1	DIODE, GERMANIUM	1N198	07688
CR2	Same as CR1		
CR3	Same as CR1		
J1	CONNECTOR, JACK	27-9	02660
L1	INDUCTOR, VARIABLE: 9.0-22.0 mH	1506-4	71279
L2	Same as L1		
L3	INDUCTOR, VARIABLE: 20-40 mH	1506-5	71279
R1	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	CB4745	01121
R2	RESISTOR, FIXED, COMPOSITION: 200Ω, 5%, 1/4W	CB2015	01121
R3	POTENTIOMETER: 250k, 10%, 1/2W	GA1M032S-254UC	01121

REF DESIG PREFIX A4

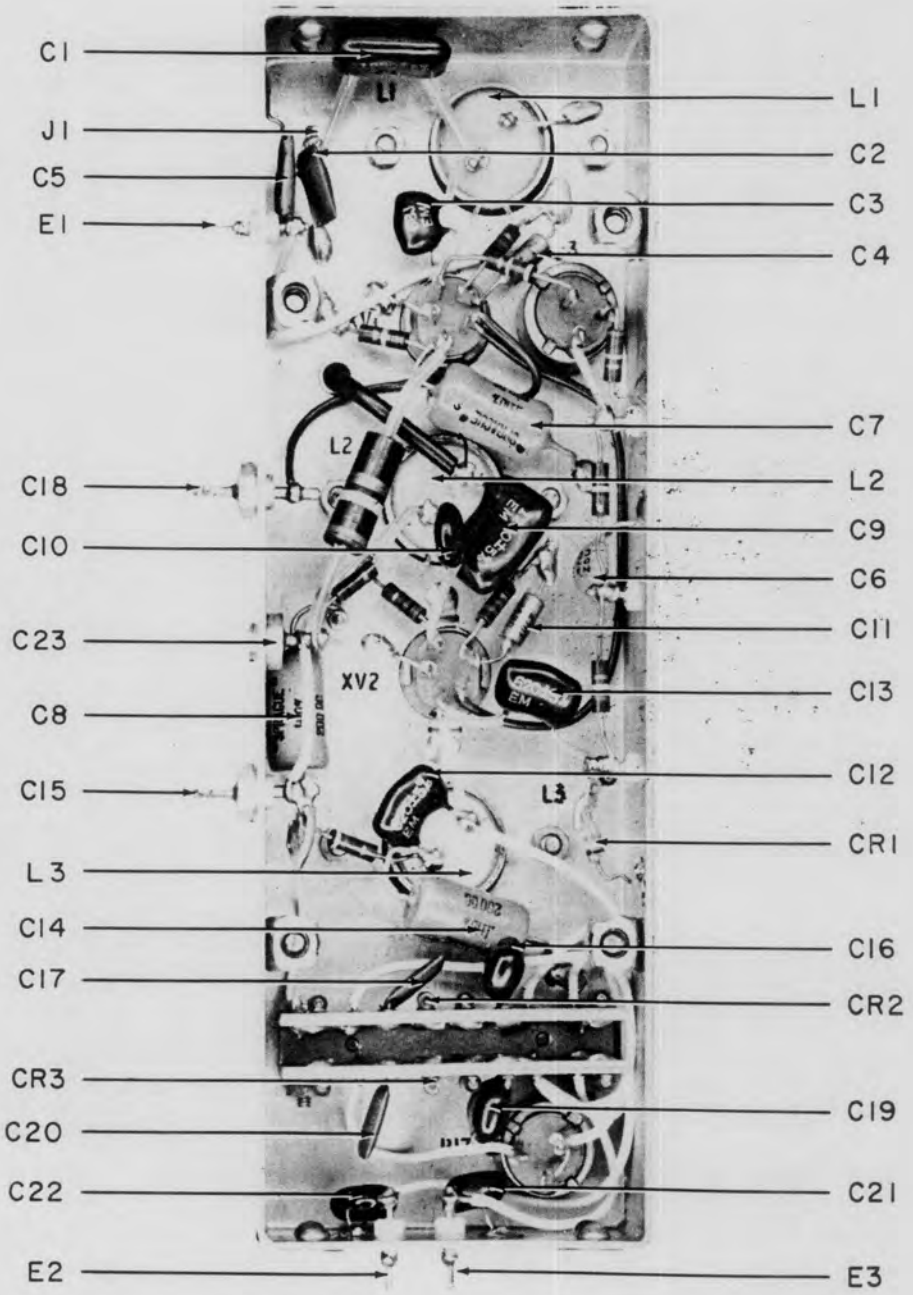


Figure 5-10. Type 8100 IF Output Chassis, Component Locations

REF DESIG PREFIX A4

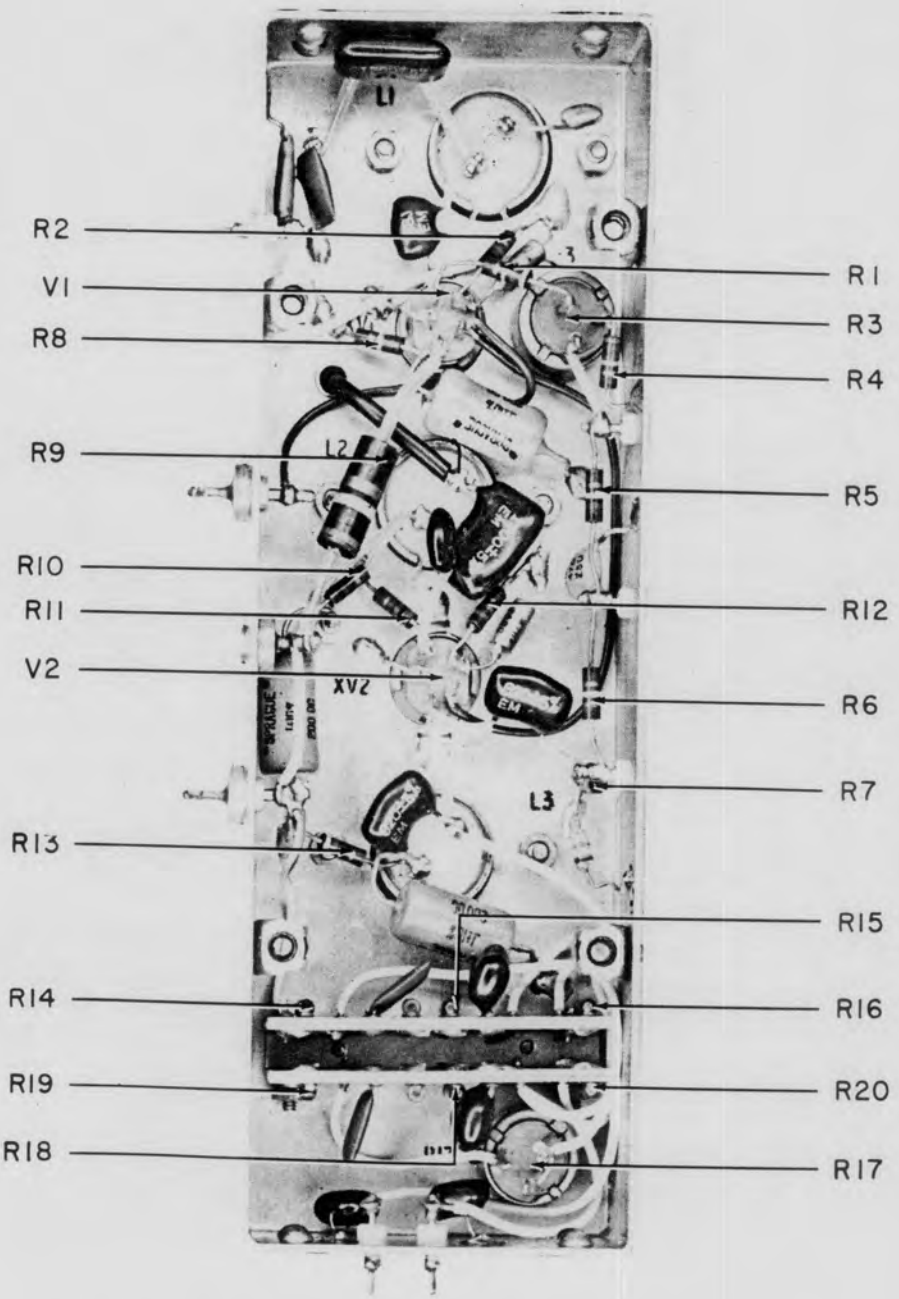


Figure 5-11. Type 8100 IF Output Chassis, Component Locations

Ref. Desig.	Description	Vendor Part No.	Vendor Code
R4	RESISTOR, FIXED, COMPOSITION: 82k, 5%, 1/4W	CB8235	01121
R5	RESISTOR, FIXED, COMPOSITION: 270k, 5%, 1/4W	CB2745	01121
R6	Same as R5		
R7	Same as R5		
R8	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	CB2235	01121
R9	RESISTOR, FIXED, COMPOSITION: 75k, 5%, 1W	GB7535	01121
R10	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	CB1025	01121
R11	RESISTOR, FIXED, COMPOSITION: 1 MΩ, 5%, 1/4W	CB1055	01121
R12	RESISTOR, FIXED, COMPOSITION: 510Ω, 5%, 1/4W	CB5115	01121
R13	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	CB4725	01121
R14	Same as R11		
R15	RESISTOR, FIXED, COMPOSITION: 330k, 5%, 1/4W	CB3345	01121
R16	RESISTOR, FIXED, COMPOSITION: 220k, 5%, 1/4W	CB2245	01121
R17	POTENTIOMETER: 500k, 10%, 1/2W	GA1M032S-504UC	01121
R18	Same as R15		
R19	Same as R11		
R20	Same as R16		
V1	TUBE, ELECTRON: Nuvistor Tetrode	7587	80131
V2	TUBE, ELECTRON: Nuvistor Triode	6CW4	80131

SECTION VI

SCHEMATIC DIAGRAMS

REF DESIG PREFIX A1

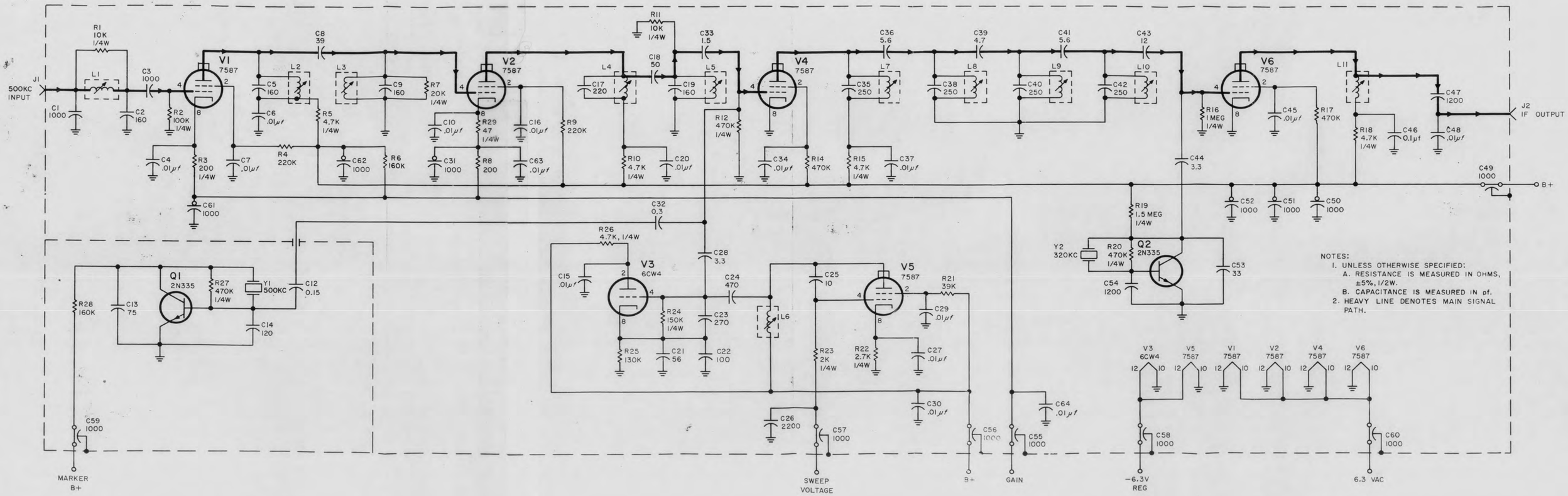


Figure 6-1. Type 8000 IF Sweep Chassis, Schematic Diagram

REF DESIG PREFIX A1

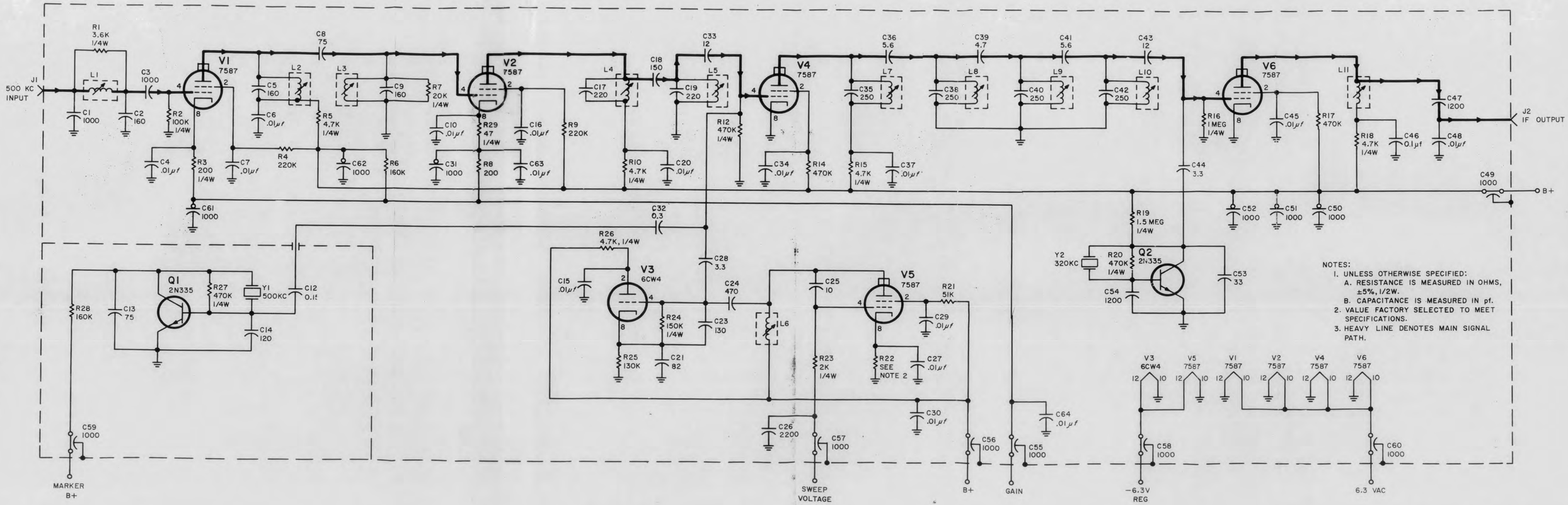
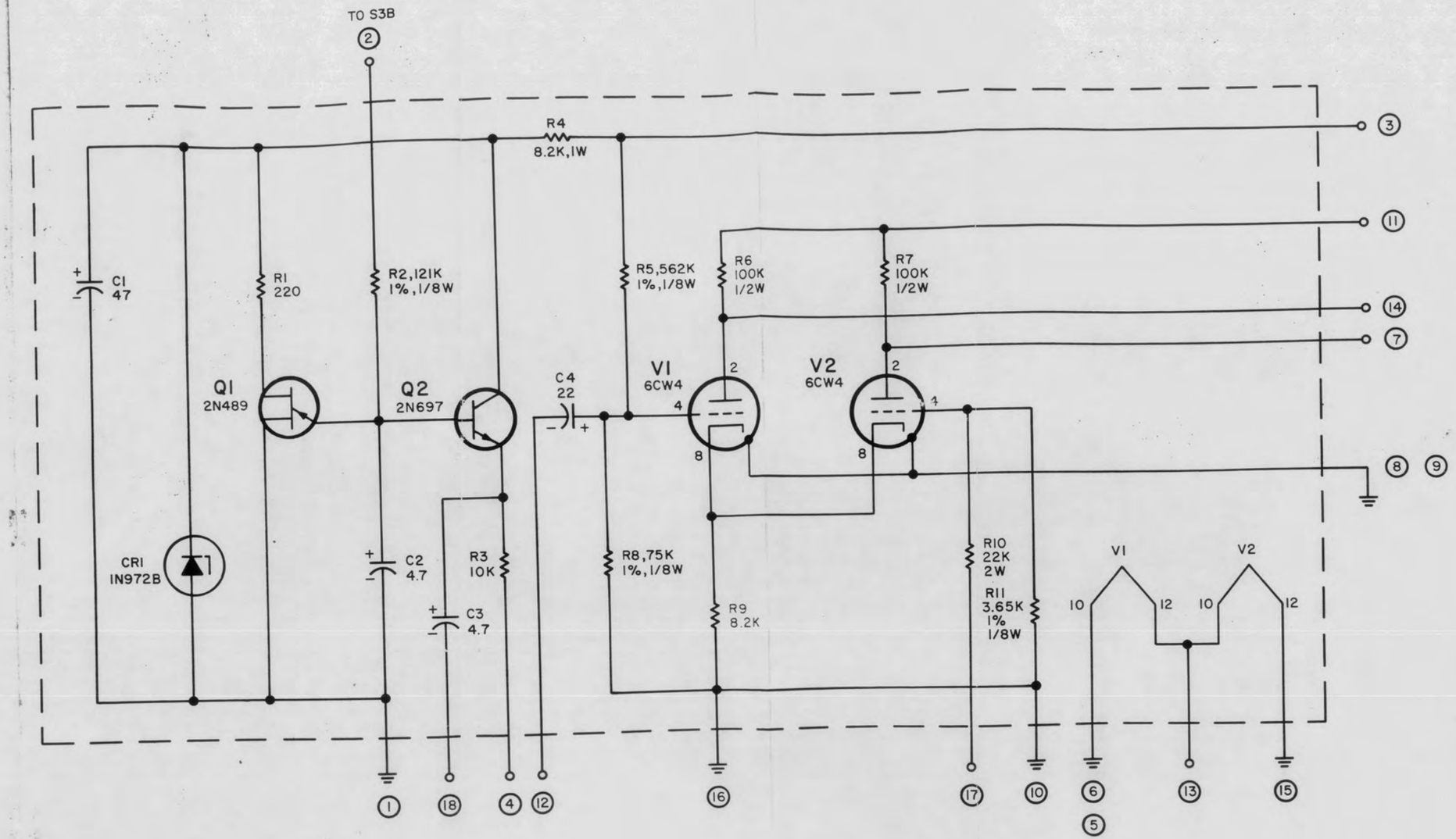


Figure 6-2. Type 8001 IF Sweep Chassis, Schematic Diagram

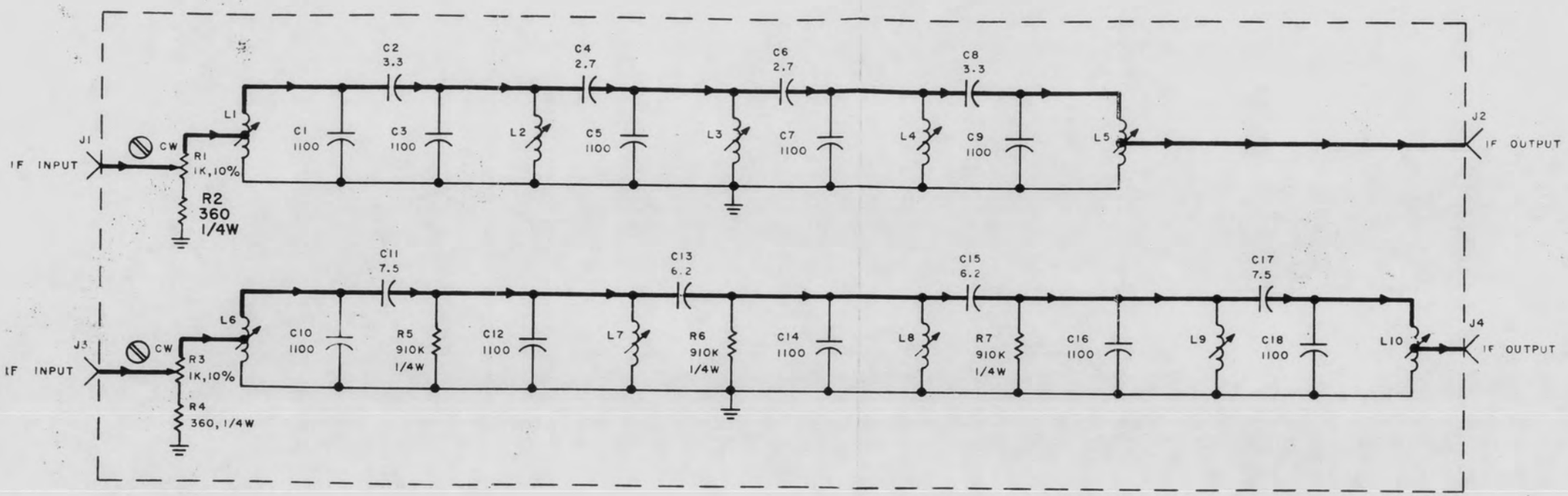
REF DESIG PREFIX A2



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 6-3. Type 8200A Sweep Generator/Deflection Module, Schematic Diagram

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 7904 Filter Chassis, Schematic Diagram

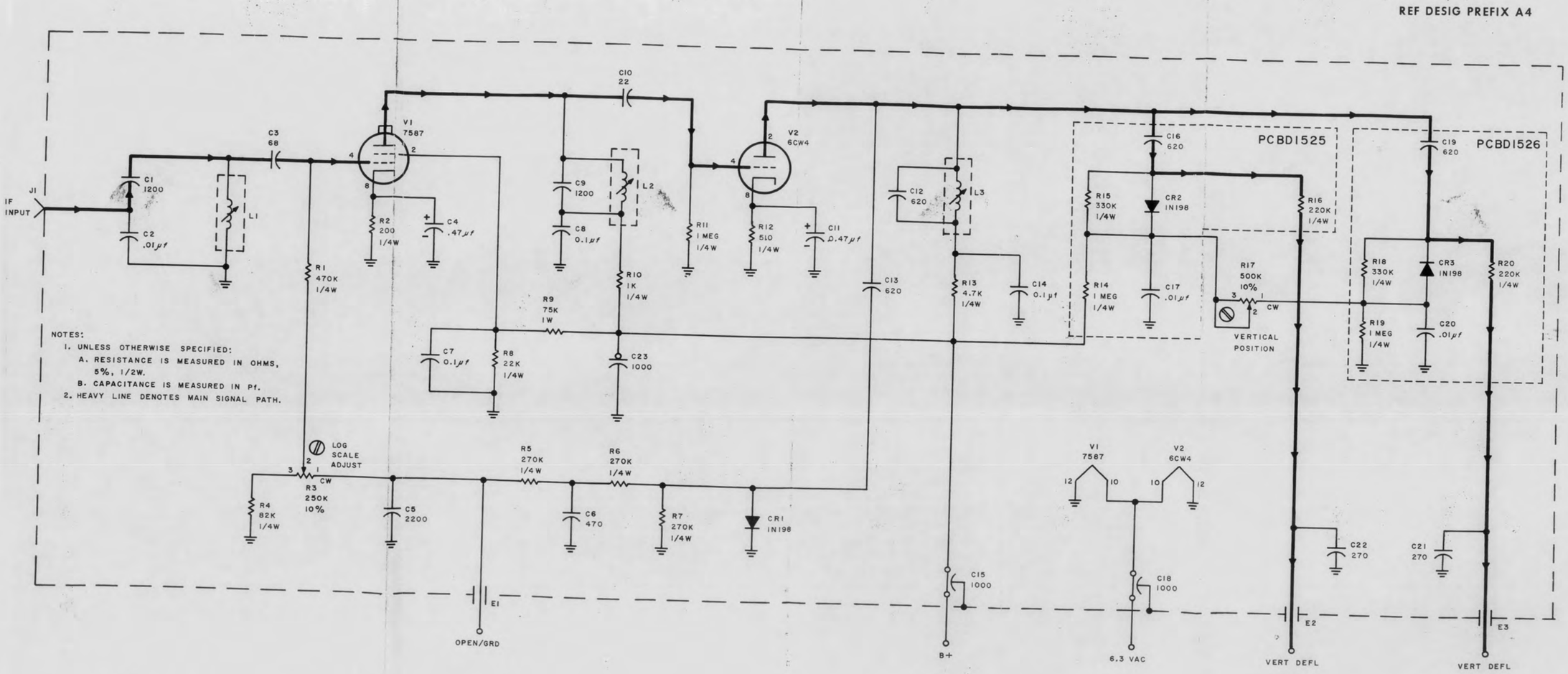


Figure 6-5. Type 8100 IF Output Chassis, Schematic Diagram

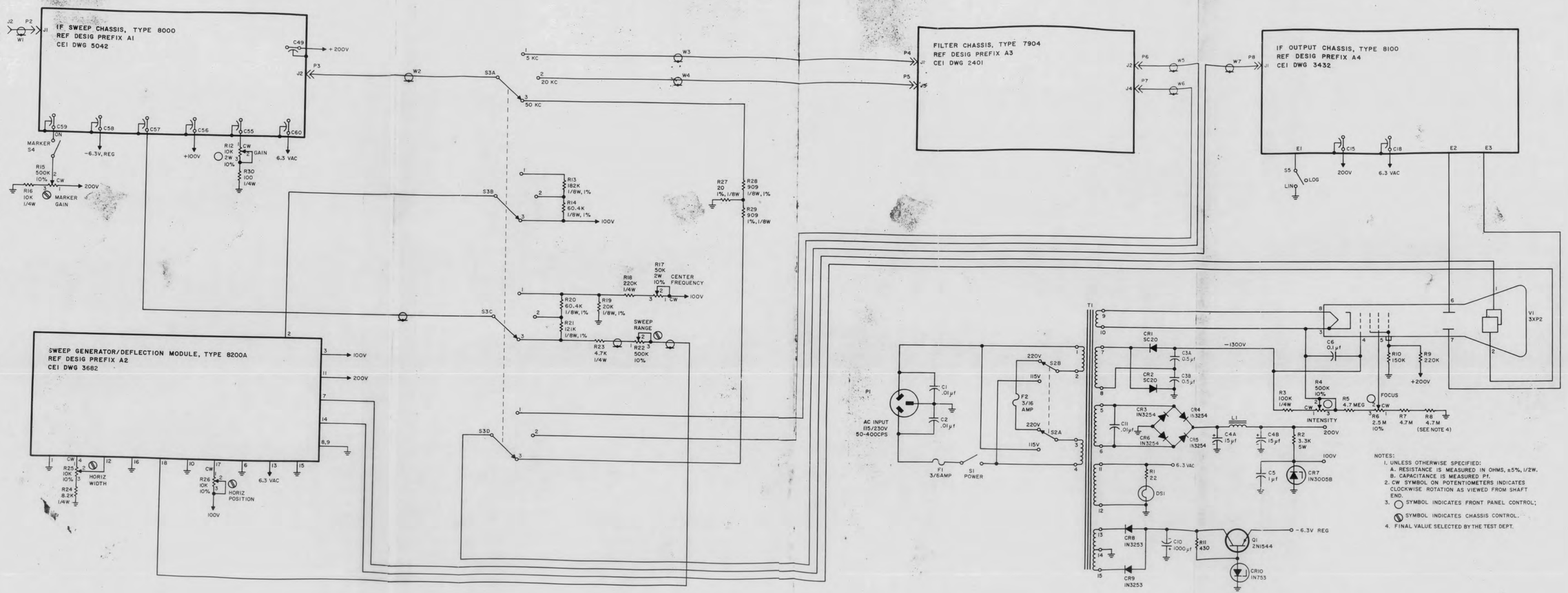


Figure 6-6. Type SM-8510 Signal Monitor, Main Chassis Schematic Diagram

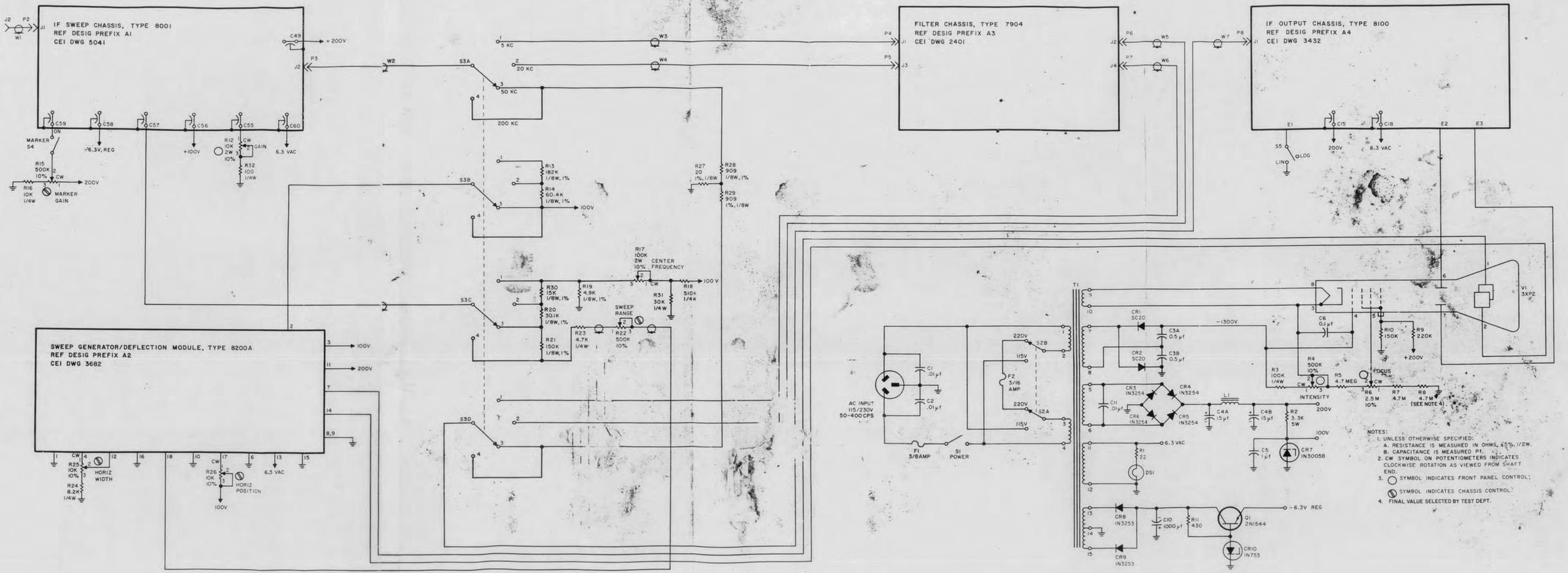


Figure 6-7. Type SM-8511 Signal Monitor, Main Chassis Schematic Diagram