INSTRUCTION MANUAL

FOR

TYPES 904A, 906A AND 906A-4

RECEIVERS

COMMUNICATION ELECTRONICS, INC.

6006 EXECUTIVE BOULEVARD ROCKVILLE, MARYLAND, 20852

INSTRUCTION MANUAL
FOR
TYPES 904A, 906A AND
906A-4 RECEIVERS

COMMUNICATION ELECTRONICS, INC.
6006 EXECUTIVE BOULEVARD
ROCKVILLE, MARYLAND, 20852

Change 1 6/7/68

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.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS

Table 1-1. Types 904A, 906A, and 906A-4 Receivers, Specifications

Type of Reception	AM, FM, and CW
Frequency Range	30 to 300 MHz in two bands: Band A, 30-90 MHz Band B, 60-300 MHz
Dial Accuracy	±1%
Input Impedance	50 ohms nominal, type BNC connector
Noise Figure	Band A: 4.5 dB, maximum; Band B: 6.5 dB, maximum
Image Rejection	Band A: 60 dB, minimum; Band B: 50 dB, minimum
IF Rejection	54 dB, minimum, at 30 MHz; 80 dB, minimum, above 50 MHz
Oscillator Radiation at Antenna Input	15 μV, maximum, below 260 MHz; 25 μV, maximum, above 260 MHz
Local Oscillator Frequency	Incoming signal frequency plus 21.4 MHz
Intermediate Frequency	21.4 MHz
IF Bandwidths	300 kHz or 20 kHz, selectable by front-panel control
Sensitivity:	
20-kHz Bandwidth	AM: 1 μV input, modulated 50% at 1 kHz rate, produces 10 dB (s plus n)/n, minimum FM: 2 μV input, modulated at 1 kHz rate with 7 kHz deviation produces 21 dB (s plus n)/n, minimum
300-kHz Bandwidth	AM: 4 μV input, modulated 50% at 1 kHz rate, produces 10 dB (s plus n)/n, minimum FM: 6 μV input, modulated at 1 kHz rate with 100 kHz deviation, produces 21 dB (s plus n)/n, minimum
Output Stability	AM: Output varies less than 5 dB for an input signal level range of 4 μV to 10,000 μV FM: Output varies less than 2 dB for input signal levels above 1.5 μV
Video Output Level	5 volts, rms, across a 10k ohm unbalanced load
Video Amplifier Response	Less than 3 dB variation from 100 Hz to 150 kHz
Audio Output Level	100 mW into a 600 ohm balanced or unbalanced load
Audio Amplifier Response	100 Hz to 40 kHz at 3 dB points
FM Deviation Sensitivity	12 mV/kHz, minimum, at video output jack
BFO	21.4 MHz, adjustable ±20 kHz; operates in CW mode
Signal Monitor Output	21.4 MHz center frequency output provided for use with CEI Signal Monitors
Local Oscillator Output	50 mV, minimum, into 50-ohm load
IF (pre-detection) Output	21.4-MHz center frequency output provides 100 mV, minimum, into a 50-ohm load for input signal levels above AGC threshold
Meters	Tuning, Signal Strength
COR (Types 906A and 906A-4 only):	
Sensitivity	Less than 1 μV
Range	Adjustable to operate over an input signal range of 1 μV to greater than 500 μV
Release Time	Slow: 6 seconds, ±20%; Fast: less than 0.5 seconds
Output	SPDT contacts
Crystal Marker Oscillator:	
Outputs	1.0 MHz or 5.0 MHz (harmonics to 300 MHz)
Frequency Stability	±0.005% from 0° to 120° F
Front Panel Controls	IF BANDWIDTH: 300 kHz-20 kHz; BFO TUNING; VIDEO GAIN; AUDIO GAIN; POWER: Bandswitch; RF GAIN; COR SENSITIVITY (906A only); COR/SQUELCH SENSITIVITY (906A-4 only); CMO: OPERATE - 1 MHz-5 MHz

Table 1-1. Types 904A, 906A, and 906A-4 Receivers, Specifications - (Cont'd)

Power Input	115/230 volts, 50-400 Hz
Power Consumption	20 watts, approximately
Weight	18 lbs., approximately
Size	19-inches wide, 3.5-inches high, and 16-inches deep

Figure 1-1

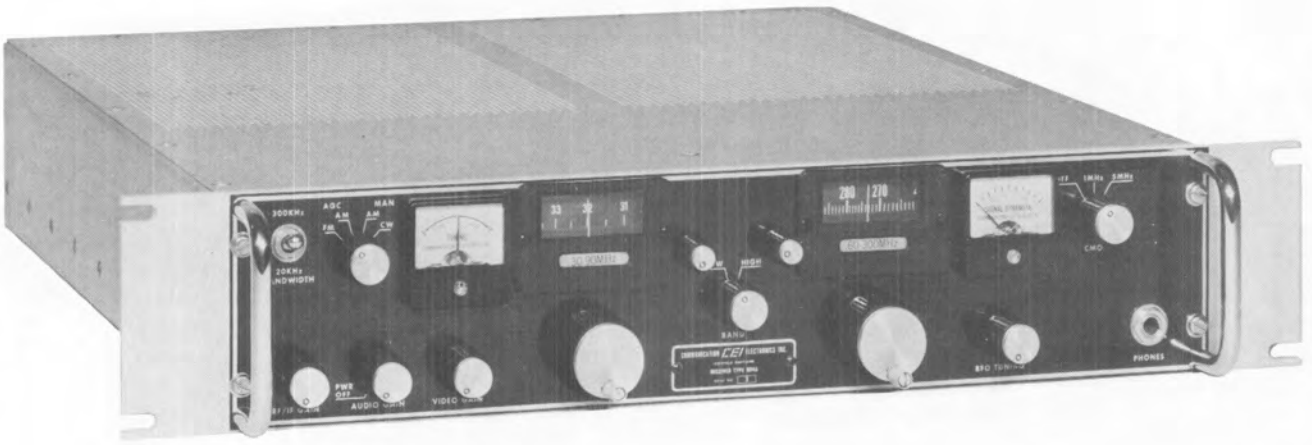


Figure 1-1. Type 904A Receiver, Front View

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL DESCRIPTION

1.1.1 The CEI Types 904A and 906A Receivers are designed for AM, FM, and CW reception in the VHF band. These superheterodyne receivers tune the frequency range of 30 to 300 MHz in two bands: 30 to 90 MHz and 60 to 300 MHz. Two IF bandwidths are available: 20 kHz and 300 kHz. The 904A and 906A Receivers are identical except that the 906A contains a COR (carrier operated relay) not included in the 904A. Five signal outputs are available from the receivers: an audio output, a video output, a local oscillator output, a signal monitor output, and an IF output. A COR output is also included on the 906A Receiver. Both receivers contain a crystal marker oscillator to provide 1-MHz and 5-MHz marker signals, tuning and signal strength meters mounted on the front panel and a BFO (beat frequency oscillator) which is activated when the CW mode of operation is selected. Pertinent specifications for the units are listed in Table 1-1; the semiconductor and tube complement is listed in Table 1-2.

1.1.2 A supplemental section beginning on page 7-1 contains complete electrical information on the type 906A-1 Receiver. This section also contains maintenance data, photographs, parts lists, and schematic diagrams pertinent to the 906A-1.

1.2 MECHANICAL CHARACTERISTICS

A front view of the type 904A Receiver is shown in Figure 1-1. The front panel of the 904A contains all the controls and indicators found on the front panel of the 906A except for the COR light, the COR DELAY switch, and the COR SENSITIVITY control. The controls and indicators are: BANDWIDTH, function, CMO, and BAND switches, RF/IF GAIN, AUDIO GAIN (also turns power on and off), VIDEO GAIN, and BFO TUNING controls, PHONES jack, TUNING and SIGNAL STRENGTH meters, and two movable fiducial controls knobs, one for the fiducial on each tape dial.

1.2.1 The rear apron of the 904A Receiver, shown in Figure 1-2, mounts the RF INPUT jack, J1, the AUX INPUT jack, J3, and the VIDEO OUTPUT jack, J12, all of which are type-BNC connectors. The rear apron also mounts the LO OUTPUT jack, A7J3, an N-type connector, terminal board TB1, power switch S5, line fuses F1 and F2 and the permanently connected power cord.

1.2.2 The front panel, main chassis, and top and bottom dust covers are constructed of aluminum. The front panel is finished with grey enamel and is overlaid with a black-anodized etched bezel. The main chassis of the 904A Receiver contains eleven subassemblies. Five of these, the 30-90-MHz RF tuner, the 60-300-MHz RF tuner, the 20/300-kHz IF amplifier, the crystal marker oscillator, and the local oscillator coupler, are constructed on silver-plated brass chassis which have been gold-flashed to prevent tarnishing. The remaining six subassemblies, the audio amplifier, video amplifier, AGC amplifier, +24V power supply, -24V power supply, and +12V power supply, are constructed on etched circuit boards that plug into the main chassis. The receivers are designed for mounting in a standard 19-inch rack. Over-all dimensions are 19-inches wide, 3.5-inches high, and 16-inches deep.

Figure 1-2. Type 904A Receiver, Rear View

Table 1-2. Types 904A and 906A Receivers, Tube and Transistor Complement

Ref. Desig.	Type	Function
	30-90-MHz RF Tuner	
A1V1	6CW4	RF Amplifier
A1V2	8058	RF Amplifier
A1V3	7587	Mixer
A1V4	6CW4	Local Oscillator
	60-300-MHz RF Tuner	
A2V1	8058	RF Amplifier
A2V2	8058	RF Amplifier
A2V3	7587	Mixer
A2V4	6CW4	Local Oscillator
	20/300-kHz IF Amplifier	
A3Q1	2N3478	1st 300-kHz IF Amplifier
A3Q2	2N3478	1st 20-kHz IF Amplifier
A3Q3	2N3478	2nd 300-kHz IF Amplifier
A3Q4	2N3478	2nd 20-kHz IF Amplifier
A3Q5	2N3478	3rd IF Amplifier
A3Q6	2N3478	4th IF Amplifier
A3Q7	2N929	Emitter Follower
A3Q8	2N929	Emitter Follower
A3Q9	2N2270	Emitter Follower
A3A1Q1	2N706	BFO
A3A2Q1	2N706	Limiter
A3A2Q2	2N706	Limiter
A3A2Q3	2N706	Limiter
A3A2Q4	2N706	Limiter
	AGC Amplifier	
A4Q1	2N3053	DC Amplifier
A4Q2	2N3053	AGC Regulator
A4Q3	2N3251	DC Amplifier
A4Q4	2N3251	Meter Driver

Ref. Desig.	Type	Function
	Video Amplifier	
A5Q1	2N3053	DC Amplifier
A5Q2	2N3251	DC Amplifier
A5Q3	2N3053	Emitter Follower
A5Q4	2N3051	Emitter Follower
	Audio Amplifier	
A6Q1	2N929	DC Amplifier
A6Q2	2N2270	Emitter Follower
A6Q3	2N2270	Power Amplifier
	+24V Power Supply Regulator	
A8Q1	2N2869	Series Regulator
A8Q2	2N526	Regulator Control
	-24V Power Supply Regulator	
A9Q1	2N3055	Series Regulator
A9Q2	2N3053	Regulator Control
	+12V Power Supply Regulator	
A10Q1	2N3055	Series Regulator
A10Q2	2N3053	Regulator Control
	Carrier Operated Relay (906A)	
A11Q1	2N3053	DC Amplifier
A11Q2	2N3251	DC Amplifier
A11Q3	2N3053	Relay Driver
A11Q4	2N3053	Relay Driver
	Crystal Marker Oscillator	
A12Q1	2N706	1-MHz Oscillator
A12Q2	2N706	5-MHz Oscillator

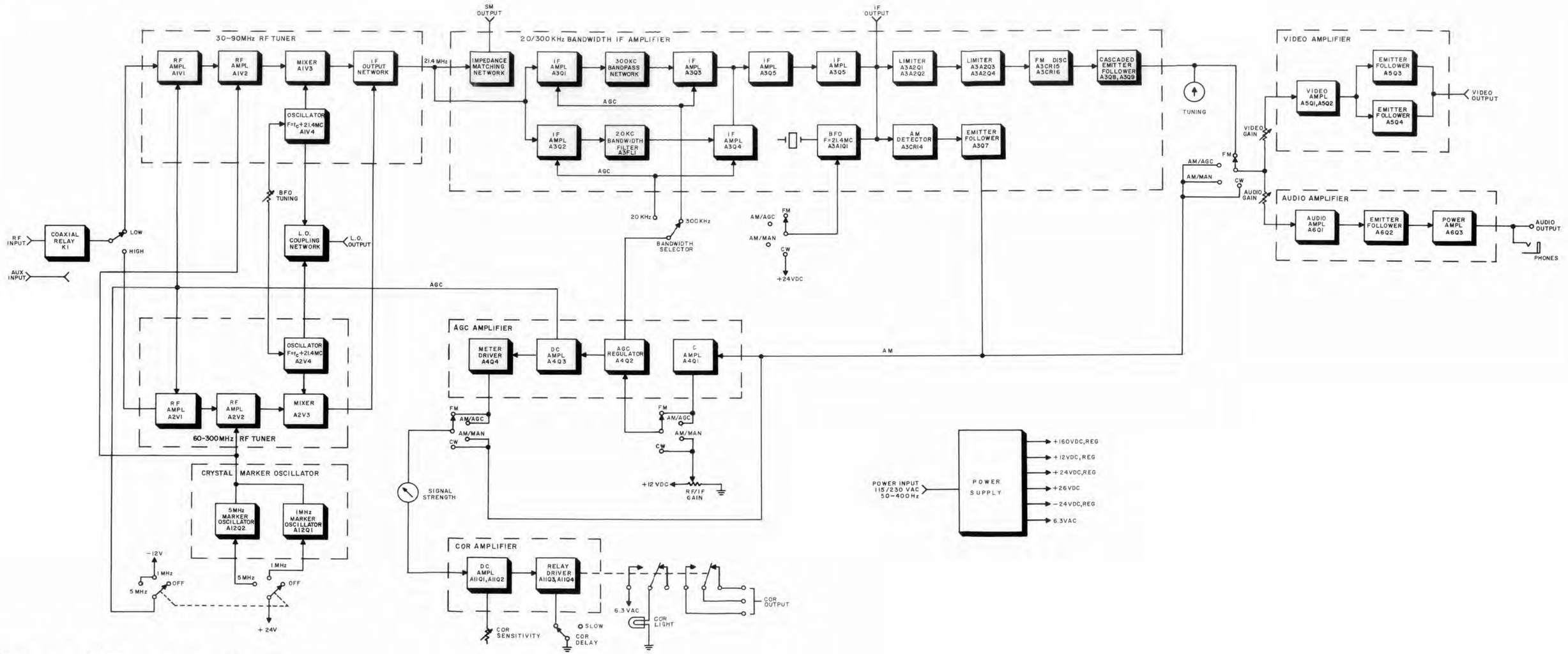


Figure 2-1. Type 906A Receiver, Functional Block Diagram

SECTION II

CIRCUIT DESCRIPTION

2.1 GENERAL

The operation of the various circuits in the Types 904A and 906A Receivers is discussed in the following paragraphs using the functional block diagram, Figure 2-1, and the schematic diagrams at the rear of this manual. Note that the unit numbering method is used for 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 A1V1 and A11R2). These subassembly prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

2.2 FUNCTIONAL DESCRIPTION

The functional block diagram, Figure 2-1, is applicable to the type 906A Receiver. It is also applicable to the type 904A Receiver except that the COR amplifier (A11) and its associated circuitry are omitted.

2.2.1 The types 904A and 906A Receivers are superheterodyne units designed to tune the 30 to 300 MHz frequency range in two bands: 30-90 MHz and 60-300 MHz. IF bandwidths of 20 kHz and 300 kHz are available. The receivers are designed so that either a single antenna or a separate antenna may be employed. When a single antenna is used, it is connected to the RF INPUT jack, J1, and switched by a coaxial relay to the input of the tuner in operation. If separate antennas are employed for each band, one of the antennas can be permanently connected to a selected tuner by means of the AUX INPUT jack, J3, and the remaining antenna can be switched through the coaxial relay.

2.2.2 Incoming signals to the 30-90-MHz RF tuner are amplified by RF amplifiers A1V1 and A1V2 which are connected in a cascode configuration. The oscillator in the tuner, A1V4, operates 21.4 MHz higher than the incoming signal. The output from the oscillator is applied to the mixer where it is heterodyned with the incoming signal to produce the 21.4-MHz IF frequency. A portion of the oscillator signal is also fed to the local oscillator coupler, and hence to the LO OUTPUT jack, A7J3, on the rear apron. The 21.4-MHz IF signal is fed through a common IF output network located in this tuner to the IF strip. The front-panel BFO TUNING control operates in conjunction with the oscillators in both tuners in order to vary the pitch of the CW-audio signal when this mode of operation is selected.

2.2.3 Incoming signals to the 60-300-MHz RF tuner are fed through cascode RF amplifiers A2V1 and A2V2 to the mixer, A2V3. The oscillator, A2V4, operating 21.4 MHz higher than the incoming signal, is also coupled to the mixer. The 21.4-MHz difference frequency produced is fed through the IF output network in the low band tuner to the IF strip. A portion of the oscillator signal from A2V4 is also fed to the local oscillator coupling network which applies it to the rear-apron LO OUTPUT jack.

2.2.4 The 21.4-MHz signal from the tuner output network is fed to an impedance-matching network in the IF strip which applies the signal to the rear-apron SM OUTPUT jack, J10, and to the IF amplifier stages. The 20/300-kHz IF amplifier contains two paths through which the signal can be conducted to subsequent stages in the unit. Both paths are similar in that each contains two IF amplifiers separated by bandpass filters. The circuits in one path are activated while the remaining path is disabled by means of the front-panel IF BANDWIDTH switch, S2. The bandpass filter in the 300-kHz bandwidth path is a conventional LC circuit, whereas a crystal filter sets the bandwidth of the 20-kHz path. The output signal from the path in operation receives additional amplification from IF amplifiers A3Q5 and A3Q6 before it is applied to the AM detector, FM limiters, and IF OUTPUT jack J11. The AM video signal from detector A3CR14 is fed through emitter follower A3Q7 to the input of the AGC amplifier, and through a section of the function switch to the audio and video amplifiers.

2.2.5 The symmetrical limiter stages (A3A2Q1-A3A2Q4) remove amplitude variations so that the output signal varies only in frequency. The limited output is demodulated by an FM discriminator circuit which includes diodes A3CR15 and A3CR16. The FM video signal is then fed through cascaded emitter followers A3Q8 and A3Q9, to the TUNING meter and through a section of the function switch to the audio and video gain controls.

2.2.6 The video module contains two amplifier stages, A5Q1, A5Q2, driving emitter followers A5Q3, A5Q4. The input to the module is through the video gain control. The amplified video output signal is fed to the rear-apron VIDEO OUTPUT jack, J12.

2.2.7 The audio amplifier receives its input signal from the audio gain control. The input signal is amplified by A6Q1 and fed through emitter follower A6Q2 and power amplifier A6Q3, to the audio output terminals on TB1 and to the front-panel PHONES jack.

2.2.8 The AGC amplifier contains voltage amplifier and regulator stages which are used to control the gain of the receiver during the reception of AM and FM signals. In addition, the module contains a meter driver stage that provides current for the signal strength meter when AGC is being applied. The output signal from the AM detector is connected to amplifier A4Q1 which applies it to a section of the function switch, S3. Regulator transistor A4Q2 receives its input signal from A4Q1, if the function switch is placed in the AM/AGC or FM positions, and from the RF/IF GAIN control if the function switch is placed in the AM/MAN or CW positions. Regulator transistor A4Q2 has two outputs. One is used as the input signal for dc amplifier A4Q3. The second output is applied through the BANDWIDTH switch to the first two stages of either the 20-kHz or 300-kHz IF amplifiers. This bias voltage determines which set of IF amplifiers is operable by forward biasing the respective base-emitter junctions of the gain-controlled transistors. The output from A4Q3 is used to control the gain of the RF amplifiers in both the low- and high-band tuners, and as the input to the meter driver stage, A4Q4. The latter transistor provides current for the signal strength meter when the function switch is in the FM or AM/AGC positions. The meter derives its current from the AM detector when the AM/MAN or CW modes are selected.

2.2.9 The power supply for the receiver consists of various main chassis components and three plug-in modules which supply all the necessary operating voltages.

2.3 TYPE 71119 30-90-MHz RF TUNER

Figure 6-1 is the schematic diagram for the type 71119 30-90-MHz RF tuner; its reference designation prefix is A1. The tuner consists of an RF amplifier, mixer, and local oscillator.

2.3.1 RF Amplifier. - The RF amplifier consists of a type-6CW4 Nuvistor triode and a type-8058 Nuvistor triode, V1 and V2, connected in a cascode configuration. Tuning of the input circuit is by means of inductor L2A, one section of a four-section inductuner, which is located in the grid circuit of V1. The amplifier output is tuned by section L2B of the inductuner in the plate circuit of V2. Neutralization of the input stage is achieved by feeding back a small out-of-phase signal from the plate to the grid of V1 through broadband transformer T1. Resistor R6 is the cathode resistor for V2. Inductor L4 prevents the RF input to V2 from being shorted to ground by the cathode bypass, C10. Gain of V1 is controlled by a negative-going delayed AGC voltage from the AGC amplifier when the input signal-to-noise ratio reaches approximately 30 dB at the receiver's output. The tuner operates at maximum gain with weaker signal inputs. Jack J5 and capacitor C50 couple the CMO signal to V2. When the CMO is operated V1 is biased off. The output from V2 is coupled through an interstage network to the mixer, V3. This network is tuned to provide a relatively uniform response over the entire frequency range. Additional energy is coupled through the network by capacitor C18 to hold up the response at the low frequency end of the band. In this part of the band end inductors L6 and L7 have little effect so that C17 and C18 are essentially in parallel.

2.3.2 Local Oscillator. - The tuner local oscillator is a type-6CW4 Nuvistor triode, V4, operating in a Colpitts configuration. The plate is held at RF ground potential by capacitor C41. The oscillator tank circuit is tuned by L2D, a section of the inductuner. The oscillator maintains a frequency that is 21.4 MHz above the incoming signal. The oscillator is coupled to the grid of the mixer through coupling capacitor C28. The pitch of the CW-audio signal is varied by changing the voltage applied to voltage variable capacitor CR1. A voltage variable capacitor is a semiconductor device whose capacitance varies inversely with the voltage applied across it. The voltage variable capacitor is effectively in parallel with the oscillator tank circuit in the grid of V4. As the front panel BFO TUNING control is rotated, a varying voltage is applied to CR1 changing its capacitance. Consequently, the frequency of the oscillator is changed and with it the beat on the CW-audio signal. Zener diode CR2 regulates the plate voltage being applied to V4 to prevent any changes in the voltage from affecting the oscillator frequency.

2.3.3 Mixer. - The mixer, V3, is a type-7587 Nuvistor tetrode. The input network for the stage is tuned by inductuner section L2C. The signal from the RF amplifier and the signal from the local oscillator are applied to the grid of V3 where they are mixed to produce a 21.4-MHz intermediate frequency. This IF signal is coupled

through a pi-network consisting of capacitor C39, inductor L11 and the plate capacitance of V3, to the IF output jack, J3. This network also serves as the high band mixer output network. The IF output from the high-band tuner is connected to IF input jack, J2, and through dc-blocking capacitor C38, to the pi-network. Test point TP1 is included in the mixer input grid circuit to provide a means of checking the oscillator injection level and interstage alignment with an oscilloscope.

2.4 TYPE 71120 60-300-MHz RF TUNER

Figure 6-2 is the schematic diagram for the type 71120 60-300-MHz RF tuner; its reference designation prefix is A2. The tuner contains a cascode RF amplifier, mixer, and local oscillator.

2.4.1 RF Amplifier. - The high band tuner employs two type-8058 Nuvistor triodes, V1 and V2, connected in a cascode configuration as the RF amplifier. The input to the tuner is from jack, J1, through capacitor, C2, to the grid of V1. Inductuner section L1A tunes the first RF amplifier stage. Neutralization of the amplifier is accomplished through the use of a bridge network which balances capacitor C3 with the combination of C4 and C5, the input capacitance of V1, and the plate-to-grid capacitance of V1. The output stage of the amplifier, V2, is tuned by inductuner section L1B. Input jack J5 and capacitor C50 are used to couple the crystal marker oscillator output signals to the input of V2. When the CMO is turned on a bias voltage is applied to V1 through the AGC input which cuts off the tube. Thus, no incoming signals are heard when the CMO is used. The interstage network between the RF amplifier and mixer is tuned to provide uniform coupling throughout the 240-MHz tuning range. Capacitor C17 couples additional energy through the network to hold up the response at the low frequency end of the band. End inductors L6 and L8 have little effect at the lower frequencies so that C17 is essentially in parallel with C14 and C16.

2.4.2 Local Oscillator. - The local oscillator stage, V4, employs a type-6CW4 Nuvistor triode in a Colpitts configuration. The oscillator circuit is tuned by L1D, a section of the inductuner. The output frequency is maintained 21.4 MHz above the incoming RF signal. Tank circuit capacitors C25 and C26 have a negative temperature coefficient to compensate for frequency drift due to ambient temperature change. The output of the oscillator is coupled into the grid circuit of the mixer through capacitor C20. Series-connected capacitors C23 and C41 feed an out-of-phase portion of the oscillator output into the RF amplifier-mixer coupling network to reduce oscillator radiation. The pitch of the CW-audio signal is varied by changing the voltage applied to voltage variable capacitor CR2. This diode is effectively in parallel with the oscillator tank circuit in the grid of V4. Rotating the front-panel BFO TUNING control varies the voltage applied to CR2. The capacitance of CR2 is a function of the applied voltage, hence, the frequency of the oscillator is changed, and with it, the tone of CW-audio signal. Oscillator plate voltage is regulated by Zener diode CR2.

2.4.3 Mixer. - The mixer stage, V3, utilizes a type-7587 Nuvistor tetrode. The interstage coupling network between the RF amplifier second stage and the mixer is tuned by section L1C of the inductuner. The mixer stage heterodynes the incoming RF signal and the local oscillator output to produce a 21.4-MHz IF signal in the plate circuit. The signal is then coupled through dc-blocking capacitor C39 and jack J2 to the common IF output network located in the low-band tuner. Test point TP1 is included in the mixer input circuit to provide a means of checking the oscillator injection level and interstage alignment with an oscilloscope.

2.5 BANDSWITCHING

Selection of the LOW or HIGH band tuners is by means of the front-panel BAND switch, S1. This switch performs three functions: it applies B-plus voltage to the selected tuner energizing the unit; it activates coaxial relay K1, when the HIGH band is selected, by the application of +26 volts; and it illuminates the dial lamps in the escutcheon associated with the band selected.

2.6 TYPE 72145 20/300-kHz IF AMPLIFIER

Figure 6-3 is the schematic diagram for the type 72145 20/300-kHz IF amplifier; its reference designation prefix is A3. The 21.4-MHz input is connected to the IF strip through jack J1. An impedance-matching network consisting of resistors R1, R2, and R3 feeds the input signal to the SM OUTPUT jack, J10, on the rear apron. The BANDWIDTH switch, S2, determines if the signal is passed through the 300- or 20-kHz bandpass amplifiers by supplying base bias from the AGC amplifier to the IF amplifiers for the selected bandwidth.

2.6.1 300-kHz Bandwidth IF Amplifiers. - Transistors Q1 and Q3 are the first and second IF amplifiers for the

300-kHz bandwidth. The bandwidth is determined by the interstage coupling between Q1 and Q3, a double-tuned, over-coupled network. The tuned circuit in the collector of Q1 consisting of C11, C12, and L1 has the junction of C11 and C12 grounded to provide a signal voltage at the junction of C12 and L1 which is out of phase with the input signal. This voltage is coupled back to the base of Q1 through C8 to neutralize the stage. The same method of neutralization is used by the second amplifier, Q3. The gain of both stages is controlled by the AGC amplifier when the function switch is in the FM or AM/AGC positions, and by the RF/IF GAIN control when the function switch is in the AM/MAN or CW positions. Placing the BANDWIDTH switch in the 20 kHz position removes base bias from both Q1 and Q3, disabling the stages.

2.6.2 20-kHz Bandwidth IF Amplifiers. - Transistors Q2 and Q4 are the first and second IF amplifiers for the 20-kHz bandwidth. The 20-kHz bandpass is determined by crystal filter FL1 in the coupling network between Q2 and Q4. The tuned collector load of Q4 is shared with Q3. Neutralization of Q4 is accomplished by feeding back out-of-phase signals from the junction of C21 and L6 through C23 to the transistor's base. Neutralization of Q2 is performed by negative feedback through C10.

2.6.3 AGC Compensation. - Diode compensation networks are included in the emitter and base circuits of Q1 through Q4 to linearize the automatic gain control characteristics of the IF strip. The AGC amplifier produces a negative-going voltage which is proportional to the average level of the incoming RF signals. This voltage is applied to the base voltage dividers of all gain-controlled stages. Diodes CR3 and CR5 in the emitter circuit of Q1, for example, conduct and short resistors R17 and R11, respectively, under no-signal conditions. At this time only R15, which is bypassed by C9, is active in the emitter circuit. This is the IF strip's maximum gain condition. As the input signal level rises, the conduction of Q1 is reduced by the AGC voltage. When the voltage drop across R17 becomes too small to maintain a forward bias on CR3 this resistor is added to the emitter circuit, further reducing the gain. As the AGC voltage continues to increase with an increasing input signal level, the voltage drop across R11 will decrease until CR5 is reverse biased and additional resistance is added to the emitter circuit. Note that R11 is not bypassed by C9, so that when CR5 is cut off ac degeneration is obtained across R11 which improves the signal-handling ability of the stage. A further expansion of the gain-control characteristics is provided by CR1. As the IF AGC voltage applied to Q1 approaches its most negative point on extremely high level input signals, the decreased conduction through CR1 causes an increase in the dynamic impedance of the diode. As a result, the AGC voltage must go even more negative to achieve an equal amount of gain reduction, than when CR1 was conducting heavily.

2.6.4 Third and Fourth IF Amplifiers. - The third and fourth IF amplifiers, Q5 and Q6, are common to both the 20- and 300-kHz bandwidths. A double-tuned, over-coupled network couples the two stages. The collector of Q6 is tuned by step-up transformer T1 which increases the detector output level. Neutralization of Q5 is by the same method used in the preceding amplifier stages. Capacitor C41 couples the feedback signal from the secondary of T1 to the base of Q6 to neutralize this stage.

2.6.5 AM Detector and Output Network. - The 21.4-MHz signal from the fourth IF amplifier is coupled from the secondary of T1 to the AM detector, CR14, and through a capacitive voltage divider to the input of the FM limiter. Capacitor C44 in conjunction with inductor L12 forms a filter to eliminate the RF signal components from the output of the detector. The audio-video output from the detector is fed through emitter follower Q7 to the AGC amplifier and through section S3A of the function switch to the audio and video gain controls. Silicon diode CR13 is used to compensate for the voltage drop across the base-emitter junction of Q7. This is done so that the AM video output will be zero volts with no signal input.

2.6.6 FM Limiters. - The 21.4-MHz signal from the IF amplifiers is fed to a symmetrical limiter stage formed by A2Q1 and A2Q2 from a capacitive voltage divider. The incoming signal swings about a dc level of approximately plus 3 volts established by base-bias resistors A2R1 and A2R2. Similar networks are in the base circuits of A2Q2, A2Q3, and A2Q4. Transistors A2Q1 and A2Q2 share a common emitter resistor, A2R4. Under no-signal conditions the combined emitter currents of the two transistors develop a voltage across A2R4 which approaches plus 3 volts. When a signal is applied to the base of A1Q1, the positive-going half cycle causes increased conduction through A2Q1 which increases the voltage drop across A2R4. If the input signal has sufficient amplitude the voltage drop across A2R4 will reverse bias the base-emitter junction of A2Q2, cutting the transistor off. On the negative-going half cycle, the decreased drop across A2R4 will cause A2Q2 to conduct to saturation. Thus the transistor operates between cut off and saturated conditions, limiting both the positive and negative cycles of the input signal. The base of A2Q2 is held at RF ground potential by capacitor A2C3. Diodes A2CR1, A2CR2, and

A2CR3 in the base circuit of A2Q1 prevent large positive-going signals from overloading the limiter, and large negative-going signals from back biasing the base-emitter junction of A2Q1. If the input signal exceeds approximately 6.6 volts peak-to-peak, Zener diode A2CR2 breaks down and clips positive-going excursions in excess of approximately 3.4 volts. Negative-going excursions in excess of approximately 3.2 volts forward bias A2CR3, shorting to ground signal voltage greater than the negative clipping level. Diode A2CR1 in series with A2CR2 blocks the Zener on negative excursions, preventing it from acting as an ordinary diode. The first limiter output is coupled to the second limiter through capacitor A2C2. Operation of the second limiter is identical to that of the first.

2.6.7 FM Discriminator and Output. - The FM discriminator is a modified Foster-Seeley circuit. Capacitor C54 couples the 21.4-MHz signal from the second limiter to a resonant circuit consisting of capacitor C55, variable inductor L13, and the primary of discriminator transformer, T2, which is tuned to the same frequency. An inductive voltage divider is formed by L13 and the primary of T2, with only a very small percentage of the limiter output appearing across the transformer primary. Capacitor C56 couples the reference voltage to the secondary of T2. Capacitive center-tapping of the secondary through C57 and C58 makes it possible to obtain a high degree of discriminator balance unaffected by coil characteristics or the position of the tuning slug. The FM video output from the discriminator is direct coupled to cascaded emitter followers Q8 and Q9. The output from Q9 is coupled through section S3A of the function switch to the audio and video gain controls, and to the TUNING meter. Inductor L14 and capacitor C62 eliminate the 21.4-MHz component from the FM output.

2.6.8 Beat Frequency Oscillator. - The BFO is a subassembly on the IF strip. It is designated A1. In the CW mode of operation a 21.4-MHz signal from the BFO is injected into the AM detector through capacitor C48. This signal beats with the IF frequency to produce an audible note. The BFO is placed in operation by the application of +24 volts through switch section S3A on the main chassis. The +24 volts biases diode A1CR2 in the forward direction, which applies the dc voltage to the collector of transistor A1Q1. The BFO is a self-regulating Colpitts oscillator. The output signal is derived from the feedback divider circuit consisting of capacitors A1C1 and A1C3. With the BFO on, diode A1CR1 is reverse biased and has little effect upon the circuit. When switch S3A is moved to any position other than the CW position, -24 volts is applied to A1CR1 and A1CR2 through R56. A1CR1 is now forward biased and A1CR2 is reverse biased. When A1CR1 is conducting a short circuit is effectively placed across crystal A1Y1. If this action were not taken, the crystal would be coupled to the IF strip through capacitors A1C3 and C48. This could cause undesirable effects in the IF response curve. Reverse biasing A1CR2 protects transistor A1Q1 from having the negative voltage applied to its collector.

2.7 TYPE 7830 AGC AMPLIFIER

Figure 6-4 is the schematic diagram for the type 7830 AGC amplifier; its reference designation prefix is A4.

2.7.1 Function. - The AGC amplifier controls the gain of the RF tuners and the 20/300-kHz IF strip when the function switch is in the FM or AM/AGC position. It also drives the SIGNAL STRENGTH meter when the function switch is in any of these positions. The AGC amplifier is a plug-in module which mounts on top of the main chassis.

2.7.2 IF AGC. - The AM video output from the 20/300-kHz IF strip is fed to the input of the AGC amplifier through pin 12 on the module. Resistor R3 and capacitor C1 form a modulation filter to remove audio variations from the dc component of the AM detector output. A second modulation filter consists of resistor R8 and capacitor C2 in the collector circuit of Q1. By removing the modulation from the input signal, the AGC voltage varies in direct proportion to the average value of the RF carrier. Transistor Q1 is cut off under no signal conditions by reverse biasing its base-emitter junction from the -24-volt supply through resistor R4. As the output from the AM detector increases in the positive direction Q1 begins to conduct. The negative-going voltage on the collector is fed to transistor Q2 through section S3B of the function switch. AGC voltage for the IF strip is obtained at the emitter of Q2. With no signal input this point is approximately 10 volts. Transistor Q2 is connected in series between the +12-volt supply and the base circuits of the IF amplifiers for the selected bandwidth. As the conduction through Q2 decreases, the base bias on the amplifiers decreases, reducing the gain of the stages.

2.7.3 RF AGC. - AGC voltage for the tuners is obtained from the collector of Q3, a PNP transistor. This transistor is biased to saturation until the signal-to-noise ratio at the receiver's output reaches approximately 30 dB, thus providing a delayed AGC voltage for the tuner. Until this signal level is reached, the tuner AGC output at the junction of resistors R13 and R14 is clamped at approximately 0.6 volt by CR1 so that the tuner operates at maximum gain. When the signal-to-noise ratio reaches the proper level the positive-going collector voltage of Q2 takes

control of Q3, biasing it out of saturation. As the input signal strength increases, the collector of Q2 goes more positive, further decreasing the conduction through Q3. This results in the tuner AGC voltage increasing in the negative direction from approximately 0 volt towards the -24-volt supply. Once the tuner AGC voltage is obtained in the IF AGC voltage increases at a much slower rate so that the receiver gain is now largely controlled by the tuner AGC for stronger signals.

2.7.4 Meter Driver Stage. - When the function switch is placed in the FM or AM/AGC positions the current to operate the signal strength meter is provided by Q2, Q3, and Q4. Initial meter deflection is provided by a small amount of current obtained from the AM detector through resistors R1 and R2. When AGC begins to function the decreasing voltage on the emitter of Q2 is conducted through R15, causing transistor Q4 to conduct. Meter current is now obtained through this stage. As the signal strength continues to increase and RF AGC is obtained, a greater voltage decrease occurs on the base of Q4 through R16 causing it to conduct even harder. A point is reached, however, when the voltage drop across R18 causes Zener diode CR2 to break down, lowering the total emitter resistance for Q4. This results in a decreased rate of change in current through the stage with increasing signal strength, thus changing the scaling factor of the meter.

2.7.5 Manual Gain Control. - When the function switch is placed in the AM/MAN or CW positions, gain of the RF tuners and the IF amplifiers is controlled by the front-panel RF/IF GAIN control, R7. This potentiometer varies the base bias on Q2 thus changing the over-all gain of the receiver. Transistors Q2, Q3, and Q4 function as they do when the AM/AGC or FM modes are selected. Transistor Q1 is disconnected from the circuit by section S3B of the function switch.

2.8 TYPE 7324 VIDEO AMPLIFIER

Figure 6-5 is the schematic diagram for the type 7324 video amplifier; its reference designation prefix is A5. The module consists of an NPN transistor Q1, dc coupled to Q2, a PNP transistor. These two stages provide the necessary voltage gain to drive complementary symmetry emitter followers Q3 and Q4. The latter two transistors are biased to operate Class B. Negative dc feedback to set the over-all gain of the amplifier is taken at the junction of R8 and R9 and fed to the emitter of Q1. Silicon diodes CR1 and CR2 serve three functions. First, they determine the idling currents of Q3 and Q4. Secondly, they eliminate crossover distortion. And third, they prevent thermal runaway. Since the transistors and diodes are made of the same material, they exhibit the same temperature coefficient of voltage characteristics. A rise in temperature lowers the base-emitter voltage drop of the transistors, tending to make them conduct harder. However, the diode voltage drop decreases by the same amount so that the voltage applied to the bases also decreases, holding the collector current nearly constant. Resistors R6 and R7 are included in the emitter circuits of Q3 and Q4 to provide additional feedback with low input signal levels. These resistors permit an imperfect match between diodes CR1 and CR2 and the base-emitter junctions of Q3 and Q4. With little or no input signal the drop across the resistors is a few-tenths of a volt. Large inputs would cause the drop to become excessive except that CR3 and CR4 become forward biased and limit the drop to approximately 0.6 volt. The low-impedance output of the complementary-symmetry emitter followers is matched to the higher impedance output terminals by means of R12. This resistor has the additional effect of preventing amplifier damage if the output terminal is accidentally shorted to ground. Resistor R1 provides a discharge path to ground for C3 if the amplifier is operated without a dc load. Resistor R10 and capacitor C2 form a frequency sensitive network that rolls off the amplifier response at approximately 1 MHz. Inductor L1 suppresses the 21.4-MHz IF signal, preventing it from appearing at the video output.

2.9 TYPE 7400B AUDIO AMPLIFIER

Figure 6-6 is the schematic diagram for the type 7400B audio amplifier; its reference designation prefix is A6. The audio amplifier is a plug-in module, utilizing three direct coupled transistors, Q1, Q2, and Q3. The first stage is a conventional voltage amplifier in a common emitter configuration. The input signal from the AUDIO GAIN potentiometer, R10, is applied to this stage through capacitor C1 and resistor R1. The second stage is an emitter follower used to match the high output impedance of the first stage to the low input impedance of the third stage, the power amplifier. Paralleled capacitor C2 and resistor R8 couple the signal from Q2 to Q3. This arrangement is used to improve the stability of the amplifier. Resistor R7 provides direct signal feedback from the third to the first stage. Transformer T1 forms the third stage collector load. The audio output is fed to both the front-panel PHONES jack, J13, and to terminal strip TB1 on the rear apron of the receiver.

2.10 TYPE 7917 LO COUPLER

Figure 6-7 is the schematic diagram for the type 7917 local oscillator coupler; its reference designation prefix is A7. This subassembly contains a resistive impedance-matching network consisting of resistors R1, R2, R4, and R5. The coupler is used to connect the local oscillator signals from the low and high band tuners to the LO OUTPUT jack, A7J3, on the rear apron.

2.11 TYPE 7506 CARRIER OPERATED RELAY (Type 906A Only)

The COR circuitry consists of a plug-in etched circuit board containing a COR amplifier and relay driver, and a double-pole, double-throw relay, K2, mounted on the main chassis. Figure 6-11 is the schematic diagram for the circuit board; A11 is its reference designation prefix.

2.11.1 The first two stages of the COR module, Q1 and Q2, form a dc amplifier. The third and fourth stages, Q3 and Q4, are a combination switch, relay driver, and time-delay circuit. Front-panel COR SENSITIVITY control R13 determines the input signal level required to actuate the relay. A negative voltage from the control wiper is applied to the base of Q1 through R1 and R2, cutting the transistor off. This reverse bias must be overcome by the positive-going input signal for the relay to operate. With Q1 cut off, all the other transistors on the module are also cut off. Diode CR1 clamps the base of Q1 to prevent the voltage from ever exceeding -0.6 vdc. Diode CR2 is forward biased from the -24 vdc supply through R6 and R7, thus clamping the emitter of Q1 at -0.6 volts. Hence, the base voltage must reach 0 vdc for Q1 to conduct.

2.11.2 Once Q1 is driven into conduction the negative-going voltage drop at the junction of load resistors R4 and R5 turn on Q2, a PNP transistor. With Q2 conducting the positive-going voltage drop at the junction of R8 and R9 turns on Q3 and Q4. Current now flows through the relay coil and Q4 to ground, causing K2 to actuate. Transistors Q3 and Q4 are connected in the Darlington configuration to obtain the beta multiplication inherent in this circuit. This is done so that variations in transistor beta will not affect the timing of the delay circuit when this feature is used.

2.11.3 With the COR FAST-SLOW switch in the FAST position K2 releases almost immediately after the input signal to Q1 disappears. Placing the switch in the SLOW position isolates C2 from ground through surge-limiting resistor R11 and results in the relay holding for approximately 6 seconds after Q1 cuts off. This delay is provided by C2 in conjunction with CR3 and CR4. At the time Q3 and Q4 conducted to energize K2, C2 discharged to ground through CR4. When the input signal cuts off, the capacitor charges through the resistance of K2's coil, R9 and CR3. This RC time constant, in parallel with the input resistance of the Q3-Q4 combination, determines how long the relay remains activated in the absence of an input signal. It is the charging current for C2 through R9 which develops the base voltage to keep Q3 and Q4 conducting. Once the charging current has decreased to the point that the voltage developed across R9 is insufficient to keep the base-emitter junctions of the two transistors forward biased, they cut off and K2 is de-energized. Capacitor C2 holds its charge until Q3 and Q4 again conduct as the result of an input signal of sufficient amplitude to the COR module to turn on Q1. When this occurs the collector voltage of Q3 and Q4 suddenly drops. Since the voltage across C2 cannot change instantaneously, the end connected at the junction of CR3 and CR4 swings below ground potential. This forward biases CR4 so that C2 discharges through the diode.

2.12 TYPE 8304 CRYSTAL MARKER OSCILLATOR

Figure 6-12 is the schematic diagram for the type 8304 crystal marker oscillator; its reference designation prefix is A12. This subassembly contains two conventional, crystal-controlled, Colpitts oscillator circuits. The circuit containing Q1 generates the 1-MHz markers and the circuit containing Q2 generates the 5-MHz markers. Selection of the desired marker is by means of the CMO switch, S7, which is mounted on the front panel. One section of this switch, S7W, applies +24 volts to the oscillator selected, energizing the circuit. The other switch section, S7X, applies -12 volts through the AGC line, to the grids of the first RF amplifiers in both tuners. This voltage biases the respective RF stages into cut off and permits the marker signal to be heard without background signals. The high-order harmonic output from the CMO circuits is possible through the use of a step recovery diode, CR1, in the output circuit. This diode causes harmonic generation at frequencies well into the VHF and UHF spectrum without loading the oscillator circuit. Capacitors C4 and C6 couple the signals from the emitters of the respective oscillators to the output network and, in addition, form a part of a filter (in conjunction with L1) to prevent the harmonics generated in the load from reaching the oscillator circuits and affecting the fundamental output frequency. Resistor R5 provides a dc return path for CR1 to permit discharge of the diode when the forward bias is removed. The marker oscillator signal is fed to jack A2J5 on the high-band tuner. This connector is wired in parallel with jack A2J4 which, in turn, feeds the signal to input jack A1J5 on the low-band tuner.

2.13 POWER SUPPLY

The primary power required is 115/230 vac, 50-400 Hz. The path for the ac input (see Figure 6-13) is from power plug P1, through filter capacitors C1 and C2, line fuse F1 and power switch S1 to the two primary windings of power transformer T1. Switch S5 connects the two primary windings in parallel for 115 volt operation and in series for 230 volt operation. Fuse F2 provides additional overload protection when the latter input power is selected. The power transformer has four secondary windings. One of these, 5-6, provides high voltage for rectifiers CR2 and CR3 which are connected in a full wave configuration. The pulsating dc output from these diodes is filtered by dual-section capacitor C3 and resistor R1. The +160 vdc from this network is the B+ voltage used to operate the vacuum tubes in the high and low band RF tuners. Another winding, 7-8, supplies the ac input power for the -24 volt and +24 volt power supply regulator modules. The ac voltage from this winding is also rectified by diodes CR4 and CR5, filtered by capacitor C4, and used to operate the coaxial antenna relay, K1. A third winding, 9-10, provides the ac input power for the +12 volt power supply regulator. The fourth winding, 11-12, supplies 6.3 vac to operate the dial lamps located in the low and high band dial escutcheons.

2.13.1 Type 7685 +24 Volt Power Supply Regulator. - The schematic diagram for the +24 vdc power supply is shown in Figure 6-8; its reference designation prefix is A8. The ac input from the power transformer T1 is rectified by silicon diodes CR1 and CR2 which are connected in a full-wave configuration. Initial filtering of the pulsating dc output is by electrolytic capacitor C1. Transistor Q1 functions as a series regulator whose conduction is controlled by Q2. Zener diode CR3 provides a fixed emitter voltage reference for Q2. Resistors R7, R8, and R9 form a sampling network through which control transistor Q2 can sense the output voltage. If, for example, the output voltage from the module tends to rise, the base of Q2 goes more positive, causing it to conduct harder. This increases the voltage drop across R1 and R2 so that the base of Q1 becomes less positive, and the conduction through the transistor decreases. As a result, the voltage output from the module drops to its nominal value. A decrease in the output voltage has the opposite effect, with the base voltage of Q2 decreasing, so that it conducts less. The voltage drop across R1 and R2 now decreases, causing the base voltage of Q1 to go more positive. The conduction of the regulator transistor will not increase so that the output voltage rises. Capacitor C2 provides additional filtering of the input voltage to minimize ripple on the base of Q1 to prevent it from appearing in the output of the regulator. Resistor R3 connects the base of the control transistor to the input side of the regulator so that any remaining voltage fluctuations at this point can be sensed and compensated for by the gain of Q2.

2.13.2 Type 7670 -24 Volt Power Supply Regulator. - Figure 6-9 is the schematic diagram for this module; its reference designation prefix is A9. The operation of this module is identical to that of module A8. The polarities of the diodes, transistors, and capacitors have been reversed to supply the negative voltage. In addition, a type 2N2869 transistor is used as the regulator and a type 2N526 transistor is used as the control element.

2.13.3 Type 7688 +12 Volt Power Supply Regulator. - The schematic diagram for this module is Figure 6-10; its reference designation prefix is A10. The operation of this module is identical to the two previous subassemblies. The ac input power, however, is lower for this regulator.

SECTION III

INSTALLATION AND OPERATION

3.1 INSTALLATION

The types 904A and 906A Receivers are designed for mounting in a standard 19-inch rack. The units will occupy 3.5 inches of vertical space and extend 16 inches back into the rack. If used in a mobile installation, some means should be devised to support the sides and/or rear of the equipment. A brace extending along the sides from the front panel to the rear apron is definitely preferred. Do not rely solely on the front-panel mounting hardware to support the unit.

3.1.1 Power Connection. - Plug the power cord into a 115/230 vac, 50-400 Hz source. The third pin of the power cord grounds the unit. If a three-pin receptacle is not available, use the adapter provided. Before energizing the unit insure that the 115/230 vac input voltage selector switch, S5, is in the proper position for the voltage being used.

3.1.2 Antenna Connection. - The receivers are shipped from the factory arranged for single-antenna operation. For this type of operation, connect the input to RF INPUT jack, J1. If separate antennas are used for each band, connect the 30-90-MHz antenna to jack J1, and connect the 60-300-MHz antenna to AUX INPUT jack, J3. Then disconnect plug P6 from jack J7 and reconnect it to the BNC connector (J4) at the rear of the AUX INPUT jack.

3.1.3 IF Output. - The 21.4-MHz IF signal is available at the rear-apron IF OUTPUT jack, J11. This jack is a type-BNC connector.

3.1.4 Signal Monitor Output. - Connect the signal monitor input (if one is used) to the SM OUTPUT jack, J10, using 50-ohm coaxial cable and mating BNC plugs.

3.1.5 LO Output. - The output from the local oscillator in operation is available at jack A7J3, a type-N connector.

3.1.6 Audio Output. - The 600-ohm audio output is available at terminals 5 and 6 of the terminal strip marked TB1 AUDIO on the rear apron and at the PHONES jack on the front panel.

3.1.7 Video Output. - The video amplifier provides an output level of 5V, rms across a 10k-ohm load. This output is available at the VIDEO OUTPUT jack J12, on the rear apron.

3.2 OPERATION

The controls and indicators found on the front panel of the type 904A Receiver are described in the following paragraphs. These controls and indicators are shown in Figure 1-1.

3.2.1 Audio Gain Control - Power On-Off Switch. - The AUDIO GAIN control varies the amplitude of the audio signal present at the rear-apron terminal board and front-panel PHONES jack. This control also turns the power on when rotated clockwise from its extremely counterclockwise PWR OFF position.

3.2.2 RF/IF Gain Control. - The gain of the receiver is controlled by the RF/IF GAIN control when AM/MAN or CW modes of operation are selected.

3.2.3 Video Gain Control. - The amplitude of the video signal present at jack J12 may be varied by the VIDEO GAIN control.

3.2.4 Band Switch. - Place the BAND switch in the LOW (30-90 MHz) or HIGH (60-300 MHz) position depending on the frequency of the carrier to be received. A lamp in the dial escutcheon for the selected tuner will light indicating the band in use.

3.2.5 BFO Tuning Control. - The BFO TUNING control is used to vary the pitch of the CW-audio signal when the CW mode of operation is selected. Set the control at midrange when tuning; the pitch can then be adjusted as desired.

3.2.6 Bandwidth Switch. - The BANDWIDTH switch sets the bandwidth of the IF strip at either 20 kHz or 300 kHz. When searching for a signal, it is advisable to use the wider bandwidth.

3.2.7 Function Switch. - Set the function switch in the FM, AM/AGC, AM/MAN, or CW position before the receiver is tuned. When the AM/MAN or CW modes are selected, the gain of the receiver is controlled by the RF/IF GAIN control. The gain of the receiver is controlled by internal circuitry when the AM/AGC or FM modes are selected.

3.2.8 COR Sensitivity Control. - The COR SENSITIVITY control is used to obtain COR operation at the desired signal level. Clockwise rotation of the control increases the sensitivity. (Types 906A and 906A-1 only.)

3.2.9 COR Delay Switch. - The COR DELAY toggle switch serves to control the length of time the COR function remains operated after the activating signal disappears. In the FAST mode, the COR function remains on for approximately 0.5 seconds; in the SLOW position, the delay is approximately 6 seconds. The COR lamp, when illuminated, indicates a carrier is being received. (Types 906A and 906A-1 only.)

3.2.10 Signal Strength Meter. - The SIGNAL STRENGTH meter indicates the relative amplitude of an incoming signal. The meter is not calibrated in any specific units.

3.2.11 Tuning Meter. - The TUNING meter indicates the position of an incoming AM or FM signal with respect to the center of the IF bandpass.

SECTION IV

MAINTENANCE

4.1 GENERAL

The types 904A and 906A Receivers are conservatively designed to give trouble-free operation. The receivers present no special maintenance problems, and normally require no care beyond being kept clean. Should trouble occur, down time will be minimized if the maintenance technician is thoroughly familiar with Section II of this manual in which the circuits are described before beginning the troubleshooting. Field maintenance should be confined to cleaning and the replacement of fuses and plug-in modules. All other maintenance should be carried out in a well-equipped shop and performed only by experienced personnel.

4.2 PLUG-IN MODULES REMOVAL

The plug-in modules can be easily removed by simply pulling them upward from the receptacles into which they are fitted. The numbers on the module pins correspond to the numbers indicated on the schematic diagrams at the points where the connecting leads pass through the lines outlining each module. Modules having different functions are keyed to prevent them from being damaged as a result of being placed in the wrong receptacle. All plug-in modules have their type numbers etched on the back of the cards. By referring to the schematic diagrams their reference designation prefixes can be found, and thus their proper location in the unit.

4.3 TROUBLESHOOTING

Initial troubleshooting should be directed toward localizing the trouble to a specific section of the receiver. In the case of the plug-in modules, a quick check can be made by plugging in a spare module known to be good. If these substitutions do not cure the trouble, then the audio, video, COR, and AGC amplifiers, and the +24, -24, and +12 Vdc power supplies can be eliminated from consideration. This leaves a series chain consisting of subassemblies A1, A2, and A3 as primary suspects. To check out the chain feed a signal within the receiver's tuning range into the antenna input, tune the receiver to the frequency, and trace the signal through the subassemblies using a wideband oscilloscope. Once the malfunctioning stage is known, voltage and resistance measurements will usually pin point the defective part. Typical transistor and module pin voltages are given in Table 4-1.

4.4 MAINTENANCE OF GEAR TRAIN ASSEMBLY

Figure 4-1 is an exploded view of one of the two gear train assemblies used in the receiver. These assemblies for the low-band tuner and for the high-band tuner are identical except for the dial tape used; therefore, the maintenance discussed below will be in terms of one unit only. Note that in some steps it will be necessary to perform the same operation on both assemblies to accomplish the desired result.

4.4.1 Dial Lamp Replacement. - To replace a burned out dial lamp proceed as follows:

(1) Remove the two black screws (no. 45 on Figure 4-1) that hold the dial escutcheon (no. 52). Remove the escutcheon.

(2) Remove the light bar by first removing the two small retaining screws.

(3) Gently pull the light bar and printed circuit light board from the gear train.

(4) Rotate the light board up and detach it from the light bar by removing screw 49.

(5) Unsolder burned out lamp and replace with Chicago Miniature CM8-725, 5 volt, incandescent lamp.

(6) Replace light board and light bar by reversing steps (1) through (4) above.

4.4.2 Alignment of Dial Tape. - A calibrated steel tape is used as the tuning dial. It is geared to the inductuner in such a manner that it is unlikely that it will ever get out of position. However, to check the alignment or to mechanically realign the dial, follow the steps given below:

(1) Turn the tuning knob counterclockwise until rotation stops.

(2) The reference mark to the right of the arrow at the low frequency end of the dial should line up with the dial pointer. If not, proceed with steps (3) through (5).

(3) Loosen Allen-head setscrews on gear no. 23.

(4) By hand, turn dial tape to align reference mark with pointer.

(5) Tighten setscrews on gear no. 23. Tune from one end of the dial to the other to make sure that the backlash between this gear and gear no. 8 does not bind the assembly.

4.4.3 Removal and Disassembly of Gear Trains. - The gear train assemblies are removed from the unit and disassembled by following the steps given below. With the gear train mechanism disassembled, parts may be replaced individually. However, it is recommended that the assembly be replaced as a unit.

(1) Unsolder all leads connected to the six feedthrough capacitors on the RF tuner.

(2) Unsolder the dial lamp wires from the printed circuit light board after following the instructions given in paragraph 4.4.1, steps (1) through (4).

(3) Remove the tuning knob from the shaft of the unit to be removed.

(4) Remove the six screws holding the RF tuner to the main chassis. Support the tuner with one hand while loosening the screws to prevent the unit from falling and causing damage to the tuning shaft. From the bottom of the receiver, remove the tuner and gear train assembly.

(5) The gear train may now be disassembled using Figure 4-1 as a guide.

4.5 ALIGNMENT PROCEDURES

4.5.1 General. - The alignment procedures given here are suitable when making periodic performance checks, or when making adjustments after replacing transistors or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the alignment of that circuit. Those controls not mentioned in any one series of steps may be left in any position. The alignment of this receiver should be performed only with suitable equipments by technicians thoroughly familiar with the receiver. If the limits and tolerances specified in the following procedures cannot be obtained, then a factory alignment is necessary.

4.5.2 Equipments Required. - The following equipments or their equivalents are required to perform the complete receiver alignment:

(1) Sweep Generator, Telonic Type SM-2000 with internal 21.4-MHz marker

(2) Sweep Generator Plug-In Head, Telonic Type LH-2

(3) Sweep Generator Plug-In Head, Telonic Type SH-1

(4) Signal Generator, Hewlett Packard Type 608D

(5) Oscilloscope, Tektronix Type 503

(6) Detector, 50-ohm, Telonic Type XD-3A

(7) Assorted cables, connectors and alignment tools

4.6 20/300-kHz IF ALIGNMENT

The alignment procedure for the 20/300-kHz IF amplifier is given in the following paragraphs.

4.6.1 300-kHz IF Alignment. - Proceed as follows:

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

(2) Place receiver BANDWIDTH switch in 300-kHz position, function switch to AM/MAN, and rotate RF/IF GAIN fully clockwise.

(3) Set output frequency of sweep generator to 21.4 MHz; turn internal 21.4-MHz marker on.

(4) Adjust sweep generator and oscilloscope controls to display a response curve.

(5) Adjust A3T1, A3L10, A3L9, A3L7, A3L6, A3L2, and A3L1, in the order given, for a maximum amplitude, symmetrical response centered about the 21.4-MHz marker. A typical response is shown in Figure 4-3.

4.6.2 20-kHz IF Alignment. - Proceed as follows:

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

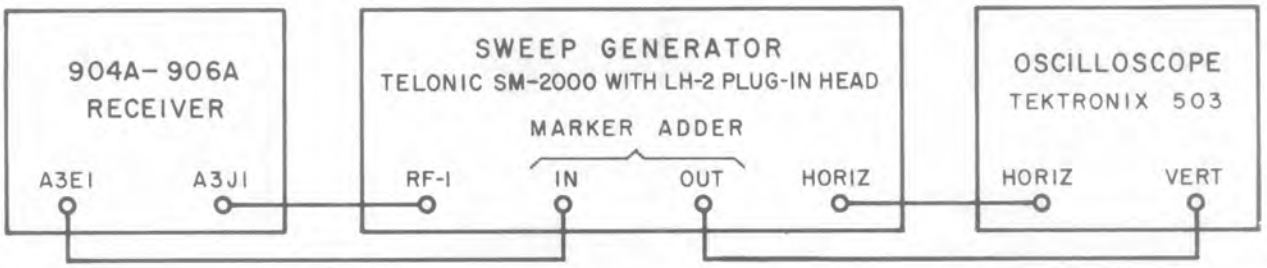


Figure 4-2. Equipment Setup, 20/300-kHz IF Alignment

(2) Set receiver BANDWIDTH switch to 20-kHz position, function switch to AM/MAN, and rotate RF/IF GAIN fully clockwise.

(3) Set output frequency of sweep generator to 21.4 MHz.

(4) Adjust oscilloscope and sweep generator controls to display a response curve

(5) Adjust A3L4 for a maximum amplitude symmetrical response similar to that shown in Figure 4-4.

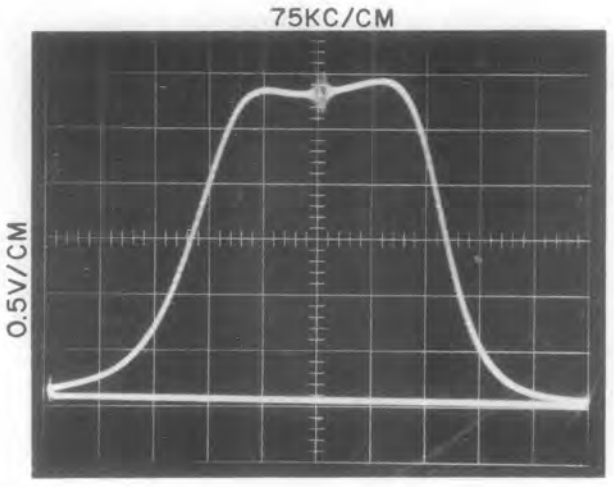


Figure 4-3. Typical Response Curve, 300-kHz IF Alignment

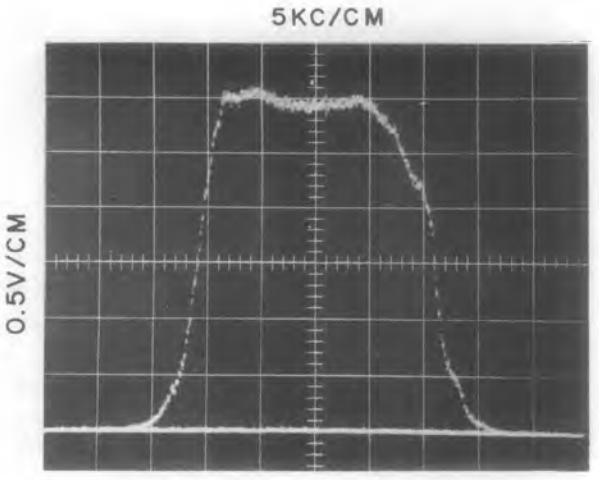


Figure 4-4. Typical Response Curve, 20-kHz IF Alignment

4.6.3 20/300-kHz FM Discriminator Alignment. - Proceed as follows:

(1) Remove the small bottom cover from the IF strip.

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

(3) Set output of sweep generator to 21.4 MHz; turn internal 21.4-MHz marker on.

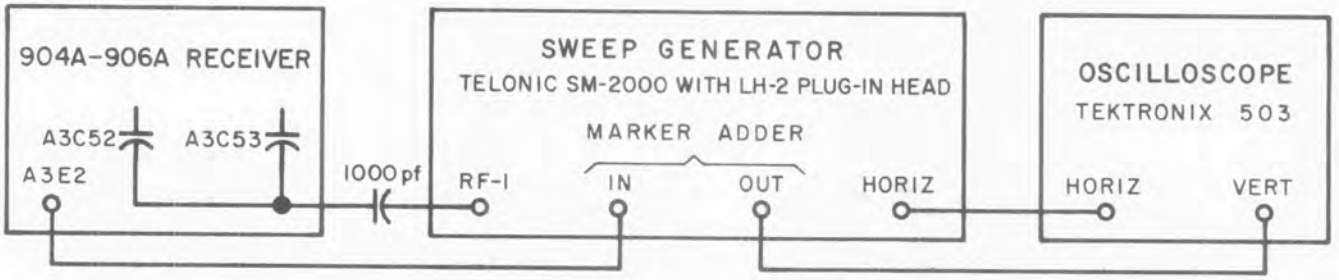


Figure 4-5. Equipment Setup, 20/300-kHz FM Discriminator Alignment

(4) Adjust sweep generator and oscilloscope controls to display an "S" response curve.

(5) Adjust A3L13 for amplitude symmetry and A3T1 for zero crossing of the "S" curve on the sweep trace base line. A typical response is shown in Figure 4-6.

(6) Replace the bottom cover.

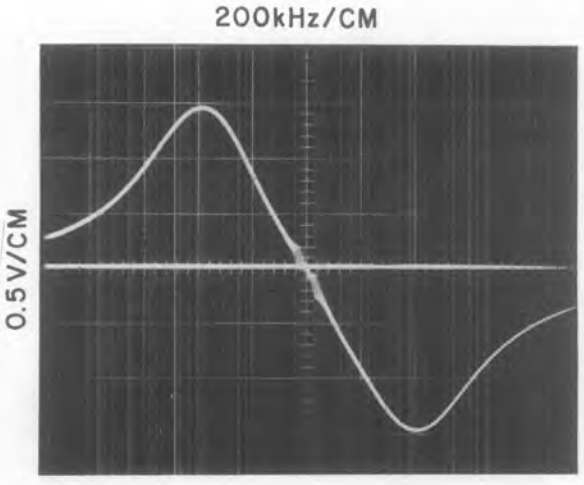


Figure 4-6. Typical Response Curve, 20/300-kHz FM Discriminator Alignment

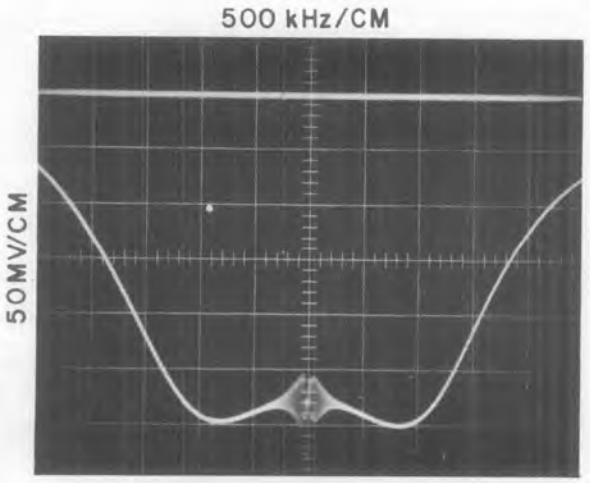


Figure 4-7. Typical Response Curve, 30-90-MHz Tuner Alignment (90 MHz)

4.7 30-90-MHz RF TUNER ALIGNMENT

The alignment procedure for the 30-90-MHz RF tuner is given in the following paragraphs.

4.7.1 RF Interstage Alignment. - Proceed as follows:

(1) Set receiver BAND switch to LOW, function switch to AM/MAN and BANDWIDTH switch to 300 kHz; tune receiver to 36 MHz.

(2) Connect equipment as shown in Figure 4-8.

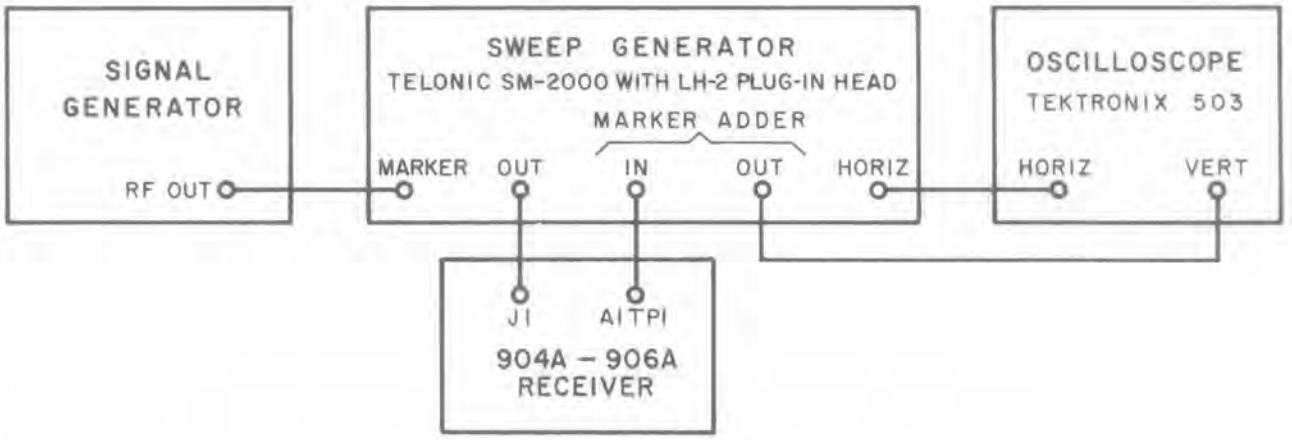


Figure 4-8. Equipment Setup, 30-90-MHz RF Tuner Alignment

(3) Set output frequencies of sweep and signal generators to 36 MHz.

(4) Remove local oscillator tube, A1V4.

(5) Adjust oscilloscope and sweep generator controls to display a response curve.

(6) Adjust A1C4, A1C16, and A1C25 for a maximum amplitude, symmetrical response centered about the 36-MHz marker.

(7) Check the response at 50 MHz, 70 MHz, and 90 MHz. The response shape will vary but the marker signal should remain on or between the peaks of the response curve. A typical response at 90 MHz is shown in Figure 4-7.

4.7.2 Local Oscillator Alignment. - Proceed as follows:

(1) Connect output of HP-608D signal generator to RF input jack J1; set output frequency to 36 MHz, CW mode.

(2) Set receiver BAND switch to LOW; function switch to AM/AGC.

(3) Tune receiver to 36 MHz using the TUNING meter to indicate the proper setting. The receiver dial should indicate 36 MHz ±1%.

(4) Repeat steps (1) and (3) for 50 MHz, 70 MHz, and 90 MHz.

(5) If any of the dial indications exceed the 1% tolerance, adjust A1C29 until the dial reading is within the specified limits. After any adjustment of A1C29 recheck calibration at all test frequencies.

4.7.3 IF Output Network Adjustment. - Proceed as follows:

(1) Remove large bottom cover from tuner.

(2) Connect sweep generator output through a 1000-pF capacitor to pin 4 of A1V3.

(3) Connect output jack A1J3 on tuner through a 50-ohm detector to MARKER ADDER IN on sweep generator; connect oscilloscope horizontal input to horizontal output on sweep generator; connect vertical scope input to MARKER ADDER OUT on sweep generator.

(4) Place receiver function switch in AM/MAN position and rotate RF/IF GAIN control fully counterclockwise.

(5) Set output frequency of sweep generator to 21.4 MHz and turn internal 21.4-MHz marker on.

(6) Adjust sweep generator and oscilloscope controls to display a response curve.

(7) Adjust A1L11 for a maximum amplitude, symmetrical response centered about the 21.4-MHz marker.

4.8 60-300-MHz RF TUNER ALIGNMENT

The alignment procedure for the 60-300-MHz RF tuner is given in the following paragraphs.

4.8.1 RF Interstage Alignment. - Proceed as follows:

(1) Set receiver BAND switch to HIGH and tune receiver to 100 MHz; rotate RF/IF GAIN fully clockwise; set function switch to AM/MAN and BANDWIDTH to 300 kHz; remove local oscillator tube, A2V4.

(2) Connect equipment as shown in Figure 4-8 except that sweep generator MARKER ADDER IN is connected to A2TP1.

(3) Install SH-1 plug-in head in sweep generator; set output frequency of sweep generator and signal generator to 100 MHz; turn internal 21.4-MHz marker off.

(4) Adjust oscilloscope and sweep generator controls to display a response curve.

(5) Adjust A2C11, A2C15, and A2C18 for a maximum amplitude, overcoupled response. The 100-MHz marker should appear between the center and low frequency side of the response curve. A typical response at 100 MHz is shown in Figure 4-9.

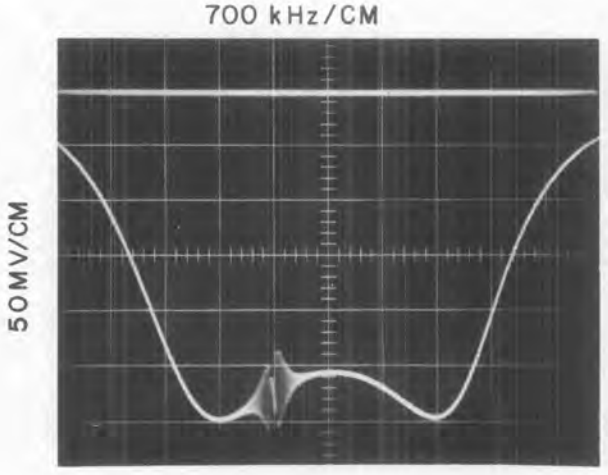


Figure 4-9. Typical Response Curve, 60-300-MHz Tuner Alignment (100 MHz)

(6) Check the response at 60 MHz and 300 MHz. The response shape will vary but the marker should remain on or between the peaks of the response curve.

(7) Replace A2V4.

4.8.2 Local Oscillator Adjustment. - Proceed as follows:

(1) Connect RF output from HP 608D to input jack J1 on the rear apron; set output frequency to 100 MHz, CW mode.

(2) Set receiver's BANDWIDTH switch to 300 kHz and function switch to AM/AGC.

(3) Tune receiver to 100 MHz using TUNING meter to indicate the proper setting.

(4) The receiver dial should indicate 100 MHz ±1%.

(5) Repeat steps (1) through (3) for 60 MHz and 300 MHz.

(6) If any of the tuning dial indications exceed the 1% tolerance, adjust A2C29 until the dial reading is within the specified limits. After any adjustment of A2C29 recheck calibration at all test frequencies.

Table 4-1. Types 904A, 906A Receivers, Tube, Transistor and Module Pin Voltages

Ref. Desig.	Type	Pin Number					Plate Cap
		2	4	8	10	12	
A1V1[1]	6CW4	74.0	0.18	0.56	0	6.6 vac	
A1V2[1]	8058	0	0	0.52	0	6.6 vac	110.0
A1V3[1]	7587	20.0	-1.0[3]	0	0	6.6 vac	97.0
A1V4[1]	6CW4	98.0	10.5[3,4]	14.0[3,4]	0	6.6 vac	
A2V1[2]	8058	0	-0.25	0	0	6.6 vac	93.0
A2V2[2]	8058	0	0	0.4	0	6.6 vac	96.0
A2V3[2]	7587	20.0	-1.4[3]	0	0	6.6 vac	100.0
A2V4[2]	6CW4	60.0	8.0[3,4]	9.8[3,4]	0	6.6 vac	

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A3Q1	2N3478	1.75	2.5	8.4
A3Q2[5]	2N3478	1.7	2.75	7.0
A3Q3	2N3478	2.15	2.85	8.0
A3Q4[5]	2N3478	2.5	3.25	7.4
A3Q5	2N3478	1.3	2.05	8.5
A3Q6	2N3478	2.35	3.1	10.8
A3Q7	2N929	0.9	1.5	11.2
A3Q8	2N929	0.88	1.45	11.2
A3Q9	2N2270	0.36	0.88	11.2
A3A1Q1[6]	2N706	17.0	16.0	23.0
A3A2Q1[7]	2N706	2.45	3.05	10.7
A3A2Q2[7]	2N706	2.45	3.05	10.6
A3A2Q3[7]	2N706	2.75	2.9	10.8
A3A2Q4[7]	2N706	2.75	3.1	10.7
A12Q1[8]	2N706	17.0	16.0	23.0
A12Q2[8]	2N706	17.0	16.0	23.0

Video Amplifier, A5

Pin Number	1	2	3	14
Voltage Reading	0.42	24.0	0	0

Table 4-1

Audio Amplifier, A6

Pin Number	2	3	4	11	13
Voltage Reading	0	0.42	24.0	0	0

+24-vdc Regulated Power Supply, A8

Pin Number	3	4	14	16
Voltage Reading	26 Vac	26 Vac	24.0	0

-24-vdc Regulated Power Supply, A9

Pin Number	3	4	14	16
Voltage Reading	26 Vac	26 Vac	-24.0	0

+12-vdc Regulated Power Supply, A10

Pin Number	1	2	13	16
Voltage Reading	14.5 vac	14.5 vac	11.2	0

Carrier Operated Relay A11 (906A Only)

Pin Number	3	4	5	6	7	10
Voltage Reading	0	23.2	23.2	-22.3	-0.55	-22.3

Test Conditions: All voltages are dc with respect to chassis unless otherwise indicated. Readings taken with RCA WV-98B VTVM with 115 vac applied to receiver. Control settings as follows: AUDIO GAIN, VIDEO GAIN, RF/IF GAIN, and BFO TUNING controls max cw; BANDWIDTH switch in 300 KC position; function switch in AM/AGC; no signal input.

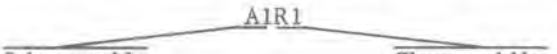
Notes:
(1) BAND switch in LOW position.
(2) BAND switch in HIGH position.
(3) Reading may vary slightly with tuning.
(4) A 1-megohm resistor used in series with the VTVM probe.
(5) BANDWIDTH switch in 20 KC position.
(6) Function switch in CW position.
(7) Function switch in FM position.
(8) CMO switch in position of oscillator under test.

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
01121	Allen-Bradley Company 136 West Greenfield Avenue Milwaukee, Wisconsin
01281	TRW Semiconductors, Inc. Lawndale, California
02114	Ferroxcube Corporation of America Saugerties, New York
04013	Taurus Corporation 8 Coryell Street Lambertville, New Jersey
05820	Wakefield Engineering, Inc. 139 Foundry Street Wakefield, Massachusetts
07688	Joint Electron Device Engineering Council Washington, D. C.
14632	Communication Electronics, Inc. 6006 Executive Boulevard Rockville, Maryland
15605	Cutler-Hammer, Inc. 321 North 12th Street Milwaukee, Wisconsin
21604	Buckeye Stamping Company 555 Marion Road Columbus, Ohio
28480	H-P Associates 620 Page Mill Road Palo Alto, California
42190	The Muter Company 1255 South Michigan Avenue Chicago, Illinois
56289	Sprague Electric Company 91 Marshall Street North Adams, Massachusetts
71279	Cambridge Thermionic Corporation 455 Concord Avenue Cambridge, Massachusetts
71400	Bussman Manufacturing Company University at Jefferson Street St. Louis, Missouri

Vendor Code	Name and Address
71700	Cornish Wire Company 50 Church Street New York, New York
71744	Chicago Miniature Lamp Works 1500 North Ogden Avenue Chicago, Illinois
71785	Cinch-Jones Manufacturing Company 1026 South Homan Avenue Chicago, Illinois
72136	Electro Motive Manufacturing Company South Park and John Streets Willimantic, Connecticut
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania
73899	J.F.D. Electronics Corporation 6101 16th Avenue Brooklyn, New York
74306	Piezo Crystal Company 265 East Pomfret Street Carlisle, Pennsylvania
74868	Amphenol RF Division 33 East Franklin Street Danbury, Connecticut
75915	Littelfuse, Incorporated 1865 Miner Street Des Plaines, Illinois
78277	Sigma Instruments, Inc. 70 Pearl Street South Braintree, Massachusetts
81349	Military Specifications Promulgated by Standardization Division Directorate of Logistic Services DSA, Washington, D. C.
82389	Switchcraft, Incorporated 5555 North Elston Avenue Chicago, Illinois
91418	Radio Materials Corporation 4242 West Bryn Mawr Avenue Chicago, Illinois
91662	Elco Corporation M Street Below Erie Avenue Philadelphia, Pennsylvania
95121	Quality Components, Inc. St. Marys, Pennsylvania
99848	Wilco Corporation 546 Drover Street Indianapolis, Indiana

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 Type 904A Receiver, Main Chassis

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
A1	30-90-MHz RF TUNER	1	71119	14632
A2	60-300-MHz RF TUNER	1	71120	14632
A3	20/300-kHz BW IF AMPLIFIER	1	72145	14632
A4	AGC AMPLIFIER	1	7830	14632
A5	VIDEO AMPLIFIER	1	7324	14632
A6	AUDIO AMPLIFIER	1	7400B	14632
A7	L. O. COUPLER	1	7917	14632
A8	+24V POWER SUPPLY REGULATOR	1	7685	14632
A9	-24V POWER SUPPLY REGULATOR	1	7670/1	14632
A10	+12V POWER SUPPLY REGULATOR	1	7688	14632
A11	NOT USED			
A12	CRYSTAL MARKER OSCILLATOR	1	8304	14632
C1	CAPACITOR, PAPER, THRU-PASS: 0.01 μF, 600V	2	102P515	56289
C2	Same as C1			
C3	CAPACITOR, ELECTROLYTIC: 40/40 μF, 250V	1	TVL-2520	56289
C4	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	150D105X9035A2	56289
C5	CAPACITOR, CERAMIC, DISC: 0.005 μF, 20%, 500V	1	SM(.005μF, 20%)	91418
CP1	ADAPTER, BNC-BNC	1	UG-492A/U	81349
CR1	DIODE	1	1N979B	07688
CR2	DIODE	2	1N3255	07688
CR3	Same as CR2			
CR4	DIODE	2	1N3253	07688
CR5	Same as CR4			
CR6	DIODE	1	1N759A	07688
DS1	LAMP, INCANDESCENT: .06A. 5V	6	CM8-683	71744
DS2	Same as DS1			
DS3	Same as DS1			
DS4	Same as DS1			
DS5	Same as DS1			
DS6	Same as DS1			
F1	FUSE, 3AG, Slow-Blow: 1/4A	1	MDL-1/4	71400
F2	FUSE, 3AG, Slow-Blow: 1/8A	1	MDL-1/8	71400
J1	CONNECTOR, JACK, BNC, Part of W1	1	UG-909B/U	81349
J2	NOT USED			

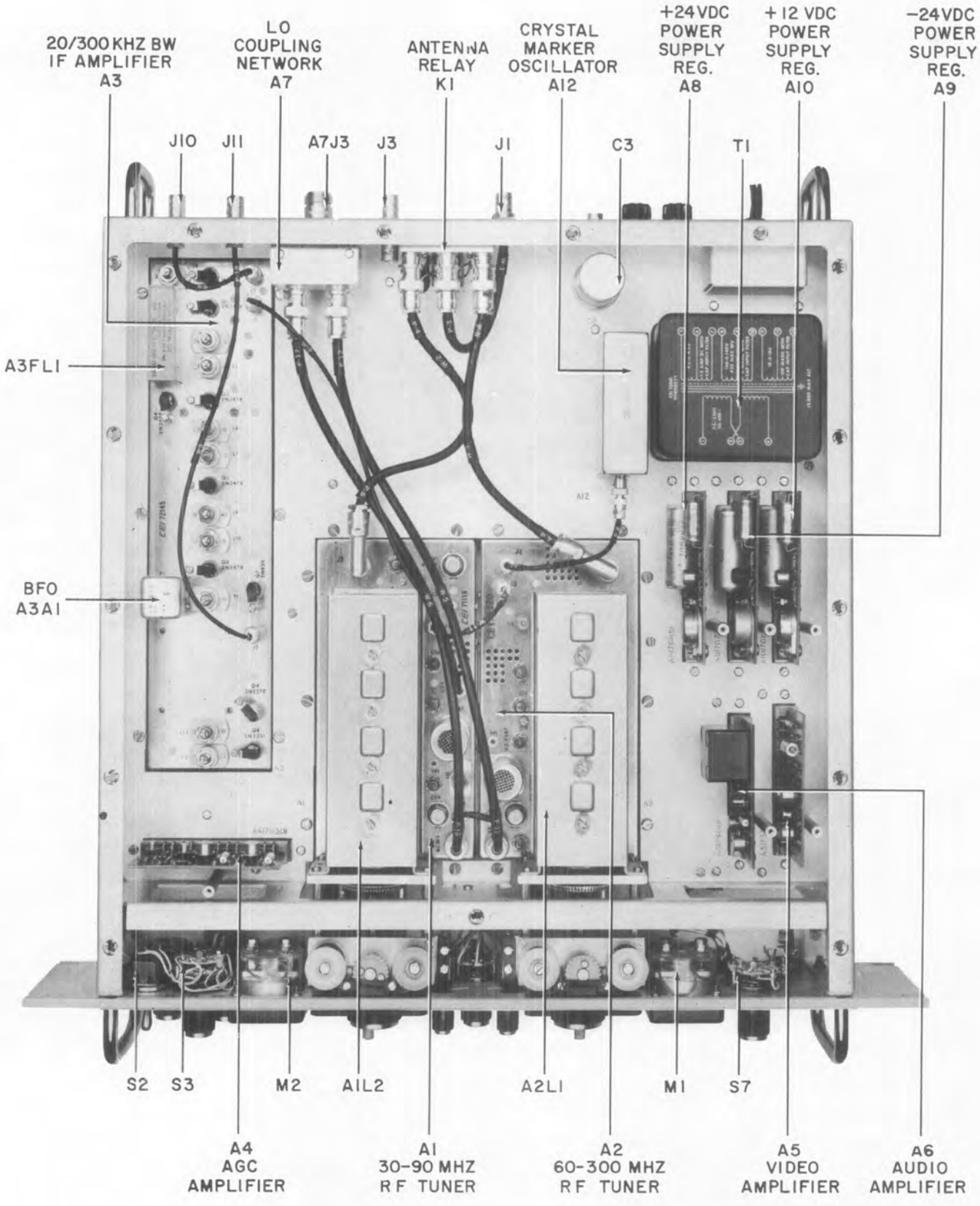


Figure 5-1. Type 904A Receiver, Top View

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
J3	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J4	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J5	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J6	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J7	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J8	NOT USED			
J9	NOT USED			
J10	CONNECTOR, JACK, BNC, Part of W8	3	17825	74868
J11	Same as J10, Part of W9			
J12	Same as J10			
J13	CONNECTOR, JACK, PHONE	1	L-11	82389
K1	RELAY	1	318-010382-3	74868
M1	METER, SIGNAL STRENGTH	1	1632	14632
M2	METER, TUNING	1	1633	14632
P1	CONNECTOR, PLUG AND POWER CORD	1	01753-001	71700
P2	CONNECTOR, PLUG, MB, Part of W10	10	44950	74868
P3	CONNECTOR, PLUG, BNC, Part of W1	7	UG-88/U	81349
P4	Same as P3, Part of W2			
P5	CONNECTOR, PLUG, BNC, Part of W2	2	UG-913A/U	81349
P6	Same as P3, Part of W3			
P7	Same as P5, Part of W3			
P8	Same as P2, Part of W10			
P9	Same as P2, Part of W4			
P10	Same as P2, Part of W4			
P11	Same as P3, Part of W5			
P12	Same as P3, Part of W5			
P13	Same as P2, Part of W7			
P14	Same as P2, Part of W7			
P15	Same as P2, Part of W8			
P16	Same as P3, Part of W6			
P17	Same as P3, Part of W6			
P18	Same as P2, Part of W9			
P19	Same as P2, Part of W11			
P20	Same as P2, Part of W11			
R1	RESISTOR, FIXED, COMPOSITION: 1kΩ, 5%, 2W	1	HB1025	01121

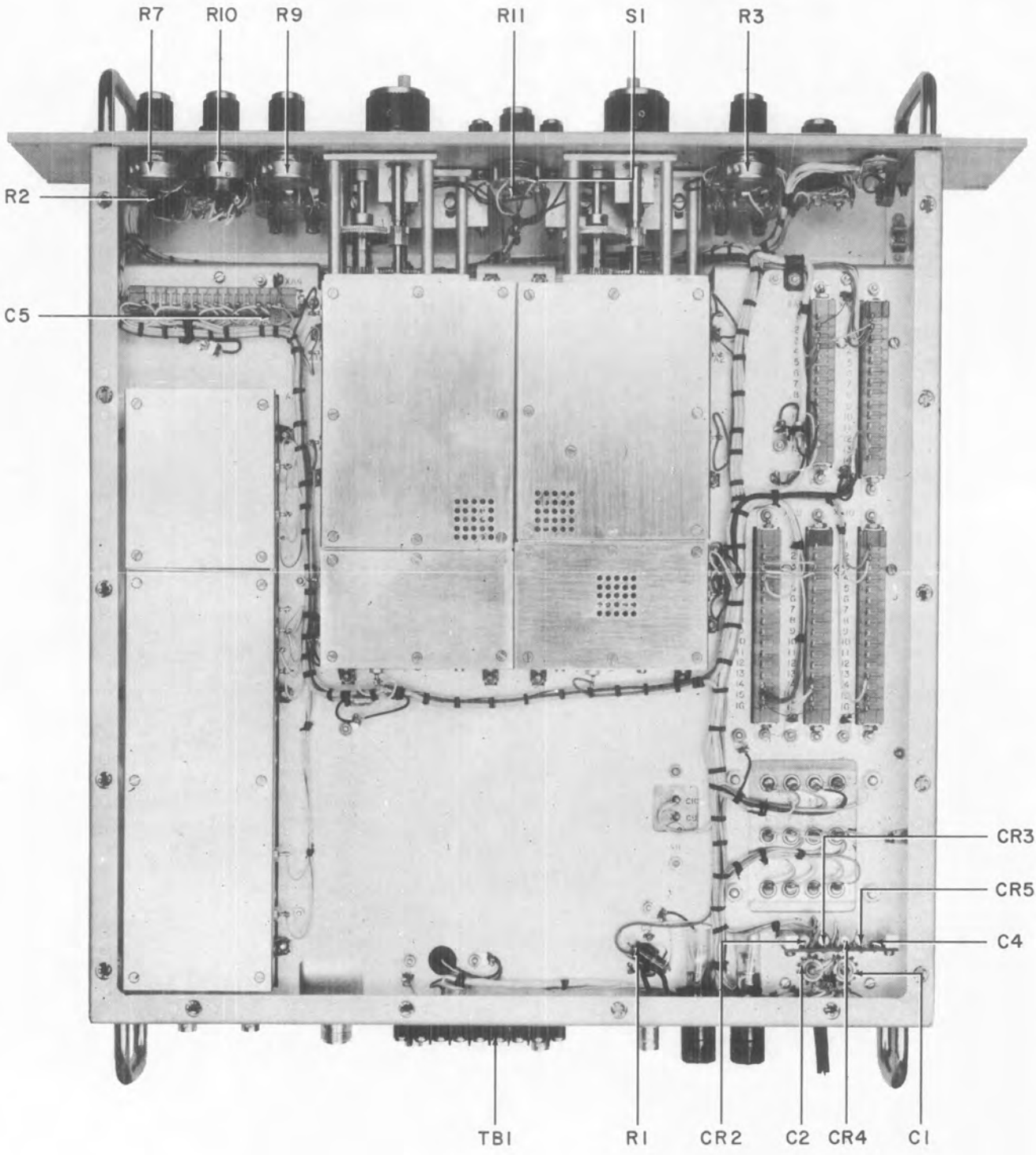


Figure 5-2. Type 904A Receiver, Bottom View

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R2	RESISTOR, FIXED, COMPOSITION: 8.2kΩ, 5%, 1/4W	2	CB8225	01121
R3	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	RV4NAYSD104A	81349
R4	RESISTOR, FIXED, COMPOSITION: 51kΩ, 5%, 1/4W	2	CB5135	01121
R5	RESISTOR, FIXED, COMPOSITION: 75kΩ, 5%, 1/2W	1	EB7535	01121
R6	Same as R4			
R7	RESISTOR, VARIABLE, COMPOSITION: 25kΩ, 10%, 2W	1	RV4NAYSD253A	81349
R8	Same as R2			
R9	RESISTOR, VARIABLE, COMPOSITION: 10kΩ, 10%, 2W	1	RV4NAYSD103A	81349
R10	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	JS1N056S104UA	01121
R11	RESISTOR, FIXED, COMPOSITION: 6.8Ω, 5%, 1/2W	1	EB68G5	01121
R12	RESISTOR, FIXED, COMPOSITION: 6.2kΩ, 5%, 1/4W	2	CB6225	01121
R13	Same as R12			
S1	SWITCH, ROTARY: 1 Section, 4 Poles, 2 Position	1	1128-41	14632
S2	SWITCH, TOGGLE, SP-DT	1	8282-K14	15605
S3	SWITCH, ROTARY: 2 Section 4 Poles, 2-6 Position	1	1128-29	14632
S4	SWITCH, ROTARY, Part of R10	---		
S5	SWITCH, SLIDE, DP-DT	1	4633	42190
S6	NOT USED			
S7	SWITCH, ROTARY: 1 Section, 2 Poles, 2-6 Position	1	1128-43	14632
T1	TRANSFORMER	1	11921	14632
TB1	TERMINAL BOARD	1	353-18-07-001	71785
W1	CABLE AND CONNECTOR ASSEMBLY	1	30020-182	14632
W2	CABLE AND CONNECTOR ASSEMBLY	1	30020-183	14632
W3	CABLE AND CONNECTOR ASSEMBLY	1	30020-546	14632
W4	CABLE AND CONNECTOR ASSEMBLY	1	30020-185	14632
W5	CABLE AND CONNECTOR ASSEMBLY	1	30020-186	14632
W6	CABLE AND CONNECTOR ASSEMBLY	1	30020-187	14632
W7	CABLE AND CONNECTOR ASSEMBLY	1	30020-188	14632
W8	CABLE AND CONNECTOR ASSEMBLY	1	30020-189	14632
W9	CABLE AND CONNECTOR ASSEMBLY	1	30020-190	14632

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
W10	CABLE AND CONNECTOR ASSEMBLY	1	30020-547	14632
W11	CABLE AND CONNECTOR ASSEMBLY	1	30020-548	14632
XA4	CONNECTOR, Printed Circuit Card, 14 Contacts	2	00-5002-014-103-002	91662
XA5	Same as XA4			
XA6	CONNECTOR, Printed Circuit Card, 13 Contacts	1	00-5002-013-103-002	91662
XA8	CONNECTOR, Printed Circuit Card, 16 Contacts	3	00-5002-016-103-002	91662
XA9	Same as XA8			
XA10	Same as XA8			
XF1	FUSEHOLDER, Panel Type, Non-indicating, Bayonet Knob	2	342004	75915
XF2	Same as XF1			
	HANDLE, Nickel-Plated Brass, Round (Rear)	2	1250-1	71279
	HANDLE, Nickel-Plated Brass, Round (Front)	2	1252-1	71279
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap; Modified	2	11754-2	14632
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	7	PS-700-2	21604
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	2	PS-500-2	21604
	DUST COVER, Aluminum, Main Chassis, Top	1	20238-1	14632
	DUST COVER, Aluminum, Main Chassis, Bottom	1	20239-1	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For IF Amplifier (Large)	1	11590	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for IF Amplifier (Small)	1	11591	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for Low Band Tuner (Small)	1	11741	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for Low Band Tuner (Large)	1	11742	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for High Band Tuner (Small)	1	11691	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for High Band Tuner (Large)	1	11692	14632

5.4.2 Type 906A Receiver, Main Chassis

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
A1	30-90-MHz RF TUNER	1	71119	14632
A2	60-300-MHz RF TUNER	1	71120	14632
A3	20/300-kHz BW IF AMPLIFIER	1	72145	14632
A4	AGC AMPLIFIER	1	7830	14632
A5	VIDEO AMPLIFIER	1	7324	14632
A6	AUDIO AMPLIFIER	1	7400B	14632
A7	L. O. COUPLER	1	7917	14632
A8	+24V POWER SUPPLY REGULATOR	1	7685	14632
A9	-24V POWER SUPPLY REGULATOR	1	7670/1	14632
A10	+12V POWER SUPPLY REGULATOR	1	7688	14632
A11	CARRIER OPERATED RELAY	1	7506	14632
A12	CRYSTAL MARKER OSCILLATOR	1	8304	14632
C1	CAPACITOR, PAPER, THRU-PASS: 0.01 μF, 600V	2	102P515	56289
C2	Same as C1			
C3	CAPACITOR, ELECTROLYTIC: 40/40 μF, 250V	1	TVL-2520	56289
C4	CAPACITOR, ELECTROLYTIC TANTALUM: 1.0 μF, 10%, 35V	1	150D105X9035A2	56289
C5	CAPACITOR, CERAMIC, DISC: 0.005 μF, 20%, 500V	1	SM(.005μF, 20%)	91418
CP1	ADAPTER, BNC-BNC	1	UG-492A/U	81349
CR1	DIODE	1	1N979B	07688
CR2	DIODE	2	1N3255	07688
CR3	Same as CR2			
CR4	DIODE	2	1N3253	07688
CR5	Same as CR4			
CR6	DIODE	1	1N759A	07688
DS1	LAMP, INCANDESCENT: .06A, 5V	6	CM8-683	71744
DS2	Same as DS1			
DS3	Same as DS1			
DS4	Same as DS1			
DS5	LAMP, INCANDESCENT: .04A, 6V	1	345	07688
DS6	Same as DS1			
DS7	Same as DS1			
F1	FUSE, 3AG, Slow-Blow: 1/4A	1	MDL-1/4	71400
F2	FUSE, 3AG, Slow-Blow: 1/8A	1	MDL-1/8	71400
J1	CONNECTOR, JACK, BNC, Part of W1	1	UG-909B/U	81349
J2	NOT USED			

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
J3	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J4	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J5	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J6	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J7	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J8	NOT USED			
J9	NOT USED			
J10	CONNECTOR, JACK, BNC, Part of W8	3	17825	74868
J11	Same as J10, Part of W9			
J12	Same as J10			
J13	CONNECTOR, JACK, PHONE	1	L-11	82389
K1	RELAY	1	318-010382-3	74868
K2	RELAY	1	22RJCC1000G/SIL	78277
M1	METER, SIGNAL STRENGTH	1	1632	14632
M2	METER, TUNING	1	1633	14632
P1	CONNECTOR, PLUG AND POWER CORD	1	01753-001	71700
P2	CONNECTOR, PLUG, MB, Part of W10	10	44950	74868
P3	CONNECTOR, PLUG, BNC, Part of W1	7	UG-88/U	81349
P4	Same as P3, Part of W2			
P5	CONNECTOR, PLUG, BNC, Part of W2	2	UG-913A/U	81349
P6	Same as P3, Part of W3			
P7	Same as P5, Part of W3			
P8	Same as P2, Part of W10			
P9	Same as P2, Part of W4			
P10	Same as P2, Part of W4			
P11	Same as P3, Part of W5			
P12	Same as P3, Part of W5			
P13	Same as P2, Part of W7			
P14	Same as P2, Part of W7			
P15	Same as P2, Part of W8			
P16	Same as P3, Part of W6			
P17	Same as P3, Part of W6			
P18	Same as P2, Part of W9			
P19	Same as P2, Part of W11			
P20	Same as P2, Part of W11			
R1	RESISTOR, FIXED, COMPOSITION: 1kΩ, 5%, 2W	1	HB1025	01121

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R2	RESISTOR, FIXED, COMPOSITION: 8.2kΩ, 5%, 1/4W	2	CB8225	01121
R3	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	RV4NAYSD104A	81349
R4	RESISTOR, FIXED, COMPOSITION: 51kΩ, 5%, 1/4W	2	CB5135	01121
R5	RESISTOR, FIXED, COMPOSITION: 75kΩ, 5%, 1/2W	1	EB7535	01121
R6	Same as R4			
R7	RESISTOR, VARIABLE, COMPOSITION: 25kΩ, 10%, 2W	1	RV4NAYSD253A	81349
R8	Same as R2			
R9	RESISTOR, VARIABLE, COMPOSITION: 10kΩ, 10%, 2W	2	RV4NAYSD103A	81349
R10	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	JS1N056S104UA	01121
R11	RESISTOR, FIXED, COMPOSITION: 6.8Ω, 5%, 1/2W	1	EB68G5	01121
R12	RESISTOR, FIXED, COMPOSITION: 6.2kΩ, 5%, 1/4W	2	CB6225	01121
R13	Same as R9			
R14	Same as R12			
S1	SWITCH, ROTARY: 1 Section, 4 Poles, 2 Position	1	1128-41	14632
S2	SWITCH, TOGGLE, SP-DT	1	8282-K14	15605
S3	SWITCH, ROTARY: 2 Section, 4 Poles, 2-6Position	1	1128-29	14632
S4	SWITCH, ROTARY, Part of R10	---		
S5	SWITCH, SLIDE, DP-DT	1	4633	42190
S6	SWITCH, TOGGLE, SP-ST	1	8280-K16	15605
S7	SWITCH, ROTARY: 1 Section, 2 Poles, 2-6 Position	1	1128-43	14632
T1	TRANSFORMER	1	11921	14632
TB1	TERMINAL BOARD	1	353-18-07-001	71785
W1	CABLE AND CONNECTOR ASSEMBLY	1	30020-182	14632
W2	CABLE AND CONNECTOR ASSEMBLY	1	30020-183	14632
W3	CABLE AND CONNECTOR ASSEMBLY	1	30020-546	14632
W4	CABLE AND CONNECTOR ASSEMBLY	1	30020-185	14632
W5	CABLE AND CONNECTOR ASSEMBLY	1	30020-186	14632
W6	CABLE AND CONNECTOR ASSEMBLY	1	30020-187	14632
W7	CABLE AND CONNECTOR ASSEMBLY	1	30020-188	14632
W8	CABLE AND CONNECTOR ASSEMBLY	1	30020-189	14632

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
W9	CABLE AND CONNECTOR ASSEMBLY	1	30020-190	14632
W10	CABLE AND CONNECTOR ASSEMBLY	1	30020-547	14632
W11	CABLE AND CONNECTOR ASSEMBLY	1	30020-548	14632
XA4	CONNECTOR, Printed Circuit Card, 14 Contacts	2	00-5002-014-103-002	91662
XA5	Same as XA4			
XA6	CONNECTOR, Printed Circuit Card, 13 Contacts	1	00-5002-013-103-002	91662
XA8	CONNECTOR, Printed Circuit Card, 16 Contacts	3	00-5002-016-103-002	91662
XA9	Same as XA8			
XA10	Same as XA8			
XA11	CONNECTOR, Printed Circuit Card, 10 Contacts	1	00-5002-010-103-002	91662
XF1	FUSEHOLDER, Panel Type, Non-indicating, Bayonet Knob	2	342004	75915
XF2	Same as XF1			
	HANDLE, Nickel-Plated Brass, Round (Rear)	2	1250-1	71279
	HANDLE, Nickel-Plated Brass, Round (Front)	2	1252-1	71279
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap; Modified	2	11754-2	14632
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	8	PS-700-2	21604
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	2	PS-500-2	21604
	DUST COVER, Aluminum, Main Chassis, Top	1	20238-1	14632
	DUST COVER, Aluminum, Main Chassis, Bottom	1	20239-1	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For IF Amplifier (Large)	1	11590	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For IF Amplifier (Small)	1	11591	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For Low Band Tuner (Small)	1	11741	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For Low Band Tuner (Large)	1	11742	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For High Band Tuner (Small)	1	11691	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed, For High Band Tuner (Large)	1	11692	14632

5.4.3 Type 71119 30-90-MHz Tuner

REF DESIG PREFIX A1

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, FEED-THRU: 1000 pF, GMV, 500V	6	FA5C-102W	01121
C2	CAPACITOR, DIPPED MICA: 33 pF, 5%, 500V	1	DM10-330J	72136
C3	CAPACITOR, DIPPED MICA: 15 pF, 5%, 500V	2	DM10-150J	72136
C4	CAPACITOR, VARIABLE, GLASS: .7-9 pF	4	VC26G	73899
C5	CAPACITOR, CERAMIC, STAND-OFF: 1000 pF, GMV, 500V	5	SS5A-102W	01121
C6	CAPACITOR, CERAMIC, TUBULAR: 3 pF, ±.25 pF, 500V	1	301-000-COJO-309C	72982
C7	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	10	SM (.001 μF, GMV)	91418
C8	Same as C5			
C9	CAPACITOR, DIPPED MICA: 510 pF, 5%, 500V	1	DM15-511J	72136
C10	Same as C5			
C11	Same as C7			
C12	CAPACITOR, DIPPED MICA: 270 pF, 5%, 500V	1	DM15-271J	72136
C13	Same as C7			
C14	Same as C7			
C15	CAPACITOR, DIPPED MICA: 22 pF, 5%, 500V	1	DM10-220J	72136
C16	Same as C4			
C17	CAPACITOR, CERAMIC, TUBULAR: 1.2 pF, ±.1 pF, 500V	1	301-000-COKO-129B	72982
C18	CAPACITOR, CERAMIC, TUBULAR: 2.0 pF, ±.25 pF, 500V	3	301-000-COKO-209C	72982
C19	CAPACITOR, CERAMIC, DISC: 470 pF, 20%, 1000V	2	B (.00047 μF, 20%)	91418
C20	Same as C19			
C21	Same as C1			
C22	Same as C7			
C23	Same as C7			
C24	CAPACITOR, CERAMIC, TUBULAR: 4.3 pF, ±.25 pF, 500V	1	301-000-COHO-439C	72982
C25	Same as C4			
C26	CAPACITOR, DIPPED MICA: 18 pF, 5%, 500V	1	DM10-180J	72136
C27	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	1	DM10-470J	72136
C28	Same as C17			
C29	Same as C4			

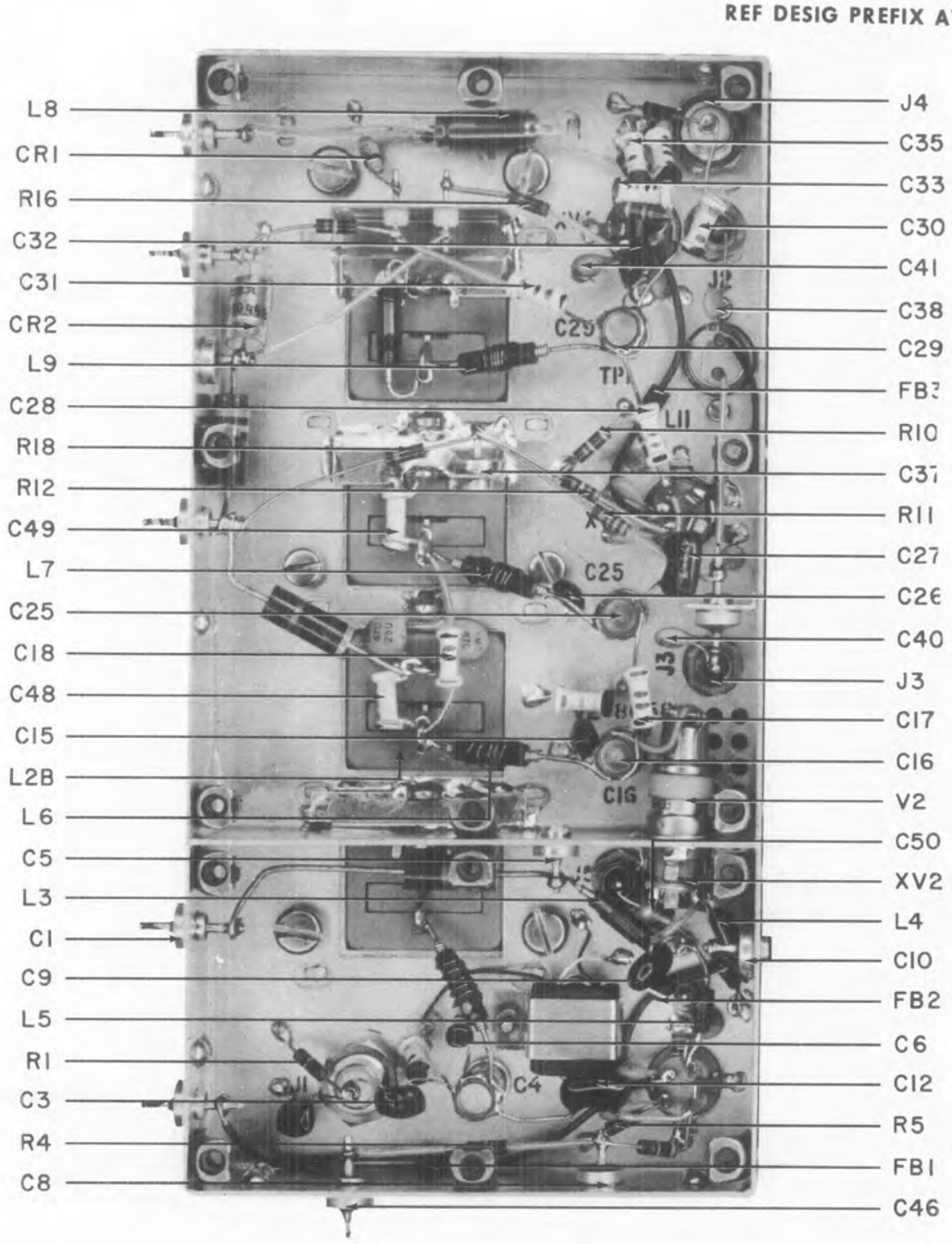


Figure 5-3. Type 71119 30-90-MHz RF Tuner, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C30	Same as C18			
C31	Same as C18			
C32	Same as C3			
C33	CAPACITOR, CERAMIC, TUBULAR: 18 pF, 5%, 500V (TC-N750)	1	301-000-U2J0-180J	72982
C34	CAPACITOR, CERAMIC, TUBULAR: 10 pF, ±.5 pF, 500V	1	301-000-COHO-100D	72982
C35	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±.25 pF, 500V (TC-N750)	1	301-000-U2J0-479C	72982
C36	Same as C7			
C37	Same as C5			
C38	Same as C7			
C39	CAPACITOR, CERAMIC, FEED-THRU: 330 pF, 10%, 500V	1	FA5C-3311	01121
C40	Same as C7			
C41	Same as C7			
C42	Same as C5			
C43	Same as C1			
C44	Same as C1			
C45	Same as C1			
C46	Same as C1			
C47	CAPACITOR, CERAMIC, TUBULAR: 5.1 pF, ±.5 pF, 500V	1	301-000-COHO-519D	72982
C48	CAPACITOR, CERAMIC, TUBULAR: 7.5 pF, ±.5 pF, 500V	2	301-000-COHO-759D	72982
C49	Same as C48			
C50	CAPACITOR, COMPOSITION, TUBULAR: 0.5 pF, 10%, 500V	1	QC (.51 pF, 10%)	95121
CR1	DIODE, ZENER	1	1N3044B	07688
CR2	DIODE, CAPACITOR	1	V27E	01281
FB1	FERRITE BEAD	3	56-590-65/4A	02114
FB2	Same as FB1			
FB3	Same as FB1			
J1	CONNECTOR, RECEPTACLE, BNC SERIES	2	UG1094/U	81349
J2	CONNECTOR, RECEPTACLE, MB SERIES	3	46025	74868
J3	Same as J2			
J4	Same as J1			
J5	Same as J2			

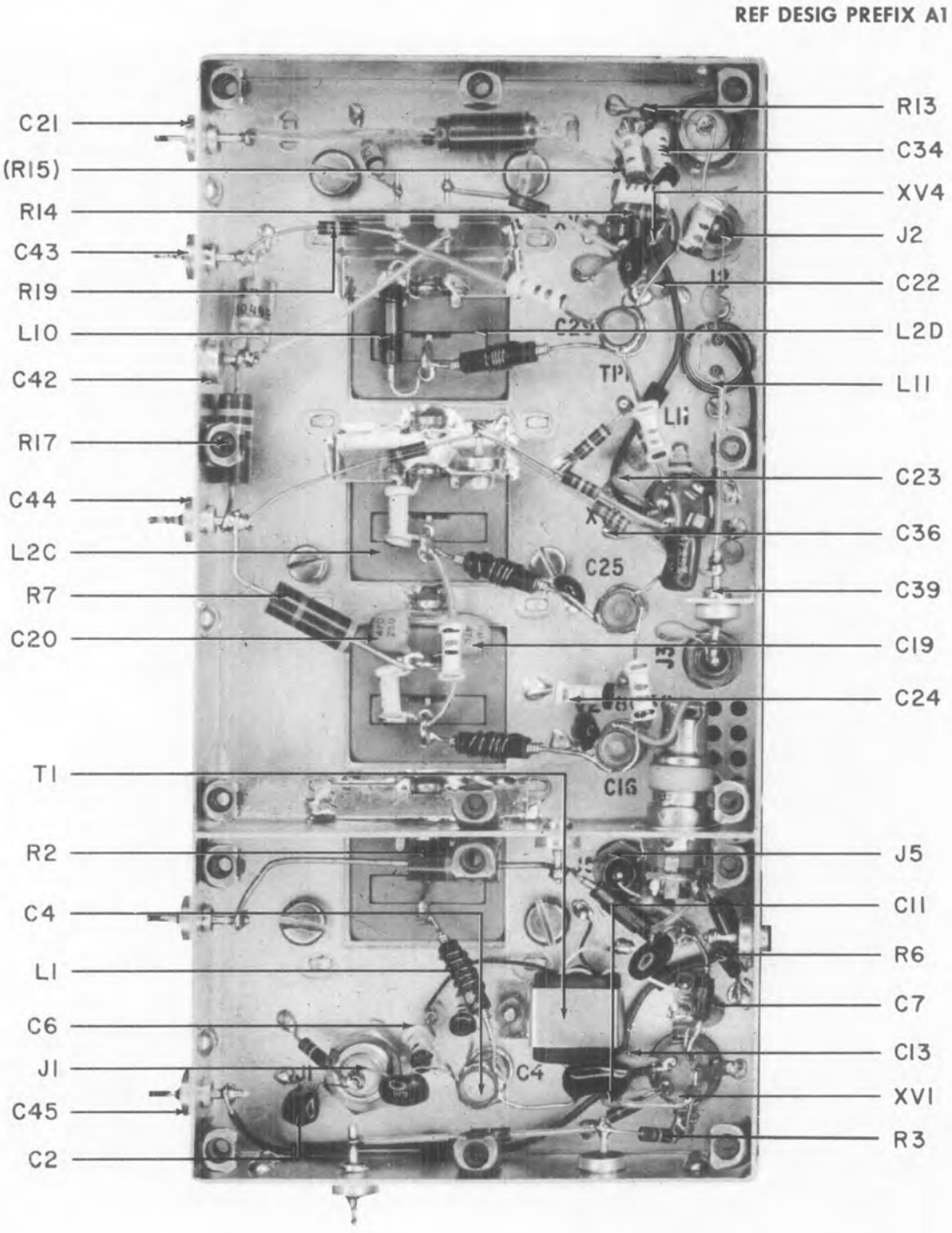


Figure 5-4. Type 71119 30-90-MHz RF Tuner, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
L1	COIL, FIXED	1	1131-83	14632
L2	INDUCTUNER	1	2027-2	14632
L3	COIL, FIXED	1	1131-36	14632
L4	COIL, FIXED	1	1131-01	14632
L5	COIL, FIXED: .24 μH	1	200-11	99848
L6	COIL, FIXED	3	1131-101	14632
L7	Same as L6			
L8	COIL, FIXED	1	1131-5	14632
L9	Same as L6			
L10	COIL, FIXED	1	1131-25	14632
L11	COIL, VARIABLE	1	1472-3	14632
R1	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	2	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 13k, 5%, 1W	2	GB1335	01121
R3	RESISTOR, FIXED, COMPOSITION: 47k, 5%, 1/4W	2	CB4735	01121
R4	RESISTOR, FIXED, COMPOSITION: 270k, 5%, 1/4W	1	CB2745	01121
R5	RESISTOR, FIXED, COMPOSITION: 82Ω, 5%, 1/4W	1	CB8205	01121
R6	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	1	CB4705	01121
R7	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1W	1	GB4725	01121
R8	RESISTOR, FIXED, COMPOSITION: 2.7k, 5%, 1/4W	1	CB2725	01121
R9	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	2	CB4745	01121
R10	Same as R9			
R11	RESISTOR, FIXED, COMPOSITION: 330k, 5%, 1/4W	1	CB3345	01121
R12	RESISTOR, FIXED, COMPOSITION: 33k, 5%, 1/4W	1	CB3335	01121
R13	RESISTOR, FIXED, COMPOSITION: 51Ω, 5%, 1/4W	1	CB5105	01121
R14	Same as R3			
R15	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	1	CB4725	01121
R16	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	1	CB1025	01121

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R17	Same as R2			
R18	RESISTOR, FIXED, COMPOSITION: 2.2k, 5%, 1/4W	1	CB2225	01121
R19	Same as R1			
R20	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	1	CB1015	01121
T1	TRANSFORMER	1	1469	14632
TP1	TEST POINT	1	TJ-6	04013
V1	TUBE, ELECTRON, NUVISTOR	2	6CW4	07688
V2	TUBE, ELECTRON NUVISTOR	1	8058	07688
V3	TUBE, ELECTRON, NUVISTOR	1	7587	07688
V4	Same as V1			

5.4.4 Type 71120 60-300-MHz Tuner

REF DESIG PREFIX A2

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, TUBULAR: 5.6 pF, ±.5 pF, 500V	1	301-000-COHO-569D	72982
C2	CAPACITOR, CERAMIC, TUBULAR: 8.2 pF, ±.5 pF, 500V	1	301-000-COHO-829D	72982
C3	CAPACITOR, CERAMIC, TUBULAR: 1.0 pF, ±.25 pF, 500V	4	301-000-COKO-109C	72982
C4	CAPACITOR, CERAMIC, TUBULAR: 6.2 pF, ±.5 pF, 500V	1	301-000-COHO-629D	72982
C5	CAPACITOR, VARIABLE, CERAMIC: .5-4.5 pF	1	CST-6	71279
C6	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	3	SS5A-102W	01121
C7	CAPACITOR, DIPPED MICA: 510 pF, 5%, 500V	1	DM15-511J	72136
C8	NOT USED			
C9	CAPACITOR, COMPOSITION, TUBULAR: .47 pF, 10%, 500V	1	QC (.47 pF, 10%)	95121
C10	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±.25 pF, 500V	3	301-000-COKO-159C	72982
C11	CAPACITOR, VARIABLE, GLASS: .7-9 pF	4	VC26G	73899
C12	CAPACITOR, CERAMIC, TUBULAR: 47 pF, 5%, 500V	2	308-000-COGO-470J	72982
C13	Same as C12			
C14	Same as C3			
C15	Same as C11			
C16	Same as C3			
C17	CAPACITOR, COMPOSITION, TUBULAR: .22 pF, 10%, 500V	1	QC (.22 pF, 10%)	95121
C18	Same as C11			
C19	CAPACITOR, CERAMIC, TUBULAR: 5.1 pF, ±.5 pF, 500V	1	301-000-COHO-519D	72982
C20	Same as C3			
C21	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM (.001 μF, GMV)	91418
C22	CAPACITOR, CERAMIC, TUBULAR: 1.5 pF, ±.25 pF, 500V (TC-N330)	2	301-000-S2K0-159C	72982
C23*	Same as C10			
C24	CAPACITOR, CERAMIC, FEED-THRU: 1000 pF, GMV, 500V	6	FA5C-102W	01121
C25	Same as C22			

* Nominal value. Both type and value selected at time of alignment.

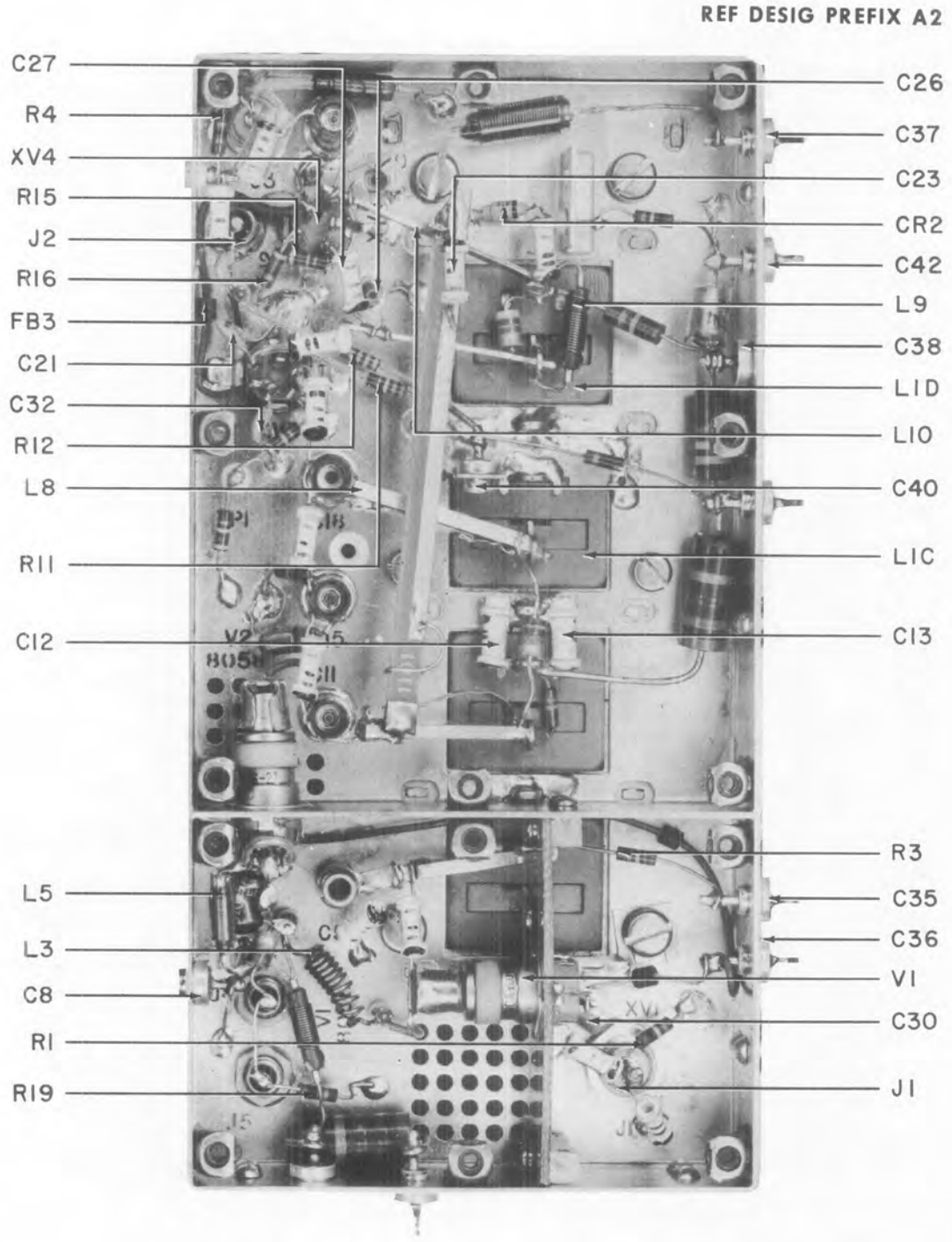


Figure 5-5. Type 71120 60-300-MHz RF Tuner, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C26*	CAPACITOR, CERAMIC, TUBULAR: 2.7 pF, ±.25 pF, 500V (TC-N750)	1	301-000-U2J0-279C	72982
C27	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±.25 pF, 500V	1	301-000-COJO-339C	72982
C28	CAPACITOR, CERAMIC, TUBULAR: 4.7 pF, ±.25 pF, 500V	1	301-000-COHO-479C	72982
C29	Same as C11			
C30	Same as C21			
C31	Same as C21			
C32	Same as C21			
C33	Same as C21			
C34	Same as C24			
C35	Same as C24			
C36	Same as C24			
C37	Same as C24			
C38	Same as C6			
C39	Same as C21			
C40	Same as C6			
C41	CAPACITOR, Part of Circuit Board, CEI #1101	---		
C42	Same as C24			
C43	CAPACITOR, COMPOSITION, TUBULAR: 0.51 pF, 10%, 500V	1	QC (.51 pF, 10%)	95121
CR1	DIODE, ZENER	1	1N3044B	07688
CR2	DIODE, CAPACITOR	1	V27E	01281
FB1	FERRITE BEAD	3	56-590-65/4A	02114
FB2	Same as FB1			
FB3	Same as FB1			
J1	CONNECTOR, RECEPTACLE, BNC SERIES	2	UG1094/U	81349
J2	CONNECTOR, RECEPTACLE, MB SERIES	3	46025	74868
J3	Same as J1			
J4	Same as J2			
J5	Same as J2			
L1	INDUCTUNER	1	2027-4	14632
L2	COIL, FIXED	1	10167	14632
L3	COIL, FIXED	1	1129-01	14632
L4	COIL, FIXED	1	1131-36	14632
L5	COIL, FIXED	1	1131-01	14632

* Nominal value. Final value selected at time of alignment.

REF DESIG PREFIX A2

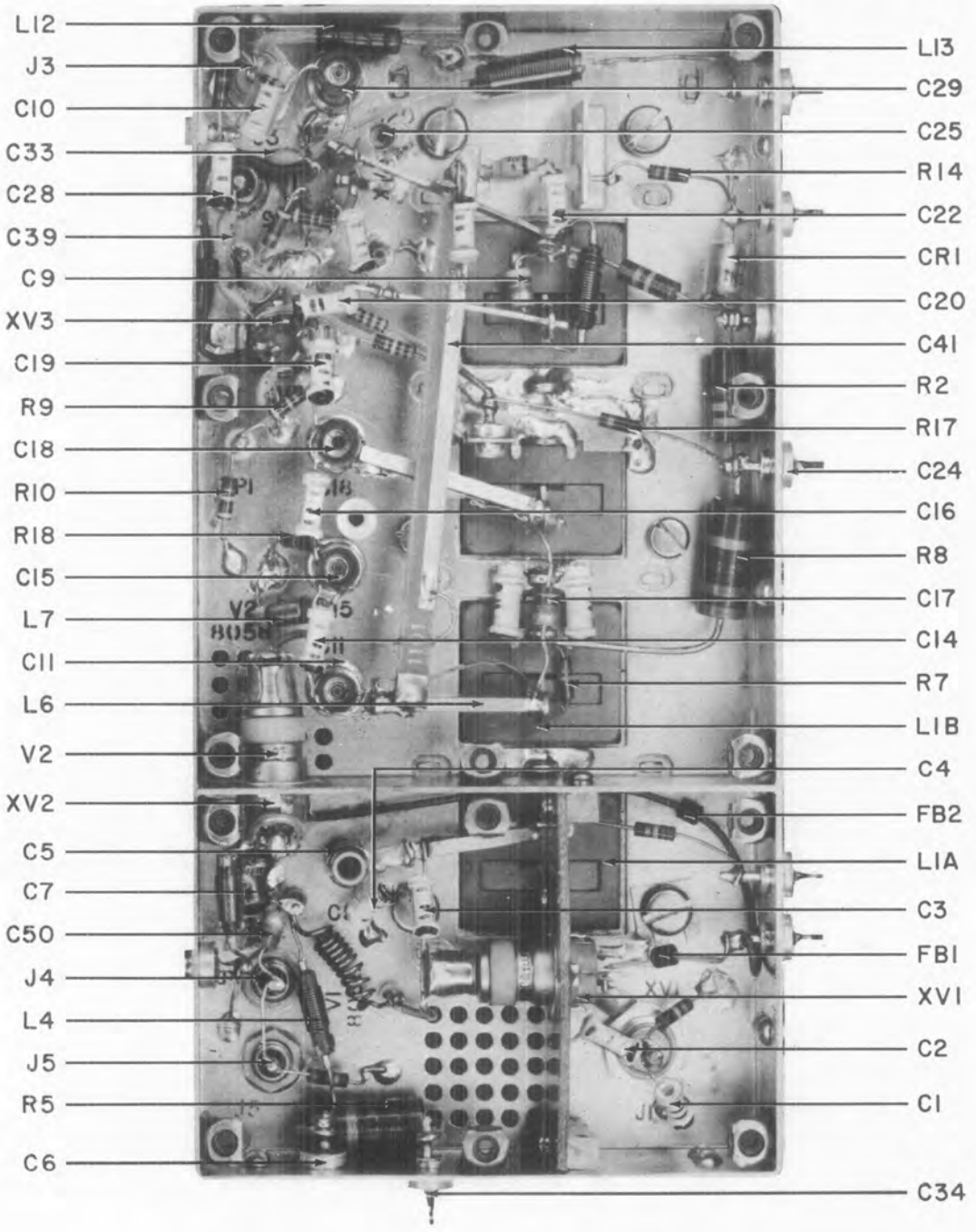


Figure 5-6. Type 71120 60-300-MHz RF Tuner, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
L6	COIL, FIXED	1	10166	14632
*L7	COIL, FIXED	1	1131-02	14632
L8	COIL, FIXED	1	1200-02	14632
L9	COIL, FIXED	1	1131-27	14632
L10	COIL, FIXED	1	1107-2	14632
L11	COIL, FIXED	1	10169	14632
L12	COIL, FIXED: 27 μH	1	W270	99848
L13	COIL, FIXED	1	1131-05	14632
R1	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	2	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 13k, 5%, 1W	1	GB1335	01121
R3	RESISTOR, FIXED, COMPOSITION: 680k, 5%, 1/4W	1	CB6845	01121
R4	RESISTOR, FIXED, COMPOSITION: 51Ω, 5%, 1/4W	1	CB5105	01121
R5	RESISTOR, FIXED, COMPOSITION: 6.2k, 5%, 2W	1	HB6225	01121
R6	NOT USED			
R7	RESISTOR, FIXED, COMPOSITION: 15k, 5%, 1/4W	1	CB1535	01121
R8	RESISTOR, FIXED, COMPOSITION: 6.8k, 5%, 2W	1	HB6825	01121
R9	RESISTOR, FIXED, COMPOSITION: 470k, 5%, 1/4W	2	CB4745	01121
R10	Same as R9			
R11	RESISTOR, FIXED, COMPOSITION: 330k, 5%, 1/4W	1	CB3345	01121
R12	RESISTOR, FIXED, COMPOSITION: 33k, 5%, 1/4W	1	CB3335	01121
R13	RESISTOR, FIXED, COMPOSITION: 15k, 5%, 1/2W	1	EB1535	01121
R14	Same as R1			
R15	RESISTOR, FIXED, COMPOSITION: 47k, 5%, 1/4W	1	CB4735	01121
R16	RESISTOR, FIXED, COMPOSITION: 4.7k, 5%, 1/4W	1	CB4725	01121
R17	RESISTOR, FIXED, COMPOSITION: 2.2k, 5%, 1/4W	1	CB2225	01121
R18	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	1	CB2235	01121

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R19	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	1	CB1015	01121
TP1	TEST POINT	1	TJ6	04013
V1	TUBE, ELECTRON, NUVISTOR	2	8058	07688
V2	Same as V1			
V3	TUBE, ELECTRON, NUVISTOR	1	7587	07688
V4	TUBE, ELECTRON, NUVISTOR	1	6CW4	07688

5.4.5 Type 72145 20/300-kHz BW IF Amplifier

REF DESIG PREFIX A3

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
A1	BFO ASSEMBLY	1	1769-3	14632
A2	FM LIMITER ASSEMBLY	1	11736/1	14632
C1	CAPACITOR, CERAMIC, FEED-THRU: 1000 pF, GMV, 500V	8	FA5C-102W	01121
C2	Same as C1			
C3	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	9	SS5A-102W	01121
C4	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	5	SM (.001 μF, GMV)	91418
C5	Same as C4			
C6	Same as C3			
C7	Same as C3			
C8	CAPACITOR, COMPOSITION, TUBULAR: .82 pF, 10%, 500V	5	QC (.82 pF, 10%)	95121
C9	Same as C3			
C10	Same as C8			
C11	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	11	CM05E470J03	81349
C12	Same as C11			
C13	Same as C11			
C14	CAPACITOR, DIPPED MICA: 200 pF, 5%, 500V	1	CM05F201J03	81349
C15	CAPACITOR, COMPOSITION, TUBULAR: .75 pF, 10%, 500V	2	QC (.75 pF, 10%)	95121
C16	CAPACITOR, DIPPED MICA: 62 pF, 5%, 500V	1	CM05E620J03	81349
C17	CAPACITOR, DIPPED MICA: 24 pF, 5%, 500V	3	CM05E240J03	81349
C18	CAPACITOR, DIPPED MICA: 360 pF, 5%, 500V	3	CM05F361J03	81349
C19	Same as C1			
C20	Same as C4			
C21	Same as C8			
C22	Same as C3			
C23	Same as C8			
C24	Same as C3			
C25	CAPACITOR, CERAMIC, DISC: .005 pF, 20%, 500V	4	SM (.005 μF, 20%)	91418
C26	Same as C11			
C27	Same as C11			
C28	Same as C3			
C29	Same as C15			

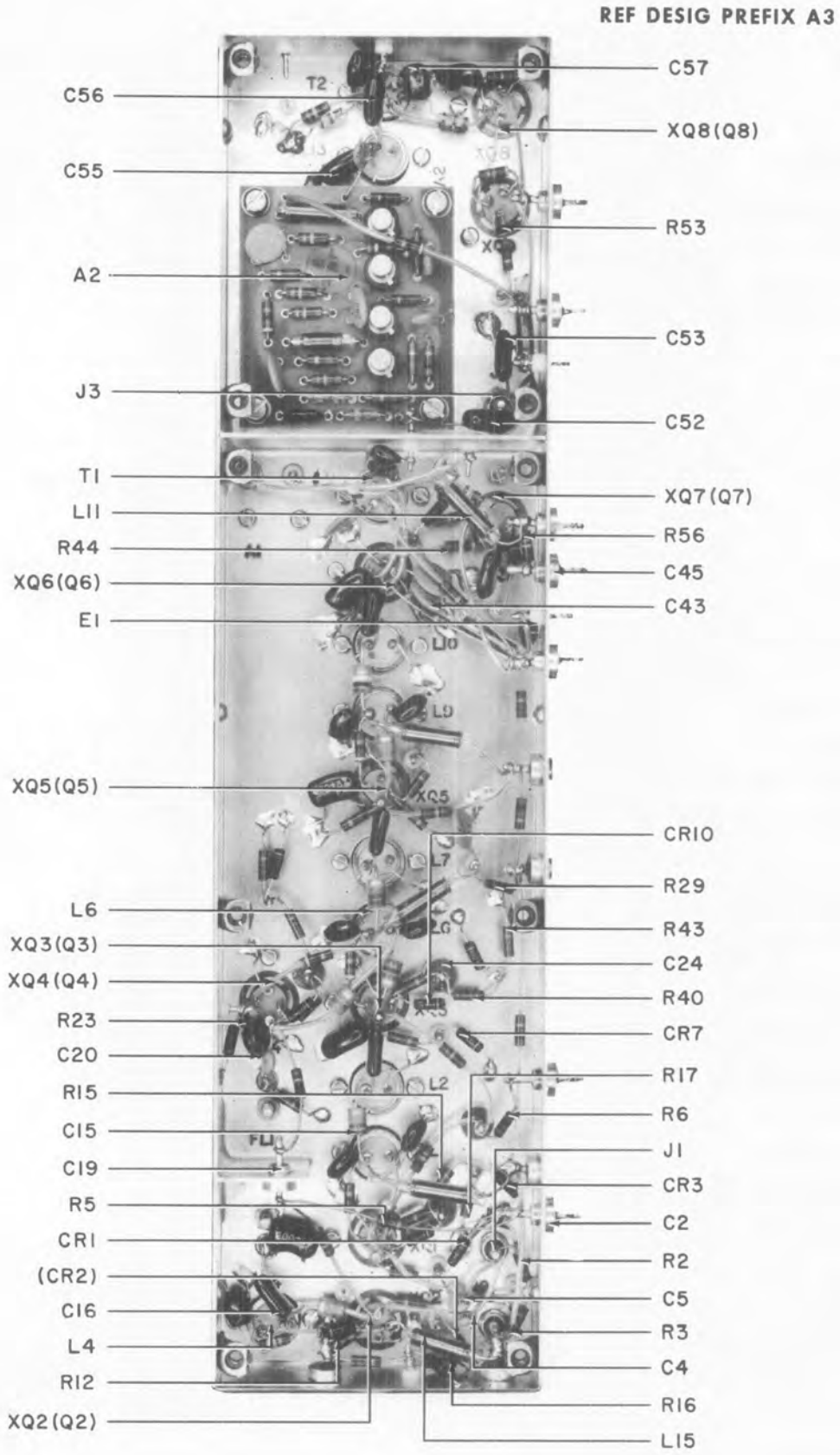


Figure 5-7. Type 72145 20/300-kHz Bandwidth IF Amplifier, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C30	Same as C17			
C31	Same as C18			
C32	Same as C3			
C33	Same as C8			
C34	Same as C4			
C35	Same as C11			
C36	Same as C11			
C37	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC (1 pF, 10%)	95121
C38	Same as C1			
C39	Same as C17			
C40	Same as C18			
C41	CAPACITOR, COMPOSITION, TUBULAR: .43 pF, 10%, 500V	1	QC (.43 pF, 10%)	95121
C42	Same as C25			
C43	Same as C25			
C44	Same as C11			
C45	Same as C1			
C46	Same as C25			
C47	Same as C1			
C48	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±.25 pF, 500V	1	301-000-COJO-339C	72982
C49	CAPACITOR, DIPPED MICA: 33 pF, 5%, 500V	1	CM05E330J03	81349
C50	Same as C1			
C51	CAPACITOR, DIPPED MICA: 27 pF, 5%, 500V	1	CM05E270J03	81349
C52	CAPACITOR, DIPPED MICA: 200 pF, 5%, 500V	1	CM05E201J03	81349
C53	CAPACITOR, DIPPED MICA: 620 pF, 5%, 500V	1	CM06F621J03	81349
C54	Same as C4			
C55	CAPACITOR, DIPPED MICA: 20 pF, 5%, 500V	2	CM05E200J03	81349
C56	Same as C55			
C57	Same as C11			
C58	Same as C11			
C59	Same as C1			
C60	Same as C3			
C61	CAPACITOR, DIPPED MICA: 30 pF, 5%, 500V	1	CM05E300J03	81349
C62	Same as C11			
CR1	DIODE	13	1N462A	07688

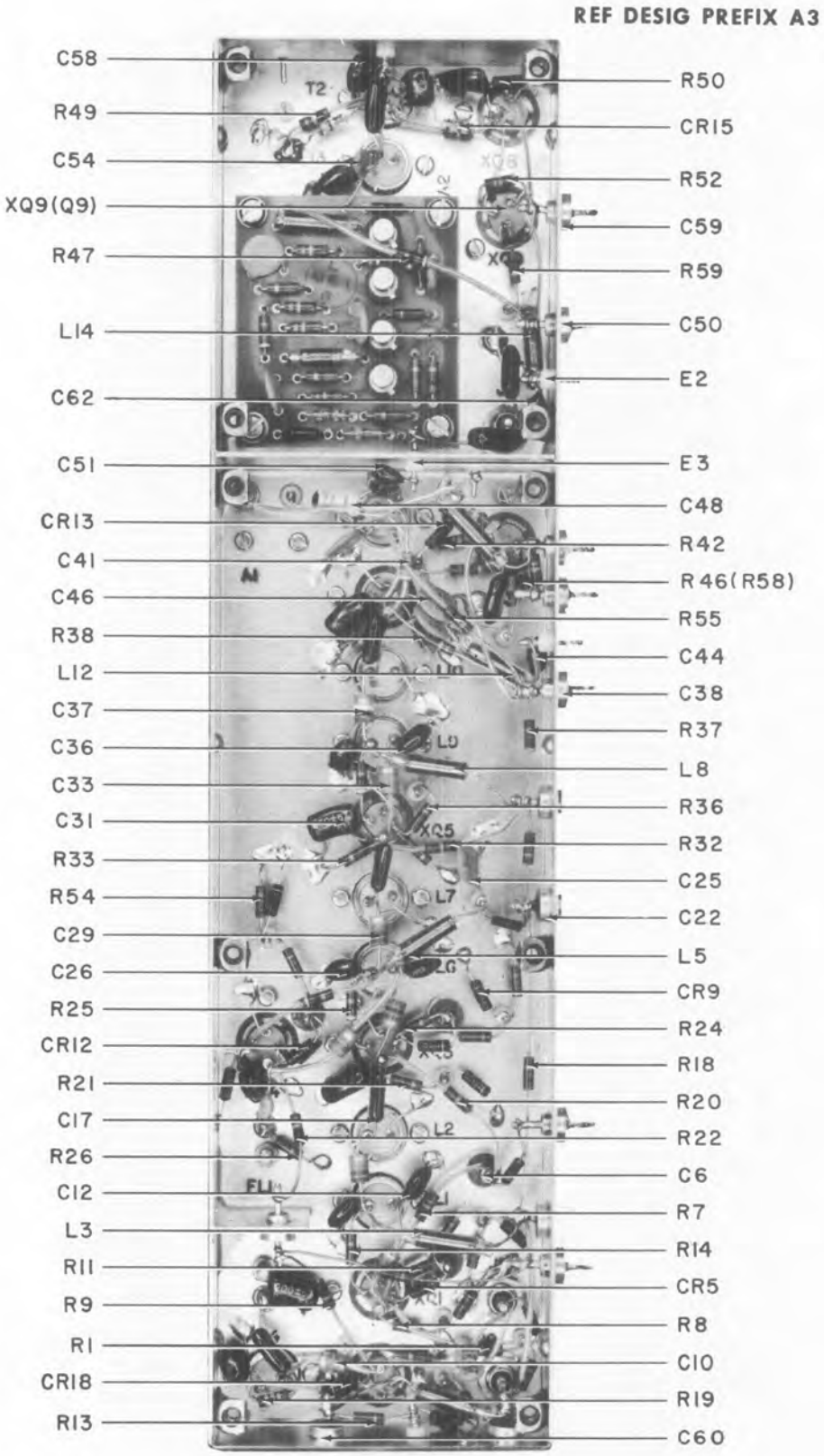


Figure 5-8. Type 72145 20/300-kHz Bandwidth IF Amplifier, Component Locations

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
CR2	Same as CR1			
CR3	Same as CR1			
CR4	NOT USED			
CR5	Same as CR1			
CR6	NOT USED			
CR7	Same as CR1			
CR8	Same as CR1			
CR9	Same as CR1			
CR10	Same as CR1			
CR11	Same as CR1			
CR12	Same as CR1			
CR13	Same as CR1			
CR14	DIODE	3	1N198	07688
CR15	Same as CR14			
CR16	Same as CR14			
CR17	Same as CR1			
CR18	Same as CR1			
E1	TERMINAL, FEEDTHRU	3	SFU-16	04013
E2	Same as E1			
E3	Same as E1			
FL1	FILTER, BAND-PASS: 20 kHz BW	1	6053653	74306
J1	CONNECTOR, RECEPTACLE, MB SERIES	3	46025	74868
J2	Same as J1			
J3	Same as J1			
L1	COIL, VARIABLE	8	1472-3	14632
L2	Same as L1			
L3	COIL, FIXED	7	1131-37	14632
L4	Same as L1			
L5	Same as L3			
L6	Same as L1			
L7	Same as L1			
L8	Same as L3			
L9	Same as L1			
L10	Same as L1			
L11	Same as L3			
L12	Same as L3			

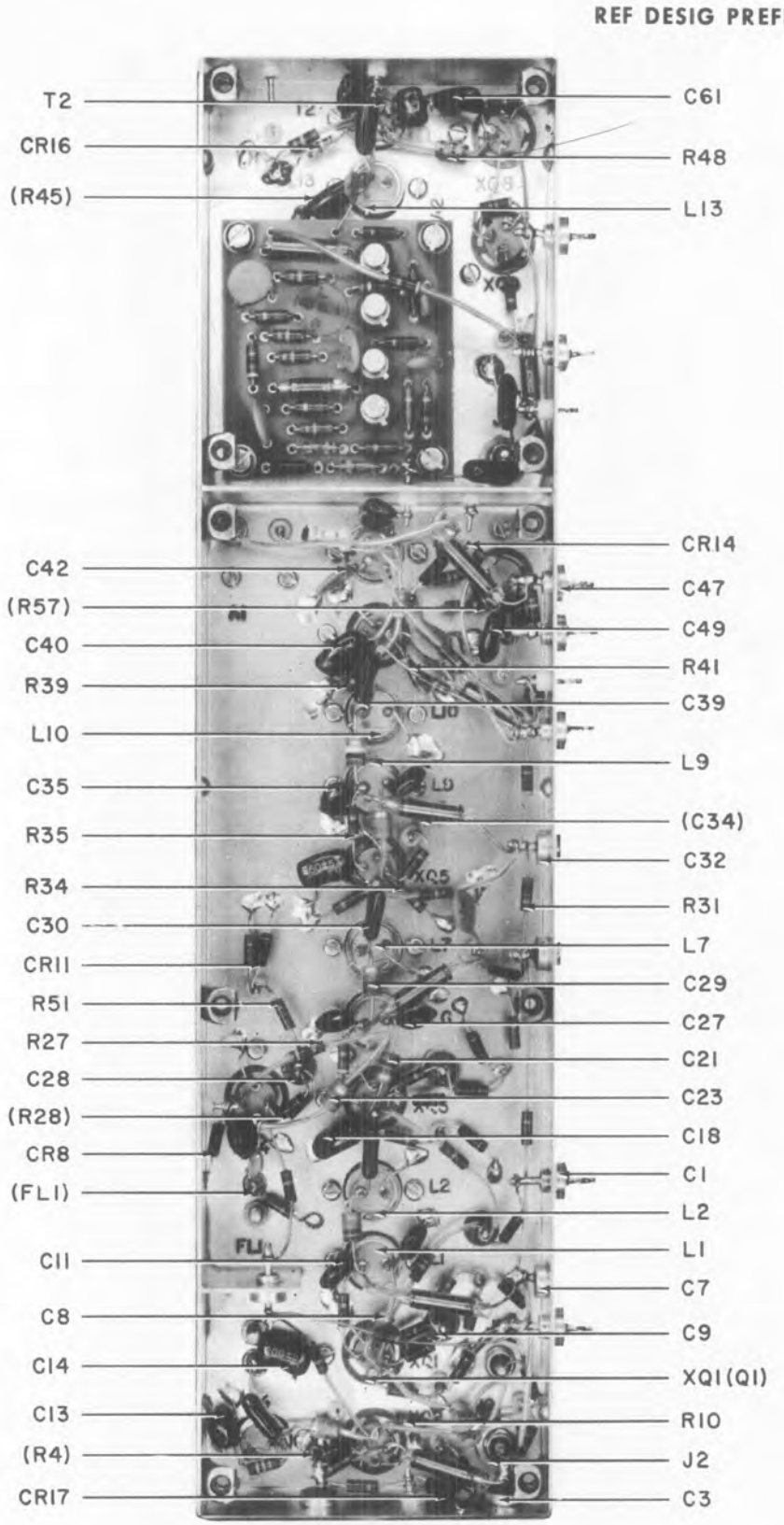


Figure 5-9. Type 72145 20/300-kHz Bandwidth IF Amplifier, Component Locations

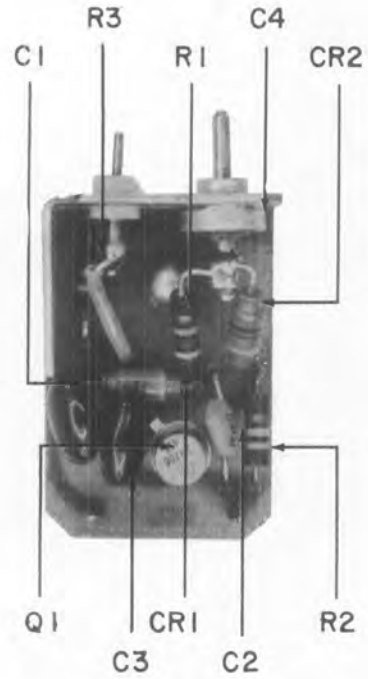
Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
L13	Same as L1			
L14	Same as L3			
L15	Same as L3			
Q1	TRANSISTOR	6	2N3478	07688
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q1			
Q7	TRANSISTOR	1	2N929	07688
Q8	TRANSISTOR	1	2N3251	07688
Q9	TRANSISTOR	1	2N2270	07688
R1	RESISTOR, FIXED, COMPOSITION: 33Ω, 5%, 1/4W	1	CB3305	01121
R2	RESISTOR, FIXED, COMPOSITION: 24Ω, 5%, 1/4W	2	CB2405	01121
R3	Same as R2			
R4	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	6	CB4705	01121
R5	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	6	CB1015	01121
R6	Same as R5			
R7	RESISTOR, FIXED, COMPOSITION: 15k, 5%, 1/4W	3	CB1535	01121
R8	RESISTOR, FIXED, COMPOSITION: 5.1k, 5%, 1/4W	6	CB5125	01121
R9	RESISTOR, FIXED, COMPOSITION: 12k, 5%, 1/4W	3	CB1235	01121
R10	Same as R8			
R11	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	7	CB1025	01121
R12	Same as R11			
R13	RESISTOR, FIXED, COMPOSITION: 680Ω, 5%, 1/4W	8	CB6815	01121
R14	Same as R4			
R15	Same as R13			
R16	Same as R13			
R17	Same as R13			
R18	Same as R5			

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R19	RESISTOR, FIXED, COMPOSITION: 24k, 5%, 1/4W	1	CB2435	01121
R20	Same as R7			
R21	Same as R8			
R22	Same as R9			
R23	Same as R8			
R24	Same as R11			
R25	Same as R4			
R26	RESISTOR, FIXED, COMPOSITION: 220Ω, 5%, 1/4W	1	CB2215	01121
R27	Same as R4			
R28	Same as R11			
R29	Same as R5			
R30	NOT USED			
R31	Same as R5			
R32	Same as R7			
R33	Same as R8			
R34	Same as R11			
R35	Same as R4			
R36	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/4W	1	CB2205	01121
R37	RESISTOR, FIXED, COMPOSITION: 470Ω, 5%, 1/4W	2	CB4715	01121
R38	Same as R9			
R39	Same as R8			
R40	Same as R13			
R41	Same as R37			
R42	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	2	CB2235	01121
R43	Same as R13			
R44	RESISTOR, FIXED, COMPOSITION: 47k, 5%, 1/4W	2	CB4735	01121
R45	RESISTOR, FIXED, COMPOSITION: 6.2k, 5%, 1/4W	1	CB6225	01121
R46	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	1	CB1035	01121
R47	Same as R4			
R48	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	2	CB1045	01121

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R49	Same as R48			
R50	RESISTOR, FIXED, COMPOSITION: 18MΩ, 5%, 1/4W	1	CB1865	01121
R51	Same as R13			
R52	Same as R44			
R53	RESISTOR, FIXED, COMPOSITION: 6.8k, 5%, 1/4W	1	CB6825	01121
R54	Same as R13			
R55	Same as R5			
R56	Same as R42			
R57	RESISTOR, FIXED, COMPOSITION: 1M, 5%, 1/4W	1	CB1055	01121
R58	Same as R11			
R59	Same as R11			
T1	TRANSFORMER	1	20349-8	14632
T2	TRANSFORMER	1	20349-7	14632

5.4.5.1 Part 1769-3 Beat Frequency Oscillator Module — REF DESIG PREFIX A3A1

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 43 pF, ±5%	1	DM10-430J	72136
C2	CAPACITOR, CERAMIC DISC: 1000 pF, GMV	1	SM	91418
C3	CAPACITOR, DIPPED MICA: 68 pF, ±5%	1	DM10-680J	72136
C4	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV	1	FA5C-102W	01121
CR1	DIODE	2	1N462A	07688
CR2	Same as CR1			
E1	FEEDTHRU, INSULATED	1	SFU-16	04013
Q1	TRANSISTOR	1	2N706	07688
R1	RESISTOR, FIXED, COMPOSITION: 47k, ±5%, 1/4W	1	CB4735	01121
R2	RESISTOR, FIXED, COMPOSITION: 240k, ±5%, 1/4W	1	CB2445	01121
R3	RESISTOR, FIXED, COMPOSITION: 10k, ±5%, 1/4W	1	CB1035	01121
Y1	CRYSTAL, QUARTZ: 21.4 MHz, Except must have wire leads	1	CR-18/U	74306



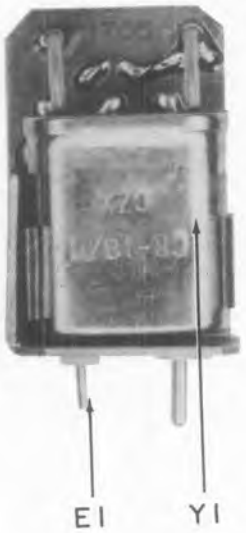


Figure 5-10. Part 1769-3 Beat Frequency Oscillator, Component Locations

5.4.5.2 Part 11736/1 FM Limiter Assembly

REF DESIG PREFIX A3A2

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, DISC: .005 μF, 20%, 500V	2	SM	91418
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	3	SM	91418
C3	Same as C2			
C4	Same as C2			
C5	Same as C1			
CR1	DIODE	2	1N198	07688
CR2	DIODE, ZENER	1	1N753A	07688
CR3	Same as CR1			
L1	COIL, FIXED	1	1131-41	14632
L2	COIL, FIXED	1	1131-37	14632
Q1	TRANSISTOR	4	2N706	07688
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 12k, 5%, 1/4W	4	CB1235	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1k, 5%, 1/4W	5	CB5125	01121
R3	Same as R2			
R4	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	1	CB1025	01121
R5	Same as R1			
R6	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/4W	2	CB2205	01121
R7	Same as R2			
R8	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	1	CB4705	01121
R9	Same as R1			
R10	Same as R2			
R11	RESISTOR, FIXED, COMPOSITION: 390Ω, 5%, 1/4W	1	CB3915	01121
R12	Same as R1			
R13	Same as R6			
R14	Same as R2			

REF DESIG PREFIX A3A2

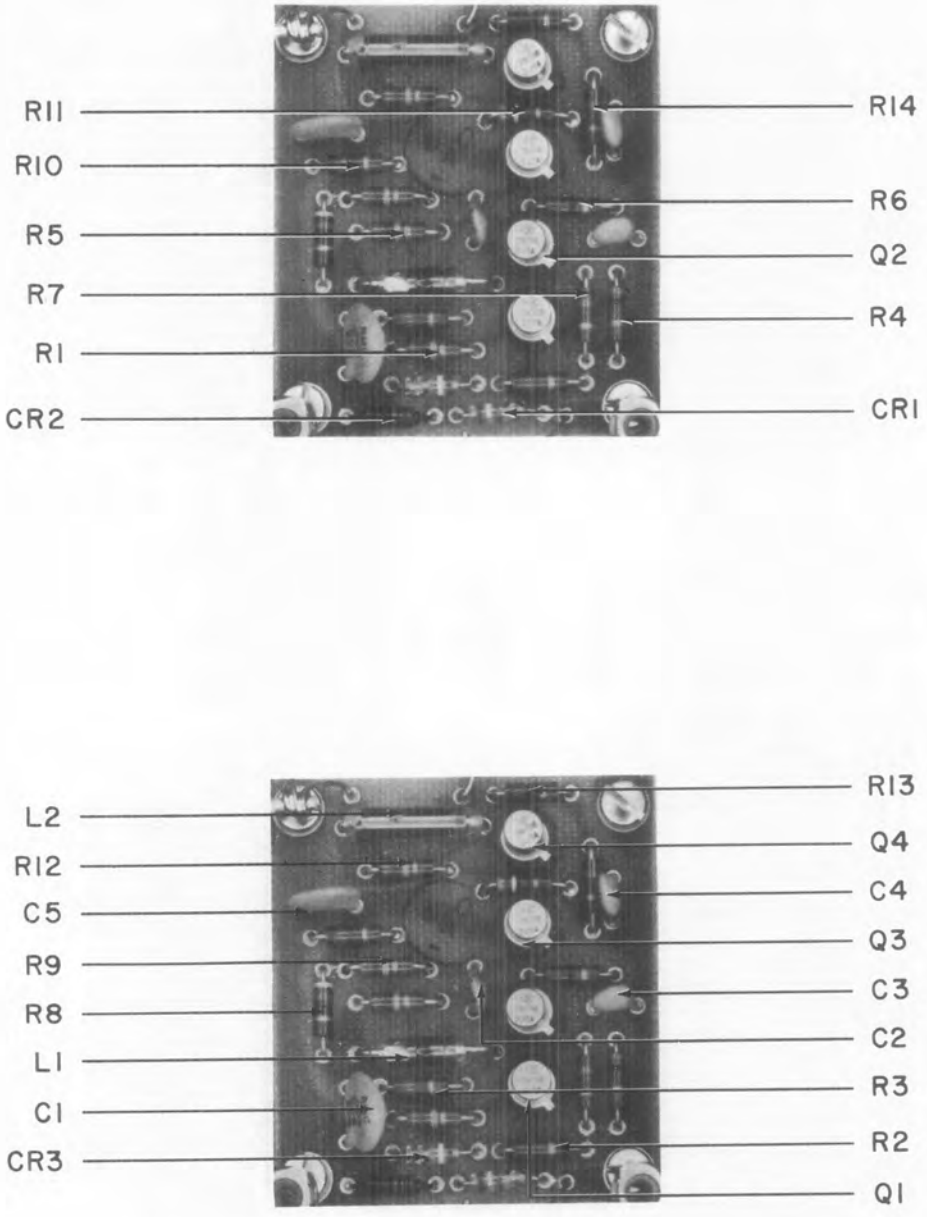


Figure 5-11. Part 11736/1 FM Limiter Assembly, Component Locations

5.4.6 Type 7830 AGC Amplifier

REF DESIG PREFIX A4

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 μF, 10%, 20V	1	150D106X9020B2	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 4.7 μF, 10%, 35V	1	150D475X9035B2	56289
CR1	DIODE	2	1N462A	07688
CR2	DIODE, ZENER	1	1N754	07688
CR3	Same as CR1			
Q1	TRANSISTOR	2	2N3053	07688
Q2	Same as Q1			
Q3	TRANSISTOR	2	2N3251	07688
Q4	Same as Q3			
R1	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	4	CB1045	01121
R2	RESISTOR, FIXED, COMPOSITION: 1M, 5%, 1/4W	1	CB1055	01121
R3	Same as R1			
R4	RESISTOR, FIXED, COMPOSITION: 820k, 5%, 1/4W	1	CB8245	01121
R5	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	5	CB1035	01121
R6	RESISTOR, FIXED, COMPOSITION: 3.9k, 5%, 1/4W	1	CB3925	01121
R7	Same as R1			
R8	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	1	CB2235	01121
R9	NOT USED			
R10	Same as R5			
R11	RESISTOR, FIXED, COMPOSITION: 560Ω, 5%, 1/4W	1	CB5615	01121
R12	RESISTOR, FIXED, COMPOSITION: 220Ω, 5%, 1/4W	1	CB2215	01121
R13	Same as R5			
R14	RESISTOR, FIXED, COMPOSITION: 24k, 5%, 1/4W	1	CB2435	01121
R15	Same as R5			
R16	Same as R1			
R17	RESISTOR, FIXED, COMPOSITION: 130k, 5%, 1/4W	1	CB1345	01121

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
R18	RESISTOR, FIXED, COMPOSITION: 360k, 5%, 1/4W	1	CB3645	01121
R19	Same as R5			
R20	RESISTOR, FIXED, COMPOSITION: 2.7M, 5%, 1/4W	1	CB2755	01121

REF DESIG PREFIX A4

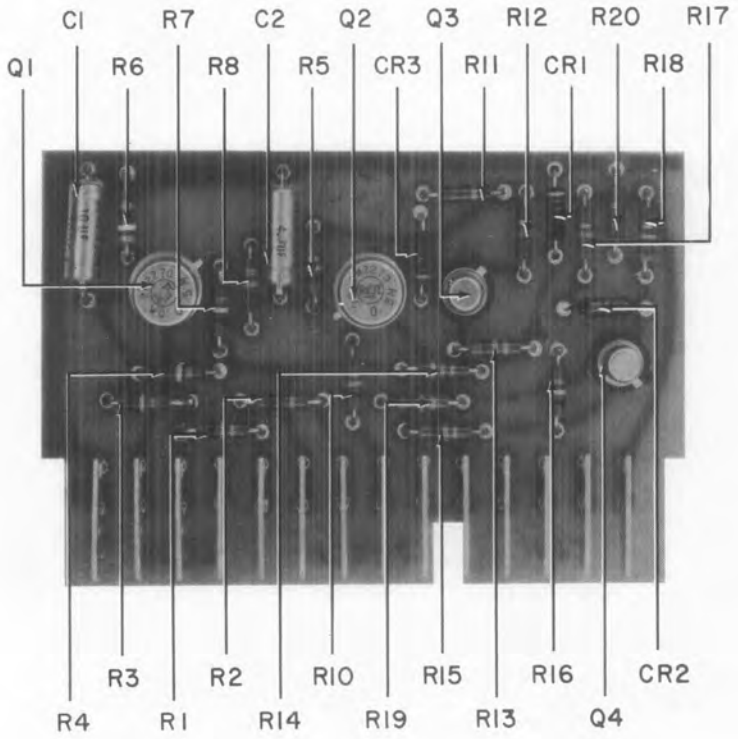


Figure 5-12. Type 7830 AGC Amplifier, Component Locations

5.4.7 Type 7324 Video Amplifier

REF DESIG PREFIX A5

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	150D105X9035A2	56289
C2	CAPACITOR, DIPPED MICA: 100 pF, 5%, 500V	1	DM10-101J	72136
C3	CAPACITOR, ELECTROLYTIC, TANTALUM: 22 μF, 10%, 35V	1	150D226X9035R2	56289
CR1	DIODE	4	1N462A	07688
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
L1	INDUCTOR, FIXED	1	1131-37	14632
Q1	TRANSISTOR	2	2N3053	07688
Q2	TRANSISTOR	2	2N3251	07688
Q3	Same as Q1			
Q4	Same as Q2			
R1	RESISTOR, FIXED, COMPOSITION: 560Ω, 5%, 1/4W	3	CB5615	01121
R2	RESISTOR, FIXED, COMPOSITION: 240k, 5%, 1/4W	1	CB2445	01121
R3	RESISTOR, FIXED, COMPOSITION: 24k, 5%, 1/4W	1	CB2435	01121
R4	RESISTOR, FIXED, COMPOSITION: 1.1k, 5%, 1/4W	1	CB1125	01121
R5	RESISTOR, FIXED, COMPOSITION: 2.7k, 5%, 1/4W	1	CB2725	01121
R6	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	2	CB4705	01121
R7	Same as R6			
R8	RESISTOR, FIXED, COMPOSITION: 5.1k, 5%, 1/4W	1	CB5125	01121
R9	Same as R1			
R10	Same as R1			
R11	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	1	CB1035	01121
R12	RESISTOR, FIXED, COMPOSITION: 43Ω, 5%, 1/4W	1	CB4305	01121

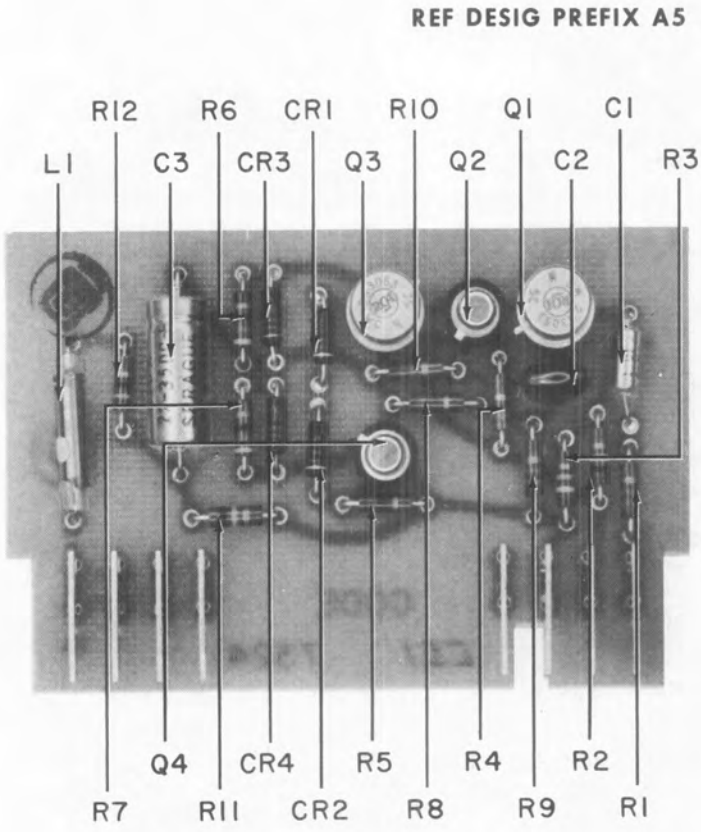


Figure 5-13. Type 7324 Video Amplifier, Component Locations

5.4.8 Type 7400B Audio Amplifier Module

REF DESIG PREFIX A6

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 μF, 10%, 35V	1	150D474X9035A2	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 μF, 10%, 20V	1	150D106X9020B2	56289
CR1	DIODE, ZENER	1	1N759A	07688
Q1	TRANSISTOR	1	2N929	07688
Q2	TRANSISTOR	2	2N2270	07688
Q3	Same as Q2			
R1	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	1	CB1035	01121
R2	RESISTOR, FIXED, CARBON FILM: 75k, 1%, 1/4W	1	RN60D7502F	81349
R3	RESISTOR, FIXED, CARBON FILM: 10k, 1%, 1/4W	1	RN60D1002F	81349
R4	RESISTOR, FIXED, CARBON FILM: 6.81k, 1%, 1/4W	1	RN60D6811F	81349
R5	RESISTOR, FIXED, CARBON FILM: 619Ω, 1%, 1/4W	1	RN60D6190F	81349
R6	RESISTOR, FIXED, COMPOSITION: 3.9k, 5%, 1/4W	1	CB3925	01121
R7	RESISTOR, FIXED, COMPOSITION: 100k, 5%, 1/4W	1	CB1045	01121
R8	RESISTOR, FIXED, COMPOSITION: 820Ω, 5%, 1/4W	1	CB8215	01121
R9	RESISTOR, FIXED, COMPOSITION: 620Ω, 5%, 1/4W	1	CB6215	01121
R10	RESISTOR, FIXED, CARBON FILM: 68.1Ω, 1%, 1/4W	1	RN60D68R1F	81349
RA1	RADIATOR, TRANSISTOR	1	NF207	05820
T1	TRANSFORMER, AUDIO OUTPUT	1	1170	14632

REF DESIG PREFIX A6

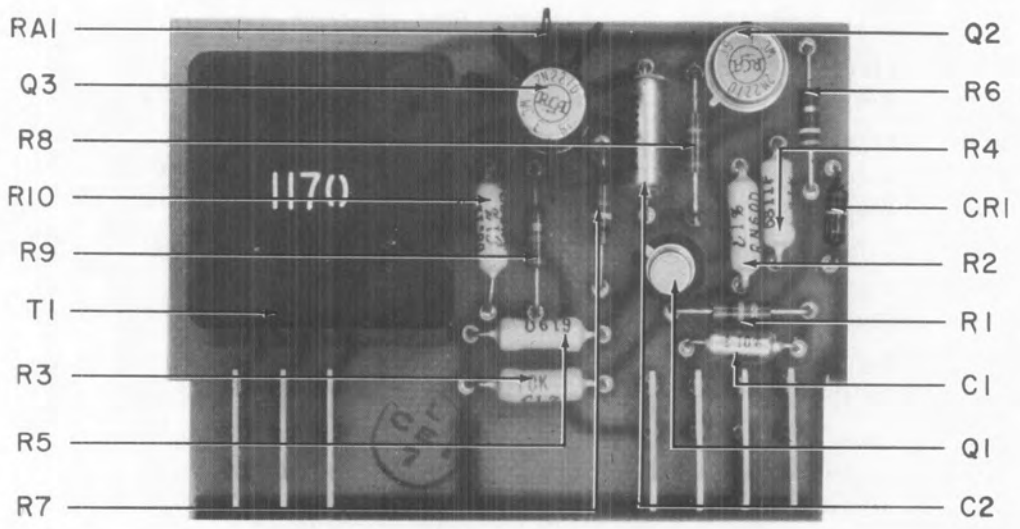


Figure 5-14. Type 7400B Audio Amplifier, Component Locations

5.4.9 Type 7917 Coupling Network

REF DESIG PREFIX A7

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
J1	CONNECTOR, RECEPTACLE, BNC	2	UG1094/U	81349
J2	Same as J1			
J3	CONNECTOR, RECEPTACLE, TYPE "N"	1	UG58A/U	81349
R1	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	2	CB1015	01121
R2	RESISTOR, FIXED, COMPOSITION: 68Ω, 5%, 1/4W	2	CB6805	01121
R3	NOT USED			
R4	Same as R2			
R5	Same as R1			

REF DESIG PREFIX A7

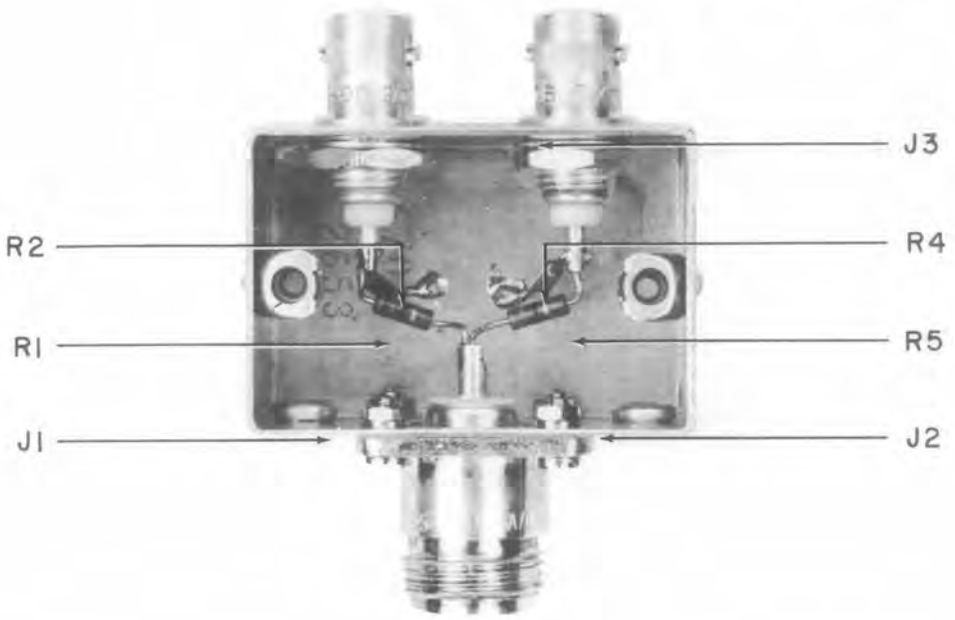


Figure 5-15. Type 7917 LO Coupling Network, Component Locations

5.4.10 Type 7685 +24V Regulated Power Supply

REF DESIG PREFIX A8

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 200 μF, 50V	1	39D207G050FJ4	56289
C2	CAPACITOR, ELECTROLYTIC: 20 μF, 50V	2	30D206G050DC4	56289
C3	Same as C2			
CR1	DIODE	2	1N3253	07688
CR2	Same as CR1			
CR3	DIODE, ZENER	1	1N759A	07688
Q1	TRANSISTOR	1	2N3055	07688
Q2	TRANSISTOR	1	2N3053	07688
R1	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	2	CB1025	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 68k, 5%, 1/4W	1	CB6835	01121
R4	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	1	CB2235	01121
R5	RESISTOR, FIXED, COMPOSITION: 2.7k, 5%, 1/4W	2	CB2725	01121
R6	Same as R5			
R7*	RESISTOR, FIXED, COMPOSITION: 10Ω, 5%, 1/4W	1	CB1005	01121

* Nominal value. Final value factory selected.

REF DESIG PREFIX A8

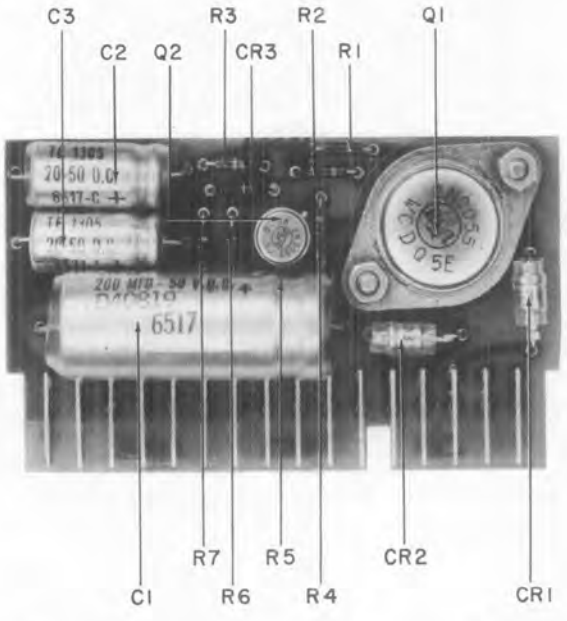


Figure 5-16. Type 7685 +24V Power Supply Regulator, Component Locations

5.4.11 Type 7670/1 -24V Regulated Power Supply

REF DESIG PREFIX A9

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 200 μF, 50V	1	39D207G050FJ4	56289
C2	CAPACITOR, ELECTROLYTIC: 20 μF, 50V	2	30D206G050DC4	56289
C3	Same as C2			
CR1	DIODE	2	1N3253	07688
CR2	Same as CR1			
CR3	DIODE, ZENER	1	1N759A	07688
Q1	TRANSISTOR	1	2N2869	07688
Q2	TRANSISTOR	1	2N526	07688
R1	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	2	CB1025	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 68k, 5%, 1/4W	1	CB6835	01121
R4	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	1	CB2235	01121
R5	RESISTOR, FIXED, COMPOSITION: 2.7k, 5%, 1/4W	2	CB2725	01121
R6	Same as R5			
R7*	RESISTOR, FIXED, COMPOSITION: 51 Ω, 5%, 1/4W	1	CB5105	01121

* Nominal value. Final value factory selected.

REF DESIG PREFIX A9

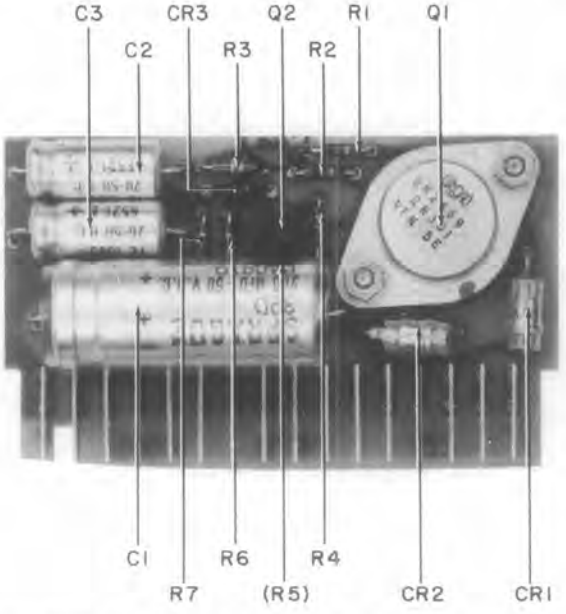


Figure 5-17. Type 7670/1 -24V Power Supply Regulator, Component Locations

5.4.12 Type 7688 +12V Regulated Power Supply

REF DESIG PREFIX A10

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC: 450 μF, 25V	1	39D457G025FJ4	56289
C2	CAPACITOR, ELECTROLYTIC: 20 μF, 50V	2	30D206G050DC4	56289
C3	Same as C2			
CR1	DIODE	2	1N3253	07688
CR2	Same as CR1			
CR3	DIODE, ZENER	1	1N753A	07688
Q1	TRANSISTOR	1	2N3055	07688
Q2	TRANSISTOR	1	2N3053	07688
R1	RESISTOR, FIXED, COMPOSITION: 510Ω, 5%, 1/4W	2	CB5115	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 33k, 5%, 1/4W	1	CB3335	01121
R4	RESISTOR, FIXED, COMPOSITION: 3.3k, 5%, 1/4W	1	CB3325	01121
R5	RESISTOR, FIXED, COMPOSITION: 1.5k, 5%, 1/4W	2	CB1525	01121
R6	Same as R5			
R7*	RESISTOR, FIXED, COMPOSITION: 330Ω, 5%, 1/4W	1	CB3315	01121

* Nominal value. Final value factory selected.

REF DESIG PREFIX A10

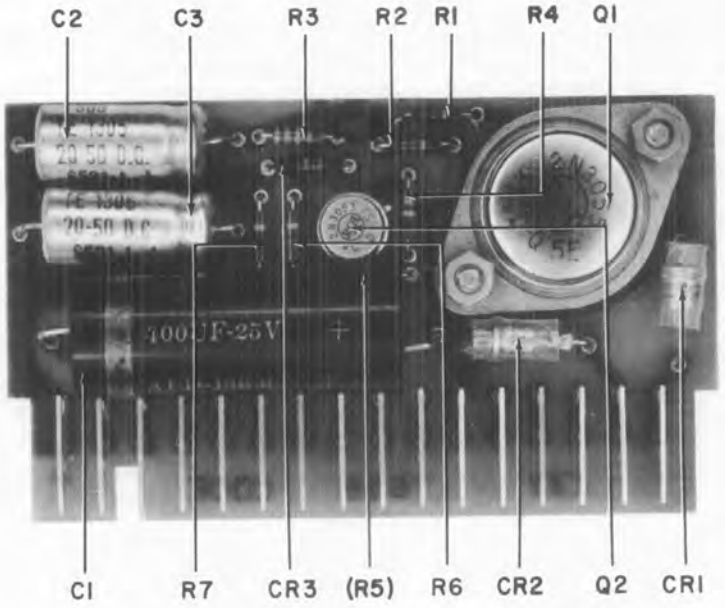


Figure 5-18. Type 7688 +12V Power Supply Regulator, Component Locations

5.4.13 Type 7506 Carrier Operated Relay (906A Only)

REF DESIG PREFIX A11

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	150D105X9035A2	56289
C2	CAPACITOR, ELECTROLYTIC, TANTALUM: 22 μF, 10%, 35V	1	150D226X9035R2	56289
CR1	DIODE	4	1N462A	07688
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
Q1	TRANSISTOR	3	2N2270	07688
Q2	TRANSISTOR	1	2N3251	07688
Q3	Same as Q1			
Q4	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 200k, 5%, 1/4W	4	CB2045	01121
R2	Same as R1			
R3	RESISTOR, FIXED, COMPOSITION: 3.3M, 5%, 1/4W	1	CB3355	01121
R4	RESISTOR, FIXED, COMPOSITION: 22k, 5%, 1/4W	2	CB2235	01121
R5	Same as R1			
R6	RESISTOR, FIXED, COMPOSITION: 10k, 5%, 1/4W	2	CB1035	01121
R7	Same as R6			
R8	Same as R1			
R9	Same as R4			
R10	RESISTOR, FIXED, COMPOSITION: 1.3k, 5%, 1/4W	1	CB1325	01121
R11	RESISTOR, FIXED, COMPOSITION: 100Ω, 5%, 1/4W	1	CB1015	01121

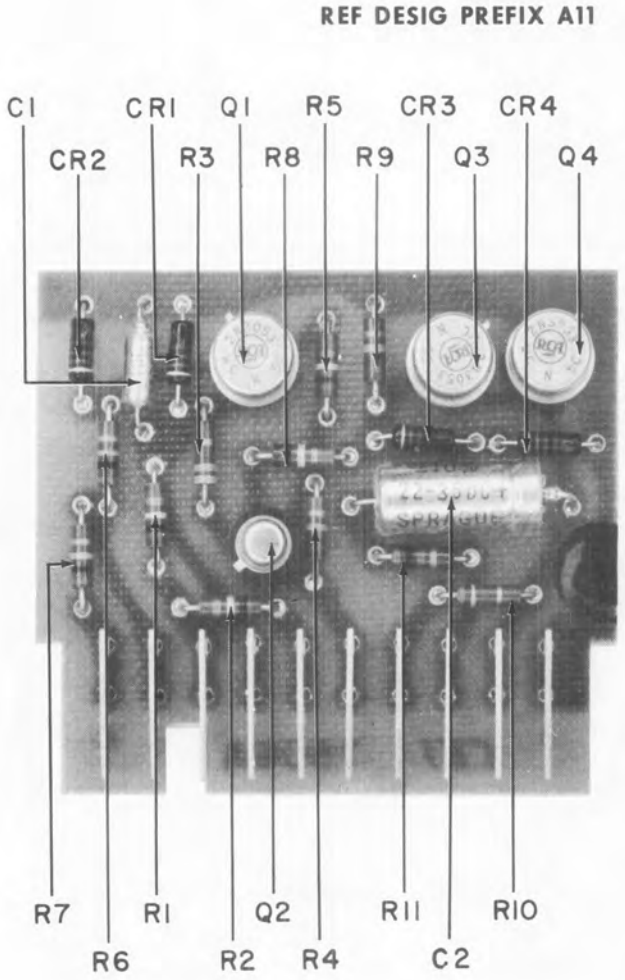


Figure 5-19. Type 7506 Carrier Operated Relay, Component Locations

5.4.14 Type 8304 Crystal Marker Oscillator

REF DESIG PREFIX A12

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	4	CM05E470J03	81349
C2	Same as C1			
C3	CAPACITOR, CERAMIC, DISC: 0.05 μF, 20%, 50V	2	55C23A1	56289
C4	CAPACITOR, DIPPED MICA: 150 pF, 5%, 100V	1	DM10-151J	72136
C5	Same as C3			
C6	CAPACITOR, DIPPED MICA: 51 pF, 5%, 500V	2	DM10-510J	72136
C7	Same as C1			
C8	Same as C1			
C9	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C-102W	01121
C10	Same as C9			
C11	Same as C6			
CR1	DIODE	1	hpa-0112	28480
J1	CONNECTOR, RECEPTACLE, MB	1	46025	74868
L1	COIL, FIXED	1	1131-40	14632
Q1	TRANSISTOR	2	2N706	07688
Q2	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 200kΩ, 5%, 1/4W	2	CB2045	01121
R2	RESISTOR, FIXED, COMPOSITION: 680Ω, 5%, 1/4W	1	CB6815	01121
R3	RESISTOR, FIXED, COMPOSITION: 2kΩ, 5%, 1/4W	2	CB2025	01121
R4	Same as R3			
R5	RESISTOR, FIXED, COMPOSITION: 3.0k, 5%, 1/4W	1	CB3025	01121
R6	RESISTOR, FIXED, COMPOSITION: 1.0kΩ, 5%, 1/4W	1	CB1025	01121
R7	RESISTOR, FIXED, COMPOSITION: 3.9k, 5%, 1/4W	2	CB3925	01121
R8	Same as R7			
R9	Same as R1			
R10	RESISTOR, FIXED, COMPOSITION: 680Ω, 5%, 1/4W	1	CB6815	01121
R11	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	2	CB4705	01121
R12	Same as R11			

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
Y1	CRYSTAL, QUARTZ: 1.0 MHz, Except w/wire leads	1	CR-18/U	81349
Y2	CRYSTAL, QUARTZ: 5.0 MHz, Except w/wire leads	1	CR-18/U	81349

REF DESIG PREFIX A12

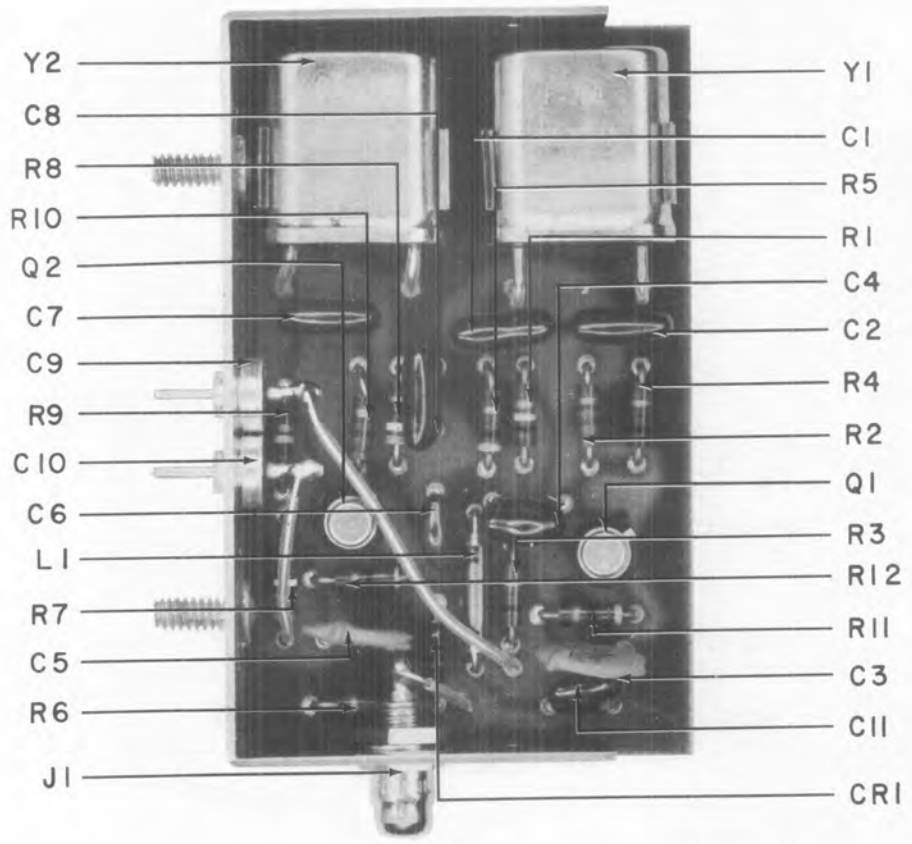
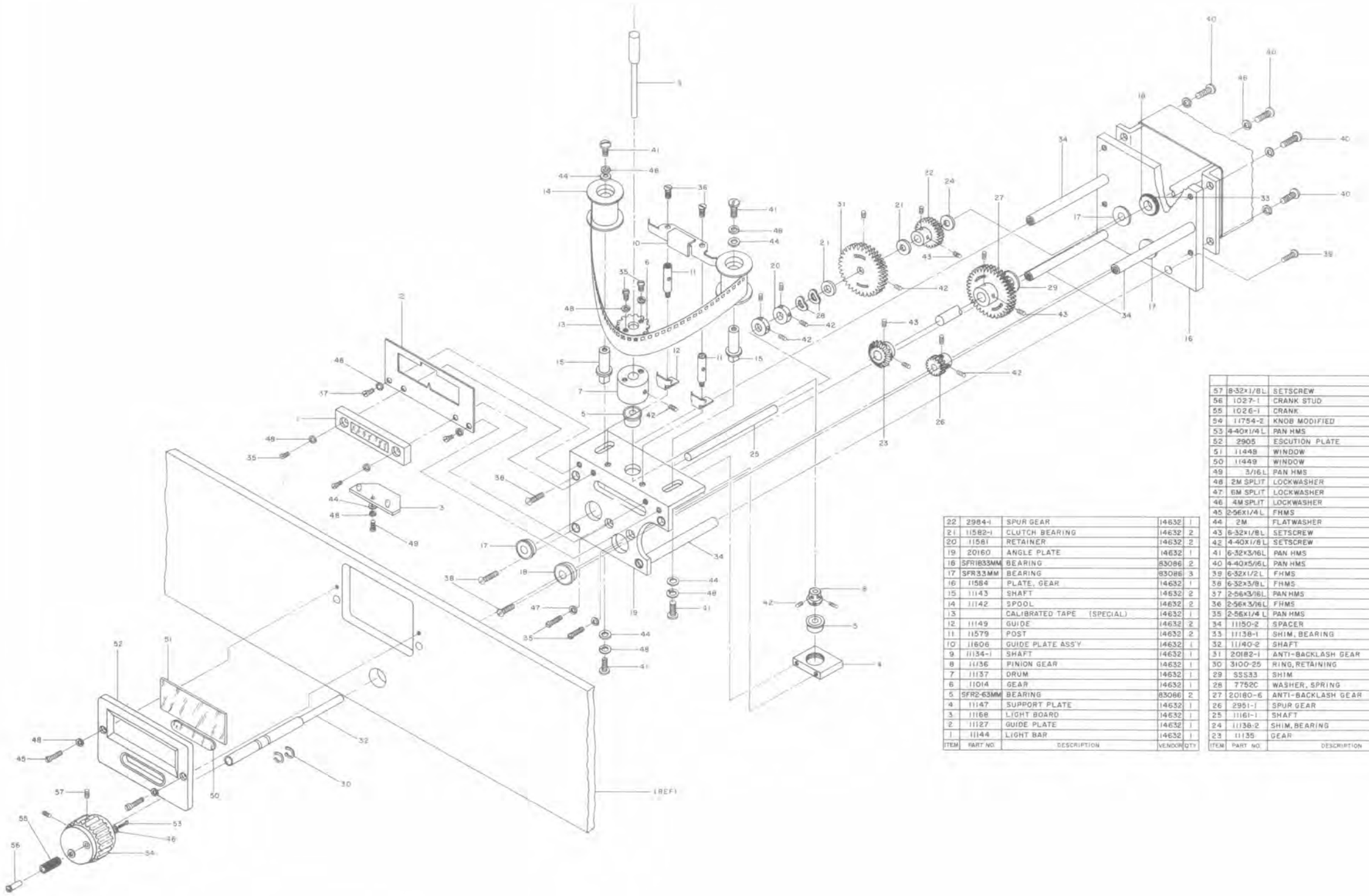


Figure 5-20. Type 8304 Crystal Marker Oscillator, Component Locations

SECTION VI

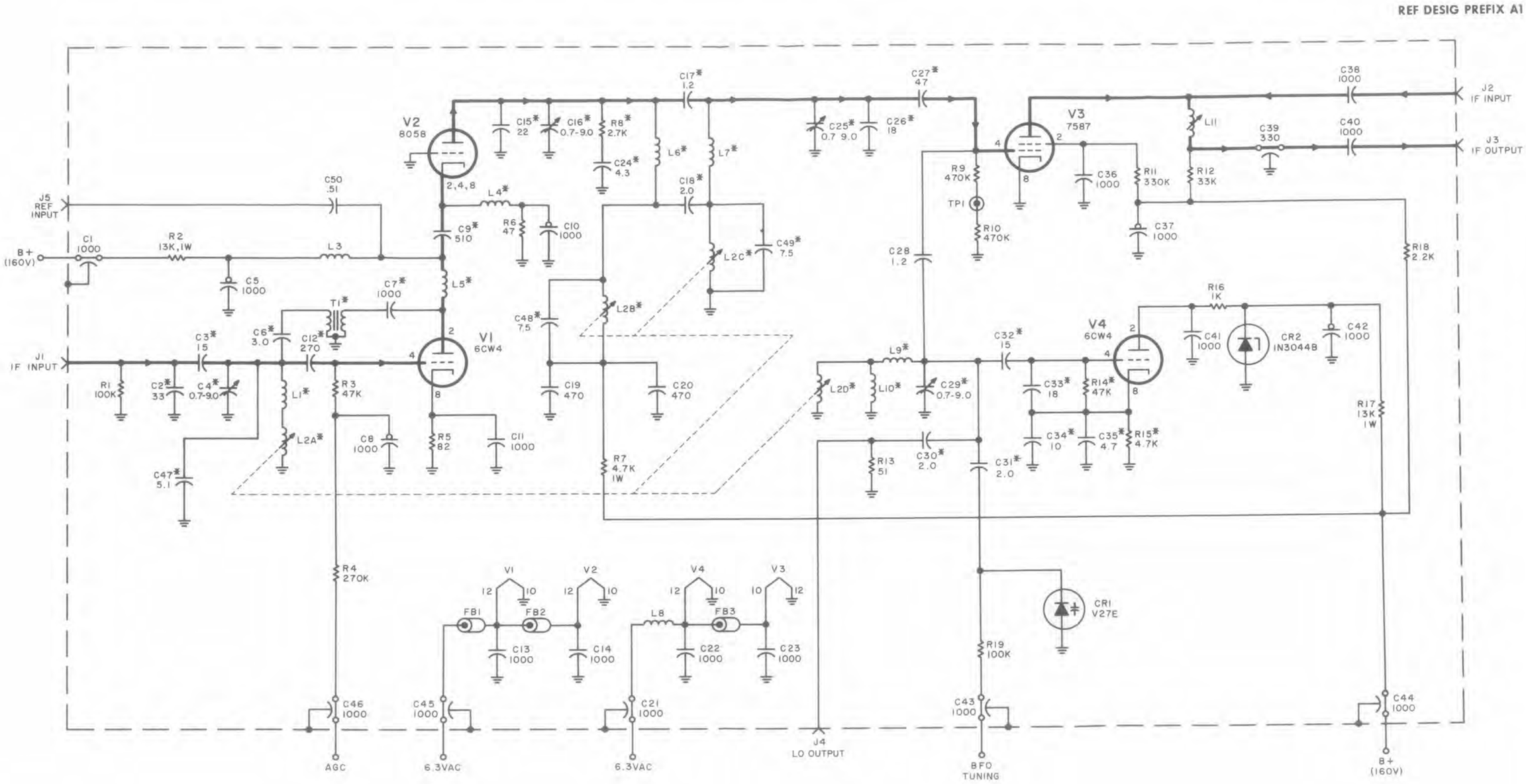
SCHEMATIC DIAGRAMS



ITEM	PART NO.	DESCRIPTION	VENDOR	QTY
22	29841	SPUR GEAR	14632	1
21	11582-1	CLUTCH BEARING	14632	2
20	11581	RETAINER	14632	2
19	20160	ANGLE PLATE	14632	1
18	SFR1833MM	BEARING	83086	2
17	SFR33MM	BEARING	83086	3
16	11584	PLATE, GEAR	14632	1
15	11143	SHAFT	14632	2
14	11142	SPOOL	14632	2
13		CALIBRATED TAPE (SPECIAL)	14632	1
12	11149	GUIDE	14632	2
11	11579	POST	14632	2
10	11606	GUIDE PLATE ASS'Y	14632	1
9	11134-1	SHAFT	14632	1
8	11136	PINION GEAR	14632	1
7	11137	DRUM	14632	1
6	11014	GEAR	14632	1
5	SFR2-63MM	BEARING	83086	2
4	11147	SUPPORT PLATE	14632	1
3	11168	LIGHT BOARD	14632	1
2	11127	GUIDE PLATE	14632	1
1	11144	LIGHT BAR	14632	1

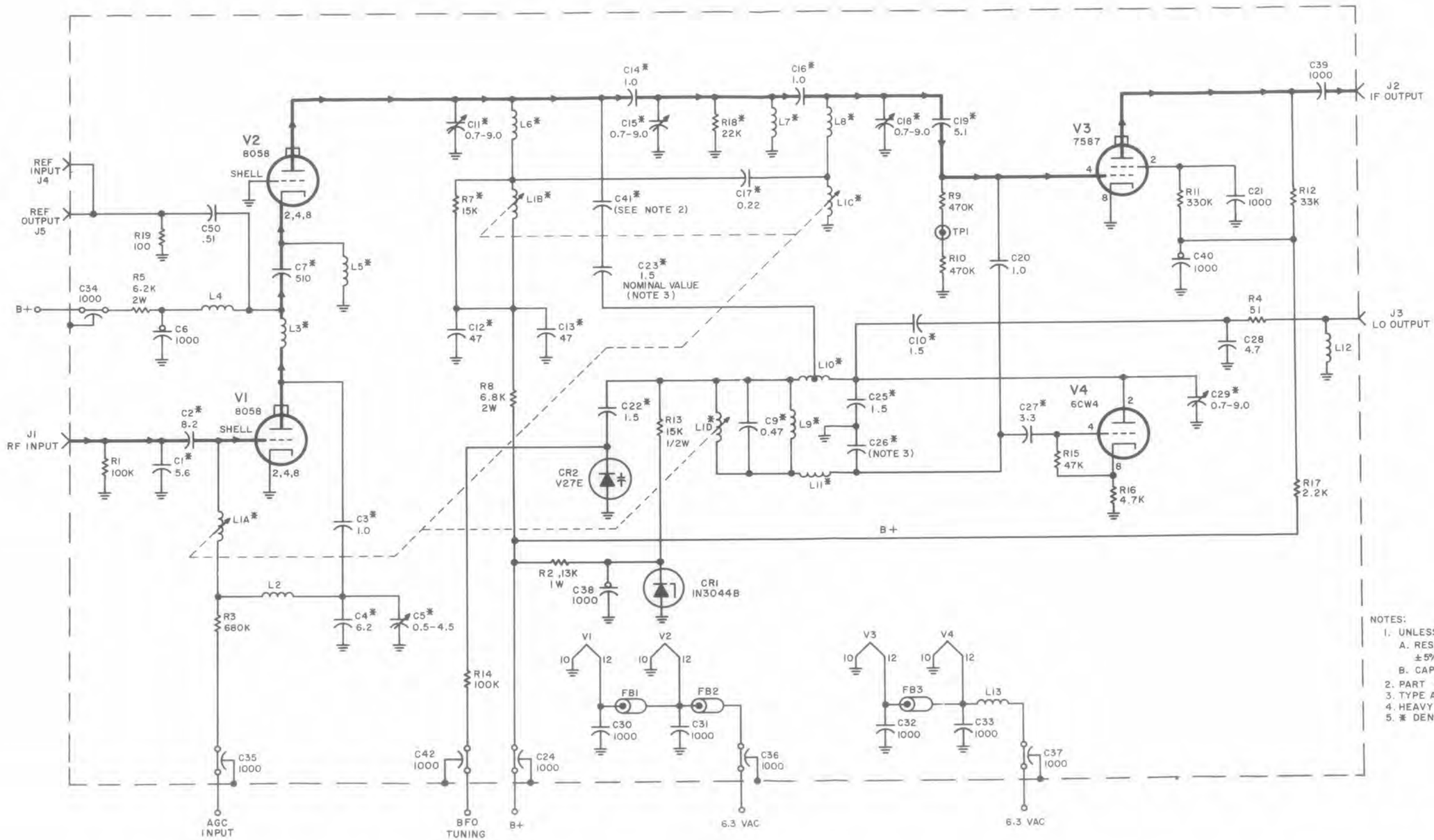
ITEM	PART NO.	DESCRIPTION	VENDOR	QTY
57	8-32X1/8L	SETSCREW	96906	2
56	1027-1	CRANK STUD	14632	1
55	1026-1	CRANK	14632	1
54	11754-2	KNOB MODIFIED	14632	1
53	4-40X1/4L	PAN HMS	96906	1
52	2905	ESCUTION PLATE	14632	1
51	11448	WINDOW	14632	1
50	11449	WINDOW	14632	1
49	3/16L	PAN HMS	96906	1
48	2M SPLIT	LOCKWASHER	96906	13
47	6M SPLIT	LOCKWASHER	96906	2
46	4M SPLIT	LOCKWASHER	96906	5
45	2-56X1/4L	FHMS	96906	2
44	2M	FLATWASHER	96906	5
43	6-32X1/8L	SETSCREW	96906	6
42	4-40X1/8L	SETSCREW	96906	11
41	6-32X3/16L	PAN HMS	96906	4
40	4-40X5/16L	PAN HMS	96906	4
39	6-32X1/2L	FHMS	96906	4
38	6-32X3/8L	FHMS	96906	4
37	2-56X3/16L	PAN HMS	96906	2
36	2-56X3/16L	FHMS	96906	2
35	2-56X1/4 L	PAN HMS	96906	6
34	11150-2	SPACER	14632	4
33	11138-1	SHIM, BEARING	14632	1
32	11140-2	SHAFT	14632	1
31	20182-1	ANTI-BACKLASH GEAR	14632	1
30	3100-25	RING, RETAINING	79464	2
29	SSS33	SHIM	01351	1
28	7752C	WASHER, SPRING	04941	2
27	20180-6	ANTI-BACKLASH GEAR	14632	1
26	2951-1	SPUR GEAR	14632	1
25	11161-1	SHAFT	14632	1
24	11138-2	SHIM, BEARING	14632	1
23	11135	GEAR	14632	1

Figure 4-1. Gear Train Assembly, Exploded View



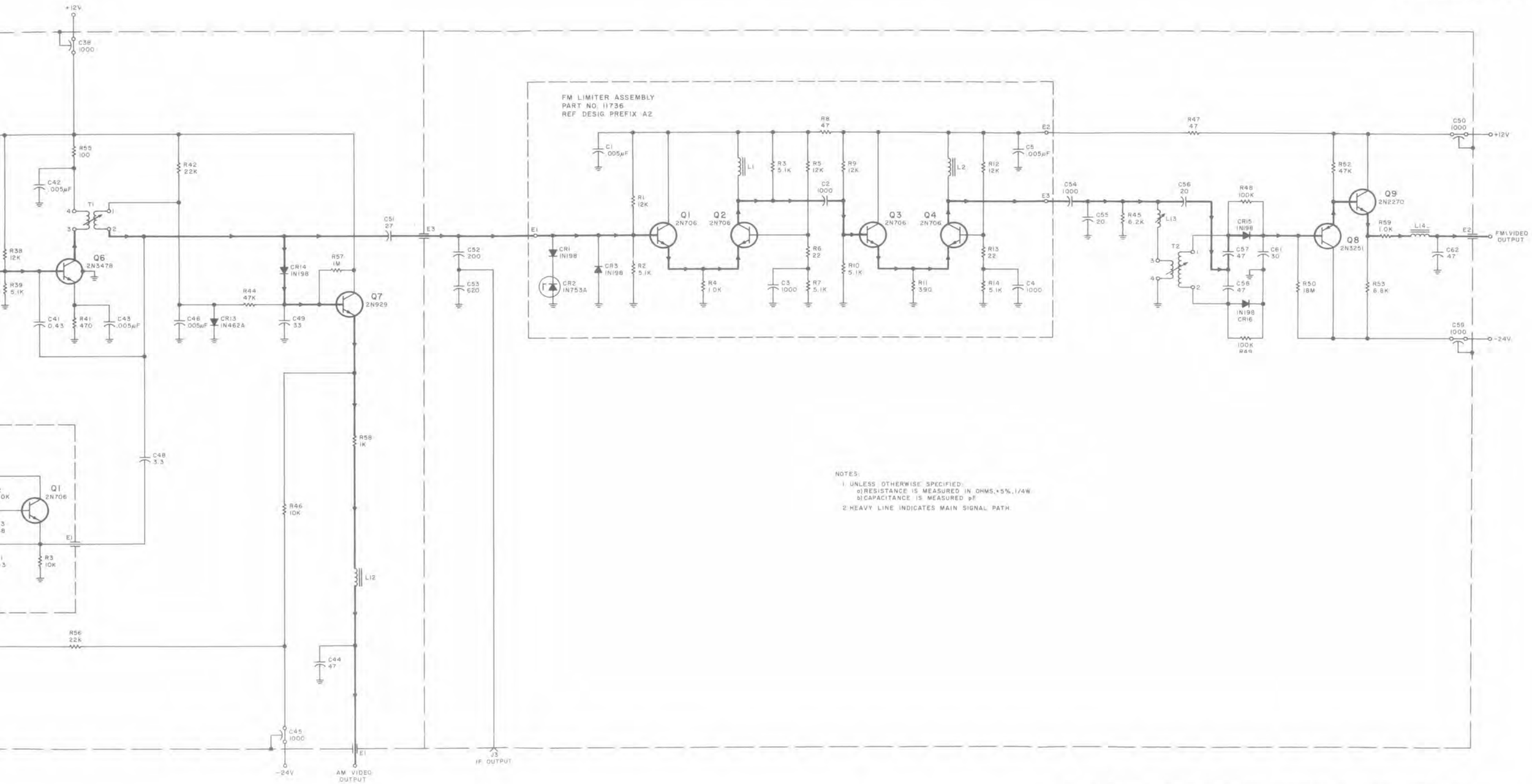
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN pf
2. HEAVY LINE DENOTES MAIN SIGNAL PATH
3. * INDICATES NON-MAINTENANCE ITEM.

Figure 6-1. Type 71119 30-90-MHz RF Tuner, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN pf.
2. PART OF CIRCUIT BOARD, CEI #1101.
3. TYPE AND VALUE FACTORY SELECTED
4. HEAVY LINE DENOTES MAIN SIGNAL PATH
5. * DENOTES NON-MAINTENANCE ITEM.

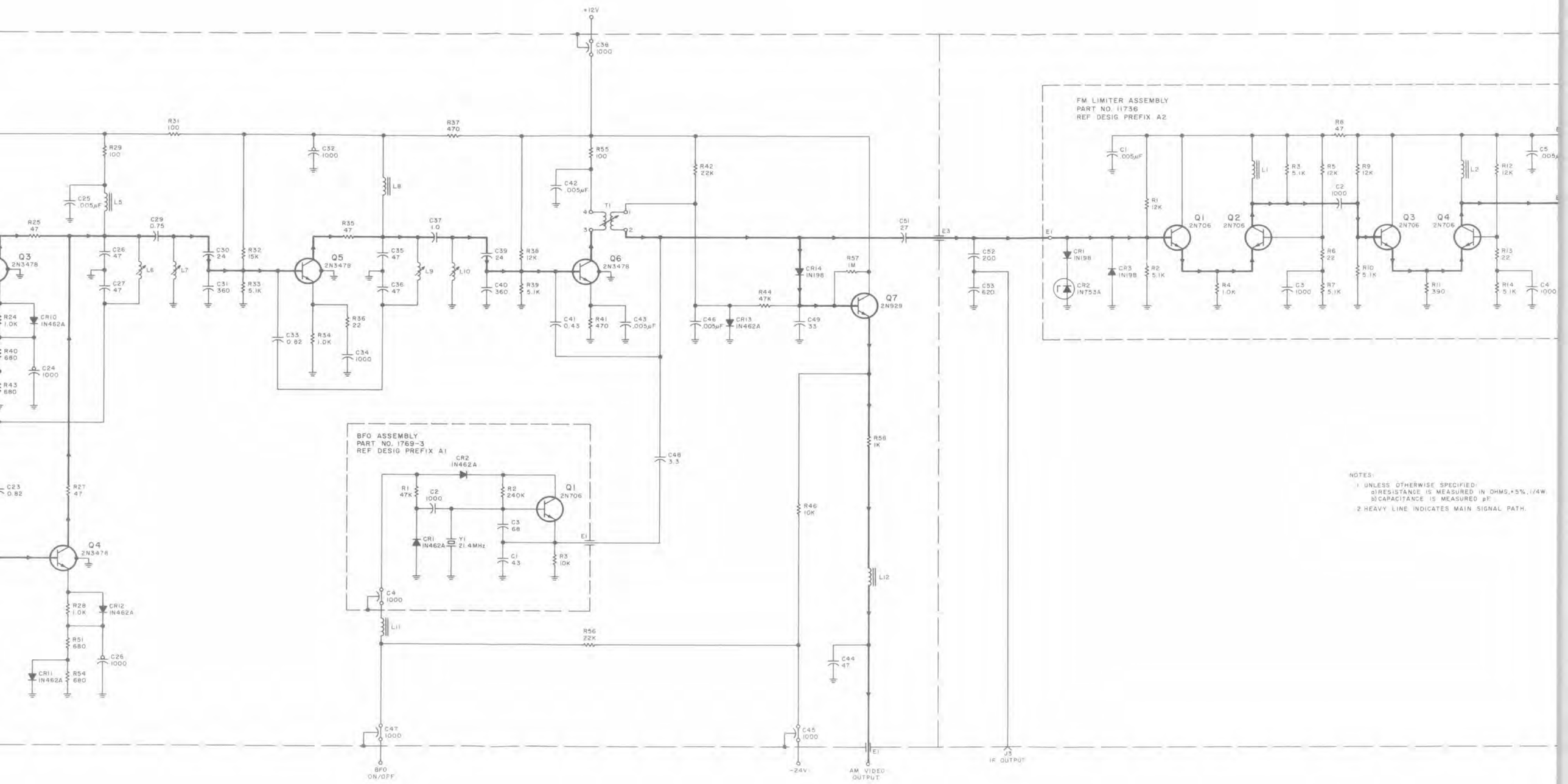
Figure 6-2. Type 71120 60-300-MHz RF Tuner, Schematic Diagram



NOTES:

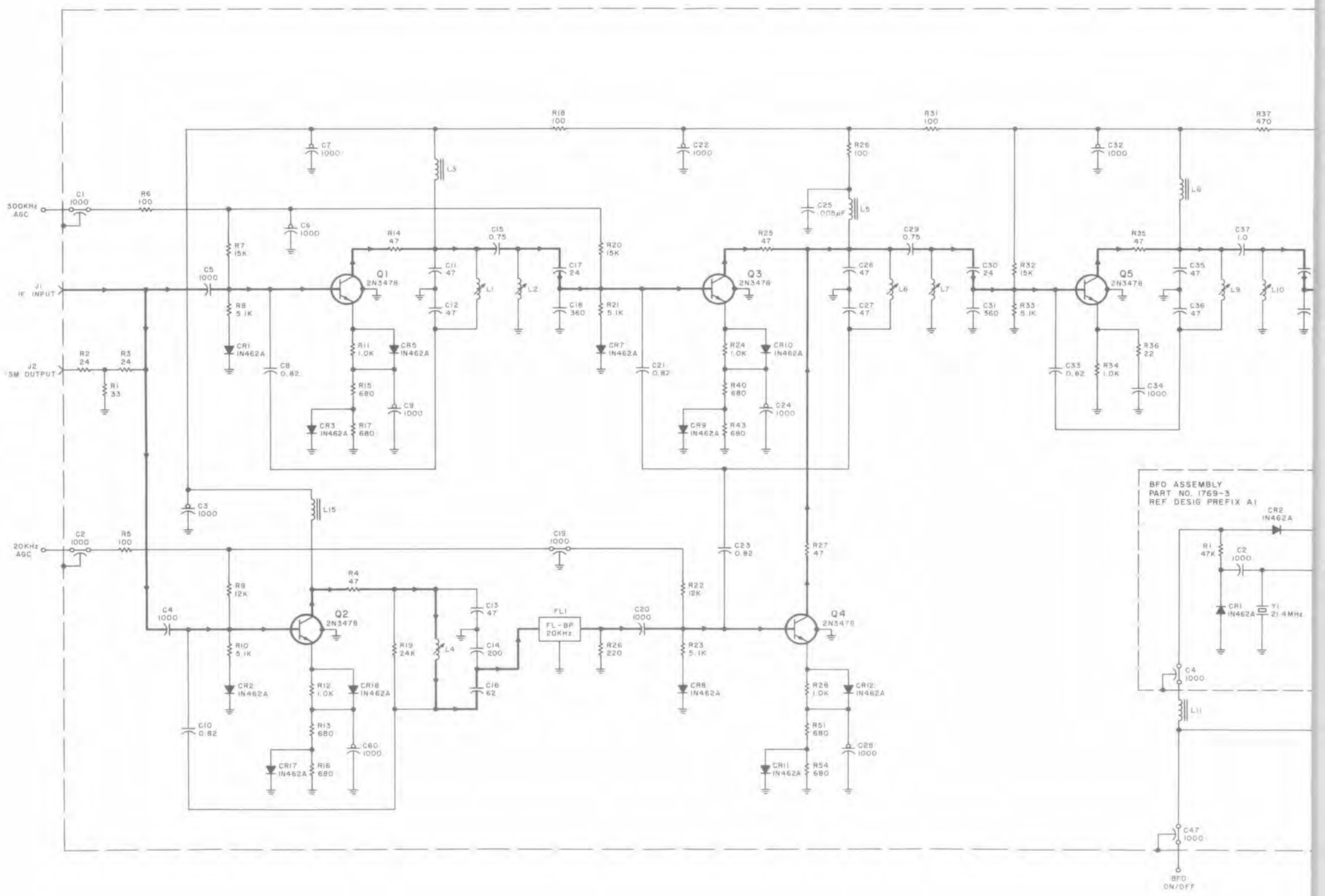
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED pF
2. HEAVY LINE INDICATES MAIN SIGNAL PATH.

Figure 6-3. Type 72145 20/300-kHz Bandwidth IF Amplifier, Schematic Diagram

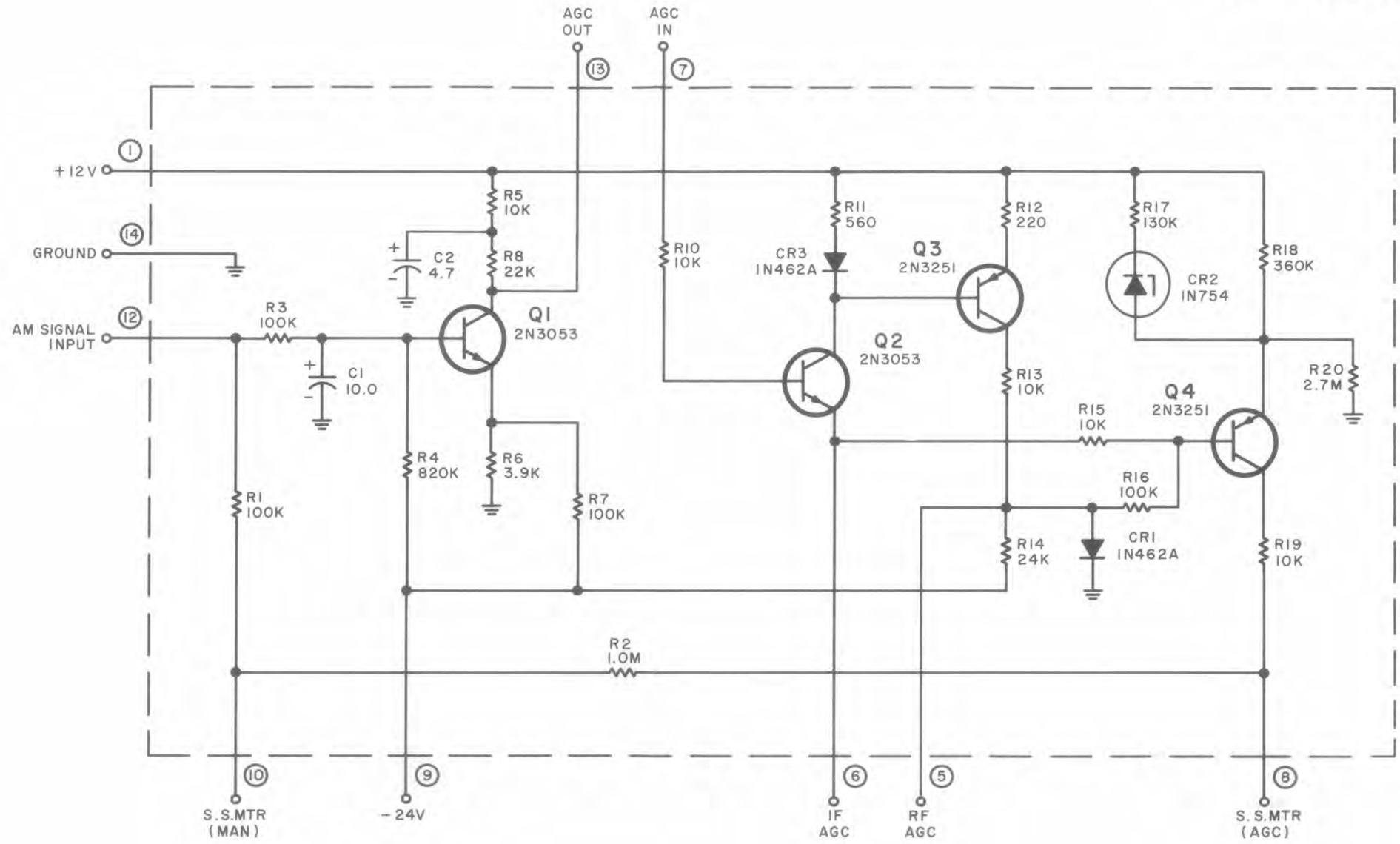


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED μF.
2. HEAVY LINE INDICATES MAIN SIGNAL PATH.



REF DESIG PREFIX A4

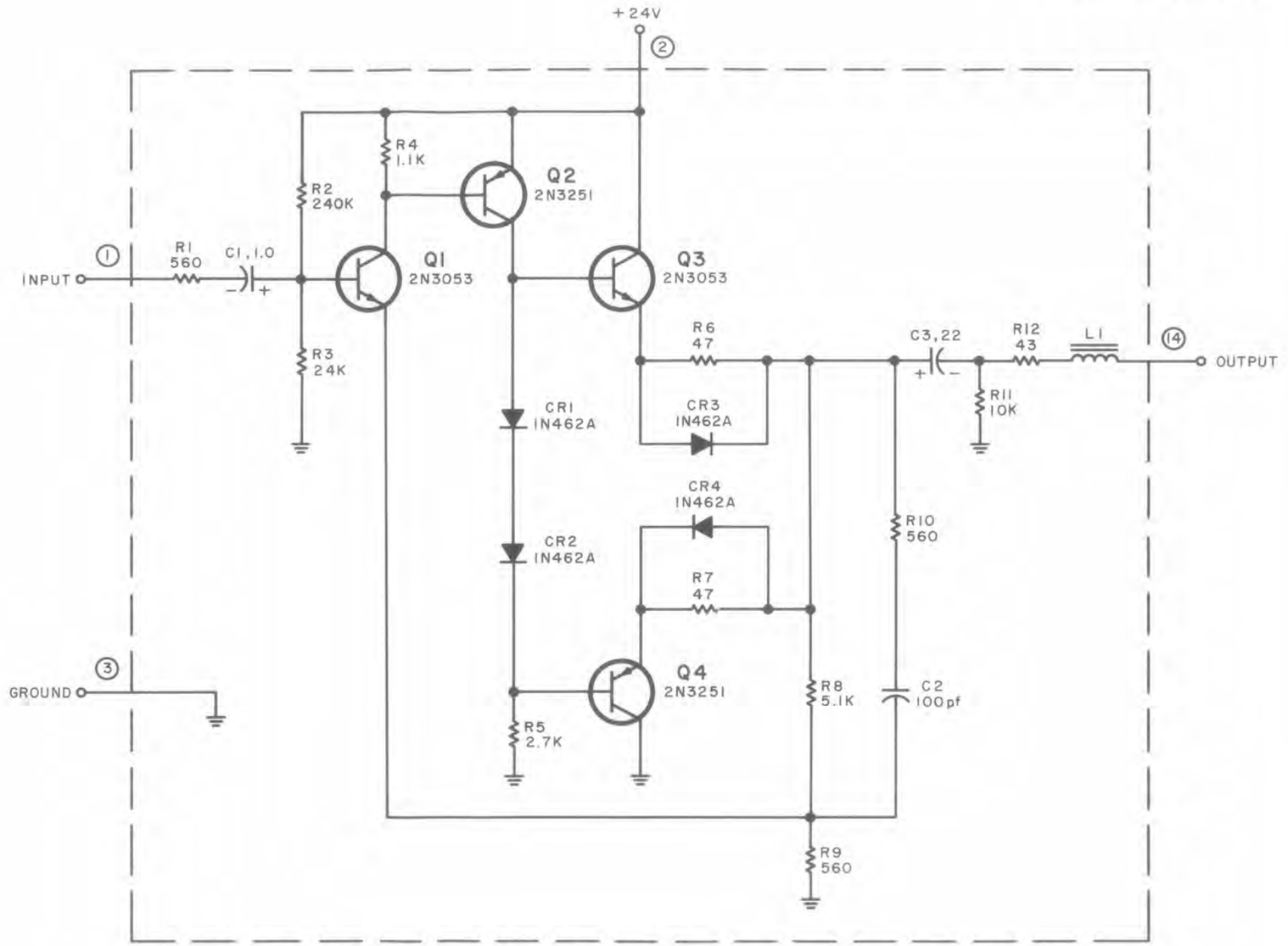


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   B. CAPACITANCE IS MEASURED IN μf.

Figure 6-4. Type 7830 AGC Amplifier, Schematic Diagram

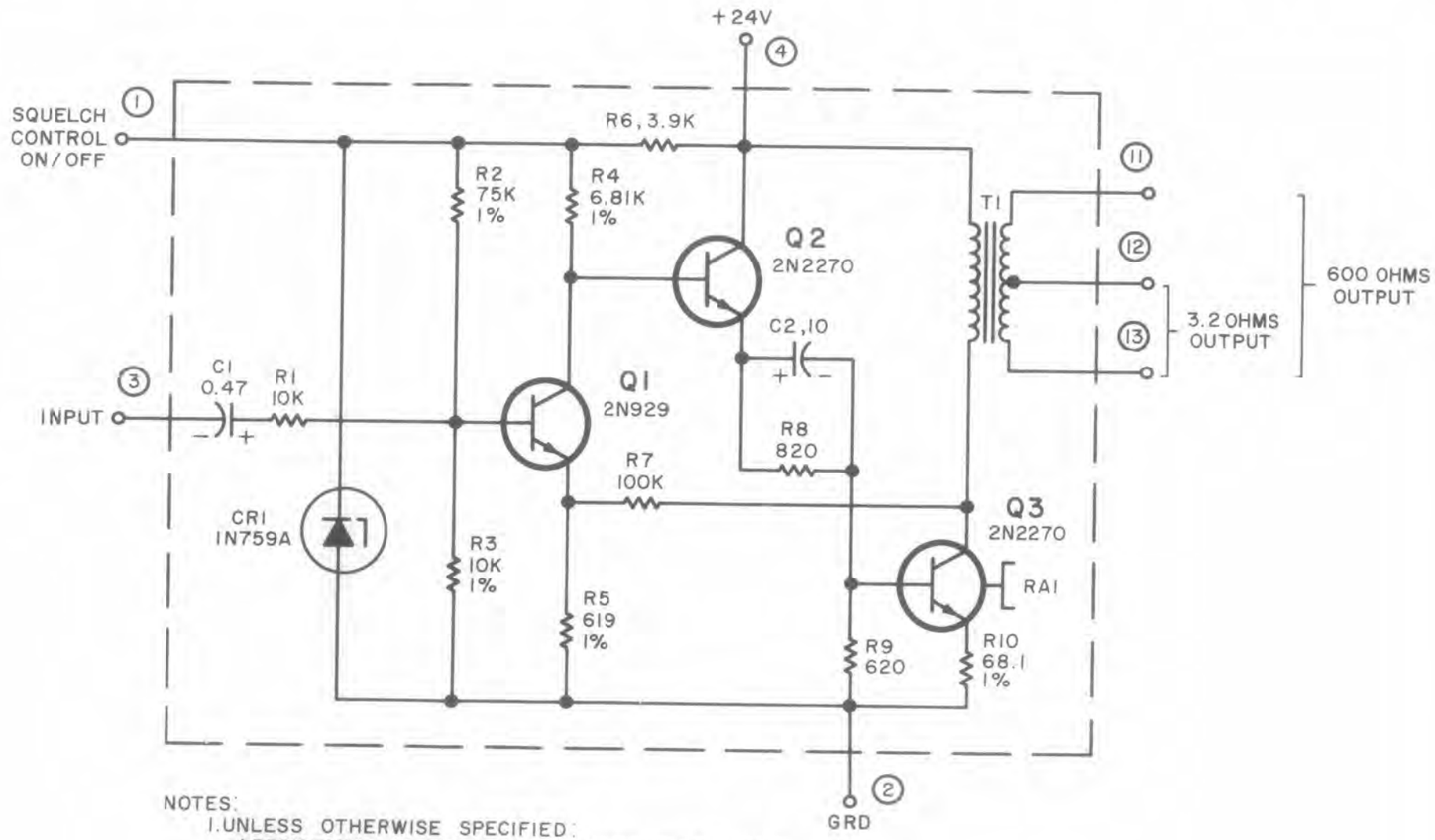
REF DESIG PREFIX A5



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 6-5. Type 7324 Video Amplifier, Schematic Diagram

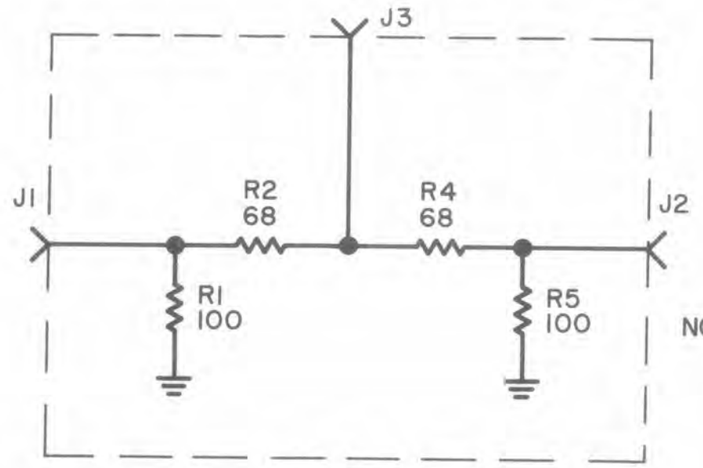
REF DESIG PREFIX A6



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

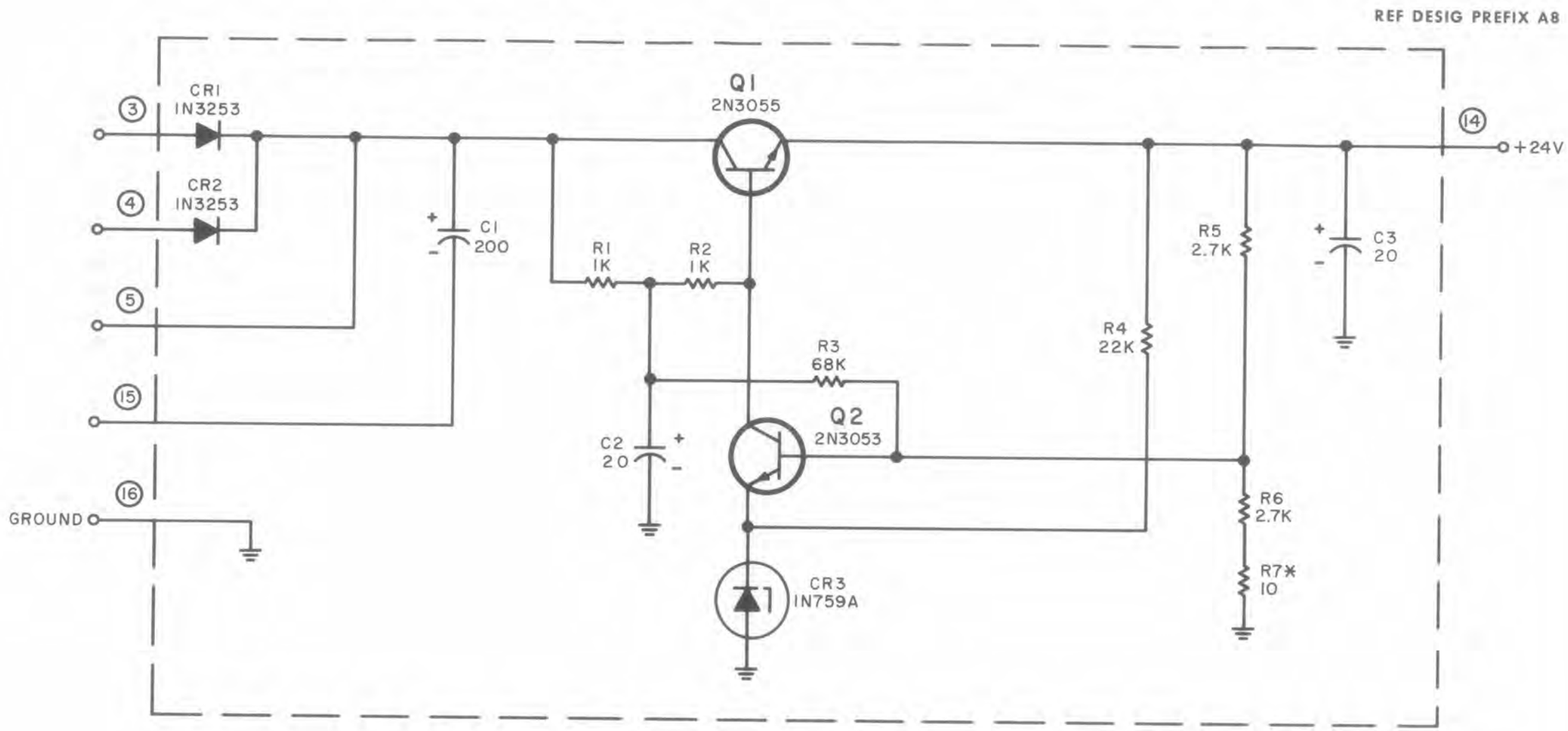
Figure 6-6. Type 7400B Audio Amplifier, Schematic Diagram

REF DESIG PREFIX A7



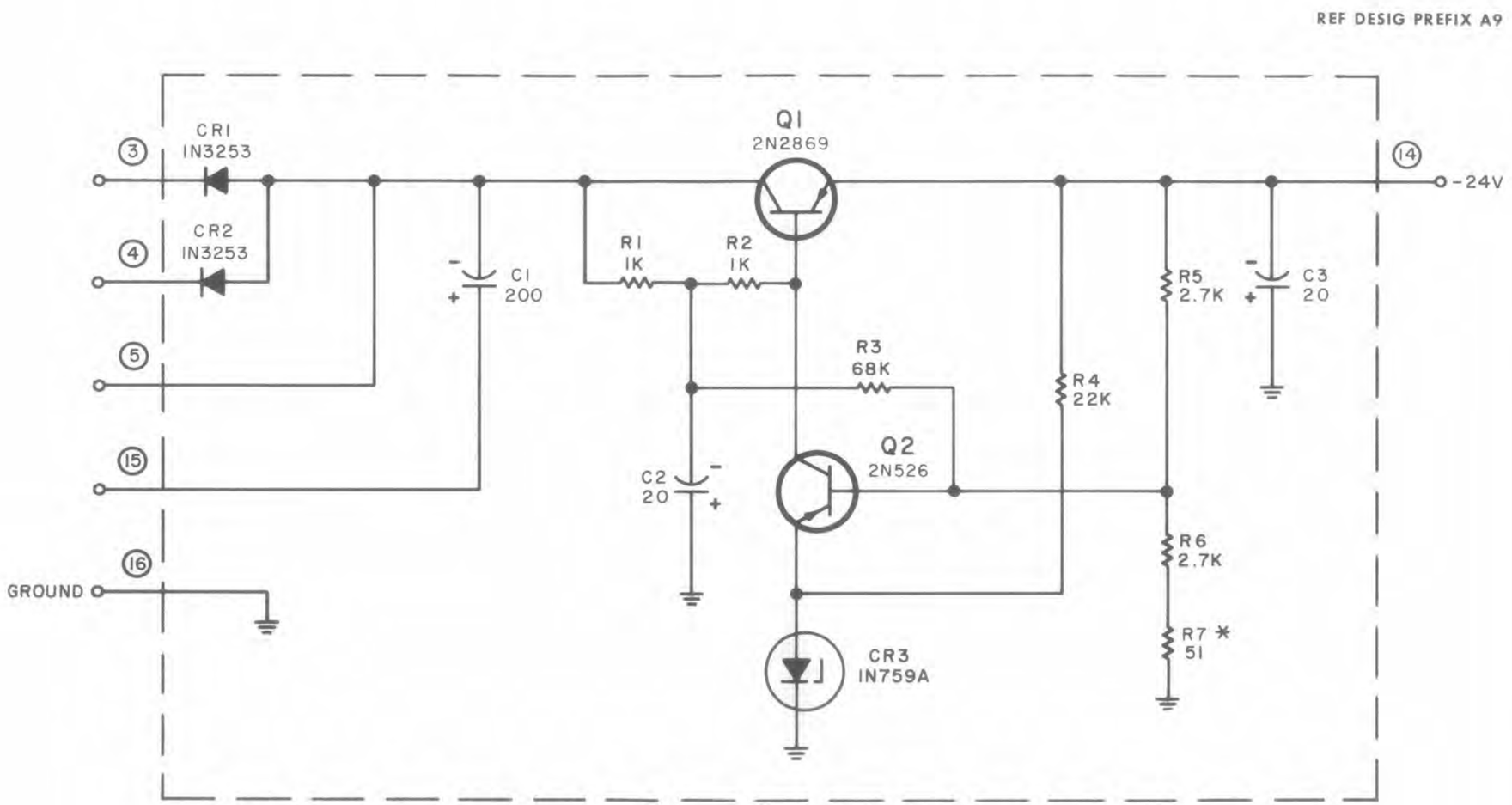
NOTE:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS MEASURED IN OHMS ±5%, 1/4W.

Figure 6-7. Type 7917 LO Coupling Network, Schematic Diagram



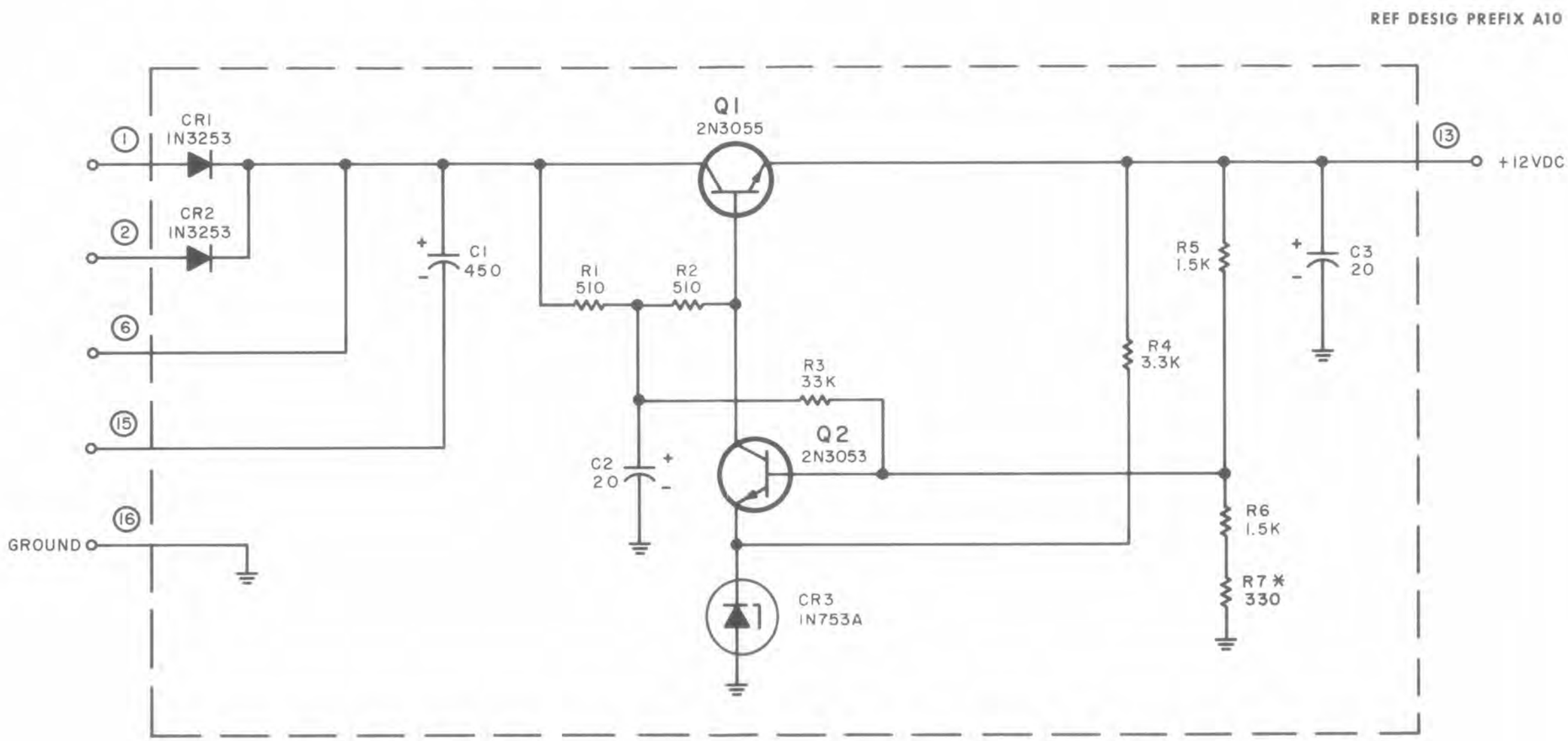
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN μf
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS
3. * NOMINAL VALUE; FINAL VALUE TO BE FACTORY SELECTED

Figure 6-8. Type 7685 +24V Power Supply Regulator, Schematic Diagram



NOTES :
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ± 5 %, 1/4 W
   b) CAPACITANCE IS MEASURED IN µf
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS
3. * INDICATES NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

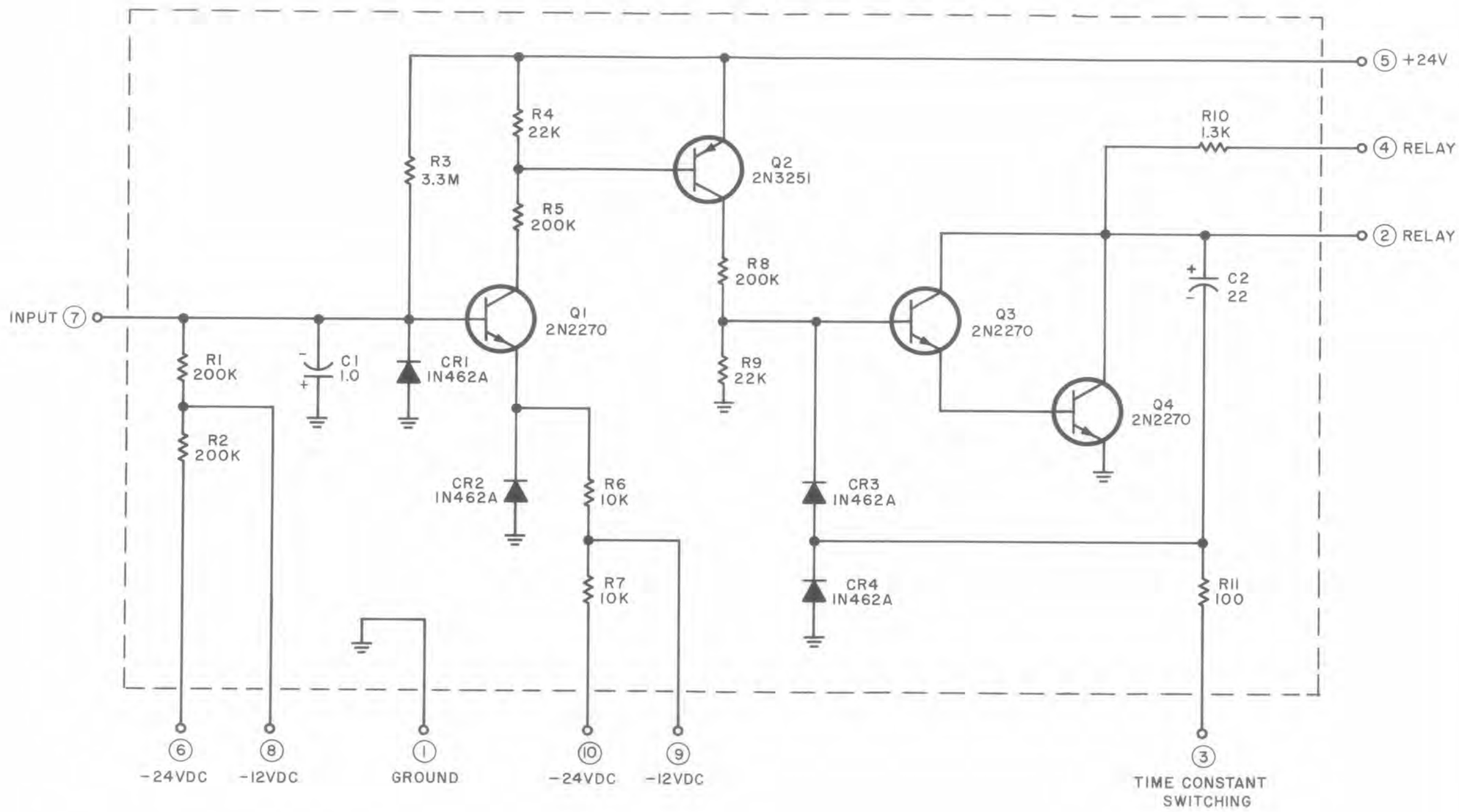
Figure 6-9. Type 7670/1 -24V Power Supply Regulator, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN μf
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS
* 3. INDICATES NOMINAL VALUE; FINAL VALUE FACTORY SELECTED

Figure 6-10. Type 7688 +12V Power Supply Regulator, Schematic Diagram

REF DESIG PREFIX A11

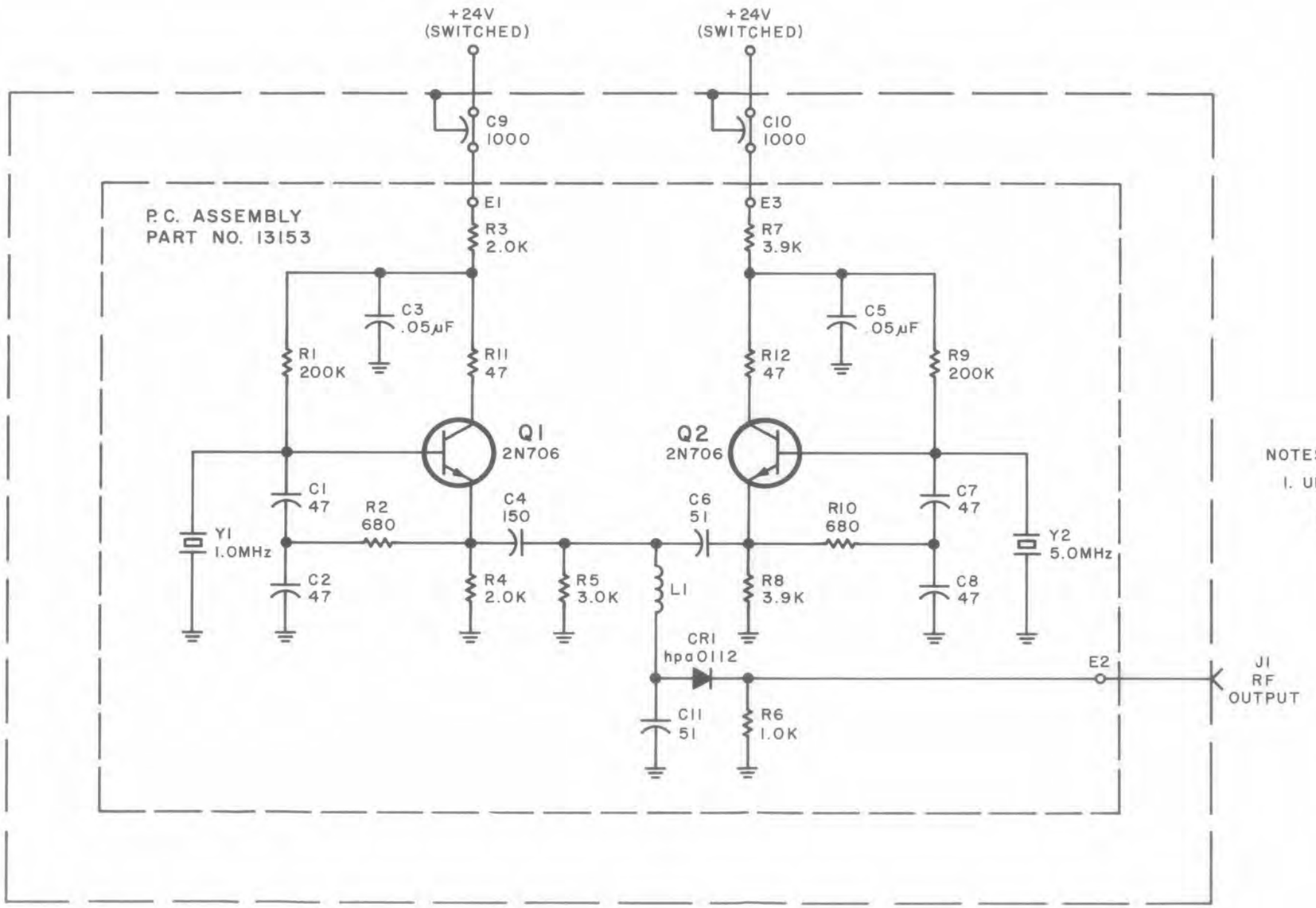


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a.) CAPACITANCE IS MEASURED IN μf.
   b.) RESISTANCE IS MEASURED IN OHMS, 1/4 W, 5%.
   c.) ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.

Figure 6-11. Type 7506 Carrier Operated Relay, Schematic Diagram

REF DESIG PREFIX A12



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURE IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.

Figure 6-12. Type 8304 Crystal Marker Oscillator, Schematic Diagram

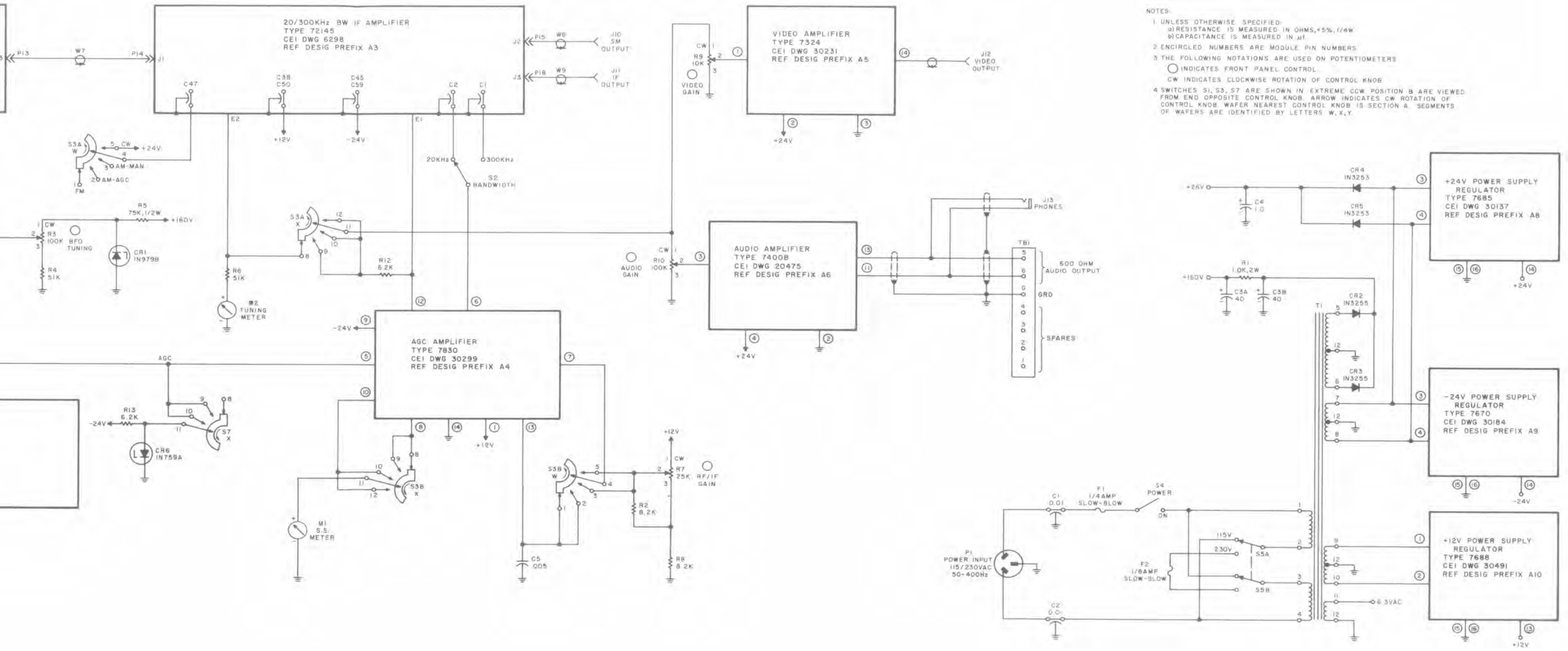
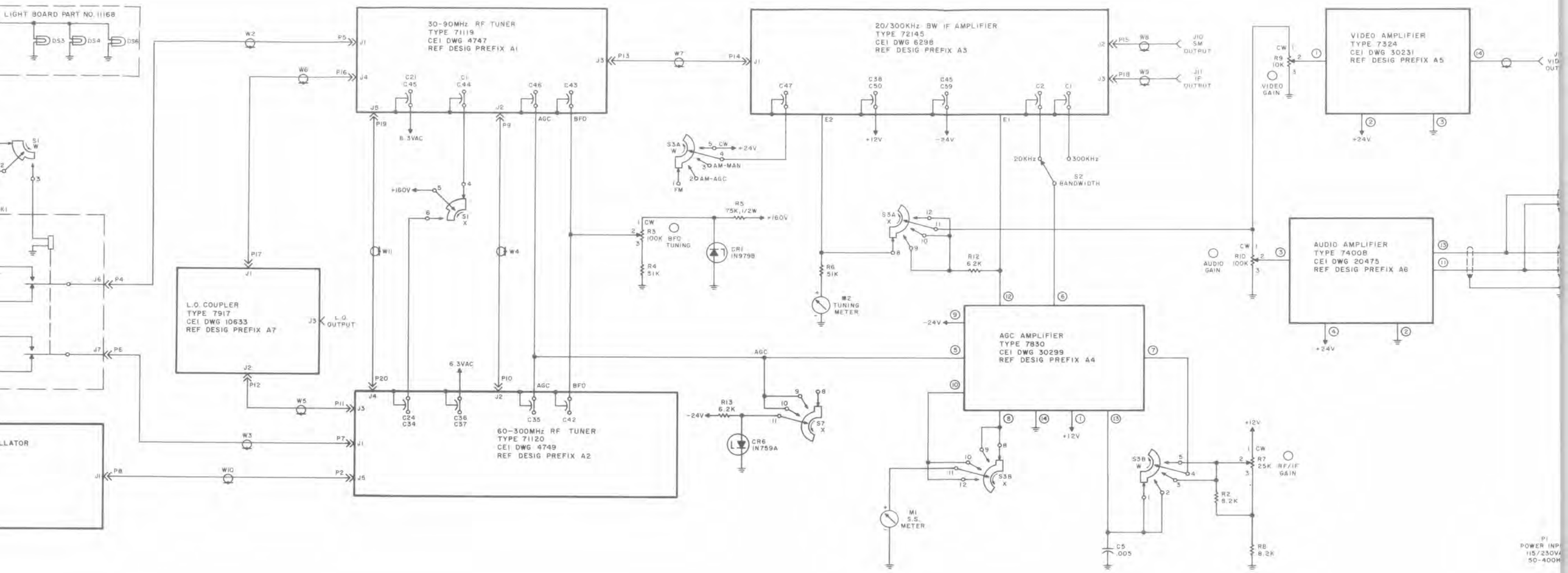
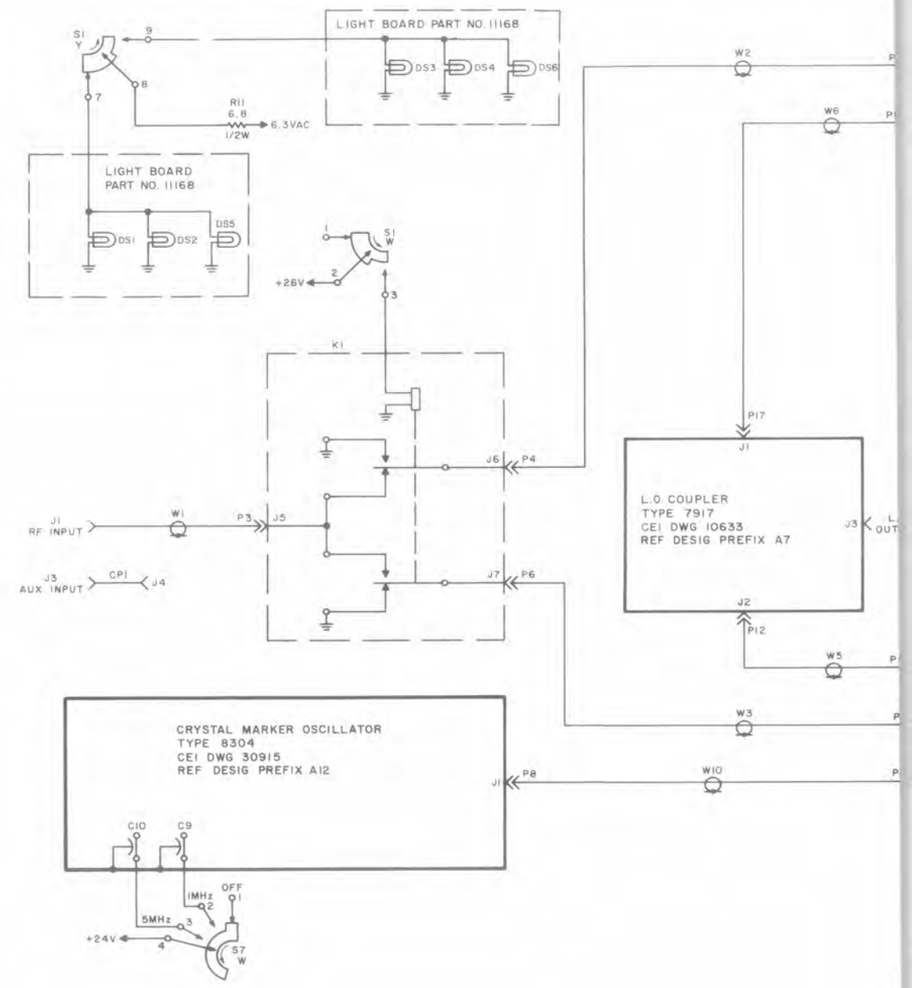
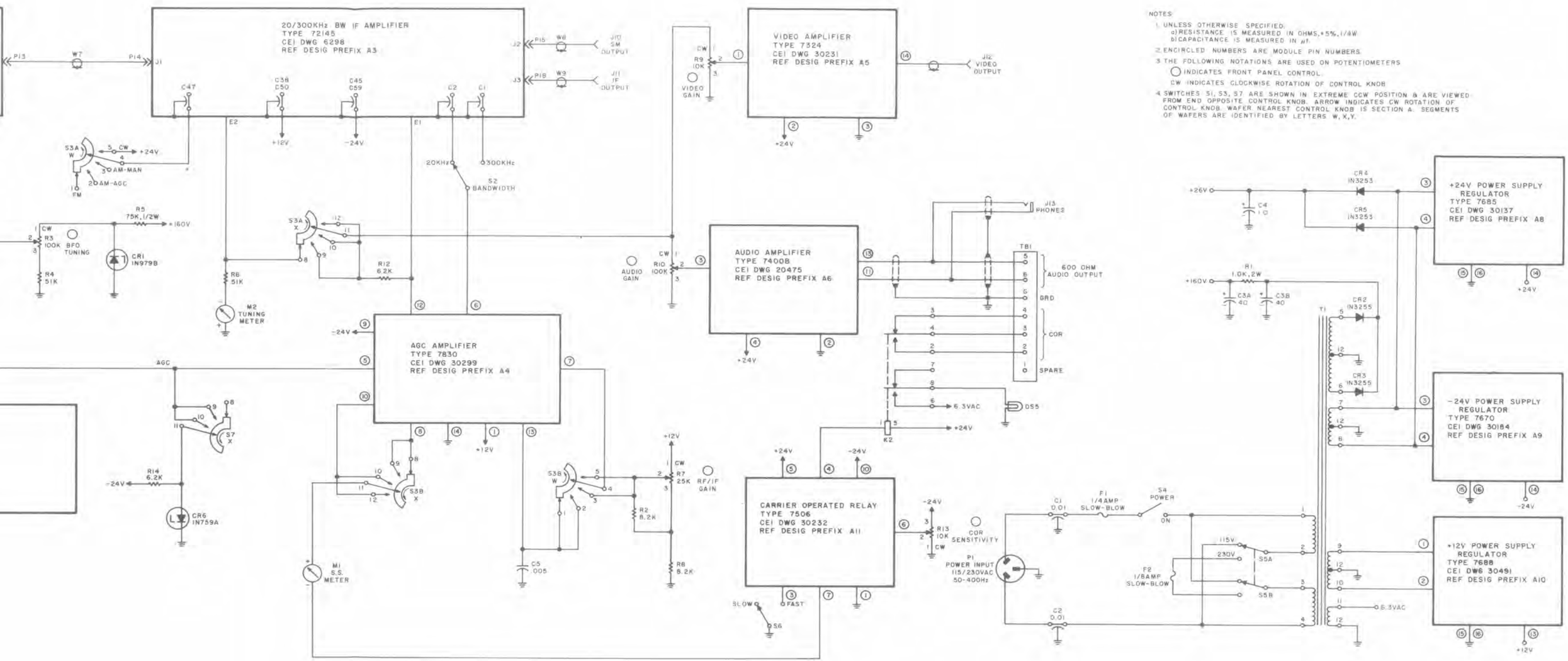


Figure 6-13. Type 904A Receiver, Main Chassis Schematic Diagram



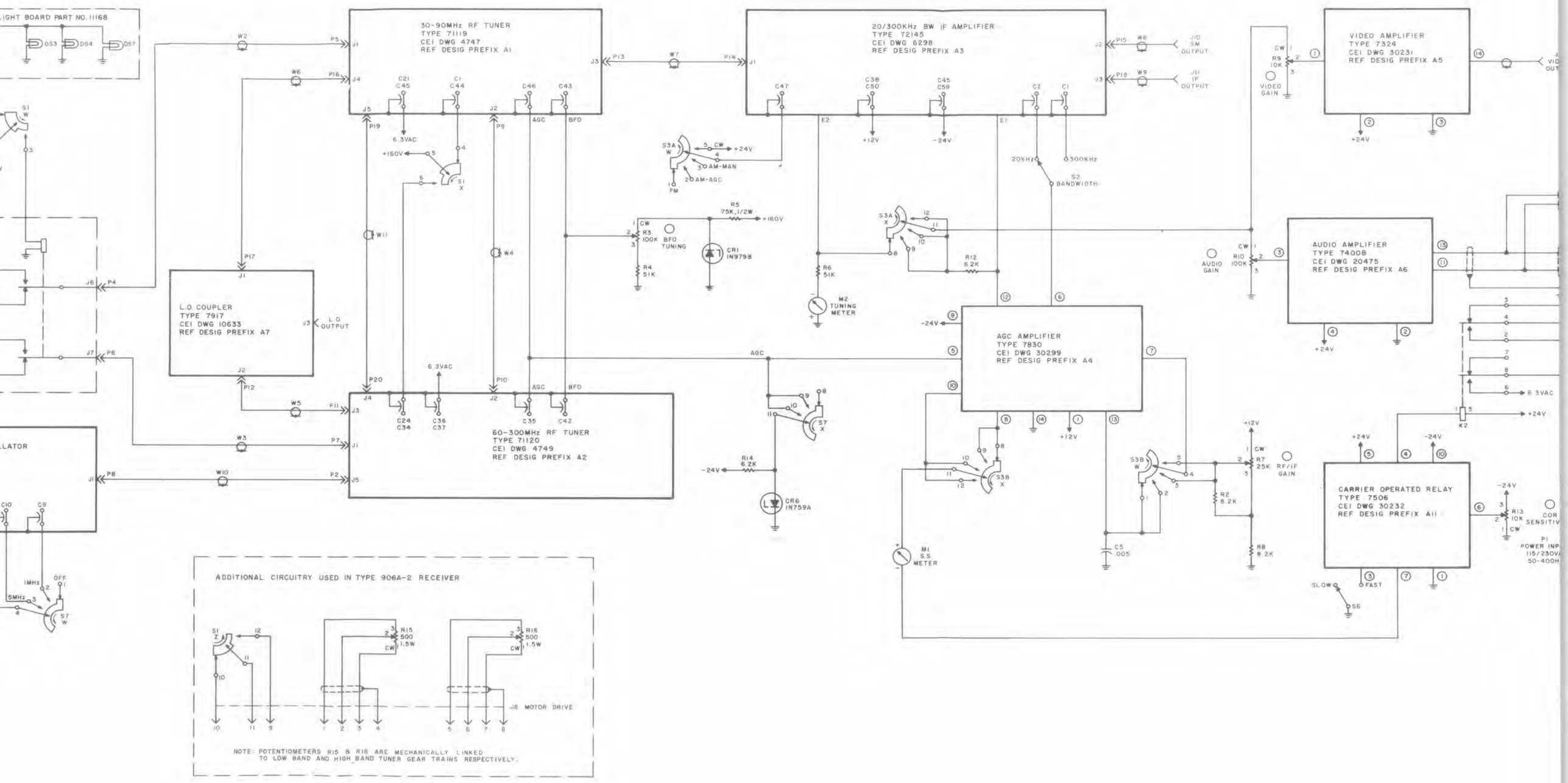




NOTES:

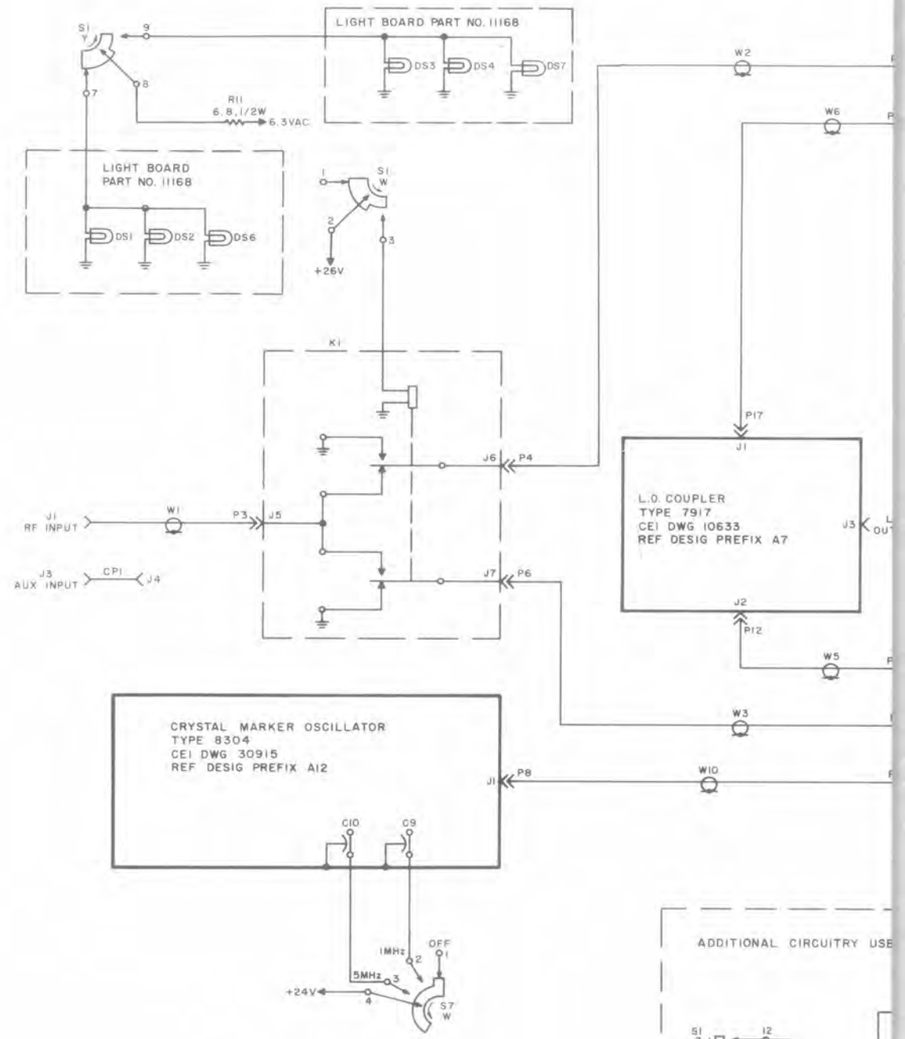
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   ◯ INDICATES FRONT PANEL CONTROL.
   CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
4. SWITCHES S1, S3, S7 ARE SHOWN IN EXTREME CCW POSITION & ARE VIEWED FROM END OPPOSITE CONTROL KNOB. ARROW INDICATES CW ROTATION OF CONTROL KNOB. WAFER NEAREST CONTROL KNOB IS SECTION A. SEGMENTS OF WAFERS ARE IDENTIFIED BY LETTERS W, X, Y.

Figure 6-14. Type 906A Receiver, Main Chassis Schematic Diagram



ADDITIONAL CIRCUITRY USED IN TYPE 906A-2 RECEIVER

NOTE: POTENTIOMETERS R15 & R16 ARE MECHANICALLY LINKED TO LOW BAND AND HIGH BAND TUNER GEAR TRAINS RESPECTIVELY.



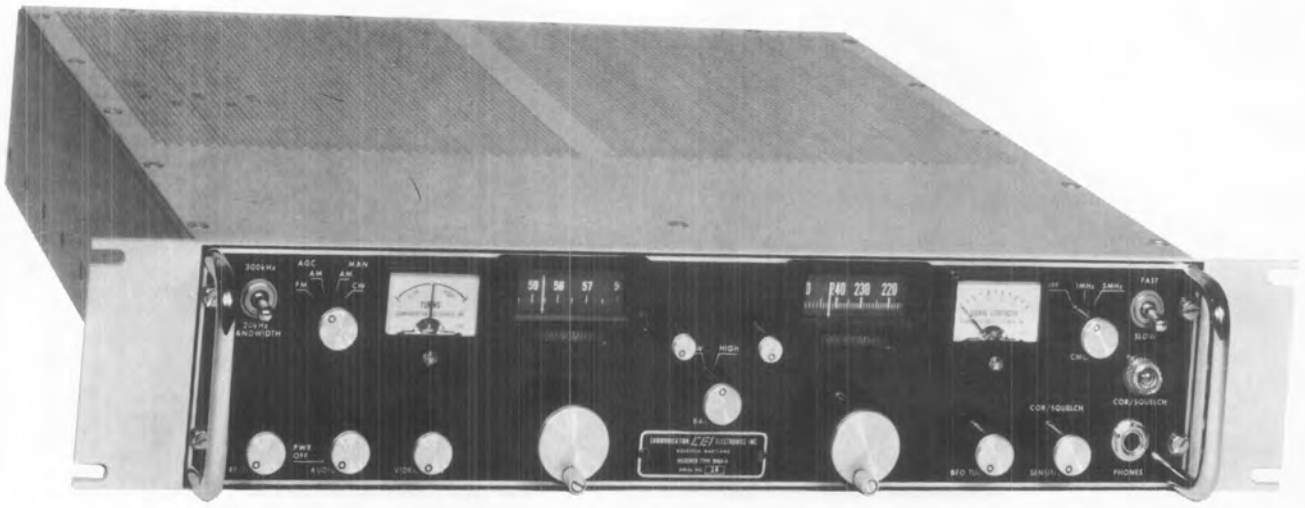


Figure 7-1. Type 906A-4 Receiver, Front View

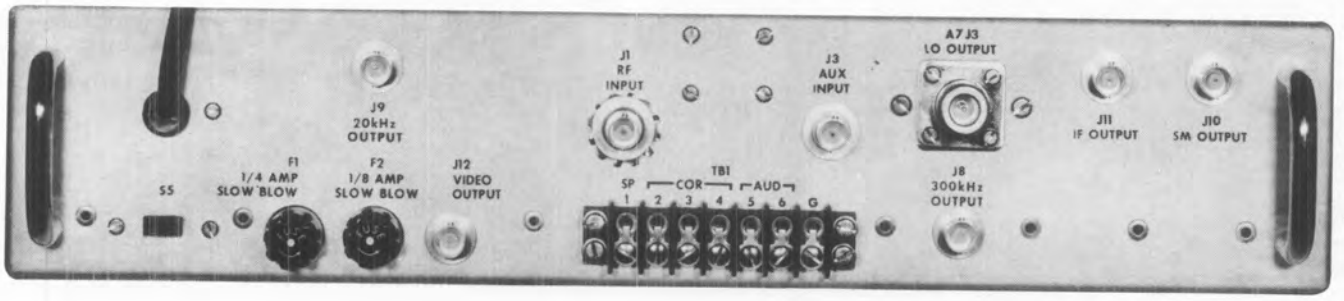


Figure 7-2. Type 906A-4 Receiver, Rear View

SECTION VII

SUPPLEMENT FOR TYPE 906A-4 RECEIVER

7.1 GENERAL

The type 906A-4 Receiver incorporates a type 72146 narrow band FM demodulator subassembly in addition to the subassemblies described in Section II for the 904A and 906A Receivers. This FM demodulator operates in conjunction with the 20/300-kHz IF amplifier to provide a separate FM output for the 20-kHz bandwidth. This additional output appears at rear-apron jack J9 labeled 20 KHZ FM OUTPUT. The 21.4-MHz IF output signal from the 906A-4 is present at jack J11. The 300 kHz FM output is present at jack J8. The 906A-4 also provides for squelch operation of the audio output from the receiver.

7.2 MECHANICAL CHARACTERISTICS

The front panel of the type 906A-4 Receiver is shown in Figure 7-1. A rear view of the receiver, Figure 7-2, shows the additional BNC-type output connector, J9. The location of the demodulator chassis is shown in Figure 7-3, a top view of the 906A-4 Receiver. Figure 7-4 is a bottom view of the receiver, and Figure 7-5 is a bottom view of the demodulator showing component locations.

7.3 CIRCUIT DESCRIPTION

7.3.1 Type 72195 20/300 kHz IF Amplifier. - In order to provide proper impedance matching to the narrow band FM demodulator module a type 72195 20/300 kHz IF amplifier is used in the 906A-4. This IF amplifier is identical to the type 72145 used in the 904A and 906A Receivers with the exception of component values used in the capacitive voltage divider consisting of C52 and C53 at the modules IF OUTPUT jack J3. A parts list and schematic diagram (Figure 7-6) for the type 72195 IF amplifier appear in the following pages. For component locations refer to Figure 5-7 through 5-9. Main chassis BANDWIDTH switch S2 is changed to a double-pole-double-throw type in order to switch the narrow and wide band FM video outputs which drive the tuning meter and the audio and video gain controls when the receiver is in the FM mode.

7.3.2 Type 72146 Narrow Band FM Demodulator. - Figure 7-6 is the schematic diagram for the type 72146 narrow band FM demodulator; its reference designation prefix is A13. The incoming 21.4-MHz signal from the IF amplifier is fed through input jack J1 and dc-blocking capacitor C7 to the FM limiter. The signal is also fed through a resistive impedance matching network consisting of R1, R2, and R3, to the IF output jack, J2. The IF signal is then fed through cable W14 to the rear-apron IF OUTPUT jack J11.

The symmetrical limiter stages used in the demodulator are identical both functionally and electrically to those described in paragraph 2.7.6. The signal from the limiters is fed through dc-blocking capacitor C1 and an impedance-matching divider consisting of C2 and C3 to a crystal FM discrminator, FL1. The demodulated output from FL1 is directly coupled through cascaded emitter followers Q1 and Q2, and inductor L2 to the FM video output jack, J3. Inductor L2 and capacitor C4 form a filter to eliminate the 21.4-MHz component from the FM output.

7.3.3 Squelch Operation. - The receivers COR sensitivity control is utilized to set the carrier level at which the audio amplifier is turned on in addition to its normal function. This front panel control is marked COR/SQUELCH SENSITIVITY on the 906A-4. COR relay K2 is used to switch the audio amplifier on or off when the carrier level set by the sensitivity control is reached. Until K2 is energized, pin one of the audio amplifier is grounded removing the dc voltage from the first stage of the amplifier. When K2 is activated by the COR amplifier the ground is removed permitting the audio amplifier to operate. The COR SLOW/FAST switch must be placed in the FAST position for optimum squelch operation.

7.4 MAINTENANCE

During the performance of the FM alignment for the 20/300-kHz IF amplifier, given in paragraph 4.6.3, make the following adjustment to the narrow band FM demodulator. Transistor pin voltages are given in Table 7-1.

(1) Connect the output of the sweep generator to input jack A13J1; connect the sweep generator MARKER ADDER IN to the FM video output jack, A13J3; connect the sweep generator MARKER ADDER OUT to the oscilloscope vertical input; connect the sweep generator HORIZ OUT to the horizontal scope input.

(2) Set the output frequency of the sweep generator to 21.4 MHz and turn internal 21.4-MHz marker on.

(3) Adjust the sweep generator and oscilloscope controls to display an "S" response curve.

(4) Adjust A13L1 for a mixiumum amplitude, symmetrical response centered about the 21.4-MHz marker.

7.5 PARTS LIST

The electrical components used on the main chassis of the 906A-4 Receiver, 20/300 kHz IF Amplifier, and in the narrowband FM demodulator are listed on the following pages.

Table 7-1. Type 72146 Narrow Band FM Demodulator, Transistor Pin Voltages

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A13A1Q1*	2N706	2.45	3.05	10.7
A13A1Q2*	2N706	2.45	3.05	10.6
A13A1Q3*	2N706	2.75	2.9	10.8
A13A1Q4*	2N706	2.75	3.1	10.7
A13Q1	2N3251	11.2	-23.0	-23.0
A13Q2	2N2270	0.36	0.88	11.2

Test Conditions: All readings are positive dc with respect to chassis unless otherwise noted; readings taken with RCA WV-98C VTVM with 115 Vac applied; no signal input.

* Function switch in FM; BANDWIDTH in 20 kHz.

7.5.1 Type 906A-4 Receiver, Main Chassis

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
A1	30-90-MHz RF TUNER	1	71119	14632
A2	60-300-MHz RF TUNER	1	71120	14632
A3	20/300-kHz BW IF AMPLIFIER	1	72195	14632
A4	AGC AMPLIFIER	1	7830	14632
A5	VIDEO AMPLIFIER	1	7324	14632
A6	AUDIO AMPLIFIER	1	7400B	14632
A7	L.O. COUPLER	1	7917	14632
A8	+24V POWER SUPPLY REGULATOR	1	7685	14632
A9	-24V POWER SUPPLY REGULATOR	1	7670	14632
A10	+12V POWER SUPPLY REGULATOR	1	7688	14632
A11	CARRIER OPERATED RELAY	1	7506	14632
A12	CRYSTAL MARKER OSCILLATOR	1	8304	14632
A13	NARROW BAND FM DEMODULATOR	1	72146	14632
C1	CAPACITOR, PAPER, THRU-PASS: 0.01 μF, 600V	2	102P515	56289
C2	Same as C1			
C3	CAPACITOR, ELECTROLYTIC: 40/40 μF, 250V	1	TVL-2520	56289
C4	CAPACITOR, ELECTROLYTIC, TANTALUM: 1.0 μF, 10%, 35V	1	150D105X9035A2	56289
C5	CAPACITOR, CERAMIC, DISC: 0.005 μF, 20%, 500V	1	SM (.005 μF, 20%)	91418
CP1	ADAPTER, BNC-BNC	1	UG-492A/U	81349
CR1	DIODE	1	1N979B	07688
CR2	DIODE	2	1N3255	07688
CR3	Same as CR2			
CR4	DIODE	2	1N3253	07688
CR5	Same as CR4			
CR6	DIODE	1	1N759A	07688
DS1	LAMP, INCANDESCENT: .115A, 5V	4	CM8-725	71744
DS2	Same as DS1			
DS3	Same as DS1			
DS4	Same as DS1			
DS5	LAMP, INCANDESCENT: .04A, 6V	1	345	07688
F1	FUSE, 3AG, Slow-Blow: 1/4A	1	MDL-1/4	71400
F2	FUSE, 3AG, Slow-Blow: 1/8A	1	MDL-1/8	71400

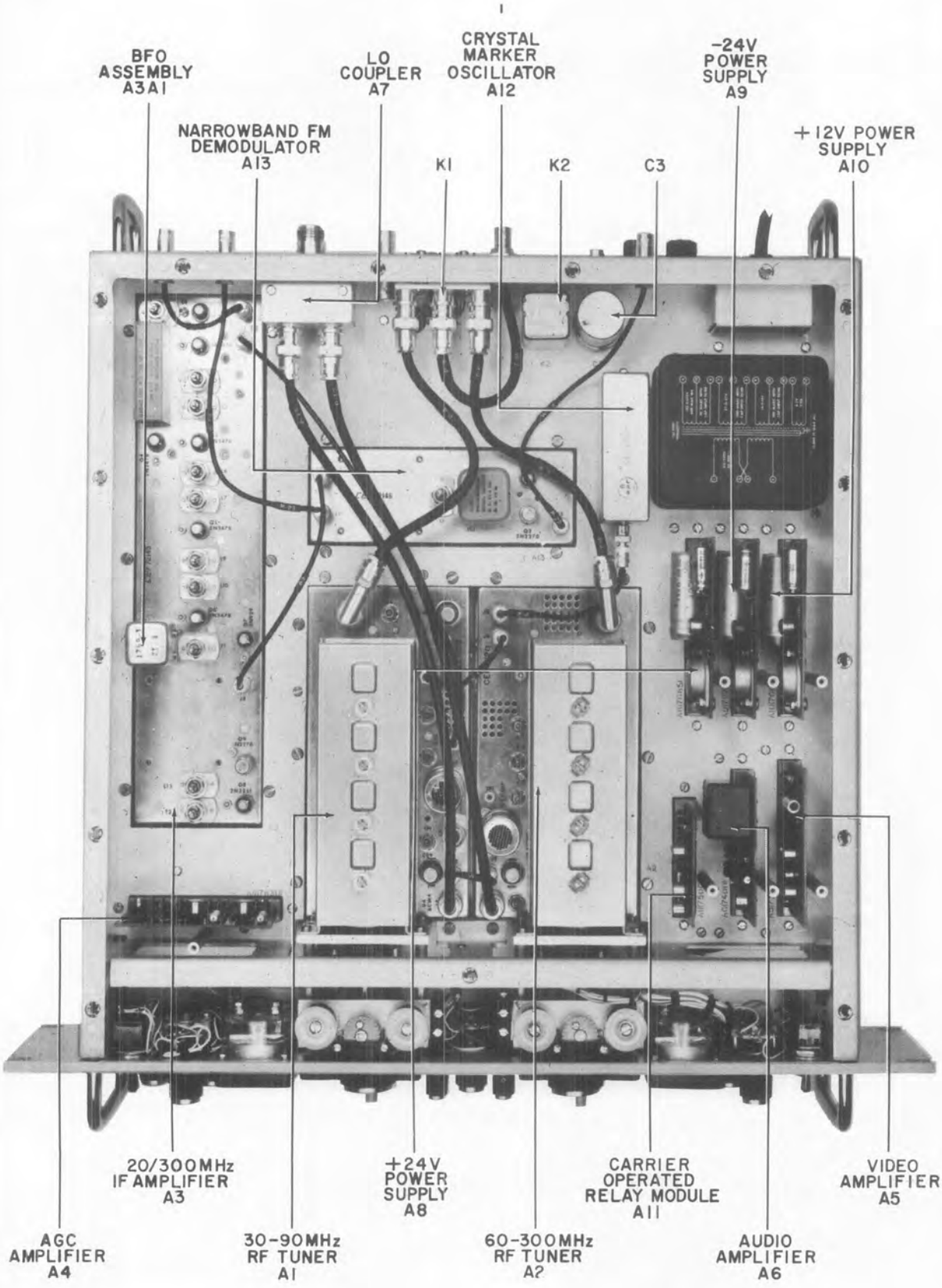


Figure 7-3. Type 906A-4 Receiver, Top View

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
J1	CONNECTOR, JACK, BNC, Part of W1	1	UG-909B/U	81349
J2	NOT USED			
J3	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J4	CONNECTOR, RECEPTACLE, BNC, Part of CP1	---		
J5	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J6	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J7	CONNECTOR, RECEPTACLE, BNC, Part of K1	---		
J8	CONNECTOR, JACK, BNC	5	17825	74868
J9	Same as J8, Part of W13			
J10	Same as J8			
J11	Same as J8, Part of W14			
J12	Same as J8			
J13	CONNECTOR, JACK, PHONE	1	L-11	82389
K1	RELAY	1	318-010382-3	74868
K2	RELAY	1	22RJCC1000G/SIL	78277
M1	METER, SIGNAL STRENGTH	1	1632	14632
M2	METER, TUNING	1	1633	14632
P1	CONNECTOR, PLUG AND POWER CORD	1	01753-001	71700
P2	CONNECTOR, PLUG, MB, Part of W10	13	44950	74868
P3	CONNECTOR, PLUG, BNC, Part of W1	7	UG-88/U	81349
P4	Same as P3, Part of W2			
P5	CONNECTOR, PLUG, BNC, Part of W2	2	UG-913A/U	81349
P6	Same as P3, Part of W3			
P7	Same as P5, Part of W3			
P8	Same as P2, Part of W10			
P9	Same as P2, Part of W4			
P10	Same as P2, Part of W4			
P11	Same as P3, Part of W5			
P12	Same as P3, Part of W5			
P13	Same as P2, Part of W7			
P14	Same as P2, Part of W7			
P15	Same as P2, Part of W8			
P16	Same as P3, Part of W6			
P17	Same as P3, Part of W6			
P18	Same as P2, Part of W9			
P19	Same as P2, Part of W11			

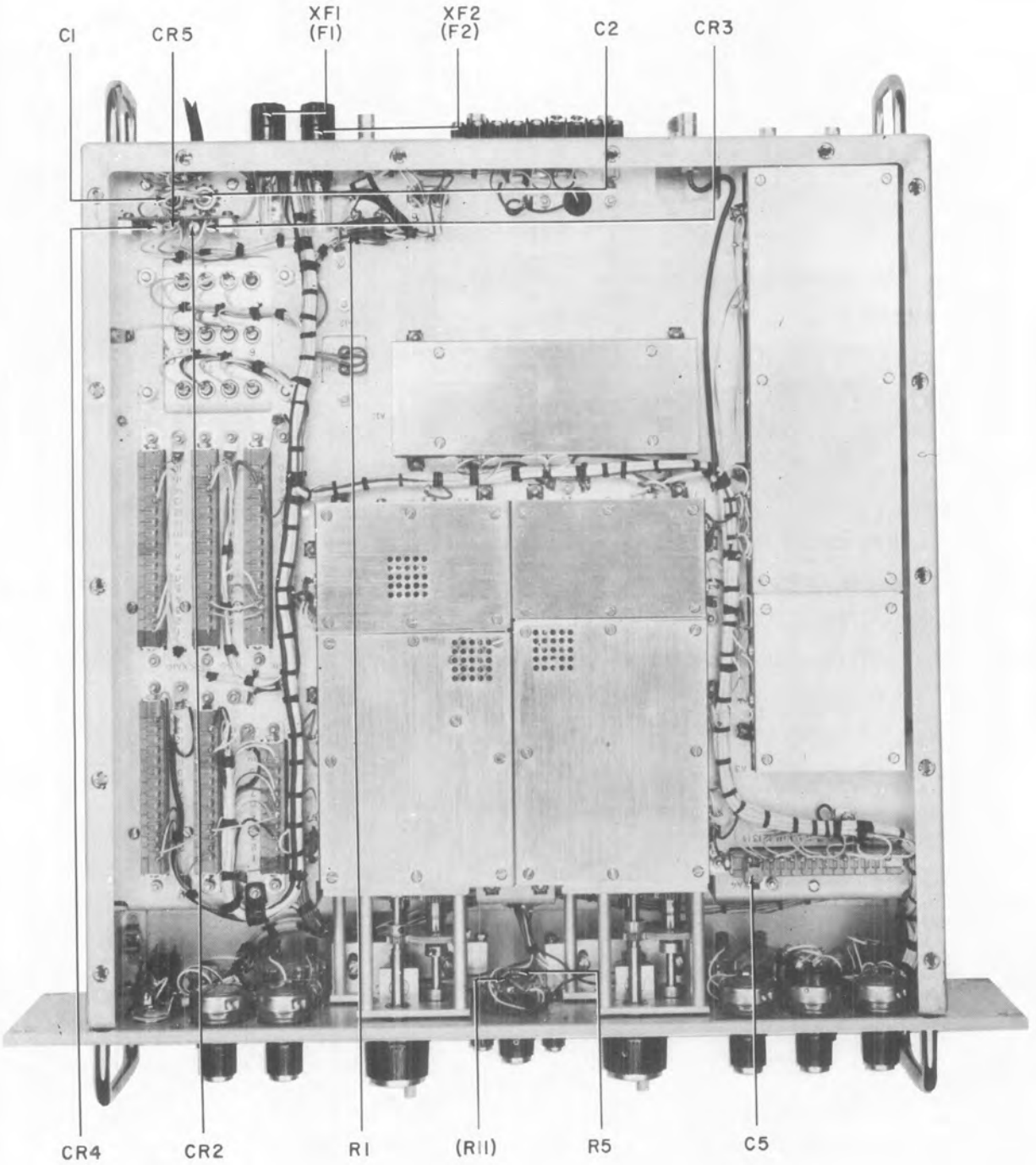


Figure 7-4. Type 906A-4 Receiver, Bottom View

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
P20	Same as P2, Part of W11			
P21	NOT USED			
P22	Same as P2, Part of W13			
P23	Same as P2, Part of W14			
P24	Same as P2, Part of W9			
R1	RESISTOR, FIXED, COMPOSITION: 1kΩ, 5%, 2W	1	HB1025	01121
R2	RESISTOR, FIXED, COMPOSITION: 8.2kΩ, 5%, 1/4W	2	CB8225	01121
R3	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	RV4NAYSD104A	81349
R4	RESISTOR, FIXED, COMPOSITION: 51kΩ, 5%, 1/4W	2	CB5135	01121
R5	RESISTOR, FIXED, COMPOSITION: 75kΩ, 5%, 1/2W	1	EB7535	01121
R6	Same as R4			
R7	RESISTOR, VARIABLE, COMPOSITION: 25kΩ, 10%, 2W	1	RV4NAYSD253A	81349
R8	Same as R2			
R9	RESISTOR, VARIABLE, COMPOSITION: 10kΩ, 10%, 2W	2	RV4NAYSD103A	81349
R10	RESISTOR, VARIABLE, COMPOSITION: 100kΩ, 10%, 2W	1	JS1N056S104UA	01121
R11	RESISTOR, FIXED, COMPOSITION: 6.8Ω, 5%, 1/2W	1	EB68G5	01121
R12	RESISTOR, FIXED, COMPOSITION: 6.2kΩ, 5%, 1/4W	2	CB6225	01121
R13	Same as R9			
R14	Same as R12			
S1	SWITCH, ROTARY: 1 Section, 4 Poles, 2 Position	1	1128-41	14632
S2	SWITCH, TOGGLE, DP-DT	1	8363-K7	15605
S3	SWITCH, ROTARY: 2 Section, 4 Poles, 2-6 Position	1	1128-29	14632
S4	SWITCH, ROTARY, Part of R10	---		
S5	SWITCH, SLIDE, DP-DT	1	4633	42190
S6	SWITCH, TOGGLE, SP-ST	1	8280-K16	15605
S7	SWITCH, ROTARY: 1 Section, 2 Poles, 2-6 Position	1	1128-43	14632
T1	TRANSFORMER	1	11921	14632
TB1	TERMINAL BOARD	1	353-18-07-001	71785
W1	CABLE AND CONNECTOR ASSEMBLY	1	30020-182	14632

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
W2	CABLE AND CONNECTOR ASSEMBLY	1	30020-183	14632
W3	CABLE AND CONNECTOR ASSEMBLY	1	30020-184	14632
W4	CABLE AND CONNECTOR ASSEMBLY	1	30020-185	14632
W5	CABLE AND CONNECTOR ASSEMBLY	1	30020-186	14632
W6	CABLE AND CONNECTOR ASSEMBLY	1	30020-187	14632
W7	CABLE AND CONNECTOR ASSEMBLY	1	30020-188	14632
W8	CABLE AND CONNECTOR ASSEMBLY	1	30020-189	14632
W9	CABLE AND CONNECTOR ASSEMBLY	1	30020-549	14632
W10	CABLE AND CONNECTOR ASSEMBLY	1	30020-547	14632
W11	CABLE AND CONNECTOR ASSEMBLY	1	30020-548	14632
W12	NOT USED			
W13	CABLE AND CONNECTOR ASSEMBLY	1	30020-550	14632
W14	CABLE AND CONNECTOR ASSEMBLY	1	30020-551	14632
XA4	CONNECTOR, Printed Circuit Card, 14 Contacts	2	00-5002-014-103-002	91662
XA5	Same as XA4			
XA6	CONNECTOR, Printed Circuit Card, 13 Contacts	1	00-5002-013-103-002	91662
XA8	CONNECTOR, Printed Circuit Card, 16 Contacts	3	00-5002-016-103-002	91662
XA9	Same as XA8			
XA10	Same as XA8			
XA11	CONNECTOR, Printed Circuit Card, 10 Contacts	1	00-5002-010-103-002	91662
XF1	FUSEHOLDER, Panel Type, Non-indicating, Bayonet Knob	2	342004	75915
XF2	Same as XF1			
	HANDLE, Nickel-Plated Brass, Round (Rear)	2	1250-1	71279
	HANDLE, Nickel-Plated Brass, Round (Front)	2	1252-1	71279
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap; Modified	2	11754-2	14632
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	8	PS-700-2	21604
	KNOB, Black Implex Plastic with Anodized-Aluminum Cap	2	PS-500-2	21604
	DUST COVER, Aluminum, Main Chassis, Top	1	20238-1	14632
	DUST COVER, Aluminum, Main Chassis, Bottom	1	20239-1	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for IF Amplifier (Large)	1	11590	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for IF Amplifier (Small)	1	11591	14632

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for Low Band Tuner (Small)	1	11741	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for Low Band Tuner (Large)	1	11742	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for High Band Tuner (Small)	1	11691	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for High Band Tuner (Large)	1	11692	14632
	CHASSIS COVER, Nickel-Plated Brass, Gold-Flashed for Narrow Band FM Demodulator	1	20646-5	14632

7.5.2 Type 72195 20/300 kHz BW IF Amplifier REF DESIG PREFIX A3

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
A1	BFO ASSEMBLY	1	1769-3	14632
A2	FM LIMITER ASSEMBLY	1	11736/1	14632
C1	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	8	FA5C-102W	01121
C2	Same as C1			
C3	CAPACITOR, CERAMIC, STANDOFF: 1000 pF, GMV, 500V	9	SS5A-102W	01121
C4	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	6	SM(.001μF, GMV)	91418
C5	Same as C4			
C6	Same as C3			
C7	Same as C3			
C8	CAPACITOR, COMPOSITION, TUBULAR: 0.82 pF, 10%, 500V	5	QC(.82pF, 10%)	95121
C9	Same as C3			
C10	Same as C8			
C11	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	11	CM05E470J03	81349
C12	Same as C11			
C13	Same as C11			
C14	CAPACITOR, DIPPED MICA: 200 pF, 5%, 500V	1	CM05F201J03	81349
C15	CAPACITOR, COMPOSITION, TUBULAR: 0.75 pF, 10%, 500V	2	QC(.75pF, 10%)	95121
C16	CAPACITOR, DIPPED MICA: 62 pF, 5%, 500V	1	CM05E620J03	81349
C17	CAPACITOR, DIPPED MICA: 24 pF, 5%, 500V	3	CM05E240J03	81349
C18	CAPACITOR, DIPPED MICA: 360 pF, 5%, 500V	3	CM05F361J03	81349
C19	Same as C1			
C20	Same as C4			
C21	Same as C8			
C22	Same as C3			
C23	Same as C8			
C24	Same as C3			
C25	CAPACITOR, CERAMIC, DISC: 0.005 μF, 20%, 500V	4	SM(.005μF, 20%)	91418
C26	Same as C11			
C27	Same as C11			
C28	Same as C3			
C29	Same as C15			
C30	Same as C17			

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
C31	Same as C18			
C32	Same as C3			
C33	Same as C8			
C34	Same as C4			
C35	Same as C11			
C36	Same as C11			
C37	CAPACITOR, COMPOSITION, TUBULAR: 1.0 pF, 10%, 500V	1	QC(1pF, 10%)	95121
C38	Same as C1			
C39	Same as C17			
C40	Same as C18			
C41	CAPACITOR, COMPOSITION, TUBULAR: 0.43 pF, 10%, 500V	1	QC(.43pF, 10%)	95121
C42	Same as C25			
C43	Same as C25			
C44	Same as C11			
C45	Same as C1			
C46	Same as C25			
C47	Same as C1			
C48	CAPACITOR, CERAMIC, TUBULAR: 3.3 pF, ±0.25 pF, 500V	1	301-000-C0J0-339C	72982
C49	CAPACITOR, DIPPED MICA: 33 pF, 5%, 500V	1	CM05E330J03	81349
C50	Same as C1			
C51	CAPACITOR, DIPPED MICA: 27 pF, 5%, 500V	1	CM05E270J03	81349
C52	Same as C4			
C53	CAPACITOR, DIPPED MICA: 180 pF, 5%, 500V	1	CM05F181J03	81349
C54	Same as C4			
C55	CAPACITOR, DIPPED MICA: 20 pF, 5%, 500V	2	CM05E200J03	81349
C56	Same as C55			
C57	Same as C11			
C58	Same as C11			
C59	Same as C1			
C60	Same as C3			
C61	CAPACITOR, DIPPED MICA: 30 pF, 5%, 500V	1	CM05E300J03	81349
C62	Same as C11			

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
CR1	DIODE	13	1N462A	07688
CR2	Same as CR1			
CR3	Same as CR1			
CR4	NOT USED			
CR5	Same as CR1			
CR6	NOT USED			
CR7	Same as CR1			
CR8	Same as CR1			
CR9	Same as CR1			
CR10	Same as CR1			
CR11	Same as CR1			
CR12	Same as CR1			
CR13	Same as CR1			
CR14	DIODE	3	1N198	07688
CR15	Same as CR14			
CR16	Same as CR14			
CR17	Same as CR1			
CR18	Same as CR1			
E1	TERMINAL, FEEDTHRU	3	SFU-16	04013
E2	Same as E1			
E3	Same as E1			
FL1	FILTER, BAND-PASS: 20 kHz BW	1	6053653	74306
J1	CONNECTOR, RECEPTACLE, MB SERIES	3	46025	74868
J2	Same as J1			
J3	Same as J1			
L1	COIL, VARIABLE	8	1472-3	14632
L2	Same as L1			
L3	COIL, FIXED	7	1131-37	14632
L4	Same as L1			
L5	Same as L3			
L6	Same as L1			
L7	Same as L1			
L8	Same as L3			
L9	Same as L1			

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
L10	Same as L1			
L11	Same as L3			
L12	Same as L3			
L13	Same as L1			
L14	Same as L3			
L15	Same as L3			
Q1	TRANSISTOR	6	2N3478	07688
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q1			
Q7	TRANSISTOR	1	2N929	07688
Q8	TRANSISTOR	1	2N3251	07688
Q9	TRANSISTOR	1	2N2270	07688
R1	RESISTOR, FIXED, COMPOSITION: 33 Ω, 5%, 1/4W	1	CB3305	01121
R2	RESISTOR, FIXED, COMPOSITION: 24 Ω, 5%, 1/4W	2	CB2405	01121
R3	Same as R2			
R4	RESISTOR, FIXED, COMPOSITION: 47 Ω, 5%, 1/4W	6	CB4705	01121
R5	RESISTOR, FIXED, COMPOSITION: 100 Ω, 5%, 1/4W	6	CB1015	01121
R6	Same as R5			
R7	RESISTOR, FIXED, COMPOSITION: 15 kΩ, 5%, 1/4W	3	CB1535	01121
R8	RESISTOR, FIXED, COMPOSITION: 5.1 kΩ, 5%, 1/4W	6	CB5125	01121
R9	RESISTOR, FIXED, COMPOSITION: 12 kΩ, 5%, 1/4W	3	CB1235	01121
R10	Same as R8			
R11	RESISTOR, FIXED, COMPOSITION: 1 kΩ, 5%, 1/4W	7	CB1025	01121
R12	Same as R11			
R13	RESISTOR, FIXED, COMPOSITION: 680 Ω, 5%, 1/4W	8	CB6815	01121
R14	Same as R4			
R15	Same as R13			
R16	Same as R13			
R17	Same as R13			
R18	Same as R5			
R19	RESISTOR, FIXED, COMPOSITION: 24 kΩ, 5%, 1/4W	1	CB2435	01121

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R20	Same as R7			
R21	Same as R8			
R22	Same as R9			
R23	Same as R8			
R24	Same as R11			
R25	Same as R4			
R26	RESISTOR, FIXED, COMPOSITION: 220 Ω, 5%, 1/4W	1	CB2215	01121
R27	Same as R4			
R28	Same as R11			
R29	Same as R5			
R30	NOT USED			
R31	Same as R5			
R32	Same as R7			
R33	Same as R8			
R34	Same as R11			
R35	Same as R4			
R36	RESISTOR, FIXED, COMPOSITION: 22 Ω, 5%, 1/4W	1	CB2205	01121
R37	RESISTOR, FIXED, COMPOSITION: 470 Ω, 5%, 1/4W	2	CB4715	01121
R38	Same as R9			
R39	Same as R8			
R40	Same as R13			
R41	Same as R37			
R42	RESISTOR, FIXED, COMPOSITION: 22 kΩ, 5%, 1/4W	2	CB2235	01121
R43	Same as R13			
R44	RESISTOR, FIXED, COMPOSITION: 47 kΩ, 5%, 1/4W	2	CB4735	01121
R45	RESISTOR, FIXED, COMPOSITION: 6.2 kΩ, 5%, 1/4W	1	CB6225	01121
R46	RESISTOR, FIXED, COMPOSITION: 10 kΩ, 5%, 1/4W	1	CB1035	01121
R47	Same as R4			
R48	RESISTOR, FIXED, COMPOSITION: 100 kΩ, 5%, 1/4W	2	CB1045	01121
R49	Same as R48			
R50	RESISTOR, FIXED, COMPOSITION: 18 MΩ, 5%, 1/4W	1	CB1865	01121
R51	Same as R13			
R52	Same as R44			
R53	RESISTOR, FIXED, COMPOSITION: 6.8 kΩ, 5%, 1/4W	1	CB6825	01121

Ref Desig	Description	Qty Per Assy	Vendor Part No.	Vendor Code
R54	Same as R13			
R55	Same as R5			
R56	Same as R42			
R57	RESISTOR, FIXED, COMPOSITION: 1 MΩ, 5%, 1/4W	1	CB1055	01121
R58	Same as R11			
R59	Same as R11			
T1	TRANSFORMER	1	20349-8	14632
T2	TRANSFORMER	1	20349-7	14632

REF DESIG PREFIX A13

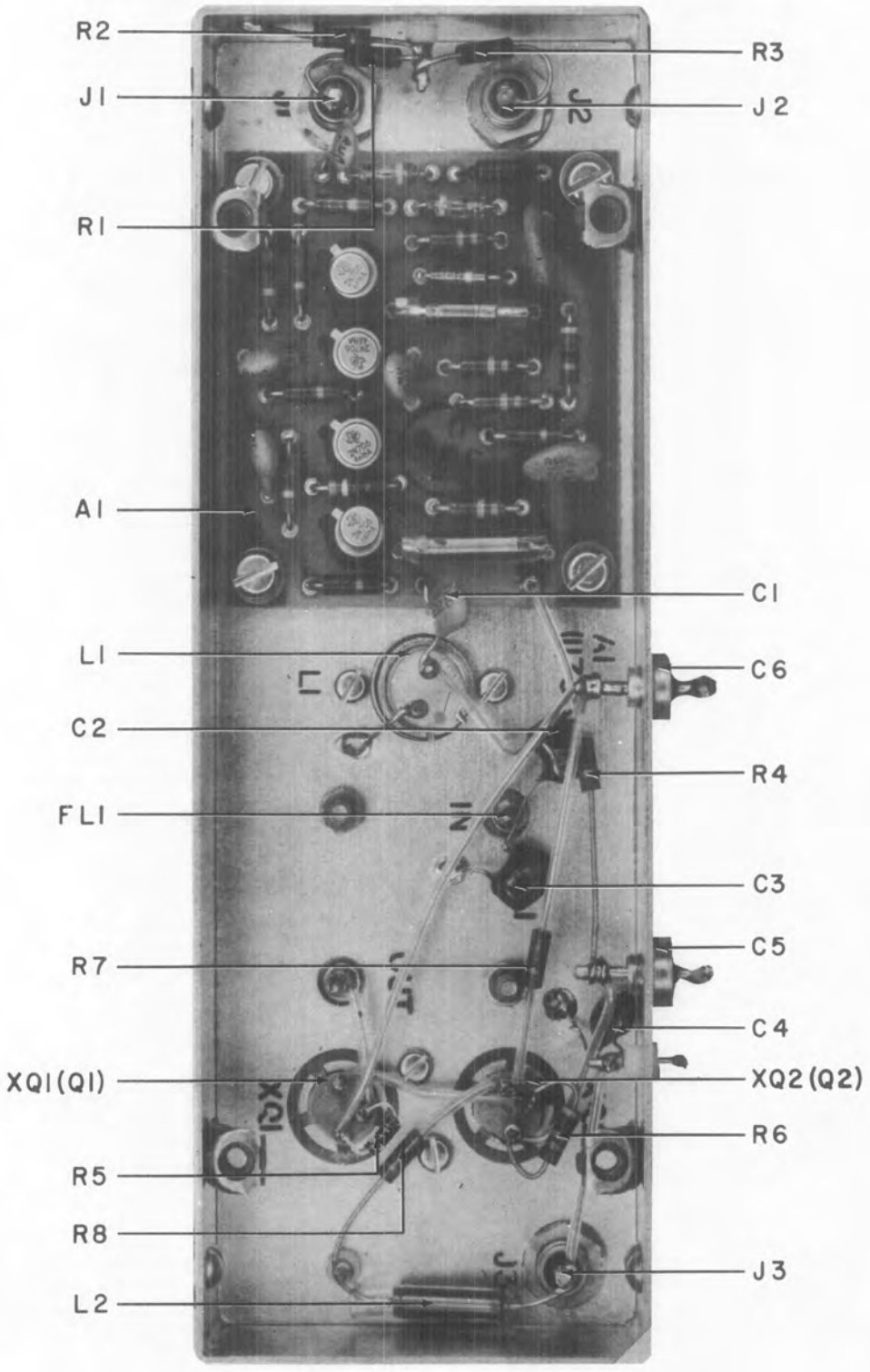


Figure 7-5. Type 72146 Narrow Band FM Demodulator, Component Locations

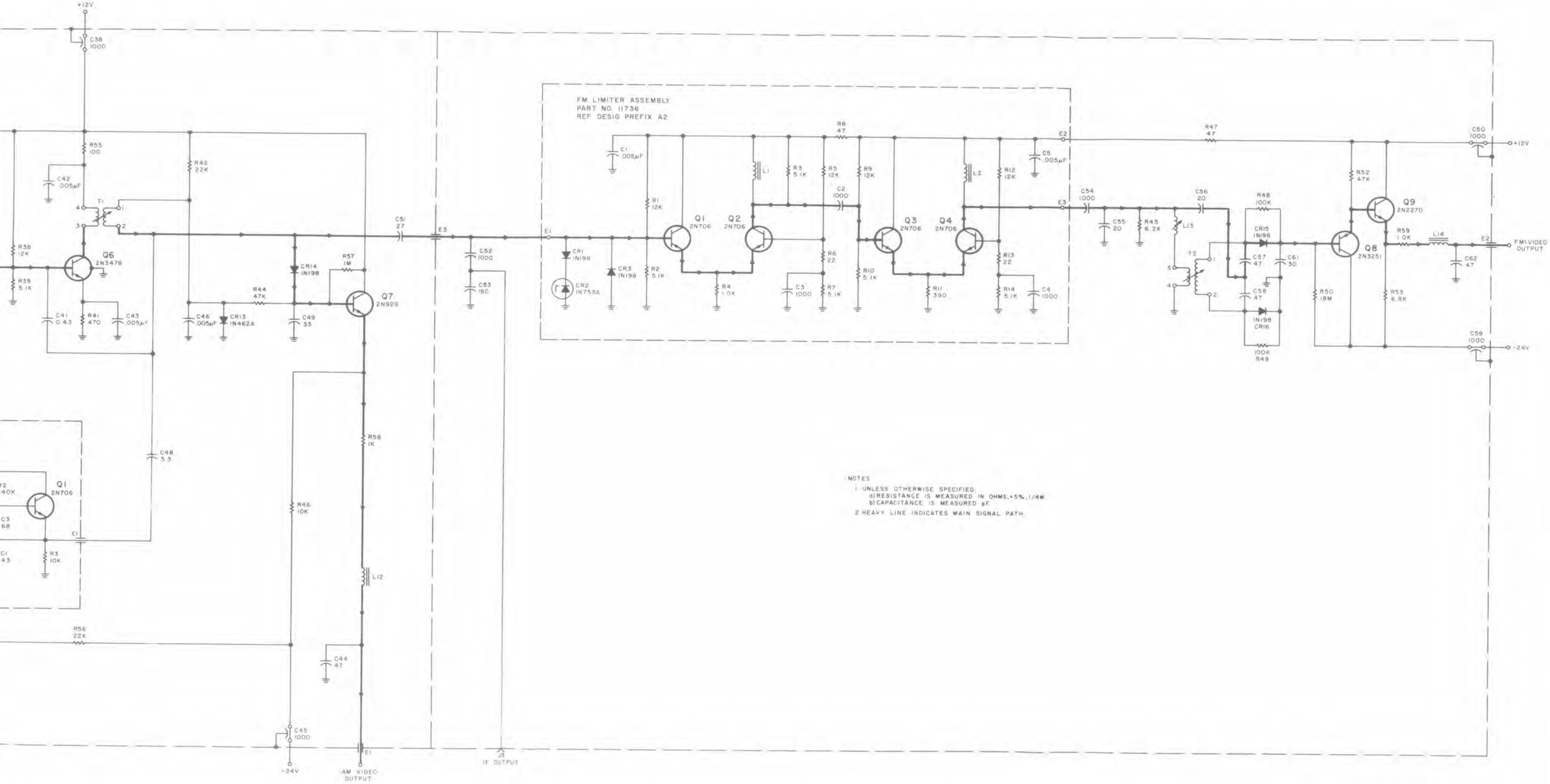
7.5.2 Type 72146 Narrow Band FM Demodulator REF DESIG PREFIX A13

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
A1	AM LIMITER P.C. ASSEMBLY	1	11736/1	14632
C1	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	2	SM (.001 μF, GMV)	91418
C2	CAPACITOR, DIPPED MICA: 75 pF, 5%, 500V	1	CM05E750J03	81349
C3	CAPACITOR, DIPPED MICA: 30 pF, 5%, 500V	1	CM05ED300J03	81349
C4	CAPACITOR, DIPPED MICA: 47 pF, 5%, 500V	1	CM05E470J03	81349
C5	CAPACITOR, CERAMIC, FEEDTHRU: 1000 pF, GMV, 500V	2	FA5C-102W	01121
C6	Same as C5			
C7	Same as C1			
E1	TERMINAL, FEEDTHRU	1	SFU-16	04013
FL1	DISCRIMINATOR FILTER	1	5093577	74306
J1	CONNECTOR, RECEPTACLE, MB	3	46025	74868
J2	Same as J1			
J3	Same as J1			
L1	COIL, VARIABLE	1	1472-3	14632
L2	COIL, FIXED	1	1131-37	14632
Q1	TRANSISTOR	1	2N3251	07688
Q2	TRANSISTOR	1	2N2270	07688
R1	RESISTOR, FIXED, COMPOSITION: 27Ω, 5%, 1/4W	2	CB2705	01121
R2	RESISTOR, FIXED, COMPOSITION: 36Ω, 5%, 1/4W	1	CB3605	01121
R3	Same as R1			
R4	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	1	CB4705	01121
R5	RESISTOR, FIXED, COMPOSITION: 18MΩ, 5%, 1/4W	1	CB1865	01121
R6	RESISTOR, FIXED, COMPOSITION: 47kΩ, 5%, 1/4W	1	CB4735	01121
R7	RESISTOR, FIXED, COMPOSITION: 6.8kΩ, 5%, 1/4W	1	CB6825	01121
R8	RESISTOR, FIXED, COMPOSITION: 1kΩ, 5%, 1/4W	1	CB1025	01121

7.5.3 Part 11736/1 FM Limiter Assembly * REF DESIG PREFIX A13A1

Ref. Desig.	Description	Qty. Per Unit	Vendor Part No.	Vendor Code
C1	CAPACITOR, CERAMIC, DISC: .005 μF, 20%, 500V	2	SM	91418
C2	CAPACITOR, CERAMIC, DISC: 1000 pF, GMV, 500V	3	SM	91418
C3	Same as C2			
C4	Same as C2			
C5	Same as C1			
CR1	DIODE	2	1N198	07688
CR2	DIODE, ZENER	1	1N753A	07688
CR3	Same as CR1			
L1	COIL, FIXED	1	1131-41	14632
L2	COIL, FIXED	1	1131-37	14632
Q1	TRANSISTOR	4	2N706	07688
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
R1	RESISTOR, FIXED, COMPOSITION: 12k, 5%, 1/4W	4	CB1235	01121
R2	RESISTOR, FIXED, COMPOSITION: 5.1k, 5%, 1/4W	5	CB5125	01121
R3	Same as R2			
R4	RESISTOR, FIXED, COMPOSITION: 1k, 5%, 1/4W	1	CB1025	01121
R5	Same as R1			
R6	RESISTOR, FIXED, COMPOSITION: 22Ω, 5%, 1/4W	2	CB2205	01121
R7	Same as R2			
R8	RESISTOR, FIXED, COMPOSITION: 47Ω, 5%, 1/4W	1	CB4705	01121
R9	Same as R1			
R10	Same as R2			
R11	RESISTOR, FIXED, COMPOSITION: 390Ω, 5%, 1/4W	1	CB3915	01121
R12	Same as R1			
R13	Same as R6			
R14	Same as R2			

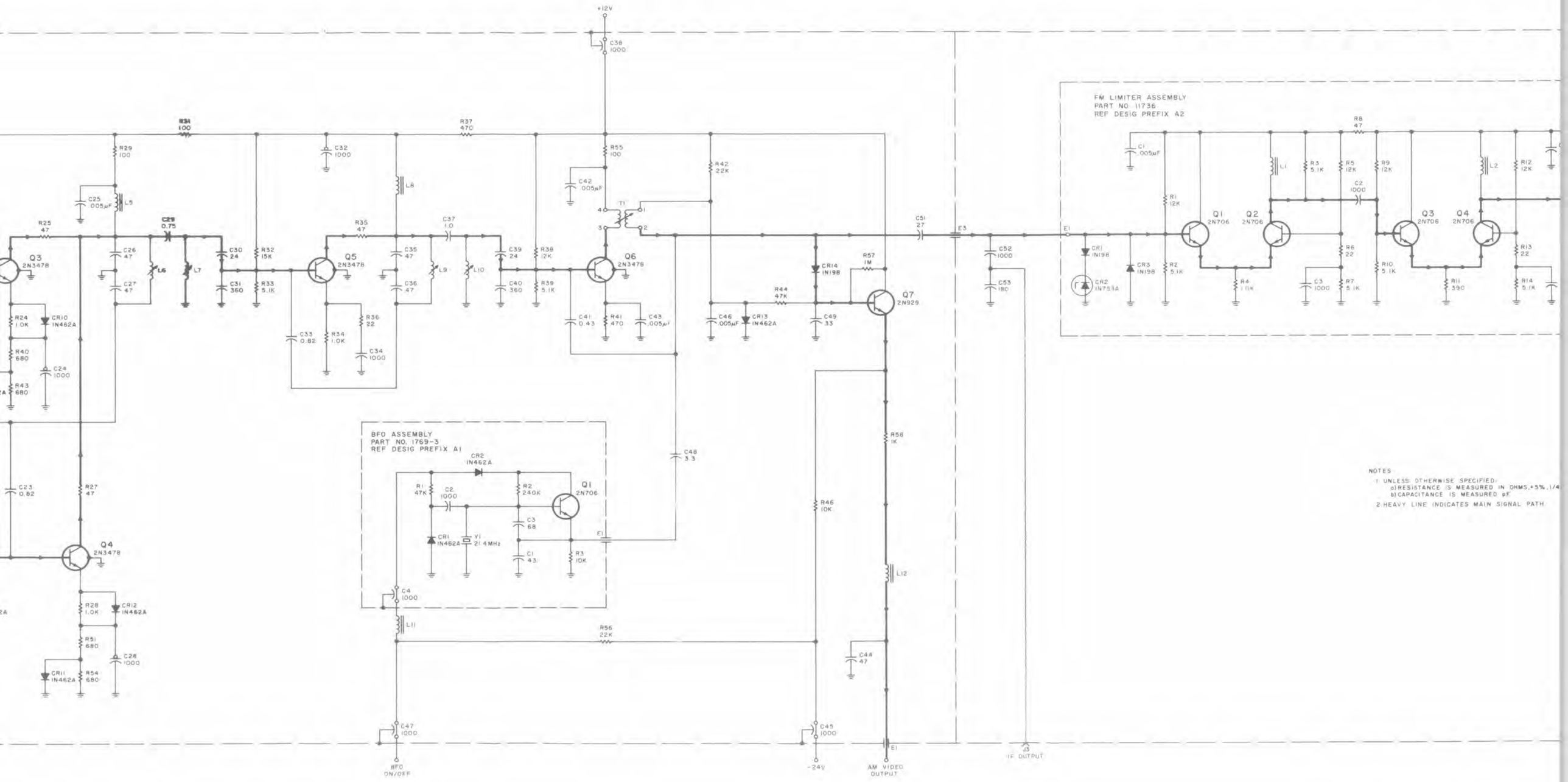
* See Figure 5-11 for component locations.



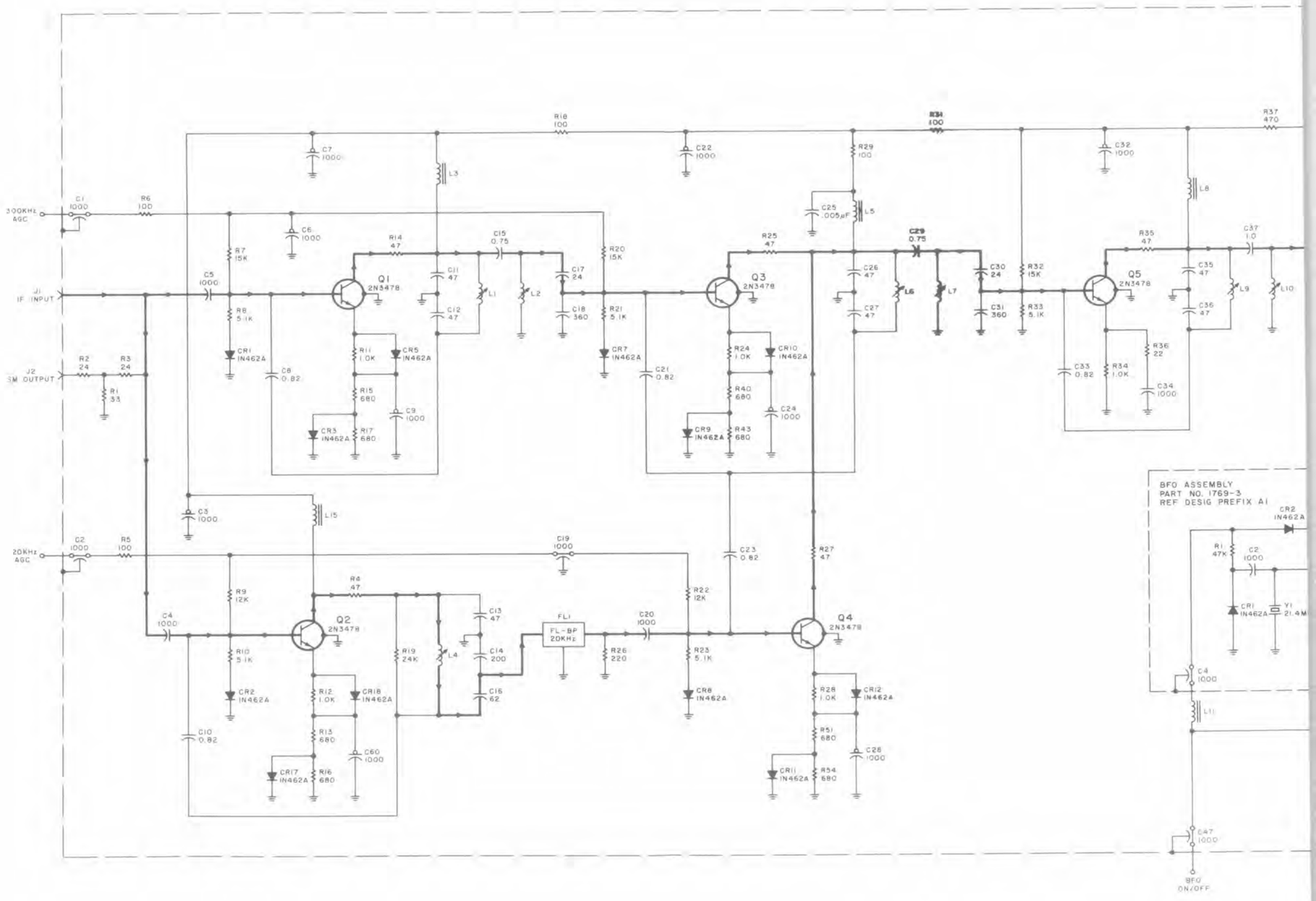
NOTES

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED pF.
2. HEAVY LINE INDICATES MAIN SIGNAL PATH.

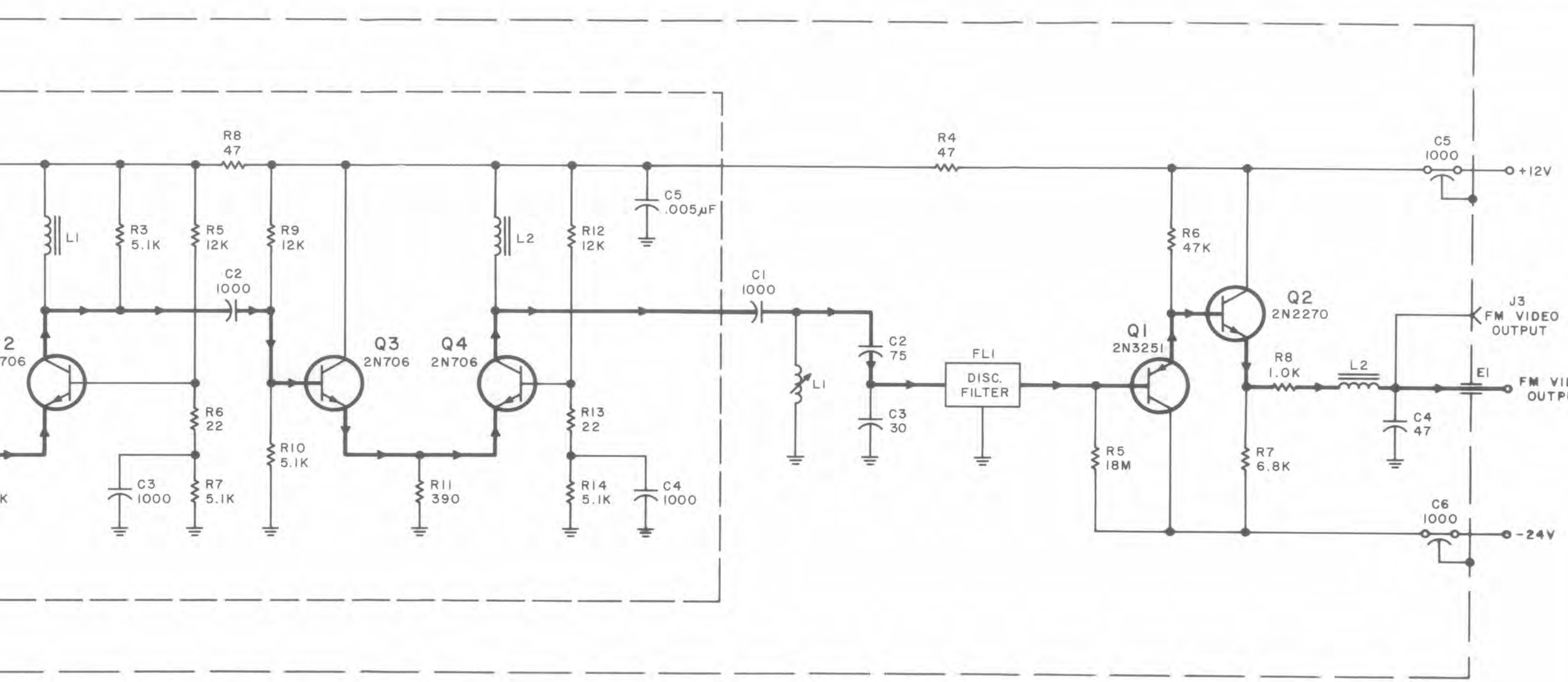
Figure 7-6. Type 72195 20/300 kHz IF Amplifier, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4
   b) CAPACITANCE IS MEASURED IN pF
2. HEAVY LINE INDICATES MAIN SIGNAL PATH



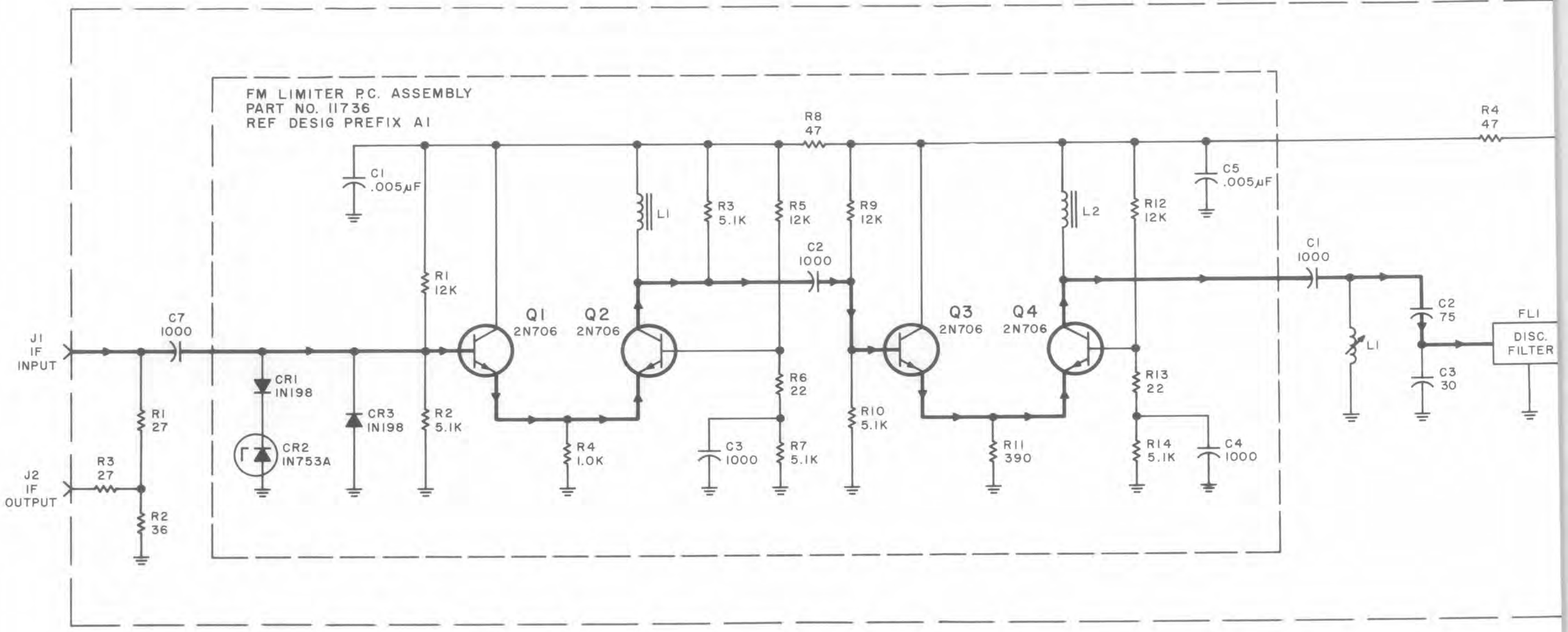
REF DESIG PREFIX A13



NOTES:

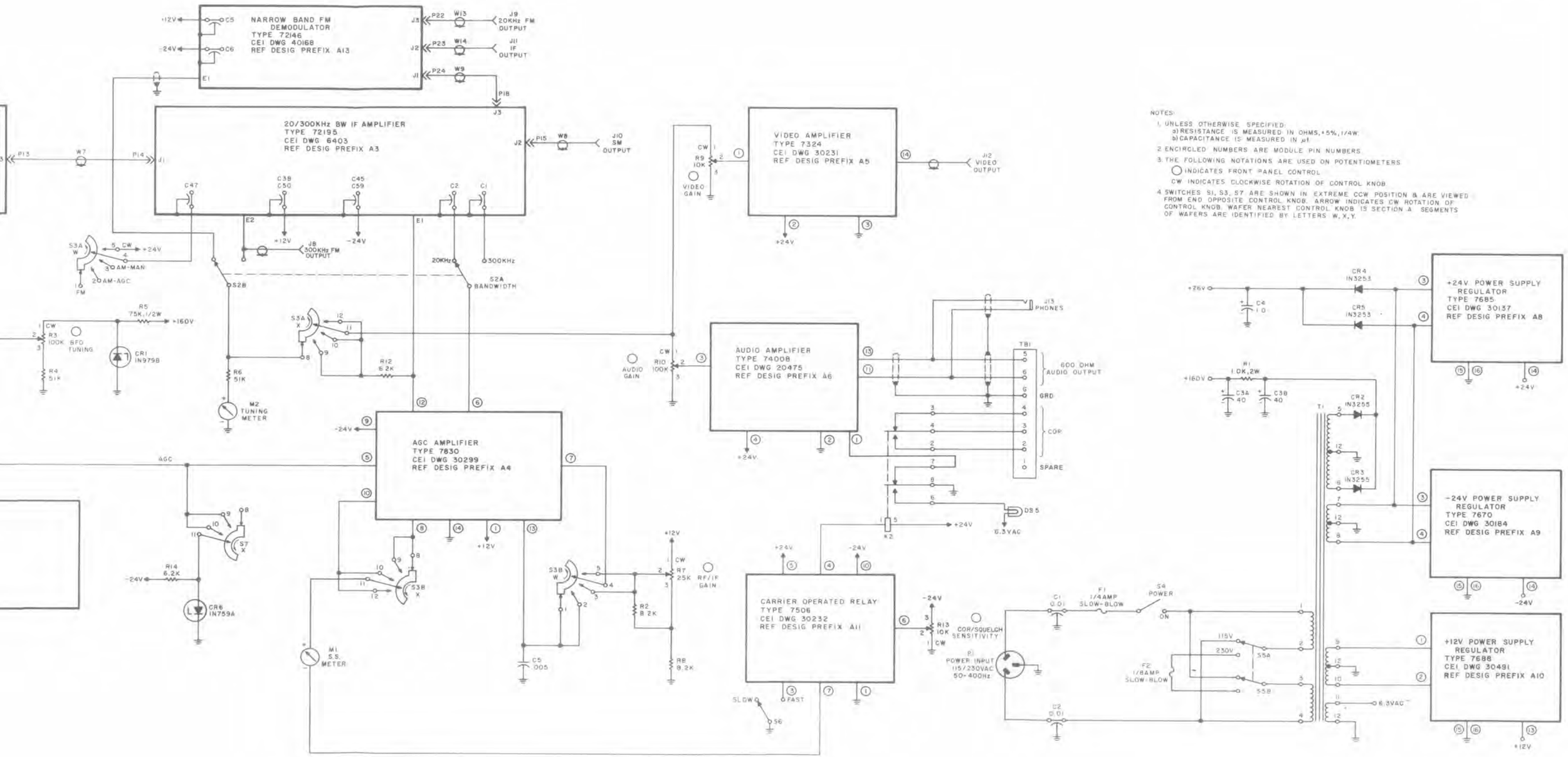
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. HEAVY LINE INDICATES MAIN SIGNAL PATH

Figure 7-7. Type 72146 Narrow Band FM Demodulator, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pF.
2. HEAVY LINE INDICATES MAIN SIGNAL PATH



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   ○ INDICATES FRONT PANEL CONTROL.
   CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
4. SWITCHES S1, S3, S7 ARE SHOWN IN EXTREME CCW POSITION & ARE VIEWED FROM END OPPOSITE CONTROL KNOB. ARROW INDICATES CW ROTATION OF CONTROL KNOB. WAFER NEAREST CONTROL KNOB IS SECTION A. SEGMENTS OF WAFERS ARE IDENTIFIED BY LETTERS W, X, Y.

Figure 7-8. Type 906A-4 Receiver, Main Chassis Schematic Diagram