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# INSTRUCTION MANUAL

## FOR

## TYPE 952 RECEIVER

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COMMUNICATION ELECTRONICS, INC.

6006 EXECUTIVE BOULEVARD

ROCKVILLE, MARYLAND, 20852

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Table 1-1. Type 952 VHF Receiver, Specifications

Type of Reception . . . . .	AM-FM-CW
Frequency Range . . . . .	30-300 MHz in two bands: Band A, 30-90 MHz Band B, 60-300 MHz
Dial Accuracy . . . . .	±1%
Input Impedance . . . . .	50 ohms, nominal
Noise Figure . . . . .	Band A, 4.5 dB, maximum Band B, 6.5 dB, maximum
IF Frequency . . . . .	21.4 MHz
IF Bandwidths . . . . .	Two: 300 kHz or 50 kHz, selectable from front panel
IF Rejection . . . . .	54 dB, minimum at 30 MHz 80 dB, minimum above 50 MHz
Image Rejection . . . . .	Band A, 60 dB Band B, 50 dB
Local Oscillator Frequency . . . . .	21.4 MHz above incoming signal
Oscillator to Antenna Conduction . . . . .	15 $\mu$ V, maximum, below 260 MHz 25 $\mu$ V, maximum, above 260 MHz
Crystal Controlled Operation . . . . .	Five internal and one rear-panel crystal sockets for the 100 to 150 MHz RF range are individually selected by a front-panel switch
Crystal Type . . . . .	CR-82 (Received Frequency + 21.4 MHz)/2
External Local Oscillator . . . . .	May be used in place of the internal oscillator in the 60 to 300 MHz tuner
Sensitivity	
300-kHz Bandwidth . . . . .	AM: 4.0 $\mu$ V input modulated 50% produces 10 dB (s + n)/n, minimum FM: 6 $\mu$ V input, modulated at 1 kHz with 100-kHz deviation, produces 21 dB (s + n)/n, minimum
50-kHz Bandwidth . . . . .	AM: 1.75 $\mu$ V input, modulated 50%, produces 10 dB (s + n)/n, minimum FM: 2 $\mu$ V input, modulated at 1 kHz rate with 18-kHz deviation, produces 21 dB (s + n)/n, minimum
Audio Output Power . . . . .	100 milliwatts, minimum, into 600-ohm load, balanced or unbalanced
Audio Response . . . . .	Within 3 dB from 100 Hz to 40 kHz
Video Output . . . . .	5 volts, rms, across a 10k-ohm load
Response of Video Amplifier . . . . .	Within 3 dB from 100 Hz to 150 kHz
Signal Monitor Output . . . . .	21.4-MHz center frequency IF signal output
Special Outputs	
Local Oscillator . . . . .	50 mV, minimum, into 50 $\Omega$ 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

Table 1-1. Type 952 VHF Receiver, Specifications - (Cont'd)

Carrier Operated Relay	
Sensitivity . . . . .	Less than 1 $\mu$ V
Range. . . . .	Adjustable to operate over an input signal level range of 1 $\mu$ V to greater than 500 $\mu$ V
Release Time . . . . .	Slow: 6 seconds $\pm$ 20%
Output . . . . .	Fast: less than 0.5 second
Output Stability with AGC . . . . .	SPDT contacts
	AM: Output varies less than 5 dB for input range of 4-10,000 $\mu$ V
	FM: Output varies less than 2 dB for input above 1.5 $\mu$ V
BFO . . . . .	Variable 20 kHz
Meters . . . . .	Tuning, Signal Strength
Power Input . . . . .	115/230 vac, 50-400 Hz
Power Consumption . . . . .	20 watts, approximately
Weight. . . . .	18 pounds, approximately
Size . . . . .	19-inches wide, 3.5-inches high, and 16-inches deep

Figure 1-1

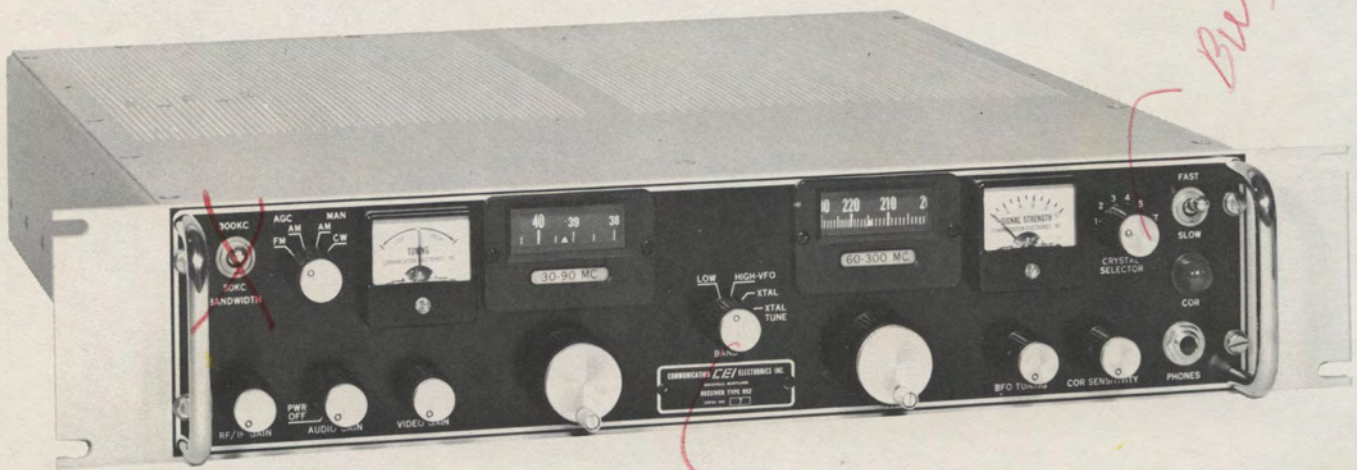


Figure 1-1. Type 952 Receiver, Front View

## SECTION I

## GENERAL DESCRIPTION

## 1.1 ELECTRICAL DESCRIPTION

The CEI type 952 VHF receiver is a compact AM-FM-CW superheterodyne covering the frequency range of 30 to 300 MHz in two bands: 30 to 90 MHz and 60 to 300 MHz. Separate RF tuners are used for each band with provision for a common or separate antennas. One of six crystal controlled channels in the 100 to 150 MHz range may be selected by a front-panel switch. An external oscillator may be used in place of the crystal oscillator by making a cable change on the main chassis. Two IF bandwidths are available: 50 kHz and 300 kHz. The desired bandwidth is selected by means of a front-panel switch. A beat frequency oscillator for CW reception is available in both bandwidth positions. Signal outputs from the receiver are audio output, video output, IF output, local oscillator output, and an output to operate a signal monitor. The audio output is available at a front-panel phones jack and at a terminal strip on the rear apron of the receiver. Nuvistor-type tubes are used in the RF tuners. All other active elements are transistors. Pertinent specifications for the type 952 receiver are given in Table 1-1; the tube and transistor complement is given in Table 1-2.

## 1.2 MECHANICAL DESCRIPTION

1.2.1 The front panel of the receiver contains a tuning control for each band, a bandswitch, a PHONES jack, RF/IF GAIN, AUDIO GAIN, VIDEO GAIN, COR SENSITIVITY and BFO TUNING controls; BANDWIDTH, CRYSTAL SELECTOR, function and COR delay switches; and SIGNAL STRENGTH and TUNING meters. The ac PWR switch is ganged with the AUDIO GAIN control.

1.2.2 The RF INPUT jack J1, the AUX INPUT jack J3, the SM OUTPUT jack J10, EXTERNAL OSCILLATOR jack J14, the LO OUTPUT jack A7J3, the IF OUTPUT jack J11, and the VIDEO OUTPUT jack J12 are all BNC-type connectors except A7J3 which is a type-N connector. All connectors are mounted on the rear of the receiver. Also located on the rear apron is the audio and COR output terminal strip TB1, the power cord, fuses F1 and F2, the line voltage selector switch S5, and the socket for external crystal Y6.

1.2.3 The main chassis, the front panel, and the top and bottom dust covers of the receiver are constructed of aluminum. The main chassis contains eleven subassemblies. Four of these, the two RF tuners, the crystal oscillator, and the IF strip, are built on silver-plated brass chassis which have been gold flashed to prevent tarnishing. The audio, AGC, and video amplifiers, the COR module, and the power supply regulator assembly are plug-in modules constructed on etched circuit boards, and mount on top of the main chassis. The receiver is designed to be mounted in a standard 19-inch rack. Over-all dimensions are 19-inches wide, 3.5-inches high, and 16-inches deep.

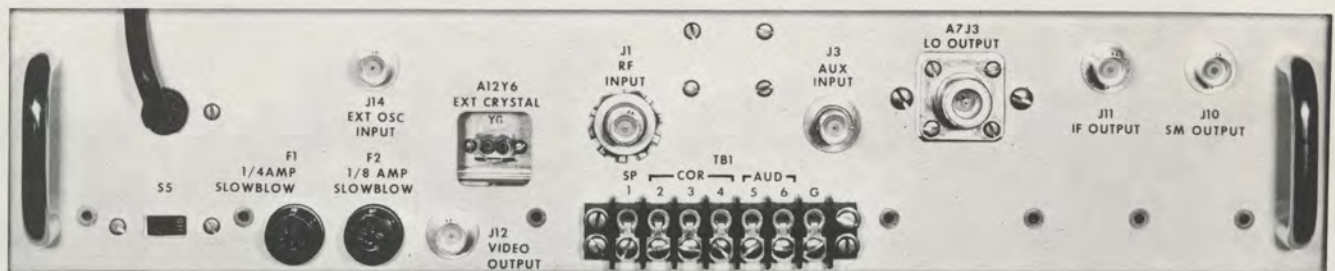


Figure 1-2. Type 952 Receiver, Rear View

Table 1-2. Type 952 Receiver, Tube and Transistor Complement

Ref. Desig.	Type	Function	Ref. Desig.	Type	Function
<u>30-90-MHz RF Tuner</u>			<u>Video Amplifier</u>		
A1V1	6CW4	RF Amplifier	A5Q1	2N3053	Video Amplifier
A1V2	6CW4	RF Amplifier	A5Q2	2N3251	Video Amplifier
A1V3	7587	Mixer	A5Q3	2N3053	Emitter Follower
A1V4	6CW4	Local Oscillator	A5Q4	2N3251	Emitter Follower
<u>60-300-MHz RF Tuner</u>			<u>Audio Amplifier</u>		
A2V1	8058	RF Amplifier	A6Q1	2N929	Audio Amplifier
A2V2	8058	RF Amplifier	A6Q2	2N2270	Emitter Follower
A2V3	7587	Mixer	A6Q3	2N2270	Power Amplifier
A2V4	6CW4	Local Oscillator	<u>+24V Power Supply Regulator</u>		
A2V5	8058	Crystal Oscillator Buffer	A8Q1	2N3055	Series Regulator
<u>50/300-kHz IF Amplifier</u>			A8Q2	2N3053	Regulator Control
A3Q1	2N3478	1st 300-kHz IF Amplifier	<u>-24V Power Supply Regulator</u>		
A3Q2	2N3478	1st 50-kHz IF Amplifier	A9Q1	2N2869	Series Regulator
A3Q3	2N3478	2nd 300-kHz IF Amplifier	A9Q2	2N526	Regulator Control
A3Q4	2N3478	2nd 50-kHz IF Amplifier	<u>+12V Power Supply Regulator</u>		
A3Q5	2N3478	3rd 50/300-kHz IF Amplifier	A10Q1	2N3055	Series Regulator
A3Q6	2N3478	4th 50/300-kHz IF Amplifier	A10Q2	2N3053	Regulator Control
A3Q7	2N929	Emitter Follower	<u>COR Amplifier</u>		
A3Q8	2N929	Emitter Follower	A11Q1	2N3053	DC Amplifier
A3Q9	2N2270	Emitter Follower	A11Q2	2N3251	DC Amplifier
A3A1Q1	2N706	Beat Frequency Oscillator	A11Q3	2N3053	Relay Driver
A3A2Q1	2N706	1st Limiter	A11Q4	2N3053	Relay Driver
A3A2Q2	2N706	1st Limiter	<u>Crystal Oscillator</u>		
A3A2Q3	2N706	2nd Limiter	A12Q1	2N3478	Oscillator
A3A2Q4	2N706	2nd Limiter	A12Q2	2N3478	Oscillator
<u>AGC Amplifier</u>			A12Q3	2N3478	Doubler
A4Q1	2N3053	AGC Amplifier	A12Q4	2N3478	Doubler
A4Q2	2N3251	AGC Amplifier			
A4Q3	2N3053	AGC Amplifier			
A4Q4	2N3251	Meter Driver			

Figure 2-1

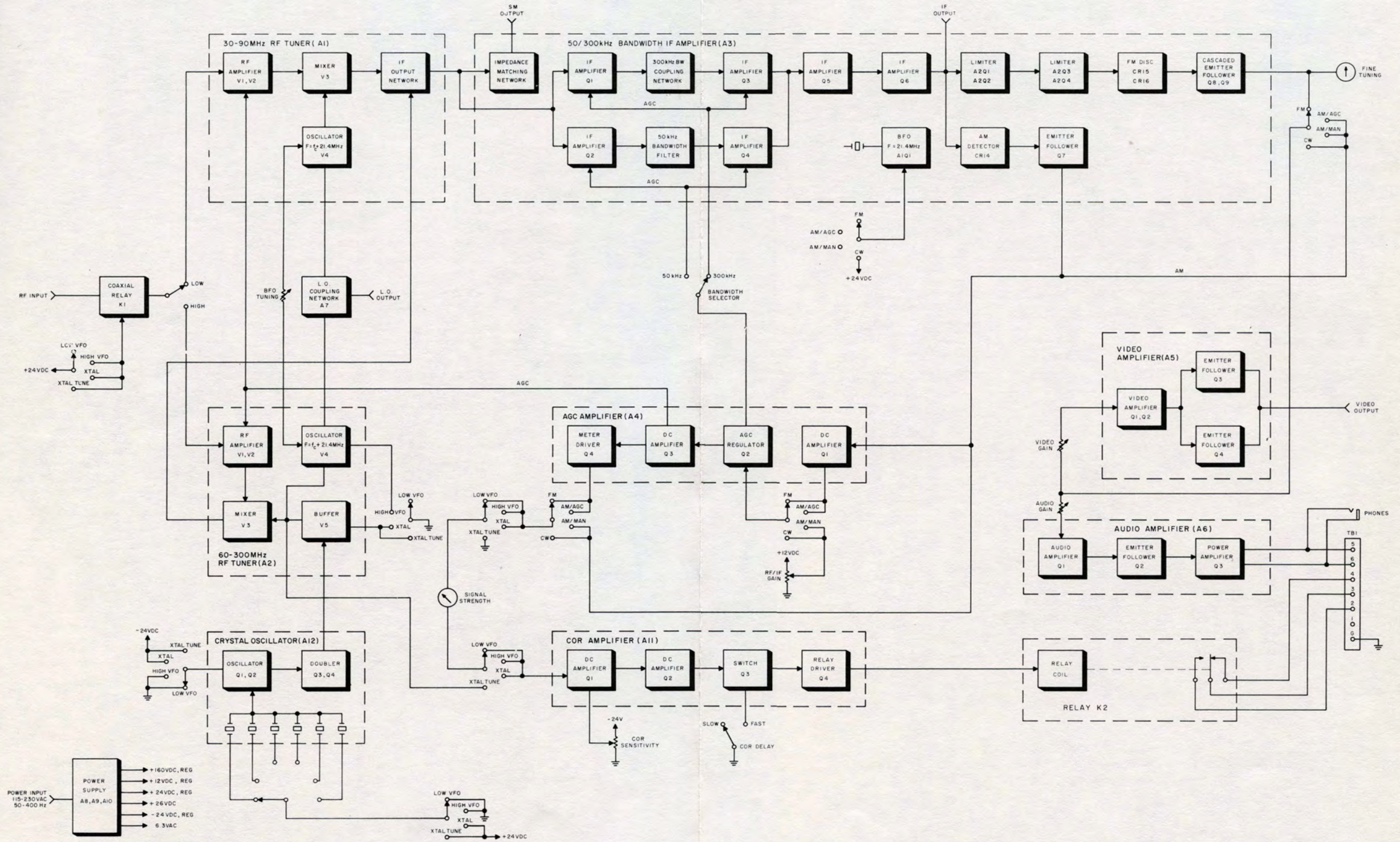


Figure 2-1. Type 952 Receiver, Functional Block Diagram



Figure 5-1

952 RECEIVER

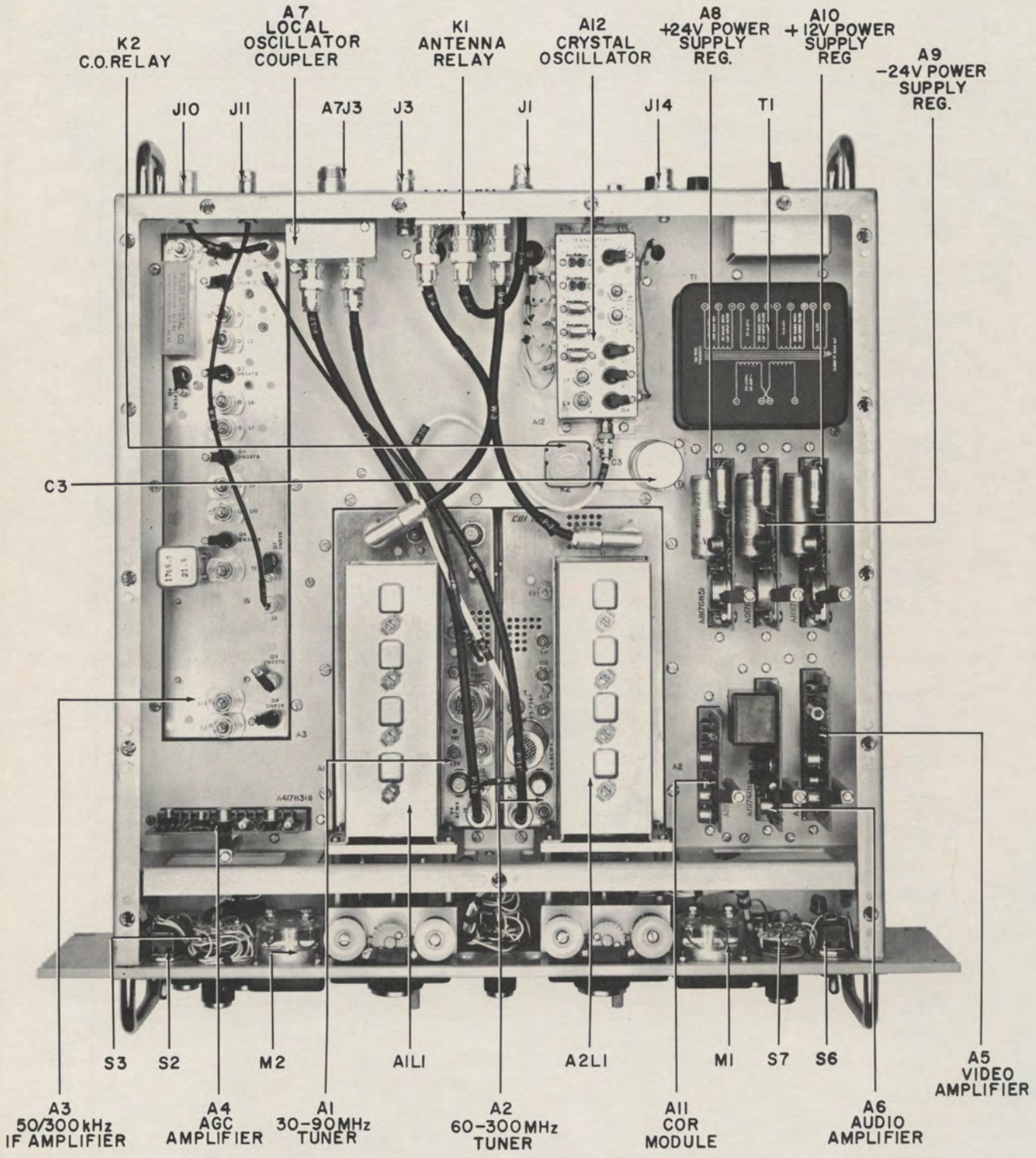


Figure 5-1. Type 952 Receiver, Top View

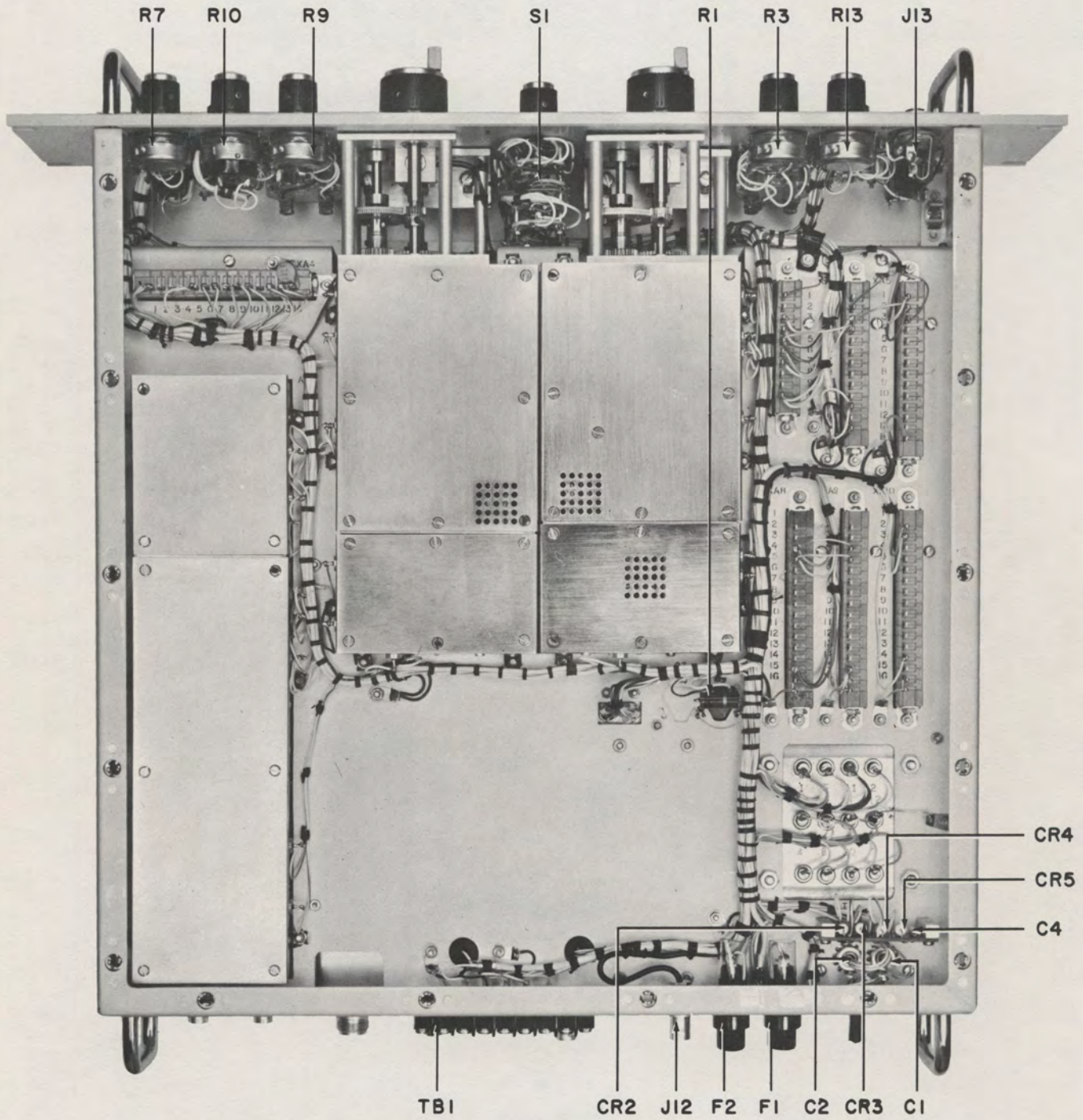
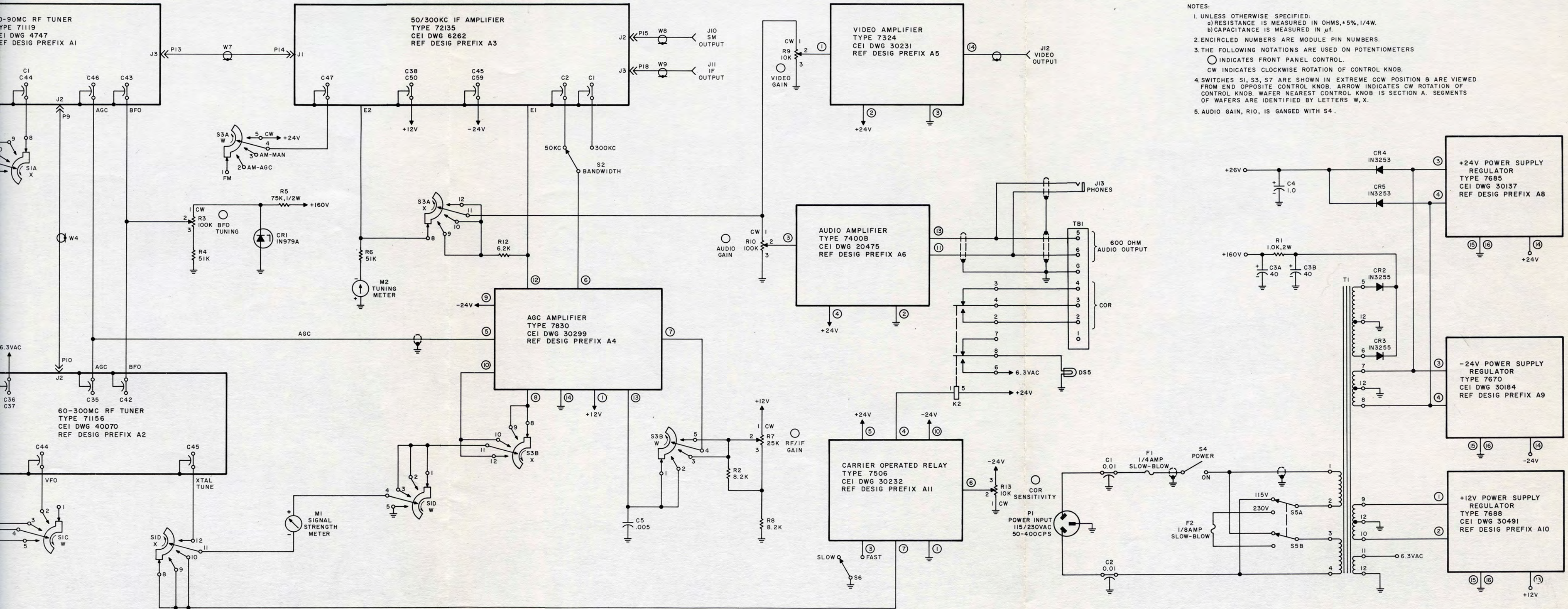


Figure 5-2. Type 952 Receiver, Bottom View



- NOTES:
- UNLESS OTHERWISE SPECIFIED:
    - a) RESISTANCE IS MEASURED IN OHMS, +5%, 1/4W.
    - b) CAPACITANCE IS MEASURED IN  $\mu$ F.
  - ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
  - THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS
    - INDICATES FRONT PANEL CONTROL.
    - CW INDICATES CLOCKWISE ROTATION OF CONTROL KNOB.
  - SWITCHES S1, S3, S7 ARE SHOWN IN EXTREME CW 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.
  - AUDIO GAIN, R10, IS GANGED WITH S4.

Figure 6-13. Type 952 Receiver, Main Chassis Schematic Diagram

