136B-2 Noise Blanker

instruction book

Collins Radio Company | Cedar Rapids, Iowa

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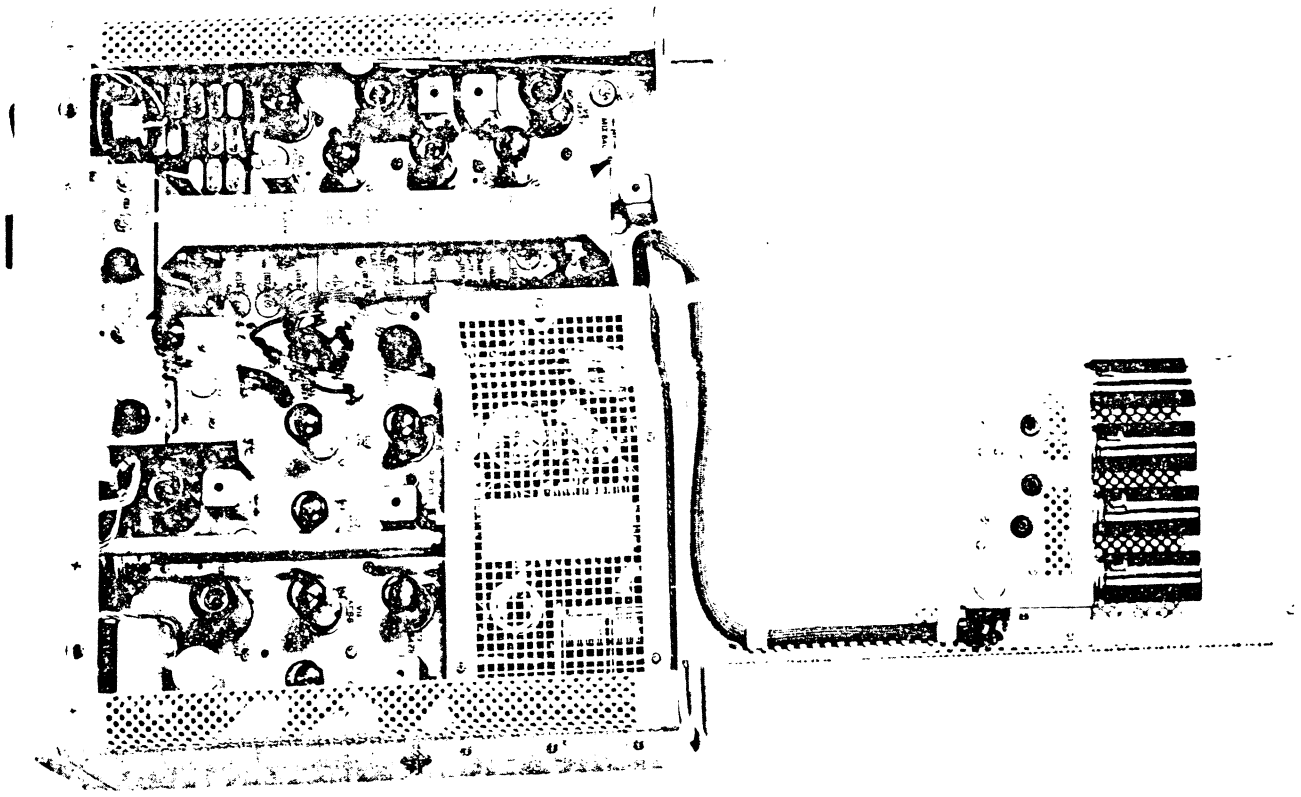

C487-17-P

Figure 1. 136B-2 Noise Blanker Installed in KWM-2 Transceiver

1.1 DESCRIPTION.

The 136B-2 Noise Blanker converts noise to bias pulses for gating the receive circuits of the KWM-2 Transceiver. This minimizes receiver output noise when it is a result of radiated noise present on both the blanker and receiver antennas. Figure 1 shows the 136B-2 installed in the KWM-2.

Noise present in the 40.0-mc portion of the spectrum occurs simultaneously with that in the high-frequency (3-30 mc) portion. The 136B-2 should be provided with its own separately tuned 40.0-mc antenna. Although a six-foot, quarter-wave, coaxial-fed whip is best in a mobile installation, in some instances a broadcast whip can be used with reduced performance. This can be accomplished without disabling the broadcast receiver if adequate isolation is provided. See figure 2.

2.1 INSTALLATION.

a. Remove the KWM-2 chassis from the cabinet.

b. Remove the knob from the R.F. GAIN control. Unsolder the leads from the R.F. GAIN control terminals, noting the location of each lead. Remove the control from the front panel.

c. Install the dual control, part number 367-2147-00, in the R.F. GAIN control mounting hole, using the nut and lock washer from the discarded control.

d. Resolder the R.F. GAIN control leads to the rear section of the dual control, as shown in detail A, figure 7.

e. Solder the two wires, which come out of the existing cable near the R.F. GAIN control, to the front section of the dual control as shown in figure 7. Install jumper between wiper and end terminal of R.F. GAIN control as shown in figure 7.

f. Install the clear plastic knob, part number 545-3090-002, on the large diameter shaft of the dual control. Install the black pointer knob, part number 544-0779-004, on the small diameter shaft of the dual control. Make sure the bushing (part number 545-3091-002) is placed over shaft end before the knob is installed. See figure 7.

g. Connect the 50-ohm r-f cable, part number 425-1005-00, from J26 to the NB ANT connector on the rear wall of the chassis. Solder the shielding to the ground lugs on the connectors as shown in figure 7. Remove the bus jumper between J22 and J23 (underchassis).

h. Replace the KWM-2 chassis in the cabinet, but do not secure.

i. Mount the 136B-2 Noise Blanker unit inside the top cover as shown in figure 7. Use existing holes in the perforated top as mounting holes. After the blanker is mounted, check clearance by closing cover and noting if any part of the blanker rubs on the meter shield, C106, PA cage, PA tuning shaft, or vfo tube. If any interference is found, the location of the blanker can be adjusted by loosening mounting screws and repositioning.

j. Remove the KWM-2 from its case, and insert noise blanker plugs P22, P23, P24, and P26 in proper jacks as marked on the KWM-2 chassis. Connect the KWM-2 for operation out of case.

k. Turn on the KWM-2. Set EMISSION switch to TUNE. Tune and load the KWM-2 into a dummy load at 14.3 mc. Switch meter to GRID position.

l. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool between terminal 3 (secondary winding) of T2 and ground. This terminal is connected to the T2 end of coupling capacitor C25.

m. Keep grid current at approximately midscale or lower by adjusting MIC GAIN control, and peak the primary of T2 with the tuning tool, such as Walsco 2543. The primary slug of T2 is at the bottom of the can. Use grid current as peak indication.

n. Remove the swamping tool from the secondary of T2, and connect it across the primary of T2 (between pins 1 and 6 of the first mixer, V5). Peak the secondary of T2 (slug at top of shield can). Remove the swamping tool.

o. Retune and reload the KWM-2 to 14.255 mc. Without swamping any of the tuned circuits, peak L4 for maximum grid current indication, keeping grid current at approximately midscale with MIC GAIN control.

p. Connect an antenna to the NB ANT connector. In a mobile installation, the broadcast receiver antenna may be used (with reduction of blanker performance). If the broadcast antenna is used, connect as shown in figure 2. Connect the choke and the capacitor as closely as possible to the antenna. These components are not supplied with the 136B-2.

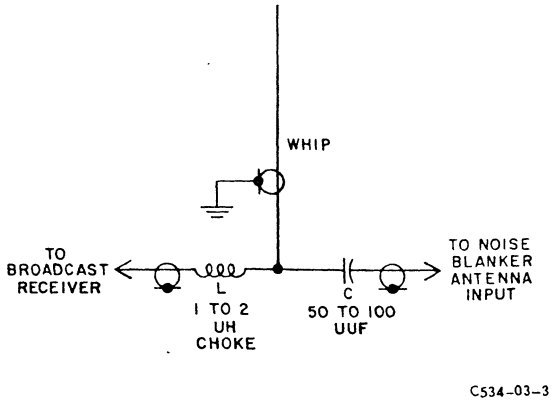

Figure 2. Suggested Connections for Using the Broadcast Whip for Both Broadcast Receiver and 136B-2 Noise Blanker

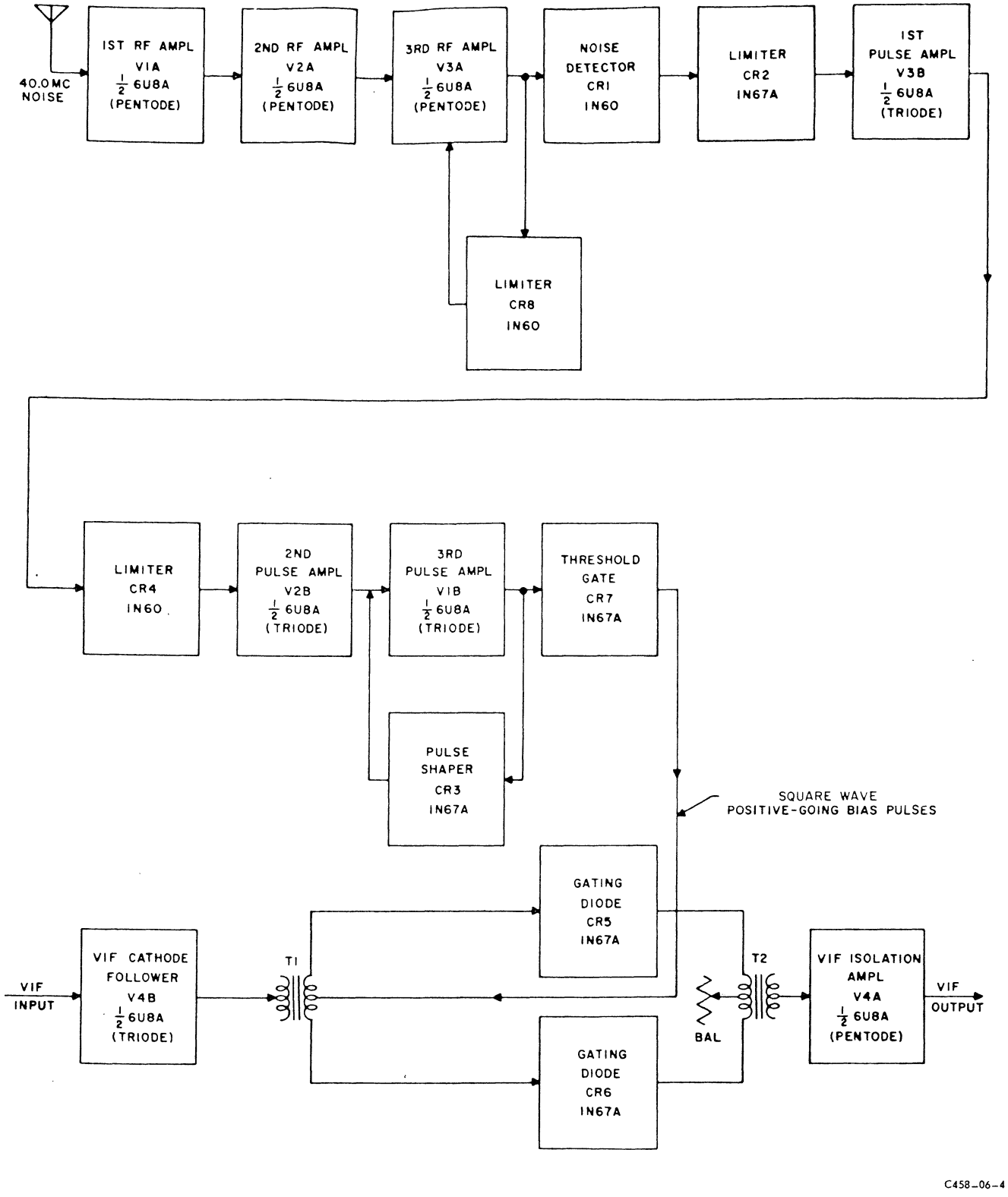

Figure 3. 136B-2 Noise Blanker, Block Diagram

q. After alignment, disconnect the noise blanker plugs from the KWM-2 chassis, and secure the KWM-2 in its case. Reconnect the noise blanker plugs P22, P23, P24, and P26 in their proper jacks on the KWM-2 chassis.

r. Secure the noise blanker cable to the cover of the KWM-2 with nylon clamps, as shown in figure 7. Dress the cable across the hinge and down the rear wall of the cabinet. The cable should lie near the chassis between the slug rack and the PA cage as shown in figure 7. This completes the installation.

3.1 OPERATION.

Set the function switch to NB position. After a sufficient warmup period, turn the blanker gain control clockwise until the noise level indicated on the S-meter drops sharply. This is the threshold point of most efficient blanker operation. Additional blanker gain is not desirable and will degrade performance. The required blanker gain setting is not a "set-and-forget" adjustment. Changing conditions, such as those encountered in driving from one area into another, will change the requirements for noise blanker gain setting. Whenever the noise level appears to have risen, reduce the blanker gain, and readjust for the threshold condition described above. If the blanker fails to reduce the noise level, turn it off. The repetition of the noise pulses may be too rapid for the blanker to gate, or a strong adjacent channel carrier may be causing erratic blanking.

4.1 CIRCUIT DESCRIPTION.

Figure 3 is a block diagram of the 136B-2, and figure 8 is a schematic diagram of the 136B-2. Tube sections V1A, V2A, and V3A are connected as a 40-mc tuned r-f amplifier. Gain of the r-f amplifier is controlled by potentiometer R25 in the cathode circuit of V2A. The output of V3A is limited by the action of diode CR8 and V3A. The positive component of the signal is clamped to the cathode of V3A. The signal is detected by CR1 and filtered by C15. The combination of C15 and R5 determines the length of the blanking pulse. The audio component of the noise is limited by CR2 and applied to the grid of the first pulse amplifier, V3B. Any negative portion of the waveform is clipped by CR4. Positive-going square pulses from V1B plate are applied through CR7 to the center tap of T1. The bias of CR7 keeps it cut off and at a high impedance to the low-level pulses, but high-level pulses overcome the bias and pass into the gate circuit. Gating diodes CR5 and CR6 are biased to conduction for normal noise-free operation. However, when a high-amplitude noise burst occurs, the positive-going pulse passes through CR7 and cuts off both CR5 and CR6. This effectively disconnects the variable i-f signal for the period of the blanking pulse. The length of the blanking pulse varies from a few microseconds to a maximum of 30 microseconds. Blanking pulse length is governed by the magnitude of the noise pulse appearing at the noise blanker antenna. For short duration noise disturbances in the variable i-f, the blanking pulses are short, while greater noise bursts develop longer blanking pulses. Transformers T1 and T2 and the gating diodes are arranged in a balanced modulator configuration so that any noise which results from the gating action is canceled and prevented from entering the receiver circuits. Any discontinuity of signal resulting from the gating action is compensated by tuned-circuit restoration in the following stages of the receiver. Both sections of V4 serve to isolate the noise-operated gate circuit from the receiver circuits. V4A provides only enough gain to compensate for the small loss in the gate circuit, so that over-all gain through the noise blanker is approximately unity. Filament power, B+ power, and bias voltage are taken from the KWM-2 power supply.

5.1 LIMITATIONS.

The noise blanking scheme has the following three limitations which decrease the blanking efficiency.

a. Noise pulses which have no energy distribution at 40 mc will occur in the frequency spectrum of the radio receiver range. The noise blanker will not generate a blanking pulse and will permit passage of these noise pulses.

b. A very strong signal in the pass band between the first and second mixers can be modulated by blanking pulses. This modulation process will cause sidebands in the pass band which result in decreased blanking efficiency. To minimize this modulation effect, a blanker on-off control and blanker r-f gain control are provided on the KWM-2 front panel.

c. Some corona noise and static disturbances have a repetition rate in excess of one hundred thousand pulses per second. The blanking efficiency decreases as the pulse repetition rate exceeds five thousand pulses per second.

6.1 SERVICE INSTRUCTIONS.

The blanker is aligned at the factory and will not need realignment when installed in the KWM-2. Tubes may be replaced in the noise blanker without necessity of realignment or readjustment. If major repairs are made to the blanker, it should be realigned.

Test equipment necessary for r-f alignment and gate balance adjustments of the 136B-2 consists of a signal generator with calibrated output capable of 40.0-mc operation, a vacuum-tube voltmeter with r-f probe, and a noise source. An ordinary doorbell buzzer or electric razor makes an excellent noise source for adjusting the 136B-2. If the noise blanker is to be used for mobile operation, use the idling engine as a noise source. Couple to the blanker by winding an insulated wire around the voltage regulator and spark plug leads.

6.1.1 R-F ALIGNMENT.

a. Connect a signal generator with a 50-ohm output impedance (such as a Measurements Corporation Model 80) to the coaxial lead marked J26 (blanker r-f input). Set the generator output to 200 microvolts.

b. Set the vtvm to a low scale and zero meter. Connect the probe between the detector test point and ground.

NOTE

Broadband operation of the noise blanker is necessary for proper operation. DO NOT attempt front-end alignment for sharp response.

c. Set the signal generator output to 40.0 mc (unmodulated), and increase the generator output until an indication is obtained on the vtvm. If a full-scale deflection results on a -1-volt scale with less than 200 microvolts input signal, the blanker may be oscillating. The blanker receiver is designed for broadband operation. If the coils are sharply peaked, oscillation can result. If this happens, detune L3 or L4 until oscillation ceases.

d. Adjust L1 and L4 for maximum indication on the vtvm. Reduce generator output as necessary to keep the voltmeter indication between 0 and -1 volt d-c.

e. Set the signal generator to 40.3 mc and peak L3.

f. Set the signal generator to 39.7 mc and peak L2.

g. Repeat the alignment of L1, L2, L3, and L4 to assure optimum band pass. When the generator frequency is moved from 41 mc to 39 mc, the detector output voltage indicated on the voltmeter should vary smoothly from a maximum at 40 mc to smaller value on either side. Any peaks between 40 and 39 or 40 and 41 mc indicate oscillations. If this occurs, repeak L2 at 39.5 mc and L3 at 40.5 mc.

6.1.2 GATE BALANCE.

a. Disconnect the KWM-2 antenna and leave the noise blanker antenna connected. Leave the KWM-2 turned on.

b. Turn on the noise source and loosely couple it to the noise blanker antenna.

c. Adjust gate balance potentiometer R32 and variable capacitor C28 for minimum noise output from the KWM-2 speaker. These two adjustments are interactive. First adjust one and then the other until neither produces any appreciable reduction in output noise.

6.1.3 VOLTAGE AND RESISTANCE MEASUREMENTS.

a. Table 1 lists the d-c voltage and resistance measurements on all tube sockets of the 136B-2.

b. All measurements are made with a vtvm with all tubes in sockets.

c. Resistances of less than one ohm are listed at zero.

d. All measurements are made from socket pin to ground.

e. Double values of resistance on pins 1 and 9 of V2 and pins 7 and 9 of V3 are caused by diodes in the circuit and the polarity of the ohmmeter used.

TABLE 1. D-C VOLTAGE AND RESISTANCE MEASUREMENTS - 136B-2

TUBE		PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V1	D-C V	100	0	110	0	0	195	2.2	2.6	0
	OHMS	50K	0	110K	0	0	30K	500	500	1.0 meg
V2	D-C V	135	0	*110 **210	0	0	205	*2.2 **15.0	4.5	0
	OHMS	45K/70K	4.7K	105K	0	0	25K	*500 **35K	3.0K	500/200K
V3	D-C V	40	0	115	0	0	220	2.6	0	-.5
	OHMS	60K	10K	100K	0	0	25K	100/500	0	10K/16K
V4	D-C V	135	0	130	0	0	225	3.0	14	11
	OHMS	45K	0	90K	0	0	25K	500	3.0K	100K

*Maximum r-f gain
**Minimum r-f gain

7.1 SPECIFICATIONS.

Power source	Companion transceiver power supply.
Frequency range	The blanking gate of the noise blanker passes i-f signals in the range of 1.5-4.0 mc in the companion transceiver. The input frequency of the noise blanker is 40.0 mc with a minimum bandwidth of 1 mc and a maximum bandwidth of 2 mc.
Sensitivity	A pulse signal input to the noise blanker of 100 microvolts peak will cause a minimum of 35 db reduction of gain in the receiver signal path.
Spurious response	Internal noise and signals introduced by the noise blanker are less than 1.0 microvolt equivalent signal.
Input impedance	Noise blanker amplifier; 50 ohms nominal ±50% unbalanced.
Output impedance	Signal blanking circuit; high impedance.
Controls	Installation of the noise blanker requires the addition of an r-f gain control (furnished with kit).
Tube complement functions	Three r-f noise and pulse amplifiers, one i-f input and output amplifier.
Size	4-11/16 by 6-3/8 by 1-7/8 inches.
Mounting centers	1-1/2 by 5-3/4 inches.
Weight	1-1/4 pounds.

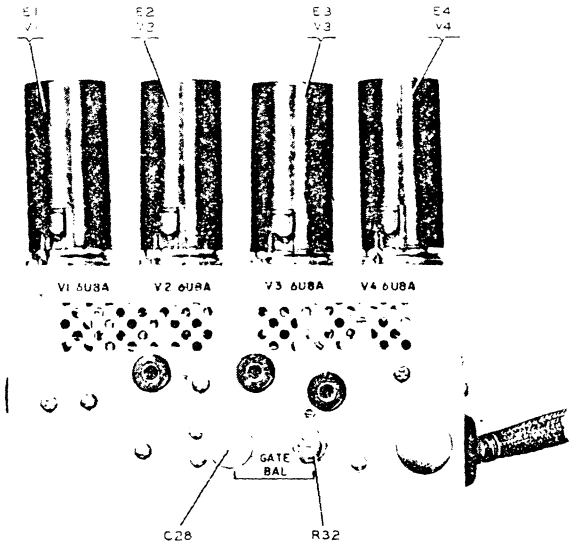

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Figure 4. 136B-2 Noise Blanker, Top View, Parts Identification

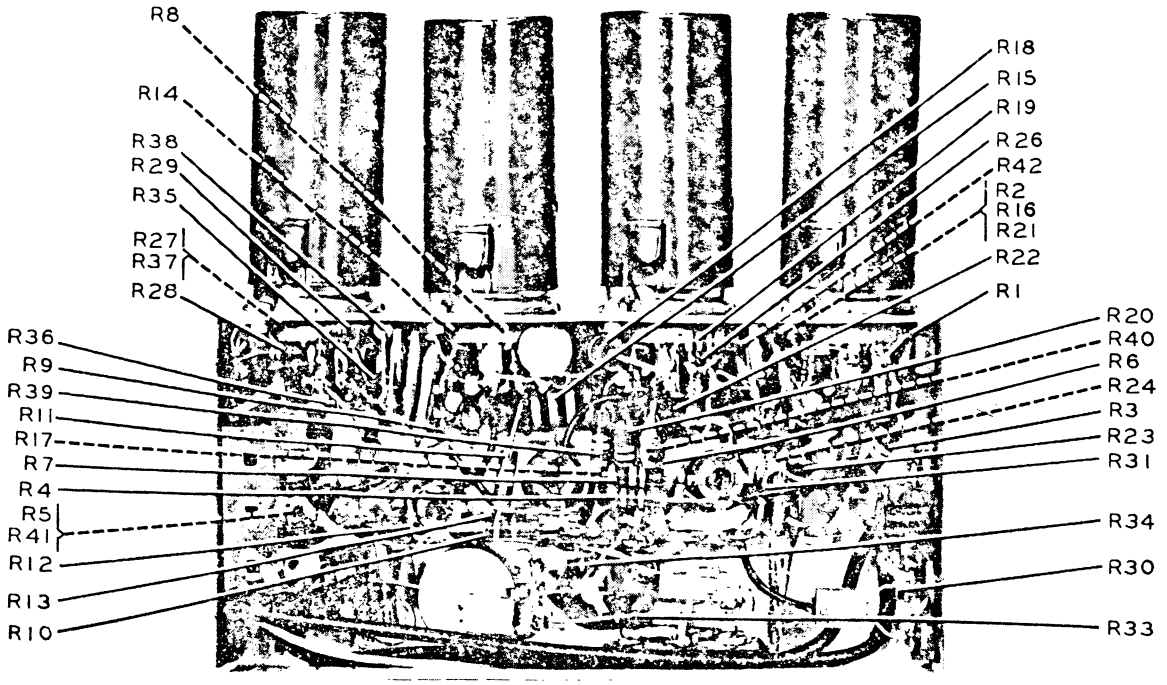

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Figure 5. Bottom View, Showing Resistor Location

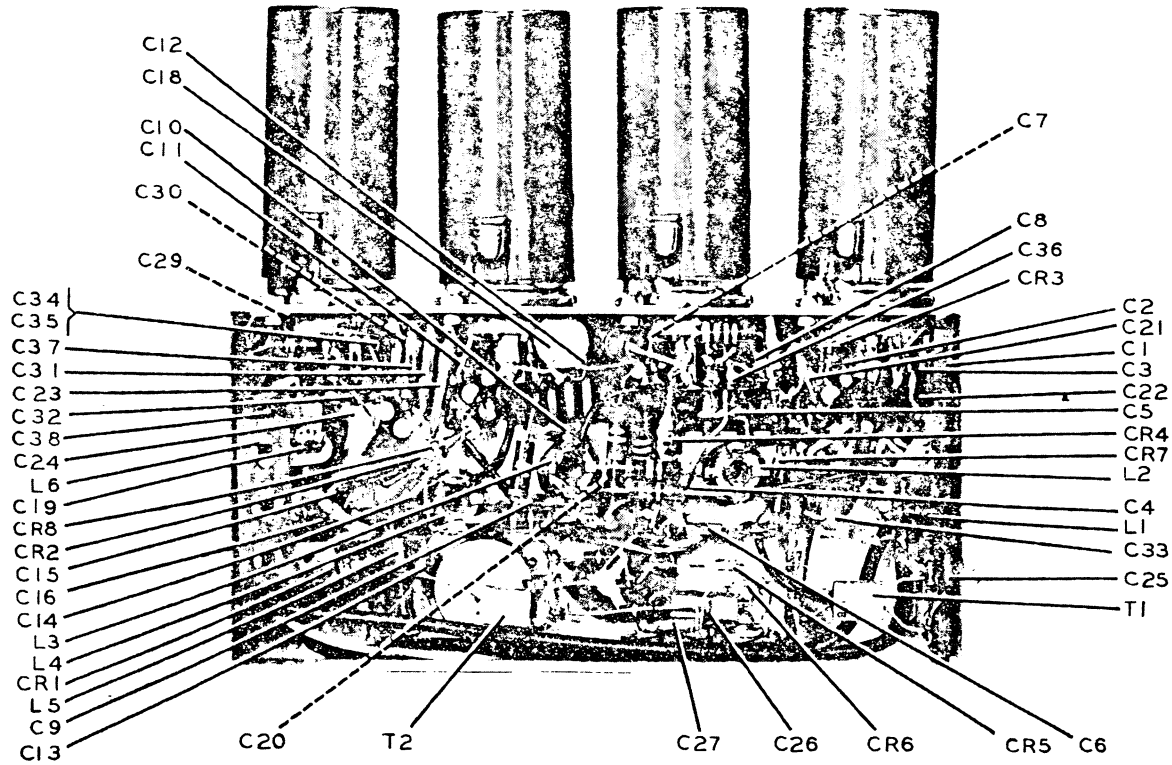

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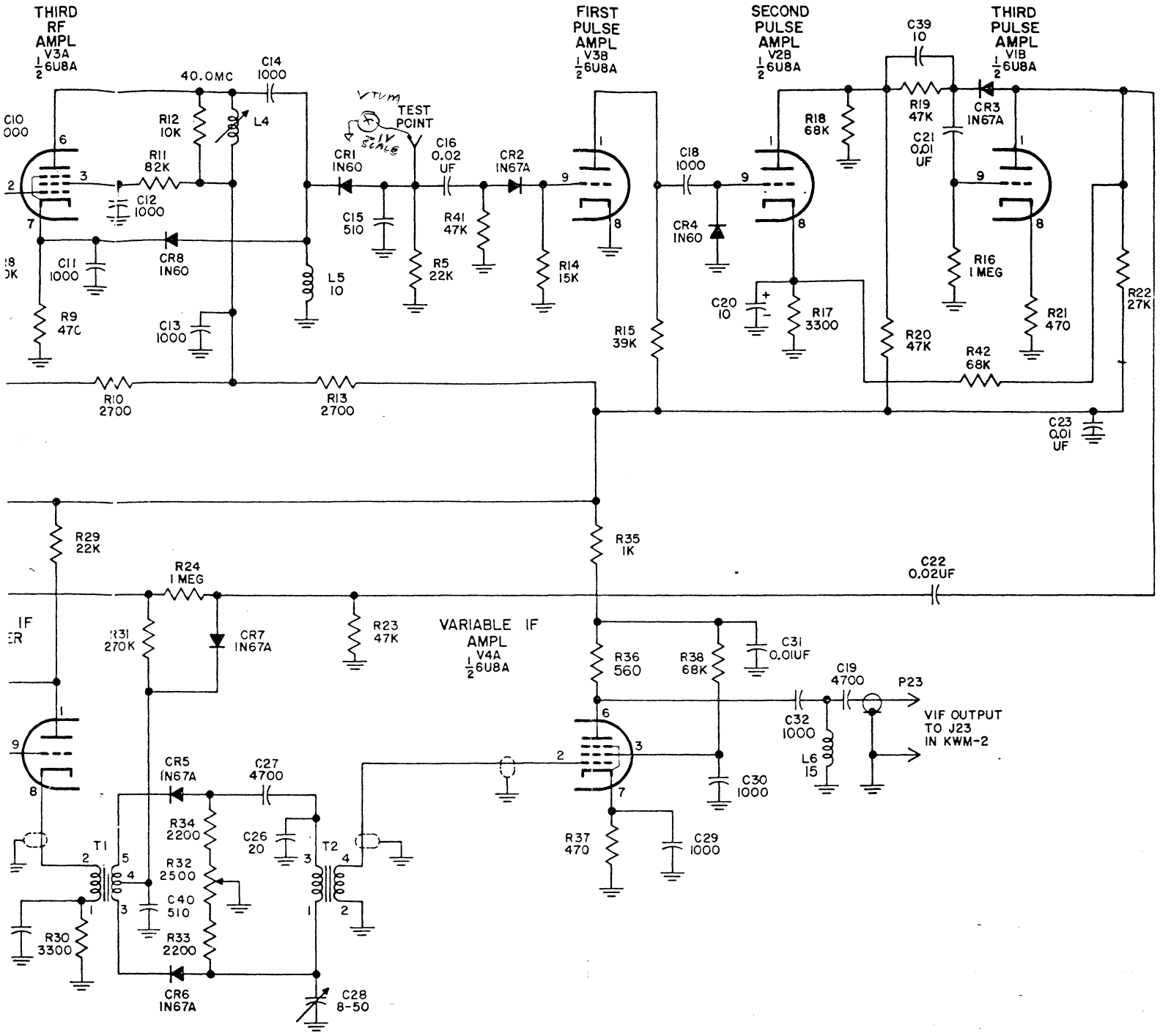
Figure 6. Bottom View, Location of Capacitors, Coils, Transformers, and Diodes

PARTS LIST

ITEM	DESCRIPTION	COLLINS PART NUMBER
	136B-2 NOISE BLANKER	522-1661-00
C1,C38, C39	CAPACITOR, FIXED, MICA: 10 uuf ±5%; 500 vdcw	912-3837-00
C2 thru C14,C17, C18,C25, C29,C30, C32,C34 thru C37	CAPACITOR, FIXED, CERAMIC: 1000 uuf +50% -20%; 500 vdcw	913-3738-00
C15,C40	CAPACITOR, FIXED, MICA: 510 uuf ±5%; 300 vdcw	912-2867-00
C16,C22	CAPACITOR, FIXED, CERAMIC: .02 uf +60% -40%; 250 vdcw	913-2097-00
C19,C27	CAPACITOR, FIXED, CERAMIC: 4700 uuf +50% -20%; 500 vdcw	913-3729-00
C20	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf -10% +100%, 25 vdcw	183-1163-00
C21,C23, C24,C31, C33	CAPACITOR, FIXED, CERAMIC: 10,000 uuf +50% -20%; 400 vdcw	913-3731-00
C26	CAPACITOR, FIXED, MICA: 20 uuf ±5%; 500 vdcw	912-3841-00
C28	CAPACITOR, VARIABLE, CERAMIC: 8 to 50 uuf; 350 vdcw	917-1075-00
CR1, CR4, CR8	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania type 1N60	353-2010-00
CR2, CR3, CR7	SEMICONDUCTOR DEVICE, DIODE: germanium; Hughes Aircraft type 1N67A	353-0147-00
CR5, CR6	SEMICONDUCTOR DEVICE, SET: 1 matched pair diode semiconductor devices; Hughes Aircraft type 1N67	353-0127-00
E1 thru E4	SHIELD, ELECTRON TUBE: for 9 pin noval; 0.950 in. od by 1-15/16 in. lg	141-0329-00
L1	TRANSFORMER, AUTO: 40 mc, 1 winding, 0.66 to 1.06 uh inductance, 11 turns #32 AWG wire, 1 tap, tapped at 1-3/4 turns, phenolic coil form	278-0291-00
L2,L3	COIL, RADIO FREQUENCY: 40 mc, universal wound; #32 AWG formvar wire; 1.2 to 2.8 uh, 30 ma	240-0822-00
L4	COIL, RADIO FREQUENCY: 40 mc, universal wound; #32 AWG formvar wire; 1.7 to 3.8 uh, 30 ma	240-0823-00
L5	COIL, RADIO FREQUENCY: single layer wound; magnet wire; 10 uh inductance	240-0164-00
L6	COIL, RADIO FREQUENCY: single layer wound; magnet wire; 15 uh	240-0151-00
P1 thru P21	NOT USED	
P22,P23, P26	PLUG, TIP: phono type; 1 terminal; 1-1/4 in. lg	361-0062-00
P24	CONNECTOR, PLUG, ELECTRICAL: 9 male contacts; for u/w miniature tube socket	372-1822-00
P25	NOT USED	
R1,R26	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%; 1/4 w	745-0773-00
R2,R6, R9,R21, R37	RESISTOR, FIXED, COMPOSITION: 470 ohms ±10%; 1/4 w	745-0737-00
R3,R7, R11	RESISTOR, FIXED, COMPOSITION: 82,000 ohms ±10%; 1/4 w	745-0818-00
R4,R10	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%; 1/4 w	745-0764-00
R5	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%; 1/4 w	745-0797-00
R8,R12	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%; 1/4 w	745-0785-00
R13	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%; 1/2 w	745-1370-00
R14	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%; 1/4 w	745-0791-00
R15	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%; 2 w	745-5719-00
R16,R24, R28	RESISTOR, FIXED, COMPOSITION: 1 megohm ±10%; 1/4 w	745-0857-00
R17,R30	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%; 1/4 w	745-0767-00
R18	RESISTOR, FIXED, COMPOSITION: 68,000 ohms ±10%; 1/2 w	745-1429-00
R19,R23, R40,R41	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%; 1/4 w	745-0809-00
R20	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%; 1 w	745-3422-00
R22	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%; 2 w	745-5712-00
R25	RESISTOR, VARIABLE: composition; dual section; 10,000 ohms ea section, ±30%; 1/4 w	376-2147-00
R27	RESISTOR, FIXED, COMPOSITION: 100,000 ohms ±10%, 1/4 w	745-0821-00
R29	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%; 2 w	745-5708-00
R31	RESISTOR, FIXED, COMPOSITION: 0.27 megohm ±10%; 1/4 w	745-0836-00
R32	RESISTOR, VARIABLE: composition; 2500 ohms ±20%; 0.2 w	380-6286-00
R33,R34	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%; 1/4 w	745-0761-00
R35	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/4 w	745-0749-00
R36	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%; 1/4 w	745-0740-00
R38,R42	RESISTOR, FIXED, COMPOSITION: 68,000 ohms ±10%; 1/2 w	745-1429-00
R39	RESISTOR, FIXED, COMPOSITION: 0.1 megohm ±10%; 1 w	745-3436-00
T1	TRANSFORMER, DISCRIMINATOR: 2.5 mc center freq; shielded, 0.525 in. dia by 11/16 in. lg; ferrite core; 5 wire-lead terminals	278-1710-00
T2	TRANSFORMER, RADIO FREQUENCY: 2 windings, ferrite case, ferrite coil form, turn ratio 1.1, 4 wire terminals	278-1711-00
V1 thru V4	ELECTRON TUBE: triode-pentode; type 6U8A	255-0328-00


THIRD RF AMPL V3A 1/2 6U8A
40.0MC
C14 1000
C10 000
R12 10K
L4
R11 82K
C12 1000
C11 1000
CR8 IN60
R9 470
C13 1000
L5 10
R10 2700
R13 2700
VTVM
TEST POINT
1V SCALE
CR1 IN60
C16 0.02 UF
CR2 IN67A
C15 510
R5 22K
R41 47K
R14 15K
FIRST PULSE AMPL V3B 1/2 6U8A
C18 1000
CR4 IN60
C20 10
R15 39K
SECOND PULSE AMPL V2B 1/2 6U8A
R18 68K
R17 3300
C39 10
R19 47K
CR3 IN67A
C21 0.01 UF
THIRD PULSE AMPL V1B 1/2 6U8A
R16 1 MEG
R21 470
R20 47K
R42 68K
R22 27K
C23 0.01 UF
R29 22K
R24 1 MEG
R35 1K
C22 0.02UF
IF
R31 270K
CR7 IN67A
R23 47K
VARIABLE IF AMPL V4A 1/2 6U8A
R36 560
R38 68K
C31 0.01UF
C19 4700
P23
VIF OUTPUT TO J23 IN KWM-2
C32 1000
L6 15
C30 1000
CR5 IN67A
C27 4700
R34 2200
C26 20
T1
T2
R32 2500
C40 510
R33 2200
R30 3300
R37 470
C29 1000
CR6 IN67A
C28 8-50

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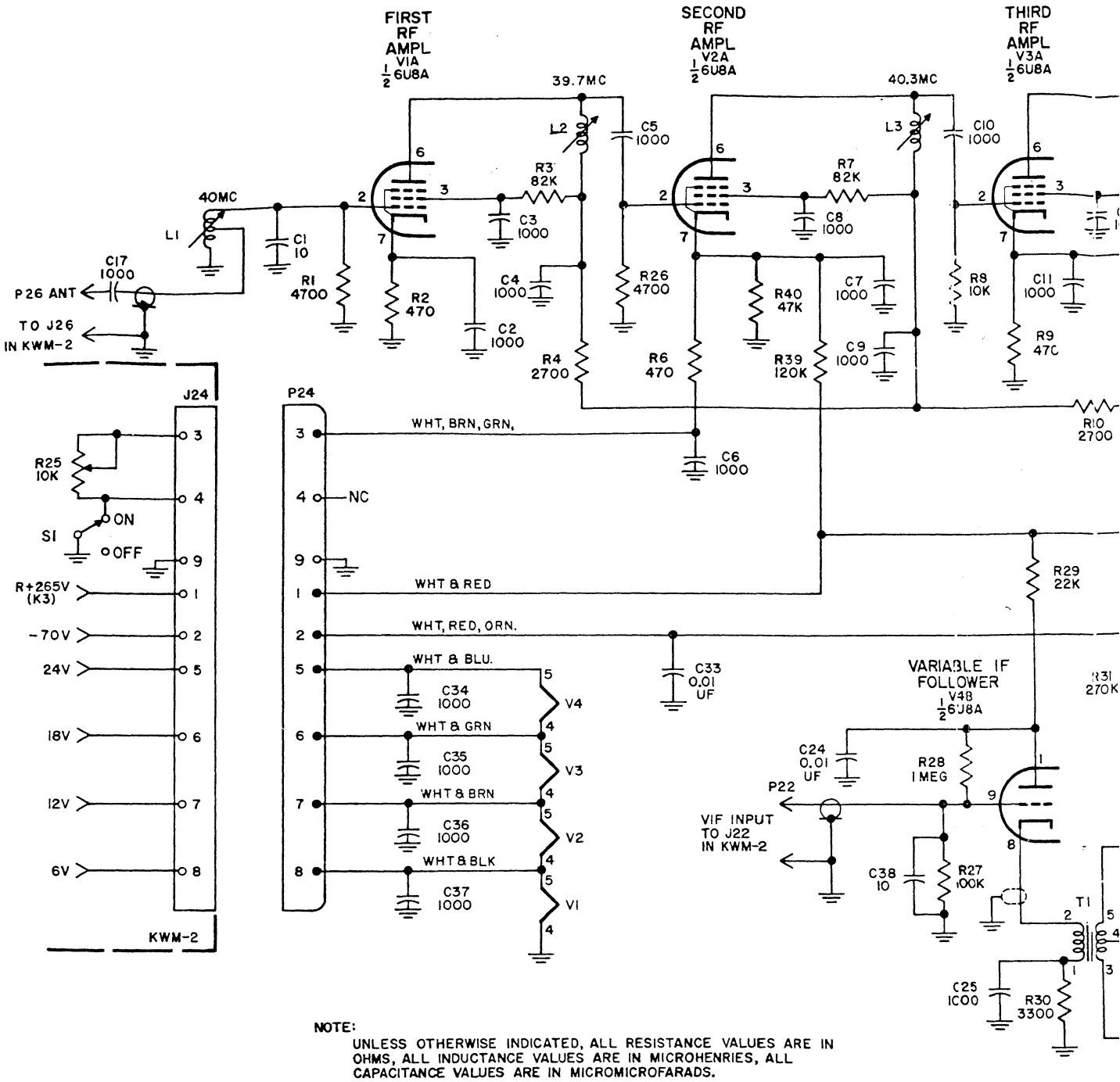

NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL INDUCTANCE VALUES ARE IN MICROHENRIES, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.