INSTRUCTION BOOK

136A-1
NOISE BLANKER

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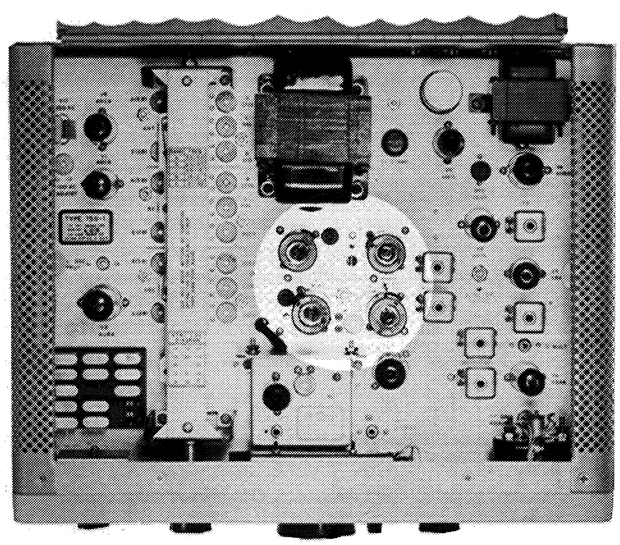

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Figure 1. 136A-1 Noise Blanker, Installed in 75S-1 Receiver

1.1 DESCRIPTION.

Figure 1 shows the 136A-1 installed in the 75S-1 Receiver. The 136A-1 converts noise to bias pulses for gating the receiver off during noise bursts. This minimizes receiver output noise when it is a result of radiated noise present on both the blanker and receiver antennas. The noise blanker must be provided with its own separately-tuned, 40-mc antenna. The noise blanker antenna should be as good at 40 mc as a logical compromise allows. In mobile work, an ordinary 60-inch broadcast whip has been found to be satisfactory. Attempts to use an antenna which is sharply resonant at the communication channel frequency will result in unsatisfactory operation of the noise blanker. The 40-mc performance of such an antenna is poor. A six-foot, quarter-wave, coaxial-fed whip is best.

The noise-blanking scheme has three limitations which decrease the blanking efficiency. These are:

a. One premise upon which the noise blanker was designed is that a noise burst occurring in the high-frequency portion of the spectrum will have some energy distribution at 40.0 mc. If this 40-mc energy distribution does not occur, the blanker will not operate to gate out the interfering noise.

b. A very strong 2.955 to 3.155-mc signal in the pass band between the first and second mixers can be modulated by blanking pulses. This modulation will cause sidebands in the pass band which result in increased noise and decreased blanking efficiency. Under adverse conditions, this effect can be bad enough to degrade the receiver signal-to-noise ratio when the blanker is turned on. This effect appears to be inherent in any gating-type system.

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

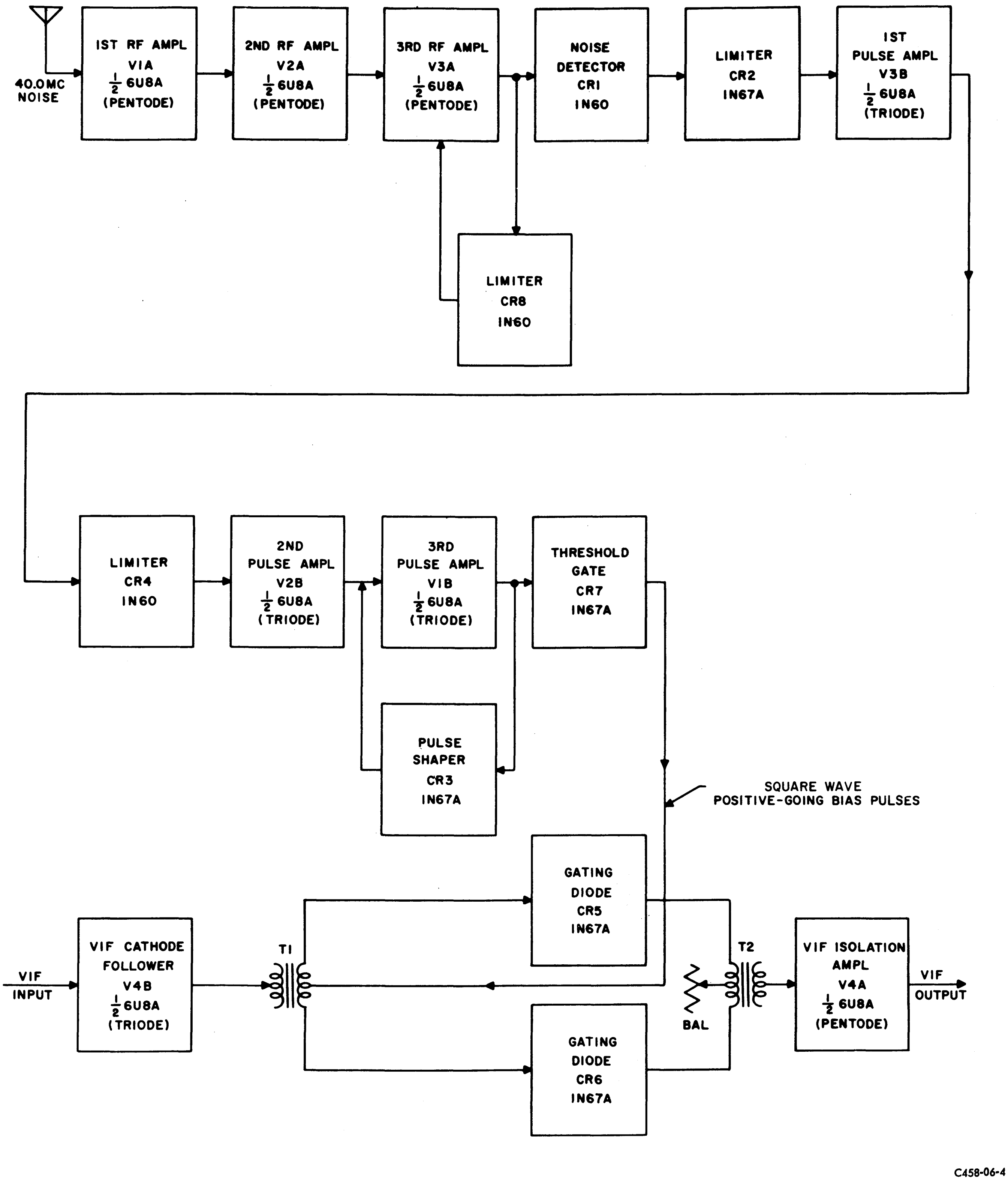

Figure 2. 136A-1 Noise Blanker, Block Diagram

pulse repetition rate exceeds five thousand pulses per second.

2.1 INSTALLATION PROCEDURES.

2.1.1 INSTALLATION.

a. Remove 75S-1 mounting feet. Remove two top front screws and take 75S-1 out of cabinet.

b. Drill a 3/8-inch diameter hole in the front panel of the 75S-1 as shown in detail A, figure 5. Remove the terminal strip as shown in figure 5. Drill a 0.089-inch (number 43 drill) hole 1/2 inch toward rear chassis and 1/2 inch toward right (looking at bottom). Measure these distances from the old terminal strip mounting hole. Mount the terminal strip to the chassis at the new hole, using the self-tapping screw which was removed from the old hole.

c. Install the noise blanker gain control (10K potentiometer, part number 376 7626 00) in the new 3/8-inch panel hole, using two knurled nuts as shown in plan view, figure 5.

d. Mount the noise blanker in the cutout provided in the center of the 75S-1 chassis. To do this, remove the cover plate and discard. Use the four screws which secured the old cover plate to secure the blanker at each of four corners in the mounting hole. Connect the white and green wire to the gain control center terminal and wire the switch as shown in plan view figure 5. Connect the white and blue wires to the switch terminals. This is a series B+ switch, so either white and blue wire may be connected to either terminal.

e. Remove the nut from one side of tube socket XV3 and replace with the insulated terminal (part number 306 0234 00).

f. Disconnect the 68-ohm resistor R8 from pin 1 of L4 and pin 2 of XV3 shown in figure 5.

g. Connect the 68K resistor (part number 745 1429 00) between terminals 1 and 3 of L4.

h. Connect the noise blanker cabling as shown in section AA and plan view of chassis, figure 5. This completes noise blanker installation.

2.1.2 75S-1 REALIGNMENT WITH SIGNAL GENERATOR.

After noise blanker installation, it will be necessary to realign the 75S-1 band-pass i-f circuits. Proceed as follows:

a. Set BAND switch to an unused 28-mc position. If all 28-mc crystal sockets are filled, remove one crystal and set BAND switch to that position. This disables the crystal oscillator V2B. Set EMISSION switch to CW.

b. Connect a signal generator to the XTAL OSC OUTPUT jack, J1, and set to 3.055 mc. Set the receiver tuning dial to 100, and increase signal generator output until signal is heard in speaker. It may be necessary to rock the signal generator dial to center the signal in the receiver filter pass band. Set R. F. GAIN control at maximum clockwise position and A. F. GAIN control at maximum counterclockwise position. Adjust signal generator output to provide S-3 indication on the S-meter.

c. Make two swamping tools by connecting a 0.01-uf capacitor in series with a 1000-ohm resistor and connecting alligator clips to the two remaining pigtails.

d. Connect one swamping network from T1 primary (terminal 1) to ground and the other from L4 (terminal 1) to ground.

e. Peak the secondary of T1 (top of can) using a Walsco 2543 tuning tool. Keep the S-meter reading at S3 with the signal generator output control.

f. Remove both swamping networks and swamp T1 secondary (terminal 3 to ground). Peak T1 primary (bottom of can) and peak L4. Keep the S-meter reading at S3 with the signal generator output control.

g. Remove the swamping network from T1 secondary. This completes the band pass i-f alignment.

h. Replace the 75S-1 in its cabinet.

2.1.3 75S-1 REALIGNMENT WITHOUT SIGNAL GENERATOR.

If a signal generator is not available, satisfactory realignment of the band-pass i-f circuits may be accomplished using the 75S-1 calibrate signal. Proceed as follows:

a. Set BAND switch to 28A. Set EMISSION switch to CW. Set A.F. GAIN at maximum counterclockwise position and R.F. GAIN at maximum counterclockwise position. Set OFF-STBY-OPR-CAL switch to CAL position. Tune the dial near 100 to peak the S-meter indication.

b. Align as in paragraph 2.1.2 steps c through h, except disregard the signal generator references.

3.1 OPERATION.

Pull the noise blanker gain knob to turn on the blanker. Turn the blanker gain control clockwise until the noise level indicated on the receiver S-meter drops sharply. This is the threshold point of most efficient blanker operation. Additional blanker gain is not desirable, and may degrade performance under some operating conditions. Operation may be improved by reducing the 75S-1 Receiver r-f gain slightly. If the blanker fails to reduce the noise level, turn it off. The repetition rate 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 2, a block diagram of the 136A-1, illustrates the noise blanking scheme, along with figure 6, schematic diagram of the 136A-1. Tube sections V1A, V2A, and V3A are connected as a three-stage, cascade, 40-mc tuned r-f amplifier. Gain of the trf amplifier is controlled by potentiometer R4 in the cathode circuit of V2A. The ouput 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 C11. The combination of C11 and R34 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. Positive-going output pulses from V3B are applied to the grid of V2B. 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 75S-1 power supply.

5.1 SERVICE INSTRUCTIONS.

The blanker is aligned at the factory and will not need realignment when installed in the 75S-1. Tubes may be replaced in the noise blanker without necessity of realignment or readjustment. However, 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 136A-1 consists of the following: 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 136A-1.

5.1.1 R-F ALIGNMENT.

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

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

c. Set the signal generator output to 40.0 mc (unmodulated) and increase the generator output until a reading is obtained on the voltmeter. If a full scale deflection results with less than 200 microvolts input signal on a 0 to -1 volt scale the blanker r-f amplifier 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 reading on the vtvm. Reduce generator output as necessary to keep the voltmeter reading 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 read on the voltmeter should vary smoothly from a maximum at 40 mc to a smaller value on either side. Any peaks between 41 and 39 mc indicate oscillation. If this occurs, repeak L2 at 39.5 mc and L3 at 40.5 mc.

5.1.2 GATE BALANCE.

a. Disconnect the 75S-1 antenna.

b. Leave the noise blanker antenna connected and the 75S-1 on. Turn the noise source on and couple loosely to the noise antenna.

c. Adjust gate balance potentiometer R30 and variable capacitor C24 for minimum noise output from the 75S-1 speaker. These two adjustments are interactive. First adjust one and then the other until neither produces any appreciable reduction in output noise.

5.1.3 VOLTAGE AND RESISTANCE MEASUREMENTS.

a. Table 1 lists the d-c voltage and resistance measurements on all tube sockets of the 136A-1. Values are nominal.

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

c. Resistances of less than one ohm are listed as 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 - 136A-1

TUBE		PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V1	DCV	60	0	110	0	0	110	2.4	1.1	0
	OHMS	50K	0	25K	0	0	25K	500	500	1.0 MEG
V2	DCV	90	0	*115 **125	0	0	*115 **125	*2.4 **15.	3.0	0
	OHMS	50K/70K	4.7K	25K	0	0	25K	*300 **35K	5K	500/200K
V3	DCV	30	0	120	0	0	105	1.5	0	-.5
	OHMS	60K	7K	22K	0	0	25K	300/75	0	20K/35K
V4	DCV	120	0	120	0	0	115	2.5	22	20
	OHMS	20K	0	22K	0	0	25K	500	3K	100K

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

6.1 SPECIFICATIONS.

Power source	Companion receiver 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 receiver. 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.
Cross modulation	The noise blanker causes no more than six db deterioration in cross modulation and/or blocking characteristics of the companion receiver.
Sensitivity	A pulse signal input to the noise blanker input 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 ohm nominal ±50% unbalanced.
Output impedance	Signal-blanking circuit; high impedance
Controls	Installation of a noise blanker in the 75S-1 receiver requires the addition of a blanker r-f gain control with a push-pull on-off switch (furnished with kit).
Tube complement functions	Three r-f noise and pulse amplifiers. One i-f input and output amplifier.
Size	3 in. x 3-9/16 in. x 4 in.
Mounting centers	2-5/8 in. x 3-1/4 in.
Weight	1 lb.

PARTS LIST

Following is the parts list for the 136A-1. Figure 3 is the top view. Figure 4a is the bottom view showing location of resistors. Figure 4b locates the remaining parts.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	136A-1 NOISE BLANKER	522 1582 00
C1	CAPACITOR, FIXED, MICA: 10 uuf, ±10%, 500 v dc	912 0432 00
C2	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v dc	913 3009 00
C3 thru C10	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C11	CAPACITOR, FIXED, MICA: 510 uuf, ±10%, 300 v dc	912 0546 00
C12	CAPACITOR, FIXED, CERAMIC: 22,000 uuf, +100% -20%, 500 v dc	913 3014 00
C13	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C14	CAPACITOR, DIPPED MICA: 390 uuf	912 2859 00
C15	CAPACITOR, FIXED, ELECTROLYTIC: aluminum, 8 uf -15% +100%, 120 cps; 6 v dc	183 1167 00
C16	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C17	CAPACITOR, FIXED, CERAMIC: same as C12	913 3014 00
C18	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C19	CAPACITOR, FIXED, CERAMIC: same as C16	913 3013 00
C20	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C21	CAPACITOR, FIXED, CERAMIC: same as C16	913 3013 00
C22	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100% -20%, 500 v dc	913 3012 00
C23	CAPACITOR, FIXED, MICA: 20 uuf, ±10%, 500 v dc	912 2766 00
C24	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C25 thru C31	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C32	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
CR1	SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N60	353 2010 00
CR2	SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N67A	353 0147 00
CR3	SEMICONDUCTOR DEVICE, DIODE: same as CR2	353 0147 00
CR4	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353 2010 00
CR5 thru CR7	SEMICONDUCTOR DEVICE, DIODE: same as CR2	353 0147 00
CR8	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353 2010 00
L1	TRANSFORMER, AUTO: 4.0 mc, 1 winding, 0.7 to 1.1 uh inductance, 11 turns no. 32 AWG wire, 1 tap, tapped at 1-3/4 turns phenolic coil form	278 0291 00
L2	COIL, RADIO FREQUENCY: universal wound, 32 AWG formvar wire; 0.8 to 1.8 uh, 30 ma	240 0822 00
L3	COIL, RADIO FREQUENCY: same as L2	240 0822 00
L4	COIL, RADIO FREQUENCY: universal wound, 32 AWG formvar wire; 1.3 to 3.0 uh, 30 ma	240 0823 00
L5	COIL, RADIO FREQUENCY: single layer wound; magnet wire; 10 uh inductance	240 0164 00
R1	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745 0773 00
R2	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/4 w	745 0737 00
R3	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/4 w	745 0773 00
R4	RESISTOR, VARIABLE: composition; 10,000 ohms, ±30%, 1/4 w (incl S1)	376 7626 00
R5	RESISTOR, FIXED, COMPOSITION: 270 ohms, ±10%, 1/4 w	745 0728 00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R6	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/2 w	745 1370 00
R7	RESISTOR, FIXED, COMPOSITION: 6800 ohms, ±10%, 1/4 w	745 0779 00
R8	RESISTOR, FIXED, COMPOSITION: same as R6	745 1370 00
R9	RESISTOR, FIXED, COMPOSITION: same as R5	745 0728 00
R10	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1/4 w	745 0785 00
R11	RESISTOR, FIXED, COMPOSITION: same as R6	745 1370 00
R12	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±10%, 1/4 w	745 0803 00
R13	RESISTOR, FIXED, COMPOSITION: 39,000 ohms, ±10%, 1/4 w	745 0806 00
R14	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±10%, 1/4 w	745 0857 00
R15	RESISTOR, FIXED, COMPOSITION: same as R1	745 0773 00
R16	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/4 w	745 0809 00
R17	RESISTOR, FIXED, COMPOSITION: same as R16	745 0809 00
R18	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R19	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, ±10%, 1/2 w	745 1412 00
R20	RESISTOR, FIXED, COMPOSITION: same as R16	745 0809 00
R21	RESISTOR, FIXED, COMPOSITION: 0.47 megohms, ±10%, 1/4 w	745 0845 00
R22	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±10%, 1/4 w	745 0713 00
R23	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±10%, 1/4 w	745 0821 00
R24	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/4 w	745 0749 00
R25	RESISTOR, FIXED, COMPOSITION: 3300 ohms, ±10%, 1/4 w	745 0767 00
R26	RESISTOR, FIXED, COMPOSITION: same as R14	745 0857 00
R27	RESISTOR, FIXED, COMPOSITION: 0.27 megohms, ±10%, 1/4 w	745 0836 00
R28	RESISTOR, FIXED, COMPOSITION: 2200 ohms, ±10%, 1/4 w	745 0761 00
R29	RESISTOR, FIXED, COMPOSITION: same as R28	745 0761 00
R30	RESISTOR, VARIABLE: composition; 2500 ohms, ±20%, 0.2 w	376 4607 00
R31	RESISTOR, FIXED, COMPOSITION: same as R24	745 0749 00
R32	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R33	RESISTOR, FIXED, COMPOSITION: same as R24	745 0749 00
R34	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, ±10%, 1/4 w	745 0797 00
R35	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, ±10%, 1/4 w	745 0818 00
R36	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/4 w	745 0809 00
R37	RESISTOR, FIXED, COMPOSITION: same as R16	745 0809 00
R38	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1/4 w	745 0815 00
S1	SWITCH PUSH: spst, 3 amps at 125 v (incl R4)	376 7626 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	ELECTRON TUBE: triode-pentode; type 6U8A	255 0328 00
V2 thru V4	ELECTRON TUBE: same as V1	255 0328 00

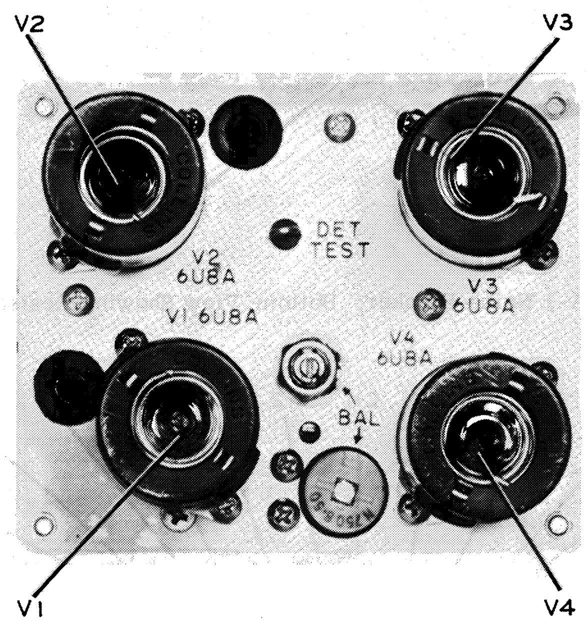

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Figure 3. 136A-1 Noise Blanker, Top View

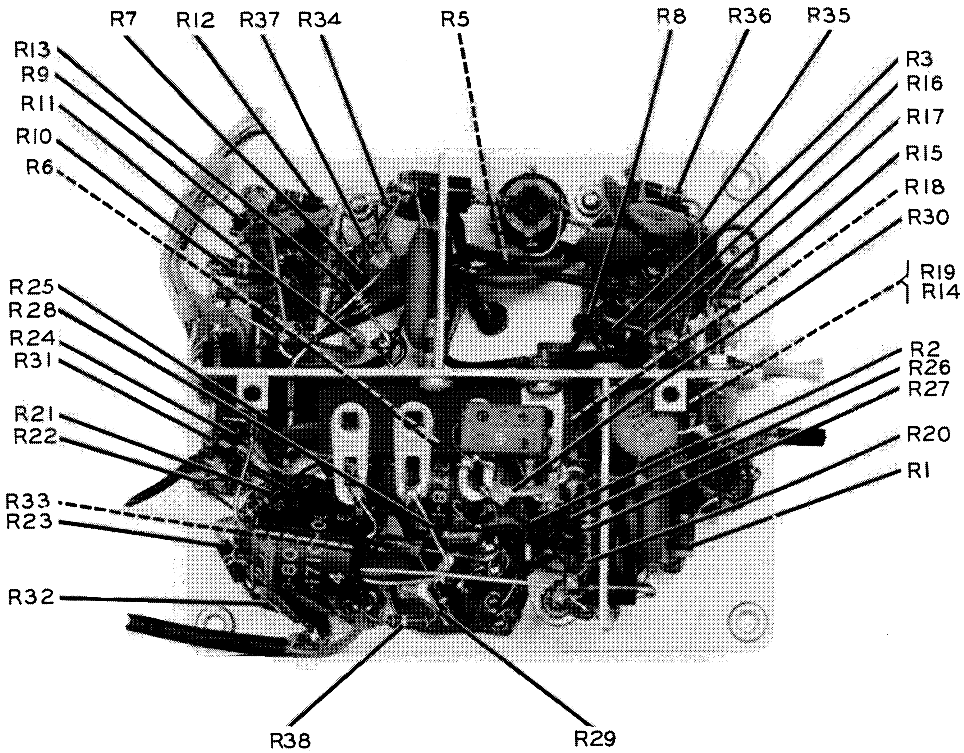

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Figure 4A. 136A-1 Noise Blanker, Bottom View Showing Resistor Location

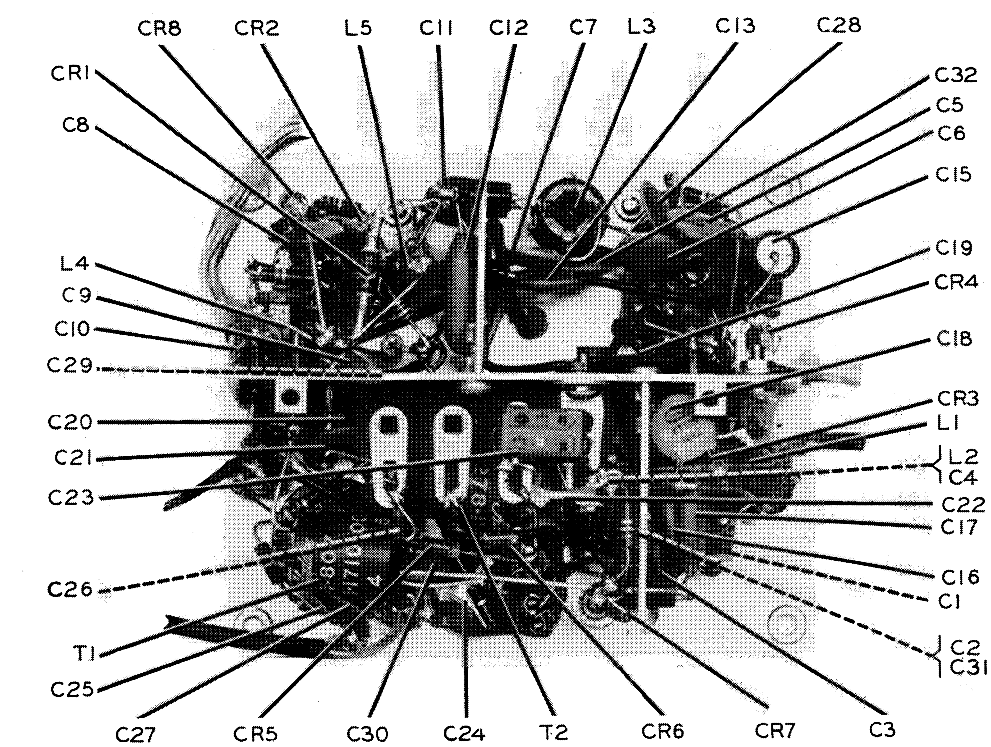

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Figure 4B. 136A-1 Noise Blanker, Bottom View Showing Location of Capacitors, Coils, Transformers, and Diodes

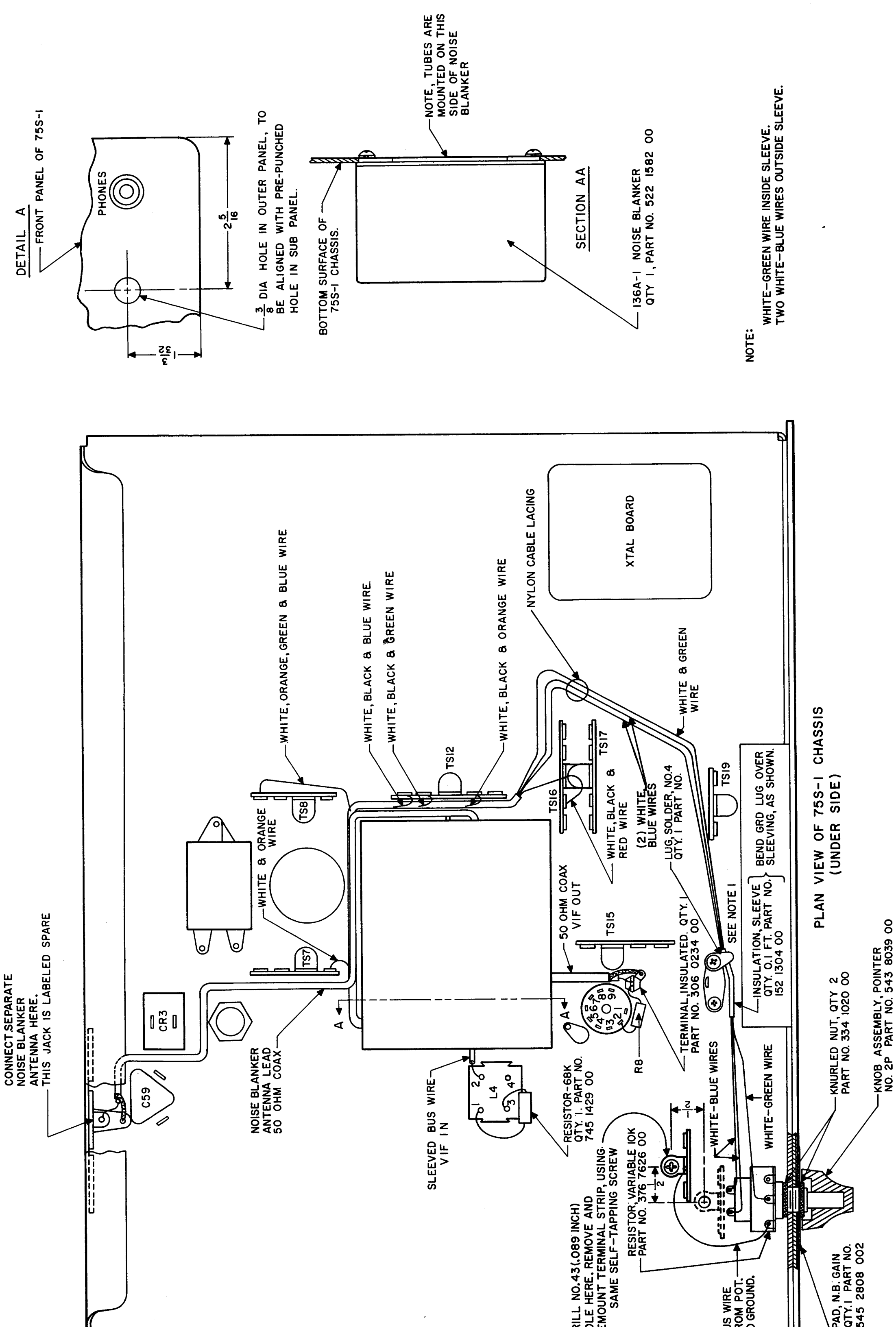

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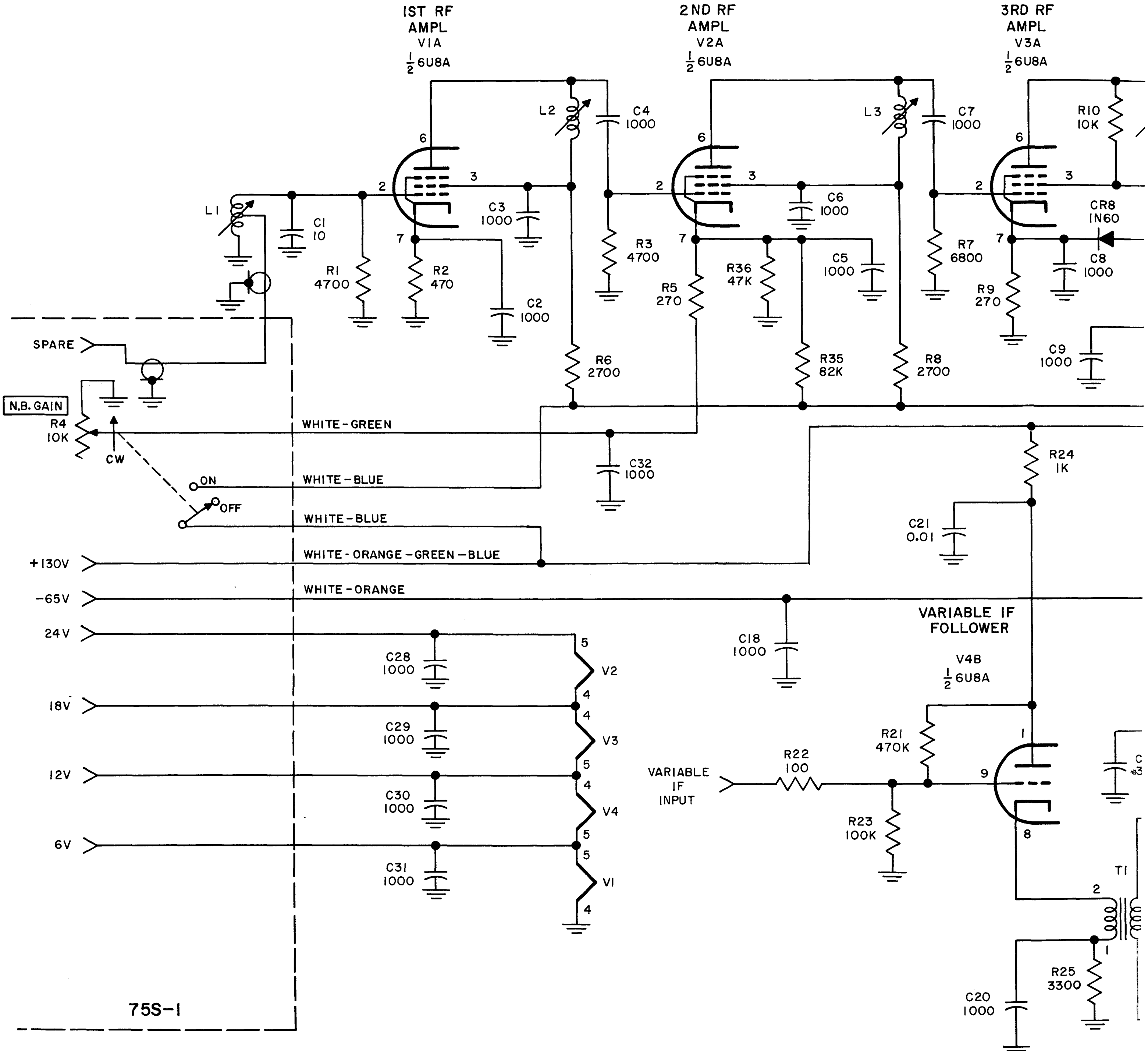
Figure 5. 136A-1 Noise Blanker, Installation Diagram



1ST RF AMPL
V1A
1/2 6U8A
2ND RF AMPL
V2A
1/2 6U8A
3RD RF AMPL
V3A
1/2 6U8A
L1
C1 10
R1 4700
R2 470
C2 1000
C3 1000
L2
C4 1000
R3 4700
R6 2700
L3
C7 1000
C6 1000
C5 1000
R36 47K
R5 270
R35 82K
R7 6800
R8 2700
R10 10K
CR8 1N60
C8 1000
R9 270
C9 1000
SPARE
N.B. GAIN
R4 10K
CW
ON
OFF
WHITE-GREEN
C32 1000
WHITE-BLUE
WHITE-BLUE
WHITE-ORANGE-GREEN-BLUE
WHITE-ORANGE
+130V
-65V
24V
18V
12V
6V
C28 1000
C29 1000
C30 1000
C31 1000
V2
V3
V4
V1
R24 1K
C21 0.01
C18 1000
VARIABLE IF FOLLOWER
V4B
1/2 6U8A
R21 470K
R22 100
VARIABLE IF INPUT
R23 100K
T1
R25 3300
C20 1000
75S-1

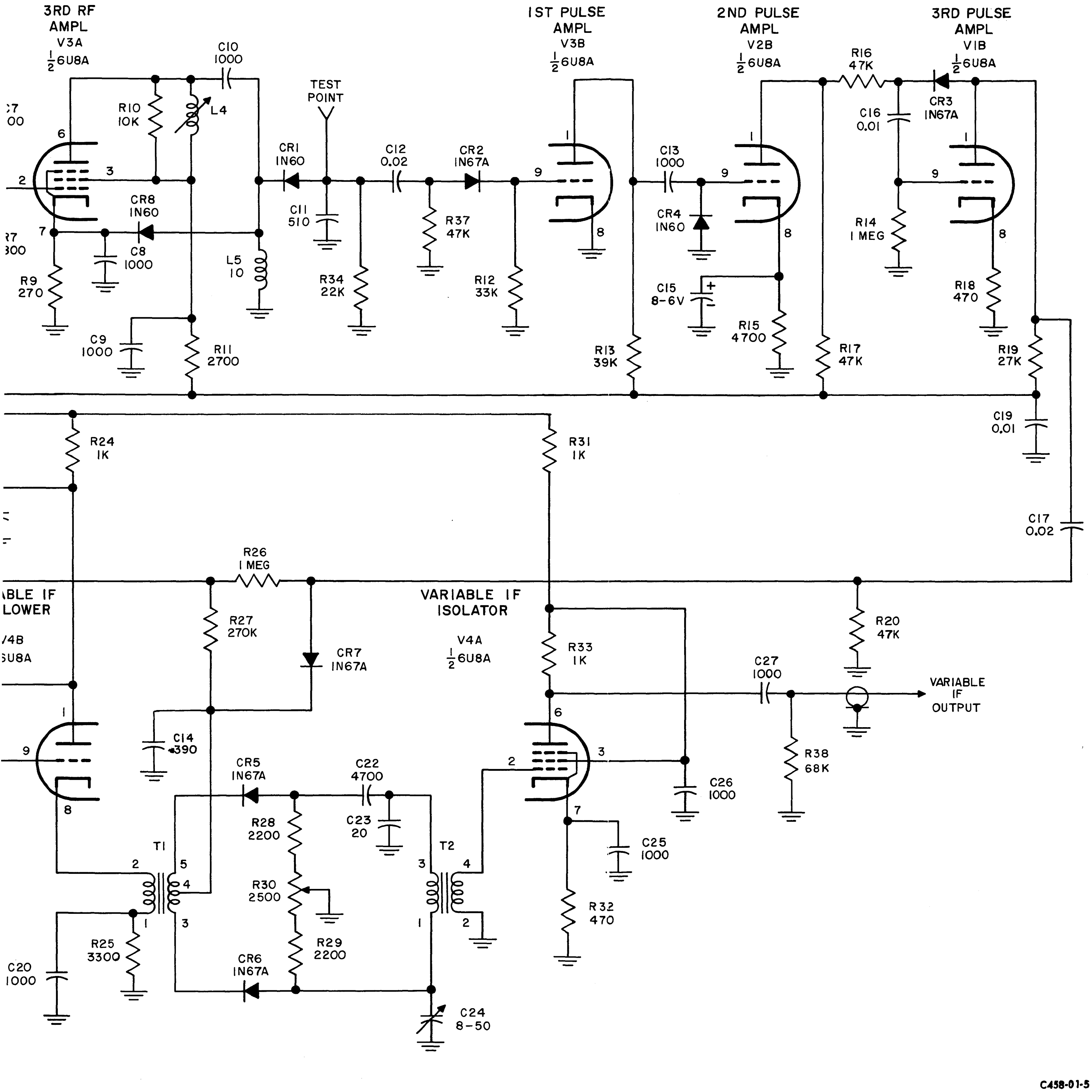


Figure 6. 136A-1 Noise Blanker, Schematic Diagram