

Installation and Operating Instructions
for the Hammarlund I.F. Noise Immunizer

INTRODUCTION

The Hammarlund I.F. Noise Immunizer has been designed to be installed in Hammarlund (HQ-170 Series and HQ-180 Series) Communication Receivers. The Noise Immunizer contains three tubes (Types 6BE6, 6BH6 and 6AL5) and associated components.

The Noise Immunizer Circuitry is introduced (between V4 and T4) into either series Communications Receiver in the identical manner electrically. The physical location of the Immunizer in each equipment is somewhat different due to receiver design differences. (See photographs for the location of the Noise Immunizer in each series receiver.)

INSTALLATION

(a) Tools Required:

1. Hollow Shaft Hex Nut Drivers for 1/4, 5/16 and 1/2 Nut Sizes.
2. Small Slot Head Type Screwdriver.
3. Small soldering Iron.
4. Phillips Head Screwdriver - #4 Size.

(b) Items Supplied in the Noise Immunizer:

1. Noise Immunizer Sub-Chassis.

<u>Quantity</u>	<u>Item Description</u>	<u>Hammarlund Pt. No.</u>
1	Concentric Shaft Potentiometer 2 Section with SPDT Switch	4735-02-19000
1	Knob with Set Screw	2430-02-00104
1	Knob with Set Screw	2430-02-00105
1	Small Bracket (Required for HQ-180 Series only)	1415-02-00140
1	Long Bracket (Required for HQ-180A with Serial No. 6900 and above)	1450-02-00134
2	Screw, Thread Cutting 4/40 x 1/4" lg. (Required for HQ-180 only)	2846-51-04108
1	Hex Nut 3/8"-32	2893-51-17200
1	Keeps Nut 6/32	2894-51-06100
1	Lockwasher 3/8", Internal Tooth	2898-63-31001
1	Instruction Sheet	9208-06-00001

INSTALLATION PROCEDURE FOR THE HQ-170 SERIES

Remove three rear cabinet screws with 5/16" Hex Nut Driver. Loosen set screw on clock shaft knob and remove knob. Loosen top cabinet screw by 3 to 4 turns and remove chassis from cabinet. (Required on units with Serial No. 6800 and below.) Turn chassis so that left side rests on table.

In the Model HQ-170 Series, the Noise Immunizer sub-chassis is fastened to the Receiver chassis by means of the same self-tapping Hex Head screws which are used to fasten the Selectivity-Side Band Switch bracket to the chassis. Loosen the Hex Head self-tapping screws sufficiently so that when the Immunizer chassis is placed in its correct position as shown in Fig. 1, it will be flush up against the receiver chassis. Then tighten both screws while firmly pressing the sub-chassis up against the receiver chassis.

After installation, locate lead wires connecting the Noise Immunizer sub-chassis to the new dual control along the front panel above the dial scales in the space between the front panel and the fiber washers.

Loosen set screw on Noise Limiter knob. Remove knob. Remove 3/8" Hex Nut on Noise Limiter control and push shaft through hole. Place 3/8" Lockwasher on new concentric control shaft and insert into panel. Fasten control to front panel with 3/8" Hex Nut. Unsolder wires individually from old control and re-solder to the new control (rear section with switch) in exactly the same position as on the old control as in Fig. 5.

Insert inner and outer shaft knobs onto Noise Immunizer Control Shafts. Adjust each knob properly and tighten set screw on each knob.

Remove entire lead (in receiver) from pin 5 of V4 going to T4. Insert all Noise Immunizer wires through large hole directly below the AM-CW-SSB switch and connect to the proper lugs on strip and tube socket as shown in Fig. 3.

INSTALLATION PROCEDURE FOR MODEL HQ-180A WITH SERIAL NO. 6900 AND ABOVE

The Noise Immunizer sub-chassis is fastened to the inverted spade lug which is located on the top rear end plate of Bandspread Tuning Gang (right Gang). (See Fig. 2) First, fasten the small adapter bracket to the Noise Immunizer sub-chassis with the two 4/40 - 1/4" lg. self-tapping screws. Remove 3/16 hex screw on side of Noise Immunizer below Transformer #1811-02-00021 and install long bracket. (See Fig. 2) Place the Noise Immunizer on the Bandspread Tuning gang rear end plate, with the spade lug protruding through the small adapter bracket. Fasten the sub-chassis to the Bandspread Tuning Gang with the nut supplied. The long bracket is fastened to the receiver chassis by means of the same self-tapping hex-head screw (located nearest front panel) which is used to fasten the Selectivity-Side Band Switch bracket to the chassis. Loosen the hex-head self-tapping screw sufficiently so that when the Immunizer chassis is placed in its correct position (as shown in Fig. 2) it will be flush up against the receiver chassis. Then tighten the screw while firmly pressing the bracket down against the receiver chassis.

Insert the lead wires under the Bandspread Capacitor Shaft, between Transformers T1 and T26, between Transformers T23 and T24, then under the Main Tuning Capacitor Shaft and to the Concentric Shaft Potentiometer.

Loosen set screw on Noise Limiter knob. Remove knob. Remove 3/8" Hex Nut on Noise Limiter control and push shaft through hole.

Place 3/8" Lockwasher on new concentric control shaft and insert into panel. Fasten control to front panel with 3/8" Hex Nut.

Unsolder wires individually from old control and re-solder to the new control (rear section with switch) in exactly the same position as on the old control as shown in Fig. 5.

Remove entire lead (in receiver) from pin 5 of V4 going to T4. Insert all Noise Immunizer leads through large hole directly below the AM-CW-SSB switch and connect to the proper lug on strip and tube socket as shown in Fig. 4.

Insert inner and outer shaft knobs onto Noise Immunizer Control Shaft. Adjust each knob properly to match panel markings and tighten set screw on each knob.

INSTALLATION PROCEDURE FOR MODEL HQ-180 SERIES WITH SERIAL NO. 6899 AND BELOW

The Noise Immunizer sub-chassis is fastened to the inverted spade lug which is located on the top rear end plate of the Bandspread Tuning Gang (Right Gang). (See Fig. 2) First, fasten the small bracket to the Noise Immunizer sub-chassis with the two 4/40 x 1/4" lg. self-tapping screws. Then, remove the Pal-Nut located on the Bandspread Tuning Gang rear end plate. Place the Immunizer sub-chassis on top of the capacitor dust cover with the spade lug protruding through the adapter bracket. Fasten the sub-chassis to the Bandspread Tuning Gang with the nut supplied.

To complete this installation follow the last six paragraphs of INSTALLATION PROCEDURE FOR MODEL HQ-180A WITH SERIAL NO. 6900 AND ABOVE.

OPERATION

After the I.F. Noise Immunizer has been installed in the Receiver, both the existing Noise Limiter and the new I.F. Noise Immunizer can be used independently or together. The existing noise limiter is an audio amplitude limiting device. The circuitry and operation of this limiter remains unchanged, and is controlled by the smaller knob which also operates the switch. This knob is normally adjusted to the extreme counter-clockwise position (Limiter OFF) and is turned clockwise to increase the degree of audio limiting in the presence of undesired noise.

A considerable degree of noise reduction is accomplished with this type of noise limiter. The Noise Limiter, however, cannot prevent noise peaks from overloading the previous stages.

The I.F. Noise Immunizer is introduced into the approximate middle of the communications receiver circuitry to "Immunize" (render inoperative) the receiver during the short duration of time of any individual noise pulse. The listener will not hear the "hole" because of its short duration and very effective noise reduction is obtained. The larger of the concentric knobs controls the degree of I.F. noise silencing of threshold. This knob is normally adjusted to its extreme counter-clockwise position (Immunizer OFF) and is turned clockwise for increasing effectiveness.

When noisy reception exists, the Immunizer knob is turned clockwise up to the position where noise is suppressed. It is desirable to use the least amount of silencing to effectively suppress the undesired noise. The knob should be adjusted to suit listening conditions. The exact knob position is not critical and depends upon the relative signal strength of the noise and also the type of noise (waveform).

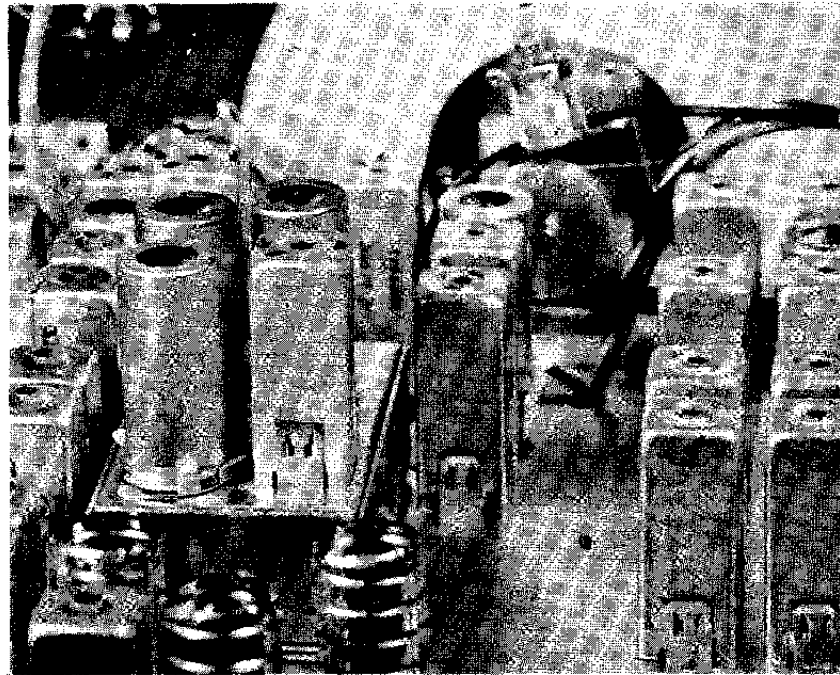


Fig. 1 - Location of I. F. Noise Immunizer in Model HQ-170 Series Receiver

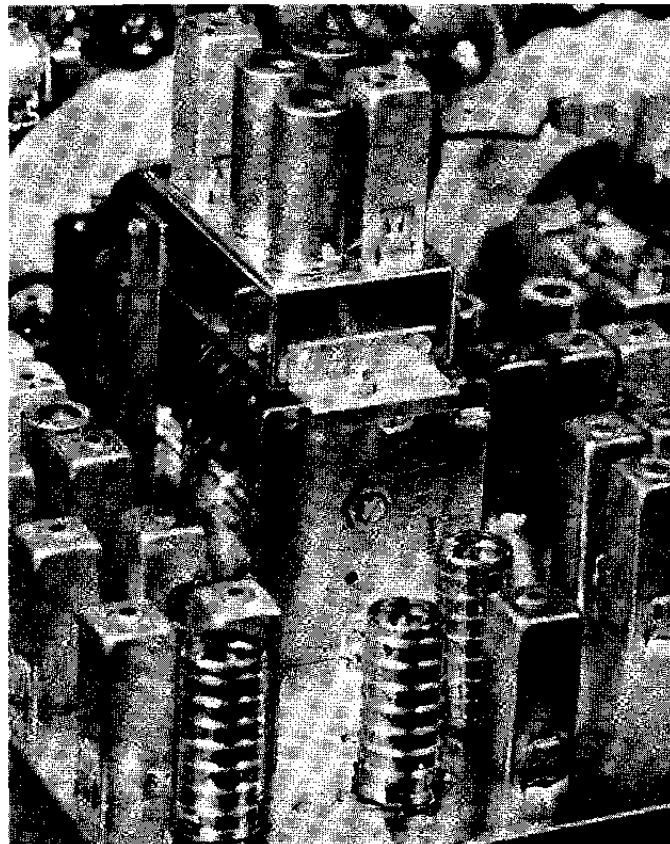


Fig. 2 - Location of I. F. Noise Immunizer in Model HQ-180 Series Receiver

This type of noise immunizing will usually be found more effective on CW and SSB, making possible the reception of signals that could not be heard without the Immunizer due to heavy ignition or other pulse type noise.

THEORY

The I.F. Noise Immunizer chassis contains two I.F. Amplifier circuits. One circuit consists of V201 (6BE6) and is a relatively low gain "noise controlled" I.F. Amplifier. It is inserted in the communications receiver between V4 (6BA6) plate and the I.F. Transformer T4. In the presence of noise, a negative rectified noise voltage is impressed upon the outer grid (pin 7) of the 6BE6 which results in a large decrease in amplification of this stage.

The grid (pin 1) of V202 (6BH6) is connected to the same I.F. input as the 6BE6, however, the output of this high gain I.F. Noise Amplifier stage feeds into a diode detector circuit (V203B) which demodulates the I.F. signal. The detected output is connected to the "Noise controlled" amplifier (V201) by means of the coupling capacitor C206 and RF Choke L200. The RF Choke presents a very high impedance to the I.F. signals but allows the detected noise pulses to pass through to the outer grid pin 7 (V201). Diode V203A which is connected from pin 7 (V201) to ground, short circuits the positive excursion of the noise pulses. Only negative noise pulses can actuate the 6BE6 tube.

The Level Adjust Control R707A located on the front panel, adjusts the amount of I.F. gain of the Noise Amplifier tube (V202-6BH6). Since the Noise Amplifier circuits can amplify the modulated signal, as well as the undesired noise, too much gain must be avoided. This control must be adjusted to suit existing signal and noise conditions.

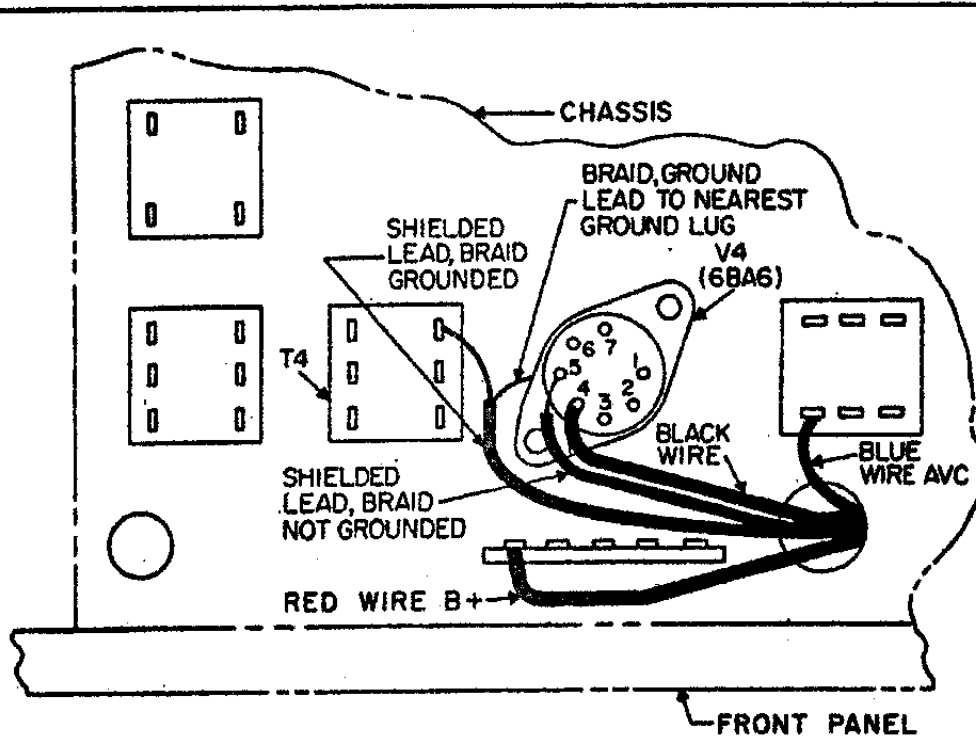
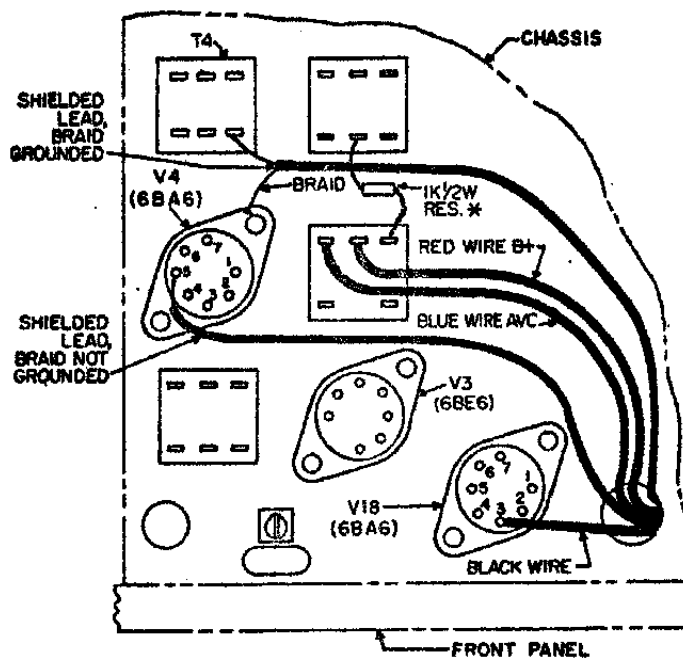


Fig. 3 - HQ-170 Series - Bottom View of Chassis, Showing New Connections from I. F. Noise Immunizer.



* ALREADY IN RECEIVER, SHOWN ONLY FOR REFERENCE.

Fig. 4 - HQ-180 Series - Bottom View of Chassis, Showing New Connections from I. F. Noise Immunizer.

ALIGNMENT OF THE I.F. NOISE IMMUNIZER

The I.F. Noise Immunizer has been factory aligned and tested at 455 kcs. in an actual Hammarlund Communications Receiver. Introduction of the Immunizer into either receiver normally requires a slight touchup of Transformer T4.

If it becomes necessary to re-align the receiver at any time, the procedure as outlined in its instruction manual should be followed. When aligning the 455 kcs. stages, the I.F. Noise Immunizer knob must be in the OFF position (maximum counter-clockwise). Transformer T201, top and bottom slugs must be adjusted for peak reading when 455 kcs. stages are aligned in receiver.

To align T202 (the Noise Amplifier I.F. transformer) the bottom cover of the Immunizer Unit must be removed. Connect a VTVM (on the negative DC Volts) across R211. Turn I.F. Noise Immunizer knob maximum clockwise. Adjust 455 kcs. Signal Generator input to Receiver to read approximately -5 V.D.C. and peak top and bottom slugs.

VOLTAGE CHART

TUBE TYPE	PIN NOS.						
	1	2	3	4	5	6	7
V201, 68E6	-.9	4.5	0	6.3 AC	270	100	-.3
V202, 68H6	0	2.2 to 27.0*	0	6.3 AC	250-270*	200-270*	0
V203, 6AL5	0	-.3	0	6.3 AC	0	0	-.3

*Varies within these limits with adjustments of Noise Immunizer Control R207A. Voltage measured under no signal conditions.

PARTS LIST I.F. NOISE IMMUNIZER

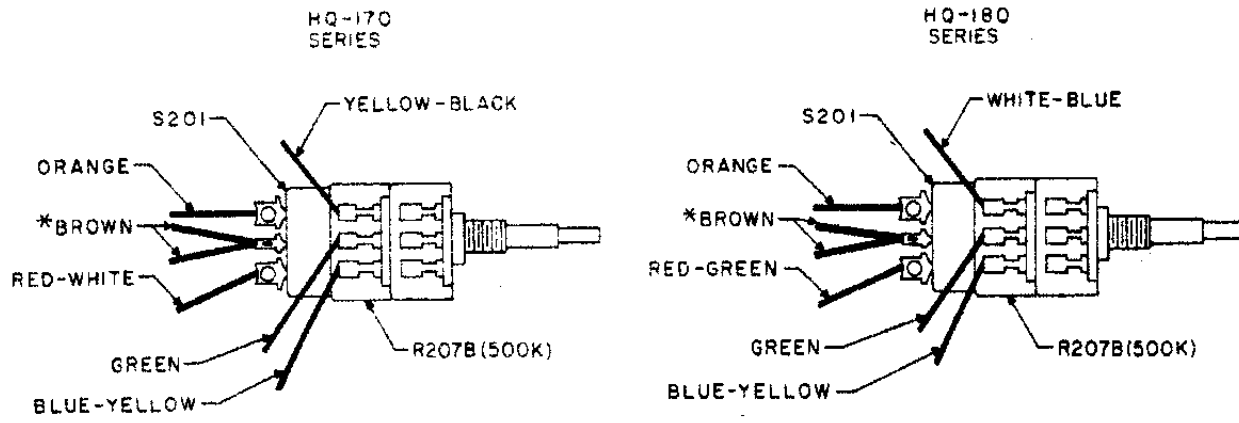
Schematic Designation	Description	Hammarlund Part No.
<u>Capacitors</u>		
C201, C211	Fixed, Silver Mica, 5 pf., 500 W.V.D.C.	1519-01-00047
C202, C203, C204 C207, C208, C209, C212	Fixed, Ceramic Disc, .01 mfd. 600 W.V.D.C.	1509-01-01011
C205, C210	Fixed, Silver Mica, 150 pf., 300 W.V.D.C.	1519-02-00034
C206	Fixed, Ceramic Disc, .001 1000 W.V.D.C.	1509-01-01012
<u>Coils</u>		
L200	Fixed, Inductor, 10 Millihenries	1801-02-00050
<u>Resistors</u>		
R200	33K ohms \pm 10%, 1W	4704-01-00650
R201	4.7K ohms \pm 10%, 1/2W	4703-01-00340
R202	1K ohms \pm 10%, 1/2W	4703-01-00332
R203	220K ohms \pm 10%, 1/2W	4703-01-00360
R204	2.2K ohms \pm 10%, 1/2W	4703-01-00336
R205	68K ohms \pm 10%, 1/2W	4703-01-00354
R206	180 ohms \pm 5%, 1/2W	4703-02-00429
R207A	Variable, 10K (Dual Concentric)	4735-02-19000
R207B	Variable, 500K (Part of R207A)	
R208	100K ohms \pm 10%, 1W	4704-01-00656
R209	27K ohms \pm 10%, 1/2W	4703-01-00349
R210	2.2K ohms \pm 10%, 1/2W	4703-01-00336
R211	47K ohms \pm 10%, 1/2W	4703-01-00352
R212	33K ohms \pm 10%, 1/2W	4703-01-00350
<u>Switches</u>		
S201	Switch SPDT (Part of R207A)	
<u>Transformers</u>		
T201	Transformer, 455 Kcs	1811-02-00021
T202	Transformer, 455 Kcs	1811-01-00018

Vacuum Tubes

V201	Electron, 6BE6	5712-01-00001
V202	Electron, 6BH6	5720-01-00002
V203	Electron, 6AL5	5702-01-00001

Mechanical Parts

Knob		2430-02-00104
Knob		2430-02-00105
Bracket (HQ-180 only)		1450-02-00140
Screw Self-Tapping #4/40 x 1/4" lg.		2860-51-04108
Long Bracket (HQ-180A with Serial No. 6900 and above)		1450-02-00134



WIRING CHANGES TO EXISTING NOISE LIMITER CIRCUITS

REMOVE WIRES ON SINGLE CONTROL WITH SWITCH, AND CONNECT TO DUAL CONTROL WITH SWITCH AS SHOWN ABOVE. NOISE IMMUNIZER WIRES ARE CONNECTED TO THE FRONT SECTION.
 * IN EARLIER HQ-170 & HQ-180 SERIES RECEIVERS, NOTE THAT THERE WERE 4 CONTACTS ON THE REAR DECK OF THE NOISE LIMITER SWITCH. THE NEW SWITCH SUPPLIED WITH THE IMMUNIZER ONLY 3 CONTACTS ARE AVAILABLE THEREFORE 2 BROWN WIRES CONNECT TO ONE TERMINAL

Fig. 5 - Wiring of New Dual Noise Immunizer Control.

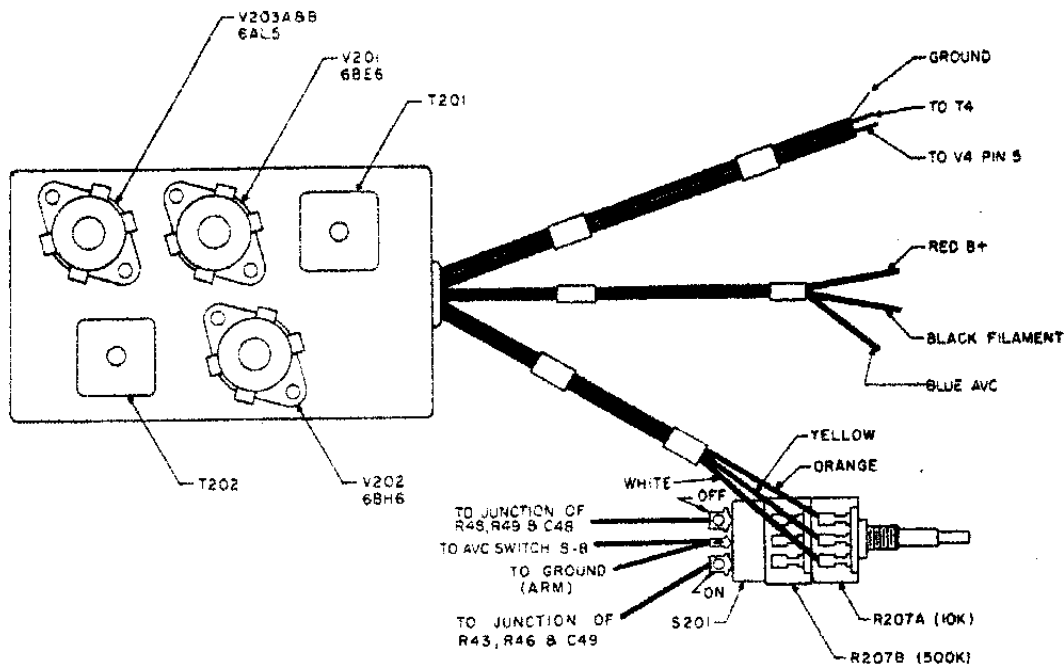


Fig. 6 - I.F. Noise Immunizer as supplied.

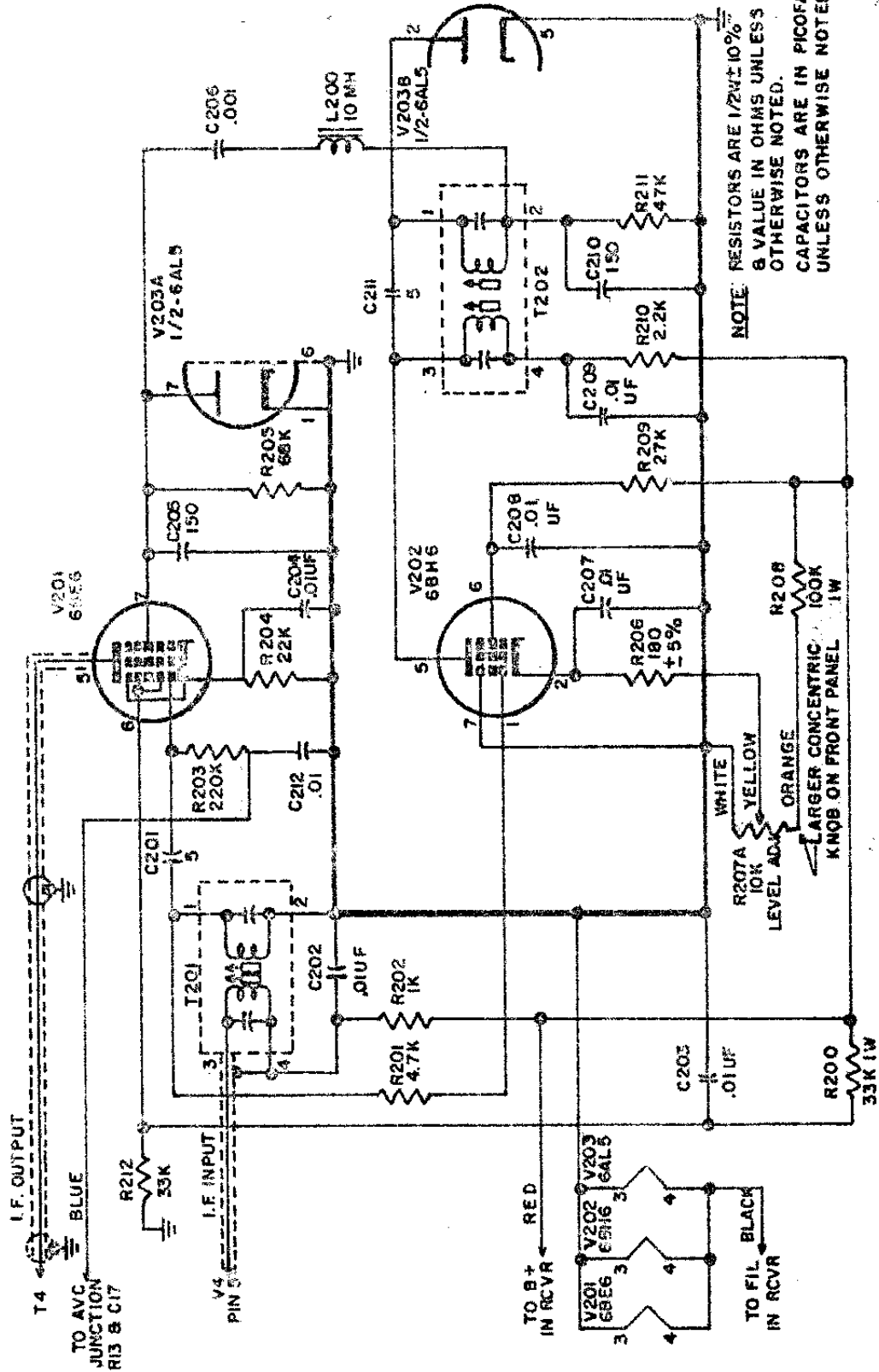


Fig. 7 - Schematic I.F. Noise Immunizer