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## VACUUM TUBE VOLTAGE & RESISTANCE CHART

Tube No.	Tube Type	See Note	Tube Pin Number								
			1	2	3	4	5	6	7	8	9
V1	6BA6	R	-.6	0	0	6.3 VAC	+ 250.	+ 100.	+ 1.1	—	—
		T	- 2.4	0	0	6.3 VAC	- 1.4	- 1.4	0	—	—
		Res.	2. mg	0	0	.1 ohms	30. K	220. K	90. ohms	—	—
V2	6CL8A	R	- 1.4	+ 23.	0	6.3 VAC	0	+ 44.	+ 80.	0	- 2.0
		T	- 2.2	- 1.4	0	6.3 VAC	0	- 1.4	- 1.4	0	- .4
		Res.	5.6 M	350. K	.1 ohms	.1 ohms	.1 ohms	260. K	350. K	7. ohms	12. K
V3	6CL8A	R	- 4	+ 110.	+ 6.6	0	6.3 VAC	+ 165.	+ 70.	0	- 2.4
		T	-.34	- 1.4	0	0	6.3 VAC	- 1.4	- 1.4	0	- 1.4
		Res.	100. K	230 K	1500 ohms	0	.1 ohms	240. K	300. K	0	5.6 mg
V4	6BA6	R	-.72	0	6.3 VAC	0	+ 250.	+ 70.	+ 55.	—	—
		T	- 1.4	0	6.3 VAC	0	- 1.4	- 1.4	0	—	—
		Res.	1.2 mg	0	.1 ohms	.1 ohms	30. K	300. K	75. ohms	—	—
V5	6AL5	R	0	-.35	0	6.3 VAC	+ .2	0	-.55	—	—
		T	0	-.16	0	6.3 VAC	+ .3	0	-.22	—	—
		Res.	6. K	40. K	0	.1 ohms	1.8 mg	0	50. K	—	—
V6	12AX7	R	+ 150.	0	+ 1.7	0	0	+ 250.	0	+ 15.	6.3 VAC
		T	+ 140.	0	+ 1.5	0	0	+ 80.	- .6	0	6.3 VAC
		Res.	400. K	1.25 M	9. K	0	0	1.2 M	5.6 mg	210. K	.1 ohms
V7	6AQ5	R	0	+ 15.	6.3 VAC	0	+ 250	+ 255	0	—	—
		T	0	+ 14.	6.3 VAC	0	+ 235	+ 250	0	—	—
		Res.	1. mg	390 ohms	.1 ohms	.1 ohms	260. K	260. K	1 mg	—	—
V8	6BH6	R	-.6	0	6.3 VAC	0	- 1.3	- 1.3	0	—	—
		T	- 1.5	+ 6.6	6.3 VAC	0	+ 240	+ 200	0	—	—
		Res.	18. K	1. K	.1 ohms	.1 ohms	∞	∞	0	—	—
V9	6CL6	R	+ 15.	0	+ 250.	0	6.3 VAC	+ 250	0	+ 250	—
		T	0	2.5 VAC	+ 140	Gr.	6.3 VAC	+ 230	0	+ 140	2.5 VAC
		Res.	200. K	18. K	170. K	0	.1 ohms	170. K	0	170. K	18. K

NOTE: R— Voltages measured under no signal condition with VTVOM between tube pin and chassis; Unit operating in RECEIVE position from 115 VAC, VOLUME set at minimum and SQUELCH control off.

ALL READINGS T— Voltage measured with VTVOM between tube pin and chassis; Unit operating in TRANSMIT position into 50 ohm load.

± 10% Res.— Resistance measured with VTVOM between tube pin and chassis; Unit OFF, 115 VAC power plug in place and filter capacitors fully discharged.

## RECEIVER ALIGNMENT

Prior to alignment, the Executive should be turned on and allowed to reach normal operation temperature. This will require approximately 15 minutes. Set the Executive operating controls as follows:

VOLUME to ON position

RECEIVE SELECTOR to TUNE position

TUNING DIAL to CHANNEL 9

SQUELCH to OFF - Fully counterclockwise until switch clicks

NOTE - Disconnect antenna and connect a dummy load to antenna jack. Dummy load may be fabricated from a #47 pilot lamp and a male coaxial connector.

Alignment of the Executive receiver is performed by adjustment of the various stages in the following order: (A) IF alignment, (B) Second Mixer grid circuit, (C) RF & 1st converter circuits.

### (A) IF Alignment, 455KC

1. Set signal generator to 455KC and connect its output through a 500 mmfd capacitor to terminal #24 on the IF unit printed circuit board.
2. Set up VTVM for negative voltage measurement on a scale that will accurately indicate from 2 to 4 volts DC. Connect VTVM test probe to AVC terminals #23 on the IF unit printed circuit board.
3. Adjust top and bottom tuning slugs in IF transformers T-1 and T-2 for maximum AVC voltage as indicated on the VTVM.

(B) Second Mixer grid circuit alignment

1. The grid circuit of the second mixer, V3A, is tuned to 10 MC. Alignment of this circuit must be done with a signal source of known accuracy. If the accuracy of the signal generator is questionable, it may be calibrated as follows:
  - a. Using a short wave communications receiver, tune in the National Bureau of Standards Station WWV at 10 MC.
  - b. Zero beat the signal generator against the 10MC WWV signal being received by the communications receiver.
2. After the signal generator has been calibrated at 10 MC, connect its output through a 500 mmfd capacitor to terminal #24 on the IF unit printed circuit board.
3. Adjust the tuning slug in coil L8 for maximum AVC voltage as indicated by the VTVM. As the AVC voltage increases, decrease the generator output to a useable level.
4. Readjust the tuning slugs in the IF transformers T-1 and T-2 for maximum AVC voltage as indicated by the VTVM. Disconnect the signal generator from the IF unit.

(C) RF & 1st Converter circuit alignment

1. The RF & 1st converter circuits must be aligned with a signal generator of known accuracy. If the calibration of the generator is questionable, it may be set on the proper channel frequency by the following method.
  - a. Since the first alignment step requires a signal source on Channel 9, set the main tuning dial of the Executive to that position.
  - b. Set RECEIVE SELECTOR switch to the TUNE position.
  - c. Set VOLUME control to about half open.
  - d. Remove dummy load from Executive antenna jack.
  - e. Set up the INTERNATIONAL C-12B Frequency Meter for operation on Channel 9, and insert the telescoping antenna into the frequency meter RF jack. Set function switch to the RF position.
  - f. Move the frequency meter close to the Executive and depress meter PWR switch to the ON position.
  - g. Rotate Executive tuning dial for maximum AVC voltage as indicated by the VTVM.

- h. Connect the output of signal generator to Executive antenna jack. Turn generator on and set frequency control dial to channel 9 frequency. Slowly adjust generator frequency until VTVM indicates maximum AVC voltage. Reduce generator output until the AVC voltage is equal to that produced by the C-12B signal.
    - i. Depress C-12B PWR switch to ON. An audio beat note will be heard in the receiver speaker. Carefully adjust generator frequency tuning for zero beat with the signal from the C12B. This calibrates the signal generator on Channel 9. The above described procedure may be used to calibrate the generator on any Citizen Band Channel desired.
2. Connect test leads of an audio output meter to voice coil terminals of the receiver speaker. Set meter voltage range switch to a low voltage scale that will provide an accurate reading of 2 to 5 volts AC.
3. With generator and receiver tuning set on Channel 9, set signal generator function switch to MCW position at 400 cps. Set modulation level to 30%. Turn receiver VOLUME control fully clockwise and set generator RF output level to produce 2 volts of audio on output meter.
4. Adjust tuning slugs in coils L2, L4 and L7 for maximum audio voltage on output meter. Reduce generator RF output level to maintain 2 volts of audio on output meter. Set generator and receiver tuning to Channel 22. Adjust tuning slug in coil L1 for maximum audio voltage on output meter.
5. Calibration of the receiver tuning dial must be done with a signal generator of known accuracy. If generator accuracy is questionable, it may be calibrated as previously discussed under 1., paragraphs e. through i.
6. Set generator on Channel 9 and rotate Executive tuning dial for maximum audio recovery as indicated on output meter. This dial setting should fall within  $\pm 1/16$ th of an inch of the panel marking for Channel 9. If the pointer setting is not within this tolerance, adjustment of the 1st converter oscillator will be necessary. Before making any adjustment to the oscillator, it will be necessary to check the receiver tuning spread.
7. Set generator on Channel 1 frequency. Rotate tuning dial to wards Channel 1 panel marking. Tune receiver for maximum audio recovery as indicated by the output meter. Note tuning dial pointer position with relation to Channel 1 panel marking.

8. Set generator to Channel 22 frequency. Repeat procedure of Step 7. Note tuning dial pointer position with relation to Channel 22 panel marking. If all three check points are off calibration about the same amount in the same direction, the tuning spread is correct and only the tuning slug in coil L3 needs adjusting at the Channel 9 dial setting to bring the unit back into calibration tolerance.
9. If calibration checks OK at Channel 9 and is off at either the Channel 1 or Channel 22 check points, the tuning spread is incorrect and capacitor C13 must be adjusted.
10. In the first instance described under 8, set generator at Channel 9 frequency and tuning dial pointer at Channel 9 panel mark. Using a small insulated hex tuning tool, slowly adjust the tuning slug in oscillator coil L3 for maximum audio recovery as indicated by the output meter. Check calibration at Channel 1 and Channel 22.
11. In the second instance covered under 9, the following adjustments should be made. Set generator to Channel 9 frequency. Set receiver tuning dial pointer to Channel 9 panel mark. Using an insulated tuning tool, turn the rotor of capacitor C13 in a clockwise direction until it is fully closed. Rotate rotor of C13 in a counterclockwise direction for 1 1/2 turns. Adjust tuning slug in oscillator coil L3 for maximum audio recovery as indicated by the output meter. Check calibration at Channel 1 and Channel 22. If calibration is still not within tolerance, alternately adjust capacitor C13 and tuning slug in L3 until calibration falls within the tolerance limits.
12. In instances where the unit has receive crystals installed in the RECEIVE SELECTOR switch assembly crystal sockets, the crystals can be trimmed exactly to the proper channel frequency by their associated capacitors C16 and C17 as follows:
  - a. Where the receiver crystal controlled channels are to be used for communications with only the one station, such as a base station, "netting" of the receiver using the base station as signal source on the proper channel will produce optimum results.
  - b. In instances such as covered by a. above, attach an antenna to the Executive antenna jack, set RECEIVE SELECTOR to the proper position. Using the base station signal, adjust the crystal trimmer for maximum AVC voltage as indicated by the VTVM. If there are two crystal control positions being used, repeat the above described adjustment for the second crystal controlled position.

- c. Instances where the crystal controlled channels are to be used in communicating with more than one station, set the signal generator up on the proper channel. With the generator in the MCW position, and RF output set at 1 uv, adjust the trimmer capacitor associated with that channel for maximum audio recovery as indicated by the output meter. If both crystal control channels are to be used, repeat the above described adjustment for the second crystal controlled position.
13. After alignment has been completed, set generator and receiver tuning to Channel 9. Turn receiver VOLUME control fully on. Adjust generator RF output until audio output meter reads 2 volts. Note generator RF output level. It should be 1 uv or less. Turn generator to standby position and note noise level on the audio output meter. This reading will depend upon noise level of the test location, but in the average test bench location, where florescent illumination is used, the reading will be approximately .5 volts and AVC voltage will be about -1.5 volts.
14. Turn SQUELCH CONTROL fully clockwise. Slowly rotate SQUELCH CONTROL in a counterclockwise direction until the receiver background noise is just quieted. Turn signal generator to MCW position and note audio level on output meter. This should be approximately 1.5 volts or better. This completes receiver alignment.

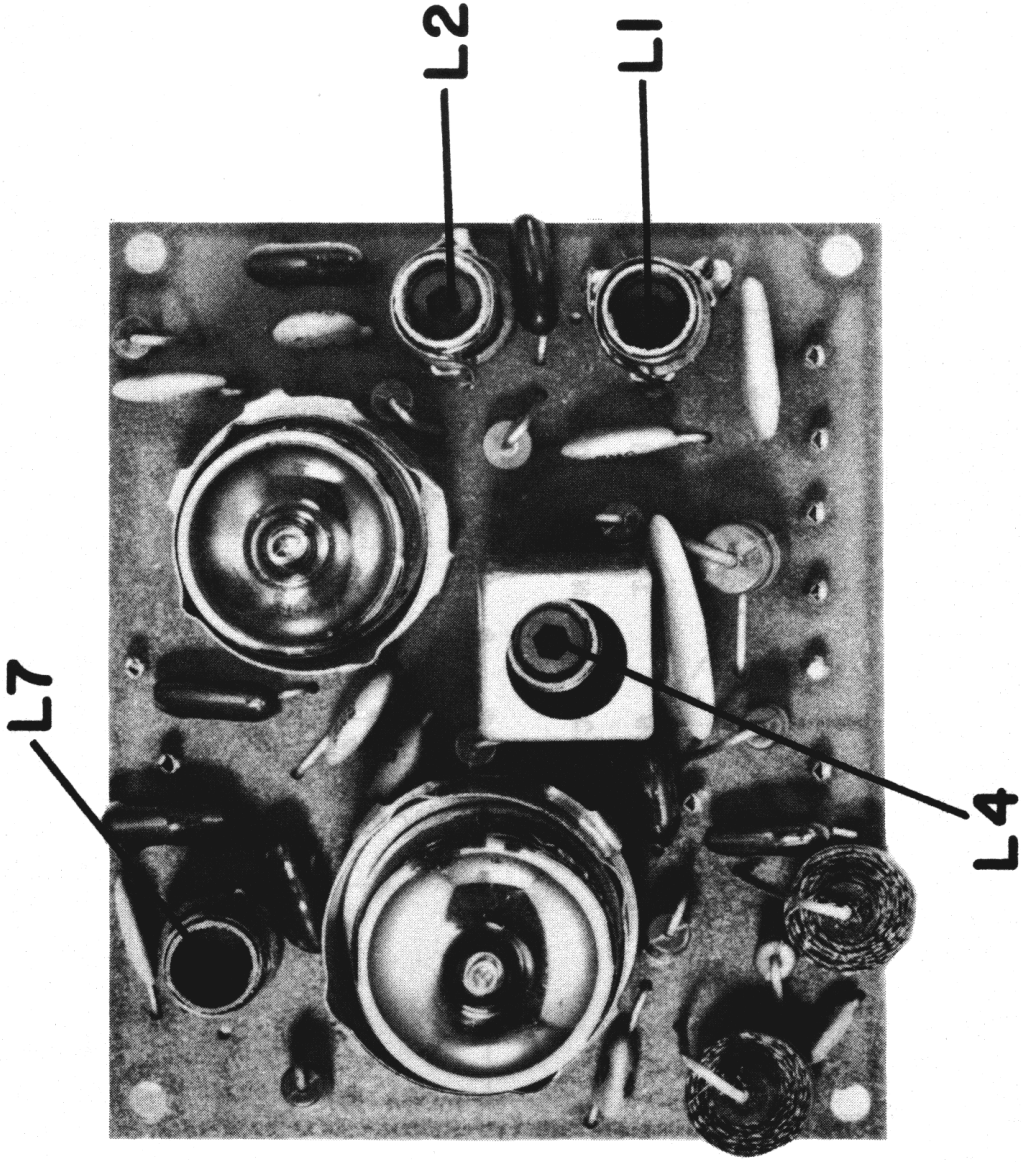
#### TRANSMITTER ALIGNMENT

The Executive series transmitter alignment can be done with an RF wattmeter, but for a complete check of overall performance the following test equipment will be required.

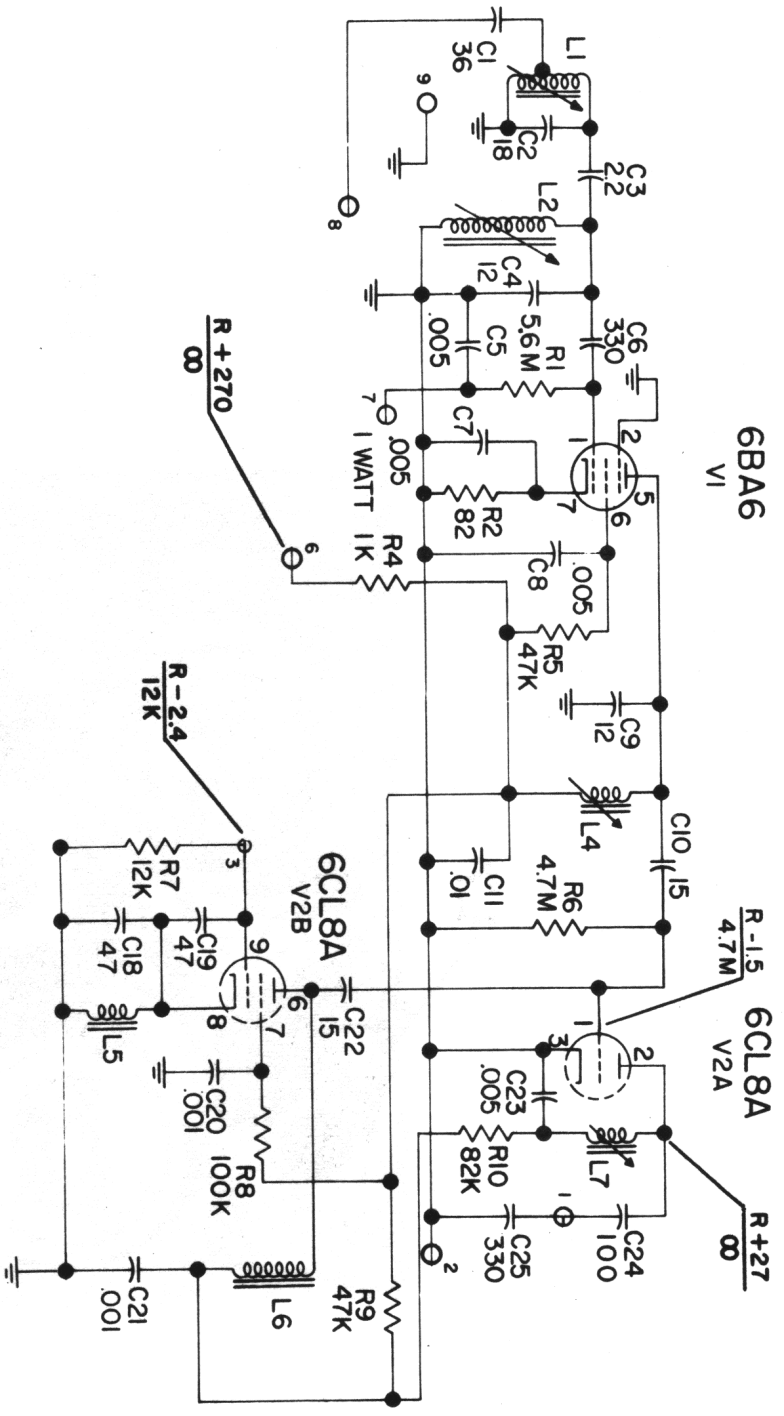
- a. RF wattmeter - Bird 611 or equivalent.
- b. Frequency meter with an accuracy of at least .0025% - INTERNATIONAL C-12B or equivalent.
2. Connect an RF wattmeter to the antenna jack on the back of the Executive.
3. Turn the set on and allow 15 minutes for the unit to reach normal operating temperature.
4. When several different crystals will be used in the transmitter, select one whose frequency is approximately half-way in between the others.

5. Key the transmitter by depressing the microphone press-to-talk switch.
6. Adjust final amplifier tuning capacitor C71 and loading capacitor C72 alternately for maximum output as indicated by the wattmeter.
7. With the volume control set at the one-half open position, and talking within normal distance from the microphone, adjust oscillator plate coil for maximum upward deflection as indicated on the wattmeter.
8. Depress the press-to-talk switch several times and note whether or not the oscillator starts immediately each time the switch is depressed.
9. The Executive series transmitter has an overall frequency tolerance of .005% or better. UNLESS SUITABLE HIGH-ACCURACY FREQUENCY MEASURING EQUIPMENT IS AVAILABLE, DO NOT ATTEMPT TO ADJUST THE TRANSMITTER FREQUENCY. A small trimmer capacitor, C61, is provided to make minor adjustments in the transmitter frequency.
10. Set TRANSMIT SELECTOR to the Channel previously used for transmitter alignment. Connect C-12B Frequency Meter through the PK-1 pick-up box to the transmitter antenna jack.
11. Set up Frequency Meter for measurement on the channel to be measured. Depress microphone press-to-talk switch and measure the frequency. If the frequency is out of tolerance, adjust trimmer C61 until the transmitter frequency is within tolerance. If this cannot be accomplished within the tuning range of C61, check the other channels in the set. If they can be brought into tolerance with trimmer C61, the crystal can be considered defective and must be replaced. If they cannot be brought into tolerance, possibly either of capacitors C62 or C63 has changed value.
12. Before replacing either of these components, if possible, the crystals in question should be checked in another Executive transmitter. If they still cannot be brought into tolerance, chances are that the crystals are defective and should be replaced. If they can be brought into tolerance in a like unit, capacitors C62 and C63 should be checked and the defective component replaced.
13. Set up C-12B Frequency Meter for modulation check. Key transmitter and talk into microphone at a normal level with a prolonged AHHHHH. The Executive Transmit indicator lamp should begin to flicker and modulation percentage should be approximately 95%. This completes the transmitter alignment.





**CONVERTER UNIT**

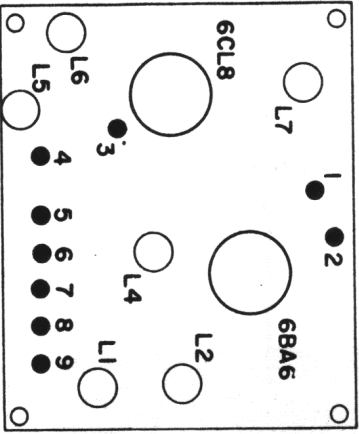


6BA6  
VI

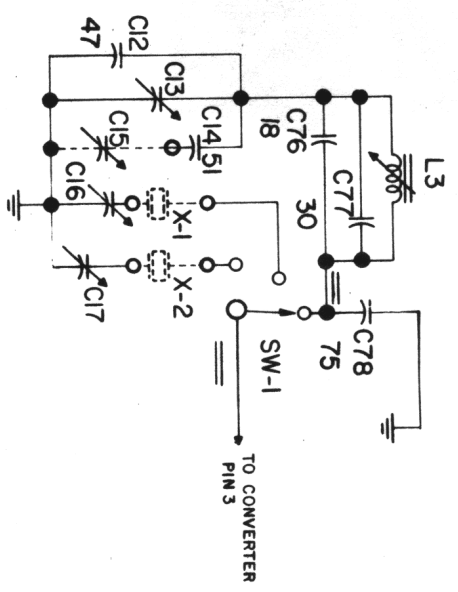
6CL8A  
V2A

NOTE:  
Voltage  
Resistance

T-TRANSMIT  
R-RECEIVE  
VOLTAGE MEASUREMENTS, NO SIGNAL  
115V OPERATION.  
VOLTAGES WILL VARY FROM 6 TO  
12 TO 115 VOLT OPERATION.  
VOLTAGE MEASUREMENTS MADE  
WITH VTVM.

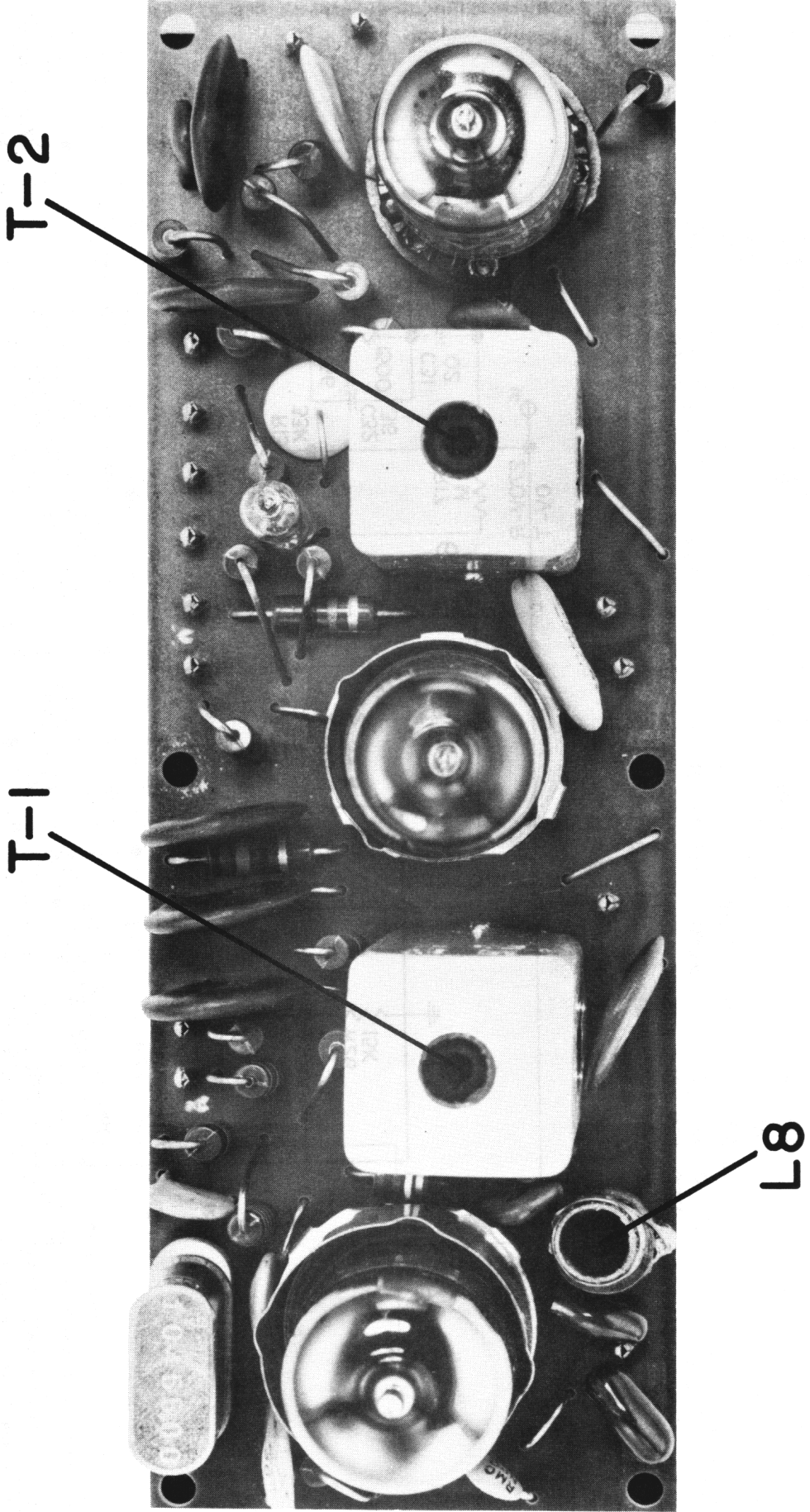


- POWER PIN CONNECTIONS
- |   |           |   |      |
|---|-----------|---|------|
| 1 | 10 MC OUT | 6 | B+   |
| 2 | GND       | 7 | AVC  |
| 3 | XTAL SW.  | 8 | ANT. |
| 4 | 12V. FIL. | 9 | GND  |
| 5 | 6V. FIL.  |   |      |



CONVERTER & XTAL SW. ASSM.  
MODEL 50

DRAWN BY: <i>AS</i>	CHECKED BY: <i>WLR</i>	APPROVED BY: <i>WLR</i>
DATE: 5-10-61	DATE: <i>WLR</i>	
INTERNATIONAL CRYSTAL MFG. CO., INC.		
18 N. LEE, OKLAHOMA CITY, OKLAHOMA		

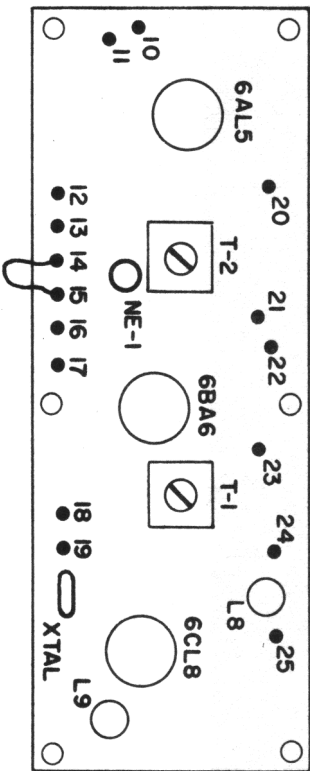
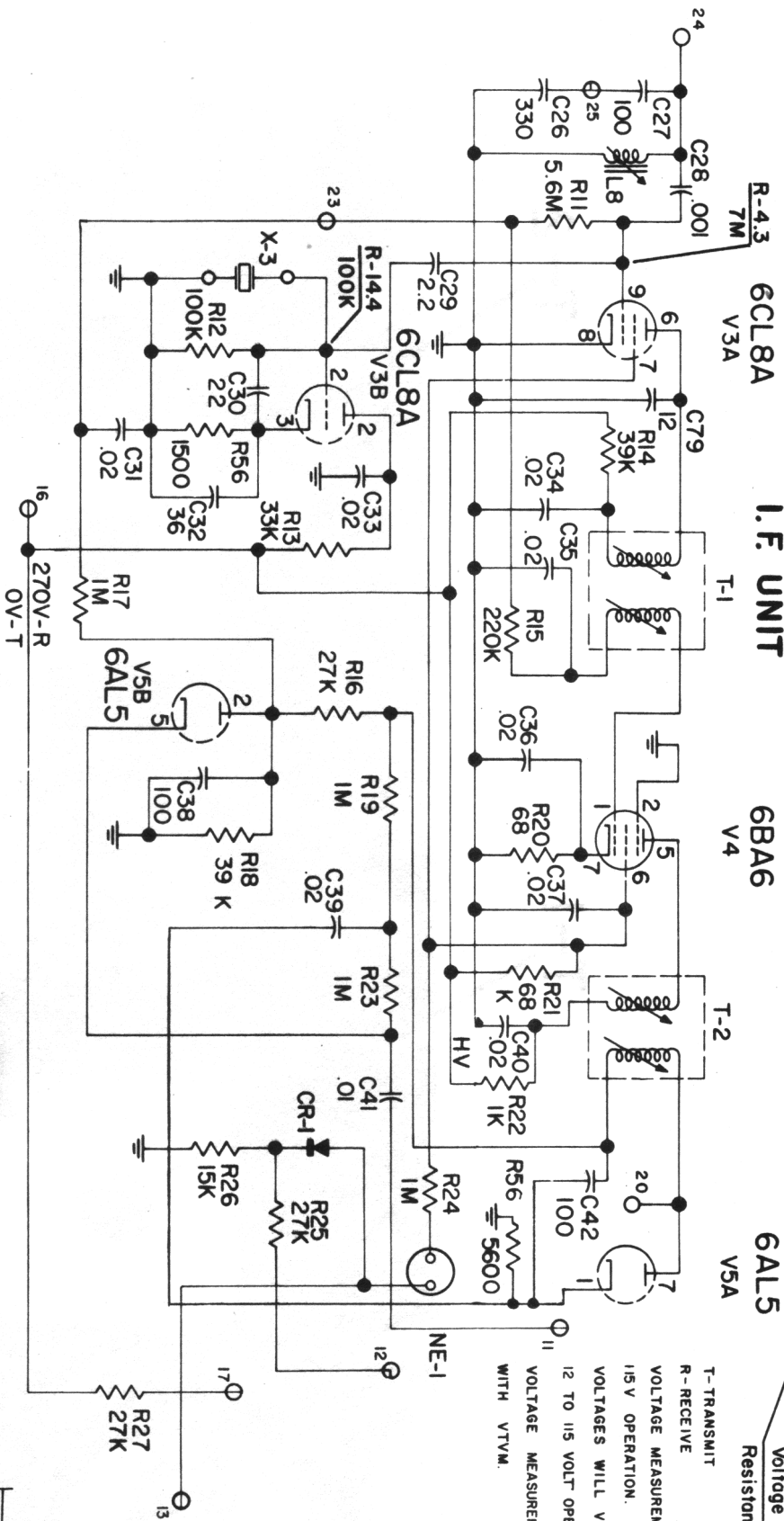


I.F. UNIT

NOTE:

Voltage  
Resistance

T-TRANSMIT  
R-RECEIVE  
VOLTAGE MEASUREMENTS, NO SIGNAL  
115 V OPERATION.  
VOLTAGES WILL VARY FROM 6 TO  
12 TO 115 VOLT OPERATION.  
VOLTAGE MEASUREMENTS MADE  
WITH VTVM.



POWER PIN CONNECTIONS

- |    |                      |    |            |
|----|----------------------|----|------------|
| 10 | AUDIO OUT GND        | 18 | NOT USED   |
| 11 | AUDIO OUT            | 19 | NOT USED   |
| 12 | TO SQUELCH CONTROL   | 20 | 455 KC OUT |
| 13 | TO SW-3 & AUDIO GRID | 21 | 12V FIL    |
| 14 | JUMPER TO 15         | 22 | 6V FIL     |
| 15 | JUMPER TO 14         | 23 | AVC        |
| 16 | B+                   | 24 | IOMC IN HI |
| 17 | TO SQUELCH CONTROL   | 25 | IOMC IN LO |

I.F. UNIT

MODEL 50

DRAWN BY: <i>[Signature]</i>	CHECKED BY: <i>[Signature]</i>	APPROVED BY: <i>[Signature]</i>
DATE: 5-9-61	DATE: <i>[Signature]</i>	
INTERNATIONAL CRYSTAL MFG. CO., INC.		
18 N. LEE, OKLAHOMA CITY, OKLAHOMA		

R17 connected to	10-10-61
Pin 2 of V5B	
C39 connected to	10-10-61
Pin 1 of V5A	
R18 changed to	10-10-61
39 K	
R16 changed to	10-10-61
27K	
R56 added	10-10-61
C42 connected to	10-10-61
Pin 1 of V5A	
L9 changed to	6-6-61
R56, 1500	
REVISION	DATE