SECTION VII

AUDIO-FREQUENCY AMPLIFIER UNIT
CRV-50098

TECHNICAL SUMMARY

ELECTRICAL CHARACTERISTICS—

Input Impedance	13,000 ohms
Output Impedance	600 ohms
Output Power (maximum undistorted)	60 milliwatts
Frequency Response (100-5,000 cycles)	±1 db
Hum Level	At least 50 db below 100% modulation

AGC Time Constant:

Fast	0.02 second
Medium	0.2 second
Battery Requirement (45 volts)	1 Burgess 2308 or equivalent

TUBE COMPLEMENT—

Driver	1 RCA-37
Output	1 RCA-89
Threshold	1 RCA-36

MECHANICAL SPECIFICATIONS—

Dimensions:

Panel Size	19 inches (width) x $10\frac{15}{32}$ inches (height)
Unit Depth (including shield)	$10\frac{1}{4}$ inches
Weight (net)	32 pounds

DESCRIPTION

The audio-frequency amplifier unit enables use of the diversity receiving equipment on modulated signals. It serves to amplify the diode detector output to a level suitable for operation of phones or a loudspeaker, or for transmission over telephone lines to a central office. Containing two stages of amplification, this unit will deliver up to 60 milliwatts to a 600 ohm line or resistance load. Its overall fidelity is sufficiently high to permit handling either commercial telephony or broadcast programs.

An AGC and threshold bias system similar to that in the tone keyer unit (see Section VI) also is provided in this unit. The threshold bias is intended for use when receiving phone signals from ships or stations that switch off the carrier during pauses in transmission. Through use of the threshold bias the noise level at the receiver output is maintained at a low level, even when the carrier is switched off at the transmitter.

Controls are provided on the front panel for adjustment of the output and threshold bias voltages. There are also two jacks on the panel for measurement of plate current in the individual amplifier stages, using the milliammeter and drop cord of the power control panel. The output terminals of the unit may be bridged by the volume indicator meter on the signal control panel (see Section V).

OPERATION

In preparing the audio-frequency amplifier unit for operation, power should be applied by throwing the "POWER SWITCH" upward. The "VOLUME CONTROL" normally should be set between zero and ±5; settings higher than 10 should not be used since such settings may produce very low-frequency regeneration (motorboating). This potentiometer is tapered so as to afford approximately linear variation of the output level.

The "THRESHOLD SWITCHED CARRIER" potentiometer should only be used when it is desired to have the noise level in the audio output held down when the signal carrier is switched off at the transmitter. This will be found desirable and generally necessary when receiving from ships, since shipboard phone transmitters are arranged to have their carrier switched on and off by the person talking—either manually, or automatically by the voice-frequency input. Some few trans-oceanic phone circuits also have the transmitter carriers switched off at such times as the circuit is idle. Successful operation requires that the noise shall not come up to high levels—due to AGC action—when the carrier of the distant transmitter is off.

When the threshold action is not to be used, the potentiometer should be turned clockwise to its "OFF" position. Normal AGC operation is then obtained.

On switched-carrier ship signals, the threshold potentiometer should be adjusted to give clean-cut switching and the desired low noise level during pauses in speech. In the case of a relatively weak signal requiring high i-f gain, or in case of a poor signal-to-noise ratio, it may be found difficult, or even impossible, to obtain clean-cut action of the threshold switching of the receiver gain. Use of the "MEDIUM" time constant and a slight reduction of i-f gain should be tried in such cases.

On trans-oceanic circuits, the carrier may be off for fairly long periods of time—possibly hours, in extreme cases. When the carrier comes on, the receiving equipment must function without fail. As the signal strength may change over a wide range, considerable care must be taken in making the initial adjustments of intermediate-frequency amplifier gain and threshold level. Otherwise, there is the possibility that the incoming carrier may be too weak to operate the receiver threshold switching circuit. The adjustments can best be checked, while the carrier is on, by varying the input coupling to the radio-frequency amplifier unit.

SERVICE

The circuit of the a-f amplifier unit as shown in the schematic diagram, Figure 3, is conventional and no serious difficulty should be encountered in servicing. In the event of a suspected failure, it is advisable first to ascertain the presence of normal operating voltages at the power control panel. A check of the associated fuses on the latter panel also should be made and replacements made as necessary.

Assuming that the supply voltages are correct, the next step should be to measure the plate currents in the respective amplifier stages. Comparison with the normal values as listed under "Maintenance" in Section I should indicate the stage in which trouble exists. The defective element should then be readily located, using an ohmmeter for checking resistance values and continuity. Location of the fault may be facilitated by applying a test tone from a beat-frequency oscillator to the input.

The threshold circuit may be checked by switching one receiver onto the a-f unit in question at the signal control panel. With the i-f gain reduced to minimum, the plate current of the r-f amplifier unit should be observed as the threshold control in the a-f unit is varied over its entire range. This r-f plate current (with normal threshold screen potential of 12 volts) should be variable from maximum down to practically zero; if not, either the battery or the tube requires replacement. This is best determined by trial, first of a new battery and then of one or more new tubes. Appreciable leakage to ground anywhere in the AGC system will also result in loss of proper range of control. Tubes should be discarded when the mutual conductance decreases to less than 70 per cent. of the original value. A replacement tube in the threshold stage can only be judged on the basis of actual performance in the unit. The 45-volt "B" battery contained in the unit for plate supply to the threshold tube should be replaced when the potential is reduced to less than 40 volts.

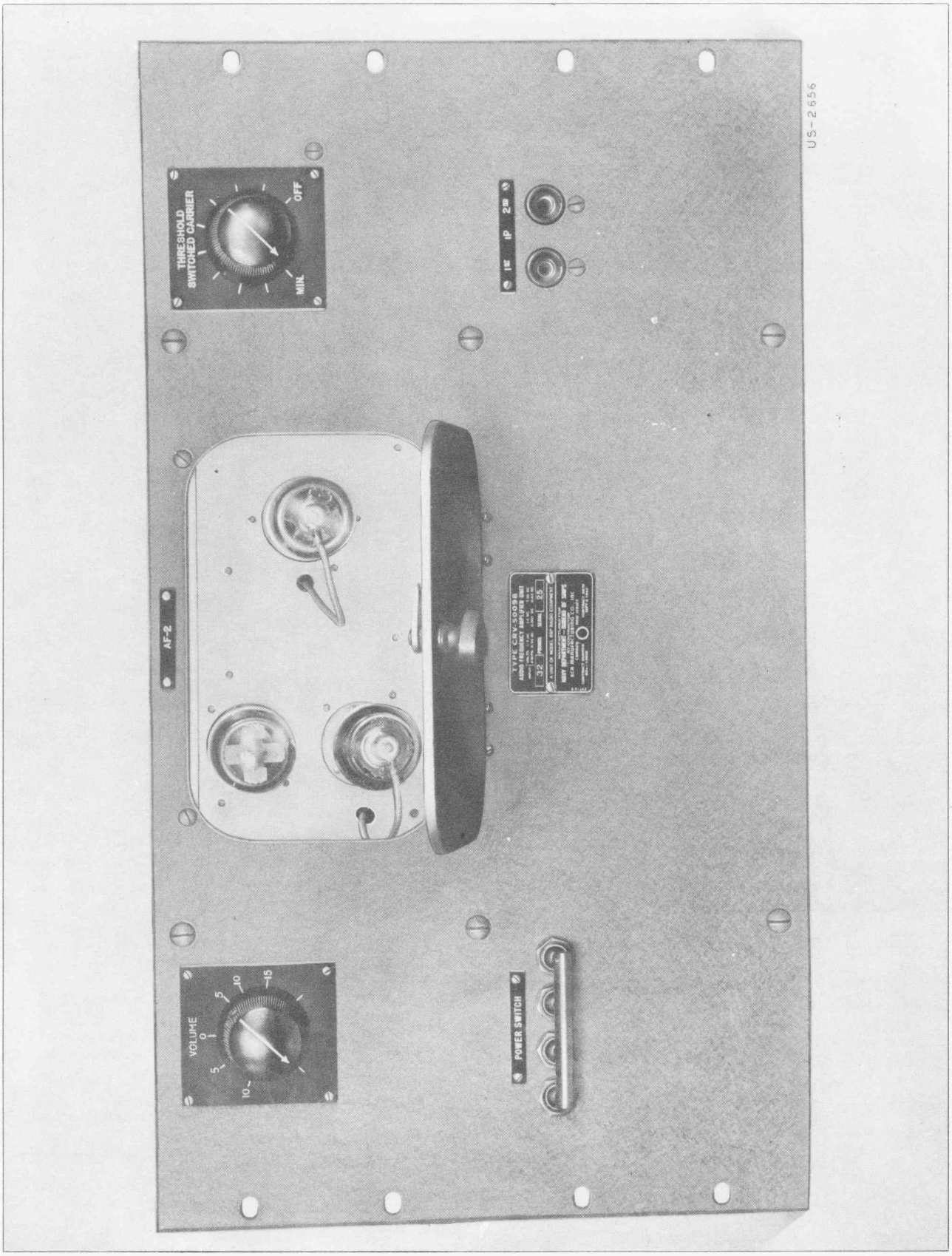

Figure 1—*Type CRV*-50098 *Audio-Frequency Amplifier Unit (Front View, Tube Access Door Open)*

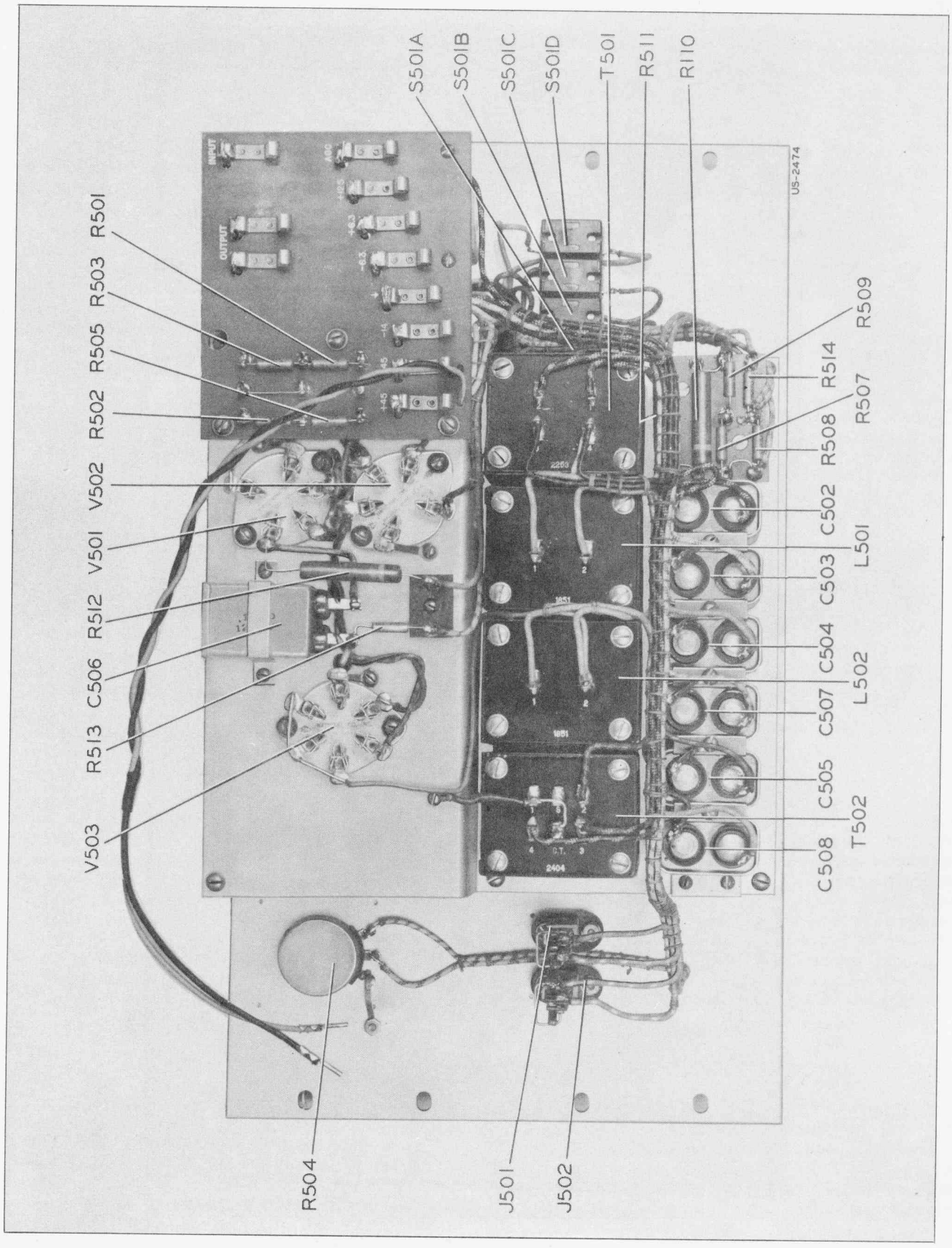

Figure 2—Type CRV-50098 Audio-Frequency Amplifier Unit (Rear View)

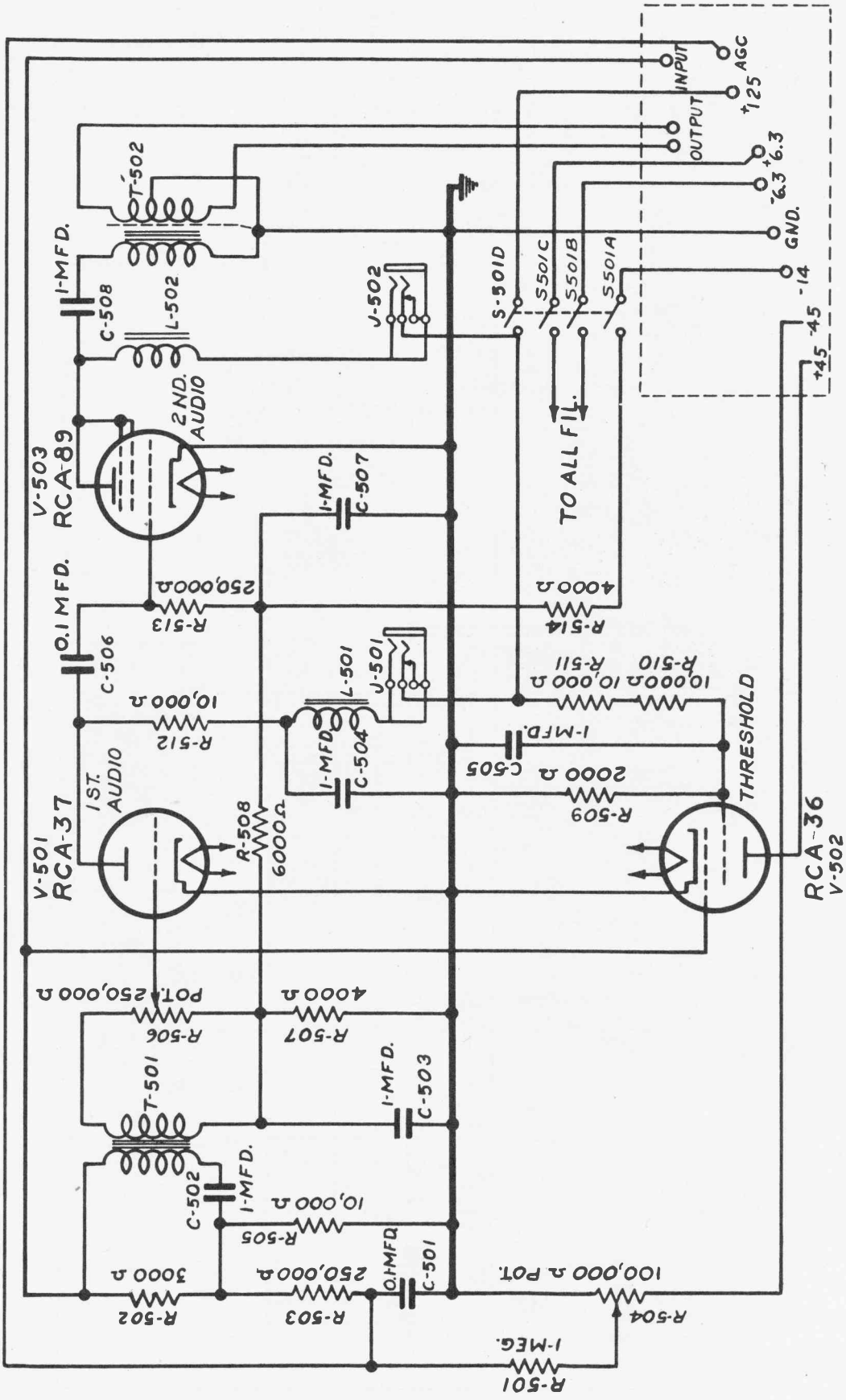

Figure 3—Type CRV-50098 Audio-Frequency Amplifier Unit Schematic (M-441152—Sub. 0)

WIRE TABLE		
DRAFTING SEE K-802308	DESCRIPTION	WIRE NUMBER
2	K-815877-11 YELLOW-BLUE TR.	1 TO 3 INCL.
3	K-815877-12 YELLOW-BLACK TR.	10
4	K-815877-20 BLACK	15 TO 19 INCL.
5	K-815877-1 BLACK-YEL. TR.	25 TO 27 INCL.
6	K-815877-8 YELLOW	35 TO 37 INCL.
7	K-815877-24 BLACK-GRN. TR.	45 & 46
8	K-815877-10 YELLOW-GRN. TR.	55 & 56
9	K-815877-3 RED	65 TO 68 INCL.
10	K-815877-4 RED-YEL TR.	75 TO 83 INCL.
11	K-815877-2 RED-BLK Red TR.	90 TO 92 INCL.
12	K-815877-14 GREEN-RED TR.	100 & 101
13	K-815877-9 YELLOW-RED TR.	110 & 111
14	K-815877-19 BLUE-YEL. TR.	120 TO 123 INCL.
15	K-815877-18 BLUE	130 TO 133 INCL.
16	P.S.105 .032 DIA TINNED COPPER WIRE	140 TO 156 INCL.
17	P.S.70 PLASTIC SLEEVING	160 & 161

NOTE #1:
CODING INSERTED IN WIRES INDICATES WIRE Nº AND DESTINATION OF WIRE RESP, THUS 1-TB1-9. WHERE A Nº ONLY IS GIVEN WIRE Nº IS INTENDED. A NUMBER PRECEDED BY A LETTER INDICATES AN ELECTRICAL ITEM THUS R511. NUMBERS IN CIRCLES REFER TO PT. NUMBERS ON WIRING M/L.

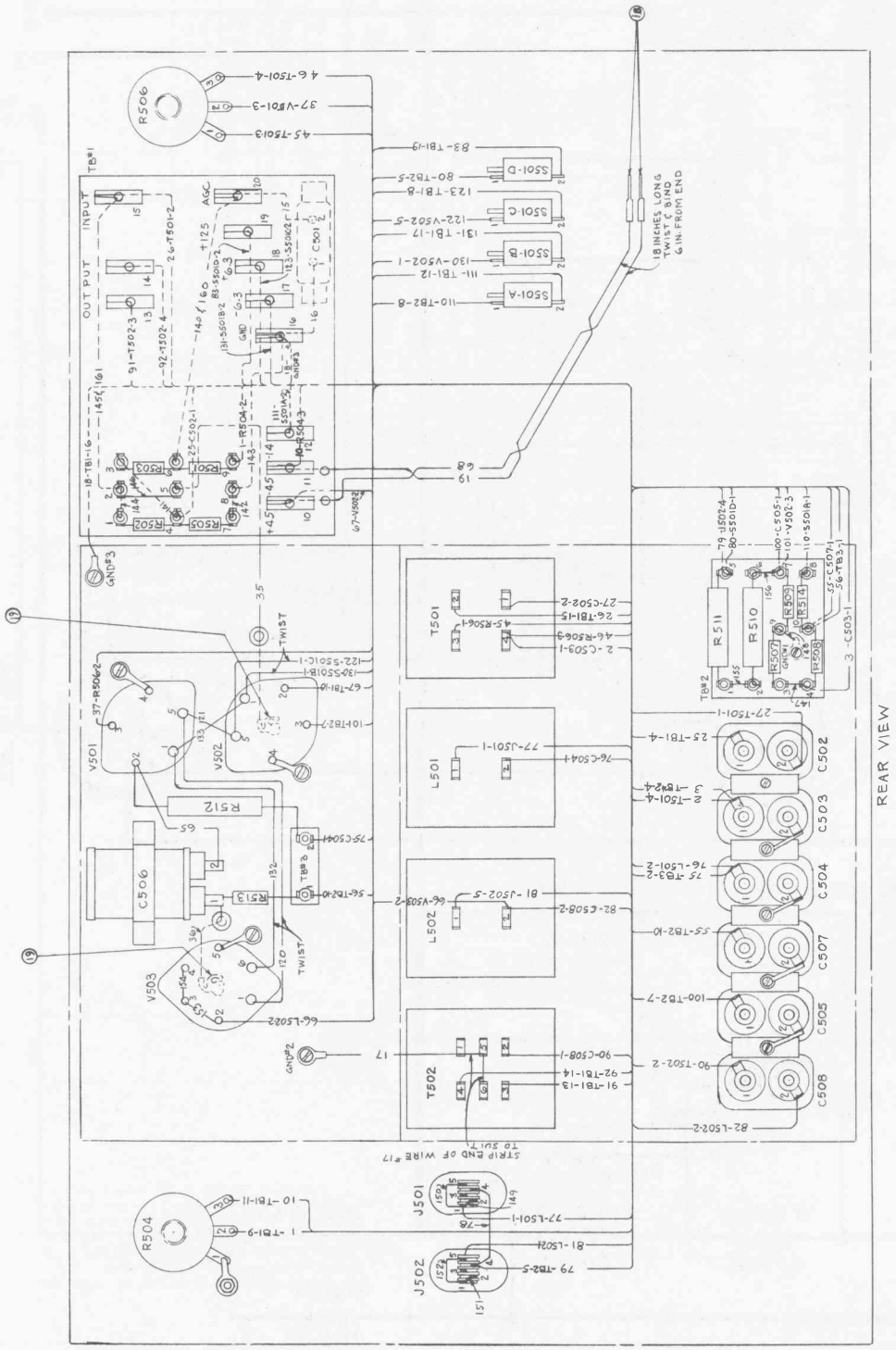

Figure 4—Type CRV-50098 Audio-Frequency Amplifier Unit Connections (T-621132—Sub. 0)