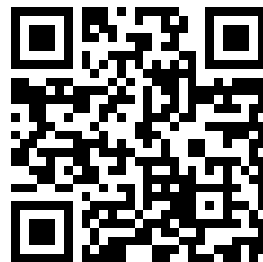

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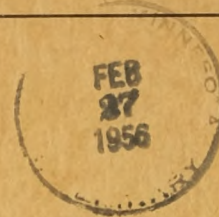
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DEPARTMENT OF THE ARMY TECHNICAL MANUAL



TELEGRAPH CARRIER
TERMINAL
AN/FGC-3, -7, AND -8



DEPARTMENT OF THE ARMY • DECEMBER 1955

TECHNICAL MANUAL }
No. 11-2260 }

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 22 December 1955

TM 11-2260, as printed by the Department of the Navy as NAVSHIPS 91901, 8 April 1953, and Correction T-1, 4 February 1954, appearing in the front of the manual, are published for the use of all concerned.

**TEMPORARY CORRECTION T-1 TO INSTRUCTION BOOK FOR
TELEGRAPH CARRIER TERMINAL AN/FCC-3, AN/FCC-7 and
AN/FCC-8 NAVSHIPS 91901**

NOTE

**IF YOU HAVE ONLY THE IN-
STRUCTION BOOK, AND NO
EQUIPMENT, MAKE ALL
CORRECTIONS CONTAINED
HEREIN.**

This correction has been issued to provide correction of the Instruction Book for the following reasons:

1. Errors on the book itself.
2. Correction of the book to cover factory changes already made.
3. Correction of the book to cover field changes to be made.

At the same time, there are three equipments involved, namely; AN/FCC-3, AN/FCC-7 and AN/FCC-8. Depending on equipment nomenclature, state of equipment with respect to field change and individual equipment serial numbers, your equipment may need:

1. Field Change in the equipment.
2. Any of 3 groups of corrections for the book.

Use the TABLE on the following page to determine what field changes and/or instruction book corrections apply to your particular equipment (in terms of its nomenclature and its serial number).

For "NOTE E" action, correct your instruction book immediately upon receipt of this Temporary Correction.

For "NOTE 1", "NOTE 2", and "NOTE 3" action, correct your instruction book only after the field changes indicated on the following page have been accomplished.

T-1 TO NAVSHIPS 91901

NOTE	AN/FCC-3		AN/FCC-7		AN/FCC-8	
	SERIAL NUMBERS	FIELD CHANGE	SERIAL NUMBERS	FIELD CHANGE	SERIAL NUMBERS	FIELD CHANGE
1.	1-69 70 & up	1-AN/FCC-3 * None	1-4 5 & up	1-AN/FCC-7 * None	1-14 15 & up	1-AN/FCC-8 * None
2.	1-103 104 & up	2-AN/FCC-3 * None	1-9 10 & up	2-AN/FCC-7 * None	1 & up 1 & up	* None * None
3.	1-140 (Trans) 141 & up	3-AN/FCC-3 * None	1-29 30 & up	3-AN/FCC-7 * None	1-14 15 & up	2-AN/FCC-8 * None
	1-134 (Rcvr) 135 & up	3-AN/FCC-3 * None	1-29 30 & up	3-AN/FCC-7 * None	1-14 15 & up	2-AN/FCC-8 * None

* No Field Change required. The equipments were modified at the factory. Correct your Instruction Book IMMEDIATELY upon receipt of this Temporary Correction.

Insert this Temporary Correction immediately after the front cover of the Instruction Book as a permanent record.

1. All instruction books (NAVSHIPS 91901) require corrections as outlined below.

<u>PAGE</u>	<u>PAR.</u>	<u>FIG.</u>	<u>NOTE</u>	<u>ACTION</u>
Page 1-7		Table 1-3	E	In QUANTITY PER EQUIPMENT column insert numeral "1" before Electronic Frequency Converter. In ARMY-NAVY OR NAVY TYPE DESIGNATION column insert "NAVSHIPS 91901" opposite Instruction Book. Opposite Maintenance Parts Kit, in OVER-ALL DIMENSIONS columns insert 24" in HEIGHT column, 15" in WIDTH column, 12" in DEPTH column.
Page 1-9		Table 1-4	E	Under the title for Table 1-4, "CARRIER SIGNAL FREQUENCIES" insert "(IN CYCLES PER SECOND)".
Page 2-4		Fig. 2-4	E	On the right side change tube V102B to "V101B".
Page 2-5		Fig. 2-5	3	Insert a neon glow lamp (NE-51), E123 between the plate of V103A (terminal 1) and grid of V103B (terminal 7). Connect a 330,000 ohm, 1 watt resistor, R127, from the grid of V103B (terminal 7) to chassis (ground). Connect the number 2 terminal of the "factory bias adjustment" board to the plate of V103A (terminal 1) instead of the grid of V103B. Change the 10,000 ohm, 2 watt resistor,

R109, to 8,200 ohms, 2 watts. Change value of R102 from 100 K to 330 K.

- Page 2-5 Para. 2-c 3 In the left-hand column change line 18 to read as follows: "These DC pulses are again shaped by R107 and the capacity connected to the plate of V103A.
In the left-hand column change lines 15 through 17 to read as follows: "Under proper operation, this plate voltage varies between +10 volts for SPACE to +80 volts for a MARK signal; a MARK signal causes the neon glow lamp, E123, to ignite (conductive) and a SPACE signal causes the neon glow lamp, E123, to extinguish (non-conductive). Thus when the neon lamp is ignited a positive potential is placed on the grid of V103B causing it to conduct current through its plate circuit. On the other hand, when the neon lamp is extinguished the grid of V103B is about 20 volts negative with respect to its cathode thereby cutting the tube conduction off."
- Page 2-9 Para. 3-a E In the left-hand column, change "carrier frequencies" in the fifth line to "signal frequencies".
Para. 3-b In the fourth line, right-hand column, "carrier signals" is changed to "signal frequencies".
- Page 2-10 Fig. 2-9 E Change as shown in Figure 1 on following page.
- Page 2-13 Fig. 2-13 3 Connect a 100 ohm, 1 watt resistor, R1357 through R1360, between the plate, pin 3, and the screen grid, pin 4, of the 6Y6 tubes, V1307 through V1310.
- Page 2-14 Para. 3f(2)(b) 3 Starting at line 18 change text to read as follows: "The 100 ohm resistors R1339, R1340, R1342, and R1357 through R1360 together with the 10,000 ohm resistor R1344 are RF oscillation suppression resistors and are placed in the control grid, and plate and screen grid circuits of tubes V1307, V1308, V1309, and V1310 respectively.
- Fig. 2-14 3 Connect a 100 ohm, 1 watt resistor, R1357 between the plate, pin 3, and the screen grid, pin 4, of the 6Y6 output keyer tube, V1307.
- Page 2-15 Fig. 2-15 1 Under resistors R1350 and R1351, change "2 w" to read "12 w", and under R1350, 220 K, insert "2 w".

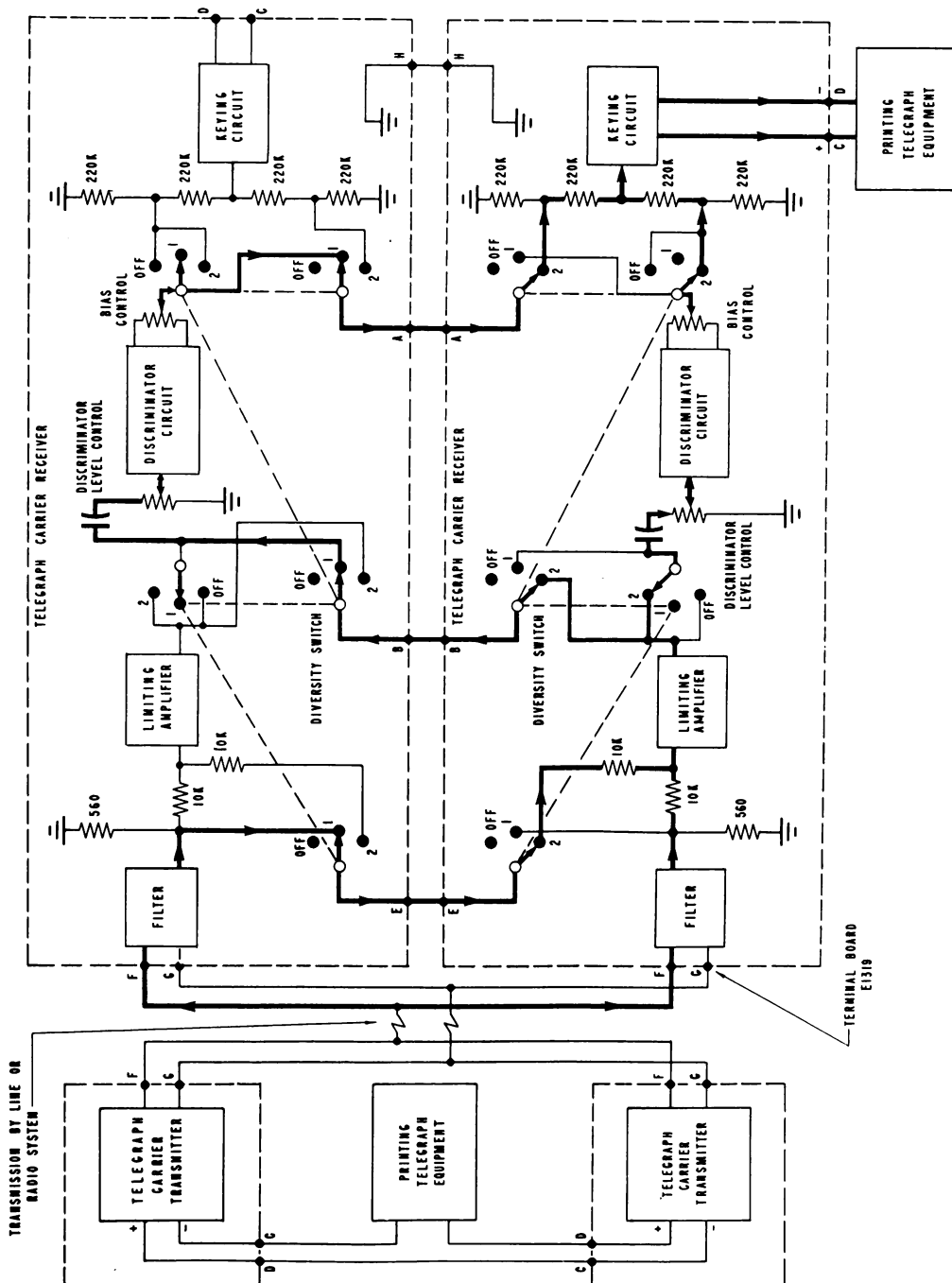


Figure 1. Corrected Block Diagram of Telegraph Carrier Receivers in Frequency Diversity

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Page 2-17	Fig. 2-17	2	Under resistor R2635 change "510 K" to "240 K".
Page 3-6	Fig. 3-5	E	Change color of the wire which connects the top terminal of switch S2501 to the receptacle box from white-black to black. Change color of wire which connects fuse F2504 to terminal 1 of transformer T2501 from white to black. Change the color of wire which connects terminal 1 of transformer T2501 to outlet J2502 from white-black to black. Change color of the wire which connects terminal 3 of T2501 to switch S2502 from white to white-black.
Page 7-4	Fig. 7-4	3	In tube 12AU7, V103, pin 1, change V23 to V75. Pin 2, change V13 to V20, R201 K to R430 K. Pin 6, change V34 to V40. Pin 7, change R226 K to R260 K. Pin 8, change R21 K to R2.2 K. In tube 6AL5W, V102, pin 7, change V13 to V23, R101 K to R330 K.
Page 7-7	Table 7-2	3	After "Trouble shoot DC amplifier V103 or check BIAS CONTROL R104" add "and NEON LAMP E123".
Page 7-10	Fig. 7-10	E	In tube 5Y3GT, V1311, pin 8, change "R105" to "R220 K". Pin 4, change "R220 K" to "R105".
Page 7-11	Fig. 7-11	1	Mark two circles to represent two wire-wound resistors R1350 and R1351 between V1314 and C1312. Label right-hand circle "R1350", and label left-hand circle "R1351".
Page 7-13	Fig. 7-12	1	On terminal board, E1323, (lower right), delete resistors R1350 and R1351.
Page 7-15	Fig. 7-16	3	In tube 12AX7, V2604, pin 1, change "V105" to "V170", "R450 K" to "R330 K". Pin 2, change "V-.4" to "V-1.3". Pin 3, change "V.35" to "V.5".
Page 7-26	Table 7-7	3	Opposite symbol ¹ V103, in Plate (V) column, change 23 to 75, 34 to 40. In the Grid (V) column, change 13 to -20.
Page 7-27	Table 7-7 Cont.	3	Opposite symbol V2604, in Plate (V) column, change 105 to 170; in Plate (MA) column, change .035 to .5; in Cathode (V) column, change .35 to .5.

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- | | | | |
|----------------|-----------|---|--|
| Page 7-31 | Table 7-9 | E | In remarks column, under "KEY RES.", change 470 K to 220 K. |
| Page 7-41/7-42 | Fig. 7-8 | E | Change (lower right) as shown in Figure 2 on following page. |
| | | 3 | Change (center) as shown in Figure 3 on Page 8 this T-1. |
| | | E | Change the color coding of the wires in the cable connecting the terminal block, E()15 to the chassis to read orange instead of red on terminal C, white instead of green on terminal F, green instead of white on terminal G, and red instead of orange on terminal I. |
| Page 7-43/7-44 | Fig. 7-9 | 3 | Mark as shown in Figure 4 on Page 9 this T-1. |
| Page 7-45/7-46 | Fig. 7-14 | 1 | In tube V()15, 0A2 (0A2WA) reverse the symbols for plate and cathode. Change the rating of R()50 and R()51 from 2 w to 12 w. Add the rating "2 w" under the value "220 K" under symbol designation R()52. |
| | | 3 | Mark as shown in Figure 5 on page 10 this T-1. |
| | | E | Change the color coding of the wires in the cable connecting the terminal block, E()19 to the chassis to read orange instead of red on terminal C, white instead of green on terminal F, green instead of white on terminal G, and red instead of orange on terminal I. |
| Page 7-47/7-48 | Fig. 7-15 | 1 | Insert following note in margin: Resistor R1350 and R1351 are removed from terminal board E1323 and replaced by two wire-wound resistors mounted on the top of the rear chassis shelf approximately next to X1314; all electrical connections remain as shown. |
| | | 3 | Mark as shown in Figure 6 on page 11 this T-1. |
| Page 7-49/7-50 | Fig. 7-21 | 2 | Under R2635 delete "510 K" and insert "240K". |
| | | E | Change the color coding of the wires in the cable connecting the terminal block, E2615 to the chassis to read orange instead of red on terminal C, white instead of green on terminal F, green instead of white on terminal G, and red instead of orange on terminal I. |

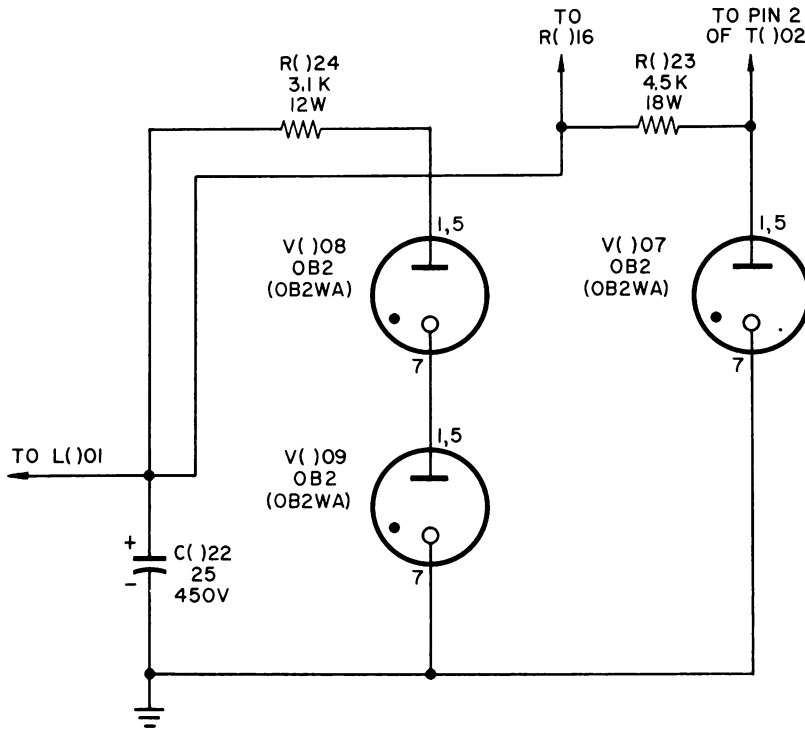


Figure 2. Sketch of Lower Right Section Showing Change to be Made

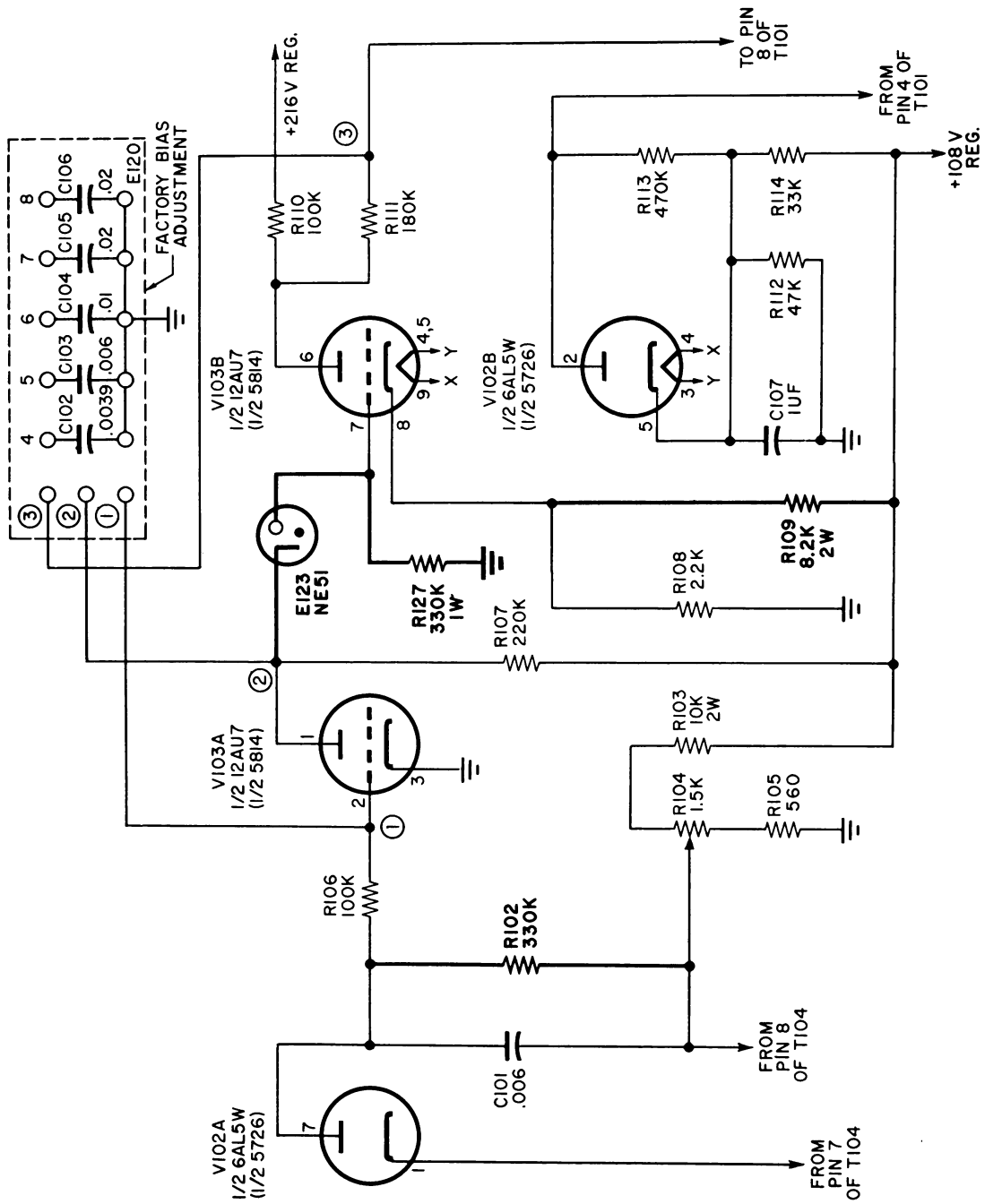


Figure 3. "After" View of Schematic Diagram of DC Amplifier Circuit

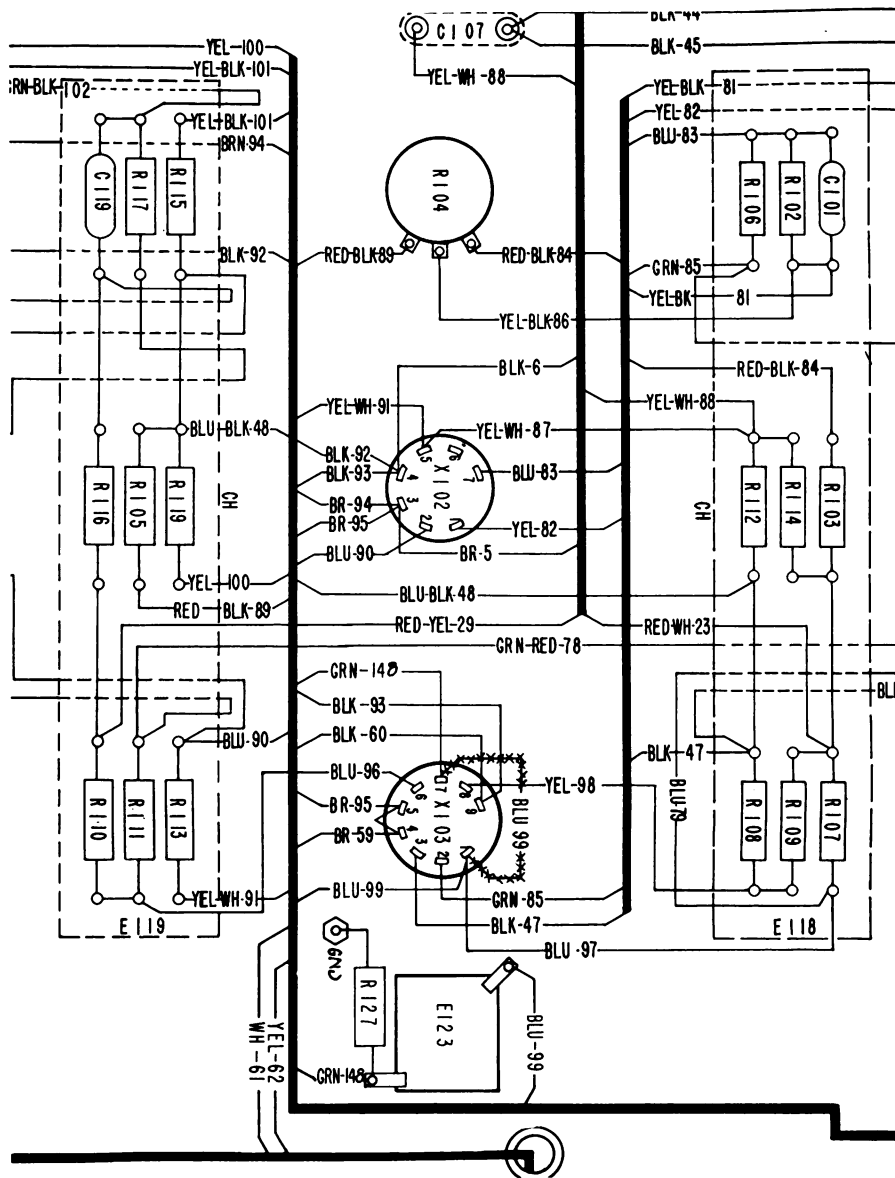


Figure 4. Sketch Showing Change to be Made in Wiring Diagram, Figure 7-9, Page 7-43/7-44

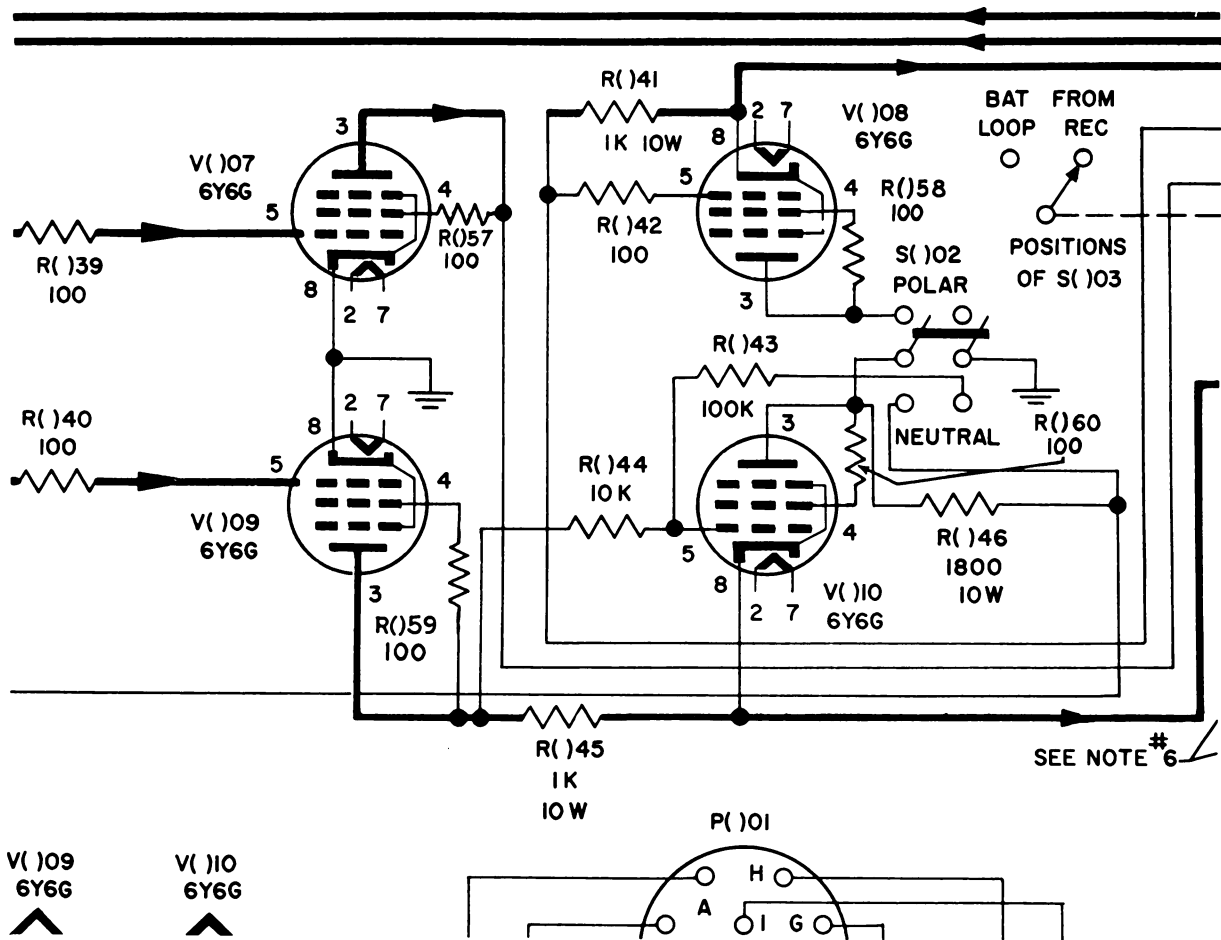


Figure 5. Portion of Schematic Diagram Figure 7-14 Showing Addition of New Resistors

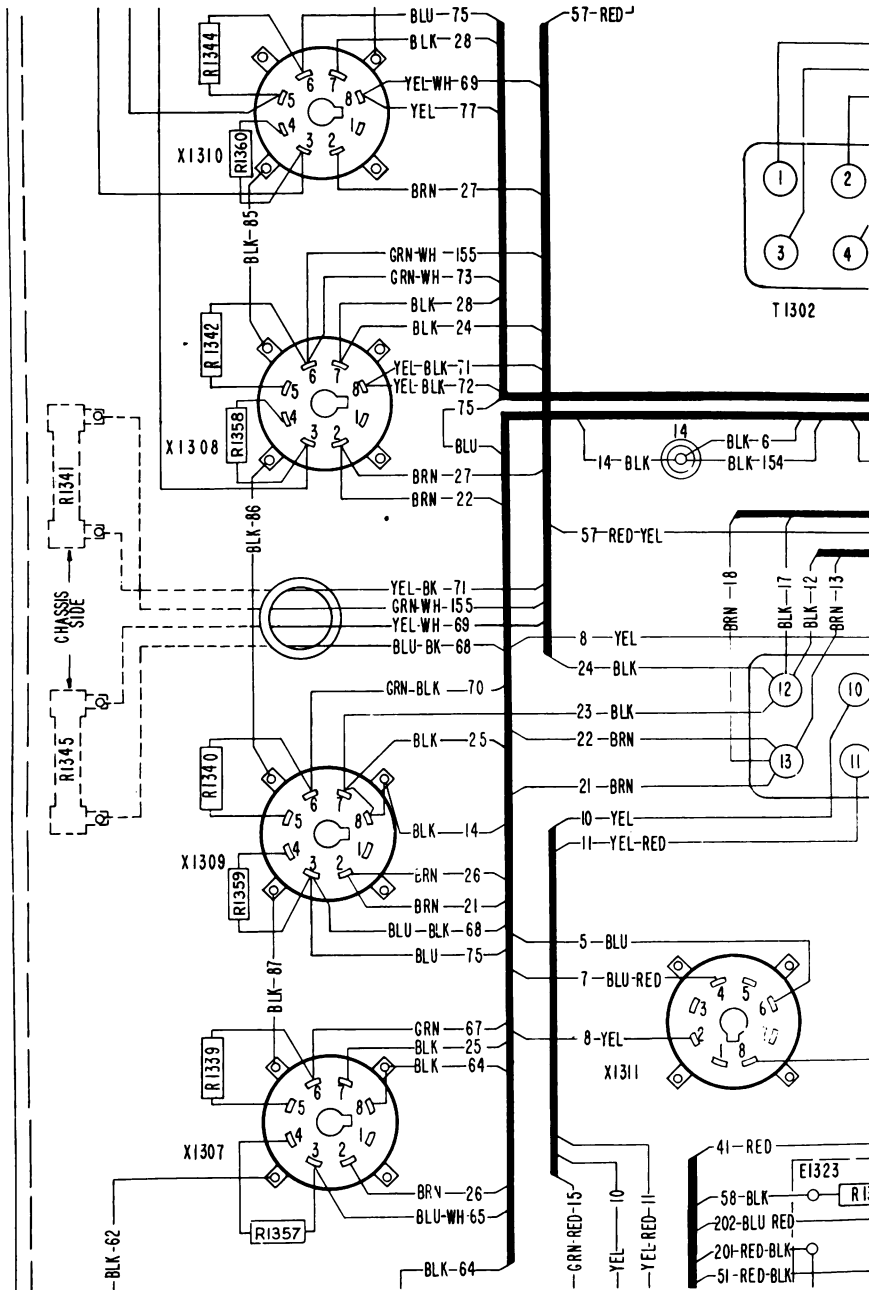


Figure 6. Sketch Showing Portion of Wiring Diagram Where Change is to be Made

CORRECTION T-1

Page
7-53/7-54

Fig. 7-27

E Change the color coding of the wires in the cable connecting the terminal block, E2714 to the chassis to read orange instead of red on terminal C, white instead of green on terminal F, green instead of white on terminal G, and red instead of orange on terminal I.

Page 8-8

3 Between E122 and F101 in REFERENCE DESIG. column insert E123. In STOCK NUMBER column opposite E123 insert 2Z5885-5 - For replacement use - G17-L-6806-130. In NAME AND DESCRIPTION column insert, LAMP, glow: Same as E101. In LOCATING FUNCTION column insert, DC coupling glow lamp.

Page 8-10

3 Between I103B and J101 in REFERENCE DESIG. column insert I104. In STOCK NUMBER column insert N17-L-51632-2389. In NAME AND DESCRIPTION column insert, SOCKET, miniature bayonet: Dialco No. 9S4931; same as MIL-L-3661 No. LH-72XX0. Mfr. has certificate of compliance, RFL part No. HA-5799. In LOCATING FUNCTION column insert, Lampholder for E123.

Page 8-13

3 Opposite resistor R102 in STOCK NUMBER column delete stock numbers and insert 3RC30BF334K - N16-R-50760-231. In NAME AND DESCRIPTION column delete the value 100,000 ohms and insert 330,000 ohms. Delete JAN type and manufacturer's number RC30BF104K and insert RC30BF334K. Change RFL part number H-1009-217 to H-1009-308.

3 Opposite resistor R106 in NAME AND DESCRIPTION column insert the following in place of existing description: RESISTOR, fixed, composition: 100,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF104K; Allen-Bradley part No. RC30BF104K; RFL part No. H-1009-217.

Page 8-14

3 Opposite resistor R109 in STOCK NUMBER column delete 3RC42BF103K - N16-R-50283-512 and insert 3RC42BF822K - For replacement use - N16-R-50238-518. In NAME AND DESCRIPTION column insert the following in place of existing description: RESISTOR,

fixed, composition: 8200 ohms $\pm 10\%$ 2 w, body 47/64''
lg x 19/64'' diam excl term; govt spec JAN-R-11,
type No. RC42BF822K; Allen-Bradley part No.
RC42BF822K, RFL part No. H-1009-259.

3 Opposite R110 in NAME AND DESCRIPTION
column delete R102 and insert R106.

Page 8-16

3 Between R126 and S101 in REFERENCE DESIG.
column insert R127. In STOCK NUMBER column,
opposite R127, insert 3RC30BF334K -
N16-R-50760-231. In NAME AND DESCRIPTION
column opposite R127 insert: RESISTOR, fixed,
composition: Same as R102. In LOCATING
FUNCTION column, opposite R127, insert: Grid
leak for V103B.

Page 8-32

3 Opposite R1308, R1309 in NAME AND DESCRIPTION
column delete R102 and insert R106.

Page 8-33

3 Opposite R1317, R1319 in NAME AND DESCRIPTION
column delete R102 and insert R106.

Page 8-34

3 Opposite R1328 in NAME AND DESCRIPTION column
delete R102 and insert R106.

Page 8-35

3 Opposite R1332, R1335, R1337 in NAME AND DES-
CRPTION column delete R102 and insert R106.

Page 8-36

1 In STOCK NUMBER column, opposite resistor R1350,
change N16-R-50283-512 to N16-R-66397-4851 and
3RC42BF103K to RW32F103. In NAME AND DES-
CRPTION column, opposite R1350, change descrip-
tion to read as follows: RESISTOR, fixed, wire-
wound: inductive winding; 10,000 ohms, $\pm 5\%$, 12 w;
body 2'' lg x 19/32'' OD excl term; Ward Leonard
part No. RW32F103; RFL part No. H-1100-166.

1 In STOCK NUMBER column, opposite resistor
R1351, change N16-R-50283-512 to N16-R-66397-4851
and 3RC42BF103K to RW32F103. In NAME AND
DESCRIPTION column, opposite R1351, change
description to read as follows: RESISTOR, fixed,
wire-wound: Same as R1350.

- 1 In STOCK NUMBER column, opposite resistor R1352 change 3RC30BF224K and N16-R-50715-231 to 3RC42BF224K and "For replacement use - N16-R-50715-509". In NAME AND DESCRIPTION column opposite R1352 change description to read as follows: RESISTOR, fixed, composition: 220,000 ohms, $\pm 10\%$, 2 w; govt spec JAN-R-11, type RC42BF224K; Allen-Bradley part No. RC42BF224K; RFL part No. H-1009-321.
- 3 Opposite R1343 in NAME AND DESCRIPTION column delete R102 and insert R106.
- Page 8-37 3 In REFERENCE DESIG. column, between R1356 and S1301, insert "R1357 through R1360". In STOCK NUMBER column, opposite above insertion, insert 3RC30BF101K and N16-R-49581-231. In NAME AND DESCRIPTION column, insert between descriptions of R1356 and S1301, the following: RESISTOR, fixed, composition: Same as R1322. In LOCATING FUNCTION column, between listed functions for R1356 and S1301, insert the following: Oscillation suppressor for V1307 through R1310.
- Page 8-41 E Opposite REFERENCE DESIG. 1500 to 1599, change stock number to read #F16R-99999-0009.
- Page 8-56 E In STOCK NUMBER column, opposite shield E2610, change N16-S-32576-6514 to N16-S-34576-6514.
- Page 8-66 2 In STOCK NUMBER column, opposite R2635, change 3RC30BF514J to 3RC30BF224J and N16-R-50839-751 to N16-R-50722-751. In NAME AND DESCRIPTION column, opposite R2635, delete description and insert: Same as R2608.
- Page 8-67 3 Opposite R2653 in NAME AND DESCRIPTION column delete R102 and insert R106.
- Page 8-68 3 Opposite R2656 in NAME AND DESCRIPTION column delete R102 and insert R106.
- 2 In the NAME AND DESCRIPTION column, opposite resistor R2665, change description to read as follows: RESISTOR, fixed, composition: Same as R1352.

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SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the Bureau of Ships Manual or superseding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS:

Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE:

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS:

Do not depend upon door switches or interlocks for protection but always shut down motor generators or other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

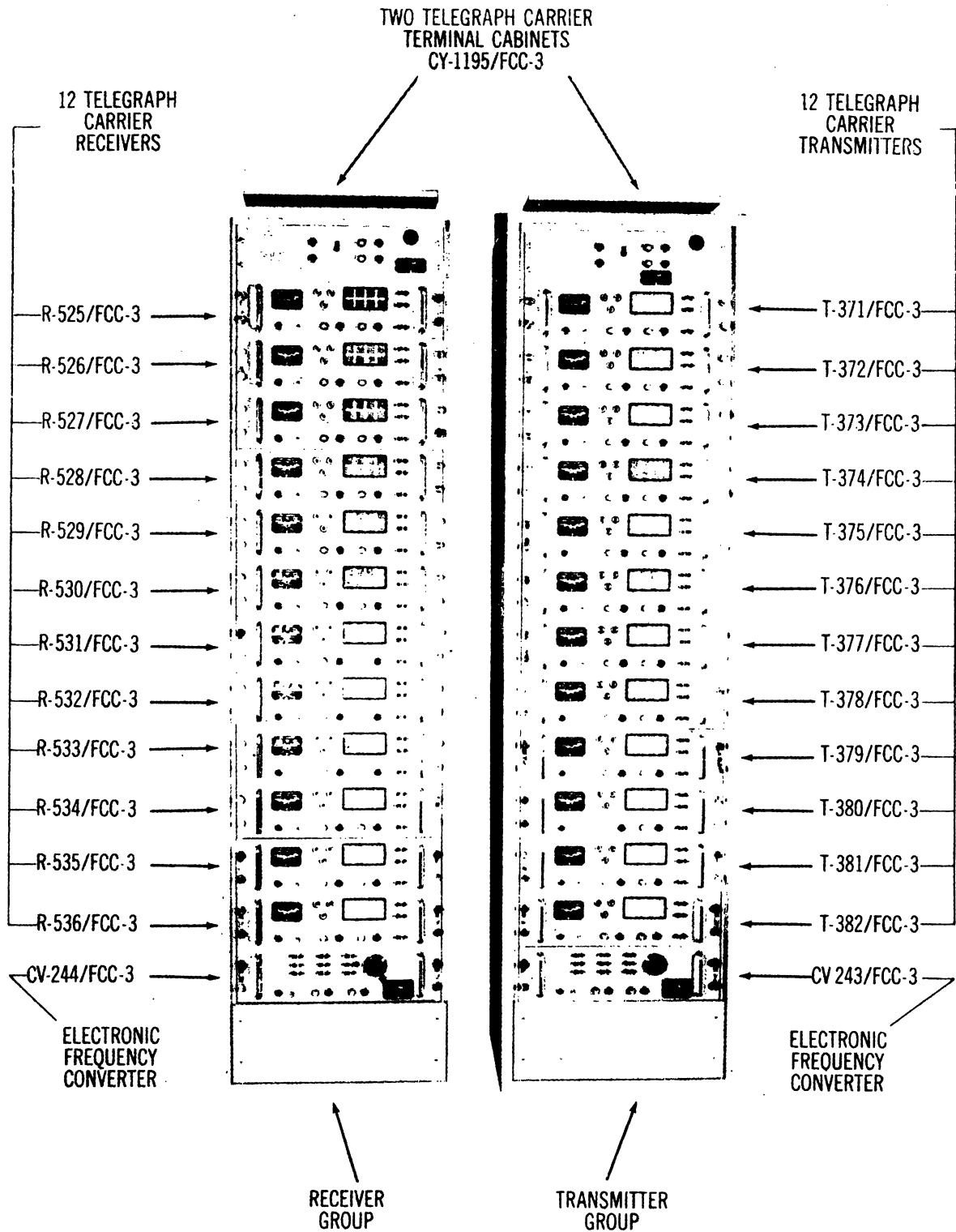


Figure 1-1. Telegraph Carrier Terminal AN/FCC-3, Identification of Units

SECTION 1 GENERAL DESCRIPTION

1. INSTRUCTION BOOK COVERAGE.

This instruction book describes and includes information concerning the installation, adjustment, operation, and maintenance of the Telegraph Carrier Terminal AN/FCC-3, as shown in figure 1-1, and the Telegraph Carrier Terminals AN/FCC-7 and AN/FCC-8.

2. PURPOSE AND BASIC PRINCIPLES.

The Telegraph Carrier Terminal AN/FCC-3 consists of both the transmitting and receiving groups of terminals for a 12 or 16 channel voice-frequency telegraph carrier communication system capable of being used on radio circuits or wire lines. The 12 channels cover approximately a 4 kc band width with 8 channels spaced 170 cps apart and four channels spaced 425 cps apart. Table 1-4 lists the channels and their MARK and SPACE frequencies. For 16 channel operation the first eight channels are converted to higher frequencies but remain within the 4 kc band width. Frequency shift modulation is employed in all channels. The normal center frequencies of the 170 cps telegraph channels are 425, 595, 765, 935, 1105, 1275, 1445, and 1615 cps with the MARK signal 42.5 cps above center frequency and the SPACE signal 42.5 cps below the center frequency. On the 425 cps channels the normal center frequencies are 1955, 2380, 2805, and 3230 cps with the MARK signal 85 cps above the center frequency and the SPACE signal 85 cycles below the center frequency.

3. DESCRIPTION OF UNITS.

a. GENERAL. - The Telegraph Carrier Terminal AN/FCC-3 consists of two groups as shown in figure 1-1. A group of 12 telegraph carrier transmitters and an Electronic Frequency Converter CV-243/FCC-3 are housed in one Telegraph Carrier Terminal Cabinet CY-1195/FCC-3 and make up one transmitter group. A group of 12 telegraph carrier receivers and an Electronic Frequency Converter CV-244/FCC-3 are housed in another Telegraph Carrier Terminal Cabinet CY-1195/FCC-3 and make up one receiver group. The connecting cables to each unit are brought out to the terminal boards in the rear of the cabinet and are wired at installation to meet the requirements of the individual communication system. The transmitter group cabinet is provided with Wiring Harness CX-2448/FCC-3 which interconnects the transmitter terminal boards, and the receiver group cabinet is provided with Wiring Harness CX-2449/FCC-3 which interconnects the receivers for diversity operation.

The Telegraph Carrier Terminal AN/FCC-7 consists of the first eight channels of the Telegraph Carrier

Terminal AN/FCC-3, and the two Electronic Frequency Converters CV-243/FCC-3 and CV-244/FCC-3; all housed in two CY-1195/FCC-3 cabinets. The Telegraph Carrier Terminal AN/FCC-8 is the same as the Telegraph Carrier Terminal AN/FCC-7, except the electronic frequency converters are omitted.

b. TELEGRAPH CARRIER TRANSMITTER. (See figure 1-2.) - This unit converts the DC telegraph pulses in the loop circuit to frequency shift MARK and SPACE audio signals for one channel. The telegraph carrier transmitter consists of a 15 kc oscillator electrically isolated from the remainder of the transmitter and magnetically coupled to an LC resistance stabilized oscillator, a frequency shifting transformer, an output band-pass filter, and power supplies for the loop and oscillator circuits. The unit operates from a single phase power source of 115/230 volts and 50/60 cycles. For 230 volt operation a transformer tap switch on the chassis must be changed. The circuit parts are mounted in a 19 inch panel and chassis combination 5-1/4 inches high and 16 inches deep. The chassis is provided with a sliding drawer mechanism which allows the chassis to be withdrawn from the cabinet and tilted up to expose the bottom for maintenance. The telegraph carrier transmitter also includes Cable Assembly CX-2124/FCC-3 and Cable Assembly CX-2125/U (4'4"). Table 1-5 correlates the nomenclature of the twelve transmitters with the mid-band center frequencies. All transmitters are electrically and mechanically alike except for the plug-in units and the connections to the bias adjusting capacitors.

c. TELEGRAPH CARRIER RECEIVERS. (See figure 1-3.) - This unit converts the frequency shift audio telegraph signals of the channel to DC pulses for operation of a telegraph printer or other telegraph end equipment. The telegraph carrier receiver consists of a power supply, signal limiter amplifier, output keying circuit, a plug-in band-pass filter and discriminator, and a diversity combining circuit. Jacks are provided in the output loop circuits for patching several telegraph printers into the same loop circuit. The unit operates from a single phase power source of 115/230 volts and 50/60 cycles. For 230 volt operation a transformer tap switch on the chassis must be changed. The circuit parts are mounted in a 19 inch panel and chassis combination 5-1/4 inches high and 16 inches deep. The chassis is provided with a sliding drawer mechanism which allows the chassis to be withdrawn from the cabinet and tilted up to expose the bottom for maintenance. The telegraph carrier receiver also includes Cable Assembly CX-2124/FCC-3 and Cable Assembly CX-2125/U (4'4"). Table 1-6 correlates the nomenclature of the twelve receivers with the mid-band center frequencies.

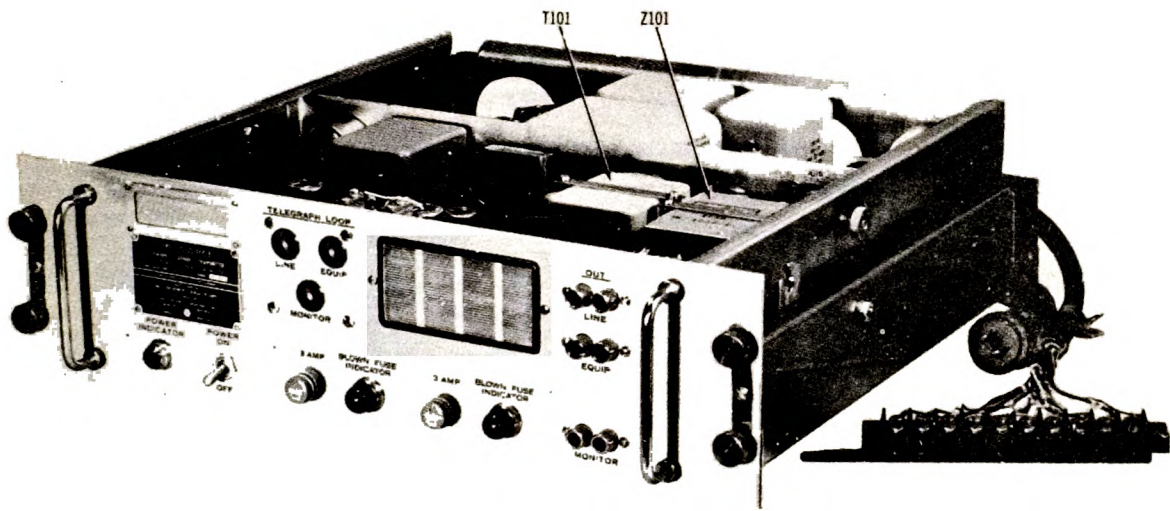


Figure 1-2. Telegraph Carrier Transmitters, Identification of

All receivers are mechanically and electrically alike except for the plug-in band-pass filter, discriminator, and a change in value of a capacitor in the wide-band channels.

d. ELECTRONIC FREQUENCY CONVERTER CV-243/FCC-3. (See figure 1-4.)—This unit provides the necessary facilities for accepting the output signals from eight narrow-band transmitters within a frequency spectrum of 382.5 cycles to 1675.5 cycles and trans-

lating these signals to a frequency spectrum of 1742.5 cycles to 3017.5 cycles. The frequency translation is accomplished by mixing the transmitted signals with a 3400 cps voltage and then selecting the lower of the two generated side bands. Mixing occurs in a balanced modulator circuit employing crystal diodes. The selection of the lower side band is obtained by a filter having a pass band of 1742.5 cycles to 3017.5 cycles.

For 16 channel operation the signals from eight additional transmitters in the frequency range of 382.5

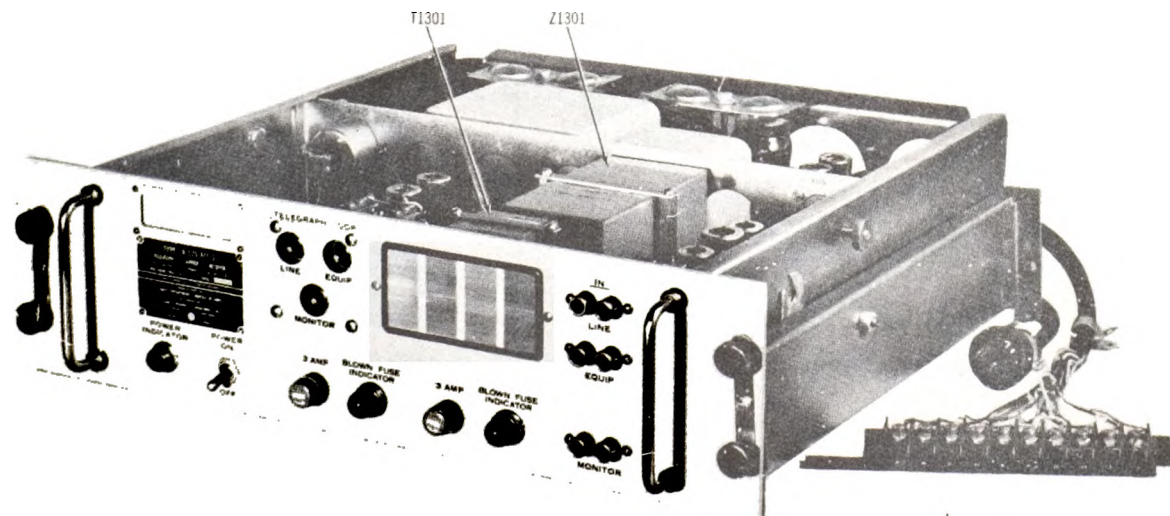


Figure 1-3. Telegraph Carrier Receivers, Identification of

cycles to 1675.5 cycles may be applied to a separate input of the converter. These signals will not be frequency translated.

A line amplifier common to both translated and non-translated signals is provided and the gain of this amplifier is sufficient to equalize the circuit losses

incurred by signals passing through the converter. The output circuit of the amplifier is ungrounded and has a nominal 600 ohm impedance. An ATTENUATOR is provided in the output circuit and is variable from 0 to 40 db in 2 db steps.

Jacks on the front panel of the converter afford a con-

TABLE 1-1. VACUUM TUBE DESIGNATION

UNIT	SYMBOL DESIGNATION	TUBE TYPE
<p>Telegraph Carrier Transmitter</p> <p>Note: The “()” indicates the 100 to 1200 series of symbol numbers as assigned in table 1-5 to the various transmitters.</p>	<p>V()01 V()02 V()03 V()04 V()05 V()06 V()07 V()08 V()09</p>	<p>JAN 12AU7 JAN 6AL5W JAN 12AU7 JAN 12AU7 JAN 5Y3GT JAN 5Y3GT JAN 0B2 JAN 0B2 JAN 0B2</p>
<p>Telegraph Carrier Receiver</p> <p>Note: The “()” indicates the 1300 to 2400 series of symbol numbers as assigned in table 1-6 to the various receivers.</p>	<p>V()01 V()02 V()03 V()04 V()05 V()06 V()07 V()08 V()09 V()10 V()11 V()12 V()13 V()14 V()15 V()16</p>	<p>JAN 6AU8 JAN 12AX7 JAN 6C4 JAN 6AL5W JAN 6J6 JAN 6J6 JAN 6Y6G JAN 6Y6G JAN 6Y6G JAN 6Y6G JAN 5Y3GT JAN 6X4W JAN 0B2 JAN 0B2 JAN 0A2 JAN 6AL5W</p>
<p>Electronic Frequency Converter CV-243/FCC-3</p>	<p>V2601 V2602 V2603 V2604 V2605 V2606 V2607 V2608 V2609</p>	<p>JAN 12AU7 JAN 12AX7 JAN 12AU7 JAN 12AX7 JAN 12AX7 JAN 12AU7 JAN 5Y3GT JAN 0B2 JAN 0B2</p>
<p>Electronic Frequency Converter CV-244/FCC-3</p>	<p>V2701 V2702 V2703 V2704 V2705 V2706 V2707 V2708</p>	<p>JAN 12AU7 JAN 12AX7 JAN 12AU7 JAN 12AU7 JAN 12AU7 JAN 5Y3GT JAN 0B2 JAN 0B2</p>

venient means of patching the transmitted signals around the converter, and also permit monitoring signal levels.

A 102 kc crystal controlled oscillator and a series of frequency dividing circuits with buffer amplifiers provide the 3400 cycle voltage for the balanced modulator circuit and also a signal of 85 cycles for test purposes.

The converter contains its own power supply which is operable from a single phase power source of 115/230 volts and 50/60 cycles. A transformer tap switch is provided on the chassis for changing from 115 volt to 230 volt operation.

Component parts of the unit are mounted on a 19 inch panel and chassis combination 5-1/4 inches high and 16 inches deep. The chassis is provided with a sliding drawer mechanism which permits the chassis to be withdrawn from the cabinet and tilted upward to expose the bottom for maintenance. Cable Assembly CX-2124/FCC-3 and Cable Assembly CX-2125/U (4'4") are included with the unit.

e. ELECTRONIC FREQUENCY CONVERTER CV-244/FCC-3. - (See figure 1-5.) This unit provides an ungrounded input circuit having a nominal 600 ohm impedance and also an ATTENUATOR variable from 0 to 40 db in 2 db steps. The acceptable range of signals at the input is from 382.5 cycles to 3315 cycles. Those signals which have been translated by the Converter CV-243/FCC-3 are selected by a filter having a pass band of 1742.5 cycles to 3017.5 cycles and are returned to their original frequency spectrum of 382.5 cycles to 1657.5 cycles. These signals may then be applied to narrow-band receivers connected to the proper output circuit of the unit. Those signals in the frequency spectrum of 382.5 cycles to 1657.5 cycles, not having been translated by the CV-243/FCC-3, are rejected by the above band-pass filter and may be applied to additional narrow-band receivers connected to the proper output circuit of the unit.

Frequency translation is accomplished by mixing the signals in the frequency spectrum of 1742.5 cycles to

TABLE 1-2. VACUUM TUBE COMPLEMENT

UNIT	NUMBER OF TUBES OF TYPE INDICATED										TOTAL NO. OF TUBES	
	5Y3GT	6AL5W	6AU6	6C4	6T6	6X4W	6Y6G	12AU7	12AX7	0A2		0B2
Telegraph Carrier Transmitter T-371	2	1						3			3	9
Telegraph Carrier Transmitter T-372	2	1						3			3	9
Telegraph Carrier Transmitter T-373	2	1						3			3	9
Telegraph Carrier Transmitter T-374	2	1						3			3	9
Telegraph Carrier Transmitter T-375	2	1						3			3	9
Telegraph Carrier Transmitter T-376	2	1						3			3	9
Telegraph Carrier Transmitter T-377	2	1						3			3	9
Telegraph Carrier Transmitter T-378	2	1						3			3	9
Telegraph Carrier Transmitter T-379	2	1						3			3	9
Telegraph Carrier Transmitter T-380	2	1						3			3	9
Telegraph Carrier Transmitter T-381	2	1						3			3	9
Telegraph Carrier Transmitter T-382	2	1						3			3	9
Telegraph Carrier Receiver R-525	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-526	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-527	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-528	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-529	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-530	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-531	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-532	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-533	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-534	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-535	1	2	1	1	2	1	4		1	1	2	16
Telegraph Carrier Receiver R-536	1	2	1	1	2	1	4		1	1	2	16
Electronic Frequency Converter CV-243/FCC-3	1							3	3		2	9
Electronic Frequency Converter CV-244/FCC-3	1							4	1		2	8
TOTAL NUMBER OF EACH TYPE	38	36	12	12	24	12	48	43	16	12	64	317

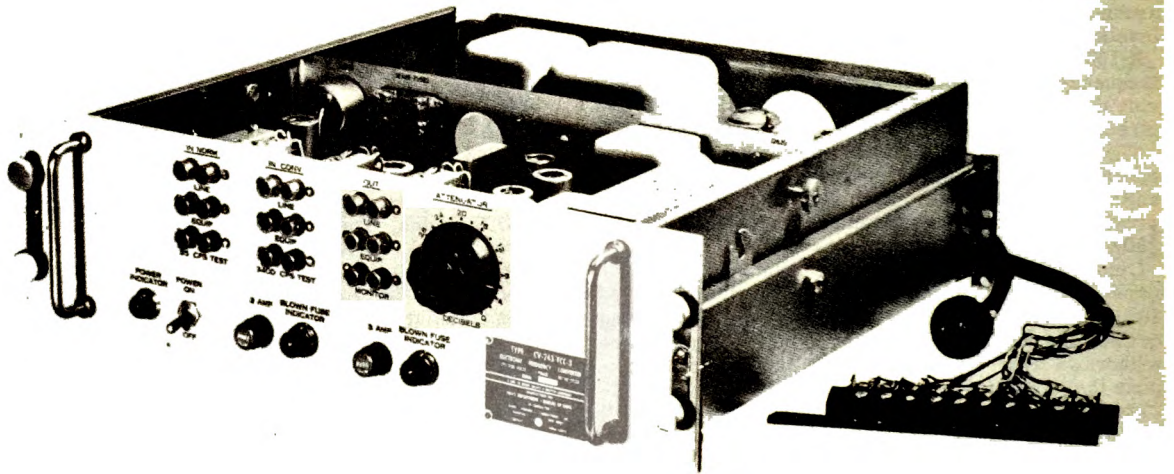


Figure 1-4. Electronic Frequency Converter CV-243/FCC-3, Identification of

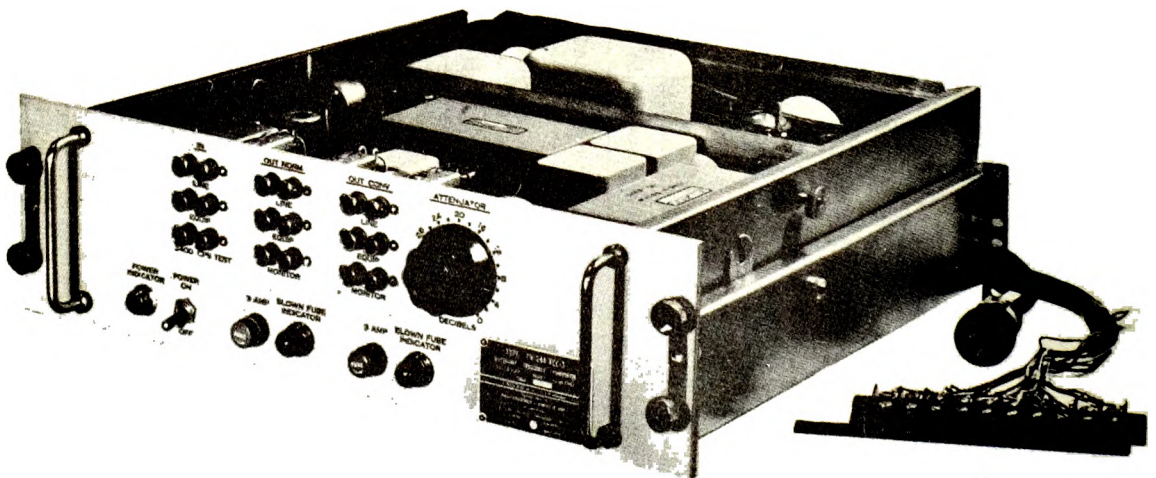


Figure 1-5. Electronic Frequency Converter CV-244/FCC-3, Identification of

3017.5 cycles with a 3400 cps voltage and then selecting the lower side band. Mixing is obtained by a balanced modulator employing crystal diodes. The lower side band is selected by a filter which passes all signals below 1657.5 cycles. A line amplifier having sufficient gain to equalize the circuit losses of the translated signals is provided. The output impedance of this amplifier is a nominal 600 ohms.

A line amplifier with an output impedance of 600 ohms is provided for the non-translated signals, and its function is to maintain an equipment gain of unity for these signals.

Jacks on the front panel provide a means for patching the signals around the converter and directly to the receivers, and also permit monitoring signal levels.

A 102 kc crystal controlled oscillator used with frequency dividing circuits and a buffer amplifier supplies the 3400 cps voltage to the balanced modulator circuit.

This unit contains its own power supply which is operable from a power source of 115/230 volts 50/60 cycles. A transformer tap switch on the chassis is provided for changing from 115 volt to 230 volt operation.

Component parts of the equipment are mounted on a 19 inch panel and chassis combination 5-1/4 inches high and 16 inches deep. A sliding drawer mechanism and tilting feature allows the converter to be withdrawn from the cabinet for servicing. The Electronic Frequency Converter CV-244/FCC-3 also includes Cable

Assembly CX-2124/FCC-3 and Cable Assembly CX-2125/U (4'4").

f. TELEGRAPH CARRIER TERMINAL CABINET CY-1195/FCC-3. - (See figure 1-6.) One of these units is used as a cabinet for the transmitter group and another is used as a cabinet for the receiver group. The unit is designed to hold thirteen standard panel and chassis

combinations 5-1/4 inches high. The telegraph carrier terminal cabinet includes the smooth grey enameled steel cabinet, the MAIN POWER switch and fuses for 115/230 volt line, thirteen power outlets in an internal channel and one external power outlet, a ventilation fan, and provision for attaching the terminal boards and cables of the individual telegraph carrier transmitter or receiver. If a 230 volt power source is used, the

TABLE 1-3. EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	ARMY-NAVY OR NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS			VOLUME (CU FT)
			HEIGHT	WIDTH	DEPTH	
2	Telegraph Carrier Terminal Cabinet	CY-1195/FCC-3	7' 9"	24"	24"	31
1	Telegraph Carrier Transmitter	T-371/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-372/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-373/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-374/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-375/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-376/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-377/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-378/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-379/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-380/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-381/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-382/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-525/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-526/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-527/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-528/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-529/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-530/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-531/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-532/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-533/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-534/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-535/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-536/FCC-3	5-1/4"	19"	16"	0.925
1	Electronic Frequency Converter	CV-243/FCC-3	5-1/4"	19"	16"	0.925
	Electronic Frequency Converter	CV-244/FCC-3	5-1/4"	19"	16"	0.925
	ACCESSORIES					
13	Cable Assembly, Special Purpose Electrical	CX-2124/FCC-3	4' 8"			
13	Cable Assembly, Power, Electrical	CX-2125/U	4' 4"			
1	Wiring Harness, (Transmitter Group Cabinet)	CX-2448/FCC-3	5' 7"			
1	Wiring Harness, (Receiver Group Cabinet)	CX-2449/FCC-3	5' 7"			
1	Maintenance Parts Kit					
2	Instruction Book					

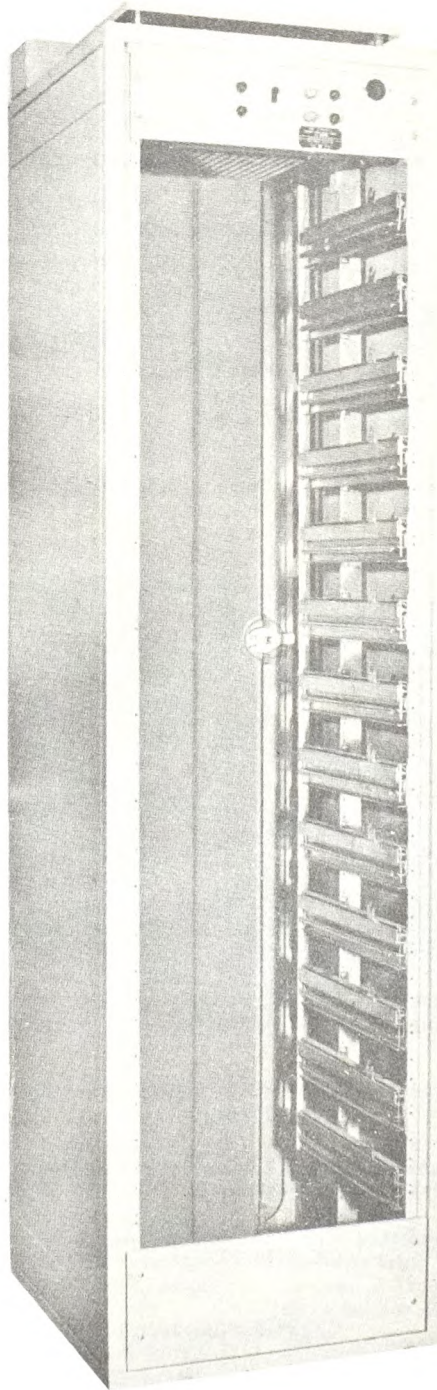


Figure 1-6. Telegraph Carrier Terminal Cabinet CY-1195/FCC-3, Identification of

115/230 volt switch for the fan transformer must be changed.

g. **TRANSMITTER FILTERS.** - (See figure 1-2.) A transmitter has one plug-in audio-frequency transformer and one plug-in transmitter band-pass filter as listed in table 1-5. Because of their identicalness, the center frequency of any transmitter may be changed by plugging in a different filter set. A readjustment of the factory bias adjustment capacitors, as described in Section 4, may be required for proper performance after a set of filters is changed. Slight change in bias may be accomplished by the BIAS CONTROL R104.

h. **RECEIVER FILTERS.** - (See figure 1-3.) A receiver has one plug-in receiver band-pass filter and one plug-in discriminator transformer. The filters supplied with the receivers are listed in table 1-6. All receivers are electrically and mechanically identical except for the different plug-in filters used and the change in value of a capacitor in the wide-band channels. The center frequency of any receiver may be changed by plugging in another set of filters.

i. **TELEGRAPH CARRIER TERMINAL AN/FCC-7.** - This equipment consists of the first eight channels of the Telegraph Carrier Terminal AN/FCC-3. The Telegraph Carrier Transmitters T-371/FCC-3, T-372/FCC-3, T-373/FCC-3, T-374/FCC-3, T-375/FCC-3, T-376/FCC-3, T-377/FCC-3, T-378/FCC-3, and an Electronic Frequency Converter CV-243/FCC-3 are housed in one Telegraph Carrier Terminal Cabinet CY-1195/FCC-3 and make up the transmitting equipment. Blank panels are placed in the cabinet to complete the front of the unit. The Telegraph Carrier Receivers R-525/FCC-3, R-526/FCC-3, R-527/FCC-3, R-528/FCC-3, R-529/FCC-3, R-530/FCC-3, R-531/FCC-3, R-532/FCC-3, and an Electronic Frequency Converter CV-244/FCC-3 are housed in one Telegraph Carrier Terminal Cabinet CY-1195/FCC-3 and make the re-

ceiving equipment. Blank panels are placed in the cabinet to complete the front of the unit.

j. **TELEGRAPH CARRIER TERMINAL AN/FCC-8.** - This equipment is the same as the Telegraph Carrier Terminal AN/FCC-7 minus the two electronic frequency converters.

4. REFERENCE DATA.

a. **NOMENCLATURE.** - Telegraph Carrier Terminal AN/FCC-3.

b. **CONTRACT.** - NObsr-52374, dated 5 April 1951.

c. **CONTRACTOR.** - Radio Frequency Laboratories, Inc., Boonton, New Jersey.

d. **COGNIZANT NAVAL INSPECTOR.** - Assistant Inspector of Naval Material, Passaic, New Jersey.

e. **PACKAGES PER COMPLETE SHIPMENT** - Three.

f. **CUBICAL CONTENTS.** - Two crates of 92 cubic feet each (crated); 31 cubic feet each (uncrated); box of equipment spares 3 cubic feet.

g. **TOTAL WEIGHTS.** - 2975 pounds crated; 1820 pounds uncrated; equipment spares, 135 pounds.

h. **FREQUENCY RANGE.** - 300 to 3400 cycles; twelve audio telegraph carrier channels.

i. **POWER OUTPUT.** - Transmitter group, 6 dbm maximum output into 600 ohms.

j. **SENSITIVITY.** - Receiver group, -40 dbm to +6 dbm on a single channel.

k. **POWER SUPPLY.** - The receiver group requires 115/230 volts; 50/60 cycles; 1645 watts. The transmitter group requires 115/230 volts; 50/60 cycles; 1125 watts.

TABLE 1-4. CARRIER SIGNAL FREQUENCIES

CHANNEL	MID-BAND CENTER	MARK	SPACE	MODULATED CHANNELS			
				MID-BAND CENTER	MARK	SPACE	
85 CYC F.S.	1	425	467.5	382.5	2975	2932.5	3017.5
	2	595	637.5	552.5	2805	2762.5	2847.5
	3	765	807.5	722.5	2635	2592.5	2677.5
	4	935	977.5	892.5	2465	2422.5	2507.5
	5	1105	1147.5	1062.5	2295	2252.5	2337.5
	6	1275	1317.5	1232.5	2125	2082.5	2167.5
	7	1445	1487.5	1402.5	1955	1912.5	1997.5
	8	1615	1657.5	1572.5	1785	1742.5	1827.5
170 CYC F.S.	9	1955	2040	1870			
	10	2380	2465	2295			
	11	2800	2890	2720			
	12	3230	3315	3145			

TABLE 1-5. TRANSMITTER AND TRANSMITTER FILTER DESIGNATIONS

MID-BAND CENTER FREQUENCY C.P.S.	FREQ. SHIFT C.P.S.	SYMBOL NUMBER SERIES	TRANSMITTER ARMY-NAVY DESIGNATION	AF TRANSFORMER		TRANSMITTER FILTER	
				SYM NO.	NAVY STANDARD STOCK NUMBER	SYM NO.	NAVY STANDARD STOCK NUMBER
425	±42.5	100	T-371/FCC-3	T101	N16ET-052374-0101	Z101	N16F-32037-8201
595	±42.5	200	T-372/FCC-3	T201	N16ET-052374-0201	Z201	N16EZ-052374-0201
765	±42.5	300	T-373/FCC-3	T301	N16ET-052374-0301	Z301	N16EZ-052374-0301
935	±42.5	400	T-374/FCC-3	T401	N16ET-052374-0401	Z401	N16EZ-052374-0401
1105	±42.5	500	T-375/FCC-3	T501	N16ET-052374-0501	Z501	N16EZ-052374-0501
1275	±42.5	600	T-376/FCC-3	T601	N16ET-052374-0601	Z601	N16EZ-052374-0601
1445	±42.5	700	T-377/FCC-3	T701	N16ET-052374-0701	Z701	N16EZ-052374-0701
1615	±42.5	800	T-378/FCC-3	T801	N16ET-052374-0801	Z801	N16EZ-052374-0801
1955	±85	900	T-379/FCC-3	T901	N16ET-052374-0901	Z901	N16EZ-052374-0901
2380	±85	1000	T-380/FCC-3	T1001	N16ET-052374-1001	Z1001	N16EZ-052374-1001
2805	±85	1100	T-381/FCC-3	T1101	N16ET-052374-1101	Z1101	N16EZ-052374-1101
3230	±85	1200	T-382/FCC-3	T1201	N16ET-052374-1201	Z1201	N16EZ-052374-1201

TABLE 1-6. RECEIVER AND RECEIVER FILTER DESIGNATIONS

MID-BAND CENTER FREQUENCY C.P.S.	FREQ. SHIFT C.P.S.	SYMBOL NUMBER SERIES	RECEIVER ARMY-NAVY DESIGNATION	RECEIVER FILTER		DISCRIMINATOR TRANSFORMER	
				SYM NO.	NAVY STANDARD STOCK NUMBER	SYM NO.	NAVY STANDARD STOCK NUMBER
425	±42.5	1300	R-525/FCC-3	Z1301	N16EZ-052374-1301	T1301	N17T-67101-1360
595	±42.5	1400	R-526/FCC-3	Z1401	N16EZ-052374-1401	T1401	N16ET-052374-1401
765	±42.5	1500	R-527/FCC-3	Z1501	N16EZ-052374-1501	T1501	N16ET-052374-1501
935	±42.5	1600	R-528/FCC-3	Z1601	N16EZ-052374-1601	T1601	N16ET-052374-1601
1105	±42.5	1700	R-529/FCC-3	Z1701	N16EZ-052374-1701	T1701	N17T-67101-2040
1275	±42.5	1800	R-530/FCC-3	Z1801	N16EZ-052374-1801	T1801	N16ET-052374-1801
1445	±42.5	1900	R-531/FCC-3	Z1901	N16EZ-052374-1901	T1901	N17T-67101-2475
1615	±42.5	2000	R-532/FCC-3	Z2001	N16EZ-052374-2001	T2001	N16ET-052374-2001
1955	±85	2100	R-533/FCC-3	Z2101	N16EZ-052374-2101	T2101	N16ET-052374-2101
2380	±85	2200	R-534/FCC-3	Z2201	N16EZ-052374-2201	T2201	N16ET-052374-2201
2805	±85	2300	R-535/FCC-3	Z2301	N16EZ-052374-2301	T2301	N16ET-052374-2301
3230	±85	2400	R-536/FCC-3	Z2401	N16EZ-052374-2401	T2401	N16ET-052374-2401

TABLE 1-7. TECHNICAL SUMMARY

UNIT	REMARKS
<p>Telegraph Carrier Terminal Cabinet CY-1195/FCC-3</p>	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 50 watts.</p> <p>Line Fuses: 30 amp at 250 volts.</p> <p>Outlet Fuses: 5 amp at 250 volts.</p> <p>Description: Includes ventilation fan, line switch, and 13 power outlets, Wiring Harness CX-2448/FCC-3 or CX-2449/FCC-3.</p>
<p>Telegraph Carrier Transmitter</p>	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 73 watts.</p> <p>Fuses: 3 amp at 250 volts.</p> <p>Description: Single channel operation. Converts DC telegraph pulses to frequency shift audio signals in 300 to 3400 cycle band. Mid-band center frequencies are determined by plug-in filters listed in table 1-5.</p> <p>Input: 20 or 60 ma neutral telegraph loop with battery supplied by the loop. 30 ma polar telegraph loop with battery supplied from the loop. 20 or 60 ma neutral telegraph loop with battery supplied from the transmitter.</p> <p>Output: 600 ohm line. Audio output level continuously variable over range of -24 dbm to +6 dbm. Operates in parallel with one or more transmitters.</p> <p>Keying Rate: With narrow-band filters, the maximum keying rate is 40 dot cycles per second. With wide-band filters, the maximum keying rate is 100 dot cycles per second.</p> <p>Frequency: MARK and SPACE signals with ± 3 cycles of normal values.</p>
<p>Telegraph Carrier Receiver</p>	<p>Power Supply: 115/230 volts, 50/60 cycles, single phase.</p> <p>Power Consumption: 110 watts.</p> <p>Fuses: 3 amp at 250 volts.</p> <p>Description: Mid-band frequencies are determined by plug-in filters listed in table 1-6. Single channel operation. Converts frequency shift audio telegraph signals 300 to 3400 cycles into DC telegraph pulses. On the wide-band 425 cycle channels C1309 is reduced to 0.006 mf.</p> <p>Input: 600 ohm line. Steady or slow varying audio signal between -40 dbm and +10 dbm at frequency of the receiver filter set used. Operates in parallel with one or more receivers. See Section 3 for diversity operation.</p> <p>Output: DC pulses of 20 or 60 ma neutral telegraph loop with battery supplied from either the loop or receiver. 30 ma polar telegraph loop with battery supplied from the receiver.</p>

TABLE 1-7, CONT'D

UNIT	REMARKS
<p>Electronic Frequency Converter CV-243/FCC-3</p>	<p>Keying Rate: With narrow-band filters, the maximum keying rate is 40 dot cycles per second. With wide-band filters the maximum keying rate is 100 dot cycles per second.</p> <p>Frequency: MARK and SPACE frequencies as given in table 1-3.</p> <p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 50 watts.</p> <p>Fuses: 3 amp at 250 volts.</p> <p>Description: Converts audio signals in frequency range of 382.5 cycles to 1675.5 cycles to the frequency range of 1742.5 cycles to 3017.5 cycles by mixing with a 3400 cycle voltage from a local oscillator. Will also accept additional signals in the range of 382.5 cycles to 3315 cycles for direct or normal transmission. Both normal and converted signals have one common output circuit.</p> <p>Input: Two 600 ohm inputs; one for signal to be frequency converted, the other for signal to be combined with the frequency converted signal. Normal input level for eight channels into each input is -0.5 dbm. Maximum combined peak signal is 4.3 volts at each input. For eight channels into the converted input alone maximum peak signal input is 5.9 volts. For twelve channels with normal input alone maximum peak signal is 7.3 volts.</p> <p>Output: 600 ohm line, ungrounded. Equipment gain of one converted and normal input circuits to output. Line <u>ATTENUATOR</u> provides from 0 to 40 db attenuation in 2 db steps.</p> <p>Test Signal: 85 cycle $\pm 0.01\%$ test signal available.</p>
<p>Electronic Frequency Converter CV-244/FCC-3</p>	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 50 watts.</p> <p>Fuses: 3 amp at 250 volts.</p> <p>Description: Accepts signals in the frequency range of 382.5 cycles to 3315 cycles. Selects those signals in the range of 1742.5 cycles to 3017.5 cycles and translates them to their original spectrum of 382.5 cycles to 1675.5 cycles. All signals at the input also appear at a separate output circuit unconverted.</p> <p>Input: 600 ohm line, ungrounded; includes line transformer and <u>ATTENUATOR</u> 0 to -40 db in 2 db steps. Normal input level is 0.5 dbm. Maximum combined input peak signal is 8.6 volts.</p> <p>Output: Two 600 ohm outputs. Equipment gain of one for signals from input to converted output circuit. Equipment gain of one for signals from input to normal output.</p>

SECTION 2 THEORY OF OPERATION

1. GENERAL DESCRIPTION OF UNITS.

The equipment includes both sending and receiving telegraph terminal circuits. The transmitter group circuits are assembled into thirteen chassis which are mounted in a relay rack as shown in figure 1-1. The receiver group circuits are assembled into thirteen chassis which also are mounted in a relay rack.

The transmitter group and receiver group are connected to one telegraph line or radio circuit. Twelve carrier telegraph channels are provided in one equipment. This includes eight narrow band channels (85 cycle frequency shift) and four wide-band channels (170 cycle frequency shift). With two equipments and using the electronic frequency converters, sixteen narrow-band channels are available over one communication link. The block diagram of figure 2-1 shows the general arrangement of circuits of a single equipment and the mid-band center frequencies of the twelve channels.

The channels at 1955, 2380, 2805, and 3230 cycles mid-band center frequency are the wide-band channels. The block diagram of figure 2-2 shows the arrangement of circuits of two equipments and the mid-band center frequencies of the sixteen channels. Only the narrow-band channels are used in this connection. Each transmitter, receiver, and frequency converter is completely self-contained and includes its own individual power supply. In the installation of a single equipment, as shown in figure 2-1, it is possible to connect an external line transformer and eliminate both the transmitter group and receiver group frequency converters as only the line amplifier, attenuators, and line isolation transformers are used in this connection.

The frequency conversion (modulation) of signals is normally not used in the installation of a single equipment. Panel jacks are provided on each transmitter for patching any incoming signal from a sending telegraph printer into the input of any other transmitter.

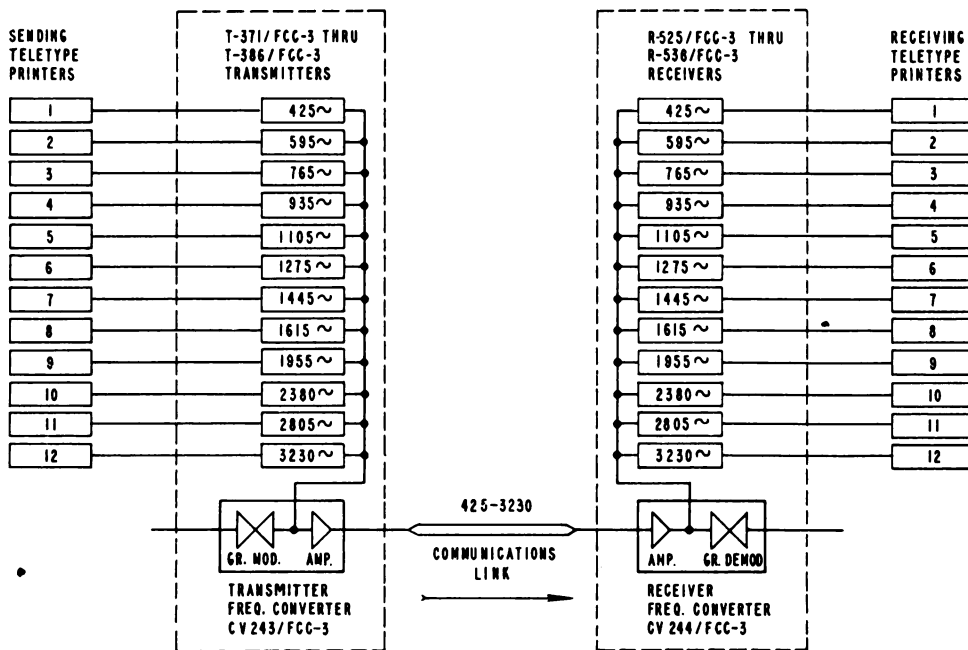


Figure 2-1. Telegraph Carrier Terminal AN/FCC-3, Block Diagram of Single Equipment Connected to Line

The original transmitter is then inactive and the POWER switch of it should be turned off. Patching and testing jacks are also incorporated into the circuits of the receiver. All the frequency determining components of the transmitter and receiver circuits are of the plug-in type. This allows a versatility of installation of the equipment or parts thereof and provides for the possibility of future alteration of channel frequencies.

2. BASIC CIRCUITS OF THE TELEGRAPH CARRIER TRANSMITTER T-371/FCC-3 THROUGH T-382/FCC-3.

a. GENERAL. - Figure 2-3 shows a block diagram of the principal circuits of the telegraph carrier transmitter. The telegraph loop circuit, which is brought into the transmitter through the TELEGRAPH LOOP LINE and TELEGRAPH LOOP EQUIP jacks J101 and J102, has the polarity markings TTY(+) and TTY(-) on terminals D and C, respectively, when the loop is in the BATTERY FROM EQUIP condition. Either an internal loop supply of 120 volts at 0.060 amp or an external

loop supply can be chosen by means of the BATTERY FROM LOOP EQUIP switch, S102. Special circuits are used in the loop to keep it ungrounded for DC potentials; but grounded by means of an RF filter to eliminate conducted (150 kc to 20 mc) and radiated (14 kc to 400 mc) RF interference from telegraph loop lines or cables. This RF filter prevents the harmonics of the 15 kc loop oscillator from being conducted out on the loop circuit. The direction of current flow through resistors R125 and R126 for twenty to forty ma or R126 for fifty to seventy ma operation when LOOP CUR OPERATE switch S107 is in 50-70 ma position is controlled by the NORMAL-REVERSE switch S101, so that a positive potential can be placed on the plates of the 12AU7 type tube V101, even if the loop lines are reversed. Under MARK condition, current flows in the loop circuit in a manner so as to make the plates of tube V101 positive in respect to the cathodes and, therefore, enables the circuit to oscillate at 15 kc. This 15 kc voltage is inductively coupled to a half-wave rectifier V102A and its associated resistor load and filtering capacitor C101. This type of coupling eliminates any metallic

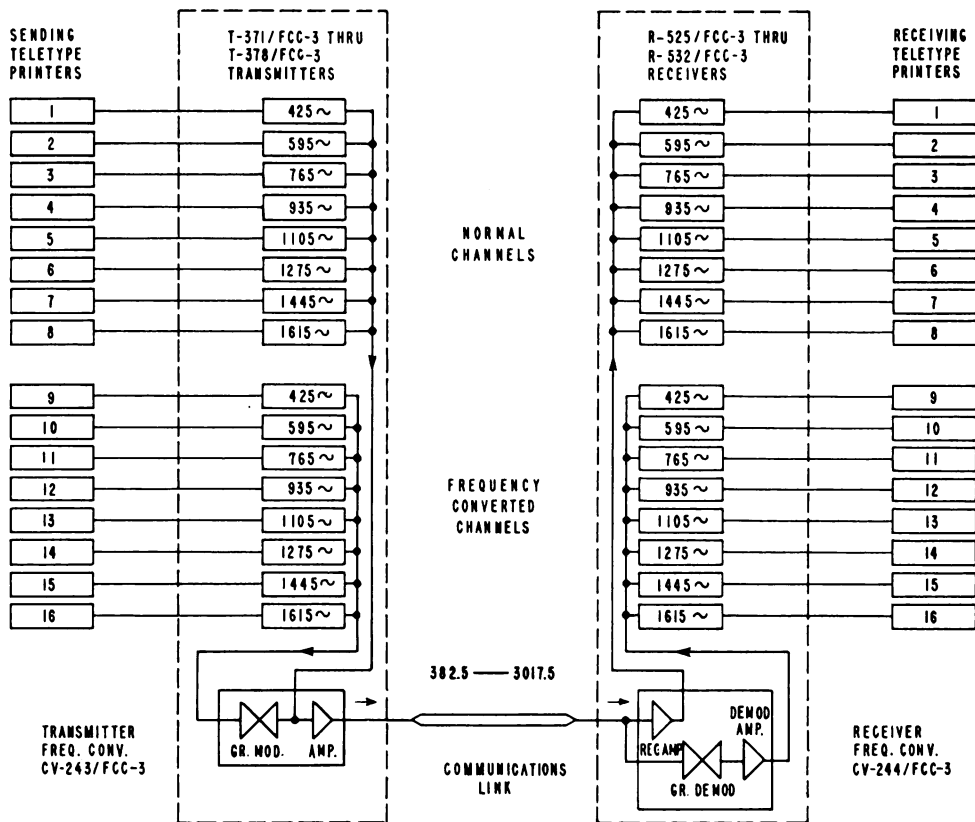


Figure 2-2. Telegraph Carrier Terminal AN/FCC-3, Block Diagram of Two Equipments Connected to Line

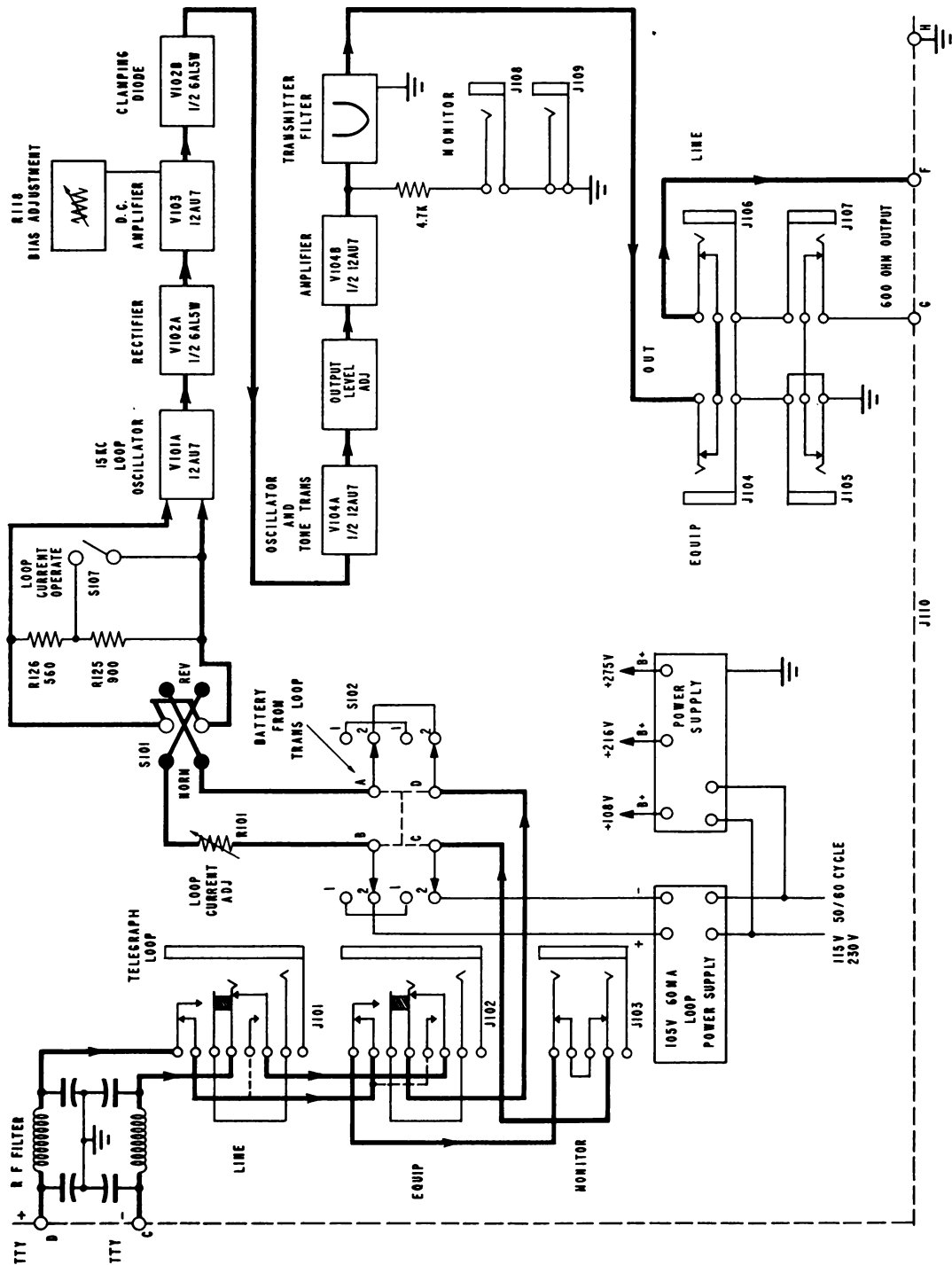


Figure 2-3. Block Diagram of Telegraph Carrier Transmitters T-371/FCC-3 through T-382/FCC-3

connection between the loop circuit and any circuits contained in the chassis. The 15 kc oscillator pulses are rectified producing DC pulses in accordance with the loop circuit MARK pulses. The 15 kc oscillator does not oscillate during SPACE conditions in the loop circuit. The purpose of the loop oscillator is to isolate the loop circuits from the chassis ground, this being necessary for effective signal patching. These DC pulses are amplified and applied to a clamping diode which adds capacity to the tuned LC circuit of the carrier oscillator under SPACE conditions and removes the capacity under MARK conditions. In this manner the frequency shift is obtained between MARK and SPACE frequencies. The output of the carrier oscillator is then amplified and filtered to prevent harmonics of the oscillator and amplifier from being transmitted on the line. Each filter is designed so that it may be operated in parallel with up to eleven other filters of different frequencies without disturbing the 600 ohm impedance of the line.

b. 15 KC LOOP OSCILLATOR CIRCUIT. - As shown in figure 2-4, the 15 kc loop oscillator consists of a push-pull tuned plate oscillator. The plate voltage for the 15 kc oscillator is obtained by utilizing the voltage drop produced across resistors R125 and R126 during marking pulses in the loop circuit. Resistors R125 and R126 are in series connection on twenty to forty ma loop current and R125 is shorted out by LOOP CURRENT OPERATE switch S107 on fifty to seventy ma loop current operation. The 15 kc voltage output from the oscillator is obtained by transformer action from the tuned coil. All the components and circuitry of this stage are hermetically sealed in a metal case to prevent radio frequency radiation.

c. DC AMPLIFIER. - In order to create a DC MARK pulse, the 15 kc voltage output of the loop oscillator is rectified by the 6AL5W type tube V102A and is filtered by a 0.006 mf capacitor C101 as shown in figure 2-5. The negative pulse so obtained is inserted into the grid of the 12AU7 type tube V103A. Under SPACE conditions in the loop circuit no voltage drop will be produced across resistors R125 and R126 therefore the 15 kc oscillator does not oscillate. No negative potential is applied to the grid of V103A by the rectifier tube V102A. This leaves a positive potential applied to the grid of tube V103A which comes from the arm of the potentiometer R104 through R102 and R106. Therefore, during keying of MARK and SPACE pulses the grid of tube V103A will go negative and positive, respectively, with respect to ground. The wave-form of the resulting DC pulses is shaped by 100,000 ohm resistors R102 and R106, and the capacity connected to the grid of tube V103A. Facilities are available to strap in various values of capacity into points marked 1, 2, and 3 on figure 2-5. During manufacture of the equipment this strapping is properly done to adjust close to zero the bias for the MARK and SPACE frequencies produced by the equipment. If a chassis is changed to any other channel frequency it may be necessary to strap other values of capacity at points 1, 2, and 3. The effect of adding capacity to point 1 is to increase the relative length of a MARK signal. Adding capacity to point 2 increases the length of a SPACE pulse, although to a lesser extent. Adding capacity to point 3 filters the sharp wave front of the transition and increases the length of a MARK signal again, but to a lesser extent. Minimum values of capacity are used to maintain a high keying speed. The arm of control R104 is set at the factory at 10 volts positive with respect to ground. This adjustment should

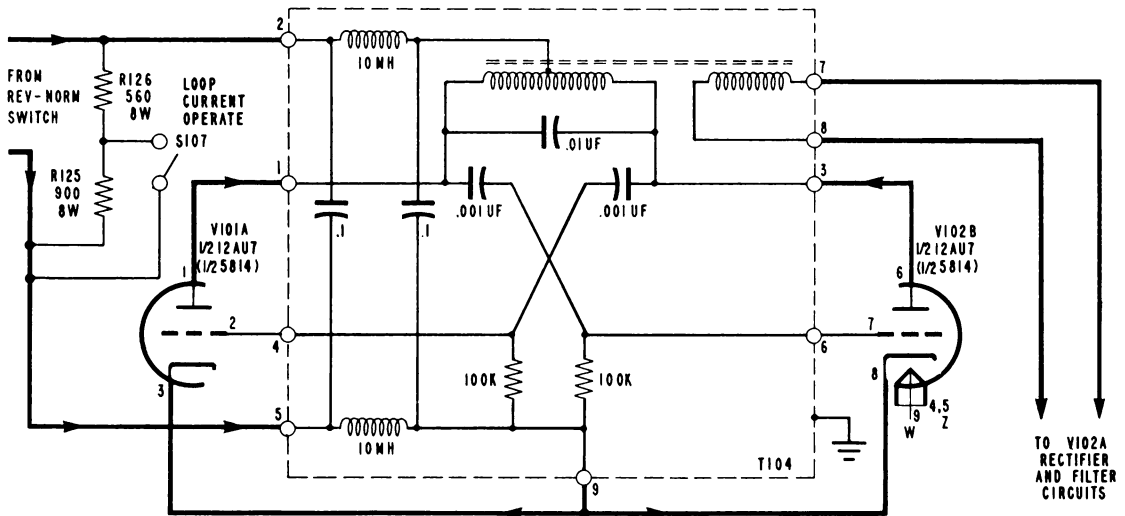


Figure 2-4. Schematic Diagram of 15 kc Loop Oscillator Keying Circuit

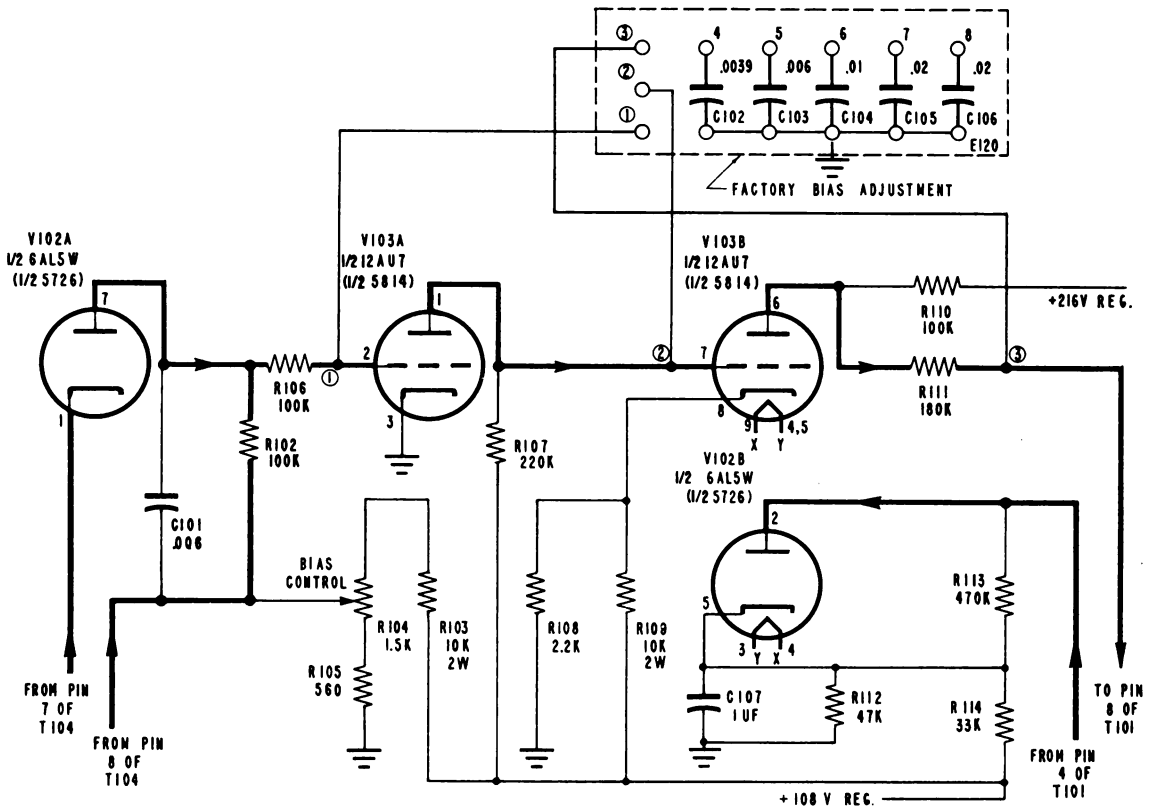


Figure 2-5. Schematic Diagram of DC Amplifier Circuit

not be disturbed unless absolutely necessary and then never less than 8 volts or greater than 12 volts. Too much change in this control will effect the bias and is very apt to stop the transmitter from keying the frequency shift oscillator. The adjustment of this control R104 is factory set to produce a voltage on the grid of tube V103A that will allow negative pulses from the rectified 15 kc oscillator output to lower the plate current of tube V103A and increase the current during SPACE conditions. The range is quite limited for successful operation. When the control R104 is correctly set DC pulses will be produced in the plate circuit of tube V103A across the 220,000 ohm plate resistor R107 supplied from a regulated plate supply of +108 volts. Under proper operation this plate voltage varies between +5 volts for a SPACE to +20 volts for a MARK signal; the 20 volts being limited by the grid current of V103B. These DC pulses are again shaped by R107 and the capacity connected to the grid of V103B. The cathode of V103B is connected to a potential of +20 volts through the voltage divider formed by R108 and R109. After further amplification the voltages on the plate of V103B vary between +30 volts for a MARK signal and +160 volts for a SPACE signal. After a rounding off by a 180,000 ohm filter resistor R111 and the capacity connected to point 3 of figure 2-5, the pulses are applied to a 6AL5 clamping diode V102B. With the cathode of V102B con-

nected to +80 volts through the voltage divider formed by R114 and R112, and the cathode also grounded to AC by means of the one mf capacitor C107, the plate of the diode has a low AC resistance to ground under SPACE conditions (when the diode is conducting) and a high resistance (slightly less than the 470,000 ohm resistor R113) under MARK conditions.

d. CARRIER OSCILLATOR AND OUTPUT CIRCUIT.

- Figure 2-6 shows a schematic diagram of the carrier oscillator and output circuit. The MARK and SPACE pulses on the clamping diode V102B control the frequency of the oscillator by disconnecting and adding a capacitor C_s to the tuned LC of the oscillator. Under a MARK signal the SPACE capacitor C_s of the audio-frequency transformer T101 is electrically disconnected from the tuned oscillator circuit by the high impedance of the diode. Under SPACE signal the capacitor C_s is grounded through the diode and appears across a portion of the coll. With a MARK signal applied to the loop the value of the MARK tuning capacitor C_m is trimmed with fine and coarse MARK FREQ ADJ controls (C117 and S106 with C113, C114, C115, and C116) for oscillation at the MARK frequency. With a SPACE signal applied to the loop the SPACE capacitor C_s is trimmed with fine and coarse SPACE FREQ ADJ controls (C112 and S105 with C108, C109, C110, and C111)

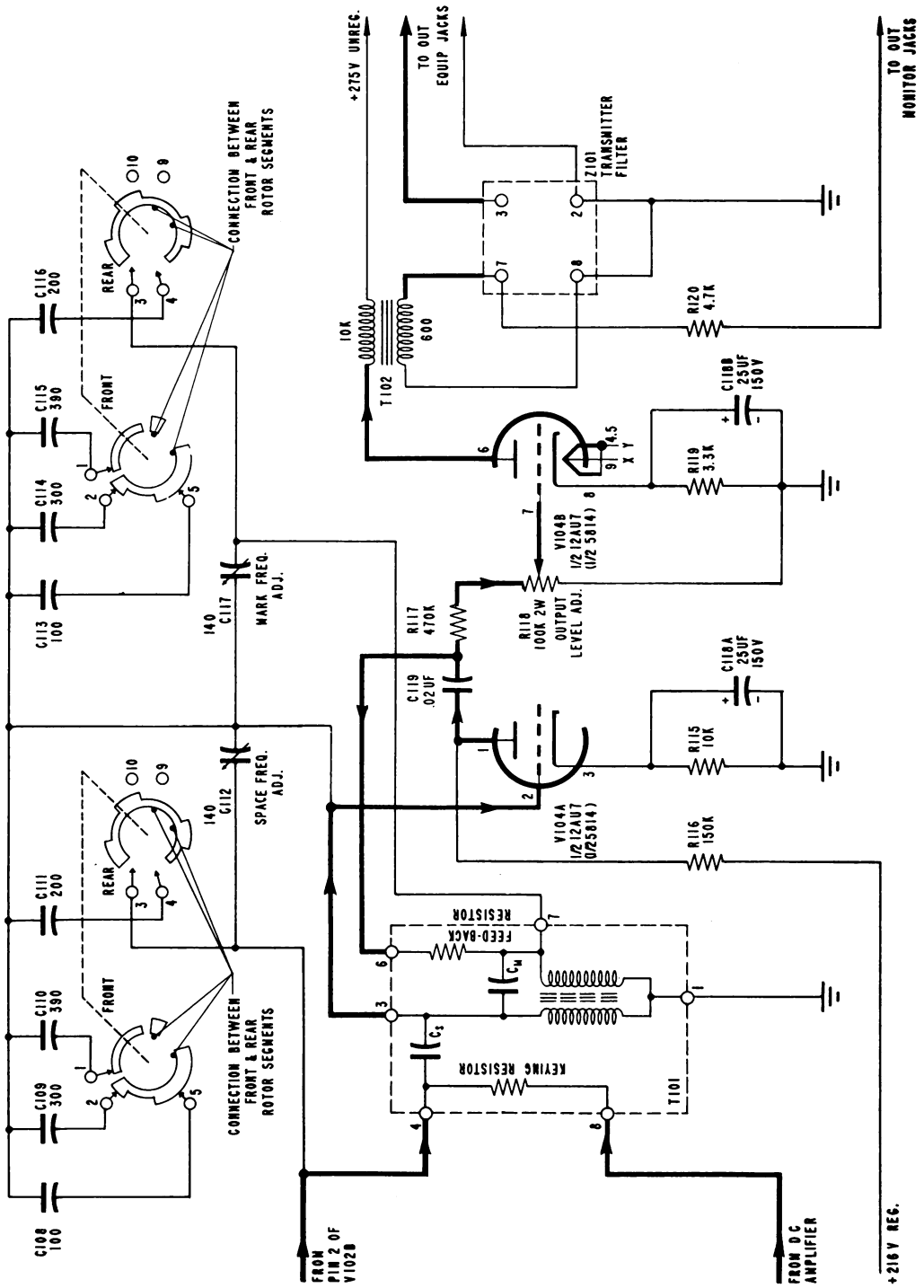


Figure 2-6. Schematic Diagram of Carrier Oscillator and Output Circuits

for oscillation at the SPACE frequency. At all times the MARK frequency must be set correctly before adjusting the SPACE frequency. A Hartley oscillator is used and consists of one-half of a 12AU7 type tube V104A with self-bias by means of R115 and C118A. Through the 0.02 mf capacitor C119 the signal is coupled to the voltage dividing network R117 and R118 (OUTPUT LEVEL ADJ potentiometer) and to the audio amplifier V104B. R119 and C118 provide self-bias for V104B, and the signal from the plate is transformer coupled by the matching transformer T102 to the 600 ohm input of transmitter band-pass filter Z101, the curves of which are shown in figure 2-24.

e. POWER SUPPLY CIRCUIT. - Figure 2-7 is a schematic diagram of the power supply that provides the necessary filament and B+ voltages for the circuits of the telegraph carrier transmitter and the telegraph loop circuits. Primary power is supplied through the ON-OFF switch S103 and the 3 amp fuses F101 and F102, each of which has a neon type BLOWN FUSE INDICATOR E101 and E102. The 115 to 230 volt switch S104, connects the two primary windings of the power transformer T103 in series for 230 volt operation and in parallel for 115 volt operation. A 120 volt source consisting of the 350 volt center-tapped winding of T103, a full-wave 5Y3GT type rectifier V105, a

swinging choke L102, a 50 mf filter capacitor C121, and a 5000 ohm bleeder resistor, R122, supplies 20 to 60 ma for the telegraph loop. Another voltage source is available from the 700 volt center-tapped winding, the 5Y3GT tube V106, the 10 henry choke L101, and the 25 mf filter capacitor C122 which supplies the B+ potentials for circuit operation. From this source is obtained a +275 volt unregulated supply, a +216 volt supply regulated by a 3100 ohm dropping resistor R124 and two 0B2 regulator tubes V108 and V109, and a +108 volt supply regulated by a 4500 ohm dropping resistor R123 and one 0B2 regulator tube V107. The filament supply of the loop oscillator tube V101 is obtained from a separate winding to minimize the danger of a filament to cathode short, since the elements of V101 are completely isolated from ground.

3. BASIC CIRCUITS OF THE TELEGRAPH CARRIER RECEIVER R-525/FCC-3 THROUGH R-536/FCC-3.

a. GENERAL. - The principal circuits of the telegraph carrier receivers are shown on the block diagram of figure 2-8. The carrier signal enters the equipment through the IN LINE and IN EQUIP jacks both of which have the left-hand jack grounded. This corresponds to the side of the input line which is grounded to the

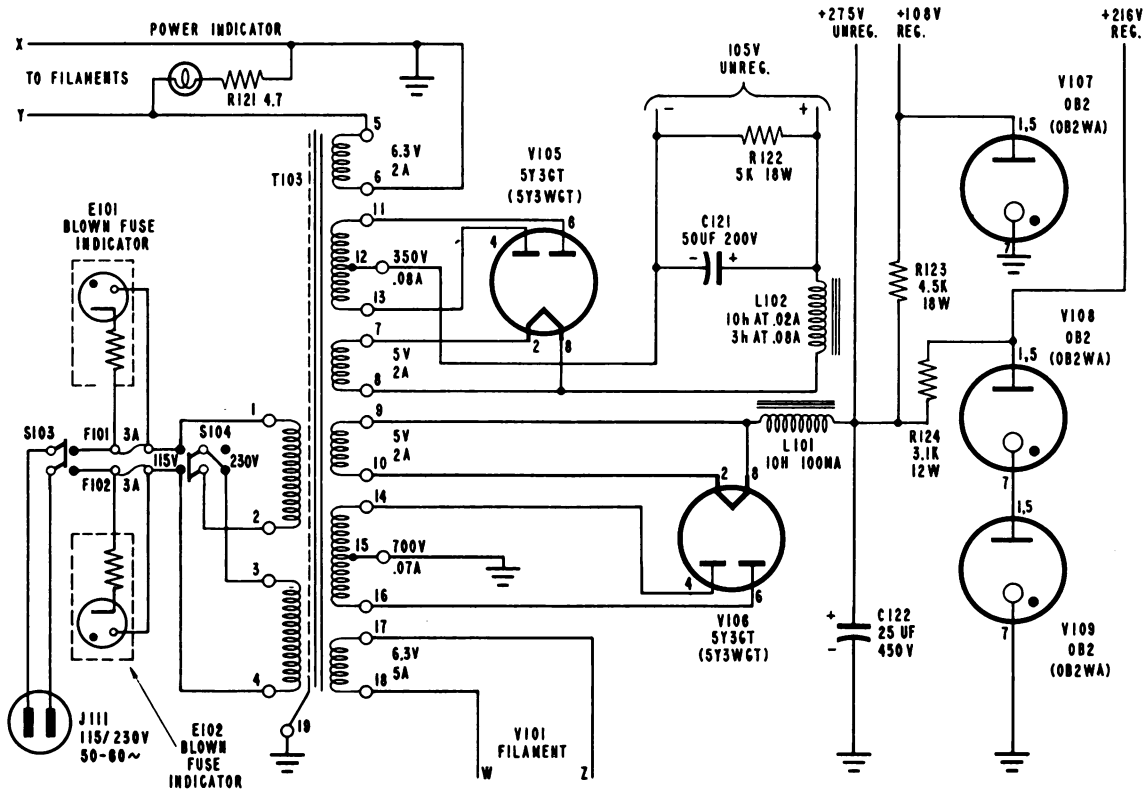


Figure 2-7. Schematic Diagram of Telegraph Carrier Transmitter Power Supply

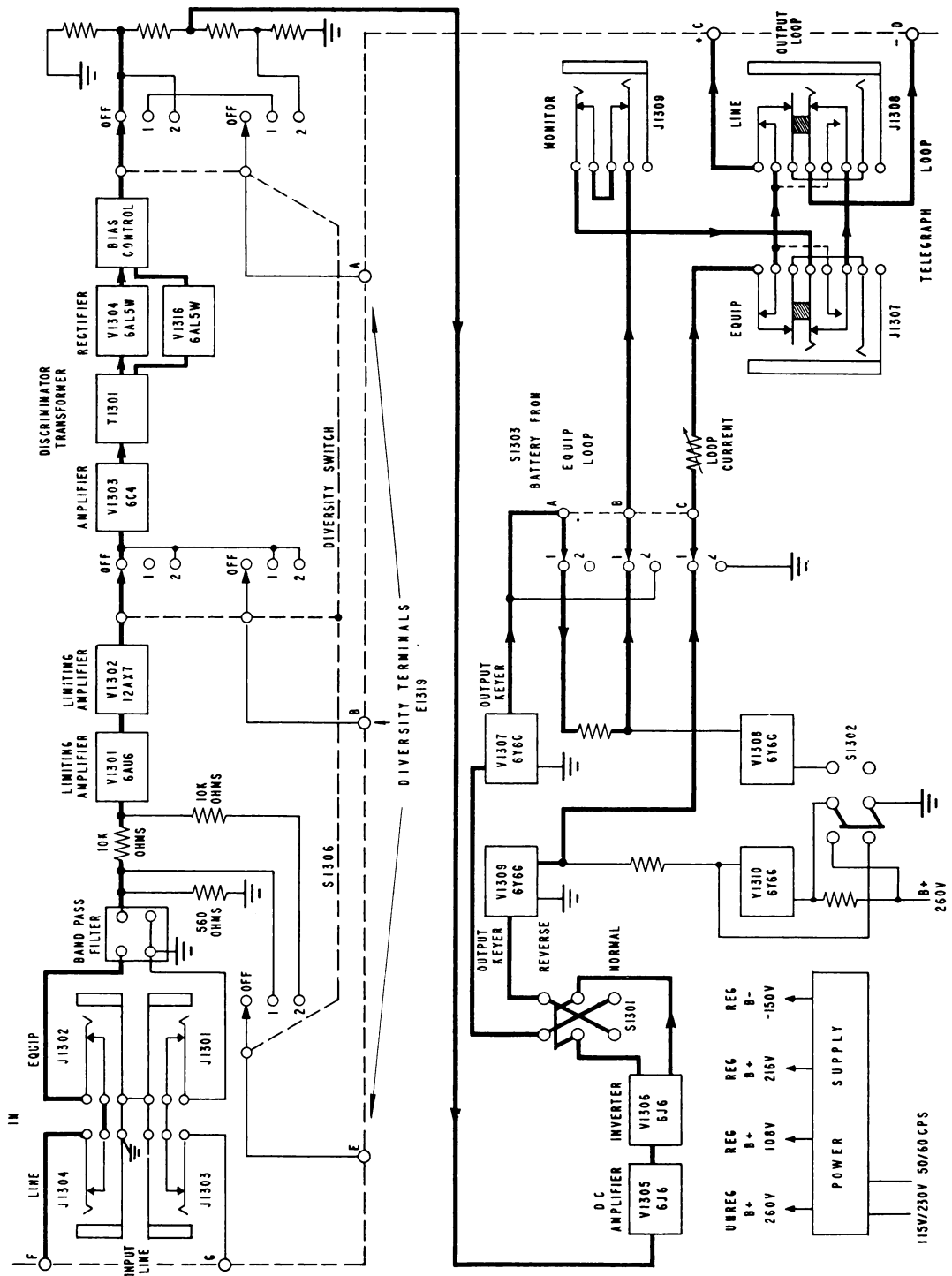


Figure 2-8. Block Diagram of Telegraph Carrier Receivers R-525/FCC-3 through R-536/FCC-3

chassis, and care must be exercised to observe this polarity when patching signals. The input band-pass filter is designed to accept and pass one carrier frequency with its corresponding MARK and SPACE frequencies and attenuate the carrier frequencies of adjacent channels by more than 40 db. From the filter the signal passes through the limiting amplifiers V1301 and V1302 and appears as a square wave output of essentially constant amplitude for any input signal between -40 to +6 dbm. This square wave output is then amplified by V1303 and applied to the discriminator transformer T1301. The output from the two tuned secondaries of T1301 are rectified by the diodes V1304 and V1316 and so combined that the DC output is positive for a SPACE signal and negative for a MARK signal. The telegraph bias of the signal is adjusted by setting the operating point on the grid of the DC amplifier V1305. Diversity connections are provided at the input and output of the limiting amplifier and at the input of the DC amplifier. The signal output of tube V1305 is amplified and inverted with tube V1306 and applied to the grids of output keying tubes V1307 and V1309. For polar telegraph out signals, the four tubes V1307, V1308, V1309, and V1310 are used in a push-pull circuit to energize the telegraph loop with both positive and negative current flow. For neutral telegraph output, tube V1308 is disconnected and tubes V1309 and V1310 are used as a voltage divider for the plate of the operating tube V1307. The magnitude of the loop current is controlled with the LOOP CURRENT control. Jacks are provided in the output loop circuit to monitor the loop signal and to allow patching of either the equipment or line.

b. DIVERSITY. - The telegraph carrier receivers are designed to be used in frequency diversity on either line or radio transmission systems. The block diagrams of figure 2-9 show the arrangement of components when two receivers are placed in diversity. As shown by the diagram the two carrier signals, which are spaced apart in frequency but keyed with the same intelligence, are applied to the grid of a common limiting amplifier and the output of this amplifier is applied to the discriminator circuits of both channels. The DC output of the discriminator circuits are combined to control the common keying and loop circuit. During a fade of radio signal the stronger carrier signal captures the limiting amplifier and controls the keying of the output loop circuit. When the input carrier signals are equal the limiting amplifier output contains both carrier signals which are rectified and combined at the input to the keying circuit. To obtain balanced operation between channel, the signal level of each channel without signal in the other channel must be the same at the input grid of the keying circuit. This is accomplished by adjusting the DISCRIMINATOR LEVEL CONTROL and measuring the input at the grid of the keying circuit. The Wiring Harness CX-2449/FCC-3 provides the electrical connections between chassis for diversity operation. As shown in figure 2-9, when the DIVERSITY switch S1306 is in the OFF position, the receiver is connected for single channel operation. For diversity operation the switch of one channel is placed in position 1 and the switch of the other is placed in position 2. Under these switching conditions the output to control the loop circuit is taken from the channel with the DIVERSITY switch in position 2.

During diversity operation the output of the limiting amplifier contains the sum and difference frequencies between the two carriers and harmonics of the two carrier signals being combined. Some of these extraneous frequencies fall in the pass-bands of the discriminator circuits but do not cause interference. The Wiring Harness CX-2449/FCC-3 places the channels listed in table 2-1 in diversity.

c. LIMITING AMPLIFIER. - The limiting amplifier is composed of three resistance-capacitance coupled stages utilizing both grid and plate limiting action. In the operating frequency range between 350 and 3500 cps, the RMS voltage of this amplifier varies about 10% for a change of input signal voltage from -40 dbm to +6 dbm. To permit the amplifier to operate at the greatest possible speed and correct for differences between MARK and SPACE signal levels, the time constants of the RC coupling networks are of the same order of magnitude as the period of the carrier signal in the lowest frequency channel. Figure 2-10 is a schematic diagram of the limiting amplifier with the DIVERSITY switch S1306 in the OFF position, thereby permitting single channel operation. The input signal carrier frequency is filtered from the line by filter Z1301 and applied to the grid of the 6AU6 type tube V1301 through the 10,000 ohm resistor R1303. The 10,000 ohm resistor R1354 is used to add the carrier signals at the grid of V1301 when two receivers are connected in diversity. Self-bias for tube V1301 is provided by the 3300 ohm resistor R1304 and the 20 mf capacitor C1301. A 470,000 ohm screen voltage dropping resistor R1305, a 0.01 mf screen by-pass capacitor C1302, and a 180,000 ohm plate load resistor R1306 complete the first stage and permit it to operate as a linear amplifier over the input signal range of -40 dbm to +6 dbm. A 1 ohm resistor R1349 lowers the filament voltages on tubes V1301 and V1302 to 5.5 volts and thereby allows the use of tubes with relatively large heater cathode leakage.

The signals from the plate of V1301 are coupled to the grid of V1302A, a 12AX7 type tube, by means of the 0.01 mf capacitor C1303 and the 100,000 ohm grid limiting resistor R1308. A 470,000 ohm grid leak resistor R1307, a 3300 ohm cathode bias resistor R1355, and a 220,000 ohm plate load resistor R1311 comprise the remaining components of the second stage. The signals from the plate of V1302A are coupled to the grid of V1302B by the 0.01 mf capacitor C1304 and the 100,000 ohm resistor R1309. Self-bias is provided by the 3300 ohm resistor R1313. The remaining components are a 220,000 ohm plate load resistor R1314 and a 180,000 ohm grid leak resistor R1310. To obtain effective grid and plate limiting the three stages are operated from a +90 volt regulated supply. Power supply decoupling is provided by the 10,000 ohm resistor R1312 and the 10 mf capacitor C1306A.

d. DISCRIMINATOR AND DIVERSITY COMBINING CIRCUITS. - (See figure 2-11.) With the DIVERSITY switch S1306 in the OFF position the output of the limiting amplifier is connected through S1306 to the 0.01 mf coupling capacitor C1305 and the 500,000 ohm potentiometer R1315 (DISCRIMINATOR LEVEL CONTROL). The potentiometer R1315 controls the magnitude of the signal applied to the grid of the 6C4 type tube V1303, and the 1000 ohm resistor R1316 provides self-bias. The discriminator transformer T1301 has one primary

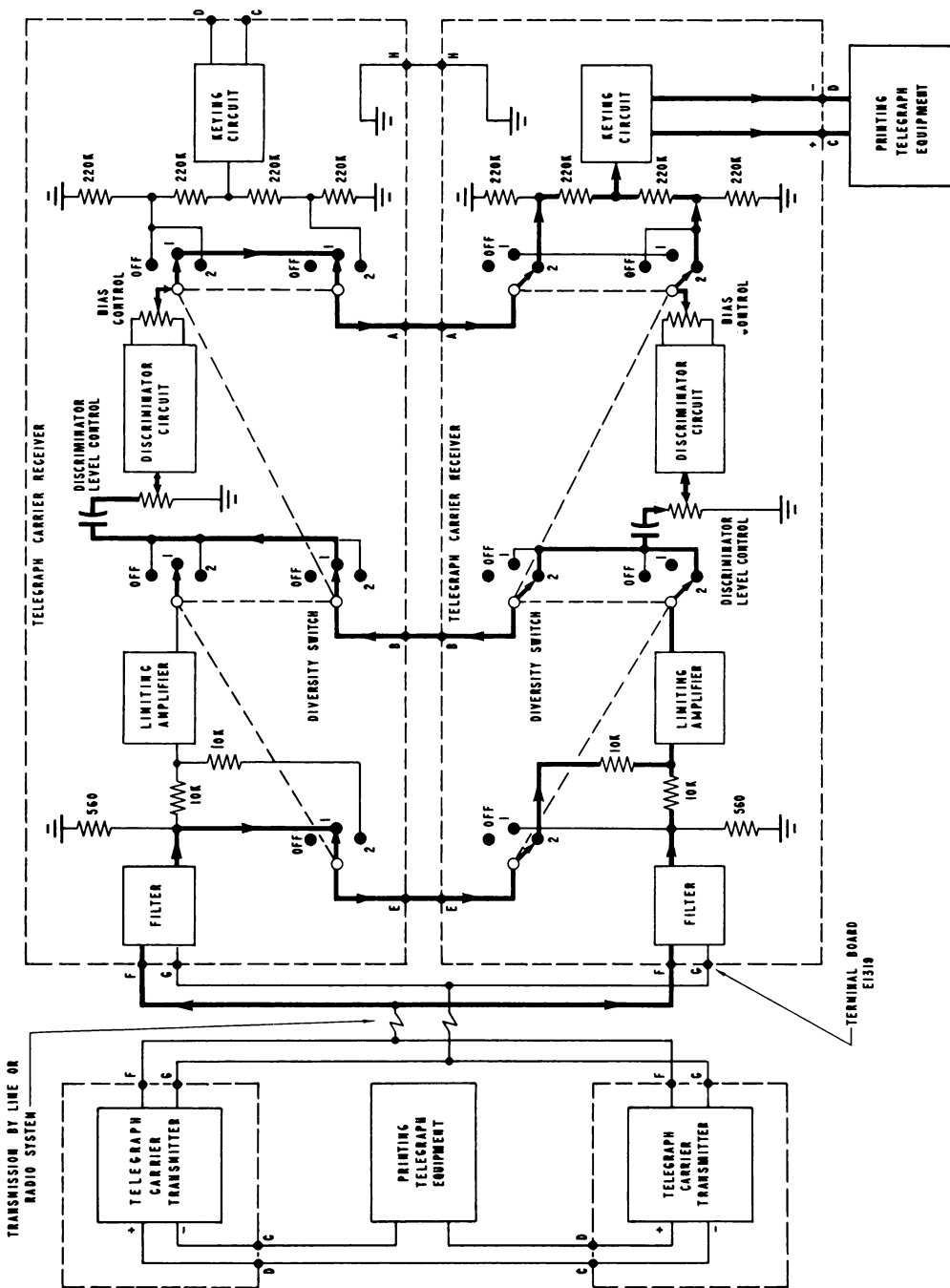


Figure 2-9. Block Diagram of Telegraph Carrier Receivers in Frequency Diversity

TABLE 2-1. CHANNELS OPERATED IN DIVERSITY

CHANNEL	CENTER-BAND FREQUENCY
Channel 1	425 cps
Channel 5	1105 cps
Channel 2	595 cps
Channel 7	1445 cps
Channel 3	765 cps
Channel 6	1275 cps
Channel 4	935 cps
Channel 8	1615 cps
Channel 9	1955 cps
Channel 11	2805 cps
Channel 10	2380 cps
Channel 12	3230 cps

which serves as a plate load for V1303 and two secondaries, one tuned for the MARK carrier frequency and one tuned for the SPACE carrier frequency. Voltage from the MARK tuned winding is applied to the cathode of the 6AL5 type tube V1304, and the rectified negative output is filtered by the 0.01 capacitor C1307. Voltage from the SPACE tuned winding of T1301 is rectified and filtered by V1316 and C1308 respectively, the resultant DC output being positive. The output of V1304 and V1316

are combined by means of the 100,000 ohm resistors R1317 and R1319 and the 100,000 ohm BIAS CONTROL potentiometer which permits the telegraph bias to be set by varying the operating point. Additional filtering is provided by the 0.02 mf capacitor C1309. With the DIVERSITY switch S1306 in the OFF position, the telegraph signal is applied to the combining network consisting of the 220,000 ohm resistors R1320, R1321, R1323, and R1324. This network is inactive except when two receivers are connected in diversity, in which case the telegraph signal from the second channel is applied to the junction of R1323 and R1324 and the combined output occurs across the 0.006 mf filter capacitor C1310. As shown in figure 2-9, the two channels in diversity have a common point at the input to the limiting amplifier, at the input to the discriminator circuits, and at the input to the DC amplifier and inverter circuits.

e. DC AMPLIFIER AND INVERTER CIRCUITS. - (See figure 2-12.) The DC amplifier and inverter circuit amplifies the output of the discriminator and squares the wave shape to push-pull form. This square wave output is used to drive the keying tubes. As shown by figure 2-12 the output of the discriminator circuit is applied to the grid of the 6J6 type tube V1305. This stage has a 100 ohm resistor R1322 in the grid circuit to suppress radio frequency oscillation and a 33,000 ohm resistor R1326 for the plate load. The 2500 ohm potentiometer R1325 provides self-bias for V1305 and is adjusted for average loop current with the grid of V1305 disconnected from the discriminator circuit. The grid is disconnected from the discriminator circuit by placing the DIVERSITY switch in position 1. The 0.05 mf capacitor C1311, is used to filter carrier signal ripple present

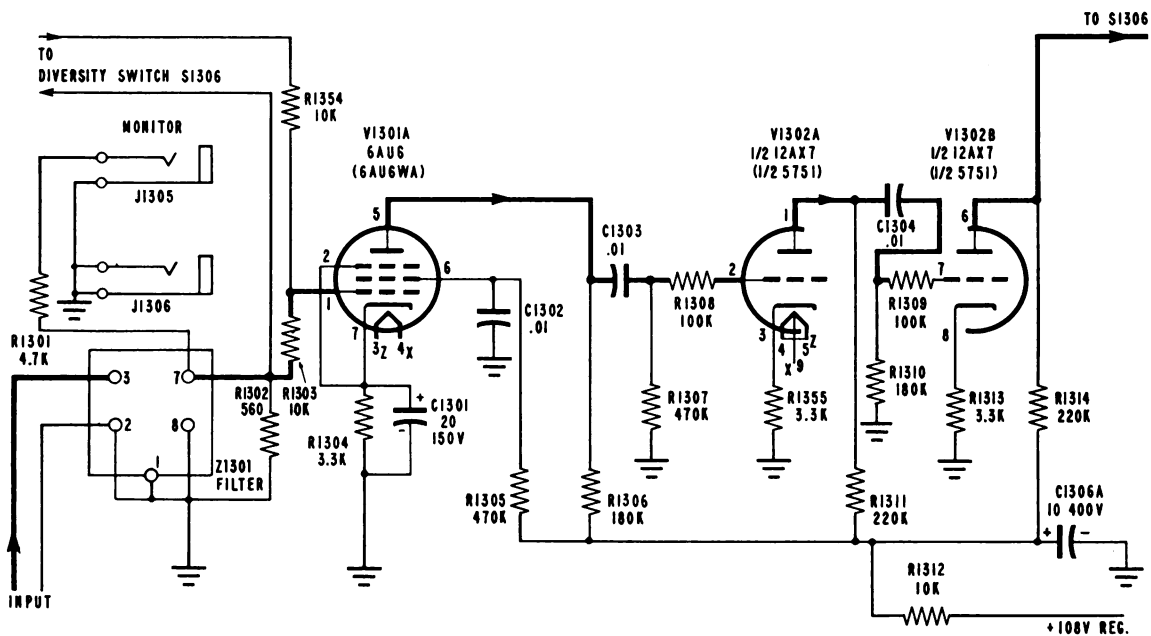


Figure 2-10. Schematic Diagram of Limiting Amplifier

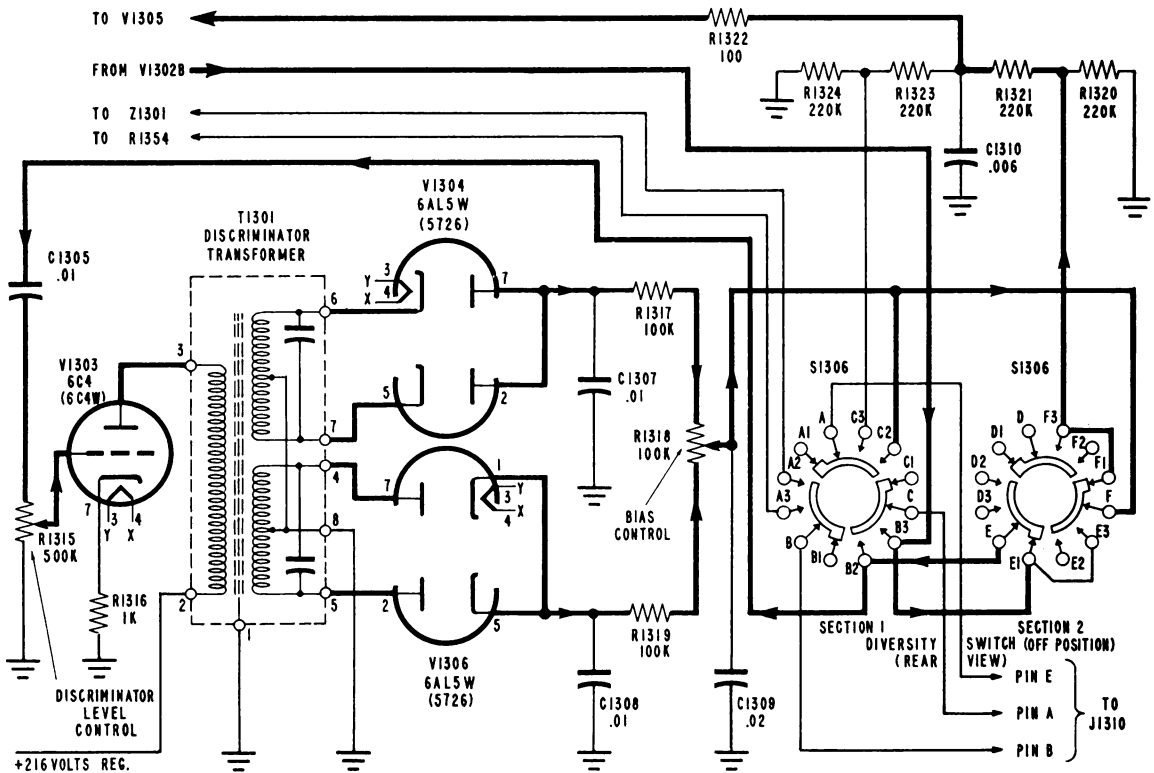


Figure 2-11. Schematic Diagram of Discriminator and Diversity Combining Circuits

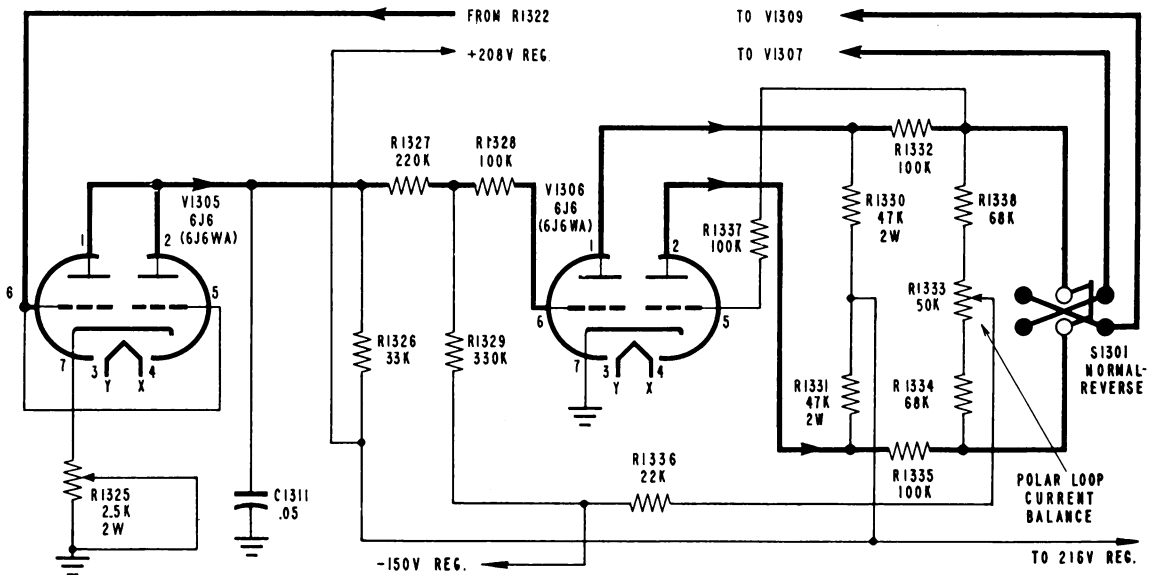


Figure 2-12. Schematic Diagram of DC Amplifier and Inverter Circuits

in the discriminator circuit output. The 220,000 ohm resistor R1327 and the 330,000 ohm resistor R1329 form a voltage divider network. To place the potential of the 100,000 ohm grid limiting resistor R1328 within the operating range of the pin 6 grid of tube V1306, a regulated -150 volt supply is connected to R1329. The 47,000 ohm resistors R1330 and R1331 are the plate load resistors for the two sections of V1306. The 100,000 ohm resistors R1332 and R1335 with the 68,000 ohm resistors R1334 and R1338 form a voltage divider. The 50,000 ohm potentiometer R1333 is the POLAR LOOP CURRENT BALANCE and allows the DC amplifier to be balanced for equal positive and negative output. The 22,000 ohm resistor R1336 is a voltage dropping resistor. Push-pull operation is obtained by applying signal from the plate of one section of tube V1306 to the grid of the other section by means of the grid limiting resistor R1337. The push-pull output of the inverter circuit can be reversed with the NORMAL-REVERSE switch S1301.

f. OUTPUT KEYSER CIRCUIT. - The output keyer circuit consists of four 6Y6G type tubes with switches and controls that permit 20 to 60 ma neutral telegraph loop operation with battery supplied either by the telegraph carrier receiver or an external source. Polar operation with a 30 ma loop and battery supplied from the receiver can be obtained with the POLAR-NEUTRAL switch in the POLAR position.

The schematic diagram of figure 2-13 shows the arrangement of the output keyer circuit for either polar or neutral operation with the battery supplied from the receiver.

(1) When switch S1302 is in the NEUTRAL position, the output keyer tubes function in the following manner:

(a) The push-pull output of tube V1306 is such that when a positive pulse is placed on the grid of tube V1307 a negative pulse is placed on the grid of tube V1309. Under these conditions tube V1307 will conduct with the plate current passing through switch S1303, resistor R1341, through switch S1303, and then out to the loop circuit through terminal D. The current returns through terminal C of the loop circuit, through the LOOP CURRENT potentiometer R1347, through switch S1303 and then through tube V1310 to the B+ power supply. Tube V1310 is conducting at this time because tube V1309 is cut off by the negative input pulse and consequently no current flows through the biasing resistor R1345 of tube V1310. Note that under this situation the electron flow at the output terminals is from D to C.

(b) When the positive pulse is applied to the grid of tube V1309, the tube will conduct and the plate current passes through resistor R1345 and tube V1310 to the B+ supply. The flow of current through resistor R1345 biases tube V1310 which then acts as a voltage divider and lowers the plate voltage of tubes V1309 and V1307. The low plate voltage on tube V1307 and the negative pulse on the grid both produce a sharp cut-off of current through output terminals C and D. Therefore, with switch S1302 in the neutral position single polarity output pulses are obtained.

(2) When switch S1303 is in the POLAR position, the output keyer tubes function as follows:

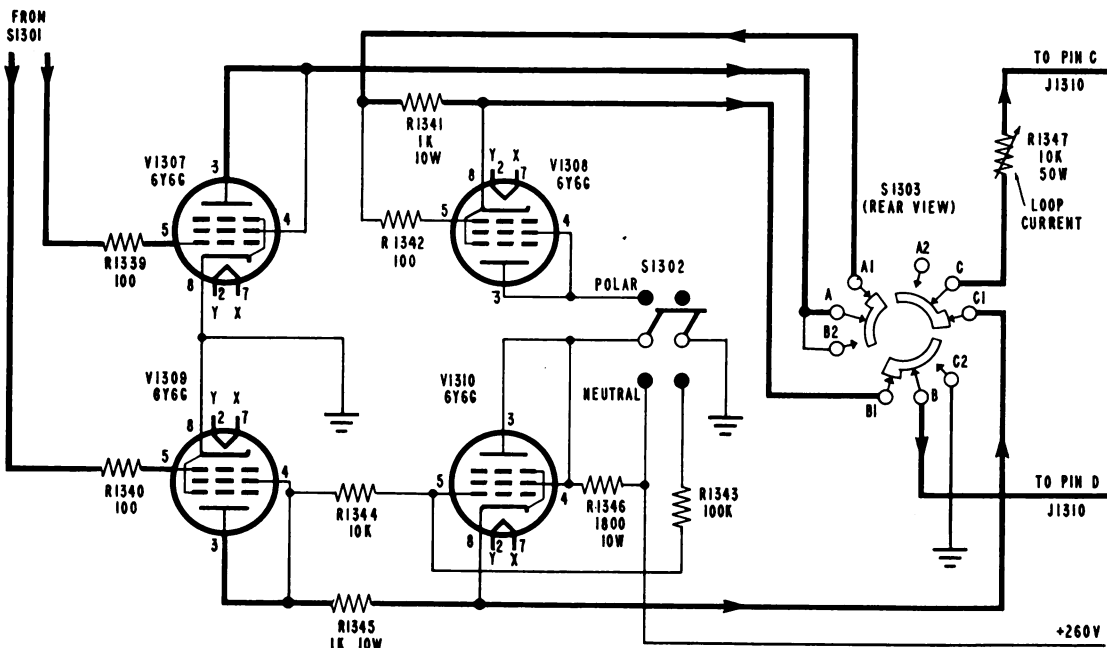


Figure 2-13. Output Keyer Circuit for Polar and Neutral Telegraph Loop with Battery from the Receiver

(a) With a positive pulse on the grid of tube V1307 the tube will conduct and the current will flow over the same path as previously outlined in subparagraph (1)(a). Although tube V1308 is now connected to the B+ supply it does not conduct because the current through resistor R1341 biases the tube to cut-off. Tube V1309 does not conduct because of the low plate voltage and negative pulse on the grid. Under the conditions outlined above, electron flow is from terminal D to C.

(b) When the push-pull input is reversed the positive pulse is applied to the grid of tube V1309 and the negative pulse to the grid of tube V1307. Tube V1307 will be cut off due to the negative pulse on its control grid and the resulting absence of current through biasing resistor R1341 permits tube V1308 to conduct. Tube V1309 conducts and the flow of current through resistor R1345 biases V1310 to cut-off. The plate current of tube V1309 passes through resistor R1345, switch S1303, and enters the loop circuit through terminal C. The current returns through terminal D, switch S1303, tube V1308, switch S1302, and resistor R1346 to the B+ supply. Under the above conditions electron flow is from terminal C to D. From the previous explanation of circuit operation it may be seen that as the input pulses reverse polarity, the output pulses reverse polarity, and a polar output is obtained.

The 100 ohm resistors R1339, R1340, and R1342 together with the 10,000 ohm resistor R1344 are RF oscillation suppression resistors and are placed in the grid circuits of tubes V1307, V1309, V1308, and V1310 respectively.

It is important to note that the loop circuit operates at the plate potential of tubes V1307 and V1309 and therefore must never be grounded.

When the BATTERY FROM LOOP EQUIP switch S1303 is set in the battery from the loop position the active components of the keying circuit are connected as shown in figure 2-14. The power for this circuit is supplied with a nominal 120 volt external battery.

g. POWER SUPPLY CIRCUIT. - The schematic diagram of the power supply circuit for the Telegraph Carrier Receivers R-525/FCC-3 through R-536/FCC-3 is shown on figure 2-15. The 50/60 cycle 115/230 volt power is brought into the equipment through the jack J1311 and controlled by the OFF-ON POWER switch S1304. Both input lines are protected by 3 amp fuses F1301 and F1302. Blown fuse indicators are provided for each fuse. The 115/230 volt switch S1305 connects the two primaries of the power transformer T1302 either in parallel for 115 volt operation or in series for 230 volt operation. A 5Y3GT type full-wave rectifier tube V1311 provides a B+ source of approximately 300 volts which is filtered by the 10 henry choke L1301 and the 25 mf capacitor C1312. The 0B2 type voltage regulating tubes V1313 and V1314 together with the 2500 ohm voltage dropping resistor R1353 provide regulated sources of +108 and +216 volts for the plate circuits of the limiting amplifier and the DC amplifier. The 1000 ohm resistor R1356 and the 10 mf capacitor C1306 provide plate decoupling.

The 6X4W type tube used as a half-wave rectifier supplies negative voltage to the 0A2 type voltage regulating tube V1315. This source of -150 volts is used in the DC amplifier to bias the grid circuits. The 10,000 ohm resistors R1350 and R1351 are voltage dropping resistors. The 10 mf capacitor C1313 filters the power frequency ripple from the output of the half-wave rectifier V1312.

4. BASIC CIRCUITS OF THE ELECTRONIC FREQUENCY CONVERTER CV-243/FCC-3.

a. BLOCK DIAGRAM. - Figure 2-16 shows the principal circuits of Electronic Frequency Converter CV-243/FCC-3. The input audio signals in the frequency range of 382.5 to 1657.5 cycles are attenuated and applied to the modulator diode bridge, which is also supplied by a 3400 cycle crystal controlled carrier frequency. From the output of the modulator the signal is impressed

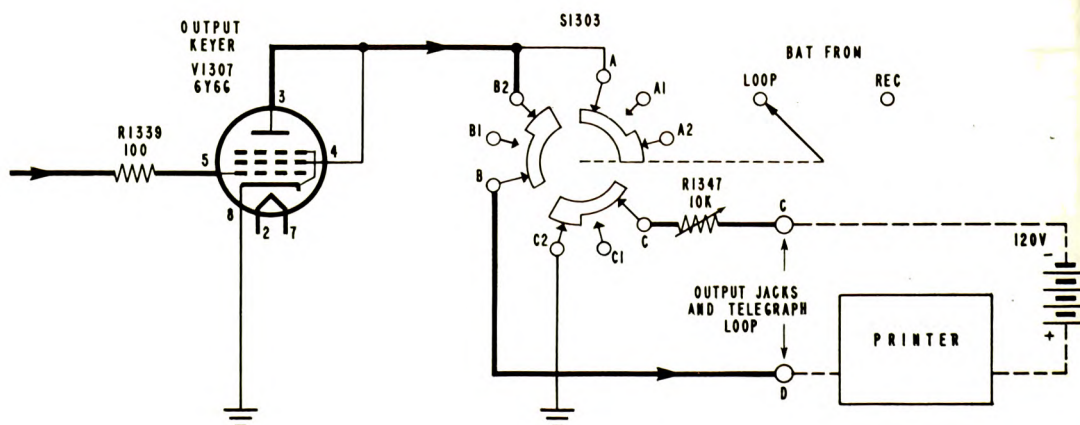


Figure 2-14. Output Keyer Circuit for Neutral Telegraph Loop with Battery Supplied from the Loop

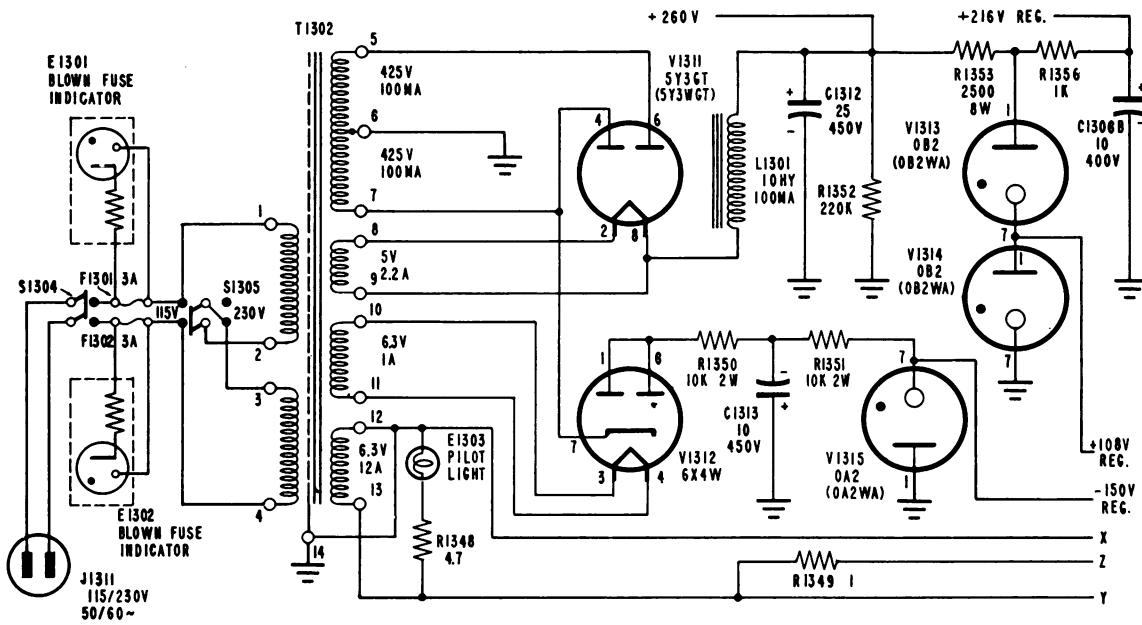


Figure 2-15. Schematic Diagram of Telegraph Carrier Receiver Power Supply Circuit

on a 3 db T-pad (used for impedance matching) and 1742.5 to 3017.5 cycle band-pass filter, Z2603, which selects the lower side band of the modulation. These frequencies are then applied to one input of a feedback amplifier, which has provisions for combining, across a common plate load, the converted signals with the normal (or unconverted) signals in the 382.5 to 1657.5 cycle band. Thus, the output of the next amplifier would contain 16 signal frequencies in the range of 382.5 to 3017.5 cycles. A transformer is provided at this point to match the amplifier to the 600 ohm line and isolate the output leads from ground. An **ATTENUATOR** allows the output level to be set at the desired line level. Line jacks are provided on the two incoming lines and on the output line. These jacks allow for the front panel patching of circuits into the equipment other than the circuits normally connected to the rear terminal board. They are also used to measure line levels, although all measurements taken on line jacks must be made with a meter of 600 ohms internal impedance. A high impedance meter must be used on the output monitor jacks, the 85 cycle jacks, and the 3400 cycle jacks. As seen on the frequency response curve of filter Z2603 shown in figure 2-26, the output levels of the channels lying near the cut-off frequencies of the filter will be less than the center frequency channels by about 3 db.

b. **OSCILLATOR AND DIVIDER CIRCUITS.** - The 3400 cycle carrier voltage for the diode modulation bridge is obtained with RC phase-shift, frequency dividing oscillators from a 102.00 kc crystal oscillator, which utilizes a 12AU7 type tube V2601A as a cathode coupled oscillator and a crystal operated in series resonance. This circuitry is shown in figure 2-17. R2601.

(4700 ohms) and C2601 (0.01 mf) form a filter for the B+ potential applied to the plate of tube V2601A and L2601 (80 millihenrys) is its plate load inductance. C2602 (1100 mf) and R2605 (51,000 ohms) form the coupling network from the plate of V2601A to the grid of V2601B.

Another filter consisting of the 10,000 ohm resistor R2640 and the 0.01 mf capacitor C2627 is used for the B+ potential applied to the plate of V2601B through the 10,000 ohm resistor R2604 load resistance. The 2200 ohm resistor R2603 is the cathode resistor of tube V2601B and couples energy to the 102.00 kc crystal Y2601, which operates in series-resonance at 102.00 kc with an effective resistance of about 3000 ohms. Crystal Y2601 transmits energy to the cathode of V2601A, thus completing an oscillating feedback loop for 102 kc. A 10 mmf capacitor C2603 couples the 102 kc to the grid of a conventional RC phase shift oscillator V2602A, tube type 12AX7, which is adjusted for free-running oscillations of about 20 kc and locks at 20.4 kc on the fifth sub-harmonic of 102 kc. C2604, C2605, C2606, C2607 (all 75 mmf), R2608, R2609, R2610 (all 240,000 ohms), R2606 (100,000 ohms), and R2607 (250,000 ohm variable) form the phase shifting network between the plate and the grid of V2602A; R2607 varies the free-running frequency of the oscillator and provides enough adjustment to lock the oscillator to 20.4 kc for all normal changes in tubes and components. Another 80 millihenry inductance L2602 represents a plate load to tube V2602A. V2602B, tube type 12AX7, operates similarly to V2602A, except that C2609, C2610, C2611, and C2612 are 510 mmf capacitors; R2614, R2615, and R2616 are 240,000 resistors; and the series combination R2612, R2613 are 150,000 ohm (fixed) and 250,000 ohm (variable) resistors. These values allow this oscillator to perform at a

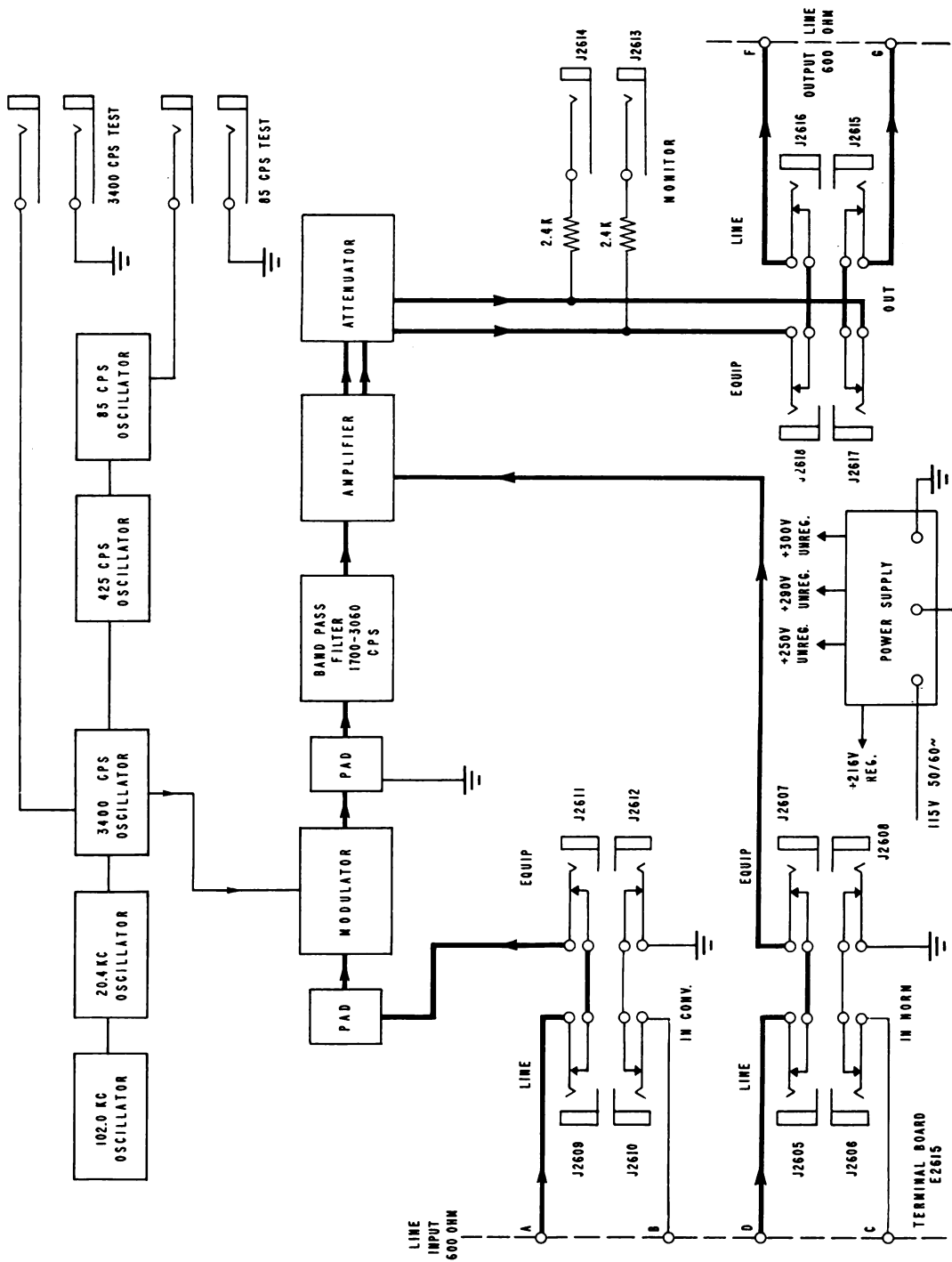


Figure 2-16. Block Diagram of Electronic Frequency Converter CV-243/FCC-3

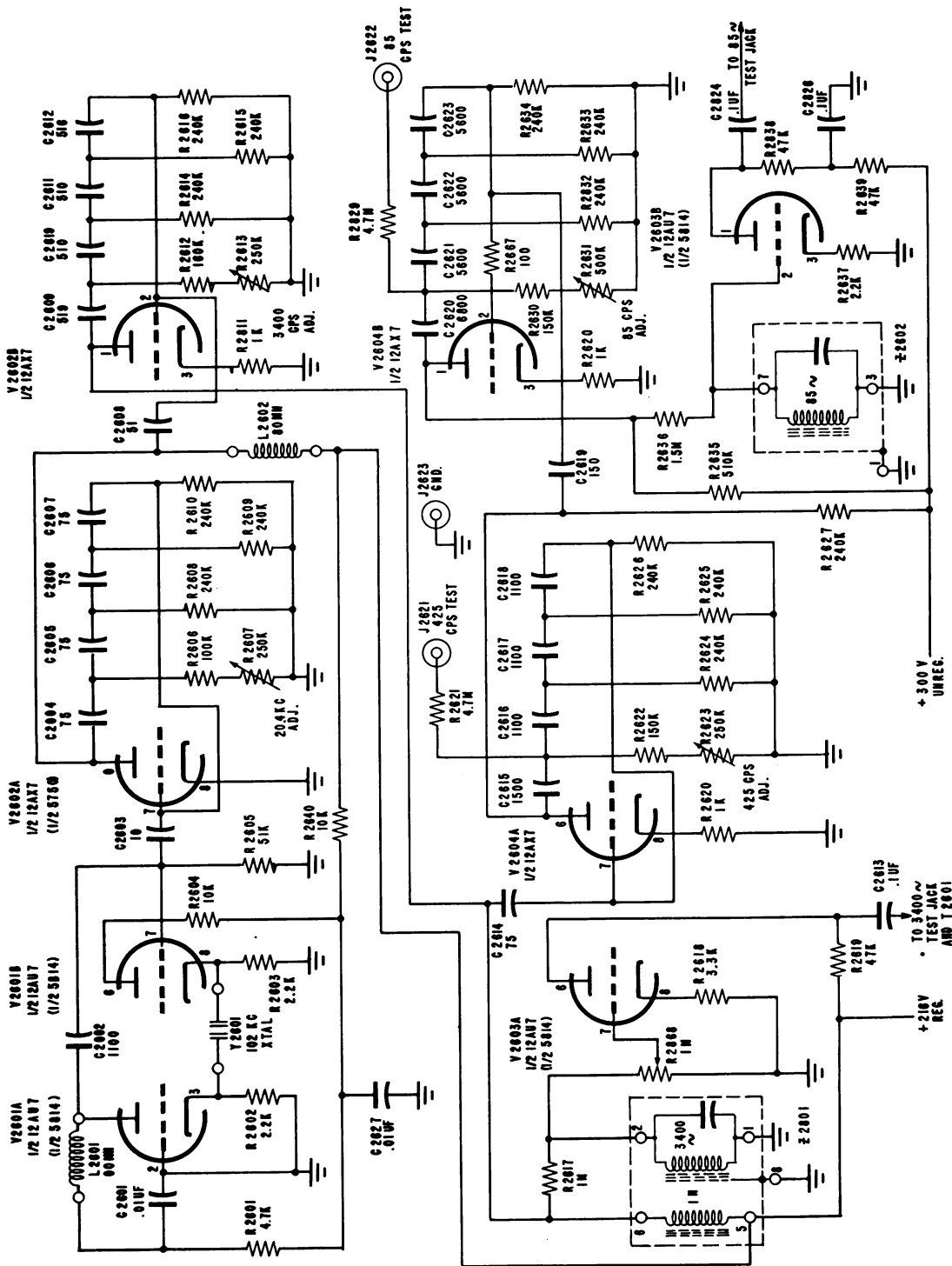


Figure 2-17. Schematic Diagram of Oscillator and Divider Circuits of Frequency Converter CV-243/FCC-3

free-running rate of about 3400 cycles, and is locked into 3400 cycles by a small amount of energy coupled from the 20.4 kc oscillator by C2608, 51 mmf. Again a reasonable adjustment range is offered by R2613. Z2601 contains the plate load inductance of V2602B and a high Q parallel resonant circuit tuned for 3400 cycles. This resonant circuit in conjunction with R2617 filters and couples the 3400 cycle output of V2602B to the grid of the 12A U7 buffer amplifier V2603A. R2668, 1 megohm, was made variable to allow the output of V2603A to be set to 20 volts. Cathode bias is supplied to tube V2603A with the 3300 ohm resistor R2618. A 0.1 mf capacitor C2613 couples the 3400 cycle output from the 47,000 ohm plate load resistor R2619 to the modulation transformer T2601, and also to the 3400 CPS TEST jacks J2601 and J2602. For test purposes the 3400 cycle voltage is further divided to 425 cycles and then 85 cycles with RC phase shift oscillators. This crystal controlled 85 cycle output is filtered and amplified by a buffer and then is made available at the 85 CPS TEST jacks J2603 and J2604 for use in checking the transmitter signal frequencies. The 425 and 85 cycle oscillators are similar to the 20.4 kc and 3400 cycle phase shift oscillators in design and theory of operation. V2604A, a 12AX7 type tube, with supporting components is a phase shift oscillator with its phase shift network adjusted for free-running at about 425 cycles. 3400 cycle energy is coupled by C2614, 75 mmf, to the grid of tube V2604A and locks it at 425 cycles, the 8th sub-harmonic of 3400 cycles. R2623, a 250,000 ohm potentiometer, allows the free-running frequency of the oscillator to be adjusted, and the test jack J2621 with a 4.7 megohm isolating resistor R2621 is provided for connecting an oscilloscope to the oscillator to observe the lock-in ratio. V2604B, a 12AX7 type tube, is another phase shift oscillator with its components set for free-running oscillation near 85 cycles. This is locked to 85 cycles as the fifth sub-harmonic by 425 cycle energy coupled to the grid of V2604B through a 150 mmf capacitor C2619. As in the 425 cycle oscillator, the 85 cycle wave shape and frequency can be observed with an oscilloscope on jack J2622, which also has a 4.7 megohm isolating resistor R2629. Filter Z2602, in conjunction with the 1.5 megohm resistor R2636, filters the harmonics from the 85 cycle voltage and applies it to the grid of buffer amplifier V2603B. After amplification in the buffer, the 85 cycle voltage is coupled to the 85 CPS TEST jacks through a 0.1 mf capacitor R2624. R2639, a 47,000 ohm resistor, and C2626, a 0.1 mf capacitor, act as a decoupling network to keep 85 cycles out of the B+ voltage.

c. MODULATOR AND FILTER CIRCUITS. - The modulator circuit mixes the input audio signals with the crystal controlled 3400 cycle carrier voltage, and generates the sum and difference frequencies between 3400 cycles and the input frequencies. Since the difference frequencies are in the passband of Z2603 they are transmitted to the amplifier while the sum frequencies are attenuated. In this manner, the input signal, which normally contains eight 170 cycle shift channels covering the frequency range of 382.5 to 1657.5 cps, is converted to a frequency range of 1742.5 to 3017.5 cps, with the lowest frequency channel of the input positioned at the upper end of the output frequency range. Jacks are provided in the input lines of both the IN CONV

IN NORM lines for testing and patching purposes. One side of each of these lines is grounded. As shown in figure 2-18, the incoming signal to be converted is applied to a T-pad consisting of 430 ohm resistors R2641 and R2642 and a 220 ohm resistor R2643 which attenuates the signal 12 db to a level acceptable to the diode bridge. C2628, a 0.05 mf capacitor across the IN CONV line, is a radio frequency filter that prevents harmonics of the 102.00 kc crystal oscillator from being transmitted out on the lines. The signal is then transformed by one of the balanced transformer sections of T2601 and applied across the type 1N71 crystal diode ring modulator, while the 3400 cycle carrier is applied across the center taps of the output and input transformer section. From the output section, the voltages received are essentially sum and difference frequencies between the 3400 cycle carrier and the signal. Since the amplitudes of the sum and difference frequencies vary as the signal voltage, the output of the modulator is approximately proportional to the input. The output of the modulation bridge is matched to the band-pass filter Z2603 by a 4 db T-pad consisting of 180 ohm resistors R2644 and R2645 and an 820 ohm resistor R2646. A line to grid transformer T2602 transmits the frequencies (1742.5 to 3017.5) in the pass band of the filter to the amplifier section input.

d. AMPLIFIER. - Figure 2-19 shows the amplifier section of the Electronic Frequency Converter CV-243/FCC-3. The purpose of the amplifier is to provide gain to offset the losses in the modulator and filter. With the gain of the amplifier properly adjusted, the level of the individual signals at the input to the equipment are the same as at the output. An overall gain of about 30 db is provided from the input of the amplifier section to the output. The converted signals are applied to the grid of 12AX7 type tube V2605A and the normal signals are applied to the grid of V2605B. The signals are then amplified and added across a common 100,000 ohm plate resistor R2653. An input level control for the converted signals is provided in the grid circuit of V2605A by a 50,000 ohm potentiometer R2647. Input level of the normal signals is attenuated by a 510 ohm resistor R2649 and made adjustable by a 100 ohm potentiometer R2650 in the grid circuit of V2605B. Current feedback is applied to the cathodes of V2605A and V2605B by the 39 ohm resistor R2652, and 2200 ohm resistors R2648 and R2651 supply cathode bias to both tubes.

Coupling to the next stage is accomplished by a 0.1 mf capacitor C2630, and here the signals are amplified by both V2606A and V2606B, 12A U7 tube types. A fraction of the output voltage at the plate of V2606B is fed back through a 1.0 mf DC blocking capacitor C2632 and the voltage dividing resistors R2659 (30,000) and R2655 (4700) to the cathode of V2606A. The ratio of the current feedback and the voltage feedback is such as to obtain a 600 ohm output from transformer T2603. A 20-step ATTENUATOR R2669 of 2 db attenuation per step is inserted in the output line of the unit along with a radio frequency filter consisting of 2.5 millihenry inductances L2604 and L2605 and 0.05 mf capacitors C2634A and C2634B which prevents harmonics of the 102.00 kc oscillator from being transmitted on the output line.

e. POWER SUPPLY CIRCUITS. - Figure 2-20 shows

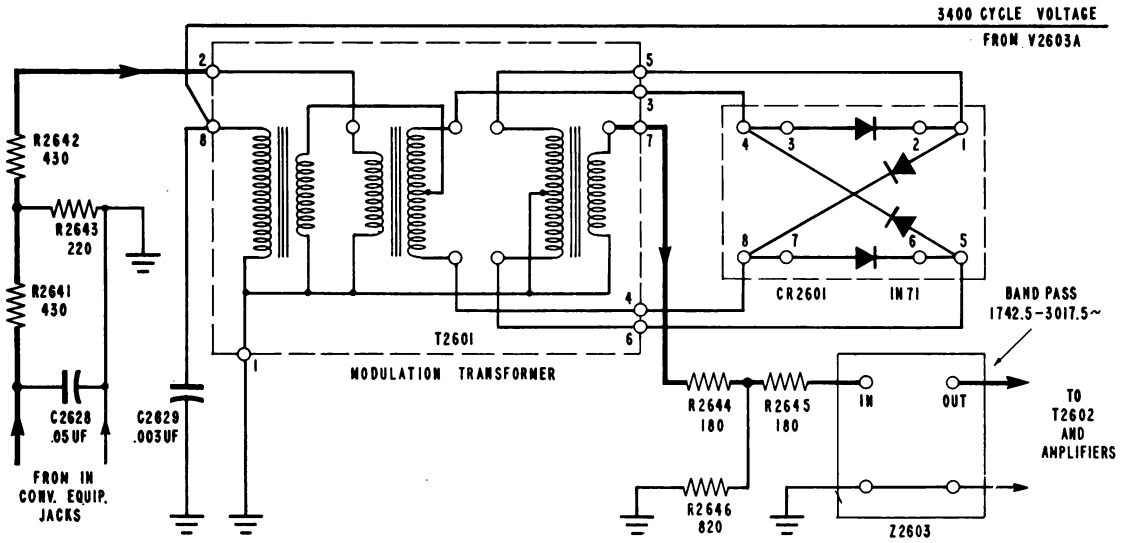


Figure 2-18. Schematic Diagram of Modulator and Filter Circuits of Electronic Frequency Converter CV-243/FCC-3

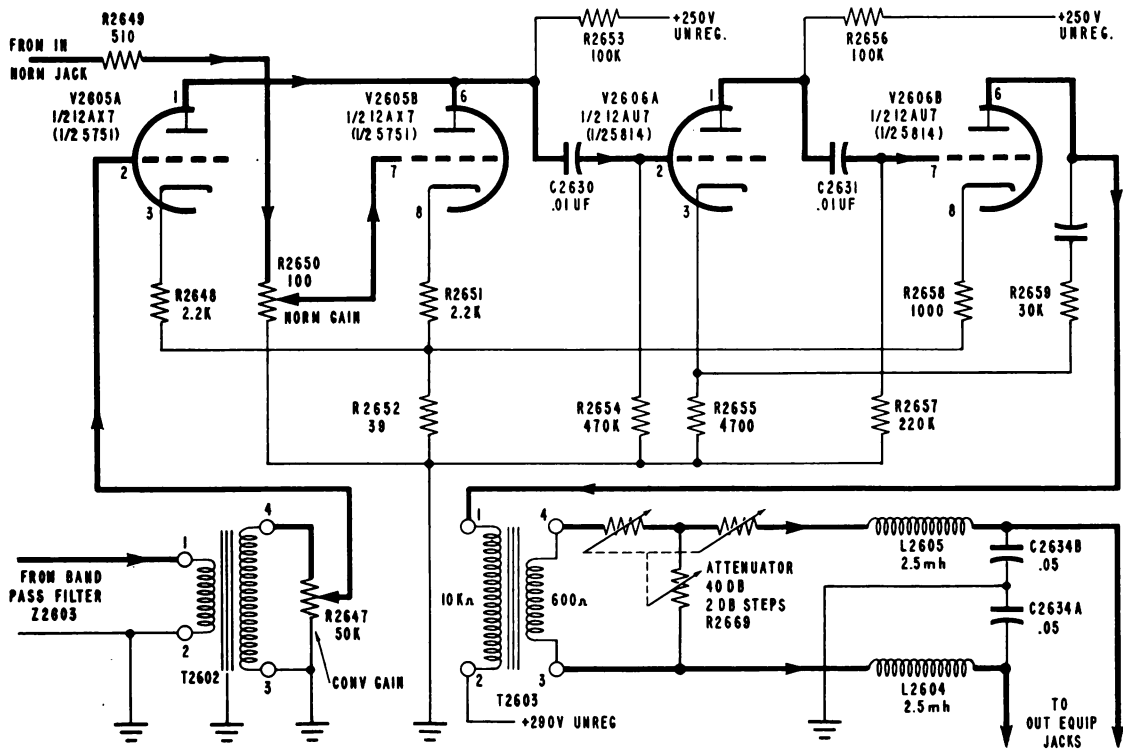


Figure 2-19. Schematic Diagram of Amplifier of Electronic Frequency Converter CV-243/FCC-3

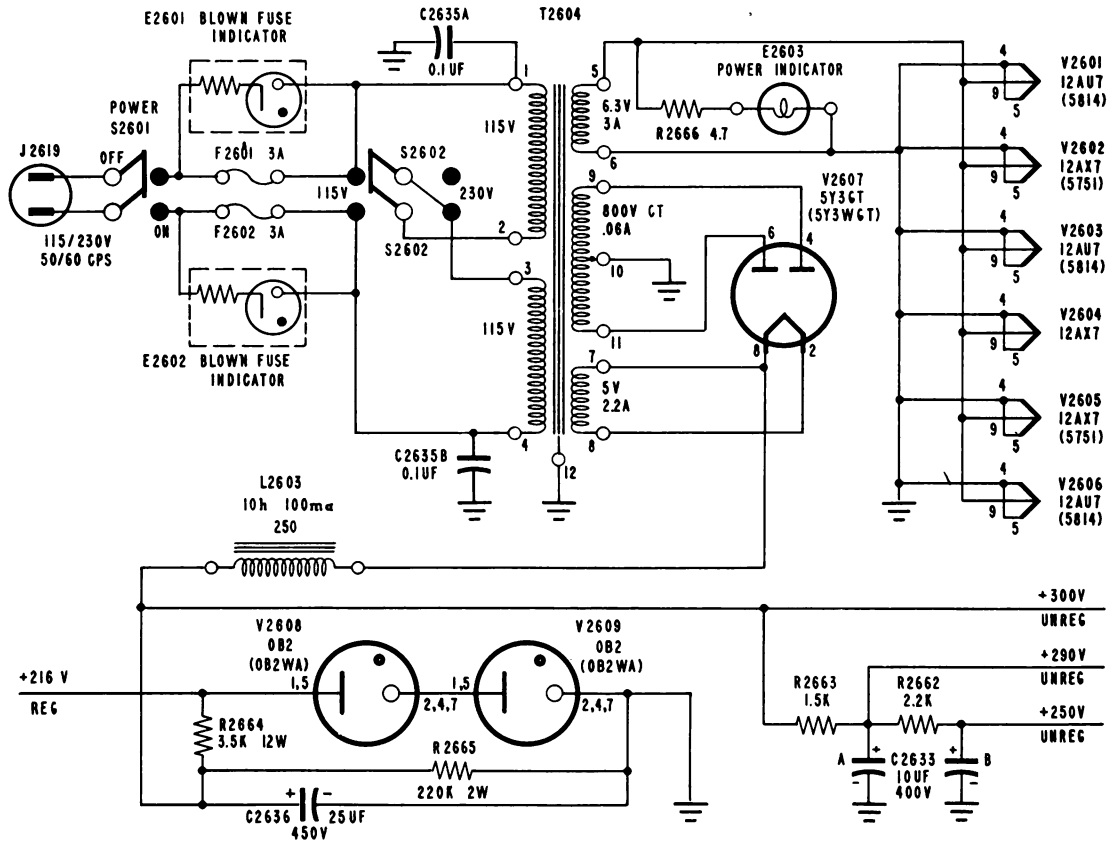


Figure 2-20. Schematic Diagram of Power Supply of Electronic Frequency Converter CV-243/FCC-3

the power supply circuits of the Electronic Frequency Converter CV-243/FCC-3. Blown fuse indicators E2601 and E2602 are neon lamps that receive the line voltage and light when the fuse they are connected across is blown. A DPDT toggle switch S2602 changes the tap connections of the power transformer T2604 for 115 or 230 volt use. On 115 volt operation the two primary windings are in parallel and on 230 volt operation the two windings are placed in series. A 4.7 ohm dropping resistor R2666 increases the life of the power indicator lamp E2603. A 5Y3GT type tube V2607 is used as a full-wave rectifier and the power supply filter consists of a 10 henry choke L2603 and a 25 mf capacitor C2636 with a 220,000 ohm resistor R2665 as a bleeder. Regulation by 0B2 type voltage regulators V2608 and V2609 is provided for the oscillator and divider circuits. The high voltage is supplied to the amplifier circuits through decoupling resistors and capacitors.

5. BASIC CIRCUITS OF THE ELECTRONIC FREQUENCY CONVERTER CV-244/FCC-3.

a. **BLOCK DIAGRAM.** - The block diagram of figure 2-21 shows the principal circuits of the Electronic

Frequency Converter CV-244/FCC-3. This equipment accepts telegraph carrier signals from the Electronic Frequency Converter CV-243/FCC-3 in the frequency range of 382.5 to 3315 cycles per second, separates the frequency band of 1742.5 to 3017.5 cycles, shifts it from 382.5 to 1657.5 cycles, and transmits it to a set of telegraph receivers. A line amplifier with an overall gain of one, amplifies the complete audio frequency range and transmits the 382.5 to 1657.5 cycle band of the input signal to another set of telegraph receivers. As shown in the block diagram of figure 2-21, the incoming signal from the line is transformed with a 1:1 isolation transformer and attenuated with a 20-step variable ATTENUATOR of 2 db steps. The output of the attenuator is applied to the line amplifier for normal channels and also to the band-pass filter through a 3 db T-pad. The purpose of this is to maintain a proper match for the filter when the variable attenuator is set at zero. Signal frequencies in the range of 1742.5 to 3017.5 cycles are passed by the filter Z2702, whose output is matched with a T-pad to the 1N71 modulator. Since the modulator bridge is supplied with the 3400 cycle voltage output of the oscillator and frequency divider circuits, the output voltage of the

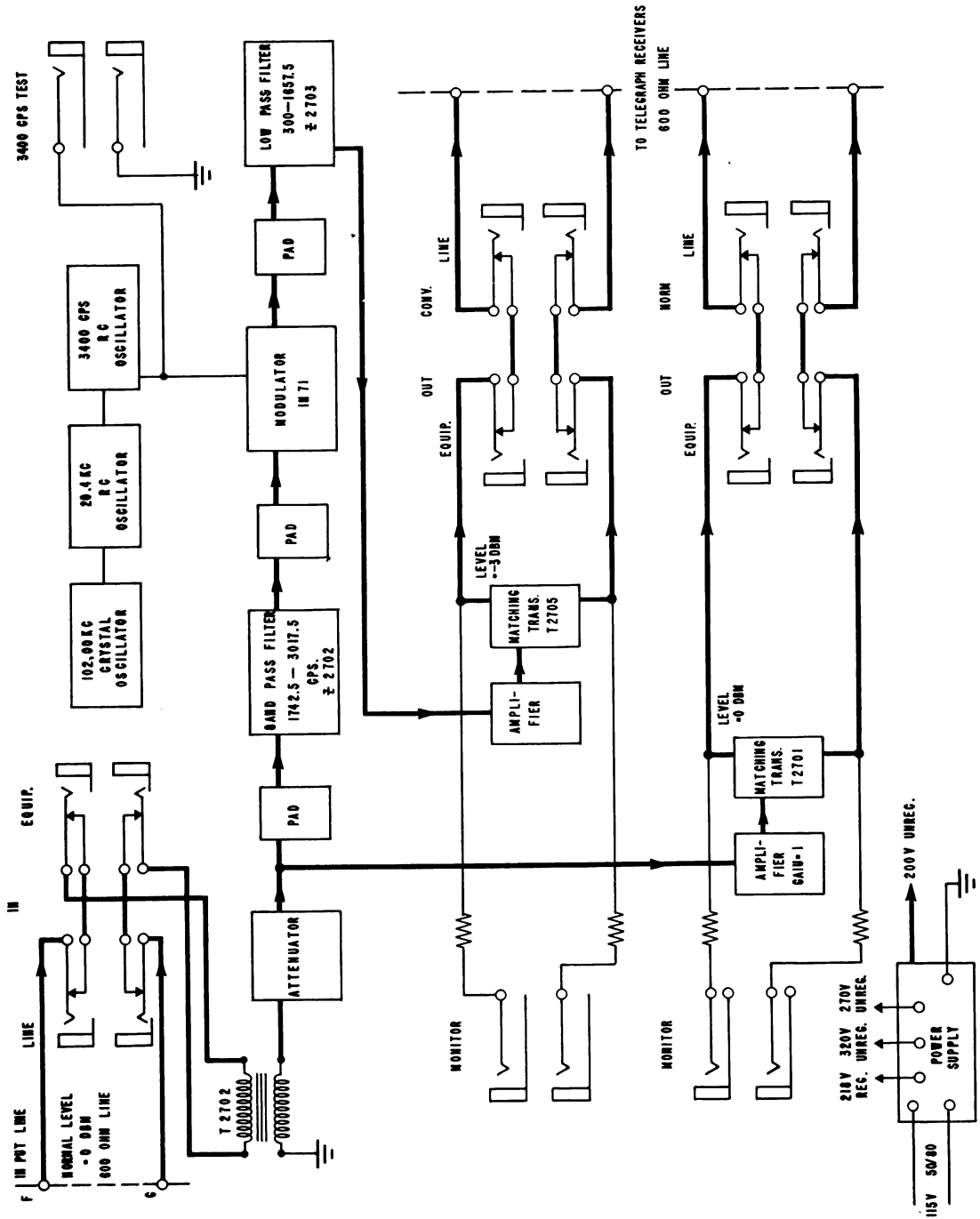


Figure 2-21. Block Diagram of Electronic Frequency Converter CV-244/FCC-3

modulator contains both the sum and difference frequencies between the signal and 3400 cycle frequencies. Signal frequencies up to 1657.5 cps only are passed by the low pass filter Z2703 and are then applied to the input of a feedback amplifier. This amplifier has a voltage gain of about 34 db from a 600 ohm input to a 600 ohm output. This gain compensates for the attenuation in the filters, pads, and modulator bridge, thereby making an overall gain of one for a properly operating equipment.

b. **OSCILLATOR AND DIVIDER CIRCUITS.** - Refer to the discussion of these circuits in the Electronic Frequency Converter CV-243/FCC-3 section (paragraph 4b, section 2). These circuits are the same in both units except that the CV-244/FCC-3 does not have the 425 and 85 cps oscillators.

c. **MODULATOR AND FILTER CIRCUITS.** - As shown on the schematic diagram of the Electronic Frequency Converter CV-244/FCC-3, figure 7-21, the incoming signal is transformed with a 1:1 line isolation transformer T2702 and attenuated with a front panel variable **ATTENUATOR** R2756. This **ATTENUATOR** is used to set line levels at approximately 1 dbm, the normal maximum level on a fading radio circuit. The signals to be converted are transmitted by the band-pass filter Z2702 and applied to the ring modulator where they are mixed with 3400 cps carrier voltage. This ring modulator operates in a similar manner to the one described for the Electronic Frequency Converter CV-243/FCC-3. Signals below 1657.5 cycles are passed by filter Z-2703 (frequency response curve shown in figure 2-26) and applied to the amplifier.

d. **NORMAL AMPLIFIER CIRCUIT.** - Figure 2-22 shows a schematic diagram of the normal line amplifier of the Electronic Frequency Converter CV-244/FCC-3. This amplifier transmits all signals in the frequency spectrum of 382.5 cycles to 3315 cycles directly through

the Electronic Frequency Converter CV-244/FCC-3 with a total input to output ratio of one, relying upon the normal receiver filters to reject the converted band of frequencies. The input signals are applied to the grid of a 12AU7 type tube V2704B with a 100,000 ohm potentiometer R2728, are amplified, and are then applied to the grid of V2704A by the 0.01 mf coupling capacitor C2716. After amplification by V2704A the signal is coupled to the line by an impedance matching transformer T2701. Voltage is fed back through C2715 (0.1 mf capacitor) and R2723 (300,000 ohm resistor) from the plate of tube V2704A to the cathode of tube V2704B to stabilize the gain of the amplifier with negative feedback. R2728 is adjusted for the same signal level across the **IN LINE** as across the **OUT NORM LINE**.

e. **CONVERTED AMPLIFIER CIRCUIT.** - The schematic diagram of figure 2-23 shows the amplifier for converted signals. This amplifier consists of three 12AU7 type triode stages and is similar to the amplifier in the Electronic Frequency Converter CV-243/FCC-3, except that the amplifier in the CV-244/FCC-3 has a 12AU7 in the input stage instead of a 12AX7. Performance of the two amplifiers is about the same. In the CV-244/FCC-3 both current and voltage feedback is used to obtain a 600 ohm output impedance. Current feedback is obtained by a common cathode resistance R2740 (100 ohms) for V2703B and V2705A. Voltage feedback is obtained by coupling voltage from the output stage V2703B back through C2720 (1.0 mf) and R2747 (18,000 ohm) to the cathode of the second stage V2705B. R2738, a 50,000 ohm potentiometer, controls the output level of the circuit.

f. **POWER SUPPLY CIRCUITS.** - Reference is made to the description of the power supply circuits of the Electronic Frequency Converter CV-243/FCC-3 (paragraph 4e, section 2) which is exactly the same as the power supply in the CV-244/FCC-3.

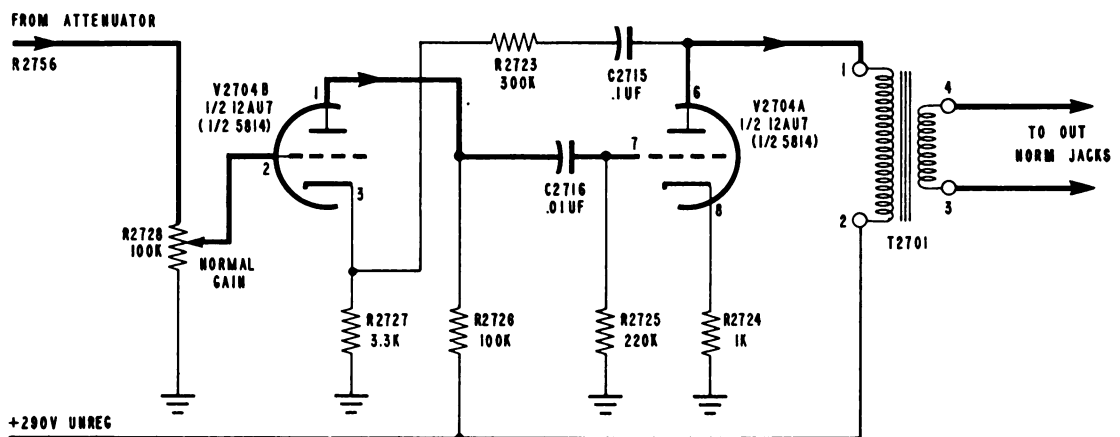


Figure 2-22. Schematic Diagram of Normal Line Amplifier

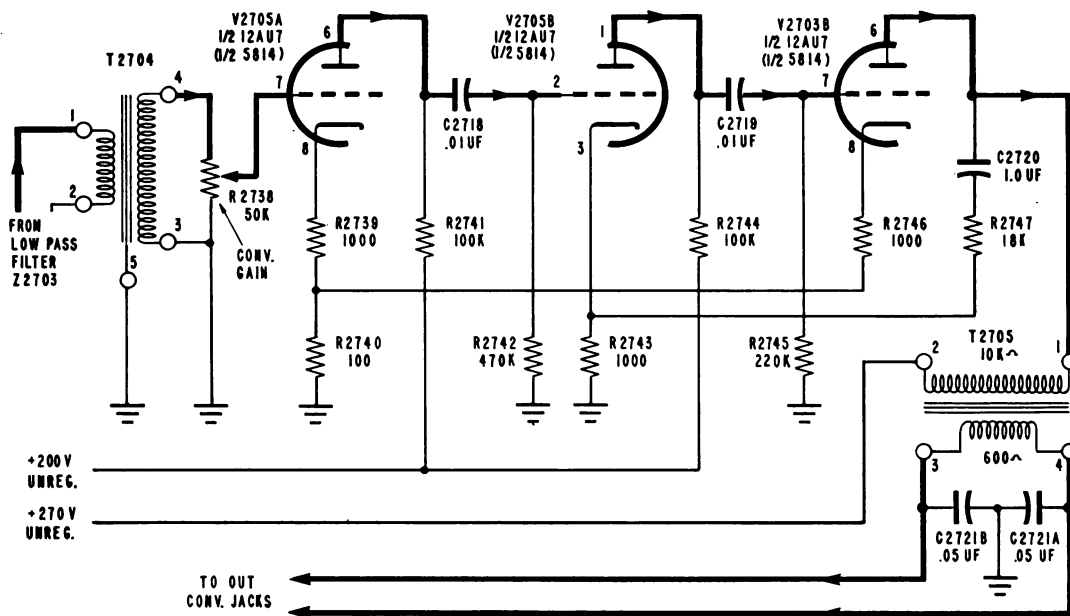


Figure 2-23. Schematic Diagram of Amplifier for Converted Signals

6. CIRCUITS OF TELEGRAPH CARRIER TERMINAL CABINET CY-1195/FCC-3.

The cabinet contains the main power circuits together with the terminal boards and wiring harnesses which connect the individual channels of the equipment into the communication system. Figure 3-5 shows the power wiring of the cabinet. The incoming 115/230 volt power is connected to the internal cabinet wiring at the receptacle box, accessible from the rear door. As shown by the wiring diagram, the power first enters S2501 a double pole, single throw switch. It then passes through F2501 and F2502, the 30 amp line fuses. These fuses are equipped with indicators which glow whenever excessive loads cause them to fail. The connector assembly, located on the rear right side of the cabinet, contains 13 receptacles designed to supply power to the 13 units mounted in the cabinet, and is connected directly to the 30 amp fuses. T2501 is an auto-transformer designed to supply 115 volts to the convenience outlet J2502 and the fan motor B2501 whenever the input supply is 230 volts. S2502, a double pole, double throw switch, is provided and wired to connect the correct transformer terminals for 115 volt or 230 volt operation. This portion of the circuit is protected with 5 amp fuses F2503 and F2504 together with blown fuse indicators E2503 and E2504. The convenience outlet J2502 is rated for 250 watts when the input supply is 230 volts and approximately 500 watts when the input is 115 volts. Switch S2502 is located in the rear adjacent to the input power connector box and is provided with a clamp to prevent accidental changing. A schematic diagram of the cabinet wiring is also provided on this rear surface.

7. FILTERS.

The output of each telegraph carrier transmitter is filtered with a band-pass filter which removes the harmonics from the output signal, matches the transmitter to the common filter bus, and prevents inter-modulation of signals. With the exception of the 425 cycle, 595 cycle, and 765 cycle filters which are designed with a maximum 8.5 db center frequency insertion loss and a 10.5 db MARK and SPACE frequency insertion loss, all other transmitter filters have a maximum 5 db center frequency insertion loss and a maximum 7 db insertion loss at the MARK and SPACE frequencies. All filters are designed to attenuate adjacent MARK and SPACE frequencies 20 db. Figure 2-25 shows the frequency response of the transmitter filters.

The input to each telegraph carrier receiver is filtered with a band-pass filter so designed that the 425 cycle, 595 cycle, and 725 cycle filters have a center frequency insertion loss of 8.5 db maximum and a MARK and SPACE frequency insertion loss of 10.5 maximum and all other filters have a center frequency insertion loss of less than 4 db and a MARK and SPACE frequency insertion loss of less than 6 db. Adjacent MARK and SPACE frequencies are attenuated approximately 40 db for all filters. Figure 2-25 shows the frequency response of the receiver filters.

The Electronic Frequency Converter CV-243/FCC-3 uses a band-pass filter with a response curve as shown on figure 2-26. This filter selects the converted signals in the frequency range of 1742.5 cps to 3017.5 cps at the output of the modulator bridge and transmits these

frequencies to the line amplifier.

The Electronic Frequency Converter CV-244/FCC-3 uses the same band-pass filter as used in the Electronic Frequency Converter CV-243/FCC-3 and a low-pass filter. The frequency response curves of these filters are shown in figure 2-26. The band-pass filter is used

to select the converted signals from the line and transmit them to the modulator bridge. The output of the modulator bridge is connected to the low-pass filter which cuts off at 1657.5 cycles and attenuates all higher frequencies.

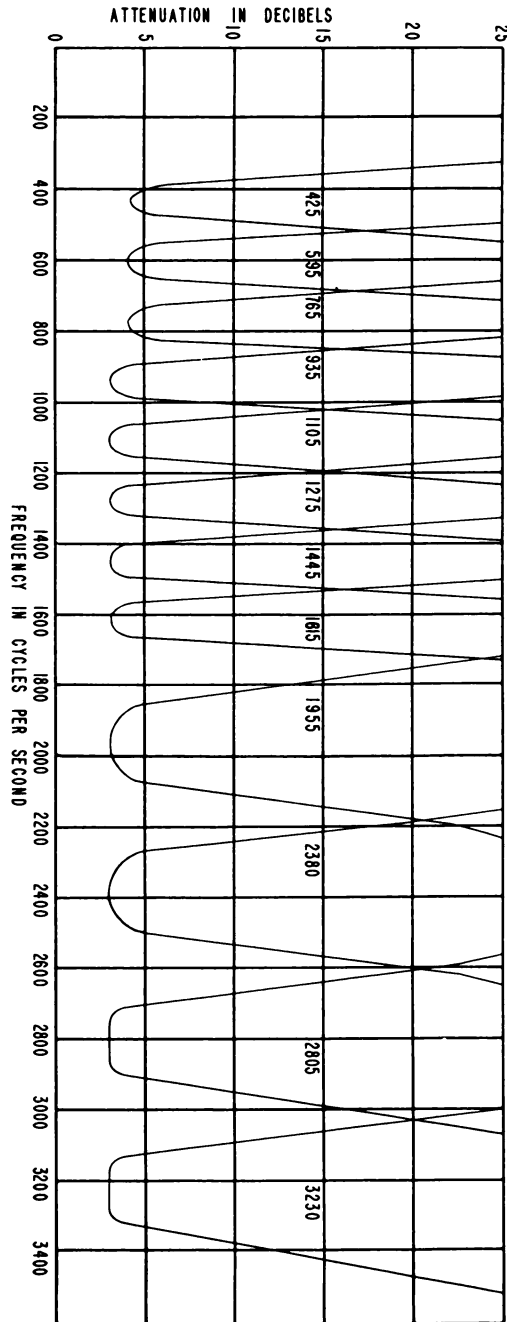


Figure 2-24. Curves Showing the Frequency Response of Telegraph Carrier Transmitter Band-Pass Filters

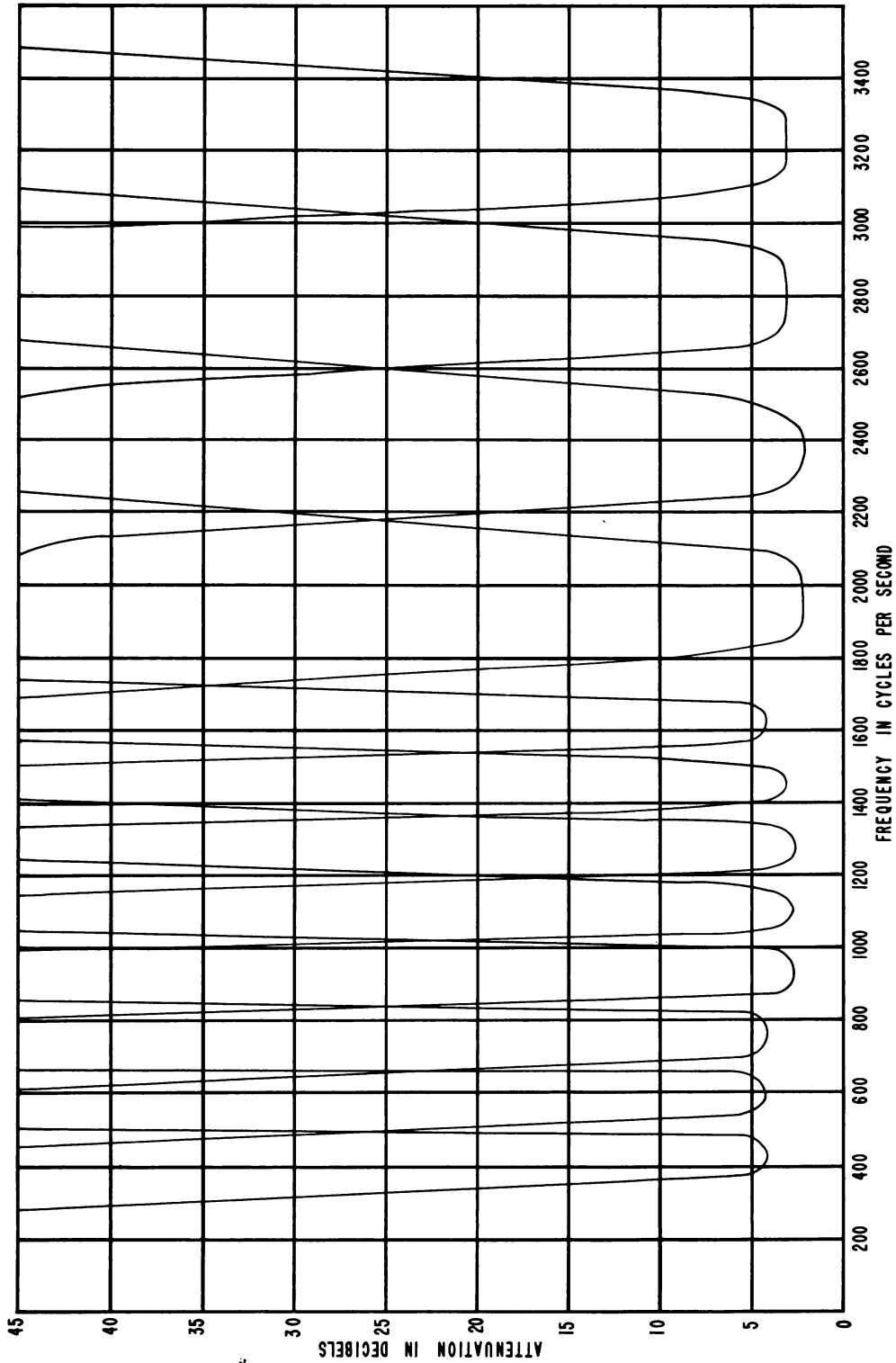


Figure 2-25. Curves Showing the Frequency Response of Telegraph Carrier Receiver Band-Pass Filters

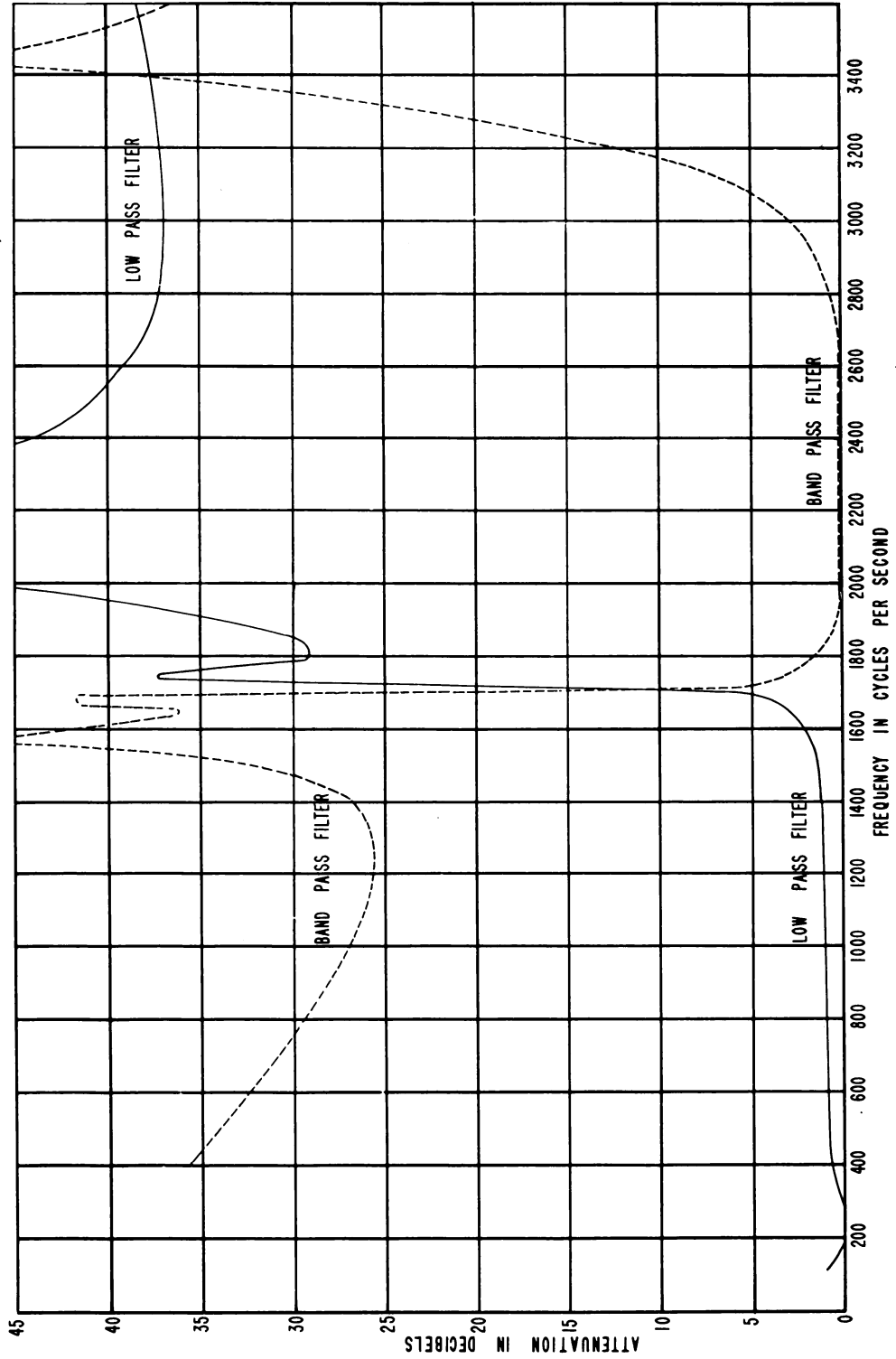


Figure 2-26. Curves Showing the Frequency Response of Group Modulator Band-Pass Filter and Low-Pass Filter
2-26

**SECTION 3
INSTALLATION**

1. UNPACKING.

The Telegraph Carrier Terminal AN/FCC-3 is packed and shipped in two wooden crates as shown in figure 3-1. Follow the notes given in figure 3-1 to dismantle the packing crate, making certain the crate is in the position shown. Leave the bottom base on to protect the unit while in local transit to the final place of installation.

2. INSTALLATION.

The over-all dimensions of the cabinets are shown in figure 3-2.

a. GENERAL. - The units of the equipment are positioned in each cabinet assembly as shown in figure 1-1. All filters and tubes are in place making each chassis ready for operation. The recommended method of installation is with access to the rear door to permit easy installation wiring. To remove a panel and chassis from the cabinet, loosen the four panel thumb screws and pull the panel and chassis out on its slides until the chassis rollers touch the slide limit pins. See figure 3-3. With the chassis in this position, release the line cord and connecting cable and loop them over the slides between the rear of the chassis and the cabinet. Do not allow these cables to lie loosely in the chassis as they may become entwined with components result-

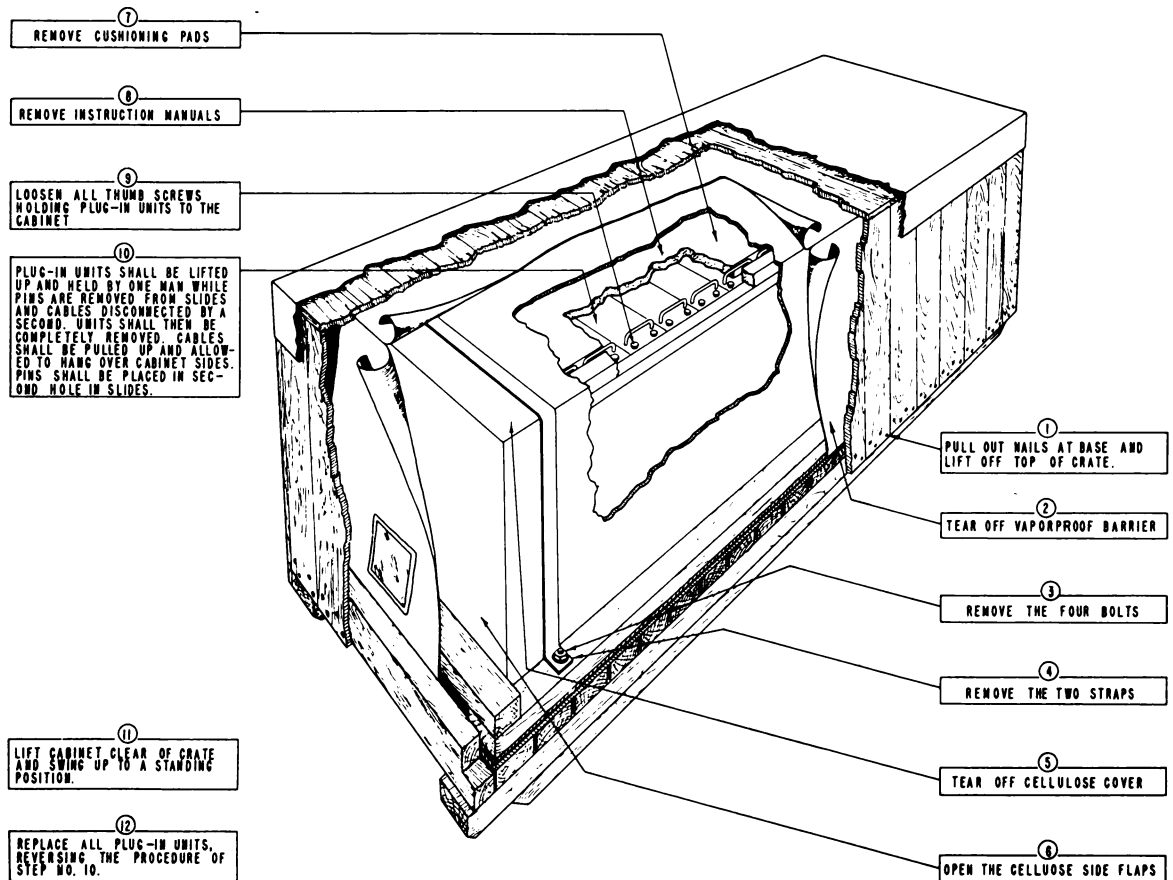


Figure 3-1. Telegraph Carrier Terminal AN/FCC-3, Unpacking Procedure

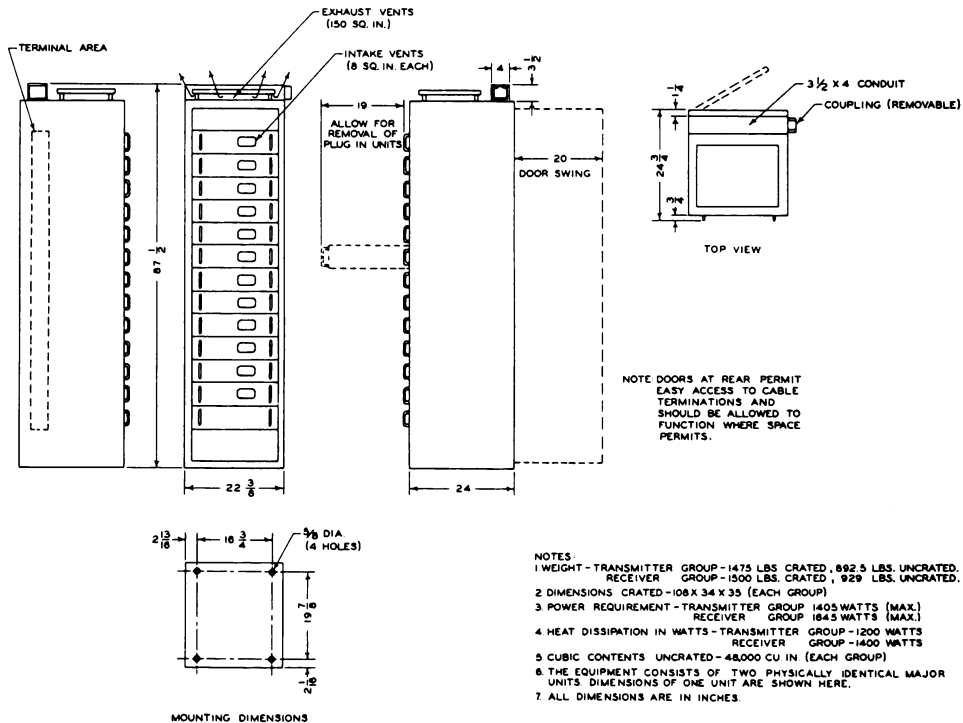


Figure 3-2. Outline Drawing of Telegraph Carrier Terminal AN/FCC-3

ing in damage to the unit or cable. Remove the slide limit pins from the front holes and place them in the holes a few inches in the rear; thereby precluding the possibility of loss. The chassis and panel may now be removed by grasping the chassis firmly on the sides, lifting it slightly to clear the end stops, and pulling it forward. When removing all of the panels and chassis, start at the bottom panel and work up. When installing panels and chassis, replace the top unit first and continue toward the bottom.

NOTE

Check that the line cord and connecting cable are connected to each chassis before sliding the panel into place.

b. **INSTALLATION WIRING.** - Figure 3-4 shows a rear view of a partially wired cabinet. The telegraph loop circuits must be wired at the time of installation to meet the over-all requirements of the particular installation and, wherever possible, these circuits should be identical to facilitate patching. In minor installations not having a common battery supply, the preferable loop connection is with the battery supplied from the AN/FCC-3. Clamps are provided along the vertical mounting bracket on the left side of the cabinet and are designed to hold the cabled loop circuit lines and keep them separate from the other wiring. The incoming lines to the cabinet can enter either through

the cable conduit at the top or through conduit openings in the floor. The power lines may also enter in a similar manner; however, it is recommended that the cable conduit in the top be used because of its proximity to the input power connection box. This connection box contains the input power cable clamp which should be affixed to the box through any convenient knock-out hole. Its purpose is to clamp the input power cable to the box and provide an entrance for the wires. After the power connections have been made inside the box, the cover should be replaced. See figure 3-5 for cabinet power circuits.

CAUTION

The equipment is shipped with all transformer switches set for 115 volts. If a 230 volt power source is used, care must be taken that all units are changed for 230 volt operation and the fan transformer switch, S2502, is at 230 volts. The fan transformer switch, S2502, is located on the rear surface of the fan housing adjacent to the input power connection box.

The following stranded hook-up wire meeting the requirements of Specification JAN-C-76 should be used: Incoming power line #12AWG; local lines to telegraph machines #18 AWG; internal connections between term-

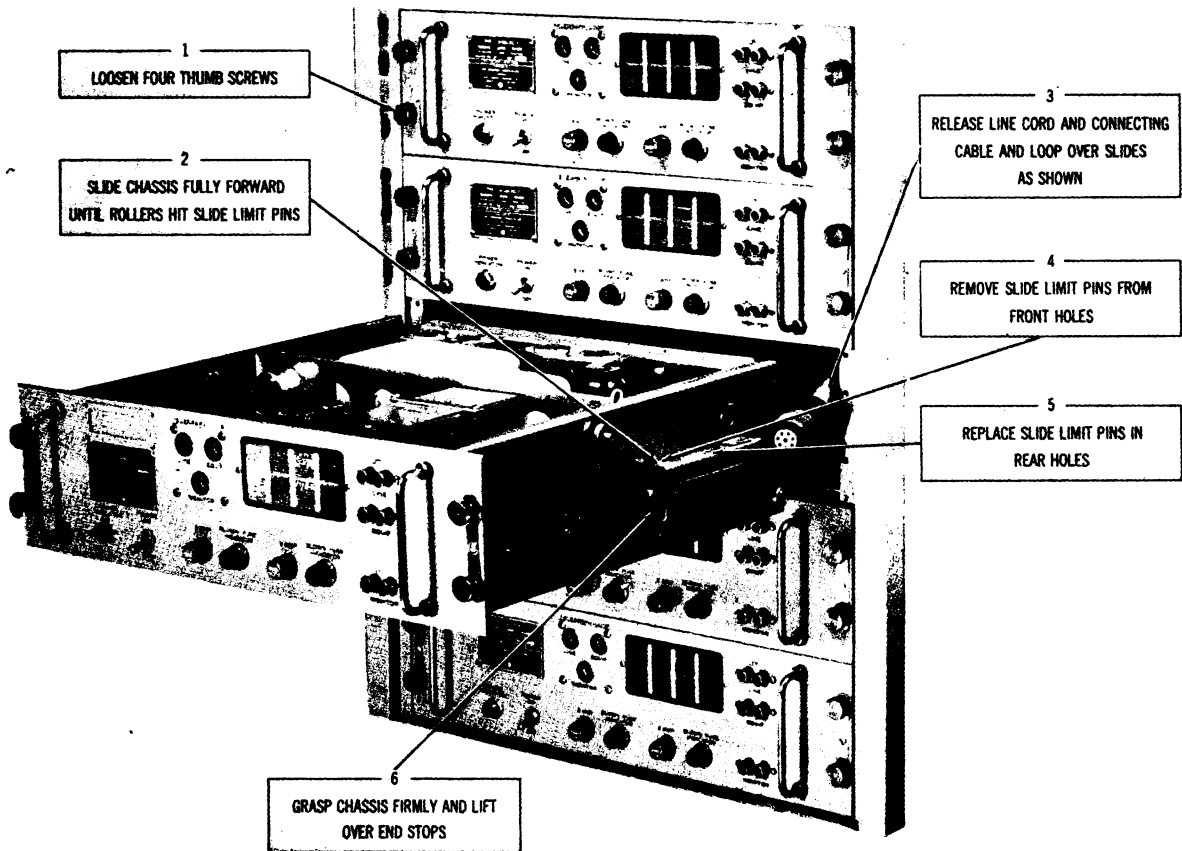


Figure 3-3. Operation of Slide Assembly

inal blocks #20 AWG. As an alternate signal to machines or main distributing frames may be run in Navy type TTRS cable, or other shielded types if required by standard practice. All wires except the incoming power lines must be terminated with a #8 solder lug insulated by a vinyl sleeve pulled over the shank. Figure 3-6 shows the inter-connection wiring harness supplied for 12 channel installations. Other special installations can be made by altering this wiring harness.

c. **INSTALLATION OF FILTER SETS.** - Figures 1-2 and 1-3 show the position of the plug-in frequency determining filter sets in the telegraph carrier transmitter and the telegraph carrier receiver. To remove one of these units, it is necessary to loosen the screw in one side bracket and remove the screw in the other bracket. This allows the cross strap to be turned to side and the filter withdrawn from the socket. To install a filter, reverse the procedure.

NOTE

When changing filters, check that the proper corresponding nameplate is attached to the front panel of the chassis.

3. INITIAL ADJUSTMENTS.

a. **POSITION OF CONTROLS.** - The Telegraph Carrier Terminal AN/FCC-3 has a number of controls and switches that are set once for each installation. These controls are listed in table 3-1.

b. **STARTING THE EQUIPMENT.** - Before starting the equipment check that all connections to the rear terminal boards have been made and that all line cords are plugged in.

CAUTION

Before applying 230 volt power to the equipment check that the switch, S2502, for the fan transformer is at 230 volts and that the transformer tap switch of all thirteen units is at the 230 volt position.

Turn off all power switches on the front panels. Apply power to the cabinet. Turn on the **MAIN POWER** switch on the top panel of the cabinet assembly. Note that the ventilating fan is operating. Turn on each power switch on the panels and note that the pilot lamps light.

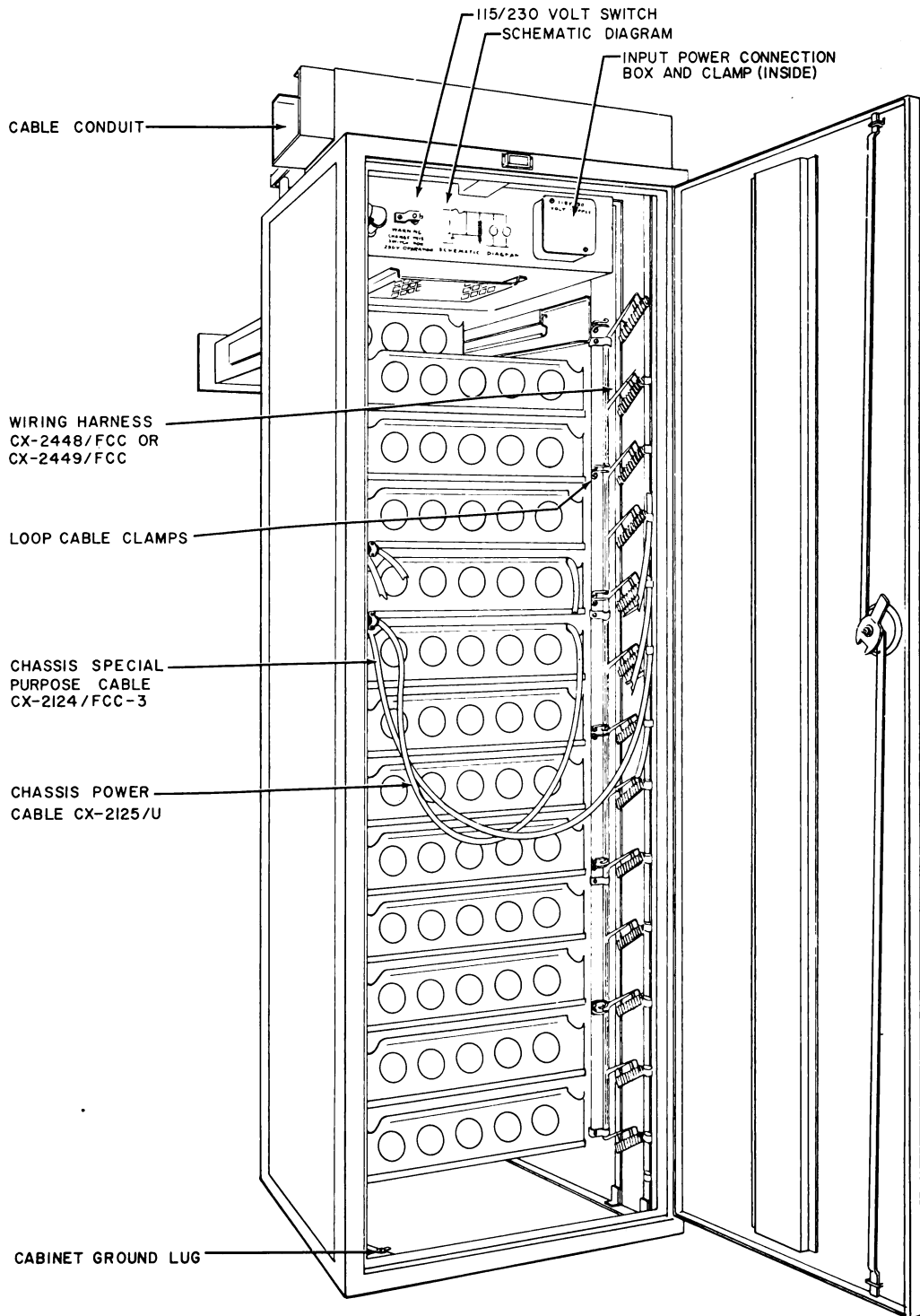


Figure 3-4. Rear View of Cabinet with Wiring

TABLE 3-1. POSITION OF CONTROLS

CONTROL	SYMBOL NUMBER	POSITION
Telegraph carrier transmitter 115 to 230 volt switch	S104	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.
BATTERY FROM LOOP EQUIP switch	S102	BATTERY FROM LOOP for 20 to 60 ma neutral telegraph loop or 30 ma polar telegraph loop with battery supplied from the loop. BATTERY FROM EQUIP for 20 to 60 ma neutral telegraph loop with battery supplied from the transmitter.
LOOP CURRENT OPERATE	S107	Set to 20-40 ma or 50-70 ma loop current.
NORMAL-REVERSE switch	S101	Set to NORMAL position for initial tests. The results of the tests may indicate the REVERSE position.
Telegraph carrier receiver 115 to 230 volt switch	S1305	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.
NORMAL-REVERSE switch	S1301	Set to NORMAL position. The results of the tests may indicate the REVERSE position.
POLAR-NEUTRAL switch	S1302	Set as required by the installation.
BATTERY FROM LOOP EQUIP switch	S1303	BATTERY FROM LOOP for 20 to 60 ma neutral telegraph loop with battery supplied from loop. BATTERY FROM EQUIP for 20 to 60 ma neutral telegraph loop with battery supplied from the receiver. 30 ma polar telegraph loop with battery supplied from the receiver.
DIVERSITY switch	S1306	Set to OFF position for single channel operation. Set to position 1 or 2 for diversity operation (See Section 3, paragraph 3g).
Electronic Frequency Converter CV-243/FCC-3 115 to 230 volt switch	S2602	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.
CONV GAIN control	R2647	Set to maximum counter-clockwise position for 12 channel operation.
Electronic Frequency Converter CV-244/FCC-3 115 to 230 volt switch	S2702	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.

c. SETTING THE SIGNAL OUTPUT LEVELS OF THE TRANSMITTER GROUP. - For single equipment 12 channel operation, the output level of each transmitter is set at -10 dbm (0.245 volts) on a voltmeter with 600 ohms internal impedance. With the controls positioned as in table 3-1, set the level of each transmitter as follows:

(1) Turn on the cabinet MAIN POWER switch S2501.

(2) Turn on the individual transmitter POWER switch.

(3) Loosen the four captive front panel thumb screws holding in the top transmitter. Pull out the transmitter. Plug the dbm meter into the OUT EQUIP jacks J104 and J105.

(4) Adjust the OUTPUT LEVEL ADJ control R118

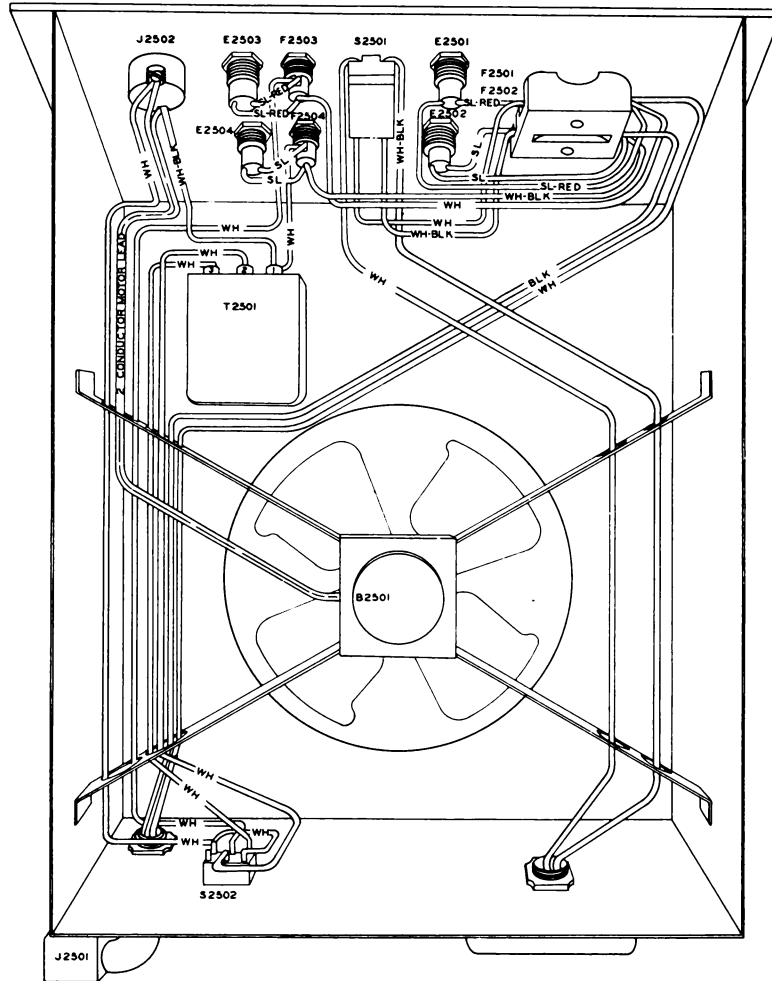


Figure 3-5. Pictorial Wiring Diagram of Cabinet Power Circuits

for an output reading of -10dbm. The frequency of the transmitter may be either MARK or SPACE. It is not necessary to connect in the loop circuit for this measurement.

(5) Check that the output level for MARK and SPACE frequencies are within 2 db of each other.

When all transmitters have been adjusted as outlined above, set the output ATTENUATOR on the Electronic Frequency Converter CV-243/FCC-3 for the level required by the communication system. This output is measured at panel OUT EQUIP jacks J2619 and J2618.

On dual equipment 16 channel operation, as indicated by the block diagram of figure 2-2, the output level of each transmitter is set at -10 dbm. The output of the Frequency Converter CV-243/FCC-3 is measured at the OUT EQUIP jacks with all the normal frequency channels operating and frequency converted channels

disabled. With the output ATTENUATOR set at zero, this level should be approximately -0.5 dbm and the same as the combined total output of the eight channels, as measured at the IN NORM LINE jacks. The line amplifier has a gain of one for the normal frequency channels, and is controlled by R2650. With the normal frequency channels disconnected and the converted channels connected the output level of the Frequency Converter CV-243/FCC-3 is adjusted with potentiometer R2647 to -0.5 dbm at the OUT EQUIP jacks with the output ATTENUATOR set at zero. This will be the same as the combined total output of the eight channels as measured at the IN CONV jacks. The normal frequency channels are then reconnected and the ATTENUATOR adjusted for the line level (-0.5 dbm). A convenient method of disabling the normal frequency channels is to plug a dummy double plug into the IN NORM jack. To disable the converted frequency channel, plug a dummy double plug into the IN CONV LINE jack.

d. **CHECKING AND SETTING THE TRANSMITTER FREQUENCIES.** - Before placing a transmitter group in operation, check that the carrier frequencies of all channels are as shown in table 1-3 under the MARK and SPACE columns. The Electronic Frequency Converter CV-243/FCC-3 is provided with a crystal controlled 85 cycle output that can be used to standardize the carrier frequencies as follows:

- (1) Turn on the MAIN POWER switch S2501.
- (2) Turn on the individual transmitter POWER switch.
- (3) Loosen the four captive front panel thumb screws that secure the transmitter and pull out the chassis. Swing the chassis into the upright position and fasten in place.
- (4) Rotate the LOOP CURRENT control to a minimum; then place the correct loop current through the transmitter loop circuit by plugging in a shorting plug in the TELEGRAPH LOOP EQUIP jack J102 and measuring this current with a 100-0-100 millammeter plugged into the MONITOR jack J103. For this adjustment place BATTERY FROM LOOP EQUIP switch in EQUIP position; then adjust LOOP CURRENT control for required loop current.

(5) Connect the output of the transmitter to the vertical plates of an oscilloscope. Use a double plug inserted in EQUIP jacks J104 and J105.

(6) Connect the 85 cycle output available at jack J2622 of the Electronic Frequency Converter CV-243/FCC-3 to the horizontal plates of the oscilloscope. Adjust the controls of the oscilloscope to view the Lissajous figure.

(7) Adjust the air capacitor C117 when current is flowing in the loop (MARK frequency) to stop the Lissajous pattern. If C117 does not give enough variation of tuning capacitance to stop the pattern, adjust the capacitance switch S106 until the pattern moves at the slowest rate, and then readjust C117. The switch adds and subtracts capacity in approximately 100 mmf steps and with C117 gives a continuous range of capacity. Care must be taken at the higher frequencies to avoid tuning to the wrong frequencies. This can be avoided in two ways; use a signal generator or similar unit for checking, or by placing the leads to the oscilloscope after the filter and noting the true frequency has a greater deflection than an incorrect one. The pattern for a narrowband transmitter should be a single crossover pattern, and the pattern for a wide band transmitter should be with no crossovers.

(8) Remove the shorting plug in TELEGRAPH LOOP EQUIP jack, and substitute an open circuit dummy plug in same jack. This places the transmitter in SPACE condition by breaking the loop current.

(9) Adjust the air capacitor C112 when current is not flowing in the loop (SPACE frequency) until the Lissajous pattern is stopped. If adjustment of C112 does not allow enough capacitance change, adjust the

switch S105. Remarks made in step 7 apply equally well here.

(10) If the Lissajous pattern cannot be stopped, refer to Section 7 for corrective maintenance.

(11) Check that the levels for MARK and SPACE frequencies are within 2 db of each other.

(12) Any standard method of measuring frequency to an accuracy of plus or minus one cycle may be used instead of the Lissajous pattern.

e. **SETTING THE SENDING BIAS CONTROL OF THE TELEGRAPH CARRIER TRANSMITTER.** - The BIAS CONTROL R104 is adjusted at the factory. A positive voltage at the arm of R104 is 10 volts with respect to ground. This voltage should not be changed unless absolutely necessary. If it is necessary to make very slight changes in the transmitted bias, then slight changes in the 10 volts mentioned above are permitted. Never allow the voltage to be less than eight, nor more than sixteen volts. The proper way to adjust transmitter bias is to strap the proper values of the capacitors C102, C103, C104, C105, and C106 on the terminal board E120 to the proper points 1, 2, and 3. (See figure 2-5 and figure 7-8.) Increasing the capacity at point 1 increases marking bias, increasing capacity at point 2 increases spacing bias and increasing the capacity connected to point 3 increases marking bias. The value of the capacity connected to any of the points should be as small as possible consistent with the desired results in transmitted bias. This is necessary in order to maintain the time constants as short as possible for high keying speeds. This is especially true in the case of the wide band channels 9, 10, 11, and 12. In respect to these channels, the capacities should be left off of points 1 and 3. The smallest value of capacity necessary to obtain zero bias should be used on point 2. On the three lowest frequency channels 1, 2, and 3, a capacity should be connected to point 3 in order that a certain condition called "jitter" is reduced to a minimum when these channels are being keyed. This "jitter" is due to the tone oscillator being of a rather low frequency compared to the keying speed and does not always shift its frequency at precisely the same moment when the signal transition occurs. Therefore, the MARK and SPACE frequency transitions may tend to be a little early or late. This shows up when measured as distortion but not necessarily as bias distortion. On all channels above the three lowest, it will not be required to correct for "jitter". The transmitter bias can best be adjusted by keying the transmitter with equal MARK and SPACE pulses at a rate proportional to the keying speed of the equipment and measuring the output frequency of the transmitter with a counting type frequency meter. At zero bias the average frequency is the mid-band frequency of the channel. This adjustment was made at the factory and need not be changed unless the plug-in frequency determining components are replaced with those of a different channel.

f. **PRELIMINARY TESTING OF THE TELEGRAPH CARRIER RECEIVER.** - The receivers are adjusted at the time of installation for optimum performance over the communication line or radio circuit. With the

equipment connected as shown in figure 2-1, follow the procedure below for preliminary testing and adjustment of the telegraph receiver. The telegraph transmitter should be tested according to paragraph c. and d. above before testing the telegraph receivers.

- (1) Turn on the MAIN POWER switch S2501.
- (2) Turn on the individual receiver POWER switch.
- (3) Loosen the four captive front panel thumb screws securing the receiver and pull out the receiver. Swing it into the upright position and fasten it in place.
- (4) Place all the transmitters in the MARK condition with MARK frequencies being transmitted.
- (5) Set switch S1302 of the telegraph receiver to POLAR or NEUTRAL as required.
- (6) Plug a 100-0-100 ma meter into the TELEGRAPH LOOP LINE jack. It is not necessary to rotate the LOOP CURRENT control to a minimum before inserting meter.
- (7) Adjust the LOOP CURRENT potentiometer R1347 for the value of loop current as required.
- (8) If the polar loop circuit is used, check that both the MARK and SPACE currents are equal. If not, adjust the POLAR LOOP CURRENT BALANCE control R1333.

(9) Transmit a message through each channel and record the message on a printer. This is done with one telegraph distributor and one telegraph printer. Note that the message is correctly received on each channel. If the message is not properly received, check that the REVERSE-NORMAL switch S1301 is in the NORMAL position and that the adjustment of the BIAS CONTROL potentiometer R1318 is within operating range. Refer to Section 7 if printing is not obtained. The adjustment of the BIAS CONTROL potentiometer can be determined by first connecting the telegraph printer to send to itself and marking the range quadrant of the machine for the number of degrees over which it will send to itself. With the printer operating from the receiver, the BIAS CONTROL potentiometer is adjusted until the range quadrant of the printer can be changed for the greatest number of degrees within the limits marked on the quadrant with the printer sending to itself.

g. DIVERSITY INSTALLATION. - Refer to figure 2-8 for a block diagram showing the arrangement of two telegraph carrier transmitters and receivers when switched into diversity.

(1) Transmitter diversity operation.

(a) For best diversity operation of the AN/FCC-3 equipment, it is necessary to combine the following channels:

Channel 1 (425 cps) & Channel 5 (1105 cps),
Channel 2 (595 cps) & Channel 7 (1445 cps),
Channel 3 (765 cps) & Channel 6 (1275 cps),

Channel 4 (935 cps) & Channel 8 (1615 cps),
Channel 9 (1955 cps) & Channel 11 (2805 cps),
Channel 10 (2380 cps) & Channel 12 (3230 cps).

(b) The transmitting printer loop circuit must be connected as follows:

1. Connect one wire of the loop to terminal C of channel 1 terminal strip. Connect a jumper wire from terminal D of the same strip to terminal C of channel 5 terminal strip. Connect the other wire of the loop to terminal D of channel 5 terminal strip. This completes the loop circuit for channels 1 and 5 in diversity.

2. Connect loop circuits for channels 2 and 7, 3 and 6, 4 and 8, 9 and 11, and 10 and 12 using the same terminal letters as above.

Do not use any external loop current supply. The current will be supplied by the transmitters. The switches are in the position to supply loop current from the equipment. For diversity operation both transmitters contribute to the loop current. In other words, the loop current power supplies operate in series when connected as indicated in paragraph (b) 1. If the jumper wires that are mentioned above are connected to any terminals other than those indicated, loop current will not flow.

If an external loop supply must be used instead of the internal supply, then the polarity must be correct. If transmitters do not key properly, it will be necessary to throw the NORMAL-REVERSE switch to get the correct polarity. Also, the voltage will have to be high enough to produce the required loop current. The loop current adjustment rheostat can be used for setting the required current. The rheostats are in series when connected for diversity operation, so both rheostats should be adjusted to leave about the same amount of resistance in each when the proper current is flowing in the loop circuit.

(c) The signal line to the radio transmitter modulator (speech amplifier) should be connected to terminals F and G of the transmitting group modulator (lowest terminal strip E2615). The output terminals of the group modulator are not grounded, so polarity does not have to be observed.

(d) Do not operate equipment in diversity with converted signals unless complete instructions have been read or information for this type of operation has been obtained from an engineer familiar with this equipment.

(e) The bias of the transmitters has been adjusted to a minimum at the factory; therefore, unless the adjustment of frequencies and bias have been upset during transportation of the equipment, it should not be necessary to change these controls.

(2) Receiver diversity operation.

(a) For the channel combinations listed in paragraph g (1) (a), the DIVERSITY switch in the receivers can be in the following position:

Channel 1 in position 1	Channel 5 in position 2
Channel 2 in position 1	Channel 7 in position 2

Channel 3 in position 1	Channel 6 in position 2
Channel 4 in position 1	Channel 8 in position 2
Channel 9 in position 1	Channel 11 in position 2
Channel 10 in position 1	Channel 12 in position 2

(b) The Wiring Harness CX-2449/FCC-3 of the receiver group, as shown in figure 3-5, provides the electrical interconnections between the above channels for diversity operation. If it becomes necessary, other channels may be connected in diversity by disconnecting the wiring harness and rewiring the terminal boards. However, the printer loop circuit must always be connected to the C and D terminals of the receiver that has the DIVERSITY switch in position 2.

(c) Connect signal line from radio receiver to the F and G terminals of the receiver group modulator. Neither F nor G is grounded, so the signal line can be connected without regard to polarity from the radio receiver.

(d) The receivers are adjusted at the factory and shipped for diversity operation with minimum bias and peak distortion. For diversity operation the two receivers are adjusted differently for minimum peak distortion than for single channel operation. Two transmitters of corresponding frequencies are keyed simultaneously with the same message. The transmitters must have been previously adjusted for zero bias (a factory adjustment, see Section 3, paragraph 3e) before using for receiver bias adjustments. Use a short line between the transmitters and receivers in order not to introduce any distortion. Set the DISCRIMINATOR LEVEL CONTROL R1315 to full clockwise position. Have NORMAL-REVERSE switch S1301 in NORMAL position. Place POLAR-NEUTRAL switch S1302 in NEUTRAL position. Set DIVERSITY switch S1306 in OFF position. Turn POWER switch S1304 on. Connect a 100-0-100 ma milliammeter by means of a plug in the TELEGRAPH LOOP EQUIP jack. Turn off signal from transmitters and adjustment R1325 (cathode resistor of tube V1305) of both receivers until loop current just begins to flow. Transmit a steady MARK signal to both receivers and set LOOP CURRENT control R1347 for 60 ma. Remove the loop current meter and connect a Distortion Test Set TS-383A/GG or a TS-611/FG (118C) Trans. Meas. Set in its place. Key the transmitters with a test message and adjust each receiver BIAS CONTROL R1318 for zero bias. The adjustments outlined above are all that are necessary for single channel operation.

(e) For diversity operation, further adjustments are necessary. Assuming that the printer is to be connected to the higher frequency channel proceed in the following way. Connect an AC V.T.V.M. between terminal 6 (grid) of tube V1305 and ground. Put DIVERSITY switch S1306 in position 1 on the lower frequency channel receiver. Put DIVERSITY switch S1306 in position 2 on the higher frequency channel receiver. While simultaneously keying both transmitters with a dotter insert a dummy plug in IN EQUIP jacks of the higher frequency channel receiver. Measure the voltage indicated by the V.T.V.M. Now remove dummy plug and insert it in IN EQUIP jacks of the lower frequency channel receiver. Measure the voltage on the grid of the same tube as before (V1305 of the higher frequency channel receiver). Note whether the first or the second

voltmeter reading was higher. If the first reading was higher, then turn the DISCRIMINATOR LEVEL CONTROL R1315 of the lower frequency channel receiver counterclockwise until the voltage on the grid of tube V1305 is the same no matter which receiver the dummy plug is in. If on the other hand the second voltmeter reading was higher then turn the DISCRIMINATOR LEVEL CONTROL R1315 of the higher frequency channel receiver counterclockwise until the voltmeter readings are alike no matter into which receiver the dummy plug has been inserted. This will result in R1315 being in the full clockwise position in one receiver while R1315 will be slightly counterclockwise in the other receiver. Remove the V.T.V.M. from terminal 6 of tube V1305 of the higher frequency channel receiver. Now key the two transmitters with a test message. Insert a dummy plug in the IN EQUIP jacks of one receiver. Readjust the BIAS CONTROL R1318 of the other receiver for zero bias as measured by the DTS. Then remove the dummy plug and insert in the IN EQUIP jacks of the other receiver and adjust BIAS CONTROL of the first receiver for zero bias. The DTS is connected to the higher channel all of the time. Remove dummy plug from receivers and readjust R1325 of the higher channel only until minimum peak distortion is indicated by the DTS. Next simulate a complete signal fade in one channel by inserting a dummy plug in the signal IN EQUIP jacks of one receiver. Observe the peak distortion and bias as indicated by the DTS. Then do the same by plugging the dummy plug into the other receiver creating a fade in this channel. Note the peak distortion and bias. By proper adjustment of R1325 a compromise may be arrived at so that minimum peak distortion will exist for the three conditions of full signal strength in both channels, complete signal fade in one channel or complete signal fade in the other channel. The receivers are now adjusted for diversity operation.

(f) Operation of this equipment in diversity with converted signals is not contemplated and is not possible without additional equipment for equalization over the frequency band.

NOTE

Ground the frame of the printers, AN/FCC-3 cabinets, and especially the Model TT-47/UG printers. Use waterpipe or other good ground. If the printer frames are not grounded, the 60 cycle ripple flows back through the filter capacitors into the loop circuit of the AN/FCC-3 equipment.

h. NORMAL SIGNAL OPERATING LEVELS. - The output of the transmitter group and input of the receiver group is normally set at 0 dbm or .775 rms volts. Receivers will operate with signal variations from -30 to +6 dbm. The signal applied to a receiver should not exceed +6 dbm (1.55 volts). The rms voltage on a line carrying a number of channels is equal to the square root of the sum of the squares of each individual channel signal level. The peak amplitude of the signal on the line is equal to the sum of the peak amplitudes of the individual channels. The maximum peak signal that can be applied to the Frequency Converter CV-244/FCC-3 is 8.66 volts for 16 channels or 4.33 volts for 8 channels operation.

TABLE 3-2. NORMAL SIGNAL OPERATING LEVELS

CONNECTION	EQUIP JACKS TRANSMITTER OUTPUT 600 OHM METER	IN NORM LINE JACKS CV-243/FCC-3 600 OHM METER	IN CONV LINE JACKS CV-243/FCC-3 600 OHM METER	OUT EQUIP JACKS CV-243/FCC-3 600 OHM METER
16 Channel	Set at -10 dbm (0.245 volts) with OUTPUT LEVEL ADJ control. Set 425 and 1615 converted channels at -7 dbm.	-0.5 dbm (0.695 volts)	-0.5 dbm (0.695 volts)	+2.5 dbm with ATTENUATOR set at zero. Set NORM GAIN control for -0.5 dbm output with converted transmitters disabled. Set CONV GAIN control for -0.5 dbm output with the normal transmitter disabled.
12 Channel	Set at -10 dbm (0.245 volts) with OUTPUT LEVEL ADJ control.	+1 dbm (0.85 volts)	0 Set CONV GAIN control at zero.	Set NORM GAIN control for +1 dbm (0.85 volts) with ATTENUATOR at zero.

Note: On a radio circuit these are to be considered as maximum safe values.

CONNECTION	IN LINE JACKS CV-244/FCC-3 600 OHM METER	OUT NORM EQUIP JACKS CV-244/FCC-3 600 OHM METER	OUT CONV EQUIP JACKS CV-244/FCC-3 600 OHM METER	MONITOR JACKS RECEIVER HIGH IMPEDANCE METER
16 Channel	+2.5 dbm	+2.5 dbm set with NORM GAIN control for +2.5 dbm.	-0.5 dbm (0.695 volts) set with CONV GAIN control for -0.5 dbm (0.695 volts).	0.09 to 0.16 volts. The 425 and 1615 converted channels less than center channels due to attenuation of band-pass filters.
12 Channel	+1 dbm	+1 dbm	not used	0.1 to 0.16 volts

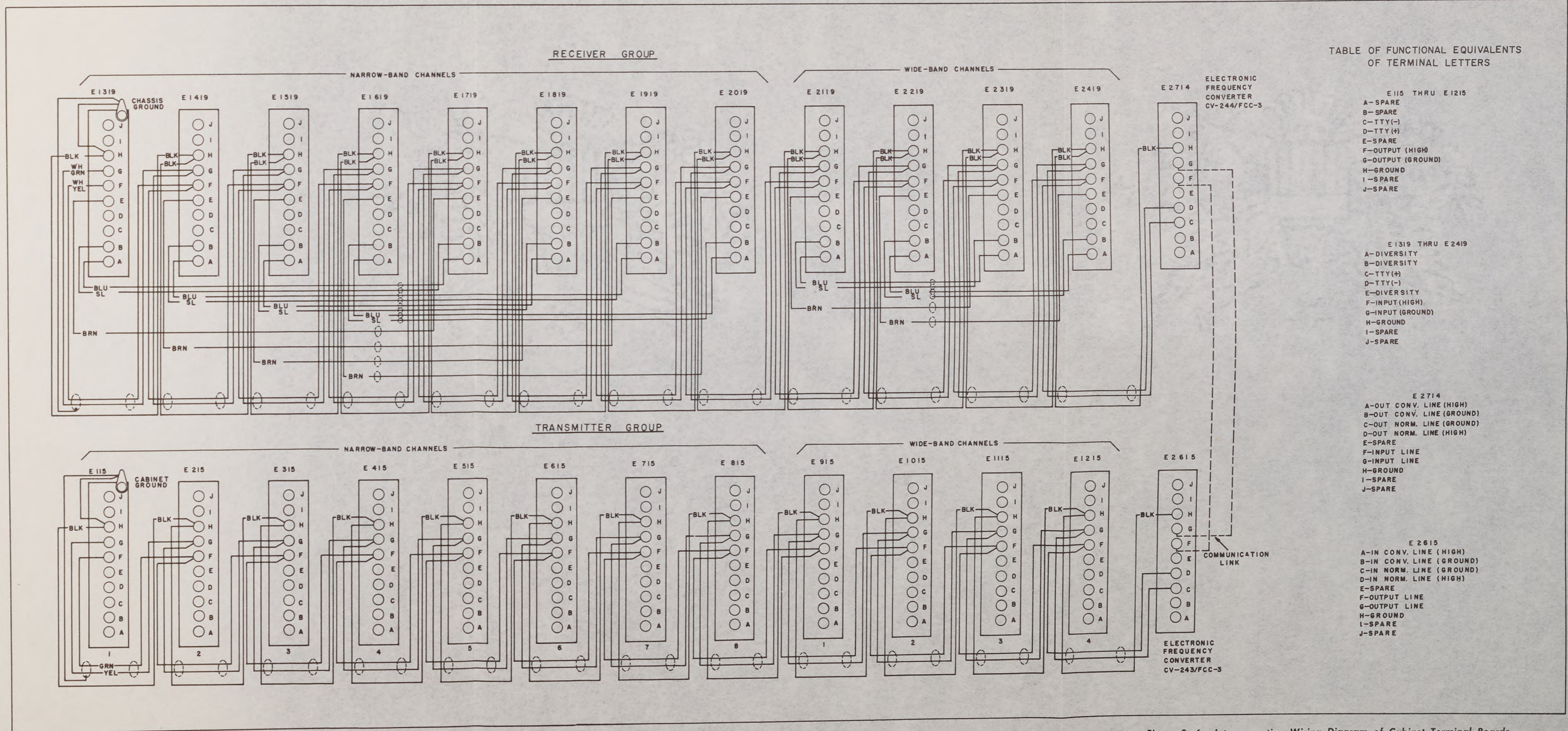


TABLE OF FUNCTIONAL EQUIVALENTS OF TERMINAL LETTERS

E 115 THRU E 1215

- A-SPARE
- B-SPARE
- C-TTY(-)
- D-TTY(+)
- E-SPARE
- F-OUTPUT (HIGH)
- G-OUTPUT (GROUND)
- H-GROUND
- I-SPARE
- J-SPARE

E 1319 THRU E 2419

- A-DIVERSITY
- B-DIVERSITY
- C-TTY(+)
- D-TTY(-)
- E-DIVERSITY
- F-INPUT (HIGH)
- G-INPUT (GROUND)
- H-GROUND
- I-SPARE
- J-SPARE

E 2714

- A-OUT CONV. LINE (HIGH)
- B-OUT CONV. LINE (GROUND)
- C-OUT NORM. LINE (GROUND)
- D-OUT NORM. LINE (HIGH)
- E-SPARE
- F-INPUT LINE
- G-INPUT LINE
- H-GROUND
- I-SPARE
- J-SPARE

E 2615

- A-IN CONV. LINE (HIGH)
- B-IN CONV. LINE (GROUND)
- C-IN NORM. LINE (GROUND)
- D-IN NORM. LINE (HIGH)
- E-SPARE
- F-OUTPUT LINE
- G-OUTPUT LINE
- H-GROUND
- I-SPARE
- J-SPARE

Figure 3-6. Interconnection Wiring Diagram of Cabinet Terminal Boards

SECTION 4
OPERATION

1. INTRODUCTION.

The Telegraph Carrier Terminal AN/FCC-3 consists of 12 channels of telegraph sending equipment and 12 channels of telegraph receiving equipment. A cabinet containing the 12 telegraph carrier transmitters and an Electronic Frequency Converter CV-243/FCC-3 is positioned at the sending end of the communication system. The receiving equipment consists of 12 telegraph carrier receivers and an Electronic Frequency Converter CV-244/FCC-3. Each channel carries a single teletype message. On poor radio circuits two channels may be put in diversity by throwing the DIVERSITY switch in both telegraph receivers and connecting the telegraph transmitter loop circuits in series. The wiring harness in the telegraph receiver cabinet allows the narrowband channels 1 and 5, 2 and 7, 3 and 6, and 4 and 8 to be connected in diversity; the wide band channels 9 and 11, 10 and 12 also may be operated in diversity. See figure 2-9 for a typical two channel diversity set-up. Notice that the DIVERSITY switch is set at position 1 in one receiver and at position 2 in the other, and the printer is plugged into the unit set for position 2. Any channel may be operated individually or placed in diversity with its diversity mate. The front panels of the equipment are provided with patching jacks. As desired, messages may be patched at the TELEGRAPH LOOP jacks of the telegraph carrier receivers and transmitters. The loop circuits to be patched at the front panel must be similar. For example, the messages on two transmitter loops set for 60 ma loop current with battery supplied from the transmitter can be exchanged without adjusting the LOOP CURRENT control; whereas, patching two 60 ma loops with one battery supplied from the loop and the other from the transmitter would require

withdrawing the chassis of each transmitter and adjusting the LOOP CURRENT control. The output jacks of the transmitter are used for test purposes and to remove a channel from the line by plugging an open jack into either the OUT LINE or OUT EQUIP jacks. Similarly, the input jacks of the telegraph carrier receiver are used for test purposes and to remove the receiver from the line by plugging an open jack into the IN LINE or IN EQUIP jacks.

2. OPERATION OF THE TELEGRAPH CARRIER
TRANSMITTER T-371/FCC-3 THROUGH
T-382/FCC-3.

a. GENERAL. - Refer to figure 4-1 for the position of the various front panel operating controls and their functions. The front panel jacks are for signal patching and test purposes. The left-hand side of the OUT EQUIP jacks and the OUT MONITOR jacks are grounded. Care should be taken that all patching jacks and cords used with the equipment are polarized. TELEGRAPH LOOP jacks are provided for patching and monitoring purposes. The telegraph carrier transmitters operate as the transmitting part of the Telegraph Carrier Terminal AN/FCC-3, as shown in the block diagram of figures 2-1 and 2-2. Table 1-3 gives the carrier frequencies of the transmitters. All transmitters, regardless of frequency channel, are the same in wiring. The units differ in the frequency determining components as listed in table 1-4 and the connections to the bias adjusting capacitors C102, C103, C104, C105, and C106. Normally, the equipment does not require adjustment during operation and, therefore, does not have operation controls on the front panel. The rear chassis controls are maintenance adjustments and remain in correct adjustment over long periods of time.

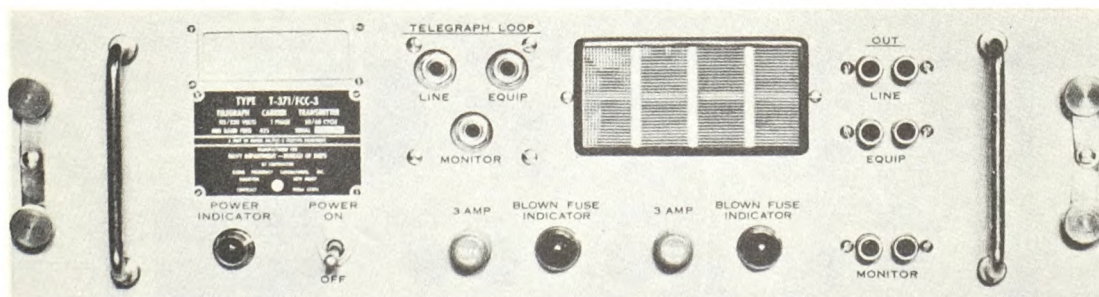


Figure 4-1. Telegraph Carrier Transmitters T-371/FCC-3 through T-382/FCC-3, Identification of Controls

Refer to Section 3 and Section 7 for making minor corrections with the chassis controls.

b. OPERATION. - To operate the equipment, turn on the POWER switch and allow the tubes to warm up. Plug a voltmeter into the OUT EQUIP jacks of each transmitter and measure the output voltage. This voltage should be as originally set at the time of installation. If not, see Section 3 for readjustment of the OUTPUT LEVEL ADJ control. Care must be taken in patching to or from the OUT EQUIP jacks of the transmitters, as the left side of the double jacks are connected to ground. The telegraph loop circuits are not grounded in the equipment. Care should be taken in patching loop circuits that the cords and plugs are polarized, or it may become necessary to change the NORMAL-REVERSE switch on the chassis to obtain correct printing.

3. OPERATION OF THE ELECTRONIC FREQUENCY CONVERTER CV-243/FCC-3.

Refer to figure 4-2 for the position of the various front panel operating controls and their functions. The Electronic Frequency Converter CV-243/FCC-3 operates as part of the telegraph carrier transmitting equipment as shown in the block diagrams of figures 2-1 and 2-2.

On the front panel there are jacks which are used for patching and testing. Care should be taken that all patching jacks and cords used with the equipment are polarized. This is required because both the LINE and EQUIP jacks in the IN NORM and IN CONV groups have the jacks on the left-hand side grounded. In the single equipment connection shown in figure 2-1, a plug placed into the IN NORM LINE jacks connects with the 12 channels on the telegraph carrier transmitter bus. Because of the switching action of each jack, a plug in either the LINE or EQUIP jack will disconnect the unit from the line, and the same plug will be connected to the line or unit depending on the jack used. For instance, a plug placed into the IN NORM EQUIP jack picks up the input to the normal channel of the converter and disconnects this input from the line. On 12 channel operation, the IN CONV channel and jacks are not used; but on 16 channel operation the IN CONV channel and jacks are connected to a bus of eight narrow-band transmitters. The IN NORM channel and jacks are connected to another

bus of eight other narrow-band transmitters. The OUT jacks of the converter connect the unit with the output line of the equipment for transmission by radio or wire line circuits. An OUT MONITOR jack is provided for test and is connected across the output line of the converter. A vacuum tube voltmeter should always be used to make measurements at the OUT MONITOR jacks. An ATTENUATOR R2669 is used to lower the output line level to meet the requirements of the radio transmission system or the wire line. An 85 CPS TEST signal of between 5 and 10 volts is available at the 85 CPS TEST jack for use in adjusting transmitter frequencies. 3400 CPS TEST jacks are provided to test the operation of the oscillator and divider circuits. Across these jacks a voltage of 20 volts can be measured with a vacuum tube voltmeter under normal operation. For adjustment procedures of the locking type controls located on the top of the chassis, refer to Section 3 and Section 7.

4. OPERATION OF THE TELEGRAPH CARRIER RECEIVER R-525/FCC-3 THROUGH R-536/FCC-3.

a. GENERAL. - Refer to figure 4-3 for the position of the various front panel operating controls and their functions. The front panel jacks are for signal patching and testing purposes. Care should be taken that all patching jacks and cords used with the equipment are polarized, since the left-hand side of the IN EQUIP and IN MONITOR jacks are grounded. The telegraph loop can be patched at the TELEGRAPH LOOP EQUIP and jacks, or monitored at the TELEGRAPH LOOP LINE MONITOR jack. As shown in the block diagram of figures 2-1 and 2-2, the telegraph carrier receivers operate as the receiving part of the Telegraph Carrier Terminal AN/FCC-3. Table 1-3 gives the carrier MARK and SPACE frequencies of the receivers. Except for the four wide-band channels, the chassis and wiring of each receiver are the same for all channels. An 0.006 mf capacitor replaced an 0.02 mf capacitor C2109, C2209, C2309, and C2409 in the wide-band receivers. There are no operation controls on the front panel since the equipment does not require adjustment during operation. The rear chassis controls are maintenance adjustments and remain in correct adjustment over long periods of time. If the telegraph polarity is changed, it may become necessary to change the posi-

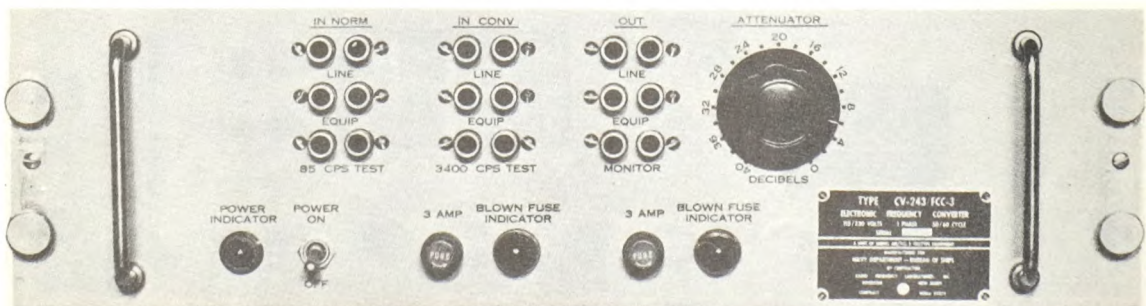


Figure 4-2. Electronic Frequency Converter CV-243/FCC-3, Identification of Controls

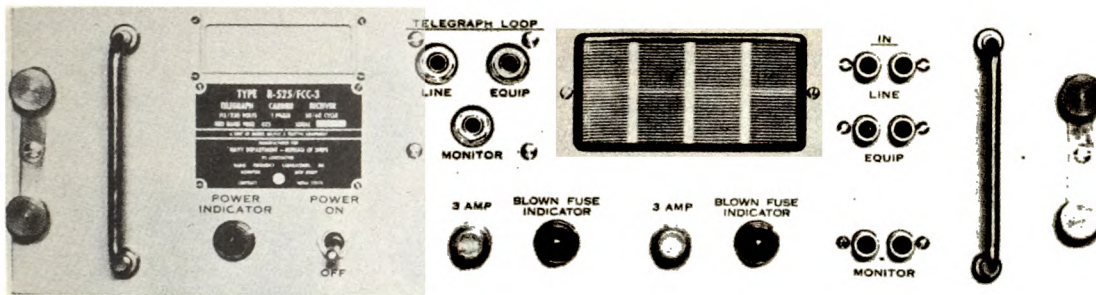


Figure 4-3. Telegraph Carrier Receivers R-525/FCC-3 through R-536/FCC-3, Identification of Controls

tion of the NORMAL-REVERSE switch. Refer to Section 3 and Section 7 for making corrections with the chassis controls.

b. **OPERATION.** - To operate the equipment turn on the POWER switch and allow the tubes to warm up. Check the TELEGRAPH LOOP MONITOR jack signal with a printer to observe satisfactory printing. If not printing, refer to Section 7 for corrective measures. The input filter of the telegraph carrier receiver is grounded; therefore, care must be taken in patching to or from the IN LINE or IN EQUIP jacks. The output telegraph loop circuits are energized from the plates of the output tubes and therefore operate at 50 to 150 volts above ground. External grounds on the output telegraph loop circuits will cause faulty operation.

c. **OPERATION OF THE TELEGRAPH CARRIER RECEIVERS IN DIVERSITY.** - Refer to figure 2-9 for a block diagram showing the arrangement of two telegraph carrier receivers when switched into diversity. For diversity the following channels are operated together; 1 and 5, 2 and 7, 3 and 6, 4 and 8, 9 and 11, and 10 and 12. The Wiring Harness CX-2449/FCC-3 provides the electrical interconnection between the above channels. To place two telegraph carrier receivers in diversity, proceed as follows:

(1) Check that the two telegraph carrier transmitters are being keyed with the same intelligence. The loop circuits of the transmitters are connected in series, as shown in figure 2-9, with the battery supplied by the transmitters.

(2) Turn the DIVERSITY switch of one telegraph carrier receiver of a pair to position 1 and the DIVERSITY switch of the other telegraph carrier receiver to position 2.

(3) Connect the output telegraph loop circuits to the telegraph carrier receiver which has the DIVERSITY switch in position 2.

(4) Plug a telegraph printer into the TELEGRAPH LOOP MONITOR jack and observe proper printing. If proper printing is not obtained refer to Section 3, paragraph 3 g.

5. OPERATION OF THE ELECTRONIC FREQUENCY CONVERTER CV-244/FCC-3.

Refer to figure 4-4 for the position of the various operating controls and their function. The front panel jacks are for patching signals and for testing the operation of the Electronic Frequency Converter CV-244/FCC-3. Care must be taken that all patching cords used with the equipment are polarized, because the left side of the OUT NORM LINE and OUT CONV LINE jacks may be grounded as these lines are the input filter bus of the telegraph carrier receivers. The Electronic Frequency Converter CV-244/FCC-3 operates as part of the telegraph carrier receiving equipment as shown in the block diagram of figures 2-1 and 2-2. Plugging into the IN LINE jacks brings the incoming telegraph carrier line out for test or patching purposes and disconnects the entire telegraph carrier receiver equipment from the line. Plugging into the IN EQUIP jacks disconnects the line and brings out the input leads to the Electronic Frequency Converter CV-244/FCC-3. Plugging into the OUT NORM LINE connects to the input filter bus of the telegraph receivers as shown in figure 2-1 and disconnects the unit from this bus. The OUT NORM EQUIP jacks connect to the output of the line amplifier as shown in figure 2-15. Under normal operation the carrier frequencies and amplitudes of the voltages present on the incoming line are present at OUT NORM EQUIP jacks. A plug in the OUT CONV LINE jacks picks up the input to the frequency converted telegraph carrier receiver channels and disconnects the output of the unit to these receivers, while a plug in the OUT CONV EQUIP jacks connects to the frequency converted signal output of the Electronic Frequency Converter CV-244/FCC-3 and also disconnects it from the receivers. Monitor jacks are provided on both the OUT NORM and OUT CONV jacks. These monitor jacks are connected across the line for test purposes and do not open the line. A vacuum tube voltmeter should be used to make measurements at these monitor jacks. An ATTENUATOR R2756 is used to lower the input line level to the Electronic Frequency Converter CV-244/FCC-3, and under normal operating conditions the input line level should be about zero dbm. Line levels of greater than +6 dbm will cause distortion and inter-modulation in the line amplifier and the modulator diode circuits. The 3400 CPS TEST jacks are provided to test the operation of the oscillator and divider circuits of the

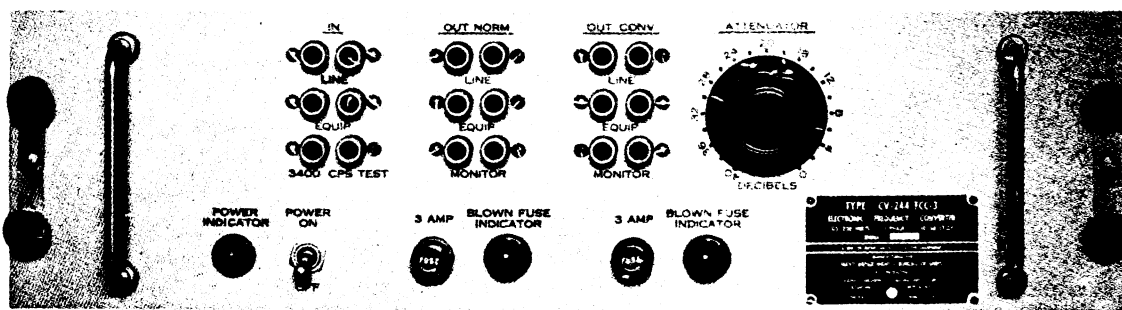


Figure 4-4. Electronic Frequency Converter CV-244/FCC-3, Identification of Controls

converter, and a 3400 cps voltage of 20 volts can be measured across these jacks with a vacuum tube voltmeter under normal operating conditions. For adjustment procedures of the locking type controls located on the top of the chassis refer to Section 3 and Section 7.

6. LONG LOOP CABLES.

a. **EFFECT ON KEYING OF EQUIPMENT.** - When the equipment is operated in connection with a long telegraph loop cable, considerable loop line distortion will exist. This is due to the capacitance, resistance, and inductance of the cable. The capacitance of the cable is the factor which contributes most of the distortion when the equipment is used in connection with a cable, approximately 5 or 10 miles long, particularly if the loop battery is located at the equipment end and the loop keying is done at the far end of the cable. The effect is particularly aggravated when the resistance of the LOOP CURRENT control R101 is increased to operate the equipment at 20 ma. The reason for this effect is that when the printer closes the loop circuit at the far end of the cable a charge is placed on the capacitance of the cable. This charge is actually the source of plate voltage that causes the 15 kc keying oscillator in the transmitter chassis to oscillate. When the printer at the far end of the cable opens, the charge on the cable can not discharge or leak off at the end so it must leak off at the end of the cable located at the equipment. The only way the charge on the cable can leak off is through the LOOP CURRENT resistor R101, R125, and R126 as well as the plate circuit of the 15 kc keying oscillator. The amplitude of the output of the 15 kc oscillator decreases rapidly when the printer key first opens. The oscillations then recede slowly. This may be observed by using an oscilloscope on the terminals 7 and 8 of the 15 kc oscillator unit. It can be observed on the screen of the oscilloscope, that the output of the keying oscillator rises to full amplitude very quickly when the printer key closes, and the output decays rapidly at first and more slowly later when the printer key opens. These tails tend to produce a distinct marking bias in the transmitter output. This effect is nearly overcome by setting the arm of BIAS CONTROL R104 at +10 volts with respect to ground. However, some marking bias will still be evident which can not and should not be corrected in the transmitter.

b. **IMPROVED KEYING OF EQUIPMENT.** - In order to improve the keying of the equipment certain steps, when possible, should be taken in locating the loop battery in relation to the equipment. First, if possible, operate the transmitters at 60 ma neutral loop current instead of 20 ma neutral. This will discharge the long cable more quickly. Second, try to locate the loop battery and the LOOP CURRENT adjustment control at the end of the cable closest to the transmitting printer. This makes it possible to reduce the resistance of the LOOP CURRENT control R101 in the equipment to a minimum, thereby discharging the loop circuit more rapidly. This method of operation will make 20 ma operation almost equal to 60 ma operation. Third, if possible, operate the equipment with polar keying instead of neutral. Polar keying is particularly effective on long cable loop circuits. It is often impossible to use polar keying; therefore it may be stated that, in general, for best operation of the equipment, the loop battery and the LOOP CURRENT adjustment should be located at the end of the loop cable where the transmitting printer is.

c. **GENERAL INFORMATION ABOUT CABLES.** - In general, a long cable may be considered as having considerable capacitance, some resistance, and a small inductance. These components are distributed along the cable but their effect, electrically, can be roughly reproduced by a pi-network consisting of two resistors in series with a local loop circuit and the junction of the resistors shunted to the other side of the local loop circuit by a capacitor. For example, a five mile standard cable might be simulated by a pi-network made up of a 200 ohm resistor in series with another 200 ohm resistor and the junction between the resistors shunted to the other side of the loop circuit by a 0.42 mf capacitor. It can be readily visualized that if the 0.42 mf capacitor is charged up by the loop battery voltage and the key suddenly opened at one end of the pi-network that the capacitor would take a considerable length of time to discharge especially if the discharge circuit consisted of fairly large values of resistors as in the case of 20 ma operation of the equipment if the resistance of the LOOP CURRENT control R101 is set at a high value. If there is inductance in the cable, spacing bias will be produced. However, it takes a lot of inductance to produce much spacing bias so the capacitance of the cable usually

out weighs the inductance. Normally, the transmitter equipment is designed and built to produce close to zero bias itself and is not expected to overcome bias due to distortion created by a loop cable circuit. It is not expected to appreciably increase the bias already existing in the loop circuit.

7. SUMMARY OF OPERATION.

The following procedure should be followed by the operator when putting the Telegraph Carrier Terminal AN/FCC-3 into operation after it has been off for a period of time.

- a. Turn on the MAIN POWER switch.
- b. Turn on the individual telegraph carrier trans-

mitter and receiver POWER switches. Turn on the POWER switches of the Electronic Frequency Converters.

- c. Allow the equipment to warm up, then measure the voltage at all the telegraph carrier receiver MONITOR jacks. This voltage should be between 0.1 and 0.16 volts on all channels with the telegraph carrier transmitter outputs set at -10 dbm and equal individual signal levels maintained through the electronic frequency converters and transmission system.

- d. Transmit a telegraph test message through each channel of the Telegraph Carrier Terminal AN/FCC-3. If errors in printing are observed, refer to Section 3 and Section 7 for adjustment or maintenance procedures to follow for correction.

SECTION 5 OPERATOR'S MAINTENANCE

1. ROUTINE CHECK CHARTS.

During periods of continuous operation the routine checks tabulated in table 5-1 should be made daily.

2. EMERGENCY MAINTENANCE.

The units may be removed from the cabinet and positioned for maintenance as shown in figure 5-1. The

unit remains in operating condition with all signals and power supply potentials connected when withdrawn from the cabinet. A blown fuse is indicated by its front panel BLOWN FUSE INDICATOR. Inspect all tubes for filament heat or gassy condition. See figures 7-3, 7-8, 7-13, and 7-18 for location of tubes. A faulty tube must be replaced with the type stamped on the chassis or its reliable counterpart as shown on the schematic diagrams of Section 7. If the cause of failure of the unit

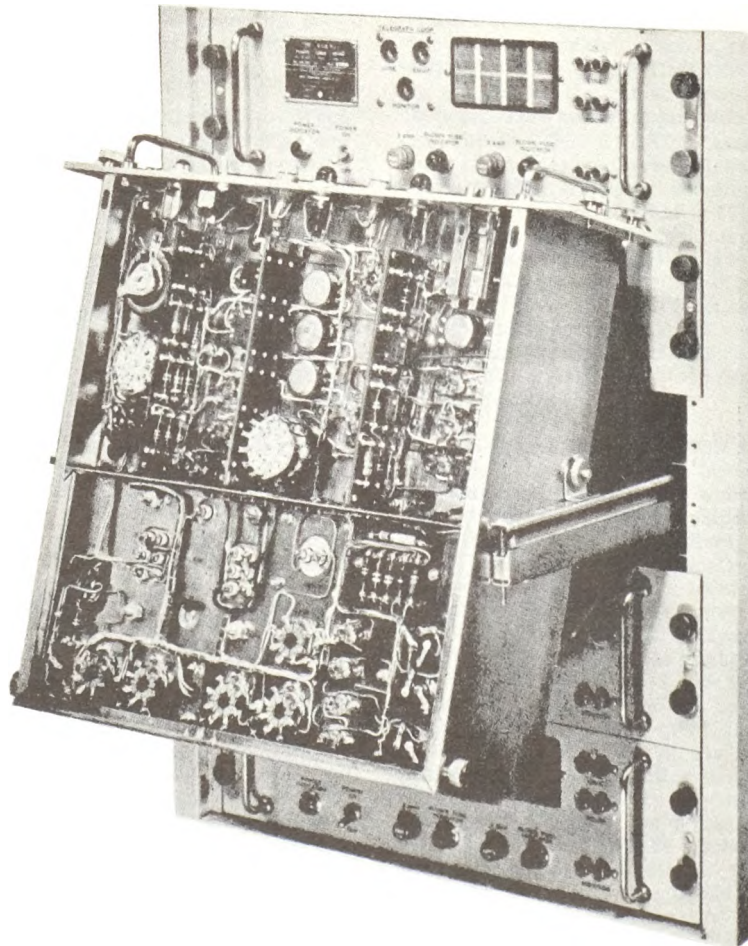


Figure 5-1. Unit Removed from Cabinet for Maintenance

cannot be determined by visual inspection, the complete unit may be replaced with a spare chassis. The following groups of units are interchangeable and can be converted to other center band channel frequencies in the same group by exchanging nameplates and plug-in frequency determining components and connecting the proper capacitors on the terminal board E120. See Section 2, paragraph 2 c. The installation adjustments of Section 3 must be performed after changing frequency determining components.

If it is necessary to replace the 12AU7 type tube V103 in the transmitter chassis with a reliable type tube 5814, it will be necessary to adjust the factory bias. This can be accomplished by connecting the proper capacitors on the terminal board E120 to the terminal lugs numbered 1, 2, and 3. For a detailed explanation

of the function of the factory bias adjustment terminal board see Section 2, paragraph 2 c.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been corrected.

CAUTION

When chassis is tilted for maintenance, thumb nuts should be tightened to prevent accidental release.

TABLE 5-1. ROUTINE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
Telegraph carrier receiver loop bias and printing.	Plug a telegraph printer into the <u>TELEGRAPH LOOP MONITOR</u> jack of the telegraph carrier receiver and monitor the received message. Check each channel for proper printing. Determine the range of correct printing on the bias quadrant of the printer.	If the range of the bias quadrant is less than normal, mark the channel for readjustment.
Telegraph carrier transmitter loop bias.	Plug a telegraph printer into the <u>TELEGRAPH LOOP MONITOR</u> jack of the telegraph carrier transmitter and monitor the bias of the transmitted message.	The transmitting printers must be properly adjusted.
Output level of each telegraph carrier transmitter.	Plug a vacuum tube voltmeter into the <u>OUT MONITOR</u> jacks of the telegraph carrier transmitter.	The voltage level at the <u>OUT MONITOR</u> jacks of the telegraph carrier transmitter should be -4 dbm.
Line level at telegraph carrier receiver equipment.	Plug a vacuum tube voltmeter into the <u>OUT NORM MONITOR</u> jacks of the Electronic Frequency Converter CV-244/FCC-3.	The line level at the telegraph carrier receivers should be a maximum of +2.5 dbm for 16 channels and +1 dbm for 12 channels. Levels less than -30 dbm may cause errors.

TABLE 5-2. INTERCHANGEABLE UNITS

GROUP	FREQUENCY DETERMINING COMPONENTS
Telegraph Carrier Transmitter T-371/FCC-3, T-372/FCC-3, T-373/FCC-3, T-374/FCC-3, T-375/FCC-3, T-376/FCC-3, T-377/FCC-3, T-378/FCC-3, T-379/FCC-3, T-380/FCC-3, T-381/FCC-3, T-382/FCC-3.	AF transformer, Transmitter filter (see Section 3 for required adjustments.)
Telegraph Carrier Receiver R-525/FCC-3, R-526/FCC-3, R-527/FCC-3, R-528/FCC-3, R-529/FCC-3, R-530/FCC-3, R-531/FCC-3, R-532/FCC-3.	Receiver filter, Discriminator transformer (see Section 3 for required adjustment.)
Telegraph Carrier Receiver R-533/FCC-3, R-534/FCC-3, R-535/FCC-3, R-536/FCC-3.	Receiver filter, Discriminator transformer (see Section 3 for required adjustment.)

SECTION 6 PREVENTIVE MAINTENANCE

1. PREVENTIVE MAINTENANCE.

Forced ventilation is provided in the Telegraph Carrier Terminal AN/FCC-3. The air flow is through the front panel air filters, over the chassis and tubes, to the rear of the cabinet, then up to the fan and out through a screen at the top. This air flow should not be disturbed by leaving a unit out of the cabinet for an extended period of time or leaving the rear door open. The screen at the top of the cabinet must be kept clean. The front panel air filters are easily inspected and cleaned. The ventilation of the Telegraph Carrier Terminal AN/FCC-3 should be maintained at the highest possible efficiency to lower the chassis temperature and so increase the life of the components and tubes.

2. ROUTINE MAINTENANCE CHECK CHARTS.

Table 6-1 lists the maintenance operations and checks

that should be done on a weekly basis to insure continued operation of the equipment.

NOTE

The attention of Maintenance Personnel is invited to the requirements of Chapter 67 of the Bureau of Ships Manual, of the latest issue.

3. LUBRICATION.

The only moving parts in this equipment are the rollers in the chassis slides and the blower motor. This motor has sealed bearings which require no lubrication. The shafts for the rollers should be lubricated semi-annually with type AN-G-25 lubricating grease. There are a total of eight shafts (four on the chassis and four on the cabinet) which are accessible after removing the chassis from the slides.

TABLE 6-1. ROUTINE MAINTENANCE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	REMARKS
Cabinet ventilation screen.	Remove plate on the top of the cabinet.	Remove screen and clean with a brush every week.
Front panel air filters.	Inspect with a flashlight. Inspect units nearest the floor.	Remove air filters and clean with compressed air at monthly intervals.
Carrier frequencies of telegraph carrier transmitters.	Follow the procedure outlined in Section 3, paragraph 3d.	
Telegraph bias.	Follow the procedure outlined in Section 3, paragraph 3f.	If a change of bias greater than 5% (7% for diversity operation) occurs, refer to Section 7 and trouble shoot the system for faulty components.
Signal levels.	Follow the system of level setting as outlined in Section 3, paragraph 3h.	A change of signal level may indicate faulty components. Refer to Section 7 and trouble shoot the channel affected.

FAILURE REPORTS

A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NAVSHIPS 383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from the nearest District Printing and Publication Office.

Figure 7-1. Failure Report,

SECTION 7 CORRECTIVE MAINTENANCE

1. GENERAL.

This section of the instruction book contains diagrams, tables and other pertinent data useful in servicing the Telegraph Carrier Terminals AN/FCC-3, AN/FCC-7 and AN/FCC-8.

The equipment does not require adjustment during operation and therefore does not have operating controls on the front panel. The rear chassis controls are maintenance adjustments and will remain in correct adjustment over long periods of time. They usually need adjustment after replacing tubes or servicing the equipment. The adjustment of these controls is normally performed by the technician to ensure proper operation of the equipment. To facilitate inspection and servicing of the chassis, the chassis may be pulled out from the cabinet and tilted up by first loosening the four thumb screws on the front panel.

2. CORRECTIVE MAINTENANCE.

A degradation in the operation of the equipment as determined by the routine checks of Section 6 indicates the need for corrective maintenance. The immediate application of corrective maintenance procedures may save the complete failure of a communication channel at the time it is most needed. In many cases an impending component failure will degrade the operation of the equipment before complete failure.

3. SYSTEM TROUBLE SHOOTING.

Normally, the first step in correcting any trouble or failure which may occur in any electronic device is to isolate the section of the circuit which is the source of trouble. The usual method of localization of trouble is to apply a signal to the input of the equipment and follow the signal through the circuits. Figures 7-2 and 7-3 show a servicing block diagram of a typical telegraph channel. An oscilloscope may be used to advantage in locating trouble by the signal tracing method. Representative oscilloscope patterns are shown in figures 7-2 and 7-3 to enable a comparative visual check of the signal as it passes through the system. These patterns are shown associated with the point in the circuit where they may be observed. The oscilloscope should be connected between the ground and the desired point in the circuit except when the receiver group input or transmitter group output signal pattern is to be observed on ungrounded circuits. The oscilloscope is connected across the line in this case. Figure 7-2 shows the multi-frequency patterns observed at the transmitter group output and the receiver group input. The presence of a particular signal in the pattern cannot be determined. It is advisable

when trouble shooting in a certain channel to turn off all the transmitters except the one of interest and follow the signal through the system. This may not be possible if the other channels are in service. If a signal is present on the input of the transmitter filter and not present at the output of the receiver filter, replace the two filters. Later determine the faulty filter of the two. Panel test jacks are provided at several points to trouble shoot the system. Refer to table 7-1 for a system trouble shooting chart. The only test equipment required is an oscilloscope and a resistor of 100 to 300 ohms. Place the resistor across the terminals of the oscilloscope when viewing the signal pattern in the TELEGRAPH LOOP MONITOR circuits.

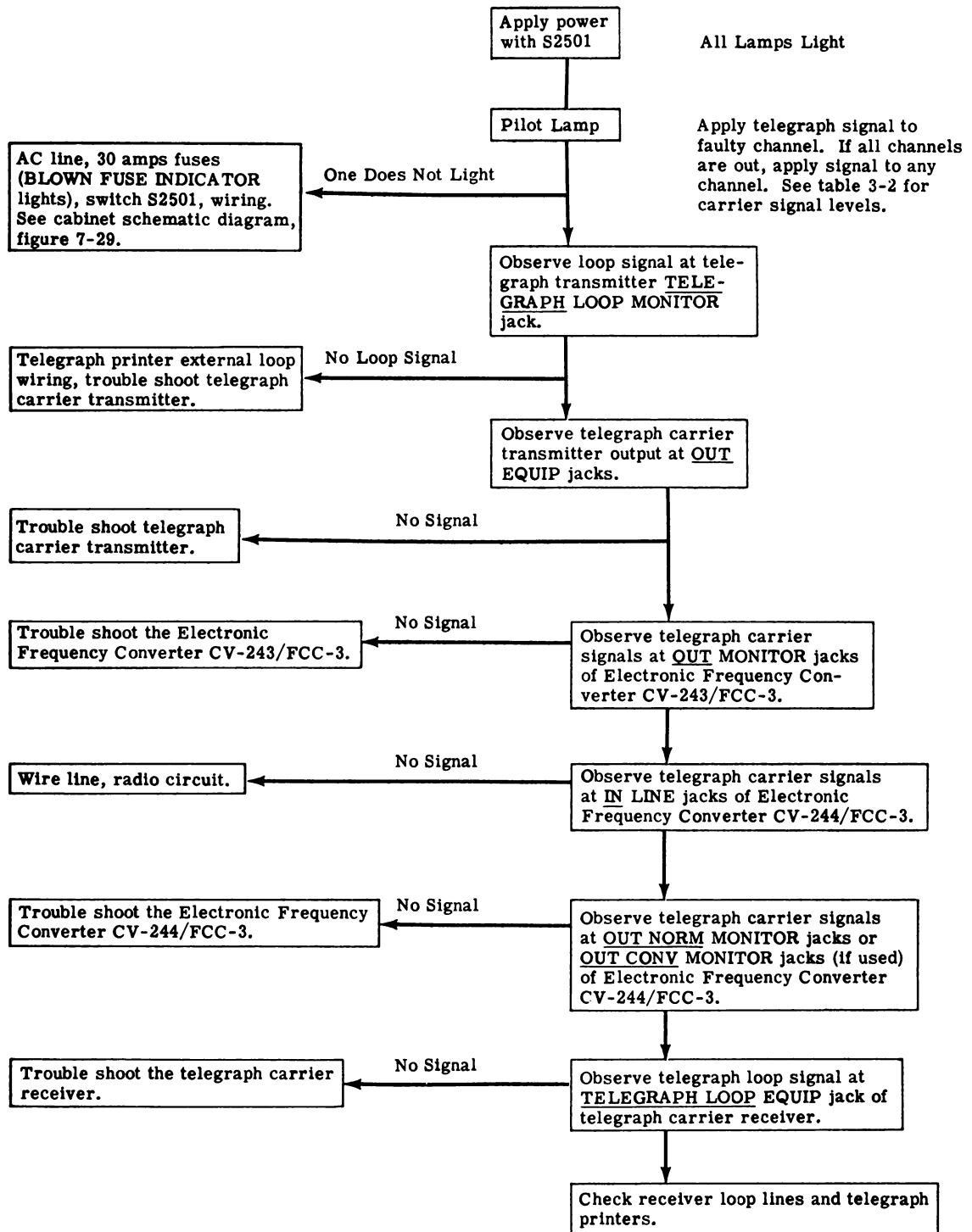
4. TELEGRAPH CARRIER TRANSMITTER T-371/FCC-3 THROUGH T-382/FCC-3, TROUBLE SHOOTING.

a. GENERAL. - The telegraph carrier transmitter converts the DC telegraph pulses to frequency shift carrier signals. A failure in this unit normally affects only the channel in which it is used. The MARK and SPACE frequency, signal level, and bias settings of the transmitter should be checked before detailed trouble shooting is started. The block diagram of figure 7-2 will be found helpful in trouble shooting this unit. The trouble shooting chart of table 7-2 describes a signal tracing method for determining trouble. The applied signal for testing can be generated by a telegraph printer or a Distortion Test Set TS-383A/GG. If a telegraph printer provided with a repeat key is used, hold down the repeat key and a single character key such as "R". If a Distortion Test Set TS-383A/GG is available, it can be set to transmit an "R" character. The wave shapes shown on the block diagram of figure 7-2 are those of a 50% MARK and SPACE signal. A letter character would include several MARK and SPACE pulse lengths. A faulty unit can be caused by jacks, 15 kc oscillator circuit, power supply, DC amplifier, carrier oscillator circuit, output amplifier, or filter. After using table 7-2 to locate the stage in which the trouble is located, refer to the schematic diagram of figure 7-8 and trouble shoot the individual components. Typical voltages and resistances are given in figure 7-4. The physical location of the components can be determined from the wiring diagram of figure 7-9 and the top and bottom views of the unit as shown in figures 7-5 and 7-6. Figure 7-7 locates the components on the terminal boards.

b. TELEGRAPH BIAS ADJUSTMENT CAPACITORS.

- The transmitter telegraph bias adjustment for each channel is set at the time of manufacture by placing the correct values of capacitors on three positions

TABLE 7-1. SYSTEM TROUBLE SHOOTING CHART



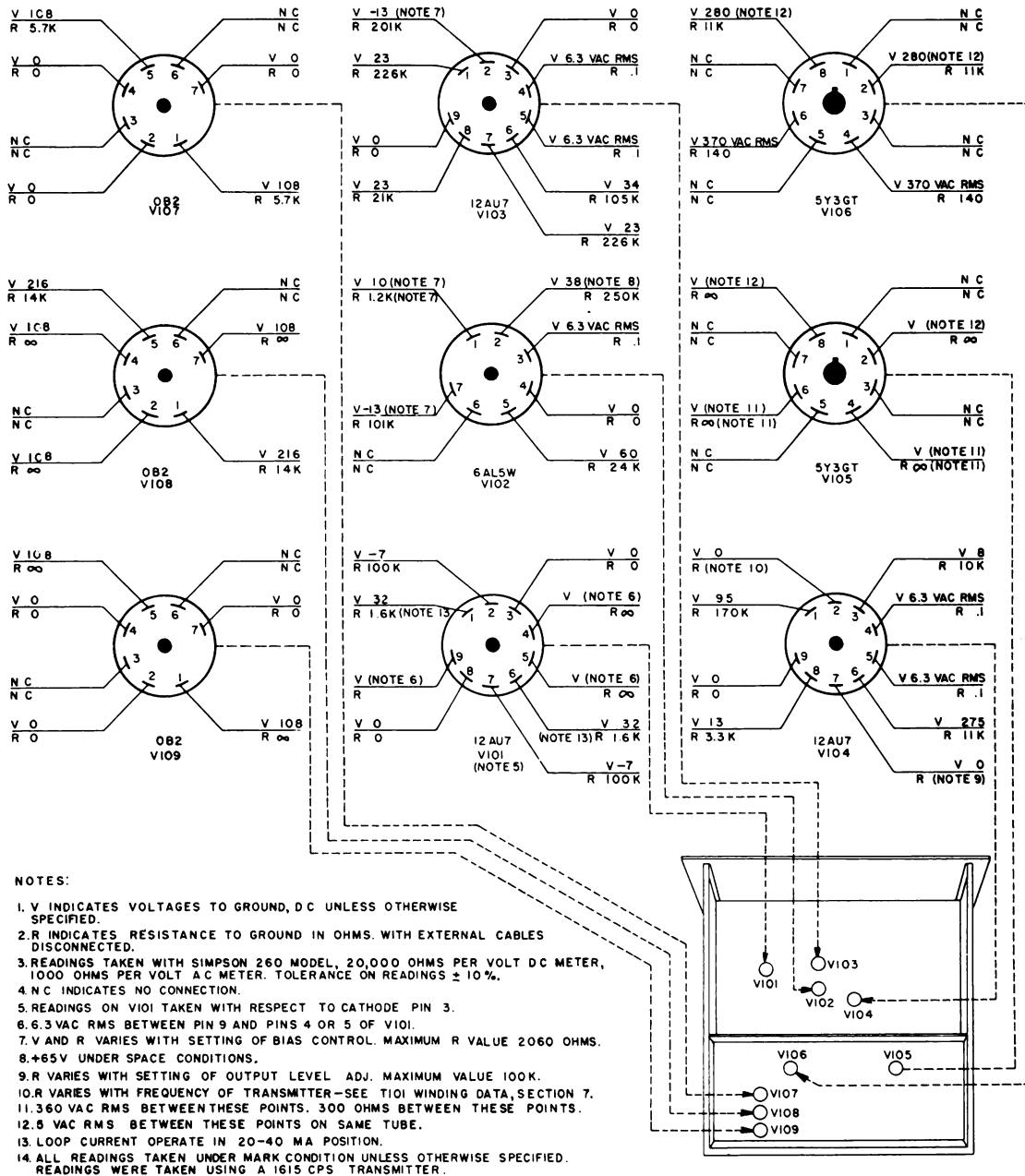


Figure 7-4. Telegraph Carrier Transmitter Voltage and Resistance Chart

in the DC amplifier. The values of these capacitors and their position are given in the notes of figure 7-8. Fine control on the adjustment of bias is accomplished with potentiometer R104. This control has approximately $\pm 5\%$ bias adjustment and can be set by the operator from the top of the chassis. If an adjustment of the bias capacitors becomes necessary, the capacitors on the terminal board E120 can be reconnected

so as to provide a control of $\pm 5\%$ from zero-bias setting with potentiometer R104. An addition of capacity on terminal 2 of the bias adjust terminal board increases the spacing bias. The addition of capacity on terminal 1 or 3 increases the marking bias. The minimum values of capacitance on terminals 1 and 2 necessary to obtain proper bias control should be used. The value of capacitance on terminal 3 should not be changed more than

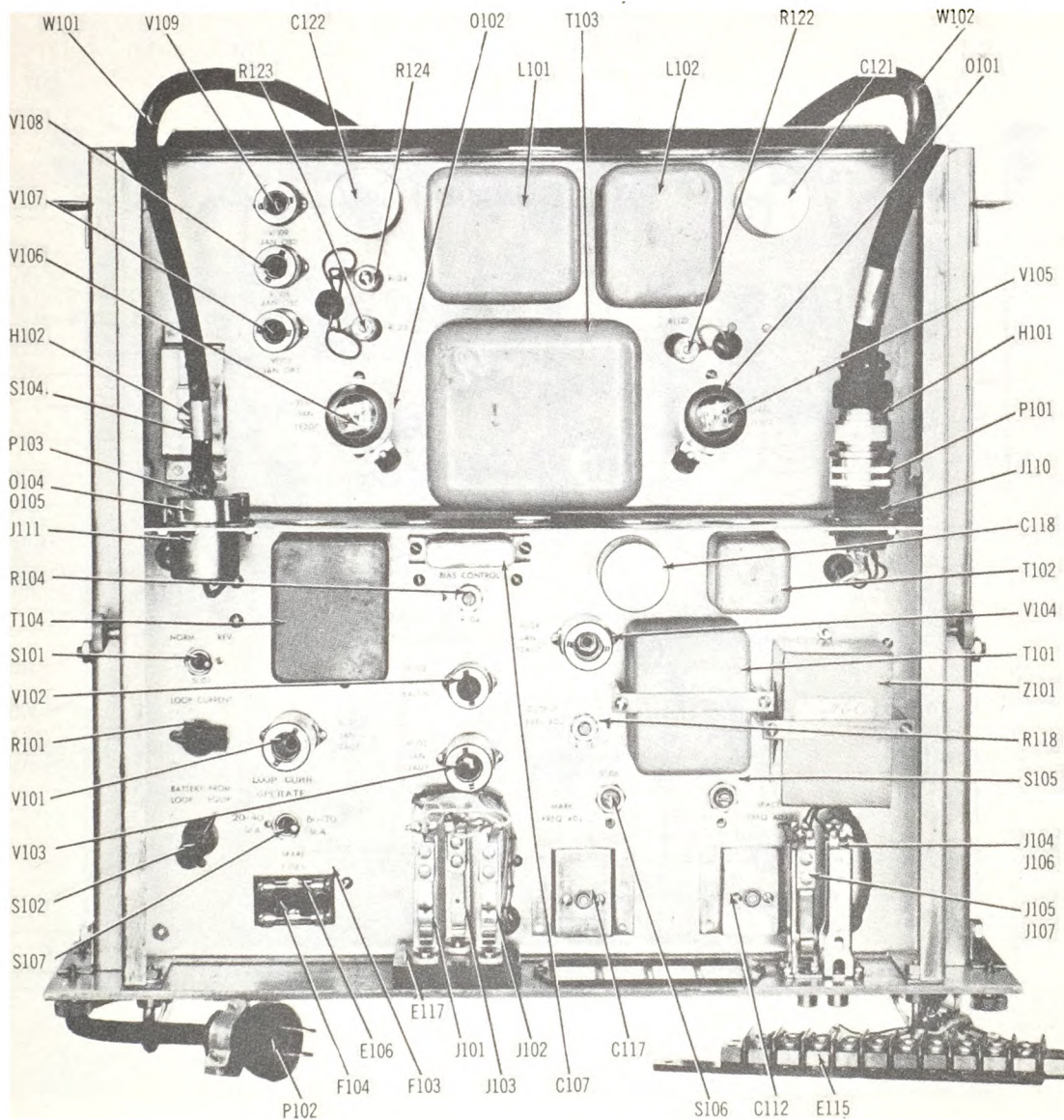


Figure 7-5. * Top View of Telegraph Carrier Transmitter

$\pm 20\%$ from the values connected in each channel, as this capacitor stabilizes the transitions. The measurement of the telegraph bias of the transmitter can be made by keying the loop circuit with 50% MARK and SPACE pulses and observing the frequency of the carrier signal with an electronic counter such as the Frequency Meter FR-38/U. With MARK and SPACE frequencies accurately set the transmitter will be adjusted to zero bias when the Frequency Meter FR-38/U indicates the center band frequency.

c. **SIGNAL LEVEL CONTROL.** - The output carrier level is adjusted with the 100,000 ohm potentiometer R118. This is a logarithmic potentiometer which allows

the output to be set between -40 dbm and +6 dbm. The normal recommended level for each of the twelve channels of carrier signals is -10 dbm (0.245 volts across 600 ohms).

5. TELEGRAPH CARRIER RECEIVER R-525/FCC-3 THROUGH R-536/FCC-3, TROUBLE SHOOTING.

a. **GENERAL.** - The telegraph carrier receiver converts the frequency shift carrier signal to DC pulses for operating a telegraph printer. A failure in this unit normally affects only the message channel in which it is used. Before detailed trouble shooting of the receiver, check that the signal voltage is present in the

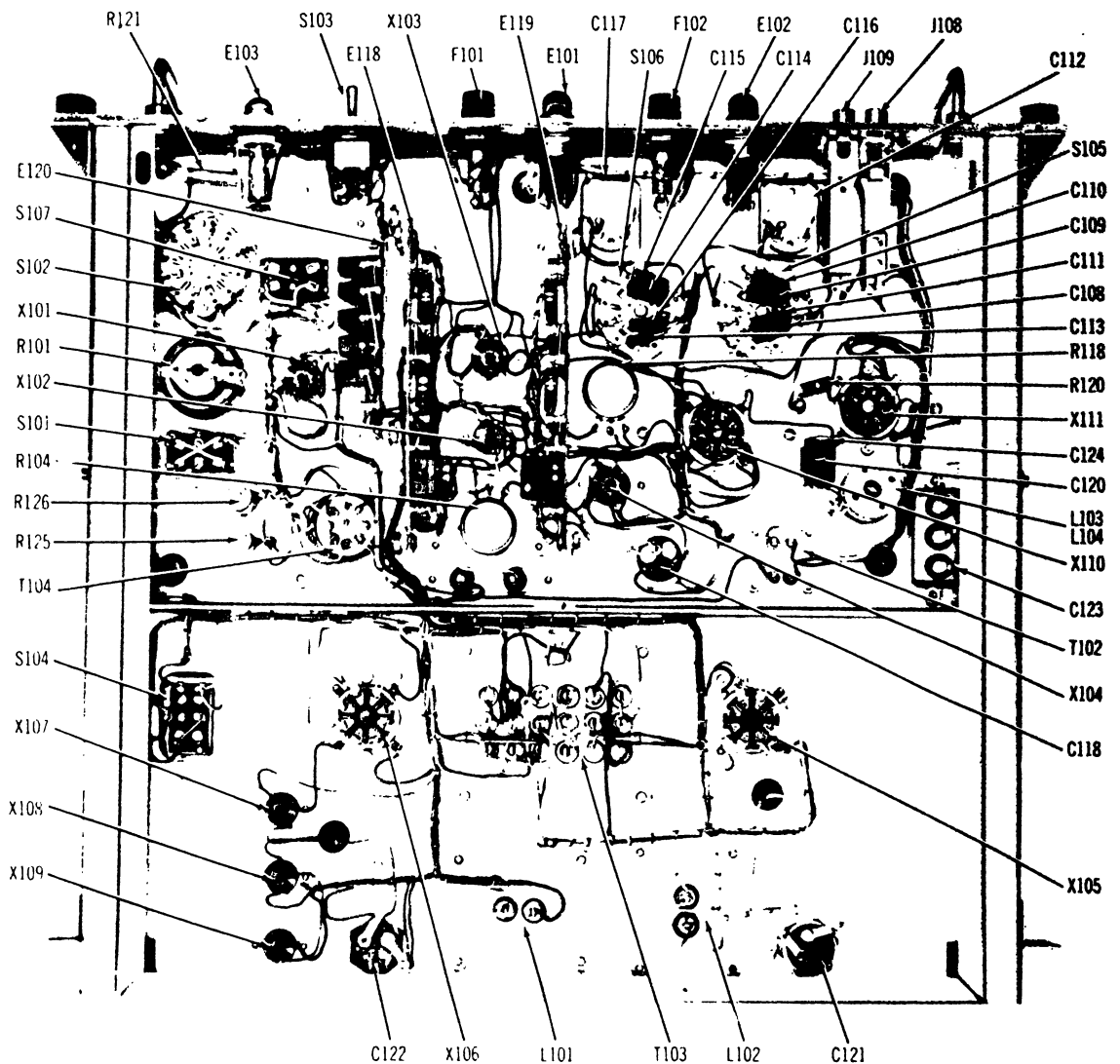


Figure 7-6. Bottom View of Telegraph Carrier Transmitter

IN MONITOR jacks. With the system levels set as shown in table 3-2 a voltage of approximately 0.1 should be observed with a vacuum tube voltmeter. If this voltage is not present, check all other carrier signal levels shown on table 3-2 and the lines and jacks to the **IN MONITOR** jacks. The block diagram of figure 7-2 will be found helpful in trouble shooting this unit. The trouble shooting chart of table 7-3 describes a signal tracing method for determining trouble. The applied signal for testing must be generated by a telegraph carrier transmitter of the same center-band frequency. This telegraph carrier transmitter is keyed with a telegraph printer or a Distortion Test Set TS-383A/GG. If a telegraph printer provided with a repeat key is used, hold down both the repeat key and

a single character key such as "R". If a Distortion Test Set TS-383A/GG is available, it can be set to transmit an "R" character. The wave shapes shown on the block diagram of figure 7-2 are those of a 50% MARK and SPACE signal. A letter character would include several MARK and SPACE pulse lengths. A faulty unit can be caused by jacks, input filter, limiting amplifier circuit, discriminator circuit, output keying circuit, output jacks, or power supply.

After using table 7-3 to determine the stage in which the trouble is located, refer to the schematic diagram of figure 7-14 and trouble shoot the individual components. Typical voltages and resistance values to ground are given in figure 7-10. The physical location of the components can be determined from the wiring

**TABLE 7-2. TELEGRAPH CARRIER TRANSMITTERS
T-371/FCC-3 THROUGH T-382/FCC-3, TROUBLE
SHOOTING CHART**

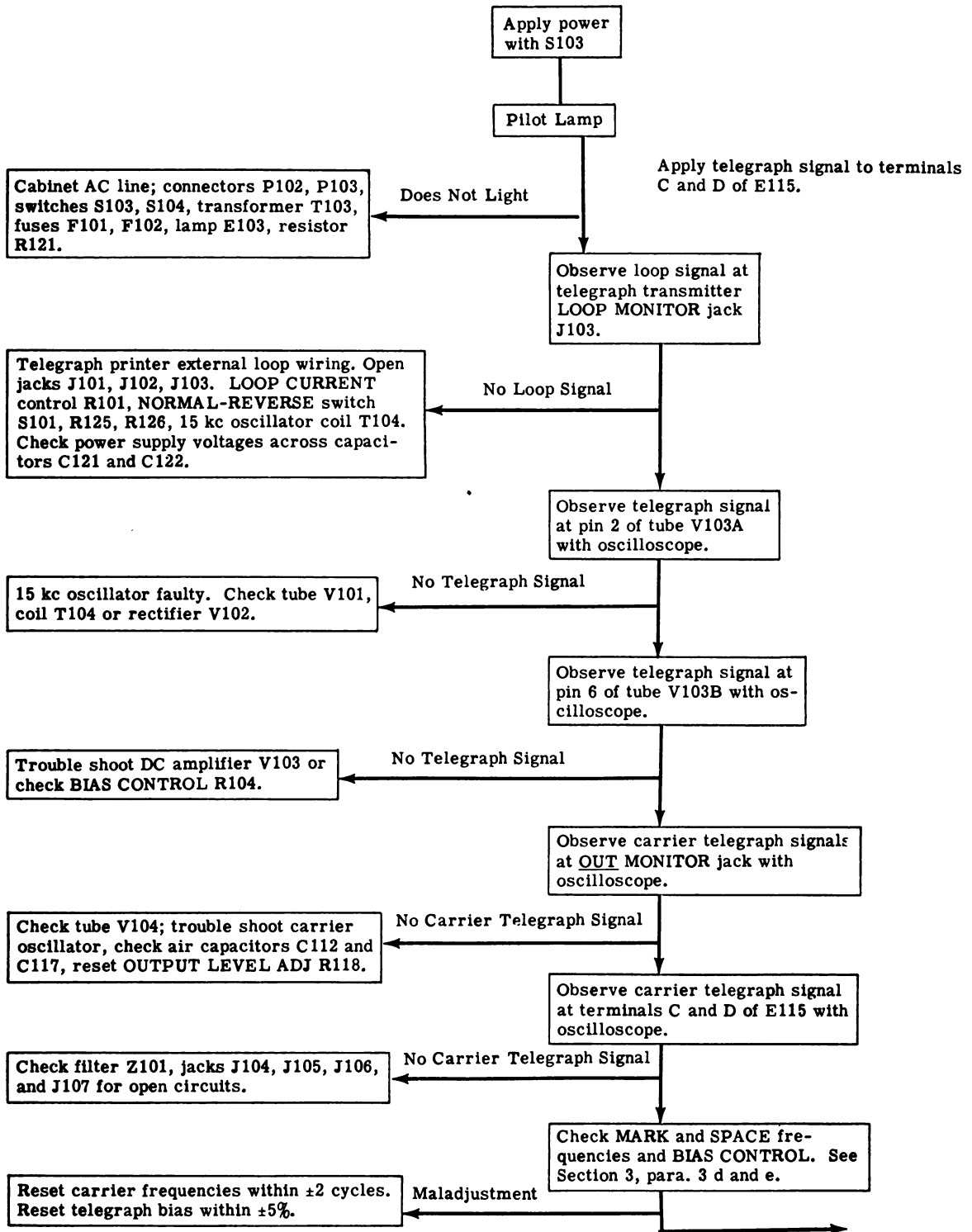
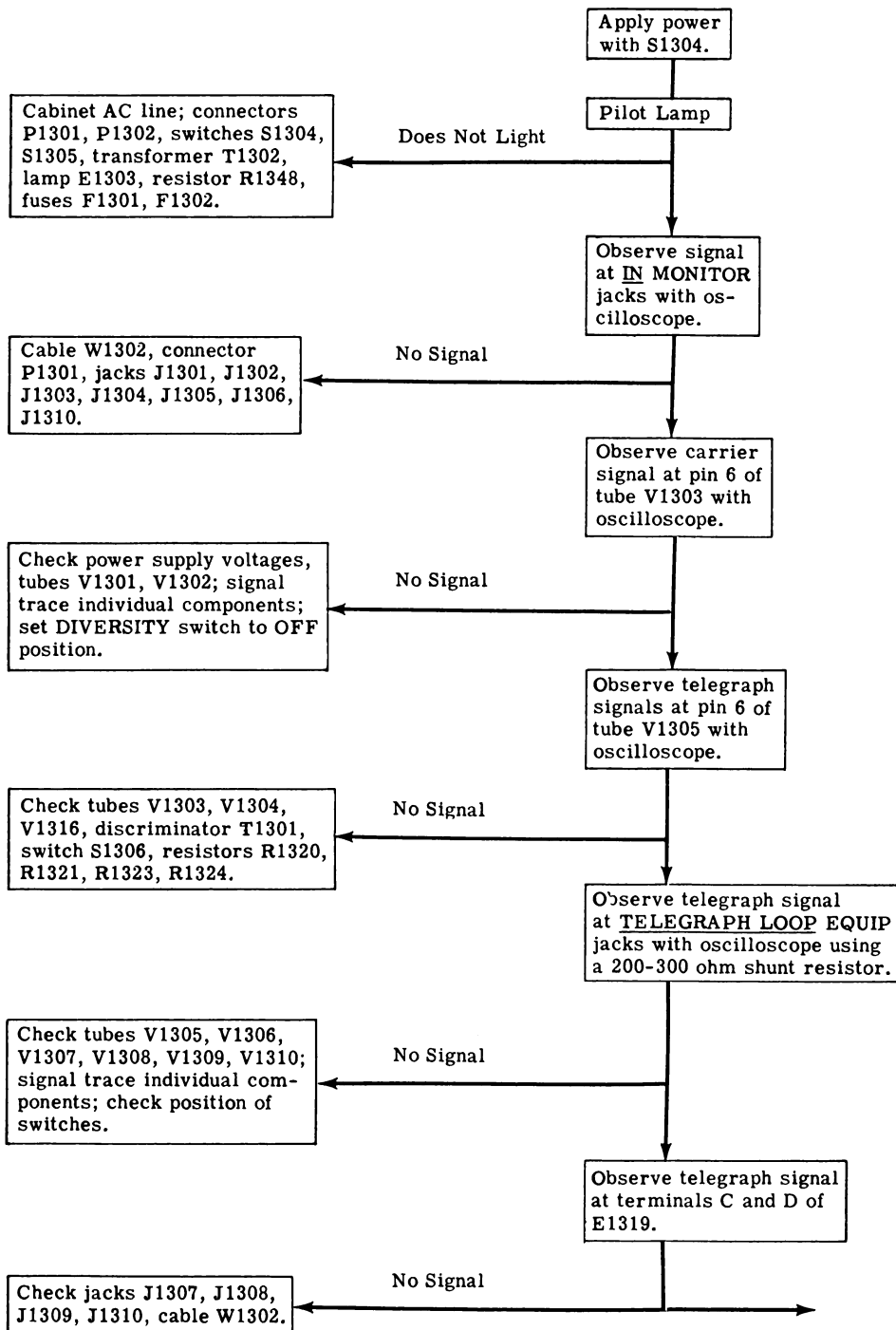


TABLE 7-3. TELEGRAPH CARRIER RECEIVERS R-525/FCC-3
THROUGH R-536/FCC-3, TROUBLE SHOOTING CHART

Apply frequency shift carrier signal to terminals F and G of E1319.

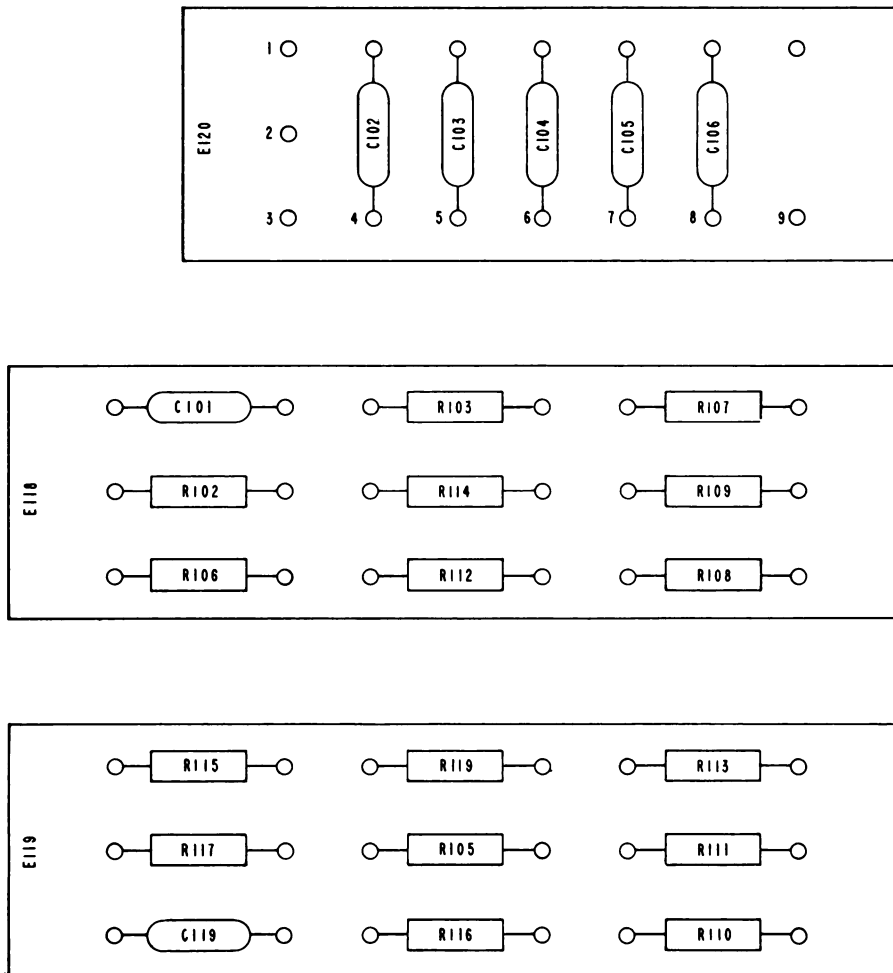


Figure 7-7. Components Location, Terminal Boards of Telegraph Carrier Transmitter

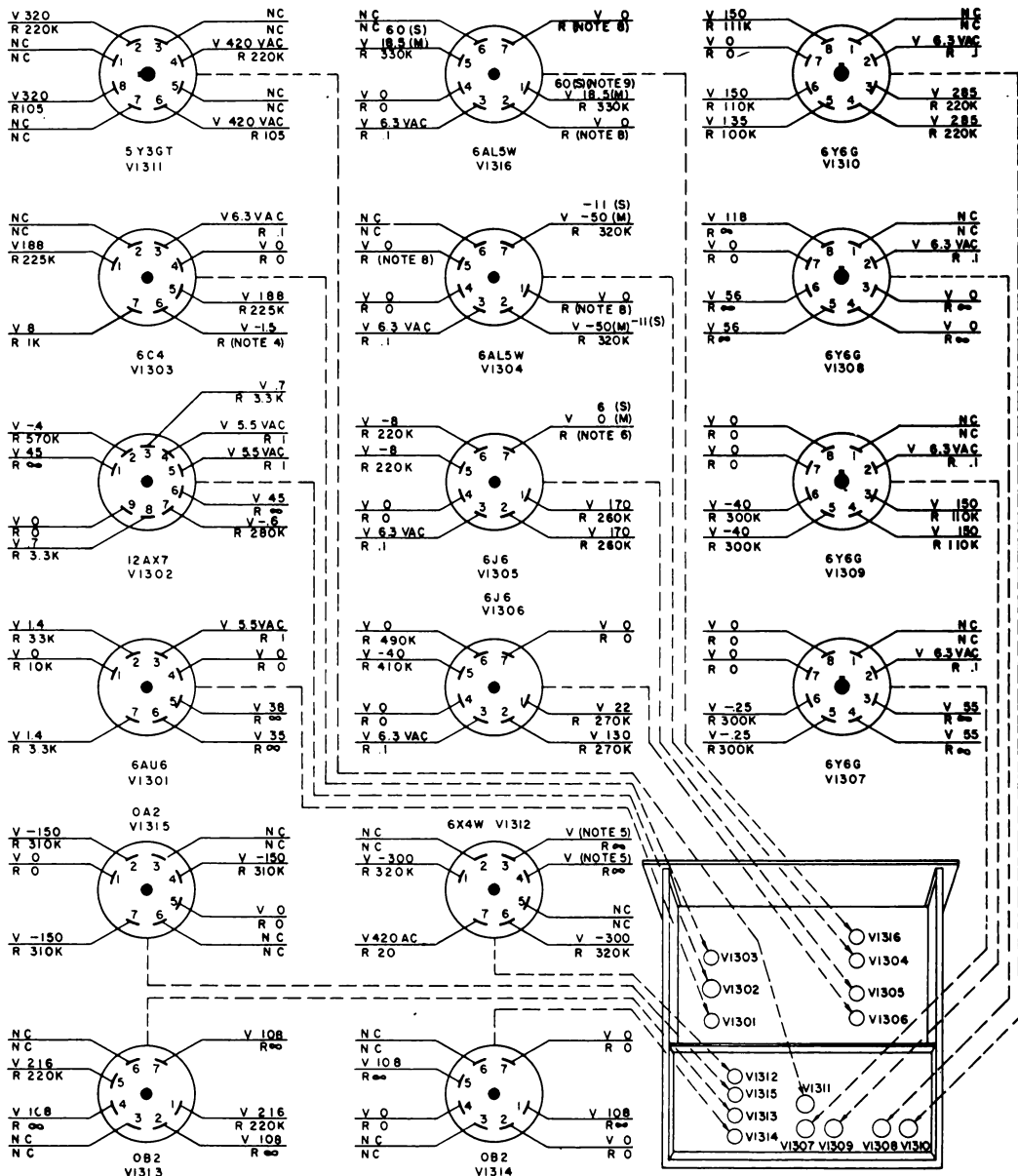
diagram of figure 7-15, the top and bottom views of the unit as shown in figures 7-11 and 7-12, and the terminal board drawing figure 7-13.

b. **TELEGRAPH BIAS ADJUSTMENT.** - The telegraph bias of a telegraph carrier receiver is adjusted with a signal from a telegraph carrier transmitter of the same center frequency. To properly adjust telegraph bias, a well adjusted telegraph carrier transmitter and a Distortion Test Set TS-383A/GG are required. The Distortion Test Set TS-383A/GG is connected to key the loop circuit of the telegraph carrier transmitter and the transmitter output is connected to the input of the telegraph carrier receiver. The stroboscope of the Distortion Test Set TS-383A/GG is plugged into the TELEGRAPH LOOP EQUIP jack of the telegraph

carrier receiver completing the signal loop. The **BIAS CONTROL** of the receiver is then adjusted until the transitions occur at the index points on the dial of the Distortion Test Set TS-383A/GG. All transitions on a test message should occur within plus or minus five divisions on the dial of the Distortion Test Set TS-383A/GG.

**6. ELECTRONIC FREQUENCY CONVERTER
CV-243/FCC-3, TROUBLE SHOOTING.**

a. **GENERAL.** - The Electronic Frequency Converter CV-243/FCC-3 carries the combined carrier signal of all channels. A failure in this unit may take all channels out of operation. The locking oscillator adjustments and the signal level adjustments should be checked before



- NOTES:
1. V INDICATES VOLTAGE TO GROUND, DC UNLESS OTHERWISE SPECIFIED; R INDICATES RESISTANCE TO GROUND IN OHMS, WITH EXTERNAL CABLES DISCONNECTED.
 2. READINGS TAKEN WITH SIMPSON 260 MODEL, 20,000 OHMS PER VOLT DC METER, 1000 OHMS PER VOLT AC METER. TOLERANCE ON READINGS ± 10%.
 3. NC INDICATES NO CONNECTION.
 4. R VARIES WITH POSITION OF DISCRIMINATOR LEVEL CONTROL. MAXIMUM VALUE 500K.
 5. 6.3 VAC BETWEEN THESE POINTS.
 6. R VARIES WITH POSITION OF R1325. MAXIMUM VALUE 2500 OHMS.
 7. MEASUREMENTS TAKEN WITH SWITCHES IN, DIV. OFF BAT FROM EQUIP, AND NEUTRAL POSITIONS.
 8. R VARIES WITH FREQUENCY OF DISCRIMINATOR. MAXIMUM VALUE APPROX. 140 OHMS.
 9. 6 INDICATES MEASUREMENTS WITH SPACE SIGNAL, AND (M) WITH MARK SIGNAL.
 10. ALL VOLTAGE READINGS MADE AT 1615 CPS FREQUENCY. OTHER FREQUENCIES WILL RESULT IN SLIGHTLY DIFFERENT READINGS.
 11. ALL READINGS TAKEN WITH INPUT SIGNAL LEVEL AT -10 DBM.
 12. ALL READINGS TAKEN WITH MARK SIGNAL UNLESS OTHERWISE SPECIFIED.

Figure 7-10. Telegraph Carrier Receiver Voltage and Resistance Chart

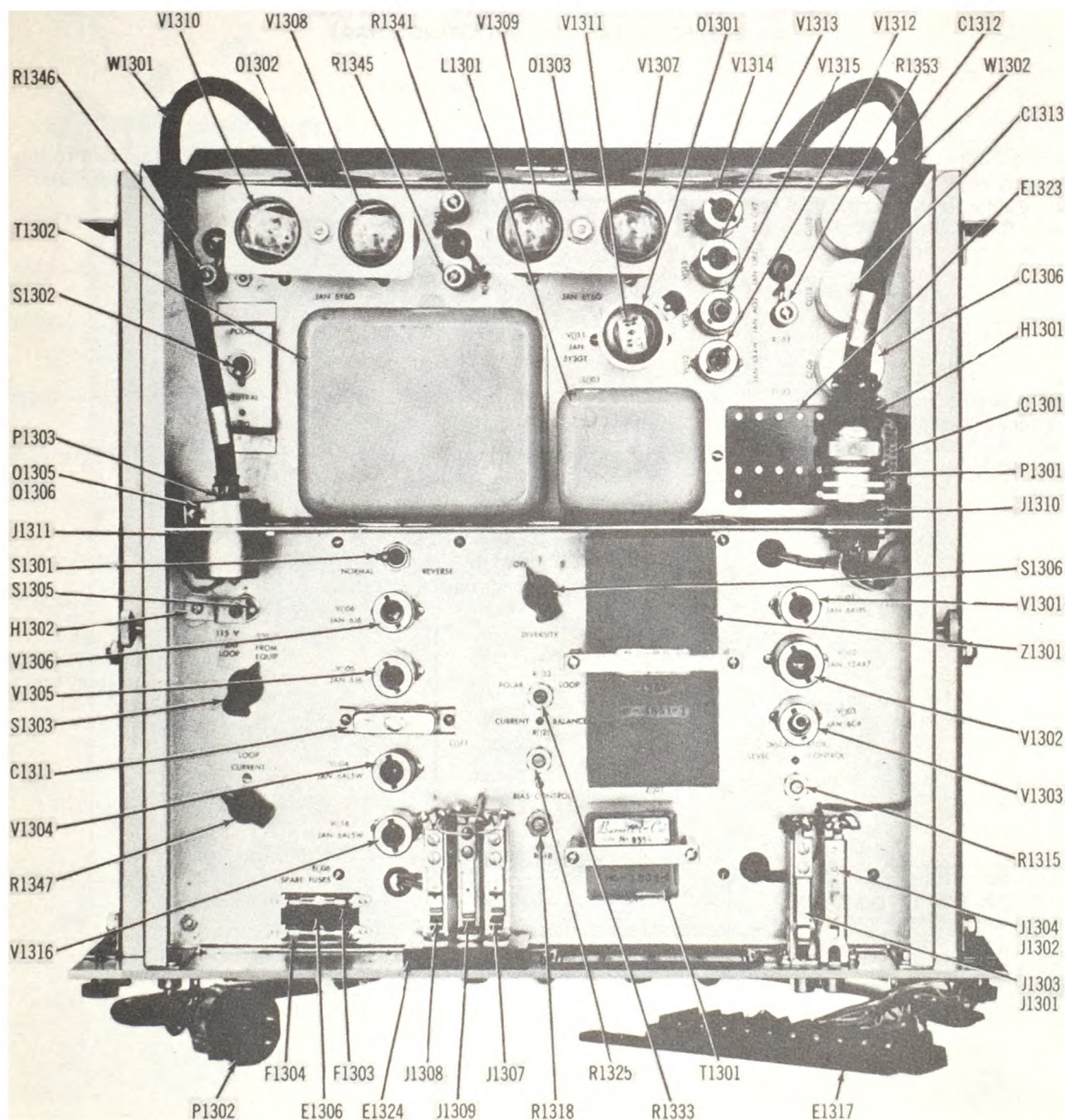


Figure 7-11. Top View of Telegraph Carrier Receiver

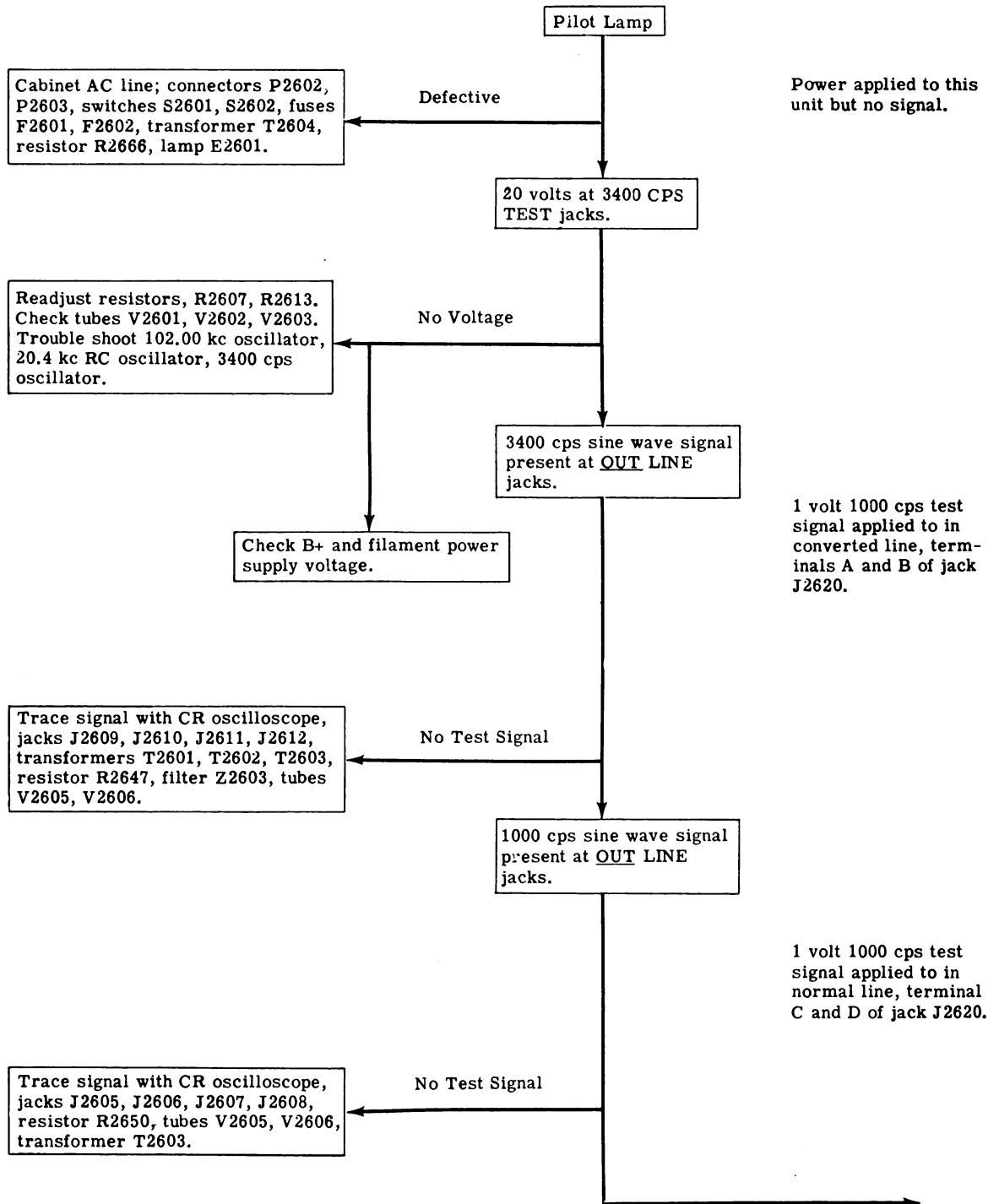
detailed trouble shooting. The block diagram shown in figure 7-3 will be helpful in trouble shooting this unit. The trouble shooting chart of table 7-4 described a signal tracing method for determining trouble. The applied signal for signal tracing is a 1000 cps sine wave. A degraded converted channel may be caused by the circuit blocks as shown in the Electronic Frequency Converter CV-243/FCC-3 section of figure 7-3. A faulty normal channel can be caused by the amplifier, power supply, attenuator, or jacks and connections. After using table 7-4 to locate the stage in which the trouble lies, refer to the schematic diagram of figure 7-21. Typical voltages and resistances are given in figure 7-16. The

physical location of the components can be determined from the wiring diagram of figure 7-22, the top and bottom views of the unit as shown in figures 7-17 and 7-18, and the terminal board drawings of figures 7-19 and 7-20.

b. LOCKING OSCILLATOR ADJUSTMENTS. - Follow the procedure below for setting the 20.4 kc, 3400 cps, 425 cps, and 85 cps locking oscillators.

(1) Connect a vacuum tube voltmeter and oscilloscope across the 3400 CPS TEST jacks J2601 and J2602.

TABLE 7-4. ELECTRONIC FREQUENCY CONVERTER
CV-243/FCC-3, TROUBLE SHOOTING CHART



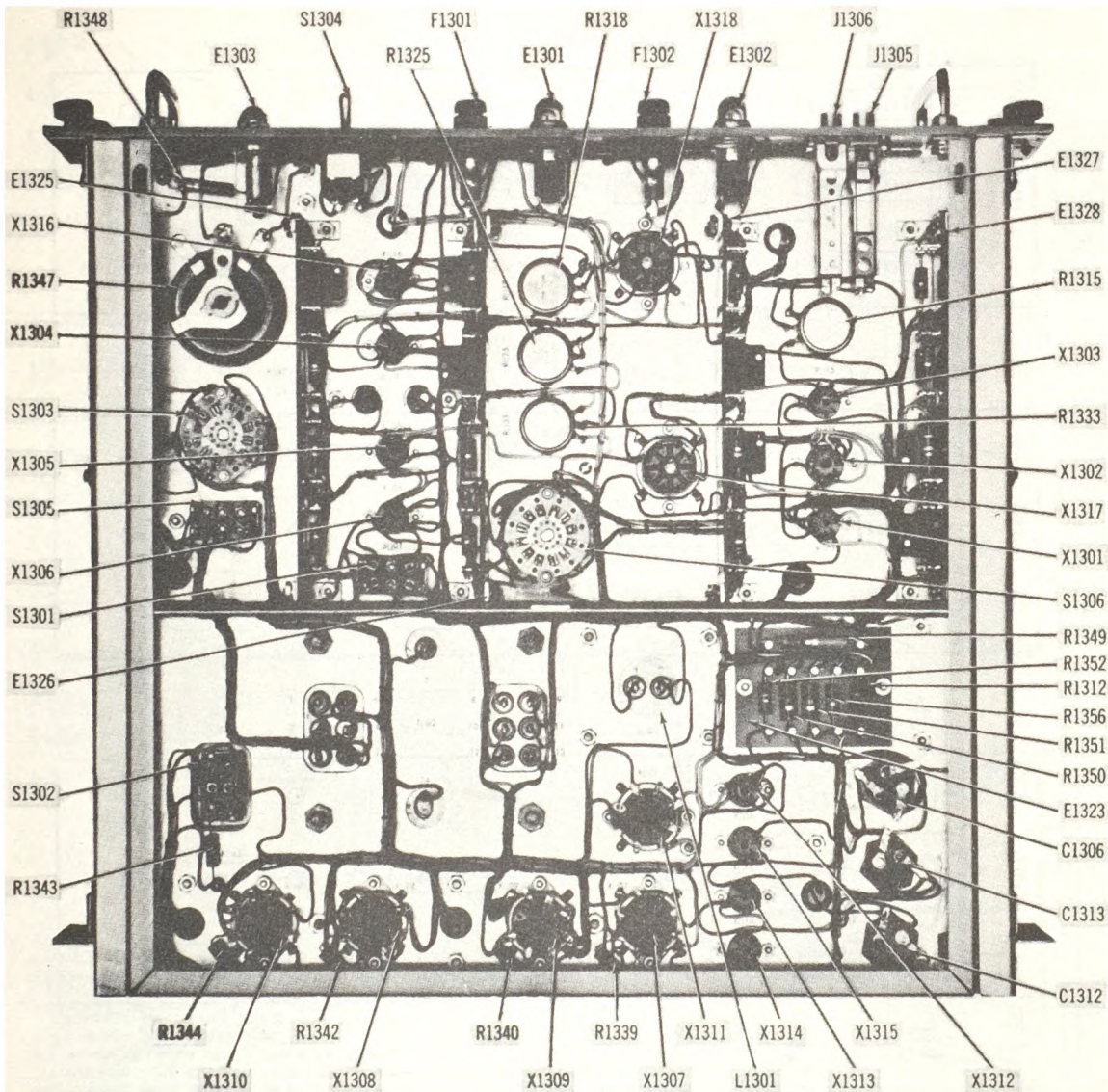


Figure 7-12. Bottom View of Telegraph Carrier Receiver

(2) Turn the 1.0 megohm potentiometer R2668 to maximum clockwise position.

(3) Alternately vary the 250,000 ohm potentiometers R2607 (20.4 kc oscillator circuit) and R2613 (3400 cps oscillator circuit) until a steady state value greater than 20 volts is indicated on the vacuum tube voltmeter.

(4) Vary potentiometer R2607 and locate the maximum and minimum settings at which the 20.4 kc oscillator begins to unlock. This may be observed by a sudden change of value indicated on the voltmeter from its steady state locked value or by a shift in the oscillo-

scope pattern. Set the potentiometer R2607 half way between the maximum and minimum points observed.

(5) Repeat the same procedure with potentiometer R2613. Reset R2668 for 20 volts at J2601.

(6) To check the 425 cps locking oscillator, connect an oscilloscope between the 425 CPS TEST jack J2621 and ground jack J2623.

(7) Adjust R2623 in 425 cps oscillator circuit for the center of its locking range. The locking of the 425 cps oscillator is indicated on the oscilloscope by a

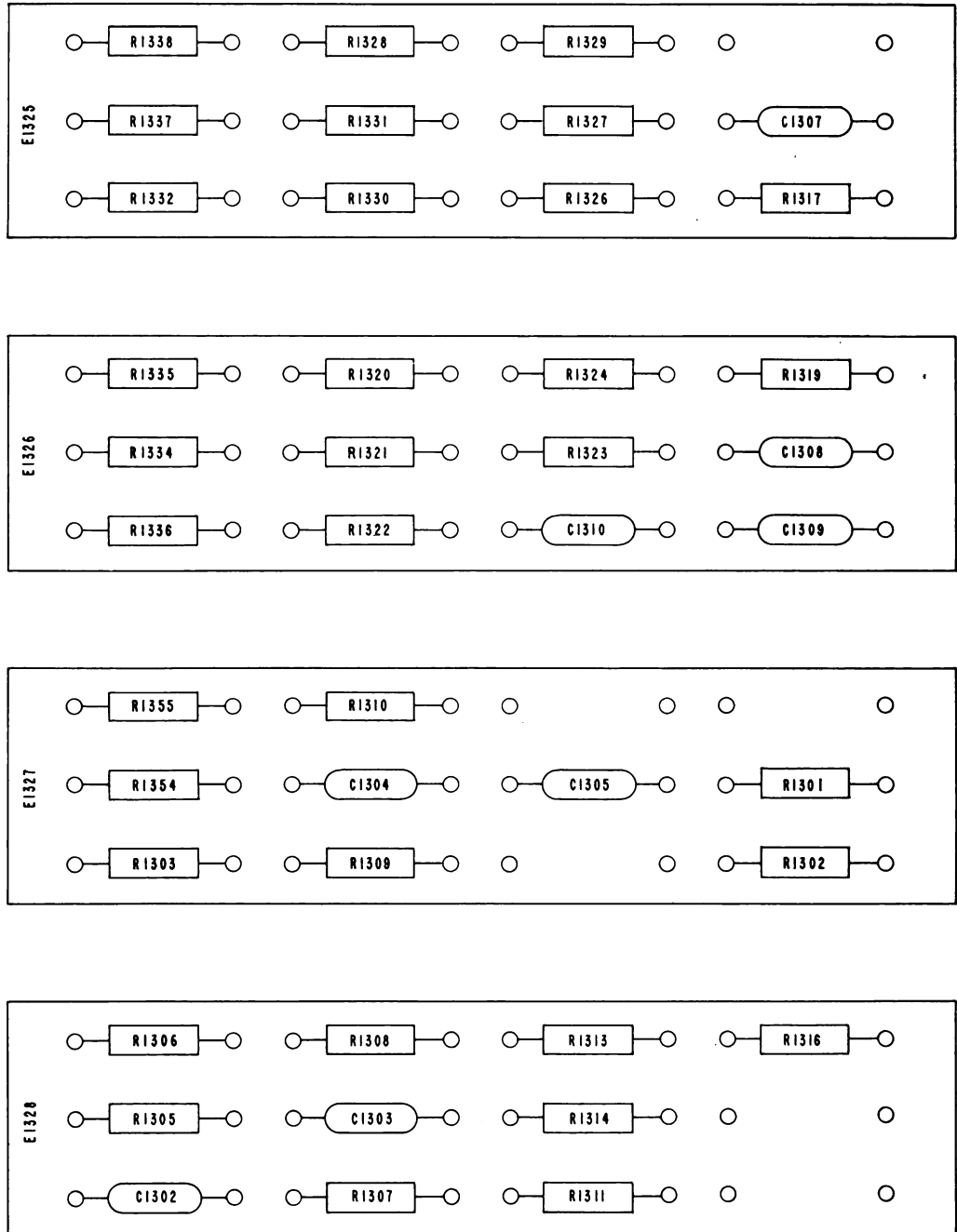


Figure 7-13. Components Location, Terminal Boards of Telegraph Carrier Receiver

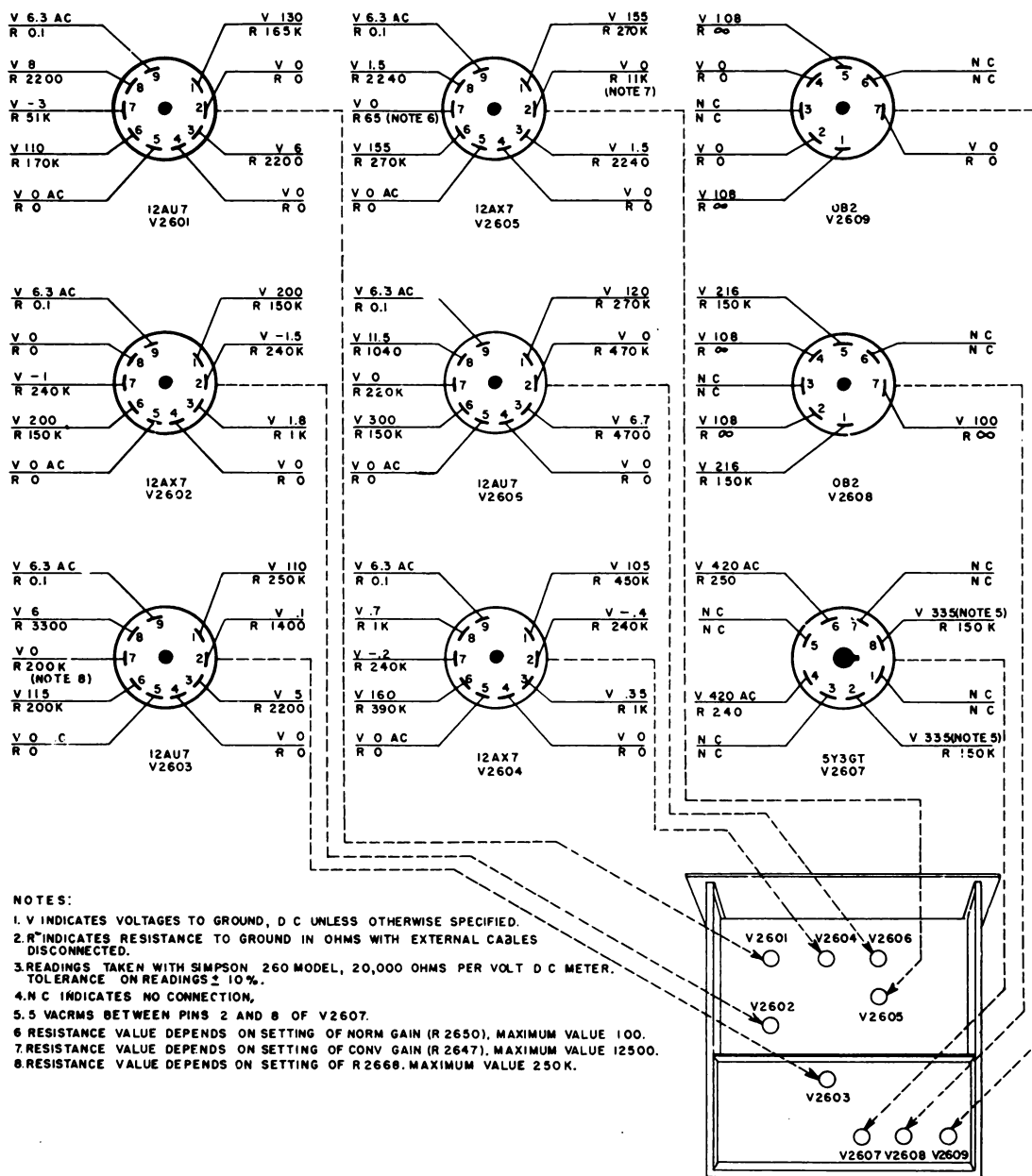


Figure 7-16. Electronic Frequency Converter CV-243/FCC-3, Voltage and Resistance Chart

single steady wave upon which eight ripples are superimposed.

(8) To check the 85 cps locking oscillator, connect the oscilloscope between the 85 CPS TEST jack J2622 and ground jack J2623.

(9) Adjust potentiometer R2631 for the center of its locking range. The locking of the 85 cps oscillator is

indicated on the oscilloscope by a single steady wave upon which five ripples are superimposed.

c. SIGNAL LEVEL ADJUSTMENTS. - With the output ATTENUATOR R2669 set to zero, the signal level adjustments are set for a gain of one in both the normal and converted channels. To set the signal level of the converted channel, connect a 1.0 volt, 1000 cps test signal to the IN CONV EQUIP jacks. Set ATTENUATOR

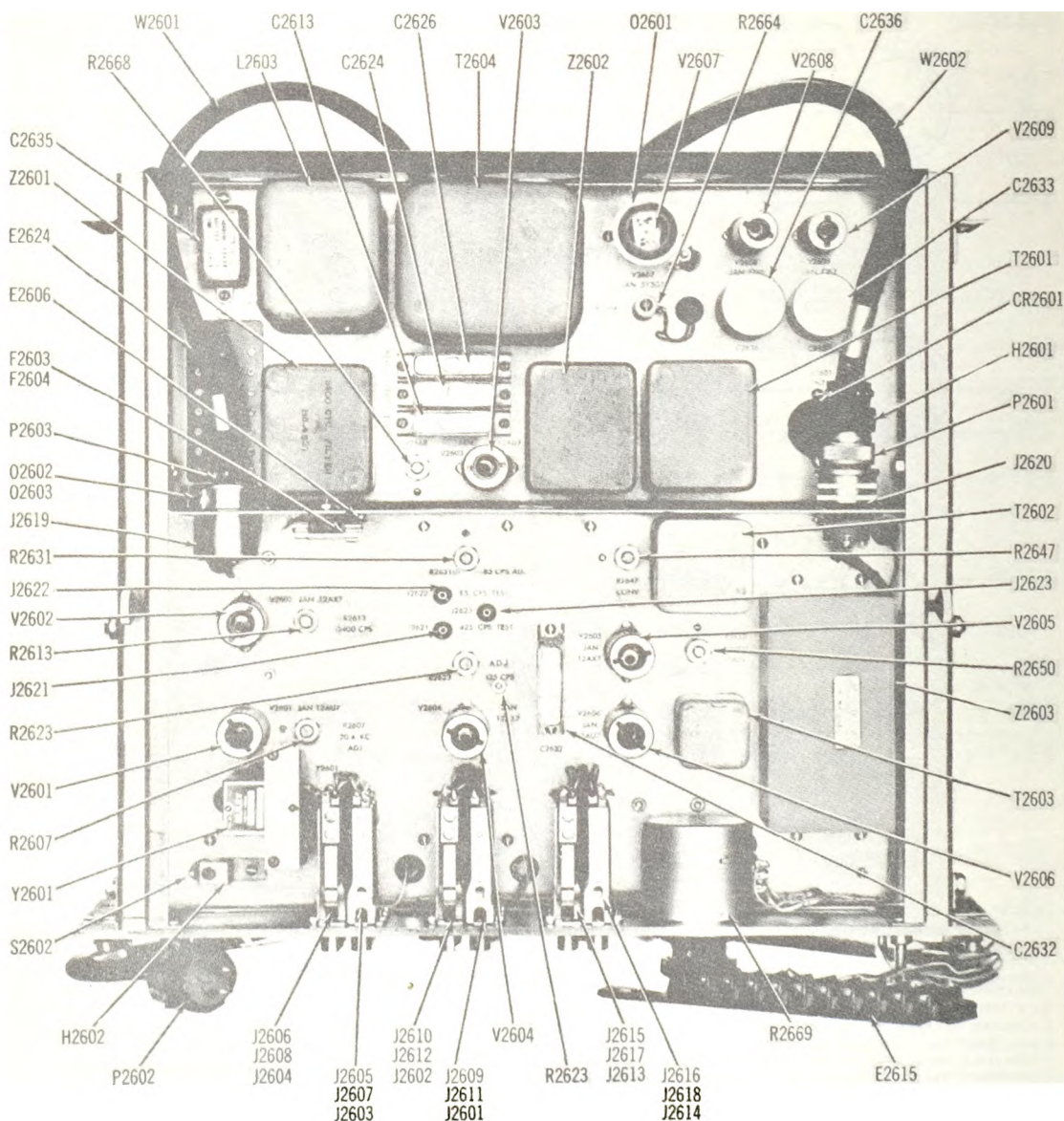


Figure 7-17. Top View of Electronic Frequency Converter CV-243/FCC-3

R2669 to zero. Adjust CONV GAIN potentiometer R2647 for 1.0 volt output at the OUT EQUIP jacks (no signal on normal channel). To set the signal level of the normal channel, connect a 1.0 volt, 1000 cps test signal to the IN NORM EQUIP jacks. With ATTENUATOR R2669 set at zero adjust the NORM GAIN potentiometer R2650 for 1.0 volt output at the OUT EQUIP jacks (no signal on converted channel). In 12 channel operation, as shown on the block diagram of figure 2-1, the CONV GAIN potentiometer R2647 is set at zero to block any undesired voltage from the channel circuits.

**7. ELECTRONIC FREQUENCY CONVERTER
CV-244/FCC-3, TROUBLE SHOOTING.**

a. GENERAL. - The Electronic Frequency Converter CV-244/FCC-3 carries the combined carrier signal of all channels in the receiving equipment. A failure in this unit may take all channels out of operation. The locking oscillator and signal level adjustments should be checked before detailed trouble shooting. The block diagram shown in figure 7-3 will be helpful in trouble shooting this unit. The trouble shooting chart

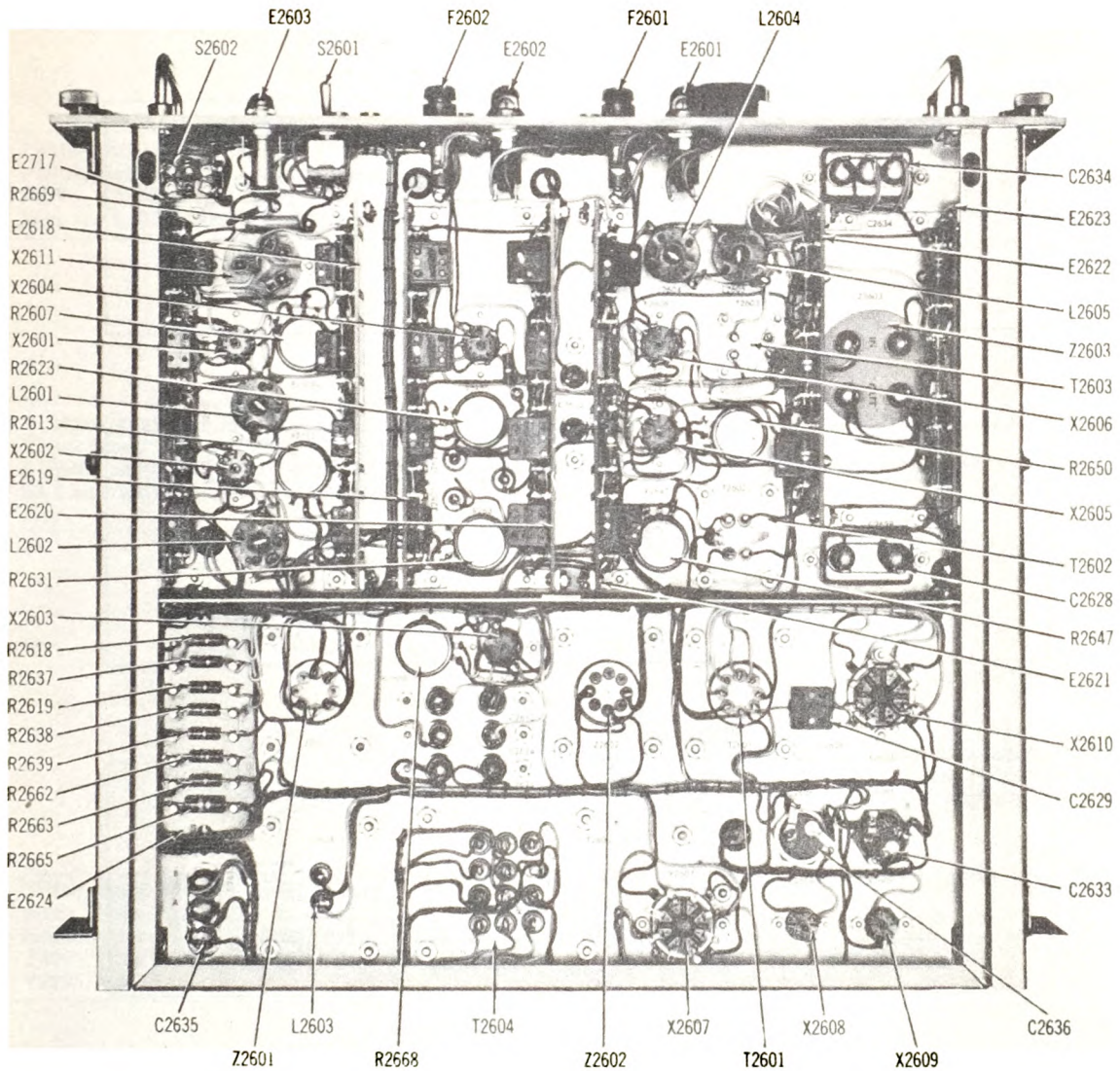


Figure 7-18. Bottom View of Electronic Frequency Converter CV-243/FCC-3

of table 7-5 described a signal tracing method for determining faulty operation. The applied signal for signal tracing is a 1000 cps sine wave. A degraded converted channel may be caused by any circuit through which the signal passes. The circuit blocks are shown in the Electronic Frequency Converter CV-244/FCC-3 section of figure 7-3. A faulty normal channel can be caused by the normal line amplifier, power supply, ATTENUATOR, or jacks and connections. After using table 7-5 to locate the stage in which the trouble occurs, refer to the schematic diagram of figure 7-27. Typical voltages and resistances are given in figure 7-23. The physical location of the components can be determined from the wiring diagram of figure 7-28, the top and

bottom views of the unit as shown in figures 7-24 and 7-25, and the terminal board drawings figure 7-26.

b. LOCKING OSCILLATOR ADJUSTMENTS. - Follow the procedure below for setting the 20.4 kc and 3400 cps locking oscillators.

(1) Connect a vacuum tube voltmeter and oscilloscope across the 3400 CPS TEST jacks J2701 and J2702.

(2) Turn the 1 megohm potentiometer R2755 to maximum clockwise position.

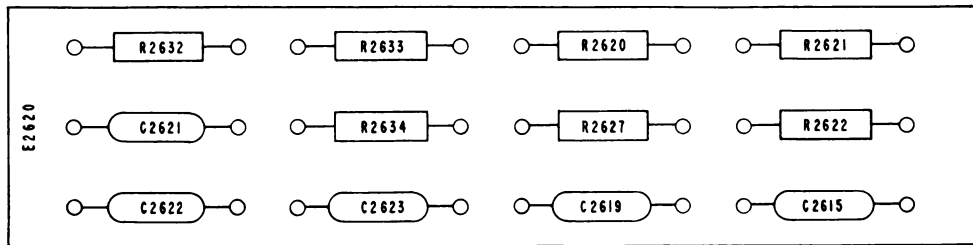
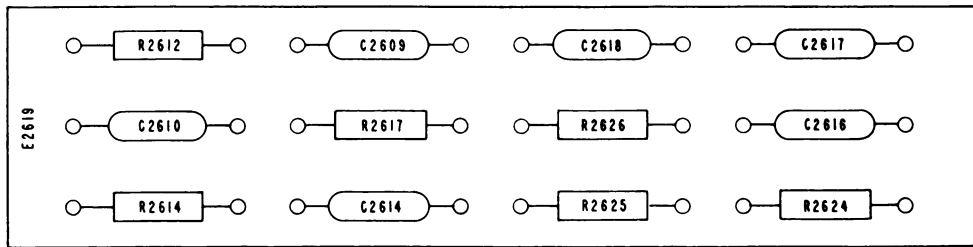
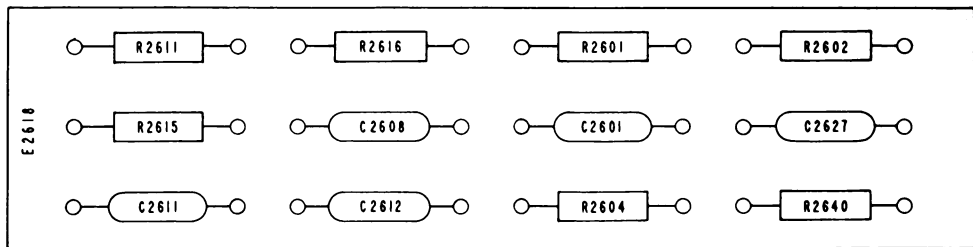
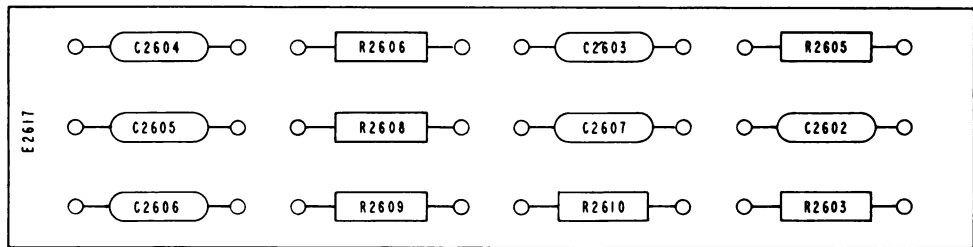
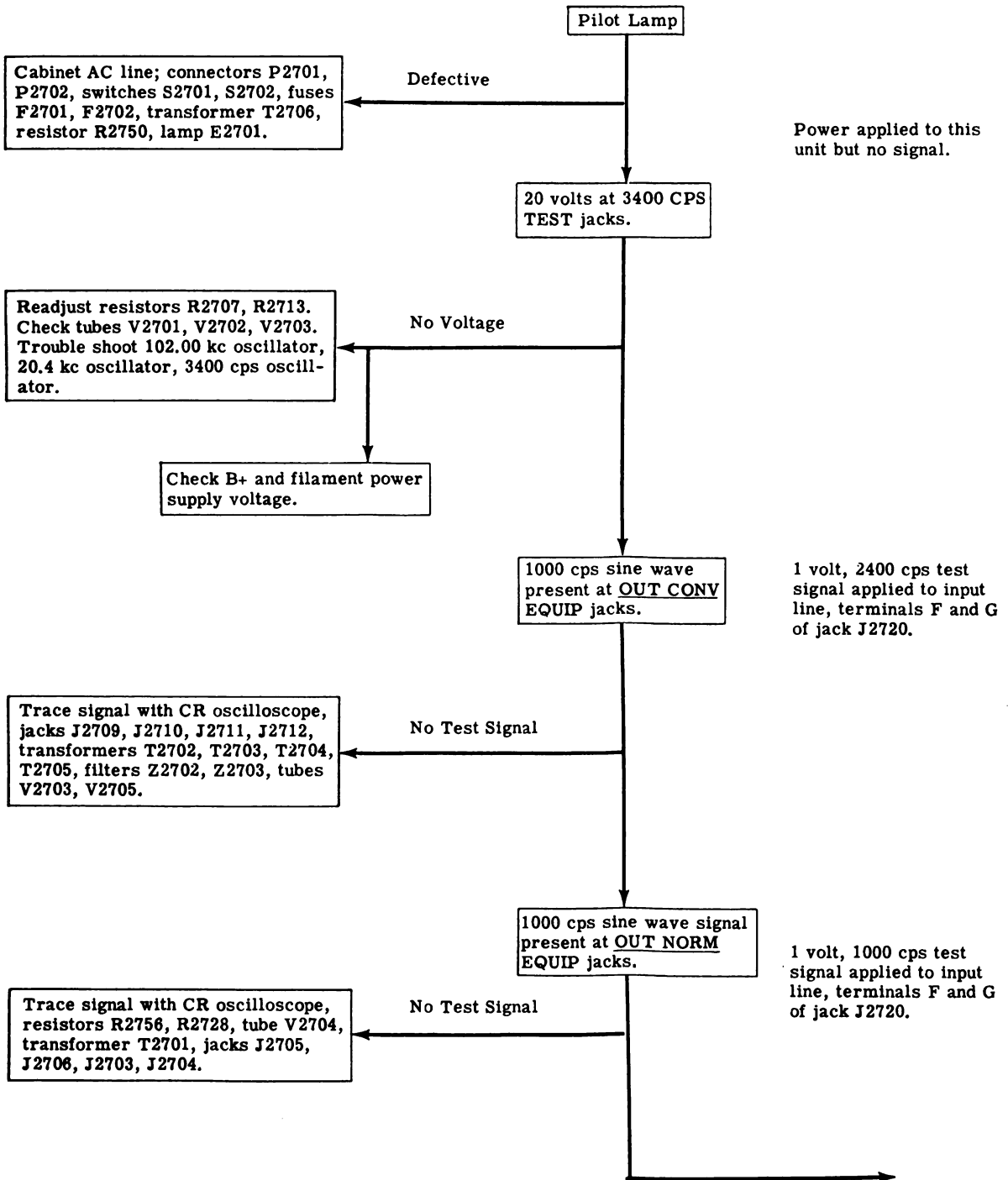


Figure 7-19. Components Location, Terminal Boards of Electronic Frequency Converter CV-243/FCC-3

TABLE 7-5. ELECTRONIC FREQUENCY CONVERTER
CV-244/FCC-3, TROUBLE SHOOTING CHART



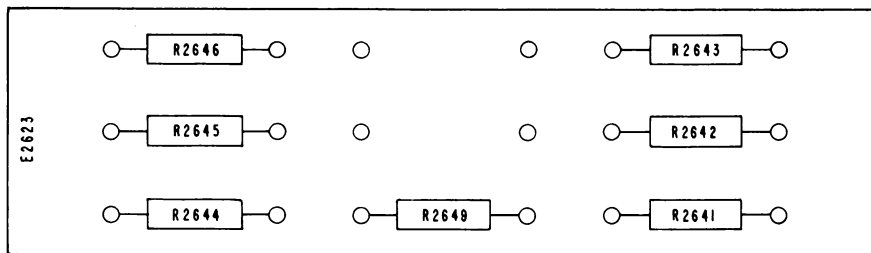
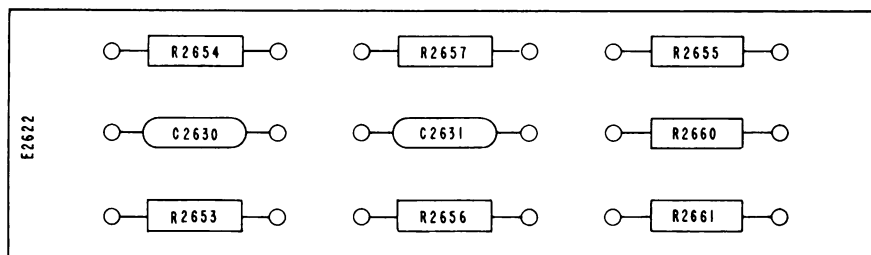
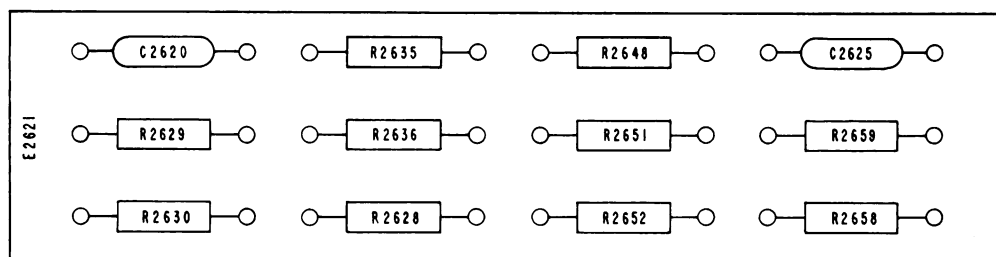


Figure 7-20. Components Location, Terminal Boards of Electronic Frequency Converter CV-243/FCC-3

(3) Alternately vary the 250,000 ohm potentiometers R2707 (20.4 kc oscillator circuit) and R2713 (3400 cps oscillator circuit) until a steady state value greater than 20 volts is indicated on the vacuum tube voltmeter.

(4) Vary potentiometer R2707 and locate the maximum and minimum settings at which the 20.4 kc oscillator begins to unlock. This may be observed by a sudden change of value indicated on the voltmeter from its steady state locked value or by a shift in the oscilloscope pattern. Set the potentiometer R2707 half way between the maximum and minimum points observed.

(5) Repeat the same procedure with potentiometer R2713. Reset R2755 for 20 volts at J2701.

c. SIGNAL LEVEL ADJUSTMENTS. - With the input

ATTENUATOR R2756 set to zero, the signal level adjustments are set for a gain of one in both the normal and converted channels. To set the signal level of the converted channel, connect a 1.0 volt, 2400 cps test signal to the IN EQUIP jacks. Set ATTENUATOR R2756 to zero. Adjust CONV GAIN potentiometer R2738 for 1.0 volt output at the OUT CONV EQUIP jacks (no signal on normal channel). To set the signal level of the normal channel, connect a 1.0 volt, 1000 cps test signal to the IN EQUIP jacks. With ATTENUATOR R2756 set at zero, adjust the NORM GAIN potentiometer R2728 for 1.0 volt output at the OUT NORM EQUIP jacks (no signal on converted channel). In 12 channel operation, as shown on the block diagram of figure 2-1, the CONV GAIN potentiometer R2738 is set at zero to block any voltage from the converted channel circuits.

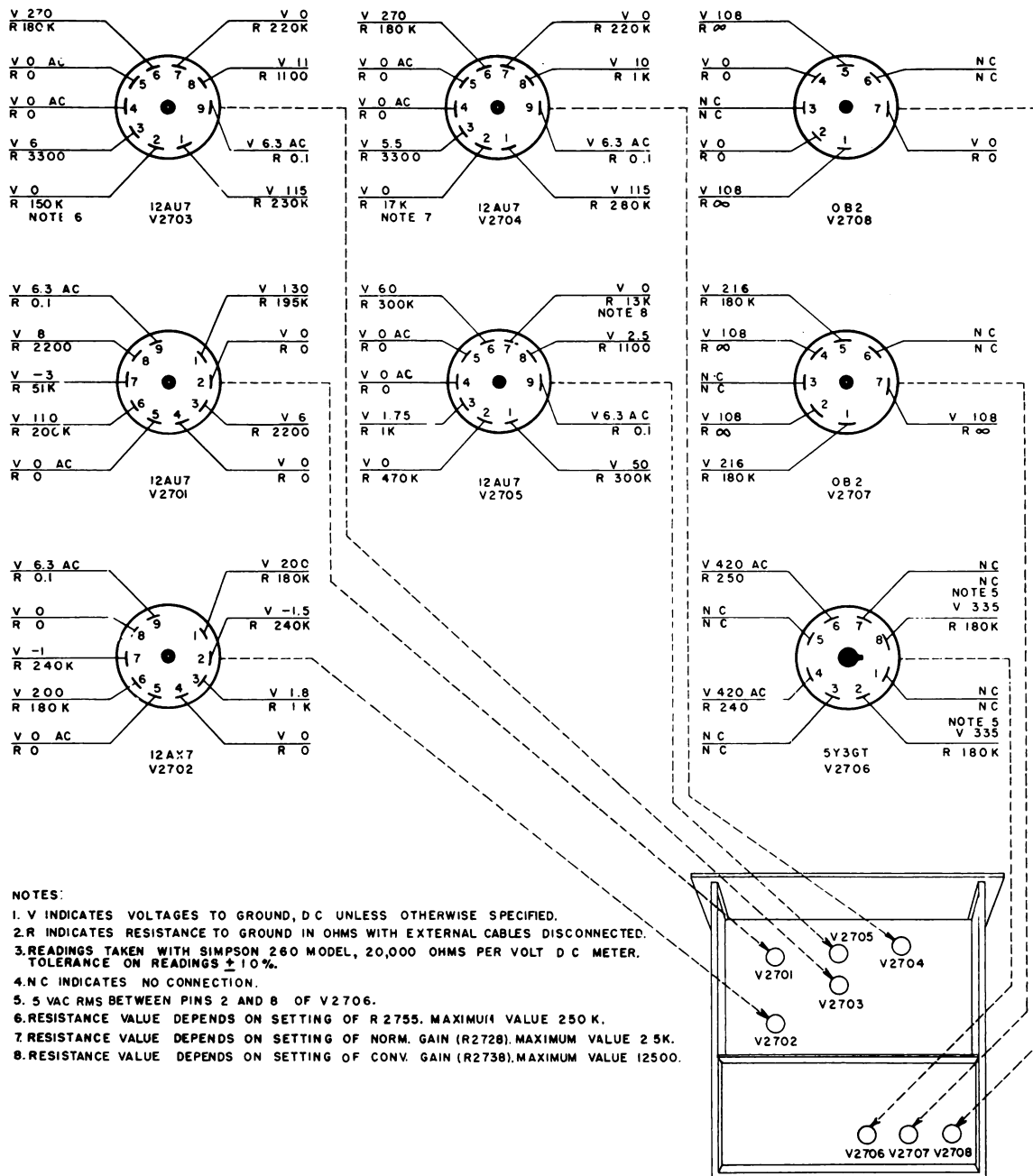


Figure 7-23. Electronic Frequency Converter CV-244/FCC-3, Voltage and Resistance Chart

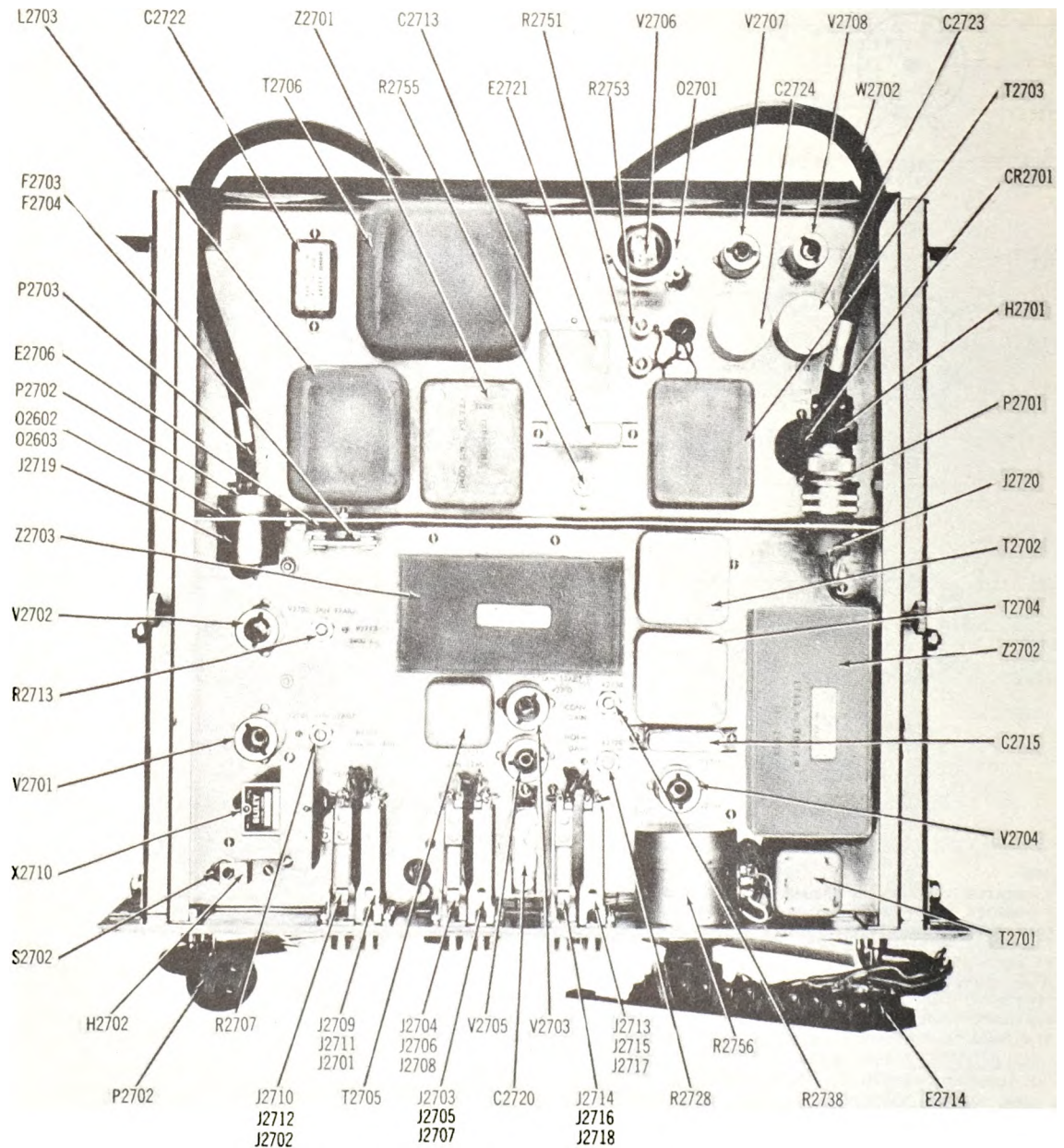


Figure 7-24. Top View of Electronic Frequency Converter CV-244/FCC-3

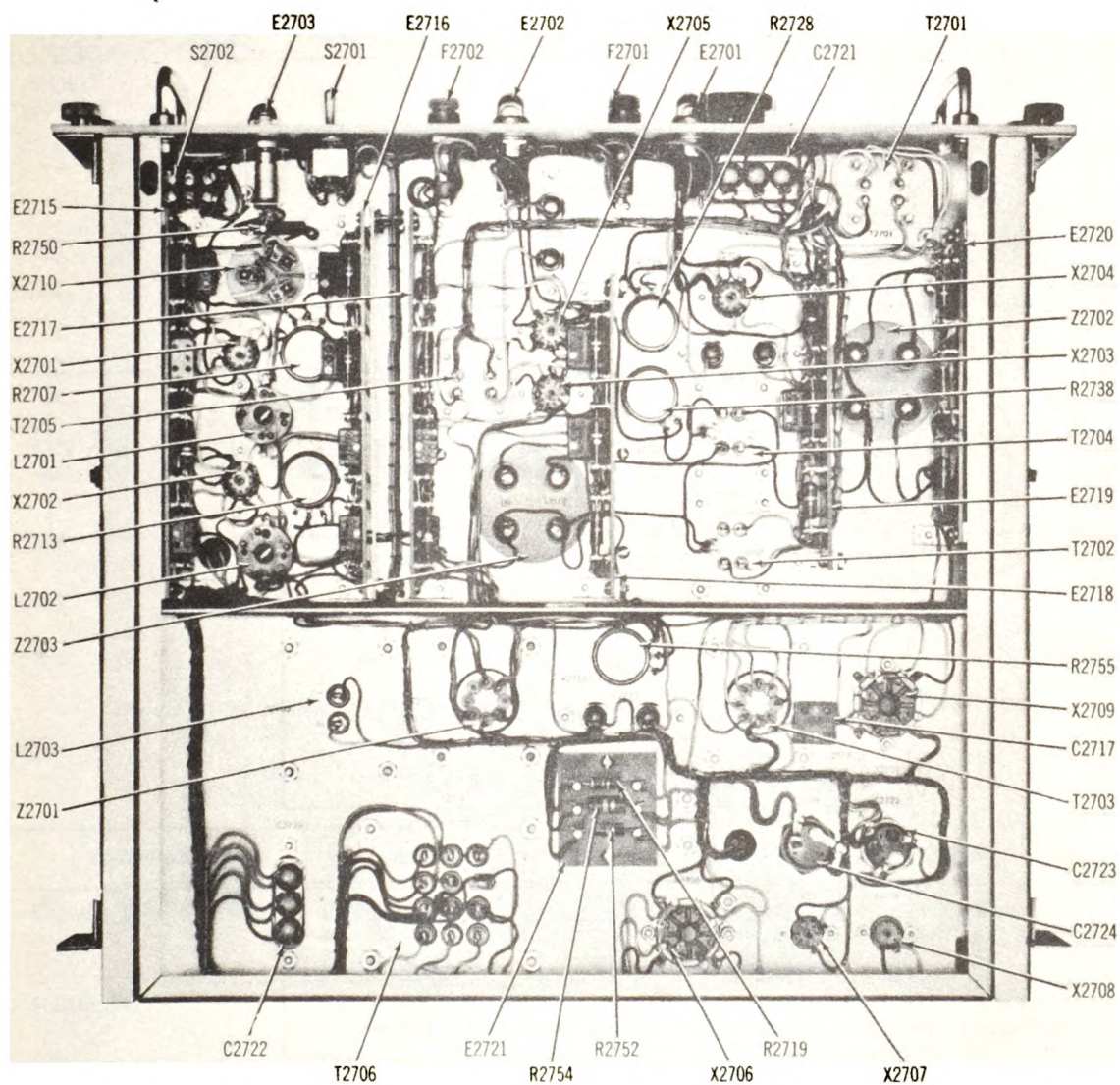


Figure 7-25. Bottom View of Electronic Frequency Converter CV-244/FCC-3

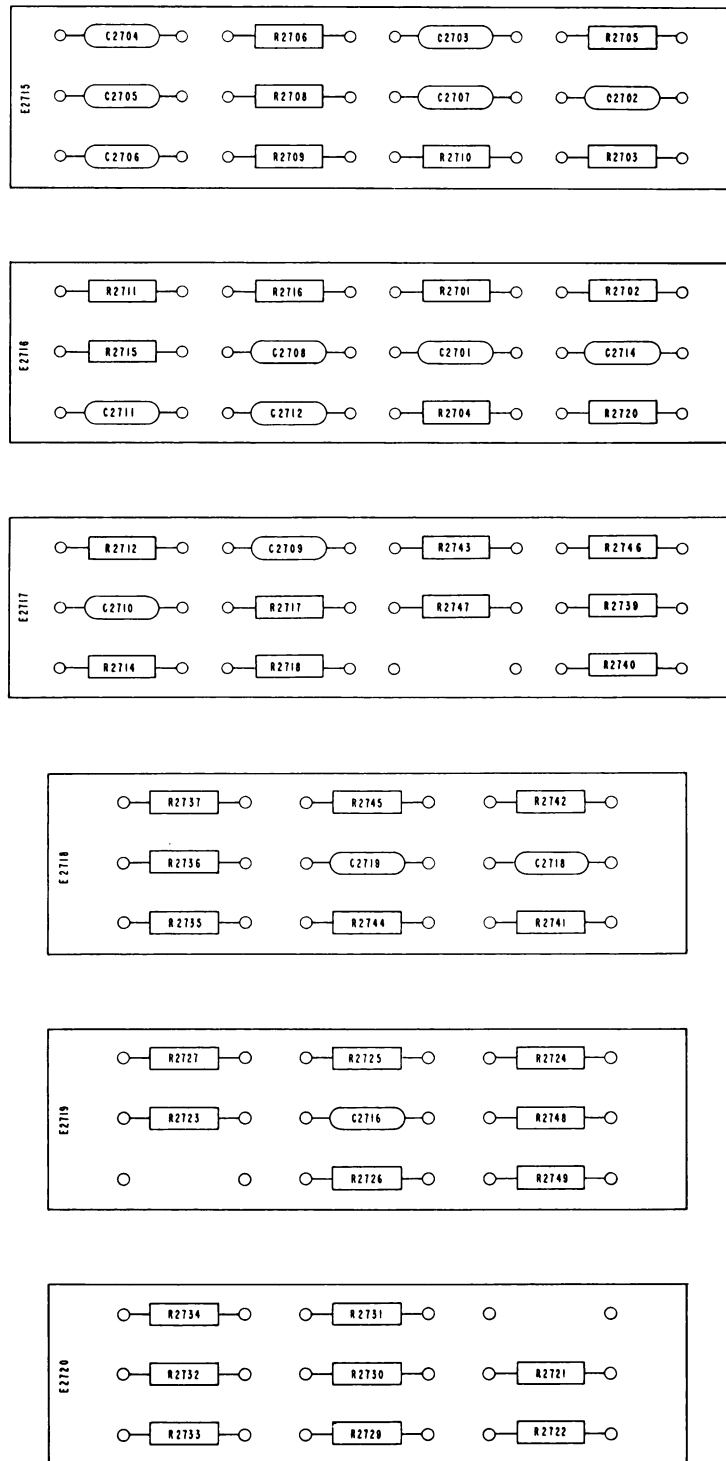


Figure 7-26. Components Location, Terminal Boards of Electronic Frequency Converter CV-244/FCC-3

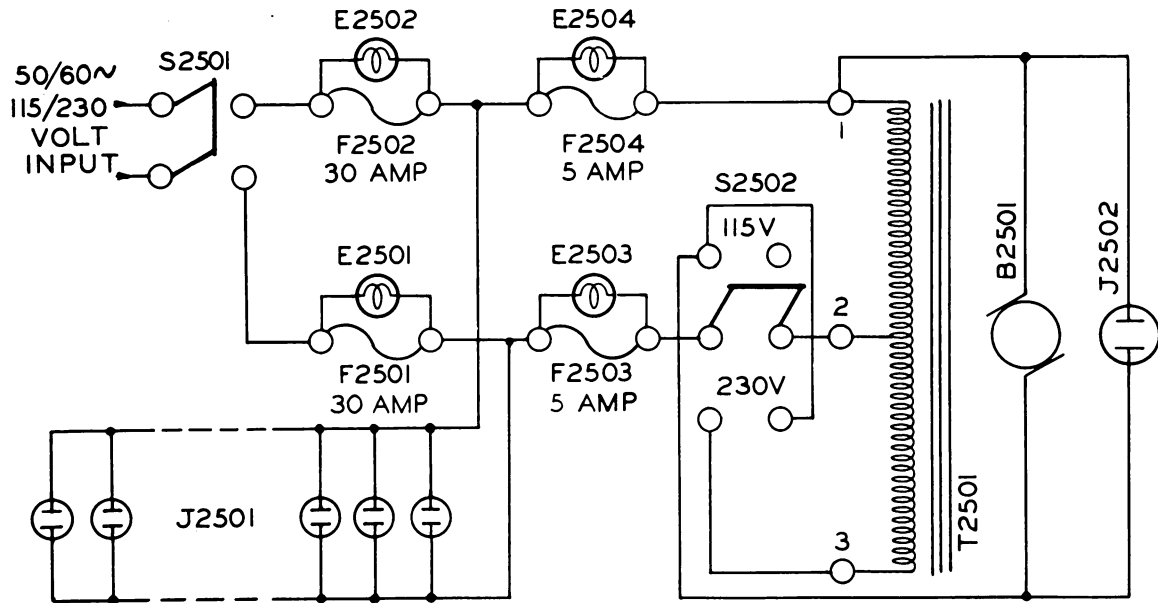


Figure 7-29. Schematic Diagram of Telegraph Carrier Terminal Cabinet CY-1195/FCC-3

TABLE 7-6. TEST EQUIPMENT

EQUIPMENT	SUITABLE TYPE	REQUIRED CHARACTERISTICS
Vacuum Tube Voltmeter	Electronic Multimeter ME-6/U, Ballantine Model 300, or equal.	Capable of indicating carrier level down to -40 dbm (0.00775 volts) and up to +6 dbm (1.55 volt).
Multimeter	Navy Model OE series Multimeter TS-352/U or equal.	Sensitivity: 20,000 ohms per volt on DC, 1000 ohms-per-volt on AC. Capable of indicating resistances between 10 ohms and 2 megohms and currents between 0 and 100 ma.
Electronic Counter	Frequency Meter FR-38/U or FR-67/U.	Indicates frequency 1 to 100,000 cps with accuracy of ± 1 cps.
Telegraph Test Set	Distortion Test Set TS-383A/GG. Modified for 100-word per minute speeds and the generation of 50% MARK and SPACE pulses.	Capable of sending 50% MARK and SPACE pulses at approximately 38 pulses per second. Capable of sending a test message and standard characters at a 100-word per minute rate.
Oscilloscope	Oscilloscope OS-8A/U.	10 to 30,000 cycles, vertical amplifier input impedance 1.5 megohms.

TABLE 7-7. TUBE OPERATING VOLTAGES AND CURRENTS

SYMBOL	TUBE TYPE	FUNCTION	PLATE (V)	PLATE (MA)	CATHODE (V)	GRID (V)	FILAMENT (V)	FILAMENT (A)
V101	12AU7	Loop push-pull oscillator	(1) 32 (6) 32		(3) 0 (8) 0	(2) -10 (7) -10	6.3	0.3
V102	6AL5W	Signal rectifier Clamping diode			(5) 60		6.3	0.3
¹ V103	12AU7	DC amplifier DC amplifier	(1) 23 (6) 34	0.4 2.3	(3) 0 (8) 23	(2) -13 (7) 23	6.3	0.3
V104	12AU7	Hartley oscillator Output amplifier	(1) 95 (6) 275	0.3 4.0	(3) 8 (8) 13	(2) 0	6.3	0.3
V105	5Y3GT	Loop supply rectifier			(2) 145 (8) 145		5.0	2.0
V106	5Y3GT	Power supply rectifier			(2) 280 (8) 280		5.0	2.0
V107	0B2	Voltage regulator	108		0			
V108	0B2	Voltage regulator	216		108			
V109	0B2	Voltage regulator	108		0			
³ V1301	6AU6	Amplifier	38	0.4	1.4	0	6.3	0.3
V1302	12AX7	Amplifier Amplifier	(1) 45 (6) 45	0.21 0.21	(3) .7 (8) .7	(2) -8 (7) -8	6.3	0.3
V1303	6C4	Discriminator driver	188	8.	8	-8	6.3	0.15
¹ V1304	6AL5W	MARK signal rectifier	-50		0		6.3	0.3
² V1305	6J6	DC amplifier	170	.45	6	-8	6.3	0.45
V1306	6J6	DC amplifier	(1) 22 (2) 130	(1) 3.4 (2) 1.2	0	(5) -40 (6) 0	6.3	0.45
V1307	6Y6G	Output keyer	55	60	0	-25	6.3	1.25
V1308	6Y6G	Output keyer	0	60	118	56	6.3	1.25
V1309	6Y6G	Output keyer	150	0	60	-40	6.3	1.25
V1310	6Y6G	Output keyer	285	150	60		6.3	1.25
V1311	5Y3GT	Power supply rectifier	(4) 420 (6) 420	90	(2) 320 (8) 320		5.0	2.0
V1312	6X4W	Negative supply rectifier	-300	7.5	420		6.3	0.6
V1313	0B2	Voltage regulator	216		108			
V1314	0B2	Voltage regulator	108		0			
V1315	0A2	Voltage regulator	0		-150			
² V1316	6AL5W	Space signal rectifier	(2) 0 (7) 0		(1) 60 (5) 60		6.3	0.3

TABLE 7-7, CONT'D

SYMBOL	TUBE TYPE	FUNCTION	PLATE (V)	PLATE (MA)	CATHODE (V)	GRID (V)	FILAMENT (V)	FILAMENT (A)
V2601	12AU7	102 kc Xtal oscillator	(1) 130 (6) 110	2.7 3.3	(3) 6 (8) 8	(2) 0 (7) -3	6.3	0.3
V2602	12AX7	20.4 kc phase shift osc. 3400 cps phase shift osc.	(6) 200 (1) 200	1.8 1.8	(8) 0 (3) 1.8	(7) -1 (2) -1.5	6.3	0.3
V2603	12AU7	3400 cps Buffer amplifier 85 cps Buffer amplifier	(6) 115 (1) 110	1.8 2.3	(8) 6 (3) 5	(7) 0 (2) .1	6.3	0.3
V2604	12AX7	425 cps phase shift osc. 85 cps phase shift osc.	(6) 160 (1) 105	0.7 0.35	(8) .7 (3) .35	(7) -.2 (2) -.4	6.0	0.3
V2605	12AX7	Mixer amplifier	(1) 155 (6) 155	0.7 0.7	(3) 1.5 (8) 1.5	(2) 0 (7) 0	6.3	0.3
V2606	12AU7	Amplifier Output amplifier	(1) 120 (6) 300	1.3 11.5	(3) 6.7 (8) 11.5	(2) 0 (7) 0	6.3	0.3
V2607	5Y3GT	Power supply rectifier			(2) 335 (8) 335		5.0	2.0
V2608	0B2	Voltage regulator	216		108			
V2609	0B2	Voltage regulator	108		0			
V2701	12AU7	102 kc Xtal oscillator	(1) 130 (6) 110	2.7 3.3	(3) 6 (8) 8	(2) 0 (7) -3	6.3	0.3
V2702	12AX7	20.4 kc phase shift osc. 3400 cps phase shift osc.	(6) 200 (1) 200	1.8 1.8	(8) 0 (3) 1.8	(7) -1 (2) -1.5	6.3	0.3
V2703	12AU7	3400 cps Buffer amplifier Converted output amplifier	(1) 115 (6) 270	1.8 10.0	(3) 6 (8) 11	(2) 0 (7) 0	6.3	0.3
V2704	12AU7	Normal amplifier Normal output amplifier	(1) 115 (6) 270	1.7 10.0	(3) 5.5 (8) 10	(2) 0 (7) 0	6.3	0.3
V2705	12AU7	Converted amplifier Converted amplifier	(1) 50 (6) 60	1.8 2.4	(3) 1.75 (8) 2.5	(2) 0 (7) 0	6.3	0.3
V2706	5Y3GT	Power supply rectifier			(2) 335 (8) 335		5.0	2.0
V2707	0B2	Voltage regulator	216		108			
V2708	0B2	Voltage regulator	108		0			
<p>¹Values given for MARK condition.</p> <p>²Values given for SPACE condition.</p> <p>³Screen voltage 35 and screen current milliamperes 0.12.</p> <p>Numbers in parenthesis indicate tube socket pin number.</p>								

TABLE 7-8. TUBE CHARACTERISTICS

TUBE TYPE	DESIGN FUNCTION	FILA- MENT VOLT- AGE (V)	FILA- MENT CUR- RENT (A)	PLATE VOLT- AGE (V)	GRID BIAS (V)	PLATE CUR- RENT (MA)	SCREEN VOLT- AGE (V)	SCREEN CUR- RENT (MA)	AC PLATE RESIS- TANCE (OHMS)	AMPLI- FICA- TION FAC- TOR (MU)	TRANS- CON- DUC- TANCE (MICRO- MHOS)
0A2	Gas Diode Voltage Reg.			150		5. to 30.					
0B2	Gas Diode Voltage Reg.			105		5. to 30.					
5Y3GT	Full- wave Hi- vacuum Rec.	5.0	2.0	3700		125					
26AL5W	Twin Diode	6.3	0.3	3117		9.					
6AU6	Sharp Cutoff RF Pentode	6.3	0.3	250 100	1 1	10.6 5	150 100	4.3 2.1	1,000,000 500,000		5,200 3,900
6C4	Medium Mu Triode	6.3	0.15	250	8.5	10.5			7,700	17	2,200
6J6	Twin Triode	6.3	0.45	100	.85	8.5			7,100	38	5,300
6X4W	Full- wave Hi- vacuum Rectifier	6.3	0.6	3650		70.					

TABLE 7-8, CONT'D

TUBE TYPE	DESIGN FUNCTION	FILA- MENT VOLT- AGE (V)	FILA- MENT CUR- RENT (A)	PLATE VOLT- AGE (V)	GRID BIAS (V)	PLATE CUR- RENT (MA)	SCREEN VOLT- AGE (V)	SCREEN CUR- RENT (MA)	AC PLATE RESIS- TANCE (OHMS)	AMPLI- FICA- TION FAC- TOR (MU)	TRANS- CON- DUC- TANCE (MICRO- MHOS)
6Y6G	Beam Power Ampli- fier	6.3	1.25	200	14.0	¹ 61.	135	¹ 2.2	18,000		7,100
² 12AU7	Medium Mu Triode	6.3	0.3	250	8.5	10.5			7,700	17.	2,200
² 12AX7	Hi-Mu Twin Triode	6.3	0.3	100	1.0	0.5			80,000	100	1,250
				250	2.0	1.2			62,500	100	1,600
¹ Zero Signal ² Each Section ³ RMS											

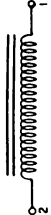
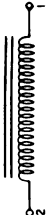
DESIG-NATION SYMBOL	R. F. L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIS-TANCE IN OHMS	REMARKS
L101, 201, 301, 401, 501, 601, 701, 801, 901, 1001, 1101, 1201 L1301, 1401, 1501, 1601, 1701, 1801, 1901, 2001, 2101, 2201, 2301, 2401	HB-4842		1-2	31E	3500	220	2500 volts RMS Hi-pot Test 10 hy at 100 ma DC
L2603, 2703 L102, 202, 302, 402, 502, 602, 702, 802, 902, 1002, 1102, 1202	HB-4897		1-2	30E	2380	105	2500 volts RMS Hi-pot Test 10 hy at 20 ma DC and 3.0 hy at 80 ma DC

TABLE 7-9, CONT'D

DESIG- NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIS- TANCE IN OHMS	RESISTANCE		REMARKS
							KEY. RES.	F.B. RES.	
T101	HB-4849-1		3-1	40HF	3930	870	470K	100K	
T201	HB-4849-2		1-7	40HF	1310	280			
T301	HB-4849-3		3-1	40HF	3930	870	240K	100K	
T401	HB-4849-4		1-7	40HF	1310	280			
T501	HB-4849-5		3-1	40HF	2475	320	150K	220K	
T601	HB-4849-6		1-7	40HF	2475	320			
T701	HB-4849-7		3-1	37HF	1520	90	150K	220K	
T801	HB-4849-8		1-7	37HF	1520	90			

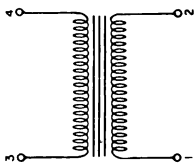
DESIG-NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIS-TANCE IN OHMS	REMARKS
T901	HB-4849-9		3-1 1-7	36HF 36HF	1240 1240	60 60	22K 220K
T1001	HB-4849-10		3-1 1-7	36HF 36HF	1240 1240	60 60	22K 220K
T1101	HB-4849-11		3-1 1-7	34HF 34HF	875 875	28 28	22K 220K
T1201	HB-4849-12		3-1 1-7	34HF 34HF	875 875	28 28	22K 220K
T102, 202, 302, 402, 502, 602, 702, 802, 902, 1002, 1102, 1202	HB-5098		1-2 3-4	39E 33E	3600 792	300 72	1000 volts RMS Hi-pot Test Plate to line 10,000/600 ohms
T2603 T2701 T2705							

TABLE 7-9, CONT'D

DESIG-NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIS-TANCE IN OHMS	REMARKS
T103, 203, 303, 403, 503, 603, 703, 803, 903, 1003, 1103, 1203	HB-4847		1-2 3-4 5-6 7-8 9-10 11-12-13 14-15-16 17-18	26E 26E 18E 19E 19E 35E 32E 24E	336 336 20 16 16 1146 CT 2240 CT 20	7.1 7.85 .102 .09 .099 276 244 .41	Pri 1 and 2 in series: 230 v 50/60 cps Pri 1 and 2 in parallel: 115 v 50/60 cps Hi-pot 1500 v RMS Sec 1 6.3 v at 2.0A Hi-pot 1500 v RMS Sec 2 5.0 v at 2.0A Hi-pot 2500 v RMS Sec 3 175-0-175 v at 80 ma CT Hi-pot 1500 v RMS Sec 4 350-0-350 v at 70 ma CT Hi-pot 2500 v RMS Sec 5 6.3 v at 0.5A Hi-pot 1500 v RMS

TABLE 7-9, CONT'D

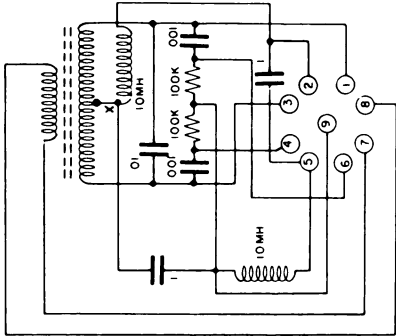
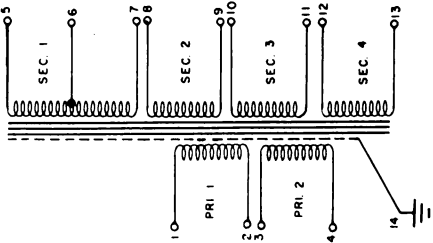
DESIG-NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIST-ANCE IN OHMS	REMARKS
T104, 204, 304, 404, 504, 604, 704, 804, 904, 1004, 1104, 1204	HC-5355		1-3 7-8 5-9 2-X 6-9 4-9	32HF 32	400HF 400HF	8.5 ohm 9.0 ohm 65 ohm 65 ohm 100 K 100 K	1000 volts RMS Hi-pot
T1302, 1402, 1502, 1602, 1702, 1802, 1902, 2002, 2102, 2202, 2102, 2202, 2302, 2402	HB-4844		1-2 3-4 5-6-7 8-9 10-11 12-13	22 22 31E 16E 22E 12E	291 291 2240CT 13 17 17	2.7 3.1 227 .04 .25 .02	Pri 1 and 2 in series: 230 v 50/60 cps Pri 1 and 2 in parallel: 115 v 50/60 cps Hi-pot 1500 v Sec 1 425-0-425 at 100 ma CT Hi-pot 3500 v Sec 2 5.0 v at 2.2A Hi-pot 3500 v Sec 3 6.3 v at 1.0A Hi-pot 2000 v Sec 4 6.3 at 12.0A Hi-pot 2000 v

TABLE 7-9, CONT'D

DESIG-NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIST-ANCE IN OHMS	REMARKS
T2501	HB-4906		1-2-3	20E	524 tap 272	3.88	AUTO TRANS. with 230 v input max output 2.5A at 115 v Hi-pot 1500 v RMS
T2601 T2703	HB-4825		1-X 3-4 5-6 1-2 1-7 1-8	36 32 32 32 32 36	450 644CT 644CT 1000 1000 4500	27 16 16 23 23 265	500 volts RMS Hi-pot
T2602 T2704	HB-5235		1-2 3-4	29E 38E	400 7304	7.17 1056	1000 volts RMS Hi-pot Line to Grid 600,50,000 ohms

TABLE 7-9, CONT'D

DESIG-NATION SYMBOL	R.F.L. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESIST-ANCE IN OHMS	REMARKS
T2604 T2706	HB-4894		1-2 3-4 9-10-11 7-8 5-6	29E 29E 34E 17E 16E	412 412 3200CT 20 25	16.2 17.72 512 .073 .068	Pri 1 and 2 in series: 230 v 50/60 cps Pri 1 and 2 in parallel: 115 v 50/60 cps Hi-pot 1500 v RMS Sec 1 6.3 v at 2.0A Hi-pot 2000 v RMS Sec 2 5.0 v at 2.2 A Hi-pot 3000 v RMS Sec 3 400-0-400 v at 60 ma Hi-pot 3000 v RMS
T2702	HB-5234		1-2 3-4	29E 29E	800 800	15.1 15.2	Line to Line 600/600 ohms Hi-pot 1000 v RMS

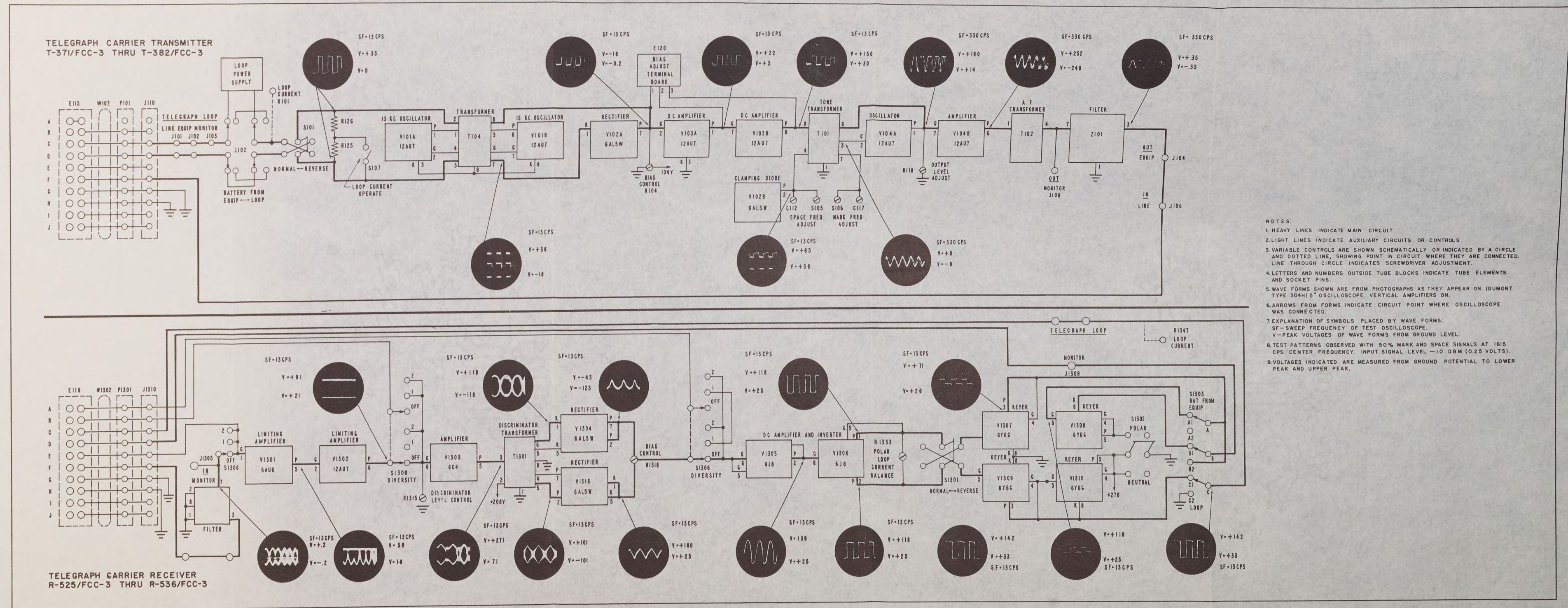
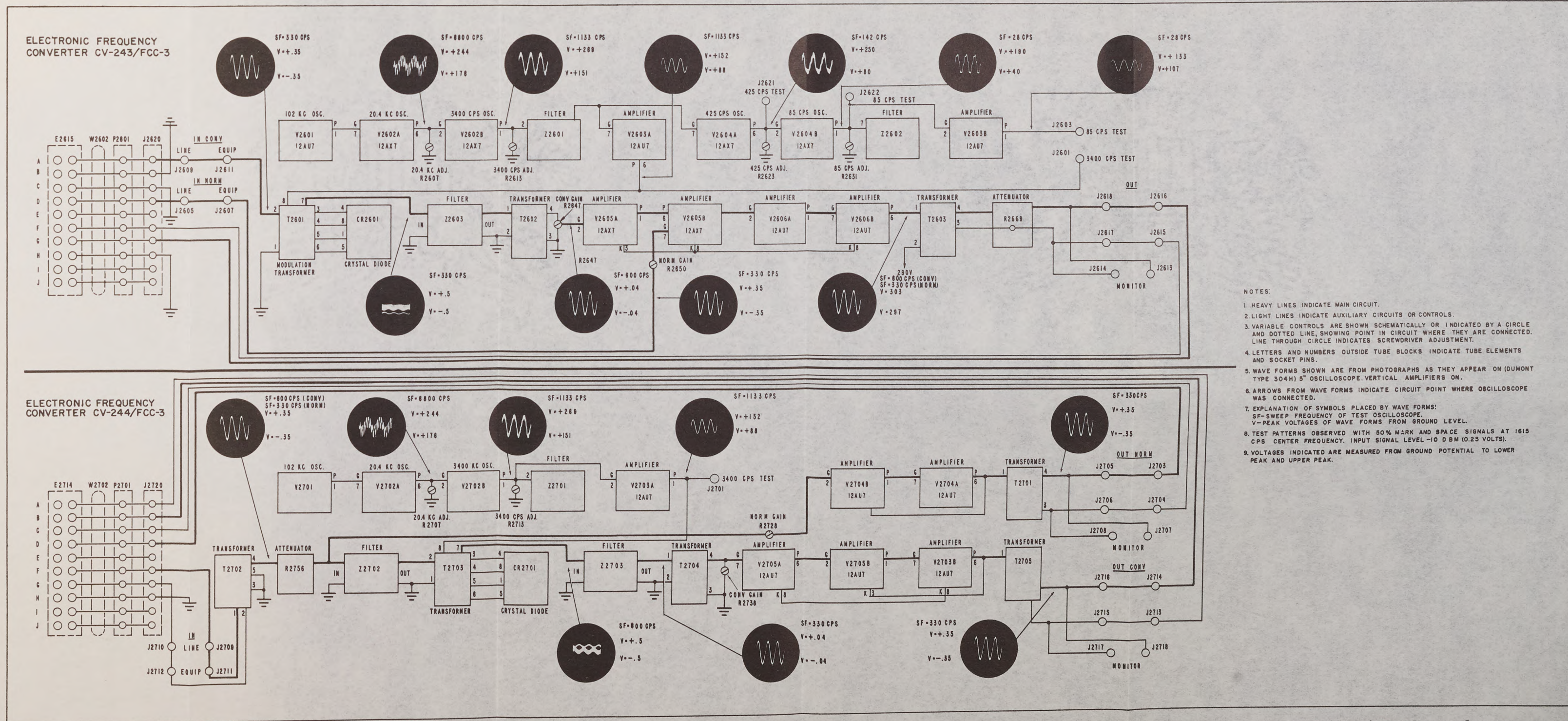


Figure 7-2. Servicing Block Diagram, Transmitter and Receiver



- NOTES:
1. HEAVY LINES INDICATE MAIN CIRCUIT.
 2. LIGHT LINES INDICATE AUXILIARY CIRCUITS OR CONTROLS.
 3. VARIABLE CONTROLS ARE SHOWN SCHEMATICALLY OR INDICATED BY A CIRCLE AND DOTTED LINE, SHOWING POINT IN CIRCUIT WHERE THEY ARE CONNECTED. LINE THROUGH CIRCLE INDICATES SCREWDRIVER ADJUSTMENT.
 4. LETTERS AND NUMBERS OUTSIDE TUBE BLOCKS INDICATE TUBE ELEMENTS AND SOCKET PINS.
 5. WAVE FORMS SHOWN ARE FROM PHOTOGRAPHS AS THEY APPEAR ON (DUMONT TYPE 304H) 5" OSCILLOSCOPE, VERTICAL AMPLIFIERS ON.
 6. ARROWS FROM WAVE FORMS INDICATE CIRCUIT POINT WHERE OSCILLOSCOPE WAS CONNECTED.
 7. EXPLANATION OF SYMBOLS PLACED BY WAVE FORMS:
SF—SWEEP FREQUENCY OF TEST OSCILLOSCOPE.
V—PEAK VOLTAGES OF WAVE FORMS FROM GROUND LEVEL.
 8. TEST PATTERNS OBSERVED WITH 50% MARK AND SPACE SIGNALS AT 1615 CPS CENTER FREQUENCY. INPUT SIGNAL LEVEL—10 DBM (0.25 VOLTS).
 9. VOLTAGES INDICATED ARE MEASURED FROM GROUND POTENTIAL TO LOWER PEAK AND UPPER PEAK.

Figure 7-3. Servicing Block Diagram, Electronic Frequency Converters

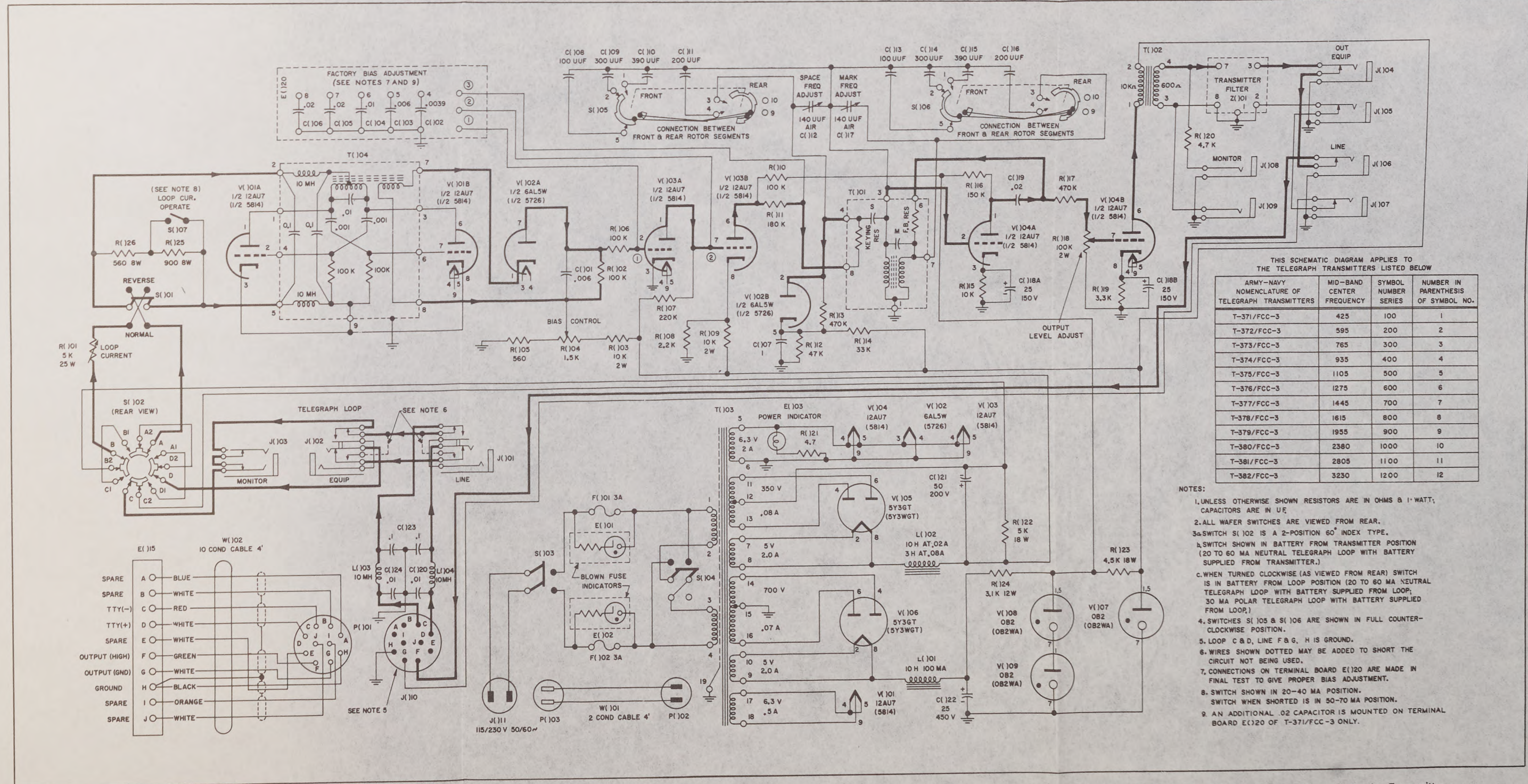


Figure 7-8. Schematic Diagram of Telegraph Carrier Transmitter

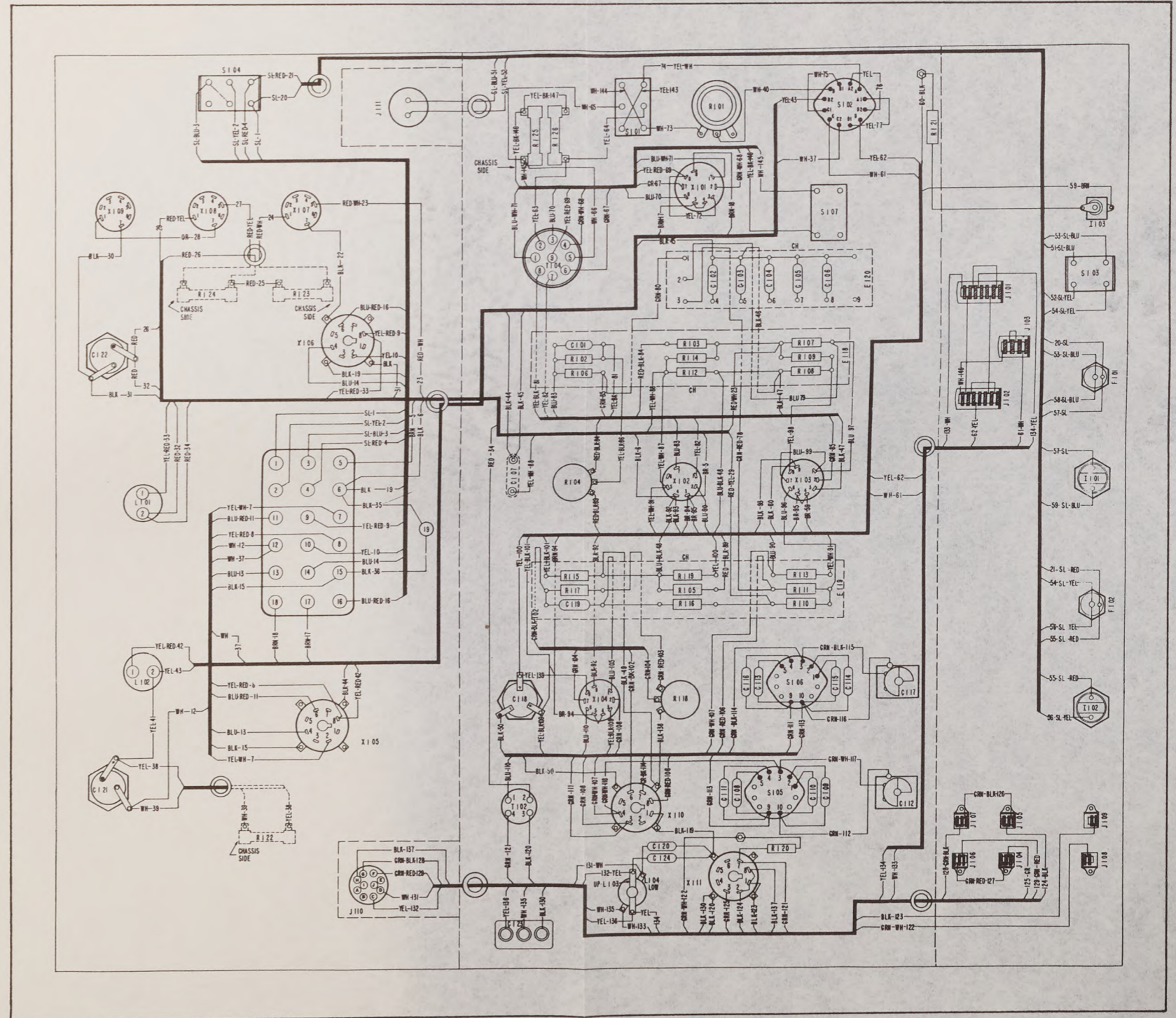
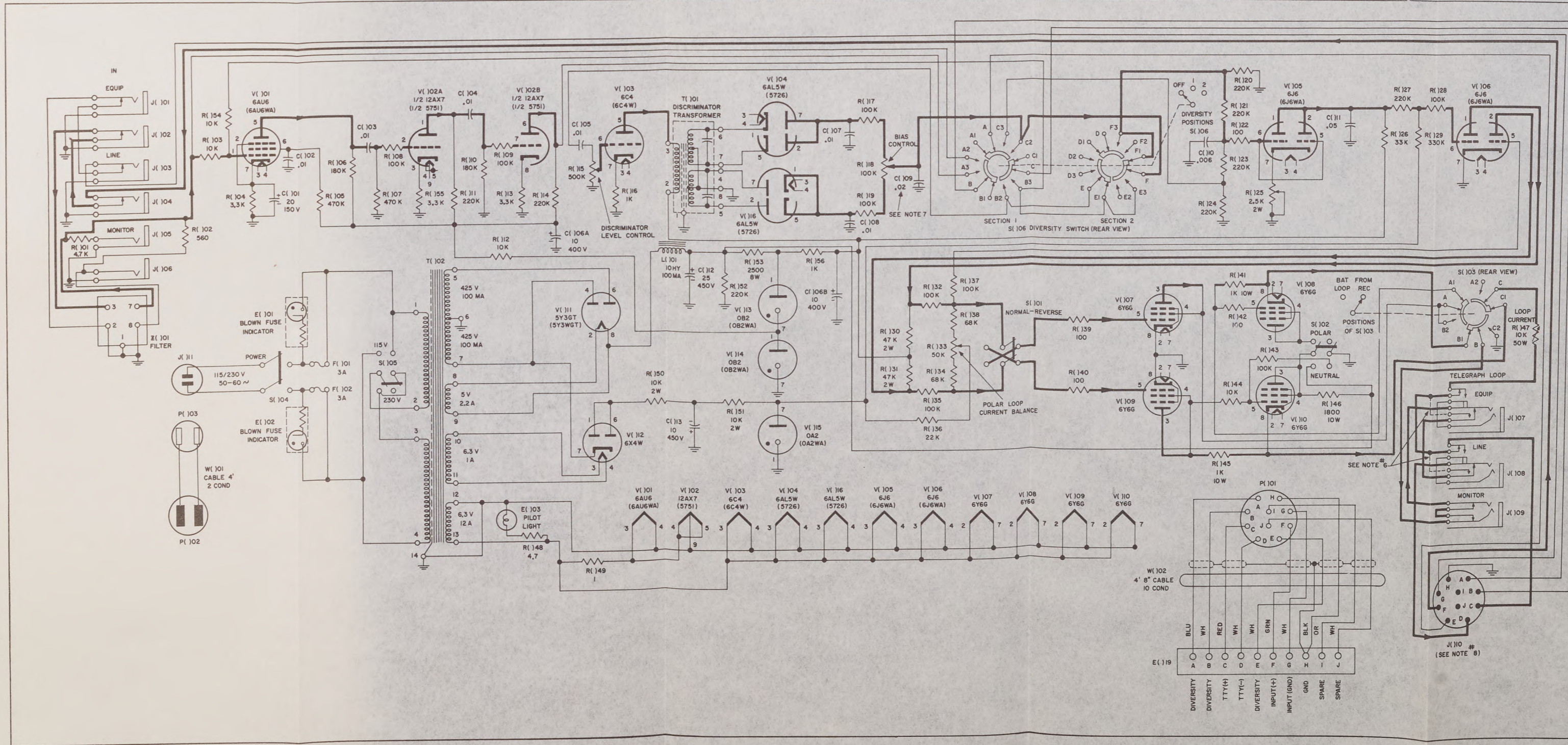


Figure 7-9. Wiring Diagram of Telegraph Carrier Transmitter

7-43/7-44



THIS SCHEMATIC DIAGRAM APPLIES TO THE TELEGRAPH RECEIVERS LISTED BELOW

ARMY-NAVY NOMENCLATURE OF TELEGRAPH RECEIVERS	MID-BAND CENTER FREQUENCY	SYMBOL NUMBER SERIES	NUMBER IN PARENTHESIS OF SYMBOL NO.
R-525/FCC-3	425	1300	13
R-526/FCC-3	595	1400	14
R-527/FCC-3	765	1500	15
R-528/FCC-3	935	1600	16
R-529/FCC-3	1105	1700	17
R-530/FCC-3	1275	1800	18
R-531/FCC-3	1445	1900	19
R-532/FCC-3	1615	2000	20
R-533/FCC-3	1955	2100	21
R-534/FCC-3	2380	2200	22
R-535/FCC-3	2805	2300	23
R-536/FCC-3	3230	2400	24

- NOTES:
- UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS; CAPACITORS ARE IN UF.
 - UNLESS OTHERWISE SHOWN, RESISTORS ARE 1 WATT.
 - ALL WAFER SWITCHES VIEWED FROM REAR.
 - SWITCH S(103) IS A 2 POSITION, 60° INDEX TYPE.
 - (a) SWITCH S(103) SHOWN IN BATTERY FROM RECEIVER POSITION (20-60 MA NEUTRAL TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM RECEIVER; 30 MA POLAR TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM REC.)
(b) SWITCH IN BATTERY FROM LOOP POSITION (20-60 MA NEUTRAL TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM LOOP)
 - WIRES SHOWN DOTTED MAY BE ADDED TO SHORT THE CIRCUIT NOT BEING USED.
 - C(109) BECOMES .006 MFD IN RECEIVERS R-533, R-534, R-535 AND R-536.
 - DIVERSITY IN A,B&H H IS GROUND
C&D
DIVERSITY OUT E,B&H
LINE F&G G IS GROUND

Figure 7-14. Schematic Diagram of Telegraph Carrier Receiver

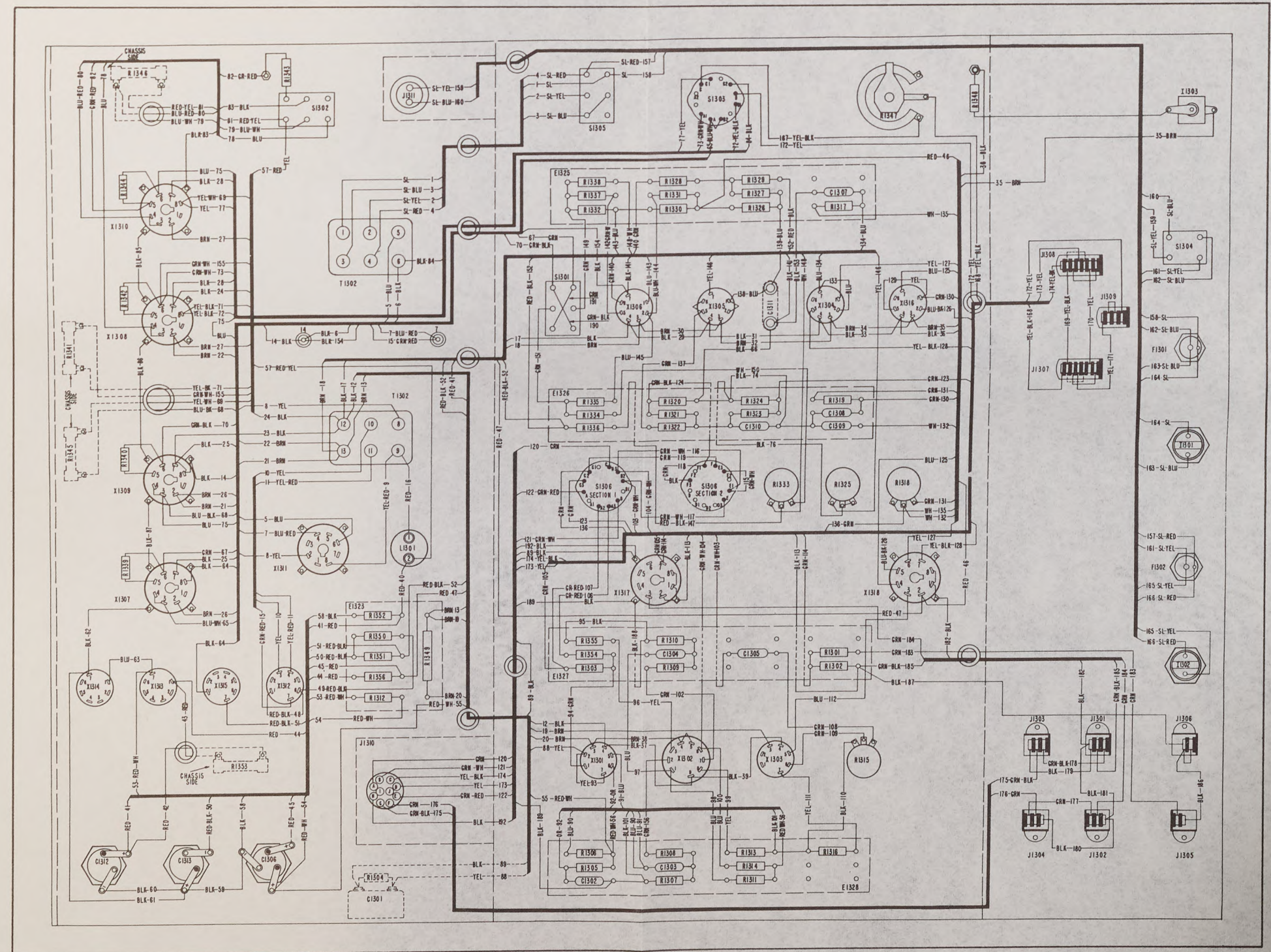
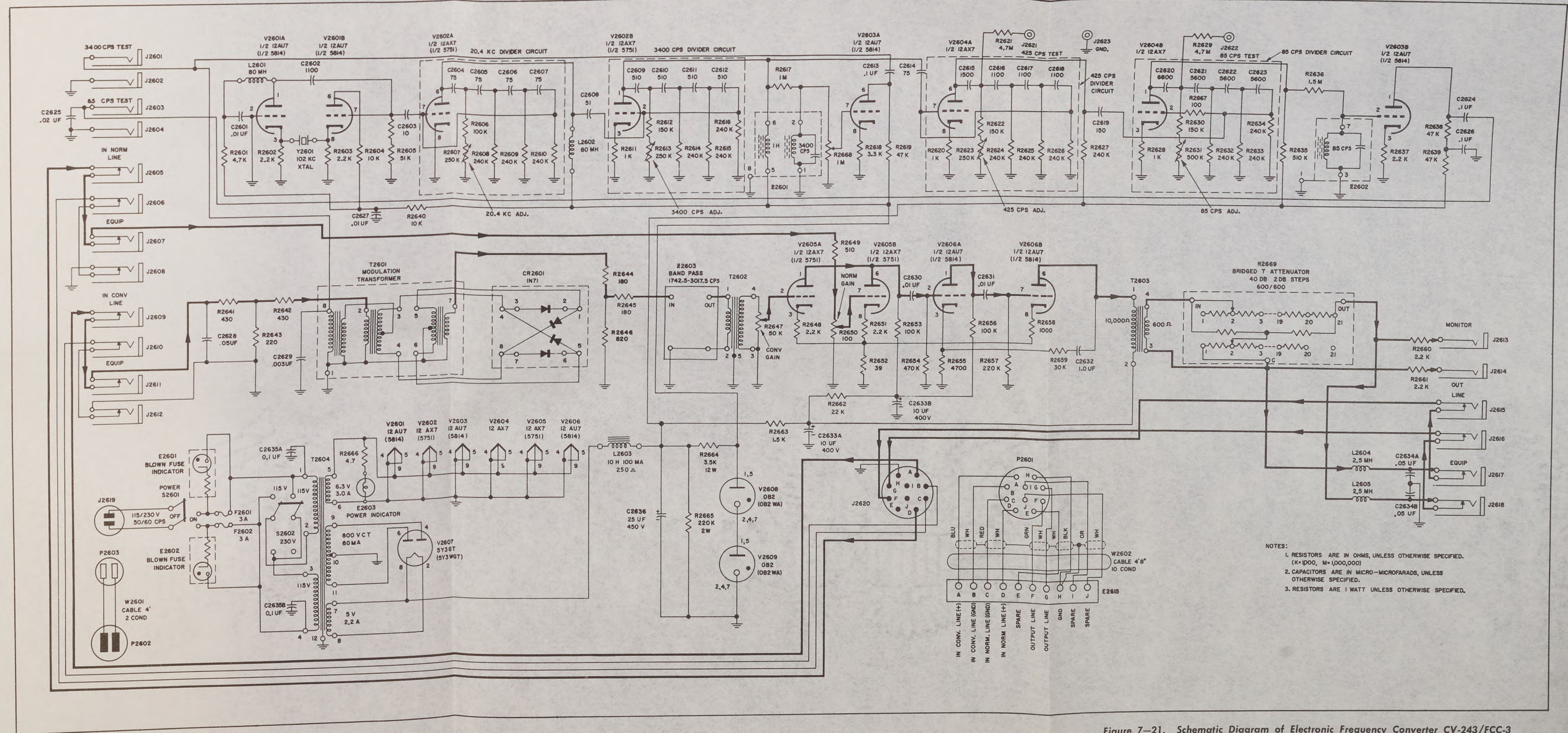


Figure 7-15. Wiring Diagram of Telegraph Carrier Receiver

7-47/7-48



NOTES:
 1. RESISTORS ARE IN OHMS, UNLESS OTHERWISE SPECIFIED.
 (K=1000, M=1,000,000)
 2. CAPACITORS ARE IN MICRO-MICROFARADS, UNLESS OTHERWISE SPECIFIED.
 3. RESISTORS ARE 1 WATT UNLESS OTHERWISE SPECIFIED.

Figure 7-21. Schematic Diagram of Electronic Frequency Converter CV-243/FCC-3

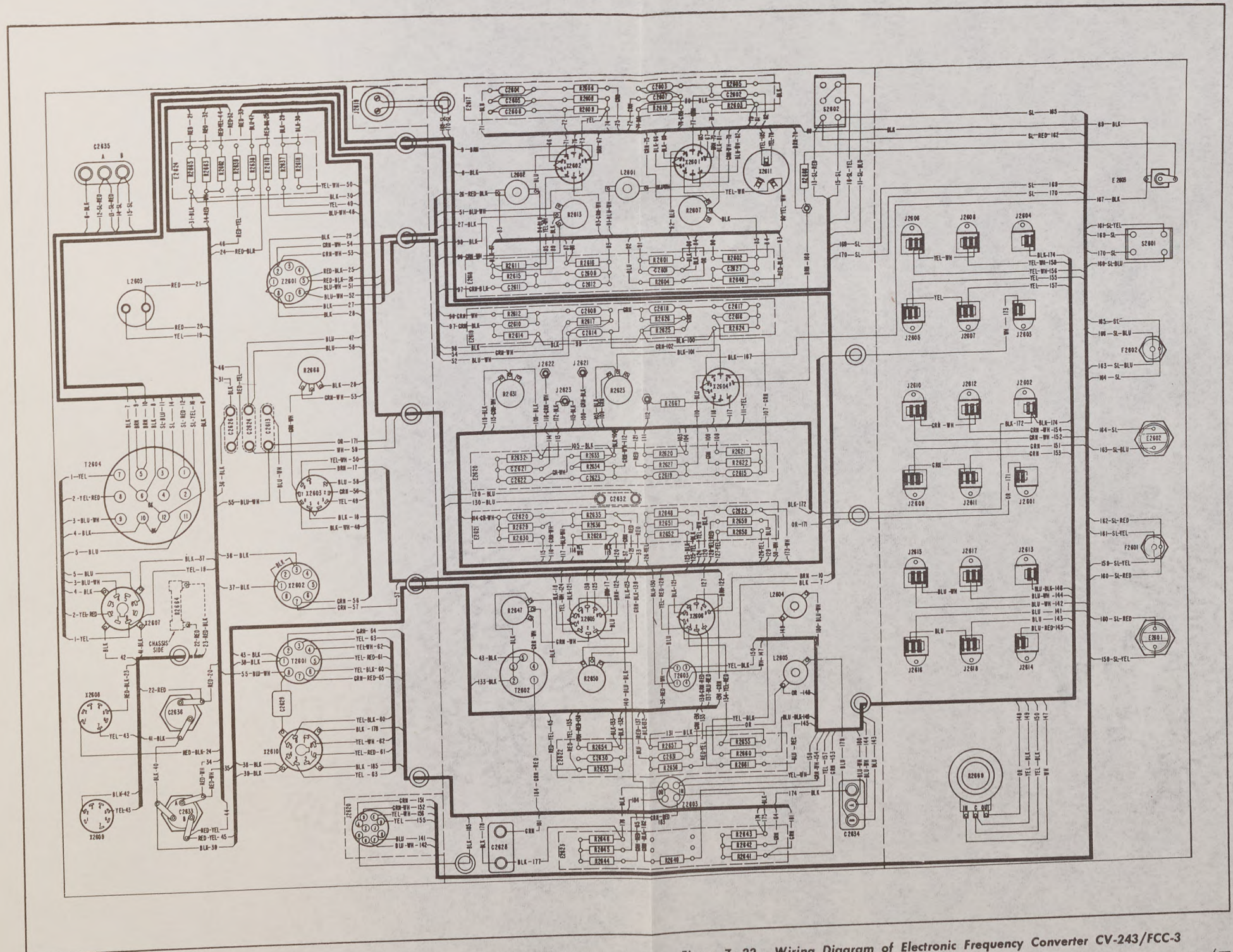


Figure 7-22. Wiring Diagram of Electronic Frequency Converter CV-243/FCC-3

7-51/7-52

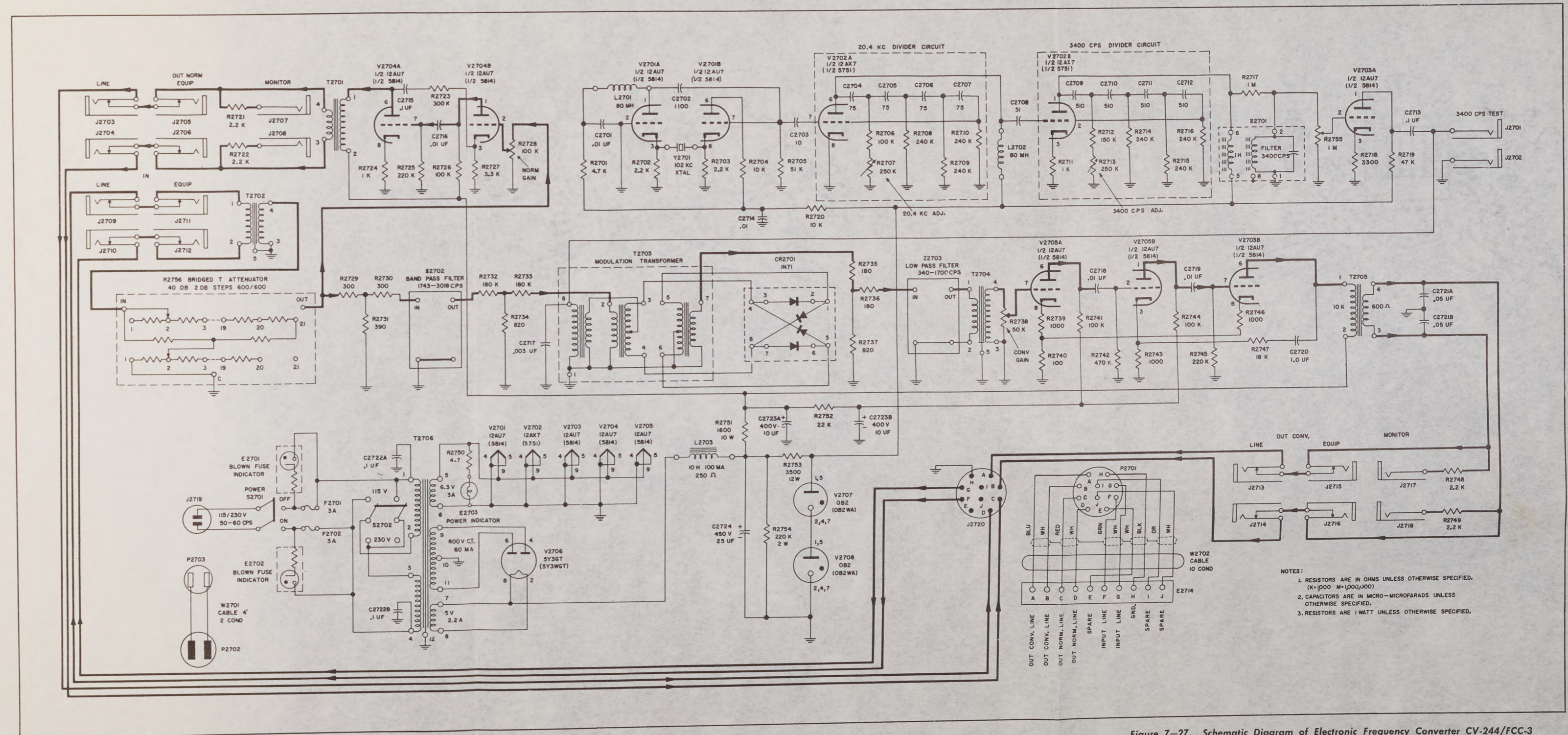


Figure 7-27. Schematic Diagram of Electronic Frequency Converter CV-244/FCC-3

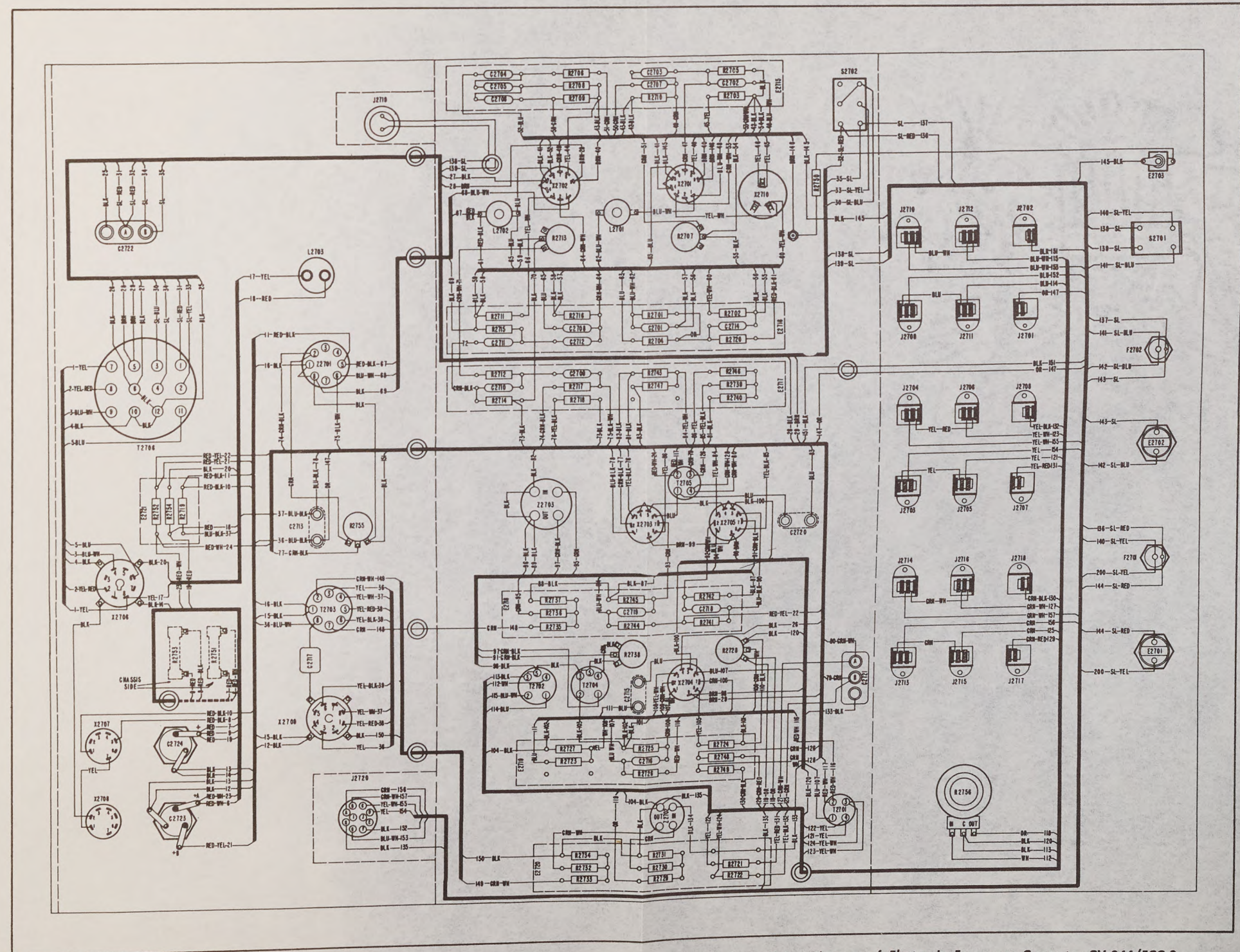


Figure 7-28. Wiring Diagram of Electronic Frequency Converter CV-244/FCC-3

7-55 / 7-56

SECTION 8
PARTS LIST**1. GENERAL.**

The items marked with an asterisk in table 8-2 and covered by notes at the bottom of the pages are not included in the Stock Repair Parts complement; if failure occurs, do not request replacement unless the item cannot be repaired or fabricated. The parts peculiar to the equipment that may fail and need immediate replacement are included in the Maintenance Parts Kit supplied with the equipment. The parts in this kit are listed in table 8-3.

TABLE 8-1. LIST OF MAJOR UNITS

SYMBOL GROUP	QUANTITY	NAME OF MAJOR UNIT	NAVY TYPE DESIGNATION
100-199	1	Telegraph Carrier Transmitter, 425 cps	T-371/FCC-3
200-299	1	Telegraph Carrier Transmitter, 595 cps	T-372/FCC-3
300-399	1	Telegraph Carrier Transmitter, 765 cps	T-373/FCC-3
400-499	1	Telegraph Carrier Transmitter, 935 cps	T-374/FCC-3
500-599	1	Telegraph Carrier Transmitter, 1105 cps	T-375/FCC-3
600-699	1	Telegraph Carrier Transmitter, 1275 cps	T-376/FCC-3
700-799	1	Telegraph Carrier Transmitter, 1445 cps	T-377/FCC-3
800-899	1	Telegraph Carrier Transmitter, 1615 cps	T-378/FCC-3
¹ 900-999	1	Telegraph Carrier Transmitter, 1955 cps	T-379/FCC-3
¹ 1000-1099	1	Telegraph Carrier Transmitter, 2380 cps	T-380/FCC-3
¹ 1100-1199	1	Telegraph Carrier Transmitter, 2805 cps	T-381/FCC-3
¹ 1200-1299	1	Telegraph Carrier Transmitter, 3230 cps	T-382/FCC-3
1300-1399	1	Telegraph Carrier Receiver, 425 cps	R-525/FCC-3
1400-1499	1	Telegraph Carrier Receiver, 595 cps	R-526/FCC-3
1500-1599	1	Telegraph Carrier Receiver, 765 cps	R-527/FCC-3
1600-1699	1	Telegraph Carrier Receiver, 935 cps	R-528/FCC-3
1700-1799	1	Telegraph Carrier Receiver, 1105 cps	R-529/FCC-3
1800-1899	1	Telegraph Carrier Receiver, 1275 cps	R-530/FCC-3
1900-1999	1	Telegraph Carrier Receiver, 1445 cps	R-531/FCC-3
2000-2099	1	Telegraph Carrier Receiver, 1615 cps	R-532/FCC-3
¹ 2100-2199	1	Telegraph Carrier Receiver, 1955 cps	R-533/FCC-3
¹ 2200-2299	1	Telegraph Carrier Receiver, 2380 cps	R-534/FCC-3
¹ 2300-2399	1	Telegraph Carrier Receiver, 2805 cps	R-535/FCC-3
¹ 2400-2499	1	Telegraph Carrier Receiver, 3230 cps	R-536/FCC-3
2500-2599	2	Telegraph Carrier Terminal Cabinet	CY-1195/FCC-3
² 2600-2699	1	Electronic Frequency Converter	CV-243/FCC-3
² 2700-2799	1	Electronic Frequency Converter	CV-244/FCC-3

¹Not used with the AN/FCC-7 or the AN/FCC-8

²Not used with the AN/FCC-8

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
AN/FCC-3	4A2812-3 F16Q-111988-100	TERMINAL, Carrier Telegraph: coded by carrier frequency shift: 8 narrow-band transmitters and receivers in freq range of 425 to 1615 cyc and 4 wide-band transmitters and receivers in freq range of 1955 to 3230 cyc, channel speed 40 dot cyc for narrow-band and 100 dot cyc for wide-band; 115/230 v 50/60 cyc, single phase; 2 wire line termination; arranged for polar and neutral loops; 12 transmitters and one electronic frequency converter mtd in a floor standing cabinet comprise the transmitter group and 12 receivers and one electronic frequency converter mtd in a floor standing cabinet comprise the receiver group; RFL part No. HC-4800; U.S. Navy Type AN/FCC-3.	
AN/FCC-7	F16Q-112104-100	TERMINAL, Carrier Telegraph: AN/FCC-7 same as AN/FCC-3 except less 4 wide-band transmitter and receiver channels.	
AN/FCC-8	F16Q-112106-100	TERMINAL, Carrier Telegraph: AN/FCC-8 same as AN/FCC-3 except less 4 wide-band transmitter and receiver channels, Converters CV-243 and CV-244.	
100 to 199	#F16T-99999-0005	TRANSMITTER, Telegraph Carrier: single channel, mid-band freq 425 cyc, frequency deviation from mid-band is +42.5 cyc per second for the mark signal and -42.5 cyc per second for the space signal; equipment consists of polar or neutral loop circuit electrically isolated from the remainder of the transmitter and ungrounded, L-C resistance stabilized oscillator controlled by audio freq transf, 425 cyc output filter, power supply, electrical power cable assembly, electrical special purpose cable assembly, audio freq transf 425 cyc; for connection to 600 ohm device; 115/230 v, 50/60 cyc, single phase; keying rate is 40 dot cps; 19" lg x 16" wd x 5-1/4" h o/a; RFL part No. HB-4806-1; U.S. Navy Type T-371/FCC-3; govt spec MIL-T-15294A (Ships).	Single channel telegraph transmitter.
C101	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: 6,000 mmf, ±10%; 600 v DC; govt spec JAN-C-91, type No. CN35A602K; Cornell-Dubilier No. CN35A602K; RFL part No. H-1080-67.	Filter capacitor for rectifier V102A.
C102	3K3539241 For replacement use N16-C-32430-6270	CAPACITOR, fixed, mica dielectric: 3,900 mmf, ±10%; 500 v DC; govt spec JAN-C-5, type No. CM35D392K; Cornell-Dubilier part No. CM-35D392K; RFL part No. H-1080-68.	Bias adjustment capacitor.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2. CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C103	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Bias adjustment capacitor.
C104	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: 10,000 mmf. $\pm 10\%$; 600 v DC; govt spec JAN-C-91, type No. CN35A103K; Cornell-Dubilier part No. CN35A103K; RFL part No. H-1080-33.	Bias adjustment capacitor.
C105	3DA20-220 N16-C-43112-6730	CAPACITOR, fixed, paper dielectric: 20,000 mmf. $\pm 10\%$; 300 v DC; govt spec JAN-C-91, type No. CN35E203K; Cornell-Dubilier part No. CN35E203K; RFL part No. H-1080-32.	Bias adjustment capacitor.
C106	3DA20-220 N16-C-43112-6730	CAPACITOR, fixed, paper dielectric: Same as C105.	Bias adjustment capacitor.
C107	3DB1-215 For replacement use N16-C-48817-2795	CAPACITOR, fixed, paper dielectric: 1 mf, $\pm 10\%$; 600 v DC; govt spec JAN-C-25, type No. CP69B1FF105K; Cornell-Dubilier part No. CP69B1FF105K; RFL part No. HA-4024.	Cathode filter capacitor for V102B.
C108	3K2010132 N16-C-28553-1201	CAPACITOR, fixed, mica dielectric: 100 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM20C101J; Cornell-Dubilier part No. CM-20C101J; RFL part No. H-1080-25.	Space frequency adjustment.
C109	3K2030142 N16-C-29660-9006	CAPACITOR, fixed, mica dielectric: 300 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM20D301J; Cornell-Dubilier part No. CM-20D301J; RFL part No. H-1080-75.	Space frequency adjustment.
C110	3K2039142 N16-C-29898-3606	CAPACITOR, fixed, mica dielectric: 390 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM20D391J; Cornell-Dubilier part No. CM-20D391J; RFL part No. H-1080-76.	Space frequency adjustment.
C111	3K2020142 N16-C-29265-3006	CAPACITOR, fixed, mica dielectric: 200 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM20D201J; Cornell-Dubilier part No. CM-20D201J; RFL part No. H-1080-77.	Space frequency adjustment.
C112	3D9143V-1 N16-C-28533-1201	CAPACITOR, variable, air-dielectric: 140 mmf, 600 v DC, 1-25/32" lg x 15/16" wd x 1-7/32" h o/a excl shaft and bushing; screwdriver adjustment; 3 term; mtd by 2 bushing tapped for #4-40 machine screws; 19 stator plates and 18 rotor plates; Hammarlund part No. APC-1C150; RFL part No. HA-5348.	SPACE FREQ ADJ.
C113	3K2010132 N16-C-28553-1201	CAPACITOR, fixed, mica dielectric: Same as C108.	Mark frequency adjust capacitor.

C114	3K2030142 N16-C-29660-9006	CAPACITOR, fixed, mica dielectric: Same as C109.	Mark frequency adjust capacitor.
C115	3K2039142 N16-C-29898-3606	CAPACITOR, fixed, mica dielectric: Same as C110.	Mark frequency adjust capacitor.
C116	3K2020142 N16-C-29265-3006	CAPACITOR, fixed, mica dielectric: Same as C111.	Mark frequency adjust capacitor.
C117	3D9143V-1	CAPACITOR, variable, air-dielectric: Same as C112.	MARK FREQ ADJ.
C118	3DB25-146 N16-C-21887-9621	CAPACITOR, fixed, electrolytic: 2 sections, 25 mf capacity per section; 150 v DC; govt spec JAN-C-62; type No. CE42C250J; Cornell-Dubilier part No. CE42C250J; RFL part No. HA-5350.	
C118A	3DB25-146 N16-C-21887-9621	CAPACITOR, fixed, electrolytic: p/o C118; for reference only.	Cathode by-pass capacitor for V104A.
C118B	3DB25-146 N16-C-21887-9621	CAPACITOR, fixed, electrolytic: p/o C118; for reference only.	Cathode by-pass capacitor for V104B.
C119	3DA20-220 N16-C-43112-6730	CAPACITOR, fixed, paper dielectric: Same as C105.	Couples plate of V104A to grid of V104B.
C120	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	RF filter capacitor.
C121	3DB50-81 N16-C-19964-7896	CAPACITOR, fixed, electrolytic: 50 mf, 200 v DC; govt spec JAN-C-62, type No. CE41C500K; Cornell-Dubilier part No. CE41C500K; RFL part No. HA-5142.	Filter capacitor for telegraph loop power supply.
C122	3DB25-88 For replacement use N16-C-19793-8136	CAPACITOR, fixed, electrolytic: 25 mf, 450 v DC; govt spec JAN-C-62, type No. CE41F250R; Cornell-Dubilier part No. CE41F250R; RFL part No. HA-4838.	Filter capacitor for high voltage power supply.
C123	3DA100-866 For replacement use N16-C-53204-4120	CAPACITOR, fixed, paper dielectric: 2 sections; 0.1 x 0.1 mf; ±15%; 600 v DC; govt spec JAN-C-25, type No. CP54B4EF104L; Cornell-Dubilier part No. CP54B4EF104L; RFL part No. HA-5392.	Filter capacitor.
C124	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	RF filter capacitor.
E101	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: 1/25 w, 65 v AC striking v, 90 v DC striking v; miniature bayonet base; bulb T3-1/4 clear, orange-red glow; 1-3/16" max o/a h; General Electric part No. NE-51; RFL part No. HA-2468.	Neon lamp; indicates blown fuse.
E102	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E103	2Z5927 For replacement use G17-L-6345	LAMP, incandescent: 6 v, 1-1/2 w, 0.25 amp; miniature bayonet base; bulb T3-1/4 clear; white; 1-3/16" max o/a h; burn any position; General Electric part No. 44; RFL part No. HA-3735.	Pilot lamp; indicates presence of line voltage.
E104	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: extractor post type; 125 v, 15 amp; accommodates one cartridge fuse 1-1/4" lg x 1/4" diam; mica filled phenolic; brass cont, nickel pl, spring type; 2-3/16" lg x 11/16" diam o/a; 2 term, solder lug type; one 1/2" diam mtg hole; Bussmann Mfg. part No. HKP-BL; RFL part No. HA-4109.	Holds AC line fuse F101.
E105	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F102.
E106	*3Z2876-6.2	FUSEHOLDER: block type; for spare fuses; accommodates two cartridge fuses; 1-1/4" lg x 1/4" diam; bakelite; bronze cont, clip type; 1-5/8" lg x 1" wd x 5/8" d; 4 term, solder lug type; two 0.144" diam mtg holes on 5/8" mtg/c; Bussmann Mfg. part No. 4408; RFL part No. HA-5133.	Spare fuseholder.
E107	*+ 2Z5824.117	KNOB: round, phenolic; black; accommodates round shaft 1/4" diam to a depth of 1/2", two #8-32 Allen head set screws; brass insert, 1-1/4" lg x 3/4" wd x 5/8" h o/a; RFL part No. HA-5224.	Control knob for S102.
E108	*+2Z5824.117	KNOB: Same as E107.	Control knob for R101.
E109	2Z8304.57 N16-S-34520-3864	SHIELD; electron tube: brass, nickel pl; cylindrical shape, 0.810" ID x 1-3/8" h; locking type; govt spec JAN-S-28A, type No. TS102U01; Cinch Mfg. part No. 8690-1; RFL part No. HA-4730.	Tube shield for V102.
E110	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: brass, nickel pl; cylindrical shape, 0.950" ID x 1-15/16" h; locking type; govt spec JAN-S-28A; type No. TS103U02; Cinch Mfg. part No. 16G13376; RFL part No. HA-4782.	Tube shield for V103.
E111	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Tube shield for V104.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

+ If required will be procured by Navy Supply Activity on demand.

E112	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: brass, nickel pl; cylindrical shape, 0.810" ID x 2-1/4" h; locking type; govt spec JAN-S-28A; type No. TS102U03; Clinch Mfg. part No. 8698-1; RFL part No. HA-4731.	Tube shield for V107.
E113	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Tube shield for V108.
E114	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Tube shield for V109.
E115	2Z9410.83 *For replacement use N17-B-77939-3236	TERMINAL BOARD, ASSEMBLY: bakelite; 20 screw type term; w/barriers; 6-5/8" lg x 1-5/16" wd x 5/8" h o/a; four 3/16" diam mtg holes on 1/2" x 6-3/16" mtg ctr; incl marker strip; H. B. Jones part No. 10-142; RFL part No. HA-5372.	Termination block for W102.
E116	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: 4,000 v; solder connection; brass, cadmium pl; 13/16" lg x 5/16" diam; mts by threaded shank #6-32, 1/4" lg; ins P.B.E. phenolic; Cambridge Thermionic Corp. part No. X1581; RFL part No. HA-5172.	Mounts component parts.
E117	*Shop mfr. locally	MOUNTING: laminated phenolic; natural color; jacks held in place by means of three #6-32 tapped holes; RFL part No. HA-5429.	Mounts J101, J102, J103 to front panel.
E118	3Z770-18.79 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 18 solder lug term; non-barrier type; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes on 1.00 x 5-5/8" mtg ctr; stamped with symbol designations, moisture and fungus proofed; RFL part No. HA-5260.	Mounts component parts.
E119	3Z770-18.80 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes on 1.00" x 5-5/8" mtg ctr; marked with symbol designations, moisture and fungus proofed; RFL part No. HA-5257.	Mounts component parts.
E120	3Z770-15.42 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 15 solder lug type term; w/o barriers; 4-3/8" lg x 1-1/2" wd x 29/64" h o/a; two 0.156" diam mtg holes spaced 4" c to c; stamped with symbol designations, moisture and fungus proofed; RFL part No. HA-5263.	Mounts component parts.
E121	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V101.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E122	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: Same as E116.	Mounts component parts.
F101	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: 3 amp, 250 v; quick acting, ferrule term; glass body; 1-1/4" lg x 1/4" diam o/a; Bussmann part No. AGC-3; RFL part No. HA-5170.	AC line fuse.
F102	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F103	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
F104	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
H101	2Z2636-287 N17-C-781444-604	CLAMP, electrical: aluminum; anodized finish; 1-1/8" lg x 1-3/16" diam o/a; American Phenolic Corp. part No. AN-3057-10; RFL part No. HA-5468; p/o W102.	Clamps cable W102 to connector P101.
H102	*Shop mfr. locally.	CLAMP, electrical: steel; cad pl, 8P iridite finish; 1-11/32" lg x 1/2" wd x 11/16" h o/a; RFL part No. HA-4998.	Clamp for switch S104.
H103	*Shop mfr. locally.	CLAMP, electrical: brass; nickel pl finish; 1-1/8" lg x 5/8" wd x 19/32" h o/a; RFL part No. HA-5064.	Clamps cable W102 to E115.
H104	6L890-.5 *Shop mfr. locally.	BOLT, thumb: stainless steel; captive type; cone point, #10-32 NF, class 1 fit, 5/16" min lgth; 1/2" nominal lgth; RFL part No. HA-5006.	Secures front panel to cabinet.
H105	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.

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H106	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H107	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H108	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: beryllium copper, nickel pl; 1-3/4" lg x 7/16" wd x 0.015" thk; one 0.156" diam mtg hole; one 1/2" lg x 0.156" wd slot for holding bolt; designed to position and hold front panel mtg thumb screw; RFL part No. HA-5010.	Secures thumb bolt to front panel.
H109	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H110	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H111	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H112	N16EH-052374-0112	SLIDE, left: cad pl and iridite dipped finish; steel material; 16" lg x 3-1/8" h x 5/8" wd; RFL part No. HC-5016.	Supporting member on chassis for slides.
H113	N16EH-052374-0113	SLIDE, right: steel; cad pl and iridite dipped; steel material; 16" lg x 3-1/8" h x 5/8" wd; RFL part No. HC-5034.	Supporting member on chassis for slides.
H114	N16EH-052374-0114	SLIDE MOUNTING PLATE, left: cold rolled steel; cad pl and iridite dipped; 16" lg x 3-1/2" h x 1-1/4" wd; two mtg brackets 14-31/32" on ctr; RFL part No. HB-5005.	Supporting member on cabinet for slides.
H115	N16EH-052374-0115	SLIDE MOUNTING PLATE, right: cold rolled steel; cad pl and iridite dipped; 16" lg x 3-1/2" h x 1-1/4" wd; two mtg brackets 14-31/32" on ctr; RFL part No. HB-5032.	Supporting member on cabinet for slides.
I101	For reference only	LIGHT, indicator: supplied w/lens; c/o I101A and I101B as listed below; RFL part No. HA-4932.	Lamp assembly for E101.
I101A	2Z5991-365 Procure on demand	LIGHT, indicator: supplied w/o lens, accommodates lens 5/8" diam, screw mtd lens holder; accommodates T 3-1/4 neon lamp, miniature bayonet base; 220 v, 0.5 amp; brass, chrome pl, encl shell; 1-11/16" lg x 13/16" diam o/a; one 11/16" mtg hole; insulated from shell; w/built-in v dropping resistor; Dial Light Co. of America part No. 26408; RFL part No. HA-5439; p/o I101.	

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
I101B	2Z6125-253 N17-L-250035-323	LENS, indicator light: amber, 5/8" diam, hemispherical type, glass, smooth; 13/16" lg x 3/4" diam; thd type mtg incl lgth of shank 9/16-27 diam x 3/16" lg; Dial Light Co. of America part No. 26-1133; RFL part No. HA-5440; p/o I101.	Lens for I101A.
I102	*	LIGHT, indicator: Same as I101.	
I102A	2Z5991-365	LIGHT, indicator: Same as I101A; p/o I102.	Lamp assembly for E102.
I102B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I102.	Lens for I102A.
I103	*	LIGHT, indicator w/lens: c/o I103A and I103B as listed below: RFL part No. HA-3734.	
I103A	2Z5991-366 N17-L-76656-2439 Procure on demand	LIGHT, indicator: supplied w/o lens, accommodates lens 1/2" diam; screw mtg lens holder; accommodates T 3-1/4 lamp, miniature bayonet base; 250 v, 3 amp; frame brass, nickel pl, open; 1-7/16" lg x 15/16" diam; one 11/16" mtg hole; insulated from shell; Drake Mfg. part No. Type JAN-50; RFL part No. HA-5437; p/o I103.	Lamp assembly for E103.
I103B	2Z5891-13 N16E1-052374-0103-2	LENS, indicator light: lens red, 1/2" diam, hemispherical type, glass, facet faced; 5/8" lg x 5/8" diam; thd type mtg 9/16" diam x 3/16" lg; Drake Mfg. part No. 25; RFL part No. HA-5438; p/o I103.	Lens for I103A.
J101	2Z5598-72 N17-J-39266-8947	JACK, telephone: accommodates 2 cond plug; 3-1/16" lg x 1/2" wd x 1-1/8" h o/a; Switchcraft part No. 4J-1022A; P.R.Mallory part No. JJ-491755; RFL part No. HA-5026.	LINE jack for TELEGRAPH LOOP.
J102	2Z5598-72 N17-J-39266-8947	JACK, telephone: Same as J101.	EQUIP jack for TELEGRAPH LOOP.
J103	2Z5598A-82 N16EJ-052374-0103	JACK, telephone: accommodates 2 cond plug; 3-1/16" lg x 0.510" wd x 1-1/8" h o/a; Switchcraft part No. 4J1049; P.R.Mallory part No. JJ-082; RFL part No. HA-5027.	MONITOR jack for TELEGRAPH LOOP.
J104	2Z5524 N16EJ-052374-0104	JACK, telephone: accommodates 2 cond plug; 3-7/16" lg x 9/16" wd x 13/16" h o/a; Switchcraft part No. MT-332A; P.R. Mallory part No. JJ-024; RFL part No. HA-5029.	EQUIP jack for signal OUT.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

J105	2Z5524	JACK, telephone: Same as J104.	EQUIP jack for signal OUT.
J106	2Z5524	JACK, telephone: Same as J104.	LINE jack for signal OUT.
J107	2Z5524	JACK, telephone: Same as J104.	LINE jack for signal OUT.
J108	2Z5598A-86 N17-J-39263-9677	JACK, telephone: accommodates 2 cond plug; 3-7/16" lg x 9/16" wd x 13/16" h o/a; Switchcraft part No. MT-331; P. R. Mallory part No. JJ-086; RFL part No. HA-5028.	MONITOR jack for signal OUT.
J109	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	MONITOR jack for signal OUT.
J110	2Z8799-130 N17-C-72632-6265	CONNECTOR, receptacle: 10 cont, male; polarized; straight type; 1-11/32" lg x 1-3/8" wd o/a; 20 amp, 200 v DC; body cylindrical shape, aluminum, anodized; molded mica filled bakelite; American Phenolic Corp. part No. AN-3102A-181P; RFL part No. HA-5240.	Connects W102 to chassis.
J111	6Z8364 N17-C-73446-3401	CONNECTOR, receptacle: 2 cont, male; straight type; 1-3/16" lg x 2-1/32" wd x 1-3/8" diam o/a; body cylindrical shape w/mitg flanges, brass, nickel pl; molded bakelite insert; Harvey Hubbell part No. 6808; RFL part No. HA-4961.	Connects W101 to chassis.
L101	3C559 N16-R-29236-8989	REACTOR: filter choke; 1 section; 10 hy o/a inductance, 100 ma DC; 230 ohms DC resistance; 2500 v RMS test v; case hermetically sealed, metal; 3-1/16" lg x 2-5/8" wd x 3-7/8" h o/a; Magnetic Winding part No. 155-38R; govt spec MIL-T-27, Grade 1, Class A; RFL part No. HB-4842.	Filter choke for B+ power supply.
L102	3C559-1 N16-R-29910-3001	REACTOR: swinging choke; 1 section; 3 hy o/a min inductance, 20 ma min DC, 10 hy max o/a inductance, 80 ma max DC; 120 ohms DC resistance; 2,500 v RMS test v; case hermetically sealed, metal; 2-3/4" lg x 2-3/8" wd x 3-25/32" h; Magnetic Winding part No. 155-39R; govt spec MIL-T-27, Grade 1, Class A; RFL part No. HB-4897.	Filter choke for B+ power supply.
L103	3C1081-24B N16-C-75078-2189	CHOKE, radio frequency: 10 mh, 125 ma current rating; RF output filter choke; cylindrical shape; 11/16" lg x 1-1/16" diam o/a; excl term; two solder lug term, located radially on coil base, Bud Radio type No. CH-1216; RFL part No. HA-5391.	RF filter choke.
L104	3C1081-24B	CHOKE, radio frequency: Same as L103.	Filter choke.
O101	2Z1619-79 N16-R-503580-311	RETAINER, electron tube: stainless steel; retains tubes 1-3/16" diam; Times Facsimile part No. 2-32; RFL part No. HA-4499.	Clamp for tube V105.
O102	2Z1619-79 N16-R-503580-311	RETAINER, electron tube: Same as O101.	Clamp for tube V106.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
O103	N16EO-052374-0103	FILTER, air: aluminum, black anodize; 4-5/8" lg x 2-5/16" wd x 5/16" h; three internal aluminum screens; RFL part No. HB-5000.	Filter input ventilation.
O104	3Z1029-22 *Shop mfr. locally	CLIP, electrical: spring brass, nickel pl; 2-1/2" lg x 17/32" wd x 21/32" h; 1-3/8" jaw opening when fully spread; RFL part No. HA-5250.	Clip for plug P103.
O105	3Z 1029-22 *Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P103.
O106	2Z8063-43 N16-EO-052374-0106	ROLLER ASSEMBLY: roller phosphor-bronze, stud monel steel, retaining ring nylon; 29/32" lg x 3/4" diam stud threaded 1/4-28 NF for 23/64"; roller and stud ride on nylon ring bearing; RFL part No. HB-5017.	Roller for chassis slide.
O107	2Z8064-43	ROLLER: Same as O106.	Roller for chassis slide.
O108	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
O109	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
O110	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
O111	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
O112	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
O113	2Z8063-43	ROLLER: Same as O106.	Roller for chassis slide.
P101	2Z7226-187 N17-C-70356-6264	CONNECTOR, plug: 10 cont, female, round; polarized; straight type; 2-1/16" lg x 1-41/64" diam o/a; 20 amp, 200 v DC; body cylindrical shape, aluminum, anodized; molded mica filled bakelite; American Phenolic Corp. part No. AN-3106A-18-1S; RFL part No. HA-5241; p/o W102.	End connector for W102.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

P102	6Z1734 N17-C-71426-7829	CONNECTOR, plug: two male flat cont; straight type; 2" lg x 1-1/2" diam; 10 amp, 250 v; cylindrical shape, black, rubber; brass insert; .437" diam max cable opening; cord grip supplied; Harvey Hubbell part No. 9754; RFL part No. HA-5351; p/o W101.	End connector for W101.
P103	6Z7568-1 N17-C-71126-4859	CONNECTOR, plug: two female flat cont; straight type; 1-21/32" lg x 1-3/8" diam; 10 amp; 250 v; body cylindrical shape, black composition; Harvey Hubbell part No. 7259; RFL part No. HA-4962; p/o W101.	End connector for W101.
R101	3RP8713 N16-R-91033-7148	RESISTOR, variable, wire wound: 1 sect, 5,000 ohms $\pm 10\%$; 25 w; 3 solder lug term; govt spec MIL-R-22A, type No. RP101FD502KK; Ohmite Mfg. Corp. part No. 0162; RFL part No. HA-4845.	Loop current potentiometer.
R102	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: 100,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF104K; Allen-Bradley part No. RC30BF104K; RFL part No. H-1009-217.	Load resistor for rectifier V102A.
R103	3RC42BF103K For replacement use N16-R-50283-512	RESISTOR, fixed, composition: 10,000 ohms $\pm 10\%$; 2 w; body 47/64" lg x 19/64" diam excl term; govt spec JAN-R-11, type No. RC42BF103K; Allen-Bradley part No. RC42BF103K; RFL part No. H-1009-270.	Voltage dividing resistor.
R104	3Z7315-19 N16-R-87379-4310	RESISTOR, variable, composition: 1,500 ohms $\pm 10\%$; 2 w; standard A taper; three solder lug term; phenolic body, metal case, encl type; case 1-1/16" diam x 1-3/16" d; shaft metal, round screwdriver slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact arm insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU1521, w/shaft bushing No. SD4040L, lockwasher No. M-2898, locking nut B-13750, and mtg nut No. M-2786; RFL part No. HA-5354.	Transmitter bias control.
R105	3RC30BF561K N16-R-49806-231	RESISTOR, fixed, composition: 560 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF561K; Allen-Bradley part No. RC30BF561K; RFL part No. H-1009-333.	Voltage dividing resistor.
R106	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid limiting resistor for V103A.
R107	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: 220,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF224K; Allen-Bradley part No. RC30BF224K; RFL part No. H-1009-332.	Plate resistor for V103A.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R108	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: 2,200 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF222K; Allen-Bradley part No. RC30BF222K; RFL part No. H-1009-314.	Voltage dividing resistor.
R109	3RC42BF103K For replacement use N16-R-50283-512	RESISTOR, fixed, composition: Same as R103.	Voltage dividing resistor.
R110	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate resistor for V103B.
R111	3RC30BF184K N16-R-50697-231	RESISTOR, fixed, composition: 180,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF184K; Allen-Bradley part No. RC30BF184K; RFL part No. H-1009-303.	Signal shaping resistor.
R112	3RC30BF473K N16-R-50481-231	RESISTOR, fixed, composition: 47,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF473K; Allen-Bradley part No. RC30BF473K; RFL part No. H-1009-310.	Voltage dividing resistor.
R113	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: 470,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF474K; Allen-Bradley part No. RC30BF474K; RFL part No. H-1009-305.	Stabilizing resistor for V102B.
R114	3RC30BF333K N16-R-50418-231	RESISTOR, fixed, composition: 33,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF333K; Allen-Bradley part No. RC30BF333K; RFL part No. H-1009-325.	Voltage dividing resistor.
R115	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: 10,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF103K; Allen-Bradley part No. RC30BF103K; RFL part No. H-1009-81.	Cathode bias resistor.
R116	3RC30BF154K N16-R-50679-231	RESISTOR, fixed, composition: 150,000 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF154K; Allen-Bradley part No. RC30BF154K; RFL part No. H-1009-78.	Plate resistor for V104A.

R117	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: Same as R113.	Voltage dividing resistor for OUTPUT LEVEL ADJ.
R118	3Z7480-206 N16-R-68009-4500	RESISTOR, variable, composition: 100,000 ohms $\pm 10\%$; 2 w; standard A taper; three solder lug term; case phenolic body, metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtg by bushing; Allen-Bradley part No. JLA1041 w/shaft bushing No. SD4040L, lockwasher No. M-2898, locking nut No. B-13750, and mtg nut No. M-2786; RFL part No. HA-5183.	Output level adjust potentiometer.
R119	3RC30BF332K N16-R-50067-231	RESISTOR, fixed, composition: 3,300 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF332K; Allen-Bradley part No. RC30BF332K; RFL part No. H-1009-231.	Cathode bias resistor for V104B.
R120	3RC30BF472K N16-R-50130-231	RESISTOR, fixed, composition: 4,700 ohms $\pm 10\%$; 1 w; body 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF472K; Allen-Bradley part No. RC30BF472K; RFL part No. H-1009-306.	Isolating resistor for J108.
R121	3RU12805 N16-R-68296-7675	RESISTOR, fixed, wire wound: inductive winding; 4.7 ohms $\pm 10\%$; 1 w; 1-9/32" lg x 9/32" OD excl term; govt spec JAN-R-184, type No. RU4B4R7K; International Resistor part No. RU4B4R7K; RFL part No. H-1100-128.	Voltage dropping resistor for POWER ON indicator light.
R122	3RW28519 N16-R-66251-4116	RESISTOR, fixed, wire wound: inductive winding; 5,000 ohms $\pm 5\%$; 18 w; 3" lg x 19/32" OD excl term; govt spec JAN-R-26A, type No. RW33F502; Ward Leonard part No. RW33F502; RFL part No. H-1100-131.	Bleeder resistor for telegraph loop power supply.
R123	3RW28217 N16-R-66233-1321	RESISTOR, fixed, wire wound: inductive winding; 4,500 ohms $\pm 5\%$; 18 w; 2" lg x 19/32" diam excl 1 term; govt spec JAN-R-26A, type No. RW33F452; Ward Leonard part No. RW33F452, RFL part No. H-1100-138.	Voltage dropping resistor for voltage regulating tube V107.
R124	3RW27324 N16-R-66167-8988	RESISTOR, fixed, wire wound: inductive winding; 3,100 ohms $\pm 5\%$; 12 w; 2" lg x 19/32" diam excl term; govt spec JAN-R-26A, type No. RW32F312; Ward Leonard part No. RW32F312; RFL part No. H-1100-150.	Voltage dropping resistor for voltage regulating tubes V108 and V109.
R125	N16ER-052374-0125	RESISTOR, fixed, wire wound: inductive winding; 900 ohms $\pm 5\%$; 8 w; 1" lg x 19/32" diam excl term; govt spec JAN-R-26A, type No. RW30G901; Ward Leonard part No. RW30G901; RFL part No. H-1100-152.	Plate resistor for V101A.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R126	N16ER-052374-0126	RESISTOR, fixed, wire wound; inductive winding; 560 ohms $\pm 5\%$; 8 w; 1" lg x 19/32" diam excl term; govt spec JAN-R-26A, type No. RW30G561; Ward Leonard part No. RW30G561; RFL part No. H-1100-153.	Plate resistor for V101A.
S101	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: DPDT; 20 amp, 125 v DC; phenolic body; actuating handle type; 6 term, solder lug type, located on bottom; single hole mtg; govt spec JAN-S-23, type No. ST52N; Cutler-Hammer part No. 8825K5; RFL part No. HA-3710.	NORMAL-REVERSE switch.
S102	3Z9825-146 N16ES-052374-0102	SWITCH, rotary: 1 sect; 2 pos, not adj; non-"pile-up" type, 4 poles, 2 throw; 6 v, 1 amp; brass cont; 1-11/16" lg x 1-5/8" wd x 1-3/4" h; single hole mtg; flatted shaft; solder lug term; 60° index, non-shorting, Centralab "H" index, "X" clips; Centralab part No. HB-4224; RFL part No. HB-4224.	BATTERY FROM TRANSMITTER-LOOP selector.
S103	3Z9863-52K.1 N17-S-72828-2605	SWITCH, toggle: DPST; 20 amp, 125 v DC; phenolic body; actuating handle type; 4 solder lug term located on bottom; single hole mtg; govt spec JAN-S-23, type No. ST52K; Cutler-Hammer part No. ST52K; RFL part No. HA-4337.	POWER ON-OFF switch.
S104	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	115 v - 230 v switch.
S105	3Z9825-146.1 N16ES-052374-0105	SWITCH, rotary: 1 section; 11 positions max number of switching positions possible, not adj; cont non-"pile-up" type, 1 pole, special segment construction; 6 v, 1 amp; brass cont, silver pl; 1-1/2" lg x 1-5/8" wd x 1-3/4" h; mts by 3/8" lg x 32 threaded bushing; shaft slotted type, 1/8" lg x 1/4" diam; solder lug term; 30° index, non-shorting Centralab "H" index, "X" clips; Centralab part No. HB-5346; RFL part No. HB-5346.	SPACE FREQ ADJ.
S106	3Z9825-146.1 N16ES-052374-0105	SWITCH, rotary: Same as S105.	MARK FREQ ADJ.
S107	3Z9863-52K.1 N17-S-72828-2605	SWITCH, toggle: Same as S103.	LOOP CURRENT OPERATE SWITCH.
T101	2Z9636.164 N16ET-052374-0101	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 425 cyc ctr freq, 382.5 space freq, 467.5 mark freq, tuned; 8 term,	Oscillator frequency control.

T102	2Z9632.786 N16ET-052374-0102	standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-1. TRANSFORMER, audio frequency: plate coupling type; 10,000 ohms pri, 600 ohms sec'd; 10 ma DC in pri; 1,000 v test; case hermetically sealed, silicon steel core; 1-5/8" lg x 1-5/8" wd x 2-3/8" h o/a; +17 dbm max output; 4.1 to 1 ratio of turns, pri to sec'd; ±1 db 300-3500 cyc freq response not tuned; 4 solder lug term located on bottom; four #6-32 mtg studs; govt spec MIL-T-27, Grade 1, Class A; Magnetic Winding part No. 155-40R; RFL part No. HB-5098.	Matches plate of V104B to Z101.
T103	2Z9621B-59 N16ET-052374-0103	TRANSFORMER, power, step-down and step-up: case hermetically sealed, steel; 115/230 v, 50/60 cyc, single phase input; 5 output windings, #1 sec'd - 6.3 v 2 amp, #2 sec'd - 5 v 2 amp, #3 sec'd - 5 v 2 amp, #4 sec'd - 6.3 v 0.5 amp, #5 sec'd - 350 v 80 ma, #6 sec'd - 700 v 70 ma, #5 and #6 sec'd CT; 2,500 v ins; compound impregnated; 4-5/16" lg x 3-11/16" wd x 3-7/8" h o/a; 19 term solder lug type located on bottom; four #10-32 mtg studs; internal shielding; govt spec MIL-T-27, Grade 1, Class A; Magnetic Winding part No. 155-31B; RFL part No. HB-4847.	Power transformer.
T104	2Z9636.165 N16ET-052374-0104	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance w/CT; hermetically sealed steel case, powdered iron core; 2-7/8" lg x 2-5/16" wd x 3-9/32" h o/a; 15 kc ±10% frequency data; 9 lug type term located on bottom; mtd by four #8-32 x 1/4" lg studs located on 1-11/16" x 2-1/16" ctr; nitrogen filled, incl radiofreq filter and plate to grid coupling capacitors; RFL part No. HA-5462.	Tuned transformer for oscillator tube V101.
V101	2J12AU7 N16-T-58241	ELECTRON TUBE: twin triode; glass envelope, RMA T-6-1/2 (6-7); 9 wire type term located on bottom; govt spec JAN-1A, type No. 12AU7; RCA part No. 12AU7; RFL part No. HA-3563.	15 kc loop oscillator.
V102	2J5726/6AL5W For replacement use N16-T-75726	ELECTRON TUBE: twin diode; glass envelope, RMA T-5-1/2 (6-1); 7 wire type term located on bottom; govt spec JAN-1A, type No. 6AL5W; RCA part No. 6AL5W; RFL part No. HA-4964.	Oscillator frequency control tube.
V103	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	DC amplifier.
V104	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	V104A: Signal oscillator. V104B: Signal amplifier.
V105	2J5Y3GT For replacement use N16-T-55738-5	ELECTRON TUBE: diode; glass envelope, RMA T-9 (e-9); 5 pin type term located on bottom; govt spec JAN-1A, type No. 5Y3GT; RCA part No. 5Y3GT; RFL part No. HA-4863.	Full-wave rectifier.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
V106	2J5Y3GT For replacement use N16-T-55738-5	ELECTRON TUBE: Same as V105.	Full-wave rectifier.
V107	2J0B2 For replacement use N16-T-52001-8	ELECTRON TUBE: diode; glass envelope, RMA T-5-1/2 (6-5); 7 wire type term located on bottom; govt spec JAN-1A, type No. 0B2; RCA part No. 0B2; RFL part No. HA-3666.	Voltage regulator.
V108	2J0B2 For replacement use N16-T-52001-8	ELECTRON TUBE: Same as V107.	Voltage regulator.
V109	2J0B2 For replacement use N16-T-52001-8	ELECTRON TUBE: Same as V107.	Voltage regulator.
W101	3E4000.138 *Assemble from component parts	CABLE ASSEMBLY, power, electrical: cable type S, 2 cond, stranded, No. 16 AWG, rubber insulated; cord filler, cotton binder, rubber jacket; 600 v RMS max rated working voltage; 4'4" o/a lgth; one Hubbell female connector type 7259 terminal fitting in first end; one Hubbell male connector type 9754 terminal fitting on second end; RFL part No. HB-5094; c/o P102, P103.	AC power input cable.
W102	3E4002.95 N16EW-052374-0102	CABLE ASSEMBLY, special purpose, electrical: ten #22 AWG stranded insul conductors; insul outer jacket; 5 pairs of shielded conductors, tinned copper braid, uncovered shields, 4'8" o/a lgth; one Amphenol female connector part No. AN-3106A-18-1S; Amphenol cable clamp No. AN-3057-10 screw fit to female connector; eleven term lugs on second end; RFL part No. HB-5093.	Input and output signal cable.
X101	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: 9 cont beryllium-copper, silver pl; noval size, incl metal shock shield; incl ctr shield; round shape; 1-3/8" lg x 1.035" wd x 25/32" h o/a; plastic body; one piece saddle mtg; Cinch Mfg. part No. 53F13373; govt spec JAN-S-28A, type No. TS103P01; RFL part No. HA-4790.	Socket for tube V101.
X102	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: 7 cont beryllium-copper, silver pl; miniature size; incl metal shock shield; incl ctr shield; round shape; 1-1/8" lg x 0.900" diam x 25/32" h o/a; plastic body; one piece saddle mtg; Cinch Mfg. part No. 9356; govt spec JAN-S-28A; type No. TS102P01; RFL part No. HA-4789.	Socket for tube V102.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

X103	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V103.
X104	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V104.
X105	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: 8 cont beryllium-copper, silver pl; medium octal size; round; 1-7/8" lg x 1-7/84" diam x 5/8" h o/a; plastic body; one piece saddle mig; Clinch Mfg. part No. 51B16758; govt spec JAN-S-28A, type No. TS101P02; RFL part No. HA-4787.	Socket for tube V105.
X106	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for tube V106.
X107	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for tube V107.
X108	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for tube V108.
X109	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for tube V109.
X110	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for T101.
X111	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for Z101.
Z101	3Z1892-72 N16-F-32037-8201	FILTER, band-pass: 425 cyc ctr freq, 382.5 to 467.5 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-11781; RFL part No. HC-4850-1.	Filters output signal.
200 to 299	#F16T-99999-0006	TRANSMITTER, Telegraph Carrier: 595 cps ctr freq; T-372/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T201	2Z9636.166 N16ET-052374-0201	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 595 cyc ctr freq, 552.5 space freq, 637.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-2.	Oscillator frequency control.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
Z201	3Z1892-72.1 N16ET-052374-0201	FILTER, band-pass: 595 cyc ctr freq, 552.5 to 637.5 cyc band-width; 600 ohms input, 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-12300; RFL part No. HC-4850-2.	Filters output signal.
300 to 399	#F16T-99999-0007	TRANSMITTER, Telegraph Carrier: 765 cps ctr freq; T-373/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	
T301	2Z9636.167 N16ET-052374-0301	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 765 cyc ctr freq, 722.5 space freq, 807.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-3.	Oscillator frequency control.
Z301	3Z1892-72.2 N16EZ-052374-0301	FILTER, band-pass: 765 cyc ctr freq, 722.5 to 807.5 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel, mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-12466; RFL part No. HC-4850-3.	Filters output signal.
400 to 499	#F16T-99999-0008	TRANSMITTER, Telegraph Carrier: 935 cps ctr freq; T-374/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T401	2Z9636.168 N16ET-052374-0401	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 935 cyc ctr freq, 892.5 space freq, 977.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-4.	Oscillator frequency control.
Z401	3Z1892-72.3 N16EZ-052374-0401	FILTER, band-pass: 935 cyc ctr freq, 892.5 to 977.5 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8533; RFL part No. HC-4850-4.	Filters output signal.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

500 to 599	#F16T-99999-0009 2Z9636.169 N16ET-052374-0501	TRANSMITTER, Telegraph Carrier: 1105 cps ctr freq; T-375/FCC-3; otherwise identical to T-371/FCC-3 except components described below: TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 1105 cyc ctr freq, 1062.5 space freq, 1147.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-5.	Single channel telegraph transmitter.
T501			Oscillator frequency control.
Z501	3Z1892-72.4 N16EZ-052374-0501	FILTER, band-pass: 1105 cyc ctr freq, 1062.5 to 1147.5 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mtd into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8534; RFL part No. HC-4850-5.	Filters output signal.
600 to 699	#F16T-99999-0010	TRANSMITTER, Telegraph Carrier: 1275 cps ctr freq; T-376/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T601	2Z9636.170 N16ET-052374-0601	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 1275 cyc ctr freq 1232.5 space freq, 1317.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-6.	Oscillator frequency control.
Z601	2Z1892-72.5 N16EZ-052374-0601	FILTER, band-pass: 1275 cyc ctr freq, 1232.5 to 1317.5 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8535; RFL part No. HC-4850-6.	Filters output signal.
700 to 799	#F16T-99999-0011	TRANSMITTER, Telegraph Carrier: 1445 cps ctr freq; T-377/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T701	2Z9636.171 N16ET-052374-0701	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 1445 cyc ctr freq, 1402.5 space freq, 1487.5 mark freq, tuned; 8 term, standard octal plug; mts in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-7.	Oscillator frequency control.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
Z701	3Z1892-72.6 N16EZ-052374-0701	FILTER, band-pass: 1445 cyc ctr freq, 1402.5 to 1487.5 cyc band-width; 600 ohms input; 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8536; RFL part No. HC-4850-7.	Filters output signal.
800 to 899	#F16T-99999-0012	TRANSMITTER, Telegraph Carrier: 1615 cps ctr freq; T-378/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T801	2Z9636.172 N16ET-052374-0801	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 1615 cyc ctr freq, 1572.5 space freq, 1657.5 mark freq, tuned; 8 term, standard octal plugs; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-8.	Oscillator frequency control.
Z801	3Z1892-72.7 N16EZ-052374-0801	FILTER, band-pass: 1615 cyc ctr freq, 1572.5 to 1657.5 cyc band-width; 600 ohms input; 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket; requires external clamp; standard octal plug; Burnell & Co. No. S-8537; RFL part No. HC-4850-8.	Filters output signal.
900 to 999	#F16T-99999-0013	TRANSMITTER, Telegraph Carrier: 1955 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-379/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T901	2Z9636.173 N16ET-052374-0901	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 1955 cyc ctr freq, 1870 space freq, 2040 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-9.	Oscillator frequency control.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

Z901	3Z1892-72.8 N16EZ-052374-0901	FILTER, band-pass: 1955 cyc ctr freq, 1870 to 2040 cyc band-width; 600 ohms input; 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8538; RFL part No. HC-4850-9.	Filters output signal.
1000 to 1099	#F16T-999999-0014	TRANSMITTER, Telegraph Carrier: 2380 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-380/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T1001	Z29636.174 N16ET-052374-1001	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 2380 cyc ctr freq, 2295 space freq, 2465 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-10.	Oscillator frequency control.
Z1001	3Z1892-72.9 N16EZ-052374-1001	FILTER, band-pass: 2380 cyc ctr freq, 2295 to 2465 cyc band-width; 600 ohms input; 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8539; RFL part No. HC-4850-10.	Filters output signal.
1100 to 1199	#F16T-999999-0015	TRANSMITTER, Telegraph Carrier: 2805 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-381/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.
T1101	Z29636.175 N16ET-052374-1101	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; 2805 cyc ctr freq, 2720 space freq, 2890 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-11.	Oscillator frequency control.
Z1101	3Z1892-72.10 N16EZ-052374-1101	FILTER, band-pass: 2805 cyc ctr freq, 2720 to 2890 cyc band-width; 600 ohms input; 600 ohms output; 2-5/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8540; RFL part No. HC-4850-11.	Filters output signal.
1200 to 1299	#F16T-999999-0016	TRANSMITTER, Telegraph Carrier: 3230 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-382/FCC-3; otherwise identical to T-371/FCC-3 except components described below:	Single channel telegraph transmitter.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
T1201	2Z9636.176 N16ET-052374-1201	TRANSFORMER, audio frequency: plate to grid audio oscillator; single tuned inductance with CT; case hermetically sealed, steel, powdered iron core: 2-13/16" lg x 2-5/16", wd x 3-1/4" h o/a; 3230 cyc ctr freq, 3145 space freq, 3315 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requiring external clamp; nitrogen filled, incl freq shifting capacitor and stabilizing resistor; RFL part No. HA-4849-12.	Oscillator frequency control.
Z1201	3Z1892-72.11 N16EZ-052374-1201	FILTER, band-pass: 3230 cyc ctr freq, 3145 to 3315 cyc band-width; 600 ohms input, 600 ohms output; 2-15/16" lg x 2-1/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. No. S-8541; RFL part No. HC-4850-12.	Filters output signal.
1300 to 1399	#F16R-99999-0007	RECEIVER, Telegraph Carrier: freq shift operation; single channel, mid-band freq 425 cyc, freq deviation from mid-band shall be +42.5 cps for the mark signal and -42.5 cps for the space signal; equipment c/o power supply, 425 cyc input filter, input signal limiter and amplifier, 425 cyc discriminator transformer, electronic rectifier and DC amplifier, keying circuit, diversity circuit, electrical power cable assem, electrical special purpose cable assem; output circuit capable of keying 20 to 60 ma neutral telegraph loop w/battery supplied from the loop, 20 to 60 ma neutral telegraph loop w/battery supplied from the receiver, 30 ma polar telegraph loop w/battery supplied from the rec; input suitable for operation from device having 600 ohm impedance; 115/230 v, 50-60 cyc, single phase; keying data 40 dot cps; 19" lg x 16" wd x 5-1/4" h o/a; not encl; will operate in freq diversity, neutral and polar selector switch provided, freq components are plug-in type; RFL part No. HB-4808-1; U. S. Navy type R-525/FCC-3; govt spec MIL-T-15294A (SHIPS).	Single channel telegraph receiver.
C1301	3DB20-112 N16-C-19713-8753	CAPACITOR, fixed, electrolytic: 20 mf; 150 v DC; govt spec JAN-C-62, type No. CE63C200J; Cornell-Dubilier part No. CE63C200J; RFL part No. HA-4840.	Cathode by-pass for V1301.
C1302	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Screen grid by-pass for V1301.

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C1303	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V1301 to grid of V1302.
C1304	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V1302A to grid of V1302B.
C1305	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V1302B to grid of V1303.
C1306	3DB10-263 N16-C-21578-6268	CAPACITOR, fixed, electrolytic: 2 sections, 10 mf capacity per section; 400 v DC; govt spec JAN-C-62, type No. CE42C100Q; Cornell-Dubilier part No. CE42C100Q; RFL part No. HA-4510.	
C1306A	3DB10-263 N16-C-21578-6268	CAPACITOR, fixed, electrolytic: p/o C1306; for reference only.	Filter for 105 v B+ supply.
C1306B	3DB10-263 N16-C-21578-6268	CAPACITOR, fixed, electrolytic: p/o C1306; for reference only.	Filter for 210 v B+ supply.
C1307	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Mark signal filter for plate of V1304.
C1308	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Space signal filter for cathode of V1316.
C1309	3DA20-220 N16-C-43112-6730	CAPACITOR, fixed, paper dielectric: Same as C105.	Signal filter for discriminator output.
C1310	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Filter capacitor for signal to grid of V1305.
C1311	3DA50-217 For replacement use N16-C-44260-6952	CAPACITOR, fixed, paper dielectric: 50,000 mmf \pm 10%; 600 v DC; govt spec JAN-C-25, type No. CP69B1EF503K; Cornell-Dubilier part No. CP69B1EF503K; RFL part No. HA-5239.	Output signal filter for plate of V1304.
C1312	3DB25-88 For replacement use N16-C-19793-8136	CAPACITOR, fixed, electrolytic: Same as C122.	B+ power supply filter.
C1313	3DB10-160 N16-C-19568-8052	CAPACITOR, fixed, electrolytic: 10 mf; 450 v DC; govt spec JAN-C-62, type No. CE41F100R; Cornell-Dubilier part No. CE41F100R; RFL part No. HA-4895.	Filter for 150 v supply.
E1301	2Z5888-5 For replacement use G-17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.
E1302	2Z5888-5 For replacement use G-17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E1303	2Z5927 For replacement use G-17-L-6345	LAMP, incandescent: Same as E103.	Pilot lamp; indicates presence of line voltage.
E1304	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F1301.
E1305	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F1302.
E1306	* 3Z2876-6.2	FUSEHOLDER: Same as E106.	Spare fuseholder.
E1307	+ 2Z5824.117	KNOB: Same as E107.	Knob for BATTERY FROM REC LOOP switch.
E1308	+ 2Z5824.117	KNOB: Same as E107.	Knob for LOOP CURRENT control.
E1309	2Z8304.57 N16-S-34520-3864	SHIELD, electron tube: Same as E109.	Shield for V1304.
E1310	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V1302.
E1311	2Z8304.276 N16-S-34557-8351	SHIELD, electron tube: brass, nickel pl; cylindrical shape; 0 810" ID x 1-3/4" h o/a; locking type; govt spec JAN-S-28A. type No. TS102U02; Cinch Mfg. part No. 6691-1; RFL part No. HA-4781.	Shield for V1301.
E1312	2Z8304.276 N16-S-34557-8351	SHIELD, electron tube: Same as E1311.	Shield for V1303.
E1313	2Z8304.276 N16-S-34557-8351	SHIELD, electron tube: Same as E1311.	Shield for V1305.
E1314	2Z8304.276 N16-S-34557-8351	SHIELD, electron tube: Same as E1311.	Shield for V1306.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

+ If required will be procured by Navy Supply Activity on demand.

E1315	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V1312.
E1316	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V1313.
E1317	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V1314.
E1318	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V1315.
E1319	2Z9410.83 For replacement use N17-B-77939-3236	TERMINAL BOARD: Same as E115.	Termination block for W1302.
E1320	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: Same as E116.	Mounts component parts.
E1321	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: Same as E116.	Mounts component parts.
E1322	+ * 2Z5824.117	KNOB: Same as E107.	Knob for DIVERSITY selector.
E1323	* 3Z770-12.153	TERMINAL BOARD: laminated phenolic; incl 12 term solder lug type; w/o barrier; 3" lg x 2-1/4" wd x 29/64" h o/a; two 5/32" diam mtg holes spaced 2.625" c to c; marked with symbol designations, moisture and fungus proofed; RFL part No. HA-5277.	Mounts component parts.
E1324	*Shop mfr. locally	MOUNTING: Same as E117, except for marking; RFL part No. HA-5430.	Mounts J1307, J1308, J1309 to front panel.
E1325	3Z770-24.70 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barrier; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations, fungus proofed; RFL part No. HB-5271.	Mounts component parts.
E1326	3Z770-24.71 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug type term; w/o barrier; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked with symbol designations, fungus proofed; RFL part No. HB-5274.	Mounts component parts.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.
+ If required will be procured by Navy Supply Activity on demand.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E1327	3Z770-24.72 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug type term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations, fungus proofed; RFL part No. HB-5265.	Mounts component parts.
E1328	3Z770-24.73 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug type term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations, fungus proofed; RFL part No. HB-5268.	Mounts component parts.
E1329	2Z8304.57 N16-S-34520-3864	SHIELD, electron tube: Same as E109.	Shield for V1316.
F1301	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F1302	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F1303	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
F1304	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
H1301	2Z2636-287 N17-C-781444-604	CLAMP, electrical: Same as H101.	Clamps cable W1302 to connector P1301.
H1302	*Shop mfr. locally	CLAMP, electrical: Same as H102.	Clamp for switch S1305.
H1303	*Shop mfr. locally	CLAMP, electrical: Same as H103.	Clamps cable W1302 to E1319.
H1304	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

H1305	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H1306	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H1307	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H1308	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H1309	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H1310	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H1311	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H1312	N16EH-052374-0112	SLIDE, left: Same as H112.	Supporting member on chassis for slides.
H1313	N16EH-052374-0113	SLIDE, right: Same as H113.	Supporting member on chassis for slides.
H1314	N16EH-052374-0114	SLIDE MOUNTING PLATE, left: Same as H114.	Supporting member on cabinet for slides.
H1315	N16EH-052374-0115	SLIDE MOUNTING PLATE, right: Same as H115.	Supporting member on cabinet for slides.
I1301	For reference only	LIGHT, indicator: Same as I101.	Lamp assembly for E1301.
I1301A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I1301.	Lens for I1301A.
I1301B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I1301.	Lamp assembly for E1303.
I1302	For reference only	LIGHT, indicator: Same as I101.	Lens for I1302A.
I1302A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I1302.	Lamp assembly for E1303.
I1302B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I1302.	Lens for I1302A.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
I1303	*	LIGHT, indicator: Same as I103.	Lamp assembly for E1303.
I1303A	2Z5991-366 Procure on demand	LIGHT, indicator: Same as I103A; p/o I1303.	Lens for I1303A.
I1303B	2Z5991-13 N16EI-052374-0103-2	LENS, indicator light: Same as I103B; p/o I1303.	EQUIP jack for signal IN.
J1301	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	EQUIP jack for signal IN.
J1302	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	LINE jack for signal IN.
J1303	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	LINE jack for signal IN.
J1304	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	MONITOR jack for signal IN.
J1305	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	MONITOR jack for signal IN.
J1306	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	EQUIP jack for TELEGRAPH LOOP.
J1307	2Z5598-72 N17-J-39266-8947	JACK, telephone: Same as J101.	LINE jack for TELEGRAPH LOOP.
J1308	2Z5598-72 N17-J-39266-8947	JACK, telephone: Same as J101.	MONITOR jack for TELEGRAPH LOOP.
J1309	2Z5598A-82 N16EJ-052374-0103	JACK, telephone: Same as J103.	Connects W1302 to chassis.
J1310	2Z8799-130 N17-C-72632-6265	CONNECTOR, receptacle: Same as J110.	Connects W1301 to chassis.
J1311	6Z8364 N17-C-73446-3401	CONNECTOR, receptacle: Same as J111.	

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

L1301	3C559 N16-R-29236-8989	REACTOR: Same as L101.	Filter choke for B+ power supply.
O1301	2Z1619-79 N16-R-503580-311	RETAINER, electron tube: Same as O101.	Clamp for V1311.
O1302	2Z1779-11 *Shop mfr. locally	RETAINER, electron tube: steel, cad pl and 8P Iridite dip; retains tubes 3-15/16" h x 1-3/16" diam; mtd by 4-7/16" stud thd #10-32 both ends; p/o U. S. Navy R-525/FCC-3; RFL part No. HA-4985.	Clamp for V1307 and V1309.
O1303	2Z1779-11 *Shop mfr. locally	RETAINER, electron tube: Same as O1302.	Clamp for V1308 and V1310.
O1304	N16-EO-052374-0103	FILTER, air: Same as O103.	Filter input ventilation.
O1305	3Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P1303.
O1306	2Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P1303.
O1307	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1308	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Koller for chassis slide.
O1309	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1310	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1311	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1312	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1313	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O1314	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
P1301	2Z7226-187 N17-C-70356-6264	CONNECTOR, plug: Same as P101.	End connector for W1302.
P1302	6Z1734 N17-C-71426-7829	CONNECTOR, plug: Same as P102.	End connector for W1301.
P1303	6Z7568-1 N17-C-71126-4859	CONNECTOR, plug: Same as P103.	End connector for W1301.
R1301	3RC30BF472K N16-R-50130-231	RESISTOR, fixed, composition: Same as R120.	Isolating resistor of J1305.
R1302	3RC30BF561K N16-R-49806-231	RESISTOR, fixed, composition: Same as R105.	Load resistor for filter Z1301.
R1303	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Input diversity combining resistor.
R1304	3RC30BF332K N16-R-50067-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias resistor for V1301.
R1305	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: Same as R113.	Voltage dropping resistor for screen grid of V1301.
R1306	3RC30BF184K N16-R-50697-231	RESISTOR, fixed, composition: Same as R111.	Plate load resistor for V1301.
R1307	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: Same as R113.	Grid leak resistor for V1302A.
R1308	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid limiting resistor for V1302A.
R1309	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid limiting resistor for V1302B.
R1310	3RC30BF184K N16-R-50697-231	RESISTOR, fixed, composition: Same as R111.	Grid leak resistor for V1302B.
R1311	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Plate load resistor for V1302A.

R1312	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Voltage dropping resistor for B+ power supply.
R1313	3RC30BF332K N16-R-50067-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias for V1302B.
R1314	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Plate load resistor for V1302B.
R1315	3Z7498-50.89 N16-R-88179-4680	RESISTOR, variable, composition: 500,000 ohms $\pm 10\%$; 2 w; standard A taper; three solder lug term; case, phenolic and metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU5041 w/shaft bushing No. SD4040L, lockwasher No. M-2898, locking nut No. B13750, and mtg nut No. M-2786; RFL part No. HA-4506.	Discriminator LEVEL control.
R1316	3RC30BF102K N16-R-49923-231	RESISTOR, fixed, composition: 1000 ohms, $\pm 10\%$; 1 w; 19/32" lg x 7/32" diam excl terms; govt spec JAN-R-11, type RC30BF102K; Allen-Bradley part No. RC30BF102K; RFL part No. H-1009-331.	Cathode bias resistor for V1303.
R1317	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V1304.
R1318	3Z7480-105 For replacement use N16-R-88009-4525	RESISTOR, variable, composition: 100,000 ohms $\pm 10\%$; 2 w; standard A taper; three solder lug term; case, phenolic and metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU1041 w/shaft bushing No. SD4040L, lockwasher No. M-2898, locking nut No. B-13750, and mtg nut M-2786; RFL part No. HA-4094.	Receiver BIAS CONTROL.
R1319	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Cathode resistor for V1316.
R1320	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Voltage dividing resistor for signal input to V1305.
R1321	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Voltage dividing resistor for signal input to V1305.
R1322	3RC30BF101K N16-R-49581-231	RESISTOR, fixed, composition: 100 ohms, $\pm 10\%$; 1 w; 19/32" lg x 7/32" diam excluding term; govt spec JAN-R-11, type RC30BF101K; Allen-Bradley part No. RC30BF101K; RFL part No. H-1009-329.	Oscillation suppressor for grid of V1305A.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R1323	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Voltage dividing resistor for signal input to V1305.
R1324	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Voltage dividing resistor for signal input to V1305.
R1325	3Z7325-17 N16-R-87419-4350	RESISTOR, variable, composition: 2500 ohms +10%; 2 w; standard A taper; three solder lug term; case, phenolic and metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU2521 w/shaft bushing No. SD4040L, lockwasher No. M-2898, locking nut No. B-13750, and mtg nut M2786; RFL part No. HA-4020.	Cathode bias potentiometer for V1305.
R1326	3RC30BF333K N16-R-50418-231	RESISTOR, fixed, composition: Same as R114.	Plate load resistor for V1305.
R1327	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Voltage dividing resistor for signal input to V1306.
R1328	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid resistor for V1306.
R1329	3RC30BF334K N16-R-50760-231	RESISTOR, fixed, composition: 330,000 ohms, +10%; 1 w; 19/32" lg x 7/32" diam excluding term; govt spec JAN-R-11, type RC30BF334K; Allen-Bradley part No. RC30BF334K; RFL part No. H-1009-308.	Voltage divider for POLAR LOOP CURRENT BALANCE circuit.
R1330	3RC42BF473K For replacement use N16-R-50481-461	RESISTOR, fixed, composition: 47,000 ohms, +10%; 2 w; 47/64" lg x 19/64" diam excluding term; govt spec JAN-R-11, type RC42BF473K; Allen-Bradley part No. RC42BF473K; RFL part No. H-1009-307.	Plate load resistor for V1306.
R1331	3RC42BF473K For replacement use N16-R-50481-461	RESISTOR, fixed, composition: Same as R1330.	Plate load resistor for V1306.

R1332	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Voltage dividing resistor for grid of output keying tube.
R1333	3Z7450-87 N16-R-87849-4590	RESISTOR, variable, composition: 50,000 ohms +10%; 2 w; standard A taper; three solder lug term; case phenolic body, metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtg by bushing; Allen-Bradley part No. JLU5031 w/shaft bushing No. SD4040L, lockwasher No. M2898, locking nut No. B-13750, and mtg nut No. M-2786; RFL part No. HA-4946.	POLAR LOOP CURRENT BALANCE potentiometer.
R1334	3RC30BF683K N16-R-50553-231	RESISTOR, fixed, composition: 68,000 ohms, +10%; 1 w; 19/32" lg x 7/32" diam excluding terms; govt spec JAN-R-11, type RC30BF683K; Allen-Bradley part No. RC30BF683K; RFL part No. H-1009-302.	Voltage dividing resistor for grid of output keying tube.
R1335	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Voltage dividing resistor for grid of output keying tube.
R1336	3RC30BF223K N16-R-50373-231	RESISTOR, fixed, composition: 22,000 ohms, +10%; 1 w; 19/32" lg x 7/32" diam excluding term; govt spec JAN-R-11, type RC30BF223K; Allen-Bradley part No. RC30BF223K; RFL part No. H-1009-304.	Voltage dividing resistor for POLAR LOOP CURRENT BALANCE potentiometer.
R1337	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid limiting resistor for V1306.
R1338	3RC30BF683K N16-R-50553-231	RESISTOR, fixed, composition: Same as R1334.	Voltage dividing resistor for grid of output keying tube.
R1339	3RC30BF101K N16-R-49581-231	RESISTOR, fixed, composition: Same as R1322.	Oscillation suppressor for V1307.
R1340	3RC30BF101K N16-R-49581-231	RESISTOR, fixed, composition: Same as R1322.	Oscillation suppressor for V1309.
R1341	3RW24336 N16-R-66030-1126	RESISTOR, fixed, wire wound; 1,000 ohms, +5%; 10 w; 1-1/2" lg x 19/32" OD excl term; govt spec JAN-R-26A, type No. RW31F102; Ward Leonard part No. RW31F102; RFL part No. H-1100-134.	Grid bias for V1308.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R1342	3RC30BF101K N16-R-49581-231	RESISTOR, fixed, composition: Same as R1322.	Oscillation suppressor for V1308.
R1343	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Grid leak for V1310.
R1344	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Oscillation suppressor for V1310.
R1345	3RW24336 N16-R-66030-1126	RESISTOR, fixed, wire wound: Same as R1341.	Grid biasing resistor for V1310.
R1346	3RW25819 N16-R-66094-5706	RESISTOR, fixed, wire wound: 1,800 ohms, +5%; 10 w; 1-1/2" lg x 19/32" OD; govt spec JAN-R-26A, type No. RW31F182; Ward Leonard part No. RW31F182; RFL part No. H-1100-135.	Plate load for V1309.
R1347	3RP9309 N16-R-91294-6975	RESISTOR, variable, wire wound: 10,000 ohms, +10%; 50 w; 2-5/16" diam x 2-1/8" h; govt spec MIL-R-22A, type No. RP151FD103KK; Ohmite Mfg. part No. 0332; RFL part No. HA-4918.	LOOP CURRENT potentiometer.
R1348	3RU12805 N16-R-68296-7675	RESISTOR, fixed, wire wound: Same as R121.	Voltage dropping resistor for E1303.
R1349	3RW6319 N16-R-68273-5121	RESISTOR, fixed, wire wound: 1 ohm; +10%; 1 w; body 1-9/32" lg x 9/32" OD excl term; govt spec JAN-R-184, type No. RU4B1ROK; International Resistor part No. RU4B1ROK; RFL par. No. H-1100-149.	Filament voltage dropping resistor for V1301 and V1302.
R1350	3RC42BF103K For replacement use N16-R-50283-512	RESISTOR, fixed, composition: Same as R103.	Filter resistor B- power supply.
R1351	3RC42BF103K For replacement use N16-R-50283-512	RESISTOR, fixed, composition: Same as R103.	Filter resistor B- power supply.
R1352	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Bleeder resistor B+ power supply.

R1353	3RW26751 N16-R-66140-5206	RESISTOR, fixed, wire wound: 2, 500 ohms, $\pm 5\%$; 8 w; body 1-3/4" lg x 1/2" OD excl term; govt spec JAN-R-26A, type No. RW29F252; Ward Leonard part No. RW29F252; RFL part No. H-1100-141.	Voltage dropping resistor for voltage regulating tubes V1313 and V1314.
R1354	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Input diversity combining resistor.
R1355	3RC30BF332K N16-R-50067-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias resistor.
R1356	3RC30BF102K N16-R-49923-231	RESISTOR, fixed, composition: Same as R1316.	B+ filtering resistor.
S1301	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	NORMAL-REVERSE switch.
S1302	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	POLAR-NEUTRAL switch.
S1303	3Z9825-56.212 N16ES-052374-1303	SWITCH, rotary: 1 sect, 2 pos; 3 poles, 2 throw; 6 v, 1 amp; brass cont; silver pl; 1-7/8" lg x 1-5/8" wd x 1-7/8" h; flattened type shaft, 1/2" lg; 30° index, non-shorting; Centralab "H" index, "X" clips; Centralab part No. HA-4514; RFL part No. HA-4514.	Selects BATTERY FROM LOOP or EQUIP position.
S1304	3Z9863-52K.1 N17-S-72828-2605	SWITCH, toggle: Same as S103.	AC power ON-OFF switch.
S1305	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	Selects 115 or 230 v input winding of T1302 power transformer.
S1306	3Z9825-146.2 N16ES-052374-1306	SWITCH, rotary: 2 sect; 3 pos, not adj; cont non-"pile-up" type; 6 poles, 3 cont; 6 v, 1 amp; brass cont; silver pl; ceramic sect; 2-5/8" lg x 1-5/8" wd x 1-3/4" h; mts by 3/8" lg, 3/8-32 thd bushing; shaft flattened type, 7/16" lg x 1/4" diam; solder lug type term; 30° index, non-shorting; Centralab part No. HB-5242; RFL part No. HB-5242.	Selects DIVERSITY circuit.
T1301	2Z9843-495 N17-T-67101-1360	TRANSFORMER, discriminator: 425 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; requires external strap over trans; octal plug type header, requires standard octal tube socket; Bunnell No. S-8554; RFL part No. HC-4852-1.	Audio discriminator for mark or space signals.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
T1302	2Z9621B-60 N16ET-052374-1302	TRANSFORMER, power, step-down and step-up; hermetically sealed, steel; 115/230 v AC, 50-60 cyc, single phase; 4 output windings, #1 secd - 850 v 0.1 amp, #2 secd - 5 v 2.2 amp, #3 secd - 6.3 v 1.0 amp, #4 secd - 6.3 v 12 amp; 3500 v RMS insul; 5-1/16" lg x 4-5/16" wd x 4" h o/a; 14 term solder lug type located on bottom; internal shielding; Magnetic Winding part No. 155-32R; govt spec MIL-T-27, Grade 1, Class A; RFL part No. HB-4844.	Power transformer.
V1301	2J6AU6 For replacement use N16-T-56203-53	TUBE, electron: amplifier pentode; glass envelope; RMA T-5-1/2; 7 wire type terminations, located on bottom; pentode; govt spec JAN-1A, type No. 6AU6; RCA part No. 6AU6; RFL part No. HA-3562.	1st limiting amplifier.
V1302	2J12AX7 N16-T-58241-60	TUBE, electron: twin triode; glass envelope; RMA T-6-1/2 (6-7); 9 pin type terminations, located on bottom; miniature Hi Mu Twin Triode; govt spec JAN-1A, type No. 12AX7; RCA part No. 12AX7; RFL part No. HA-2287.	2nd limiting amplifier.
V1303	2J6C4 For replacement use N16-T-56214-55	TUBE, electron: triode; glass envelope; RMA T-5-1/2; 7 wire type terminations, located on bottom; general purpose triode; govt spec JAN-1A, spec type No. 6C4; RCA part No. 6C4; RFL part No. HA-3592.	3rd limiting amplifier.
V1304	2J5726/6AL5W For replacement use N16-T-56195-50	TUBE, electron: Same as V102.	Discriminator for space frequency.
V1305	2J6J6 For replacement use N16-T-56360-5	TUBE, electron: twin triode; glass envelope; RMA T-5-1/2 (6-2); 7 wire type terminations, located on bottom; twin triode; govt spec JAN-1A, type 6J6; RCA part No. 6J6; RFL part No. HA-3564.	Amplifier tube.
V1306	2J6J6 For replacement use N16-T-56360-5	TUBE, electron: Same as V1305.	Amplifier keyer.
V1307	2J6Y6G N16-T-56916	TUBE, electron: pentode; glass envelope; RMA ST-14 (4-8); 7 pin type terminations, located on bottom; beam-power amplifier; govt spec JAN-1A, type No. 6Y6G; RCA part No. 6Y6G; RFL part No. HA-4516.	Output keyer tube.

V1308	2J6Y6G N16-T-56916	TUBE, electron: Same as V1307.	Output keyer tube.
V1309	2J6Y6G N16-T-56916	TUBE, electron: Same as V1307.	Output keyer tube.
V1310	2J6Y6G N16-T-56916	TUBE, electron: Same as V1307.	Output keyer tube.
V1311	2J5Y3GT For replacement use N16-T-55738-5	TUBE, electron: Same as V105.	Full-wave rectifier for B+ power supply.
V1312	2J6X4W N16-T-56840-50	TUBE, electron: diode; glass envelope, RMA T-5-1/2; 7 terminations wire type, located on bottom; full-wave high-vacuum rectifier; govt spec JAN-1A, type No. 6X4W; RCA part No. 6X4W; RFL part No. HA-4831.	Half-wave rectifier for B- power supply.
V1313	2JOB2 For replacement use N16-T-52001-8	TUBE, electron: Same as V107.	Voltage regulator.
V1314	2JOB2 For replacement use N16-T-52001-8	TUBE, electron: Same as V107.	Voltage regulator.
V1315	2JOA2 For replacement use N16-T-52001-3	TUBE, electron: diode; glass envelope, RMA T-5-1/2 (6-5); 7 wire type terminations, located on bottom; voltage regulator; govt spec JAN-1A, type No. 0A2; RCA part No. 0A2; RFL part No. HA-3665.	Voltage regulator.
V1316	2J5726/6AL5W For replacement use N16-T-75726	TUBE, electron: Same as V102.	Discriminator for mark frequency.
W1301	3E4000.138 Assembled from component parts	CABLE ASSEMBLY, power, electrical: Same as W101.	AC power input cable.
W1302	3E4002.95 N16EW-052374-0102	CABLE ASSEMBLY, special purpose: Same as W102.	Input and output signal and diversity circuit cable.
X1301	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1301.
X1302	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V1302.
X1303	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1303.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
X1304	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1304.
X1305	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1305.
X1306	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1306.
X1307	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for V1307.
X1308	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for V1308.
X1309	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for V1309.
X1310	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X109.	Socket for V1310.
X1311	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for V1311.
X1312	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1312.
X1313	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1313.
X1314	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1314.
X1315	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1315.
X1316	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V1316.
X1317	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for Z1301.

X1318	2Z8678-326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for T1301.
Z1301	3Z1892-72.12 N16EZ-052374-1301	FILTER, band-pass: 425 cyc ctr freq; 382.5 to 467.5 cyc band-width; 600 ohm input, 600 ohm output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-11782; RFL part No. HC-4851-1.	Filters input signal.
1400 to 1499	#F16R-99999-0008	RECEIVER, Telegraph Carrier: 595 cyc ctr freq; R-528/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
T1401	2Z9643.496 N16ET-052374-1401	TRANSFORMER, discriminator: 595 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8555; RFL part No. HC-4852-2.	Audio discriminator for mark or space signals.
Z1401	3Z1892-72.13 N16EZ-052374-1401	FILTER, band-pass: 595 cyc ctr freq, 552.5 to 637.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-12301; RFL part No. HC-4851-2.	Filters input signal.
1500 to 1599	#16R-99999-0009	RECEIVER, Telegraph Carrier: 765 cyc ctr freq; R-527/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
T1501	2Z9643.497 N16ET-052374-1501	TRANSFORMER, discriminator: 765 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freqs about 100 cyc above and below freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8556; RFL part No. HC-4852-3.	Audio discriminator for mark or space signals.
Z1501	3Z1892-72.14 N16EZ-052374-1501	FILTER, band-pass: 765 cyc ctr freq, 722.5 to 807.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-12467; RFL part No. HC-4851-3.	Filters input signal.
1600 to 1699	#F16R-99999-0010	RECEIVER, Telegraph Carrier: 935 cyc ctr freq; R-528/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.

* This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
T1601	2Z9643.498 N16ET-052374-1601	TRANSFORMER, discriminator: 935 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freq about 100 cycles above and below freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8557; RFL part No. HC-4852-4.	Audio discriminator for mark or space signals.
Z1601	3Z1892-72.15 N16EZ-052374-1601	FILTER, band-pass: 935 cyc ctr freq, 892.5 to 977.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8545; RFL part No. HC-4851-4.	Filters input signal.
1700 to 1799	#F16R-99999-0011	RECEIVER, Telegraph Carrier: 1105 cyc ctr freq; R-529/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
T1701	2Z9643.499 N17-T-67101-2040	TRANSFORMER, discriminator: 1105 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8558; RFL part No. HC-4852-5.	Audio discriminator for mark or space signals.
Z1701	3Z1892-72.16 N16EZ-052374-1701	FILTER, band-pass: 1105 cyc ctr freq, 1062.5 to 1147.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8546; RFL part No. HC-4851-5.	Filters input signal.
1800 to 1899	#F16R-99999-0012	RECEIVER, Telegraph Carrier: 1275 cyc ctr freq; R-530/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
T1801	2Z9643.500 N16ET-052374-1801	TRANSFORMER, discriminator: 1275 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core; wax filled; tuned to freq about 100 cyc above and below ctr freq;	Audio discriminator for mark or space signals.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

Z1801	3Z1892-72.17 N16EZ-052374-1801	mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8559; RFL part No. HC-4852-6.	Filters input signal.
1900 to 1999	#F16R-99999-0013	FILTER, band-pass: 1275 cyc ctr freq; 1232.5 to 1317.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8547; RFL part No. HC-4851-6.	Single channel tele-graph receiver.
T1901	2Z9643.501 N17-T-67101-2475	RECEIVER, Telegraph Carrier: 1445 cyc ctr freq; R-531/FCC-3; otherwise identical to R-525/FCC-3 except components described below: TRANSFORMER, discriminator: 1445 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a powdered iron core; wax filled; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8560; RFL part No. HC-4852-7.	Audio discriminator for mark or space signals.
Z1901	3Z1892-72.18 N16EZ-052374-1901	FILTER, band-pass: 1445 cyc ctr freq; 1402.5 to 1487.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8548; RFL part No. HC-4851-7.	Filters input signal.
2000 to 2099	#F16R-99999-0014	RECEIVER, Telegraph Carrier: 1615 cyc ctr freq; R-532/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
T2001	2Z9643.502 N16ET-052374-2001	TRANSFORMER, discriminator: 1615 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core; wax filled; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8561; RFL part No. HC-4852-8.	Audio discriminator for mark or space signals.
Z2001	3Z1892-72.19 N16EZ-052374-2001	FILTER, band-pass: 1615 cyc ctr freq; 1572.5 to 1657.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8549; RFL part No. HC-4851-8.	Filters input signal.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
2100 to 2199	#F16R-99999-0015	RECEIVER, Telegraph Carrier: 1955 cyc ctr freq; 85.0 cyc cps freq shift; 100 dot cyc keying rate; R-533/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
C2109	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Signal filter capacitor.
T2101	2Z9643.503 N16ET-052374-2101	TRANSFORMER, discriminator: 1955 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core, wax filled; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8562; RFL part No. HC-4852-9.	Audio discriminator for mark or space signals.
Z2101	3Z1892-72.20 N16EZ-052374-2101	FILTER, band-pass: 1955 cyc ctr freq; 1870 to 2040 cyc bandwidth; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8550; RFL part No. HC-4851-9.	Filters input signal.
2200 to 2299	#F16R-99999-0016	RECEIVER, Telegraph Carrier: 2380 cyc ctr freq; 85.0 cps freq shift; 100 dot cyc keying rate; R-534/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
C2209	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Signal filter capacitor
T2201	2Z9643.504 N16ET-052374-2201	TRANSFORMER, discriminator: 2380 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core; wax filled; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8563; RFL part No. HC-4852-10.	Audio discriminator for mark or space signals.
Z2201	3Z1892-72.21 N16EZ-052374-2201	FILTER, band-pass: 2380 cyc ctr freq; 2295 to 2465 cyc bandwidth; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8551; RFL part No. HC-4851-10.	Filters input signal.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

2300 to 2399	#F16R-99999-0017	RECEIVER, Telegraph Carrier: 2805 cyc ctr freq; 85. 0 cps freq shift; 100 dot cyc keying rate; R-535/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
C2309	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Signal filter capacitor.
T2301	2Z9643.505 N16ET-052374-2301	TRANSFORMER, discriminator: 2805 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core; wax filled; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header. standard octal tube socket; Burnell & Co. part No. S-85564; RFL part No. HC-4852-11.	Audio discriminator for mark or space signals.
Z2301	3Z1892-72.22 N16EZ-052374-2301	FILTER, band-pass: 2805 cyc ctr freq; 2720 to 2890 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8552; RFL part No. HC-4851-11.	Filters input signal.
2400 to 2499	#F16R-99999-0018	RECEIVER, Telegraph Carrier: 3230 cyc ctr freq; 85. 0 cps freq shift; 100 dot cyc keying rate; R-536/FCC-3; otherwise identical to R-525/FCC-3 except components described below:	Single channel telegraph receiver.
C2409	3DA6-132 N16-C-41596-8380	CAPACITOR, fixed, paper dielectric: Same as C101.	Signal filter capacitor.
T2401	2Z9643.506 N16ET-052374-2401	TRANSFORMER, discriminator: 3230 cyc ctr freq; shielded; 1-3/4" lg x 1-3/4" wd x 2-11/16" h o/a; powdered iron core; wax filled; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuned; requires external strap over transf; octal plug type header, standard octal tube socket; Burnell & Co. part No. S-8565; RFL part No. HC-4852-12.	Audio discriminator for mark or space signals.
Z2401	3Z1892-72.23 N16EZ-052374-2401	FILTER, band-pass: 3230 cyc ctr freq; 3145 to 3315 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; case rectangular, steel; mts into standard octal tube socket, requires external clamp; standard octal plug; Burnell & Co. part No. S-8553; RFL part No. HC-4851-12.	Filters input signal.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
2500 to 2599	#F16C-99999-0009	CABINET, Telegraph Carrier Terminal: designed to hold 12 telegraph receiver chassis and one group modulator chassis, or 12 telegraph transmitter chassis and one group modulator; smooth gray enameled steel; 6'11-15/16" h x 22-3/8" wd x 24" d o/a; ventilation fan, hinged rear door, control panel containing convenience outlet, fuses, ON-OFF power switch, and blown fuse indicator. 13 115/230 v power outlets located in channel strip, term board, exterior cable duct; RFL part No. HC-5484; U. S. Navy type CY-11195/FCC-3; govt spec MIL-T-15294A (SHIPS).	Provide mtg facilities for the AG units.
B2501	3H1938-1 N16EB-052374-2501	FAN ASSEMBLY: propeller blade type; electric motor; 4 aluminum blades 8-3/4" diam; non-portable; 6 w, 1550 rpm, 115 v AC, single phase; 3-1/2" diam x 4-3/8" h excl blades; single speed direct drive; clockwise rotation; steel case w/black enamel finish; GE motor No. 5KSP51CL14-CW and blade No. 8114792AA1; RFL motor No. HA-4883 and blade No. HA-5053, and Assembly No. HA-5441.	Remove heated air from cabinet.
E2501	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Blown fuse indicator.
E2502	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Blown fuse indicator.
E2503	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Blown fuse indicator.
E2504	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Blown fuse indicator.
E2505	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Fuseholder.
E2506	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Fuseholder.

This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

E2507	3Z2879-2 N17-F-73789-2201	FUSEHOLDER: block type; 250 v, 30 amp; accommodates 2 cartridge fuses; porcelain body; bronze clip type cont; 3-5/16" lg x 2-11/16" wd x 1-3/8" h o/a; 4 screw type term; 2 mtg holes; Harvey Hubbell No. 1917; RFL part No. HB-5051.	AC line fuseholder.
F2501	3Z2630.22 N16EF-052374-2501	FUSE, cartridge: 30 amp, 250 v; ferrule type term; encl type, fibre body; one-time; non-indicating; 2" lg x 9/16" diam o/a; Federal Spec W-F-791a; Bussmann Mfg. part No. NFA-30; RFL part No. HA-5052.	AC line fuse.
F2502	3Z2630.22 N16EF-052374-2501	FUSE, cartridge: Same as F2501.	AC line fuse.
F2503	3Z2605 For replacement use G17-F-16302-140	FUSE, cartridge: 5 amp, 250 v; quick acting; ferrule type term; encl type, glass body; one time; non-indicating; 1-1/4" lg x 1/4" diam o/a; Bussmann Mfg. part No. MTH-5; RFL part No. HA-4529.	Fan and outlet fuse.
F2504	3Z2605 For replacement use G17-F-16302-140	FUSE, cartridge: Same as F2503.	Fan and outlet fuse.
F2505	3Z2605 For replacement use G17-F-16302-140	FUSE, cartridge: Same as F2503.	Spare fuse for fan and outlet.
F2506	3Z2630.22 N16EF-052374-2501	FUSE, cartridge: Same as F2501.	Spare AC line fuse.
H2501	Shop mfr. locally	CLAMP, electrical: Same as H102.	Clamps S2502.
H2502	*Shop mfr. locally	CLAMP, electrical: steel, gray enamel; 1-7/8" lg x 3/8" wd x 5/8" h o/a; RFL part No. HA-5060.	Clamps J2501 to cabinet.
H2503	Shop mfr. locally	CLAMP, electrical: Same as H2502.	Clamps J2501 to cabinet.
H2504	Shop mfr. locally	CLAMP, electrical: Same as H2502.	Clamps J2501 to cabinet.
H2505	Shop mfr. locally	CLAMP, electrical: Same as H2502.	Clamps J2501 to cabinet.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
H2506	2Z2642.910 *+	CLAMP, electrical; malleable iron; cad pl and iridite dip; 2 screw type fasteners; 2" lg x 1" diam o/a; mtd by 7/16" lg thd bushing; Appleton Electric part No. 7380-V; RFL part No. HA-5246.	Clamps power input cable to baffle.
H2507	6Z3675-1 +	CONDUIT FITTING: 90° elbow for coupling conduit to box; 2-5/8" x 2-7/16" on 90°, 1-1/8" diam, 15/16" across flats of hexagonal compression nut for 1/2" thin wall conduit; compression type on one end, 1/2" pipe thd on other end; malleable iron; cad pl and 8P iridite dipped; Thomas & Betts part No. 4220; RFL part No. HA-4987.	Conduit connector for power input cable to J2501.
H2508	6Z3147-3 +	CONDUIT FITTING: 1-5/16" lg x 1-1/16" across flats of hexagonal compression nut; compression type on one end, 1/2" pipe thd on other end; steel, cad pl and 8P iridite dipped; Thomas & Betts No. 4271; RFL part No. HA-4876.	Conduit connector for power input cable to J2501.
H2509	N17-P-91801-1005	PULLER, fuse; scissor action type; black fibre; 5" lg x 3/4" wd x 7/16" thk o/a; Trico Fuse "Midget" type; RFL part No. HA-2254.	Fusepuller.
H2510	For replacement use G41-W-2446	WRENCH: steel, blued; 1-31/32" lg x 45/64" h x 5/64" wd o/a; wrench for #8 Allen head set screw; for control knob set screws; Allen Mfg. code No. 564; RFL part No. HA-2235.	To remove knobs.
H2511	For replacement use G41-W-2451	WRENCH: steel, blued; 2-11/32" lg x 15/16" h x 5/32" wd o/a; for #10 socket head cap screw; Allen Mfg. code No. 532; RFL part No. HA-2238.	To adjust rollers.
H2512	*Shop mfr. locally	CLAMP, electrical; spring brass, nickel pl finish; 1-29/32" lg x 1-11/16" wd x 9/16" h o/a; designed to hold 1-1/2" diam electrical plug; RFL part No. HA-5344.	Clamps plug to receptacle strip.
H2513	Shop mfr. locally	CLAMP, electrical; Same as H2512.	Clamps plug to receptacle strip.

+ If required will be procured by Navy Supply Activity on demand.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

H2514	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2515	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2516	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2517	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2518	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2519	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2520	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2521	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2522	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2523	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2524	Shop mfr. locally	CLAMP, electrical: Same as H2512.	Clamps plug to receptacle strip.
H2525	Shop mfr. locally	CLAMP, electrical: phosphor-bronze, nickel pl; two spring clip type fasteners; 1-3/4" lg x 3/8" wd x 5/8" h o/a; mtd by one #8-32 machine screw; Farnestock Electric part No. 9C; RFL part No. HA-5345.	Clamp for Allen wrenches.
H2526	*Shop mfr. locally	CLAMP, electrical: brass, nickel pl; one loop type fastening device; 1-1/4" diam x 3/8" h o/a; mtd by #10-32 machine screw; RFL part No. HA-5357.	Support for loop cable.
H2527	Shop mfr. locally	CLAMP, electrical: Same as H2526.	Support for loop cable.
H2528	Shop mfr. locally	CLAMP, electrical: Same as H2526.	Support for loop cable.
H2529	Shop mfr. locally	CLAMP, electrical: Same as H2526.	Support for loop cable.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
H2530	Shop mfr. locally	CLAMP, electrical: Same as H2526.	Support for loop cable.
H2531	Shop mfr. locally	CLAMP, electrical: Same as H2526.	Support for loop cable.
H2532	Shop mfr. locally	CLAMP, electrical: aluminum, #14 iridite coated; compression type fastening device; 1-5/16" lg x 1/2" wd x 3/8" h o/a; mtd by one 0.196" diam hole; RFL part No. HA-5471; (Receiver Group and Transmitter Group Cabinets).	Clamps W2501 or W2502 to cabinet.
H2533	Shop mfr. locally	CLAMP, electrical: Same as H2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2534	Shop mfr. locally	CLAMP, electrical: Same as H2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2535	Shop mfr. locally	CLAMP, electrical: Same as H2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2536	Shop mfr. locally	CLAMP, electrical: aluminum, #14 iridite coated; compression type fastening device; 1-5/16" lg x 1/2" wd x 3/8" h o/a; mtd by one 0.196" diam hole; RFL part No. HA-5472; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
H2537	Shop mfr. locally	CLAMP, electrical: Same as H2536; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
H2538	Shop mfr. locally	CLAMP, electrical: aluminum, #14 iridite coated; compression type fastening device; 1-3/8" lg x 1/2" wd x 7/16" h o/a; mtd by one 0.196" diam hole; RFL part No. HA-5473; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
I2501	For reference only	LIGHT, indicator: Same as I101.	Holder for E2501.
I2501A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2501.	
I2501B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2501.	Holder for E2501.
I2502	For reference only	LIGHT, indicator: Same as I101.	Lens for I2501A.
I2502A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2502.	Holder for E2502.

I2502B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2502.	Lens for I2502A.
I2503	For reference only	LIGHT, indicator: Same as I101.	Holder for E2503.
I2503A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2503.	Lens for I2503A.
I2503B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2503.	Holder for E2504.
I2504	For reference only	LIGHT, indicator: Same as I101.	Lens for I2504A.
I2504A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2504.	AC power connector strip.
I2504B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2504.	Convenience outlet.
J2501	2Z3105-65 For reference only	CONNECTOR ASSEMBLY, electrical: 13 connectors in assem; 13 Wiremold part No. 1927 receptacles, 2 flat female type cont; cont 10 amp, AC, 250 v; steel case, gray enamel finish; 71-1/4" lg x 13/16" wd x 9/16" d o/a; strap mtd; RFL part No. HC-5168.	Main POWER ON-OFF switch.
J2502	6Z7811 N17-C-73128-9405	CONNECTOR, receptacle: two female flat blades; not polarized; straight type; 7/8" lg x 1.390" diam o/a; cont 10 amps, 250 v; "U" shaped strap, body steel, cadmium pl; molded brown bakelite; two mtg holes w/No. 8-32 thd, 1-3/4" mtg ctr; Harvey Hubbell part No. 7331; RFL part No. HA-2865.	115 v - 230 v switch.
S2501	4T95007 N16ES-052374-2501	SWITCH, toggle: DPST; 20 amp, 250 v AC; porcelain body; 4-1/8" lg x 1-5/8" wd x 1-25/32" d o/a; 4 screw type term located on front; Harvey Hubbell part No. 8942; RFL part No. HB-4868.	115 v supply transformer for fan and outlet.
S2502	3Z9863-52N.1 N17S-73959-1025	SWITCH, toggle: Same as S101.	
T2501	2Z9621B-61 N16ET-052374-2501	TRANSFORMER, power, fixed auto-transformer: hermetically sealed, steel case; 115/230 v AC, 50/60 cyc, single phase, single tap for 115 v AC input; 115 v AC, 2.5 amp, 250 w output; 1500 v RMS insul; black potting compound; 4-29/64" lg x 4-5/16" wd x 3-11/16" h o/a; 3 term; four 0.169" mtg holes; Magnetic Winding part No. 155-29R; govt spec MIL-T-27, Grade 1 Class A; RFL part No. HB-4906.	

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
W2501	For reference only.	WIRING HARNESS: main body conductor 4 #22 AWG copper stranded; breakout conductor 4 #22 AWG copper stranded; vinyl insulated shielded conductors; 1000 v RMS max working voltage; 67" lg main body, 11 breakouts each 4-5/16" lg; twine laced 1/2" apart binds cond together; 48 marked terminal lugs located on both ends and on ends of breakouts; RFL part No. HD-5244.	Interconnect transmitters and converter.
W2502	For reference only.	WIRING HARNESS: main body conductor 14 #22 AWG copper stranded; breakout conductor 7 #22 AWG copper stranded; vinylite insulation; 1000 v RMS max working voltage; 67" lg main body; 11 breakouts each 4-5/16" lg; twine laced 1/2" apart binds cond together; 84 terminations located on both ends and on ends of breakouts; RFL part No. HD-5245.	Interconnect receivers and converter.
2600 to 2699	#F16C-99999-0010	CONVERTER, Frequency, Electronic, CV-243/FCC-3: input freq range 382.5 to 1657.5, output freq range 1742.5 to 2932.5, 600 ohm input and output impedance; 1 ON-OFF switch, 1 output level control; 115/230 v AC, 50-60 cyc, single phase; output suitable for connection to device having 600 ohms impedance and variable over range -10 dbm to +6 dbm, input suitable for connection to 8 transmitters, 85 cyc test signal available, electrical power and special purpose cables supplied; provides means for raising the operating freq of the 8 narrow-band transmitters to a higher freq spectrum; govt identification data CV-243/FCC-3; govt spec MIL-T-15294A (SHIPS); RFL part No. HB-4859.	Converts frequency of eight narrow-band transmitters to high frequency.
C2601	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Plate to grid coupling capacitor for V2601A.
C2602	3K3011232 For replacement use N16-C-31190-8294	CAPACITOR, fixed, mica dielectric: 1,100 mmf, +5%; 500 v DC; govt spec JAN-C-5, type No. CM35C112J; Cornell-Dubilier part No. CM35C112J; RFL part No. H-1080-34.	Couples plate of V2601A to grid of V2602A.
C2603	3K2010021 For replacement use N16-C-26025-8276	CAPACITOR, fixed, mica dielectric: 10 mmf, +10%; 500 v DC; govt spec JAN-C-5, type No. CM20A100K; Cornell-Dubilier part No. CM20A100K; RFL part No. H-1080-35.	Couples grid of V2601B to grid of V2602A.

* This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

C2604	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: 75 mmf, ±5%; 500 v DC; govt spec JAN-C-5, type No. CM20C750J; Cornell-Dubilier part No. CM20C750J; RFL part No. H-1080-36.	Feedback capacitor for V2602A.
C2605	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2602A.
C2606	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2602A.
C2607	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2602A.
C2608	3K2051032 N16-C-27656-2601	CAPACITOR, fixed, mica dielectric: 51 mmf, ±5%; 500 v DC; govt spec JAN-C-5, type No. CM20C510J; Cornell-Dubilier part No. CM20C510J; RFL part No. H-1080-20.	Couples plate of V2602A to grid of V2602B.
C2609	3K2051132 For replacement use N16-C-30188-5006	CAPACITOR, fixed, mica dielectric: 510 mmf, ±5%; 500 v DC; govt spec JAN-C-5, type No. CM20C511J; Cornell-Dubilier part No. CM20C511J; RFL part No. H-1080-42.	Feedback capacitor for V2602B.
C2610	3K2051132 For replacement use N16-C-30188-5001	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2602B.
C2611	3K2051132 For replacement use N16-C-30188-5001	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2602B.
C2612	3K2051132 For replacement use N16-C-30188-5001	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2602B.
C2613	3DA100-534 N16-C-45777-2863	CAPACITOR, fixed, paper dielectric: 100,000 mmf, ±10%; 600 v DC; govt spec JAN-C-25; type No. CP69B1EF104K; Cornell-Dubilier part No. CP69B1EF104K; RFL part No. HA-4940.	Couples V2603A to T2603.
C2614	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Couples plate of V2602B to grid of V2604B.
C2615	3K3515232 For replacement use N16-C-31507-4094	CAPACITOR, fixed, mica dielectric: 1500 mmf, ±5%; 500 v DC; govt spec JAN-C-5, type No. CM35C152J; Cornell-Dubilier part No. CM35C152J; RFL part No. H-1080-84.	Feedback capacitor for V2604A.
C2616	3K3011232 For replacement use N16-C-31190-8294	CAPACITOR, fixed, mica dielectric: Same as C2602.	Feedback capacitor for V2604A.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C2617	3K3011232 For replacement use N16-C-31190-8294	CAPACITOR, fixed, mica dielectric: Same as C2602.	Feedback capacitor for V2604A.
C2618	3K3011232 For replacement use N16-C-31190-8294	CAPACITOR, fixed, mica dielectric: Same as C2602.	Feedback capacitor for V2604A.
C2619	3K2015132 N16-C-28975-1601	CAPACITOR, fixed, mica dielectric: 150 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM20C151J; Cornell-Dubilier part No. CM20C151J; RFL part No. H-1080-37.	Couples plate of V2604A to grid of V2604B.
C2620	3K3568232 For replacement use N16-C-33063-6870	CAPACITOR, fixed, mica dielectric: 6,800 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM35C682J; Cornell-Dubilier part No. CM35C682J; RFL part No. H-1080-83.	Feedback capacitor for V2604B.
C2621	3K3556232 For replacement use N16-C-32826-3270	CAPACITOR, fixed, mica dielectric: 5,600 mmf, $\pm 5\%$; 500 v DC; govt spec JAN-C-5, type No. CM35C562J; Cornell-Dubilier part No. CM35C562J; RFL part No. H-1080-40.	Feedback capacitor for V2604B.
C2622	3K3556232 For replacement use N16-C-32826-3270	CAPACITOR, fixed, mica dielectric: Same as C2621.	Feedback capacitor for V2604B.
C2623	3K3556232 For replacement use N16-C-32826-3270	CAPACITOR, fixed, mica dielectric: Same as C2621.	Feedback capacitor for V2604B.
C2624	3DA100-534 N16-C-45777-2863	CAPACITOR, fixed, paper dielectric: Same as C2613.	Blocking capacitor for J2603.
C2625	3DA20-220 N16-C-43112-6730	CAPACITOR, fixed, paper dielectric: Same as C105.	Filter capacitor for J2603.
C2626	3DA100-534 N16-C-45777-2863	CAPACITOR, fixed, paper dielectric: Same as C2613.	Plate decoupling capacitor.
C2627	3DA10-392 N16-C-42736-8556	CAPACITOR, fixed, paper dielectric: Same as C104.	Plate decoupling capacitor.
C2628	3DA50-477 For replacement use N16-C-44260-7100	CAPACITOR, fixed, paper dielectric: 50,000 mmf, -10% $+20\%$; 800 v DC; govt spec JAN-C-26, type No. CP54B1EF503V; Cornell-Dubilier part No. CP54B1EF503V; RFL part No. HA-5463.	Filter capacitor for J2611 and J2612.

C2629	3K3530232 For replacement use N16-C-32193-2494	CAPACITOR, fixed, mica dielectric: 3,000 mmf, ±5%; 500 v DC; govt spec JAN-C-5, type No. CM35C302J; Cornell-Dubilier part No. CM35C302J; RFL part No. H-1080-44.	Filter capacitor for carrier signal input to T2603.
C2630	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V2605 to grid of V2606A.
C2631	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V2606A to grid of V2606B.
C2632	3DB1-215 For replacement use N16-C-48817-2795	CAPACITOR, fixed, paper dielectric: Same as C107.	Blocking capacitor for feed-back to cathode V2606A.
C2633	3DB10-263 N16-C-21578-6268	CAPACITOR, fixed, electrolytic: Same as C1306.	Filter capacitor for B+ power supply.
C2634	3DA50-515 For replacement use N16-C-53010-6139	CAPACITOR, fixed, paper dielectric: 2 sect; 50,000 mmf, ±15%; 600 v DC; govt spec JAN-C-25, type No. CP54B4FF503L; Cornell-Dubilier part No. CP54B4FF503L; RFL part No. HA-5155.	RF filter capacitor for J2617.
C2634A	3DA50-515 For replacement use N16-C-53010-6139	CAPACITOR, fixed, paper dielectric: p/o C2634; for reference only.	RF filter capacitor for J2618.
C2634B	3DA50-515 For replacement use N16-C-53010-6139	CAPACITOR, fixed, paper dielectric: p/o C2634; for reference only.	AC power input filter.
C2635	3DA100-876 For replacement use N16-C-53201-3990	CAPACITOR, fixed, paper dielectric: 2 sections; 100,000 mmf, ±15%; 600 v DC; govt spec JAN-C-25; type No. CP55B4FF104L; Cornell-Dubilier part No. CP55B4FF104L; RFL part No. HA-5156.	Filter capacitor for AC power input.
C2635A	3DA100-876 For replacement use N16-C-53201-3990	CAPACITOR, fixed, paper dielectric: p/o C2635; for reference only.	Filter capacitor for AC power input.
C2635B	3DA100-876 For replacement use N16-C-53201-3990	CAPACITOR, fixed, paper dielectric: p/o C2635; for reference only.	B+ power supply filter capacitor.
C2636	3DB25-88 For replacement use N16-C-19793-8136	CAPACITOR, fixed, electrolytic: Same as C122.	

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
CR2601	2Z3565-18 N16-T-51771-0000	CRYSTAL UNIT, rectifying: germanium type; 0.060 amp max continuous forward current; 0.200 amp max peak forward current; 40 v peak inverse v; 1 mmf shunt capacitance; 1-3/16" h x 1-5/16" diam body dim; plugs into standard octal socket; 8 term, pin type; unit contains 4 matched germanium diodes for use as ring modulator; Sylvania part No. 1N71; RFL part No. HA-4935.	Ring Modulator.
E2601	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.
E2602	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.
E2603	2Z5927 For replacement use G17-L-6345	LAMP, incandescent: Same as E103.	Pilot lamp; indicates presence of line voltage.
E2604	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F2601.
E2605	3Z3282-42.9 For replacement use N17-F-74267-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F2602.
E2606	* 3Z2876-6.2	FUSEHOLDER: Same as E106.	Spare fuseholder.
E2607	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2601.
E2608	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2602.
E2609	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2603.
E2610	2Z8304.275 N16-S-32576-6514	SHIELD, electron tube: Same as E110.	Shield for V2604.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

E2611	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2605.
E2612	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2606.
E2613	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V2608.
E2614	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V2609.
E2615	2Z9410.83 For replacement use N17-B-77939-3236	TERMINAL BOARD: Same as E115.	Input and output signal termination block.
E2616	3Z12072-53.1 N16-T-28218-4116	TERMINAL, stud: Same as E116.	Insulated terminal for mounting components.
E2617	3Z770-24.74 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156 diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HB-5286.	Mounts component parts.
E2618	3Z770-24.75 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" dia mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HB-5289.	Mounts component parts.
E2619	3Z770-24.76 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 6.875" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HB-5292.	Mounts component parts.
E2620	3Z770-24.77 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HB-5295.	Mounts component parts.
E2621	3Z770-24.78 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 6.875" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HB-5298.	Mounts component parts.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E2622	3Z770-18.81 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 5.625" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HA-5280.	Mounts component parts.
E2623	3Z770-18.82 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 5.625" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HA-5283.	Mounts component parts.
E2624	3Z770-16.93 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 16 solder lug term; w/o barriers; 4-5/16" lg x 1-7/8" wd x 29/64" h o/a; two 0.156" diam mtg holes on 3.937" mtg ctr; marked w/symbol designations; fungus and moisture proofed; RFL part No. HA-5301.	Mounts component parts.
E2625	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: Same as E116.	Mounts component parts.
F2601	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F2602	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F2603	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
F2604	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
H2601	2Z2636-287 N17-C-781444-604	CLAMP, electrical: Same as H101.	Clamp cable W2602 to connector P2603.
H2602	*Shop mfr. locally	CLAMP, electrical: Same as H102.	Clamp for switch S2602.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

H2603	*Shop mfr. locally	CLAMP, electrical: Same as H103.	Clamp cable W2602 to E2615.
H2604	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2605	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2606	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2607	6L890-.5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2608	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2609	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2610	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2611	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2612	N16EH-052374-0112	SLIDE, left: Same as H112.	Supporting member on chassis for slides.
H2613	N16EH-052374-0113	SLIDE, right: Same as H113.	Supporting member on chassis for slides.
H2614	N16EH-052374-0114	SLIDE MOUNTING PLATE, left: Same as H114.	Supporting member on cabinet for slides.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
H2615	N16EH-052374-0115	SLIDE MOUNTING PLATE, right: Same as H115.	Supporting member on cabinet for slides.
I2601	For reference only	LIGHT, indicator: Same as I101.	
I2601A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A, p/o I2601.	Lamp assembly for E2601.
I2601B	2Z6125-253	LENS, indicator light: Same as I101B, p/o I2601.	Lens for I2601A.
I2602	For reference only	LIGHT, indicator: Same as I101.	
I2602A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A, p/o I2602.	Lamp assembly for E2602.
I2602B	2Z6125-253	LENS, indicator light: Same as I101B, p/o I2602.	Lens for I2602A.
I2603	*	LIGHT, indicator: Same as I103.	
I2603A	2Z5991-366 Procure on demand	LIGHT, indicator: Same as I103A, p/o I2603.	Lamp assembly for E2603.
I2603B	2Z5991-13 N16EI-052374-0103-2	LENS, indicator light: Same as I103B, p/o I2603.	Lens for I2603A.
J2601	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	3400 cycle TEST jack.
J2602	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	3400 cycle TEST jack.
J2603	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	85 cycle TEST jack.
J2604	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	85 cycle TEST jack.
J2605	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN NORM-LINE jack.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

J2606	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN NORM-LINE jack.
J2607	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN NORM-EQUIP jack.
J2608	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN NORM-EQUIP jack.
J2609	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN CONV-LINE jack.
J2610	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN CONV-LINE jack.
J2611	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN CONV-LINE jack.
J2612	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	IN CONV-EQUIP jack.
J2613	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	IN CONV-EQUIP jack.
J2614	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	MONITOR jack.
J2615	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	MONITOR jack.
J2616	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	OUT-LINE jack.
J2617	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	OUT-LINE jack.
J2618	2Z5524 N16-EJ-052374-0104	JACK, telephone: Same as J104.	OUT-EQUIP jack.
J2619	6Z8364 N17-C-73446-3401	CONNECTOR, receptacle: Same as J111.	OUT-EQUIP jack.
J2620	2Z8799-130 N17-C-72632-6265	CONNECTOR, receptacle: Same as J110.	AC input power connector. Input and output signal connector.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
J2621	2Z3055-46 †N17-C-73108-4940	CONNECTOR, receptacle: 1 cont, female, cylindrical; not polarized; straight type; red, phenolic pin type connector; 15/16" lg x 1/2" diam o/a; 10 amp, 250 v; brass body; 1 mtg stud, 1/4" diam threaded w/#1/4-32 thd, 1/2" lg; Insuline Corp. part No. 889R (Modified); RFL part No. HA-5157.	425 cycle test jack.
J2622	2Z3055-46 †N17-C-73108-4940	CONNECTOR, receptacle: Same as J2621.	85 cycle test jack.
J2623	2Z3055-52 †N17-C-73108-4851	CONNECTOR, receptacle: 1 cont, female, cylindrical; not polarized; straight type; black, phenolic pin type connector; 15/16" lg x 1/2" diam o/a; 10 amp, 250 v; brass body; 1 mtg stud, 1/4" diam threaded #1/4-32 thd, 1/2" lg; Insuline Corp. part No. 889B (Modified); RFL part No. HA-5158.	Ground jack.
L2601	3C323-50F N16-C-75528-9470	CHOKE: radio frequency, 80 ma current rating; load impedance for oscillator; for use with freq above 150 kc; cylindrical shape; 15/16" lg x 1-1/16" diam o/a; 2 term, solder lug type; located radially on coil base; impregnated against moisture; Bud Radio part No. CH-1220; RFL part No. HA-4899.	RF filter choke.
L2602	3C323-50F N16-C-75528-9470	CHOKE, radio frequency: Same as L2601.	RF filter choke.
L2603	3C559 N16-R-29236-8989	REACTOR: Same as L101.	B+ power supply filter choke.
L2604	3C496C N17-C-74647-3905	CHOKE, radio frequency: 125 ma current rating; RF output filter choke; for use with freq above 150 kc; cylindrical shape; 15/16" lg x 1-1/16" diam o/a; 2 term, solder lug type, located radially on coil base; impregnated against moisture; Bud Radio part No. CH-1212; RFL part No. HA-5159.	RF filter choke.
L2605	3C496C N17-C-74647-3905	CHOKE, radio frequency: Same as L2604.	RF filter choke.
O2601	2Z1619-79 N16-R-503580-311	RETAINER, electron tube: Same as O101.	Clamp for V2607.
O2602	3Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P2603.

† For replacement use modified as indicated in description.

O2603	3Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P2603.
O2604	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2605	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2606	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2607	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2608	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2609	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2610	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2611	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
P2601	2Z7226-187 N17-C-70356-6264	CONNECTOR, plug: Same as P101.	Input and output signal connector.
P2602	6Z1734 N17-C-71426-7829	CONNECTOR, plug: Same as P102.	AC power input connector.
P2603	6Z7568-1 N17-C-71126-4859	CONNECTOR, plug: Same as P103.	AC power input connector.
R2601	3RC30BF472K N16-R-50130-231	RESISTOR, fixed, composition: Same as R120.	Plate load for V2601A.
R2602	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Cathode bias resistor for V2601A.
R2603	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Cathode bias resistor for V2601B.
R2604	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Plate load for V2601B.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R2605	3RC30BF513J N16-R-50497-751	RESISTOR, fixed, composition: 51,000 ohms, $\pm 5\%$; 1 w; 23/32" lg x 1/4" diam body dim; ins, resistant to humidity and salt water immersion cycling; 2 term, wire lead; govt spec data JAN-R-11, spec type RC30BF513J; Allen-Bradley part No. RC30BF513J; RFL part No. H-1009-319.	Plate load for V2601A.
R2606	3RC30BF104J N16-R-50632-751	RESISTOR, fixed, composition: 100,000 ohms, $\pm 5\%$; 1 w; 23/32" lg x 1/4" diam; ins, resistant to humidity and salt water immersion cycling; 2 term, wire leads; govt spec data JAN-R-11, RC30BF104J; Allen-Bradley part No. RC30BF104J; RFL part No. H-1009-320.	Component in phase shift network of V2602A.
R2607	3Z7498-25.55 N16-R-88079-4360	RESISTOR, variable: single sect, 250,000 ohms, $\pm 10\%$; 2 w; standard A taper; three solder lug term; case phenolic body, metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU 2541 w/shaft bushing No. SD4040L, lockwasher No. M2898, locking nut No. B-13750, and mtg nut No. M-2786; RFL part No. HA-4505.	Component in phase shift network of V2602A.
R2608	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: 240,000 ohms, $\pm 5\%$; 1 w; govt spec data JAN-R-11, RC30BF244J; Allen-Bradley part No. RC30BF244J; RFL part No. H-1009-283.	Component in phase shift network of V2602A.
R2609	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2602A.
R2610	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2602A.
R2611	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: 1,000 ohms, $\pm 5\%$; 1 w; govt spec data JAN-R-11, RC30BF102J; Allen-Bradley part No. RC30BF102J; RFL part No. H-1009-280.	Cathode bias resistor for V2602B.
R2612	3RC30BF154J N16-R-50677-751	RESISTOR, fixed, composition: 150,000 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, RC30BF154J; Allen-Bradley part No. RC30BF154J; RFL part No. H-1009-345.	Component in phase shift network of V2602B.
R2613	3Z7498-25.55 N16-R-88079-4360	RESISTOR, fixed, composition: Same as R2607.	Component in phase shift network of V2602B.

R2614	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2602B.
R2615	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2602B.
R2616	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2602B.
R2617	3RC30BF105J N16-R-50974-751	RESISTOR, fixed, composition: 1 megohm, +5%; 1 w; govt spec data JAN-R-11, RC30BF105J; Allen-Bradley part No. RC30BF105J; RFL part No. H-1009-327.	Grid limiting resistor for V2603A.
R2618	3RC30BF332K N16-R-50067-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias resistor for V2603A.
R2619	3RC30BF473K N16-R-50481-231	RESISTOR, fixed, composition: Same as R112.	Plate load for V2603A.
R2620	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias for V2604A.
R2621	3RC30BF475K N16-R-51174-231	RESISTOR, fixed, composition: 4.7 megohms, +10%; 1 w; govt spec JAN-R-11, type RC30BF475K; Allen-Bradley part No. RC30BF475K; RFL part No. H-1009-318.	Isolating resistor for J2621.
R2622	3RC30BF154J N16-R-50677-751	RESISTOR, fixed, composition: Same as R2612.	Component in phase shift network of V2604A.
R2623	3Z7498-25.55 N16-R-88079-4360	RESISTOR, variable: Same as R2607.	Component in phase shift network of V2604A.
R2624	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604A.
R2625	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604A.
R2626	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604A.
R2627	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604A.
R2628	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Component in phase shift network of V2604A.
R2629	3RC30BF475K N16-R-51174-231	RESISTOR, fixed, composition: Same as R2621.	Plate load for V2604A. Cathode bias for V2604B. Isolating resistor for J2622.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R2650	3RC30BF154J N16-R-50677-751	RESISTOR, fixed, composition: Same as R2612.	Component in phase shift network of V2604B.
R2631	3Z7498-50.89 N16-R-88179-4680	RESISTOR, variable: Same as R1315.	Component in phase shift network of V2604B.
R2632	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604B.
R2633	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604B.
R2634	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component in phase shift network of V2604B.
R2635	3RC30BF514J N16-R-50839-751	RESISTOR, fixed, composition: 510,000 ohms, +5%; 1 w; govt spec data JAN-R-11, type RC30BF514J; Allen-Bradley part No. RC30BF514J; RFL part No. H-1009-282.	Plate load resistor for V2604B.
R2636	3RC30BF155J N16-R-51019-751	RESISTOR, fixed, composition: 1.5 megohms, +5%; 1 w; govt spec data JAN-R-11, type RC30BF155J; Allen-Bradley part No. RC30BF155J; RFL part No. H-1009-337.	Grid limiting resistor for V2603B.
R2637	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Cathode bias resistor for V2603B.
R2638	3RC30BF473K N16-R-50481-231	RESISTOR, fixed, composition: Same as R112.	Plate load for V2603B.
R2639	3RC30BF473K N16-R-50481-231	RESISTOR, fixed, composition: Same as R112.	Plate load for V2603B.
R2640	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Voltage-dropping resistor for V2601.
R2641	3RC30BF431J N16-R-49750-751	RESISTOR, fixed, composition: 430 ohms, +5%; 1 w; govt spec JAN-R-11, type RC30BF431J; Allen-Bradley part No. RC30BF431J; RFL part No. H-1009-258.	Component of 600 ohm T pad.
R2642	3RC30BF431J N16-R-49750-751	RESISTOR, fixed, composition: Same as R2641.	Component of 600 ohm T pad.

R2643	3RC30BF221J N16-R-49660-751	RESISTOR, fixed, composition: 220 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF221J; Allen-Bradley part No. RC30BF221J; RFL part No. H-1009-316.	Component of 600 ohm T pad.
R2644	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: 180 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF181J; Allen-Bradley part No. RC30BF181J; RFL part No. H-1009-261.	Component of 600 ohm T pad.
R2645	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: Same as R2644.	Component of 600 ohm T pad.
R2646	3RC30BF821J N16-R-49876-751	RESISTOR, fixed, composition: 820 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF821J; Allen-Bradley part No. RC30BF821J; RFL part No. H-1009-262.	Component of 600 ohm T pad.
R2647	3Z7450-87 N16-R-87849-4590	RESISTOR, variable, composition: Same as R1333.	Grid level potentiometer for V2605A.
R2648	3RC30BF222J N16-R-50011-751	RESISTOR, fixed, composition: 2200 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF222J; Allen-Bradley part No. RC30BF222J; RFL part No. H-1009-339.	Cathode bias resistor for V2605A.
R2649	3RC30BF511J N16-R-49786-751	RESISTOR, fixed, composition: 510 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF511J; Allen-Bradley part No. RC30BF511J; RFL part No. H-1009-315.	Voltage dividing resistor for grid V2605A.
R2650	3Z7100-38 N16-R-87023-8958	RESISTOR, variable, composition: single sect, 100 ohms, $\pm 10\%$; 2 w; standard A taper; three solder lug term; case phenolic body, metal, encl type, 1-1/16" diam x 1-3/16" d incl sect and switches; shaft metal, round, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtg by bushing; Allen-Bradley part No. JLU1011 w/shaft bushing No. SD4040L, lockwasher No. M2898, locking nut No. B-13750, and mtg nut No. M-2786; RFL part No. HA-5227.	Grid signal level potentiometer for V2605B.
R2651	3RC30BF222J N16-R-50011-751	RESISTOR, fixed, composition: Same as R2648.	Cathode bias resistor for V2605B.
R2652	3RC30BF390J N16-R-49390-751	RESISTOR, fixed, composition: 39 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF390J; Allen-Bradley part No. RC30BF390J; RFL part No. H-1009-268.	Cathode bias resistor for V2605B.
R2653	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V2605.
R2654	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: Same as R113.	Grid leak resistor for V2606A.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R2655	3RC30BF472J N16-R-50128-751	RESISTOR, fixed, composition: 4,700 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF472J; Allen-Bradley part No. RC30BF472J; RFL part No. H-1009-248.	Cathode bias resistor for V2606A.
R2656	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V2606A.
R2657	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Grid leak resistor for V2606B.
R2658	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias and feedback resistor for V2606B.
R2659	3RC30BF303J N16-R-50407-751	RESISTOR, fixed, composition: 30,000 ohms, $\pm 5\%$; 1 w; govt spec JAN-R-11, type RC30BF303J; Allen-Bradley part No. RC30BF303J; RFL part No. H-1009-338.	Plate feedback resistor for V2606B.
R2660	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2613.
R2661	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2614.
R2662	3RC30BF223K N16-R-50373-231	RESISTOR, fixed, composition: Same as R1336.	Voltage dividing resistor for B+ power supply.
R2663	3RC30BF152K N16-R-49968-231	RESISTOR, fixed, composition: 1,500 ohms, $\pm 10\%$; 1 w; govt spec JAN-R-11, type RC30BF152K; Allen-Bradley part No. RC30BF152K; RFL part No. H-1009-328.	Voltage dividing resistor for B+ power supply.
R2664	3RW27611 N16-R-66186-9541	RESISTOR, fixed, wire wound: 3500 ohms, $\pm 5\%$; 12 w; govt spec JAN-R-26A, type RW32F352; Ward Leonard part No. RW32F352; RFL part No. H-1100-136.	Voltage dividing resistor for B+ power supply.
R2665	3RC42BF224K For replacement use N16-R-50715-509	RESISTOR, fixed, composition: 220,000 ohms, $\pm 10\%$; 2 w; govt spec JAN-R-11, type RC42BF224K; Allen-Bradley part No. RC42BF224K; RFL part No. H-1009-321.	Bleeder resistor for B+ power supply.
R2666	3RU12805 N16-R-68296-7675	RESISTOR, fixed, wire wound: Same as R121.	Voltage dropping resistor for E2601.
R2667	3RC30BF101K N16-R-49581-231	RESISTOR, fixed, composition: Same as R1322.	Oscillation suppressor for V2604B.

R2668	3Z7499-1.20 N16-R-88342-5555	RESISTOR, variable, composition: 1 megohm, ±20%; 2 w; 3 term; phenolic body, metal case, 1-1/16" diam x 1-3/16" lg; standard A taper; shaft round, metal, screwdriver-slot, 1/4" diam, 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact insulated, no OFF position; mtd by bushing; Allen-Bradley part No. JLU1052 w/shaft bushing No. SD4040L, lockwasher No. M2898, locking nut No. B-13750, and mtg nut No. M-2786; RFL part No. HA-4504.	Gain control on 3400 cycle amplifier.
R2669	2Z394.125 N16-A-98521-3474	ATTENUATOR: variable, resistive type "T", 600 ohms input and 600 ohms output impedance; 0 to 40 db range, ±5%, 20 steps; 2-3/8" diam x 3" d o/a; 6 term; two 8-32 thd tapped mtg holes 1-1/2" apart on front; linear attenuation taper, 2 db per step; Daven Co. part No. T-257-G; RFL part No. HA-4934.	Adjusts level of output signal.
S2601	3Z9863-52K.1 N17-S-72828-2605	SWITCH, toggle: Same as S103.	Power ON-OFF switch.
S2602	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	115 V - 230 V switch.
T2601	2Z9634.150 N16ET-052374-2601	TRANSFORMER, audio frequency: modulation type; upright case, aluminum, 3 mu-metal core; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; zero dbm max audio operating level #1 core 100 to 1, #2 core, 3.1 to 1, #3 core 3.1 to 1; used in conjunction with 1N71 crystal diode as ring modulator to modulate signals in freq range of 382.5 cyc to 1657.5 cyc w/ 3400 cyc signal, the output being in the freq range of 1742.5 to 3017.5 cyc, not tuned; 8 solder lug term; four #8-32 x 1/4" lg thd mtg studs located on 1-11/16" x 2-1/16" ctr; wax impregnated, not shielded; RFL part No. HA-5459.	Modulation transformer.
T2602	2Z9636.177 N16ET-052374-2602	TRANSFORMER, audio frequency: 600 ohms prim, 50, 000 ohms sec'd; 1000 v RMS test v; upright case, steel; 2" lg x 2" wd x 3-1/8" h o/a; 1 to 9 ratio of turns, primary to sec'd; +1/2 db from 300 to 3500 cyc; 5 solder lug type term; 4 mtg studs #6-32 thd x 3/8" lg on 1-1/4" 1-5/8" mtg ctr; zero dbm max signal; govt spec data MIL-T-27, Grade I, Class A; Magnetic Winding Co. part No. 155-42R; RFL part No. HB-5235.	Matches Z2503 to V2605A.
T2603	2Z9632.786 N16ET-052374-0102	TRANSFORMER, audio frequency: Same as T102.	Matches V2606B to R2669.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
T2604	2Z9621B-65 N16ET-052374-2604	TRANSFORMER, power, step-down and step-up: hermetically sealed, steel; 115/230 v AC, 50-60 cyc; single phase; 3 output windings, #1 secd 6.3 v 3.0 amp, #2 secd 5.0 v 2.2 amp, #3 secd 800 v 0.60 amp, #3 secd CT; 3000 v RMS ins; 3-15/16" lg x 3-25/64" wd x 4-7/16" h dim; 12 term solder lug type; four #10-32 thd studs on 3" x 2-7/16" mtg/c; internal shielding; govt spec MIL-T-27; Magnetic Winding Co. part No. 155-30R; RFL part No. HB-4894.	Power transformer.
V2601	2J12AU7 N16-T-58241	TUBE, electron: Same as V101.	102 kc oscillator.
V2602	2J12AX7 N16-T-58241-60	TUBE, electron: Same as V1302.	V2602A: 20.4 kc phase shift oscillator. V2602B: 3400 cyc phase shift oscillator.
V2603	2J12AU7 N16-T-58241	TUBE, electron: Same as V101.	V2603A: 3400 cyc carrier frequency amplifier. V2603B: 85 cyc amplifier.
V2604	2J12AX7 N16-T-58241-60	TUBE, electron: Same as V1302.	V2604A: 425 cyc phase shift oscillator. V2604B: 85 cyc phase shift oscillator.
V2605	2J12AX7 N16-T-58241-60	TUBE, electron: Same as V1302.	V2605A: Converter signal input amplifier. V2605B: Normal and converted signal amplifier.
V2606	2J12AU7 N16-T-58241	TUBE, electron: Same as V101.	Normal and converted signal amplifier.
V2607	2J5Y3GT For replacement use N16-T-55738-5	TUBE, electron: Same as V105.	Full-wave rectifier.
V2608	2JOB2 For replacement use N16-T-52001-8	TUBE, electron: Same as V107.	Voltage regulator.

V2609	2JOB2 For replacement use N16-T-52001-8	TUBE, electron: Same as V107.	Voltage regulator.
W2601	3E4000.138 *Assemble from component parts	CABLE ASSEMBLY, power, electrical: Same as W101.	AC input cable assembly.
W2602	3E4002.95 N16EW-052374-0102	CABLE ASSEMBLY, special purpose, electrical: Same as W102.	Input and output signal cable.
X2601	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2601.
X2602	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2602.
X2603	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2603.
X2604	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2604.
X2605	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2605.
X2606	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for V2606.
X2607	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for V2607.
X2608	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V2608.
X2609	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for V2609.
X2610	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for CR2601.
X2611	2Z8761-28 N16-S-54698-8195	SOCKET, crystal: cont 5/32" diam, 3 holes, two spaced 1/2" c to c and one spaced 7/8" from c to c line of two holes; medium size; oval shape; 2-11/32" lg x 1-3/8" wd x 5/16" h o/a; ceramic body; one piece saddle mtg; Electronic Mechanics part No. ETS-3; RFL part No. HA-4944.	Socket for Y2601.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
Y2601	2X200A-102 N16EY-052374-2601	CRYSTAL UNIT, quartz: 1 crystal plate; 102.00 kc nominal freq of plate; body rectangular shape, molded phenolic, 1-19/32" lg x 1-3/16" wd x 2-1/8" h; govt spec MIL-C-3098, type CR-16/U; Billey Electric Co. part No. CR-16/U; RFL part No. HA-4936.	Stabilizer 102 kc oscillator.
Z2601	3Z1892-72.24 N16EZ-052374-2601	FILTER, band-pass: 3400 cyc operating freq, 3350 cyc to 3450 cyc band-width; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; rectangular, metal case; four #8-32 x 1/4" lg mtg studs on 1-11/16" x 2-1/16" ctr; 8 term, solder lug type; term 5 and 6 are connected to a 1.0 hy coil; RFL part No. HA-5460.	Filters 3400 cycle oscillator frequency.
Z2602	3Z1894-32 N16EZ-052374-2602	FILTER, band-pass: 85 cyc oper freq, 80 cyc to 90 cyc; 2-13/16" lg x 2-5/16" wd x 3-1/4" h o/a; case rectangular metal; four #8-32 threaded studs 1/4" lg on 1-11/16" x 2-1/16" ctr; 8 solder lug term located on bottom; RFL part No. HA-5461.	Filters 85 cycle oscillator frequency.
Z2603	3Z1892-72.25 N16EZ-052374-2603	FILTER, band-pass: 1742.5 to 3017.5 cyc band-width, 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; rectangular, metal case, mtd by four #6-32 tapped holes on 3-1/2" x 1-7/8" ctr; 4 term, solder lug type; attenuation constant 13 db over band-pass region; output at 3400 cyc down 40 db and output at 1657.5 cyc down 20 db; Burnell Co. part No. S-8529; RFL part No. HC-4904.	Filters converted input signal.
2700 to 2799	#F16C-99999-0011	CONVERTER, Frequency, Electronic, CV-244/FCC-3: 1742.5 to 2935.5 cyc input freq range, 382.5 to 1657.5 cyc output freq range, 600 ohms input impedance and 600 ohms output impedance; one ON-OFF switch, one OUTPUT LEVEL control; 115/230v AC, 50-60 cyc, single phase; input circuit is suitable for oper from a device having a 600 ohm impedance, variable output level, output suitable for connection to 8 rec inputs, electrical power cable assem and special purpose electrical cable assem supplied; RFL No. HB-4861; provides means for lowering 8 channels in the freq spectrum of 1742.5 to 3017.5 cyc to a freq spectrum of 382.5 to 1657.5 cyc; U.S. Navy CV-244/FCC-3; govt spec MIL-T-15294A(Ships); RFL HB-4861.	Converts 8 high frequency telegraph channels to low frequency.
C2701	3DA10-382 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples grid to plate of V2701A.

* This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned into the activity from which the replacement is received.

C2702	3K301132 For replacement use N16-C-31190-8294	CAPACITOR, fixed, mica dielectric: Same as C2602.	Couples plate of V2701A to grid of V2701B.
C2703	3K2010021 For replacement use N16-C-26025-8276	CAPACITOR, fixed, mica dielectric: Same as C2603.	Couples plate of V2701A to grid of V2702A.
C2704	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2702A.
C2705	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2702A.
C2706	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2702A.
C2707	3K2075032 N16-C-28130-9801	CAPACITOR, fixed, mica dielectric: Same as C2604.	Feedback capacitor for V2702A.
C2708	3K2051032 N16-C-27656-2601	CAPACITOR, fixed, mica dielectric: Same as C2608.	Couples plate of V2702A to grid of V2702B.
C2709	3K2051132 For replacement use N16-C-30188-5006	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2702B.
C2710	3K2051132 For replacement use N16-C-30188-5006	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2702B.
C2711	3K2051132 For replacement use N16-C-30188-5006	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2702B.
C2712	3K2051132 For replacement use N16-C-30188-5006	CAPACITOR, fixed, mica dielectric: Same as C2609.	Feedback capacitor for V2702B.
C2713	3DA100-534 N16-C-45777-2863	CAPACITOR, fixed, paper dielectric: Same as C2613.	Blocking capacitor for J2701.
C2714	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Plate decoupling capacitor.
C2715	3DA100-534 N16-C-45777-2863	CAPACITOR, fixed, paper dielectric: Same as C2613.	Couples plate of V2704A to cathode V2704B.
C2716	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples grid of V2704A to plate of V2704B.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
C2717	3K330292 For replacement use N16-C-32193-2494	CAPACITOR, fixed, mica dielectric: Same as C2629.	Filter capacitor for carrier frequency input to T2703.
C2718	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V2705A to grid of V2705B.
C2719	3DA10-392 N16-C-42736-8356	CAPACITOR, fixed, paper dielectric: Same as C104.	Couples plate of V2705B to grid of V2703B.
C2720	3DB1-215 For replacement use N16-C-48817-2795	CAPACITOR, fixed, paper dielectric: Same as C107.	Blocking capacitor for feed-back to cathode of V2705B.
C2721	3DA50-515 For replacement use N16-C-53010-6139	CAPACITOR, fixed, paper dielectric: Same as C2634.	RF filter for signal output from T2705.
C2722	3DA100-876 For replacement use N16-C-53201-3990	CAPACITOR, fixed, paper dielectric: Same as C2635.	AC power input filter.
C2723	3DB10-263 N16-C-21578-6268	CAPACITOR, fixed, electrolytic: Same as C1306.	B+ power supply filter.
C2724	3DB25-88 For replacement use N16-C-19793-8136	CAPACITOR, fixed, electrolytic: Same as C122.	B+ power supply filter.
CR2701	2Z3565-18 N16EC-052374-2601-9	CRYSTAL UNIT, rectifying: Same as CR2601.	Ring Modulator.
E2701	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.
E2702	2Z5888-5 For replacement use G17-L-6806-130	LAMP, glow: Same as E101.	Neon lamp; indicates blown fuse.
E2703	2Z5927 For replacement use G17-L-6345	LAMP, incandescent: Same as E103.	Pilot lamp; indicates presence of line voltage.

E2704	3Z3282-42.9 For replacement use N17-F-74287-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F2701.
E2705	3Z3282-42.9 For replacement use N17-F-74287-5075	FUSEHOLDER: Same as E104.	Holds AC line fuse F2702.
E2706	3Z2876-6.2 *	FUSEHOLDER: Same as E106.	Spare fuseholder.
E2707	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2701.
E2708	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2702.
E2709	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2703.
E2710	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2704.
E2711	2Z8304.275 N16-S-34576-6514	SHIELD, electron tube: Same as E110.	Shield for V2705.
E2712	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V2707.
E2713	2Z8304.277 N16-S-34607-6039	SHIELD, electron tube: Same as E112.	Shield for V2708.
E2714	2Z9410.83 For replacement use N17-B-77939-3236	TERMINAL BOARD: Same as E115.	Input and output signal termination block.
E2715	3Z770-24.79 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 6.875" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HB-5313.	Mounts component parts.
E2716	3Z770-24.80 *Shop mfr. locally	TERMINAL BOARD: laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 6.875" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HB-5316.	Mounts component parts.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
E2717	3Z770-24.81 *Shop mfr. locally	TERMINAL BOARD; laminated phenolic; incl 24 solder lug term; w/o barriers; 7-1/4" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 6.875" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HB-5319.	Mounts component parts.
E2718	3Z770-18.83 *Shop mfr. locally	TERMINAL BOARD; laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00" x 5.625" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HA-5304.	Mounts component parts.
E2719	3Z770-18.84 *Shop mfr. locally	TERMINAL BOARD; laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 5.625" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HA-5307.	Mounts component parts.
E2720	3Z770-18.85 *Shop mfr. locally	TERMINAL BOARD; laminated phenolic; incl 18 solder lug term; w/o barriers; 6" lg x 1-1/2" wd x 29/64" h o/a; four 0.156" diam mtg holes 1.00 x 5.625 mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HA-5310.	Mounts component parts.
E2721	3Z770-6.176 *Shop mfr. locally	TERMINAL BOARD; laminated phenolic; incl 6 solder lug term; w/o barriers; 2-1/8" lg x 1-7/8" wd x 29/64" h o/a; two 0.156" diam mtg holes on 1-3/4" mtg ctr; marked w/symbol designations; moisture and fungus proofed; RFL part No. HA-5322.	Mounts component parts.
E2722	3Z12072-53.1 N16-T-28218-4116	STUD, terminal: Same as E116.	Mounts component parts.
F2701	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.
F2702	3Z2603.2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	AC line fuse.

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F2703	3Z2603. 2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
F2704	3Z2603. 2 For replacement use G17-F-16302-120	FUSE, cartridge: Same as F101.	Spare AC line fuse.
H2701	2Z2636-287 N17-C-781444-604	CLAMP, electrical: Same as H101.	Clamp cable W2702 to connector P2703.
H2702	*Shop mfr. locally	CLAMP, electrical: Same as H102.	Clamp for switch S2702.
H2703	*Shop mfr. locally	CLAMP, electrical: Same as H103.	Clamps cable W2702 to E2714.
H2704	6L890-. 5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2705	6L890-. 5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2706	6L890-. 5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2707	6L890-. 5 *Shop mfr. locally	BOLT, thumb: Same as H104.	Secures front panel to cabinet.
H2708	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2709	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2710	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2711	2Z7779-10 *Shop mfr. locally	RETAINER, bolt: Same as H108.	Secures thumb bolt to front panel.
H2712	N16EH-052374-0112	SLIDE, left: Same as H112.	Supporting member on chassis for slides.
H2713	N16EH-052374-0113	SLIDE, right: Same as H113.	Supporting member on chassis for slides.
H2714	N16EH-052374-0114	SLIDE MOUNTING PLATE, left: Same as H114.	Supporting member on cabinet for slides.

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REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
H2715	N16EH-052374-0115	SLIDE MOUNTING PLATE, right: Same as H115.	Supporting member on cabinet for slides.
I2701	For reference only	LIGHT, indicator: Same as I101.	
I2701A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2701.	Lamp assembly for E2702.
I2701B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2701.	Lens for I2701A.
I2702	For reference only	LIGHT, indicator: Same as I101.	
I2702A	2Z5991-365 Procure on demand	LIGHT, indicator: Same as I101A; p/o I2702.	Lamp assembly for E2703.
I2702B	2Z6125-253	LENS, indicator light: Same as I101B; p/o I2702.	Lens for I2702A.
I2703	*	LIGHT, indicator: Same as I103.	
I2703A	2Z5991-366 Procure on demand	LIGHT, indicator: Same as I103A; p/o I2703.	Lamp assembly for E2701.
I2703B	2Z5891-13 N16EI-052374-0103-2	LENS, Indicator light: Same as I103B; p/o I2703.	Lens for I2703A.
J2701	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	3400 cyc TEST jack.
J2702	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	3400 cyc TEST jack.
J2703	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT NORM-LINE jack.
J2704	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT NORM-LINE jack.
J2705	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT NORM-EQUIP jack.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

J2706	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT NORM-EQUIP jack.
J2707	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	OUT NORM-MONITOR jack.
J2708	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	OUT NORM-MONITOR jack.
J2709	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	IN - LINE jack.
J2710	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	IN - LINE jack.
J2711	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	IN - EQUIP jack.
J2712	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	IN - EQUIP jack.
J2713	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT CONV - LINE jack.
J2714	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT CONV - LINE jack.
J2715	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT CONV - EQUIP jack.
J2716	2Z5524 N16EJ-052374-0104	JACK, telephone: Same as J104.	OUT CONV - EQUIP jack.
J2717	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	OUT CONV - MONITOR jack.
J2718	2Z5598A-86 N17-J-39263-9677	JACK, telephone: Same as J108.	OUT CONV - MONITOR jack.
J2719	6Z8364 N17-C-73446-3401	CONNECTOR, receptacle: Same as J111.	AC input power connector.
J2720	2Z8799-130 N17-C-72692-6265	CONNECTOR, receptacle: Same as J110.	Input and output signal connector.
L2701	3C323-50F N16-C-75528-9470	CHOKE, radio frequency: Same as L2601.	RF filter choke.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
L2702	3C323-50F N16-C-75528-9470	CHOKE, radio frequency: Same as L2601.	RF filter choke.
L2703	3C559 N16-R-29236-8989	REACTOR: Same as L101.	B+ power supply filter choke.
O2701	2Z1619-79 N16-R-503580-311	RETAINER, electron tube: Same as O101.	Clamp for V2706.
O2702	3Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P2703.
O2703	3Z1029-22 Shop mfr. locally	CLIP, electrical: Same as O104.	Clip for plug P2703.
O2704	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2705	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2706	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2707	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2708	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2709	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2710	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
O2711	2Z8063-43 N16EO-052374-0106	ROLLER: Same as O106.	Roller for chassis slide.
P2701	2Z7226-187 N17-C-70356-6264	CONNECTOR, plug: Same as P101.	Input and output signal connector.

P2702	6Z1734 N17-C-71426-7829	CONNECTOR, plug: Same as P102.	AC power input connector.
P2703	6Z7588-1 N17-C-71126-4859	CONNECTOR, plug: Same as P103.	AC power input connector.
R2701	3RC30BF472K N16-R-50130-231	RESISTOR, fixed, composition: Same as R120.	Voltage dropping resistor for grid of V2701A.
R2702	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Cathode bias resistor for V2701A.
R2703	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Cathode bias resistor for V2701B.
R2704	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Plate load resistor for V2701B.
R2705	3RC30BF513J N16-R-50497-751	RESISTOR, fixed, composition: Same as R2605.	Plate load resistor for V2701A.
R2706	3RC30BF154J N16-R-50632-751	RESISTOR, fixed, composition: Same as R2606.	Component of phase shift network for V2702A.
R2707	3Z7498-25.55 N16-R-88079-4360	RESISTOR, variable, composition: Same as R2607.	Component of phase shift network for V2702A.
R2708	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702A.
R2709	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702A.
R2710	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702A.
R2711	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias resistor for V2702B.
R2712	3RC30BF154J N16-R-50677-751	RESISTOR, fixed, composition: Same as R2612.	Component of phase shift network for V2702B.
R2713	3Z7498-25.55 N16-R-88079-4360	RESISTOR, variable, composition: Same as R2607.	Component of phase shift network for V2702B.
R2714	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702B.
R2715	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702B.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R2716	3RC30BF244J N16-R-50722-751	RESISTOR, fixed, composition: Same as R2608.	Component of phase shift network for V2702B.
R2717	3RC30BF105J N16-R-50974-751	RESISTOR, fixed, composition: Same as R2617.	Limiting resistor for grid of V2703A.
R2718	3RC30BF332K N16-R-50087-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias resistor for V2703A.
R2719	3RC30BF473K N16-R-50481-231	RESISTOR, fixed, composition: Same as R112.	Plate load for V2703A.
R2720	3RC30BF103K N16-R-50283-231	RESISTOR, fixed, composition: Same as R115.	Voltage dropping resistor for V2701.
R2721	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2707.
R2722	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2708.
R2723	3RC30BF304J N16-R-50749-751	RESISTOR, fixed, composition: 300,000 ohms, +5%; 1 w; 19/32" lg. x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF304J; Allen-Bradley part No. RC30BF304J; RFL part No. H-1009-324.	Plate load resistor for V2704A.
R2724	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias resistor for V2704A.
R2725	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Grid leak resistor for V2704A.
R2726	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V2704B.
R2727	3RC30BF332K N16-R-50087-231	RESISTOR, fixed, composition: Same as R119.	Cathode bias resistor for V2704B.
R2728	3Z7480-105 For replacement use N16-R-88009-4525	RESISTOR, variable, composition: Same as R1318.	Grid signal level potentiometer for V2704B.

R2729	3RC30BF391J N16-R-49696-751	RESISTOR, fixed, composition: 300 ohms, +5%; 1 w; 19/32" lg x 7/32" diam excl term; Insul; govt spec JAN-R-11, type No. RC30BF301J; Allen-Bradley part No. RC30BF301J; RFL part No. H-1009-265.	Component of 600 ohm T-pad.
R2730	3RC30BF391J N16-R-49696-751	RESISTOR, fixed, composition: Same as R2729.	Component of 600 ohm T-pad.
R2731	3RC30BF391J N16-R-49732-751	RESISTOR, fixed, composition: 390 ohms, +5%; 1 w; 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF391J; Allen-Bradley part No. RC30BF391J; RFL part No. H-1009-323.	Component of 600 ohm T-pad.
R2732	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: Same as R2644.	Component of 600 ohm T-pad.
R2733	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: Same as R2644.	Component of 600 ohm T-pad.
R2734	3RC30BF821J N16-R-49876-751	RESISTOR, fixed, composition: Same as R2646.	Component of 600 ohm T-pad.
R2735	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: Same as R2644.	Component of 600 ohm T-pad.
R2736	3RC30BF181J N16-R-49642-751	RESISTOR, fixed, composition: Same as R2644.	Component of 600 ohm T-pad.
R2737	3RC30BF821J N16-R-49876-751	RESISTOR, fixed, composition: Same as R2646.	Component of 600 ohm T-pad.
R2738	3Z7450-87 N16-R-87849-4590	RESISTOR, variable, composition: Same as R1333.	Grid signal level potentiometer for V2705A.
R2739	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias resistor for V2705A.
R2740	3RC30BF101J N16-R-49579-751	RESISTOR, fixed, composition: 100 ohms, +5%; 1 w; 19/32" lg x 7/32" excl term; govt spec JAN-R-11, type No. RC30BF101J; Allen-Bradley part No. RC30BF101J; RFL part No. H-1009-182.	Cathode bias resistor for V2705A.
R2741	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V2705A.
R2742	3RC30BF474K N16-R-50823-231	RESISTOR, fixed, composition: Same as R113.	Grid leak resistor for V2705B.
R2743	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias resistor for V2705B.

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
R2744	3RC30BF104K N16-R-50634-231	RESISTOR, fixed, composition: Same as R102.	Plate load for V2705B.
R2745	3RC30BF224K N16-R-50715-231	RESISTOR, fixed, composition: Same as R107.	Grid leak resistor for V2703B.
R2746	3RC30BF102J N16-R-49921-751	RESISTOR, fixed, composition: Same as R2611.	Cathode bias and feedback resistor for V2703B.
R2747	3RC30BF183J N16-R-50353-751	RESISTOR, fixed, composition: 18,000 ohms, $\pm 5\%$; 1 w; 19/32" lg x 7/32" diam excl term; govt spec JAN-R-11, type No. RC30BF183J; Allen-Bradley part No. RC30BF183J; RFL part No. H-1009-340.	Feedback resistor for plate of V2703B to V2705B.
R2748	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2717.
R2749	3RC30BF222K N16-R-50013-231	RESISTOR, fixed, composition: Same as R108.	Isolating resistor for J2718.
R2750	3RU12805 N16-R-68296-7675	RESISTOR, fixed, wire wound: Same as R121.	Voltage dropping resistor for E2703.
R2751	3RW25522 N16-R-66085-3766	RESISTOR, fixed, wire wound: Inductive winding: 1600 ohms, $\pm 5\%$; 10 w; govt spec JAN-R-26A, type No. RW31F162; Ward Leonard part No. RW31F162; RFL part No. H-1100-142.	Voltage dividing resistor for B+ power supply.
R2752	3RC30BF223K N16-R-50373-231	RESISTOR, fixed, composition: Same as R1336.	Voltage dividing resistor for B+ power supply.
R2753	3RW27611 N16-R-66186-9541	RESISTOR, fixed, wire wound: Same as R2664.	Voltage dividing resistor for B+ power supply.
R2754	3RC42BF224K For replacement use N16-R-50715-509	RESISTOR, fixed, wire wound: Same as R2665.	Bleeder resistor for B+ power supply.
R2755	3Z7499-1.20 N16-R-88342-5555	RESISTOR, variable, composition: Same as R2668.	Signal level potentiometer for V2703A.
R2756	2Z394.125 N16-A-98521-3474	ATTENUATOR, variable: Same as R2669.	Adjusts level of input signal.

S2701	3Z9863-52K.1 N17-S-72828-2605	SWITCH, toggle: Same as S103.	POWER ON-OFF switch.
S2702	3Z9863-52N.1 N17-S-73959-1025	SWITCH, toggle: Same as S101.	115 v - 230 v switch.
T2701	2Z9632.786 N16ET-052374-0102	TRANSFORMER, audio frequency: Same as T102.	Plate to line matching transformer.
T2702	3Z9631.448 N16ET-052374-2702	TRANSFORMER, audio frequency: Input type; 600 ohms primary, 600 ohms secondary; 1000 v RMS test v; case upright, steel; 2" lg x 2" wd x 3-1/8" h o/a; 1 to 1 ratio of turns, primary to secondary; ± 1 db from 300 to 3500 cyc, not tuned; five solder lug term located on bottom; four #6-32 mtg studs 3/8" lg on 1-1/4" x 1-5/8" mtg ctr; Magnetic Winding part No. 155-41R; RFL part No. HB-5234; govt spec MIL-T-27, Grade 1, Class A.	Line isolating transformer.
T2703	2Z9634.150 N16ET-052374-2601	TRANSFORMER, audio frequency: Same as T2601.	Modulation transformer.
T2704	2Z9636.177 N16ET-052374-2602	TRANSFORMER, audio frequency: Same as T2602.	600 ohm to grid matching transformer.
T2705	2Z9632.786 N16ET-052374-0102	TRANSFORMER, audio frequency: Same as T102.	Plate to line matching transformer.
T2706	2Z9621B-65 N16ET-052374-2604	TRANSFORMER, power, step-down and step-up: Same as T2604.	Power transformer.
V2701	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	102 kc oscillator.
V2702	2J12AX7 N16-T-58241-60	ELECTRON TUBE: Same as V1302.	V2702A: 20.4 kc phase shift oscillator. V2702B: 3400 cyc phase shift oscillator.
V2703	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	V2703A: 3400 cyc carrier amplifier. V2703B: Output converted signal amplifier.
V2704	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	Normal signal amplifier.
V2705	2J12AU7 N16-T-58241	ELECTRON TUBE: Same as V101.	V2705A: Converted signal amplifier. V2705B: Converted signal amplifier.

TABLE 8-2, CONT'D

REFERENCE DESIG.	STOCK NO. SIGNAL CORPS, STANDARD NAVY, AIR FORCE	NAME AND DESCRIPTION	LOCATING FUNCTION
V2706	2J5Y3GT For replacement use N16-T-55738-5	ELECTRON TUBE: Same as V105.	Full-wave rectifier.
V2707	2J0B2 For replacement use N16-T-52001-8	ELECTRON TUBE: Same as V107.	Voltage regulator.
V2708	2J0B2 For replacement use N16-T-52001-8	ELECTRON TUBE: Same as V107.	Voltage regulator.
W2701	3E4000.138 * Assemble from component parts	CABLE ASSEMBLY, power, electrical: Same as W101.	AC power input cable.
W2702	N16EW-052374-0102	CABLE ASSEMBLY, special purpose, electrical: Same as W102.	Input and output signal cable.
X2701	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V2701.
X2702	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V2702.
X2703	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V2703.
X2704	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V2704.
X2705	2Z8679.30 N16-S-64063-6713	SOCKET, electron tube: Same as X101.	Socket for tube V2705.
X2706	2Z8678.326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for tube V2706.
X2707	2Z8677.94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for tube V2707.

* Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

X2708	2Z8677-94 N16-S-62603-6699	SOCKET, electron tube: Same as X102.	Socket for tube Y2708.
X2709	2Z8678-326 N16-S-63515-4158	SOCKET, electron tube: Same as X105.	Socket for CR2701.
X2710	2Z8761-28 N16-S-54698-8195	SOCKET, crystal: Same as X2611.	Socket for Y2701.
Y2701	2X200A-102 N16EY-052374-2601	CRYSTAL UNIT, quartz: Same as Y2601.	Stabilizes 102 kc oscillator.
Z2701	3Z1892-72-24 N16EZ-052374-2601	FILTER, band-pass: Same as Z2601.	Filter 3400 cyc oscillator frequency.
Z2702	3Z1892-72-25 N16EZ-052374-2602	FILTER, band-pass: Same as Z2603.	Filters input signals to be converted.
Z2703	3Z1892-72-26 N16EZ-052374-2703	FILTER, band-pass: 300 to 1657.5 cyc band-width; 600 ohms input, 600 ohms output; 4-15/16" lg x 2-9/16" wd x 2-9/16" h o/a; rectangular metal case; four solder lug term; mtd by 4 tapped holes; Burnell & Co. part No. S-8528; RFL part No. HC-4905.	Filters output converted signals.

TABLE 8-3. MAINTENANCE PARTS KIT

KEY DESIGNATION	QUANTITY
B2501	1
CR2601	4
J101	1
L101	2
L102	1
L103	2
R1349	1
T102	1
T103	1
T104	1
T1302	1
T2501	1
T2601	1
T2602	1
T2604	1
T2702	1
Y2601	1

NOTE:

The spare parts for the Telegraph Carrier Terminal AN/FCC-3 (modified) consists of items 3, 4, 5, 6, 7, 8, 9, 10, and 11.

The spare parts for the Telegraph Carrier Terminal AN/FCC-7 consists of all items listed for the AN/FCC-3.

The spare parts for the Telegraph Carrier Terminal AN/FCC-8 consists of items 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

TABLE 8-4. CROSS REFERENCE PARTS LIST

JAN (OR AWS) DESIGNATION	REF. DESIG.	JAN (OR AWS) DESIGNATION	REF. DESIG.	JAN (OR AWS) DESIGNATION	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.
CN35A602K	C101	CE41F100R	C1313	RC30BF222J	R2648	N17-F-74267-5075	E104	N16-R-68296-7675	R121
CM35D392K	C102	TS102U02	E1311	RC30BF511J	R2649	N16-S-34520-3864	E109	N16-R-66251-4116	R122
CN35A103K	C104	RC30BF102K	R1316	RC30BF390J	R2652	N16-S-34576-6814	E110	N16-R-66233-1321	R123
CN35E203K	C105	RC30BF101K	R1322	RC30BF472J	R2655	N16-S-34607-6039	E112	N16-R-66167-8988	R124
CP69B1FF105K	C107	RC30BF334K	R1329	RC30BF303J	R2659	N17-B-77939-3236	E115	N17-S-73959-1025	S101
CM20C101J	C108	RC42BF473K	R1330	RC30BF152K	R2663	N16-T-28218-4116	E116	N16ES-052374-0102	S102
CM20D301J	C109	RC30BF683K	R1334	RW32F352	R2664	G17-F-16302-120	F101	N17-S-72828-2605	S103
CM20D391J	C110	RC30BF223K	R1336	RC42BF224K	R2665	N17-C-781444-640	H101	N16ES-052374-0105	S105
CM20D201J	C111	RW31F102	R1341	RC30BF301J	R2729	N16EH-052374-0112	H112	N16ET-052374-0101	T101
CE41C500K	C121	RW31F182	R1346	RC30BF391J	R2731	N16EH-052374-0113	H113	N16ET-052374-0102	T102
CE41F2504	C122	RU4B1R0K	R1349	RC30BF101J	R2740	N16EH-052374-0114	H114	N16ET-052374-0103	T103
CP54B4EF104L	C123	RW29F252	R1353	RC30BF183J	R2747	N16EH-052374-0115	H115	N16ET-052374-0104	T104
TS102U01	E109	6A U6	V1301	RW31F162	R2751	N17-L-250035-323	I101B	N16-T-58241	V101
TS103U02	E110	12AX7	V1302			N17-L-76656-2439	I103A	N16-T-75726	V102
TS102U03	E112	6C4	V1303			N16EF0523740103-2	I103B	N16-T-55738-5	V105
RC30BF104K	R102	6J6	V1305			N17-J-39266-8947	J101	N16-T-52001-8	V107
RC42BF103K	R103	6Y6G	V1307	AN-3102A-181-P	J110	N16EJ-052374-0103	J103	N16EW-052374-0102	W102
RC30BF561K	R105	6X4W	V1312	AN-3106A-18-1S	P101	N16EJ-052374-0104	J104	N16-S-64063-6713	X101
RC30BF224K	R107	0A2	V1315	AN-3057-10	W102	N17-J-39263-9877	J108	N16-S-62603-6699	X102
RC30BF222K	R108	CM35C112J	C2602			N17-C-72632-6265	J110	N16-S-63515-4158	X105
RC30BF184K	R111	CM20A100K	C2603			N17-C-73446-3401	J111	N16-F-32037-8201	Z101
RC30BF473K	R112	CM20C750J	C2604			N16-R-29236-8989	L101	F16T-99999-0006	200 to
RC30BF474K	R113	CM20C510J	C2608			N16-R-29910-3001	L102	N16ET-052374-0201	299
RC30BF333K	R114	CM20C511J	C2609			N16-C-75078-2189	L103	N16EZ-052374-0201	T201
RC30BF103K	R115	CP69B1EF104K	C2613			N16-R-503580-311	O101	N16Z-052374-0201	Z201
RC30BF154K	R116	CM35C152J	C2615			N16EO-052374-0103	O103	F16T-99999-0007	300 to
RC30BF332K	R119	CM20C151J	C2619			N16EO-052374-0106	O106		399
RC30BF472K	R120	CM35C682J	C2620			N17-C-70356-6284	P101	N16ET-052374-0301	T301
RU4B4R7K	R121	CM35C562J	C2621			N17-C-71426-7829	P102	N16EZ-052374-0301	Z301
RW33F502	R122	CP54B1EF503V	C2628			N17-C-71126-4859	P103	F16T-99999-0008	400 to
RW33F452	R123	CM35C302J	C2629			N16-R-91033-7148	R101		499
RW32F312	R124	CP54B4FF503L	C2634			N16-R-50634-231	R102	N16ET-052374-0401	T401
RW30G901	R125	CP55B4FF104L	C2635			N16-C-32430-6270	R103	N16EZ-052374-0401	Z401
RW30G561	R126	RC30BF513J	R2605			N16-C-42736-8356	R104	F16T-99999-0009	500 to
ST52N	S101	RC30BF104J	R2606			N16-C-43112-6730	R105		599
ST52K	S103	RC30BF244J	R2608			N16-C-48817-2795	R107	N16ET-052374-0501	T501
12AU7	V101	RC30BF102J	R2611			N16-C-28553-1201	R108	N16EZ-052374-0501	Z501
6AL5W	V102	RC30BF154J	R2612			N16-C-29660-9006	R109	F16T-99999-0010	600 to
5Y3GT	V105	RC30BF105J	R2617			N16-C-29898-3606	C109		699
CB2	V107	RC30BF475K	R2621			N16-C-29285-3006	C111	N16ET-052374-0601	T601
TS103P01	X101	RC30BF151J	R2635			N16-C-21887-9621	C118	N16EZ-052374-0601	Z601
TS102P01	X102	RC30BF155J	R2636			N16-C-19964-7896	C121	F16T-99999-0011	T701
TS101P02	X105	RC30BF431J	R2641			N16-C-19793-8136	C122	N16ET-052374-0701	T701
CE63C200J	C1301	RC30BF221J	R2643			N16-C-53204-4120	E101	N16EZ-052374-0701	Z701
CE42C100Q	C1306	RC30BF181J	R2644			G17-L-6806-130	E103		
CP69B1EF503K	C1311	RC30BF821J	R2646			G17-L-6345	E103		

TABLE 8-4, CONT'D

STANDARD NAVY STOCK NO.	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.	STANDARD NAVY STOCK NO.	REF. DESIG.	NAVY TYPE	REF. DESIG.
F16T-99999-0012	800 to 899	N16ET-052374-1302	T1302	N16ET-052374-2301	2399	N16-R-50974-751	R2617	T-372/FCC-3	200 to 299		
N16ET-052374-0801	T801	N16-T-56203-53	V1301	N16EZ-052374-2301	T2301	N16-R-51174-231	R2621				
N16EZ-052374-0801	Z801	N16-T-58241-60	V1302	F16R-99999-0018	Z2301	N16-R-50839-751	R2635	T-373/FCC-3	300 to 399		
F16T-99999-0013	900 to 999	N16-T-56214-55	V1303		2400 to 2499	N16-R-51019-751	R2636				
N16ET-052374-0901	T901	N16-T-56360-5	V1305	N16ET-052374-2401	2499	N16-R-49750-751	R2641	T-374/FCC-3	400 to 499		
N16EZ-052374-0901	Z901	N16-T-56916	V1307	N16EZ-052374-2401	T2401	N16-R-49660-751	R2643				
F16T-99999-0014	1000 to 1099	N16-T-52001-3	V1312	F16C-99999-0009	Z2401	N16-R-49642-751	R2644	T-375/FCC-3	500 to 599		
N16ET-052374-1001	T1001	N16EZ-052374-1301	Z1310		2500 to 2599	N16-R-49876-751	R2646				
N16EZ-052374-1001	Z1001	F16R-99999-0008	Z1315	N16EB-052374-2501	B2501	N16-R-50011-751	R2648	T-376/FCC-3	600 to 699		
F16T-99999-0015	1100 to 1199	N16ET-052374-1401	T1401	N17-F-73789-2201	E2507	N16-R-49786-751	R2649				
N16ET-052374-1101	T1101	N16EZ-052374-1401	Z1401	N16EF-052374-2501	F2501	N16-R-87023-8958	R2650	T-377/FCC-3	700 to 799		
N16EZ-052374-1101	Z1101	F16R-99999-0009	Z1500	G17-F-16302-140	F2503	N16-R-49390-751	R2652				
F16T-99999-0016	1200 to 1299	N16ET-052374-1501	Z1501	N17-P-91801-1005	H2509	N16-R-50128-751	R2655	T-378/FCC-3	800 to 899		
N16ET-052374-1201	T1201	F16R-99999-0010	1699	G41-W-2446	H2510	N16-R-50407-751	R2659				
N16EZ-052374-1201	Z1201	N16ET-052374-1501	T1501	G41-W-2451	H2511	N16-R-49968-231	R2663	T-379/FCC-3	900 to 999		
F16R-99999-0007	1300 to 1399	N16EZ-052374-1501	Z1501	N16ES-052374-2501	S2501	N16-R-66186-9541	R2664				
N16-C-19713-8753	C1301	F16R-99999-0011	1799	N16ET-052374-2501	T2501	N16-R-50715-509	R2665	T-380/FCC-3	1000 to 1099		
N16-C-21578-6288	C1306	N16ET-052374-1601	T1601	F16-C-99999-0010	2600 to 2699	N16-A-98521-3474	R2669				
N16-C-44260-6952	C1311	N16EZ-052374-1601	Z1601		C2602	N16ET-052374-2601	T2601	T-381/FCC-3	1100 to 1199		
N16-C-19568-8052	C1313	F16R-99999-0012	1899	N16-C-31190-8294	C2602	N16ET-052374-2602	T2602				
N16-S-34557-8351	E1311	N16ET-052374-1701	T1701	N16-C-26025-8276	C2603	N16ET-052374-2604	T2604	T-382/FCC-3	1200 to 1299		
N16-R-88179-4680	R1315	F16R-99999-0013	1900 to 1999	N16-C-28130-9801	C2604	N16-S-54698-8195	X2611				
N16-R-49923-231	R1316	N16ET-052374-1801	T1801	N16-C-27656-2601	C2608	N16EY-052374-2601	Y2601	R-525/FCC-3	1300 to 1399		
N16-R-88009-4525	R1318	F16R-99999-0013	1900 to 1999	N16-C-30188-5006	C2609	N16EZ-052374-2601	Z2601				
N16-R-49581-231	R1322	N17-T-67101-2040	T1701	N16-C-45777-2863	C2613	N16EZ-052374-2602	Z2602	R-525/FCC-3	O1302		
N16-R-87419-4350	R1325	F16R-99999-0014	2000 to 2099	N16-C-31507-4094	C2615	N16EZ-052374-2603	Z2603				
N16-R-50760-231	R1329	N16ET-052374-2001	T2001	N16-C-32826-3270	C2619	F16-C-99999-0010	2799	R-527/FCC-3	1400 to 1499		
N16-R-50481-461	R1330	F16R-99999-0015	2100 to 2199	N16-C-33063-6870	C2620						
N16-R-87849-4590	R1333	N16ET-052374-2101	T2101	N16-C-44260-7100	C2621	N16-R-50749-751	R2723	R-528/FCC-3	1500 to 1599		
N16-R-50553-231	R1334	N16EZ-052374-2101	Z2101	N16-C-32193-2494	C2628	N16-R-49696-751	R2729				
N16-R-50373-231	R1336	F16R-99999-0015	2200 to 2299	N16-C-53010-6139	C2629	N16-R-49732-751	R2731	R-529/FCC-3	1600 to 1699		
N16-R-66030-1126	R1341	N16ET-052374-2201	T2201	N16-C-53201-3990	C2634	N16-R-49579-751	R2740				
N16-R-66094-5706	R1346	N16EZ-052374-2201	Z2201	N16-C-53201-3990	C2635	N16-R-50353-751	R2747	R-530/FCC-3	1700 to 1799		
N16-R-91294-6975	R1347	F16R-99999-0016	2300 to 2399	N16-T-51771-0000	CR2601	N16-R-66085-3766	R2751				
N16-R-66140-5206	R1349	N16ET-052374-2301	T2301	N17-C-73108-4940	J2621	N16EY-052374-2702	Y2702	R-531/FCC-3	1800 to 1899		
N16-R-66140-5206	R1353	N16EZ-052374-2301	Z2301	N16-C-73108-4851	J2623	N16ET-052374-2703	T2703				
N16ES-052374-1303	S1303	F16R-99999-0017	2300 to 2399	N17-C-75528-9470	L2604			R-532/FCC-3	2000 to 2099		
N16ES-052374-1306	S1306			N16-R-50497-751	R2605						
N17-T-67101-1360	T1301			N16-R-50632-751	R2606			R-533/FCC-3	2100 to 2199		
				N16-R-88079-4360	R2607						
				N16-R-50722-751	R2608			R-534/FCC-3	2200 to 2299		
				N16-R-49921-751	R2611						
				N16-R-50677-751	R2612			R-535/FCC-3	2300 to 2399		

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NAVY TYPE	REF. DESIG.	SIGNAL CORPS STOCK NO.	REF. DESIG.	SIGNAL CORPS STOCK NO.	REF. DESIG.	SIGNAL CORPS STOCK NO.	REF. DESIG.	SIGNAL CORPS STOCK NO.	REF. DESIG.	SIGNAL CORPS STOCK NO.	REF. DESIG.
R-536/FCC-3	2400 to	2Z55891-13	I103B	2Z5726/6AL5W	V102	3RC30BF101K	R1322	3Z1892-72.23	R1322	3Z1892-72.23	Z2401
	2499	2Z5598-72	J101	2Z5Y3GT	V105	3Z7325-17	R1325	3H1938-1	R1325	3H1938-1	E2501
CY-1195/FCC-3	2500 to	2Z5598A-82	J103	2ZJ052	W107	3RC30BF334K	R1329	3Z2879-2	R1329	3Z2879-2	E2501
	2599	2Z5524	J104	3E4000.138	W102	3RC30BF473K	R1330	3Z2630.22	R1330	3Z2630.22	F2503
CV-244/FCC-3	2700 to	2Z5898A-86	J108	3E4002.95	X101	3Z7450-87	R1333	3Z2605	R1333	3Z2605	F2503
	2799	2Z8799-130	J110	2Z8879.30	X101	3RC30BF683K	R1334	2Z2642.910	R1334	2Z2642.910	H2506
		6Z8364	J111	2Z8877.94	X102	3RC30BF223K	R1336	6Z3675-1	R1336	6Z3675-1	H2507
		3C559	L101	2Z8878.326	X105	3RW24336	R1341	6Z3147-3	R1341	6Z3147-3	H2508
		3C559-1	L102	3Z1892-72	T201	3RW25819	R1346	2Z5991-365	R1346	2Z5991-365	I2501A
		3C1081-24B	L103	2Z9836.166	T201	3RP9309	R1347	2Z6125-253	R1347	2Z6125-253	I2501B
		2Z1619-79	O101	3Z1892-72.1	Z301	3RW6319	R1349	2Z5991-665	R1349	2Z5991-665	I2502A
		3Z1029-22	O104	2Z9836.167	T301	3RW26751	R1353	2Z3105-65	R1353	2Z3105-65	J2501
		2Z8063-43	O106	3Z1892-72.2	Z301	3Z9825-58.212	S1303	6Z7811	S1303	6Z7811	J2502
		2Z7226-187	P101	2Z9836.168	T401	3Z9825-146.2	S1306	4T95007	S1306	4T95007	S2501
		6Z1734	P102	3Z1892-72.3	Z401	2Z9843.495	T1302	2Z9621B-61	T1302	2Z9621B-61	T2501
		6Z7568-1	P103	2Z9836.169	T501	2Z9621B-60	V1301	3K2010021	V1301	3K2010021	C2603
		3RP8713	R101	3Z1892-72.4	Z501	2J6AU6	V1302	3K2075032	V1302	3K2075032	C2604
		3RC30BF104K	R102	2Z9836.170	T601	2J12AX7	V1302	3K2051032	V1302	3K2051032	C2608
		3RC42BF103K	R103	2Z1892-72.5	Z601	2J6C4	V1303	3K2051132	V1303	3K2051132	C2609
		3Z7315-19	R104	2Z9836.171	T701	2J6T6	V1305	3K20515232	V1305	3K20515232	C2615
		3RC30BF561K	R105	3Z1892-72.6	Z701	2J6Y6G	V1307	3DA100-534	V1307	3DA100-534	C2619
		3RC30BF224K	R107	2Z9836.172	T801	2J6X4W	V1312	3K3556232	V1312	3K3556232	C2621
		3RC30BF222K	R108	3Z1892-72.7	Z801	2J6A2	V1315	3K2015132	V1315	3K2015132	C2628
		3RC30BF184K	R111	2Z9836.173	T901	2Z9843.496	T1401	3K3530232	T1401	3K3530232	C2629
		3RC30BF473K	R112	3Z1892-72.8	Z901	3Z1892-72.12	T1501	3DA50-477	T1501	3DA50-477	C2634
		3RC30BF474K	R113	2Z9836-174	T1001	3Z1892-72.13	Z1401	3DA50-515	Z1401	3DA50-515	C2635
		3RC30BF333K	R114	2Z9836-175	Z1001	2Z9843.497	T1601	3DA100-876	T1601	3DA100-876	CR2601
		3RC30BF103K	R115	2Z9836.175	T1101	2Z9843-498	T1601	2Z3565-18	T1601	2Z3565-18	E2617
		3RC30BF154K	R116	3Z1892-72.10	Z1101	3Z1892-72.15	T1701	3Z770-24.74	T1701	3Z770-24.74	E2618
		3Z7480-206	R118	2Z9836.176	T1201	2Z9843.499	Z1701	3Z770-24.75	Z1701	3Z770-24.75	E2619
		3RC30BF332K	R119	3Z1892-72.11	Z1201	3Z1892-72.16	T1801	3Z770-24.76	T1801	3Z770-24.76	E2620
		3RC30BF472K	R120	3DB20-112	C1301	2Z9843.500	Z1801	3Z770-24.77	Z1801	3Z770-24.77	E2621
		3RUI2805	R121	3DB10-263	C1306	3Z1892-72.17	T1901	3Z770-18.81	T1901	3Z770-18.81	E2622
		3RW28519	R122	3DA50-217	C1311	3Z1892-72.18	Z1901	3Z770-16.93	Z1901	3Z770-16.93	E2623
		3RW28217	R123	3DB10-160	C1313	3Z9843.501	T2001	2Z3055-46	T2001	2Z3055-46	J2621
		3RW27324	R124	3DB10-276	E1311	3Z9843.502	Z2101	2Z3055-52	Z2101	2Z3055-52	J2623
		3Z9863-52N.1	S101	3Z770-12.153	E1323	2Z9843.503	T2101	3C323-50F	T2101	3C323-50F	L2601
		3Z9825-146	S102	3Z770-24.70	E1325	3Z1892-72.19	Z2201	3C496C	Z2201	3C496C	L2604
		3Z9863-52K.1	S103	3Z770-24.71	E1326	2Z9843.504	T2201	3RC30BF513J	T2201	3RC30BF513J	R2605
		3Z9825-146.1	S105	3Z770-24.72	E1327	3Z1892-72.20	Z2301	3RC30BF104J	Z2301	3RC30BF104J	R2606
		2Z9836.164	T101	3Z770-24.73	E1328	2Z9843.504	T2301	3Z7498-50.89	T2301	3Z7498-50.89	
		2Z9832.786	T102	2Z7779-11	O1302	3Z1892-72.21	Z2401	3Z7480-105	Z2401	3Z7480-105	
		2Z9621B-59	T103	3Z7498-50.89	R1315	2Z9843.505	T2501		T2501		
		2Z9636.165	T104	3RC30BF102K	R1316	3Z1892-72.22	Z2601		Z2601		
		2J12AU7	V101	3Z7480-105	R1318	2Z9843.506	T2601		T2601		

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3RC30BF244J	R2608								
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3RC30BF154J	R2612								
3RC30BF105J	R2617								
3RC30BF475K	R2621								
3RC30BF514J	R2635								
3RC30BF155J	R2636								
3RC30BF431J	R2641								
3RC30BF221J	R2643								
3RC30BF181J	R2644								
3RC30BF821J	R2646								
3RC30BF222J	R2648								
3RC30BF511J	R2649								
3Z7100-38	R2650								
3RC30BF390J	R2652								
3RC30BF472J	R2655								
3RC30BF303J	R2659								
3RC30BF152K	R2663								
3RW27611	R2664								
3RC42BF224K	R2665								
3Z7499-1.20	R2668								
2Z394.125	R2669								
2Z9634.150	T2601								
2Z9636.177	T2602								
2Z9621B-65	T2604								
2Z8761-28	X2611								
2X200A-102	Y2601								
3Z1892-72.24	Z2601								
3Z1894.32	Z2602								
3Z1892-72.25	Z2603								
3Z770-24.79	E2715								
3Z770-24.80	E2716								
3Z770-24.81	E2717								
3Z770-18.83	E2718								
3Z770-18.84	E2719								
3Z770-18.85	E2720								
3Z770-6.176	E2721								
3RC30BF304J	R2723								
3RC30BF391J	R2729								
3RC30BF391J	R2731								
3RC30BF101J	R2740								
3RC30BF183J	R2747								
3RW25522	R2751								
3Z9631.448	T2702								
3Z1892-72.26	Z2703								

TABLE 8-5. COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS

RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

JAN COLOR CODE FOR CERAMIC-DIELECTRIC CAPACITORS AXIAL TYPE INSULATED

RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

RADIAL TYPE

JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED

RADIAL TYPE NON-INSULATED

RMA: RADIO MANUFACTURERS ASSOCIATION JAN. JOINT ARMY - NAVY CAPACITORS

TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC	VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	1	1	1		A
	.10	1	BROWN	10	10	10	100	B
	1.00	2	RED	100	100	100	200	C
	10.00	3	ORANGE	1000	1000	1000	300	D
	100.000	4	YELLOW	10000	10000	10000	400	E
	1000.000	5	GREEN	100000	100000	100000	500	F
	10000.000	6	BLUE	1000000	1000000	1000000	600	G
	10,000,000	7	VIOLET	10,000,000	10,000,000	10,000,000	700	
	100,000,000	8	GRAY	100,000,000	100,000,000	0.01	800	
	1,000,000,000	9	WHITE	1,000,000,000	1,000,000,000	0.1	900	
5	0.1		GOLD	0.1	0.1	0.1	1000	
10	0.01		SILVER	0.01	0.01	0.01	2000	
20			NO COLOR				500	

TABLE 8-6. LIST OF MANUFACTURERS

PREFIX	NAME	ADDRESS	PREFIX	NAME	ADDRESS
	Appleton Electric	1738 Wellington Avenue Chicago, Illinois	CDN	Hammarlund Manufacturing Co.	460 W. 34th Street New York, New York
	Fahnestock Electric Co., Inc.	46-44 11th Street Long Island City, New York	CHS	Sylvania Electric Products, Inc.	Emporium, Pennsylvania
	Harvey Hubbel	State & Thomas Streets Bridgeport 5, Connecticut	CIR	International Resistor Corp.	401 N. Broad Street Philadelphia, Pennsylvania
	Thomas and Betts Co.	Elizabeth 1, New Jersey	CJC	H. B. Jones	2300 W. Wabansia Avenue Chicago, Illinois
CD	Cornell-Dubilier Electric Corp.	1000 Hamilton Boulevard South Plainfield, New Jersey	CMG	Cinch Manufacturing Co.	1026 S. Homan Avenue Chicago, Illinois
CG	General Electric Co.	Schenectady 5, New York	CPH	American Phenolic Corp.	1830 South 54th Avenue Chicago, Illinois
CAE	Cutler-Hammer, Inc.	1333 W. St. Paul Avenue Milwaukee, Wisconsin	CQB	Bliley Electric Co.	200 Union Station Bldg. Erie, Pennsylvania
CAD	Ward Leonard	6 South Street Mount Vernon, New York	CRC	RCA Manufacturing Co. Radiotron Division	Harrison New Jersey
CBN	Central Radio Laboratory Division of Globe Union	900 E. Keefe Avenue Milwaukee, Wisconsin	CACA	Times Facsimile Corp.	229 W. 43 Street New York, New York
CBZ	Allen-Bradley Co.	118 W. Greenfield Avenue Milwaukee, Wisconsin	CAMQ	Cambridge Thermionic Corp.	445 Concord Avenue Cambridge, Massachusetts
CDB	Bud Radio, Inc.	2118 E. 55th Street Cleveland, Ohio	CAOR	Radio Frequency Laboratories, Inc.	Boonton, New Jersey
CDM	Ohmite Manufacturing Co.	4835 W. Flourney Chicago, Illinois	CAUW	Magnetic Winding Co.	16 & Butler Street Easton, Pennsylvania
CFA	Daven Company	160 Summit St. at Newman Newark, New Jersey	CAXD	Insuline Corporation of America	30-02 35th Avenue Long Island City, New York
CHC	Bussmann Manufacturing Co.	2538 W. University Street St. Louis, Missouri	CAYS	Drake Manufacturing Co.	1713 W. Hubbard Street Chicago, Illinois

TABLE 8-6, CONT'D

PREFIX	NAME	ADDRESS	PREFIX	NAME	ADDRESS
CAYT	Allen Manufacturing Co.	100 Seldon Street Hartford, Connecticut	CBIM	Switchcraft Co.	1328-30 N. Halsted Street Chicago, Illinois
CAYZ	Dial Light Corp.	900 Broadway New York, New York	CBIS	Burnell & Company	10-12 Van Cortland Avenue Bronx, New York
CBEA	Trico Fuse Manufacturing Co.	Milwaukee, Wisconsin	CBJR	Wiremold Co.	Hartford, Connecticut

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NG: None.

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For explanation of abbreviations used, see SR 320-50-1.

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