

NAVSHIPS 93109

Non-Registered

★

TECHNICAL MANUAL
for
TELEGRAPH
CARRIER TERMINAL
AN/FCC-3A
and
AN/FCC-7A

AERMOTIVE EQUIPMENT CORPORATION
KANSAS CITY, MISSOURI

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

Contract: NObsr-71273

★
Approved by BuShips: 7 February 1958

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original		
ii to ix	Original	5-0 to 5-1	Original
1-0 to 1-11	Original	6-0 to ---	Original
2-0 to 2-24	Original	7-1 to 7-56	Original
3-1 to 3-12	Original	8-1 to 8-83	Original
4-1 to 4-5	Original	i-1 to i-5	Original



DEPARTMENT OF THE NAVY

BUREAU OF SHIPS
WASHINGTON 25, D. C.IN REPLY REFER TO
Code 993-100

From: Chief, Bureau of Ships
To: All Activities concerned with the Installation,
Operation, and Maintenance of the Subject Equipment

Subj: Technical Manual for Telegraph Carrier Terminal AN/FCC-3A
AN/FCC-7A, NAVSHIPS 93109

1. This non-registered publication is the technical manual for the subject equipment and is in effect upon receipt.
2. When superseded by a later edition, this publication shall be destroyed.
3. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.
4. Errors found in this publication (other than obvious typographical errors), which have not been corrected by means of Temporary Corrections or Permanent Changes, should be reported. Such report should include the complete title of the publication and the publication number (short title); identify the page and line or figure and location of the error; describe the error or indicate what change should be made; and be forwarded to the Electronics Publications Section of the Bureau of Ships.
5. All Navy requests for NAVSHIPS electronics publications should be directed to the nearest Bureau of Supplies and Accounts Forms and Publications Supply Point. When changes or revised books are distributed, notice will be included in the Electronics Information Bulletin, NAVSHIPS 900,022, and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

A. G. MUMMA
Chief of Bureau

TABLE OF CONTENTS

SECTION 1 - GENERAL DESCRIPTION

<i>Paragraph</i>		<i>Page</i>
1-1.	Instruction Book Coverage.....	1-1
1-2.	Purpose and Basic Principles.....	1-1
1-3.	Description of Units	1-1
a.	General.....	1-1
b.	Telegraph Carrier Transmitter.....	1-1
c.	Telegraph Carrier Receivers.....	1-2
d.	Electronic Frequency Converter CV-243A/FCC-3	1-2
e.	Electronic Frequency Converter CV-244A/FCC-3	1-3
f.	Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3	1-4
g.	Transmitter Filters.....	1-5
h.	Receiver Filters.....	1-5
i.	Telegraph Receiver Terminal AN/FCC-7A.....	1-6
1-4.	Reference Data	1-8
a.	Nomenclature	1-8
b.	Contract	1-8
c.	Contractor	1-8
d.	Cognizant Naval Inspector.....	1-8
e.	Packages Per Complete Shipment...	1-8
f.	Cubical Contents.....	1-8
g.	Total Weights.....	1-8
h.	Frequency Range.....	1-8
i.	Power Output.....	1-8
j.	Sensitivity.....	1-8
k.	Power Supply.....	1-8

SECTION 2 - THEORY OF OPERATION

2-1.	General Description of Units.....	2-0
2-2.	Basic Circuits of the Telegraph Carrier Transmitter T-371A/FCC-3 through T-382A/FCC-3	2-1
a.	General.....	2-1
b.	15 kc Loop Oscillator Circuit	2-3
c.	DC Amplifier.....	2-3
d.	Carrier Oscillator and Output Circuit	2-4
e.	Power Supply Circuit.....	2-4
2-3.	Basic Circuits of the Telegraph Carrier Receiver R-525A/FCC-3 through R-536A/FCC-3	2-6
a.	General.....	2-6
b.	Diversity	2-6
c.	Limiting Amplifier.....	2-9
d.	Discriminator and Diversity Combining Circuits	2-11
e.	DC Amplifier and Inverter Circuits .	2-11
f.	Output Keyer Circuit	2-11
g.	Power Supply Circuit	2-13

SECTION 2 - THEORY OF OPERATION CONT'D

<i>Paragraph</i>		<i>Page</i>
2-4.	Basic Circuits of the Electronic Fre- quency Converter CV-243A/FCC-3..	2-16
a.	Block Diagram.....	2-16
b.	Oscillator and Divider Circuits.....	2-16
c.	Modulator and Filter Circuits	2-17
d.	Amplifier	2-17
e.	Power Supply Circuits.....	2-20
2-5.	Basic Circuits of the Electronic Fre- quency Converter CV-244A/FCC-3..	2-20
a.	Block Diagram	2-20
b.	Oscillator and Divider Circuits.....	2-20
c.	Modulator and Filter Circuits	2-20
d.	Normal Amplifier Circuit.....	2-21
e.	Converter Amplifier Circuit	2-21
f.	Power Supply Circuits	2-21
2-6.	Circuits of Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3	2-21
2-7.	Filters.....	2-22

SECTION 3 - INSTALLATION

3-1.	Unpacking.....	3-1
3-2.	Installation	3-1
a.	General.....	3-1
b.	Installation Wiring	3-2
c.	Installation of Filter Sets	3-3
3-3.	Initial Adjustments	3-3
a.	Position of Controls.....	3-3
b.	Starting the Equipment	3-3
c.	Setting the Signal Output Levels of the Transmitter Group	3-6
d.	Checking and Setting the Trans- mitter Frequencies	3-7
e.	Preliminary Testing of the Telegraph Carrier Receiver	3-7
f.	Diversity Installation.....	3-8
g.	Normal Signal Operating Levels	3-9

SECTION 4 - OPERATION

4-1.	Introduction	4-1
4-2.	Operation of the Telegraph Carrier Transmitter T-371A/FCC-3 through T-382A/FCC-3.....	4-1
a.	General	4-1
b.	Operation	4-1
4-3.	Operation of the Electronic Frequency Converter CV-243A/FCC-3	4-2

TABLE OF CONTENTS, CONT'D

SECTION 4 - OPERATION, CONT'D

<i>Paragraph</i>	<i>Page</i>
4-4. Operation of the Telegraph Carrier Receiver R-525A/FCC-3 through R-536A/FCC-3	4-2
a. General	4-2
b. Operation	4-2
c. Operation of the Telegraph Carrier Receivers in Diversity	4-3
4-5. Operation of the Electronic Frequency Converter CV-244A/FCC-3	4-3
4-6. Long Loop Cables	4-4
a. Effect on Keying of Equipment	4-4
b. Improved Keying of Equipment	4-4
c. General Information about Cables	4-4
4-7. Summary of Operation	4-5

SECTION 5 - OPERATOR'S MAINTENANCE

5-1. Routine Check Charts	5-0
5-2. Emergency Maintenance	5-0

SECTION 6 - PREVENTIVE MAINTENANCE

6-1. Preventive Maintenance	6-0
6-2. Routine Maintenance Check Charts	6-0
6-3. Lubrication	6-0

SECTION 7 - CORRECTIVE MAINTENANCE

7-1. General	7-1
7-2. Corrective Maintenance	7-1
7-3. System Trouble Shooting	7-1
7-4. Telegraph Carrier Transmitter T-371A/FCC-3 through T-382A/FCC-3, Trouble Shooting	7-3
a. General	7-3
b. Telegraph Bias Adjustment Capacitors	7-4
c. Signal Level Control	7-4
7-5. Telegraph Carrier Receiver R-525A/FCC-3 through R-536A/FCC-3, Trouble Shooting	7-5
a. General	7-5
b. Telegraph Bias Adjustment	7-8
7-6. Electronic Frequency Converter CV-243A/FCC-3, Trouble Shooting	7-8
a. General	7-8
b. Locking Oscillator Adjustments	7-10
c. Signal Level Adjustments	7-14

SECTION 7 - CORRECTIVE MAINTENANCE CONT'D

<i>Paragraph</i>	<i>Page</i>
7-7. Electronic Frequency Converter CV-244A/FCC-3, Trouble Shooting	7-15
a. General	7-15
b. Locking Oscillator Adjustments	7-17
c. Signal Level Adjustments	7-17

SECTION 8 - PARTS LIST

8-1. Introduction	8-1
-------------------------	-----

LIST OF ILLUSTRATIONS

SECTION 1 - GENERAL DESCRIPTION			SECTION 2 - THEORY OF OPERATION CONT'D		
<i>Figure</i>	<i>Title</i>	<i>Page</i>	<i>Figure</i>	<i>Title</i>	<i>Page</i>
1-1.	Telegraph Carrier Terminal AN/FCC-3A, Identification of Units	1-0	2-17.	Schematic Diagram of Oscillator and Divider Circuits of Frequency Converter CV-243A/FCC-3	2-15
1-2.	Telegraph Carrier Transmitters, Identification of	1-1	2-18.	Schematic Diagram of Modulator and Filter Circuits of Electronic Frequency Converter CV-243A/FCC-3	2-17
1-3.	Telegraph Carrier Receivers, Identification of	1-2	2-19.	Schematic Diagram of Amplifier of Electronic Frequency Converter CV-243A/FCC-3	2-18
1-4.	Electronic Frequency Converter, CV-243A/FCC-3, Identification of	1-3	2-20.	Schematic Diagram of Power Supply of Electronic Frequency Converter CV-243A/FCC-3	2-18
1-5.	Electronic Frequency Converter, CV-244A/FCC-3, Identification of	1-3	2-21.	Block Diagram of Electronic Frequency Converter CV-244A/FCC-3	2-19
1-6.	Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3, Identification of ..	1-4	2-22.	Schematic Diagram of Normal Line Amplifier	2-20
SECTION 2 - THEORY OF OPERATION			2-23.	Schematic Diagram of Amplifier for Converted Signals	2-21
2-1.	Telegraph Carrier Terminal AN/FCC-3A, Block Diagram of Single Equipment Connected to Line	2-0	2-24.	Curves Showing the Frequency Response of Telegraph Carrier Transmitter Band-Pass Filters	2-22
2-2.	Telegraph Carrier Terminal AN/FCC-3A, Block Diagram of Two Equipments Connected to Line	2-1	2-25.	Curves Showing the Frequency Response of Telegraph Carrier Receiver Band-Pass Filters	2-23
2-3.	Block Diagram of Telegraph Carrier Transmitters T-371A/FCC-3 through T-382A/FCC-3	2-2	2-26.	Curves Showing the Frequency Response of Group Modulator Band-Pass Filter and Low-Pass Filter	2-24
2-4.	Schematic Diagram of 15 kc Loop Oscillator Keying Circuit	2-3	SECTION 3 - INSTALLATION		
2-5.	Schematic Diagram of DC Amplifier Circuit	2-4	3-1.	Telegraph Carrier Terminal AN/FCC-3A, Unpacking Procedure	3-1
2-6.	Schematic Diagram of Carrier Oscillator and Output Circuits	2-5	3-2.	Outline Drawing of Telegraph Carrier Terminal AN/FCC-3A	3-2
2-7.	Schematic Diagram of Telegraph Carrier Transmitter Power Supply ..	2-6	3-3.	Operation of Slide Assembly	3-3
2-8.	Block Diagram of Telegraph Carrier Receivers R-525A/FCC-3 through R-536A/FCC-3	2-7	3-4.	Rear View of Cabinet with Wiring	3-4
2-9.	Block Diagram of Telegraph Carrier Receivers in Frequency Diversity ..	2-8	3-5.	Pictorial Wiring Diagram of Cabinet Power Circuits	3-6
2-10.	Schematic Diagram of Limiting Amplifier	2-9	3-6.	Interconnection Wiring Diagram of Cabinet Terminal Boards	3-11, 3-12
2-11.	Schematic Diagram of Discriminator and Diversity Combining Circuits ...	2-10	SECTION 4 - OPERATION		
2-12.	Schematic Diagram of DC Amplifier and Inverter Circuits	2-10	4-1.	Telegraph Carrier Transmitters T-371A/FCC-3 through T-382A/FCC-3, Identification of Controls ...	4-1
2-13.	Output Keyer Circuit for Neutral Telegraph Loop	2-12			
2-14.	Output Keyer Circuit Terminal Strapping Variations	2-12			
2-15.	Schematic Diagram of Telegraph Carrier Receiver Power Supply Circuit	2-13			
2-16.	Block Diagram of Electronic Frequency Converter CV-243A/FCC-3	2-14			

LIST OF ILLUSTRATIONS, CONT'D

SECTION 4 - OPERATION, CONT'D

<i>Figure</i>	<i>Title</i>	<i>Page</i>
4-2.	Electronic Frequency Converter CV-243A/FCC-3, Identification of Controls.....	4-2
4-3.	Telegraph Carrier Receiver R-525A/FCC-3 through R-536A/FCC-3, Identification of Controls ..	4-3
4-4.	Electronic Frequency Converter CV-244A/FCC-3, Identification of Controls	4-4

SECTION 5 - OPERATOR'S MAINTENANCE

5-1.	Unit Removed from Cabinet for Maintenance.....	5-0
------	--	-----

SECTION 7 - CORRECTIVE MAINTENANCE

7-1.	Failure Report, Sample Form	7-1
7-2.	Servicing Block Diagram, Transmitter and Receiver	7-37, 7-38
7-3.	Servicing Block Diagram Electronic Frequency Converters ..	7-39, 7-40
7-4.	Telegraph Carrier Transmitter Voltage and Resistance Chart.....	7-3
7-5.	Top View of Telegraph Carrier Transmitter.....	7-4
7-6.	Bottom View of Telegraph Carrier Transmitter.....	7-5
7-7.	Components Location, Terminal Boards of Telegraph Carrier Transmitter	7-8
7-8.	Schematic Diagram of Telegraph Carrier Transmitter	7-41, 7-42
7-9.	Wiring Diagram of Telegraph Carrier Transmitter	7-43, 7-44
7-10.	Telegraph Carrier Receiver Voltage and Resistance Chart.....	7-9
7-11.	Top View of Telegraph Carrier Receiver	7-10
7-12.	Bottom View of Telegraph Carrier Receiver.....	7-12
7-13.	Components Location, Terminal Boards of Telegraph Carrier Receiver	7-13
7-14.	Schematic Diagram of Telegraph Carrier Receiver	7-45, 7-46

SECTION 7 - CORRECTIVE MAINTENANCE CONT'D

<i>Figure</i>	<i>Title</i>	<i>Page</i>
7-15.	Wiring Diagram of Telegraph Carrier Receiver.....	7-47, 7-48
7-16.	Electronic Frequency Converter CV-243A/FCC-3, Voltage and Resistance Chart	7-14
7-17.	Top View of Electronic Frequency Converter CV-243A/FCC-3	7-15
7-18.	Bottom View of Electronic Frequency Converter CV-243A/FCC-3	7-16
7-19.	Components Location, Terminal Boards of Electronic Frequency Converter CV-243A/FCC-3	7-17
7-20.	Components Location, Terminal Boards of Electronic Frequency Converter CV-243A/FCC-3	7-19
7-21.	Schematic Diagram of Electronic Frequency Converter CV-243A/FCC-3.....	7-49, 7-50
7-22.	Wiring Diagram of Electronic Frequency Converter CV-243A/FCC-3.....	7-51, 7-52
7-23.	Electronic Frequency Converter CV-244A/FCC-3, Voltage and Resistance Chart	7-20
7-24.	Top View of Electronic Frequency Converter CV-244A/FCC-3	7-21
7-25.	Bottom View of Electronic Frequency Converter CV-244A/FCC-3	7-22
7-26.	Components Location, Terminal Boards of Electronic Frequency Converter CV-244A/FCC-3	7-23
7-27.	Schematic Diagram of Electronic Frequency Converter CV-244A/FCC-3.....	7-53, 7-54
7-28.	Wiring Diagram of Electronic Frequency Converter CV-244A/FCC-3.....	7-55, 7-56
7-29.	Schematic Diagram of Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3.....	7-24

LIST OF TABLES

SECTION 1 - GENERAL DESCRIPTION			SECTION 7 - CORRECTIVE MAINTENANCE		
<i>Figure</i>	<i>Title</i>	<i>Page</i>	<i>Figure</i>	<i>Title</i>	<i>Page</i>
1-1.	Vacuum Tube Designation	1-5	7-1.	System Trouble Shooting Chart.....	7-2
1-2.	Vacuum Tube Complement	1-6	7-2.	Telegraph Carrier Transmitters T-371A/FCC-3 through T-382A/ FCC-3, Trouble Shooting Chart	7-6
1-3.	Equipment Supplied	1-7	7-3.	Telegraph Carrier Receivers R-525A/FCC-3 through R-536A/ FCC-3, Trouble Shooting Chart	7-7
1-4.	Carrier Signal Frequencies.....	1-8	7-4.	Electronic Frequency Converter CV-243A/FCC-3, Trouble Shooting Chart.....	7-11
1-5.	Transmitter and Transmitter Filter Designations	1-9	7-5.	Electronic Frequency Converter CV-244A/FCC-3, Trouble Shooting Chart	7-18
1-6.	Receiver and Receiver Filter Designations	1-9	7-6.	Test Equipment	7-24
1-7.	Technical Summary	1-10	7-7.	Tube Operating Voltages and Currents .	7-25
SECTION 2 - THEORY OF OPERATION			7-8.	Tube Characteristics	7-27
2-1.	Channels Operated in Diversity.....	2-11	7-9.	Winding Data	7-28
SECTION 3 - INSTALLATION			SECTION 8 - PARTS LIST		
3-1.	Position of Controls.....	3-5	8-1.	List of Major Units	8-2
3-2.	Normal Signal Operating Levels.....	3-10	8-2.	List of Major Units by Colloquial Name	8-4
SECTION 5 - OPERATOR'S MAINTENANCE			8-3.	Maintenance Parts List	8-5
5-1.	Routine Check Chart	5-1	8-4.	Color Codes and Miscellaneous Data...	8-82
5-2.	Interchangeable Units	5-1	8-5.	List of Manufacturers.....	8-83
SECTION 6 - PREVENTIVE MAINTENANCE					
6-1.	Routine Maintenance Check Chart	6-0			

TWO TELEGRAPH CARRIER
TERMINAL CABINETS
CY-1195A/FCC-3

12 TELEGRAPH
CARRIER
TRANSMITTERS

12 TELEGRAPH
CARRIER
RECEIVERS

T-371A/FCC-3 →

← R-525A/FCC-3

T-372A/FCC-3 →

← R-526A/FCC-3

T-373A/FCC-3 →

← R-527A/FCC-3

T-374A/FCC-3 →

← R-528A/FCC-3

T-375A/FCC-3 →

← R-529A/FCC-3

T-376A/FCC-3 →

← R-530A/FCC-3

T-377A/FCC-3 →

← R-531A/FCC-3

T-378A/FCC-3 →

← R-532A/FCC-3

T-379A/FCC-3 →

← R-533A/FCC-3

T-380A/FCC-3 →

← R-534A/FCC-3

T-381A/FCC-3 →

← R-535A/FCC-3

T-382A/FCC-3 →

← R-536A/FCC-3

CV-243A/FCC-3 →

← CV-244A/FCC-3

ELECTRONIC
FREQUENCY
CONVERTER

ELECTRONIC
FREQUENCY
CONVERTER

TRANSMITTER
GROUP

RECEIVER
GROUP

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

SECTION 1 GENERAL DESCRIPTION

1-1. INSTRUCTION BOOK COVERAGE.

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

1-2. PURPOSE AND BASIC PRINCIPLES.

The Telegraph Carrier Terminal AN/FCC-3A 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.

1-3. DESCRIPTION OF UNITS.

a. GENERAL. - The Telegraph Carrier Terminal AN/FCC-3A consists of two groups as shown in figure 1-1. A group of 12 telegraph carrier transmitters and an Electronic Frequency Converter CV-243A/FCC-3 are housed in one Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3 and make up one transmitter group. A group of 12 telegraph carrier receivers and an Electronic Frequency Converter CV-244A/FCC-3 are housed in another Telegraph Carrier Terminal Cabinet CY-1195A/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-4290/FCC-3A which interconnects the transmitter terminal boards, and the receiver group cabinet is provided with Wiring Harness CX-4289/FCC-3A which interconnects the receivers for diversity operation.

The Telegraph Carrier Terminal AN/FCC-7A consists of the first eight channels of the Telegraph Carrier Terminal AN/FCC-3A, and the two Electronic Frequency Converters CV-243A/FCC-3 and CV-244A/FCC-3; all housed in two CY-1195A/FCC-3 cabinets.

b. TELEGRAPH CARRIER TRANSMITTER. (See figure 1-2.) - This unit converts the DC telegraph

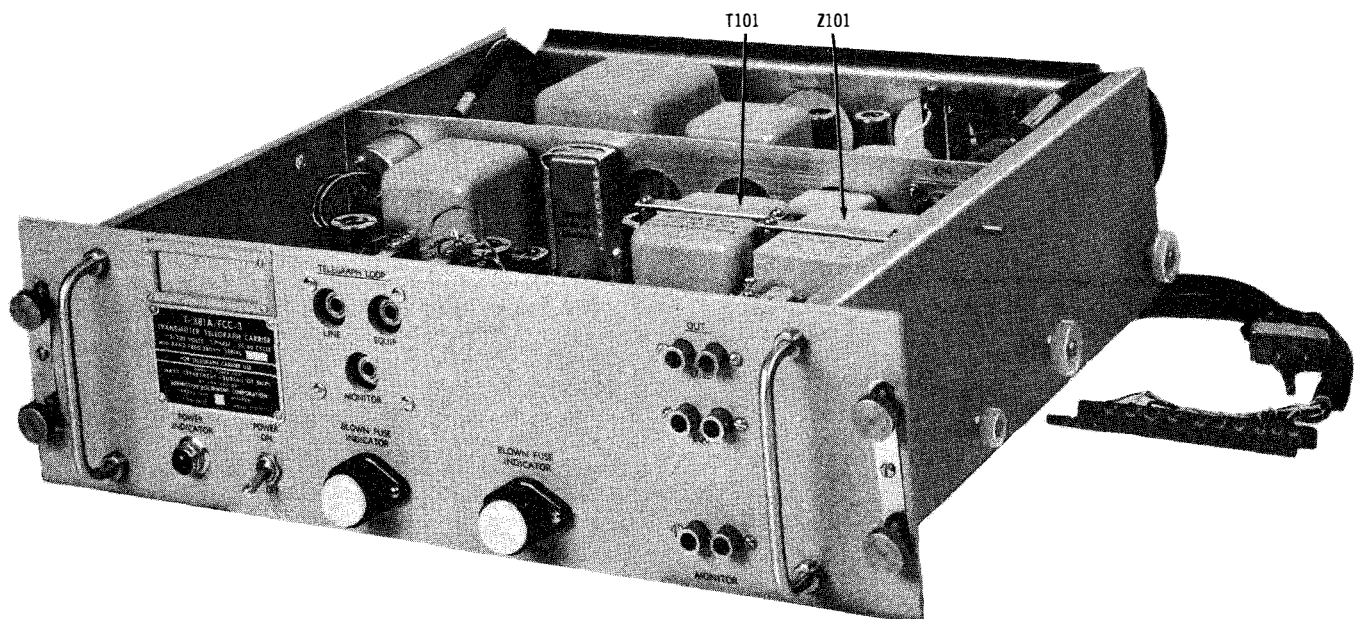


Figure 1-2. Telegraph Carrier Transmitters, Identification of

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-4292/FCC-3 and Cable Assembly CX-4291/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.

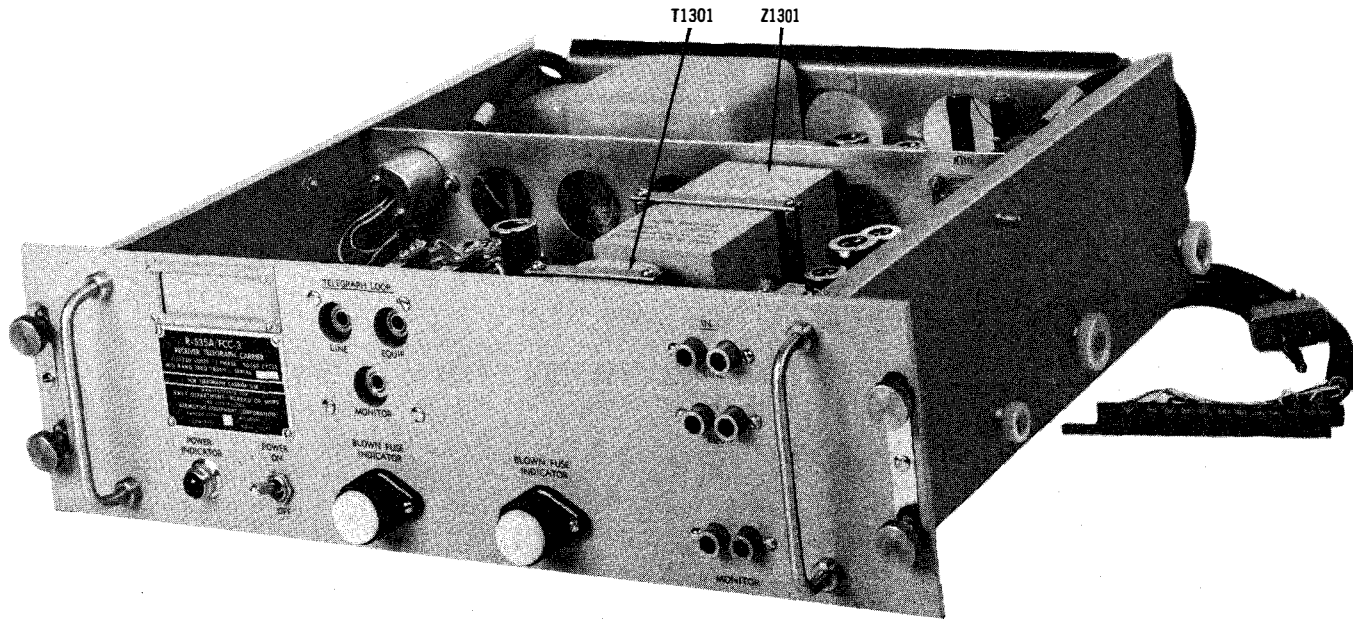


Figure 1-3. Telegraph Carrier Receivers, Identification of

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-4292/FCC-3A and Cable Assembly CX-4291/U (4'4"). Table 1-6 correlates the nomenclature of the twelve receivers with the mid-band center frequencies. 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-243A/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 translating 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 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.

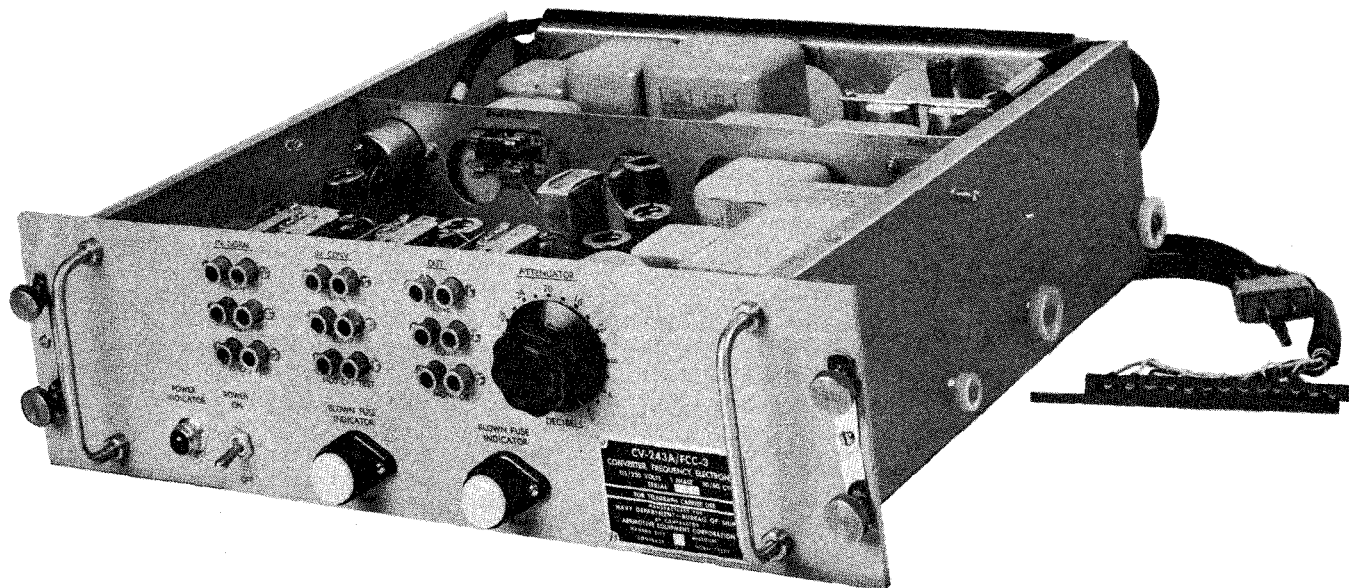


Figure 1-4. Electronic Frequency Converter CV-243A/FCC-3, Identification of

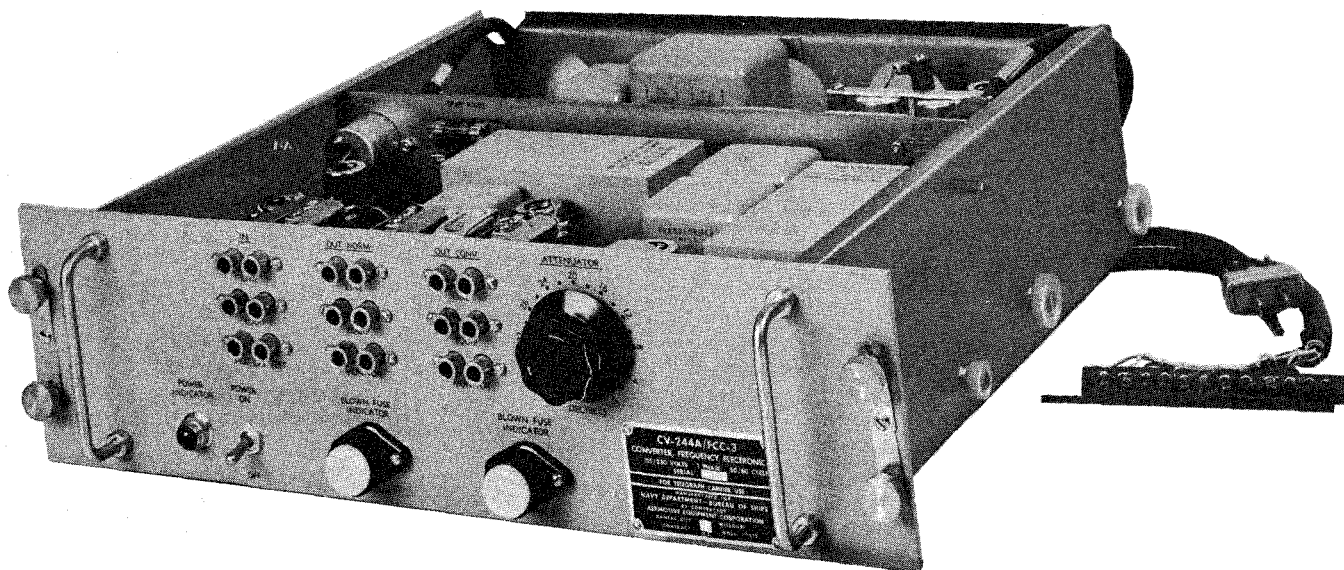


Figure 1-5. Electronic Frequency Converter CV-244A/FCC-3, Identification of

Jacks on the front panel of the converter afford a convenient 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-4292/FCC-3A and Cable Assembly CX-4291/U (4'4") are included with the unit.

e. ELECTRONIC FREQUENCY CONVERTER CV-244A/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-243A/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-243A/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 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-244A/FCC-3 also includes Cable Assembly CX-4292/FCC-3A and Cable Assembly CX-4291/U (4'4").

f. TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/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, fourteen 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 115/230 volt switch for the fan transformer must be changed.

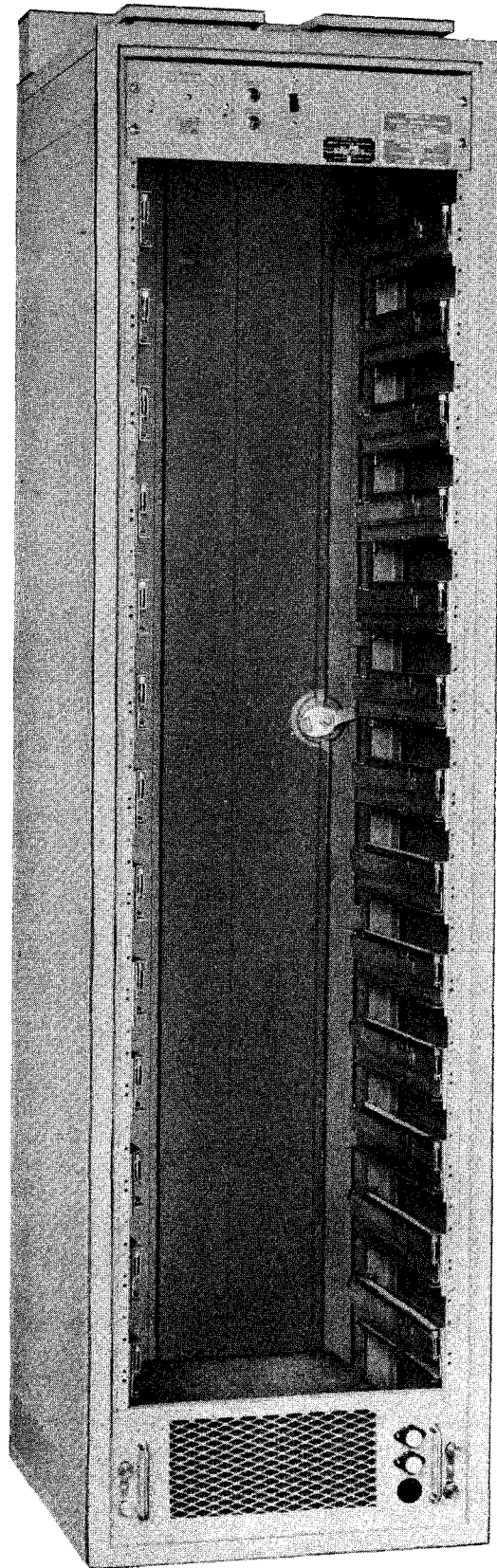


Figure 1—6. Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3, Identification of

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 the identicalness, the center frequency of any transmitter may be changed by plugging in a different filter set. A readjustment of the BIAS CONTROL R104, as described in Section 4, may be required for proper performance after a set of filters is changed.

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.

TABLE 1-1. VACUUM TUBE DESIGNATION

UNIT	SYMBOL DESIGNATION	TUBE TYPE	
Telegraph Carrier Transmitter	V()01	JAN 5814A	
	V()02	JAN 5726	
	V()03	JAN 5814A	
	V()04	JAN 5814A	
	V()07	JAN 0B2WA	
	V()08	JAN 0B2WA	
	V()09	JAN 0B2WA	
Note: The "()" indicates the 100 to 1200 series of symbol numbers as assigned in table 1-5 to the various transmitters.			
Telegraph Carrier Receiver	V()01	JAN 6AU6WA	
	V()02	JAN 5751	
	V()03	JAN 6135	
	V()04	JAN 5726	
	V()05	JAN 5670	
	V()06	JAN 5670	
	V()07	JAN 5670	
	V()08	JAN 5726	
	V()09	JAN 6216	
	V()10	JAN 6216	
	V()13	JAN 0B2WA	
	V()14	JAN 0B2WA	
	V()15	JAN 0A2WA	
	V()16	JAN 5726	
	Note: The "()" indicates the 1300 to 2400 series of symbol numbers as assigned in table 1-6 to the various receivers.		
	Electronic Frequency Converter CV-243A/FCC-3	V2601	JAN 5814A
V2602		JAN 5751	
V2603		JAN 5814A	
V2604		JAN 5751	
V2605		JAN 5751	
V2606		JAN 5814A	
V2608		JAN 0B2WA	
V2609		JAN 0B2WA	
Electronic Frequency Converter CV-244A/FCC-3		V2701	5814A
	V2702	5751	
	V2703	5814A	
	V2704	5814A	
	V2705	5814A	
	V2707	JAN 0B2WA	
	V2708	JAN 0B2WA	

TABLE 1-2. VACUUM TUBE COMPLEMENT

UNIT	NUMBER OF TUBES OF TYPE INDICATED									
	5726	6AU6WA	6135	5670	6216	5814A	5751	0A2WA	0B2WA	TOTAL NO. OF TUBES
Telegraph Carrier Transmitter T-371A	1					3			3	7
Telegraph Carrier Transmitter T-372A	1					3			3	7
Telegraph Carrier Transmitter T-373A	1					3			3	7
Telegraph Carrier Transmitter T-374A	1					3			3	7
Telegraph Carrier Transmitter T-375A	1					3			3	7
Telegraph Carrier Transmitter T-376A	1					3			3	7
Telegraph Carrier Transmitter T-377A	1					3			3	7
Telegraph Carrier Transmitter T-378A	1					3			3	7
Telegraph Carrier Transmitter T-379A	1					3			3	7
Telegraph Carrier Transmitter T-380A	1					3			3	7
Telegraph Carrier Transmitter T-381A	1					3			3	7
Telegraph Carrier Transmitter T-382A	1					3			3	7
Telegraph Carrier Receiver R-525A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-526A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-527A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-528A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-529A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-530A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-531A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-532A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-533A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-534A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-535A	3	1	1	3	2		1	1	2	14
Telegraph Carrier Receiver R-536A	3	1	1	3	2		1	1	2	14
Electronic Frequency Converter CV-243A/FCC-3						3	3		2	8
Electronic Frequency Converter CV-244A/FCC-3						4	1		2	7
TOTAL NUMBER OF EACH TYPE	48	12	12	36	24	43	16	12	64	267

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

TABLE 1-3. EQUIPMENT SUPPLIED

QUAN- TITY PER EQUIP- MENT	NAME OF UNIT	ARMY-NAVY OR NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS			VOLUME (CU FT)
			HEIGHT	WIDTH	DEPTH	
2	Telegraph Carrier Terminal Cabinet	CY-1195A/FCC-3	7' 4"	24"	22 3/8"	28
1	Telegraph Carrier Transmitter	T-371A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-372A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-373A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-374A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-375A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-376A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-377A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-378A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-379A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-380A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-381A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Transmitter	T-382A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-525A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-526A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-527A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-528A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-529A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-530A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-531A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-532A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-533A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-534A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-535A/FCC-3	5-1/4"	19"	16"	0.925
1	Telegraph Carrier Receiver	R-536A/FCC-3	5-1/4"	19"	16"	0.925
1	Electronic Frequency Converter	CV-243A/FCC-3	5-1/4"	19"	16"	0.925
	Electronic Frequency Converter	CV-244A/FCC-3	5-1/4"	19"	16"	0.925
	ACCESSORIES					
13	Cable Assembly, Special Purpose Electrical	CX-4292/FCC-3A	4' 8"			
13	Cable Assembly, Power, Electrical	CX-4291/U	4' 4"			
1	Wiring Harness, (Transmitter Group Cabinet)	CX-4290/FCC-3A	5' 7"			
1	Wiring Harness, (Receiver Group Cabinet)	CX-4289/FCC-3A	5' 7"			
2	Instruction Book	NAVSHIPS 93109				

**TABLE 1-4. CARRIER SIGNAL FREQUENCIES
(IN CYCLES PER SECOND)**

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	2805	2890	2720			
	12	3230	3315	3145			

1-4. REFERENCE DATA.

- a. NOMENCLATURE. - Telegraph Carrier Terminal AN/FCC-3A.
- b. CONTRACT. - NObsr-71273, dated 30 April 1956.
- c. CONTRACTOR. - Aermotive Equipment Corp., Kansas City, Missouri.
- d. COGNIZANT NAVAL INSPECTOR. - Inspector of Naval Material.
- e. PACKAGES PER COMPLETE SHIPMENT - Two.
- f. CUBICAL CONTENTS. - Two crates of 92 cubic feet each (crated); 28 cubic feet each (uncrated).

g. TOTAL WEIGHTS. - 2770 pounds crated; 1615 pounds uncrated.

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

i. POWER OUTPUT. - Transmitter group, +10 dbm maximum output into 600 ohms.

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

k. POWER SUPPLY. - The receiver group requires 115/230 volts; 50/60 cycles; 1110 watts. The transmitter group requires 115/230 volts; 50/60 cycles; 935 watts.

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-371A/FCC-3	T101	N5950-392-6499	Z101	N5915-375-2200
595	±42.5	200	T-372A/FCC-3	T201	N5950-334-8818	Z201	N5915-375-2205
765	±42.5	300	T-373A/FCC-3	T301	N5950-334-8819	Z301	N5915-375-2208
935	±42.5	400	T-374A/FCC-3	T401	N5950-392-6502	Z401	N5915-375-2213
1105	±42.5	500	T-375A/FCC-3	T501	N5805-665-3372	Z501	N5915-375-2221
1275	±42.5	600	T-376A/FCC-3	T601	N5950-392-6504	Z601	N5915-375-2227
1445	±42.5	700	T-377A/FCC-3	T701	N5950-334-8821	Z701	N5915-376-7817
1615	±42.5	800	T-378A/FCC-3	T801	N5950-334-8822	Z801	N5915-375-2243
1955	±85	900	T-379A/FCC-3	T901	N5950-334-8823	Z901	N5915-376-7820
2380	±85	1000	T-380A/FCC-3	T1001	N5950-392-6508	Z1001	N5915-375-2271
2805	±85	1100	T-381A/FCC-3	T1101	N5950-392-6509	Z1101	N5915-643-8231
3230	±85	1200	T-382A/FCC-3	T1201	N5950-392-6510	Z1201	N5915-375-2286

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 STOCK NUMBER	RECEIVER FILTER		DISCRIMINATOR TRANSFORMER	
				SYM NO.	NAVY STANDARD STOCK NUMBER	SYM NO.	NAVY STANDARD STOCK NUMBER
425	±42.5	1300	R-525A/FCC-3	Z1301	N5915-375-2199	T1301	N5950-647-9107
595	±42.5	1400	R-526A/FCC-3	Z1401	N5915-375-2204	T1401	N5960-647-9078
765	±42.5	1500	T-527A/FCC-3	Z1501	N5915-375-2207	T1501	N5950-647-9077
935	±42.5	1600	R-528A/FCC-3	Z1601	N5915-375-2212	T1601	N5950-647-9108
1105	±42.5	1700	R-529A/FCC-3	Z1701	N5915-376-7815	T1701	N5950-647-9099
1275	±42.5	1800	R-530A/FCC-3	Z1801	N5915-376-7816	T1801	N5950-647-8944
1445	±42.5	1900	R-531A/FCC-3	Z1901	N5915-376-7818	T1901	N5950-647-9100
1615	±42.5	2000	R-532A/FCC-3	Z2001	N5915-376-7819	T2001	N5950-647-4079
1955	±85	2100	R-533A/FCC-3	Z2101	N5915-376-7821	T2101	N5950-647-9092
2380	±85	2200	R-534A/FCC-3	Z2201	N5915-376-7823	T2201	N5950-647-8952
2805	±85	2300	R-535A/FCC-3	Z2301	N5915-501-4132	T2301	N5950-647-8950
3230	±85	2400	R-536A/FCC-3	Z2401	N5915-375-2287	T2401	N5950-647-8949

TABLE 1-7. TECHNICAL SUMMARY

UNIT	REMARKS
Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 100 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 14 power outlets, Wiring Harness CX-4289/FCC-3A or CX-4290/FCC-3A.</p>
Telegraph Carrier Transmitter	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 66 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 +10 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>
Telegraph Carrier Receiver	<p>Power Supply: 115/230 volts, 50/60 cycles, single phase.</p> <p>Power Consumption: 81 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 20 or 60 ma neutral telegraph loop either side grounded with battery supplied from loop; DC pulses of 20 or 60 ma neutral telegraph loop negative side grounded with battery supplied from receivers; DC pulses of 30 to 130 volts, 20,000 ohms input impedance either side grounded with battery supplies from receiver. Output impedance 800 ohms.</p>

TABLE 1-7, CONT'D

UNIT	REMARKS
<p>Electronic Frequency Converter CV-243A/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: 40 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 ATTENUATOR 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-244A/FCC-3</p>	<p>Power Supply: 115/230 volts, 50/60 cycle, single phase.</p> <p>Power Consumption: 40 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 ATTENUATOR 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

2-1. 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. 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.

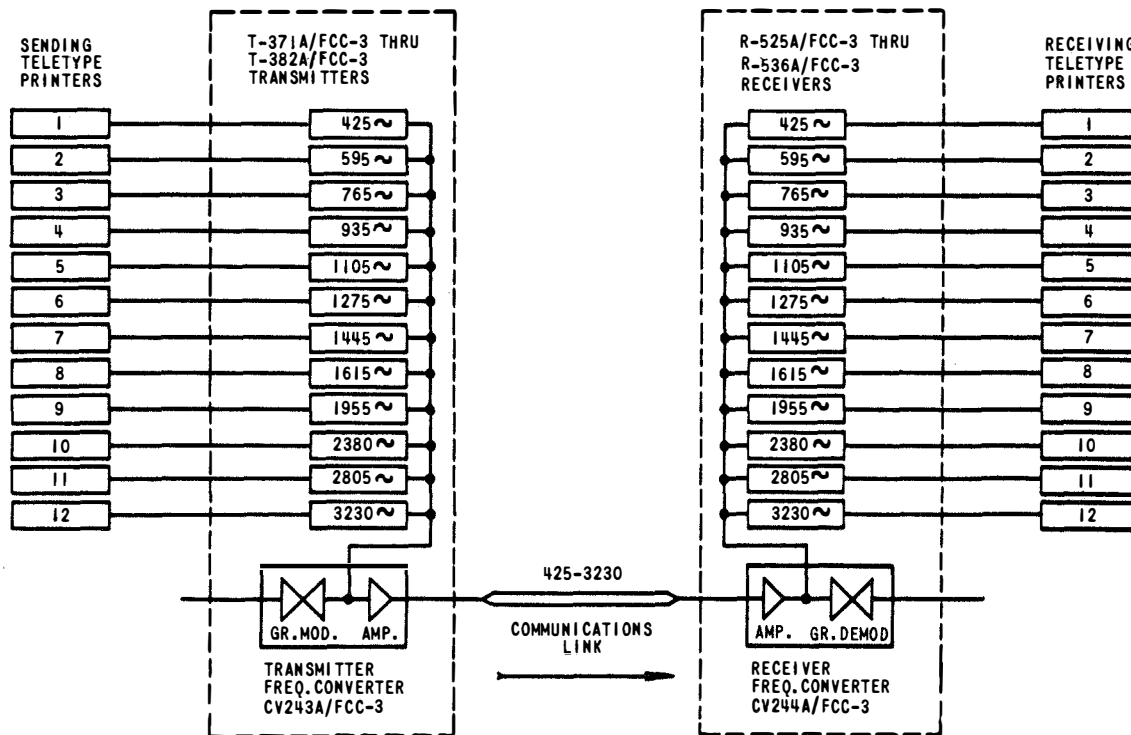


Figure 2-1. Telegraph Carrier Terminal AN/FCC-3A, Block Diagram of Single Equipment Connected to Line

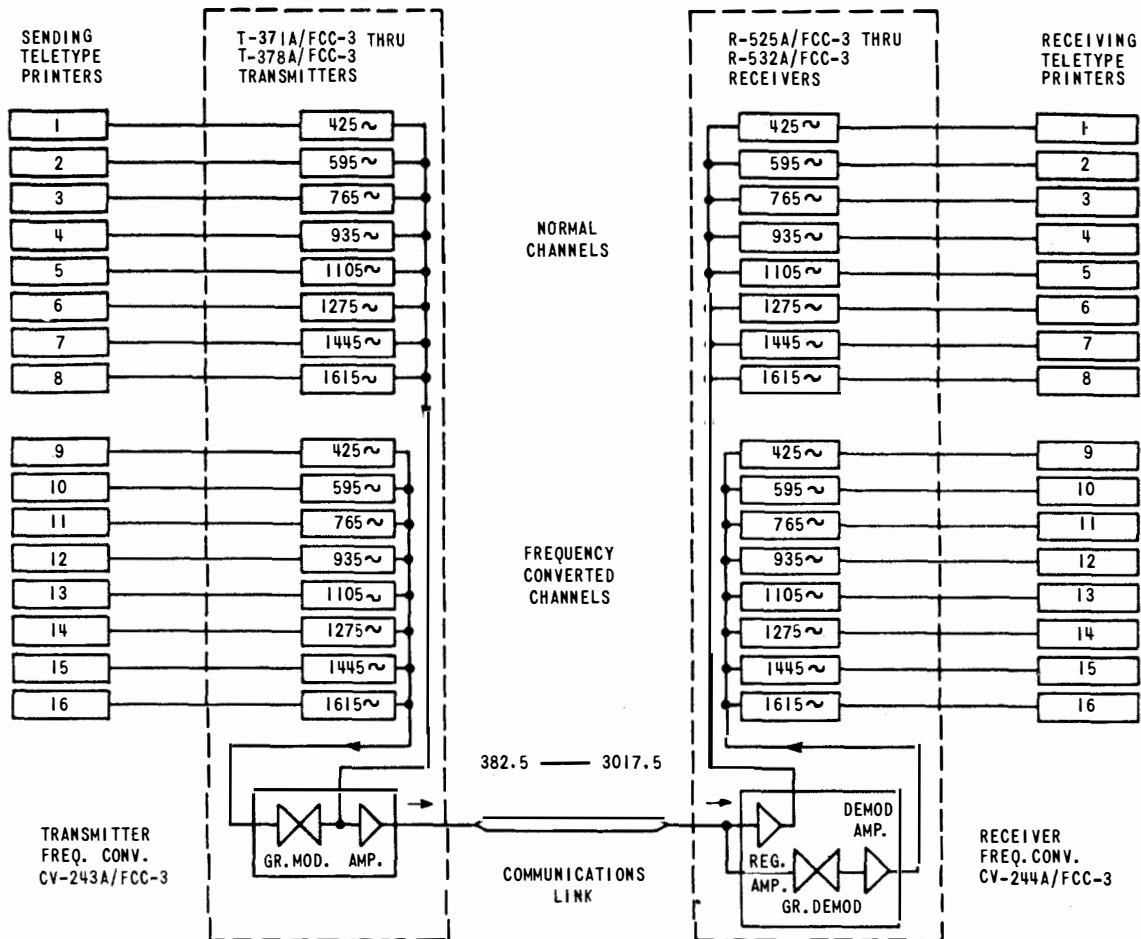


Figure 2—2. Telegraph Carrier Terminal AN/FCC-3A, Block Diagram of Two Equipments Connected to Line

2-2. BASIC CIRCUITS OF THE TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 THROUGH T-382A/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 5814A 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 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

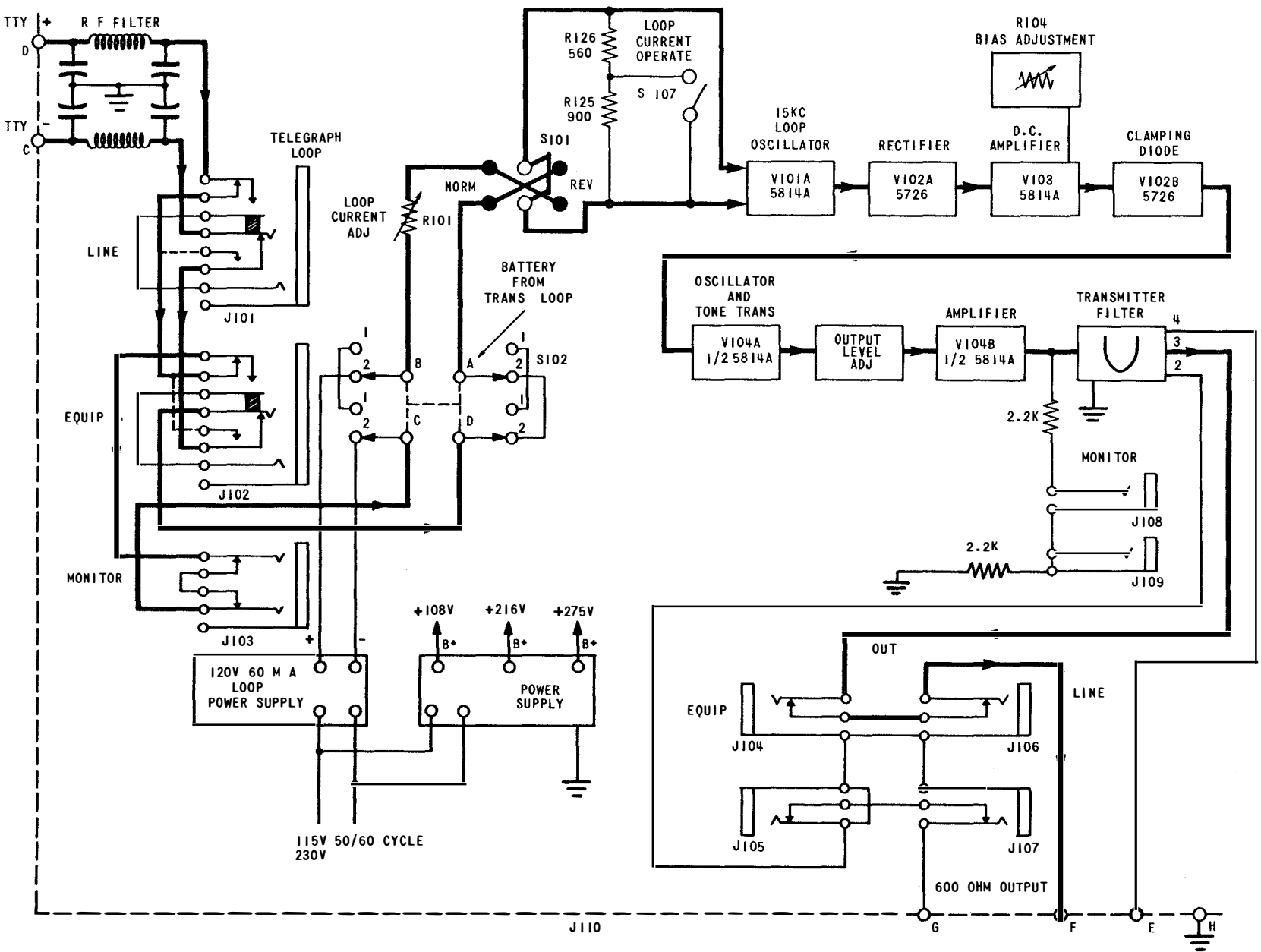


Figure 2-3. Block Diagram of Telegraph Carrier Transmitters T-371A/FCC-3 through T-382A/FCC-3

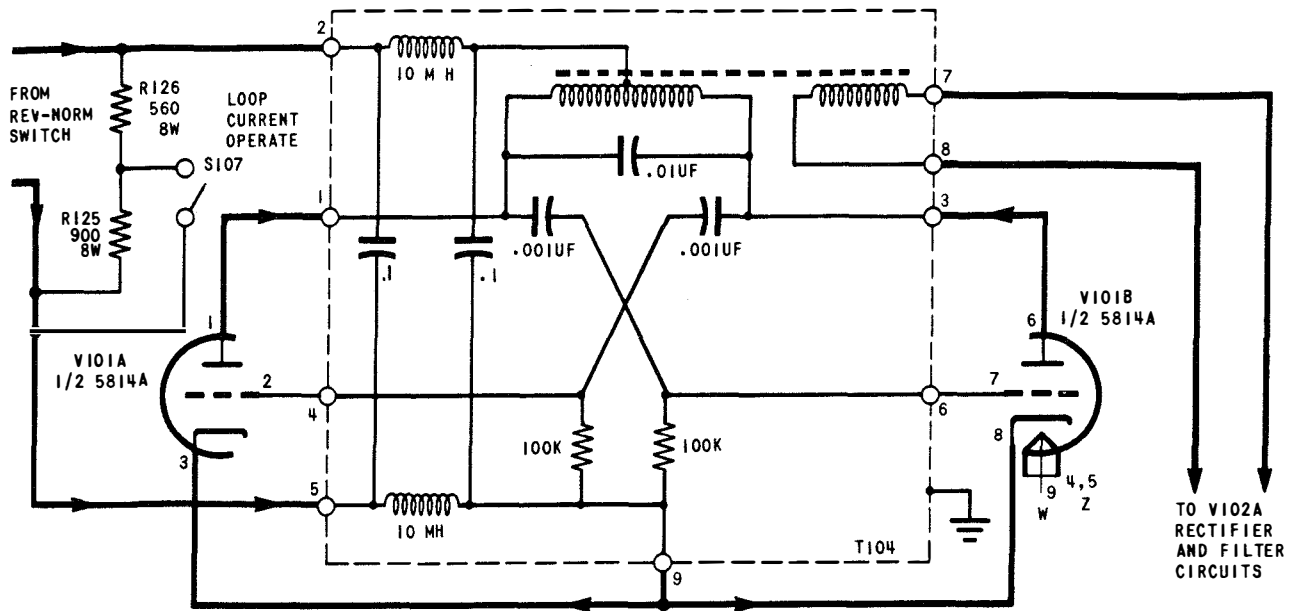


Figure 2-4. Schematic Diagram of 15 kc Loop Oscillator Keying Circuit

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 5726 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 5814 type tube V103A. Under SPACE conditions in the loop circuit, no voltage drop will be produced across resistors R125 and R126 and 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 grid of V103B is resistance coupled from the plate of V103A. The cathodes of V103A and V103B have a common 3300 ohm cathode resistor R105. This resistor provides a means of providing sufficient feed back to shape the waveform of the DC pulses appearing across the 100,000 ohm plate resistor R110 of V103B to produce sharp wave fronts of the transition from MARK to SPACE and from SPACE to MARK;

The arm of bias control R104 is set at the factory 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. When no 15 kc oscillation occurs, the plate current of tube V103A increases. The arm of control R104 is nominally set between 12 and 16 volts with respect to ground. This adjustment should not be disturbed unless absolutely necessary. Too high a voltage at this point will produce a constant SPACE signal regardless of operation on the 15 kc oscillator, and too low a voltage will produce a constant MARK signal. When control R104 is properly set, the plate voltage of V103B should vary between +20 volts for MARK operation to +130 volts for SPACE operation. A slight adjustment in transmitter output distortion may be obtained by the setting of control R104, however the prime purpose is to obtain a maximum voltage change on the plate of V103B between MARK and SPACE operation. The DC pulses from the plate of V103B are applied to the plate of a 5726 clamping diode V102B through a 47,000 ohm resistor R111 and keying resistor within transformer T101. With the cathode of V102B connected to +60 volts through the

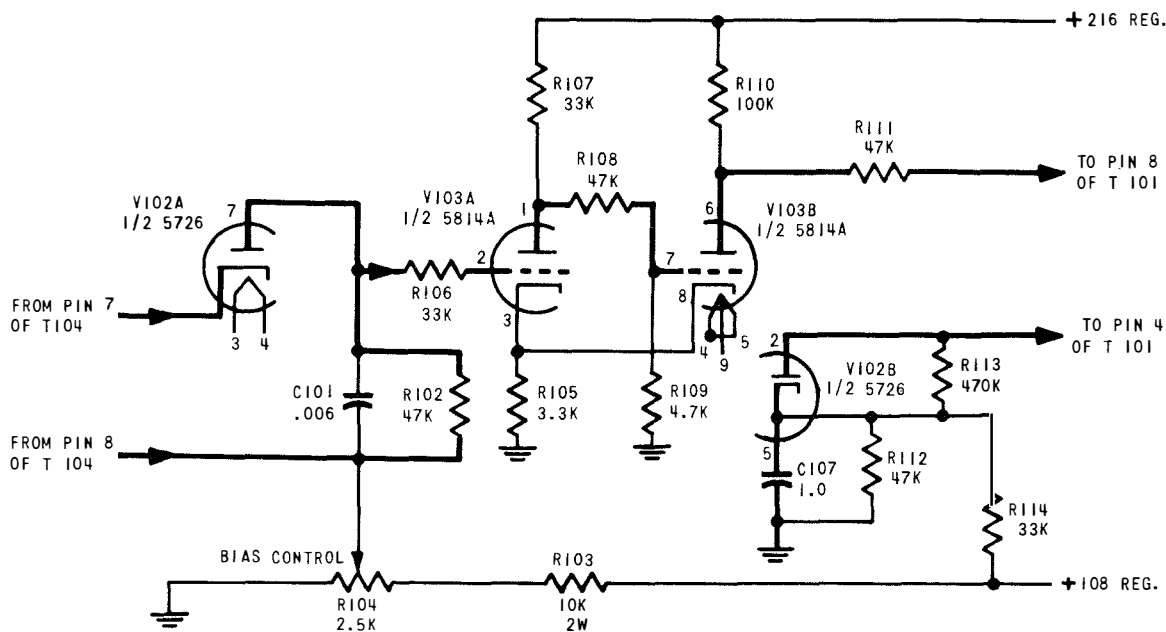


Figure 2-5. Schematic Diagram of DC Amplifier Circuit

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 coil. 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) 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 5814A 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 82 volt winding of T103, two 1N540 type silicon diodes CR101 and CR102, a swinging choke L102, three 10 mf filter capacitors C121A, C121B, C125, and a 5000 ohm bleeder resistor, R122, supplies 20 to 60 ma for the telegraph loop. Another voltage source is available from the 140 volt winding, two 1N540 type silicon diodes CR103 and CR105, two 1N538 type silicon diodes CR104 and CR106, the 10 henry choke L101, and three 10 mf filter capacitors C122A, C122B, and C126 which supply the B-potentials for circuit operation. From this source is obtained a +300 volt nonregulated supply, a +216 volt supply regulated by a 3100 ohm dropping resistor R124 and two 0B2WA regulator tubes V108 and V109, and a +108 volt supply regulated by a 4500 ohm dropping resistor R123 and one 0B2WA 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.

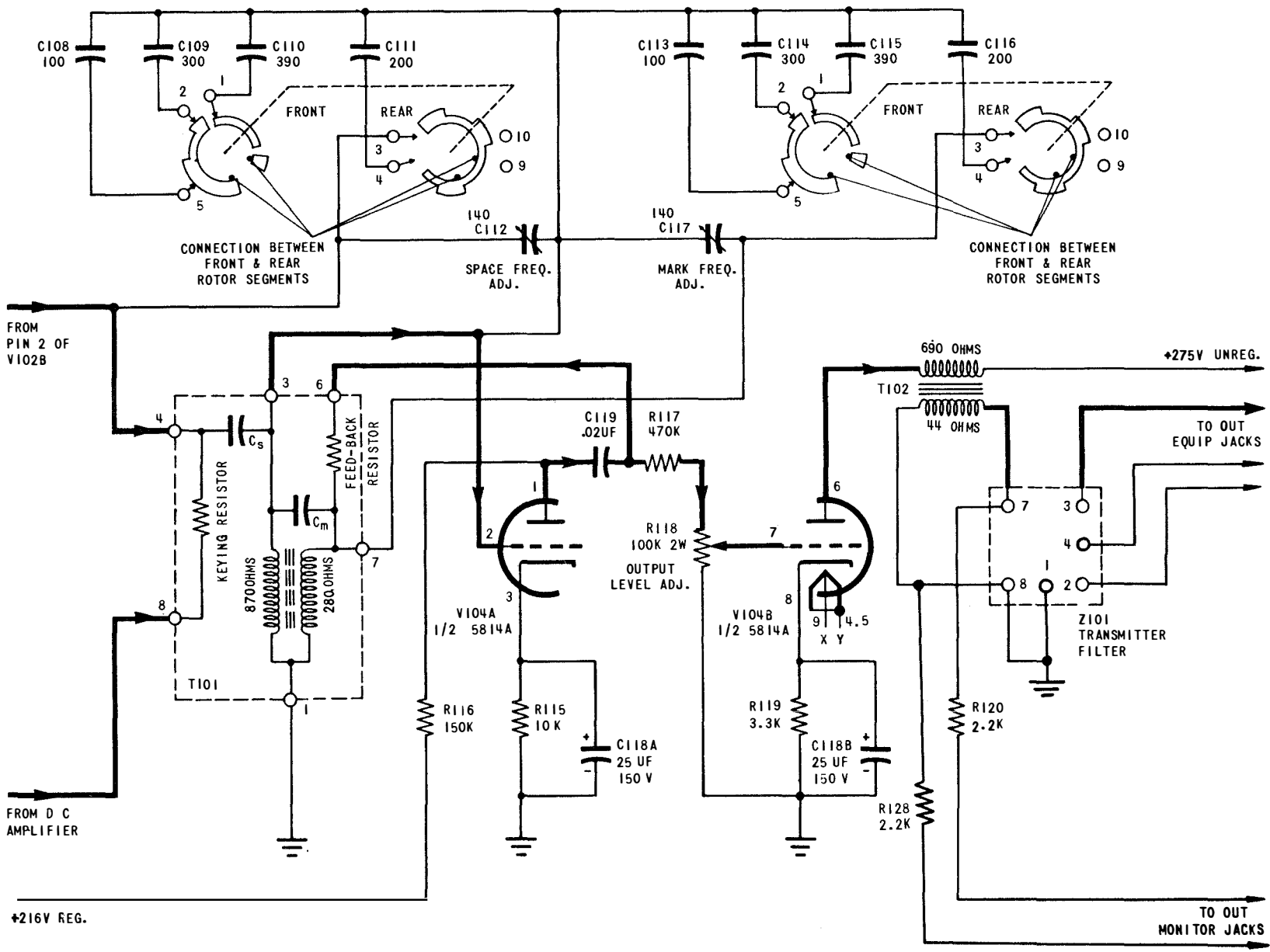


Figure 2-6. Schematic Diagram of Carrier Oscillator and Output Circuits

ORIGINAL

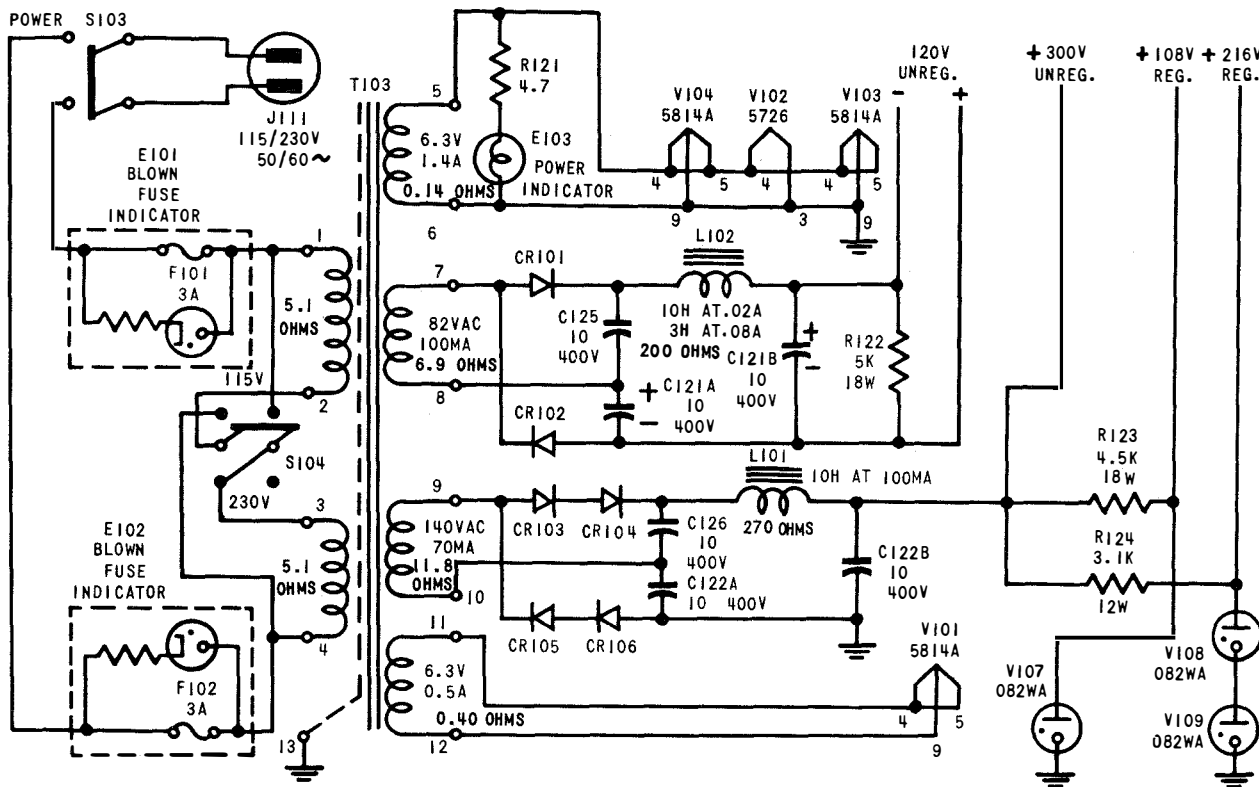


Figure 2-7. Schematic Diagram of Telegraph Carrier Transmitter Power Supply

2-3. BASIC CIRCUITS OF THE TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 THROUGH R-536A/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 none of which are grounded. The input band-pass filter is designed to accept and pass one carrier frequency with its corresponding MARK and SPACE frequencies and attenuate the signal 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 an output of essentially constant amplitude for any input signal between -40 to +6 dbm. This 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 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 grid of loop oscillator keyer tube V1307. Tube

V1307 and transformer T1303 form a 15 kc oscillator circuit which permits isolation between the output loop circuit and the remainder of the receiver. The 15 kc output of transformer T1303 is rectified by tube V1308 in a full wave rectifier circuit and the DC output is applied as bias to the grids of output keyer tubes V1309 and V1310 which are connected in parallel. The plates and cathodes of tubes V1309 and V1310 and the output loop current control R1347 are connected into the output loop circuit by means of appropriate jumper strips on terminal board E1331 (See Table 3-1 for specific instructions). 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

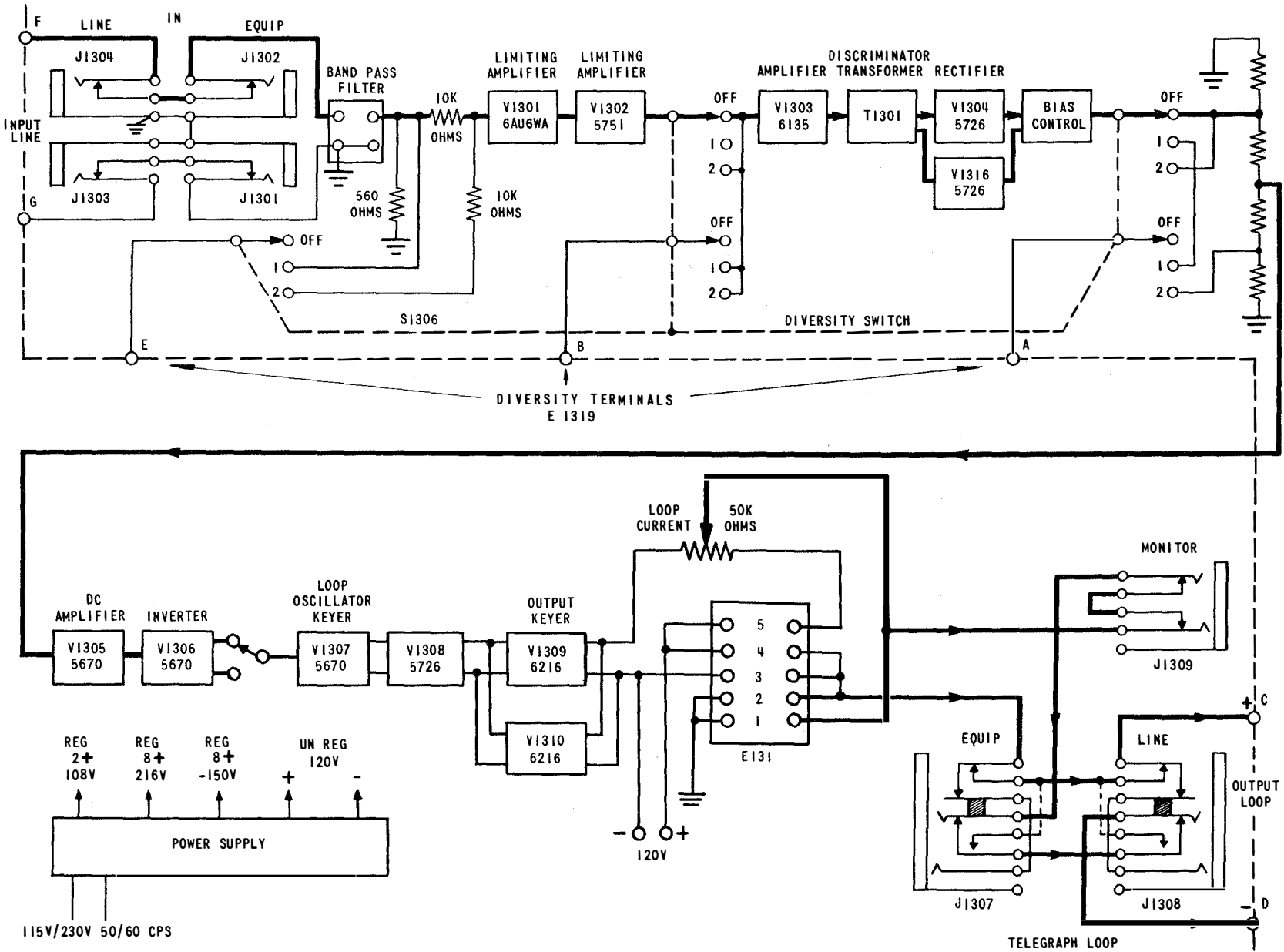


Figure 2-8. Block Diagram of Telegraph Carrier Receivers R-525A/FCC-3 through R-536A/FCC-3

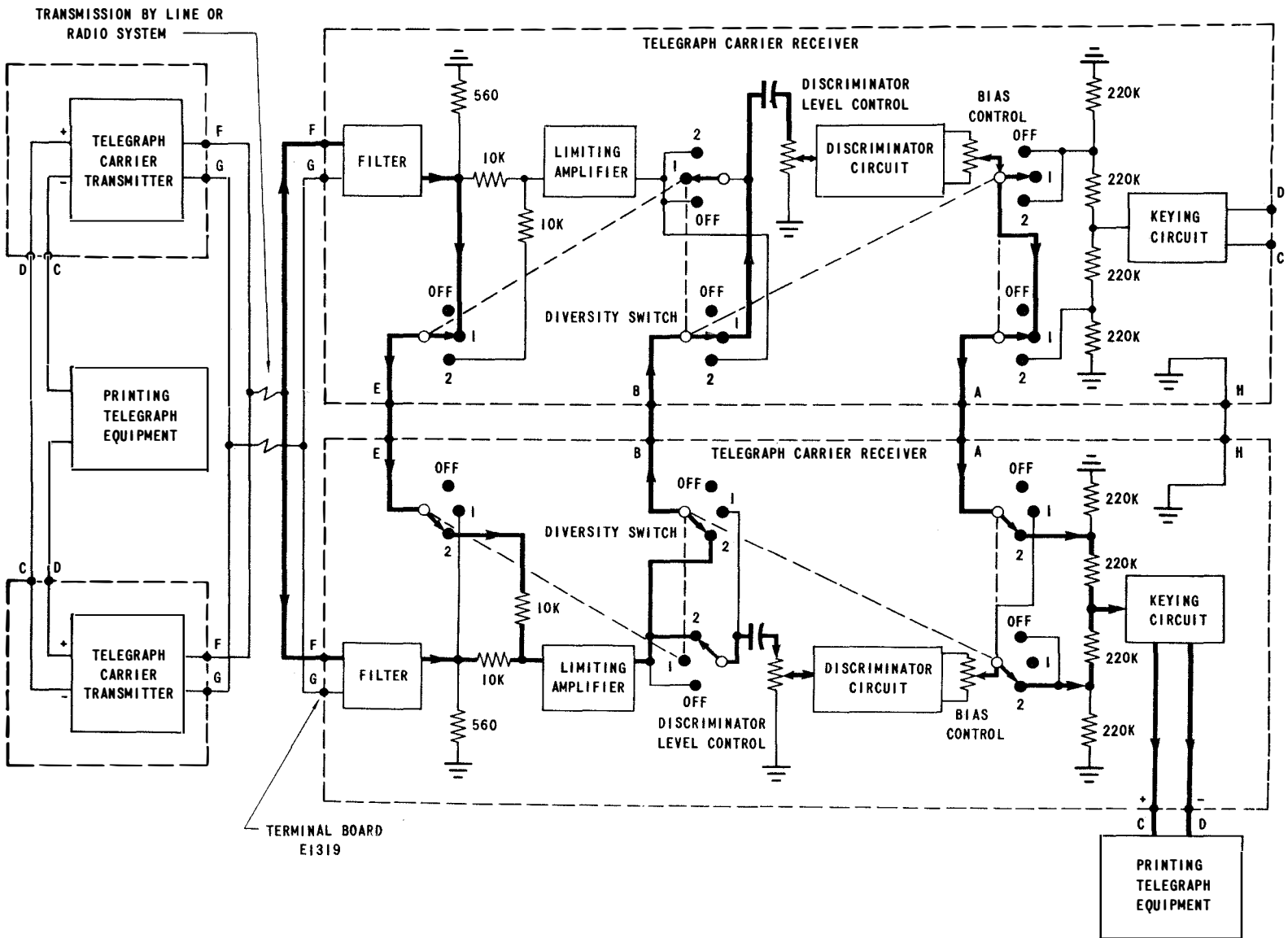


Figure 2-9. Block Diagram of Telegraph Carrier Receivers in Frequency Diversity

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 channels, 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-4289/FCC-3A 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-4289/FCC-3A 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 6AU6WA 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 bypass capacitor C1302, and a 180,000 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 5751 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 re-

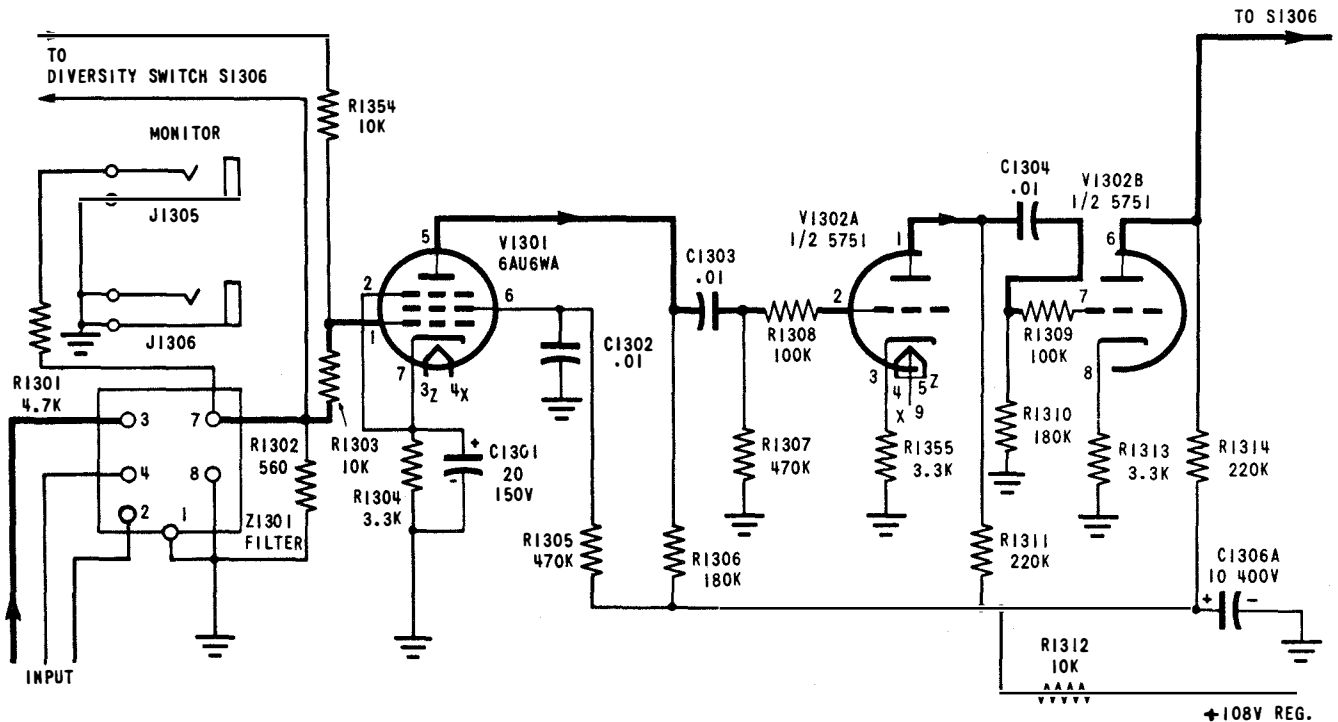


Figure 2-10. Schematic Diagram of Limiting Amplifier

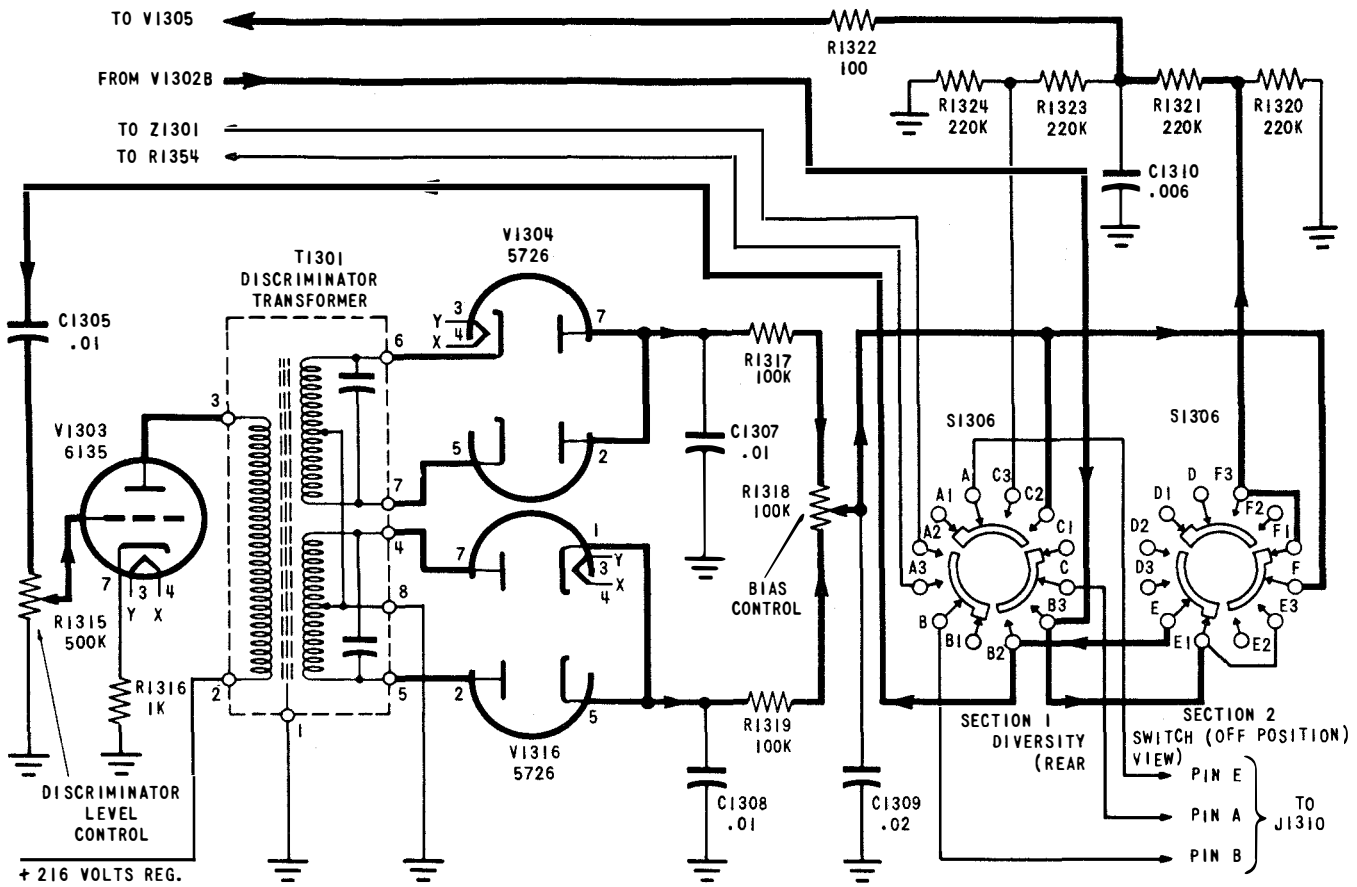


Figure 2-11. Schematic Diagram of Discriminator and Diversity Combining Circuits

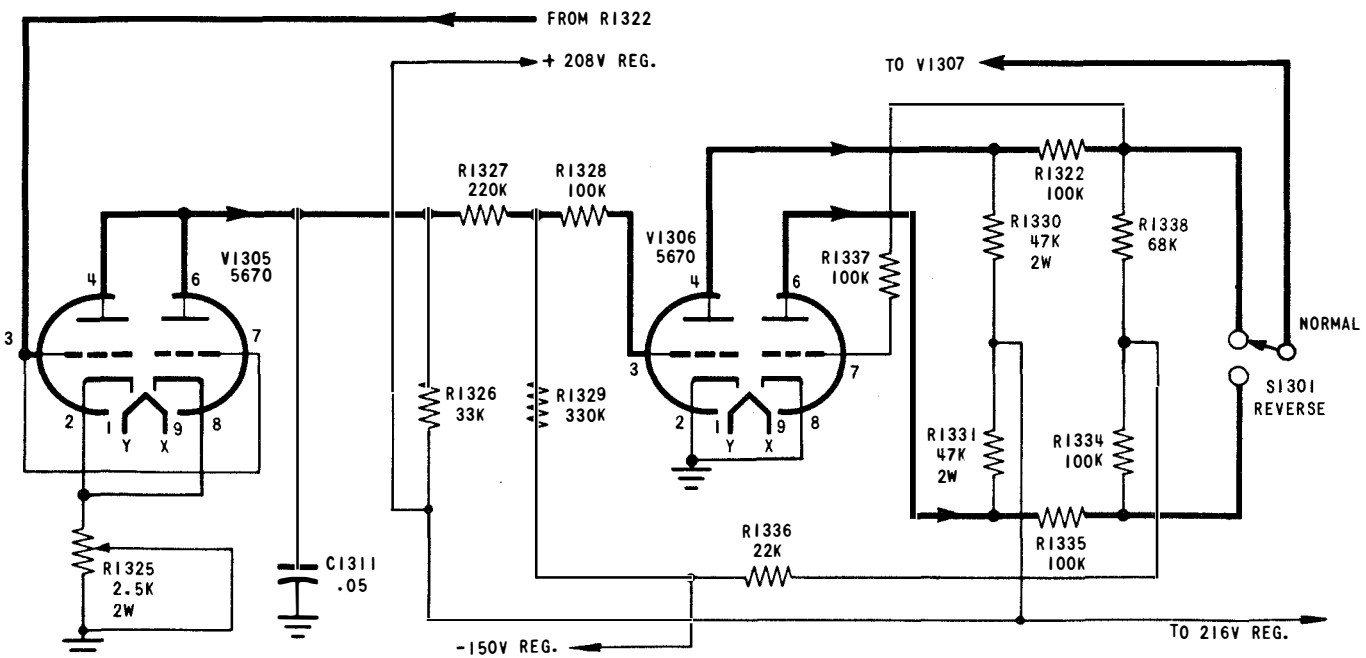


Figure 2-12. Schematic Diagram of DC Amplifier and Inverter Circuits

sistor 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.

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

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 6135 type tube V1303, and the 1000 ohm resistor R1316 provides self-bias. The discriminator transformer T1301 has one primary 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 5726 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 R1318 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 5670 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 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 3 grid of the 5670 type 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 100,000 ohm resistors R1334 and R1338 form a voltage divider. 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 the 5670 type tube V1307 which generates a keyed 15 kc oscillator voltage. The loop output circuit is isolated from the rest of the receiver by transformer T1303. The 5726 type tube V1308 rectifies the 15 kc oscillator signal which is filtered by a 4700 ohm resistor R1343 and two 0.006 mf capacitors C1317 and C1318. The negative DC voltage developed across the 22,000 ohm resistor R1344 is applied to the grids of the two 6216 type tubes V1309 and V1310. V1309 and V1310 are connected in parallel in order to obtain a lower input impedance in the loop circuit. Appropriate jumper strips are placed on terminal board E1331 to obtain the desired operation in accordance with the instructions given in Table 3-1. The receivers are shipped from the factory with jumpers across terminal 1 and across terminal 4 that is 20 to 60 ma loop current, negative side grounded, battery supplied by the receiver.

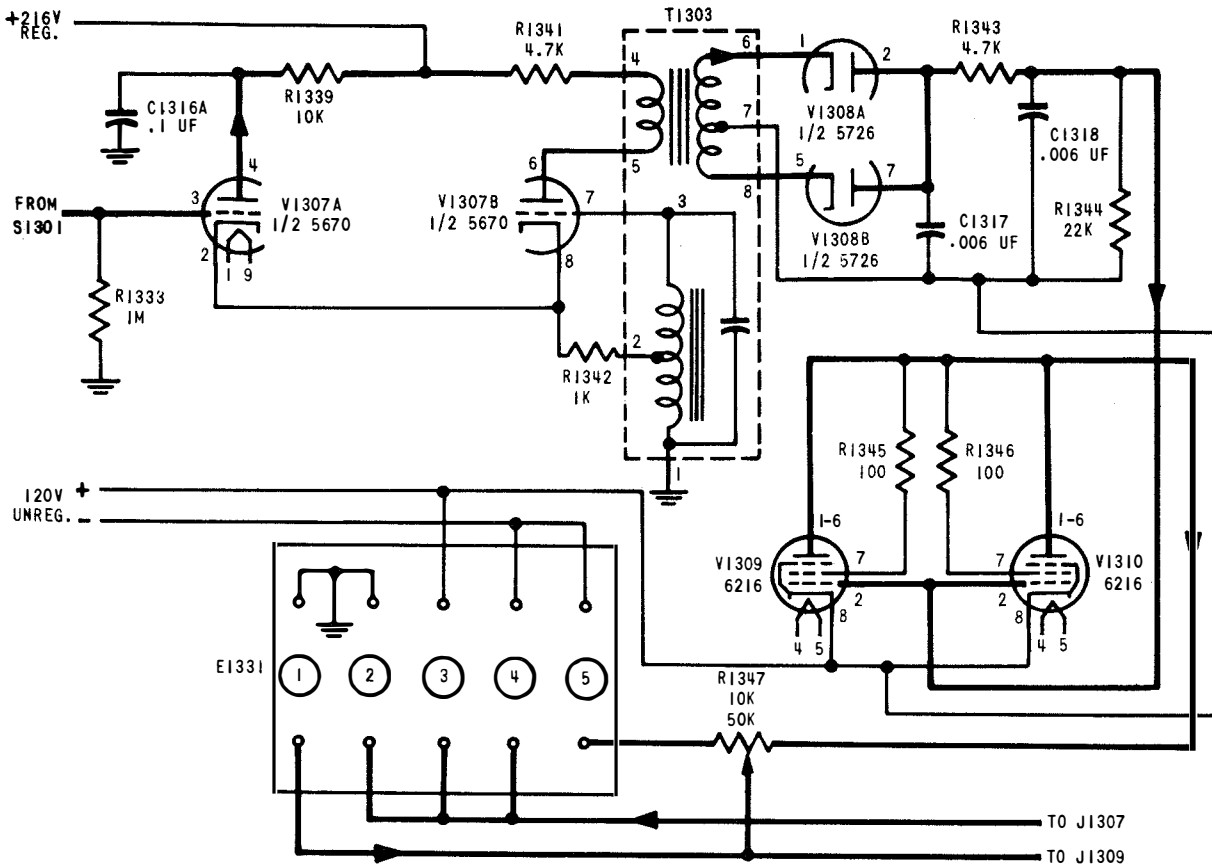


Figure 2-13. Output Key Circuit for Neutral Telegraph Loop

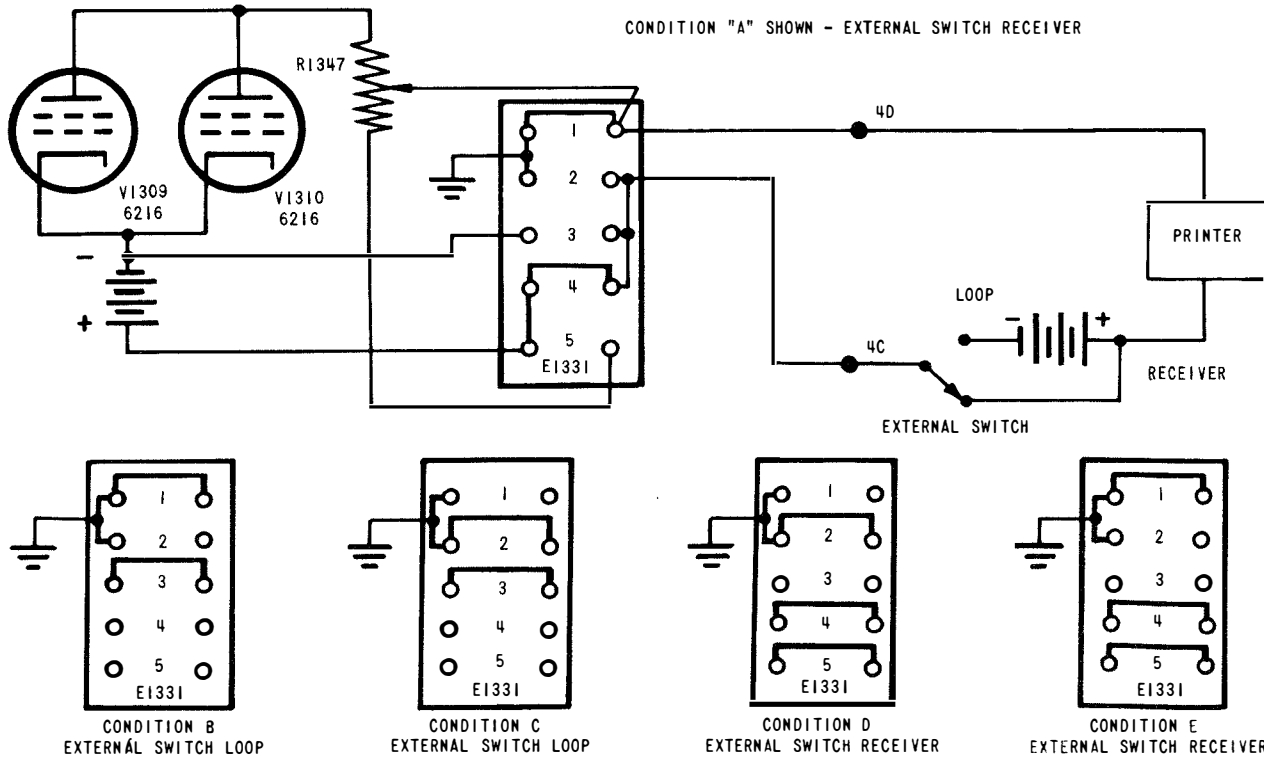


Figure 2-14. Output Key Circuit Terminal Strapping Variations

(a) When a positive voltage is applied to the grid of tube V1307A, the cathode of V1307B is AC grounded through V1307A by the 0.1 mf capacitor C1316. V1307B will not oscillate, no DC output voltage is obtained from rectifier tube V1308 and zero voltage bias is placed on the grids of tubes V1309 and V1310. Tubes V1309 and V1310 will have low DC plate resistances and DC current will flow in the output loop dependent upon the loop voltage and the loop resistance. Loop current potentiometer R1347 is used to adjust the desired loop current for loop current operation or the desired loop voltage for loop voltage operation.

(b) When a negative voltage is applied to the grid of tube V1307A, the tube is cut off. The cathode of V1307B is then returned to ground through the 1000 ohm resistor R1342 and a portion of the oscillator coil in transformer T1303. The portion of the coil provides a grid to cathode feed back loop. The oscillator coil is tuned to oscillate at 15 kc. The 15 kc output of tube V1307B is isolated by means of the output section of V1303. The rectified voltage produced across the 22,000 ohm resistor R1344 of -55 volts is sufficient to cut off tubes V1309 and V1310 thereby reducing the loop current to zero.

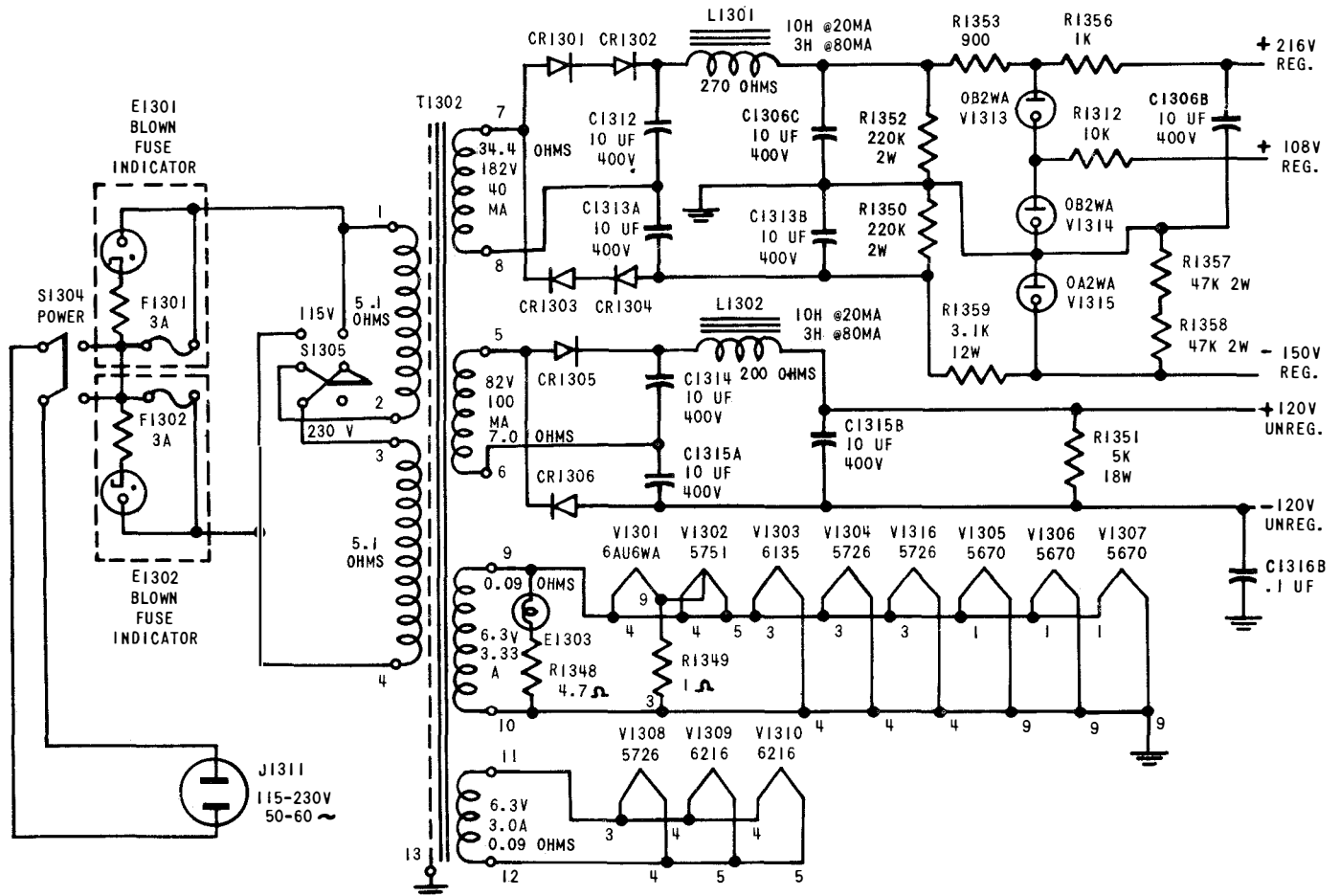
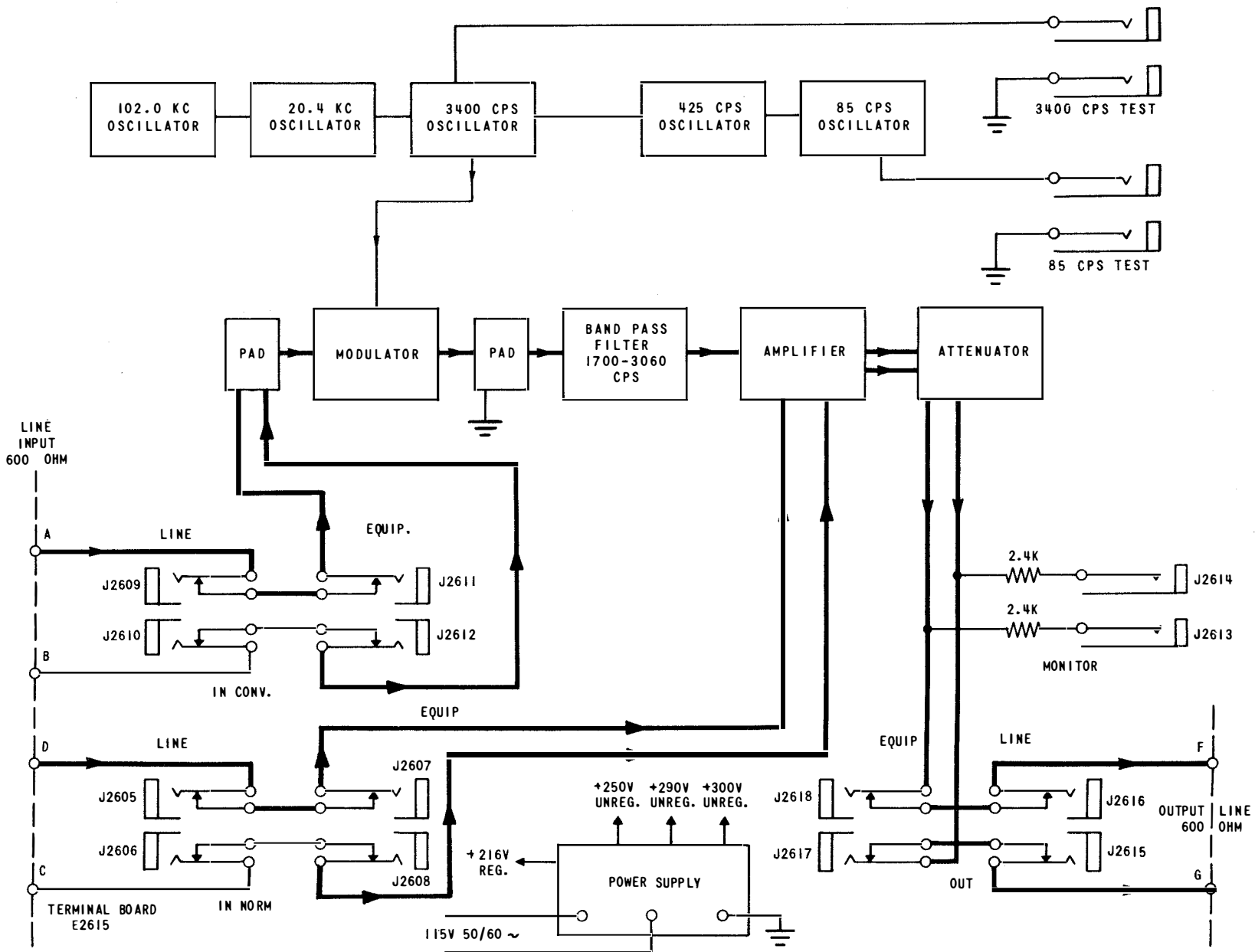


Figure 2—15. Schematic Diagram of Telegraph Carrier Receiver Power Supply Circuit

g. POWER SUPPLY CIRCUIT. The schematic diagram of the power supply circuit for the Telegraph Carrier Receivers R525A/FCC-3 through R536A/FCC-3 is shown in 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 silicon diode type voltage doubler power supply is used to provide 480 volts DC. The output is filtered by the 10 henry choke L1301 and 10 mf capacitors C1306C and C1313B. Two 220,000 ohm resistors

R1350 and R1352 are used as bleeders. Two 0B2WA type voltage regulators V1313 and V1314 and one 0A2WA type voltage regulator, together with a 900 ohm voltage dropping resistor R1353 and a 3100 ohm voltage dropping resistor R1359, provide regulated outputs of +216 volts, +108 volts, and -150 volts. The 1000 ohm resistor R1356 and the 10 mf capacitor C1306B provide plate decoupling. The two 47,000 ohm resistors R1357 and R1358 are placed in series across tube V1315 and limit its current. A separate silicon diode type voltage doubler power supply is used to provide the 120 volt DC telegraph loop supply voltage. Filtering is obtained by a swinging choke L102, a 10 mf filter capacitor C121B, and 5000 ohm bleeder resistor R122.



NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
THEORY OF OPERATION

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

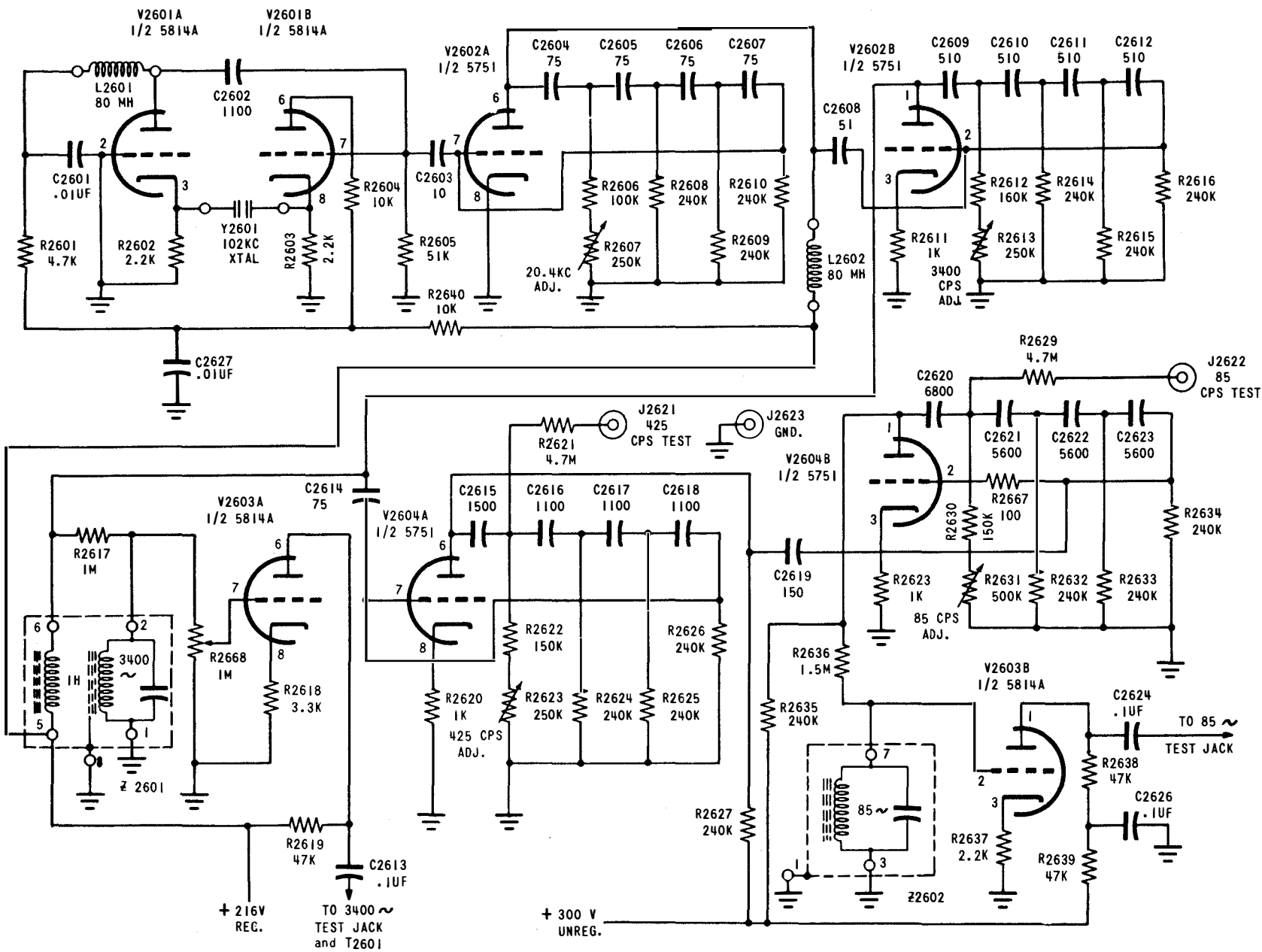


Figure 2-17. Schematic Diagram of Oscillator and Divider Circuits of Frequency Converter CV-243A/FCC-3

ORIGINAL

**2-4. BASIC CIRCUITS OF THE ELECTRONIC
FREQUENCY CONVERTER CV-243A/FCC-3.**

a. **BLOCK DIAGRAM.** Figure 2-16 shows the principal circuits of Electronic Frequency Converter CV-243A/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 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 5814A 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 5751, 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 5751, operates similarly to V2602A, except C2609, C2610, C2611, and C2612 are 510 mmf capacitors; R2614, R2615 and R2616 are 240,000 ohm 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 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 5814A 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 5751 type tube, with supporting components is a phase shift oscillator with its phase shift network adjusted for free-running about 425 cycles. 3400 cycle energy is coupled by C2614, 75 mmf, to 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 5751 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.

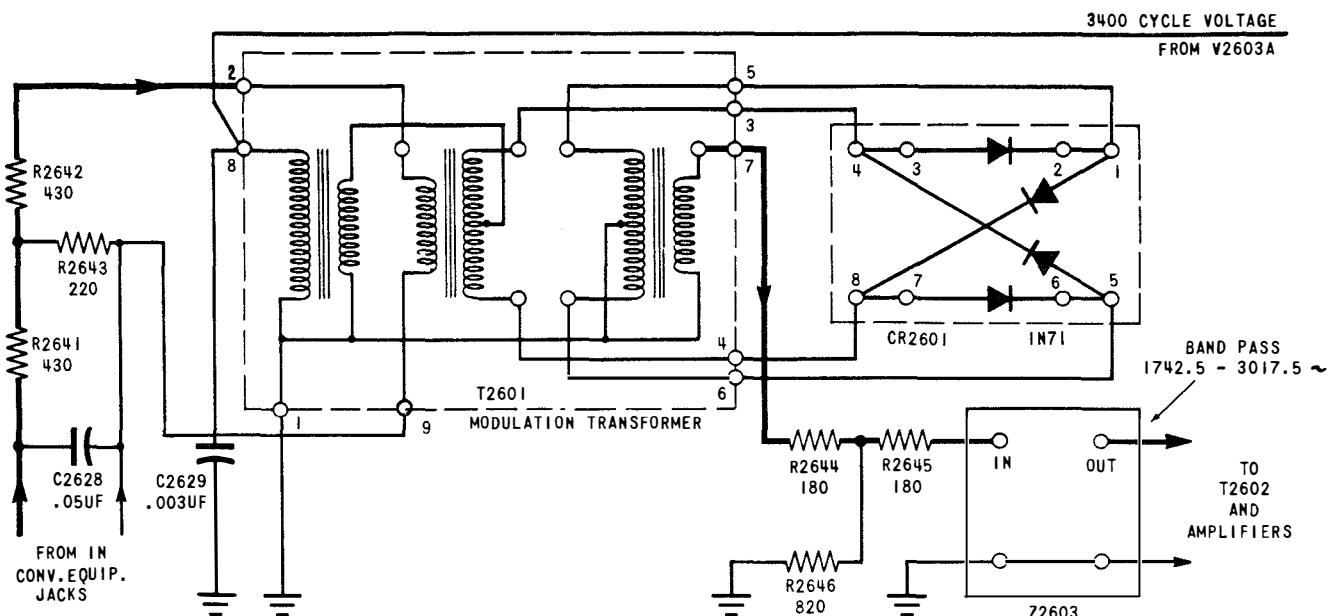


Figure 2-18. Schematic Diagram of Modulator and Filter Circuits of Electronic Frequency Converter CV-243A/FCC-3

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 pass band 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 and IN NORM lines for testing and patching purposes. Neither side of these lines are 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-243A/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 5751 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, 5814A 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 feed-

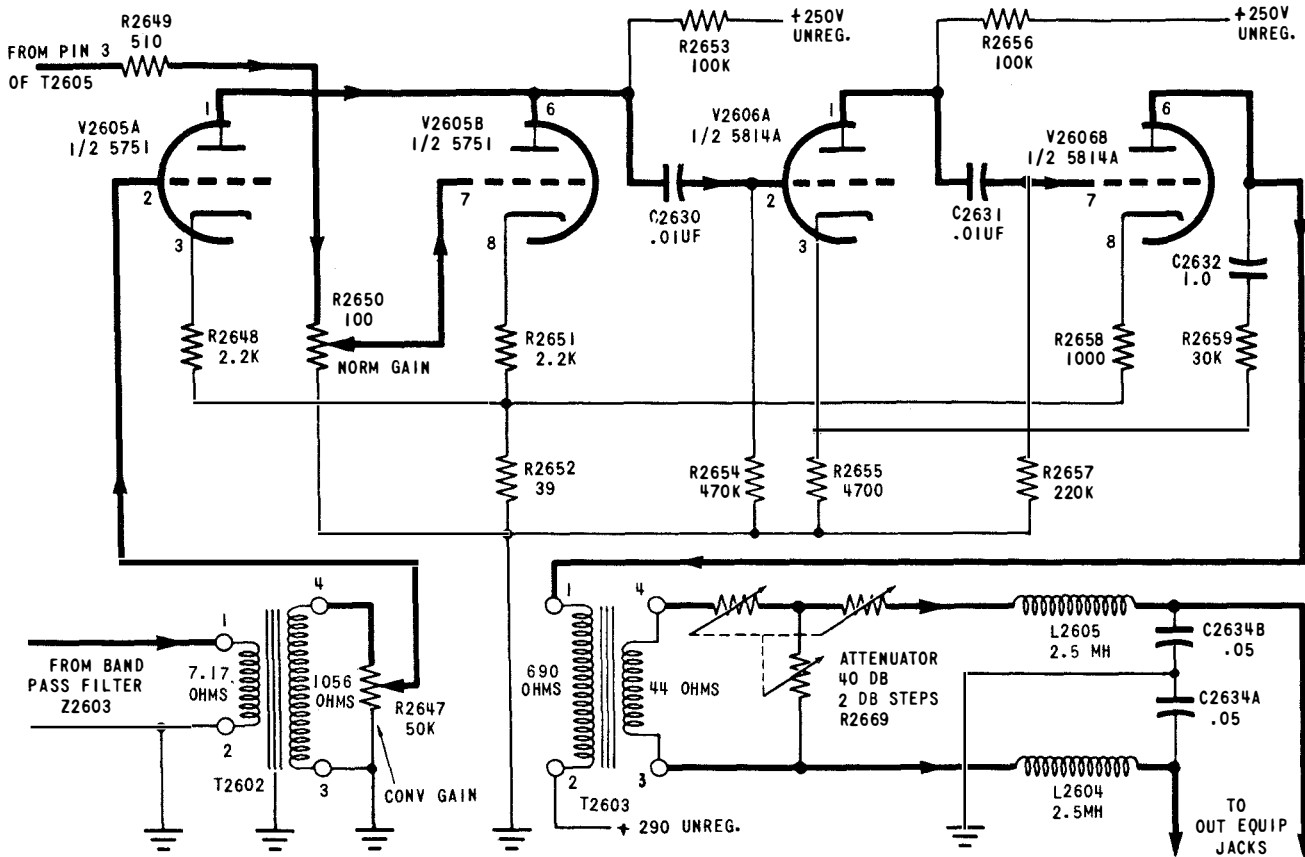


Figure 2-19. Schematic Diagram of Amplifier of Electronic Frequency Converter CV-243A/FCC-3

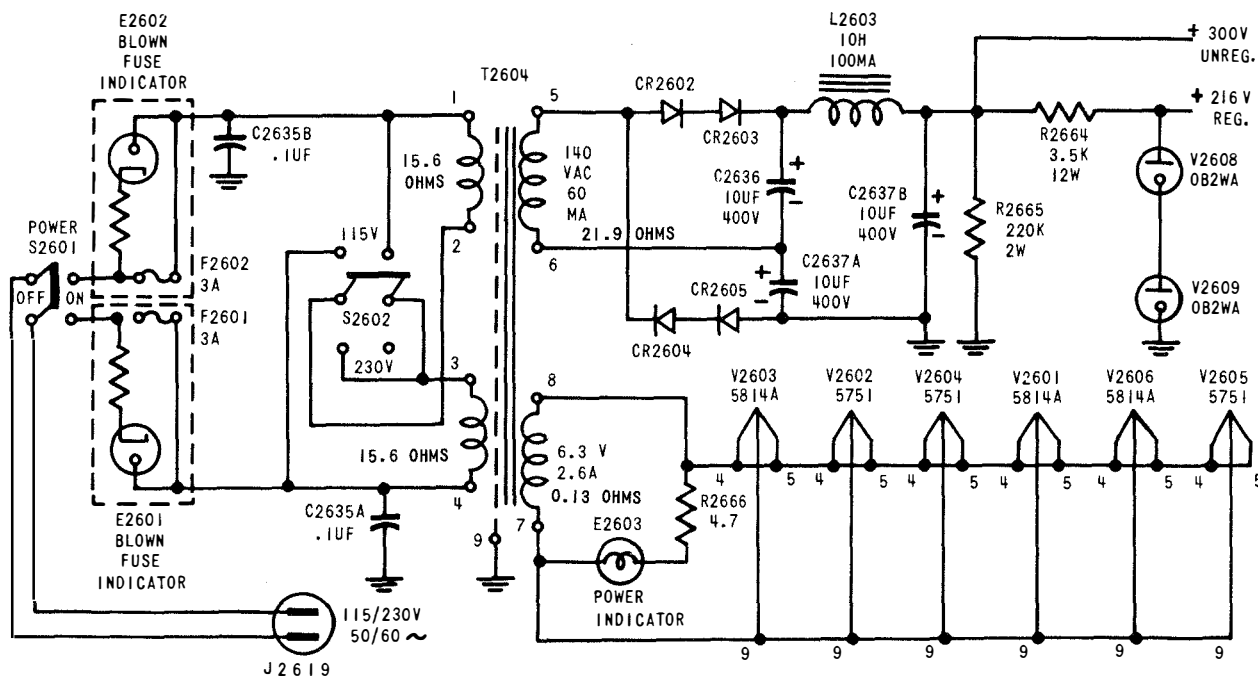


Figure 2-20. Schematic Diagram of Power Supply of Electronic Frequency Converter CV-243A/FCC-3

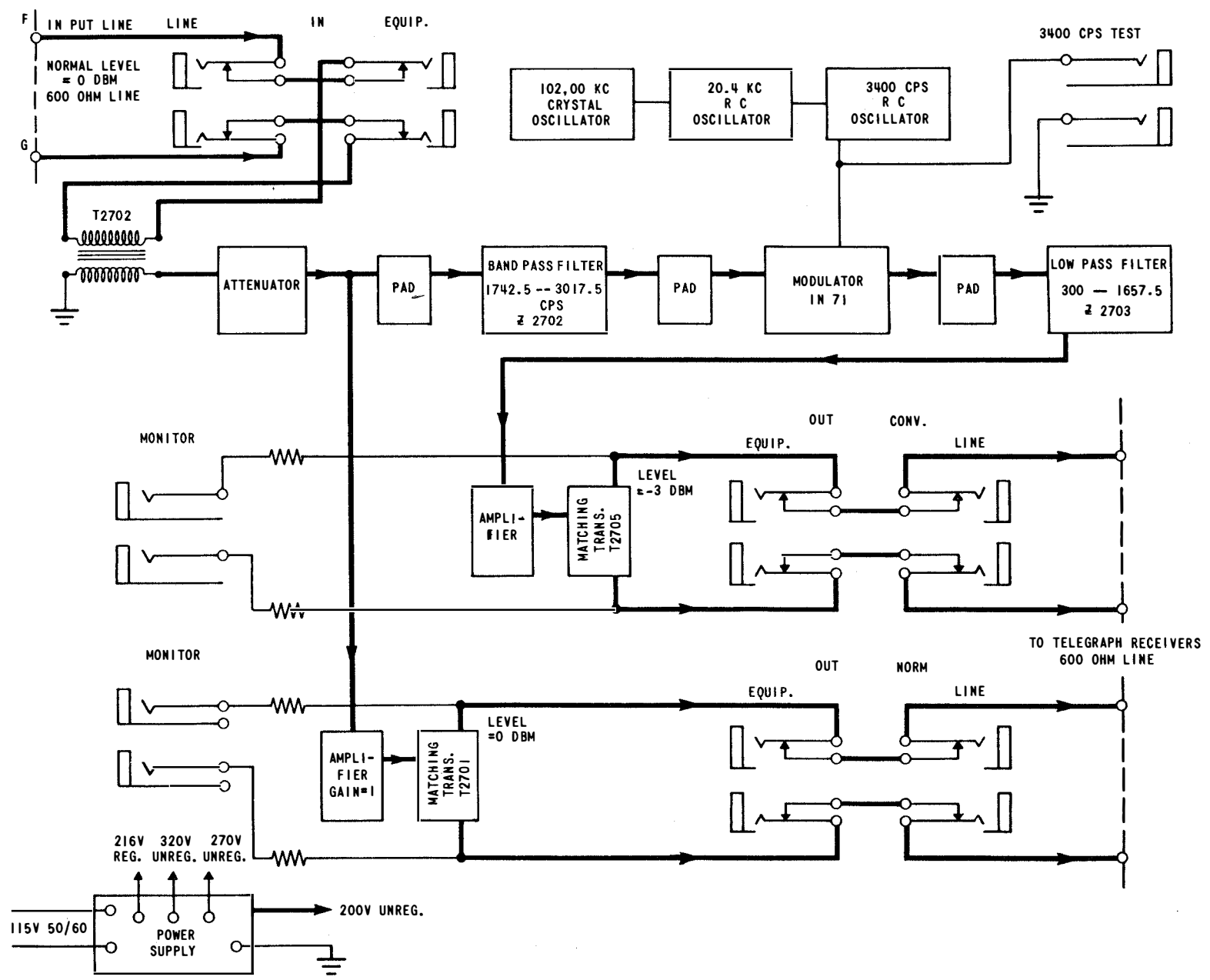


Figure 2-21. Block Diagram of Electronic Frequency Converter CV-244A/FCC-3

back 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 the power supply circuits for the Electronic Frequency Converter CV-243A/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 are 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 47 ohm dropping resistor R2666 increases the life of the power indicator lamp E2603. A silicon diode type voltage doubler power supply is filtered by a 10 henry choke L2603 and a 10 mf capacitor C2637B with a 220,000 ohm bleeder resistor R2665. The output of this supply is +300 volts unregulated. A +216 volt regulated voltage is obtained by the two 0B2WA type tube voltage regulators V2608 and V2609 and 3500 ohm dropping resistor R2664. The +300 volts is supplied to the amplifier circuits through decoupling resistors and capacitors.

2-5. BASIC CIRCUITS OF THE ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3.

a. **BLOCK DIAGRAM.** - The block diagram of figure 2-21 shows the principal circuits of the Electronic Frequency Converter CV-244A/FCC-3. This equipment accepts telegraph carrier signals from the Electronic Frequency Converter CV-243A/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 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-243A/FCC-3 section (paragraph 4b, section 2). These circuits are the same in both units except that the CV-244A/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-244A/FCC-3, figure 7-21, the incoming signal is transformed with a 1:1 line isolation transformer T2702 and attenuated with a

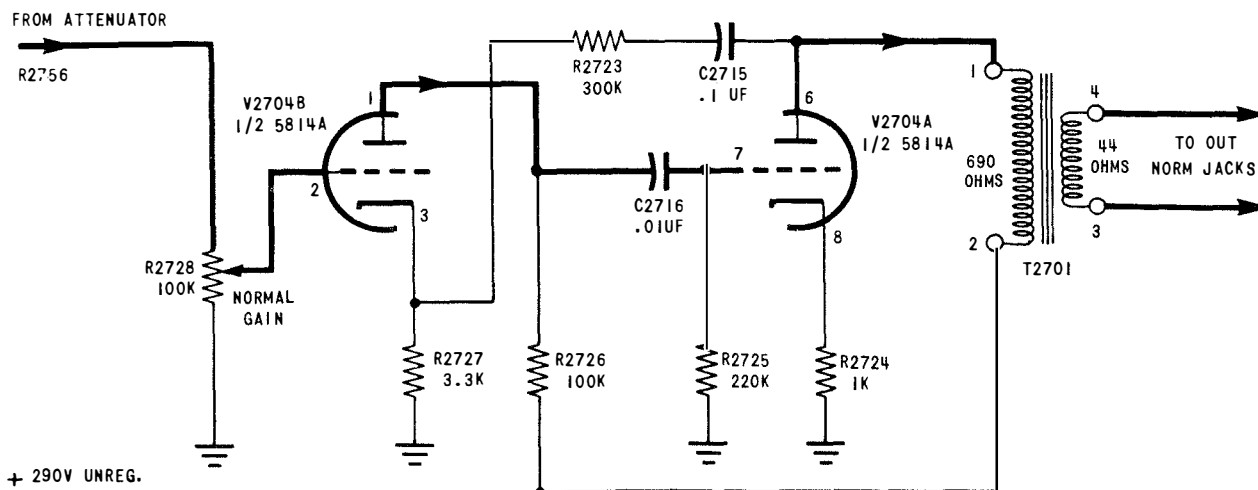


Figure 2-22. Schematic Diagram of Normal Line Amplifier

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-243A/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-244A/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-244A/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 5814A 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 sche-

matic diagram of figure 2-23 shows the amplifier for converted signals. This amplifier consists of three 5814A type triode stages and is similar to the amplifier in the Electronic Frequency Converter CV-243A/FCC-3, except that the amplifier in the CV-244A/FCC-3 has a 5814A in the input stage instead of a 5751. Performance of the two amplifiers is about the same. In the CV-244A/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-243A/FCC-3 (paragraph 4e, section 2) which is exactly the same as the power supply in the CV-244A/FCC-3.

2-6. CIRCUITS OF TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/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

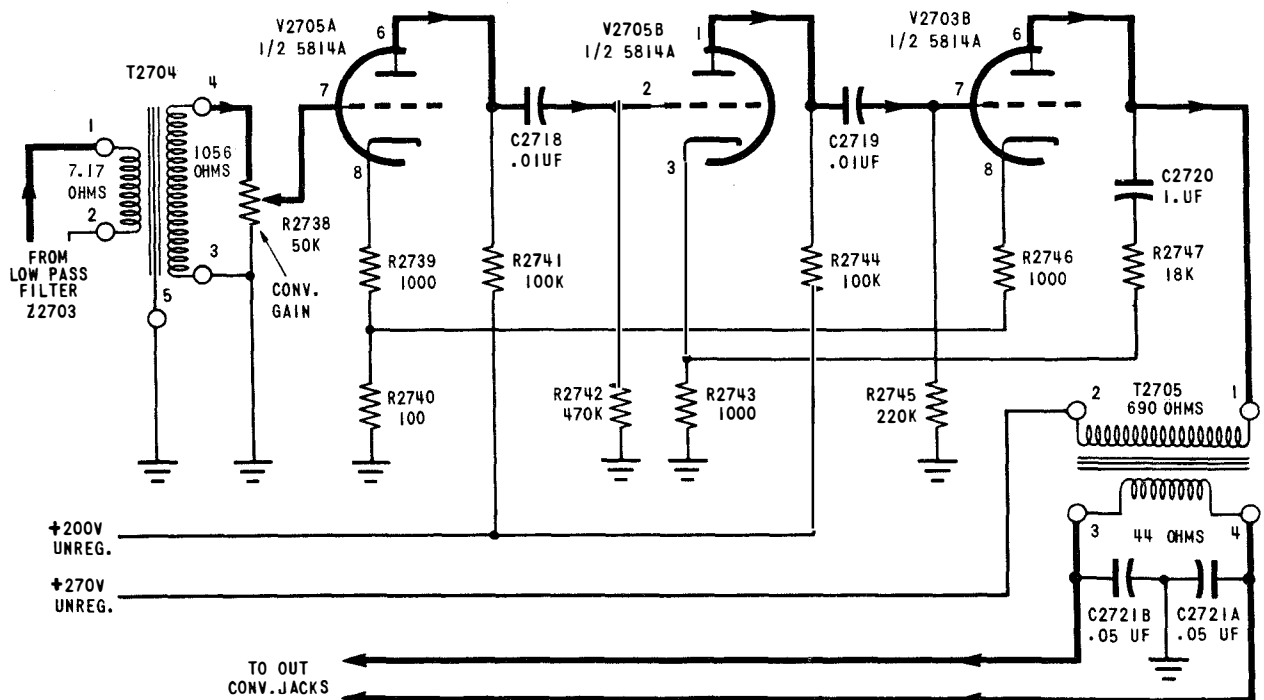


Figure 2-23. Schematic Diagram of Amplifier for Converted Signals

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 14 receptacles designed to supply power to the 13 units mounted in the cabinet, and transformer T2501. The connector Assembly 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 E2507 and E2508. 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 to the right of the fan assembly and is accessible when the air filter is removed. The switch is provided with a clamp to prevent accidental changing. A schematic diagram of the cabinet wiring is provided on rear surface of the fan housing.

2-7. 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 intermodulation 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. The output of each filter is balanced with respect to an ungrounded center tap. Figure 2-24 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 db 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. The input of each filter is balanced with respect to an ungrounded center tap. Figure 2-25 shows the frequency response of the receiver filters.

The Electronic Frequency Converter CV-243A/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-244A/FCC-3 uses the same band-pass filter as used in the Electronic Frequency Converter CV-243A/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.

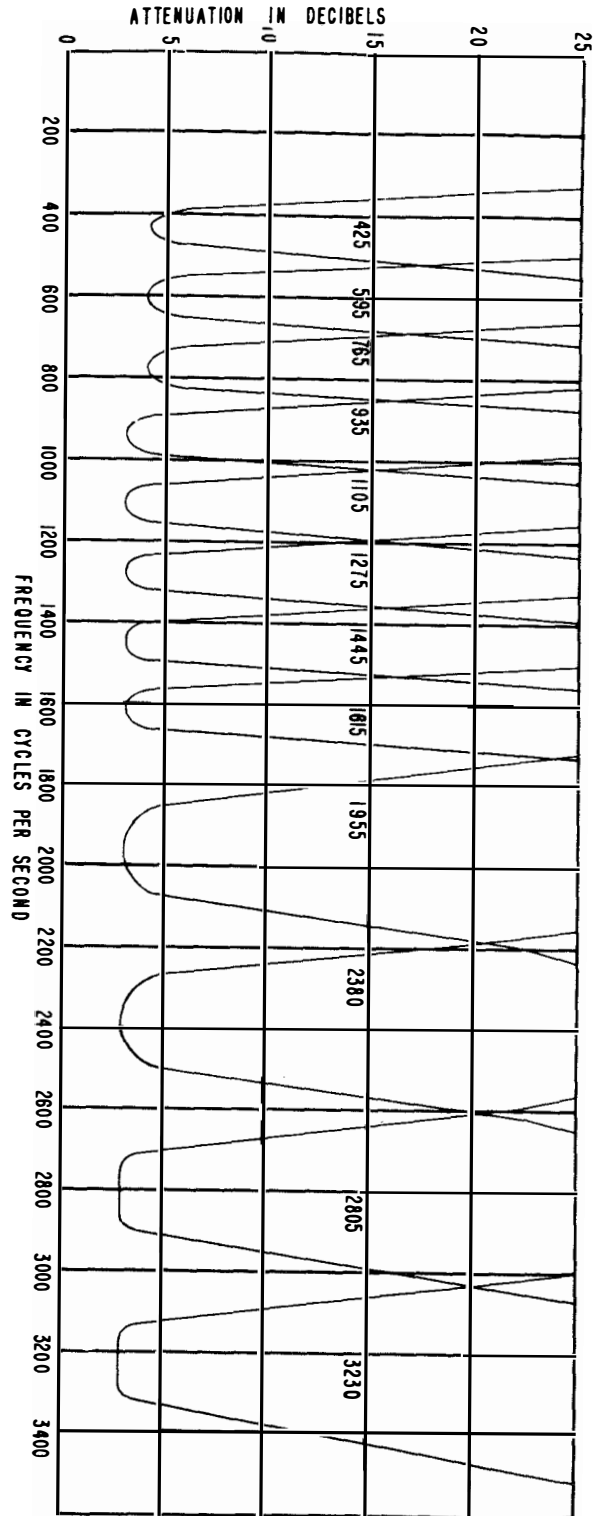


Figure 2—24. Curves Showing the Frequency Response of Telegraph Carrier Transmitter Band-Pass Filters

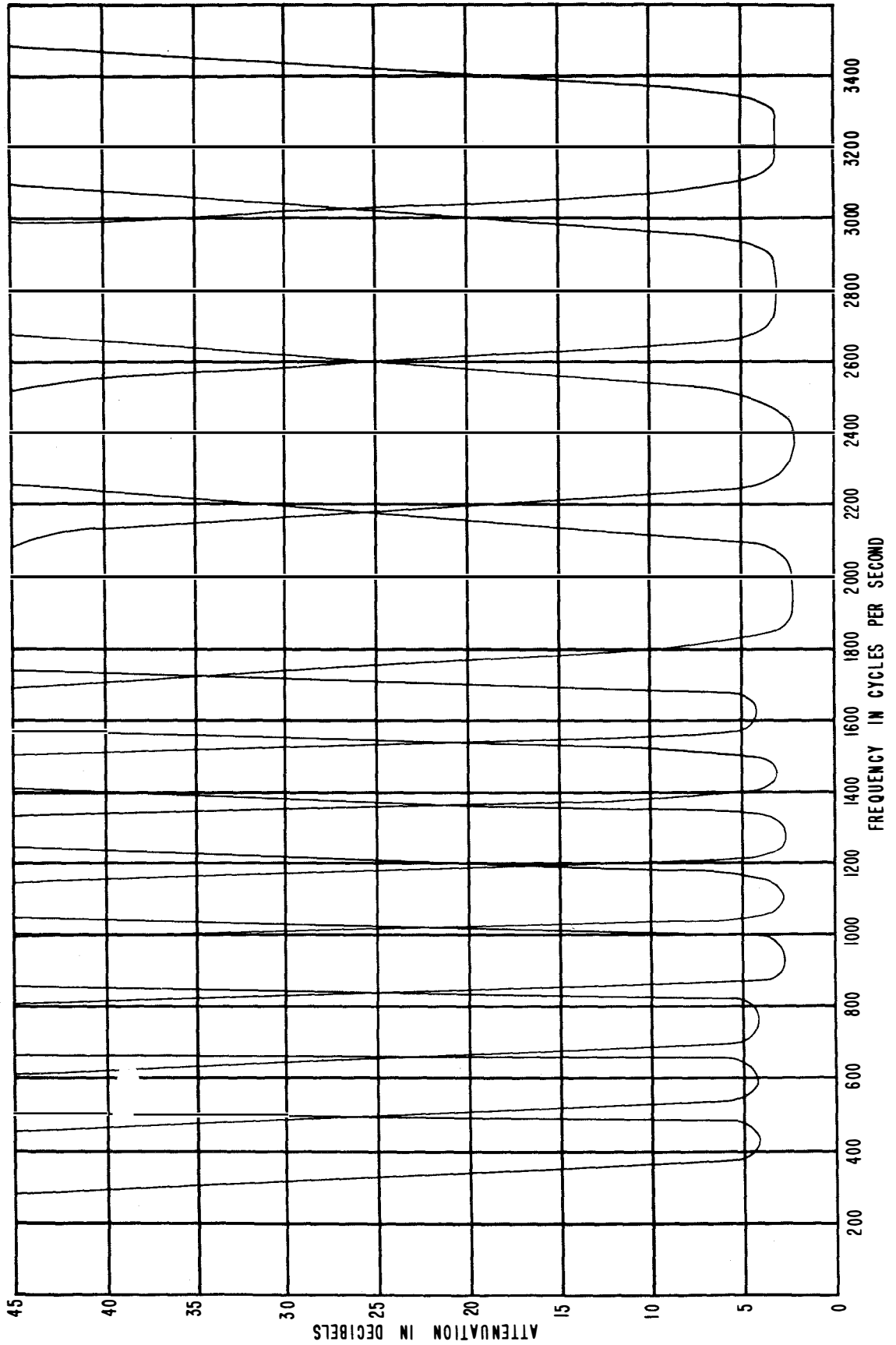


Figure 2—25. Curves Showing the Frequency Response of Telegraph Carrier Receiver Band-Pass Filters

ORIGINAL

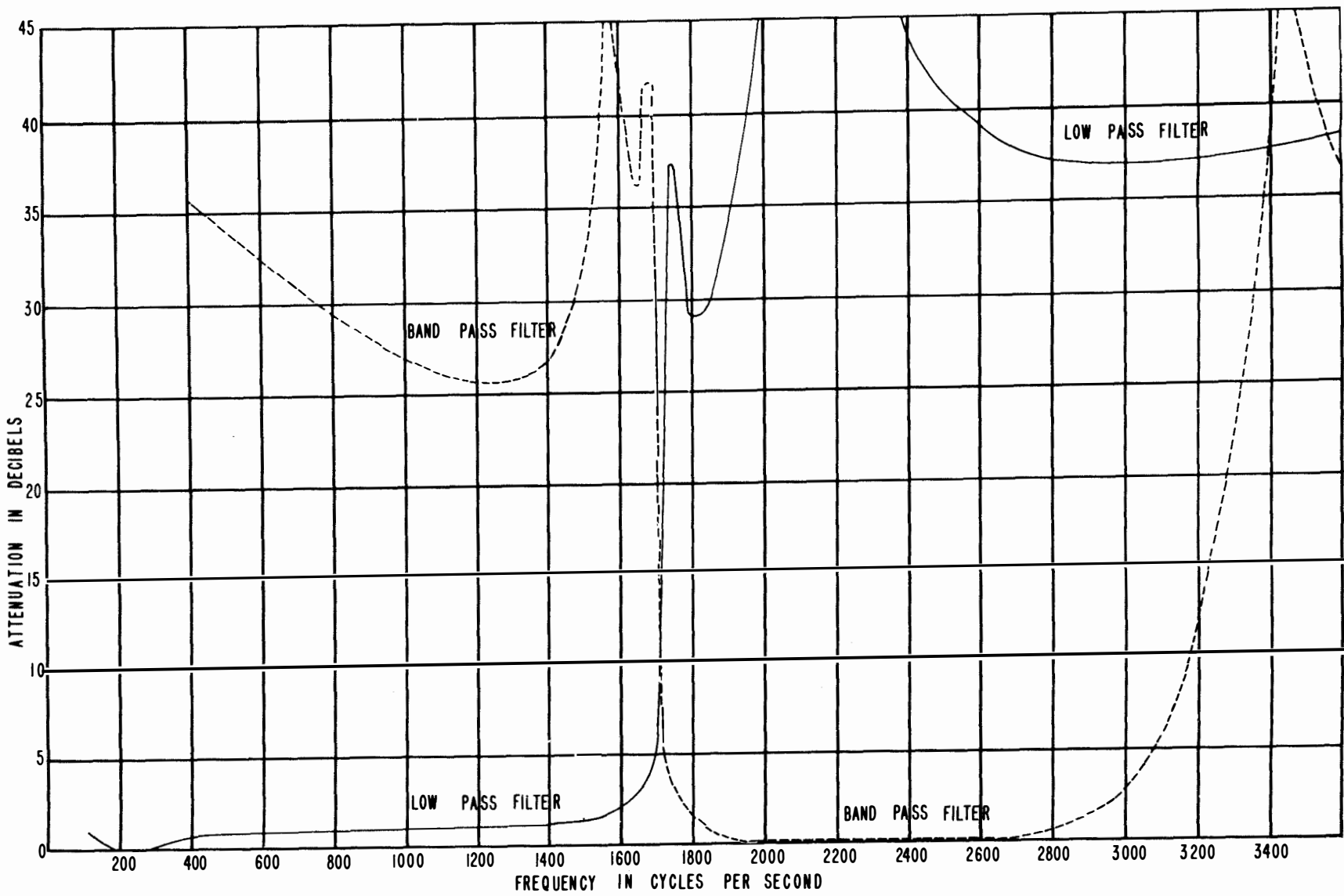


Figure 2-26. Curves Showing the Frequency Response of Group Modulator Band-Pass Filter and Low-Pass Filter

SECTION 3 INSTALLATION

3-1. UNPACKING.

The Telegraph Carrier Terminal AN/FCC-3A 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.

3-2. 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 com-

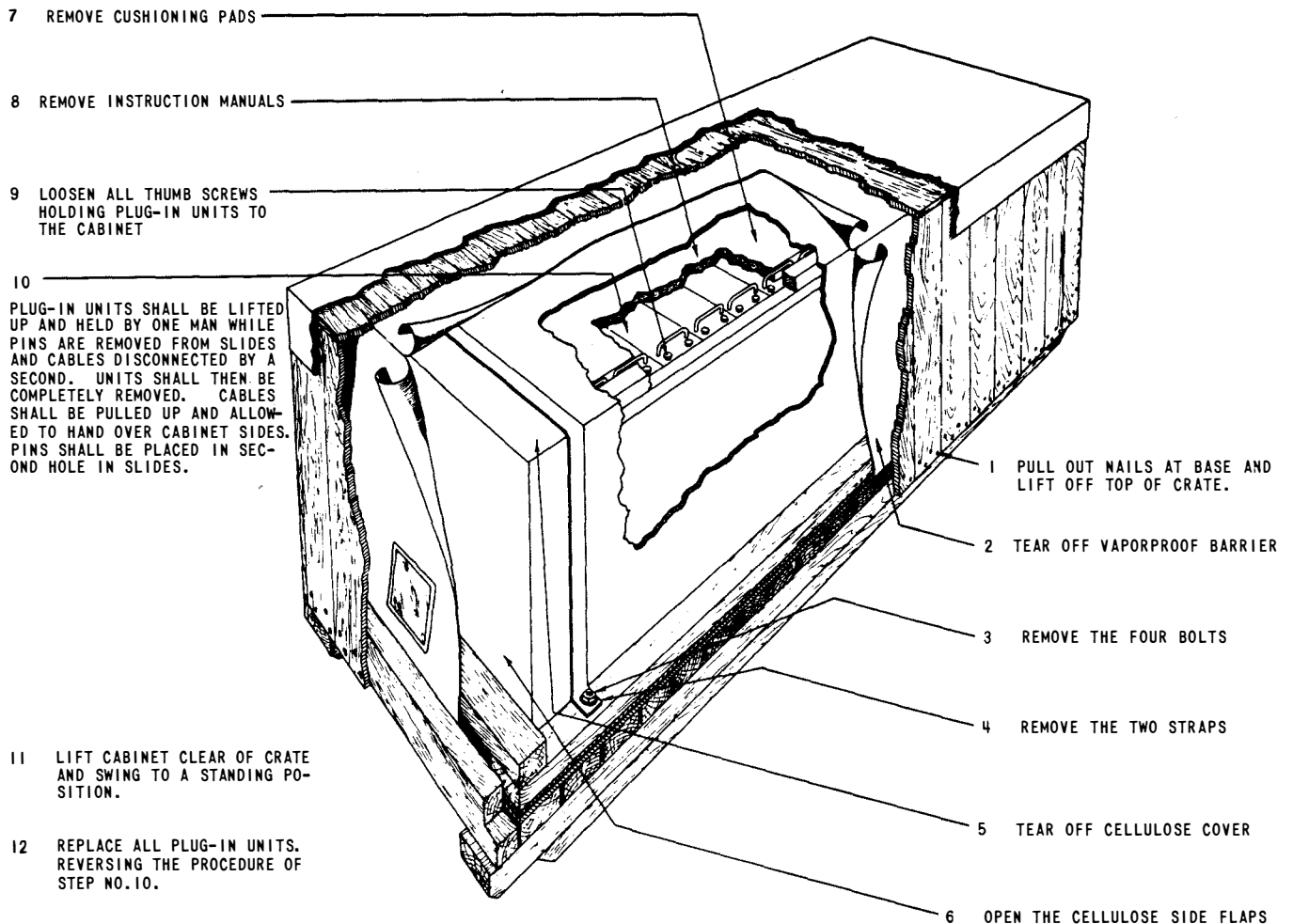


Figure 3—1. Telegraph Carrier Terminal AN/FCC-3A, Unpacking Procedure

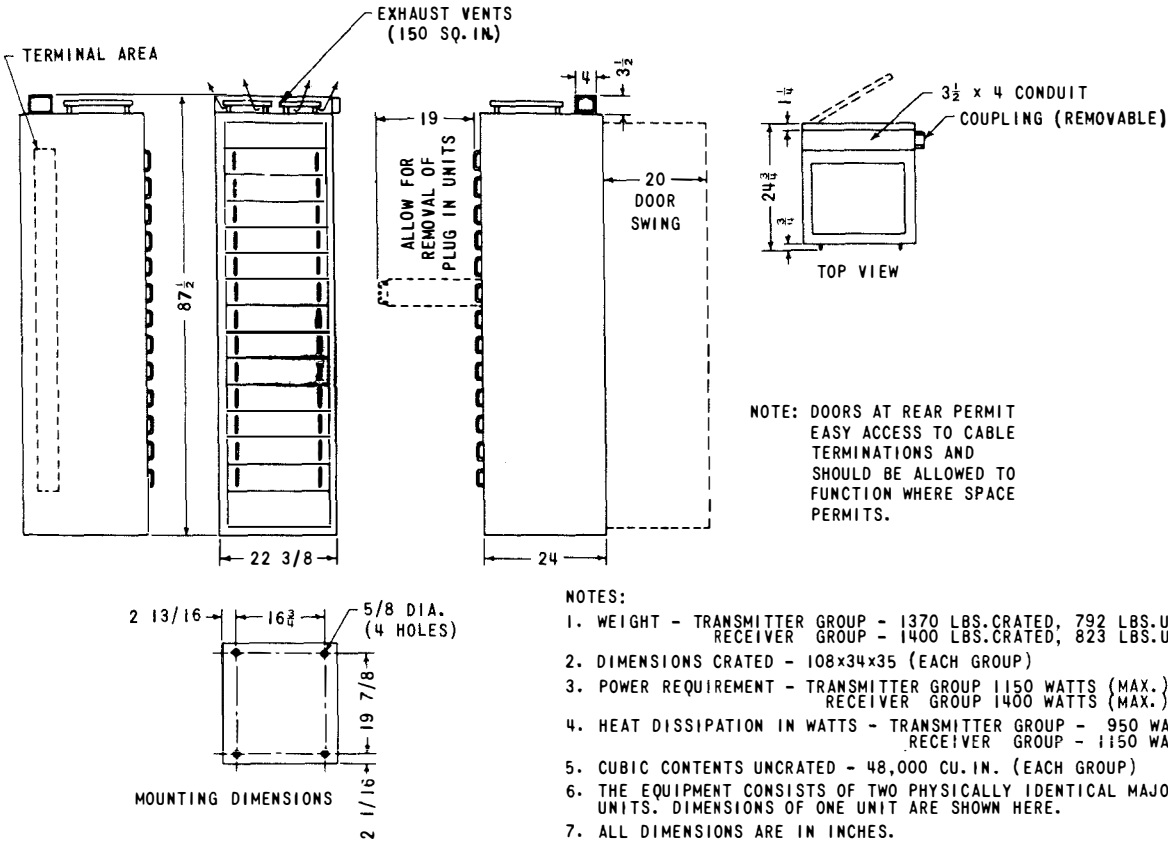


Figure 3-2. Outline Drawing of Telegraph Carrier Terminal AN/FCC-3A

ponents resulting in damage to the unit or cable. Remove the slide limit screws from their threaded holes. When loosened screws may be left in top hole, 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-3A. 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 right side of the fan housing and is accessible when the air filter is removed.

The following stranded hook-up wire meeting the requirements of Specification MIL-W-16878 should be used: Incoming power line No. 12AWG; local lines to telegraph machines No. 18AWG; internal connections

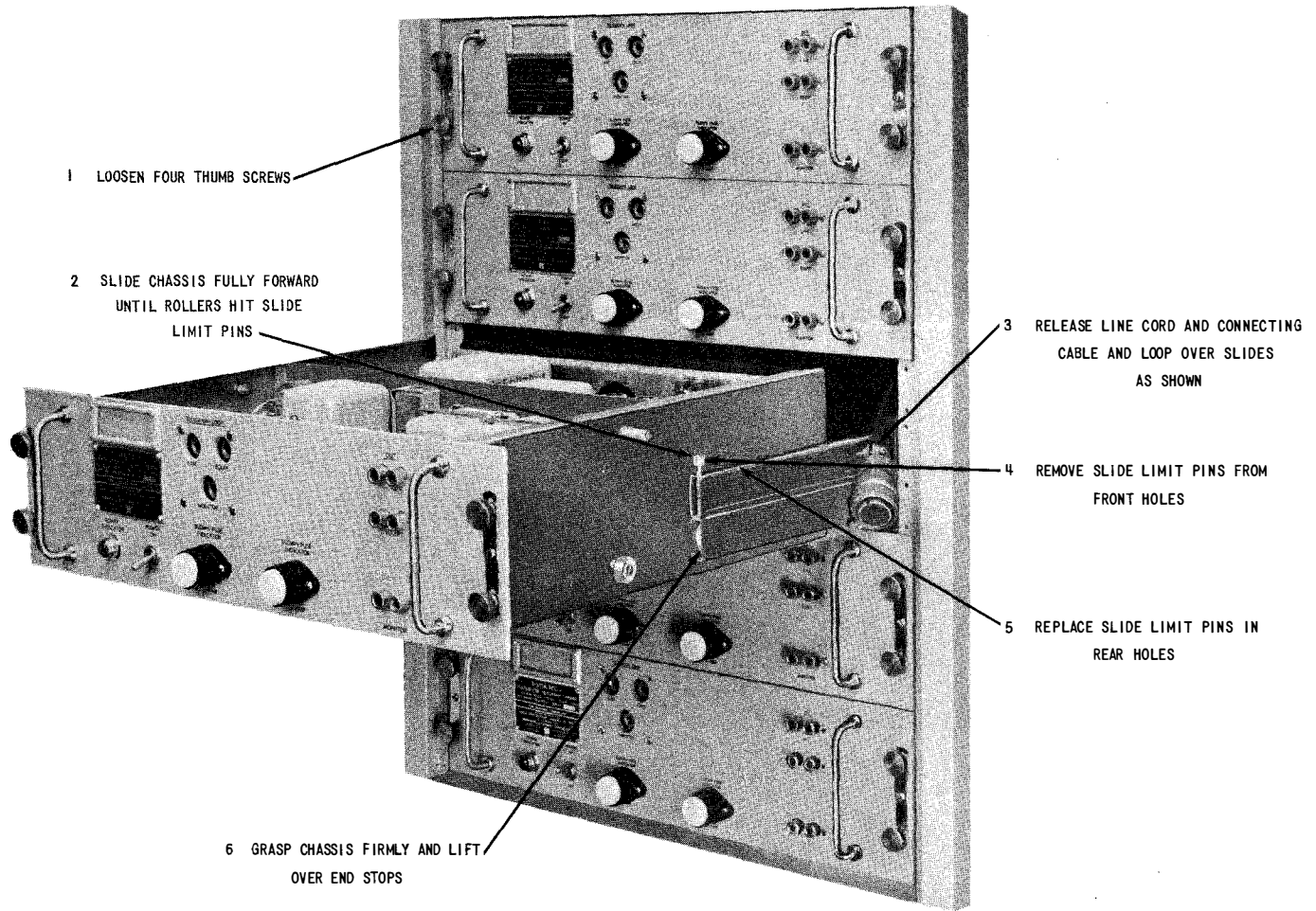


Figure 3—3. Operation of Slide Assembly

between terminal blocks No. 20AWG. 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 No. 4 solder lug insulated by a vinyl sleeve pulled over the shank. Figure 3-6 shows the interconnection 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 the side and 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.

3-3. INITIAL ADJUSTMENTS.

a. POSITION OF CONTROLS. - The Telegraph Carrier Terminal AN/FCC-3A 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.

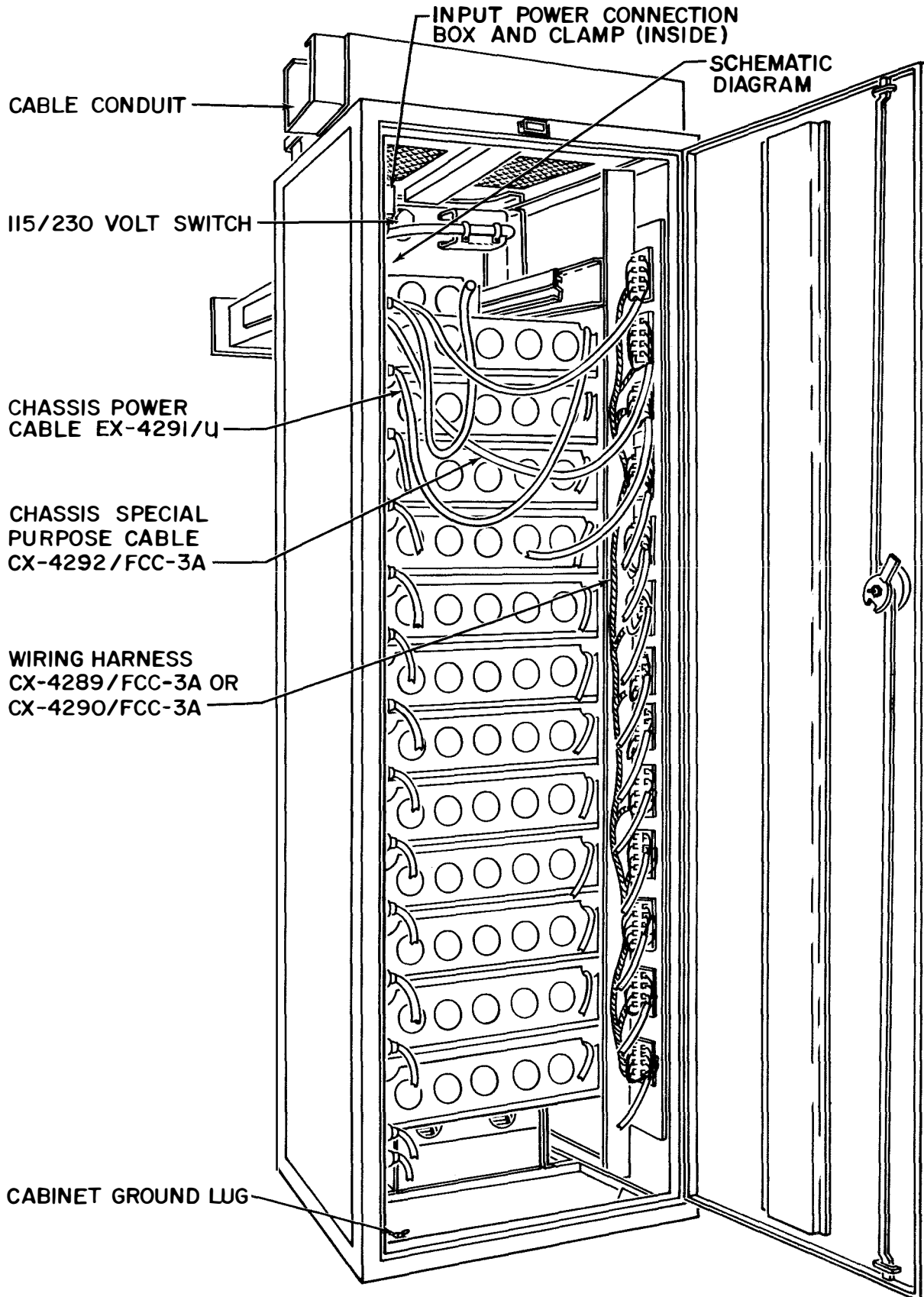


Figure 3-4. Rear View of Cabinet with Wiring

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.
Output Loop Terminal Board Strapping. (See Figure 2-14.)	E1331	Output; DC pulses 20 or 60 ma neutral telegraph loop either side grounded with battery supplied from loop, DC pulses of 20 or 60 ma neutral telegraph loop negative side grounded with battery supplied from receiver, DC pulses of 30 to 130 volts, 20,000 ohms input impedance either side grounded with battery supplied from receiver.
<p>CAUTION</p> <p>Be sure power is off to Receiver before changing strapping.</p>		<p>A. Jumper across terminal 1 and across terminal 4 for 20 to 60 ma neutral telegraph loop negative side grounded with battery supplied from receiver.</p> <p>B. Jumper across terminal 1 and across terminal 3 for 20 to 60 ma neutral telegraph loop positive side grounded with battery supplied from loop.</p> <p>C. Jumper across terminal 2 and across terminal 3 for 20 to 60 ma neutral telegraph loop negative side grounded with battery supplied from loop.</p> <p>D. Jumper across terminal 2, terminal 4, and terminal 5 for 30 to 130 volts, 20,000 ohms impedance neutral telegraph loop positive side grounded with battery supplied from receiver.</p> <p>E. Jumper across terminal 1, terminal 4, and terminal 5 for 30 to 130 volts, 20,000 ohms input impedance neutral telegraph loop, negative side grounded with battery supplied from receiver.</p>
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-243A/ FCC-3 115 to 230 volt switch	S2602	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.

TABLE 3-1. POSITION OF CONTROLS CONT'D

CONTROL	SYMBOL NUMBER	POSITION
CONV GAIN control	R2647	Set to maximum counter-clockwise position for 12 channel operation.
Electronic Frequency Converter CV-244A/ FCC-3 115 to 230 volt switch	S2702	Set at 115 volts for 115 volt operation. Set at 230 volts for 230 volt operation.

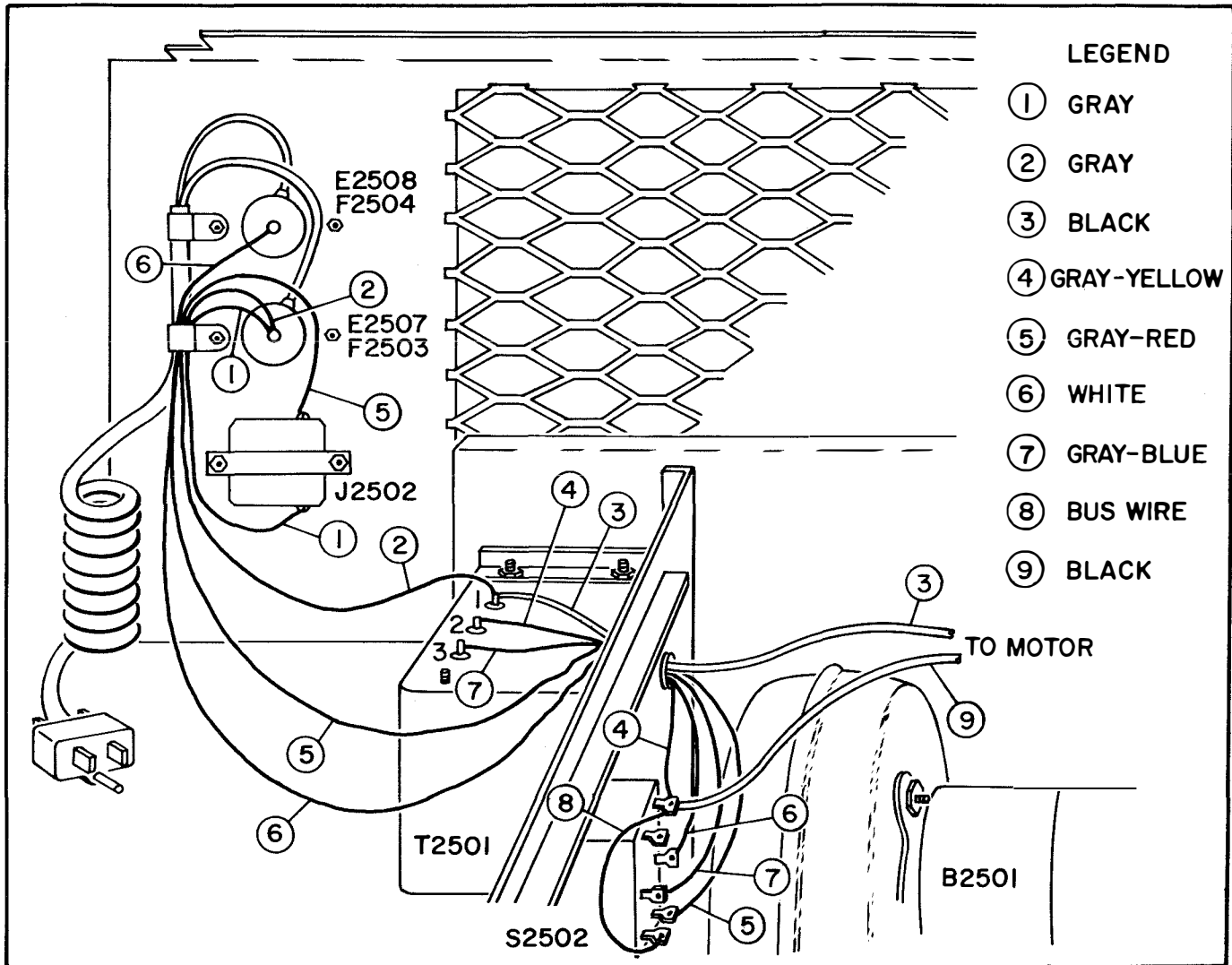


Figure 3-5. Pictorial Wiring Diagram of Cabinet Power Circuits

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 for an output reading of -10 dbm. 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-243A/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-243A/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-243A/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-243A/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 milliammeter 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-243A/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 narrow band 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. 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. The output loop strapping is initially set for 20 to 60 ma neutral telegraph, negative side grounded, battery supplied from receiver. If other operation is desired, see table 3-1 for strapping. With the equipment con-

nected 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) 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.

(6) Adjust the LOOP CURRENT potentiometer R1347 for the value of loop current as required.

(7) 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.

f. 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-3A 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 6 and 7 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-4289/FCC-3A 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 3 and 4 terminals of the receiver that has the DIVERSITY switch in position 2.

(c) Connect signal line from radio receiver to the 5 and 6 terminals of the receiver group modulator. Neither 5 nor 6 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. 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. 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 the transmitters and adjust 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 3 (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 counterclock-

wise 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 3 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-3A cabinets, and especially the Model TT-47/UG printers. Use water-pipe 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-3A equipment.

g. 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 -40 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-244A/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-243A/FCC-3 600 OHM METER	IN CONV LINE JACKS CV-243A/FCC-3 600 OHM METER	OUT EQUIP JACKS CV-243A/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-244A/FCC-3 600 OHM METER	OUT NORM EQUIP JACKS CV-244A/FCC-3 600 OHM METER	OUT CONV EQUIP JACKS CV-244A/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 channel 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

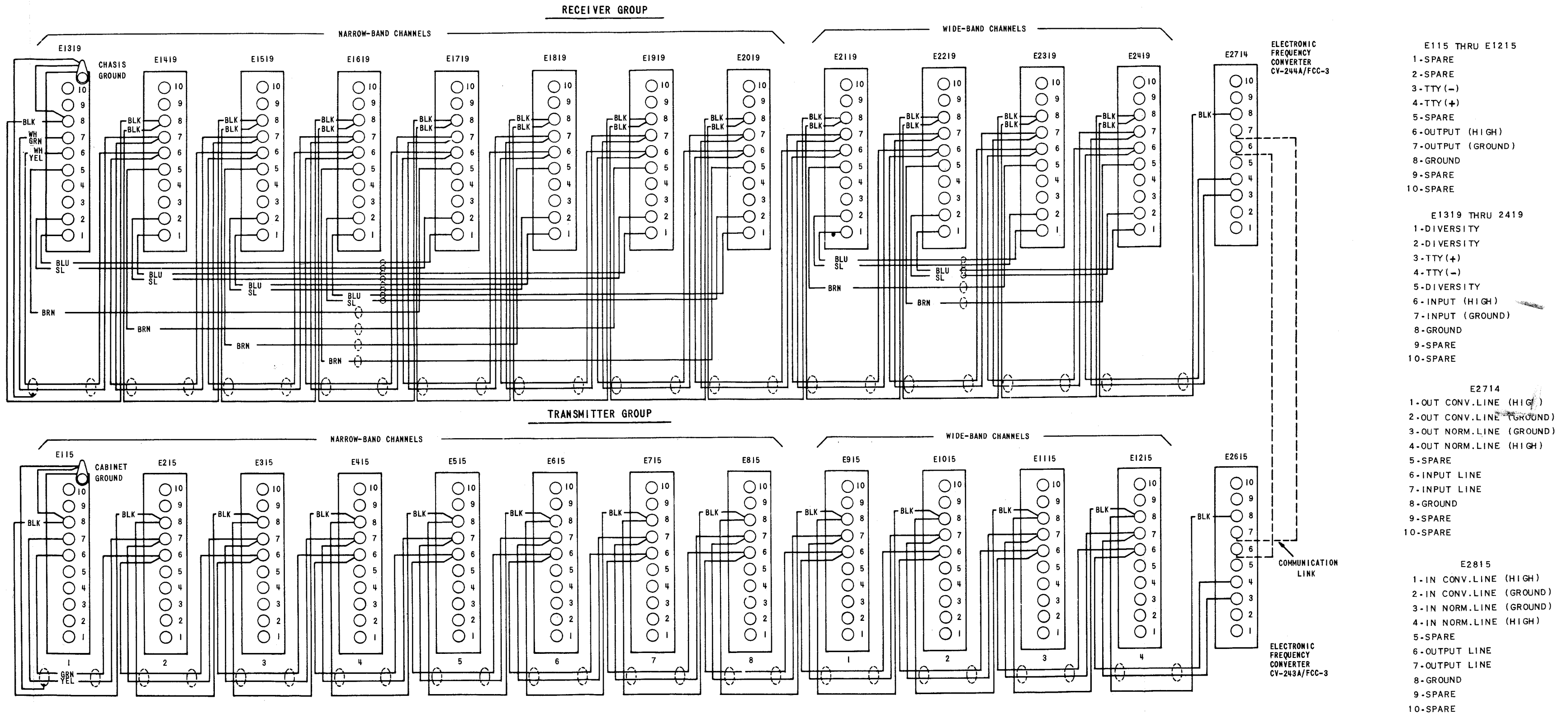


Figure 3-6. Interconnection Wiring Diagram of Cabinet Terminal Boards

SECTION 4 OPERATION

4-1. INTRODUCTION.

The Telegraph Carrier Terminal AN/FCC-3A 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-243A/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-244A/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 narrow band 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 with-

drawing 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.

4-2. OPERATION OF THE TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 THROUGH T-382A/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. 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-3A, 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. 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. 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

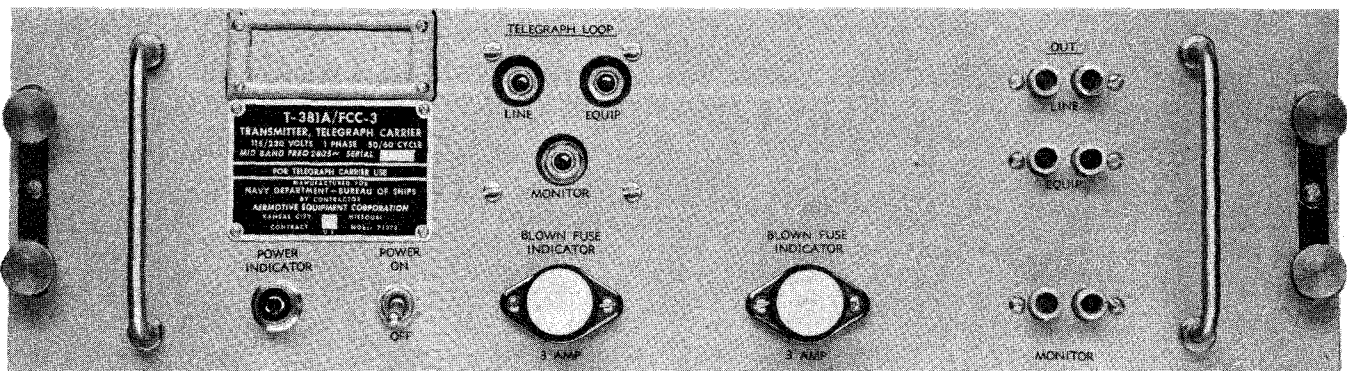


Figure 4-1. Telegraph Carrier Transmitters T-371A/FCC-3 through T-382A/FCC-3, Identification of Controls

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. The out filter of the telegraph carrier transmitter is balanced with respect to an ungrounded center tap. 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.

4-3. OPERATION OF THE ELECTRONIC FREQUENCY CONVERTER CV-243A/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-243A/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. 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 AT-

TENUATOR 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.

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

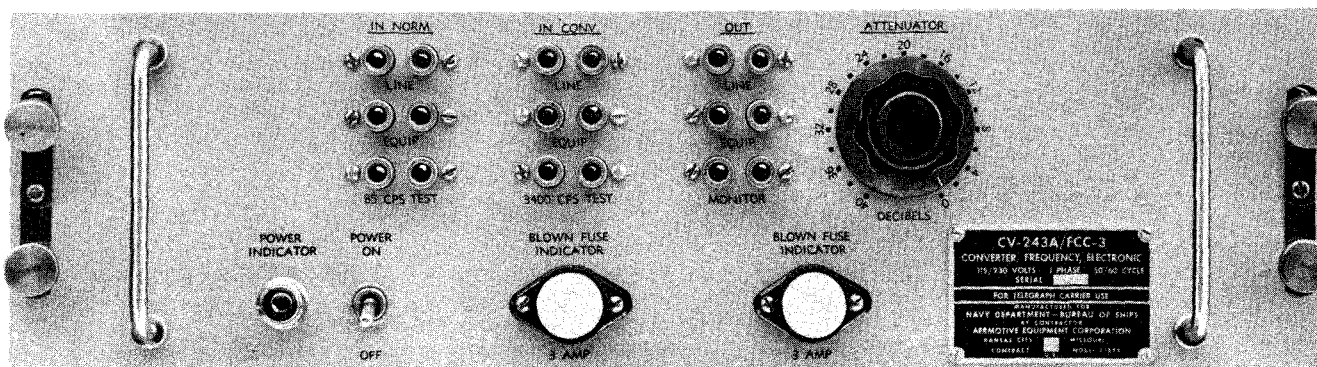


Figure 4—2. Electronic Frequency Converter CV-243A/FCC-3, Identification of Controls

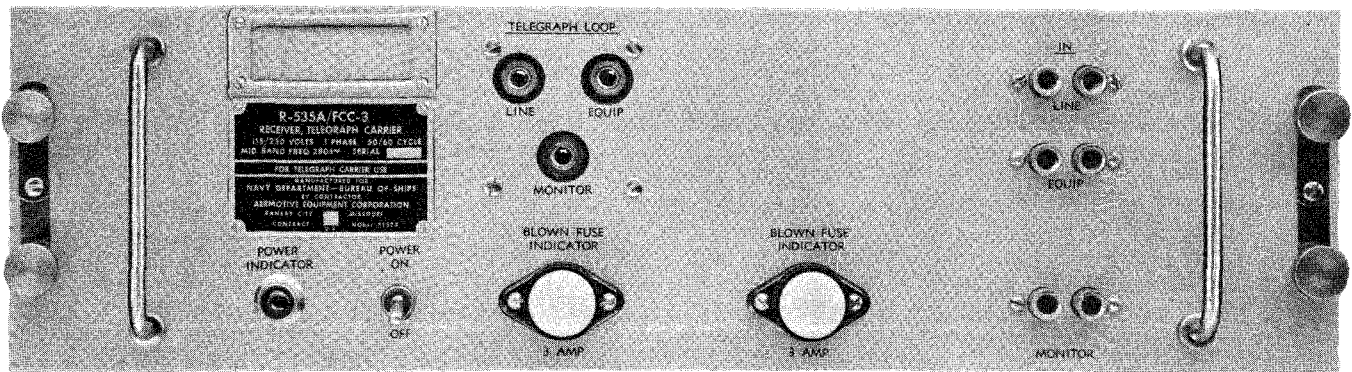


Figure 4—3. Telegraph Carrier Receiver R-525A/FCC-3 through R-536A/FCC-3, Identification of Controls

If not printing, refer to Section 7 for corrective measures. The input filter of the telegraph carrier receiver is balanced with respect to an ungrounded center tap. 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-4289/FCC-3A 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.

4-5. OPERATION OF THE ELECTRONIC FREQUENCY CONVERTER CV-244A/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-244A/FCC-3. The Electronic Frequency Converter CV-244A/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

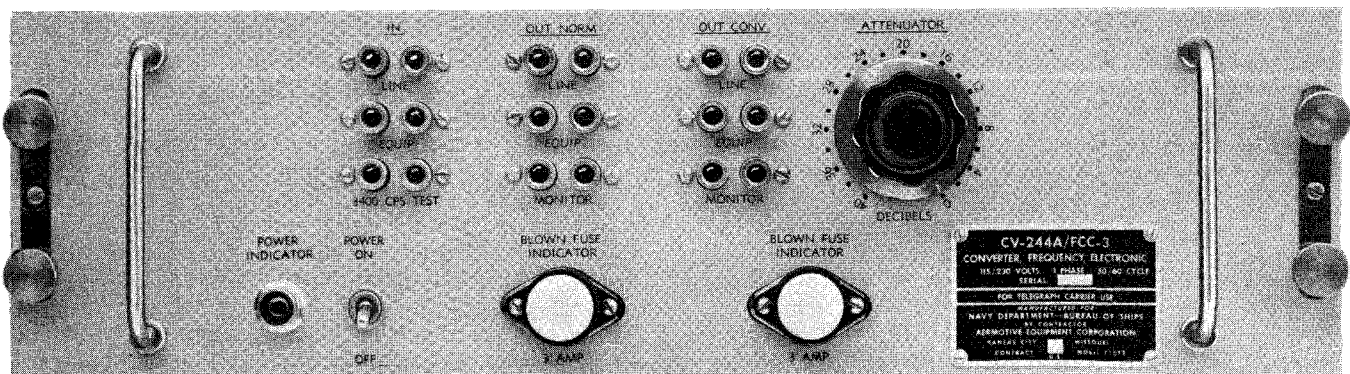


Figure 4—4. Electronic Frequency Converter CV-244A/FCC-3, Identification of Controls

the line and brings out the input leads to the Electronic Frequency Converter CV-244A/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-244A/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-244A/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 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.

4-6. 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 cannot 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 outweighs 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.

4-7. SUMMARY OF OPERATION.

The following procedure should be followed by the operator when putting the Telegraph Carrier Terminal AN/FCC-3A 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 transmitter 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-3A. 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

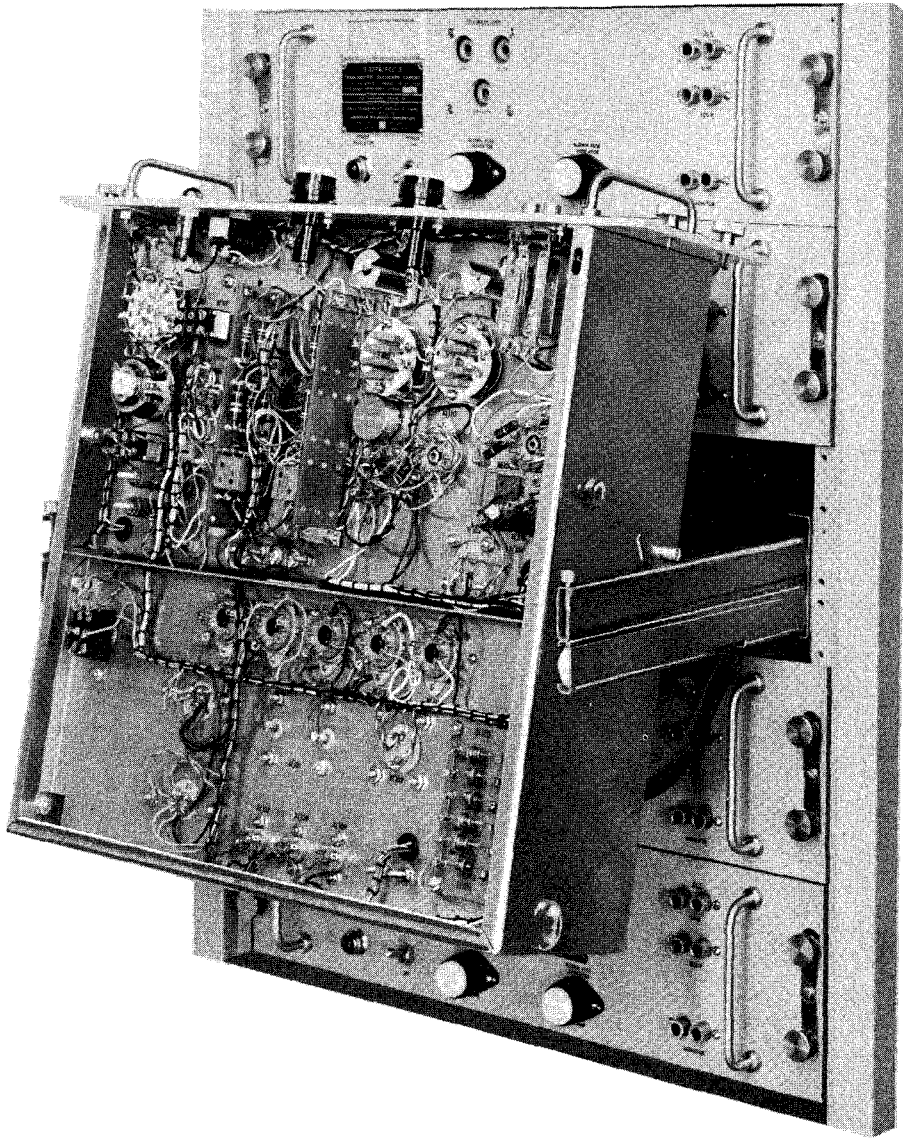


Figure 5—1. Unit Removed from Cabinet for Maintenance

5-1. ROUTINE CHECK CHARTS.

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

5-2. 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 as shown on the schematic diagrams of Section 7. If the cause of failure of the unit can not 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. The installation adjustments of Section 3 must be performed after changing frequency determining components.

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, tilt lock should be pulled down over locking stud.

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 TELEGRAPH LOOP MONITOR 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 re-adjustment.
Telegraph carrier transmitter loop bias.	Plug a telegraph printer into the TELEGRAPH LOOP MONITOR 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 OUT MONITOR jacks of the telegraph carrier transmitter.	The voltage level at the OUT MONITOR jacks of the telegraph carrier transmitter should be -4 dbm.
Line level at telegraph carrier receiver equipment.	Plug a vacuum tube voltmeter into the OUT NORM MONITOR jacks of the Electronic Frequency Converter CV-244A/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-371A/FCC-3, T-372A/FCC-3, T-373A/FCC-3, T-374A/FCC-3, T-375A/FCC-3, T-376A/FCC-3, T-377A/FCC-3, T-378A/FCC-3, T-379A/FCC-3, T-380A/FCC-3, T-381A/FCC-3, T-382A/FCC-3.	AF transformer, Transmitter filter (see Section 3 for required adjustments.)
Telegraph Carrier Receiver R-525A/FCC-3, R-526A/FCC-3, R-527A/FCC-3, R-528A/FCC-3, R-529A/FCC-3, R-530A/FCC-3, R-531A/FCC-3, R-532A/FCC-3.	Receiver filter, Discriminator transformer (see Section 3 for required adjustment.)
Telegraph Carrier Receiver R-533A/FCC-3, R-534A/FCC-3, R-535A/FCC-3, R-536A/FCC-3.	Receiver filter, Discriminator transformer (see Section 3 for required adjustment.)

SECTION 6 PREVENTIVE MAINTENANCE

6-1. PREVENTIVE MAINTENANCE.

Forced air ventilation is provided in the Telegraph Carrier Terminal AN/FCC-3A. The air flow is through the air filter on the bottom front panel of the cabinet, through the fan, up through the various chassis in the cabinet, and exhausted through the screens at the top of the cabinet. 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 screens at the top of the cabinet must be kept clean. The air filter on the bottom front panel is easily accessible by removing the four thumb screws holding the bottom front panel on the cabinet. The air filter is of the cleanable type and should be cleaned as follows: Wash with a hose, followed by draining and then dip or spray with a light oil, SAE 10 or equivalent, followed by draining 12 to 24 hours following dipping. If sprayed, only a few minutes draining is required.

Ventilation of the Telegraph Carrier Terminal AN/FCC-3A should be maintained at the highest possible efficiency to lower the chassis temperature and so increase the life of the components and tubes. The air pressure and air flow within the cabinet may be adjusted by the two hoods located directly over the screens at the top of the cabinet. The position of each

hood is adjusted by four wing nuts located in the top inside of the cabinet.

6-2. 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.

6-3. LUBRICATION.

The only moving parts in this equipment are the rollers in the chassis slides and the blower motor. The 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 ten shafts (six 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 screens.	Remove hoods on the top of the cabinet.	Remove screen and clean with a brush every day.
Front panel air filter.	Remove 4 thumb screws on bottom front panel, remove panel, air filter, and visually inspect.	Remove air filter and clean as specified in Section 6, Paragraph 1 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.

SECTION 7 CORRECTIVE MAINTENANCE

FAILURE REPORTS

“Report each failure of the equipment, whether caused by a defective part, wear, improper operation, or an external cause. Use ELECTRONIC FAILURE REPORT form DD787. Each pad of the forms includes full instructions for filling out the forms and forwarding them to the Bureau of Ships. However, the importance of providing complete information cannot be emphasized too much. Be sure that you include the model designation and serial number of the equipment (from the equipment identification plate), the type number and serial number of the major unit (from the major unit identification plate), and the type number and reference designation of the particular defective part (from the technical manual). Describe the cause of the failure completely, continuing on the back of the form if necessary. Do not substitute brevity for clarity. And remember--there are two sides to the failure report--

“YOUR SIDE”

“Every FAILURE REPORT is a boost for you:

1. It shows that you are doing your job.
2. It helps make your job easier.
3. It insures available replacements.
4. It gives you a chance to pass your knowledge to every man on the team.

Always keep a supply of failure report forms on board. You can get them from the nearest Forms and Publications Supply Distribution Point.”

“BUREAU SIDE”

“The Bureau of Ships used the information to:

1. Evaluate present equipment.
2. Improve future equipment.
3. Order replacements for stock.
4. Prepare field changes.
5. Publish maintenance data.

Figure 7—1. Failure Report, Sample Form

7-1. GENERAL.

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

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 assure 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.

7-2. CORRECTIVE MAINTENANCE.

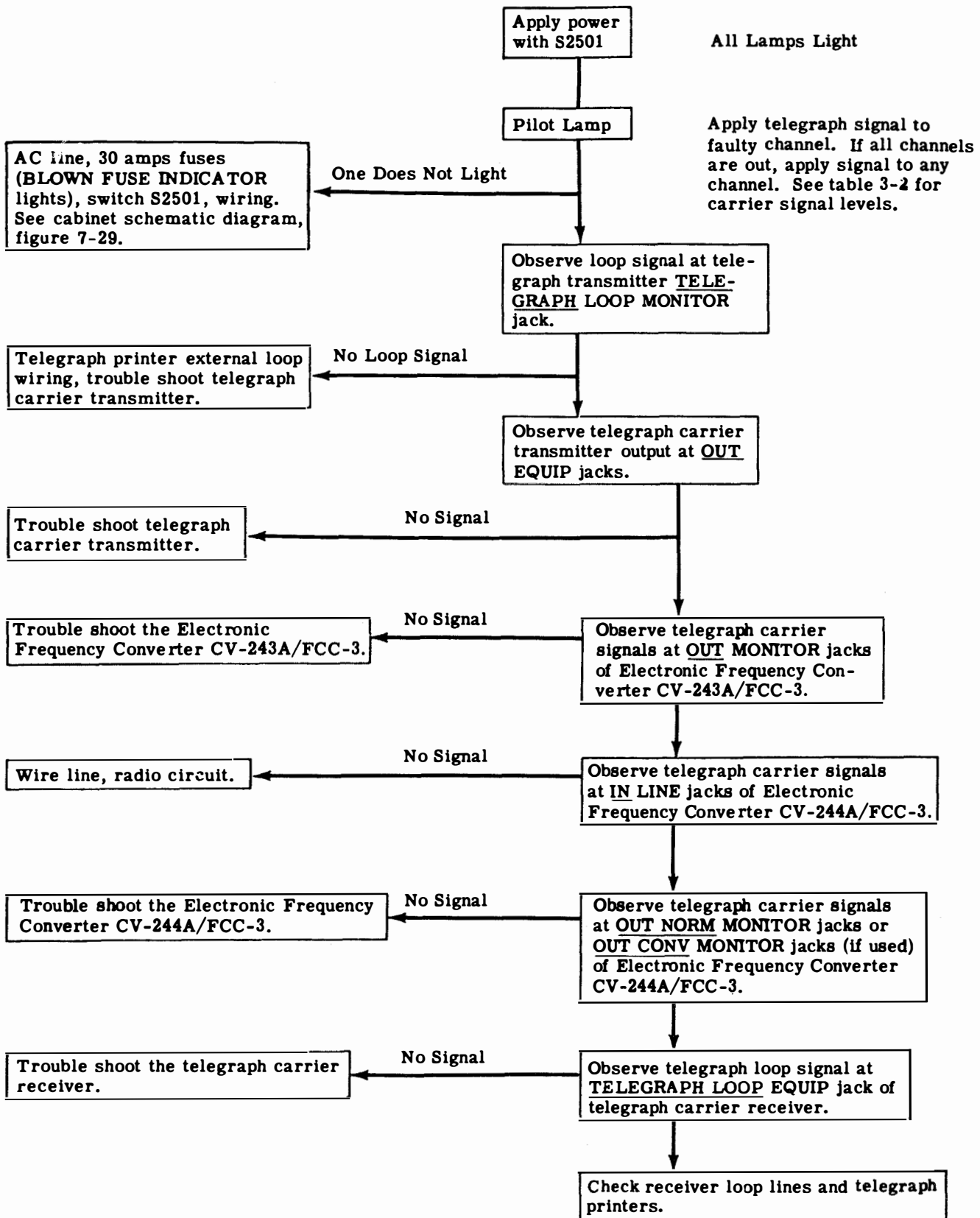
A degradation in the operation of the equipment as determined by the routine checks of Section 6 indicates the need for corrective maintenance. The immediate application of corrective maintenance procedures may save the complete failure of a communication channel at the time it is most needed. In many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

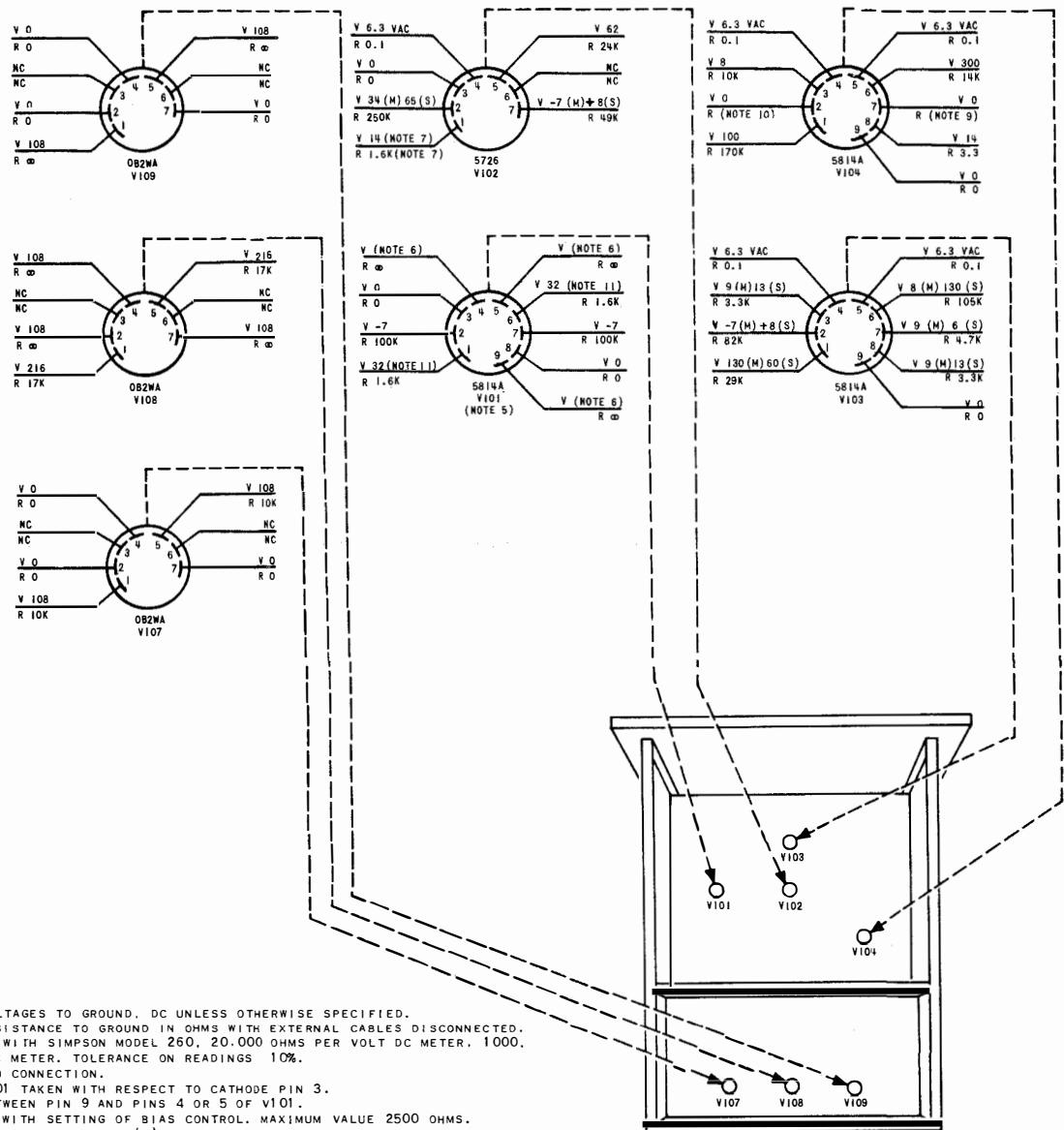
7-3. SYSTEM TROUBLE SHOOTING.

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

TABLE 7-1. SYSTEM TROUBLE SHOOTING CHART





NOTES:

1. V INDICATES VOLTAGES TO GROUND, DC UNLESS OTHERWISE SPECIFIED.
2. R INDICATES RESISTANCE TO GROUND IN OHMS WITH EXTERNAL CABLES DISCONNECTED.
3. READINGS TAKEN WITH SIMPSON MODEL 260, 20,000 OHMS PER VOLT DC METER, 1000 OHM PER VOLT AC METER, TOLERANCE ON READINGS 10%.
4. NC INDICATES NO CONNECTION.
5. READINGS ON V101 TAKEN WITH RESPECT TO CATHODE PIN 3.
6. 6.3 VAC RMS BETWEEN PIN 9 AND PINS 4 OR 5 OF V101.
7. V AND R VARIES WITH SETTING OF BIAS CONTROL, MAXIMUM VALUE 2500 OHMS.
8. (M) INDICATES MARK CONDITION, (S) INDICATES SPACE CONDITION.
9. R VARIES WITH SETTING OF OUTPUT LEVEL ADJ, MAXIMUM VALUE 100K.
10. R VARIES WITH FREQUENCY OF TRANSMITTER - SEE T101 WINDING DATA, SECTION 7.
11. LOOP CURRENT OPERATE IN 20-40 MA POSITION.
12. ALL READINGS TAKEN UNDER MARK CONDITION UNLESS OTHERWISE SPECIFIED. READINGS WERE TAKEN USING A 1615 CPS TRANSMITTER.

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

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.

7-4. TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 THROUGH T-382A/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

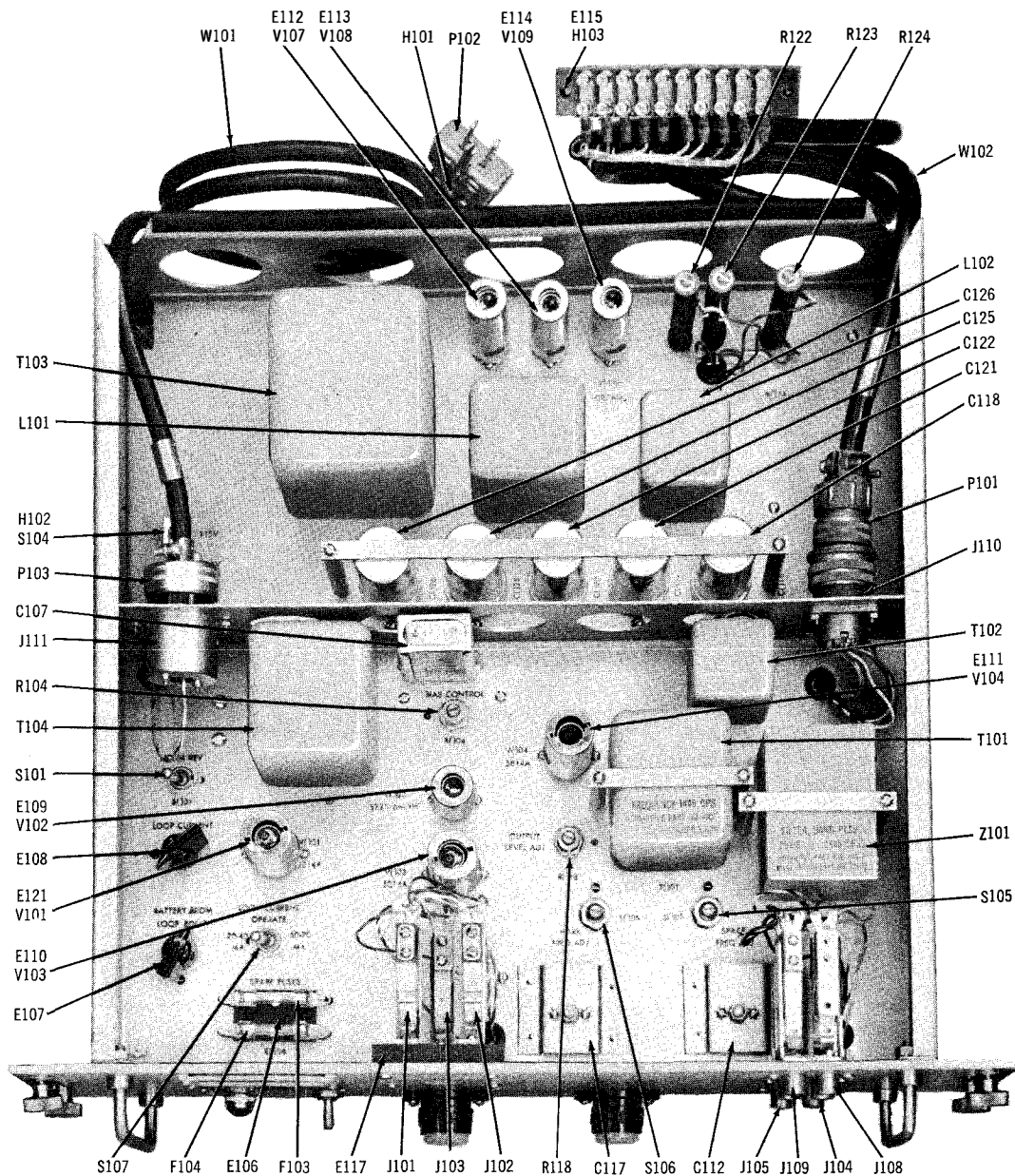


Figure 7-5. Top View of Telegraph Carrier Transmitter

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 CONTROL. - 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. The mea-

surement 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).

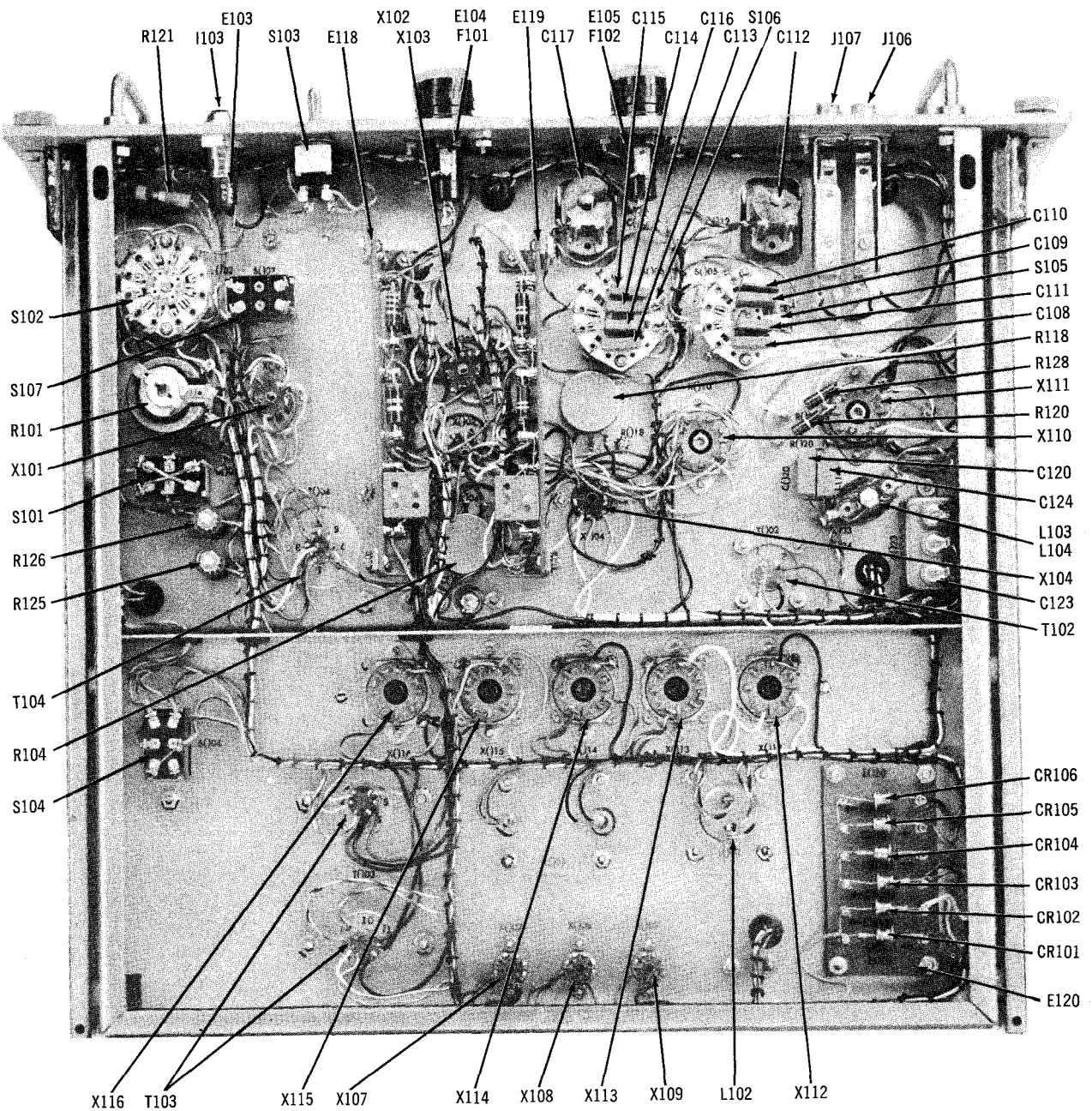


Figure 7-6. Bottom View of Telegraph Carrier Transmitter

7-5. TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 THROUGH R-536A/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 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

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

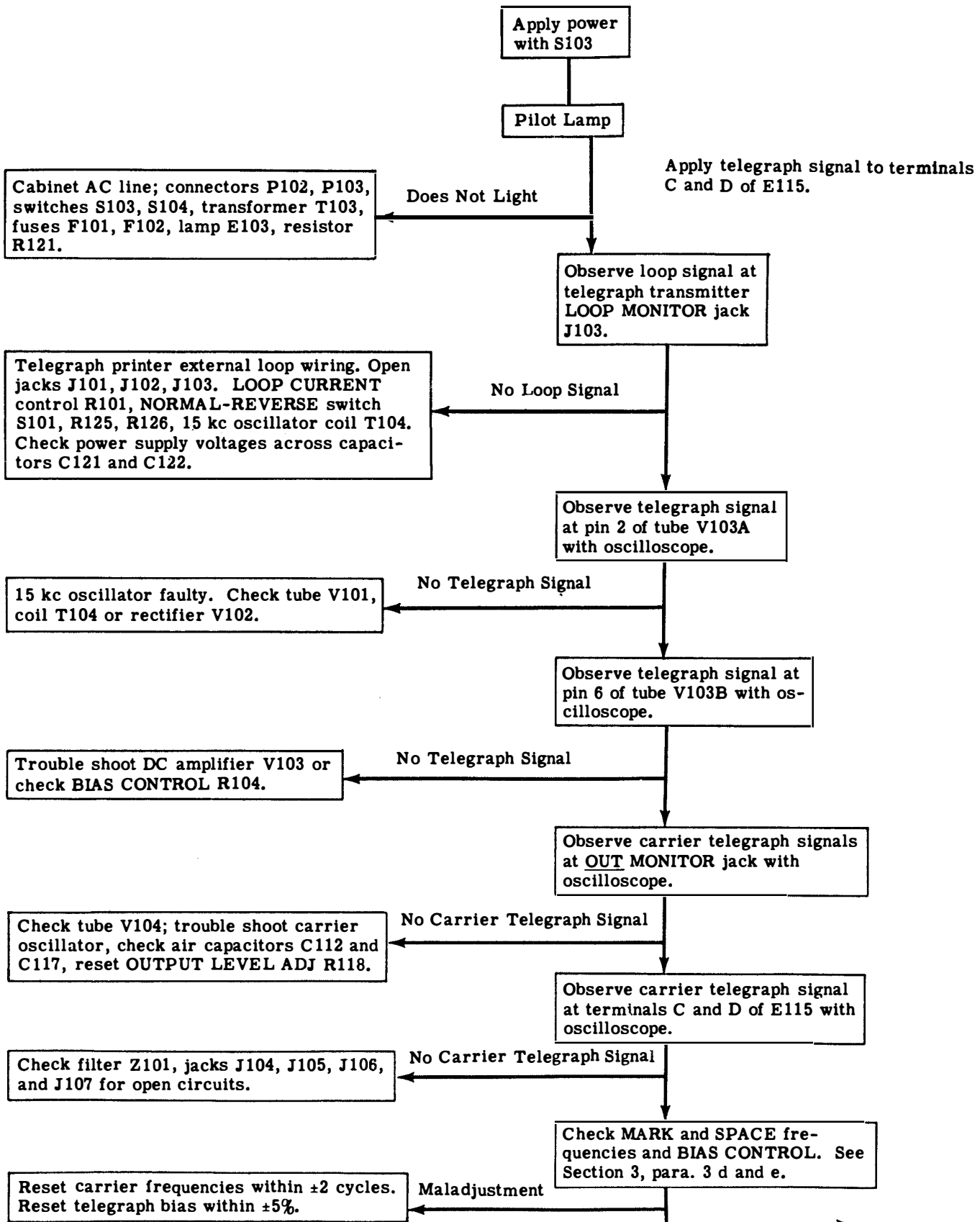
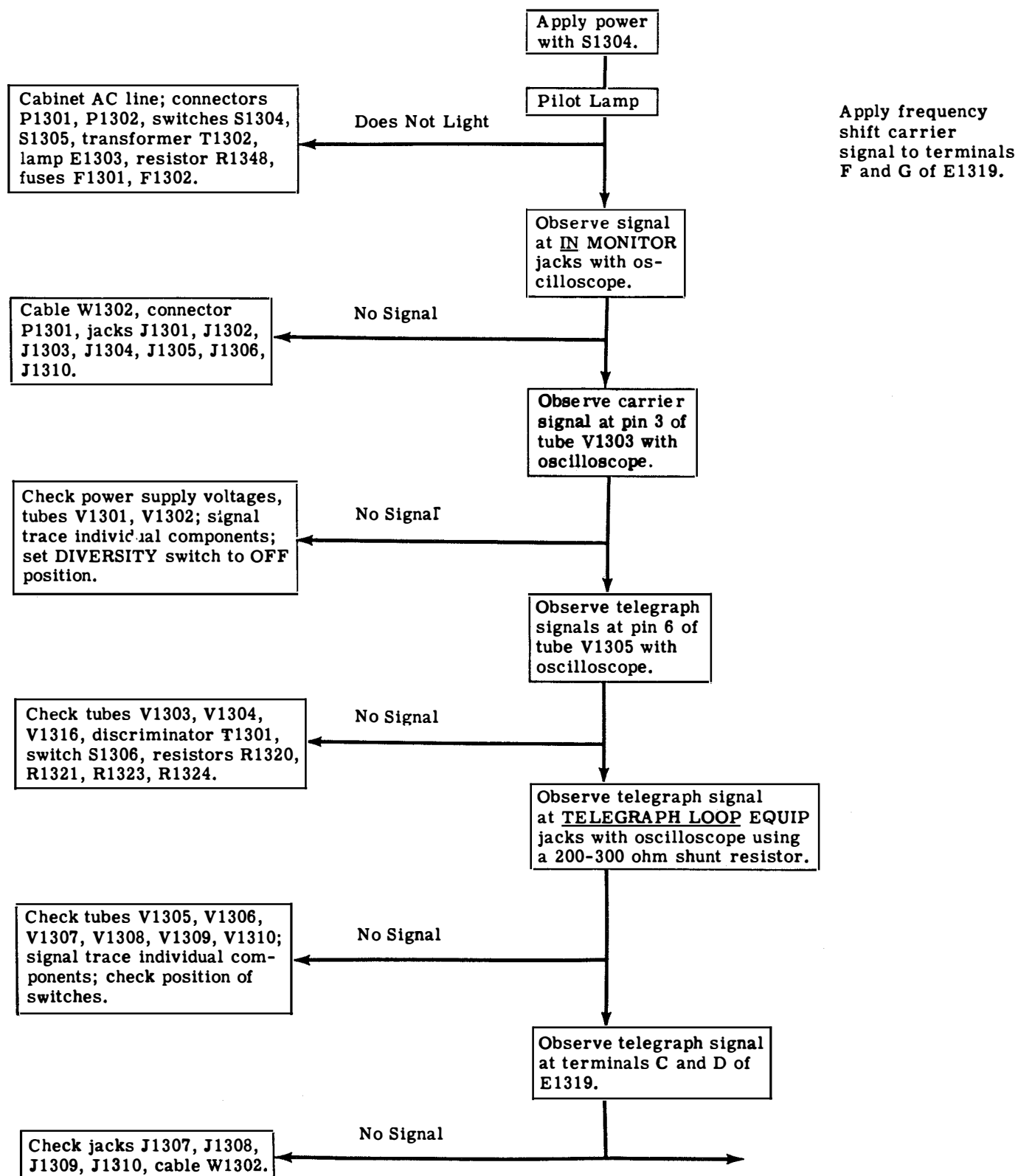


TABLE 7-3. TELEGRAPH CARRIER RECEIVERS R-525A/FCC-3 THROUGH R-536A/FCC-3, TROUBLE SHOOTING CHART



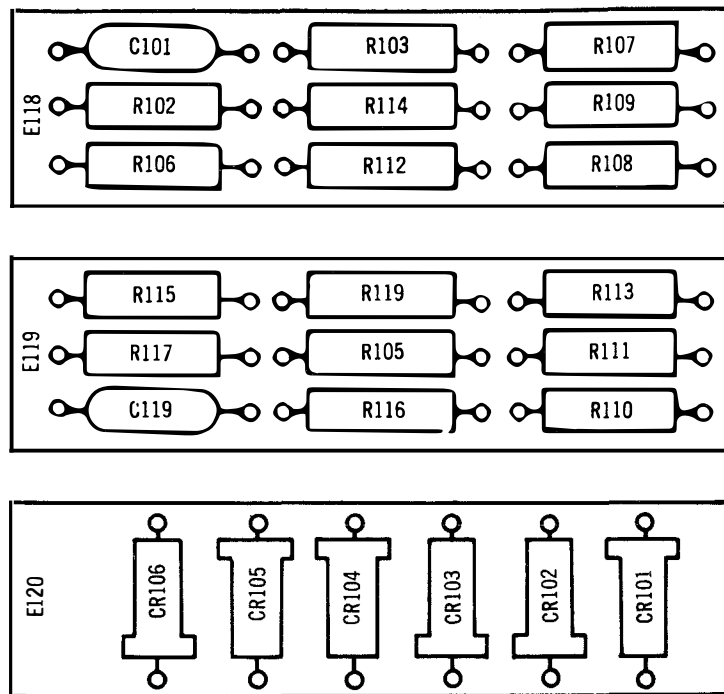


Figure 7-7. Components Location, Terminal Boards of Telegraph Carrier Transmitter

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.

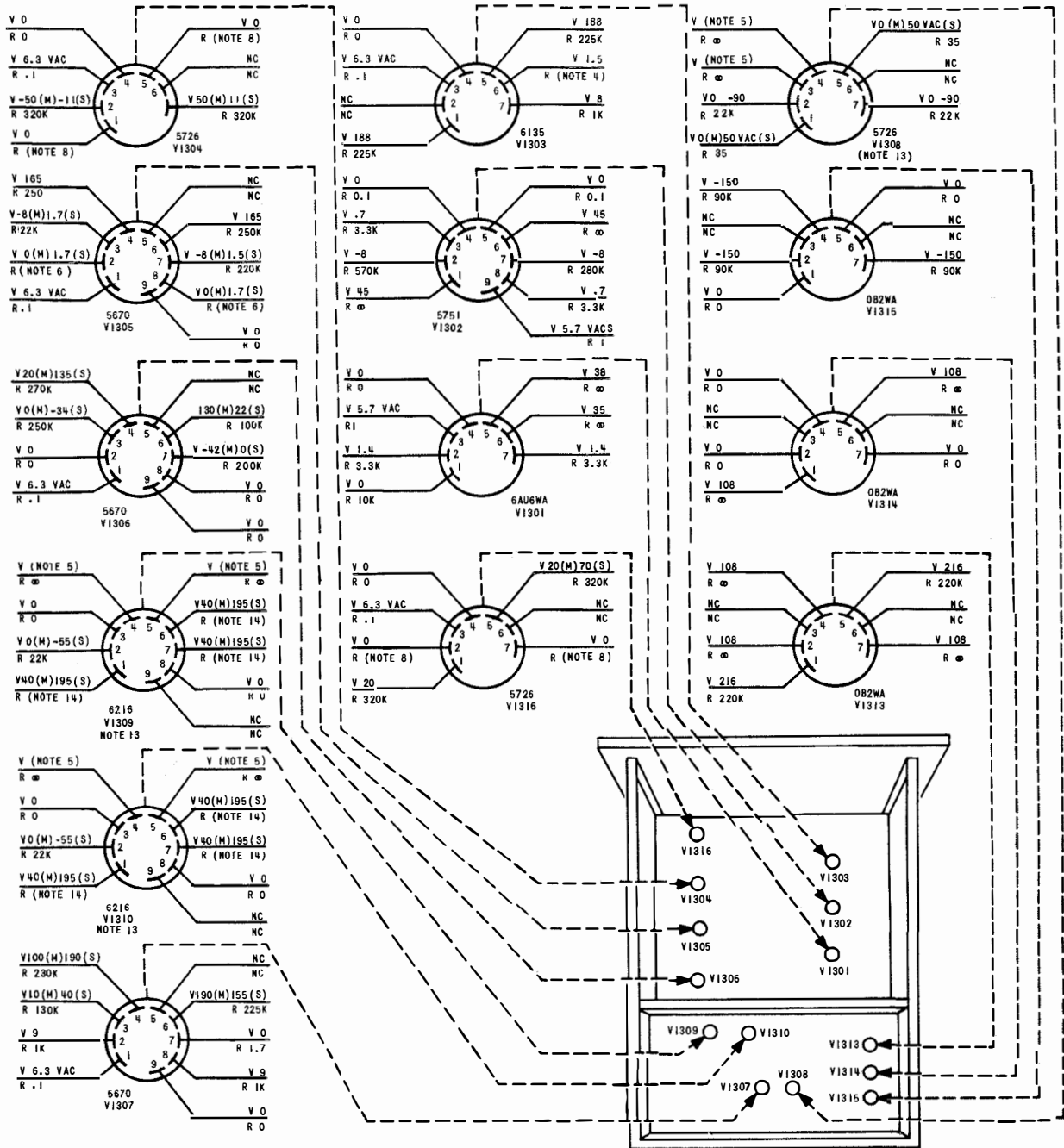
After using table 7-3 to determine the stage in which the trouble is located, refer to the schematic diagram of figure 7-14 and trouble shoot the individual components. Typical voltages and resistance values to ground are given in figure 7-10. The physical location of the components can be determined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

mitter 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.

7-6. ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3, TROUBLE SHOOTING.

a. GENERAL. - The Electronic Frequency Converter CV-243A/FCC-3 carries the combined carrier signal of all channels. A failure in this unit may take all



- 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 MODEL 260, 20,000 OHMS PER VOLT DC METER, 1000 OHMS PER VOLT AC METER, TOLERANCE 10%.
 3. NC INDICATES NO CONNECTION.
 4. 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 APPROX. 2500 OHMS.
 7. MEASUREMENTS TAKEN WITH TERMINAL STRAPPING AS SHOWN IN FIGURE 2-14. CONDITION "A" - EXTERNAL SWITCH RECEIVER.
 8. R VARIES WITH FREQUENCY OF DISCRIMINATOR. MAXIMUM VALUE APPROX. 140 OHMS.
 9. (S) 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.
 13. MEASURED WITH RESPECT TO PIN 8 OF V1309.
 14. VARIES WITH POSITION OF R1347 AND LOOP RESISTANCE.

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

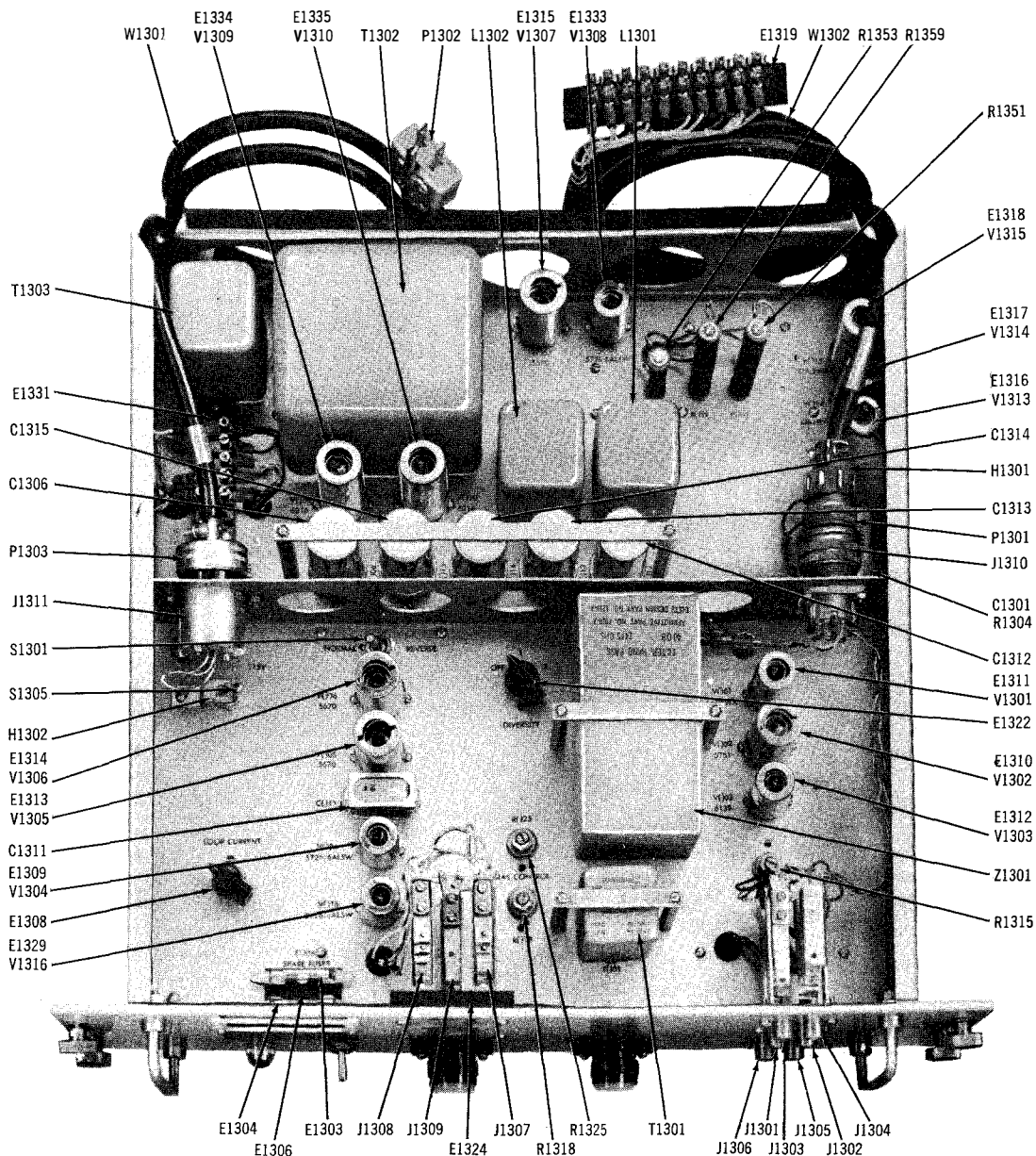


Figure 7-11. Top View of Telegraph Carrier Receiver

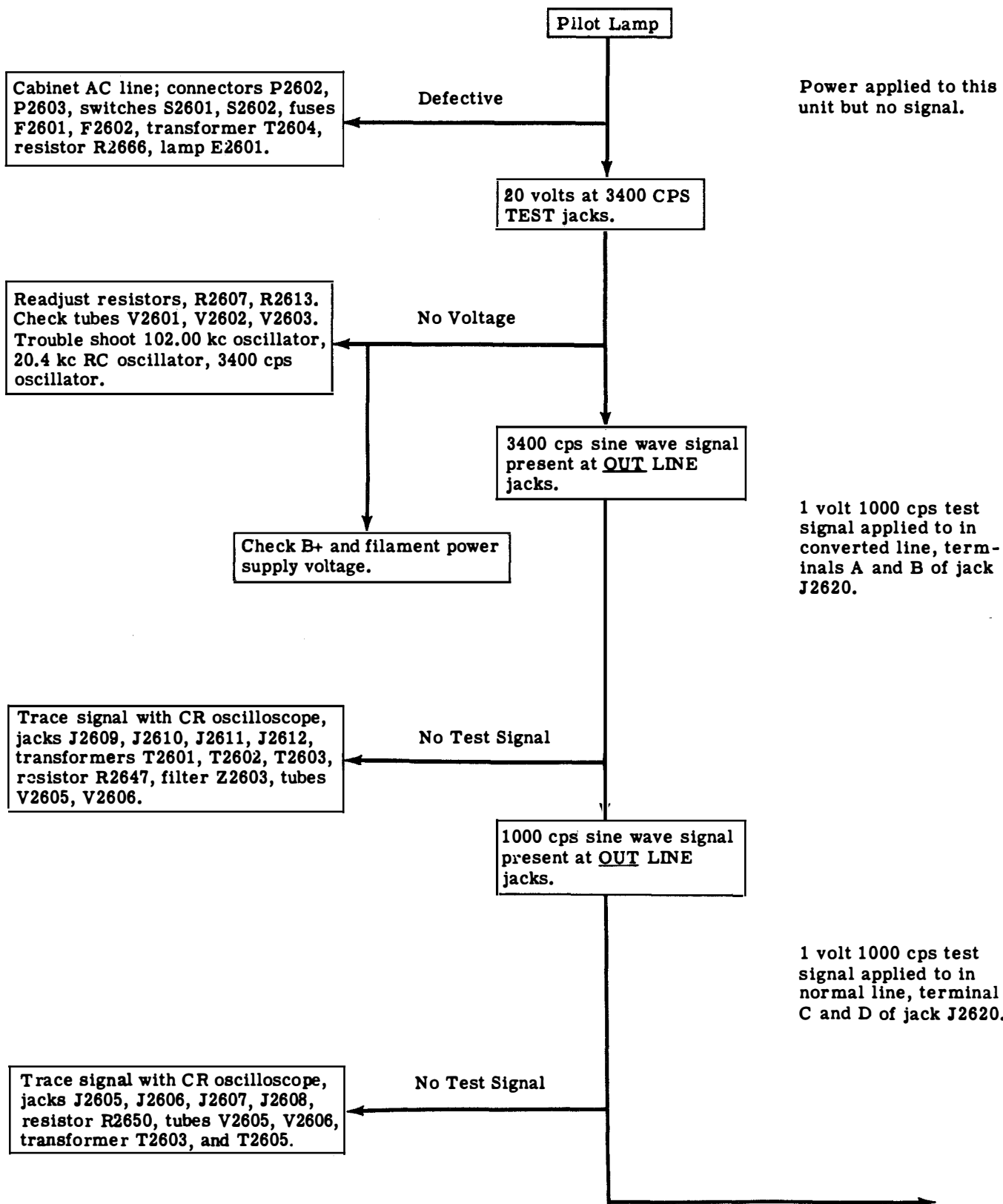
channels out of operation. The locking oscillator adjustments and the signal level adjustments should be checked before detailed trouble shooting. The block diagram shown in figure 7-3 will be helpful in trouble shooting this unit. The trouble shooting chart of table 7-4 describes a signal tracing method 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-243A/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 volt-

ages 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-243A/FCC-3, TROUBLE SHOOTING CHART



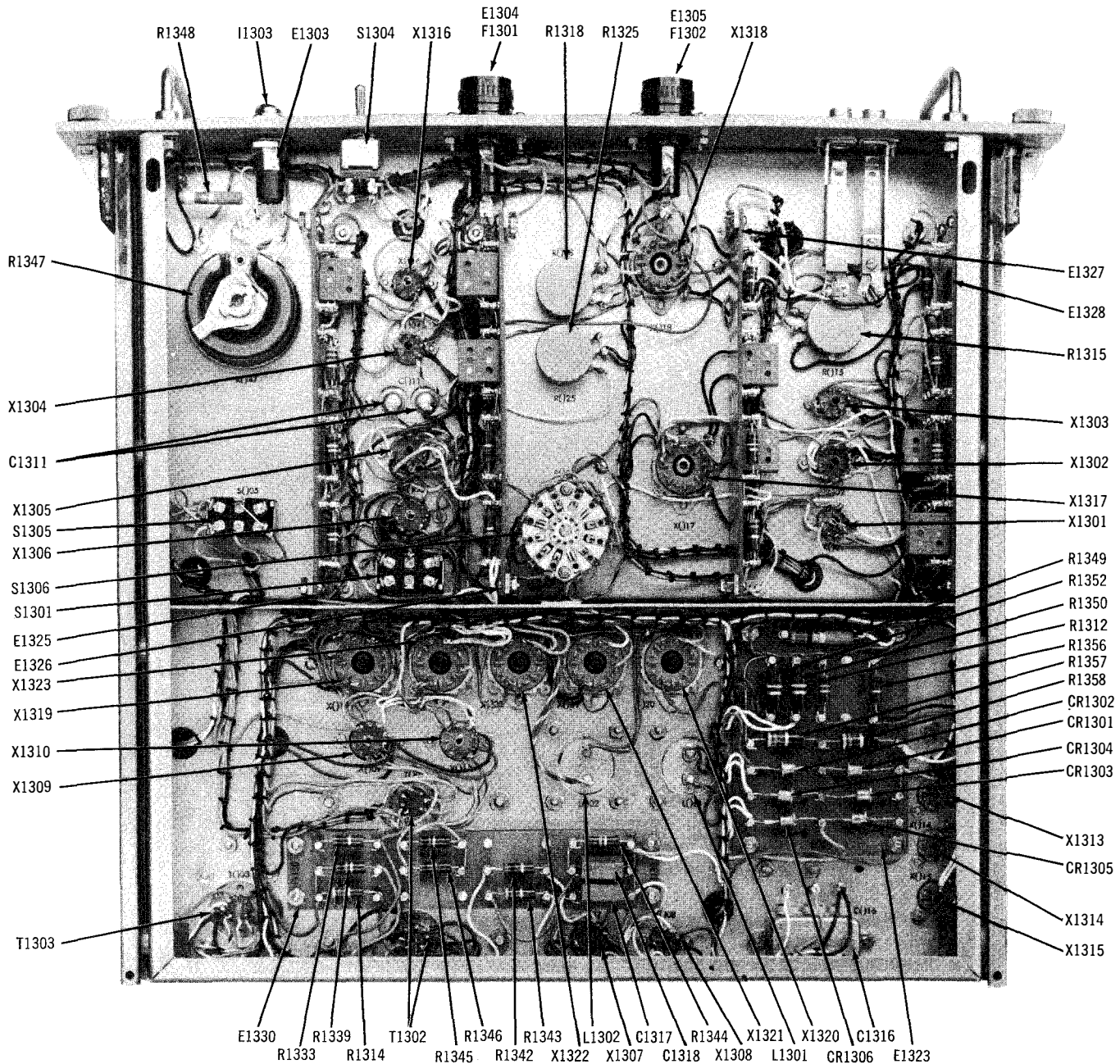


Figure 7-12. Bottom View of Telegraph Carrier Receiver

(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 oscilloscope 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

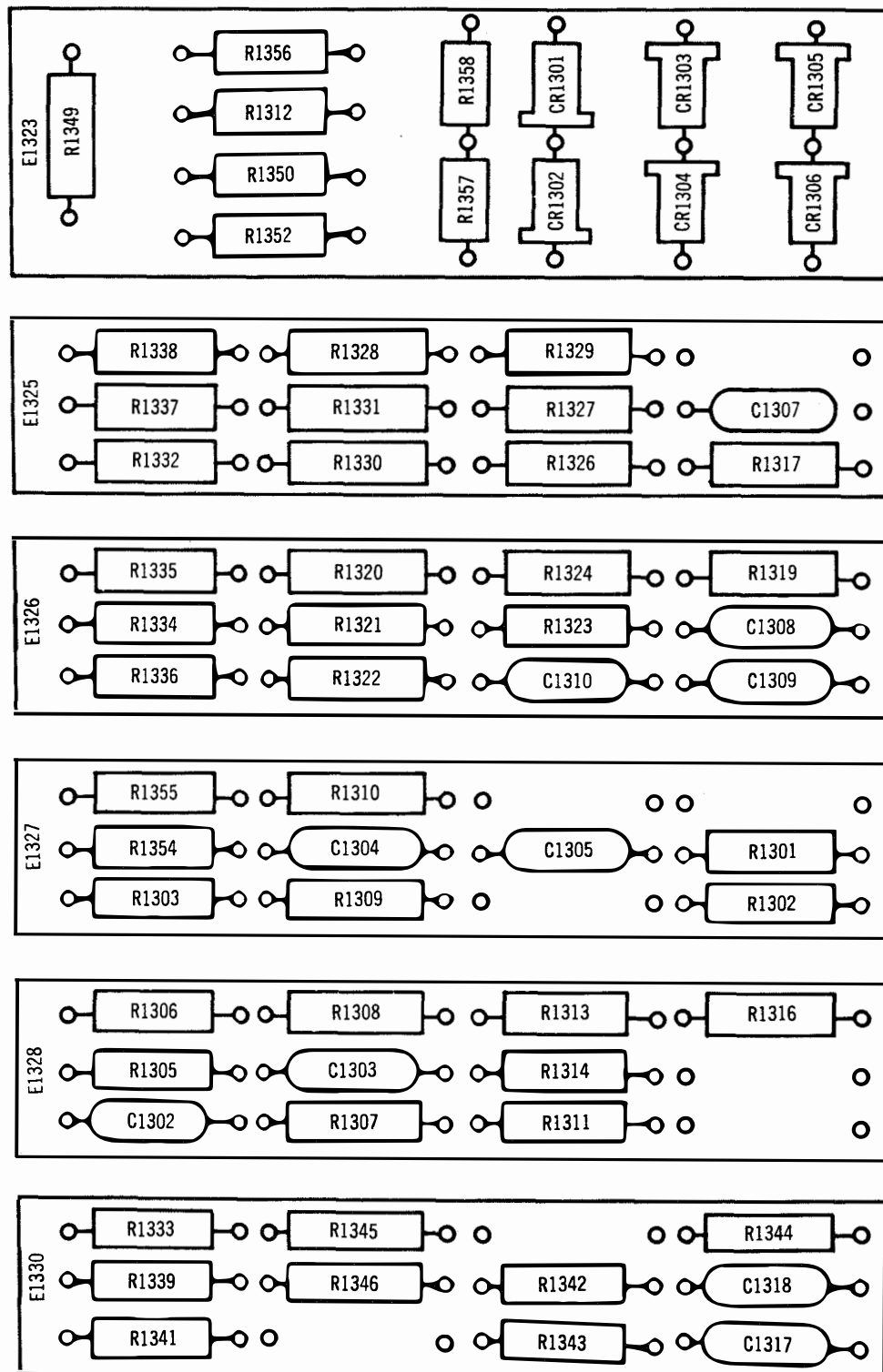
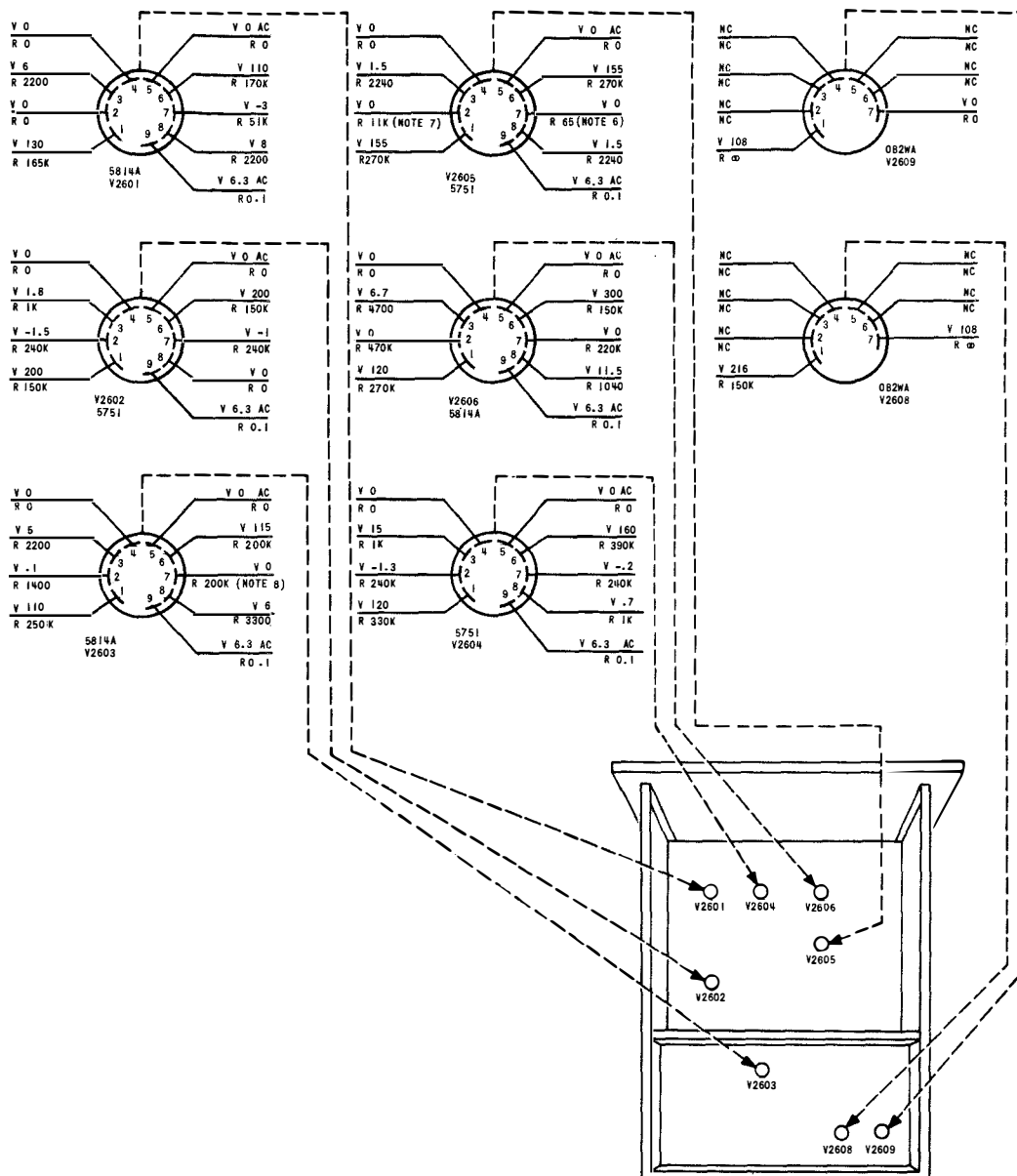


Figure 7-13. Components Location, Terminal Boards of Telegraph Carrier Receiver



NOTES:

1. V INDICATES VOLTAGES TO GROUND. DC UNLESS OTHERWISE SPECIFIED.
2. R INDICATES RESISTANCE TO GROUND IN OHMS WITH EXTERNAL CABLES DISCONNECTED.
3. READINGS TAKEN WITH SIMPSON MODEL 260. 20,000 OHMS PER VOLT DC METER. TOLERANCE ON READINGS 10%.
4. NC INDICATES NO CONNECTION.
5. RESISTANCE VALUE DEPENDS ON SETTING OF NORM GAIN (R2650). MAXIMUM VALUE 100.
6. RESISTANCE VALUE DEPENDS ON SETTING OF CONV GAIN (R2647). MAXIMUM VALUE 12,500.
7. RESISTANCE VALUE DEPENDS ON SETTING OF R2668. MAXIMUM VALUE 250K.

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

425 cps oscillator is indicated on the oscilloscope by a 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

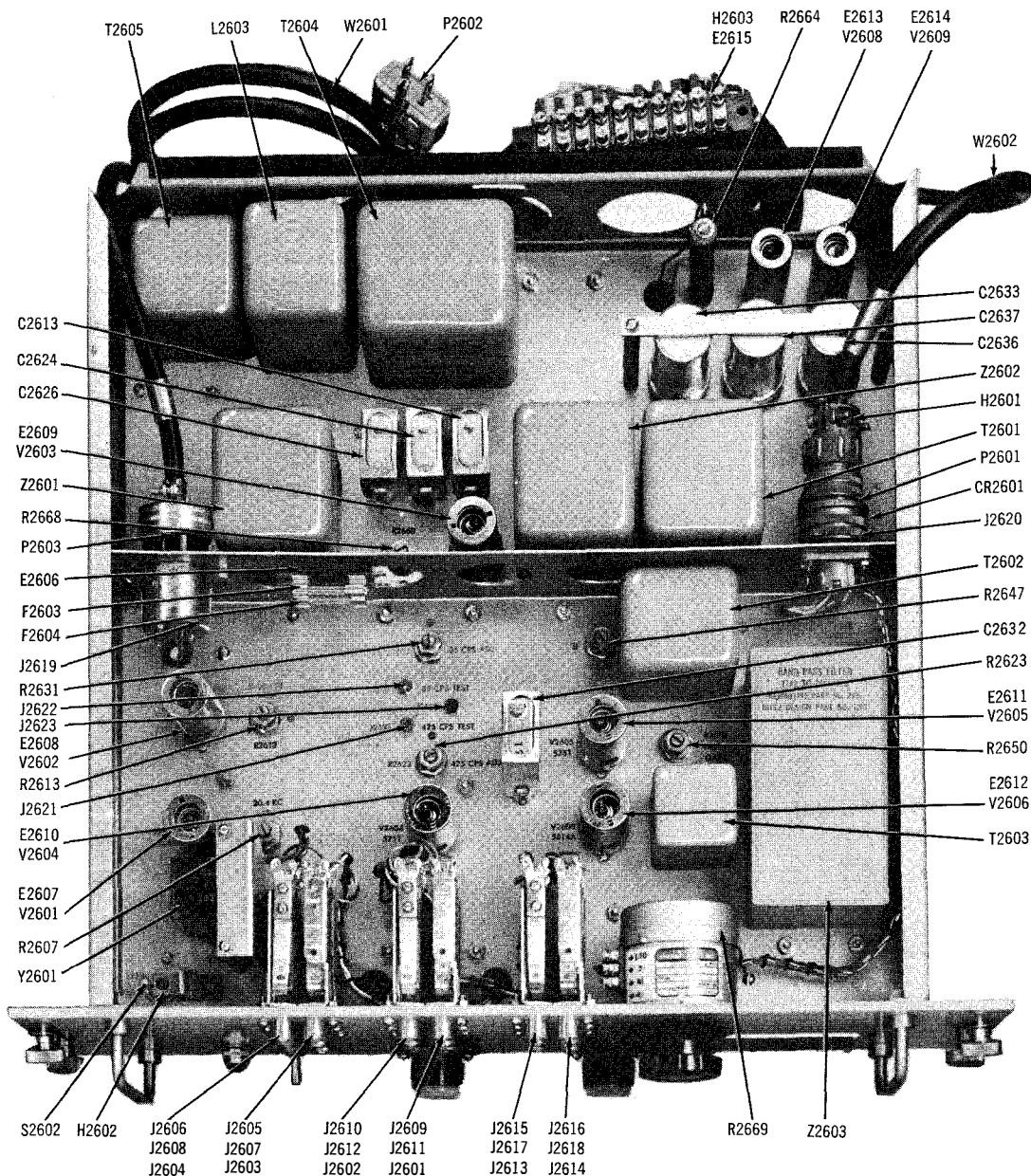


Figure 7-17. Top View of Electronic Frequency Converter CV-243A/FCC-3

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 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 out-

put 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.

7-7. ELECTRONIC FREQUENCY CONVERTER V-244A/FCC-3, TROUBLE SHOOTING.

a. GENERAL. - The Electronic Frequency Converter CV-244A/FCC-3 carries the combined carrier signal

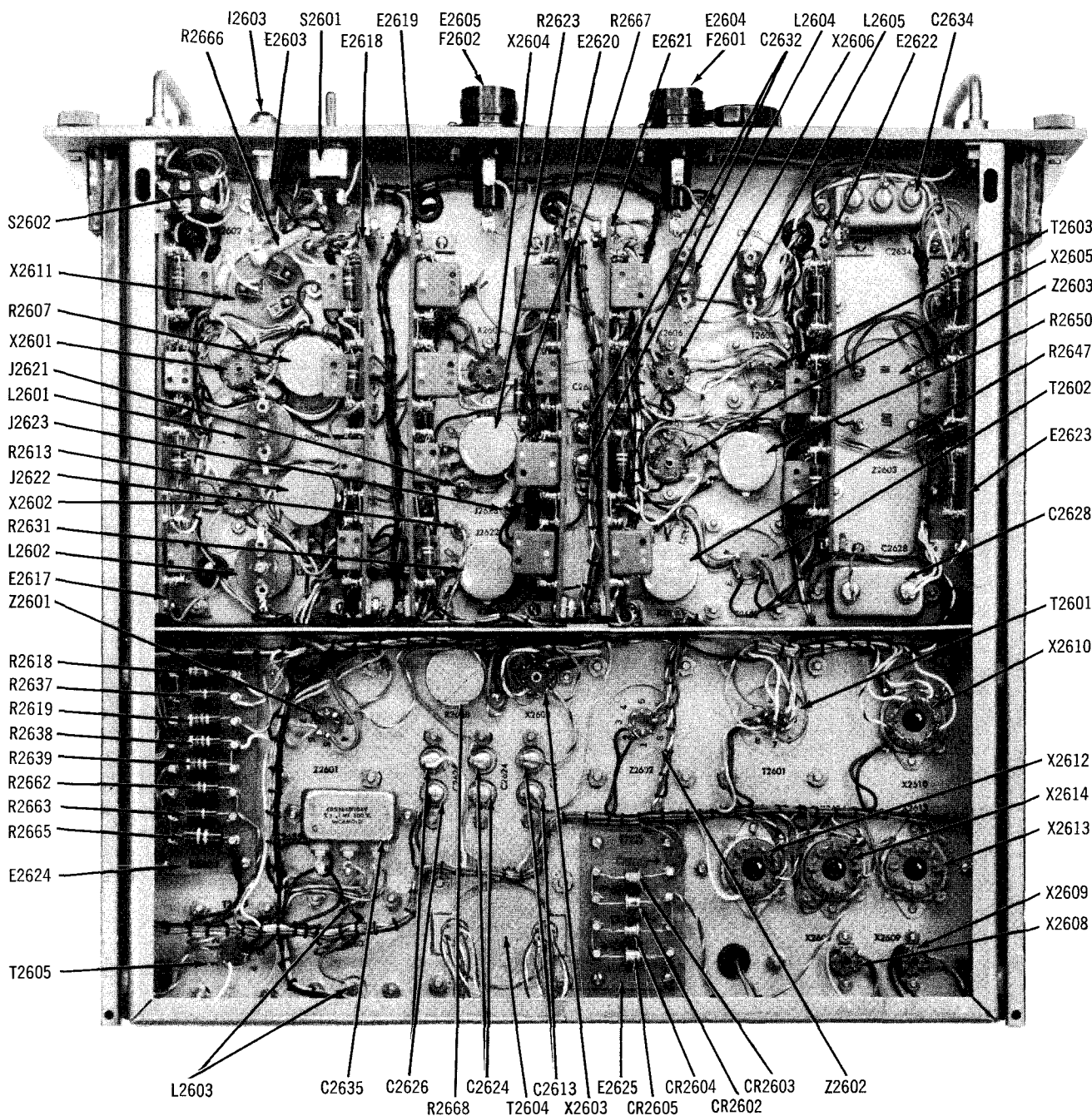


Figure 7-18. Bottom View of Electronic Frequency Converter CV-243A/FCC-3

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 of table 7-5 describes 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-244A/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

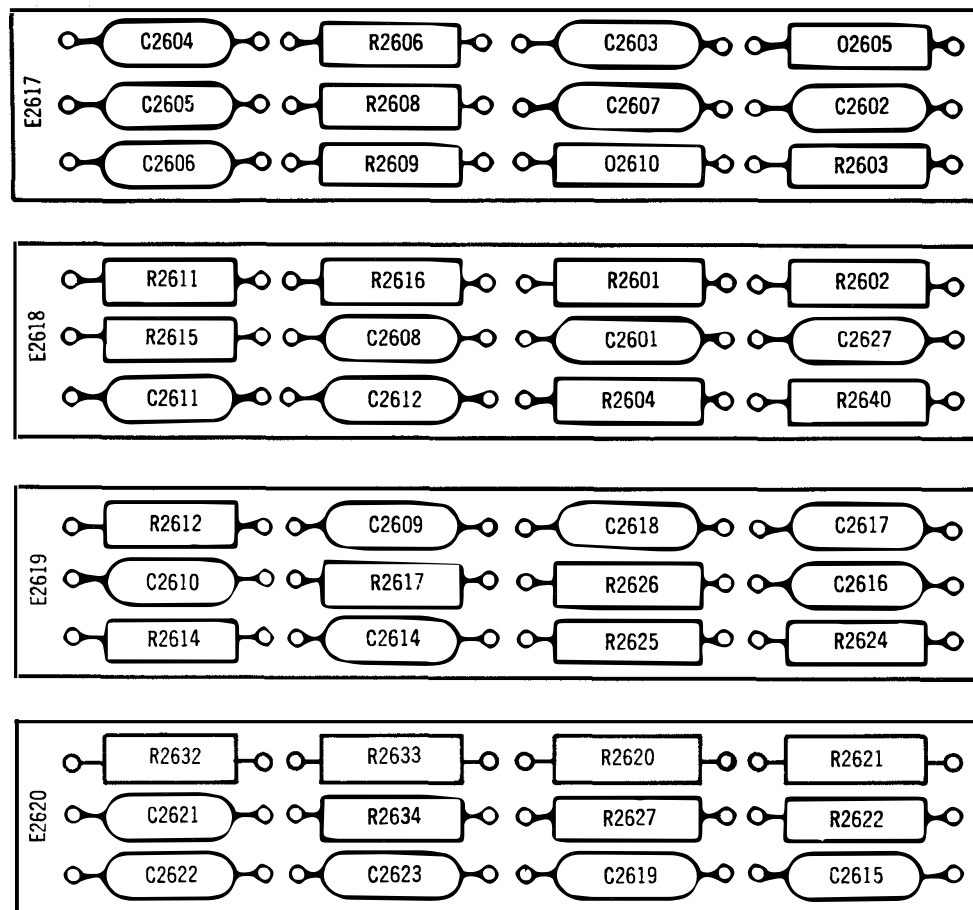


Figure 7—19. Components Location, Terminal Boards of Electronic Frequency Converter CV-243A/FCC-3

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.

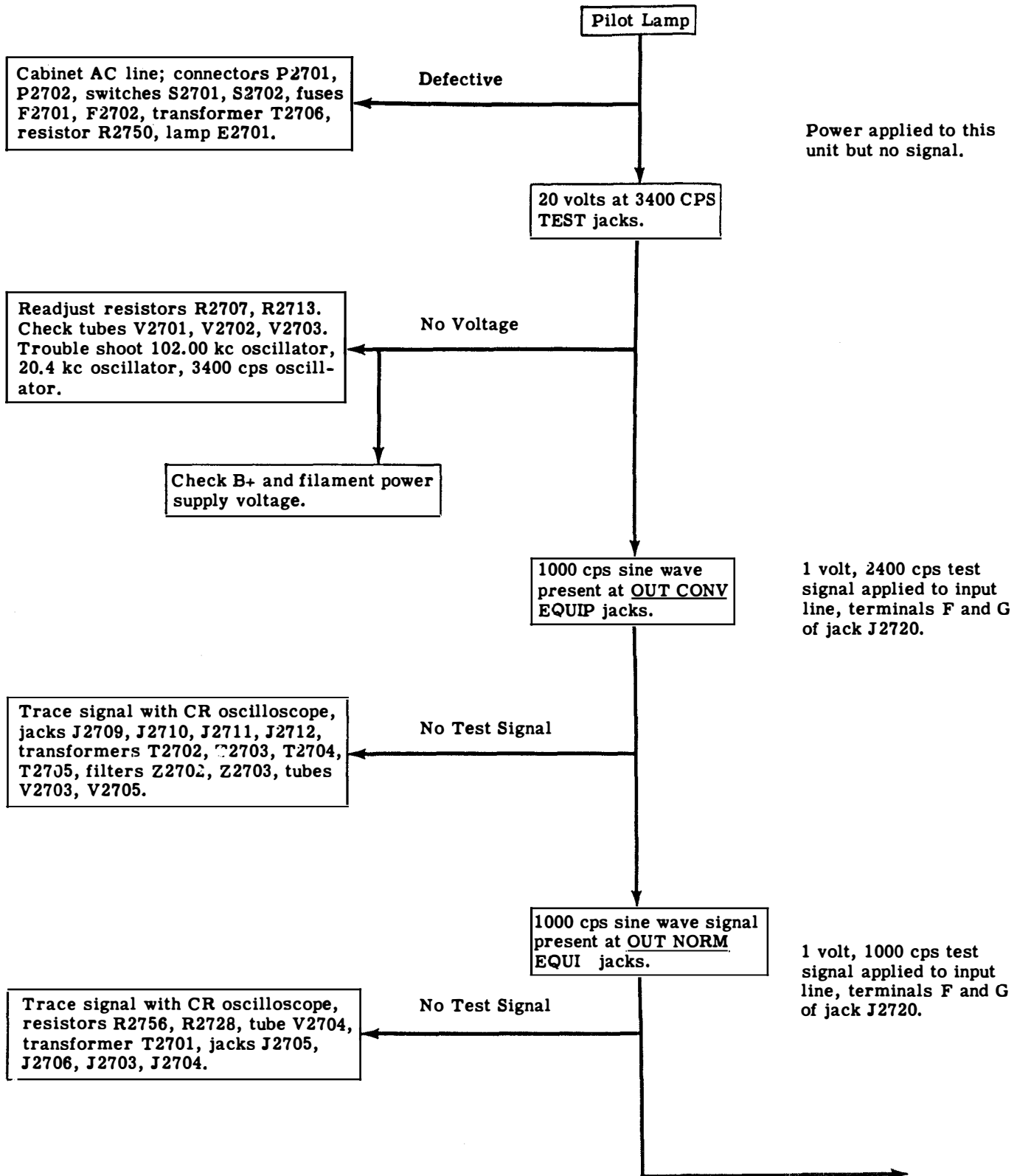
(3) Alternately vary the 250,000 ohm potentiometers R2707 (20.4 kc oscillator circuit) and R2713 (3400 cps oscillator circuit) until a steady state value greater than 20 volts is indicated on the vacuum tube voltmeter.

(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**

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



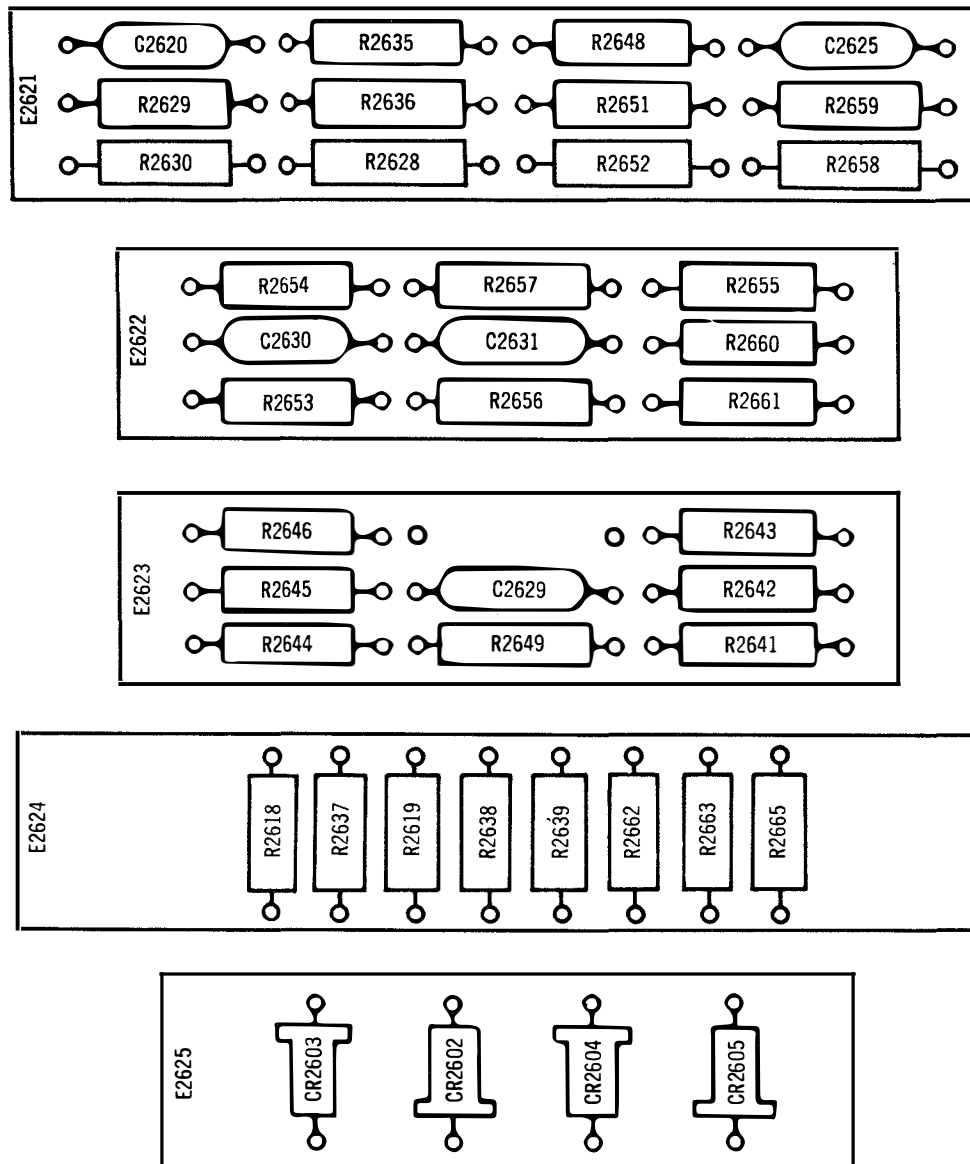


Figure 7—20. Components Location, Terminal Boards of Electronic Frequency Converter CV-243A/FCC-3

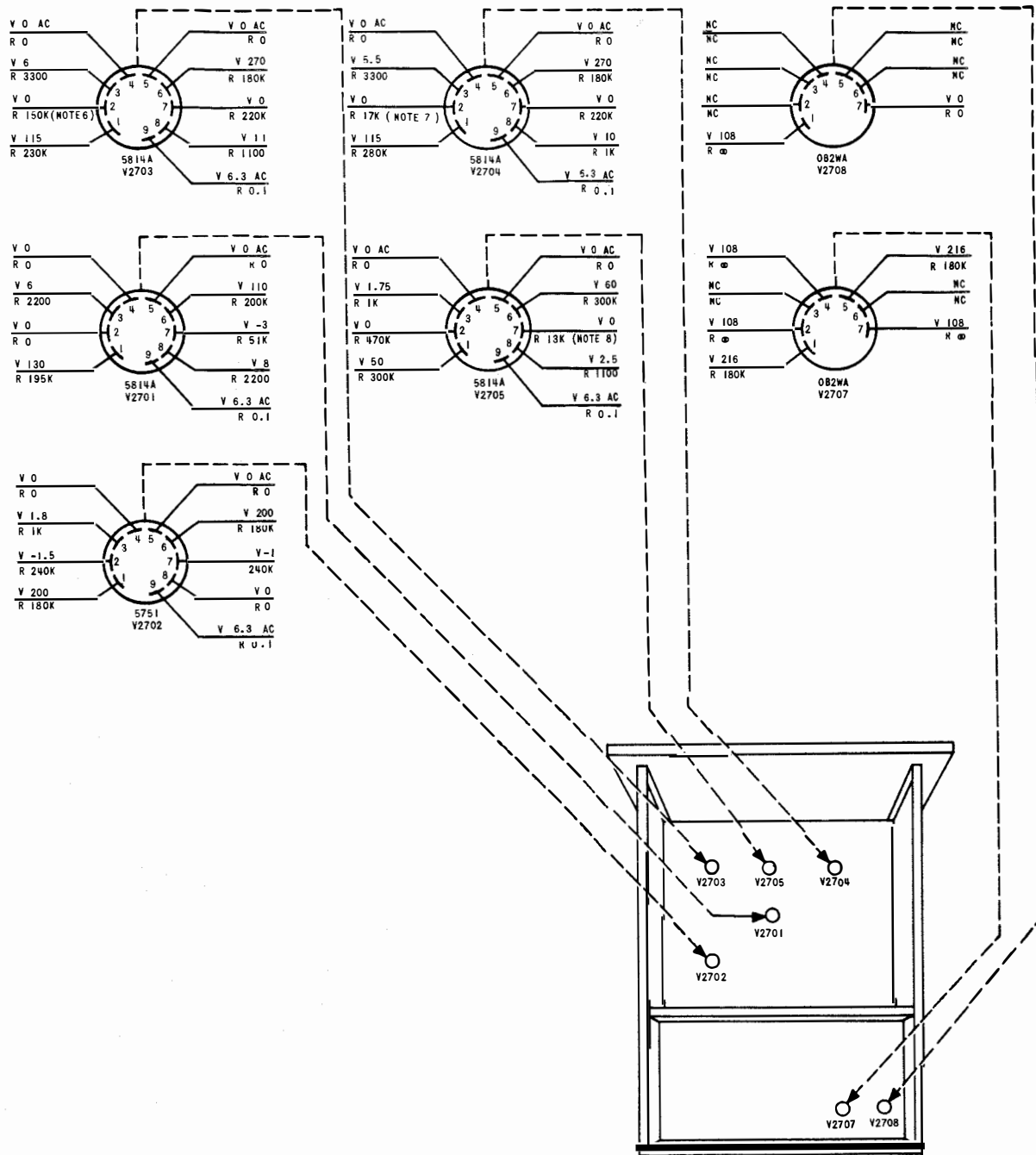
R-2756 to zero. Adjust CONV GAIN potentiometer R2738 for 1.0 volt output at the OUT CONV EQUIP jacks (no signal on normal channel). To set the signal level of the normal channel, connect a 1.0 volt, 1000 cps test signal to the IN EQUIP jacks. With ATTENUATOR R2756 set at zero, adjust the NORM

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

NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
CORRECTIVE MAINTENANCE



NOTES:

1. V INDICATES VOLTAGES TO GROUND. DC UNLESS OTHERWISE SPECIFIED.
 2. R INDICATES RESISTANCE TO GROUND IN OHMS WITH EXTERNAL CABLES DISCONNECTED.
 3. READINGS TAKEN WITH SIMPSON MODEL 260, 20,000 OHMS PER VOLT DC METER.
- TOLERANCE ON READINGS 10%.
4. NC INDICATES NO CONNECTION.
 5. RESISTANCE VALUE DEPENDS ON SETTING OF R2755. MAXIMUM VALUE 250K.
 6. RESISTANCE VALUE DEPENDS ON SETTING OF NORM GAIN (R2728). MAXIMUM VALUE 2.5K.
 7. RESISTANCE VALUE DEPENDS ON SETTING OF CONV GAIN (R2738). MAXIMUM VALUE 12,500.

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

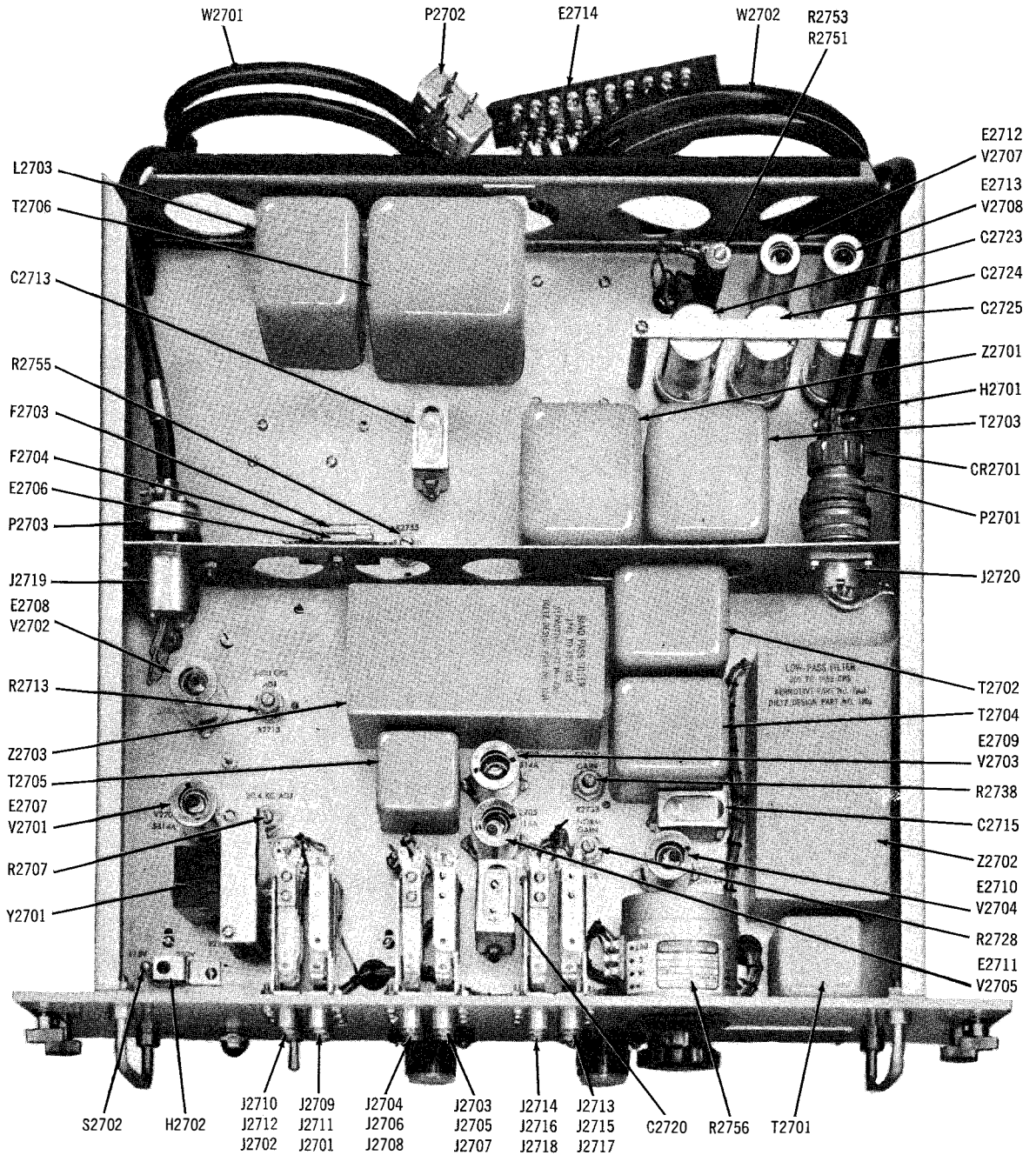


Figure 7-24. Top View of Electronic Frequency Converter CV-244A/FCC-3

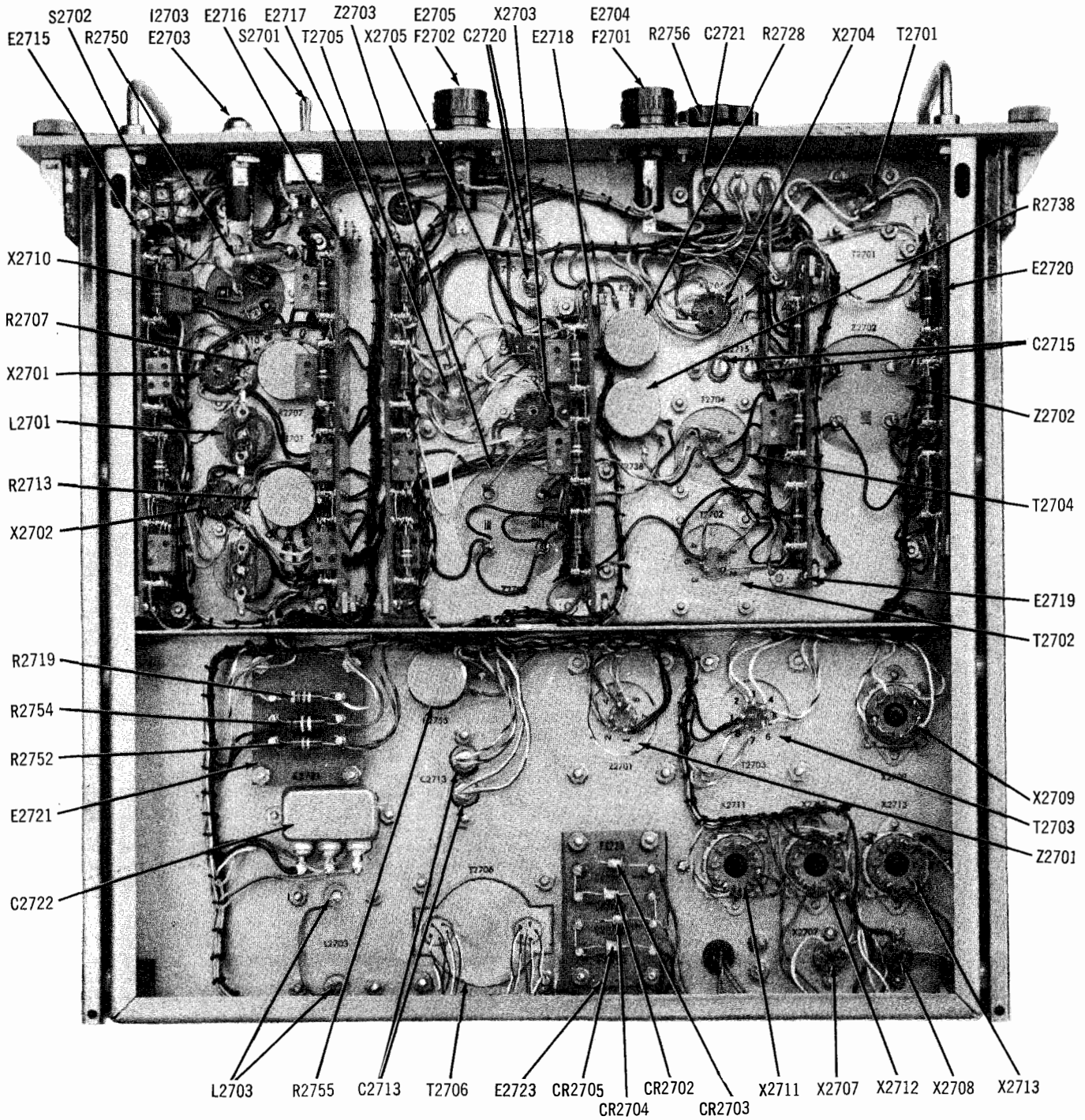


Figure 7-25. Bottom View of Electronic Frequency Converter CV-244A/FCC-3

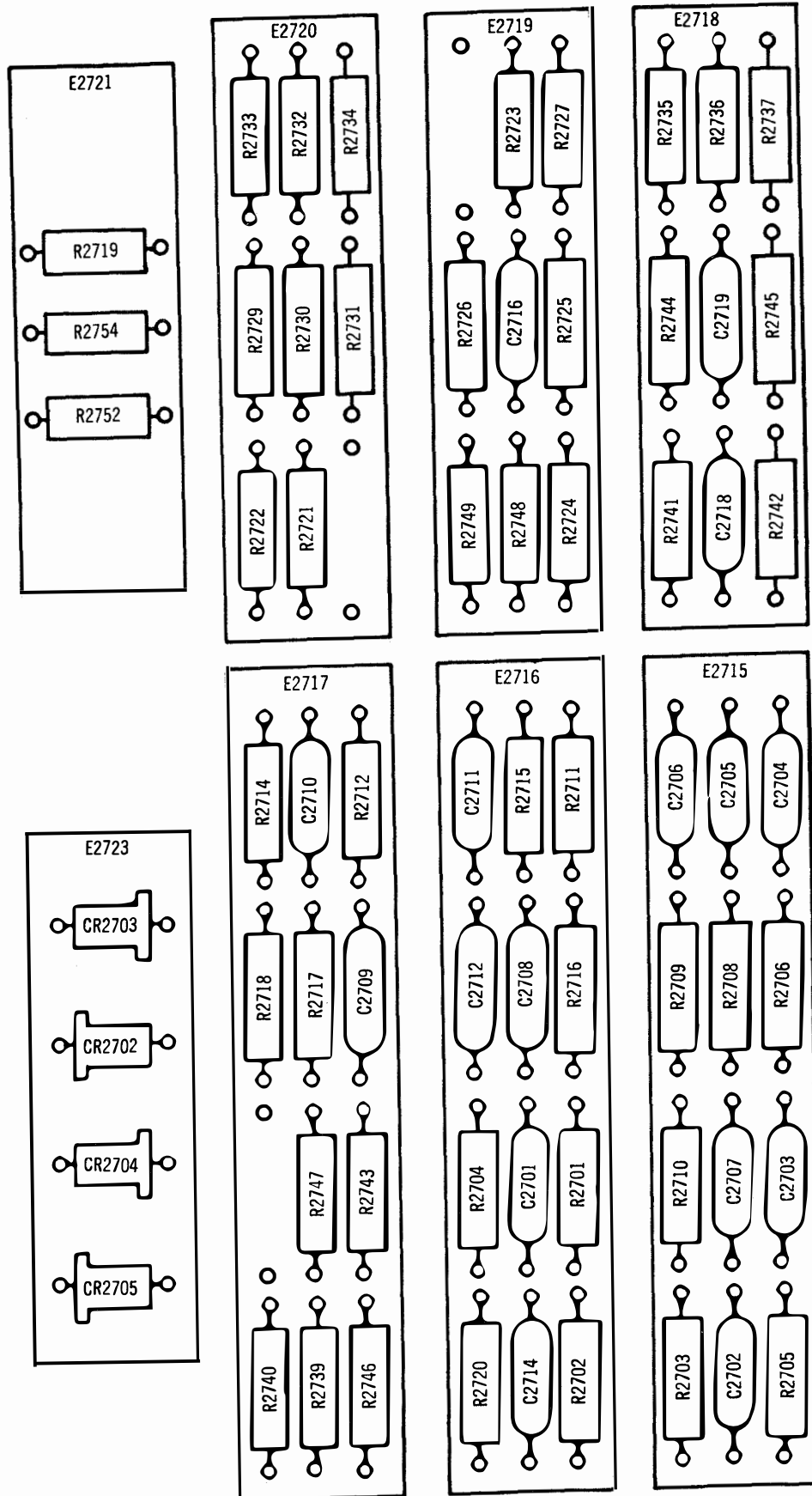
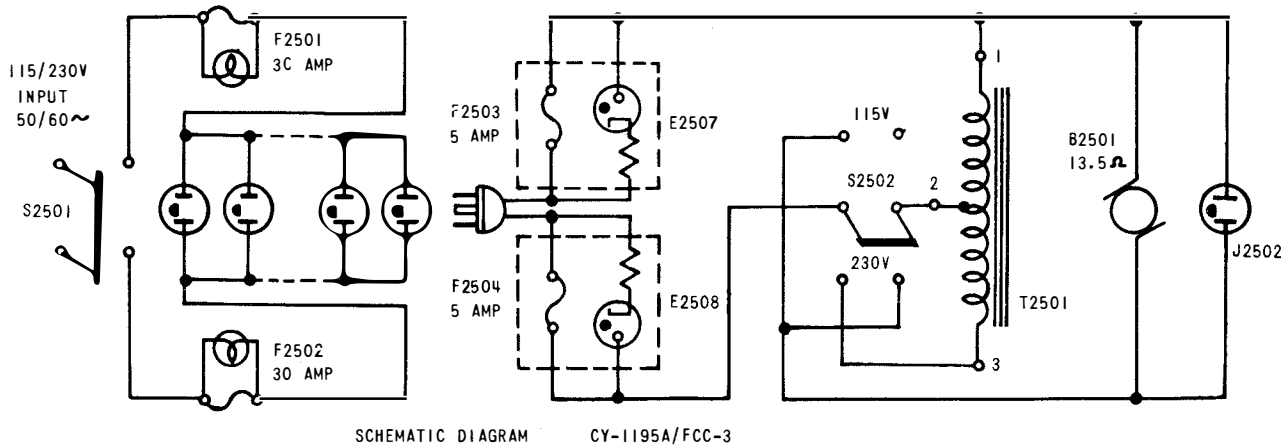


Figure 7-26. Components Location, Terminal Boards of Electronic Frequency Converter CV-244A/FCC-3



CHANGE SWITCH S2502
FOR
230V OPERATION

Figure 7—29. Schematic Diagram of Telegraph Carrier Terminal Cabinet
CY-1195A/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	5814A	Loop push-pull oscillator	(1) 32 (6) 32		(3) 0 (8) 0	(2) -7 (7) -7	6.3	0.35
V102	5726	Signal rectifier Clamping diode	(7) -7 (2) 34		(1) 14 (5) 62		6.3	0.30
V103	5814A	DC amplifier DC amplifier	(1) 130 (6) 18	0.1 2.0	(3) 9 (8) 9	(2) -7 (7) 9	6.3	0.35
V104	5814A	Hartley oscillator Output amplifier	(1) 100 (6) 300	0.8 4.0	(3) 8 (8) 14	(2) 0 (7) 0	6.3	0.35
V107	0B2WA	Voltage regulator	108		0			
V108	0B2WA	Voltage regulator	216		108			
V109	0B2WA	Voltage regulator	108		0			
³ V1301	6AU6WA	Amplifier	38	0.4	1.4	0	5.7	0.3
V1302	5751	Amplifier Amplifier	(1) 45 (6) 45	0.21 0.21	(3) 0.7 (8) 0.7	(2) -8 (7) -8	5.7	0.35
V1303	6135	Discriminator driver	188	8.0	8	-1.5	6.3	0.175
¹ V1304	5726	Mark signal rectifier	-50		0		6.3	0.3
² V1305	5670	DC amplifier	165	0.45	0	-8	6.3	0.35
V1306	5670	DC amplifier	(4) 20 (6) 130	3.4 1.2	(2) 0 (8) 0	(3) 0 (7) -42	6.3	0.35
⁴ V1307	5670	Loop oscillator keyer	(4) 90 (6) 190	9 0	(2) 9 (8) 9	(3) 10 (7) 0	6.3	0.35
V1308	5726	Signal rectifier	-90				6.3	0.30
⁴ V1309	6216	Output keyer	40	30	0	0	6.7	1.2
⁴ V1310	6216	Output keyer	40	30	0	0	6.7	1.2
V1313	0B2WA	Voltage regulator	216		108			
V1314	0B2WA	Voltage regulator	108		0			
V1315	0A2WA	Voltage regulator	0		-150			
² V1316	5726	Space signal rectifier	(2) 0 (7) 0		(1) 70 (5) 70			
V2601	5814A	102 kc Stal oscillator	(1) 130 (6) 110	2.7 3.3	(3) 6 (8) 8	(2) 0 (7) -3	6.3	0.35
V2602	5751	20.4 kc phase shift oscillator 3400 cps phase shift oscillator	(6) 200 (1) 200	1.8 1.8	(8) 0 (3) 1.8	(7) -1 (2) -1.5	6.3	0.35

TABLE 7-7. TUBE OPERATING VOLTAGES AND CURRENTS CONT'D

SYMBOL	TUBE TYPE	FUNCTION	PLATE (V)	PLATE (MA)	CATHODE (V)	GRID (V)	FILAMENT (V)	FILAMENT (A)
V2603	5814A	3400 cps Buffer amp. 85 cps Buffer amp.	(6) 115 (1) 110	1.8 2.3	(8) 6 (3) 5	(7) 0 (2) .1	6.3	0.35
V2604	5751	425 cps phase shift oscillator 85 cps phase shift oscillator	(6) 160 (1) 170	0.7 0.5	(8) .7 (3) .5	(7) -.2 (2) -.4	6.0	0.35
V2605	5751	Mixer amplifier	(1) 155 (6) 155	0.7 0.7	(3) 1.5 (8) 1.5	(2) 0 (7) 0	6.3	0.35
V2606	5814A	Amplifier Output amplifier	(1) 120 (6) 300	1.3 11.5	(3) 6.7 (8) 11.5	(2) 0 (7) 0	6.3	0.35
V2608	0B2WA	Voltage regulator	216		108			
V2609	0B2WA	Voltage regulator	108		0			
V2701	5814A	102 kc Xtal osc.	(1) 130 (6) 110	2.7 3.3	(3) 6 (8) 8	(2) 0 (7) -3	6.3	0.35
V2702	5751	20.4 kc phase shift oscillator 3400 cps phase shift oscillator	(6) 200 (1) 200	1.8 1.8	(8) 0 (3) 1.8	(7) -1 (2) -1.5	6.3	0.35
V2703	5814A	3400 cps Buffer amp. Converted output amp.	(1) 115 (6) 270	1.8 10.0	(3) 6 (8) 11	(2) 0 (7) 0	6.3	0.35
V2704	5814A	Normal amplifier Normal output amp.	(1) 115 (6) 270	1.7 10.0	(3) 5.5 (8) 10	(2) 0 (7) 0	6.3	0.35
V2705	5814A	Converted amplifier Converted amplifier	(1) 50 (6) 60	1.8 2.4	(3) 1.75 (8) 2.5	(2) 0 (7) 0	6.3	0.35
V2707	0B2WA	Voltage regulator	216		108			
V2708	0B2WA	Voltage regulator	108		0			

¹Values given for MARK condition.

²Values given for SPACE condition.

³Screen voltage 35 and screen current milliamperes 0.12.

⁴Measured with respect to pin 8 of V109.

Numbers in parentheses indicate tube socket pin number.

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-FICAT-ION FACT-OR (MU)	TRANS-CONDUCT-ANCE (MICRO-MHOS)
0A2WA	Gas Diode Voltage Reg.			150		5. to 30.					
0B2WA	Gas Diode Voltage Reg.			108		5. to 30.					
6AU6WA	Sharp Cutoff RF Pentode	6.3	0.3	250	1	10.6	150	4.3	1,000,000		5,200
				100	1	5	100	2.1	500,000		3,900
5670	Twin Triode	6.3	0.35	150	2	8.2			6,400	35	5,500
¹ 5726	Twin	6.3	0.3	² 117		9.					
¹ 5751	Hi-Mu Twin Triode	6.3	0.35	100	1.0	0.9			58,000	70	1,200
				250	3.0	1.0			58,000	70	1,200
¹ 5814A	Medium Mu Triode	6.3	0.35	250	8.5	10.5			7,700	17	2,200
6135	Medium Mu Triode	6.3	0.195	250	8.5	10.5			7,700	17	2,200
6216	Filter Reactor	6.3	1.2	100	3.0	72	100	3	18,500		12,800

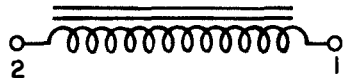
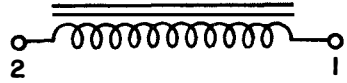
¹Each Section
²RMS

TABLE 7-9. WINDING DATA

Table
7.9

NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
CORRECTIVE MAINTENANCE

DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE 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 L2603, 2703	7928		1-2	31E	3500	270	1500 volts RMS Hi-pot Test 10 hy at 100 ma DC
L102, 202, 302, 402, 502, 602, 702, 802, 902, 1002, 1102, 1202	7927		1-2	30E	2380	200	2500 volts RMS Hi-pot Test 10 hy at 20 ma DC and 3.0 hy at 80 ma DC

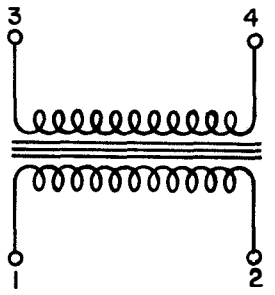
7-28

ORIGINAL

TABLE 7-9. CONT'D

DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS	
							KEY. RES.	F. B. RES.
T101	7907-1		3-1	40HF	3930	870	220K	100K
T201	7907-2		1-7	40HF	1310	280	240K	100K
T301	7907-3		3-1	40HF	3930	870	150K	220K
T401	7907-4		1-7	40HF	1310	280	150K	220K
T501	7907-5		3-1	40HF	2475	320	150K	220K
T601	7907-6		1-7	40HF	2475	320	150K	220K
T701	7907-7		3-1	40HF	2475	320	150K	220K
T801	7907-8		1-7	40HF	2475	320	150K	220K
			3-1	37HF	1520	90	200K	220K
			1-7	37HF	1520	90	200K	220K
			3-1	37HF	1520	90	200K	220K
			1-7	37HF	1520	90	200K	220K

TABLE 7-9. CONT'D

DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS	
T901	7907-9		3-1	36HF	1240	60	22K	220K
			1-7	36HF	1240	60		
T1001	7907-10		3-1	36HF	1240	60	22K	220K
			1-7	36HF	1240	60		
T1101	7907-11		3-1	34HF	875	28	22K	220K
			1-7	34HF	875	28		
T1201	7907-12		3-1	34HF	875	28	22K	220K
			1-7	34HF	875	28		
T102, 202 302, 402, 502, 602, 702, 802, 902, 1002, 1102, 1202, T2603 T2701 T2705	7903		1-2 3-4	39E 33E	3600 792	690 44	1000 volts RMS Hi-pot Test Plate to line 10,000/600 ohms	

ORIGINAL

NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
CORRECTIVE MAINTENANCE

TABLE 7-9. CONT'D

DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS
T103, 203, 303, 403, 503, 603, 703, 803, 903, 1003, 1103, 1203	7924		1-2 3-4 5-6 7-8 9-10 11-12	24 24 19 26 26 24	323 323 18 236 386 18	5.1 5.1 0.14 6.9 11.8 0.40	<p>Pri 1 and 2 in series: 230 v 50/60 cps</p> <p>Pri 1 and 2 in parallel: 115 v. 50/60 cps Hi-pot 1000 v RMS</p> <p>Sec. 1 6.3 v at 1.4 A Hi-pot 500 v RMS</p> <p>Sec. 2 82 v at 100 ma Hi-pot 700 v RMS</p> <p>Sec. 3 140 v at 70 ma Hi-pot 1200 v RMS</p> <p>Sec. 4 6.3 v at 0.5 A Hi-pot 600 v RMS</p>
T104, 204, 304, 404, 504, 604, 704, 804, 904, 1004, 1104, 1204	7917		1-3 7-8 5-9 2-X 6-9 4-9	32HF 32	400HF 400HF	8.5 9.0 65 65 100 K 100 K	<p>1000 volts</p> <p>RMS Hi-pot</p>

TABLE 7-9. CONT'D

Table
7-9

DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS
T1302, 1402, 1502, 1602, 1702, 1802, 1902, 2002, 2102, 2202, 2302, 2402	7926		1-2 3-4 5-6 7-8 9-10 11-12	24 24 26 29 16 16	323 323 256 580 18 18	5.1 5.1 7.0 34.4 0.09 0.09	Pri 1 and 2 in series: 230 v 50/60 cps Pri 1 and 2 in para- llel: 115 v 50/60 cps Hi-pot 1000 v RMS Sec. 1 82 v at 100 ma Hi- pot 700 v RMS Sec. 2 182 v at 40 ma Hi- pot 1000 v RMS Sec. 3 6.3 v at 3.33 A Hi-pot 500 v RMS Sec. 4 6.3 v at 3.0 A Hi-pot 600 v RMS
T2501	7929		1-2-3	20E	524 tap 272	3.88	AUTO TRANS. with 230 v input max out- put 2.5A at 115 v Hi-pot 1500 v RMS

NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
CORRECTIVE MAINTENANCE

TABLE 7-9. CONT'D

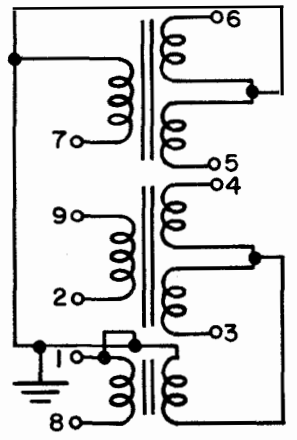
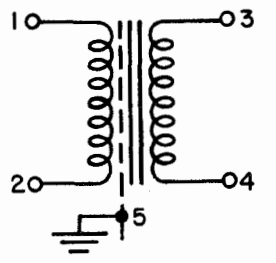
DESIGNATION SYMBOL	A. E. C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS
T2601 T2703	7914		1-X 3-4 5-6 9-2 1-7 1-8	36 32 32 32 32 36	450 644CT 644CT 1000 1000 4500	27 16 16 23 23 265	500 volts RMS Hi-pot
T2602 T2704	7900		1-2 3-4	29E 38E	400 7304	7.17 1056	1000 volts RMS Hi-pot Line to Grid 600/50,000 ohms

TABLE 7-9. CONT'D

Table
7-9

DESIGNATION SYMBOL	A.E.C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS
T2604 T2706	7925		1-2 3-4 5-6 7-8	28 28 28 17	438 438 528 26	15.6 15.6 21.9 0.13	Pri 1 and 2 in series: 230 v 50/60 cps Pri 1 and 2 in parallel: 115 v 50/60 cps Hi-pot 1000 v RMS Sec. 1 140 v at 60 ma Hi-pot 1250 v RMS Sec. 2 6.3 v at 2.6 A Hi-pot 500 v RMS
T2605	7905		1-2 3-4	29E 29E	800 800	15.1 15.2	Line to Line 600/600 ohms Hi-pot 1000 v RMS

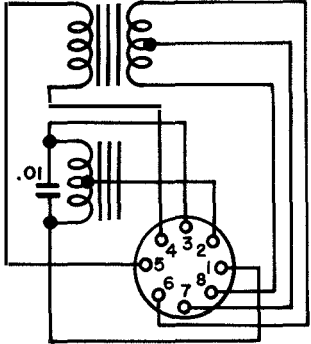
7-34

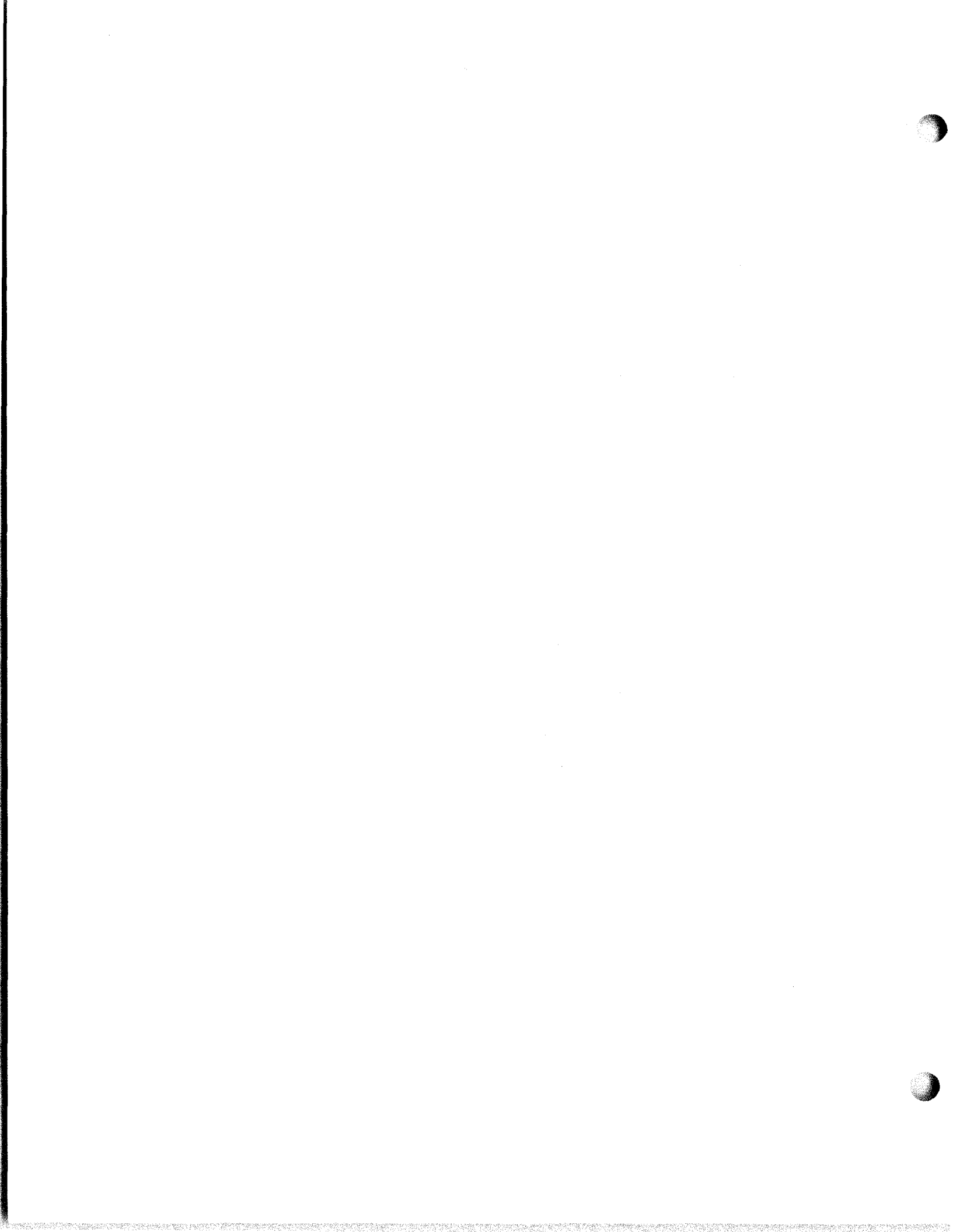
ORIGINAL

NAVSHIPS 93109

AN/FCC-3A, AN/FCC-7A
CORRECTIVE MAINTENANCE

TABLE 7-9. CONT'D

DESIGNATION SYMBOL	A.E.C. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	REMARKS
T1303 thru T2403	7931		1-2 1-3 4-5 6-7 6-8	27 27 36 36 36	67 270 625 529 1058	.5 2.1 33 35 71	1000 volts RMS Hi-pot



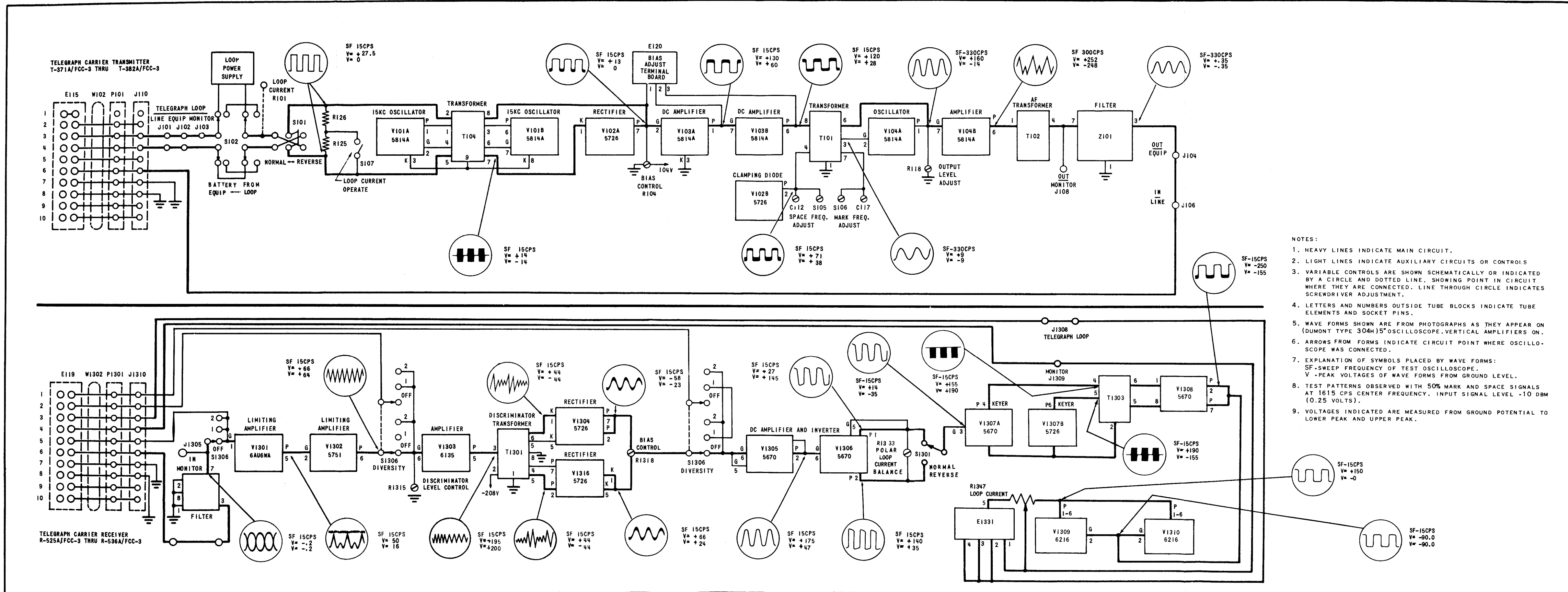
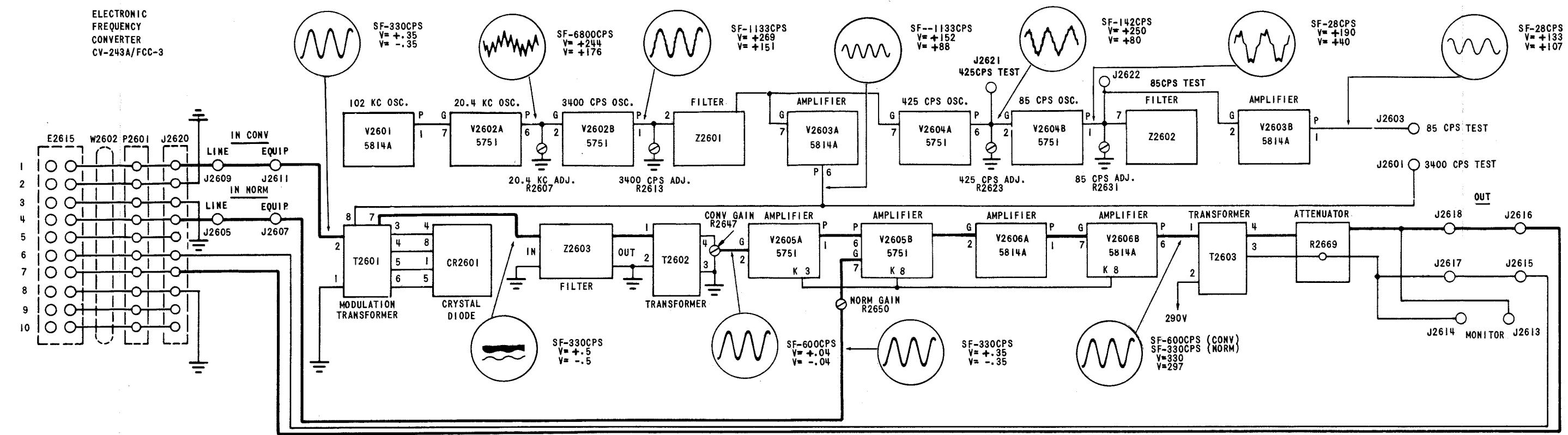


Figure 7-2. Servicing Block Diagram, Transmitter and Receiver



- 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 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.

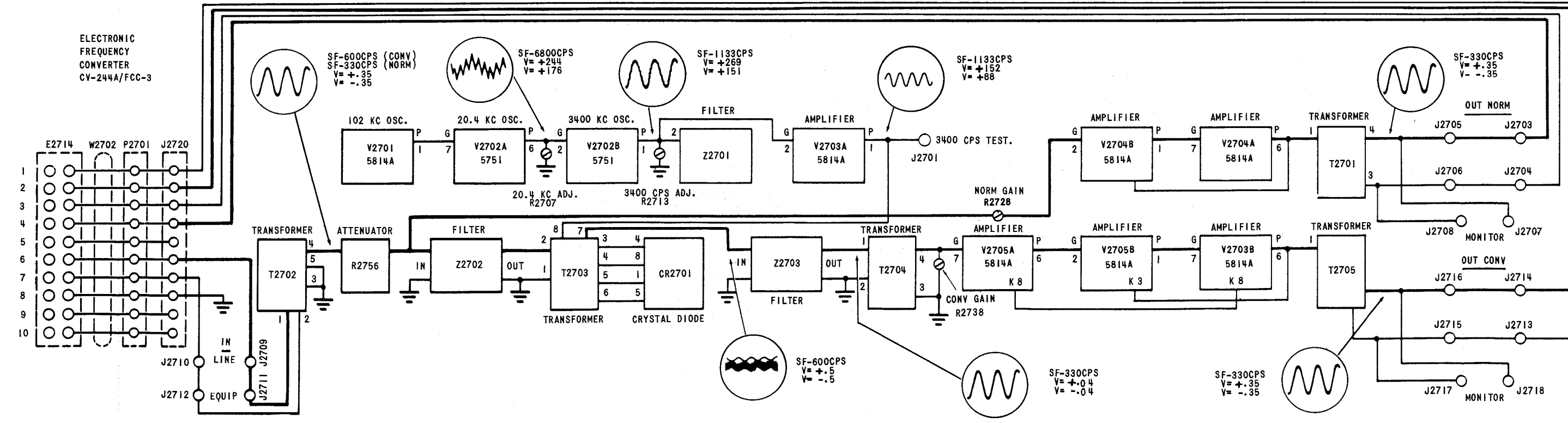
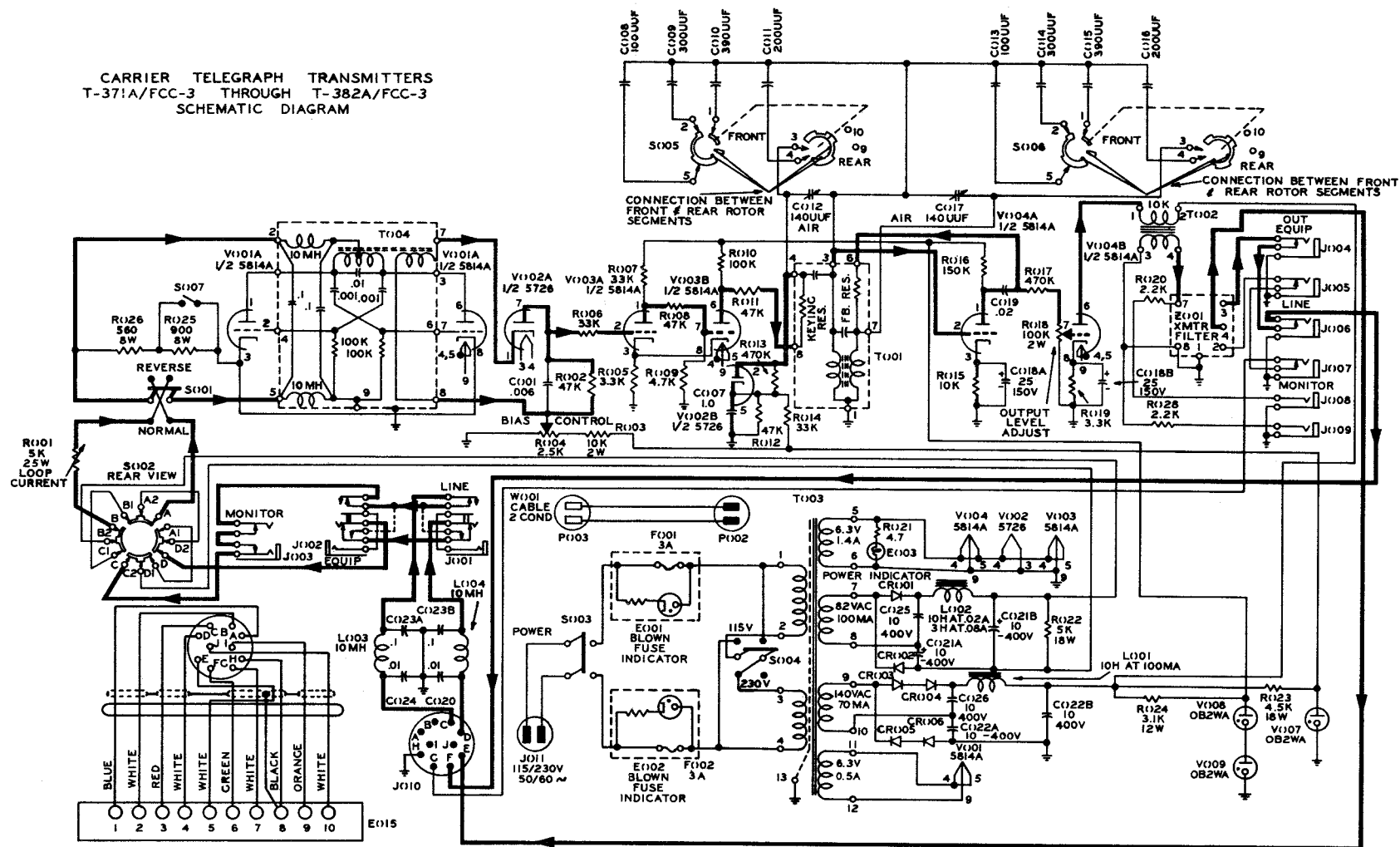


Figure 7-3. Servicing Block Diagram, Electronic Frequency Converters



THIS SCHEMATIC DIAGRAM APPLIES TO
THE TELEGRAPH TRANSMITTERS LISTED BELOW

ARMY — NAVY NOMENCLATURE OF TELEGRAPH TRANSMITTERS	MID-BAND CENTER FREQUENCY	SYMBOL NUMBER SERIES	NUMBER IN PARENTHESES OF SYMBOL NO.
T-371A/FCC-3	425	100	1
T-372A/FCC-3	595	200	2
T-373A/FCC-3	765	300	3
T-374A/FCC-3	935	400	4
T-375A/FCC-3	1105	500	5
T-376A/FCC-3	1275	600	6
T-377A/FCC-3	1445	700	7
T-378A/FCC-3	1615	800	8
T-379A/FCC-3	1955	900	9
T-380A/FCC-3	2380	1000	10
T-381A/FCC-3	2805	1100	11
T-382A/FCC-3	3230	1200	12

- NOTES
- UNLESS OTHERWISE SHOWN RESISTORS ARE IN OHMS & 1 WATT; CAPACITORS ARE IN UF.
 - ALL WAFER SWITCHES ARE VIEWED FROM REAR.
 - a SWITCH S102 IS A 2 POSITION 60° INDEX TYPE.
b SWITCH SHOWN IN BATTERY FROM EQUIPMENT POSITION (20 TO 60 MA NEUTRAL TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM TRANSMITTER.)
c WHEN TURNED CLOCKWISE (AS VIEWED FROM REAR) SWITCH IS IN BATTERY FROM LOOP POSITION (20 TO 60 MA NEUTRAL TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM LOOP; 30 MA POLAR TELEGRAPH LOOP WITH BATTERY SUPPLIED FROM LOOP.)
 - SWITCHES S1005 & S1006 ARE SHOWN IN FULL COUNTERCLOCKWISE POSITION.
 - LOOP C & D. LINE F & C. H IS GROUND.
 - WIRES SHOWN DOTTED MAY BE ADDED TO SHORT THE CIRCUIT NOT BEING USED.
 - SWITCH SHOWN IN 20-40 MA POSITION. SWITCH WHEN SHORTED IS IN 50-70 MA POSITION.

Figure 7-8. Schematic Diagram of Telegraph Carrier Transmitter

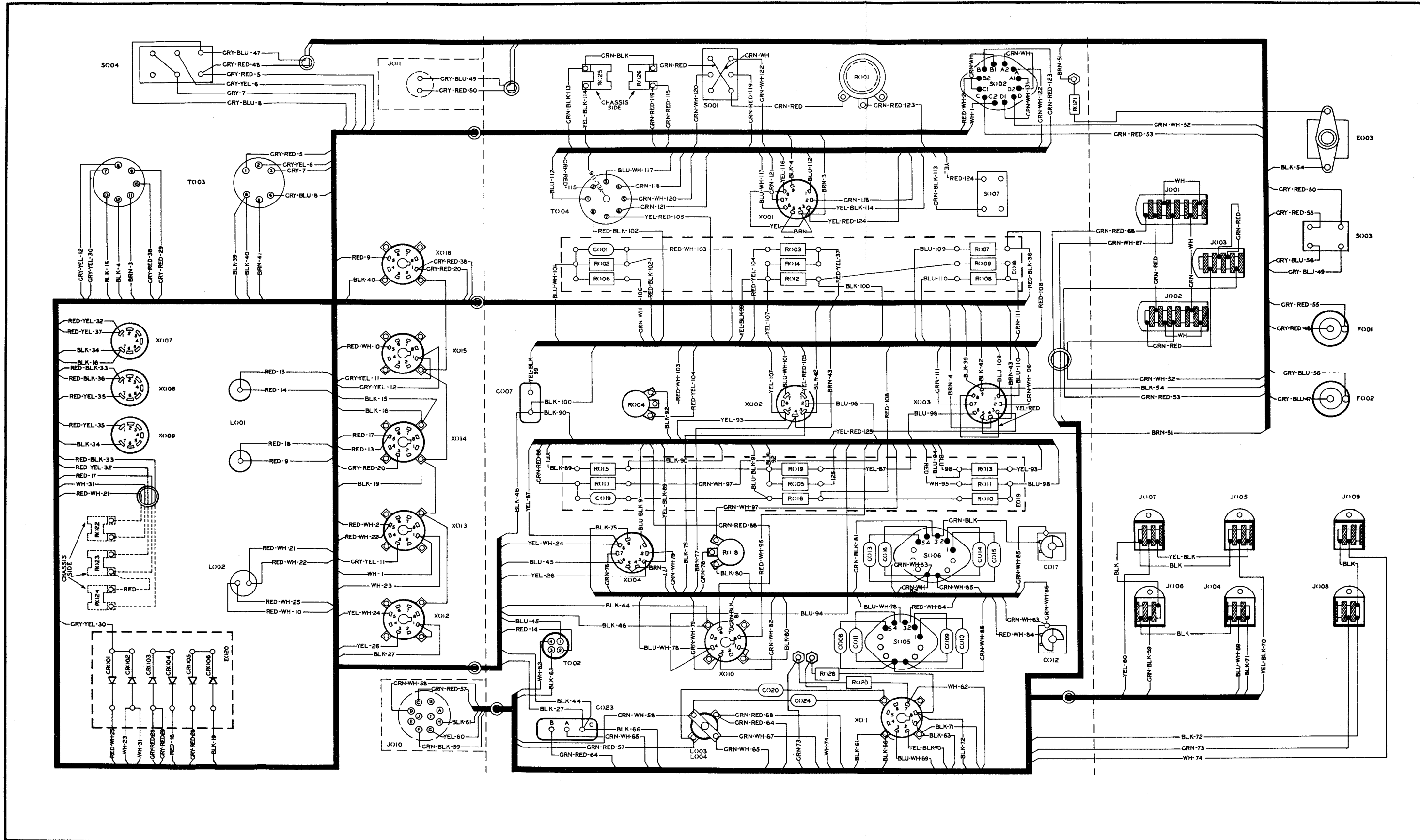


Figure 7-9. Wiring Diagram of Telegraph Carrier Transmitter

ORIGINAL

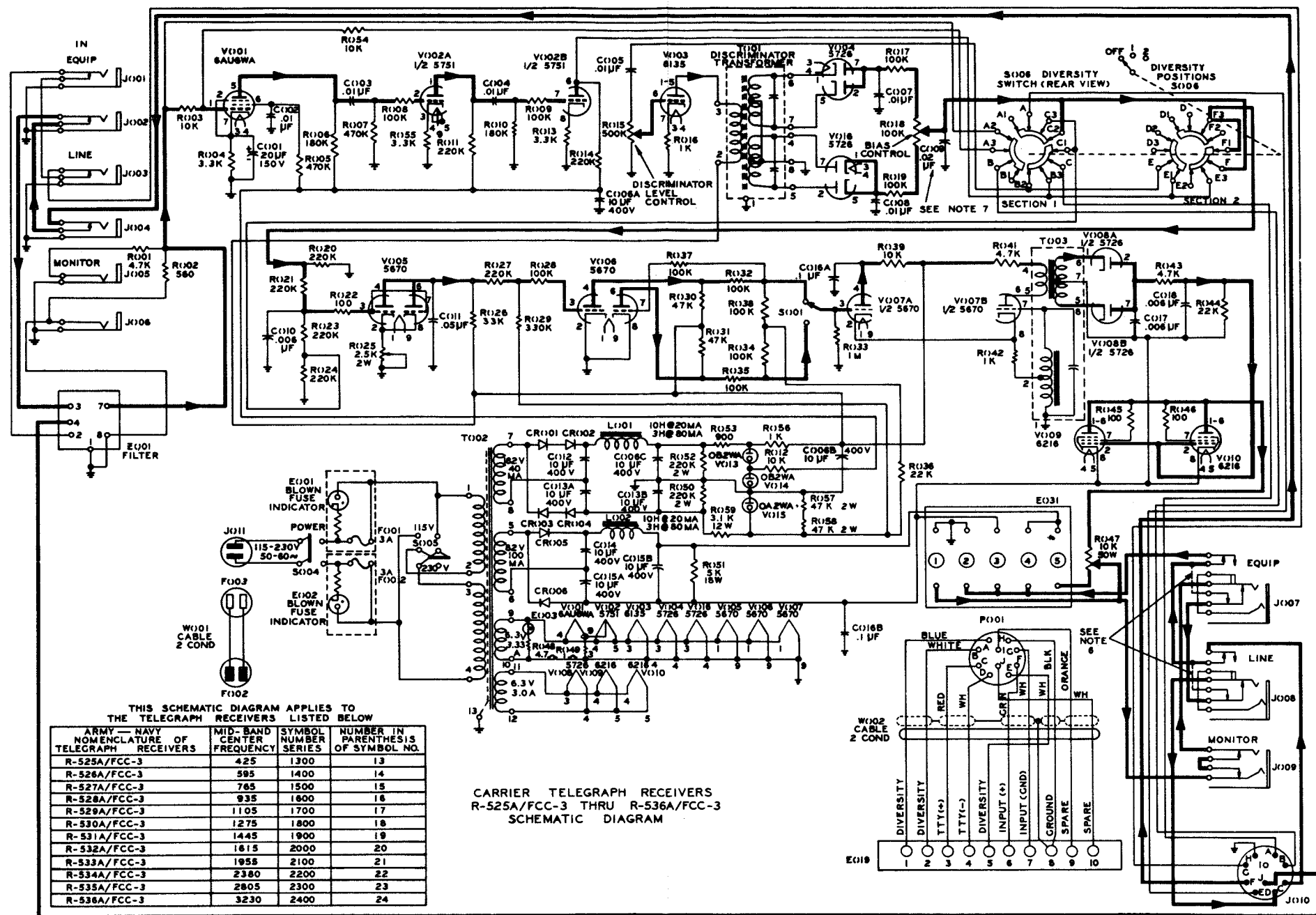


Figure 7-14. Schematic Diagram of Telegraph Carrier Receiver

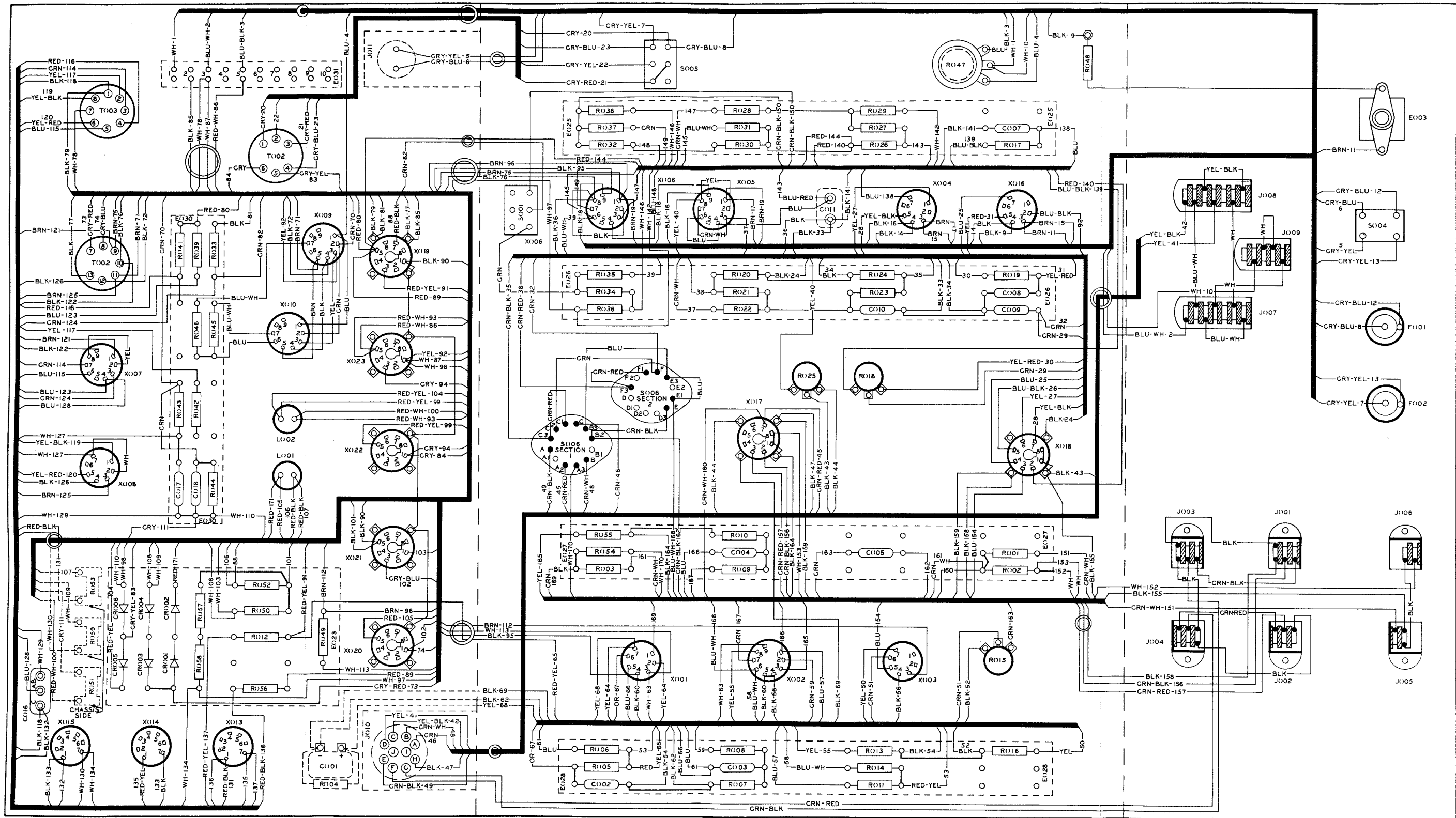
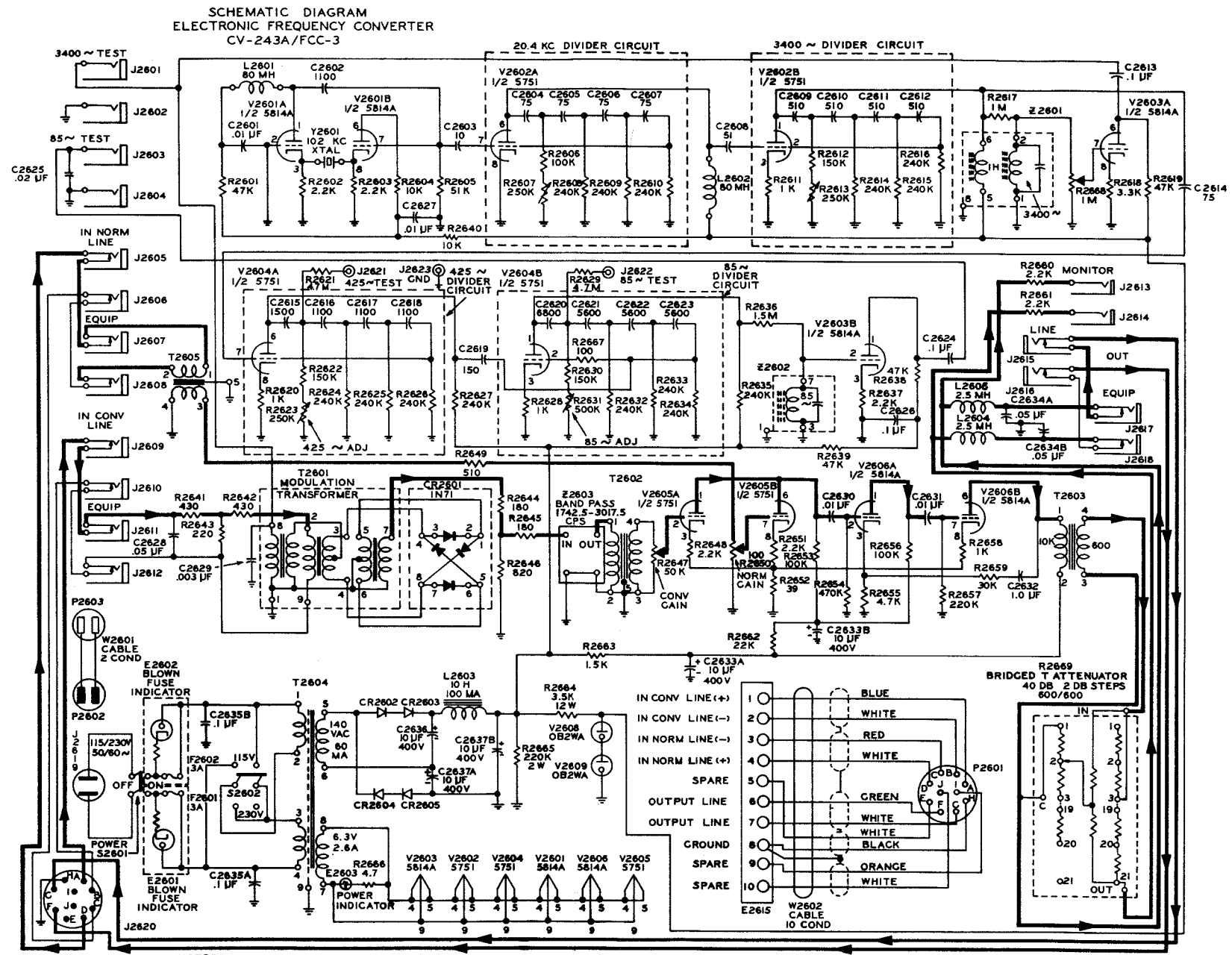


Figure 7-15. Wiring Diagram of Telegraph Carrier Receiver

ORIGINAL



- NOTES**
1. RESISTORS ARE IN OHMS, UNLESS OTHERWISE SPECIFIED. (K=1,000, 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-243A/FCC-3

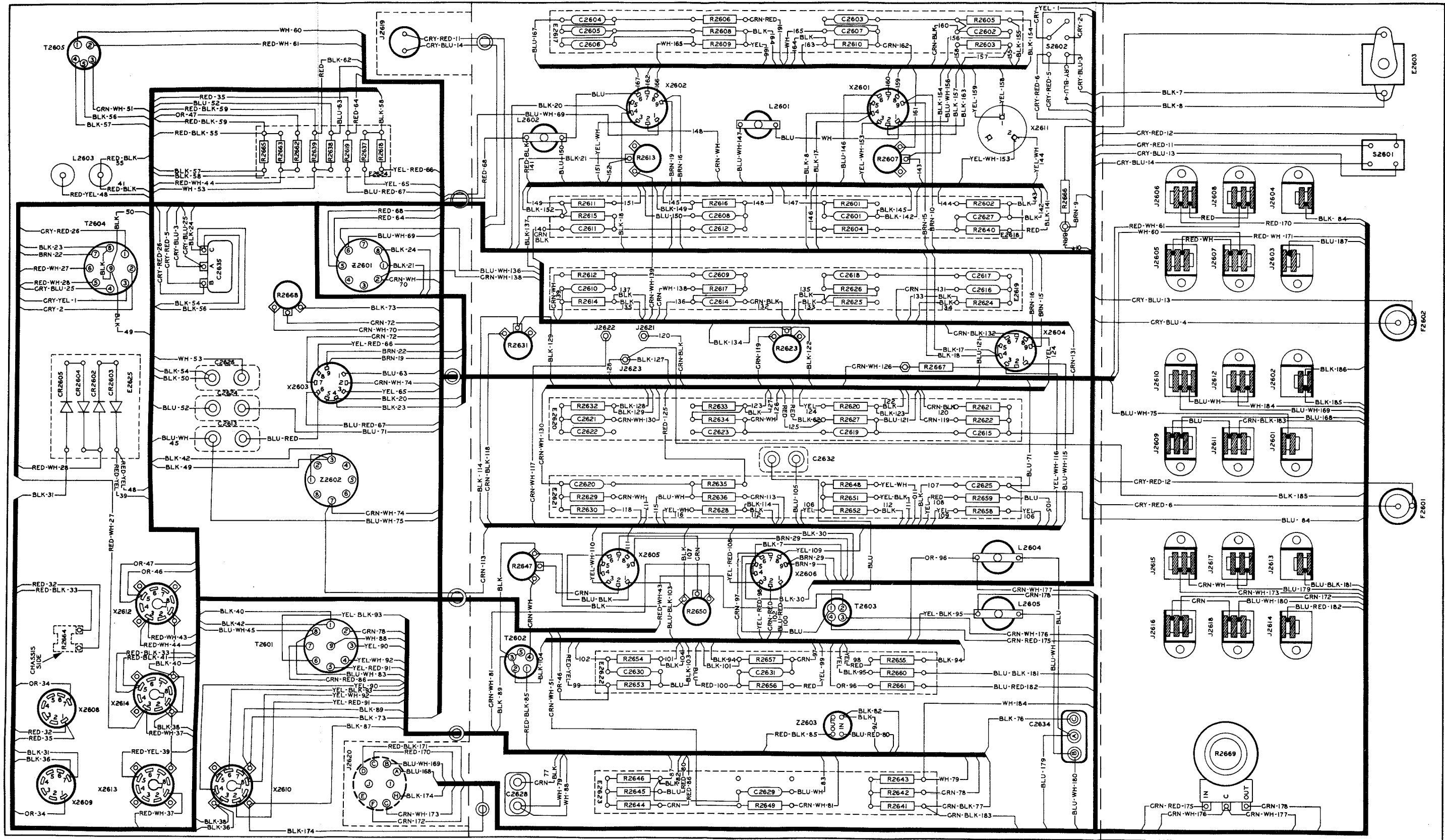


Figure 7-22. Wiring Diagram of Electronic Frequency Converter
CV-243A/FCC-3

ORIGINAL

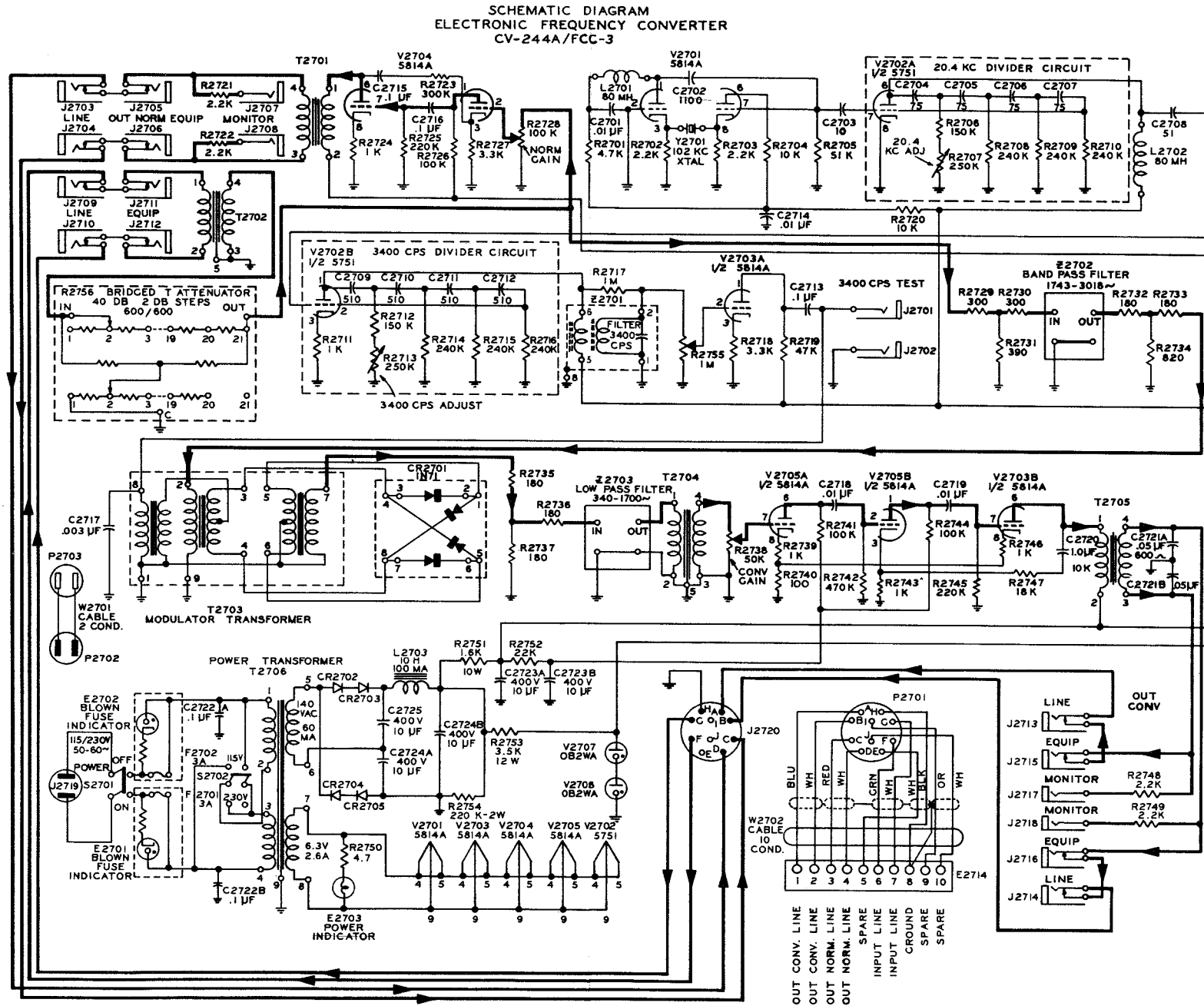


Figure 7-27. Schematic Diagram of Electronic Frequency Converter
CV-244A/FCC-3

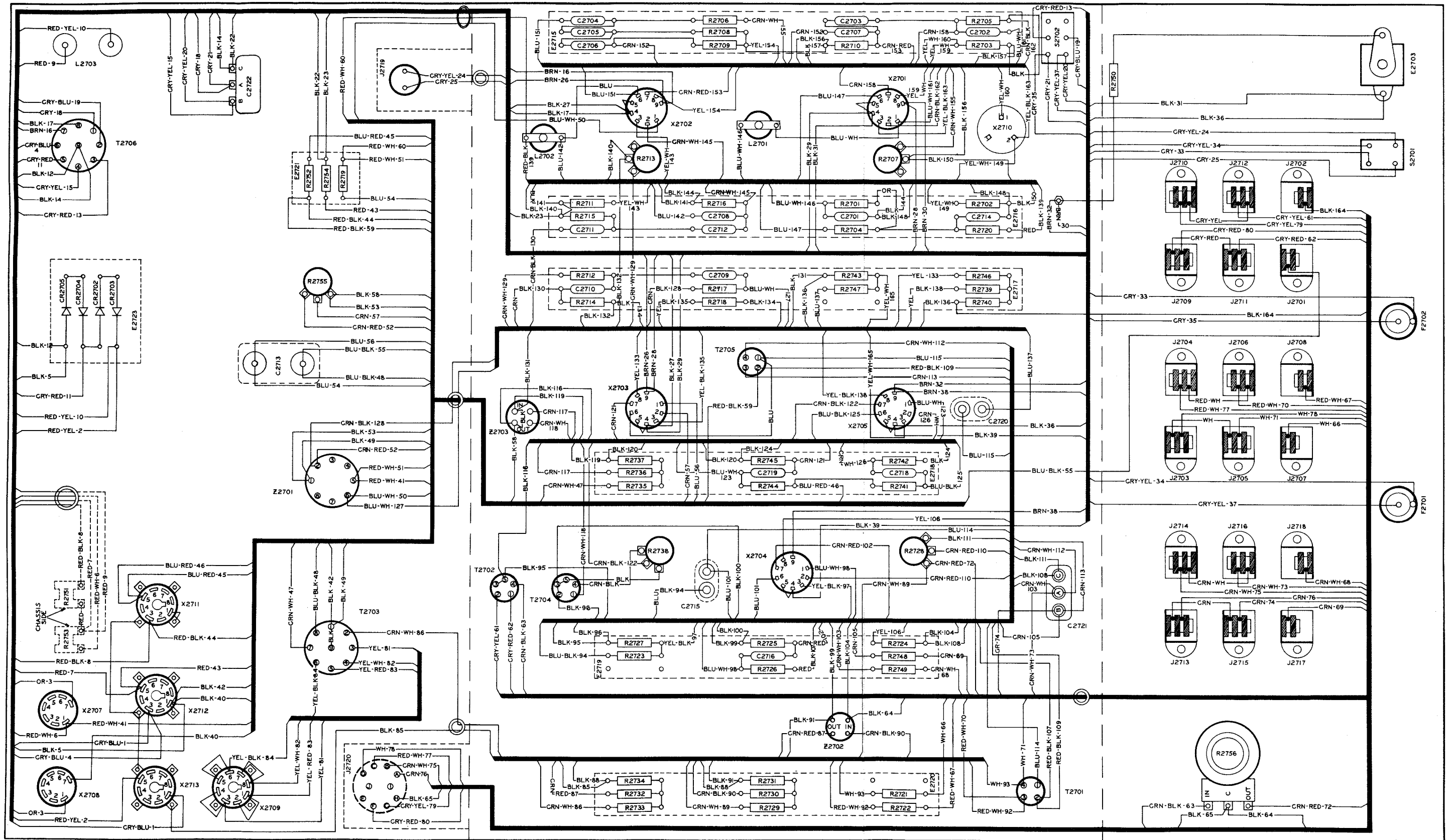


Figure 7-28. Wiring Diagram of Electronic Frequency Converter
CV-244A/FCC-3

SECTION 8 PARTS LIST

NOTE

New Stock Number Identification Tables (SNIT's) issued by the Electronics Supply Office include Federal Stock Numbers and Source, Maintenance, and Recoverability Codes. Therefore, reference shall be made to the SNIT for this information.

8-1. INTRODUCTION.

Reference designations (previously referred to as circuit symbols, reference symbols, etc.) have been assigned to identify all maintenance parts of the equipment. They are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, amplifier, electron tubes, etc. The number differentiates between parts of the same generic group. Parts of the same first major unit are numbered from 1 to 199; parts of the second 201 to 299, etc. Two consecutive series of numbers have been assigned to major units in which there are more than 100 parts of the same generic group. Sockets associated with a particular plug-in device, such as an electron tube or a fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F7 is designated XF7.

8-2. LIST OF MAJOR UNITS.

Table 8-1 is arranged by the groups of reference designations that apply to a major unit. Thus when the reference designation of a part is known, this table will furnish ready reference to the major unit in which it is used. The table also gives the following information for each major unit: (1) its colloquial name (see column 5), official nomenclature (see columns 3 and 4); (2) quantity in one equipment;* (3) location of its parts in table 8-3.

8-3. LIST OF MAJOR UNITS BY COLLOQUIAL NAME.

Table 8-2 is arranged by the common or colloquial name of major units. Only those major units are in-

cluded where the common name differs from the official nomenclature. The table also locates the parts description of the major units in table 8-3.

8-4. MAINTENANCE PARTS LIST.

Table 8-3 lists all major units and their maintenance parts. The parts of each major unit are grouped together. Column 1 lists the reference series of each major unit, followed by the reference designations of the various parts in alphabetical and numerical order. Column 2 refers to Source, Maintenance, and Recoverability Codes. Column 3 gives the name and describes the various parts. Information classified higher than the parts list has been omitted, however, such information has been referenced in Section 1. Complete information is given for all key parts (parts differing from any part previously listed in this table) and sub-key parts (parts identical with a key part but appearing for the first time for a major unit). The name and description are omitted for other parts. However, reference is made to the key part or sub-key part for the data. Column 4 indicates how the part is used and gives its functional location in the equipment. It also includes the figure number of the pictorial illustration on which the part is identified.

8-5. COLOR CODES AND MISCELLANEOUS DATA

Table 8-4 contains an explanation of capacitor and resistor color coding and other miscellaneous data.

8-6. LIST OF MANUFACTURERS.

Table 8-5 lists manufacturers of parts used in the equipment. The first column includes the abbreviations used in table 8-3 to identify manufacturers.

TABLE 8-1. TELEGRAPH CARRIER TERMINAL AN/FCC-3A, LIST OF MAJOR UNITS

(Telegraph Carrier Terminal AN/FCC-7A consists of first eight channels of Telegraph Carrier Terminal AN/FCC-3A only. All other components are identical.)

REF. DESIG.	QUANT.	NAME OF MAJOR UNIT	DESIGNATION	COLLOQUIAL NAME	PAGE
100 to 199	1	Telegraph Carrier Transmitter	T-371A/FCC-3	Transmitter	
200 to 299	1	Telegraph Carrier Transmitter	T-372A/FCC-3	Transmitter	
300 to 399	1	Telegraph Carrier Transmitter	T-373A/FCC-3	Transmitter	
400 to 499	1	Telegraph Carrier Transmitter	T-374A/FCC-3	Transmitter	
500 to 599	1	Telegraph Carrier Transmitter	T-375A/FCC-3	Transmitter	
600 to 699	1	Telegraph Carrier Transmitter	T-376A/FCC-3	Transmitter	
700 to 799	1	Telegraph Carrier Transmitter	T-377A/FCC-3	Transmitter	
800 to 899	1	Telegraph Carrier Transmitter	T-378A/FCC-3	Transmitter	
* 900 to 999	1	Telegraph Carrier Transmitter	T-379A/FCC-3	Transmitter	
*1000 to 1099	1	Telegraph Carrier Transmitter	T-380A/FCC-3	Transmitter	
*1100 to 1199	1	Telegraph Carrier Transmitter	T-381A/FCC-3	Transmitter	
*1200 to 1299	1	Telegraph Carrier Transmitter	T-382A/FCC-3	Transmitter	
1300 to 1399	1	Telegraph Carrier Receiver	R-525A/FCC-3	Receiver	
1400 to 1499	1	Telegraph Carrier Receiver	R-526A/FCC-3	Receiver	
1500 to 1599	1	Telegraph Carrier Receiver	R-527A/FCC-3	Receiver	
1600 to 1699	1	Telegraph Carrier Receiver	R-528A/FCC-3	Receiver	
1700 to 1799	1	Telegraph Carrier Receiver	R-529A/FCC-3	Receiver	

* Not used with the AN/FCC-7A.

TABLE 8-1. TELEGRAPH CARRIER TERMINAL AN/FCC-3A, LIST OF MAJOR UNITS CONT'D

(Telegraph Carrier Terminal AN/FCC-7A consists of first eight channels of Telegraph Carrier Terminal AN/FCC-3A only. All other components are identical.)

REF. DESIG.	QUANT.	NAME OF MAJOR UNIT	DESIGNATION	COLLOQUIAL NAME	PAGE
1800 to 1899	1	Telegraph Carrier Receiver	R-530A/FCC-3	Receiver	
1900 to 1999	1	Telegraph Carrier Receiver	R-531A/FCC-3	Receiver	
2000 to 2099	1	Telegraph Carrier Receiver	R-532A/FCC-3	Receiver	
*2100 to 2199	1	Telegraph Carrier Receiver	R-533A/FCC-3	Receiver	
*2200 to 2299	1	Telegraph Carrier Receiver	R-534A/FCC-3	Receiver	
*2300 to 2399	1	Telegraph Carrier Receiver	R-535A/FCC-3	Receiver	
*2400 to 2499	1	Telegraph Carrier Receiver	R-536A/FCC-3	Receiver	
2500 to 2599	2	Telegraph Carrier Terminal Cabinet	CY-1195A/FCC-3	Cabinet	
2600 to 2699	1	Electronic Frequency Converter	CV-243A/FCC-3	Frequency Converter	
2700 to 2799	1	Electronic Frequency Converter	CV-244A/FCC-3	Frequency Converter	

* Not used with the AN/FCC-7A

**TABLE 8-2. TELEGRAPH CARRIER TERMINAL AN/FCC-3A, LIST OF MAJOR
UNITS BY COLLOQUIAL NAME**

COLLOQUIAL NAME	DESIGNATION	PAGE
Transmitter	Telegraph Carrier Transmitter T-371A/FCC-3 T-372A/FCC-3 T-373A/FCC-3 T-374A/FCC-3 T-375A/FCC-3 T-376A/FCC-3 T-377A/FCC-3 T-378A/FCC-3 T-379A/FCC-3 T-380A/FCC-3 T-381A/FCC-3 T-382A/FCC-3	
Receiver	Telegraph Carrier Receiver R-525A/FCC-3 R-526A/FCC-3 R-527A/FCC-3 R-528A/FCC-3 R-529A/FCC-3 R-530A/FCC-3 R-531A/FCC-3 R-532A/FCC-3 R-533A/FCC-3 R-534A/FCC-3 R-535A/FCC-3 R-536A/FCC-3	
Cabinet	Telegraph Carrier Terminal Cabinet CY-1195A/FCC-3	
Frequency Converter	Electronic Frequency Converter CV-243A/FCC-3 CV-244A/FCC-3	

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A, MAINTENANCE PARTS LIST

TELEGRAPH CARRIER TERMINAL AN/FCC-3A

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
AN/FCC-3A	X-FFS	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 or neutral current loop to transmitter and neutral voltage or current loop from receiver; 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; AEC part No. 7860; U. S. Navy type No. AN/FCC-3A; govt spec MIL-T-15294C-2 (Ships).	Figure 1-1

TELEGRAPH CARRIER TERMINAL AN/FCC-7A

AN/FCC-7A	X-FFS	TERMINAL, CARRIER TELEGRAPH: AN/FCC-7A same as AN/FCC-3A except less 4 wide-band transmitter and receiver channels.	Figure 1-1
-----------	-------	---	------------

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3

100 to 199	X-FFS	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; 16" lg x 19" wd x 5-1/4" h o/a; AEC part No. 7866; U. S. Navy Type T-371A/FCC-3; govt spec MIL-T-15294C-2 (Ships).	Single channel telegraph transmitter. Figure 1-2
C101	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 6,000 mmf, ±10%; 600 v DC; govt spec MIL-C-91A, type No. CN35AF-602K; Micamold No. CN35AF602K; AEC part No. CN35AF602K.	Filter capacitor for rectifier V102A. Figure 7-7
C102		DELETED	
C103		DELETED	
C104		DELETED	
C105		DELETED	
C106		DELETED	
C107	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 1 mf, ±10%; 600 v DC; govt spec MIL-C-25A, type No. CP61B1EF105K; Micamold part No. CP61B1EF105K; AEC part No. CP61B1EF105K.	Cathode filter capacitor for V102B. Figure 7-5

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C108	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 100 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C101J; Sangamo part No. CM20C101J; AEC part No. CM20C101J.	Space frequency adjustment. Figure 7-6.
C109	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 300 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C301J; Sangamo part No. CM20C301J; AEC part No. CM20C301J.	Space frequency adjustment. Figure 7-6
C110	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 390 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C391J; Sangamo part No. CM20C391J; AEC part No. CM20C391J.	Space frequency adjustment. Figure 7-6
C111	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 200 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C201J; Sangamo part No. CM20C201J; AEC part No. CM20C201J.	Space frequency adjustment. Figure 7-6
C112	P1FFC	CAPACITOR, VARIABLE, AIR-DIELECTRIC: 140 mmf, 600 v DC, 1-15/16" lg x 15/16" wd x 1-7/32" h o/a excl shaft and bushing; screwdriver adjustment; 3 term; mtd by 2 bushings tapped for No. 4-40 machine screws; 19 stator plates and 18 rotor plates; govt spec JAN-C-92; E. F. Johnson part No. CT1C150; AEC part No. CT1C150.	SPACE FREQ ADJ. Figure 7-5
C113		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C108.	Mark frequency adjustment capacitor. Figure 7-6
C114		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C109.	Mark frequency adjustment capacitor. Figure 7-6
C115		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C110.	Mark frequency adjustment capacitor. Figure 7-6
C116		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C111.	Mark frequency adjustment capacitor. Figure 7-6
C117		CAPACITOR, VARIABLE, AIR-DIELECTRIC: Same as C112.	MARK FREQ ADJ. Figure 7-5
C118	P3FFC	CAPACITOR, FIXED, ELECTROLYTIC: 2 sections, 25 mf capacity per section; 150 v DC; govt spec JAN-C-62; type No. CE52C250J; Pyramid part No. CE52C250J; AEC part No. CE52C250J.	Figure 7-5
C118A	X1FFC	CAPACITOR, FIXED, ELECTROLYTIC; p/o C118; for reference only.	Cathode by-pass capacitor for V104A.
C118B	X1FFC	CAPACITOR, FIXED, ELECTROLYTIC; p/o C118; for reference only.	Cathode by-pass capacitor for V104B.
C119	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC; 20,000 mmf, $\pm 10\%$; 300 v DC; govt spec MIL-C-91A; type No. CN35EX-203K; Micamold part No. CN35EX203K; AEC part No. CN35EX203K.	Couples plate of V104A to grid of V104B. Figure 7-7

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C120	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 10,000 mmf, $\pm 10\%$; 600 v DC; govt spec MIL-C-91A, type No. CN35AF-103K; Micamold part No. CN35AF103K; AEC part No. CN35AF103K.	RF filter capacitor Figure 7-6
C121	P3FFC	CAPACITOR, FIXED, ELECTROLYTIC: 2 sections, 10 mf capacity per section; 400 v DC; govt spec JAN-C-62; type No. CE52C100Q; Pyramid part No. CE52C100Q; AEC part No. CE52C100Q.	Filter capacitor loop power supply. Figure 7-5
C122		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121	Filter capacitor high voltage power supply. Figure 7-5
C123	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 2 sections; 0.1 x 0.1 mf; $\pm 20\%$; 600 v DC; govt spec MIL-C-25A, type No. CP54B4EF104V; Micamold part No. CP54B4EF104V; AEC part No. CP54B4EF104V.	Filter capacitor. Figure 7-6
C124		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120	RF filter capacitor. Figure 7-6
C125	P3FFC	CAPACITOR, FIXED, ELECTROLYTIC: one section, 10 mf capacity, 400 v DC; govt spec JAN-C-62; type No. CE51C100Q; Pyramid part No. CE51C100Q; AEC part No. CE51C100Q.	Filter capacitor loop power supply. Figure 7-5
C126		CAPACITOR, FIXED, ELECTROLYTIC: Same as C125	Filter capacitor high voltage supply. Figure 7-5
CR101	P1FFC	DIODE, SILICON: 400 piv, 500 ma, type 1N540; .680" lg x .385" diam, lead mounted; AEC part No. 1N540.	Half-wave rectifier. Figure 7-7
CR102		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figure 7-7
CR103		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figure 7-7
CR104	P1FFC	DIODE, SILICON: 200 piv, 500 ma, type 1N538; .680" lg x .385" diam, lead mounted; AEC part No. 1N538.	Half-wave rectifier. Figure 7-7
CR105		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figure 7-7
CR106		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figure 7-7
E101		DELETED	
E102		DELETED	
E103	P1FFC	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. MS15571-1; AEC part No. MS15571-1.	Pilot lamp; indicates presence of line voltage. Figure 7-6

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E104	P1FFC	FUSEHOLDER: indicating type, supplied w/cap and body assembly; c/o E104A and E104B as listed below; type FHL-25/U; govt spec MIL-F-19207; Bussmann Mfg. part No. FHL-25U; AEC part No. FHL-25/U.	
E104A	X1FFC	CAP, FUSEHOLDER: supplied w/o body assembly, includes knob, window and neon type indicating lamp; with extractor post accommodating one cartridge fuse 1-1/4" lg x 1/4" diam; 2-15/16" lg x 1-1/16" wd x 1-1/4" d; Bussmann Mfg. part No. Carrier Assembly for No. 6335-1/2; AEC part No. 8093; p/o E104.	Blown fuse indicator.
E104B	X1FFC	BODY, FUSEHOLDER: supplied w/o cap, includes resistor (lamp), 220,000 ohms; accommodates one cartridge fuse (in extractor post described above); 2 term, solder lug type; two 3/16" diam mtg holes on 1-5/16" mtg/c; 2-1/16" lg x 1-3/4" wd x 1-1/8" d; Bussmann Mfg. part: Body Assembly for HPC; AEC part No. 8094; p/o E104.	Holds AC line fuse.
E105		FUSEHOLDER: Same as E104.	
E105A		CAP, FUSEHOLDER: Same as E104A; p/o E105.	Blown fuse indicator.
E105B		BODY, FUSEHOLDER: Same as E104B; p/o E105.	Holds AC line fuse.
E106	P1FFC	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; AEC part No. 8083.	Spare fuseholder. Figure 7-5
E107	P1FFC	KNOB, POINTER: plastic, skirted, 0.800" h x 0.700" diam; accommodates round shaft 1/4" diam to a depth of 1/2", two No. 8-32 Allen head set screws; type 700-8S of MIL-STD-242; govt spec MIL-K-3926; AEC part No. 7997.	Control for S102. Figure 7-5
E108		KNOB, POINTER: Same as E107.	Control for R101. Figure 7-5
E109	P1FFC	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; AEC part No. TS102U01.	Tube shield for V102. Figure 7-5
E110	P1FFC	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; AEC part No. TS103U02.	Tube shield for V103. Figure 7-5
E111		SHIELD, ELECTRON TUBE: Same as E110.	Tube shield for V104. Figure 7-5
E112	P1FFC	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; AEC part No. TS102U03.	Tube shield for V107. Figure 7-5
E113		SHIELD, ELECTRON TUBE: Same as E112.	Tube shield for V108. Figure 7-5
E114		SHIELD, ELECTRON TUBE: Same as E112.	Tube shield for V109. Figure 7-5

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E115	P1FFC	TERMINAL BOARD: MFI-20 material; 2 rows of 10 terminals with barriers; 4-5/8" lg x 7/8" wd x 1/2" h o/a; two 0.180" diam mtg holes on 4-1/4" mtg centers; with 10 stud connectors and 20 terminal nuts; type 8TB10M, govt spec MIL-T-16784; Kulka Electric Mfg. Co. part No. 8TB10M; AEC part No. 8TB10M.	Termination block for W102. Figure 7-5
E116	P1FFC	STUD, TERMINAL: 4,000 v; solder connection; brass, cadmium pl; 13/16" lg x 5/16" diam; mts by threaded shank No. 6-32, 1/4" lg; ins P. B. E. phenolic; Cambridge Thermionic Corp. part No. X1581; AEC part No. 7947.	Mounts component parts.
E117	M-FFC	MOUNTING: laminated phenolic; natural color; jacks held in place by means of three No. 6-32 tapped holes; AEC part No. 7982-2.	Mounts J101, J102, J103 to front panel. Figure 7-5
E118	M-FFC	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; AEC part No. 7936-4.	Mounts component parts. Figures 7-6, 7-7
E119	M-FFC	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; AEC part No. 7936-7.	Mounts component parts. Figures 7-6, 7-7
E120	M-FFC	TERMINAL BOARD: laminated phenolic; incl 12 solder lug type term; w/o barriers; 3-13/16" lg x 2" wd x 29/64" h o/a; four 0.156" diam mtg holes spaced 3-7/16" x 1-5/8" centers; stamped with symbol designations, moisture and fungus proofed; AEC part No. 7938.	Mounts component parts. Figures 7-6, 7-7
E121		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V101. Figure 7-5
E122		STUD, TERMINAL: Same as E116.	Mounts component parts.
E123		STUD, TERMINAL: Same as E116.	Mounts component parts.
F101	P1FFC	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; AEC part No. F02G3R00A.	AC line fuse. Figure 7-6
F102		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-6.
F103		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-5
F104		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-5

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H101		CLAMP, ELECTRICAL: aluminum; anodized finish; 1-1/8" lg x 1-3/16" diam o/a; American Phenolic Corp. part No. AN-3057-10; AEC part No. AN-3057-10, p/o W102.	Clamps cable W102 to connector P101. Figure 7-5
H102	N-FFC	CLAMP, ELECTRICAL: steel; cad pl, iridite finish; 1-11/32" lg x 1/2" wd x 11/16" h o/a; AEC part No. 7946.	Clamp for switch S104. Figure 7-5
H103	N-FFC	CLAMP, ELECTRICAL: nylon, black; 1-1/8" lg x 5/8" wd x 19/32" h o/a; AEC part No. 7977-2.	Clamps cable W102 to E115.
H104	N-FFC	BOLT, THUMB: stainless steel; captive type; cone point, No. 10-32 NF, class 2 fit, 5/16" min lgth; 1/2" nominal lgth; AEC part No. 8011.	Secures front panel to cabinet.
H105		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H106		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H107		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H108	N-FFC	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; AEC part No. 8008.	Secures thumb bolt to front panel.
H109		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H110		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H111		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H112	P1FFC	SLIDE, LEFT: cad pl and iridite dipped finish; steel material; 16" lg x 3" h x 5/8" wd; AEC part No. 8071-5.	Supporting member on chassis for slides.
H113	P1FFC	SLIDE, RIGHT: steel; cad pl and iridite dipped; steel material; 16" lg x 3" h x 5/8" wd; AEC part No. 8071-6.	Supporting member on chassis for slides.
H114	P1FFC	SLIDE MOUNTING PLATE, LEFT: cold rolled steel; cad pl and iridite dipped; 16" lg x 3-1/2" h x 1-7/16" wd; two mtg brackets 14-31/32" on ctr; AEC part No. 8071-3.	Supporting member on cabinet for slides.
H115	P1FFC	SLIDE MOUNTING PLATE, RIGHT: cold rolled steel; cad pl and iridite dipped; 16" lg x 3-1/2" h x 1-7/16" wd; two mtg brackets 14-31/32" on ctr; AEC part No. 8071-4.	Supporting member on cabinet for slides
I101		DELETED	
I102		DELETED	

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
I103	P1FFC	LIGHT, INDICATOR W/LENS: c/o I103A and I103B as listed below: Govt. Spec. MIL-L-3661, Type LH62BR2; Drake Mfg. Part No. LH62BR2; AEC part No. LH62BR2.	Figure 7-6
I103A	X1FFC	LIGHT, INDICATOR: supplied w/o lens: accommodates T3-1/4 lamp, miniature bayonet base; 28 v, 3 amp, 2-7/32" lg x 5/8" diam; one 11/16" diam mtg hole; Drake Mfg. part No. MIL 100, less Jewel AEC part No. 8096; p.o. I103.	Lamp assembly for E103.
I103B	X1FFC	LENS, INDICATOR LIGHT: lens red, 5/8" diam x 5/8" lg; Drake Mfg. part No. MIL 25, Jewel Red SFB; AEC part No. 8097; p/o I103.	Lens for I103A
J101	P1FFC	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; AEC part No. 7999.	LINE jack for TELEGRAPH LOOP Figure 7-5
J102		JACK, TELEPHONE: Same as J101.	EQUIP jack for TELEGRAPH LOOP Figure 7-5
J103	P1FFC	JACK, TELEPHONE: accommodates 2 cond plug; 3-1/16" lg x 0.510" wd x 1-1/8" h o/a; P. R. Mallory part No. JJ-082; AEC part No. JJ-082.	MONITOR jack for TELEGRAPH LOOP Figure 7-5
J104	P1FFC	JACK, TELEPHONE: accommodates 2 cond plug; 3-7/16" lg x 9/16" wd x 13/16" h o/a; P. R. Mallory part No. JJ-024; AEC part No. JJ-024.	EQUIP jack for signal OUT. Figure 7-5
J105		JACK, TELEPHONE: Same as J104.	EQUIP jack for signal OUT. Figure 7-5
J106		JACK, TELEPHONE: Same as J104.	LINE jack for signal OUT. Figure 7-6.
J107		JACK, TELEPHONE: Same as J104.	LINE jack for signal OUT. Figure 7-6
J108	P1FFC	JACK, TELEPHONE: accommodates 2 cond plug; 3-7/16" lg x 9/16" wd x 13/16" h o/a; P. R. Mallory part No. JJ-086; AEC part No. JJ-086.	MONITOR jack for signal OUT. Figure 7-5
J109		JACK, TELEPHONE: Same as J108.	MONITOR jack for signal OUT. Figure 7-5
J110	P1FFC	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-18-1P; AEC part No. AN-3102A-18-1P.	Connects W102 to chassis. Figure 7-5
J111	P1FFC	CONNECTOR, RECEPTACLE: 2 cont, male; twist lock type; 1-3/8" lg x 2-1/32" wd x 1-13/32" diam o/a; body cylindrical shape w/mtg flanges, brass, nickel pl; molded bakelite insert; Harvey Hubbell part No. 7523; AEC part No. 8044.	Connects W101 to chassis. Figure 7-5

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
L101	P1FCC	REACTOR: filter choke; 1 section; 10 hy o/a inductance, 100 ma DC; 270 ohms DC resistance; 1500 v RMS test v; case hermetically sealed, metal; 2-5/16" lg x 2-1/16" wd x 2-7/8" h o/a; Dietz part No. 1228; govt spec MIL-T-27A, Grade 1, Class R; AEC part No. 7928.	Filter choke for B+ power supply. Figure 7-5
L102	P1FFC	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; 200 ohms DC resistance; 1,500 v RMS test v; case hermetically sealed, metal; 1-15/16" lg x 1-13/16" wd x 2-13/16" h; Dietz part No. 1227; govt spec MIL-T-27A, Grade 1, Class R; AEC part No. 7927.	Filter choke for B+ power supply. Figures 7-5, 7-6
L103	P1FFC	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; J. W. Miller type No. 3653-2; AEC part No. 7930-2.	RF filter choke. Figure 7-6
L104		CHOKE, RADIO FREQUENCY: Same as L103.	RF filter choke. Figure 7-6
O101		DELETED	
O102		DELETED	
O103		DELETED	
O104		DELETED	
O105		DELETED	
O106	N-FFC	ROLLER ASSEMBLY: roller nylon; stud cad pl steel; 29/32" lg x 1-3/64" diam stud threaded 1/4-20 for 3/8"; AEC part No. 8072-1.	Roller for chassis slide.
O107		ROLLER: Same as O106.	Roller for chassis slide.
O108		ROLLER: Same as O106.	Roller for chassis slide.
O109		ROLLER: Same as O106.	Roller for chassis slide.
O110	N-FFC	ROLLER ASSEMBLY: roller nylon; stud cad pl steel; 29/32" lg x 11/16" diam stud threaded 1/4-20 for 3/8"; AEC part No. 8072-2.	Roller for chassis slide.
O111		ROLLER: Same as O110.	Roller for chassis slide.
O112	N-FFC	TILT PIN ASSEMBLY: tilt pin 7/16" lg x 5/16" diam; cad pl steel; stud, pinhead screw 8-32 threaded x 3/4" lg; with split ring type lock washer and 8-32 hex nut; AEC part No. 8073.	Locks chassis in upright position.
O113		TILT PIN ASSEMBLY: Same as O112.	Locks chassis in upright position.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
P101	P1FFC	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; AEC part No. AN-3106A-18-1S; p/o W102.	End connector for W102. Figure 7-5
P102		CONNECTOR, PLUG: two male flat cont; straight type with detachable grounding prong; 2-5/32" lg x 1-1/4" wd; 10 amp, 250 v; .450" diam max cable opening; cord grip supplied; type MS-91185; govt spec MIL-C-3767; AEC part No. MS-91185; p/o W101.	End connector for W101. Figure 7-5
P103	P1FFC	CONNECTOR, PLUG: two female twist lock contacts; 1-5/8" lg x 1-7/16" diam; 10 amp; 250 v; body cylindrical shape, black composition; Harvey Hubbell part No. 7688; AEC part No. 8042; p/o W101.	End connector for W101. Figure 7-5
R101	P1FFC	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; AEC part No. RP101FD502KK.	Loop current potentiometer. Figure 7-6
R102	P1FFC	RESISTOR, FIXED, COMPOSITION: 47,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF473K; Allen-Bradley part No. RC32GF473K; AEC part No. RC32GF473K.	Load resistor for rectifier V102A. Figure 7-7
R103	P1FFC	RESISTOR, FIXED, COMPOSITION: 10,000 ohms $\pm 10\%$; 2 w; body 11/16" lg x 5/16" diam excl term; govt spec MIL-R-11A, type No. RC42GF103K; Allen-Bradley part No. RC42GF103K; AEC part No. RC42GF103K.	Voltage dividing resistor. Figure 7-7
R104		RESISTOR, VARIABLE, COMPOSITION: 2,500 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; type RV4LATSA252A, govt. spec MIL-R-94A; Allen Bradley part No. RV4LATSA252A; AEC part No. RV4LATSA252A.	Transmitter bias control. Figures 7-5, 7-6
R105	P1FFC	RESISTOR, FIXED, COMPOSITION: 3300 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF332K; Allen-Bradley part No. RC32GF332K; AEC part No. RC32GF332K.	Cathode resistor for V103A. Figure 7-7
R106	P1FFC	RESISTOR, FIXED, COMPOSITION: 33,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl terminals; govt spec MIL-R-11A; type No. RC32GF333K; Allen-Bradley part No. RC32GF333K; AEC part No. RC32GF333K.	Grid limiting resistor for 103A. Figure 7-7
R107	P1FFC	RESISTOR, FIXED COMPOSITION: 68,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF683K; Allen-Bradley part No. RC32GF683K; AEC part No. RC32GF683K.	Plate resistor for V103A. Figure 7-7

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R108		RESISTOR, FIXED, COMPOSITION: Same as R102	Voltage dividing resistor. Figure 7-7
R109	P1FFC	RESISTOR, FIXED, COMPOSITION: 4700 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF472K; Allen-Bradley part No. RC32GF472K; AEC part No. RC32GF472K.	Voltage dividing resistor. Figure 7-7
R110	P1FFC	RESISTOR, FIXED, COMPOSITION: 100,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF104K; Allen-Bradley part No. RC32GF104K; AEC part No. RC32GF104K.	Plate resistor for V103B. Figure 7-7
R111		RESISTOR, FIXED, COMPOSITION: Same as R102.	Signal shaping resistor. Figure 7-7
R112		RESISTOR, FIXED, COMPOSITION: Same as R102.	Cathode bias resistor for V102B. Figure 7-7
R113	P1FFC	RESISTOR, FIXED, COMPOSITION: 470,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type RC32GF474K; Allen-Bradley part No. RC32GF474K; AEC part No. RC32GF474K.	Stabilizing resistor for V102B. Figure 7-7
R114		RESISTOR, FIXED, COMPOSITION: Same as R106	Voltage dividing resistor. Figure 7-7
R115	P1FFC	RESISTOR, FIXED, COMPOSITION: 10,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type RC32GF103K; Allen-Bradley part No. RC32GF103K; AEC part No. RC32GF103K.	Cathode bias resistor. Figure 7-7
R116	P1FFC	RESISTOR, FIXED, COMPOSITION: 150,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF154K; Allen-Bradley part No. RC32GF154K; AEC part No. RC32GF154K.	Plate resistor for V104A. Figure 7-7
R117		RESISTOR, FIXED, COMPOSITION: Same as R113.	Voltage dividing resistor for OUTPUT LEVEL ADJ. Figure 7-7
R118	P1FFC	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; mtd by bushing; type No. RV4LATSA104A; govt spec MIL-R-94A; Allen Bradley part No. RV4LATSA104A; AEC part No. RV4LATSA104A.	Output level adjust potentiometer. Figures 7-5, 7-6
R119		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor for V104B. Figure 7-7

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R120	P1FFC	RESISTOR, FIXED, COMPOSITION: 2,200 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF222K; Allen-Bradley part No. RC32GF222K; AEC part No. RC32GF222K.	Isolating resistor for J108. Figure 7-6
R121	P1FFC	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; IRC part No. RU4B4R7K; AEC part No. RU4B4R7K.	Voltage dropping resistor for POWER ON indicator light. Figure 7-6
R122°	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 5,000 ohms $\pm 5\%$; 18 w; 3" lg x 19/32" OD excl term; govt spec MIL-R-26B, type No. RW33G502; IRC part No. RW33G502; AEC part No. RW33G502.	Bleeder resistor for telegraph loop power supply. Figure 7-5
R123	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 4,500 ohms $\pm 5\%$; 18 w; 3" lg x 19/32" diam excl term; govt spec MIL-R-26B, type No. RW33G452; IRC part No. RW33G452; AEC part No. RW33G452.	Voltage dropping resistor for voltage regulating tube V107 Figure 7-5
R124	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 3,100 ohms $\pm 5\%$; 18 w; 2" lg x 19/32" diam excl term; govt spec MIL-R-26B, type No. RW33G312; IRC part No. RW33G312; AEC part No. RW33G312.	Voltage dropping resistor for voltage regulating tubes V108 and V109. Figure 7-5
R125	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 900 ohms $\pm 5\%$; 8 w; 1" lg x 19/32" diam excl term; govt spec MIL-R-26B, type No. RW30G901; IRC part No. RW30G901; AEC part No. RW30G901.	Plate resistor for V101A. Figure 7-6
R126	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 560 ohms $\pm 5\%$; 8 w; 1" lg x 19/32" diam excl term; govt spec MIL-R-26B, type No. RW30G561; IRC part No. RW30G561; AEC part No. RW30G561.	Plate resistor for V101A. Figure 7-6
R127		DELETED	
R128		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J109. Figure 7-6
S101	P1FFC	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; AH&H part No. ST52N; AEC part No. ST52N.	NORMAL-REVERSE switch. Figure 7-6
S102	P1FFC	SWITCH, ROTARY: 1 sect; 2 pcs, 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; AEC part No. 8028.	BATTERY FROM TRANSMITTER-LOOP selector. Figure 7-6
S103	P1FFC	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; AH&H part No. ST52K; AEC part No. ST52K.	POWER ON-OFF switch. Figure 7-6

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
S104		SWITCH, TOGGLE: Same as S101.	115 v - 230 v switch Figure 7-6
S105	P1FFC	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; AEC part No. 8029.	SPACE FREQ ADJ. Figures 7-5, 7-6
S106		SWITCH, ROTARY: Same as S105	MARK FREQ ADJ. Figures 7-5, 7-6
S107		SWITCH, TOGGLE: Same as S103	LOOP CURRENT OPERATE SWITCH. Figure 7-6
T101	P1FFC	TRANSFORMER, AUDIO FREQUENCY; plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" h o/a; 425 cyc ctr freq, 382.5 space freq, 467.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-1; AEC part No. 7907-1.	Oscillator frequency control. Figure 7-5
T102	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate coupling type; 10,000 ohms pri, 600 ohms secd; 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 secd; ±1 db 300-3500 cyc freq response not tuned; 4 solder lug term located on bottom; four No. 6-32 mtg studs; govt spec MIL-T-27A, Grade 1, Class R; Dietz Design & Mfg. part No. 1203; AEC part No. 7903.	Matches plate of V104B to Z101. Figures 7-5, 7-6
T103	P1FFC	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP; case hermetically sealed, steel; 115/230 v, 50/60 cyc, single phase input; 4 output windings, No. 1 secd - 6.3 v 1.4 amp, No. 2 secd - 82 v 100 ma, No. 3 secd - 140 v 70 ma, No. 4 secd 6.3 v 0.5 amp; 4-5/16" lg x 3-11/16" wd x 3-1/2" h o/a; 13 term solder lug type located on bottom; four No. 10-32 mtg studs; internal shielding; govt spec MIL-T-27A, Grade 1, Class R, Dietz Design & Mfg. part No. 1224; AEC part No. 7924.	Power transformer Figures 7-5, 7-6
T104	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/CT; hermetically sealed steel case, powdered iron core; 2-3/4" lg x 2-3/8" wd x 2-13/16" h o/a; 15 kc ±10% frequency data; 9 lug type term located on bottom; mtd by four No. 8-32 x 1/4" lg studs located on 1-11/16" x 2-1/16" ctr; incl radio freq filter and plate to grid coupling capacitors; Dietz Design & Mfg. part No. 1217; AEC part No. 7917.	Tuned transformer for oscillator tube V101. Figures 7-5, 7-6

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
V101	P1FFC	ELECTRON TUBE: twin triode; glass envelope, RMA T-6-1/2 (6-7); 9 wire type term located on bottom; govt spec MIL-E-1, type No. JAN- 5814A; AEC part No. JAN-5814A.	15 kc loop oscillator. Figure 7-5
V102	P1FFC	ELECTRON TUBE: twin diode; glass envelope, RMA T-5-1/2 (6-1); 7 wire type term located on bottom; govt spec MIL-E-1, type No. JAN-5726/6AL5W; AEC part No. JAN-5726/6AL5W.	Oscillator frequency control tube. Figure 7-5
V103		ELECTRON TUBE: Same as V101.	DC amplifier. Figure 7-5
V104		ELECTRON TUBE: Same as V101.	V104A: Signal oscillator. V104B: Signal amplifier. Figure 7-5
V105		DELETED	
V106		DELETED	
V107	P1FFC	ELECTRON TUBE: diode; glass envelope, RMA T-5-1/2 (6-5); 7 wire type term located on bottom; govt spec MIL-E-1, type No. OB2WA; AEC part No. OB2WA.	Voltage regulator. Figure 7-5
V108		ELECTRON TUBE: Same as V107	Voltage regulator. Figure 7-5
V109		ELECTRON TUBE: Same as V107	Voltage regulator. Figure 7-5
W101	A-FFC	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; Belden Mfg. Co. commercial type "Tuffer", AEC part No. W101A; 4'4" o/a lgth; one Hubbell female connector type P103 term fitting in first end; one male connector type P102 term fitting on second end; AEC part No. 8043; c/o P102, P103; U.S. Navy type No. CX-4291/U(-4ft-4in).	AC power input cable. Figure 7-5
W101A	P1FFC	CABLE, BULK: AEC Pt. No. 8040	Used with W101
W102	A-FFC	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: ten No. 22 AWG stranded insul conductors; insul outer jacket; 5 pairs of shielded conductors, tinned copper braid, uncovered shields; special purpose cable only AEC part No. W102A, 4'8" o/a lgth; one Amphenol female connector part No. P101; Amphenol cable clamp No. H101 screw fit to female connector; eleven term lugs on second end; AEC part No. 7971 U. S. Navy type No. CX-4292/FCC-3A.	Input and output signal cable. Figure 7-5
W102A	P1FFC	CABLE, BULK: AEC Part No. 7970	Used with W102

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
X101	P1FFC	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; govt spec JAN-S-28A, type No. TS103P01; AEC part No. TS103P01.	Socket for tube V101. Figure 7-6
X102	P1FFC	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; govt spec JAN-S-28A; type No. TS102P01; AEC part No. TS102P01.	Socket for tube V102. Figure 7-6
X103		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V103. Figure 7-6
X104		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V104. Figure 7-6
X105		DELETED	
X106		DELETED	
X107		SOCKET, ELECTRON TUBE: Same as X102.	Socket for tube V107. Figure 7-6
X108		SOCKET, ELECTRON TUBE: Same as X102.	Socket for tube V108. Figure 7-6
X109		SOCKET, ELECTRON TUBE: Same as X102.	Socket for tube V109. Figure 7-6
X110	P1FFC	SOCKET, ELECTRON TUBE: 8 cont beryllium-copper, silver pl; medium octal size; round; 1-7/8" lg x 1-7/64" diam x 5/8" h o/a; plastic body; one piece saddle mtg; govt spec JAN-S-28A, type No. TS101P02; AEC part No. TS101P02.	Socket for T101. Figure 7-6
X111		SOCKET, ELECTRON TUBE: Same as X110.	Socket for Z101. Figure 7-6
X112		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C118. Figure 7-6
X113		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C121. Figure 7-6
X114		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C122. Figure 7-6
X115		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C125. Figure 7-6
X116		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C126. Figure 7-6

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-371A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
Z101	P1FFC	FILTER, BAND-PASS: 425 cyc ctr freq, 382.5 to 467.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-1; AEC part No. 7918-1.	Filters output signal. Figure 7-5

TELEGRAPH CARRIER TRANSMITTER T-372A/FCC-3

200 to 299	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 595 cps ctr freq; T-372A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T201	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-2; AEC part No. 7907-2.	Oscillator frequency control. Figure 7-5 (Ref)
Z201	P1FFC	FILTER, BAND-PASS: 595 cyc ctr freq, 552.5 to 637.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-2; AEC part No. 7918-2.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-373A/FCC-3

300 to 399	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 765 cps ctr freq; T-373A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Figure 1-2 (Ref)
T301	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" h o/a; 765 cyc ctr freq, 722.5 cyc space freq, 807.5 cyc mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-3; AEC part No. 7907-3.	Oscillator frequency control. Figure 7-5 (Ref)
Z301	P1FFC	FILTER, BAND-PASS: 765 cyc ctr freq, 722.5 to 807.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-3; AEC part No. 7918-3.	Filters output signal. Figure 7-5 (Ref)

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL T-374A/FCC-3

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
400 to 499	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 935 cps ctr freq; T-374A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter Figure 1-2 (Ref)
T401	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-4; AEC part No. 7907-4.	Oscillator frequency control. Figure 7-5 (Ref)
Z401	P1FFC	FILTER, BAND-PASS: 935 cyc ctr freq, 892.5 to 977.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-4; AEC part No. 7918-4.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-375A/FCC-3

500 to 599	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 1105 cps ctr freq; T-375A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T501	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-5; AEC part No. 7907-5.	Oscillator frequency control. Figure 7-5 (Ref)
Z501	P1FFC	FILTER, BAND-PASS: 1105 cyc ctr freq, 1062.5 to 1147.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-5; AEC part No. 7918-5.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-376A/FCC-3

600 to 699	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 1275 cps ctr freq; T-376A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T601	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-6; AEC part No. 7907-6.	Oscillator frequency control. Figure 7-5 (Ref)

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-376A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
Z601	P1FFC	FILTER, BAND-PASS: 1275 cyc ctr freq, 1232.5 to 1317.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-6; AEC part No. 7918-6.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-377A/FCC-3

700 to 799	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 1445 cps ctr freq; T-377A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T701	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" h o/a; 1445 cyc ctr freq, 1402.5 space freq, 1487.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-7; AEC part No. 7907-7.	Oscillator frequency control. Figure 7-5 (Ref)
Z701	P1FFC	FILTER, BAND-PASS: 1445 cyc ctr freq, 1402.5 to 1487.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-7; AEC part No. 7918-7.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-378A/FCC-3

800 to 899	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 1615 cps ctr freq; T-378A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T801	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" h o/a; 1615 cyc ctr freq; 1572.5 space freq, 1657.5 mark freq, tuned; 8 term, standard octal plug; mtd in standard octal tube socket, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-8; AEC part No. 7907-8.	Oscillator frequency control. Figure 7-5 (Ref)
Z801	P1FFC	FILTER, BAND-PASS: 1615 cyc ctr freq, 1572.5 to 1657.5 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-8; AEC part No. 7918-8.	Filters output signal. Figure 7-5 (Ref)

NAVSHIPS 93109

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-379A/FCC-3

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
900 to 999	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 1955 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-379A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter Figure 1-2 (Ref)
T901	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-9; AEC part No. 7907-9.	Oscillator frequency control. Figure 7-5 (Ref)
Z901	P1FFC	FILTER, BAND-PASS: 1955 cyc ctr freq, 1870 to 2040 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. part No. 1218-9; AEC part No. 7918-9.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-380A/FCC-3

1000 to 1099	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 2380 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-380A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T1001	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-10; AEC part No. 7907-10.	Oscillator frequency control. Figure 7-5 (Ref)
Z1001	P1FFC	FILTER, BAND-PASS: 2380 cyc ctr freq, 2295 to 2465 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-10; AEC part No. 7918-10.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-381A/FCC-3

1100 to 1199	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 2805 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-381A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
--------------	-------	---	--

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TRANSMITTER T-381A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
T1101	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-11; AEC part No. 7907-11.	Oscillator frequency control. Figure 7-5 (Ref)
Z1101	P1FFC	FILTER, BAND-PASS: 2805 cyc ctr freq, 2720 to 2890 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-11; AEC part No. 7918-11.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER TRANSMITTER T-382A/FCC-3

1200 to 1299	X-FFS	TRANSMITTER, TELEGRAPH CARRIER: 3230 cps ctr freq; 85.0 cps freq shift; 100 dot cyc channel speed; T-382A/FCC-3; otherwise identical to T-371A/FCC-3 except components described below:	Single channel telegraph transmitter. Figure 1-2 (Ref)
T1201	P1FFC	TRANSFORMER, AUDIO FREQUENCY: plate to grid audio oscillator; single tuned inductance w/tap; case hermetically sealed, steel, powdered iron core; 2-3/4" lg x 2-3/8" wd x 3-3/16" 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, requires external clamp; incl freq shifting capacitor and stabilizing resistor; Dietz Design & Mfg. Co. part No. 1207-12; AEC part No. 7907-12.	Oscillator frequency control. Figure 7-5 (Ref)
Z1201	P1FFC	FILTER, BAND-PASS: 3230 cyc ctr freq, 3145 to 3315 cyc band-width; 600 ohms unbalanced input, 600 ohms balanced output; 2-15/16" lg x 2-1/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1218-12; AEC part No. 7918-12.	Filters output signal. Figure 7-5 (Ref)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3

1300 to 1399	X-FFS	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 to 130 v DC, 20,000 ohms input impedance, neutral telegraph loop w/battery supplied from the receiver; input suitable for operation from device having a balanced 600 ohm impedance; 115/230 v, 50-60 cyc, single phase;	Single channel telegraph receiver. Figure 1-3
--------------------	-------	---	--

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
		keying data 40 dot cps; 16'' lg x 19'' wd x 5-1/4'' h o/a; not encl; will operate in freq diversity, terminal board strapping for selection of voltage or current keying provided; freq components are plug-in type; AEC part No. 7867; U.S. Navy type R-525A/FCC-3; govt spec MIL-T-15294C-2 (SHIPS).	
C1301	P3FFC	CAPACITOR, FIXED, ELECTROLYTIC: 20 mf; 150 v DC; govt spec JAN-C-62, type No. CE63C200J; Pyramid part No. CE63C200J; AEC part No. CE63C200J;	Cathode by-pass for V1301. Figure 7-11
C1302		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Screen grid by-pass for V1301. Figure 7-13
C1303		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V1301 to grid of V1302. Figure 7-13
C1304		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V1302A to grid of V1302B. Figure 7-13
C1305		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120	Couples plate of V1302B to grid of V1303. Figure 7-13
C1306	P3FFC	CAPACITOR, FIXED, ELECTROLYTIC: 3 sections, 10 mf capacity per section; 400 v DC; govt spec JAN-C-62, type No. CE53C100Q; Pyramid part No. CE53C100Q; AEC part No. CE42C100Q.	Figure 7-11
C1306A	X1FFC	CAPACITOR, FIXED, ELECTROLYTIC: p/o C1306; for reference only.	Filter for 105 v B+ supply.
C1306B	X1FFC	CAPACITOR, FIXED, ELECTROLYTIC: p/o C1306; for reference only.	Filter for 210 v B+ supply.
C1306C	X1FFC	CAPACITOR, FIXED, ELECTROLYTIC: p/o C1306; for reference only.	Filter for B+ power supply.
C1307		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Mark signal filter for plate of V1304. Figure 7-13
C1308		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Space signal filter for cathode of V1316. Figure 7-13
C1309		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C119.	Signal filter for discriminator output. Figure 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C1310		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	Filter capacitor for signal to grid of V1305. Figure 7-13
C1311	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 50,000 mmf $\pm 10\%$; 600 v DC; govt spec MIL-C-25A, type No. CP61B1EF503K; Micamold part No. CP61B1EF503K; AEC part No. CP61B1EF503K.	Output signal filter for plate of V1305. Figures 7-11, 7-12
C1312		CAPACITOR, FIXED, ELECTROLYTIC: Same as C125.	Filter for B+ power supply. Figure 7-11
C1313		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	Filter for power supply. Figure 7-11
C1314		CAPACITOR, FIXED, ELECTROLYTIC: Same as C125.	Filter for loop supply. Figure 7-11
C1315		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	Filter for loop supply. Figure 7-11
C1316	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 2 sections; 0.1 x 0.1 mf, $\pm 20\%$, 1000 v DC; govt spec MIL-C-25A, type No. CP53B4EG104V; Micamold part No. CP53B4EG104V; AEC part No. CP53B4EG104V.	Figure 7-12
C1316A	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C1316; for reference only.	Plate by-pass for V1307A.
C1316B	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C1316; for reference only.	Keying loop by-pass capacitor.
C1317		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	15 kc filter capacitor Figures 7-11, 7-13
C1318		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	15 kc filter capacitor Figures 7-11, 7-13
CR1301		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-11, 7-13
CR1302		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-11, 7-13
CR1303		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-11, 7-13
CR1304		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-11, 7-13
CR1305		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-11, 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
CR1306		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-11, 7-13
E1301		DELETED	
E1302		DELETED	
E1303		LAMP, INCANDESCENT: Same as E103.	Pilot lamp; indicates presence of line voltage.
E1304		FUSEHOLDER: Same as E104.	
E1304A		CAP, FUSEHOLDER: Same as E104A; p/o E1304.	Blown fuse indicator.
E1304B		BODY, FUSEHOLDER: Same as E104B; p/o E1304.	Holds AC line fuse.
E1305		FUSEHOLDER: Same as E104.	
E1305A		C. P., FUSEHOLDER: Same as E104A; p/o E1305.	Blown fuse indicator.
E1305B		BODY, FUSEHOLDER: Same as E104B; p/o E1305.	Holds AC line fuse.
E1306		FUSEHOLDER: Same as E106.	Spare fuseholder. Figure 7-11
E1307		KNOB: Same as E107.	Knob for DIVERSITY control. Figure 7-11
E1308		KNOB: Same as E107.	Knob for LOOP CURRENT control. Figure 7-11
E1309		SHIELD, ELECTRON TUBE: Same as E109.	Shield for V1304. Figure 7-11
E1310		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V1302. Figure 7-11
E1311	P1FFC	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; AEC part No. TS102U02.	Shield for V1301. Figure 7-11
E1312		SHIELD, ELECTRON TUBE: Same as E1311.	Shield for V1303. Figure 7-11
E1313	P1FFC	SHIELD, ELECTRON TUBE: brass, nickel pl; cylindrical shape, 0.950" ID x 1-1/2" h, locking type; govt spec JAN-S-28A, type No. TS103U01; AEC part No. TS103U01.	Shield for V1305. Figure 7-11
E1314		SHIELD, ELECTRON TUBE: Same as E1313.	Shield for V1306. Figure 7-11
E1315		SHIELD, ELECTRON TUBE: Same as E1313.	Shield for V1307. Figure 7-11

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E1316		SHIELD, ELECTRON TUBE: Same as E112	Shield for V1313. Figure 7-11
E1317		SHIELD, ELECTRON TUBE: Same as E112.	Shield for V1314. Figure 7-11
E1318		SHIELD, ELECTRON TUBE: Same as E112.	Shield for V1315. Figure 7-11
E1319		TERMINAL BOARD: Same as E115.	Termination block for W1302.
E1320		STUD, TERMINAL: Same as E116.	Mounts component parts.
E1321		DELETED	
E1322		KNOB: Same as E107.	Knob for DIVERSITY selector. Figure 7-11
E1323	M-FFC	TERMINAL BOARD: laminated phenolic; incl 24 solder lug type term; w/o barriers; 4-9/16" lg x 3-7/16" wd x 29/64" h o/a; four 0.156" diam mtg holes; 4-1/16" x 2-29/32" mtg ctr; marked w/symbol designations, fungus proofed; AEC part No. 7941.	Mounts component parts. Figures 7-12, 7-13
E1324		MOUNTING: Same as E117, except for marking; AEC part No. 7982-1.	Mounts J1307, J1308, J1309 to front panel. Figure 7-11
E1325	M-FFC	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; AEC part No. 7937-3.	Mounts component parts. Figures 7-12, 7-13
E1326	M-FFC	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; AEC part No. 7937-4.	Mounts component parts. Figures 7-12, 7-13
E1327	M-FFC	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; AEC part No. 7937-1.	Mounts component parts. Figures 7-12, 7-13
E1328	M-FFC	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; AEC part No. 7937-2.	Mounts component parts. Figures 7-12, 7-13
E1329		SHIELD, ELECTRON TUBE: Same as E109.	Shield for V1316. Figure 7-11

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E1330	M-FFC	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; AEC part No. 7937-13.	Mounts component parts. Figures 7-12, 7-13
E1331		TERMINAL BOARD: Same as E115.	Receiver loop strapping. Figure 7-11
E1332		DELETED	
E1333		SHIELD, ELECTRON TUBE: Same as E109.	Shield for V1308. Figure 7-11
E1334	P1FFC	SHIELD, ELECTRON TUBE: brass, nickel pl; cylindrical shape, 0.950" ID x 2-3/8" h; locking type, govt spec JAN-S-28A, type No. TS103U03; AEC part No. TS103U03.	Shield for V1309. Figure 7-11
E1335		SHIELD, ELECTRON TUBE: Same as E1334.	Shield for V1310. Figure 7-11
F1301		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-12
F1302		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-12
F1303		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-11
F1304		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-11
H1301		CLAMP, ELECTRICAL: Same as H101.	Clamps cable W1302 to connector P1301. Figure 7-11
H1302		CLAMP, ELECTRICAL: Same as H102.	Clamp for switch S1305. Figure 7-11
H1303		CLAMP, ELECTRICAL: Same as H103.	Clamps cable W1302 to E1319.
H1304		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H1305		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H1306		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H1307		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H1308		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H1309		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H1310		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H1311		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H1312		SLIDE, LEFT: Same as H112.	Supporting member on chassis for slides.
H1313		SLIDE, RIGHT: Same as H113.	Supporting member on chassis for slides.
H1314		SLIDE MOUNTING PLATE, LEFT: Same as H114.	Supporting member on cabinet for slides.
H1315		SLIDE MOUNTING PLATE, RIGHT: Same as H115.	Supporting member on cabinet for slides.
I1301		DELETED	
I1302		DELETED	
I1303		LIGHT, INDICATOR: Same as I103.	Figure 7-11
I1303A		LIGHT, INDICATOR: Same as I103A; p/o I1303.	Lamp assembly for E1303.
I1303B		LENS, INDICATOR LIGHT: Same as I103B; p/o I1303.	Lens for I1303A.
J1301		JACK, TELEPHONE: Same as J104.	EQUIP jack for signal IN. Figure 7-11
J1302		JACK, TELEPHONE: Same as J104.	EQUIP jack for signal IN. Figure 7-11
J1303		JACK, TELEPHONE: Same as J104.	LINE jack for signal IN. Figure 7-11
J1304		JACK, TELEPHONE: Same as J104.	LINE jack for signal IN. Figure 7-11
J1305		JACK, TELEPHONE: Same as J108.	MONITOR jack for signal IN. Figure 7-11
J1306		JACK, TELEPHONE: Same as J108.	MONITOR jack for signal IN. Figure 7-11

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
J1307		JACK, TELEPHONE: Same as J101.	EQUIP jack for TELEGRAPH LOOP. Figure 7-11
J1308		JACK, TELEPHONE: Same as J101.	LINE jack for TELEGRAPH LOOP. Figure 7-11
J1309		JACK, TELEPHONE: Same as J103.	MONITOR jack for TELEGRAPH LOOP. Figure 7-11
J1310		CONNECTOR, RECEPTACLE: Same as J110.	Connects W1302 to chassis. Figure 7-11
J1311		CONNECTOR, RECEPTACLE: Same as J111.	Connects W1301 to chassis. Figure 7-11
L1301		REACTOR: Same as L102.	Filter choke for B+ power supply. Figures 7-11, 7-12
L1302		REACTOR: Same as L102.	Filter choke for loop power supply. Figure 7-11
O1301		DELETED	
O1302		DELETED	
O1303		DELETED	
O1304		DELETED	
O1305		DELETED	
O1306		DELETED	
O1307		ROLLER: Same as O106.	Roller for chassis slide.
O1308		ROLLER: Same as O106.	Roller for chassis slide.
O1309		ROLLER: Same as O106.	Roller for chassis slide.
O1310		ROLLER: Same as O106.	Roller for chassis slide.
O1311		ROLLER: Same as O110.	Roller for chassis slide.
O1312		ROLLER: Same as O110.	Roller for chassis slide.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
O1313		TILT PIN: Same as O112.	Locks chassis in upright position.
O1314		TILT PIN: Same as O112.	Locks chassis in upright position.
P1301		CONNECTOR, PLUG: Same as P101.	End connector for W1302. Figure 7-11
P1302		CONNECTOR, PLUG: Same as P102.	End connector for W1301. Figure 7-11
P1303		CONNECTOR, PLUG: Same as P103.	End connector for W1301. Figure 7-11
R1301		RESISTOR, FIXED, COMPOSITION: Same as R109.	Isolating resistor of J1305.
R1302	P1FFC	RESISTOR, FIXED, COMPOSITION: 560 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF561K; Allen-Bradley part No. RC32GF561K; AEC part No. RC32GF561K.	Load resistor for filter Z1301. Figure 7-13
R1303		RESISTOR, FIXED, COMPOSITION: Same as R115.	Input diversity combining resistor. Figure 7-13
R1304		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor for V1301. Figure 7-11
R1305		RESISTOR, FIXED, COMPOSITION: Same as R113.	Voltage dropping resistor for screen grid of V1301. Figure 7-13
R1306	P1FFC	RESISTOR, FIXED, COMPOSITION: 180,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF184K; Allen-Bradley part No. RC32GF184K; AEC part No. RC32GF184K.	Plate load resistor for V1301. Figure 7-13
R1307		RESISTOR, FIXED, COMPOSITION: Same as R113.	Grid leak resistor for V1302A. Figure 7-13
R1308		RESISTOR, FIXED, COMPOSITION: Same as R110.	Grid limiting resistor for V1302A. Figure 7-13
R1309		RESISTOR, FIXED, COMPOSITION: Same as R110.	Grid limiting resistor for V1302B. Figure 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R1310		RESISTOR, FIXED, COMPOSITION: Same as R1306.	Grid leak resistor for V1302B. Figure 7-13
R1311	P1FFC	RESISTOR, FIXED, COMPOSITION: 220,000 ohms $\pm 10\%$; 1 w; body 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF224K; Allen-Bradley part No. RC32GF224K; AEC part No. RC32GF224K.	Plate load resistor for V1302A. Figure 7-13
R1312		RESISTOR, FIXED, COMPOSITION: Same as R115.	Voltage dropping resistor for B+ power supply. Figures 7-12, 7-13
R1313		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias for V1302B. Figure 7-13
R1314		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Plate load resistor for V1302B. Figure 7-13
R1315	P1FFC	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; shaft metal, round, screwdriver-slot, 1/4" diam x 5/8" lg from mtg surface, normal torque, w/split bushing and shaft locking nut; contact arm insulated, no OFF position; mtd by bushing; govt spec MIL-R-94A, type No. RV4LATSA504A; Allen-Bradley part No. RV4LATSA504A; AEC part No. RV4LATSA504A.	Discriminator LEVEL control. Figures 7-11, 7-12
R1316	P1FFC	RESISTOR, FIXED, COMPOSITION: 1000 ohms $\pm 10\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF102K; Allen-Bradley part No. RC32GF102K; AEC part No. RC32GF102K.	Cathode bias resistor for V1303. Figure 7-13
R1317		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load resistor for V1304. Figure 7-13
R1318		RESISTOR, VARIABLE, COMPOSITION: Same as R118.	Receiver BIAS CONTROL. Figures 7-11, 7-12
R1319		RESISTOR, FIXED, COMPOSITION: Same as R110.	Cathode resistor for V1316. Figure 7-13
R1320		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Voltage dividing resistor for signal input to V1305. Figure 7-13
R1321		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Voltage dividing resistor for signal input to V1305. Figure 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R1322	P1FFC	RESISTOR, FIXED, COMPOSITION: 100 ohms $\pm 10\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF101K; Allen-Bradley part No. RC32GF101K; AEC part No. RC32GF101K.	Oscillation suppressor for grid of V1305A. Figure 7-13
R1323		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Voltage dividing resistor for signal input to V1305. Figure 7-13
R1324		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Voltage dividing resistor for signal input to V1305. Figure 7-13
R1325		RESISTOR, VARIABLE, COMPOSITION: Same as R104.	Cathode bias potentiometer for V1305. Figures 7-11, 7-12
R1326		RESISTOR, FIXED, COMPOSITION: Same as R106.	Plate load resistor for V1305. Figure 7-13
R1327		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Voltage dividing resistor for signal input to V1306. Figure 7-13
R1328		RESISTOR, FIXED, COMPOSITION: Same as R110.	Grid resistor for V1306. Figure 7-13
R1329	P1FFC	RESISTOR, FIXED, COMPOSITION: 330,000 ohms $\pm 10\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF334K; Allen-Bradley part No. RC32GF334K; AEC part No. RC32GF334K.	Voltage divider for LOOP CURRENT BALANCE circuit. Figure 7-13
R1330	P1FFC	RESISTOR, FIXED, COMPOSITION: 47,000 ohms $\pm 10\%$; 2 w; 47/64" lg x 19/64" diam excl term; govt spec MIL-R-11A, type No. RC42GF473K; Allen-Bradley part No. RC42GF473K; AEC part No. RC42GF473K.	Plate load resistor for V1306. Figure 7-13
R1331		RESISTOR, FIXED, COMPOSITION: Same as R1330.	Plate load resistor for V1306. Figure 7-13
R1332		RESISTOR, FIXED, COMPOSITION: Same as R110.	Voltage dividing resistor for grid of output keying tube. Figure 7-13
R1333	P1FFC	RESISTOR, FIXED, COMPOSITION: 1 megohm $\pm 10\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF105K; Allen-Bradley part No. RC32GF105K; AEC part No. RC32GF105K.	Grid leak resistor for V1307A. Figures 7-12, 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R1334		RESISTOR, FIXED, COMPOSITION: Same as R110.	Voltage dividing resistor for grid of output keying tube. Figure 7-13
R1335		RESISTOR, FIXED, COMPOSITION: Same as R110.	Voltage dividing resistor for grid of output keying tube. Figure 7-13
R1336	P1FFC	RESISTOR, FIXED, COMPOSITION: 22,000 ohms $\pm 10\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF223K; Allen-Bradley part No. RC32GF223K; AEC part No. RC32GF223K.	Voltage dividing resistor for LOOP CURRENT BALANCE. Figure 7-13
R1337		RESISTOR, FIXED, COMPOSITION: Same as R110.	Grid limiting resistor for V1306. Figure 7-13
R1338		RESISTOR, FIXED, COMPOSITION: Same as R110.	Voltage dividing resistor for grid of output keying tube. Figure 7-13
R1339		RESISTOR, FIXED, COMPOSITION: Same as R115.	Plate resistor for V1307A. Figures 7-12, 7-13
R1340		DELETED	
R1341		RESISTOR, FIXED, WIRE WOUND: Same as R109.	Plate resistor for V1307B. Figures 7-12, 7-13
R1342		RESISTOR, FIXED, COMPOSITION: Same as R1316.	Cathode resistor for V107. Figures 7-12, 7-13
R1343		RESISTOR, FIXED, COMPOSITION: Same as R109.	Filter resistor for 15 kc oscillator. Figures 7-12, 7-13
R1344		RESISTOR, FIXED, COMPOSITION: Same as R1336.	Grid resistor for loop keying tube. Figures 7-12, 7-13
R1345		RESISTOR, FIXED, WIRE WOUND: Same as R1322.	Screen resistor for V1309. Figures 7-12, 7-13
R1346		RESISTOR, FIXED, WIRE WOUND: Same as R1322.	Screen resistor for V1310. Figures 7-12, 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R1347	P1FFC	RESISTOR, VARIABLE, WIRE WOUND: 10,000 ohms $\pm 10\%$; 50 w; 2-5/16" diam x 2-1/8" h; govt spec MIL-R-22A, type No. RP151FD103KK; Ohmite Mfg. part No. RP151FD103KK; AEC part No. RP151FD103KK.	LOOP CURRENT potentiometer Figure 7-12
R1348		RESISTOR, FIXED, WIRE WOUND: Same as R121.	Voltage dropping resistor for power on indicator light. Figure 7-12
R1349	P1FFC	RESISTOR, FIXED, WIRE WOUND: 1 ohm $\pm 10\%$; 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; AEC part No. RU4B1ROK.	Filament voltage dropping resistor for V1301 and V1302. Figures 7-12, 7-13
R1350	P1FFC	RESISTOR, FIXED, COMPOSITION: 220,000 ohms $\pm 10\%$; 2 w; body 11/16" lg x 5/16" diam excl term; govt spec MIL-R-11A, type No. RC42GF224K; Allen-Bradley part No. RC42GF224K; AEC part No. RC42GF224K.	Bleeder resistor for B+ power supply. Figures 7-12, 7-13
R1351		RESISTOR, FIXED, WIRE WOUND: Same as R122.	Bleeder resistor for loop power supply. Figure 7-11
R1352		RESISTOR, FIXED, COMPOSITION: Same as R1350.	Bleeder resistor for bias power supply. Figures 7-12, 7-13
R1353	P1FFC	RESISTOR, FIXED, WIRE WOUND: 900 ohms $\pm 5\%$; 8 w; body 1-3/4" lg x 1/2" OD excl term; govt spec MIL-R-26B, type No. RW29G901, Ward Leonard part No. RW29G901; AEC part No. RW29G901.	Voltage dropping resistor for voltage regulating tubes V1313 and V1314. Figure 7-11
R1354		RESISTOR, FIXED, COMPOSITION: Same as R115.	Input diversity combining resistor. Figure 7-13
R1355		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor. Figure 7-13
R1356		RESISTOR, FIXED, COMPOSITION: Same as R1316.	B+ filtering resistor. Figures 7-12, 7-13
R1357	P1FFC	RESISTOR, FIXED, COMPOSITION: 4,700 ohms $\pm 10\%$; 2 w; body 11/16" lg x 5/16" diam excl term; govt spec MIL-R-11A, type No. RC42GF472K; Allen-Bradley part No. RC42GF472K; AEC part No. RC42GF472K.	Load resistor for bias supply. Figures 7-12, 7-13
R1358		RESISTOR, FIXED, COMPOSITION: Same as R1357.	Load resistor for bias supply. Figures 7-12, 7-13

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R1359		RESISTOR, FIXED, WIRE WOUND: Same as R124.	Voltage dropping resistor for voltage regulating tube V1315. Figure 7-11
S1301		SWITCH, TOGGLE: Same as S101.	NORMAL-REVERSE switch. Figures 7-11, 7-12
S1302		DELETED	
S1303		DELETED	
S1304		SWITCH, TOGGLE: Same as S103.	AC power ON-OFF switch. Figure 7-12
S1305		SWITCH, TOGGLE: Same as S101.	Selects 115 or 230 v input winding of T1302 power transformer. Figures 7-11, 7-12
S1306	P1FFC	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 flatted type 7/16" lg x 1/4" diam; solder lug type term; 30° index, non-shortng; Centralab part No. HB-5242; AEC part No. 8027.	Selects DIVERSITY circuit. Figure 7-12
T1301	P1FFC	TRANSFORMER, DISCRIMINATOR: 425 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-1; AEC part No. 7904-1.	Audio discriminator for mark or space signals. Figure 7-11
T1302	P1FFC	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: hermetically sealed, steel; 115/230 v AC, 50-60 cyc, single phase; 4 output windings, No. 1 secd - 82 v 100 ma, No. 2 secd - 182 v 40 ma, No. 3 secd - 6.3 v 3.33 amp, No. 4 secd - 6.3 v 3 amp; 4-5/16" lg x 3-11/16" wd x 3-1/2" h o/a; 13 term solder lug type located on bottom; 4 No. 10-32 mtg studs; internal shielding; Dietz Design & Mfg. part No. 1226; govt spec MIL-T-27A, Grade 1, Class R; AEC part No. 7926.	Power transformer. Figures 7-11, 7-12
T1303	P1FFC	TRANSFORMER, OSCILLATOR: 2 sects, No. 1 sect tuned to 15 kc with 0.01 mf, tapped at a turns ratio of 1 to 4; No. 2 sect primary inductance 75 mh primary to secondary, turns ratio 7 to 20, secd winding ctr tapped; 1-13/16" lg x 1-13/16" wd x 2-7/16" h o/a; 8 term solder lug type located on bottom; four No. 6-32 mtg studs; Dietz Design & Mfg. part No. 1231; AEC part No. 7931.	Loop keying transformer. Figures 7-11, 7-12

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
V1301	P1FFC	TUBE, ELECTRON: amplifier pentode; glass envelope; RMA T-5-1/2; 7 wire type term, located on bottom; pentode; govt spec MIL-E-1, type No. JAN-6AU6WA; AEC part No. JAN-6AU6WA.	1st limiting amplifier. Figure 7-11
V1302	P1FFC	TUBE, ELECTRON: twin triode; glass envelope; RMA T-6-1/2 (6-7); 9 pin type term, located on bottom; miniature Hi Mu Twin Triode; govt spec MIL-E-1, type No. JAN-5751; AEC part No. JAN-5751.	2nd limiting amplifier. Figure 7-11
V1303	P1FFC	TUBE, ELECTRON: triode; glass envelope; RMA T-5-1/2; 7 wire type term, located on bottom; general purpose triode; govt spec MIL-E-1, spec type No. JAN-6135; AEC part No. JAN-6135.	3rd limiting amplifier. Figure 7-11
V1304		TUBE, ELECTRON: Same as V102.	Discriminator for space frequency. Figure 7-11
V1305	P1FFC	TUBE, ELECTRON: twin triode; glass envelope; RMA T-6-1/2; 9 wire type term, located on bottom; twin triode; govt spec MIL-E-1, type JAN-5670; AEC part No. JAN-5670.	Amplifier tube. Figure 7-11
V1306		TUBE, ELECTRON: Same as V1305.	Amplifier keyer. Figure 7-11
V1307		TUBE, ELECTRON: Same as V1305.	Output keyer tube. Figure 7-11
V1308		TUBE, ELECTRON: Same as V102.	Full-wave rectifier. Figure 7-11
V1309	P1FFC	TUBE, ELECTRON: pentode; glass envelope; RMA T-6-1/2; 9 wire type term located on bottom; govt spec MIL-E-1, type No. JAN-6216; AEC part No. JAN-6216.	Output keyer tube. Figure 7-11
V1310		TUBE, ELECTRON: Same as V1309.	Output keyer tube. Figure 7-11
V1311		DELETED	
V1312		DELETED	
V1313		TUBE, ELECTRON: Same as V107	Voltage regulator. Figure 7-11
V1314		TUBE, ELECTRON: Same as V107.	Voltage regulator. Figure 7-11
V1315	P1FFC	TUBE, ELECTRON: diode; glass envelope, RMA T-5-1/2 (6-5); 7 wire type term, located on bottom; voltage regulator; govt spec MIL-E-1, type No. JAN-OA2WA; AEC part No. JAN-OA2WA.	Voltage regulator. Figure 7-11
V1316		TUBE, ELECTRON: Same as V102.	Discriminator for mark frequency. Figure 7-11

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
W1301		CABLE ASSEMBLY, POWER, ELECTRICAL: Same as W101.	AC power input cable. Figure 7-11
W1301A		CABLE, BULK: Same as W101A.	Used with W1301.
W1302		CABLE ASSEMBLY, SPECIAL PURPOSE: Same as W102.	Input and output signal and diversity circuit cable. Figure 7-11
W1302A		CABLE, BULK: Same as W102A.	Used with W1302.
X1301		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1301. Figure 7-11
X1302		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1302. Figure 7-11
X1303		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1303. Figure 7-11
X1304		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1304. Figure 7-11
X1305		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1305. Figure 7-11
X1306		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1306. Figure 7-11
X1307		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1307. Figure 7-11
X1308		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1308. Figure 7-11
X1309		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1309. Figure 7-11
X1310		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V1310. Figure 7-11
X1311		DELETED	
X1312		DELETED	
X1313		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1313. Figure 7-11
X1314		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1314. Figure 7-11
X1315		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1315. Figure 7-11
X1316		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V1316. Figure 7-11

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-525A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
X1317		SOCKET, ELECTRON TUBE: Same as X110.	Socket for Z1301. Figure 7-12
X1318		SOCKET, ELECTRON TUBE: Same as X110.	Socket for T1301. Figure 7-12
X1319		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C1306. Figure 7-12
X1320		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C1312. Figure 7-12
X1321		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C1313. Figure 7-12
X1322		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C1314. Figure 7-12
X1323		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C1315. Figure 7-12
Z1301	P1FFC	FILTER, BAND-PASS: 425 cyc ctr freq, 382.5 to 467.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-1; AEC part No. 7919-1.	Filters input signal. Figure 7-11

TELEGRAPH CARRIER RECEIVER R-526A/FCC-3

1400 to 1499	X-FFS	RECEIVER, TELEGRAPH CARRIER: 595 cyc ctr freq; R-526A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver Figure 1-3 (Ref)
T1401	P1FFC	TRANSFORMER, DISCRIMINATOR: 595 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-2; AEC part No. 7904-2.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1401	P1FFC	FILTER, BAND-PASS: 595 cyc ctr freq, 552.5 to 637.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-2; AEC part No. 7919-2.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-527A/FCC-3

1500 to 1599	X-FFS	RECEIVER, TELEGRAPH CARRIER: 765 cyc ctr freq; R-527A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
--------------------	-------	---	--

NAVSHIPS 93109

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-527A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
T1501	P1FFC	TRANSFORMER, DISCRIMINATOR: 765 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-3; AEC part No. 7904-3.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1501	P1FFC	FILTER, BAND-PASS: 765 cyc ctr freq, 722.5 to 807.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-3; AEC part No. 7919-3.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-528A/FCC-3

1600 to 1699	X-FFS	RECEIVER, TELEGRAPH CARRIER: 935 cyc ctr freq; R-528A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
T1601	P1FFC	TRANSFORMER, DISCRIMINATOR: 935 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-4; AEC part No. 7904-4.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1601	P1FFC	FILTER, BAND-PASS: 935 cyc ctr freq, 892.5 to 977.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-4; AEC part No. 7919-4.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-529A/FCC-3

1700 to 1799	X-FFS	RECEIVER, TELEGRAPH CARRIER: 1105 cyc ctr freq; R-529A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
T1701	P1FFC	TRANSFORMER, DISCRIMINATOR: 1105 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-5; AEC part No. 7904-5.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1701	P1FFC	FILTER, BAND-PASS: 1105 cyc ctr freq, 1062.5 to 1147.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-5; AEC part No. 7919-5.	Filters input signal. Figure 7-11 (Ref)

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-530A/FCC-3

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
1800 to 1899	X-FFS	RECEIVER, TELEGRAPH CARRIER: 1275 cyc ctr freq; R-530A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
T1801	P1FFC	TRANSFORMER, DISCRIMINATOR: 1275 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-6; AEC part No. 7904-6.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1801	P1FFC	FILTER, BAND-PASS: 1275 cyc ctr freq, 1232.5 to 1317.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-6; AEC part No. 7919-6.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-531A/FCC-3

1900 to 1999	X-FFS	RECEIVER, TELEGRAPH CARRIER: 1445 cyc ctr freq; R-531A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
T1901	P1FFC	TRANSFORMER, DISCRIMINATOR: 1445 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-7; AEC part No. 7904-7.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z1901	P1FFC	FILTER, BAND-PASS: 1445 cyc ctr freq, 1402.5 to 1487.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-7; AEC part No. 7919-7.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-532A/FCC-3

2000 to 2099	X-FFS	RECEIVER, TELEGRAPH CARRIER: 1615 cyc ctr freq; R-532A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
T2001	P1FFC	TRANSFORMER, DISCRIMINATOR: 1615 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 100 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-8; AEC part No. 7904-8.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z2001	P1FFC	FILTER, BAND-PASS: 1615 cyc ctr freq, 1572.5 to 1657.5 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-8; AEC part No. 7919-8.	Filters input signal. Figure 7-11 (Ref)

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-533A/FCC-3

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
2100 to 2199	X-FFS	RECEIVER, TELEGRAPH CARRIER: 1955 cyc ctr freq; 85.0 cyc cps freq shift; 100 dot cyc keying rate; R-533A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
C2109		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	Signal filter capacitor.
T2101	P1FFC	TRANSFORMER, DISCRIMINATOR: 1955 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-9; AEC part No. 7904-9.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z2101	P1FFC	FILTER, BAND-PASS: 1955 cyc ctr freq, 1870 to 2040 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-9; AEC part No. 7919-9.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-534A/FCC-3

2200 to 2299	X-FFS	RECEIVER, TELEGRAPH CARRIER: 2380 cyc ctr freq; 85.0 cps freq shift; 100 dot cyc keying rate; R-534A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
C2209		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	Signal filter capacitor.
T2201	P1FFC	TRANSFORMER, DISCRIMINATOR: 2380 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-10; AEC part No. 7904-10.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z2201	P1FFC	FILTER, BAND-PASS: 2380 cyc ctr freq, 2295 to 2465 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-10; AEC part No. 7919-10.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-535A/FCC-3

2300 to 2399	X-FFS	RECEIVER, TELEGRAPH CARRIER: 2805 cyc ctr freq; 85.0 cps freq shift; 100 dot cyc keying rate; R-535A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
C2309		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	Signal filter capacitor.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER RECEIVER R-535A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
T2301	P1FFC	TRANSFORMER, DISCRIMINATOR: 2805 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-11; AEC part No. 7904-11.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z2301	P1FFC	FILTER, BAND-PASS: 2805 cyc ctr freq, 2720 to 2890 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-11; AEC part No. 7919-11.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER RECEIVER R-536A/FCC-3

2400 to 2499	X-FFS	RECEIVER, TELEGRAPH CARRIER: 3230 cyc ctr freq; 85.0 cps freq shift; 100 dot cyc keying rate; R-536A/FCC-3; otherwise identical to R-525A/FCC-3 except components described below:	Single channel telegraph receiver. Figure 1-3 (Ref)
C2409		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C101.	Signal filter capacitor.
T2401	P1FFC	TRANSFORMER, DISCRIMINATOR: 3230 cyc ctr freq; shielded; 1-5/8" lg x 1-5/8" wd x 3" h o/a; powdered iron core; tuned to freq about 200 cyc above and below ctr freq; mica capacitor tuning; standard octal plug; mtd in standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1204-12; AEC part No. 7904-12.	Audio discriminator for mark or space signals. Figure 7-11 (Ref)
Z2401	P1FFC	FILTER, BAND-PASS: 3230 cyc ctr freq, 3145 to 3315 cyc band-width; 600 ohms balanced input, 600 ohms unbalanced output; 4-15/16" lg x 2-9/16" wd x 3-3/16" h o/a; case rectangular, steel; standard octal plug; mts into standard octal tube socket, requires external clamp; Dietz Design & Mfg. Co. part No. 1219-12; AEC part No. 7919-12.	Filters input signal. Figure 7-11 (Ref)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3

2500 to 2599	X-FFS	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; 7' 3-9/16" h x 22-3/8" wd x 24" d o/a; hinged rear door, top control panel containing fuses, ON-OFF power switch, and blown fuse indicator; bottom panel containing ventilation fan and filter, convenience outlet and indicating fuseholders; 14 115/230 v power outlets located in channel strip, term board, exterior cable duct; AEC part No. 7800; U.S. Navy type CY-1195A/FCC-3; govt spec MIL-T-15294C-2 (SHIPS).	Provide mtd facilities for the AG units. Figure 1-6
A2501	A-FFS	FAN ASSEMBLY, dual squirrel cage type, consists of motor B2501, 2 blower wheels - 02502, 02503, and 2 housings, 02504 and 02505, 9-7/8" lg x 6-3/8" wd x 5-5/8" h o/a; AEC part No. 8069.	Remove heated air from cabinet.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
B2501	P1FFC	MOTOR, ELECTRIC: non-portable; 115v, 1 amp, single phase, 2700 rpm; single speed direct drive double shaft, steel case with black enamel finish; 3-1/4" dia. x 6-3/4" lg including shaft, p/o A2501; Universal Electric Co. part No. 19-113 motor only; AEC part No. 8069-4.	Motor for A2501
E2501	P1FFC	LAMP, GLOW, 1/25 w, 65v 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. NE51; AEC part No. NE51.	Neon lamp: indicates blown fuse.
E2502		LAMP, GLOW: Same as E2501.	Neon lamp: indicates blown fuse.
E2503		DELETED	
E2504		DELETED	
E2505		DELETED	
E2506	P1FFC	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; AEC part No. 8088.	AC line fuseholder.
E2507		FUSEHOLDER: Same as E104.	
E2507A		CAP, FUSEHOLDER: Same as E104A, p/o E2507.	Blown fuse indicator.
E2507B		BODY, FUSEHOLDER: Same as E104B, p/o E2507.	Holds AC line fuse.
E2508		FUSEHOLDER: Same as E104.	
E2508A		CAP, FUSEHOLDER: Same as E104A, p/o E2508.	Blown fuse indicator.
E2508B		BODY, FUSEHOLDER: Same as E104B, p/o E2508.	Holds AC line fuse.
F2501	P1FFC	FUSE, CARTRIDGE: 30 amp, 250 v; ferrule type term; encl type, fibre body; one-time; non-indicating; 2" lg x 9/16" dia o/a; Federal Spec W-F-791a; Bussmann Mfg part No. NFA-30; AEC part No. 8090.	AC line fuse.
F2502		FUSE, CARTRIDGE: Same as F2501	AC line fuse.
F2503	P1FFC	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; AEC part No. F02G5R00A.	Fan and outlet fuse.
F2504		FUSE, CARTRIDGE: Same as F2503.	Fan and outlet fuse.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
F2505		FUSE, CARTRIDGE: Same as F2503.	Spare fuse for fan and outlet.
F2506		FUSE, CARTRIDGE: Same as F2501.	Space AC line fuse.
H2501		CLAMP, ELECTRICAL: Same as H102.	Clamps S2502.
H2502	M-FFC	CLAMP, ELECTRICAL: steel gray enamel; 2-3/8" lg x 3/8" wd x 13/16" h o/a; AEC part No. 8003.	Clamps J2501 to cabinet.
H2503		CLAMP, ELECTRICAL: Same as H2502	Clamps J2501 to cabinet.
H2504		CLAMP, ELECTRICAL: Same as H2502.	Clamps J2501 to cabinet.
H2505		CLAMP, ELECTRICAL: Same as H2502.	Clamps J2501 to cabinet.
H2506		DELETED	
H2507		DELETED	
H2508		DELETED	
H2509	P1FFC	PULLER, FUSE: scissor action type; black fibre; 5" lg x 3/4" wd x 7/16" thk o/a; Trico Fuse "Midget" type; AEC part No. 8080.	Fusepuller.
H2510	P1FFC	WRENCH: 1-15/16" lg x 3/4" h x 1/16" wd o/a; wrench for No. 5 Allen head set screws for control knob set screw; AEC part No. 7088-3.	To remove knobs.
H2511		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2512		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2513		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2514		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2515		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H2516		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2517		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2518		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2519		DELETED	
H2520		DELETED	
H2521		DELETED	
H2522		DELETED	
H2523		DELETED	
H2524		DELETED	
H2525	M-FFC	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 No. 8-32 machine screw; Fahnestock Electric part No. 9C; AEC part No. 8084.	Clamp for Allen wrench.
H2526	M-FFC	CLAMP, ELECTRICAL: nylon, black; one loop type fastening device; 1-1/8" lg x 5/8" wd x 19/32" h o/a; mtd by No. 10-32 machine screw; AEC part No. 7977-3.	Support for loop cable.
H2527		CLAMP, ELECTRICAL: Same as H2526.	Support for loop cable.
H2528		CLAMP, ELECTRICAL: Same as H2526.	Support for loop cable.
H2529		CLAMP, ELECTRICAL: Same as H2526	Support for loop cable.
H2530		CLAMP, ELECTRICAL: Same as H2526.	Support for loop cable.
H2531		CLAMP, ELECTRICAL: Same as H2526.	Support for loop cable.
H2532	M-FFC	CLAMP, ELECTRICAL: nylon, black; compression type fastening device; 1-1/8" lg x 5/8" wd x 19/32" h o/a; mtd by one 0.196" diam hole; AEC part No. 7977-1; (Receiver Group and Transmitter Group Cabinets).	Clamps W2501 or W2502 to cabinet.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H2533		CLAMP, ELECTRICAL: Same as 2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2534		CLAMP, ELECTRICAL: Same as H2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2535		CLAMP, ELECTRICAL: Same as H2532; (Transmitter Group Cabinet only).	Clamps W2501 to cabinet.
H2536		CLAMP, ELECTRICAL: Same as H2532; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
H2537		CLAMP, ELECTRICAL: Same as H2532; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
H2538		CLAMP, ELECTRICAL: Same as H2532; (Receiver Group Cabinet only).	Clamps W2502 to cabinet.
H2539	P1FFC	WRENCH: steel, blued 2-1/2" lg x 1" wd x 1/8" h; wrench for a 1/4 Allen head set screw for blower wheel set screws; AEC part No. 7088-4.	To remove blower wheel.
I2501	P1FFC	LIGHT, INDICATOR: supplied w/lens; c/o I2501A and I2501B as listed below; govt. spec. MIL-L-3661, type No. LH64PY2; AEC part No. LH64PY2.	
I2501A	X1FFC	LIGHT, INDICATOR; SUPPLIED W/O LENS: accommodates T3-1/4 neon lamp, NE-51, miniature bayonet base; 220 v, 0.5 amp; brass, chrome plated including shell; 1-3/4" lg x 13/16" diam. o/a; one 11/16" mtg hole insulated from shell with built-in "V" dropping resistor; Drake Mfg. part No. MIL-100N, less Jewel, AEC part No. 8098; p/o I2501.	Holder for E 2501.
I2501B	X1FFC	LENS, INDICATOR LIGHT: amber, 5/8" diam. x 5/8" lg; Drake Mfg. part No. MIL-25, Jewel Yellow Smooth Plain; AEC part No. 8099; p/o I2501.	Lens for I2501A.
I2502		LIGHT, INDICATOR: Same as I2501.	
I2502A		LIGHT, INDICATOR: Same as I2501A; p/o I2502.	Holder for E 2502.
I2502B		LENS, INDICATOR LIGHT: Same as I2501B; p/o I2502.	Lens for I2502A.
I2503		DELETED	
I2504		DELETED	

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
J2501	N-FFC	CONNECTOR ASSEMBLY, ELECTRICAL: 14 connectors in assem; 14 Wiremold part No. 2027G receptacles, 3 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; AEC part No. 8058.	AC power connector strip.
J2502	P1FFC	CONNECTOR, RECEPTACLE: 3 female blades; includes ground; straight type; 1-7/32" lg x 1-5/8" 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, 1.937 mtg ctr; Harvey Hubbell part No. 5284; AEC part No. 8045.	Convenience outlet.
O2501	N-FFC	FILTER, AIR: permanent, washable, all metal, panel type; steel, electroplated zinc finish, 14 mesh screen wire arranged in 8 alternate layers of flat and herringbone-crimp screens, with 5/8" bonding frame; 12-3/4" lg x 6-3/4" h x 2" d; Farr Mfg. type 44 media; AEC part No. 8070.	Filters input cooling air.
O2502	N-FFC	WHEEL, BLOWER: 3-13/16" dia x 3" lg steel cadmium plated mounts on 5/16" shaft for counter-clockwise rotation; p/o A2501; Torrington Mfg. Co. part No. 326-128ccw; AEC part No. 8069-5.	Blower wheel for A2501.
O2503	N-FFC	WHEEL, BLOWER: 3-13/16" dia x 3" lg steel cadmium plated mounts on 5/16" shaft for clockwise rotation; p/o A2501; Torrington Mfg. Co. part No. 326-300cw; AEC part No. 8069-6.	Blower wheel for A2501.
O2504	N-FFC	HOUSING: left, sheet metal fabricated steel cadmium plated and iridite finish; p/o A2501, 6-3/8" lg x 5-5/8" wd x 3" h; AEC part No. 8069-1.	Housing for A2501.
O2505	N-FFC	HOUSING: right, sheet metal fabricated steel cadmium plated and iridite finish; p/o A2501; 6-3/8" lg x 5-5/8" wd x 3" h; AEC part No. 8069-2.	Housing for A2501.
P2501		CONNECTOR, PLUG: Same as P102.	Blower connector.
S2501	P1FFC	SWITCH, TOGGLE: DDST; 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; AEC part No. 8092.	Main POWER ON-OFF switch.
S2502		SWITCH, TOGGLE: Same as S101.	115 v - 230 v switch.
T2501	P1FFC	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; 1,000 v RMS insul; 3-11/16" lg x 4-5/16" wd x 5" h o/a; four No. 10-32 x 1/2" mtg studs located on 3-5/16" x 2-11/16" mtg/c; govt spec MIL-T-27A, Grade I, Class R; Dietz Design & Mfg. part No. 1229; AEC part No. 7929.	115v supply transformer for fan and outlet.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

TELEGRAPH CARRIER TERMINAL CABINET CY-1195A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
W2501	A-FFS	WIRING HARNESS: main body and breakout thirty-seven No. 22 AWG copper stranded, vinyl insulated shielded conductors; 1,000 v RMS max working voltage; 65-1/2" lg main body, 11 breakouts each 1-1/2" lg; plastic twine laced 3/4" apart binds cond together; 74 marked term lugs located on both ends and on ends of breakouts; AEC part No. 7972; U. S. Navy type No. CX-4290/FCC-3A.	Interconnect transmitters and converter.
W2502	A-FFS	WIRING HARNESS: main body and breakout fifty-five No. 22 AWG copper stranded, vinyl insulated shielded conductors; 1,000 v RMS max working voltage; 63-1/2" lg main body, 11 breakouts each 1-1/2" lg; plastic twine laced 3/4" apart binds cond together; 110 marked term lugs located on both ends and on ends of breakouts; AEC part No. 7973; U. S. Navy type No. CX-4289/FCC-3A.	Interconnect receivers and converter.

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3

2600 to 2699	X-FFS	CONVERTER, FREQUENCY, ELECTRONIC: CV-243A/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 -10dbm 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-243A/FCC-3; govt spec MIL-T-15294C-2 (SHIPS); AEC part No. 7868.	Converts frequency of eight narrow-band transmitters to high frequency. Figure 1-4.
C2601		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120	Plate to grid coupling capacitor for V2601A. Figure 7-19
C2602	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 1,100 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM30D112J; Sangamo part No. CM30D112J; AEC part No. CM30D112J.	Couples plate of V2601A to grid of V2602A. Figure 7-19
C2603	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 10 mmf, $\pm 10\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20B100K; Sangamo part No. CM20B100K; AEC part No. CM20B100K.	Couples grid of V2601B to grid of V2602A. Figure 7-19
C2604	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 75 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C750J; Sangamo part No. CM20C750J; AEC part No. CM20C750J.	Feedback capacitor for V2602A. Figure 7-19
C2605		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2602A. Figure 7-19
C2606		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2602A. Figure 7-19

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C2607		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2602A. Figure 7-19
C2608	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 51 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C510J; Sangamo part No. CM20C510J; AEC part No. CM20C510J.	Couples plate of V2602A to grid of V2602B. Figure 7-19
C2609	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 510 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C511J; Sangamo part No. CM20C511J; AEC part No. CM20C511J.	Feedback capacitor for V2602B. Figure 7-19
C2610		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2602B. Figure 7-19
C2611		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2602B. Figure 7-19
C2612		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2602B. Figure 7-19
C2613	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 100,000 mmf, $\pm 10\%$; 600 v DC; govt spec MIL-C-25A, type No. CP61B1-EF104K; Micamold part No. CP61B1EF104K; AEC part No. CP61B1EF104K.	Couples V2603A to T2601. Figures 7-17, 7-18
C2614		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Couples plate of V2602B to grid of V2604A. Figure 7-19
C2615	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 1500 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM30D152J; Sangamo part No. CM30D152J; AEC part No. CM30D152J.	Feedback capacitor for V2604A. Figure 7-19
C2616		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2602.	Feedback capacitor for V2604A. Figure 7-19
C2617		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2602.	Feedback capacitor for V2604A. Figure 7-19
C2618		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2602.	Feedback capacitor for V2604A. Figure 7-19
C2619	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 150 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM20C151J; Sangamo part No. CM20C151J; AEC part No. CM20C151J.	Couples plate of V2604A to grid of V2604B. Figure 7-19
C2620	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 6,800 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM35D682J; Sangamo part No. CM35D682J; AEC part No. CM35D682J.	Feedback capacitor for V2604B. Figure 7-20

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C2621	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 5,600 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM35D562J; Sangamo part No. CM35D562J; AEC part No. CM35D562J.	Feedback capacitor for V2604B. Figure 7-19
C2622		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2621.	Feedback capacitor for V2604B. Figure 7-19
C2623		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2621.	Feedback capacitor for V2604B. Figure 7-19
C2624		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C2613.	Blocking capacitor for J2603. Figures 7-17, 7-18
C2625		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C119.	Filter capacitor for J2603. Figure 7-20
C2626		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C2613.	Plate decoupling capacitor. Figures 7-17, 7-18
C2627		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Plate decoupling capacitor. Figure 7-19
C2628	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 50,000 mmf, $\pm 10\%$; 600 v DC; govt spec MIL-C-25A, type No. CP54B-1EF503K; Micamold part No. CP54B1EF503K; AEC part No. CP54B1EF503K.	Filter capacitor for J2611 and J2612. Figure 7-18
C2629	P1FFC	CAPACITOR, FIXED, MICA DIELECTRIC: 3,000 mmf, $\pm 5\%$; 500 v DC; govt spec MIL-C-5A, type No. CM30D302J; Sangamo part No. CM30D302J; AEC part No. CM30D302J.	Filter capacitor for carrier signal input to T2603. Figure 7-20
C2630		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V2605 to grid of V2606A. Figure 7-20
C2631		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V2606A to grid of V2606B. Figure 7-20
C2632		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C107.	Blocking capacitor for feedback to cathode V2606A. Figures 7-17, 7-18
C2633		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	Filter capacitor for B+ power supply. Figure 7-17

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C2634	P1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: 2 sect; 50,000 mmf, $\pm 15\%$; 1,000 v DC; govt spec MIL-C-25A, type No. CP54B4EG503V; Micamold part No. CP54B4EG503V; AEC part No. CP54B4EG503V.	Figure 7-18
C2634A	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C2634; for reference only.	RF filter capacitor for J2617.
C2634B	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C2634; for reference only.	RF filter capacitor for J2618.
C2635		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C1316.	AC power input filter. Figure 7-18
C2635A	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C2635; for reference only.	Filter capacitor for AC power input.
C2635B	X1FFC	CAPACITOR, FIXED, PAPER DIELECTRIC: p/o C2635; for reference only.	Filter capacitor for AC power input.
C2636		CAPACITOR, FIXED, ELECTROLYTIC: Same as C125.	B+ power supply filter capacitor. Figure 7-17
C2637		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	B+ power supply filter capacitor. Figure 7-17
CR2601	P1FFC	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; AEC part No. 1N71.	Ring Modulator. Figure 7-17
CR2602		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-18, 7-20
CR2603		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-18, 7-20
CR2604		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-18, 7-20
CR2605		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-18, 7-20
E2601		DELETED	
E2602		DELETED	
E2603		LAMP, INCANDESCENT: Same as E103.	Pilot lamp; indicates presence of line voltage. Figure 7-18
E2604		FUSEHOLDER: Same as E104.	Figure 7-18

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E2604A		CAP, FUSEHOLDER: Same as E104A; p/o E2604.	Blown fuse indicator.
E2604B		BODY, FUSEHOLDER: Same as E104B; p/o E2604.	Holds AC line fuse.
E2605		FUSEHOLDER: Same as E104.	Figure 7-18
E2605A		CAP, FUSEHOLDER: Same as E104A; p/o E2605.	Blown fuse indicator.
E2605B		BODY, FUSEHOLDER: Same as E104B; p/o E2605.	Holds AC line fuse.
E2606		FUSEHOLDER: Same as E106.	Spare fuseholder. Figure 7-17
E2607		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2601. Figure 7-17
E2608		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2602. Figure 7-17
E2609		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2603. Figure 7-17
E2610		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2604. Figure 7-17
E2611		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2605. Figure 7-17
E2612		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2606. Figure 7-17
E2613		SHIELD, ELECTRON TUBE: Same as E112.	Shield for V2608. Figure 7-17
E2614		SHIELD, ELECTRON TUBE: Same as E112.	Shield for V2609. Figure 7-17
E2615		TERMINAL BOARD: Same as E115.	Input and output sig- nal termination block. Figure 7-17
E2616		TERMINAL, STUD: Same as E116.	Insulated terminal for mounting com- ponents.
E2617	M-FFC	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; AEC part No. 7937-5.	Mounts component parts. Figures 7-18, 7-19
E2618	M-FFC	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; AEC part No. 7937-6.	Mounts component parts. Figures 7-18, 7-19

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E2619	M-FFC	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; AEC part No. 7937-7.	Mounts component parts. Figures 7-18, 7-19
E2620	M-FFC	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; AEC part No. 7937-8.	Mounts component parts. Figures 7-18, 7-19
E2621	M-FFC	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; AEC part No. 7937-9.	Mounts component parts. Figures 7-18, 7-20
E2622	M-FFC	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; AEC part No. 7936-5.	Mounts component parts. Figures 7-18, 7-20
E2623	M-FFC	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; AEC part No. 7936-6.	Mounts component parts. Figures 7-18, 7-20
E2624	M-FFC	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; AEC part No. 7935.	Mounts component parts. Figures 7-18, 7-20
E2625		STUD, TERMINAL: Same as E116.	Mounts component parts. Figures 7-18, 7-20
E2626	M-FFC	TERMINAL BOARD: laminated phenolic; incl 8 solder lug term; w/o barriers; 2-7/8" lg x 2" wd x 29/64" h o/a; four 0.156" diam mtg holes on 1-3/8" x 2-1/2" mtg ctr; marked w/symbol designations; fungus and moisture proofed; AEC part No. 7940-1.	Mounts component parts.
F2601		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-18
F2602		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-18
F2603		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-17
F2604		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-17

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H2601		CLAMP, ELECTRICAL: Same as H101.	Clamp cable W2602 to connector P2603. Figure 7-17
H2602		CLAMP, ELECTRICAL: Same as H102.	Clamp for switch S2602. Figure 7-17
H2603		CLAMP, ELECTRICAL: Same as H103.	Clamp cable W2602 to E2615. Figure 7-17
H2604		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2605		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2606		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2607		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2608		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2609		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2610		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2611		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2612		SLIDE, LEFT: Same as H112.	Supporting member on chassis for slides.
H2613		SLIDE, RIGHT: Same as H113.	Supporting member on chassis for slides.
H2614		SLIDE MOUNTING PLATE, LEFT: Same as H114.	Supporting member on cabinet for slides.
H2615		SLIDE MOUNTING PLATE, RIGHT: Same as H115.	Supporting member on cabinet for slides.
I2601		DELETED	
I2602		DELETED	
I2603		LIGHT, INDICATOR: Same as I103.	Figure 7-18

NAVSHIPS 93109

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
I2603A		LIGHT, INDICATOR: Same as I103A; p/o I1303.	Lamp assembly for E2603.
I2603B		LENS, INDICATOR LIGHT: Same as I103B; p/o I2603.	Lens for I2603A.
J2601		JACK, TELEPHONE: Same as J108.	3400 cycle TEST jack. Figure 7-17
J2602		JACK, TELEPHONE: Same as J108.	3400 cycle TEST jack. Figure 7-17
J2603		JACK, TELEPHONE: Same as J108.	85 cycle TEST jack. Figure 7-17
J2604		JACK, TELEPHONE: Same as J108.	85 cycle TEST jack. Figure 7-17
J2605		JACK, TELEPHONE: Same as J104.	IN NORM-LINE jack. Figure 7-17
J2606		JACK, TELEPHONE: Same as J104.	IN NORM-LINE jack. Figure 7-17
J2607		JACK, TELEPHONE: Same as J104.	IN NORM-EQUIP jack. Figure 7-17
J2608		JACK, TELEPHONE: Same as J104.	IN NORM-EQUIP jack. Figure 7-17
J2609		JACK, TELEPHONE: Same as J104.	IN CONV-LINE jack. Figure 7-17
J2610		JACK, TELEPHONE: Same as J104.	IN CONV-LINE jack. Figure 7-17
J2611		JACK, TELEPHONE: Same as J104.	IN CONV-EQUIP jack. Figure 7-17
J2612		JACK, TELEPHONE: Same as J104.	IN CONV-EQUIP jack. Figure 7-17
J2613		JACK, TELEPHONE: Same as J108.	MONITOR jack. Figure 7-17
J2614		JACK, TELEPHONE: Same as J108.	MONITOR jack. Figure 7-17
J2615		JACK, TELEPHONE: Same as J104.	OUT-LINE jack. Figure 7-17
J2616		JACK, TELEPHONE: Same as J104.	OUT-LINE jack. Figure 7-17

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
J2617		JACK, TELEPHONE: Same as J104.	OUT-EQUIP jack. Figure 7-17
J2618		JACK, TELEPHONE: Same as J104.	OUT-EQUIP jack. Figure 7-17
J2619		CONNECTOR, RECEPTACLE: Same as J111	AC input power connector. Figure 7-17
J2620		CONNECTOR, RECEPTACLE: Same as J110.	Input and output signal connector. Figure 7-17
J2621	P1FFC	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/No. 1/4-32 thd, 1/2" lg; Insuline Corporation part No. 889R; AEC part No. 8031-1.	425 cycle test jack. Figures 7-17, 7-18
J2622		CONNECTOR, RECEPTACLE: Same as J2621.	85 cycle test jack. Figures 7-17, 7-18
J2623	P1FFC	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 No. 1/4-32 thd, 1/2" lg; Insuline Corporation part No. 889B. AEC part No. 8031-2.	Ground jack. Figures 7-17, 7-18
L2601	P1FFC	CHOKE, RADIO FREQUENCY: 80 mh, 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; J. W. Miller type No. 3653-1; AEC part No. 7930-1.	RF filter choke. Figure 7-18
L2602		CHOKE, RADIO FREQUENCY: Same as L2601.	RF filter choke. Figure 7-18
L2603		REACTOR: Same as L101.	B+ power supply filter choke. Figure 7-17
L2604	P1FFC	CHOKE, RADIO FREQUENCY: 2.5 mh, 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; J. W. Miller type No. 3653-3; AEC part No. 7930-3.	RF filter choke. Figure 7-18
J2605		CHOKE, RADIO FREQUENCY: Same as L2604.	RF filter choke. Figure 7-18
O2601		DELETED	
O2602		DELETED	

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
O2603		DELETED	
O2604		DELETED	
O2605		DELETED	
O2606		ROLLER: Same as O106.	Roller for chassis slide.
O2607		ROLLER: Same as O106.	Roller for chassis slide.
O2608		ROLLER: Same as O106.	Roller for chassis slide.
O2609		ROLLER: Same as O106.	Roller for chassis slide.
O2610		ROLLER: Same as O110.	Roller for chassis slide.
O2611		ROLLER: Same as O110.	Roller for chassis slide.
O2612		TILT PIN ASSEMBLY: Same as O112.	Locks chassis in upright position.
O2613		TILT PIN ASSEMBLY: Same as O112.	Locks chassis in upright position.
P2601		CONNECTOR, PLUG: Same as P101.	Input and output signal connector. Figure 7-17
P2602		CONNECTOR, PLUG: Same as P102.	AC power input connector. Figure 7-17
P2603		CONNECTOR, PLUG: Same as P103.	AC power input connector. Figure 7-17
R2601		RESISTOR, FIXED, COMPOSITION: Same as R109.	Plate load for V2601A. Figure 7-19
R2602		RESISTOR, FIXED, COMPOSITION: Same as R120.	Cathode bias resistor for V2601A. Figure 7-19
R2603		RESISTOR, FIXED, COMPOSITION: Same as R120.	Cathode bias resistor for V2601B. Figure 7-19
R2604		RESISTOR, FIXED, COMPOSITION: Same as R115.	Plate load for V2601B. Figure 7-19

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2605	P1FFC	RESISTOR, FIXED, COMPOSITION: 51,000 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" diam body dim: govt spec data MIL-R-11A, spec type RC32GF513J; Allen-Bradley part No. RC32GF513J; AEC part No. RC32GF513J;	Plate load for V2601A. Figure 7-19
R2606		RESISTOR, FIXED, COMPOSITION: Same as R110.	Component in phase shift network of V2602A. Figure 7-19
R2607	P1FFC	RESISTOR, VARIABLE, COMPOSITION: 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; 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; type No. RV4LATS254A; govt spec MIL-R-94A; Allen Bradley part No. RV4LATS254A; AEC part No. RV4LATS254A.	Component in phase shift network of V2602A. Figures 7-17, 7-18
R2608	P1FFC	RESISTOR, FIXED, COMPOSITION: 240,000 ohms, $\pm 5\%$; 1 w; govt spec data MIL-R-11A, RC32GF244J; Allen-Bradley part No. RC32GF244J; AEC part No. RC32GF244J.	Component in phase shift network of V2602A. Figure 7-19
R2609		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2602A. Figure 7-19
R2610		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2602A. Figure 7-19
R2611	P1FFC	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 5\%$; 1 w; govt spec data MIL-R-11A, RC32GF102J; Allen-Bradley part No. RC32GF102J; AEC part No. RC32GF102J.	Cathode bias resistor for V2602B. Figure 7-19
R2612		RESISTOR, FIXED, COMPOSITION: Same as R116.	Component in phase shift network of V2602B. Figure 7-19
R2613		RESISTOR, VARIABLE, COMPOSITION: Same as R2607.	Component in phase shift network of V2602B. Figures 7-17, 7-18
R2614		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2602B. Figure 7-19
R2615		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2602B. Figure 7-19

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2616		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2602B. Figure 7-19
R2617	P1FFC	RESISTOR, FIXED, COMPOSITION: 1 megohm, $\pm 5\%$. 1 w; govt spec data MIL-R-11A, RC32GF105J; Allen-Bradley part No. RC32GF105J; AEC part No. RC32GF105J.	Grid limiting resistor for V2603A. Figure 7-19
R2618		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor for V2603A. Figures 7-18, 7-20
R2619		RESISTOR, FIXED, COMPOSITION: Same as R102.	Plate load for V2603A. Figures 7-18, 7-20
R2620		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias for V2604A. Figure 7-19
R2621	P1FFC	RESISTOR, FIXED, COMPOSITION: 4.7 megohms, $\pm 10\%$; 1 w; govt spec MIL-R-11A, type RC32GF475K; Allen-Bradley part No. RC32GF475K; AEC part No. RC32GF475K.	Isolating resistor for J2621. Figure 7-19
R2622		RESISTOR, FIXED, COMPOSITION: Same as R116.	Component in phase shift network of V2604A. Figure 7-19
R2623		RESISTOR, VARIABLE: Same as R2607.	Component in phase shift network of V2604A. Figures 7-17, 7-18
R2624		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604A. Figure 7-19
R2625		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604A. Figure 7-19
R2626		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604A. Figure 7-19
R2627		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Plate load for V2604A. Figure 7-19
R2628		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias for V2604B. Figure 7-20

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2629		RESISTOR, FIXED, COMPOSITION: Same as R2621.	Isolating resistor for J2622. Figure 7-20
R2630		RESISTOR, FIXED, COMPOSITION: Same as R116.	Component in phase shift network of V2604B. Figure 7-20
R2631		RESISTOR, VARIABLE: Same as R1315.	Component in phase shift network of V2604B. Figures 7-17, 7-18
R2632		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604B. Figure 7-19
R2633		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604B. Figure 7-19
R2634		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component in phase shift network of V2604B. Figure 7-19
R2635		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Plate load resistor for V2604B. Figure 7-20
R2636	P1FFC	RESISTOR, FIXED, COMPOSITION: 1.5 megohms, $\pm 5\%$; 1 w; govt spec data MIL-R-11A, type RC32GF155J; Allen-Bradley part No. RC32GF155J; AEC part No. RC32GF155J.	Grid limiting resistor for V2603B. Figure 7-20
R2637		RESISTOR, FIXED, COMPOSITION: Same as R120.	Cathode bias resistor for V2603B. Figures 7-18, 7-20
R2638		RESISTOR, FIXED, COMPOSITION: Same as R102.	Plate load for V2603B. Figures 7-18, 7-20
R2639		RESISTOR, FIXED, COMPOSITION: Same as R102.	Plate load for V2603B. Figures 7-18, 7-20
R2640		RESISTOR, FIXED, COMPOSITION: Same as R115.	Voltage dropping resistor for V2601. Figure 7-19
R2641	P1FFC	RESISTOR, FIXED, COMPOSITION: 430 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF431J; Allen-Bradley part No. RC32GF431J; AEC part No. RC32GF431J.	Component of 600 ohm T pad. Figures 7-18, 7-20

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2642		RESISTOR, FIXED, COMPOSITION: Same as R2641.	Component of 600 ohm T pad Figures 7-18, 7-20
R2643	P1FFC	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type No. RC32GF221J; Allen-Bradley part No. RC32GF221J; AEC part No. RC32GF221J.	Component of 600 ohm T pad. Figures 7-18, 7-20
R2644	P1FFC	RESISTOR, FIXED, COMPOSITION: 180 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF181J; Allen-Bradley part No. RC32GF181J; AEC part No. RC32GF181J.	Component of 600 ohm T pad. Figures 7-18, 7-20
R2645		RESISTOR, FIXED, COMPOSITION: Same as R2644.	Component of 600 ohm T pad. Figures 7-18, 7-20
R2646	P1FFC	RESISTOR, FIXED, COMPOSITION: 820 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF821J; Allen-Bradley part No. RC32GF821J; AEC part No. RC32GF821J.	Component of 600 ohm T pad. Figures 7-18, 7-20
R2647	P1FFC	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, $\pm 10\%$; 2 w; std A taper; 3 solder lug term; phenolic body, metal case, encl type; case 1-1/16" diam x 1-3/16" d; metal shaft, 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; type RV4LATSA503A; govt spec MIL-R-94A; Allen Bradley part No. RV4LATSA503A; AEC part No. RV4LATSA503A.	Grid level potentiometer for V2605A. Figures 7-17, 7-18
R2648	P1FFC	RESISTOR, FIXED, COMPOSITION: 2200 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF222J; Allen-Bradley part No. RC32GF222J; AEC part No. RC32GF222J.	Cathode bias resistor for V2605A. Figure 7-20
R2649	P1FFC	RESISTOR, FIXED, COMPOSITION: 510 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF511J; Allen-Bradley part No. RC32GF511J; AEC part No. RC32GF511J.	Voltage dividing resistor for V2605A. Figure 7-20
R2650	P1FFC	RESISTOR, VARIABLE, COMPOSITION: single sect, 100 ohms, $\pm 10\%$; 2 w; std A taper; 3 solder lug term; case phenolic body, metal, encl type, 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 insulated, no OFF position; mtd by bushing; type RV4LAVSA101A; govt spec MIL-R-94A; Reon part No. RV4LAVSA101A; AEC part No. RV4LAVSA101A.	Grid signal level potentiometer for V2605B. Figures 7-18, 7-19
R2651		RESISTOR, FIXED, COMPOSITION: Same as R2648.	Cathode bias resistor for V2605B. Figure 7-20
R2652	P1FFC	RESISTOR, FIXED, COMPOSITION: 39 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF390J; Allen-Bradley part No. RC32GF390J; AEC part No. RC32GF390J.	Cathode bias resistor for V2605B. Figure 7-20
R2653		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load for V2605. Figure 7-20

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2654		RESISTOR, FIXED, COMPOSITION: Same as R113.	Grid leak resistor for V2606A.
R2655	P1FFC	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF472J; Allen-Bradley part No. RC32GF472J; AEC part No. RC32GF472J.	Cathode bias resistor for V2606A. Figure 7-20
R2656		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load for V2606A. Figure 7-20
R2657		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Grid lead resistor for V2606B. Figure 7-20
R2658		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias and feedback resistor for V2606B. Figure 7-20
R2659	P1FFC	RESISTOR, FIXED, COMPOSITION: 30,000 ohms, $\pm 5\%$; 1 w; govt spec MIL-R-11A, type RC32GF303J; Allen-Bradley part No. RC32GF303J; AEC part No. RC32GF303J.	Plate feedback resistor for V2606B. Figure 7-20
R2660		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2613. Figure 7-20
R2661		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2614. Figure 7-20
R2662		RESISTOR, FIXED, COMPOSITION: Same as R1336.	Voltage dividing resistor for B+ power supply. Figures 7-18, 7-20
R2663	P1FFC	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, $\pm 10\%$; 1 w; govt spec MIL-R-11A, type RC32GF152K; Allen-Bradley part No. RC32GF152K; AEC part No. RC32GF152K.	Voltage dividing resistor for B+ power supply. Figures 7-18, 7-20
R2664R	P1FFC	RESISTOR, FIXED, WIRE WOUND: 3,500 ohms, $\pm 5\%$; 18 w; govt spec MIL-R-26B, type RW33G352; I. R. C. part No. RW33G352; AEC part No. RW33G352.	Voltage dividing resistor for B+ power supply. Figure 7-17
R2665		RESISTOR, FIXED, COMPOSITION: Same as R1350.	Bleeder resistor for B+ power supply. Figures 7-18, 7-20
R2666		RESISTOR, FIXED, WIRE WOUND: Same as R121.	Voltage dropping resistor for E2603. Figure 7-18
R2667		RESISTOR, FIXED, COMPOSITION: Same as R1322.	Oscillation suppressor for V2604B. Figure 7-18

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2668	P1FFC	RESISTOR, VARIABLE, COMPOSITION: 1 megohm, $\pm 10\%$; 2 w; 3 term; phenolic body, metal case, 1-1/16" diam x 1-3/16" lg; standard A taper; shaft round, metal, screw-driver-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; type RV4LATSA-105A; govt spec MIL-R-94A; Allen Bradley part No. RV4LATSA105A; AEC part No. RV4LATSA105A.	Gain control on 3400 cycle amplifier. Figures 7-17, 7-18
R2669	P1FFC	ATTENUATOR: variable, resistive type "T", 600 ohms input and 600 ohms output impedance; 0 to 40 db range, $\pm 5\%$; 20 steps; 2-3/8" diam x 3" d o/a; 6 term; two No. 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; AEC part No. 7998.	Adjusts level of output signal. Figure 7-17
S2601		SWITCH, TOGGLE: Same as S103.	Power ON-OFF switch. Figure 7-18
S2602		SWITCH, TOGGLE: Same as S101.	115 V - 230 V switch. Figures 7-17, 7-18
T2601	P1FFC	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 No. 1 core 100 to 1, No. 2 core, 3.1 to 1, No. 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; 9 solder lug term; four No. 8-32 x 1/4" lg thd mtg studs located on 1-11/16" x 2-1/16" ctr; not shielded; Dietz Design & Mfg. part No. 1214; AEC part No. 7914.	Modulation transformer. Figures 7-17, 7-18
T2602	P1FFC	TRANSFORMER, AUDIO FREQUENCY: 600 ohms prim, 50 000 ohms sec'd; 500 v RMS test v, upright case, steel; 2-5/16" lg x 2-1/16" wd x 2-7/8" h o/a; 1 to 9 ratio of turns, primary to sec'd; $\pm 1/2$ db from 300 to 3500 cyc; 5 solder lug type term; 4 mtg studs No. 6-32 thd x 3/8" lg on 1-1/4" x 1-5/8" mtg ctr; zero dbm max signal; govt spec data MIL-T-27A, Grade I, Class R; Dietz Design & Mfg. part No. 1200; AEC part No. 7900.	Matches Z2603 to V2605A. Figures 7-17, 7-18
T2603		TRANSFORMER, AUDIO FREQUENCY: Same as T102.	Matches V2606B to R2669. Figures 7-17, 7-18
T2604	P1FFC	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: hermetically sealed, steel; 115/230 v AC, 50-60 cyc; single phase; 2 output windings, No. 1 sec'd 6.3 to 2.6 amp, No. 2 sec'd 140 v 60 ma; 3-9/16" lg x 3-1/16" wd x 3-1/2" h o/a; 9 term solder lug type; four No. 8-32 thd studs on 2- 5/8 " x 2- 1/8 " mtg/c; internal shielding; govt spec MIL-T-27A, Grade I, Class R; Dietz Design & Mfg. part No. 1225; AEC part No. 7925.	Power transformer. Figures 7-17, 7-18

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
T2605	P1FFC	TRANSFORMER, AUDIO FREQUENCY: input type; 600 ohms primary; 600 ohms secondary; case upright, steel; 2-5/16" lg x 2-1/16" wd x 2-7/8" h o/a; 1 to 1 ratio of turns, primary to secondary; ± 1 db from 300 to 3500 cyc. not tuned; 5 solder lug term located on bottom; four No. 6-32 mtd studs 3/8" lg on 1-1/4" x 1-5/8" mtg/c; govt spec MIL-T-27A, Grade I, Class R; Dietz Design & Mfg. part No. 1205; AEC part No. 7905.	Line isolating transformer. Figures 7-17, 7-18
V2601		TUBE, ELECTRON: Same as V101.	102 kc oscillator. Figure 7-17
V2602		TUBE, ELECTRON: Same as V1302.	V2602A: 20.4 kc phase shift oscillator. V2602B: 3400 cyc phase shift oscillator. Figure 7-17
V2603		TUBE, ELECTRON: Same as V101.	V2603A: 3400 cyc carrier frequency amplifier. V2603B: 85 cyc amplifier. Figure 7-17
V2604		TUBE, ELECTRON: Same as V1302.	V2604A: 425 cyc phase shift oscillator. V2604B: 85 cyc phase shift oscillator. Figure 7-17
V2605		TUBE, ELECTRON: Same as V1302.	V2605A: Converter signal input amplifier. V2605B: Normal and converted signal amplifier. Figure 7-17
V2606		TUBE, ELECTRON: Same as V101.	Normal and converted signal amplifier. Figure 7-17
V2607		DELETED	
V2608		TUBE, ELECTRON: Same as V107.	Voltage regulator. Figure 7-17
V2609		TUBE, ELECTRON: Same as V107.	Voltage regulator. Figure 7-17
W2601		CABLE ASSEMBLY, POWER, ELECTRICAL: Same as W101.	AC input cable assembly. Figure 7-17

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
W2601A		CABLE, BULK: Same as W101A.	Used with W2601.
W2602		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Same as W102.	Input and output signal cable. Figure 7-17
W2602A		CABLE, BULK: Same as W102A.	Used with W2602.
X2601		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2601. Figure 7-18
X2602		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2602. Figure 7-18
X2603		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2603. Figure 7-18
X2604		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2604. Figure 7-18
X2605		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2605. Figure 7-18
X2606		SOCKET, ELECTRON TUBE: Same as X101.	Socket for V2606. Figure 7-18
X2607		DELETED	
X2608		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V2608. Figure 7-18
X2609		SOCKET, ELECTRON TUBE: Same as X102.	Socket for V2609. Figure 7-18
X2610		SOCKET, ELECTRON TUBE: Same as X110.	Socket for CR2601. Figure 7-18
X2611	P1FFC	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; Elec- tronic Mechanics part No. ETS-3; AEC part No. 7953.	Socket for Y2601. Figure 7-18
X2612		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2633. Figure 7-18
X2613		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2636. Figure 7-18
X2614		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2637. Figure 7-18
Y2601	P1FFC	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; Standard Crystal Co. part No. CR-16/U; AEC part No. CR-16/U.	Stabilizer 102 kc oscillator. Figure 7-17

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-243A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
Z2601	P1FFC	FILTER, BAND-PASS: 3,400 cyc operating freq, 3,350 cyc to 3,450 cyc band-width; 2-3/4" lg x 2-3/8" wd x 3-1/4" h o/a; rectangular, metal case; four No. 8-32 x 3/8" 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; Dietz Design & Mfg. part No. 1216; AEC part No. 7916.	Filters 3,400 cycle oscillator frequency. Figures 7-17, 7-18
Z2602	P1FFC	FILTER, BAND-PASS: 85 cyc oper freq, 80 cyc to 90 cyc; 2-3/4" lg x 2-3/8" wd x 3-1/4" h o/a; case rectangular metal; four No. 8-32 threaded studs 3/8" lg on 1-11/16" x 2-1/16" ctr; 8 solder lug term located on bottom; Dietz Design & Mfg. part No. 1215; AEC part No. 7915.	Filters 85 cycle oscillator frequency. Figures 7-17, 7-18
Z2603	P1FFC	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 No. 6-32 x 7/8" mtg studs on 3-1/2" x 1-7/8" ctr; 4 term, solder lug type; attenuation constant ± 3 db over band-pass region; output at 3,400 cyc down 34 db and output at 1657.5 cyc down 20 db; Dietz Design & Mfg. part No. 1201; AEC part No. 7901.	Filters converted input signal. Figures 7-17, 7-18

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3

2700 to 2799	X-FFC	CONVERTER, FREQUENCY, ELECTRONIC, CV-244A/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; 115/230 v 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; 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-244A/FCC-3; govt spec MIL-T-15294C-2 (Ships); AEC part No. 7869.	Converts eight high frequency telegraph channels to low frequency. Figure 1-5
C2701		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples grid to plate of V2701A. Figures 7-25, 7-26
C2702		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2602.	Couples plate of V2701A to grid of V2701B. Figures 7-25, 7-26
C2703		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2603.	Couples plate of V2701A to grid of V2702A. Figures 7-25, 7-26
C2704		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2702A. Figures 7-25, 7-26
C2705		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2702A. Figures 7-25, 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C2706		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2702A. Figures 7-25, 7-26
C2707		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2604.	Feedback capacitor for V2702A. Figures 7-25, 7-26
C2708		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2608.	Couples plate of V2702A to grid of V2702B. Figures 7-25, 7-26
C2709		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2702B. Figures 7-25, 7-26
C2710		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2702B. Figures 7-25, 7-26
C2711		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2702B. Figures 7-25, 7-26
C2712		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2609.	Feedback capacitor for V2702B. Figures 7-25, 7-26
C2713		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C2613.	Blocking capacitor for J2701. Figures 7-24, 7-25
C2714		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Plate decoupling capacitor. Figures 7-25, 7-26
C2715		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C2613.	Couples plate of V2704A to cathode V2704B. Figures 7-24, 7-25
C2716		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples grid of V2704A to plate of V2704B. Figures 7-25, 7-26
C2717		CAPACITOR, FIXED, MICA DIELECTRIC: Same as C2629.	Filter capacitor for carrier frequency input to T2703.
C2718		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V2705A to grid of V2705B. Figures 7-25, 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
C2719		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C120.	Couples plate of V2705B to grid of V2703B. Figures 7-25, 7-26
C2720		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C107.	Blocking capacitor for feedback to cathode of V2705B. Figures 7-24, 7-25
C2721		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C2634.	RF filter for signal output from T2705. Figure 7-25
C2722		CAPACITOR, FIXED, PAPER DIELECTRIC: Same as C1316.	AC power input filter. Figure 7-25
C2723		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	B+ power supply filter. Figure 7-24
C2724		CAPACITOR, FIXED, ELECTROLYTIC: Same as C121.	B+ power supply filter. Figure 7-24
C2725		CAPACITOR, FIXED, ELECTROLYTIC: Same as C125.	B+ power supply filter. Figure 7-24
CR2701		CRYSTAL UNIT, RECTIFYING: Same as CR2601.	Ring Modulator. Figure 7-25
CR2702		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-25, 7-26
CR2703		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-25, 7-26
CR2704		DIODE, SILICON: Same as CR101.	Half-wave rectifier. Figures 7-25, 7-26
CR2705		DIODE, SILICON: Same as CR104.	Half-wave rectifier. Figures 7-25, 7-26
E2701		DELETED	
E2702		DELETED	
E2703		LAMP, INCANDESCENT: Same as E103.	Pilot lamp; indicates presence of line voltage. Figure 7-25
E2704		FUSEHOLDER: Same as E104.	Figure 7-25
E2704A		CAP, FUSEHOLDER: Same as E104A; p/o E2704.	Blown fuse indicator.
E2704B		BODY, FUSEHOLDER: Same as E104B; p/o E2704.	Holds AC line fuse.

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E2705		FUSEHOLDER: Same as E104.	Figure 7-25
E2705A		CAP, FUSEHOLDER: Same as E104A; p/o E2705.	Blown fuse indicator.
E2705B		BODY, FUSEHOLDER: Same as E104B; p/o E2705.	Holds AC line fuse.
E2706		FUSEHOLDER: Same as E104.	Figure 7-24
E2706A		CAP, FUSEHOLDER: Same as E104A; p/o E2706.	Blown fuse indicator.
E2706B		BODY, FUSEHOLDER: Same as E104B; p/o E2706.	Holds AC line fuse.
E2707		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2701. Figure 7-24
E2708		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2702. Figure 7-24
E2709		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2703. Figure 7-24
E2710		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2704. Figure 7-24
E2711		SHIELD, ELECTRON TUBE: Same as E110.	Shield for V2705. Figure 7-24
E2712		SHIELD, ELECTRON TUBE: Same as E112.	Shield for V2707. Figure 7-24
E2713		SHIELD, ELECTRON TUBE: Same as E11	Shield for V2708. Figure 7-24
E2714		TERMINAL BOARD: Same as E115.	Input and output sig- nal termination block. Figure 7-24
E2715	M-FFC	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; AEC part No. 7937-10.	Mounts component parts. Figures 7-25, 7-26
E2716	M-FFC	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; AEC part No. 7937-11.	Mounts component parts. Figures 7-25, 7-26
E2717	M-FFC	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; AEC part No. 7937-12.	Mounts component parts. Figures 7-25, 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
E2718	M-FFC	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; AEC part No. 7936-1.	Mounts component parts. Figures 7-25, 7-26
E2719	M-FFC	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; AEC part No. 7936-3.	Mounts component parts. Figures 7-25, 7-26
E2720	M-FFC	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; AEC part No. 7936-2.	Mounts component parts. Figures 7-25, 7-26
E2721	M-FFC	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; AEC part No. 7932.	Mounts component parts. Figures 7-25, 7-26
E2722		STUD, TERMINAL: Same as E116.	Mounts component parts.
E2723	M-FFC	TERMINAL BOARD: laminated phenolic; incl 8 solder lug term; w/o barriers; 2-7/8" lg x 2" wd x 29/64" h o/a; four 0.156" diam mtg holes on 1-3/8" x 2-1/2" mtg ctr marked with symbol designations; fungus and moisture proofed; AEC part No. 7940-2.	Mounts component parts. Figures 7-25, 7-26
F2701		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-25
F2702		FUSE, CARTRIDGE: Same as F101.	AC line fuse. Figure 7-25
F2703		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-24
F2704		FUSE, CARTRIDGE: Same as F101.	Spare AC line fuse. Figure 7-24
H2701		CLAMP, ELECTRICAL: Same as H101.	Clamp cable W2702 to connector P2703. Figure 7-24
H2702		CLAMP, ELECTRICAL: Same as H102.	Clamp for switch S2702. Figure 7-24
H2703		CLAMP, ELECTRICAL: Same as H103.	Clamps cable W2702 to E2714.
H2704		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.

NAVSHIPS 93109

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
H2705		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2706		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2707		BOLT, THUMB: Same as H104.	Secures front panel to cabinet.
H2708		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2709		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2710		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2711		RETAINER, BOLT: Same as H108.	Secures thumb bolt to front panel.
H2712		SLIDE, LEFT: Same as H112.	Supporting member on chassis for slides.
H2713		SLIDE, RIGHT: Same as H113.	Supporting member on chassis for slides.
H2714		SLIDE MOUNTING PLATE, LEFT: Same as H114.	Supporting member on cabinet for slides.
H2715		SLIDE MOUNTING PLATE, RIGHT: Same as H115.	Supporting member on cabinet for slides.
I2701		DELETED	
I2702		DELETED	
I2703		LIGHT, INDICATOR: Same as I103.	Figure 7-25
I2703A		LIGHT, INDICATOR: Same as I103A; p/o I1303.	Lamp assembly for E2703.
I2703B		LENS, INDICATOR LIGHT: Same as I103B; p/o I2703.	Lens for I2703A.
J2701		JACK, TELEPHONE: Same as J108.	3400 cyc TEST jack. Figure 7-24
J2702		JACK, TELEPHONE: Same as J108.	3400 cyc TEST jack. Figure 7-24
J2703		JACK, TELEPHONE: Same as J104.	OUT NORM-LINE jack. Figure 7-24

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
J2704		JACK, TELEPHONE: Same as J104.	OUT NORM-LINE jack. Figure 7-24
J2705		JACK, TELEPHONE: Same as J104.	OUT NORM-EQUIP jack. Figure 7-24
J2706		JACK, TELEPHONE: Same as J104.	OUT NORM-EQUIP jack. Figure 7-24
J2707		JACK, TELEPHONE: Same as J108.	OUT NORM-MONITOR jack. Figure 7-24
J2708		JACK, TELEPHONE: Same as J108.	OUT NORM-MONITOR jack. Figure 7-24
J2709		JACK, TELEPHONE: Same as J104.	IN-LINE jack. Figure 7-24
J2710		JACK, TELEPHONE: Same as J104.	IN-LINE jack. Figure 7-24
J2711		JACK, TELEPHONE: Same as J104.	IN-EQUIP jack. Figure 7-24
J2712		JACK, TELEPHONE: Same as J104.	IN-EQUIP jack. Figure 7-24
J2713		JACK, TELEPHONE: Same as J104.	OUT CONV-LINE jack. Figure 7-24
J2714		JACK, TELEPHONE: Same as J104.	OUT CONV-LINE jack. Figure 7-24
J2715		JACK, TELEPHONE: Same as J104.	OUT CONV-EQUIP jack. Figure 7-24
J2716		JACK, TELEPHONE: Same as J104.	OUT CONV-EQUIP jack. Figure 7-24
J2717		JACK, TELEPHONE: Same as J108.	OUT CONV-MONITOR jack. Figure 7-24
J2718		JACK, TELEPHONE: Same as J108.	OUT CONV-MONITOR jack. Figure 7-24
J2719		CONNECTOR, RECEPTACLE: Same as J111.	AC input power connector Figure 7-24

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
J2720		CONNECTOR, RECEPTACLE: Same as J110.	Input and output signal connector. Figure 7-24
L2701		CHOKE, RADIO FREQUENCY: Same as L2601.	RF filter choke. Figure 7-25
L2702		CHOKE, RADIO FREQUENCY: Same as L2601.	RF filter choke. Figure 7-25
L2703		REACTOR: Same as L101.	B+ power supply filter choke. Figures 7-24, 7-25
O2701		DELETED	
O2702		DELETED	
O2703		DELETED	
O2704		DELETED	
O2705		DELETED	
O2706		ROLLER: Same as O106.	Roller for chassis slide.
O2707		ROLLER: Same as O106.	Roller for chassis slide.
O2708		ROLLER: Same as O106.	Roller for chassis slide.
O2709		ROLLER: Same as O106.	Roller for chassis slide.
O2710		ROLLER: Same as O110.	Roller for chassis slide.
O2711		ROLLER: Same as O110.	Roller for chassis slide.
O2712		TILT PIN ASSEMBLY: Same as O112.	Locks chassis in upright position.
O2713		TILT PIN ASSEMBLY: Same as O112.	Locks chassis in upright position.
P2701		CONNECTOR, PLUG: Same as P101.	Input and output signal connector. Figure 7-24
P2702		CONNECTOR, PLUG: Same as P102.	AC power input connector. Figure 7-24
P2703		CONNECTOR, PLUG: Same as P103.	AC power input connector. Figure 7-24

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2701		RESISTOR, FIXED, COMPOSITION: Same as R109.	Voltage dropping resistor for grid of V2701A. Figure 7-26
R2702		RESISTOR, FIXED, COMPOSITION: Same as R120.	Cathode bias resistor for V2701A. Figure 7-26
R2703		RESISTOR, FIXED, COMPOSITION: Same as R120.	Cathode bias resistor for V2701B. Figure 7-26
R2704		RESISTOR, FIXED, COMPOSITION: Same as R115.	Plate load resistor for V2701B. Figure 7-26
R2705		RESISTOR, FIXED, COMPOSITION: Same as R2605.	Plate load resistor for V2701A. Figure 7-26
R2706		RESISTOR, FIXED, COMPOSITION: Same as R110.	Component of phase shift network for V2702A. Figure 7-26
R2707		RESISTOR, VARIABLE, COMPOSITION: Same as R2607.	Component of phase shift network for V2702A.
R2708		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702A. Figure 7-26
R2709		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702A. Figure 7-26
R2710		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702A. Figure 7-26
R2711		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias resistor for V2702B. Figure 7-26
R2712		RESISTOR, FIXED, COMPOSITION: Same as R116.	Component of phase shift network for V2702B. Figure 7-26
R2713		RESISTOR, VARIABLE, COMPOSITION: Same as R2607.	Component of phase shift network for V2702B. Figures 7-25, 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2714		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702B. Figure 7-26
R2715		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702B. Figure 7-26
R2716		RESISTOR, FIXED, COMPOSITION: Same as R2608.	Component of phase shift network for V2702B. Figure 7-26
R2717		RESISTOR, FIXED, COMPOSITION: Same as R2617.	Limiting resistor for grid of V2703A. Figure 7-26
R2718		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor for V2703A. Figure 7-26
R2719		RESISTOR, FIXED, COMPOSITION: Same as R102.	Plate load for V2703A. Figures 7-25, 7-26
R2720		RESISTOR, FIXED, COMPOSITION: Same as R115.	Voltage dropping resistor for V2701. Figure 7-26
R2721		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2707. Figure 7-26
R2722		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2708. Figure 7-26
R2723	P1FFC	RESISTOR, FIXED, COMPOSITION: 300,000 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF304J; Allen-Bradley part No. RC32GF304J; AEC part No. RC32GF304J.	Plate load resistor for V2704A. Figure 7-26
R2724		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias resistor for V2704A. Figure 7-26
R2725		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Grid leak resistor for V2704A. Figure 7-26
R2726		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load for V2704B. Figure 7-26
V2727		RESISTOR, FIXED, COMPOSITION: Same as R105.	Cathode bias resistor for V2704B. Figure 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2728		RESISTOR, VARIABLE, COMPOSITION: Same as R118.	Grid signal level potentiometer for V2704B. Figures 7-24, 7-25
R2729	P1FFC	RESISTOR, FIXED, COMPOSITION: 300 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" diam excl term; insul; govt spec MIL-R-11A, type No. RC32GF301J; Allen-Bradley part No. RC32GF301J; AEC part No. RC32GF301J.	Component of 600 ohm T-pad. Figure 7-26
R2730		RESISTOR, FIXED, COMPOSITION: Same as R2729.	Component of 600 ohm T-pad. Figure 7-26
R2731	P1FFC	RESISTOR, FIXED, COMPOSITION: 390 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF391J; Allen-Bradley part No. RC32GF391J; AEC part No. RC32GF391J.	Component of 600 ohm T-pad Figure 7-26
R2732		RESISTOR, FIXED, COMPOSITION: Same as R2644.	Component of 600 ohm T-pad. Figure 7-26
R2733		RESISTOR, FIXED, COMPOSITION: Same as R2644.	Component of 600 ohm T-pad. Figure 7-26
R2734		RESISTOR, FIXED, COMPOSITION: Same as R2646.	Component of 600 ohm T-pad. Figure 7-26
R2735		RESISTOR, FIXED, COMPOSITION: Same as R2644.	Component of 600 ohm T-pad. Figure 7-26
R2736		RESISTOR, FIXED, COMPOSITION: Same as R2644.	Component of 600 ohm T-pad. Figure 7-26
R2737		RESISTOR, FIXED, COMPOSITION: Same as R2646.	Component of 600 ohm T-pad. Figure 7-26
R2738		RESISTOR, VARIABLE, COMPOSITION: Same as R2647.	Grid signal level potentiometer for V2705A. Figures 7-24, 7-25
R2739		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias resistor for V2705A. Figure 7-26
R2740	P1FFC	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" excl term; govt spec MIL-R-11A, type No. RC32GF101J; Allen-Bradley part No. RC32GF101J; AEC part No. RC32GF101J.	Cathode bias resistor for V2705A. Figure 7-26

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2741		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load for V2705A. Figure 7-26
R2742		RESISTOR, FIXED, COMPOSITION: Same as R113.	Grid leak resistor for V2705B. Figure 7-26
R2743		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias resistor for V2705B. Figure 7-26
R2744		RESISTOR, FIXED, COMPOSITION: Same as R110.	Plate load for V2705B. Figure 7-26
R2745		RESISTOR, FIXED, COMPOSITION: Same as R1311.	Grid leak resistor for V2703B. Figure 7-26
R2746		RESISTOR, FIXED, COMPOSITION: Same as R2611.	Cathode bias and feedback resistor for V2703B. Figure 7-26
R2747	P1FFC	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 5\%$; 1 w; 9/16" lg x 7/32" diam excl term; govt spec MIL-R-11A, type No. RC32GF183J; Allen-Brodley part No. RC32GF183J; AEC part No. RC32GF183J.	Feedback resistor for plate of V2703B to V2705B. Figure 7-26
R2748		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2717. Figure 7-26
R2749		RESISTOR, FIXED, COMPOSITION: Same as R120.	Isolating resistor for J2718. Figure 7-26
R2750		RESISTOR, FIXED, WIRE WOUND: Same as R121.	Voltage dropping resistor for E2703. Figure 7-25
R2751	P1FFC	RESISTOR, FIXED, WIRE WOUND: inductive winding; 1600 ohms, $\pm 5\%$; 10 w; govt spec JAN-R-26A, type No. RW31G162; I. R. C. part No. RW31G162; AEC part No. RW31G162.	Voltage dividing resistor for B+ power supply. Figure 7-24
R2752		RESISTOR, FIXED, COMPOSITION: Same as R1336.	Voltage dividing resistor for B+ power supply. Figures 7-25, 7-26
R2753		RESISTOR, FIXED, WIRE WOUND: Same as R2664.	Voltage dividing resistor for B+ power supply. Figure 7-24

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
R2754		RESISTOR, FIXED, WIRE WOUND: Same as R1350.	Bleeder resistor for B+ power supply. Figures 7-25, 7-26
R2755		RESISTOR, VARIABLE, COMPOSITION: Same as R2668.	Signal level potentiometer for V2703A. Figures 7-24, 7-25
R2756		ATTENUATOR, VARIABLE: Same as R2669.	Adjusts level of input signal. Figures 7-24, 7-25
S2701		SWITCH, TOGGLE: Same as S103.	POWER ON-OFF switch.
S2702		SWITCH, TOGGLE: Same as S101.	115 v - 230 v switch. Figures 7-24, 7-25
T2701		TRANSFORMER, AUDIO FREQUENCY: Same as T102.	Plate to line matching transformer. Figures 7-24, 7-25
T2702		TRANSFORMER, AUDIO FREQUENCY: Same as T2605.	Line isolating transformer. Figures 7-24, 7-25
T2703		TRANSFORMER, AUDIO FREQUENCY: Same as T2601.	Modulation transformer. Figures 7-24, 7-25
T2704		TRANSFORMER, AUDIO FREQUENCY: Same as T2602.	600 ohm to grid matching transformer. Figures 7-24, 7-25
T2705		TRANSFORMER, AUDIO FREQUENCY: Same as T102.	Plate to line matching transformer. Figures 7-24, 7-25
T2706		TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: Same as T2604.	Power transformer. Figures 7-24, 7-25
V2701		ELECTRON TUBE: Same as V101.	102 kc oscillator. Figure 7-24
V2702		ELECTRON TUBE: Same as V1302.	V2702A: 20.4 kc phase shift oscillator. V2702B: 3400 cyc phase shift oscillator. Figure 7-24
V2703		ELECTRON TUBE: Same as V101.	V2703A: 3400 cyc carrier amplifier. V2703B: Output converted signal amplifier. Figure 7-24

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
V2704		ELECTRON TUBE: Same as V101.	Normal signal amplifier. Figure 7-24
V2705		ELECTRON TUBE: Same as V101.	V2705A: Converted signal amplifier. V2705B: Converted signal amplifier. Figure 7-24
V2706		DELETED	
V2707		ELECTRON TUBE: Same as V107.	Voltage regulator. Figure 7-24
V2708		ELECTRON TUBE: Same as V107.	Voltage regulator. Figure 7-24
W2701		CABLE ASSEMBLY, POWER, ELECTRICAL: Same as W101.	AC power input cable. Figure 7-24
W2701A		CABLE, BULK: Same as W101A.	Used with W2701.
W2702		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Same as W102.	Input and output signal cable. Figure 7-24
W2702A		CABLE, BULK: Same as W102A.	Used with W2702.
X2701		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V2701. Figure 7-25
X2702		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V2702. Figure 7-25
X2703		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V2703. Figure 7-25
X2704		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V2704. Figure 7-25
X2705		SOCKET, ELECTRON TUBE: Same as X101.	Socket for tube V2705. Figure 7-25
X2706		DELETED	
X2707		SOCKET, ELECTRON TUBE: Same as X102.	Socket for tube V2707. Figure 7-25
X2708		SOCKET, ELECTRON TUBE: Same as X102.	Socket for tube V2708. Figure 7-25

TABLE 8-3. TELEGRAPH CARRIER TERMINAL AN/FCC-3A & AN/FCC-7A,
MAINTENANCE PARTS LIST (CONT.)

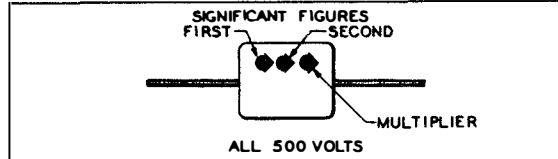
ELECTRONIC FREQUENCY CONVERTER CV-244A/FCC-3 (CONT.)

REF. DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
X2709		SOCKET, ELECTRON TUBE: Same as X110.	Socket for CR2701. Figure 7-25
X2710		SOCKET, CRYSTAL: Same as X2611.	Socket for Y2701. Figure 7-25
X2711		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2723. Figure 7-25
X2712		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2724. Figure 7-25
X2713		SOCKET, ELECTRON TUBE: Same as X110.	Socket for C2725. Figure 7-25
Y2701		CRYSTAL UNIT, QUARTZ: Same as Y2601.	Stabilizes 102 kc oscillator. Figure 7-25
Z2701		FILTER, BAND-PASS: Same as Z2601.	Filter 3,400 cyc oscillator frequency. Figures 7-24, 7-25
Z2702		FILTER, BAND-PASS: Same as Z2603.	Filters input signals to be converted. Figures 7-24, 7-25
Z2703	P1FFC	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 four No. 6-32 x 3/8" mtg studs on 3-1/2" x 1-7/8" mtg/c; Dietz Design & Mfg. part No. 1202; AEC part No. 7902.	Filters output converted signals. Figures 7-24, 7-25

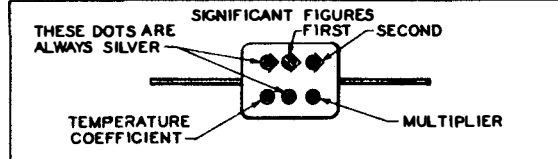
TABLE 8-4. COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

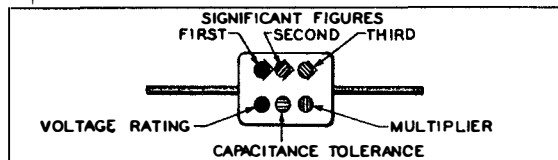
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



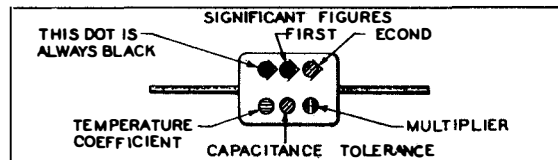
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



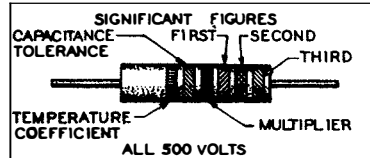
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



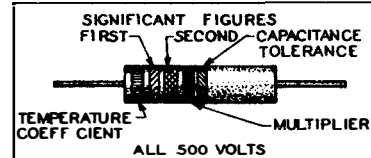
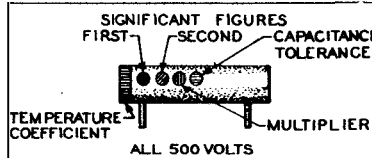
JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



JAN COLOR CODE FOR CERAMIC-DIELECTRIC CAPACITORS
RADIAL TYPE NON-INSULATED AXIAL TYPE INSULATED

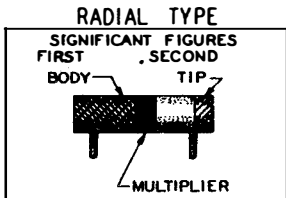
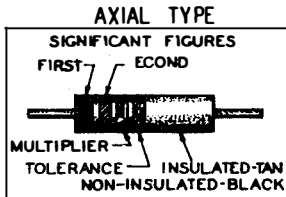


RMA: RADIO MANUFACTURERS ASSOCIATION JAN: JOINT ARMY-NAVY

RESISTORS			CAPACITORS				VOLTAGE RATING	TEMPERATURE COEFFICIENT
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	MULTIPLIER RMA MICA AND CERAMIC-DIELECTRIC	MULTIPLIER JAN MICA AND PAPER-DIELECTRIC	MULTIPLIER JAN CERAMIC DIELECTRIC		
	1	0	BLACK	1	1	1	A	
	10	1	BROWN	10	10	10	B	
	100	2	RED	100	100	100	C	
	1,000	3	ORANGE	1,000	1,000	1,000	D	
	10,000	4	YELLOW	10,000			E	
	100,000	5	GREEN	100,000			F	
	1,000,000	6	BLUE	1,000,000			G	
	10,000,000	7	VIOLET	10,000,000				
	100,000,000	8	GRAY	100,000,000		0.01		
	1,000,000,000	9	WHITE	1,000,000,000		0.1		
5	0.1		GOLD	0.1	0.1		1000	
10	0.01		SILVER	0.01	0.01		2000	
20			NO COLOR				500	

RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

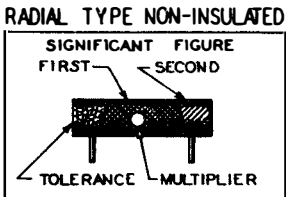
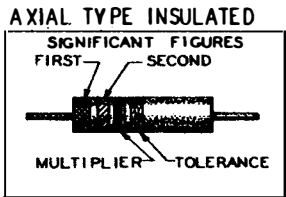


TABLE 8-5. TELEGRAPH CARRIER TERMINAL AN/FCC-3A, LIST OF MANUFACTURERS

ABBREVIATION	NAME	ADDRESS
Aermotive	Aermotive Equipment Corp.....	1632 Central, Kansas City, Mo.
AH & H	Arrow - Hart & Hageman.....	103 Hawthorn Street, Hartford 6, Connecticut
Allen - Bradley	Allen - Bradley Co.....	136 W. Greenfield Ave. Milwaukee, Wisconsin
Amphenol.....	American Phenolic Corp.....	1830 South 54th Ave., Chicago, Ill.
Belden	Belden Manufacturing Co.	4647 West Van Buren, Chicago, Ill.
Buss	Bussman Manufacturing Co.	2538 W. University St., St. Louis, Mo.
Cambridge Thermionic.	Cambridge Thermionic Corp.	445 Concord Avenue, Cambridge, Mass.
Cannon	Cannon Electric Co.	3209 Humboldt St., Los Angeles, Calif.
Centralab.....	Central Radio Laboratory..... (Div. Globe Union, Inc.)	900 E. Keefe Ave., Milwaukee, Wisc.
Daven	Daven Electric Co.	160 Summit St. at Newman, Newark, N. J.
Dietz.....	Dietz Design & Mfg. Co.....	Grandview, Missouri
Drake	Drake Mfg. Co.	1713 W. Hubbard St., Chicago, Ill.
Electronic Mechanics ..	Electronic Mechanics Co.....	101 Clifton Blvd., Clifton, N. J.
Fahnestock.....	Fahnestock Electric Co.	46-44 Eleventh St., Long Island City, New York
G F	General Electric Co.	Schenectady 5, New York
Hubbell.....	Harvey Hubbell	State & Thomas Streets Bridgeport, Connecticut
Insuline	Insuline Corp.	Long Island City, New York
I R C.....	International Resistor Corp.	401 N. Broadstreet, Philadelphia, Pa.
Johnson	Johnson, E. F. Co.	Waseca, Minnesota
Kulka	Kulka Electric Mfg. Corp.....	Mount Vernon, N. Y.
Mallory	P. R. Mallory Co.	Indianapolis 6, Indiana
Micamold	Micamold Electronics Mfg.	1087 Flushing Ave., Brooklyn 37, N. Y.
Miller.....	Miller, J. W. Co.	5915 S. Main St., Los Angeles 3, Calif.
Ohmite	Ohmite Mfg. Co.	4835 W. Flourney, Chicago, Ill.
Pyramid	Pyramid Electric Co.	1445 Hudson Blvd., North Bergen, N. J.
Sangamo	Sangamo Electric	Converse & Burton Sts., Springfield, Illinois
Standard.....	Standard Crystal	1714 Locust St., Kansas City, Mo.
Sylvania	Sylvania Electric Products, Inc. ...	Emporium, Pennsylvania
Torrington	Torrington Mfg. Co.	Torrington, Connecticut
Trico	Trico Fuse Mfg. Co.....	Milwaukee, Wisconsin
Universal	Universal Electric	205 W. Rio Grande, Colorado Springs, Colorado
Ward Leonard.....	Ward Leonard.....	6 South Street, Mount Vernon, N. Y.



INDEX

SUBJECT	FIGURE OR TABLE	APPENDIX SECTION	PARAGRAPH
A			
Adjustments —			
bias, transmitter .....	.....	2	2-2c
checking and setting transmitter frequencies .....	.....	3	3-3d
initial .....	.....	3	3-3
MARK and SPACE frequencies - transmitter .....	.....	2	2-2d
preliminary testing of receiver .....	.....	3	3-3f
receivers in diversity .....	.....	2	2-3b
setting output levels of transmitter .....	.....	3	3-3c
B			
Bias adjustment - transmitter .....	.....	2	2-2c
C			
Cabinet CY-1195A/FCC-3 —			
circuits .....	.....	2	2-6
identification	1-6	1	.....
schematic diagram	7-29	7	.....
wiring diagram of power circuits	3-5	3	.....
wiring in rear of	3-4	3	.....
Channel frequencies —			
diversity	2-1	2	.....
major unit	1-4	1	.....
Control positions	3-1	3	.....
Color codes	8-4	8	.....
D			
Description —			
of circuits - general .....	.....	2	2-1
of units - general .....	.....	1	1-3a
Discriminator level control - use .....	.....	2	2-3b
E			
Electronic Frequency Converter CV-243A/FCC-3 —			
amplifier .....	.....	2	2-4d
basic circuits - general .....	.....	2	2-4a
block diagram	2-16	2	.....
bottom view of chassis	7-18	7	.....
components location - terminal boards	7-19, 7-20	7	.....
description .....	.....	1	1-3d
identification	1-4	1	.....
identification of controls	4-2	4	.....
modulator and filter circuits .....	.....	2	2-4c
operation of .....	.....	4	4-3
oscillator and divider circuits .....	.....	2	2-4b
power supply circuits .....	.....	2	2-4e
schematic - amplifier	2-19	2	.....
schematic diagram	7-21	7	.....
schematic - modulator and filter circuits	2-18	2	.....
schematic - oscillator and divider circuits	2-17	2	.....
schematic - power supply circuits	2-20	2	.....
servicing block diagram	7-3	7	.....

SUBJECT	FIGURE OR TABLE	OR APPENDIX SECTION	PARAGRAPH
setting the output signal level .....	.....	3	3-3c
top view of chassis	7-17	7	.....
trouble shooting —			
chart - trouble tracing	7-4	7	.....
locking oscillator - adjustments .....	.....	7	7-6b
general .....	.....	7	7-6a
voltage and resistance chart	7-16	7	.....
wiring diagram	7-22	7	.....
Electronic Frequency Converter CV-244A/FCC-3 —			
basic circuits - general .....	.....	2	2-5a
block diagram	2-21	2	.....
converted amplifier circuit .....	.....	2	2-5e
description .....	.....	1	1-3e
identification	1-5	1	.....
identification of controls	4-4	4	.....
modulator and filter circuits .....	.....	2	2-5c
normal amplifier circuit .....	.....	2	2-5d
operation of .....	.....	4	4-5
oscillator and divider circuits .....	.....	2	2-5b
power supply circuit .....	.....	2	2-5f
schematic - converted signal amplifier	2-23	2	.....
schematic diagram	7-27	7	.....
schematic - normal line amplifier	2-22	2	.....
servicing block diagram	7-3	7	.....
trouble shooting —			
bottom view of chassis	7-25	7	.....
chart - trouble tracing	7-5	7	.....
components location - terminal boards	7-26	7	.....
general .....	.....	7	7-7a
locking oscillator adjustments .....	.....	7	7-7b
signal level adjustments .....	.....	7	7-7c
top view of chassis	7-24	7	.....
voltage and resistance chart	7-23	7	.....
wiring diagram	7-28	7	.....
Equipment —			
similarities —			
terminal AN/FCC-7A .....	.....	1	1-3i
supplied	1-3	1	.....
unpacking of .....	.....	3	3-1
F			
Filters —			
characteristic curves —			
electronic frequency converters	2-26	2	.....
installation and removal .....	.....	3	3-2c
telegraph carrier receiver	2-25	2	.....
telegraph carrier transmitter	2-24	2	.....
general .....	.....	2	2-7
receiver .....	.....	1	1-3h
receiver, designations	1-6	1	.....
transmitter .....	.....	1	1-3g
transmitter, designations	1-5	1	.....
Failure Report	7-1	7	.....
I			
Installation —			
filter sets .....	.....	3	3-2c
general .....	.....	3	3-2a
receivers in diversity .....	.....	3	3-3f(2)
removal or replacement of unit in cabinet .....	.....	3	3-2a
slide operation	3-3	3	.....
space required - cabinet dimensions	3-2	3	.....
transmitters in diversity .....	.....	3	3-3f(1)

SUBJECT	FIGURE OR TABLE	APPENDIX SECTION	PARAGRAPH
unit positions	1-1	1	.....
wiring .....	.....	3	3-3b
Interchangeable units	5-2	5	.....
L			
Long loop cables —			
effect on keying .....	.....	4	4-6a
general information .....	.....	4	4-6c
methods of improving keying .....	.....	4	4-6b
Lubrication .....	.....	6	6-3
List of manufacturers	8-6	8	.....
List of major units	8-1	8	.....
List of major units by colloquial name	8-2	8	.....
M			
Maintenance —			
corrective —			
trouble shooting the converter CV-243A .....	.....	7	7-6
trouble shooting the converter CV-244A .....	.....	7	7-7
trouble shooting the receiver .....	.....	7	7-5
trouble shooting the system .....	.....	7	7-3
trouble shooting the transmitter .....	.....	7	7-4
emergency .....	.....	5	5-2
operators routine check	5-1	5	.....
preventive —			
cleaning equipment .....	.....	6	6-1
lubrication .....	.....	6	6-3
routine maintenance check charts	6-1	6	.....
unit removed from cabinet	5-1	5	.....
Major units - list of	8-1	8	.....
Manufacturers - list of	8-5	8	.....
N			
Normal signal operating levels	3-2	3	3-3g
O			
Operation —			
electronic frequency converter CV-243A .....	.....	4	4-3
electronic frequency converter CV-244A .....	.....	4	4-5
general .....	.....	4	4-1
summary .....	.....	4	4-7
telegraph carrier receiver .....	.....	4	4-4
telegraph carrier transmitter .....	.....	4	4-2
P			
Purpose and basic principles .....	.....	1	1-2
Parts —			
maintenance list	8-3	8	.....
R			
Reference data .....	.....	1	1-4
Resistor and capacitor color codes	8-4	8	.....
Resistance measurements .....	.....	
electronic frequency converter CV-243A	7-16	7	.....
electronic frequency converter CV-244A	7-23	7	.....
telegraph carrier receiver	7-10	7	.....
telegraph carrier transmitter	7-4	7	.....

SUBJECT	FIGURE OR TABLE	APPENDIX SECTION	PARAGRAPH
S			
Schematic diagrams —			
electronic frequency converter CV-243A/FCC-3	7-21	7	.....
electronic frequency converter CV-244A/FCC-3	7-28	7	.....
telegraph carrier receiver	7-14	7	.....
telegraph carrier transmitter	7-8	7	.....
telegraph carrier terminal cabinet.....	7-29	7	.....
Servicing block diagram —			
electronic frequency converter CV-243A	7-3	7	.....
electronic frequency converter CV-244A	7-3	7	.....
telegraph carrier receiver	7-2	7	.....
telegraph carrier transmitter	7-2	7	.....
Slide operation	3-3	3	.....
Starting the equipment .....	.....	3	3-3b
System trouble shooting chart.....	7-1	7	.....
System trouble shooting .....	.....	7	7-3
T			
Technical Summary	1-7	1	.....
Test Equipment	7-6	7	.....
Telegraph Carrier Receiver —			
basic circuits - general .....	.....	2	2-3a
block diagram	2-8	2	.....
block diagram - diversity operation	2-9	2	.....
bottom view of chassis	7-12	7	.....
components location	7-13	7	.....
DC amplifier and inverter circuits.....	.....	2	2-3c
description .....	.....	1	1-3e
discriminator and diversity combining circuits .....	.....	2	2-3d
diversity operation .....	.....	2	2-3b
identification of controls.....	4-3	4	.....
identification of unit.....	1-3	1	.....
limiting amplifier .....	.....	2	2-3c
operation of .....	.....	4	4-4
output keyer circuit .....	.....	2	2-3f
power supply circuit .....	.....	2	2-3g
preliminary testing.....	.....	3	3-3f
schematic - DC amplifier and inverter circuits.....	2-12	2	.....
schematic - discriminator and diversity combining circuits.....	2-11	2	.....
schematic - limiting amplifier	2-10	2	.....
schematic - output keyer circuit for neutral telegraph loop	2-13	2	.....
schematic - output keyer circuit terminal strapping variations	2-14	2	.....
schematic - power supply circuit	2-15	2	.....
schematic diagram	7-14	7	.....
servicing block diagram	7-2	7	.....
top view of chassis.....	7-11	7	.....
trouble shooting —			
chart - trouble tracing	7-3	7	.....
general.....	.....	7	7-5a
telegraph bias adjustment .....	.....	7	7-5b
voltage and resistance chart.....	7-10	7	.....
wiring diagram	7-15	7	.....
Telegraph Carrier Terminal —			
basic principles .....	.....	1	1-2
block diagram - two equipments	2-2	2	.....
block diagram - single equipment.....	2-1	2	.....
description of circuits.....	.....	2	2-1
description of units .....	.....	1	1-3a
Telegraph Carrier Terminal AN/FCC-7A .....	.....	1	1-3i
Telegraph Carrier Transmitter —			
basic circuits - general .....	.....	2	2-2a
bias adjustment.....	.....	2	2-2c
block diagram	2-3	2	.....

SUBJECT	FIGURE OR TABLE	APPENDIX SECTION	PARAGRAPH
bottom view of chassis.....	7-6	7	.....
carrier oscillator and output circuit .....	.....	2	2-2d
checking and setting frequencies .....	.....	3	3-3d
components location - terminal boards	7-7	7	.....
DC amplifier .....	.....	2	2-2c
description.....	.....	1	1-3b
identification of controls.....	4-1	4	.....
identification of unit.....	1-2	1	.....
loop oscillator circuit .....	.....	2	2-2b
MARK and SPACE frequency adjustment.....	.....	2	2-2d
operation of .....	.....	4	4-2
power supply circuit .....	.....	2	2-2e
schematic - carrier oscillator and output	2-6	2	.....
schematic diagram	7-8	7	.....
schematic - DC amplifier circuit	2-5	2	.....
schematic - loop oscillator circuit.....	2-4	2	.....
schematic - power supply.....	2-7	2	.....
servicing block diagram	7-2	7	.....
setting output levels .....	.....	3	3-3c
setting the bias control .....	.....	3	3-3e
trouble shooting —			
chart - trouble tracing.....	7-2	7	.....
general .....	.....	7	7-4a
signal level control.....	.....	7	7-7c
telegraph bias adjustment capacitors .....	.....	7	7-4b
top view of chassis.....	7-5	7	.....
voltage and resistance chart.....	7-4	7	.....
wiring diagram	7-9	7	.....
Transformer winding data	7-9	7	.....
Tubes —			
characteristics	7-8	7	.....
complement	1-2	1	.....
operating voltages and currents	7-7	7	.....
Tube characteristics.....	7-8	7	.....
Tube operating voltages and currents	7-7	7	.....
U			
Unpacking .....	.....	3	3-1
V			
Vacuum tube designation	1-1	1	.....
Vacuum tube complement.....	1-2	1	.....
W			
Weights and dimensions - equipment.....	3-2	3	.....
Wiring Diagrams —			
electronic frequency converter CV-243A	7-22	7	.....
electronic frequency converter CV-244A	7-28	7	.....
telegraph carrier receiver.....	7-15	7	.....
telegraph carrier terminal cabinet.....	3-5	3	.....
telegraph carrier transmitter	7-9	7	.....

