

TM 11-5895-288-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL

COMMUNICATIONS CENTRAL
AN/TSC-20



HEADQUARTERS, DEPARTMENT OF THE ARMY
5 JANUARY 1962

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working near the power supply circuits or on the 115-volt ac line connections. Be careful when working near the transmitting antenna or the transmitting antenna terminals; high radio-frequency voltages exist at these points.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING UNITS:

Generator Set, Electrical, Portable, Gasoline Engine Driven Model CE-105-AC/WK8	10 kw
Transmitting Set, Radio AN/FRT-53	3,000 volts
Converter, Single, Sideband CV-157/URR	1,000 volts
Receiver, Radio R-390/URR	570 volts
Radio Set AN/TRC-47	345 volts

WARNING

VENTILATION IS REQUIRED

The shelter must be ventilated when occupied. When the equipment is operating, be sure that either the air conditioner vents are open and the air conditioner is operating, or that the door of the shelter is open.

COMMUNICATIONS CENTRAL AN/TSC-20

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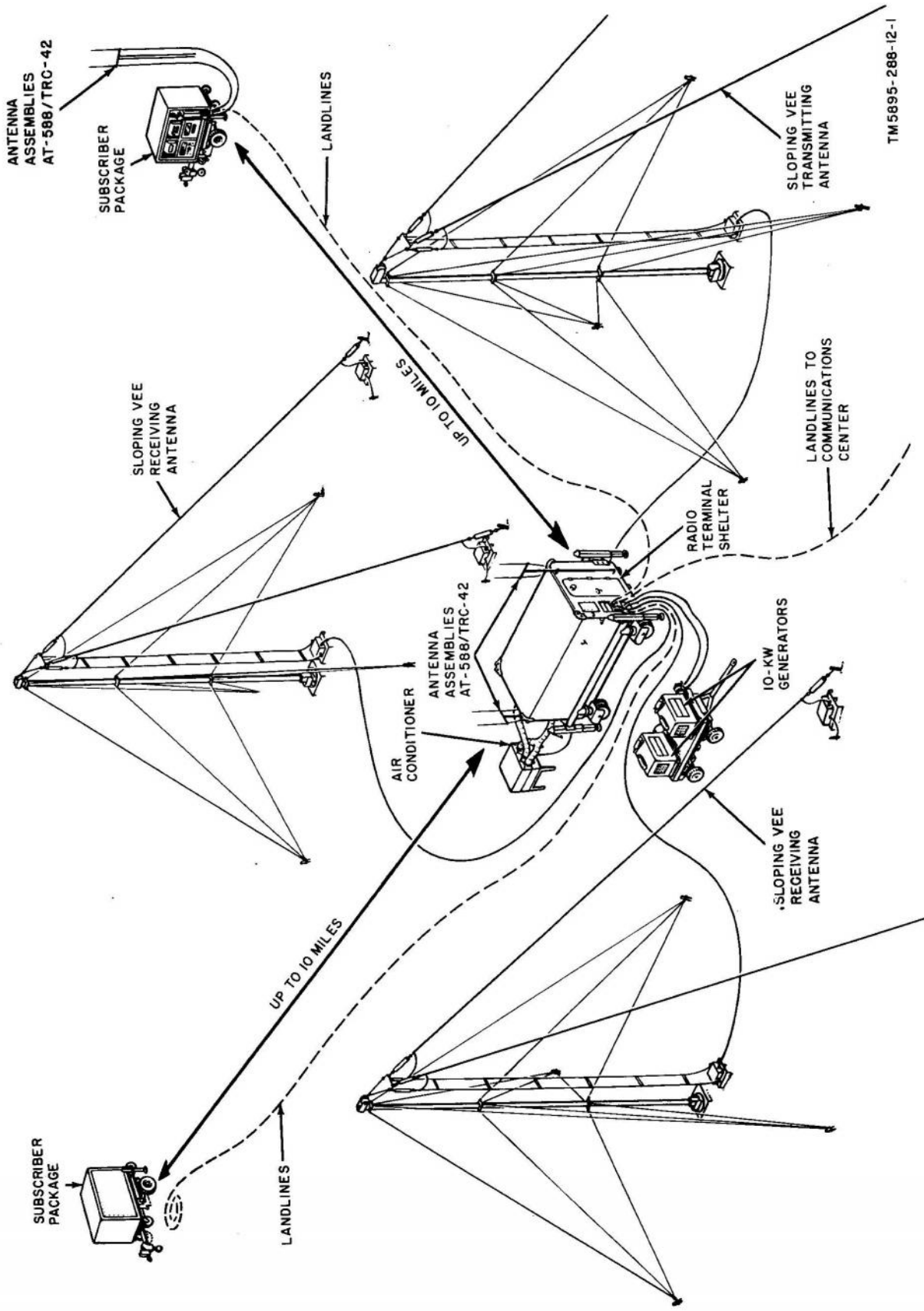


Figure 1. Communications Central AN/TSC-20.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Communication Central AN/TSC-20 (fig. 1) and covers its installation, operation, operator's and second echelon maintenance. It includes operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available at first and second echelon. This manual contains detailed information on the following components:

- (1) Control relay panel No. 1.
- (2) Control relay panel No. 2.
- (3) Current limiter panel.
- (4) Meter panel.
- (5) Combined function panel.
- (6) Hybrid unit.
- (7) Transfer switch.
- (8) Multiple repeat panel.
- (9) Alarm unit.
- (10) Subscriber power supply.
- (11) Black patch panel.
- (12) Audio patch panel No. 1.
- (13) Audio patch panel No. 2.
- (14) Red patch panel.
- (15) Audio-dc patch panel.
- (16) Antenna patch panel.
- (17) Heater.
- (18) RAC-30A coupler.
- (19) TRC-500 coupler.
- (20) TDR-002.5 terminators.
- (21) RTB-5 terminators.
- (22) Fan housings.
- (23) Portable milliammeters.
- (24) Dual speaker and amplifier panel.
- (25) Shelter dolly.
- (26) Subscriber package trailer.
- (27) Generator air conditioner trailer.
- (28) Standing wave ratio Meter SWR-1K.
- (29) Air conditioner modification.
- (30) Subscriber alarm unit.

b. Detailed information pertaining to the remainder of the major components comprising the AN/TSC-20 is contained in the technical manuals and commercial man-

uals listed in appendix I. The table of components is included in appendix II.

2. Forms and Records

a. *Unsatisfactory Equipment Reports.*

- (1) Fill out and forward DD Form 787-1 (Electronic Failure Report — Signal Equipment) as specified in AR 700-39, for Communications Security Equipment TSEC/KW-26.
- (2) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) as specified in AR 700-38, for all other equipments.

b. *Report of Damaged or Improper Shipment.* Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58.

c. *Preventive Maintenance Forms.* For components covered in their own technical manuals, prepare preventive maintenance forms as directed in such manuals (appx I). For all other components, prepare DA Form 11-238 (fig. 59 and 60) (Maintenance Check List for Signal Equipment (Sound Equipment, Radio, Direction Finding, Radar, Radiosonde and Television)), in accordance with instructions on page one of the form.

d. *Parts List Forms.* Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J., with comments on parts listings.

e. *Index of Equipment Publications.* Refer to DA Pamphlet 310-4 to determine what changes to or revisions of this publication are current.

f. *Comments on Manual.* Forward all comments on this publication direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N. J.

Section II. DATA

3. Purpose and Use

a. Communications Central AN/TSC-20 (fig. 1) is a vehicular and air transportable, 1-kilowatt (kw), independent sideband (isb) radio teletypewriter facility capable of simultaneous transmission and reception of voice and teletypewriter signals in the 2.0- to 32.0- megacycle (mc) frequency range. Two identical subscriber packages, each containing telephone, very high frequency (vhf) radio, teletypewriter and communications security equipment, provide access to the long haul radio facilities of the radio terminal shelter from distances up to 10 miles.

b. The AN/TSC-20 is used to provide access to the worldwide STARCOM network for the commander of a tactical striking force.

4. Technical Characteristics, Communications Central AN/TSC-20

The technical characteristics of the overall system are listed below. The high frequency (hf) radio terminal and subscriber packages are covered in paragraphs 5 and 6. Generator Set, Electric Portable Gasoline Engine Driven Model CE-105-AC/WK8 is covered in paragraph 7.

Number of vf channels.....	4.
Number of teletypewriter channels (on one of the vf channels)	8 maximum.
Transmission range	2,500 miles (approx).
Transmission range between radio terminal shelter and each subscriber package	10 miles (approx).
Number of channels between radio terminal shelter and each subscriber package	1 speech plus teletypewriter, full duplex.

Weights:

S-141/G (loaded) without dolly assembly and security equipment	9,160 lb.
Dolly assembly	880 lb.
Radio terminal shelter TSEC/KW-26 (2 units)....	375 lb.
Radio terminal shelter TSEC/KW-9 (4 units)	212 lb.
Subscriber package (each without security equipment).....	760 lb.

Subscriber package TSEC/KW-9 (2 units).....	106 lb.
Two-wheel trailer (each) ...	380 lb.
Four-wheel trailer (loaded).....	5,060 lb.
Four-wheel trailer	1,260 lb.
Air conditioner	750 lb.
10-kw generators (each) ...	1,425 lb.
Air conditioner mounting stand.....	100 lb.
Cable reel.....	75 lb.
Sling assembly.....	25 lb.
Total.....	18,179 lb.

5. Technical Characteristics Radio Terminal Shelter

a. Power Requirements.

Technical load	7.5 kw.
Utility load.....	8 kw.
Voltage	120 or 208 volts ac.
Frequency	60 cps.
Phase	3.

b. Transmitting.

Frequency range.....	2.0 to 32.0 mc.
Power output	1 kw rf (pep).
Type of transmission	Independent sideband.
Modulation	Am, suppressed carrier.
Antennas.....	Doublet or sloping-vee.
Output impedance	52 ohms unbalanced.

c. Receiving.

Frequency range	0.5 to 32.0 mc.
Types of signals received	Modulated cw (A2), voice (A3), isb (A9).
Antennas	2 double-doublets or 2 sloping-vees.
Input impedance	125 ohms balanced.

d. Communications Link to Subscriber Packages.

(1) Radio.

Number of channels	2 (1 send and 1 receive).
Frequency range	132 to 150 mc.
Type of modulation	Am.
Transmitted carrier output power	7 watts, continuous duty.
Output impedance (transmitter).....	52 ohms, unbalanced.
Input impedance (receiver).....	52 ohms, unbalanced.
Antenna	AT-588/TRC-42.

(2) Landline.

Type	Field wire or spiral-four cable.
No. of circuits	2 (1 send and 1 receive).
Type of circuits	Speech plus teletypewriter.

6. Technical Characteristics, Subscriber Package

a. Power Requirements.

Consumption	1,186 watts.
Voltage	120 volts ac.
Frequency	60 cps.
Phase	Single.

b. Communications Link to Radio Terminal Shelter.

Same as paragraph 5d. above.

7. Technical Characteristics, Generator Set, Electric Portable Gasoline Engine Driven Model CE-105-AC/WK8

Output voltage	120/208 volts ac.
Frequency	60 cps.
Power	10 kw.
Phase	3.
Fuel	Gasoline.

8. Equipment Modifications

a. *General.* Some operating and test equipment has been modified by substituting polarized plugs for the standard two-prong plugs on the power cords. All rack-mounted equipment has been modified by the addition of rack slides.

b. *Radio Set AN/TRC-47* (TM 11-212-10). Antenna Assembly AT-588/TRC-42 is used in place of Antenna AS-813/TRC-47. The equipment is mounted in a rack instead of in Electrical Equipment Cabinet CY-2126/TRC-47. Converter, Telephone Telegraph Signal CV-1170/G (VPT-1), (TM

11-5805-322-12, is used in place of Telephone Signal Converter CV-542/TRC-47.

c. *Telephone Sets TA-43/PT and TA-312/PT.* Telephone Set Case CY-1277/PT of the TA-43/PT (TM 11-337) and Telephone Set Case CY-1277A/PT of the TA-312/PT (TM 11-2155) are not used. The TA-312/PT and TA-43/PT's are mounted in specially fabricated brackets.

d. *Teletypewriter Set AN/FGC-25X.* Table FN-65/FG is not used in the AN/TSC-20. The TT-178A/FG and the TT-119A/FG of the AN/FGC-25X (TM 11-5815-244-12) are mounted in racks. A terminal board has been mounted at the rear of the TT-178A/FG to facilitate the transmitter-distributor clutch modification (fig. 76).

e. *Air Conditioner.* The air conditioner is modified by changing the power wiring to the compressors. Each compressor is now separately controlled by circuit breakers CB9 and CB10 in the radio terminal shelter.

9. Common Names

a. Throughout this manual, Converter, Telephone-Telegraph Signal CV-1170/G is referred to as the VPT-1.

b. The components of the AN/TSC-20 to which common names are assigned are listed below.

Item	Common name
Shelter, Electrical Equipment S-141/G (modified) with equipment installed	Radio terminal shelter
Tone keyer shelf, Type 221, Model 2 -----	Tone keyer shelf
Tone keyer, Type 211, Model 1 -----	Tone keyer
Tone converter shelf, Type 222, Model 2 -----	Tone converter shelf
Tone converter, Type 212, Model 2 -----	Tone converter
Diversity combiner, Type 234, Model 1 -----	Diversity combiner
Multiplexer, Type 248, Model 1 -----	Multiplexer
Demultiplexer, Type 249, Model 1 -----	Demultiplexer
Multiplexer and demultiplexer shelf, Type 250, Model 1:	
With multiplexers mounted -----	Multiplexer shelf
With demultiplexers mounted -----	Demultiplexer shelf
Line battery power supply panel, Type 227, Model 1 -----	Line battery power supply panel
Line battery power supply, Type 228, Model 1 -----	Line battery power supply
Automatic power supply control unit, Type NRC-690 -----	Control unit
Power supply, Type 223, Model 1 -----	Power supply
Telephone line isolation unit, Type NRC-693 -----	Isolation unit
Generator set, electric portable, gasoline engine driven Model CE-105-AC/WK8.	10-kw generator
Air conditioner, self-contained, air-cooled, Model F-6B-CE-----	Air conditioner

10. Additional Equipment Required

The following equipment required for

normal operation is not supplied with the AN/TSC-20.

Quantity	Equipment	Function
4 ea	3/4 in. x 3 ft, galvanized pipe or copper tubing and mounting hardware.	For use as a mast for Antenna Assemblies AT-588/TRC-42 (two required at each subscriber package).
2 ea	Power cable (approx 50 ft) capable of handling 115 volts ac at 12 amperes.	Power input cable for each subscriber package.
2 ea	Male plugs -----	For use on power cable.
4 sets	Crystals for assigned operating frequencies -----	Used with Radio Set AN/TRC-47.
12 ea	Battery BA-30 -----	Used with Telephone Sets TA-43/PT and TA-312/PT.

Section III. DESCRIPTION OF RADIO TERMINAL SHELTER

11. Shelter, Electrical Equipment S-141/G (Modified)

a. *General.* The shelter (fig. 2 and 3) is approximately 11 feet long, 6 feet wide, and 6 feet high. It weighs approximately 1,200 pounds empty and is fully insulated. The shelter may be transported on the dolly assembly shown in figures 2 and 3 or by helicopter or fixed-wing aircraft. The dolly assembly may be removed, and the shelter transported by truck. Signal and power wiring is distributed throughout the shelter by wiring raceways. All signal and input power connections are made at the power or signal entrance boxes on the exterior front wall. Figure 4 is an elevation drawing showing the inside of the shelter with equipment in place.

b. *Signal Entrance Box.* The signal entrance box (fig. 3) contains four pairs of binding posts for landline connections between the radio terminal shelter and the subscriber packages and sixteen pairs of binding posts for landline connections to a communications center or to additional subscribers. Four radiofrequency (rf) connectors are used for vhf antennas and two rf connectors for diversity receiving antennas. The hf transmitting antenna entrance box (fig. 2) contains two rf connectors for the hf transmitting antennas.

c. *Power.* Alternating current (ac) power from the 10-kw generators is connected at the power entrance box (fig. 3). The power control and distribution panel

(C, fig. 4) controls power to all tributary circuits in the radio terminal shelter. Power for the external air conditioner is obtained from a receptacle on the air conditioner power output box (fig. 2).

d. *Lighting.* Ten tubular shaded incandescent lamps and two spotlights provide general shelter illumination. A trouble light provides additional light for maintenance and troubleshooting. A BLACKOUT switch (fig. 5) provides shelter lighting control under blackout conditions.

e. *Dolly Assembly.* The dolly assembly consists of a right side assembly, a left side assembly, a removable tow bar, and four leveling jacks. Each side assembly consists of a longitudinal tube and two caster assemblies. A turning bar is mounted on each longitudinal tube. The turning bars are used to turn the caster assemblies to change the direction of the radio terminal shelter during positioning.

12. Transmitting Set, Radio AN/FRT-25 (fig. 6)

The AN/FRT-53 is a 1,000-watt peak envelope power (pep) transmitter used to transmit independent sideband signals. It consists of Transmitting Mode Selector SBE, Variable Frequency Oscillator VOX-5, Linear Power Amplifier PAL-1K, and Auxiliary Power Panel APP-4. AN/FRT-53 No. 1, mounted in rack 402, is used as the main transmitter; AN/FRT-53 No. 2, also mounted in rack 402, is the standby

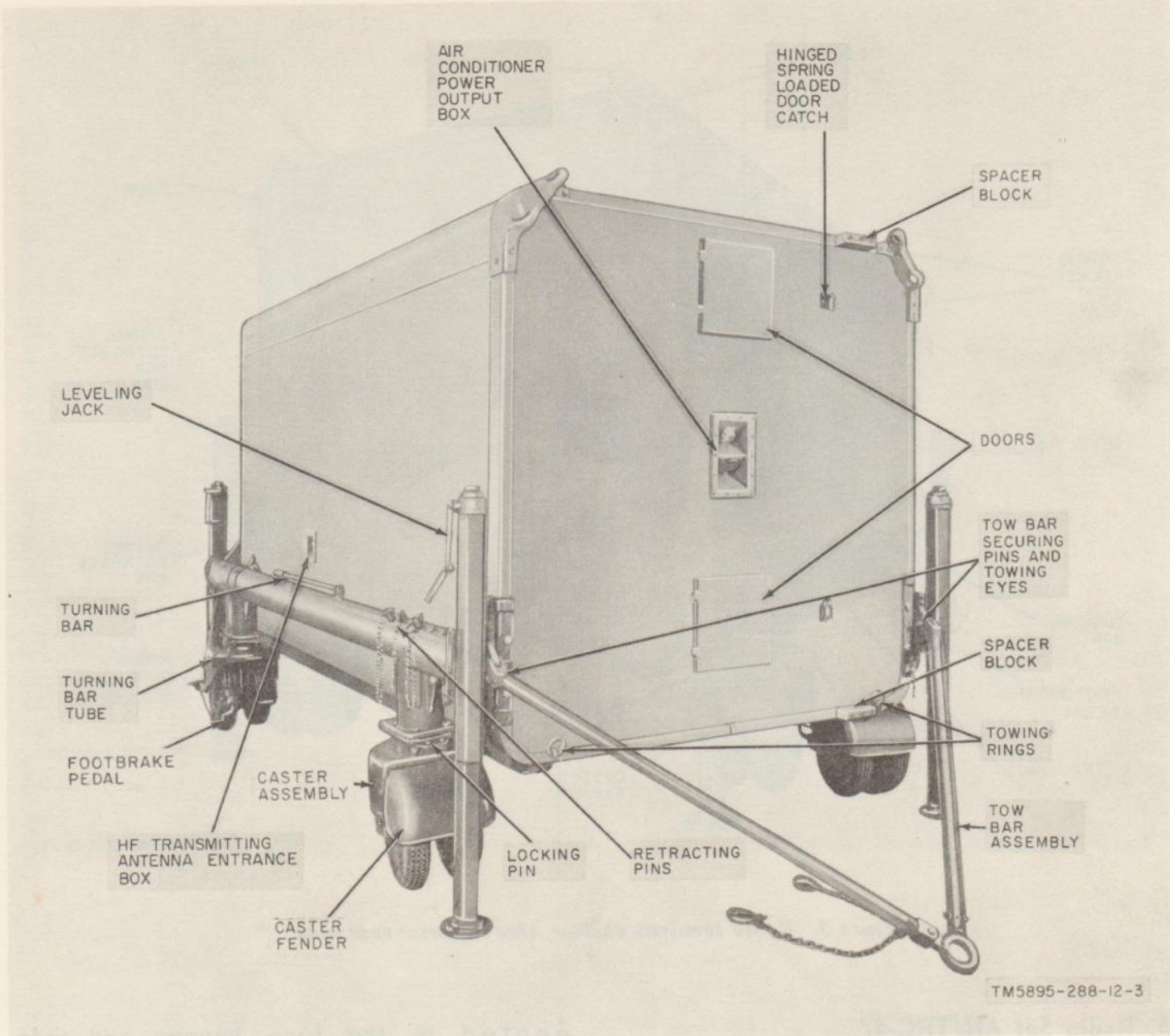


Figure 2. Radio terminal shelter and dolly assembly, three-quarter front view.

unit. Refer to the commercial manual for a detailed description of the AN/FRT-53.

13. Standing Wave Ratio Meter SWR-1K
(A, fig. 4)

The SWR-1K provides direct readings of standing wave ratio (swr). It is mounted in rack 403 and is used to measure the forward and reflected power of the AN/FRT-53. Refer to the commercial manual for a detailed description of the SWR-1K.

14. Converter, Telephone-Telegraph Signal CV-1170/G (Formerly, Terminal Telegraph Telephone (Voice Plus Telegraph Terminal, Stelma Model VPT-1))
(fig. 6)

The VPT-1 unit is mounted in rack 403 and can provide speech-plus-teletypewriter terminal facilities. It is used between the radio terminal shelter and each subscriber package. Refer to TM 11-5805-322-12 for a detailed description of the VPT-1.

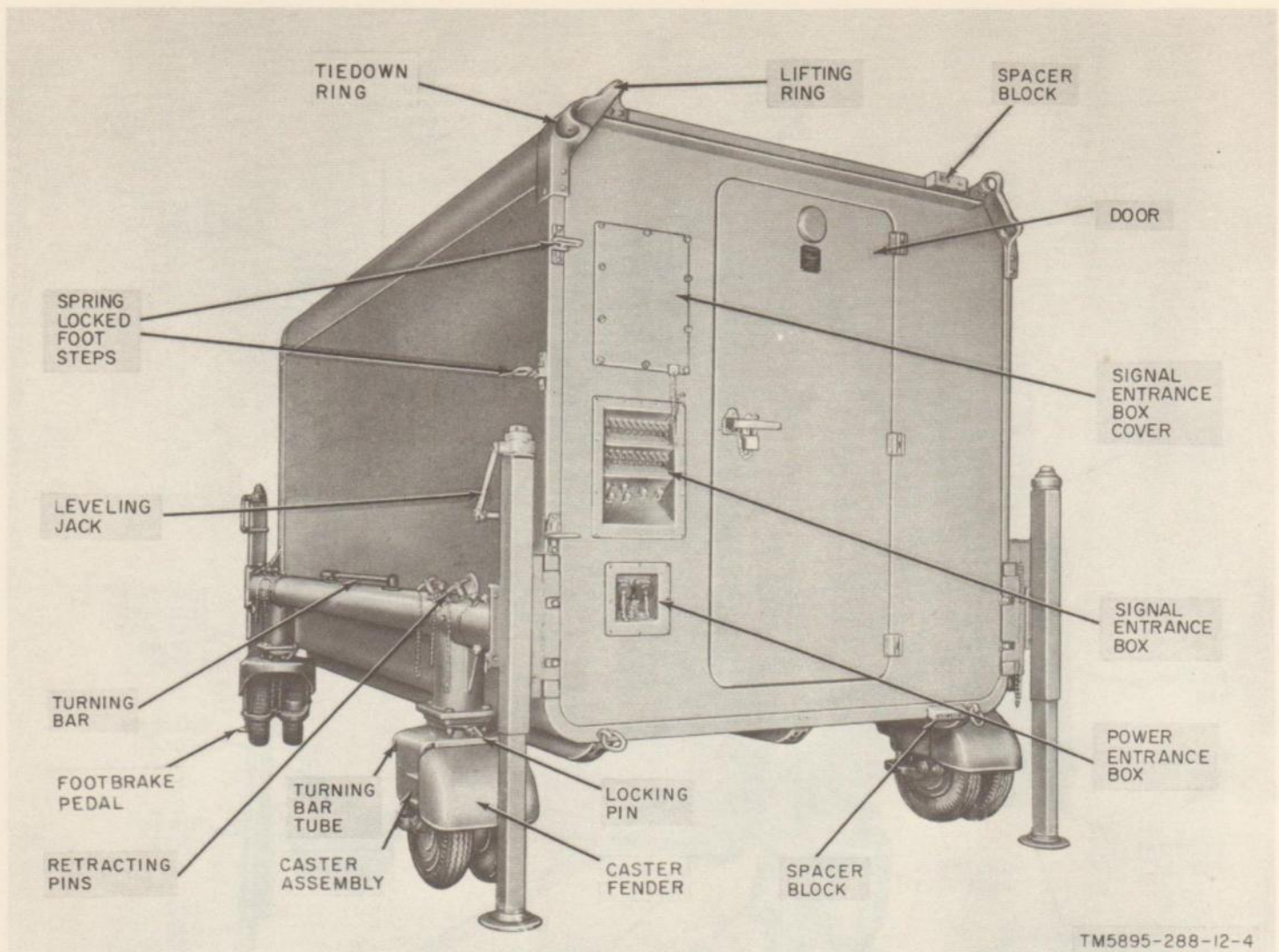


Figure 3. Radio terminal shelter, three-quarter rear view.

15. Radio Set AN/TRC-47 (fig. 6)

The AN/TRC-47 is a single channel vhf radio relay terminal set. Two AN/TRC-47's are mounted in rack 403. They are used to provide the terminal facilities for the vhf radio links between the radio terminal shelter and each subscriber package. Refer to TM 11-212-10 for a detailed description of the AN/TRC-47.

16. Current Limiter Panel (fig. 8)

The current limiter panel consists of 16 rheostats and a terminal board. It is mounted in rack 405A2 and is used to control the current levels in the teletypewriter send and receive circuits con-

nected to the tone keyers and tone converters. The terminal board, on the rear of the panel, is used to terminate the circuit connections. All information pertaining to the control limiter panel is contained in this manual.

17. Multiple Repeat Panel (fig. 9 and 35)

The multiple repeat panel consists of eight toggle switches, three jacks, and three fuses. It is mounted in rack 406. It is used to send teletypewriter test signals into the tone keyers during system or channel testing. Test signals are applied to the panel through the SIG jack. All information pertaining to the multiple repeat panel is contained in this manual.

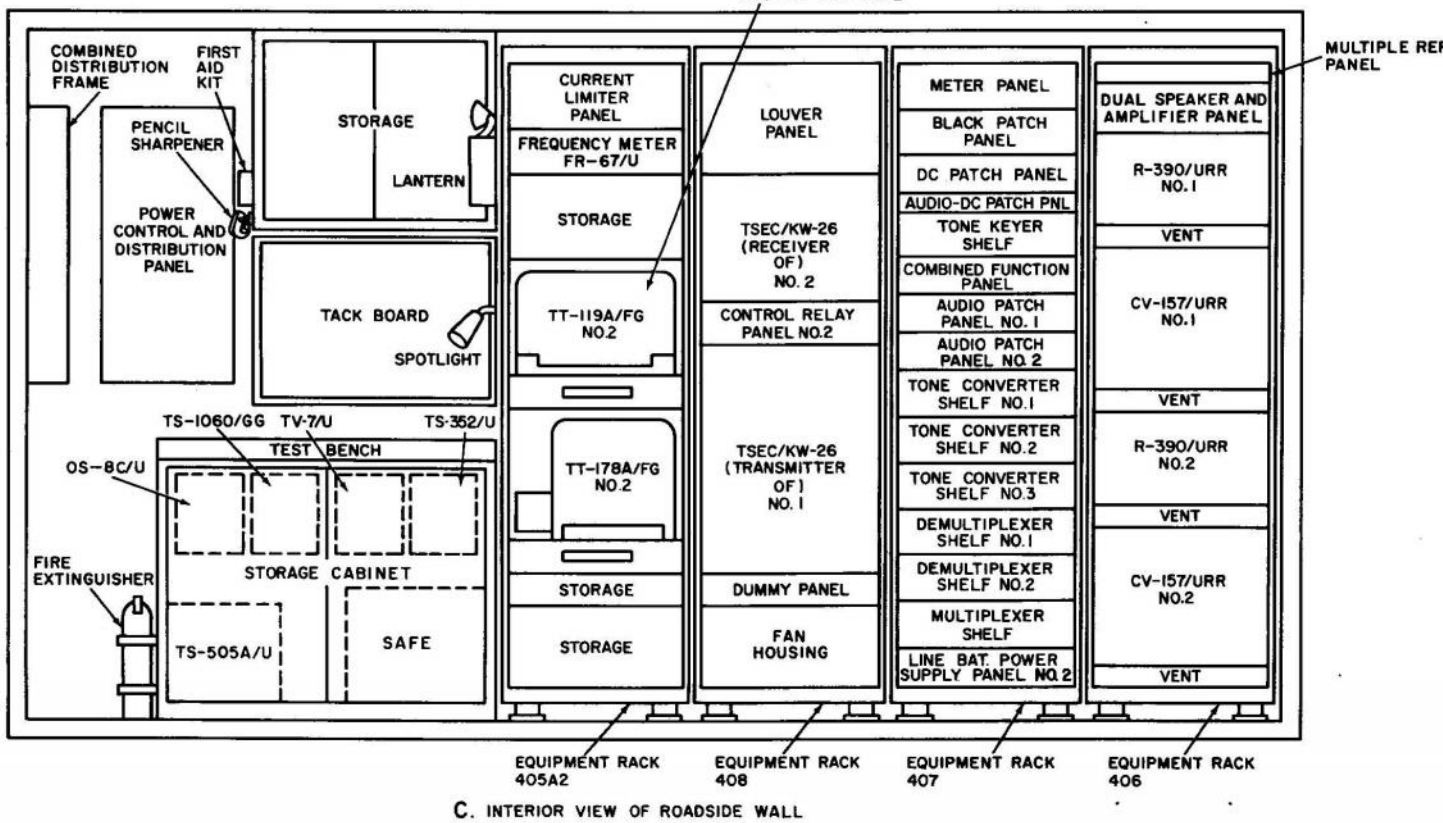
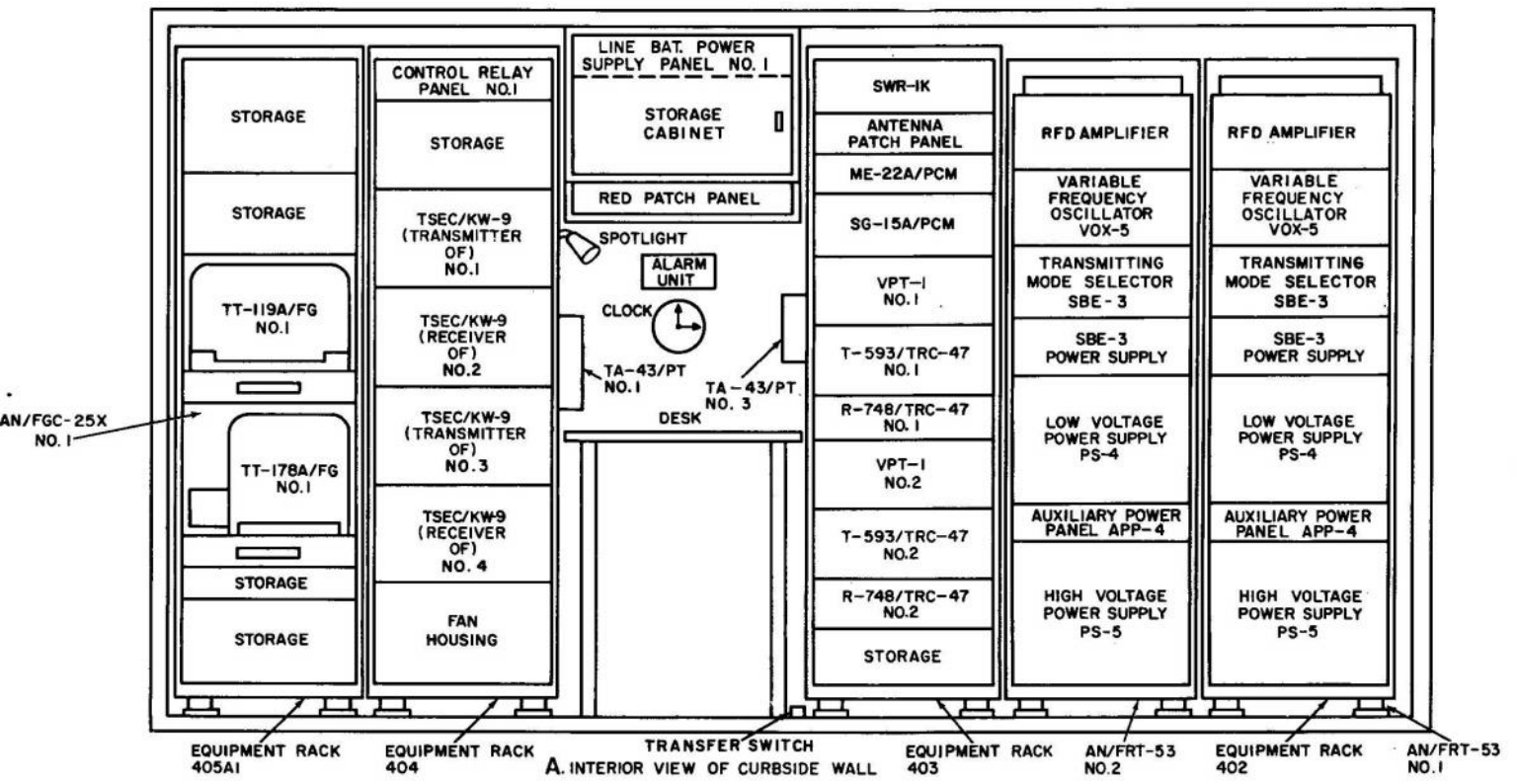
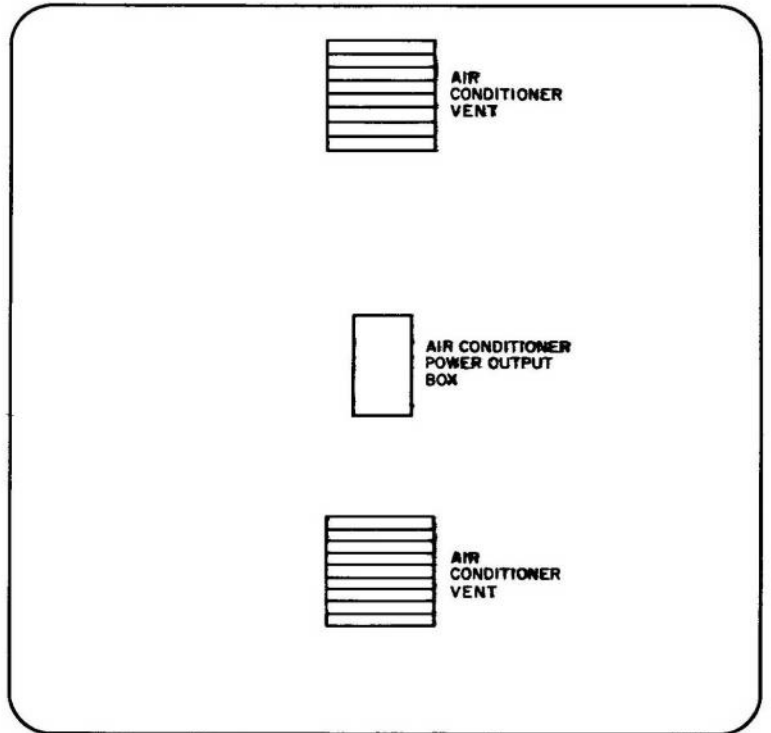
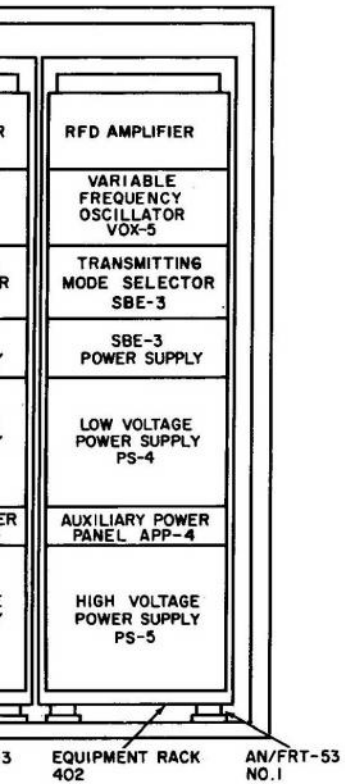
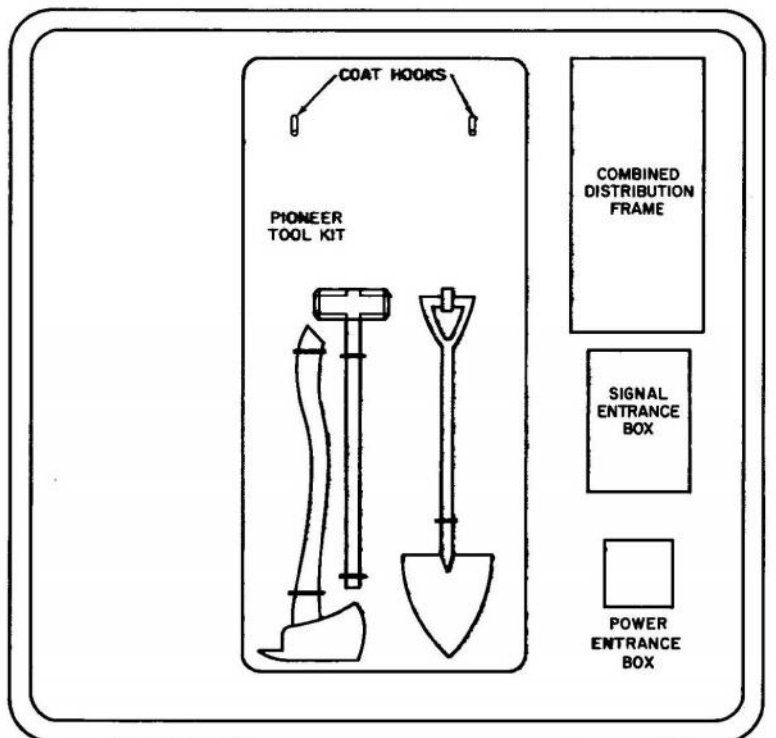
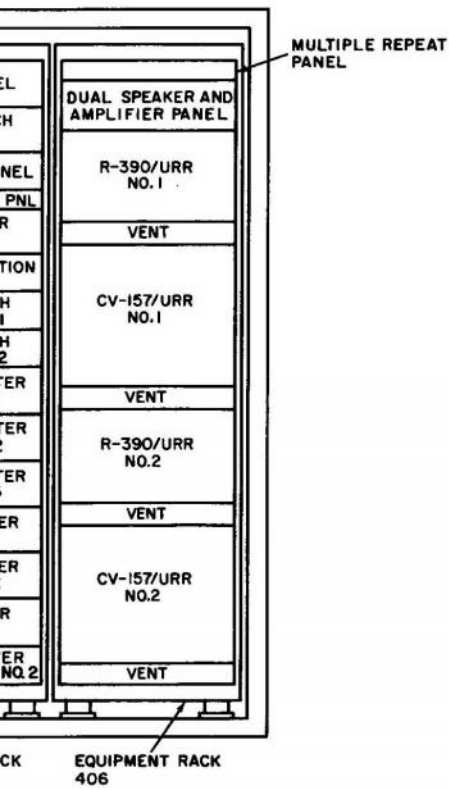


Figure 4. Radio terminal shelter, elevation dia

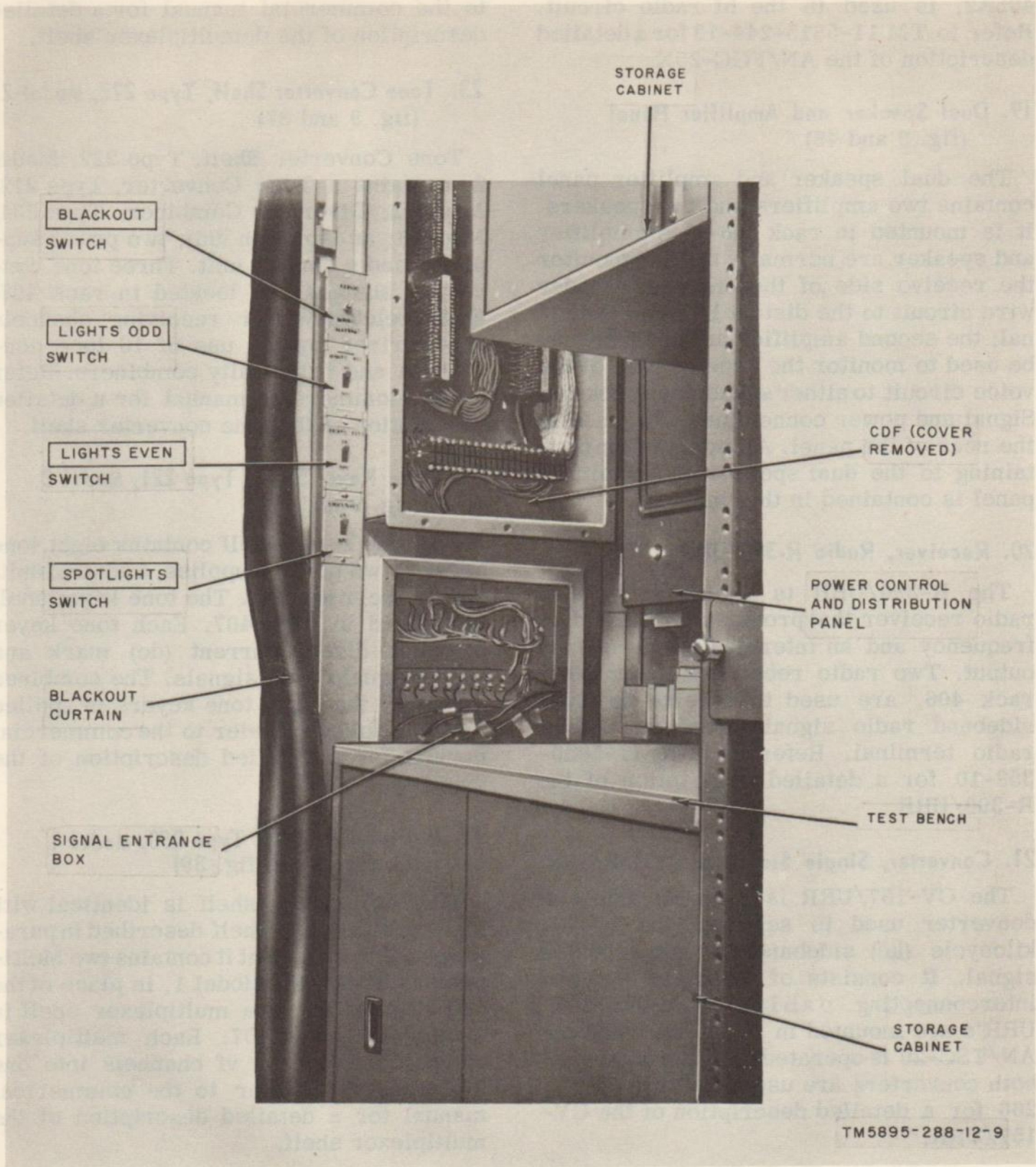


B. INTERIOR VIEW OF FRONT WALL



D. INTERIOR VIEW OF REAR WALL

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Figure 5. Radio terminal shelter, interior rear roadside view.

18. Teletypewriter Set AN/FGC-25X
(fig. 7 and 8)

Teletypewriter Set AN/FGC-25X consists of Teletypewriter TT-119A/FG and Reperforator-Transmitter TT-178A/FG.

It provides facilities for the transmission and reception of messages. AN/FGC-25X No. 1, mounted in rack 405A1, is used on the vhf radio link between the radio terminal shelter and the subscriber packages. AN/FGC-25X No. 2, mounted in rack

405A2, is used in the hf radio circuit. Refer to TM 11-5815-244-12 for a detailed description of the AN/FGC-25X.

19. Dual Speaker and Amplifier Panel (fig. 9 and 48)

The dual speaker and amplifier panel contains two amplifiers and two speakers. It is mounted in rack 406. One amplifier and speaker are normally used to monitor the receive side of the engineer's order wire circuit to the distant hf radio terminal; the second amplifier and speaker may be used to monitor the receive side of the voice circuit to either subscriber package. Signal and power connections are made at the rear of the panel. All information pertaining to the dual speaker and amplifier panel is contained in this manual.

20. Receiver, Radio R-390/URR

The R-390/URR is a general-purpose radio receiver that provides both an audio-frequency and an intermediate-frequency output. Two radio receivers, mounted in rack 406, are used to receive the twin sideband radio signals from the distant radio terminal. Refer to TM 11-5820-358-10 for a detailed description of the R-390/URR.

21. Converter, Single Sideband CV-157/URR

The CV-157/URR is a single sideband converter used to separate the two 6-kilocycle (kc) sidebands of the received signal. It consists of the main unit and interconnecting cables. Two CV-157/URR's are mounted in rack 406. When the AN/TSC-20 is operated on space diversity, both converters are used. Refer to TM 11-266 for a detailed description of the CV-157/URR.

22. Demultiplexer Shelf, Type 250, Model 1 (fig. 9 and 38)

Each shelf contains two Demultiplexers, Type 249, Model 1, two power supplies, and a control unit. Two demultiplexer shelves are located in rack 407. Each demultiplexer converts one 6-kc sideband into two 3-kc voice frequency (vf) channels. Refer

to the commercial manual for a detailed description of the demultiplexer shelf.

23. Tone Converter Shelf, Type 222, Model 2 (fig. 9 and 37)

Tone Converter Shelf, Type 222, Model 2, contains a Tone Converter, Type 212, Model 2; Diversity Combiner, Type 234, Model 1; an isolation unit, two power supplies, and a control unit. Three tone converter shelves are located in rack 407. Eight teletypewriter receiving channels are derived by the use of 16 tone converters and 8 diversity combiners. Refer to the commercial manual for a detailed description of the tone converter shelf.

24. Tone Keyer Shelf, Type 221, Model 2 (fig. 9 and 36)

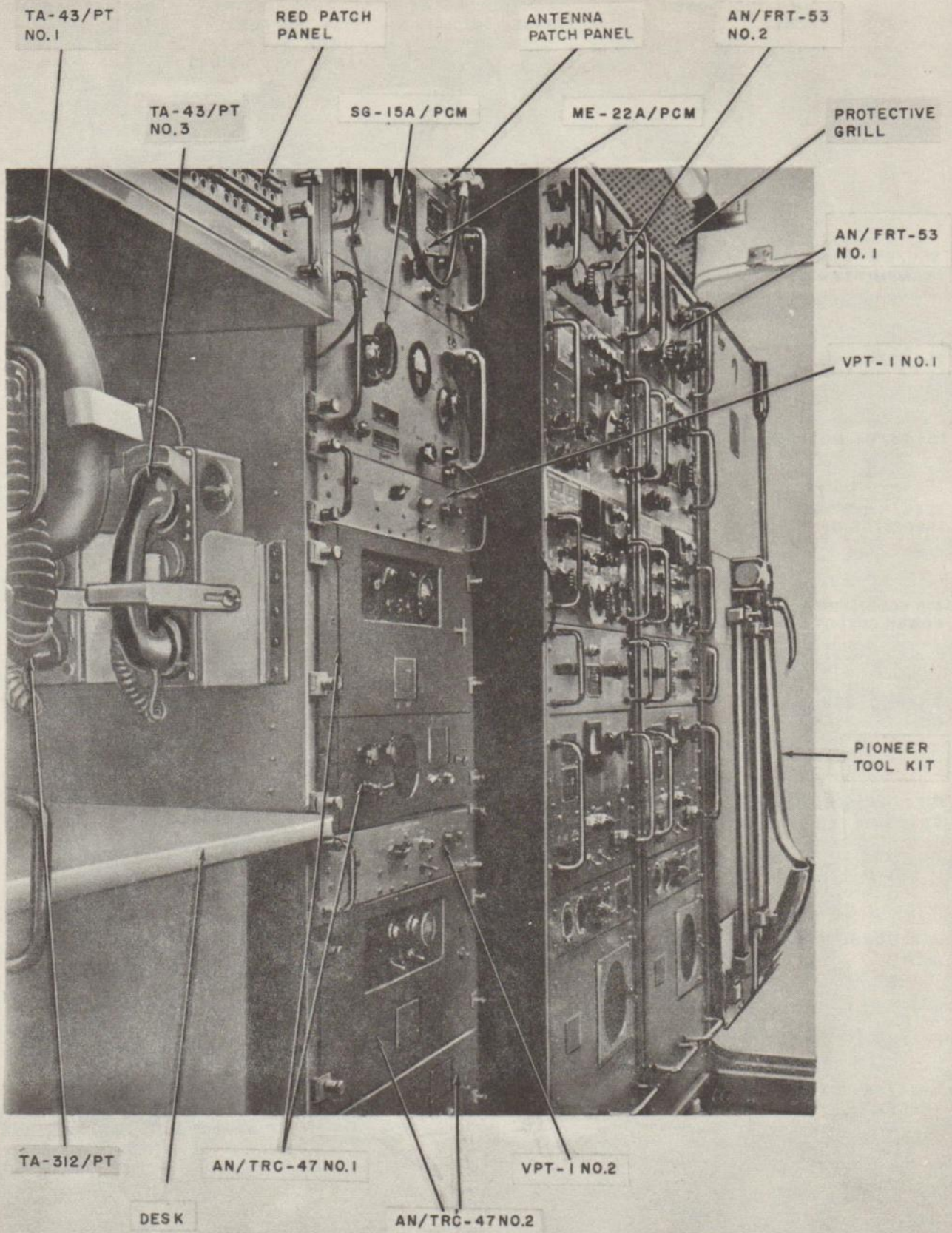
The tone keyer shelf contains eight tone keyers, two power supplies, a control unit, and an isolation unit. The tone keyer shelf is located in rack 407. Each tone keyer converts direct current (dc) mark and space signals to vf signals. The combined output of the eight tone keyers is applied to a multiplexer. Refer to the commercial manual for a detailed description of the tone keyer shelf.

25. Multiplexer Shelf, Type 250, Model 1 (C, fig. 4 and fig. 39)

The multiplexer shelf is identical with the demultiplexer shelf described in paragraph 22, except that it contains two Multiplexers Type 248, Model 1, in place of the demultiplexers. The multiplexer shelf is located in rack 407. Each multiplexer combines two 3-kc vf channels into one 6-kc channel. Refer to the commercial manual for a detailed description of the multiplexer shelf.

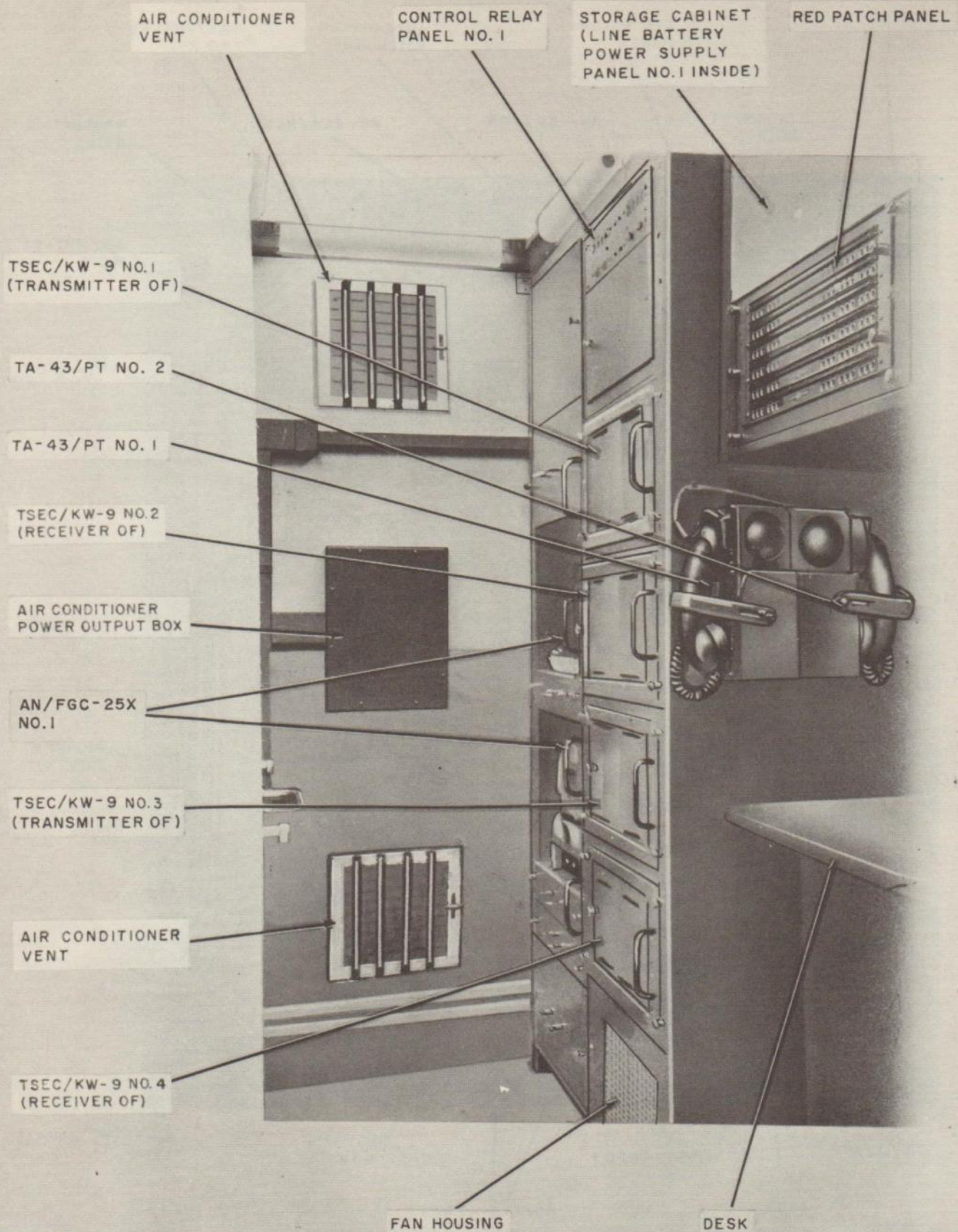
26. Line Battery Power Supply Panel, **Type 227, Model 1** (A, fig. 4 and fig. 45)

The line battery power supply panel contains two Line Battery Power Supplies, Type 228, Model 1. One power supply is normally in use and the other is on standby. An automatic transfer circuit on the panel



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Figure 6. Radio terminal shelter, interior rear curbside view.



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Figure 7. Radio terminal shelter, interior front curbside view.

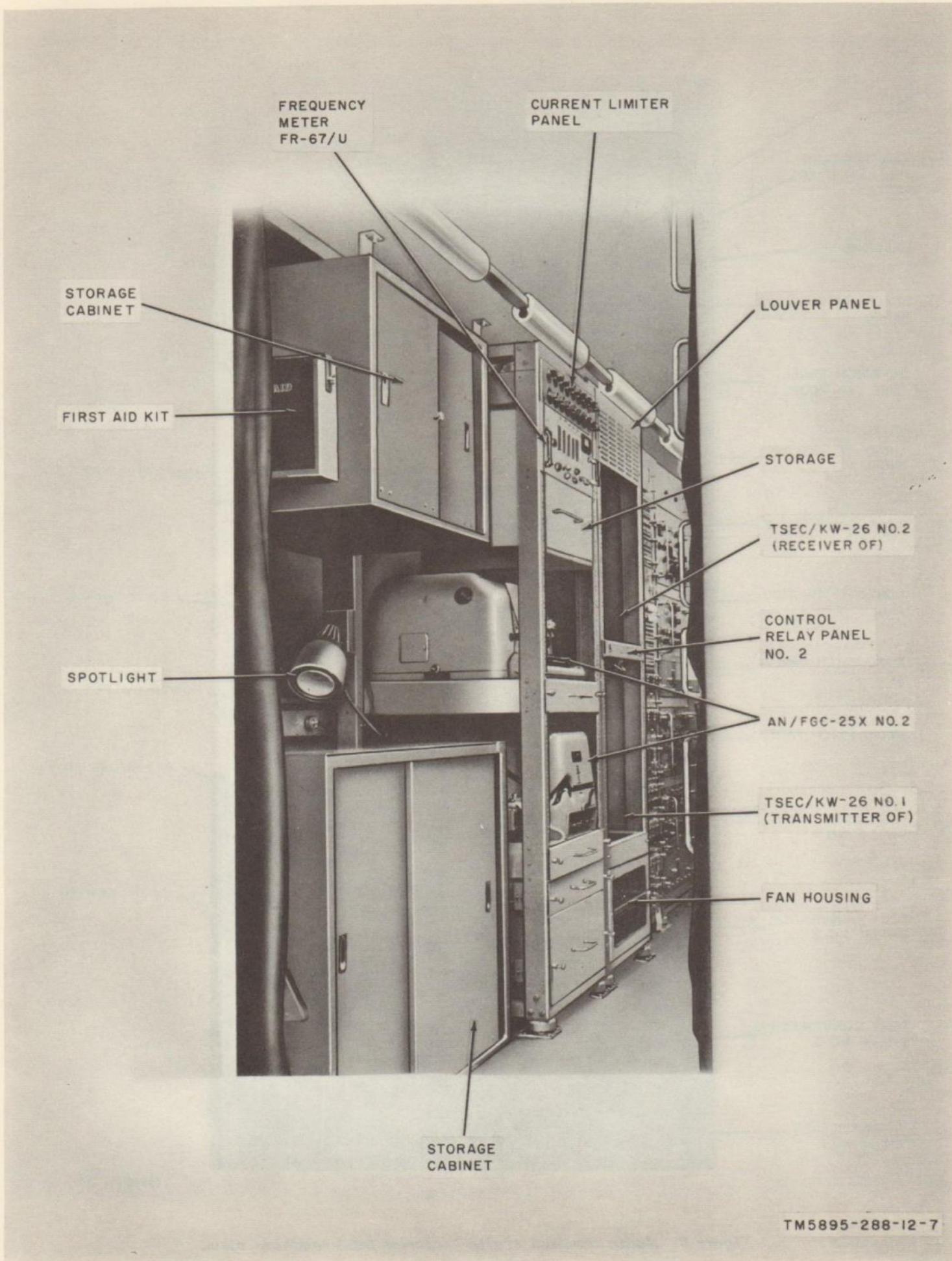


Figure 8. Radio terminal shelter, interior roadside view.

MULTIPLE
REPEAT
PANEL

DUAL SPEAKER
AND AMPLIFIER
PANEL

METER PANEL

BLACK PATCH
PANEL

DC PATCH PANEL,
TYPE 240 MODEL 2

AUDIO-DC PATCH
PANEL

TONE KEYS SHELF

COMBINED FUNCTION
PANEL

AUDIO PATCH PANEL
NO. 1

AUDIO PATCH PANEL
NO. 2

TONE CONVERTER
SHELF NO. 1

TONE CONVERTER
SHELF NO. 2

TONE CONVERTER
SHELF NO. 3

DEMULTIPLEXER
SHELF NO. 1

R-390/URR NO. 1

CV-157/URR NO. 1

AIR CONDITIONER
POWER OUTPUT BOX

R-390/URR NO. 2

CV-157/URR NO. 2

TM5895-288-12-2

Figure 9. Radio terminal shelter, interior front roadside view.

is provided to place the standby unit in operation, if the in-use supply fails. Two line battery power supply panels are provided: No. 1 is mounted in the storage cabinet next to rack 403 and supplies dc power for the *red* teletypewriter circuits, and No. 2 is mounted in rack 407 and supplies dc power for the *black* teletypewriter circuits. Two line battery power supplies and an automatic transfer relay are connected into each line battery power supply panel. Refer to the commercial manual for a detailed description of the line battery power supply panel.

27. Local Battery Loop Control No. 1 (A, fig. 41)

Local battery loop control No. 1 contains OPR, SIG, and BIAS rheostats which control current flow in the multiple repeat panel's operating, signal, and bias circuits respectively. Local battery loop control No. 1 is located in rack 406 behind the dual-speaker and amplifier panel (A, fig. 4).

28. Local Battery Loop Control No. 2 (B, fig. 41)

Local battery loop control No. 2 contains CKT 2, CKT 3, and CKT 4 rheostats which control current flow through the LOCAL BAT jacks on the audio-dc patch panel (C, fig. 4). Local battery loop control No. 2 is located in rack 407 behind the black patch panel.

29. Local Battery Loop Control No. 3 (C, fig. 41)

Local battery loop control No. 3 contains CKT 5, CKT 8, and CKT 14 rheostats which control current flow through the BAT jacks on the red patch panel (A, fig. 4). Local battery loop control No. 3 is located behind the red patch panel.

30. Meter Panel (C, fig. 4 and fig. 49)

The meters on the panel are used to measure vf and teletypewriter signal levels. The meter panel is located in rack 407. It consists of a volume unit (vu) meter used to measure vf signal levels, and a dc

milliammeter meter used to measure teletypewriter loop current levels. Meter connections at the rear of the panel are terminated in DC MA and VU MTR jacks on the audio-dc patch panel.

31. Antennas (fig. 1)

a. One hf transmitting antenna (sloping-vee or doublet) and two hf receiving antennas (sloping-vee or double-doublet) are used with the radio terminal shelter for communication with a distant radio terminal. Figure 10 shows the components of the sloping-vee hf transmitting antenna. Figure 11 shows the components used to construct the sloping-vee hf receiving antenna, the doublet transmitting antenna, and the double-doublet receiving antenna.

b. Four Antenna Assemblies AT-588/TRC-42 (fig. 12) (two transmitting and two receiving) are used at the radio terminal shelter for vhf radio communication with the subscriber packages.

32. Generators, 10-Kw

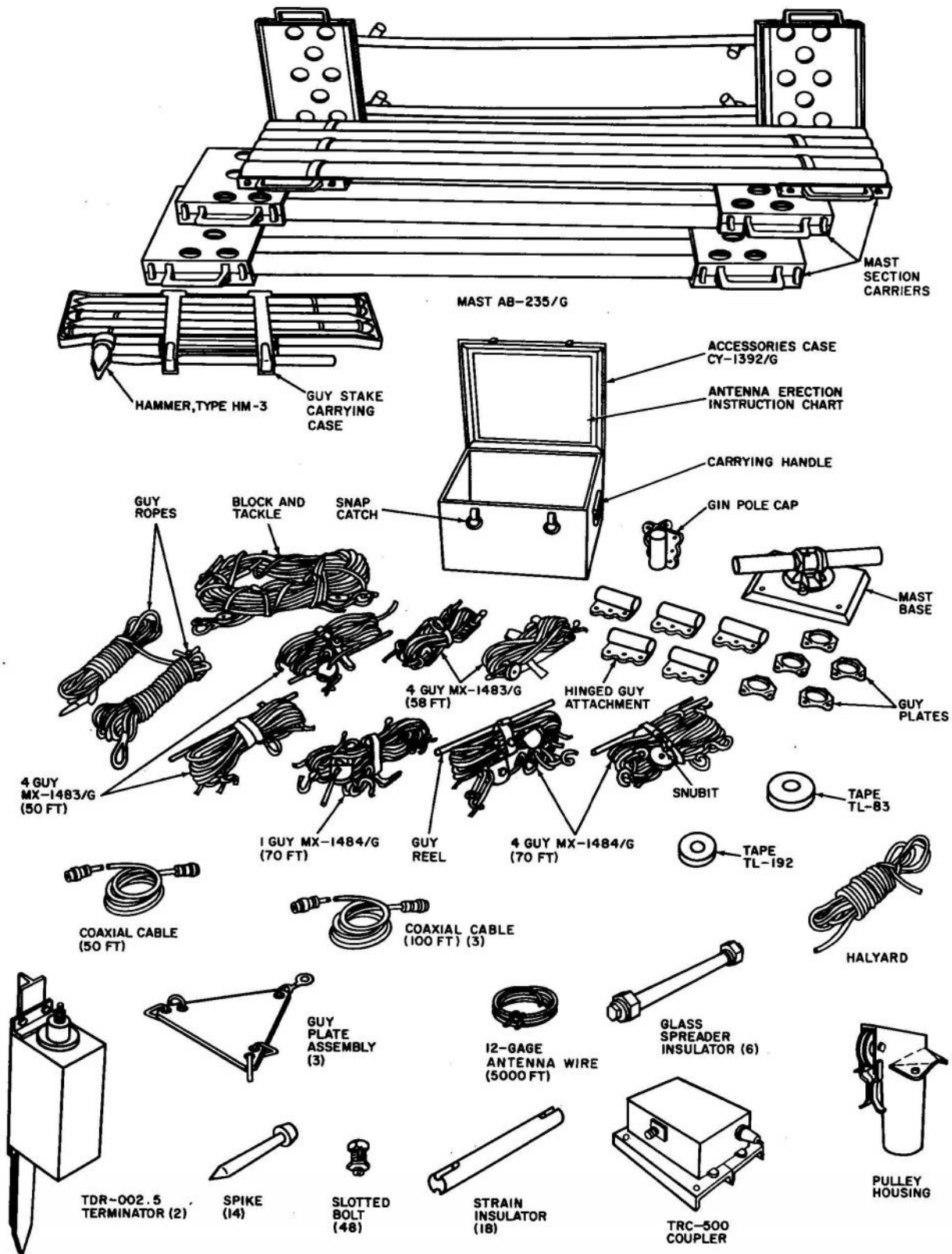
Two 10-kw generators (fig. 13) mounted on a four-wheel trailer supply ac power for the radio terminal shelter. One supplies power for the communication equipment, the convenience outlets, and lighting (technical power). The other supplies power for heating and air conditioning (utility power). Refer to the commercial manual for a detailed description of the 10-kw generator.

33. Air Conditioner

The air conditioner (fig. 13) provides control of the shelter's interior temperature and humidity and provides air circulation when required. Refer to the commercial manual for a detailed description of the air conditioner.

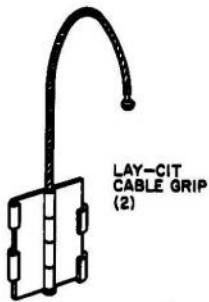
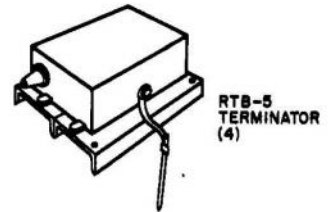
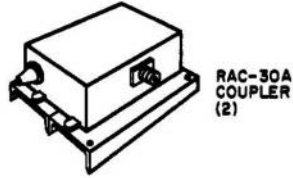
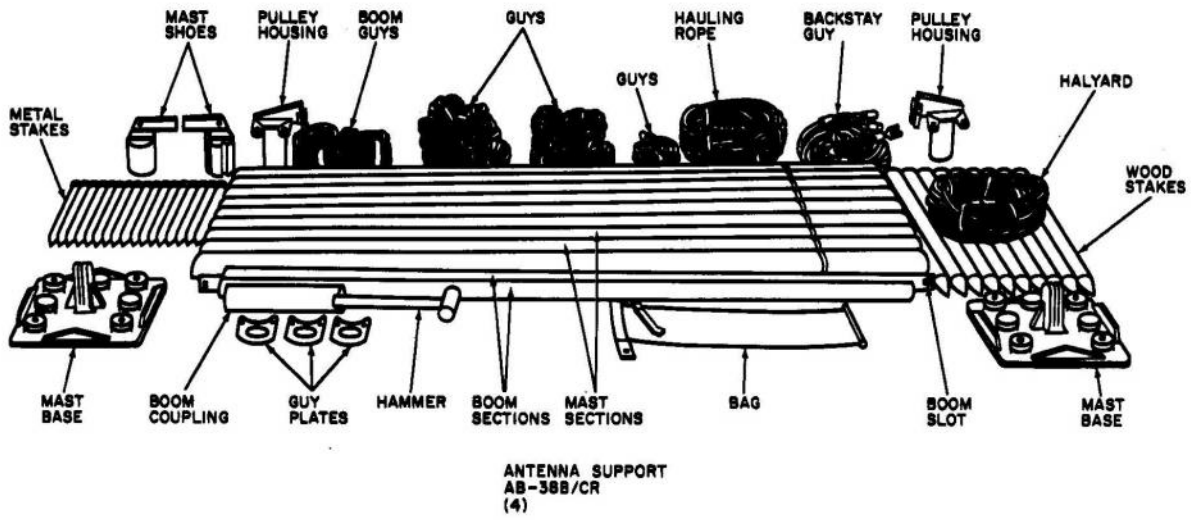
34. Electric Heater

An electric heater (D, fig. 16), stored on top of the test bench, is used to heat the radio terminal shelter. The heater outlet is on the front wall of the radio terminal shelter.



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Figure 10. Mast AB-235/G and antenna accessories.



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Figure 11. Antenna Support AB-38B/CR and antenna accessories.

35. Combined Distribution Frame (fig. 5)

a. The combined distribution frame (CDF) is the distribution point for all signal wiring. It contains four intermediate distribution frames (two designated H-IDF and two designated V-IDF) and a main distribution frame (MDF).

b. The IDF's each contain 26 rows of 6 terminal lugs. The signal wiring for all components of the radio terminal shelter (except the red patch panel) are wired through the IDF's.

c. The MDF consists of terminal lugs, dropout fuses, and carbon blocks. All terminals of the signal entrance box are wired through the MDF

36. Telephone Sets TA-43/PT and TA-312/PT

(fig. 6 and 7)

Four telephone sets (one TA-312/PT and three TA-43/PT's) are located in the radio terminal shelter. The TA-312/PT is in the engineer's order wire circuit between the radio terminal shelter and the distant radio terminal. A transfer switch, located on the floor between the desk and rack 403, connects the receive portion of the engineer's order wire circuit to either the dual speaker and amplifier panel or to the TA-312/PT. TA-43/PT No. 1 and No. 2 provide order wire communications between the radio terminal shelter and the associated subscriber packages. TA-43/PT No. 3 provides telephone communication between the radio terminal shelter and a communications center. Refer to TM 11-337 and TM 11-2155 for detailed descriptions of the TA-43/PT and the TA-312/PT.

37. Alarm Unit

(A, fig. 4 and 46)

The alarm unit is located above the desk between racks 404 and 403. It provides an audible and visual indication when the subscriber package calls into the radio terminal shelter and when the surrounding temperature in racks 404 or 408 exceeds 95° F (35° C). A SUBSCRIBER CALL-1 or SUBSCRIBER CALL-2 lamp indicates

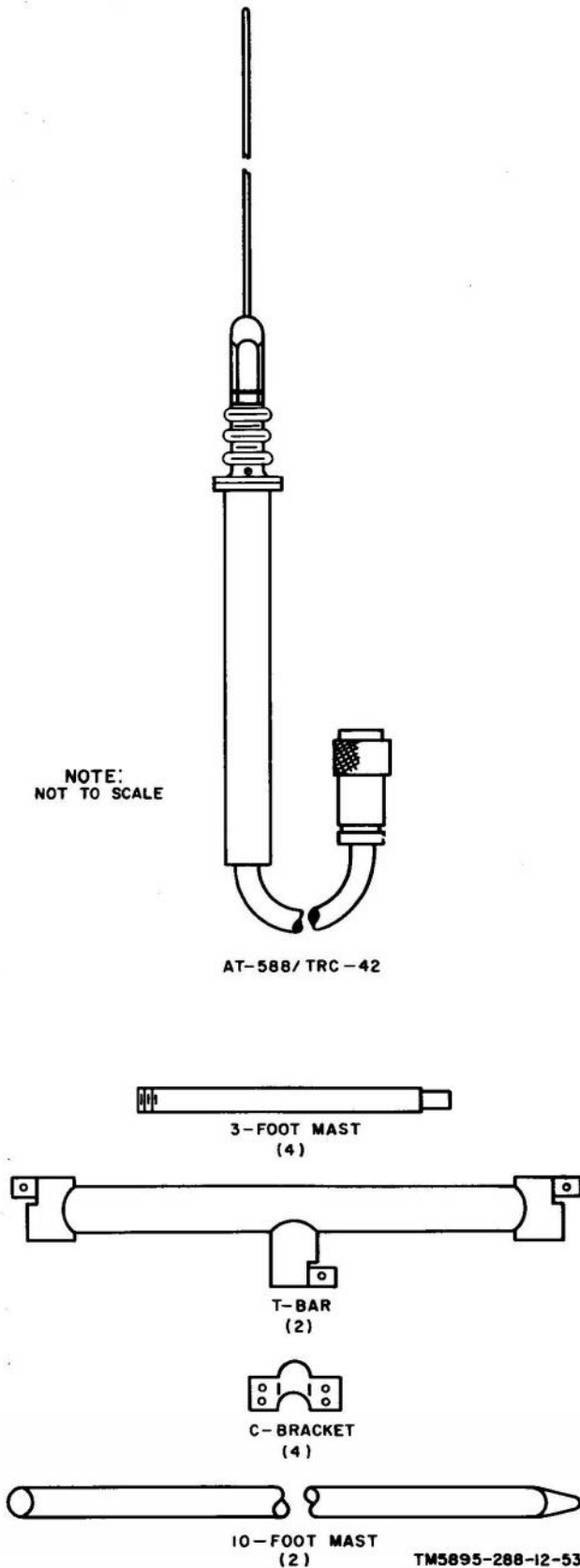


Figure 12. Antenna Assemblies AT-588/TRC-42 and antenna accessories.

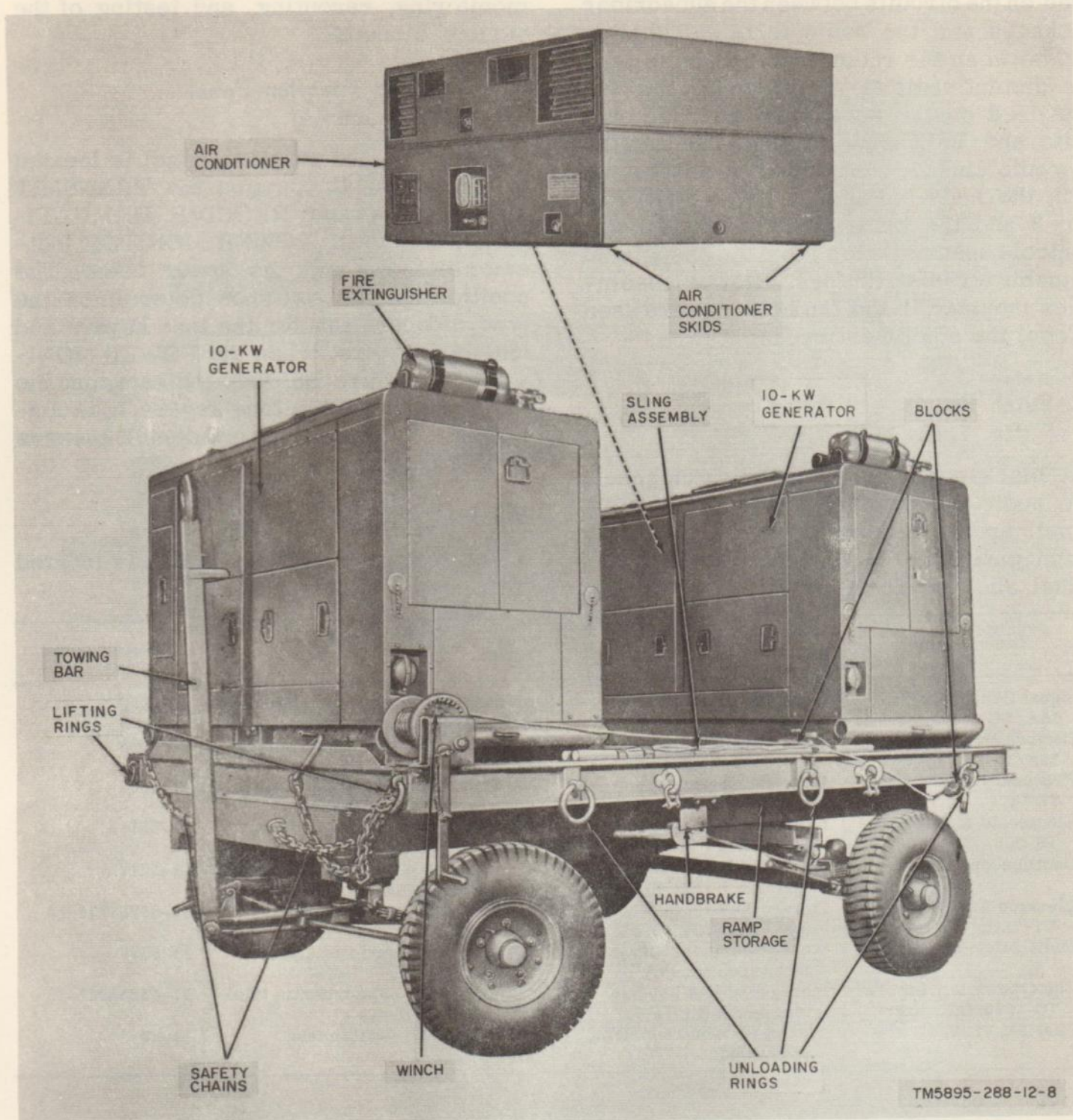


Figure 13. Ten-kw generators, air conditioner, and four-wheel trailer.

which subscriber package is calling; a KW-9 and KW-26 OVERHEAT lamp glows to indicate which security equipment rack (404 or 408) is overheated. An ALARM STOP switch and an ALARM DISABLED lamp are associated with the KW-9 and the KW-26 overheat circuits to permit the bell to be disabled. The ALARM DISABLED

lamp glows when the bell is disabled. The bell on the call circuits cannot be disabled.

38. Communications Security Equipments TSEC/KW-9 and TSEC/KW-26 (fig. 7 and 8)

Communication security equipments are located in racks 404 and 408. They are

used on the circuits between the subscriber packages and the radio terminal shelter and between the radio terminal shelter and the distant radio terminal. TSEC/KW-9's are used on the subscriber package circuits and TSEC/KW-26's are used on the hf radio link. A control relay, associated with the send portion of KW-9 No. 1 and No. 3 and the transmitter of the KW-26, controls transmission from the associated transmitter-distributors. Blower assemblies mounted in the fan housings are used to cool the equipment racks.

39. Patch Panels (fig. 7 and 9)

A black patch panel, a red patch panel, two audio patch panels, an antenna patch panel, an audio-dc patch panel, and a dc patch panel are located in the radio terminal shelter. These patch panels permit

monitoring, rerouting, and testing of the various circuits.

40. Combined Function Panel (fig. 9 and 44)

The combined function panel is located in rack 407. It contains the TRANSMIT MULTIPLEX and RECEIVE DEMULTIPLEX switches, POWER MONITOR indicator lamps, and the keyer fuses. The position of the switches determines the type of operation for the tone keyers and tone converters. When the POWER MONITOR lamps are on, they indicate that the power supply to the tone keyers, tone converters, multiplexers, and demultiplexers is operating.

41. Test Equipment

The following test equipment is located in the radio terminal shelter:

Test equipment	Location	Function	Technical manual
Signal Generator SG-15A/PCM.	Rack 403 (fig. 8) -----	Provides audio signal for alignment and maintenance.	11-2096
Decibel Meter ME-22A/PCM.	Rack 403 (fig. 8) -----	Used for db measurements during alignment and maintenance.	11-2096
Frequency Meter FR-87/U.	Rack 405A2 (fig. 8) -----	Used to measure the output frequency of the tone keyers.	11-2698
Electronic Multimeter TS-505A/U.	Storage cabinet beneath test bench (fig. 8).	Used for voltage and resistance measurements.	11-5511A
Oscilloscope OS-8C/U	Storage cabinet beneath test bench (fig. 8).	Used to check waveform patterns during maintenance.	11-1214A
Electron Tube Test Set TV-7/U.	Storage cabinet beneath test bench (fig. 8).	Used to test electron tubes -----	11-8625-274-12
Multimeter TS-352/U	Storage cabinet beneath test bench (fig. 8).	Used for voltage and resistance measurements.	11-5527
Teletypewriter Test Set TS-1060/GG.	Storage cabinet beneath test bench (fig. 8).	Used to measure distortion in teletypewriter circuits.	11-8625-207-10
Test Set TS-2/TG ----	Placed as required during operation.	Provides teletypewriter test signals.	11-2208

Section IV. DESCRIPTION OF SUBSCRIBER PACKAGE

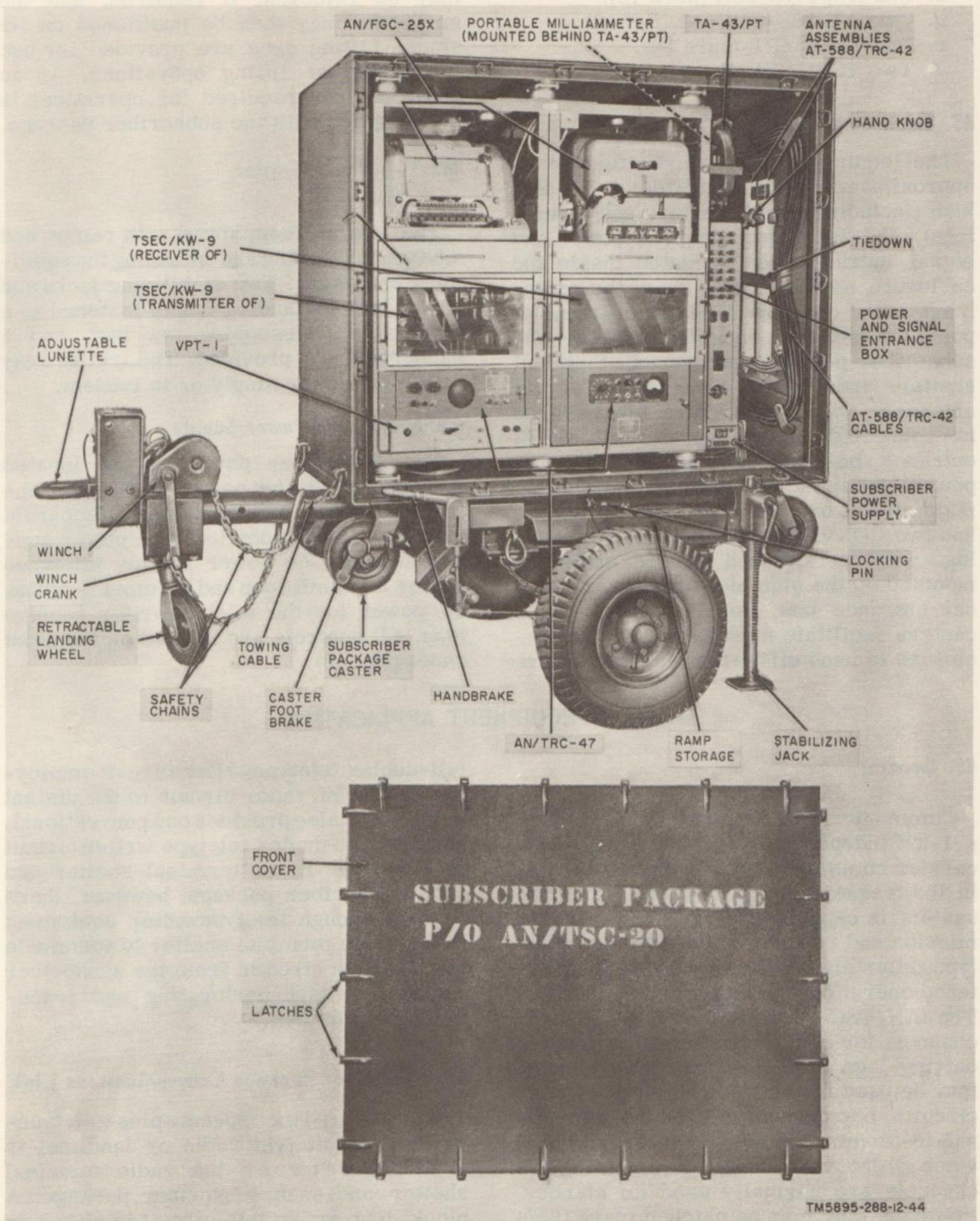
42. General

The subscriber package (fig. 14) consists of the components listed in appendix II. The equipment enclosure, equipped with dollies, is mounted on a two-wheel trailer. The equipment may be operated with the enclosure either mounted on the trailer or removed as convenient. Several components are identical with those described for the radio terminal shelter. These are

listed in a through f below. The other components are described in paragraphs 43 through 45. The equipment is used to provide terminal facilities for one telephone and one secure teletypewriter circuit (speech-plus-duplex) to the radio terminal shelter.

a. One VPT-1 (para 14).

b. One AN/TRC-47 (receiver and transmitter only) (para 15).



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Figure 14. Subscriber package (equipment enclosure and two-wheel trailer).

- c. One AN/FGC-25X (para 18).
- d. Two AT-588/TRC-42 (fig. 12).
- e. One TA-43/PT (para 36).
- f. Two TSEC/KW-9.

43. Equipment Enclosure

The equipment enclosure (fig. 14) is approximately 4-1/2 feet wide, 4-1/2 feet high (including 6-inch casters and mountings), and 2-1/2 feet deep. A power and signal entrance box, located inside the enclosure on the right side of the equipment rack, contains 12 pairs of terminal posts for landline connections between the subscriber package and the radio terminal shelter, and two rf connectors for vhf antennas. Ac power from a local source is connected at the power and signal entrance box (fig. 33). In addition, the power and signal entrance box houses the main circuit breaker, two POWER lamps, and two CONVENIENCE outlets. A ground lug, with an attached ground strap, is mounted on the side of the power and signal entrance box. Four corner-mounted casters facilitate movement when the enclosure is used off the trailer. The casters

may be removed, if required, and the enclosure may then be positioned on its skids. Lifting eyes are provided for use in loading or lifting operations. An ac power source required for operations is not supplied with the subscriber package.

44. Two-Wheel Trailer (fig. 14)

The trailer is equipped with ramps and a winch for loading and unloading the equipment enclosure. Two stabilizing jacks and a retractable landing wheel fastened to a detachable, telescoping tow bar, and a handbrake are provided. The trailer may be towed either singly or in tandem.

45. Subscriber Power Supply

The subscriber power supply, located directly below the power and signal entrance box (fig. 14), contains two separate identical power supplies. One power supply supplies dc power for the teletypewriter transmit loop and the other supplies dc power for the teletypewriter receive loop. All controls are located on the front panel (fig. 42).

Section V. EQUIPMENT APPLICATION

46. General

Communications Central AN/TSC-20 is a 1-kw independent sideband suppressed carrier communications system operating in the frequency range of 2 to 32 mc. The system is capable of simultaneous transmission and reception of speech and teletypewriter signals for continuous long distance operation from a semifixed location. The AN/TSC-20 provides four 3-kc vf channels for both the transmitting and receiving legs of the system. One channel may be used for up to eight teletypewriter circuits, one channel is used for a terminal-to-terminal (engineer's order wire) voice order wire, and the remaining two channels are normally used for standby. However, they may be patched (para 123b) to provide speech or facsimile service, if required. The radio terminal shelter contains equipment to provide one secure

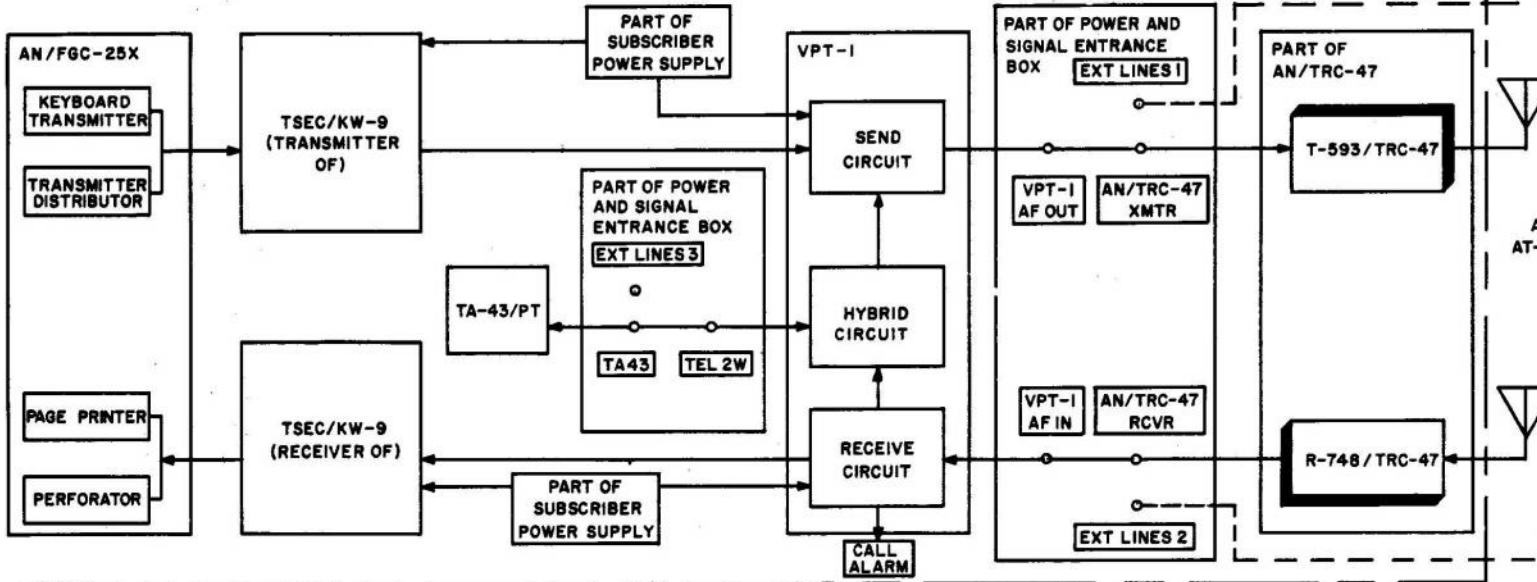
full-duplex teletypewriter circuit employing on the hf radio circuit to the distant terminal. It also provides one conventional, secure, full-duplex teletype writer circuit between the radio terminal shelter and each subscriber package; however, there is only enough teletypewriter equipment in the radio terminal shelter to terminate one of these circuits from the subscriber package in tape-perforating and transmitting equipment.

47. Subscriber Package Communications Link

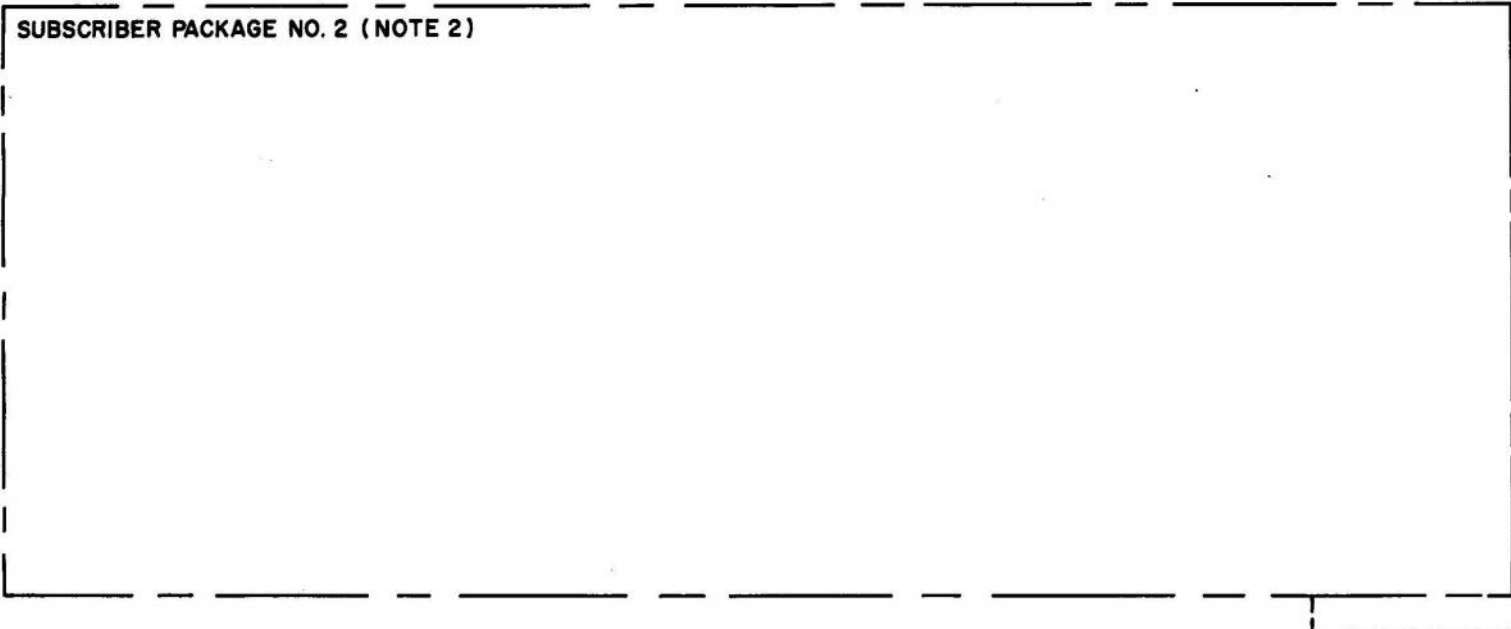
A full-duplex speech-plus-teletypewriter circuit (vhf radio or landline) is available between the radio terminal shelter and each subscriber package. A block diagram of this circuit is shown on sheets 1 and 2 of figure 15.

a. *Teletypewriter Circuit.* Dc teletypewriter signals, sent from the keyboard or

SUBSCRIBER PACKAGE NO. 1



SUBSCRIBER PACKAGE NO. 2 (NOTE 2)



FROM SUBSCRIBER PACKAGE OR --- COMMUNICATIONS CENTER

FROM COMMUNICATIONS CENTER VIA

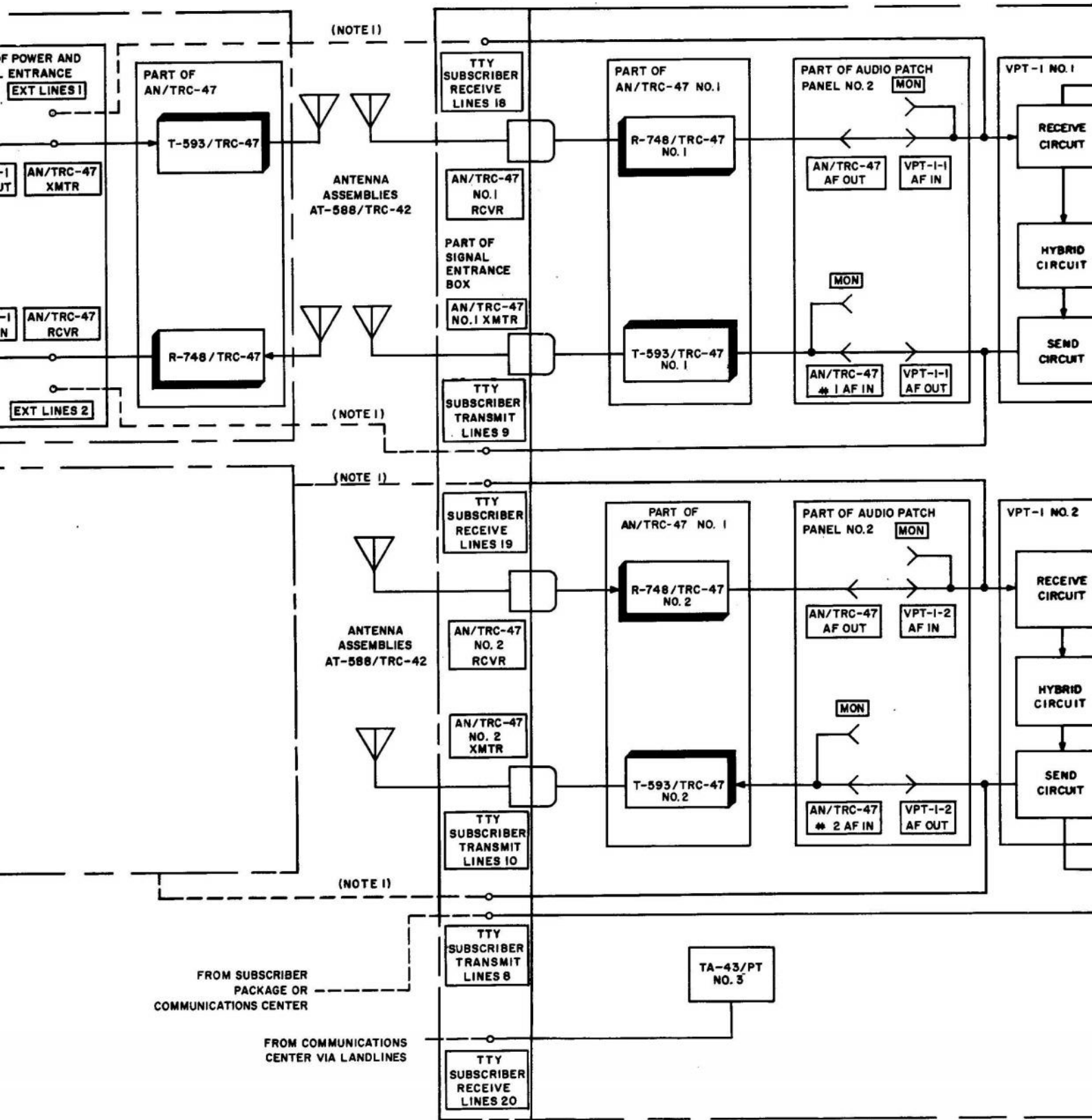
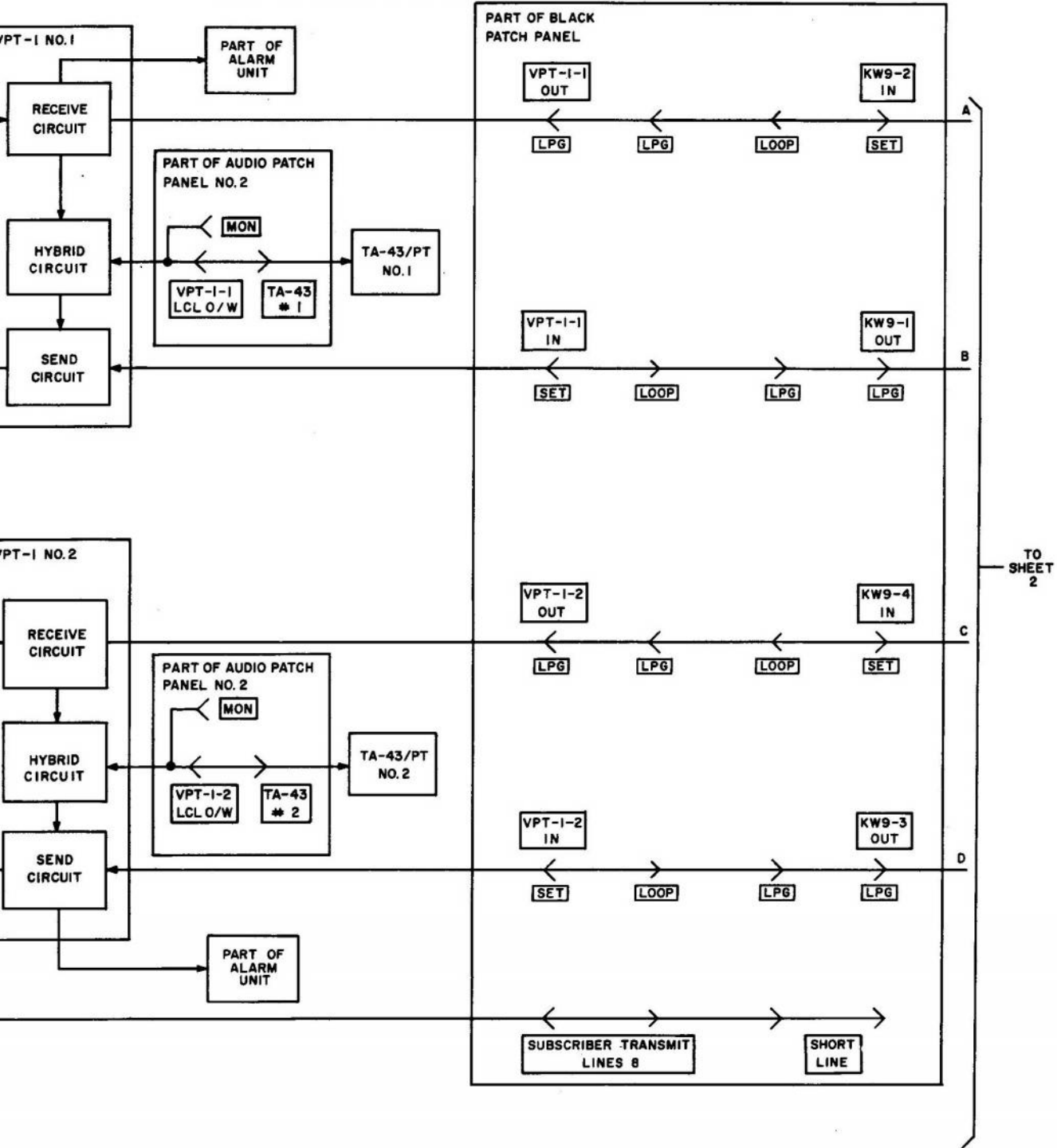
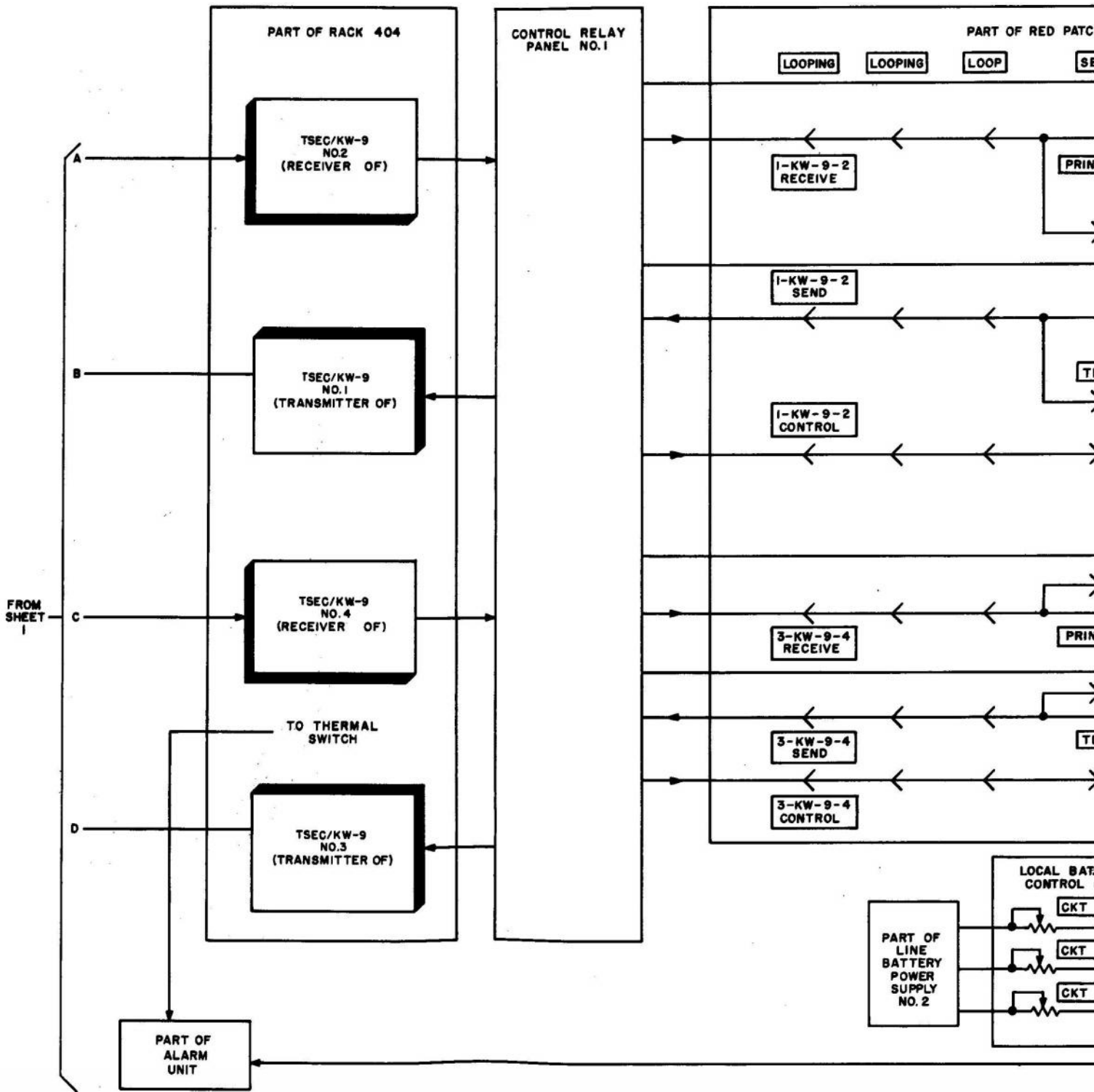


Figure 15 (1). Block diagram, part 1 of 4.

PART OF RADIO TERMINAL SHELTER





PART OF RADIO TERMINAL SHELTER

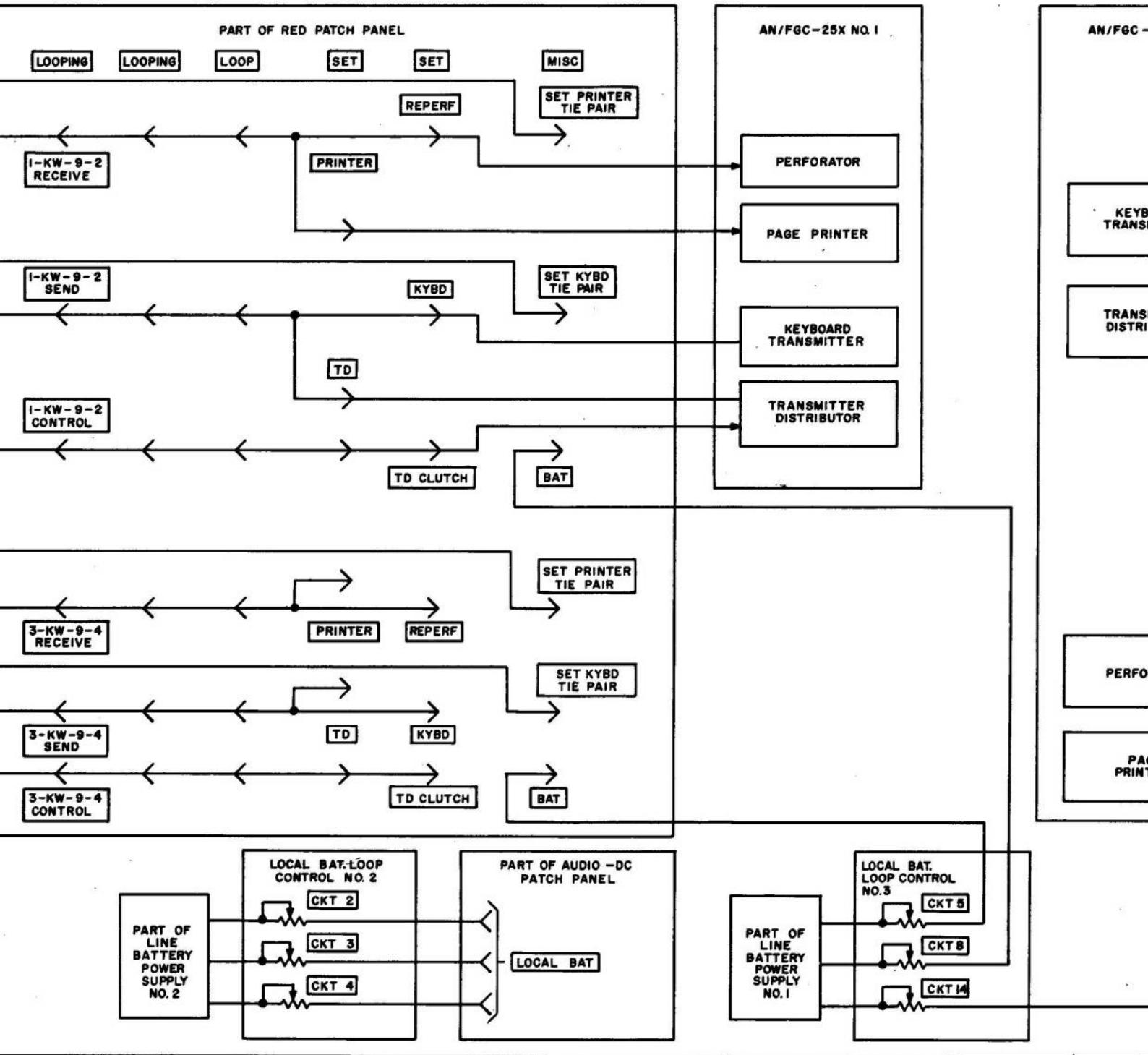
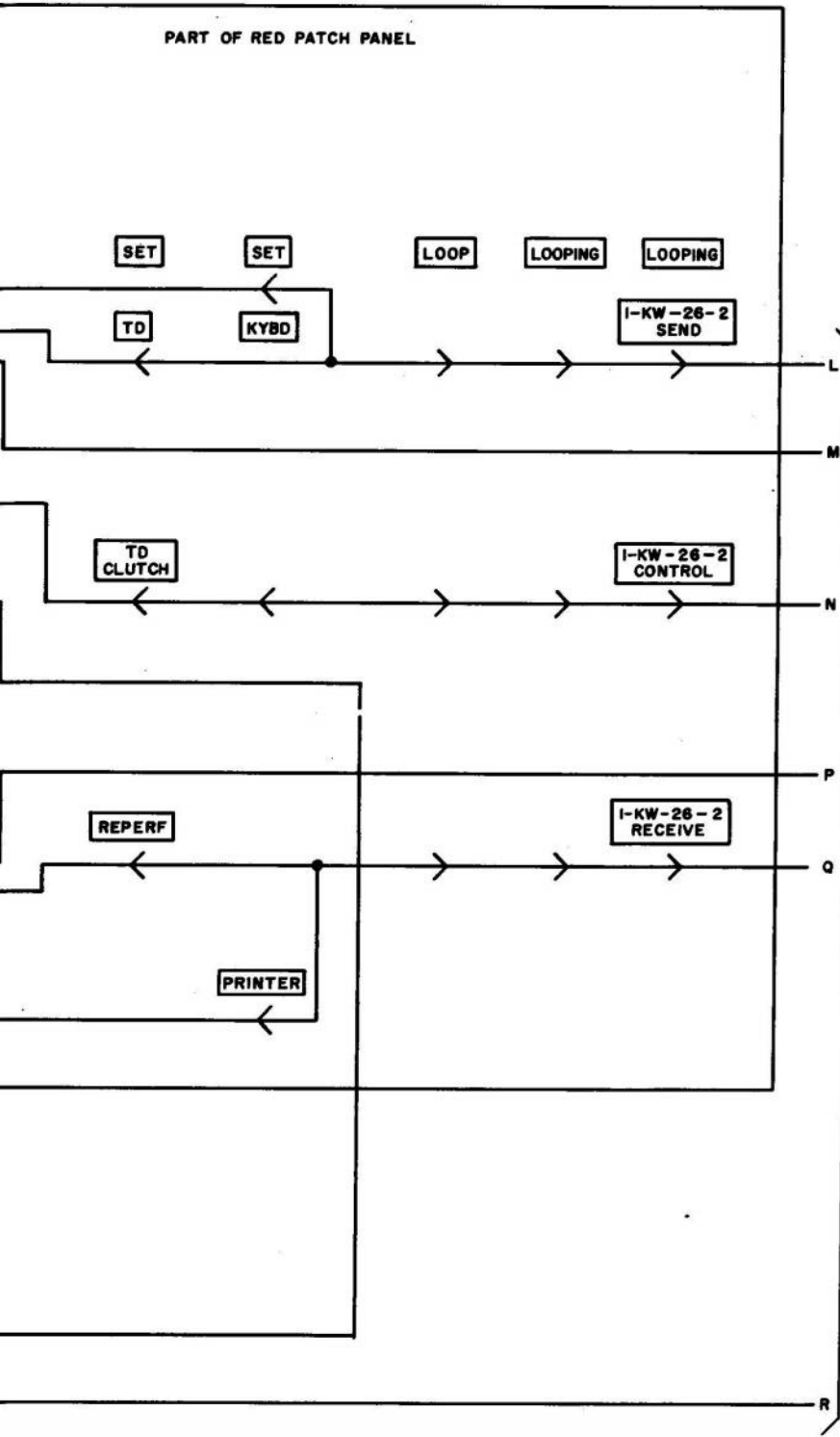


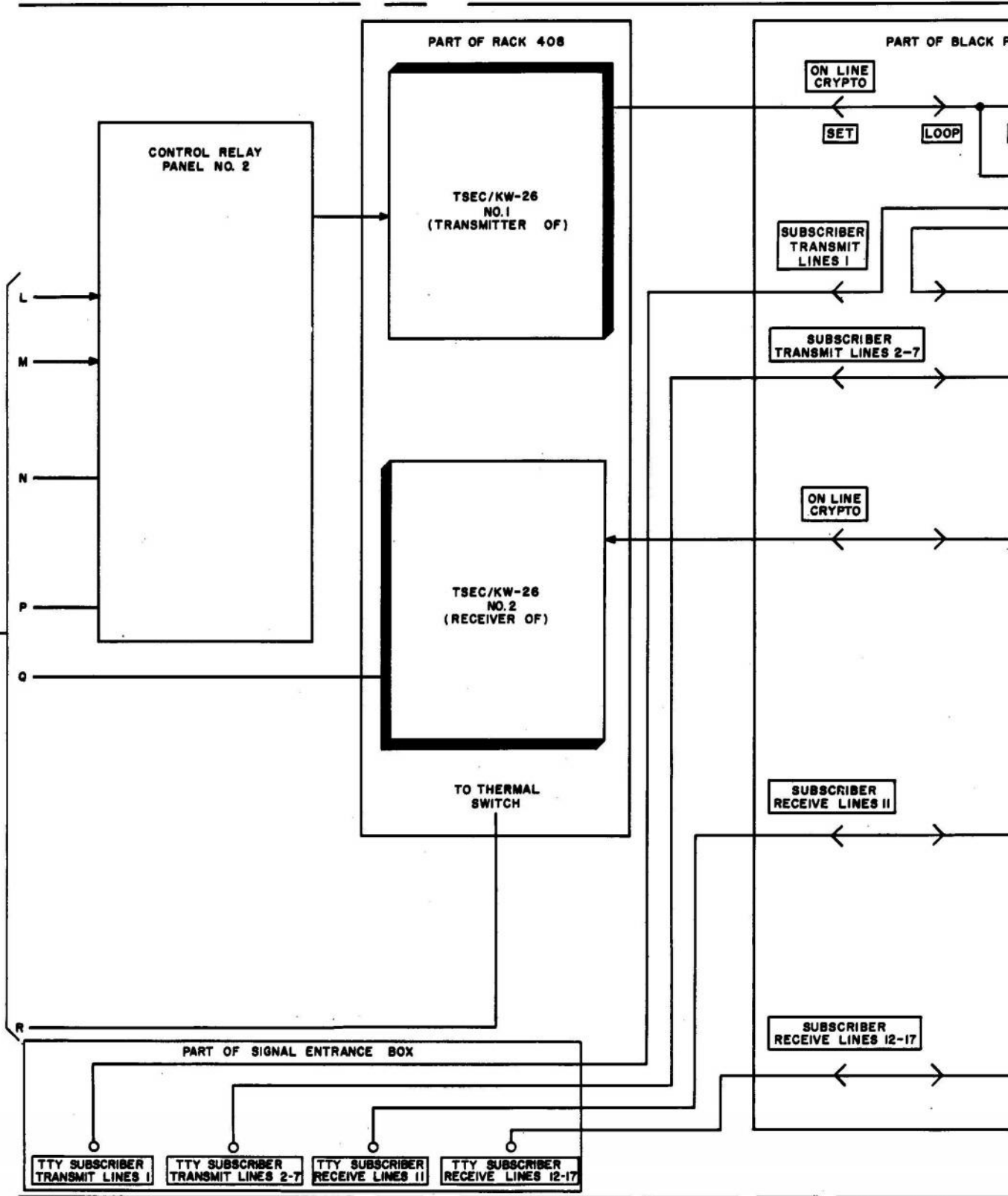
Figure 15 (2). Block diagram, part 2 of 4.

PART OF RED PATCH PANEL



TO SHEET 3

FROM SHEET 2



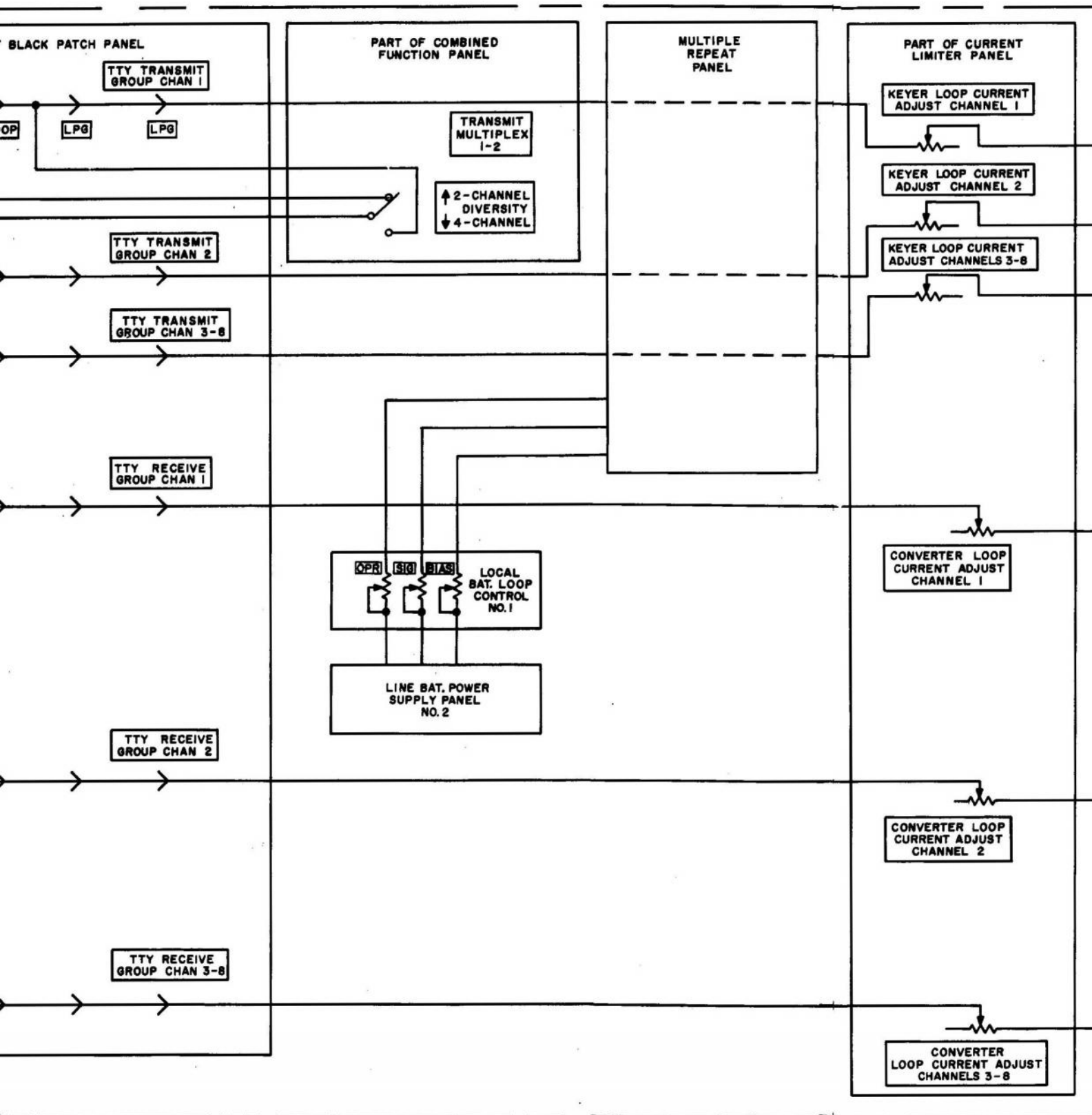
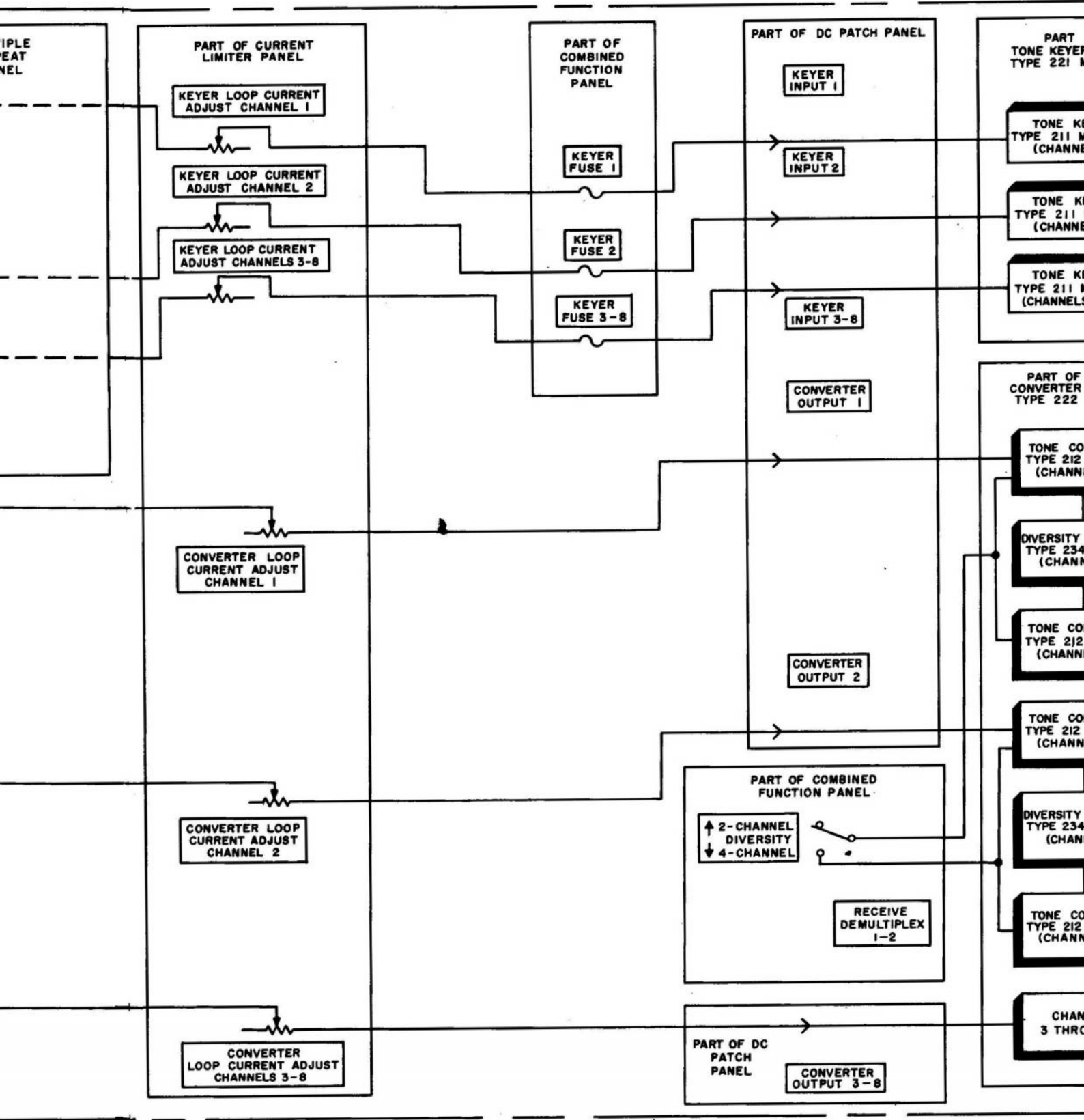
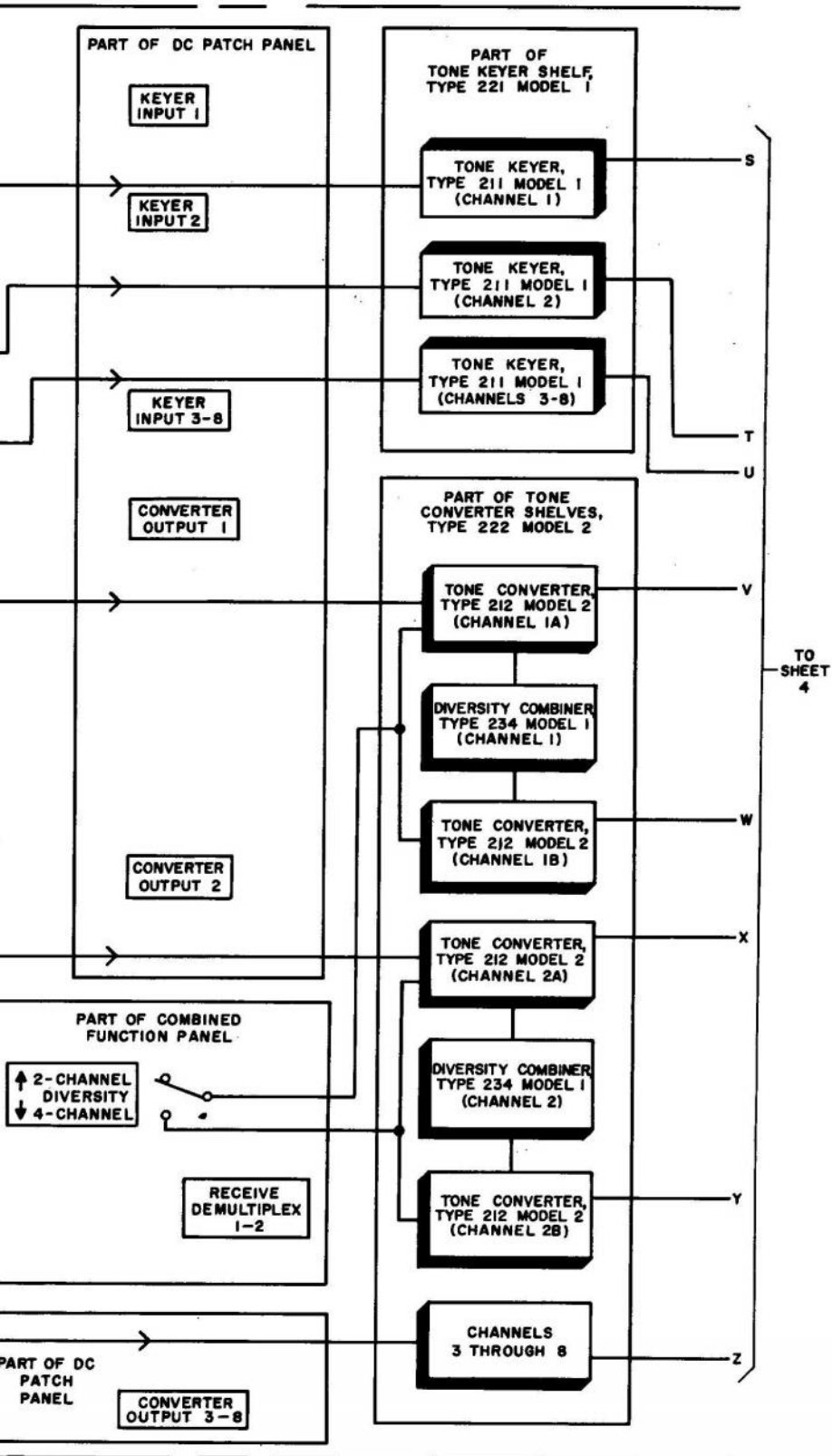
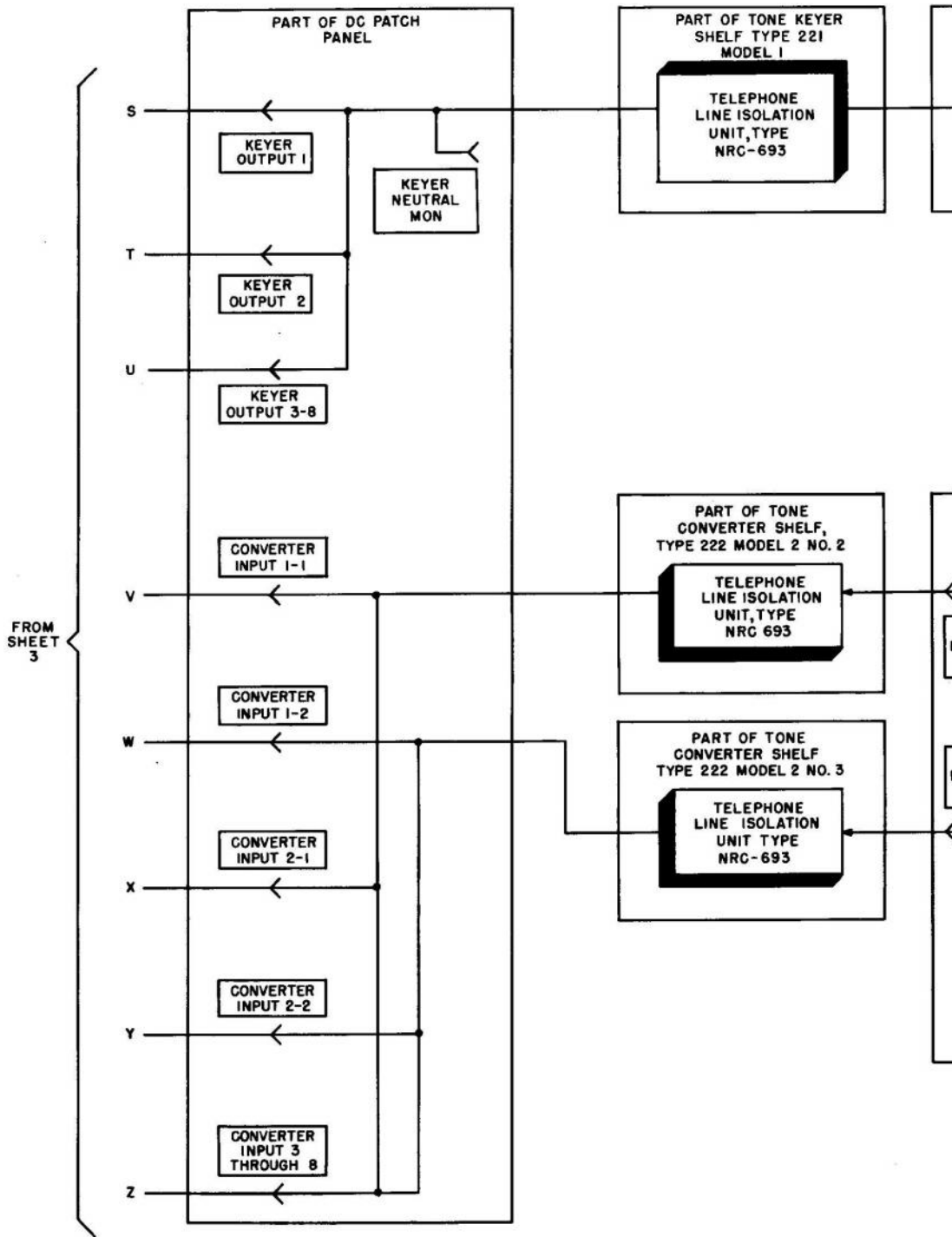


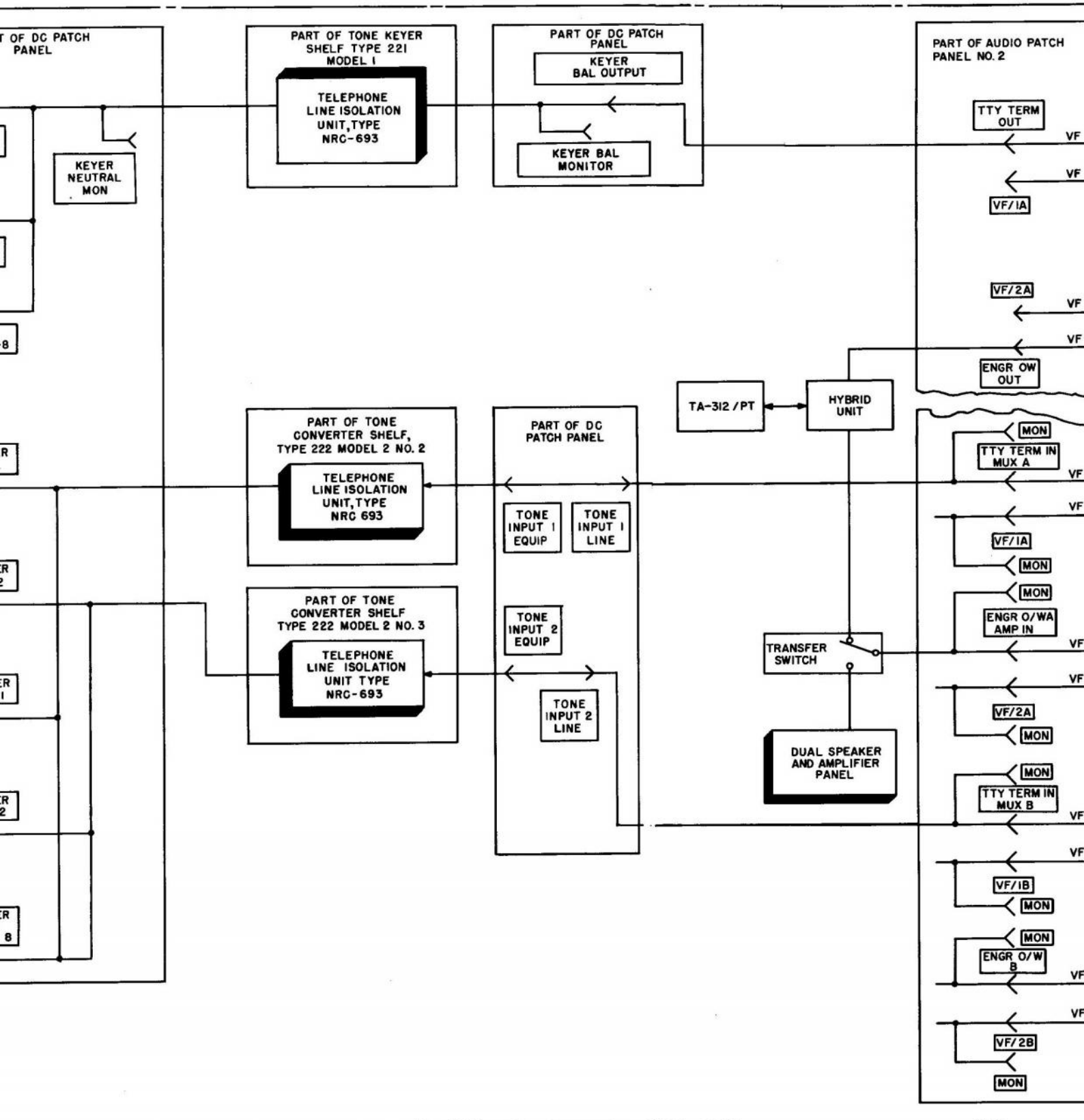
Figure 15 (3). Block diagram, part 3 of 4.





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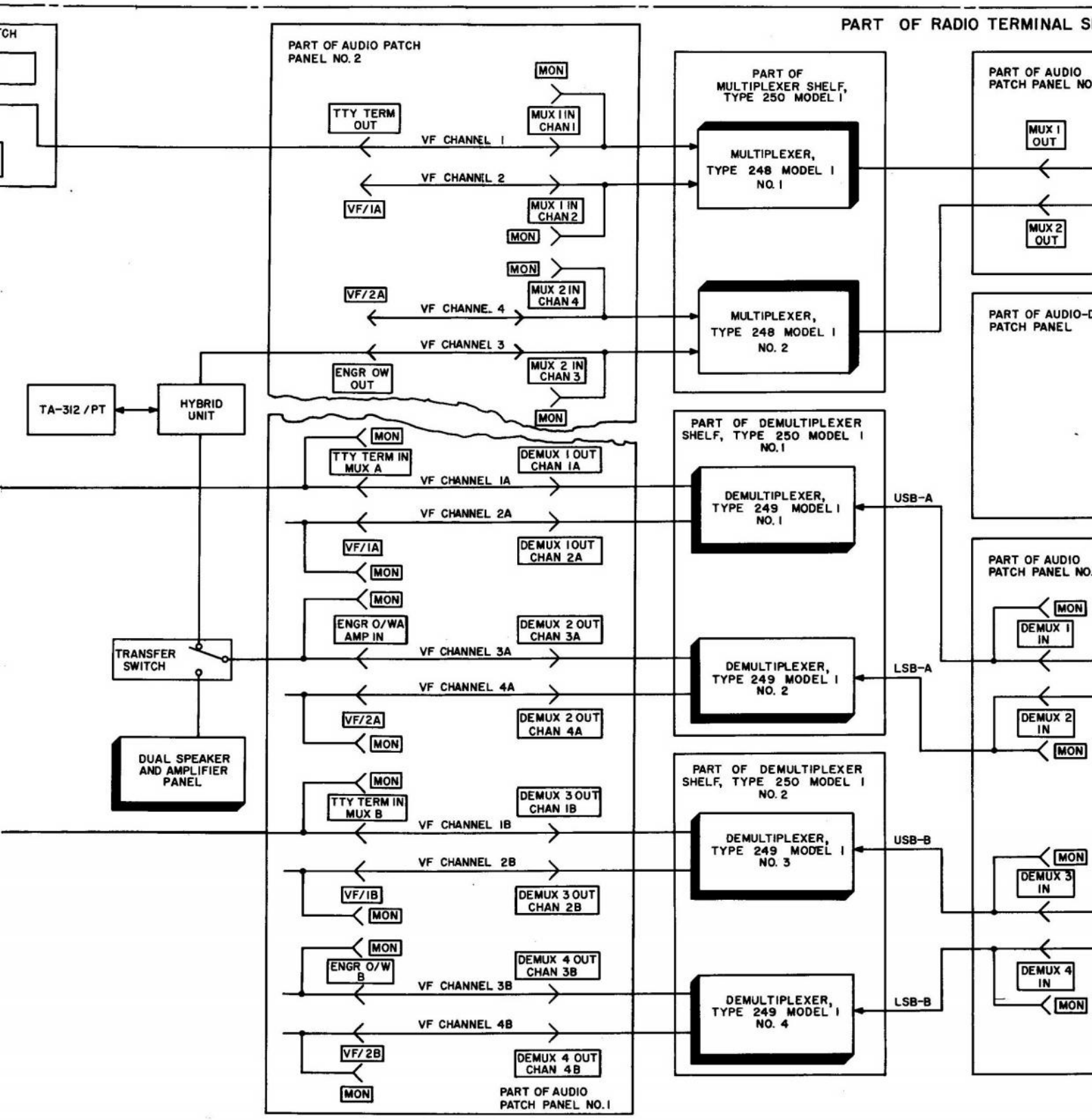


Figure 15 (4). Block diagram, part 4 of 4.

PART OF RADIO TERMINAL SHELTER

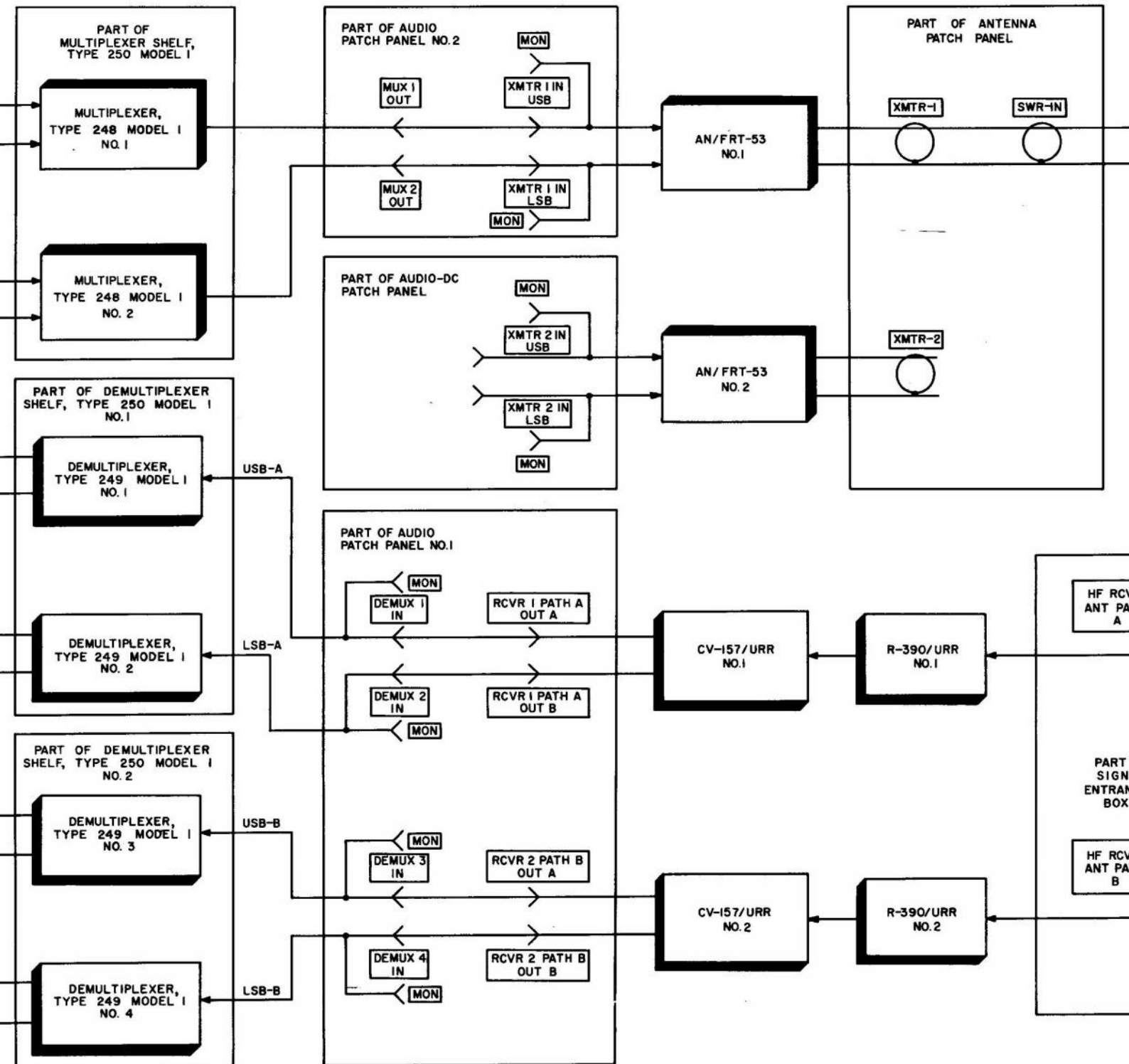
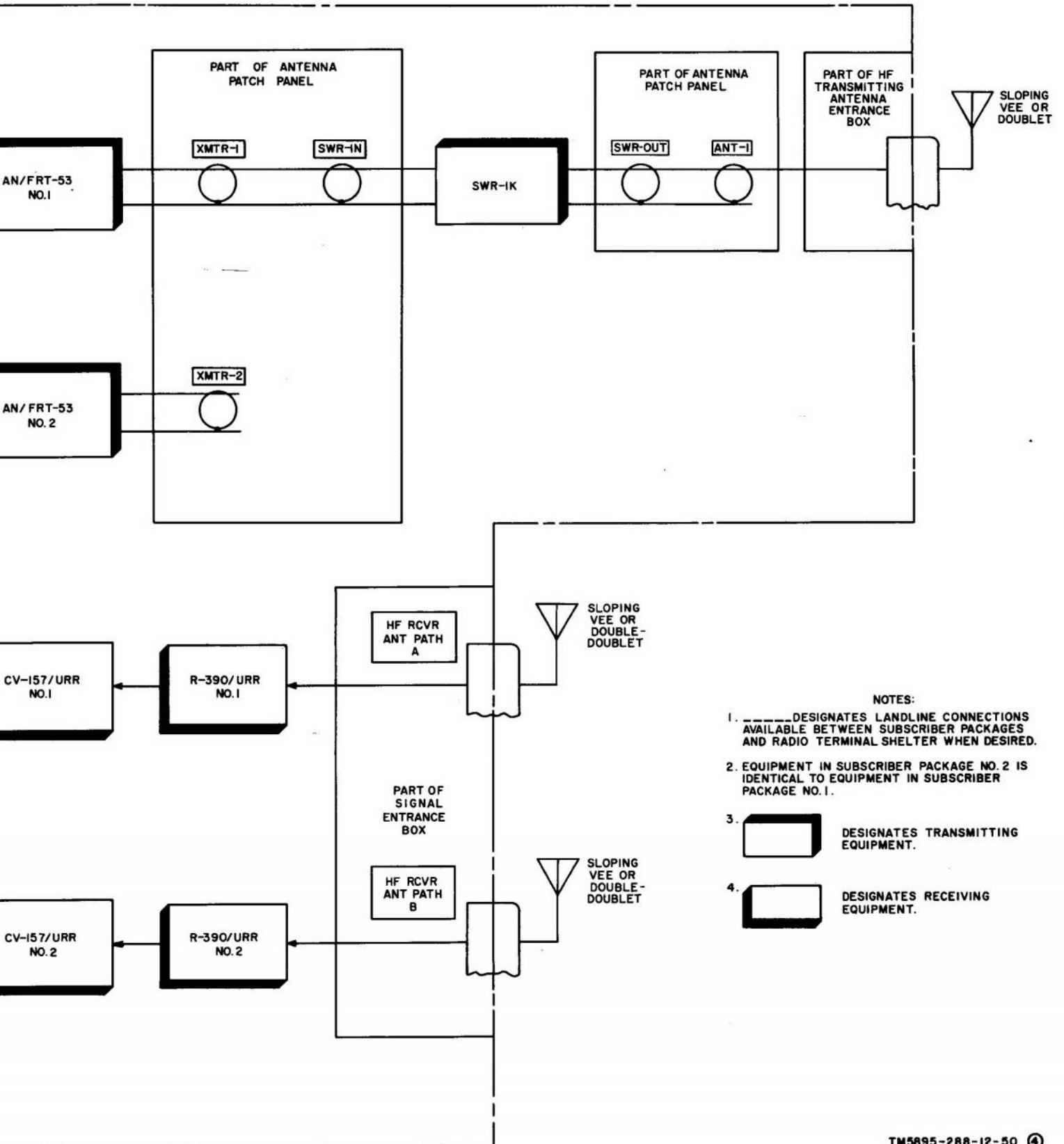


Figure 15 (4). Block diagram, part 4 of 4.



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transmitter distributor of the AN/FGC-25X in the subscriber package, are routed to the transmitter portion of the TSEC/KW-9. The encrypted dc output of the TSEC/KW-9 is connected to the VPT-1 (send circuit) where the dc signals are converted to frequency shift teletypewriter signals. The vf output of the VPT-1 appears at the VPT-1 AF OUT binding posts in the power and signal entrance box where they are strapped to either the AN/TRC-47 XMTR binding posts or to the EXT LINES binding posts, depending on whether vhf radio or landlines are used between the subscriber package and the radio terminal shelter. When vhf radio is used, the vf output of the VPT-1 is applied to the input of the T-593/TRC-47 where it amplitude modulates the rf carrier. The modulated rf carrier is transmitted via Antenna Assembly AT-588/TRC-42 to the radio terminal shelter. At the radio terminal shelter, the rf signal is received at the antenna and fed to the input of the R-748/TRC-47 where the signal is converted to a vf signal and applied through jacks on audio patch panel No. 2 to the receive circuit of VPT-1 No. 1. The VPT-1 No. 1 converts the vf signal to dc teletypewriter signals which are routed to the receive portion of TSEC/KW-9 No. 2 via the normalled-through jacks in the black patch panel. The decrypted dc teletypewriter signals from the TSEC/KW-9 are routed via control relay panel No. 1 and the normalled-through jacks of the red patch panel to the page printer and perforator of AN/FGC-25X No. 1, where the message sent from the subscriber package is printed and perforated. The teletypewriter send circuit from the radio terminal shelter to the subscriber package follows a path similar to that described above, starting from the keyboard or transmitter-distributor of AN/FGC-25X No. 1 at the radio terminal shelter and continuing to the page printer and perforator of the AN/FGC-25X in the subscriber package.

b. Telephone Circuit. The two-wire circuit from the TA-43/PT appears at the TA-43 binding posts in the power and signal entrance box in the subscriber package. These binding posts must be strapped

to the TEL 2W binding posts which are connected to the hybrid circuit in the VPT-1. The hybrid circuit converts the two-wire circuit to a four-wire circuit. The send portion of the telephone circuit is connected to a send filter in the VPT-1, which combines the voice and teletypewriter signals into one 3-kc band, but still maintains the separation between the teletypewriter and voice signals. The circuit from the output of the VPT-1 in the subscriber package to VPT-1 No. 1 in the radio terminal shelter is the same as for the teletypewriter circuit described in a above up to the receive circuit of VPT-1 No. 1. At this point, the teletypewriter and voice signals are separated by a receive filter. The teletypewriter signals are routed to AN/FGC-25X No. 1 and the voice signals are routed through the hybrid circuit in VPT-1 No. 1 and normalled-through jacks in audio patch panel No. 2 to the receiver of TA-43/PT No. 1. The telephone send circuit between TA-43/PT No. 1 in the radio terminal shelter and the receive portion of the TA-43/PT in the subscriber package follows a path similar to that described above. A call alarm bell associated with each telephone rings in response to a ring signal from either TA-43/PT.

48. High Frequency Radio Communication Link, Send Circuits (fig. 15①, ②, and ③)

a. Teletypewriter Circuit. The keyboard or transmitter-distributor of AN/FGC-25X No. 2 is used to originate messages to be transmitted by the AN/FRT-53. Dc signals from the teletypewriters are routed via normalled-through jacks on the red patch panel to control relay panel No. 2 and then to the transmitter portion of TSEC/KW-26 No. 1. The enciphered output of the TSEC/KW-26 is routed via normalled-through jacks on the black patch panel, multiple repeat panel, KEYER LOOP CURRENT ADJUST rheostat, KEYER FUSE 1, and series KEYER INPUT 1 jack to the tone keyer for channel 1 where the encrypted dc signals are converted to frequency-shift keyed (fsk) vf signals which appear at KEYER OUTPUT 1 jack

on the dc patch panel. The output of the eight tone keyer channels are combined at this point and are routed through the telephone line isolation unit which is used to adjust the input signal level to the multiplexer. The circuit continues through series-connected jacks on the dc patch panel and audio-dc patch panel No. 2 to multiplexer No. 1. Multiplexer No. 1 combines the 3-kc vf channel containing the 8-fsk teletypewriter channels (vf channel 1) and the standby 3-kc vf channel (vf channel 2) into one 6-kc vf channel which is applied through jacks on audio patch panel No. 2 to the upper sideband (usb) terminals on AN/FRT-53 No. 1. Under adverse radio propagation conditions, the reliability of the teletypewriter circuits may be increased by using four-channel diversity operation on both ends of the hf radio circuit. When the TRANSMIT MULTIFLEX 1-2 switch on the combined function panel is moved to 4-CHANNEL DIVERSITY, the input teletypewriter signal from the TSEC/KW-26 No. 1 transmitter is applied to two tone keyers simultaneously. At the receiving end of the circuit (para 49a), it provides four signals containing the same intelligence from which the best is selected for use.

b. *Telephone Circuit (Engineer's Order Wire)*. The engineer's order wire circuit in the radio terminal shelter is terminated in the TA 312/PT (fig. 15④). The two-wire circuit from the TA-312/PT is connected to a hybrid unit which converts the two-wire circuit to a four-wire circuit. The send circuit from the hybrid unit is routed through the ENGR OW OUT jack on the audio patch panel No. 2 to multiplexer No. 2. Multiplexer No. 2 combines the 3-kc vf engineer's order wire circuit (vf channel 3) and the second standby 3-kc vf channel (vf channel 4) into one 6-kc vf channel which is applied through jacks on audio patch panel No. 2 to the lower sideband (lsb) terminals on AN/FRT-53 No. 1.

c. *Standby Vf Channels*. A standby vf channel is available at MUX 1 IN CHAN 2 and MUX 2 IN CHAN 4 jacks in audio patch panel No. 2. These channels may be used for either voice or facsimile service to a location outside the radio terminal shelter, if required (para 123b).

49. High Frequency Radio Communication Link, Receive Circuits (fig. 15②,③, and④)

Space diversity reception is normally used between the radio terminal shelter and the distant radio terminal using two Receivers, Radio R-390/URR and either sloping-vee or double-doublet antennas. The hf radio signal is received at the antenna and routed via the RAC-30A coupler (not shown) and the signal entrance box to R-390/URR No. 1. The intermediate frequency (if.) output of the R-390/URR is connected to the input of CV-157/URR No. 1, which demodulates the if. signal and produces two 6-kc signals that contain the intelligence from the upper and lower sidebands. Each 6-kc output signal from the CV-157/URR is routed through jacks on audio patch panel No. 1 to a demultiplexer in demultiplexer shelf No. 1. The upper sideband information (USB-A) is connected to demultiplexer No. 1, and the lower sideband information (LSB-A) is connected to demultiplexer No. 2. Each demultiplexer, in turn, converts the 6-kc input signal to two 3-kc signals which appear on jacks in audio patch panel No. 1. The circuit through R-390/URR No. 2, CV-157/URR No. 2, and demultiplexers No. 3 and No. 4 is identical with that described above.

a. *Teletypewriter Circuit*. One 3-kc output from demultiplexer No. 1 in demultiplexer shelf No. 1 (vf channel 1A) contains the eight teletypewriter channels which are routed through a telephone isolation unit to the converter inputs. When space diversity operation is used, the output from demultiplexer No. 1 (vf channel 1A) and the output from demultiplexer No. 3 (vf channel 1B) are each applied to one of a pair of tone converters, which converts the fsk signals to dc signals. Each pair of converters is tuned to accept that portion of the 3-kc input signal associated with a specific teletypewriter channel. The diversity combiner samples the signal at each converter and selects the instantaneously larger signal output. The selected signal is routed through jacks on the dc patch panel, converter loop current adjust channel 1, and jacks on the black patch

panel to the receiver of TSEC/KW-26 No. 2. The TSEC/KW-26 deciphers the dc signal and routes it through jacks on the red patch panel to the perforator and page printer of AN/FGC-25X No. 2. Under adverse receiving conditions, the reliability of the teletypewriter circuits may be increased by using four-channel diversity operation on both ends of the hf radio circuit. When the RECEIVE DEMULTIPLEX 1-2 switch on the combined function panel is moved to 4-CHANNEL DIVERSITY, the combined output from four tone converters is routed to the TSEC/KW-26. Four-channel diversity operation reduces the number of teletypewriter message channels available over the hf communications link by one-half.

b. *Telephone Circuit (Engineer's Order Wire)*. One 3-kc output from demultiplexer No. 2 in demultiplexer shelf No. 1 (vf chan-

nel 3A) (fig. 15(4)) is normally used as the receive side of the telephone circuit. This output signal is routed through jacks on audio patch panel No. 1 and a transfer switch to the hybrid unit. The hybrid unit passes the voice signal to the receiver of the TA-312/PT. When the transfer switch is operated, the voice signal is applied to the dual speaker and amplifier panel.

c. *Standby Vf Channels*. The standby vf channels from demultiplexer No. 1 and No. 2 (vf channel 2A and 4A) may be used for voice or facsimile service to a location outside of the radio terminal shelter, if required. This may be accomplished by patching from the applicable DEMUX OUT jack on audio patch panel No. 1 to any jack on the black patch panel that is connected to TTY SUBSCRIBER RECEIVE LINES binding posts in the SIGNAL ENTRANCE BOX.

CHAPTER 2

INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

50. Siting (fig. 1)

a. *General.* The location of the AN/TSC-20 depends on the tactical situation, antenna siting considerations, and local terrain. Three sites are required; one for the radio terminal shelter with associated air conditioner, 10-kw generators, and antennas; and one for each of the two subscriber packages. Consideration must be given to selecting a line-of-sight position for the subscriber packages with relation to the side of the radio terminal shelter. Where possible, all three sites should be on level, dry ground with good drainage. The sites selected for the antennas should be cleared of any obstructions and tree or brush growth. The radio terminal shelter dolly assembly, the two-wheel trailer, and the four-wheel trailer facilitate towing and positioning of the equipments. If the AN/TSC-20 is towed to the site, vehicular speed should not exceed 20 miles per hour (mph) over first-grade roads or 5 mph cross country.

b. *Radio Terminal Shelter.* The radio terminal shelter should be located near the center of the sites cleared for the high frequency transmitting and receiving antennas to permit proper location and orientation of the antennas. The ground should be as level as possible. The radio terminal shelter leveling jacks will compensate for slight variations. The hf transmitting antenna may be located up to 150 feet from the shelter in the direction of the distant terminal. The hf receiving antennas are located on opposite sides of the radio terminal shelter behind the transmitting antenna. Each receiving antenna may be located up to 350 feet from the shelter.

c. *Air Conditioner and Generator Sets.* The mounting stand for the air conditioner should be set up close to the front of the radio terminal shelter. The four-wheel

trailer should be towed into position so that the air conditioner can be transferred from the trailer to the mounting stand. The 10-kw generators should be located as far as possible from the radio terminal shelter to minimize communication interference caused by generator noise.

d. *Subscriber Packages.* The subscriber packages may be located a maximum distance of 10 miles from the radio terminal shelter. The actual distance will depend on the tactical situation. A site must be selected that will permit line-of-sight communications with the radio terminal shelter. The selected site must be close to a power source since subscriber packages are not provided with ac power sources.

51. Installation of Radio Terminal Shelter

At the site, the radio terminal shelter normally is installed with its skids resting on the ground and the caster assemblies swung upright against the sides of the shelter. However, the radio terminal shelter may be installed with the wheels in the towing position provided the footbrake on each wheel is operated to lock the wheels. The leveling jacks are required in either case if the terrain is not level.

a. *Positioning Radio Terminal Shelter.* Each caster assembly on the radio terminal shelter may be rotated with a turning bar to enable the shelter to be correctly positioned on the selected site. Position the shelter as instructed below.

- (1) Release the footbrakes (fig. 2 and 3) by raising the footbrake pedal.
- (2) Check the locking pins on each caster assembly. If the locking pin is in the vertical position, the caster assembly is locked. Release the caster assembly by pulling outward on the locking pin until it can be turned to the horizontal position.

The caster assembly is then free to move.

- (3) Remove each turning bar from its mounting bracket by pushing the turning bar from its mounting bracket by pushing the turning bar into the tubular mounting bracket until the opposite end of the turning bar can be lifted free.
- (4) Insert the tapered end of the turning bar into the turning bar tube located at the rear of each caster fender.
- (5) Rotate each caster assembly to the desired position with the turning bars. The caster fender on each assembly should be at the rear of the wheels.
- (6) Push or tow the radio terminal shelter as required.

Caution: If the radio terminal shelter is towed, make certain that the two rear casters are locked (locking pins in the vertical position) and the two front casters are free to rotate (locking pins in the horizontal position).

- (7) Replace each turning bar by first placing the circular end of the turning bar in the tubular mounting bracket. Press the turning bar into the tubular mounting bracket until its tapered end is aligned with the rectangular mounting bracket and release the turning bar.

b. Removing Tow Bar Assembly. To remove the tow bar assembly, depress the center button on each tow bar securing pin in the towing eyes and remove the tow bar securing pins.

c. Installing Radio Terminal Shelter on Ground.

- (1) At each leveling jack, lift the crank handle to the horizontal position and push inward until the handle is firmly engaged in the crank fitting.
- (2) Use a man at each end of the radio terminal shelter. Raise each side alternately about 6 inches at a time by turning the crank handles clockwise, until all casters clear the ground.
- (3) Remove the three retracting pins

from the cylindrical dolly frame above each caster. Press down on the center button to free the pin. Pull the pin by means of the finger grip flange.

- (4) Lift each caster upward until the shaft and frame holes are aligned.
- (5) Insert the center retracting pin for each caster into the center hole to secure each caster in the upward position.
- (6) Turn each crank handle counter-clockwise until the radio terminal shelter is lowered to the ground.

d. Leveling Radio Terminal Shelter. If the radio terminal shelter is installed on uneven ground, level the radio terminal shelter by operating the applicable jacks until the radio terminal shelter is level. If the terrain is level enough, and the radio terminal shelter is to remain sited on its dolly, secure the radio terminal shelter by operating each footbrake pedal to the brake position.

52. Unpacking

The components required for installing the antennas at the radio terminal shelter and the adapter masks, flexible hoses, and Y-adapter for the air conditioner are secured in the radio terminal shelter during transportation. The air conditioner mounting stand and power cables are secured on top of the air conditioner, which is on the four-wheel trailer. The antenna components for the subscriber package are secured at the rear of the subscriber package. Unpacking instructions for the air conditioner are given in paragraph 54 and for the subscriber package in paragraph 55. Unpack the radio terminal shelter as described below.

a. Unlock the padlock and open the door of the radio terminal shelter.

Note: The padlock keys are in a drawstring bag attached to the door hasp.

b. Release the tiedowns (B, fig. 16) and remove the TS-2C/TG, coils of coaxial cable, 12-gage antenna wire, and the reel of RG-86 transmission line from the top of Accessories Case CY-1392/G. Remove the CY-1392/G from between the tiedown floor brackets.

c. Remove the tiedown floor brackets by removing the attaching screws.

d. Remove the holding bolts and washers (E, fig. 16) and remove the TRC-500 coupler from the rear posts.

e. Remove the bolts, nuts, and washers, and remove the TDR-002.5 terminators and terminator mounting stakes from the rear posts.

f. Remove the folding chair by releasing its tiedown.

g. Remove the bolts, nuts, and washers that hold the storage brackets (B, fig. 16) between the center and rear posts. Remove the storage brackets.

h. Remove the top and bottom nuts and washers on the two rear posts. Remove the rear posts.

i. Remove the three mast section carriers and the guy stake carrying case.

j. Remove the top and bottom rear post mounting plates (A, fig. 16) by removing the mounting screws.

k. Remove the rear holding bracket (B, fig. 16).

l. Remove the top and bottom nuts and washers from the center curbside post. Remove the center curbside post.

m. Remove top Antenna Support AB-38B/CR (B, fig. 16). Release the tiedowns and remove the adapter mask. Release the tiedowns and remove the flexible hose enclosure. Place the adapter mask and flexible hose enclosure near the generator air conditioner trailer.

n. Remove the three remaining AB-38B/CR's.

o. Remove the top and bottom nuts and washers from the center roadside post (A, fig. 18) and remove the center roadside post.

p. Remove the top and bottom center post mounting plates by removing the mounting screws.

q. Remove two vhf masts strapped to the floor.

r. Remove the front holding bracket (B, fig. 16).

s. Remove the top and bottom nuts and washers from the front posts. Remove the front posts.

t. Remove the top and bottom front post

mounting plates (A, fig. 16) by removing the mounting screws.

u. Remove the ground rod assemblies (B, fig. 16) by turning each hand knob counterclockwise and rotating each securing clamp 90°.

v. Remove the Jacob's staff from the ceiling brackets (A, fig. 16).

w. Remove the Y-adapter and heater (D, fig. 16) from the top of the test bench by releasing the tiedowns.

x. Remove the coupler storage case (C, fig. 16) from under the desk by releasing the tiedowns.

y. Remove Antenna Assemblies AT-588/TRC-42 (D, fig. 16) from under the test bench.

53. Checking Unpacked Equipment

Check the equipment against the enclosed packing list or against the list of components (appx II) if no packing list is available. In addition, check the equipment for the following:

a. Damaged panel fronts, broken indicators or meters, loosened or broken knobs.

b. Loose panels.

c. Loose cable connectors, broken cabling, or frayed insulation.

d. Damaged antenna, power, or landline connectors.

54. Unloading and Installing Air Conditioner

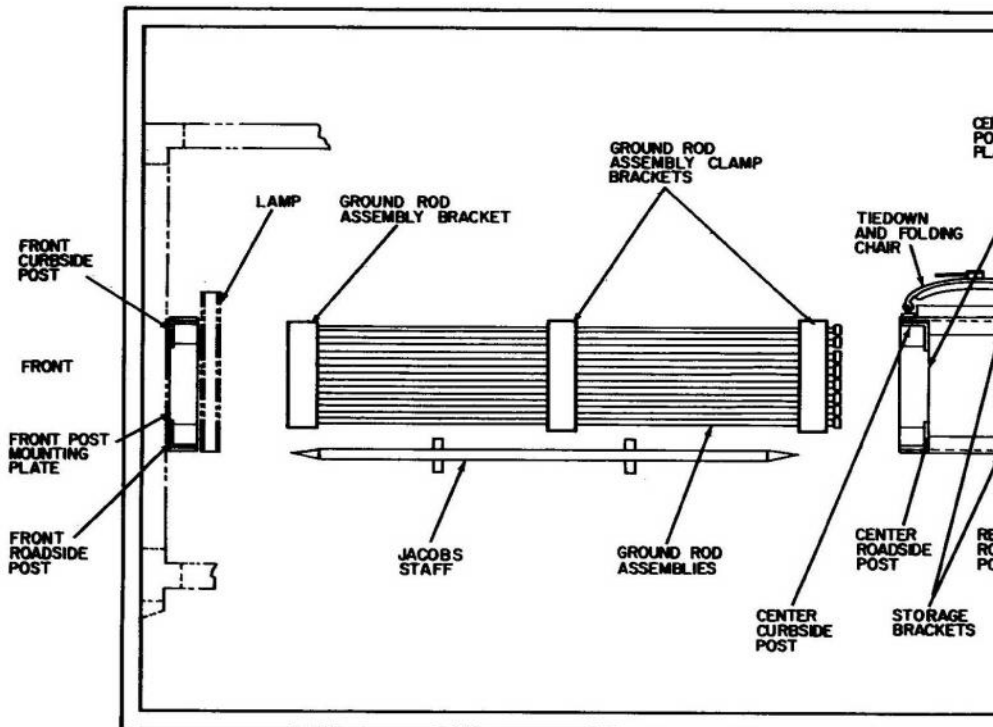
Before installing the 10-kw generators, unload the air conditioner and place it on its mounting stand (fig. 19). At least four men are required to unload the air conditioner. Unload and install the air conditioner and mounting stand as follows:

a. Place the trailer at the front curbside of the radio terminal shelter so that the tow bar faces the radio terminal shelter. Apply the handbrake.

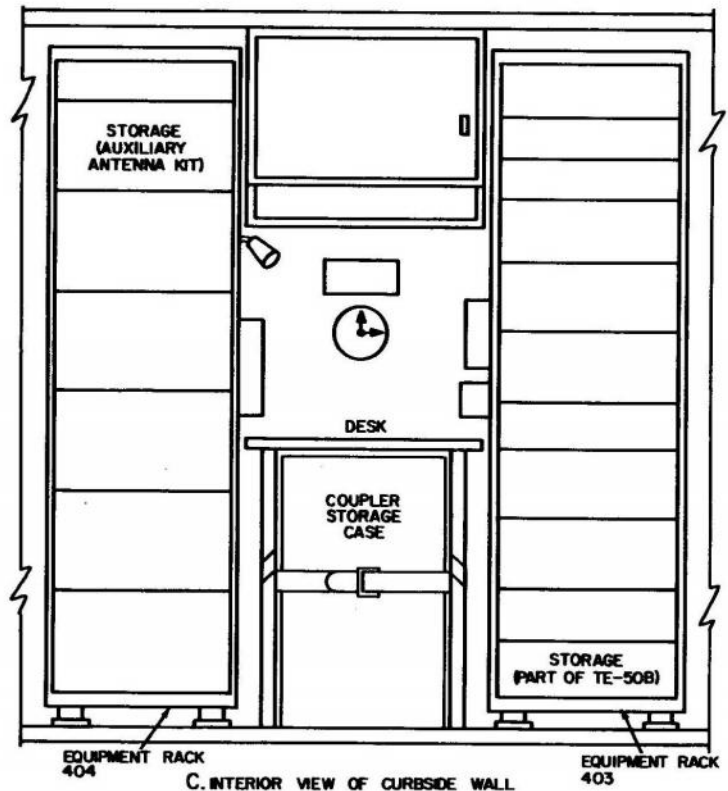
b. Release the tiedowns that hold the cable reel and mounting stand legs to the mounting stand top on the air conditioner (fig. 17).

c. Remove the cable reel, mounting stand legs, and mounting stand top from the top of the air conditioner.

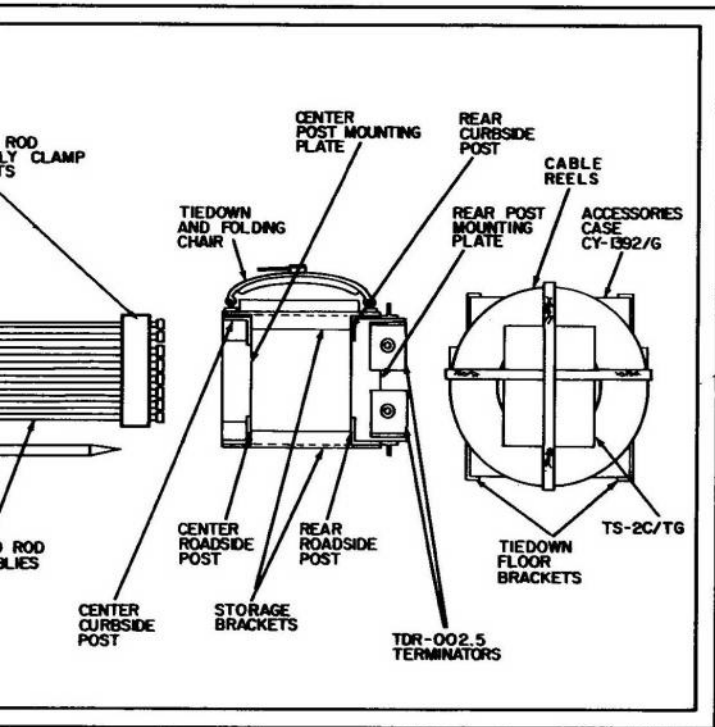
d. Assemble the mounting stand (fig. 18)



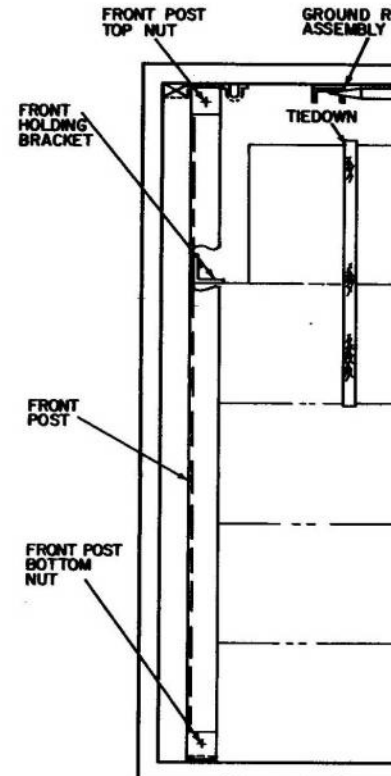
A. TOP VIEW (ROOF REMOVED)



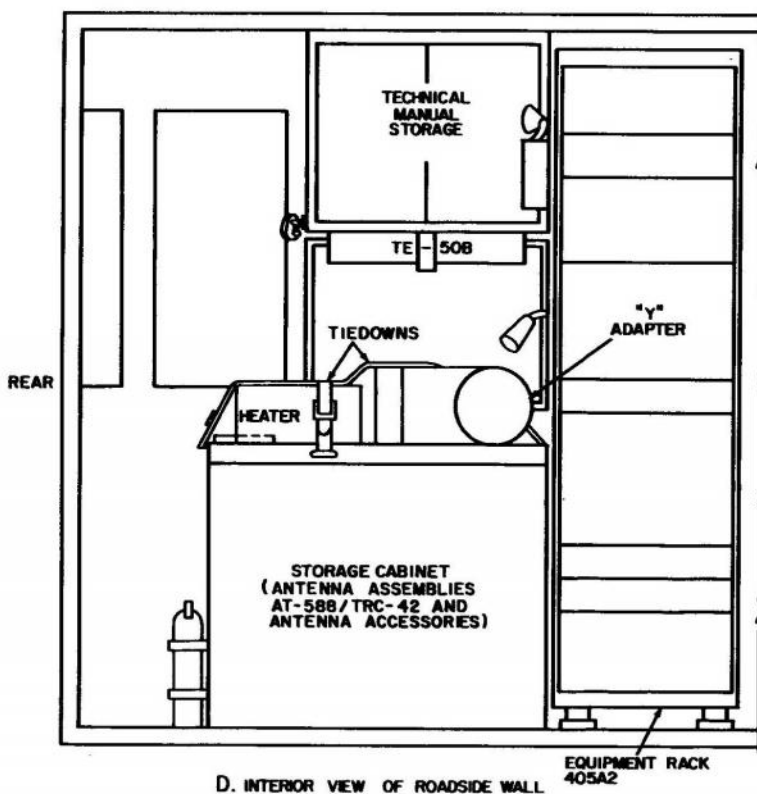
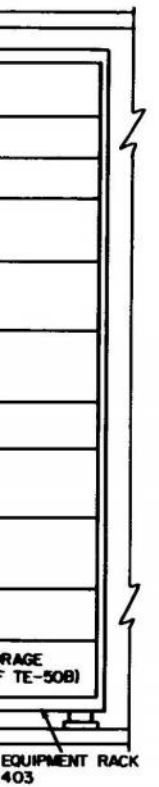
C. INTERIOR VIEW OF CURBSIDE WALL



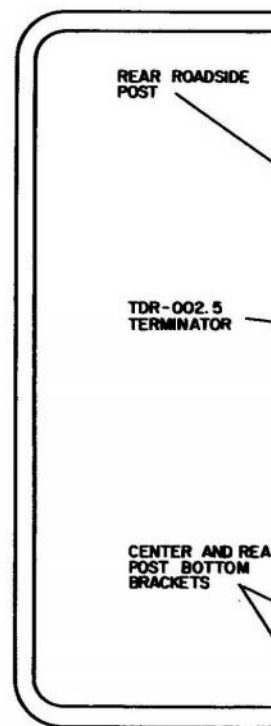
A. TOP VIEW (ROOF REMOVED)



B. ROADSIDE VIEW (W

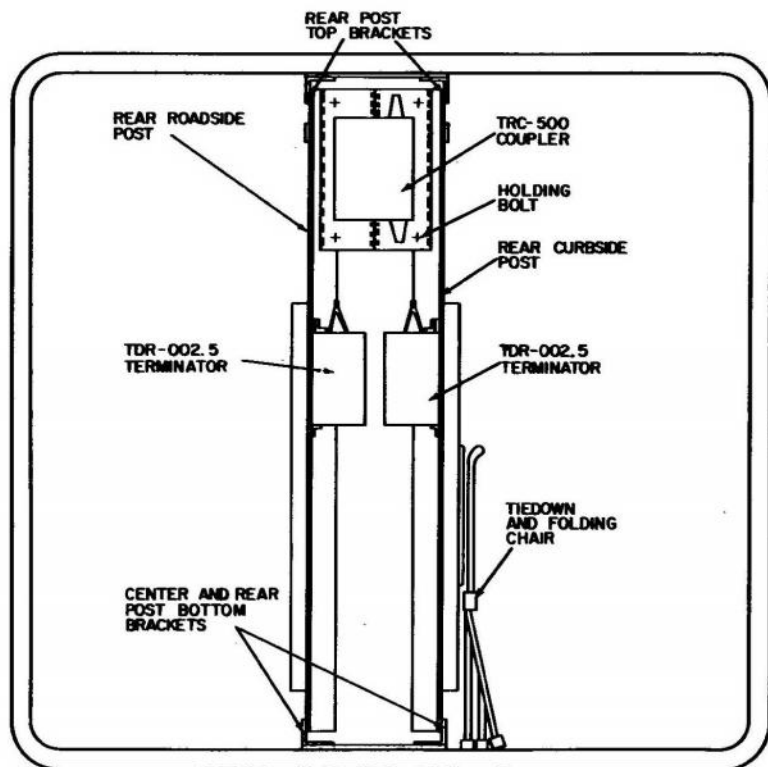
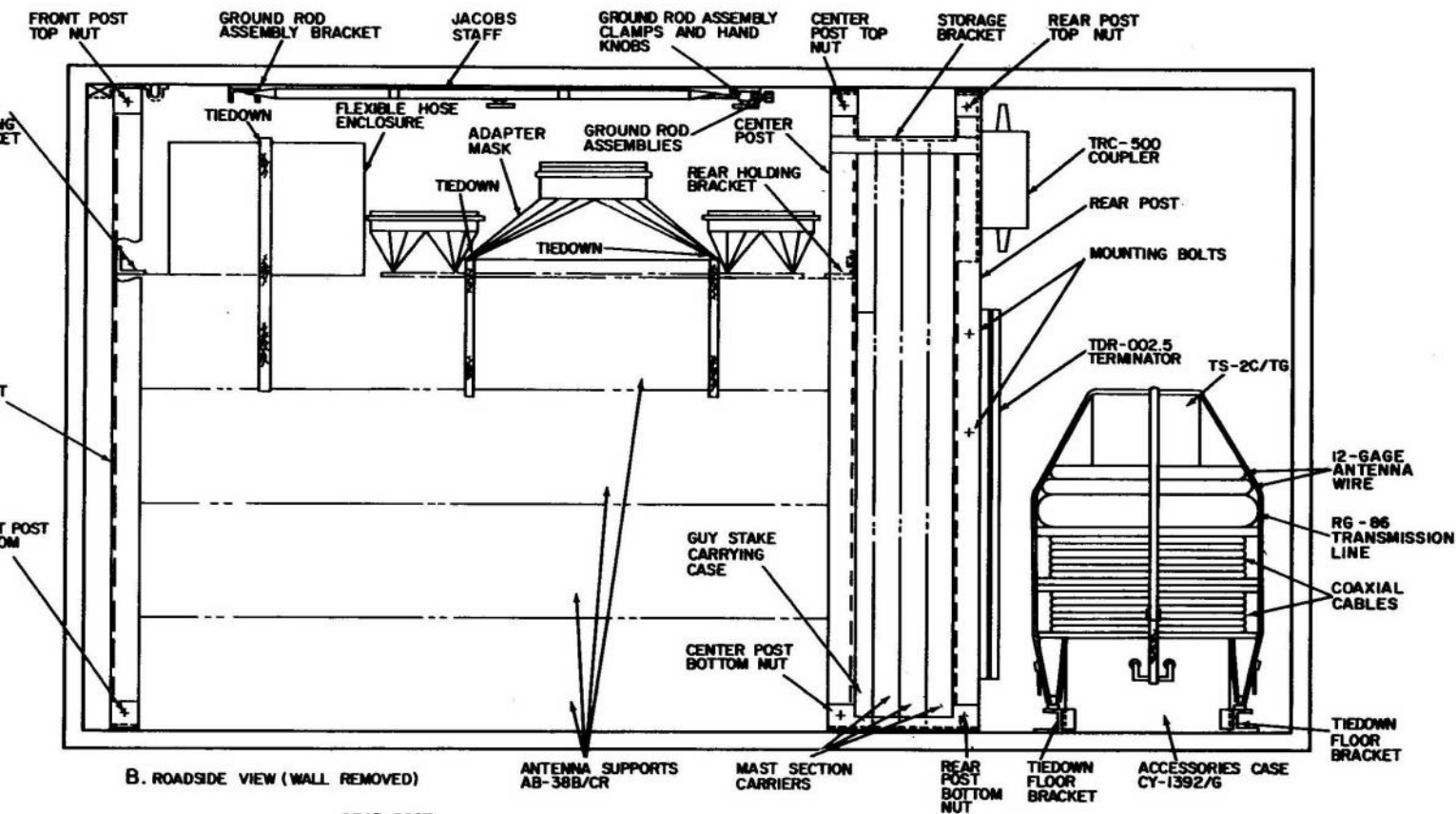


D. INTERIOR VIEW OF ROADSIDE WALL

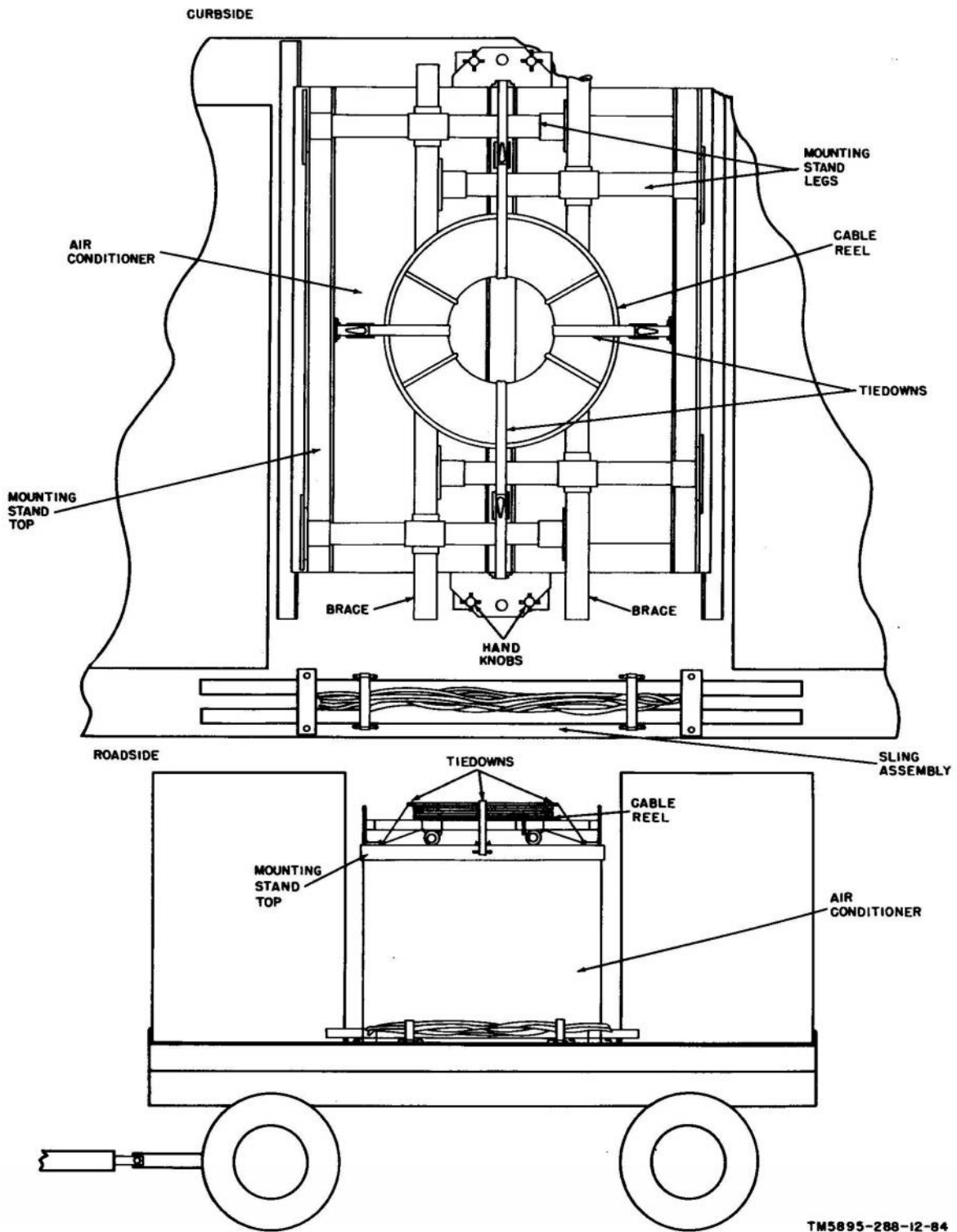


E. INTER

Figure 16. Radio terminal shelter, location of stored items.

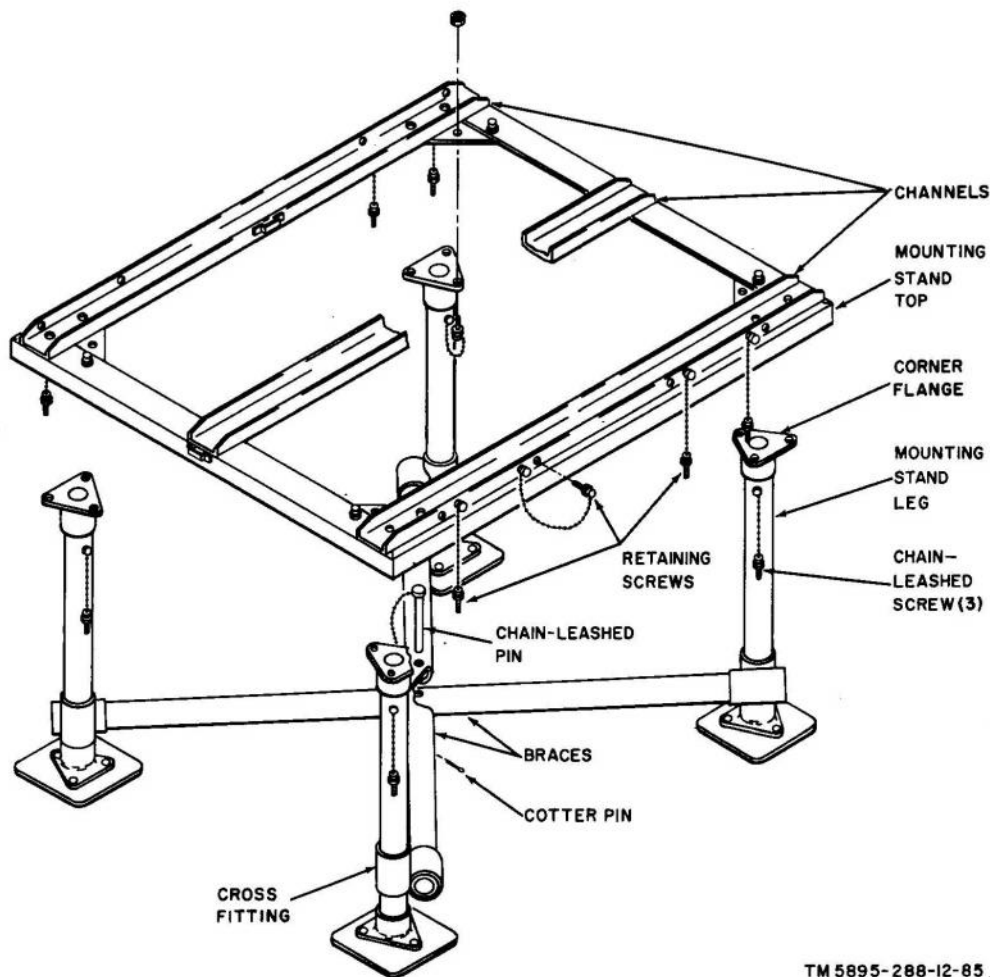


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Figure 17. Air conditioner and mounting stand storage.



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Figure 18. Air conditioner and mounting stand, exploded view.

by first placing the mounting stand top upside down (three channels down) on the ground.

Note: When stored, the mounting legs are attached in pairs by their associated braces. When assembling the mounting stand, the mounting stand legs of each pair must be placed in diagonally opposite corners, and the pair associated with the chain-leashed pin must be mounted first.

e. Connect the mounting stand legs to the mounting stand top by aligning the corner flange of each leg with the mounting holes. Secure each leg with the three chain-leashed screws.

f. Set the mounting stand legs the correct distance apart by sliding the brace in the cross fittings until the end of the brace is flush with the outside of the cross fitting. Secure the braces by placing a chain-leashed pin through both braces and

then place a cotter pin through the bottom of the chain-leashed pin.

g. Place the mounting stand (fig. 20) approximately 6 feet from the front of the radio terminal shelter so that the three channels on the mounting stand top are parallel to the front wall of the radio terminal shelter. The center of the mounting stand should be opposite the center of the shelter.

h. Release the handbrake on the trailer and move it so that its curbside is flush against the mounting stand and the three skids of the air conditioner are aligned with the three channels on the mounting stand top. Apply the handbrake on the trailer.

i. Remove the hand knob screws (fig. 17) from the air conditioner mounting brackets.

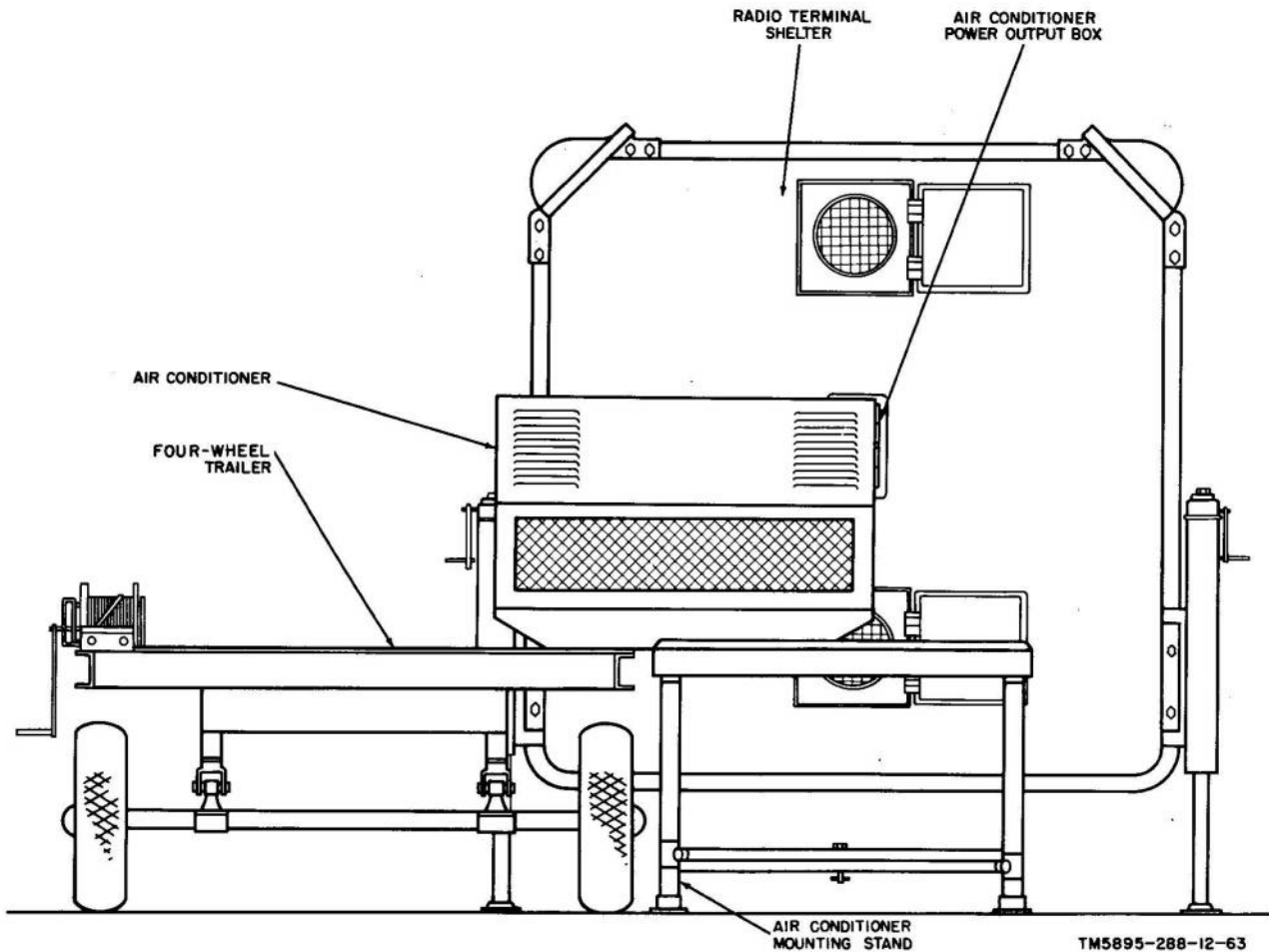


Figure 19. Installing air conditioner on mounting stand.

j. Attach winch blocks to the center outboard unloading rings; block No. 1 (block nearest winch cable hook) to the curbside ring, and block No. 2 to the roadside ring.

k. Attach the winch cable hook to the air conditioner mounting bracket on the roadside of the air conditioner with the winch cable passing underneath the air conditioner.

l. Using the winch, pull the air conditioner as far onto the mounting stand as possible. Be sure that the mounting stand is held firmly. Remove the winch cable hook and push the air conditioner onto the stand until it rests firmly on the stand.

m. Secure the air conditioner to the mounting stand by inserting the eight chain-leashed retaining screws through the outside channels of the mounting stand.

n. Release the handbrake and move the

trailer to a position approximately 50 feet from rear roadside corner of the radio terminal shelter (fig. 1). Apply the handbrake.

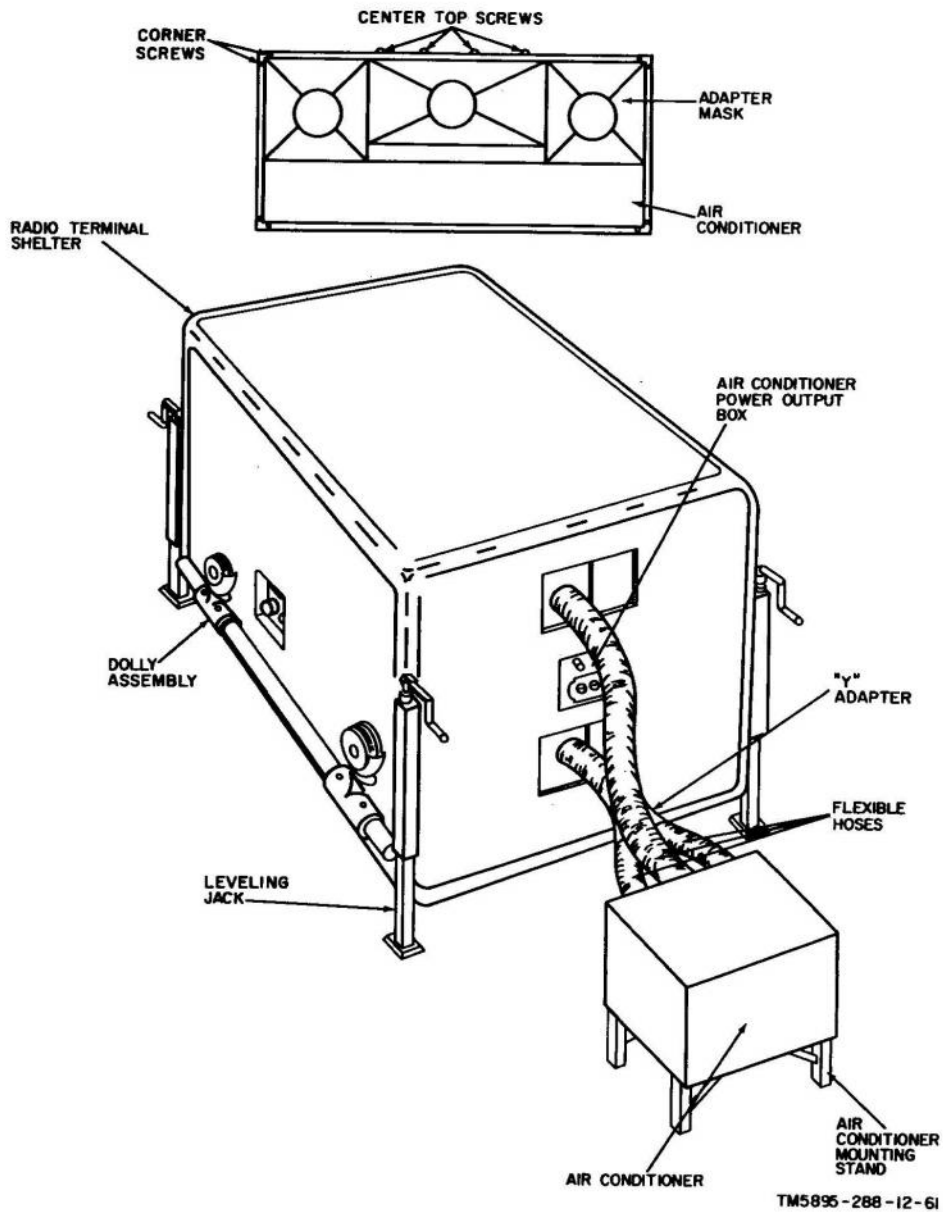
o. Remove the eight screws from the corners of the upper front section of the air conditioner (fig. 20). Loosen the four center top screws.

p. Fit the adapter mask over the front top section of the air conditioner and secure it with the eight screws removed in o above. Tighten the four center top screws.

q. Use adjustable band clamps to secure the two short lengths of flexible hose to both outside openings on the adapter mask.

r. Use adjustable band clamps to secure one end of the longest length of flexible hose to the center opening on the adapter mask.

s. Use adjustable band clamps to secure



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Figure 20. Installing air conditioner adapter mask and flexible hoses.

the free ends of the short flexible hoses to the Y-adapter, and secure a third short flexible hose to the leg of the Y-adapter. The Y-adapter should be under the center flexible hose.

t. Loosen the captive thumbscrews on the upper and lower doors (fig. 2) on the front of the radio terminal shelter.

u. Hold the doors open with the spring-loaded door catches.

v. Use adjustable band clamps to secure the long flexible hose from the center of

the adapter mask to the upper air conditioning opening of the radio terminal shelter, and secure the short flexible hose from the Y-adapter to the lower air conditioning opening of the radio terminal shelter.

55. Unloading and Installing Subscriber Packages

a. *General.* Depending on the tactical situation, the equipment enclosure can be

operated either mounted upon or removed from the two-wheel trailer. In either case, the equipment enclosure must be located near a source of local power. The site for the subscriber package must be selected to provide line-of-sight communication, not more than 10 miles from the radio terminal shelter. Refer to paragraph 64c for subscriber package connections.

b. Operating with Equipment Enclosure Mounted on Trailer (fig. 14).

- (1) Remove the safety chain and disconnect the trailer from the transporting vehicle.
- (2) Move the trailer to the desired location.
- (3) Apply the handbrake.
- (4) Lower the retractable landing wheel.
- (5) Lower the stabilizing jacks.
- (6) Open the relief valve (not shown) on the side of the equipment enclosure.
- (7) Open the latches and remove the front cover of the equipment enclosure.

c. Unloading Subscriber Package from Trailer (fig. 14). Unload the subscriber package from the trailer as follows:

Note: Before taking the subscriber package off the trailer, make certain that the ground at the selected site is hard and fairly level to permit the subscriber package to be rolled on its casters.

- (1) Move the trailer as close to the desired location as possible.
- (2) Lower the stabilizing jacks.
- (3) Remove the ramps from ramp storage and attach them to the ramp attachment slot at the rear of the trailer.
- (4) Attach the hook at the end of the winch cable to the towing cable on the side of the subscriber package.
- (5) Pull out on the locking pins on both sides of the subscriber package.
- (6) Place the winch brake at OFF.
- (7) Push the subscriber package down the ramp; use the winch to hold it, until all four casters on the subscriber package rest on the ground.
- (8) Roll the subscriber package to the desired location.

Note: The dimensions of the subscriber package are 57-1/2 inches high, 57-7/8 inches wide, and 29-1/2 inches deep. It can be moved through a doorway if it is desired to operate the subscriber package indoors.

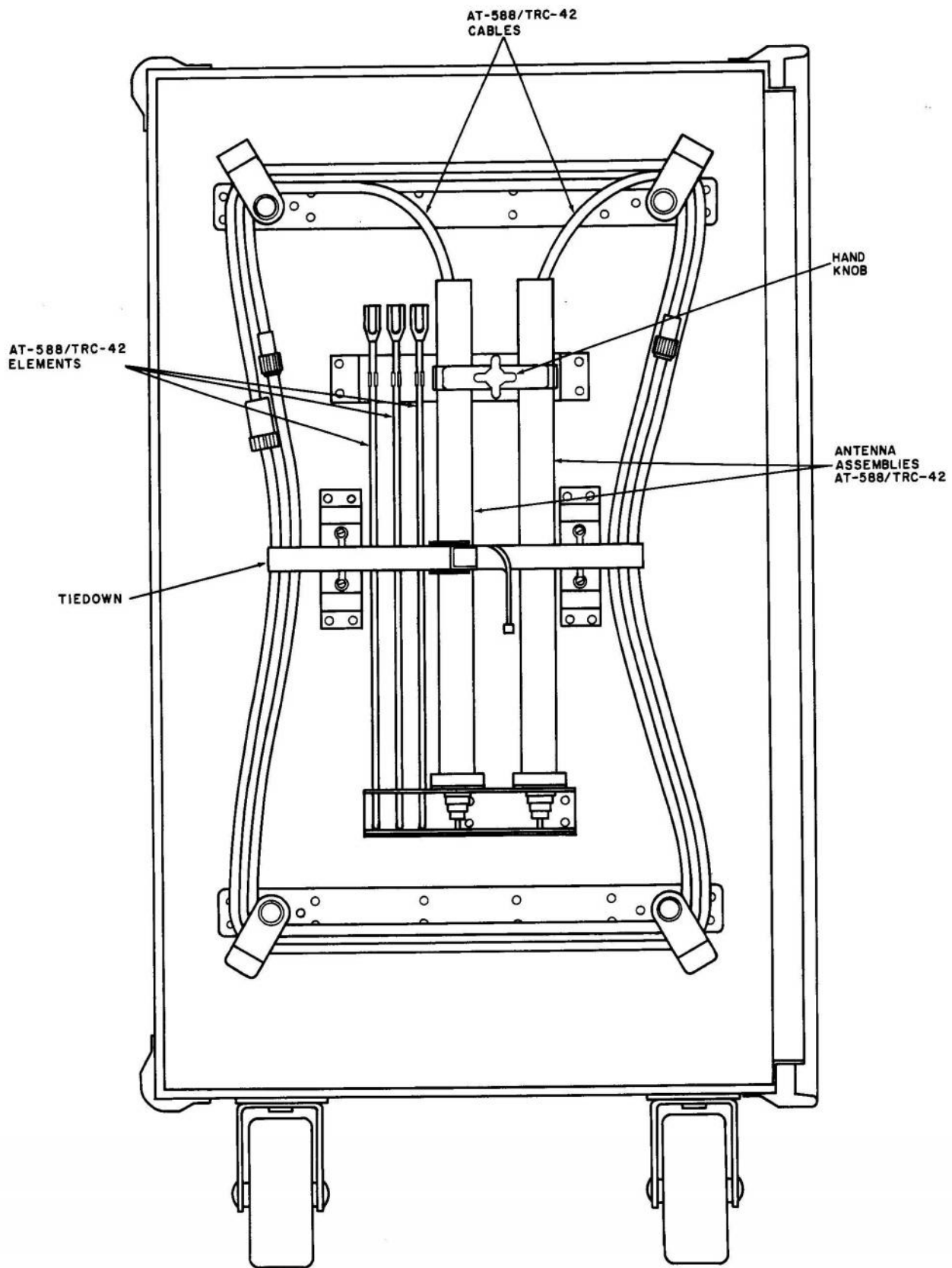
d. Unpacking Subscriber Package. Unpack the subscriber package as follows:

- (1) Open the relief valve on the side of the subscriber package.
- (2) Open the latches and remove the front cover.
- (3) Release the hand knob and tiedown (fig. 21) and remove Antenna Assemblies AT-588/TRC-42 from the brackets.
- (4) Remove the AT-588/TRC-42 elements from the brackets.
- (5) Loosen the thumbscrews and remove the ground rod assembly from inside the front cover (fig. 4).

56. Installation of High Frequency Antenna

a. General. In a duplex radio system, care must be taken to avoid receiver crosstalk problems. For this reason, proper antenna use and location is an important consideration. Depending on the distance between stations, different systems of high frequency antennas are used. Sufficient material is supplied with the radio terminal shelter to fabricate any one of four high frequency antenna systems. Each system consists of one transmitting antenna and two receiving antennas as follows: a sloping-vee transmitting antenna and two double-doublet receiving antennas; a sloping-vee transmitting antenna and two sloping-vee receiving antennas; a doublet transmitting antenna and two sloping-vee receiving antennas; or a doublet transmitting antenna and two double-doublet receiving antennas. When the last system is used, the double-doublet receiving antennas are erected on masts 25 feet high.

b. High Frequency Antenna Location. The high frequency antennas should be located on level or evenly sloping, open ground. If woods or bushes exist on the proposed site, the area around and between the masts should be cleared so that the masts and antenna curtains may be staked



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Figure 21. Subscriber package, location of stored items.

and erected. Obstructions, such as hills and buildings in the direction of transmission or reception, should be avoided. Elimination of antenna coupling is accomplished by placing the transmitting antenna forward of two widely spaced (600 feet) receiving antennas. In this way, the amount of transmitted signal reaching the receivers is kept to a minimum. The receiving antennas are widely spaced to avoid receiver crosstalk. A measuring tape is provided for antenna installation. In addition, there are three extra 100-foot lengths of coaxial cable if it is desired to space the receiving antennas further apart, or to place the transmitting antenna further away from the radio terminal shelter.

c. High Frequency Antenna Orientation. Although the sloping-vee and double-doublet antennas are broadband antennas, for optimum performance it is necessary to orient the antennas correctly with respect to the direction of the distant radio terminal. A Jacob's staff and a compass are provided to determine antenna orientation.

- (1) *Doublet and double-doublet antenna orientation.* Set up the Jacob staff and compass on the desired antenna site. Read the azimuth in the direction of transmission. Use the measuring tape and measure off, at right angles to the direction of transmission, the location of the mast bases as described in paragraph 59.
- (2) *Sloping-vee antenna orientation.* Set up the Jacob staff and compass directly in front of the mast base. Read the azimuth in the direction of transmission and install the antenna as described in paragraph 57 or 58.

57. Installation of Sloping-Vee Transmitting Antenna

The sloping-vee transmitting antenna is connected to a 45-foot, 9-section Mast AB-235/G. To erect the sloping-vee transmitting antenna, select a level area approximately 50 feet from the radio terminal shelter. Figure 22 shows a typical ground plan for the sloping-vee antenna

installation. Distance CB is at right angles to the direction of transmission. Distance AD should be 376 feet. Choose the position for point A and secure the mast base. Fabricate and erect the sloping-vee transmitting antenna as follows:

a. Perform the procedures given in TM 11-687, paragraph 67b(1) through (19) and (22) through (30), paragraph 68a and b, and paragraph 70a, b, c, e, and f with the following exceptions:

- (1) Wherever the rear stake is referenced, use the guy stake at 135°; wherever the front stake is referenced, use the guy stake at 315°; wherever the side stakes are referenced, use the guy stakes at 45° and 225°.

Note: To insure that the above directions are properly used, place the mast base so that the 0° marking on the base faces the 315° mark on the ground assembly plan.

- (2) After performing the procedure given in paragraph 67b(19) of TM 11-687, attach the pulley housing with halyard to the top of the ninth mast section (fig. 23). Use shackles to fasten the four 70-foot guy wires to the pulley housing.

b. Measure 376 feet from the mast base in the direction of transmission (point D, fig. 22).

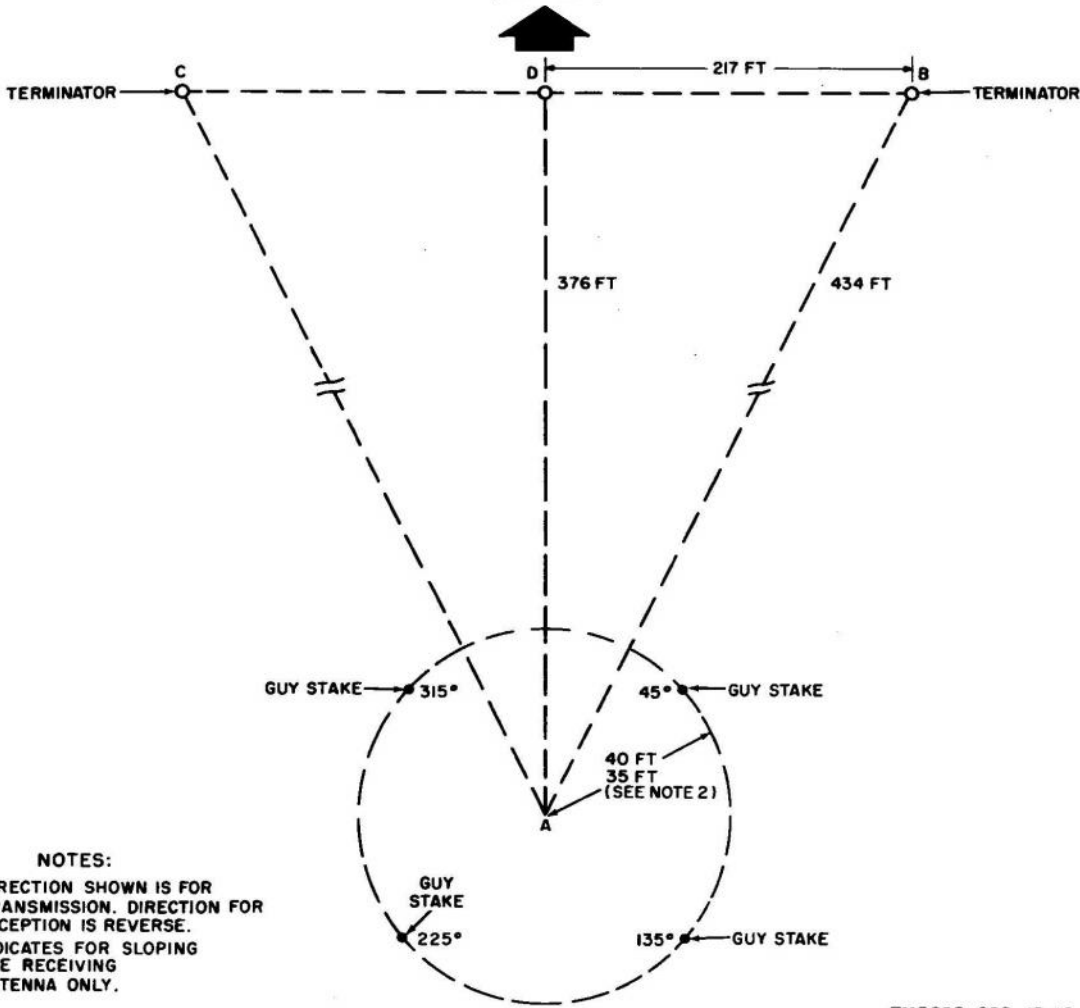
c. Measure 217 feet right and 217 feet left of point D, figure 22. Place the terminator mounting stakes at these points (points B and C, fig. 22). Make sure that the terminator mounting stakes are tilted approximately 10° from vertical in a direction away from the AB-235/G.

Caution: Before placing the terminator mounting stake in the ground, make sure that the TDR-002.5 terminator is removed. The shock of driving the terminator mounting stake into the ground will damage the TDR-002.5. To remove the TDR-002.5, use the adjustable wrench to remove the four mounting bolts (fig. 23). Remove the TDR-002.5 from the mounting stake.

d. Measure and cut two 432-foot lengths of 12-gage antenna wire for the legs of the sloping-vee transmitting antenna.

e. Measure and cut two 50-foot lengths of 12-gage antenna wire for the open line

DIRECTION
OF TRANSMISSION
(SEE NOTE 1)



NOTES:

1. DIRECTION SHOWN IS FOR TRANSMISSION. DIRECTION FOR RECEPTION IS REVERSE.
2. INDICATES FOR SLOPING VEE RECEIVING ANTENNA ONLY.

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Figure 22. Ground plan for sloping-vee antenna.

feed of the sloping-vee transmitting antenna.

f. Secure the jaw and eye swivel of the guy plate assembly to the outside end of the halyard (detail C, fig. 23).

g. Use 12-gage antenna wire to connect four strain insulators to the thimbles on the guy plate assembly (detail C, fig. 23).

Note: Do not use slotted bolts for the strain connections.

h. Connect the antenna legs and open line feed wires as shown in detail C, figure 23.

Note: Do not use more than 6 inches of antenna leg for connection to the strain insulator.

i. Connect the antenna legs to the open line feed wires with a short length of an-

tenna wire. Use two slotted bolts at each end of the connection.

j. Connect the first glass spreader insulator 2 feet below the guy plate assembly. Connect the five other glass spreader insulators at 8-foot intervals thereafter.

k. Use the halyard to raise the antenna curtain until the guy plate assembly is approximately 5 feet from the pulley housing. Secure the halyard to the gin pole tube at the mast base.

l. Stake the TRC-500 coupler 10 feet in front of the AB-235/G. Stakes are stored in the storage cabinet under the test bench (D, fig. 16).

Note: To allow for drainage, make sure that the ground on which the TRC-500 coupler is placed is higher than surrounding area.

Note: Before making connections to the TRC-500, open the lid and see that the leads on the transformer are on the 700-ohm taps. Close the lid.

m. Loosen the nuts on each insulator of the TRC-500 and wrap the ends of the open line feed wires around the insulator one-half turn. Tighten the insulator nuts (detail A, fig. 23).

n. Wrap the free end of the open line feed wires around themselves.

o. Secure one strain insulator to the free end of each antenna leg (detail B, fig. 23).

Note: Do not use more than 6 inches of antenna leg when connecting to the strain insulator. This will leave a distance of 431 feet for antenna leg.

p. Connect the free end of each insulator to the thimble on the associated terminator mounting stake (detail B, fig. 23).

q. Attach the TDR-002.5 to the terminator mounting stakes by replacing the four mounting bolts (*c* above).

r. Use a length of 12-gage antenna wire and slotted bolts to connect the end of the antenna legs to the insulators on the TDR-002.5. Connect one end of a length of 12-gage antenna wire just above the strain insulator at the end of the antenna leg; use two slotted bolts. Loosen the insulator nuts on the TDR-002.5 and wrap the other end of the 12-gage antenna wire around the insulator one-half turn. Tighten the insulator nuts and wrap the end of the 12-gage antenna wire around itself (detail B, fig. 23).

s. Stake the ground rod assembly approximately 1 foot from each TDR-002.5 (detail B, fig. 23). Connect the ground wire to the ground rod assembly.

t. Construct the counterpoise (detail D, fig. 23) as follows:

- (1) Measure 70 feet from the ground rod assembly in the direction of the AB-235/G. Mark the spot.
- (2) Measure 2-1/2, 9-3/4, and 14-3/4 feet on each side of the 70-foot mark and drive a spike at each spot.
- (3) Attach approximately 440 feet of 12-gage antenna wire to the ground rod assembly by wrapping the end of the wire around the ground rod

assembly 1 full turn and twisting it back on itself 4 or 5 turns.

- (4) Bring the 12-gage antenna wire to spike A (detail D, fig. 23) and wrap the wire 1 full turn around spike A.
- (5) Bring the 12-gage antenna wire to spike B and wrap it 1 full turn around spike B.
- (6) Bring the 12-gage antenna wire back to the ground rod assembly and wrap it around the ground rod assembly 1 full turn.
- (7) From the ground rod assembly, bring the 12-gage antenna wire to spike C and wrap it 1 full turn around spike C.
- (8) Bring the 12-gage antenna wire to spike D and wrap it 1 full turn around spike D.
- (9) Bring the 12-gage antenna wire back to the ground rod assembly and wrap it around the ground rod assembly 1 full turn.
- (10) Bring the 12-gage antenna wire to spike E and wrap it 1 full turn around spike E.
- (11) Bring the 12-gage antenna wire to spike F and wrap it 1 full turn around spike F.
- (12) Bring the 12-gage antenna wire back to the ground rod assembly and wrap the wire around the ground rod assembly 1 full turn.
- (13) Cut the 12-gage antenna wire, leaving approximately 6 inches, and twist it back on itself 4 or 5 turns.

u. Connect the coaxial cable (50 feet) to the coaxial connector on the TRC-500. For connection of the coaxial cable (50 feet) to the radio terminal shelter, refer to paragraph 64.

58. Installation of Sloping-Vee Receiving Antenna

The sloping-vee receiving antennas are mounted on 50-foot, eight-section Antenna Supports AB-38B/CR. The AB-38B/CR requires a circular area of 35-foot radius. In addition, the antenna curtains require a minimum of 434 linear feet each at a distance of 376 feet from the AB-38B/CR

(fig. 22). Erect the sloping-vee receiving antennas as follows:

a. Select a level area within approximately 250-foot radius on one side of the radio terminal shelter. Assemble and install the AB-38B/CR in accordance with the instructions in chapter 2, section II of TM 11-2620A.

b. Measure 376 feet from the AB-38B/CR (point D, fig. 22).

c. Measure 217 feet right and 217 feet left of the 376-foot point (*b* above). Place the ground stakes at these points (points B and C, fig. 22). Make sure that the ground stakes are tilted approximately 10° from vertical and in a direction away from the AB-38B/CR.

d. Measure and cut two 432-foot lengths of 12-gage antenna wire for the sloping-vee receiving antenna legs (fig. 24).

e. Measure and cut two 60-foot lengths of 12-gage antenna wire for the open line feed of the sloping-vee receiving antenna.

f. Secure the jaw and eye swivel of the guy plate assembly to the outside end of the halyard.

g. Connect four strain insulators to the thimbles on the guy plate assembly.

h. Connect the antenna legs, open line feed, and connecting wires as shown in figure 24. Use two slotted bolts at each end of the connection wire.

Note: Do not use more than 6 inches of antenna leg for connection to the strain insulator.

i. Connect the first ceramic spreader insulator 2 feet below the guy plate assembly and add a ceramic spreader insulator every 10 feet thereafter (detail B, fig. 24). Connect the ceramic spreader insulator by first placing the open line feed in the end slot; secure by placing a short length of 22-gage wire through the hole in the ceramic spreader insulator and wrapping both ends around the open line feed four or five times.

j. Use the halyard to raise the antenna curtain until the guy plate assembly is approximately 5 feet from the pulley housing. Secure the halyard to the boat cleat at the base of the bottom section of the AB-38B/CR.

k. Use metal stakes to stake the RAC-

30A coupler 10 feet in front of the AB-38B/CR.

Note: Make sure that the ground on which the RAC-30A coupler is placed is higher than the surrounding area to allow for drainage.

l. Loosen the nuts on each insulator of the RAC-30A and wrap the ends of the open line feed wires around the insulator one-half turn. Tighten the insulator nuts.

m. Secure the end of the open line feed wire to itself at each connection.

n. Secure the strain insulators to the free ends of the antenna legs by passing the end of the antenna leg through the strain insulator and twisting the 12-gage antenna wire back on itself 4 or 5 turns.

Note: Do not use more than 6 inches of antenna leg when connecting it to the insulator. This will leave a distance of 431 feet for the antenna leg.

o. Measure and cut two 5-foot lengths of 12-gage antenna wire. Connect one end of each 5-foot length to the free end of the strain insulator (*n* above). Secure the other end of the 5-foot length to the ground stake (*c* above) (detail D, fig. 24).

p. Use metal stakes to stake the RTB-5 terminator approximately 1 foot away from the strain insulator (*n* above).

Note: Make sure that the ground on which the RTB-5 terminator is placed is higher than the surrounding area to allow for drainage.

q. Use a length of 12-gage antenna wire and slotted bolts to connect the end of the antenna legs to the insulator on the RTB-5 terminator (detail C, fig. 24).

r. Stake the ground rod assemblies approximately 1 foot from the RTB-5 terminators. Connect the RTB-5 terminators to the ground rod assemblies (detail C, fig. 24).

s. Connect a 250-foot coaxial cable to the coaxial connector on the RAC-30A. For connection of coaxial cable to the radio terminal shelter, refer to paragraph 64.

59. Installation of Double-Doublet Receiving Antenna

Erect the double-doublet receiving antenna as follows:

a. Mark off a rectangle 179 feet 6 inches by 49 feet 6 inches on level or evenly sloping terrain (fig. 25).

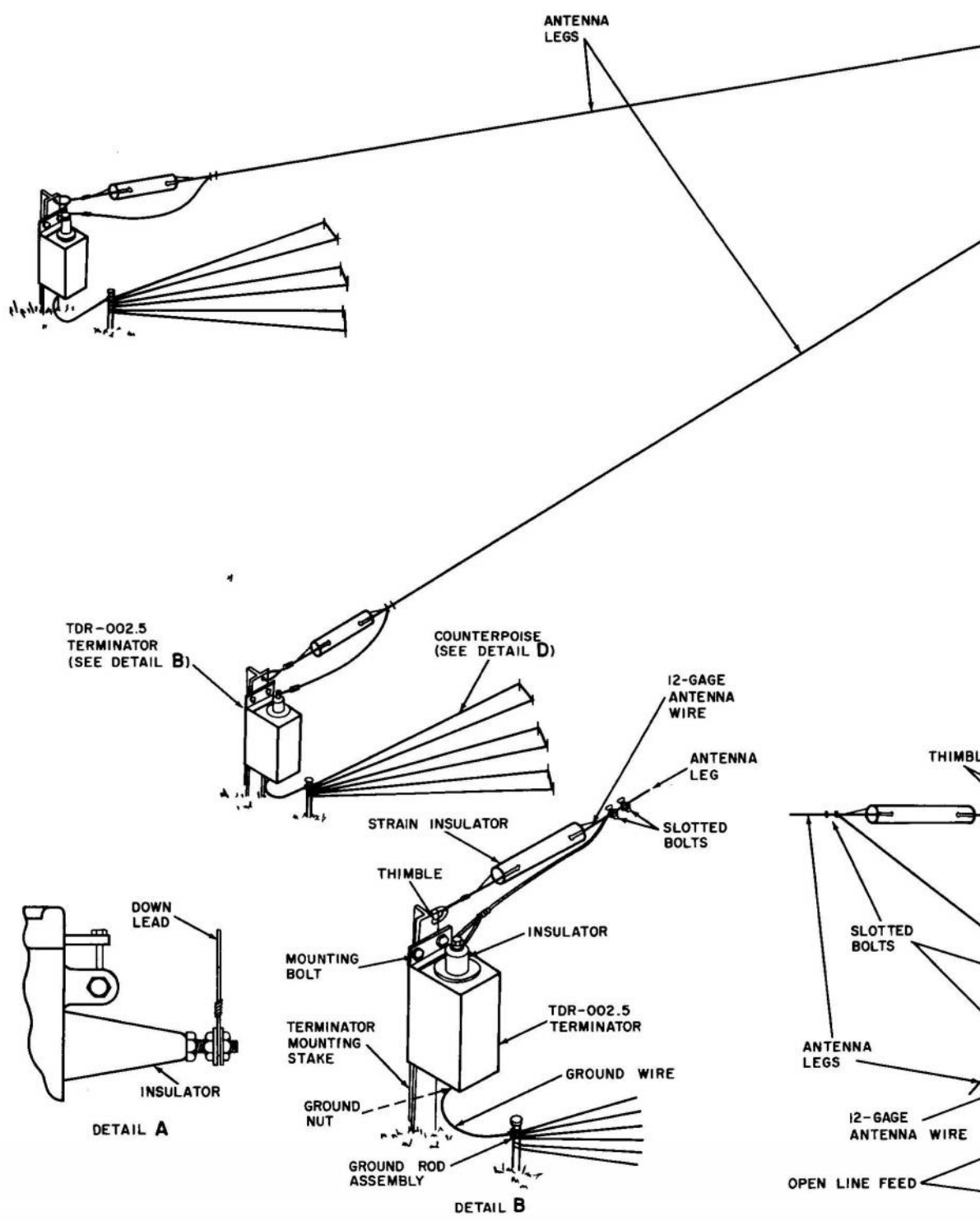
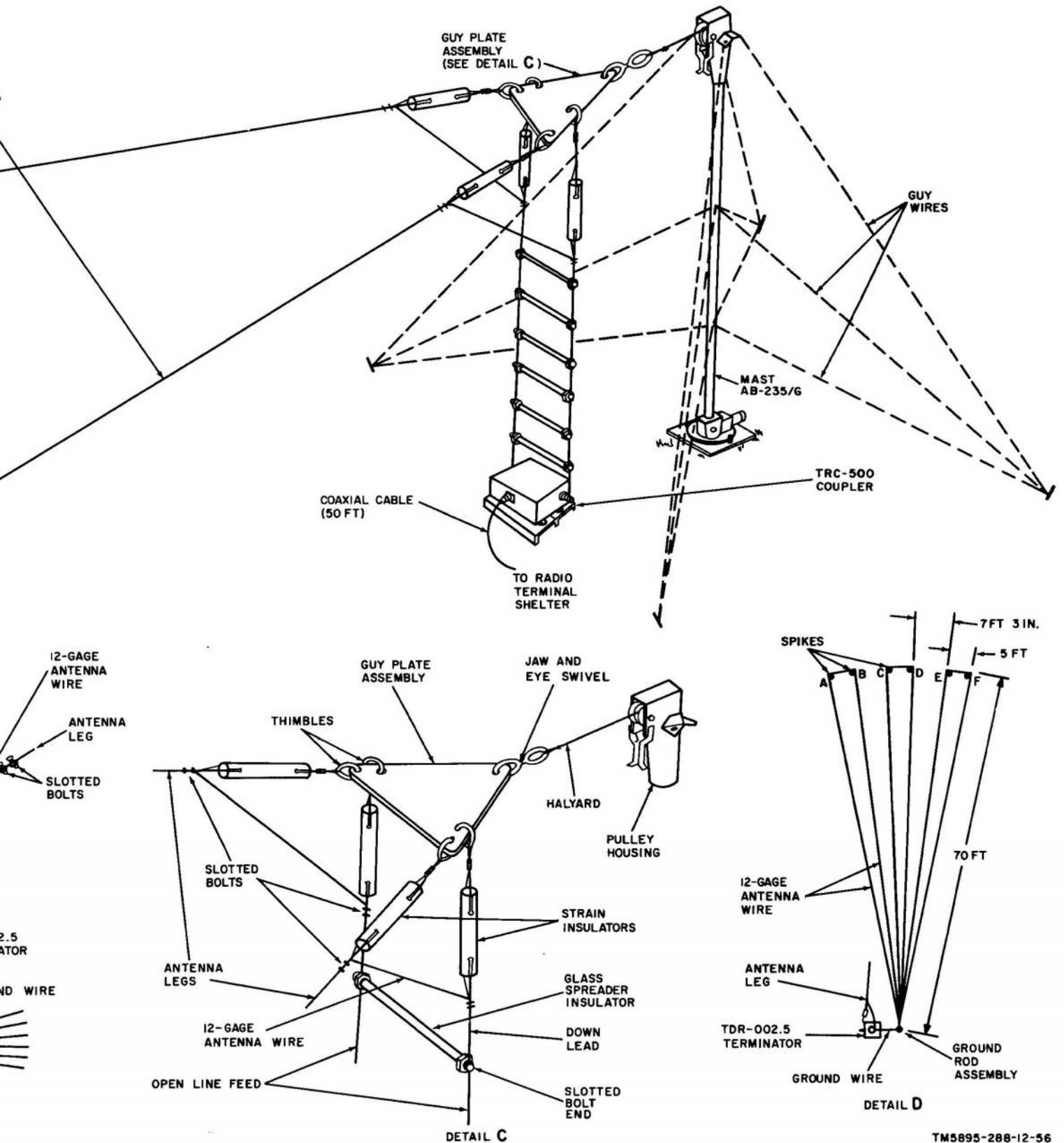


Figure 23. Installing sloping



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Figure 23. Installing sloping-vee transmitting antenna.

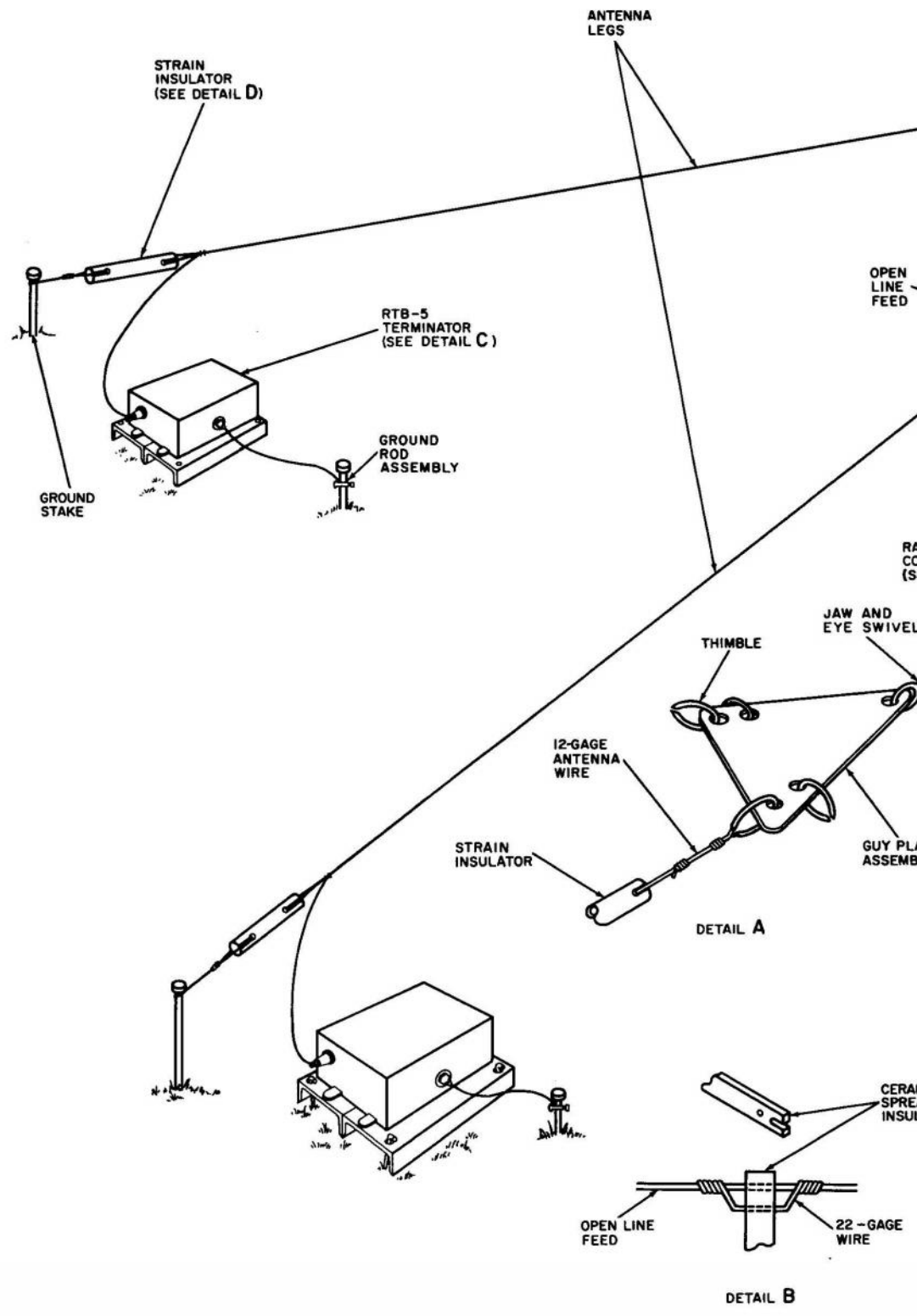
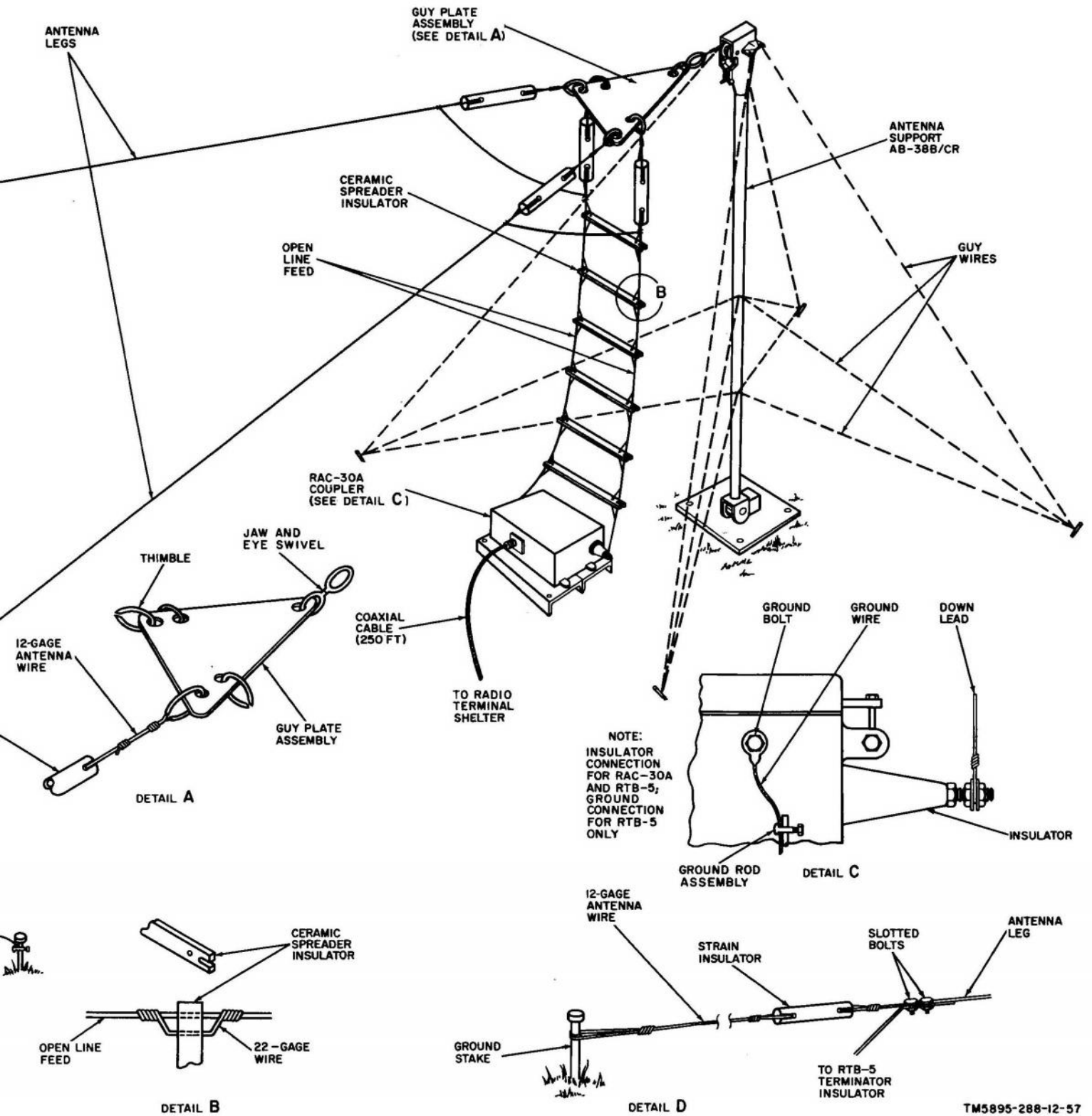


Figure 24. Installing sloped antenna



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Figure 24. Installing sloping-vee receiving antenna.

b. Mark off 49 feet 6 inches in from both ends of the rectangle to form two 49-foot 6-inch squares on each end of the rectangle.

c. Mark the center of each 49-foot 6-inch square and stake the mast base over the center.

d. Place the guy wire stakes at the corners of both squares. The distance from the center mast base to each of its four guy wire stakes should be approximately 35 feet.

e. Assemble and install AB-38B/CR's on each mast base as instructed in chapter 2, section II, TM-2620A.

f. Measure and cut two 92-foot lengths of 12-gage antenna wire for the upper and lower elements (fig. 26).

g. Secure one end of the strain insulator to the outside end of the halyard on one AB-38B/CR (detail A, fig. 26).

h. Secure the end of one 92-foot length of 12-gage antenna wire (*f* above) to the other end of the strain insulator (detail A, fig. 26) by passing the wire through the strain insulator and wrapping it back on itself 4 or 5 turns.

i. Insert the other end of the 92-foot length of 12-gage antenna wire into one of two top holes on the top surface of the cross-connect insulator (detail B, fig. 26) and pull the end through diagonally opposite the bottom hole until the 12-gage antenna wire measures exactly 60 feet from the center of the cross-connect insulator to the strain insulator.

Note: Make sure that the end of the 92-foot 12-gage antenna wire is inserted in the cross-connect insulator so that the two wires cross each other on opposite surfaces of the cross-connect insulator (detail B, fig. 26).

j. Measure exactly 30 feet from the center of the cross-connect insulator to the free end of the 12-gage antenna wire and secure to one end of another strain insulator by passing the wire through the strain insulator and twisting it back on itself 4 or 5 turns.

k. Remove the two 100-foot guy ropes from the AB-38B/CR kits.

l. Secure one end of a 100-foot guy rope (detail A, fig. 26) to the free end of the strain insulator (*j* above).

m. Repeat procedures *g* through *j* and *l* above to install the other half of the antenna curtain.

n. Cut a 115-foot length of RG-86 transmission line. Separate the leads from one end of the transmission line for approximately 6 inches.

o. Strip each RG-86 transmission line lead (*n* above) for 1-1/2 inches; do not nick the wire.

p. Use fine sandpaper to remove the oxide coating from the sections of the 12-gage antenna wire that pass through the cross-connect insulator.

q. Connect one RG-86 transmission line lead to the cleaned section of the 12-gage antenna wire on each surface of the cross-connect insulator (detail B, fig. 26). Use two slotted bolts for each connection.

r. Insert the Lay-Cit cable grip through the center bottom hole of the cross-connect insulator and clamp it to the RG-86 transmission line (detail B, fig. 26).

s. Use both halyards simultaneously to raise the antenna curtain; leave approximately 2-1/2 feet of halyard between the pulley housing and the strain insulators connected to the upper element (*g* above). Wrap the ends of the halyards in a figure eight, around the boat cleat at the base of the bottom sections of the AB-38B/CR's.

Note: The center antenna sag should be approximately 3 feet.

t. Measure 23 feet from the center of each mast base toward the outside guy stakes (fig. 25). Place guy stakes at these points.

u. Secure the free ends of the 100-foot guy ropes (*l* above) to the stakes (*t* above).

v. Place the RAC-30A coupler approximately 2 feet from the base of the AB-38B/CR closest to the radio terminal shelter.

Note: Make sure that the ground on which the RAC-30A is placed is higher than the surrounding area to allow for drainage.

w. Separate two leads at the free end of the RG-86 transmission line for approximately 1 foot.

x. Strip each RG-86 transmission line lead for 4 inches; do not nick the wire.

Note: The RG-86 transmission line should fall vertically from the cross-connect insulator and then

should run horizontally toward the RAC-30A. If the RG-86 transmission line touches the ground, cut the excess length and repeat procedures *w* and *x* above.

y. Loosen the nuts on each insulator of the RAC-30A, wrap each RG-86 transmission line lead one-half turn around an insulator, and tighten the insulator nuts. Wrap excess RG-86 around itself.

z. Connect a 250-foot coaxial cable to the coaxial connector on the RAC-30A. For connections of coaxial cable to the radio terminal shelter, refer to paragraph 64.

Note: When laying out the area for the second double-doublet receiving antenna, make sure that the plane of the antenna curtain is slightly out of line with the plane of the first double-doublet receiving antenna curtain.

60. Installation of Doublet Transmitting Antenna

The doublet transmitting antenna can be used instead of the sloping-vee transmitting antenna. It is mounted on two 50-foot, light-duty, 8-section Antenna Supports AB-38B/CR. Erect the doublet transmitting antenna as follows:

a. Since the antenna length is determined by the transmitting frequency, it is suggested that the antenna masts be spaced 150 feet apart for operation on frequencies between 3.5 and 32 megacycles and 245 feet apart for operation on frequencies below 3.5 megacycles.

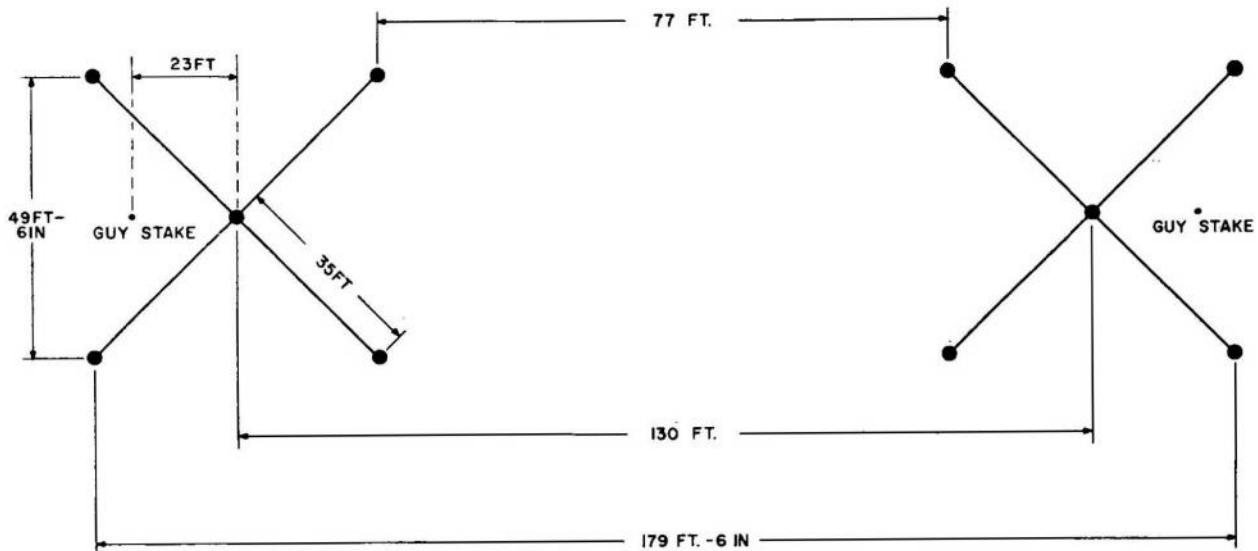
b. Figure 25 shows the layout of the masts for a double-doublet antenna. The layout for the doublet antenna is similar except that the distance between the masts is different and the extra guy stakes are not required. Orient the antenna masts so that the antenna axis is broadside to the direction of transmission. Lay out and assemble the masts as instructed below.

- (1) Mark off a rectangle 199 feet 6 inches by 49 feet 6 inches for high frequency operation (*a* above), or a rectangle 294 feet 6 inches by 49 feet 6 inches for low frequency operation.
- (2) Mark off 49 feet 6 inches in from both ends of the rectangle to form two 49-foot 6-inch squares on each end of the rectangle.

- (3) Mark the center of each 49-foot 6-inch square and stake a mast base over the center.
- (4) Place guy wire stakes at the corners of both squares. The distance from the center of the mast base to each of its four guy stakes should be approximately 35 feet.
- (5) Assemble and install an AB-38B/CR on each mast base as instructed in chapter 2, section II, TM 11-2620A.

c. Figure 27 shows a typical doublet transmitting antenna. The A (length of antenna) and B (distance between delta legs) dimensions are given in the chart in *e* below. To determine the antenna length for frequencies not given in the chart, use the formula: A equals 468 divided by the frequency. Since the dimensions given for B in the chart are approximate, use interpolation to determine dimension B for frequencies not given in the chart. Construct the antenna as instructed below.

- (1) Measure and cut a length of 12-gage antenna wire 2 feet longer than the A dimension (*e* below) given for the frequency being used. The 2 extra feet of antenna wire are for making connections at the strain insulators.
- (2) Secure one strain insulator (detail A, fig. 27) to each end of the 12-gage antenna wire ((1) above) by passing the end of the 12-gage antenna wire through the strain insulator and twisting it back on itself 4 or 5 turns. The antenna length between the inside eyes of the strain insulators should equal the A dimension.
- (3) Secure the free end of each strain insulator to the outside end of the halyards on the AB-38B/CR's; knot sufficiently to hold (detail A, fig. 27).
- (4) Use the halyards to suspend the 12-gage antenna wire 4 or 5 feet above the ground.
- (5) The length of the delta legs to the first glass spreader insulator (dimension C, fig. 27) should be approximately 0.15 wavelength.



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Figure 26. Ground plan for double-doublet antenna.

The delta leg should be a length which will permit the use of a minimum of three glass spreader insulators, spaced as shown in figure 27. construct the delta as instructed below.

Note: To determine the wavelength (in feet) at the particular frequency being used, use the formula: wavelength equals 984 divided by the frequency.

- (a) Measure and cut two 54-foot lengths of 12-gage antenna wire for the legs of the delta (length C, fig. 27) and down leads.
- (b) Measure the midpoint of the suspended 12-gage antenna wire and, from this point, measure one-half of dimension B (e below) in each direction. Distance between delta legs is twice this distance (length B, fig. 27).
- (c) Use two slotted bolts at each connection to attach the ends of the 54-foot 12-gage antenna wires ((a) above) to the attachment points (detail B, fig. 27) as indicated in (b) above.
- (d) Measure length C (fig. 27) on each delta leg and attach both 12-gage antenna wires to a single glass spreader insulator (detail C, fig. 27).

- (e) Attach as many additional glass spreader insulators as are required, 5 feet apart, below the first one ((d) above).

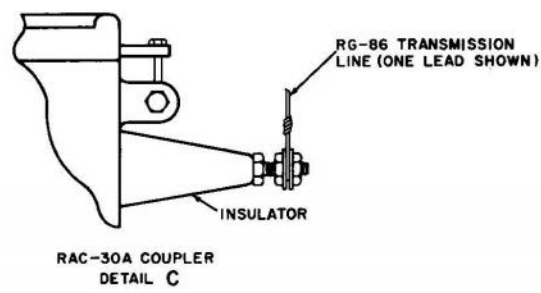
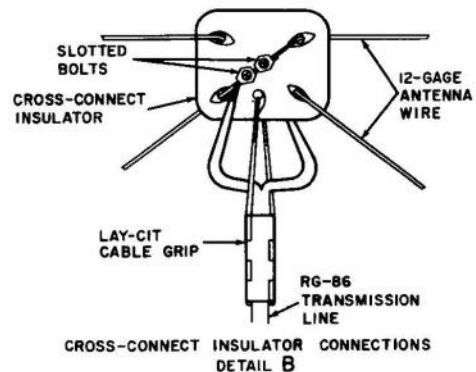
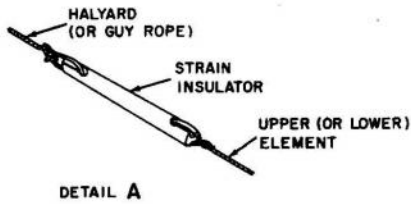
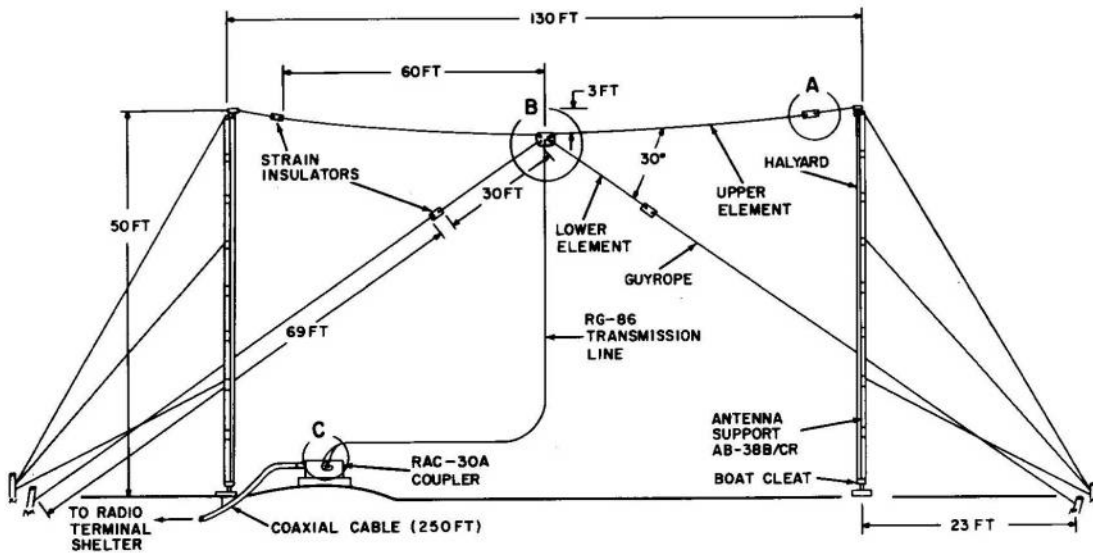
- (6) Use the halyards to raise the antenna, leaving a minimum of 5 feet of halyard between the pulley housing and strain insulator on both sides of the antenna. Wrap the halyard in a figure eight around the boat cleat at the base of the bottom sections of the AB-38B/CR's.

d. Connect the antenna delta legs to the coupler and the coupler to the shelter as instructed below.

- (1) Use metal stakes to stake the TRC-500 coupler midway between the mast bases of two AB-38B/CR's.

Note: Make sure that the ground on which the TRC-500 coupler is placed is higher than the surrounding area to allow for drainage.

- (2) Before making connections to the TRC-500, open the lid and see that the leads on the transformer are on the 700-ohm taps. Close the lid.
- (3) Loosen the nuts on each insulator of the TRC-500 and wrap the ends of the down leads around the insulator one-half turn. Tighten the insulator nuts.



NOTE:
SOME GUY WIRES ARE OMITTED TO ENABLE
ANTENNA DETAILS TO BE CLEARLY SHOWN

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Figure 26. Installing double-doublet receiving antenna.

- (4) Wrap the down leads around themselves (detail D, fig. 27). Cut and discard excess wire (if any).
- (5) Connect a 50-foot coaxial cable to the coaxial connector on the TRC-500.

- (6) For connections of coaxial cable to the radio terminal shelter, refer to paragraph 64.
- e. The chart below gives the antenna length and delta tap distance for frequencies between 2 and 32 megacycles.

Frequency (mc)	Antenna length A (ft)	Delta tap distance B (ft)	Frequency (mc)	Antenna length A (ft)	Delta tap distance B (ft)
2	234	33	18	26	6
3	156	30	19	25	6
4	117	27	20	24	6
5	94	26	21	22	5
6	78	22	22	21	5
7	67	19	23	20	5
8	59	16	24	20	5
9	52	12	25	19	5
10	47	10	26	18	5
11	43	10	27	17	4
12	39	8	28	17	4
13	36	8	29	16	4
14	34	8	30	16	4
15	31	8	31	15	3
16	29	7	32	15	3
17	28	7			

61. Installation of Antenna Assemblies AT-588/TRC-42 on Radio Terminal Shelter (fig. 28)

The AT-588/TRC-42's are mounted on the front roadside and rear curbside walls of the radio terminal shelter. Both mountings are identical. Three men are required to erect the AT-588/TRC-42's on each corner of the radio terminal shelter (one on the roof of the shelter and two on the ground).

a. Assemble each antenna assembly as instructed below:

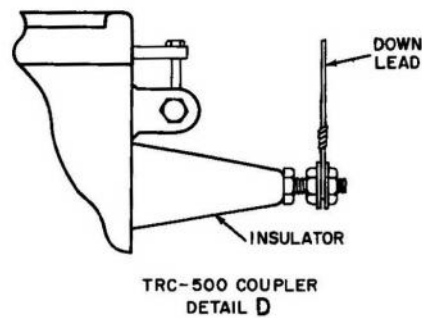
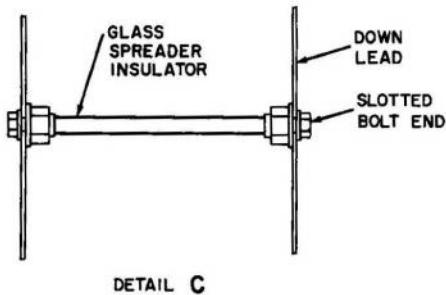
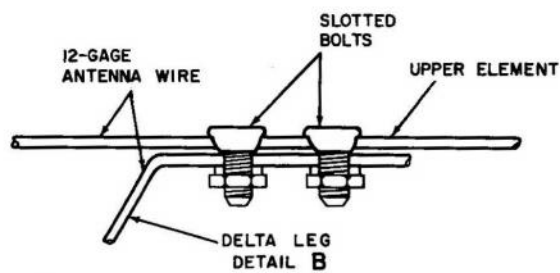
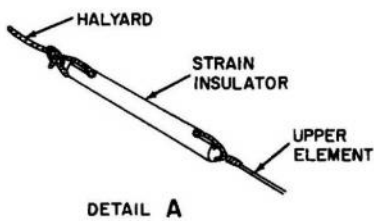
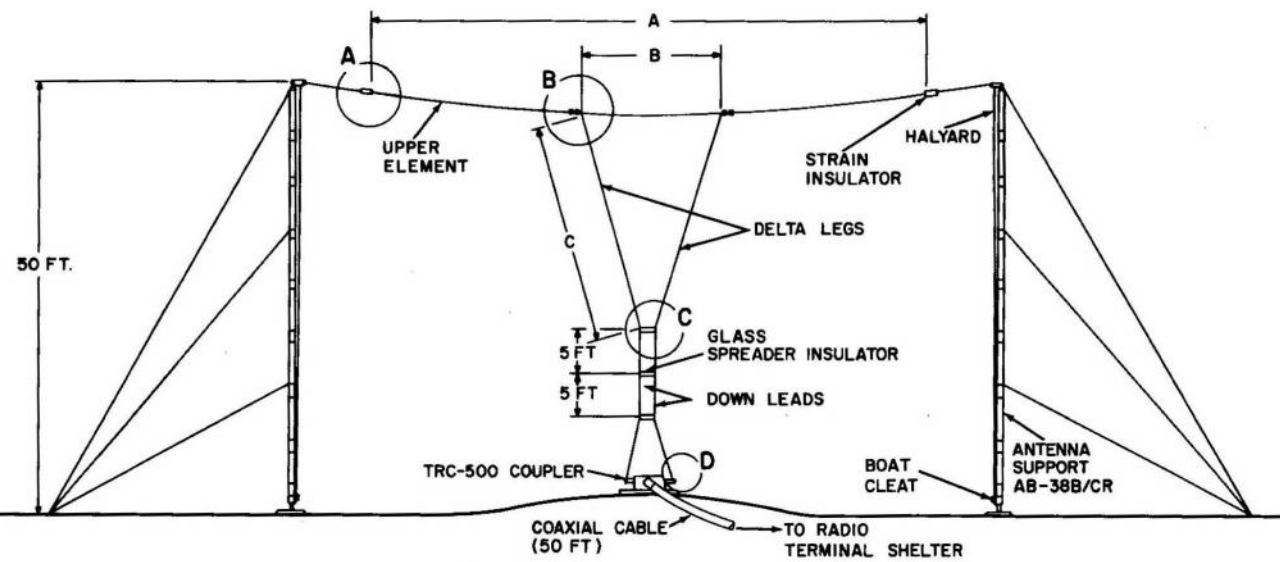
- (1) Push the coaxial cable from the AT-588/TRC-42 through the top of the 3-foot mast and out the bottom end.
- (2) Screw the AT-588/TRC-42 mount onto the end of the 3-foot mast. The outer sleeve of the AT-588/TRC-42 may have to be removed during this procedure. It is attached to the AT-588/TRC-42 mount by three screws and lockwashers. Be sure to tighten the screws firmly when the sleeve is replaced to insure a good electrical connection.
- (3) Screw the antenna element onto the

stud projecting from the AT-588/TRC-42 insulator. Hold the locknut with a wrench to prevent its turning while tightening the antenna element. Tighten the antenna element firmly against the locknut; not against the insulator. A slight amount of looseness between the locknut and the insulator is permissible. The hexagonal setscrews should not be loosened. They compress the internal clamps that hold the end of the coaxial cable.

b. Assemble and erect the T-bar mounting assembly on the side of the shelter.

- (1) Slide the lower clamp of the T-bar onto the 10-foot mast and tighten the lower clamp.
- (2) Slide the 3-foot masts of two antenna assemblies into the upper clamps of the T-bar and tighten the upper clamps.
- (3) Have one man climb to the top of the shelter, using the spring-locked foot steps (fig. 3).
- (4) At the upper spacer block (fig. 28), attach one C-bracket; use one screw and lockwasher.

Note: Leave the screw loose so that the C-bracket is free to rotate.



NOTE:
SOME GUY WIRES ARE OMITTED TO ENABLE
ANTENNA DETAILS TO BE CLEARLY SHOWN

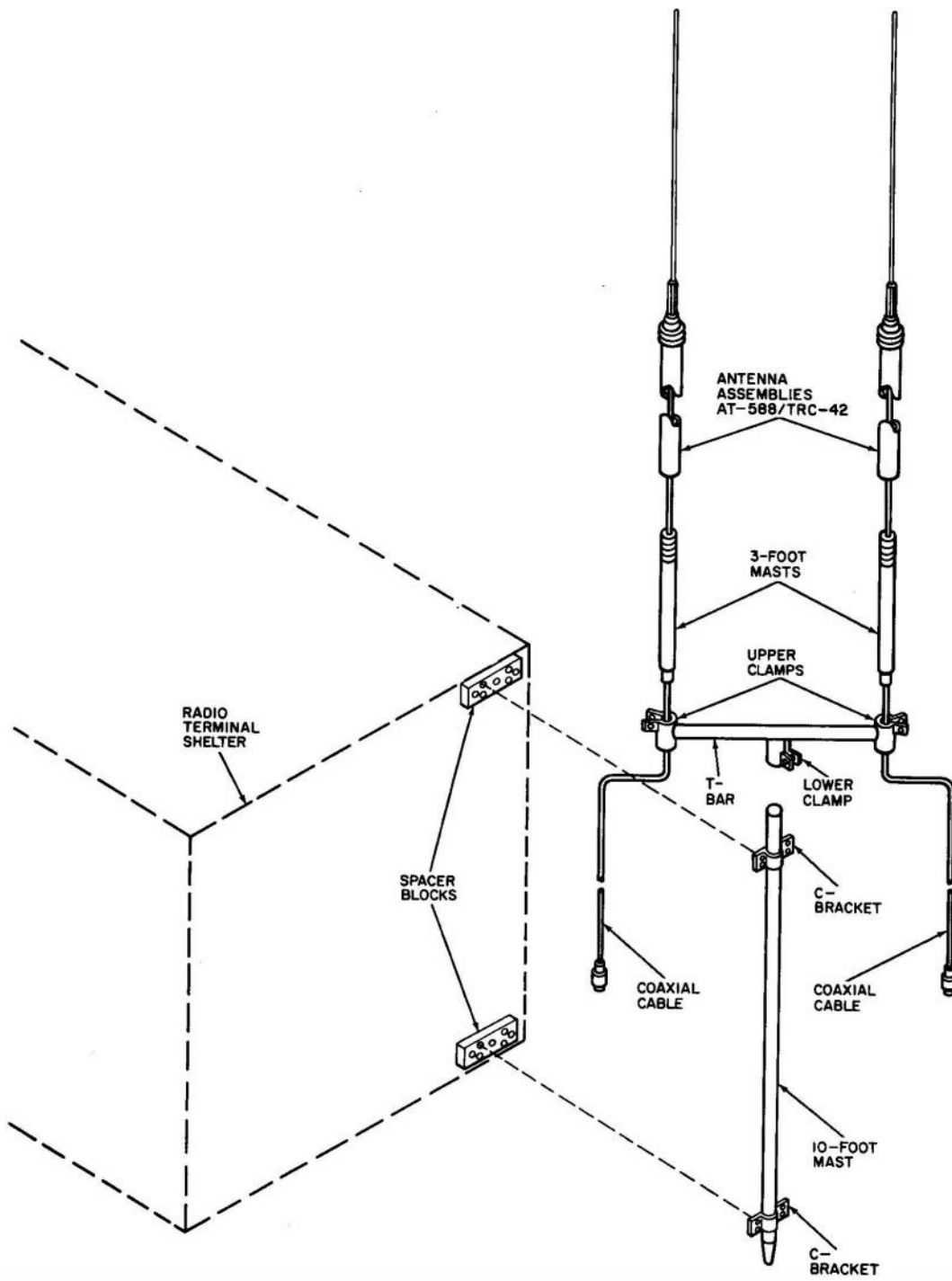
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Figure 27. Installing doublet transmitting antenna.

- (5) Raise the entire mast assembly so that the 10-foot mast rests against the upper and lower spacer block.
- (6) At the upper spacer block, secure

the C-bracket; use three additional screws and lockwashers.

Note: The screws should be tightened so that the 10-foot mast is free to rotate but will not have excessive free movement.



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Figure 28. Installing vhf antennas on radio terminal shelter.

- (7) While one man holds the mast in position, the other man secures the other C-bracket to the lower spacer block.
- (8) Lower the mast assembly so that the pointed end of the 10-foot mast is embedded in the ground.
- (9) Rotate the T-bar from the top of the shelter, until the plane of the AT-588/TRC-42's is at right angles to the direction of the associated subscriber package.
- (10) When the T-bar is properly oriented, tighten the screws on the upper and lower C-brackets.

Note: One man should remain on top of the radio terminal shelter to erect the other set of AT-588/TRC-42's.

- (11) Repeat procedures (1) through (10) above to erect the other AT-588/TRC-42's on the opposite corner of the radio terminal shelter.

62. Installation of Antenna Assemblies AT-588/TRC-42 at Subscriber Package

The AT-588/TRC-42's for the subscriber package are erected close to the site of the subscriber package. The distance from the subscriber package to the antennas is limited only by the length of the coaxial cable furnished with the antennas.

a. Siting. The antennas should be erected close to the subscriber package to permit them to be mounted as high as

possible for maximum efficiency. Avoid depressions, valleys, and low places because the surrounding terrain absorbs much of the radiofrequency energy.

b. Assembling Antenna. Two AT-588/TRC-42's are provided for each subscriber package; one for transmitting and one for receiving. Assemble each antenna assembly as instructed in paragraph 61 with the following exception: a 3/4-inch pipe (not furnished) with an American Standard Pipe thread is required for the antenna mount.

c. Mounting Antenna. The antenna mounting pipe should be securely fastened to an upright pole. Orient the two AT-588/TRC-42's so that the plane of the antennas is at right angles to the direction of the radio terminal shelter.

63. Installation of Fuses and Batteries

a. General. The AN/TSC-20 is shipped with all fuses installed. When the TSEC/KW-9's and the TSEC/KW-26's are installed, the fuses should be checked to be sure that the correct fuses are being used. Check each unit in the radio terminal shelter (*b* below) and in the subscriber packages (*c* below) to be sure that the correct fuse is installed before operating the equipment.

Caution: Do not use fuses rated above the values specified in the fuse charts below. Damage to the equipment may result.

b. Radio Terminal Shelter.

Unit	Panel designation	Current rating (amp)	Location
Variable frequency oscillator VOX-5	OVENS 3 AMPS F101	3	Rear panel.
	POWER 2 AMPS F102	2	Rear panel.
Transmitting mode selector SBE-3 power supply.	OVEN 2A	2	Front panel.
	MAIN 3A	3	Front panel.
	B+ .25A	1/4	Front panel.
	LINE	5	Front panel.
Low voltage power supply PS-4 -----	BLOWER	2	Front panel.
	LV(B-)	1/10	Front panel.
	LV(B+)	1/4	Front panel.
	F501 5A	5	Front panel.
Auxiliary power panel APP-4 -----	F502 5A	5	Front panel.
	1 AMP	1	Front panel.
Decibel Meter ME-22A/PCM -----	SPARE	1	Front panel.
	2 AMPS	2	Front panel.
Signal Generator SG-15/PCM -----	1/8 A	1/8	Front panel.
	1/8 A	1/8	Front panel.
Transmitter T-593/TRC-47 -----	POWER	2	Front panel.
Receiver R-748/TRC-47 -----	F1	1	Front panel.

Unit	Panel designation	Current rating (amp)	Location
Teletypewriter TT-119A/FG -----	1.6A	1.6 1/16	Power input circuit. Bias fuse and terminal box.
Reperforator-Transmitter TT-178A/FG.	D. C. POWER 3/4 AMP D. C. POWER 1/2 AMP 4 AMPS 4 AMPS	3/4 1/2 4 4	Rear control panel. Rear control panel. Rear control panel. Rear control panel.
Dual speaker and amplifier ----- Radio Receiver R-390/URR -----	DC 20A AC 3A B+ 3/8 A	0.5 20 3 3/8	Rear panel. Rear panel. Rear panel. Rear panel.
Tone keyer shelf -----	FUSE 1 FUSE 2	1/2 1/2	Front panel. Front panel.
Combined function panel -----	KEYER FUSE 1 KEYER FUSE 2 KEYER FUSE 3 KEYER FUSE 4 KEYER FUSE 5 KEYER FUSE 6 KEYER FUSE 7 KEYER FUSE 8	1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow)	Front panel. Front panel. Front panel. Front panel. Front panel. Front panel. Front panel. Front panel.
Tone converter -----	FUSE 1 FUSE 2	1/2 1/2	Front panel. Front panel.
Demultiplexer shelf -----	FUSE 1 FUSE 2	1/2 1/2	Front panel. Front panel.
Multiplexer shelf -----	FUSE 1 FUSE 2	1/2 1/2	Front panel. Front panel.
Line battery power supply panel -----	A. C. INPUT SUPPLY NO. 1 A. C. INPUT SUPPLY NO. 2 OUTPUT-D. C. SUPPLY NO. 1 OUTPUT-D. C. SUPPLY NO. 2	1-1/2 1-1/2 1-1/2 1-1/2	Front panel. Front panel. Front panel. Front panel.
Multiple repeat panel -----	OPR SIG BIAS	1/8 (slow blow) 1/8 (slow blow) 1/8 (slow blow)	Front panel. Front panel. Front panel.
Frequency Meter FR-67/U -----		3.2 3.2	Rear panel. Rear panel.
RAC-30A coupler -----		4 4	Inside. Inside.

c. *Subscriber Package.* The chart below lists all units in the subscriber package which contain fuses.

Unit	Panel designation	Current rating (amp)	Location
Subscriber power supply -----	AC IN AC IN	0.175 (slow blow) 0.175 (slow blow)	Front panel. Front panel.
Voice plus telegraph terminal VPT-1	1/8 A 1/8 A	1/8 1/8	Front panel. Front panel.
Teletypewriter TT-119A/FG	1.6A	1.6	Power input circuit.
Reperforator-Transmitter TT-178A/FG.	D. C. POWER 3/4 AMP	3/4	Rear control panel.

d. *Batteries.* Install two BA-30's (not supplied with AN/TSC-20) in TA-43/PT No. 1 and No. 2, the TA-312/PT, and the TA-43/PT's in the subscriber packages.

64. Connections

When all equipment is properly installed, connections between the radio terminal shelter and external equipment (a below),

such as the 10-kw generators and antennas, are necessary before the radio terminal can be operated. Similar connections must be made at the subscriber package (b below). Landline options are described in c below.

a. *Radio Terminal Shelter.* Connect the external equipment to the radio terminal shelter as follows:

- (1) Connect the coaxial cable (50-foot) from the hf antenna (sloping-vee or doublet) to the ANT XMTR 1 connector on the hf transmitting antenna entrance box (fig. 29).
- (2) Connect the coaxial cable from one Antenna Assembly AT-588/TRC-42 on the front roadside of the radio terminal shelter to AN/TRC-47 No. 1 XMTR feedthrough connector on the signal entrance box (fig. 30).
- (3) Connect the coaxial cable from the second Antenna Assembly AT-588/TRC-42 on the front roadside of radio terminal shelter to AN/TRC-47 No. 1 RCVR feedthrough connector on the signal entrance box.
- (4) Connect the coaxial cable from one Antenna Assembly AT-588/TRC-42 on the rear curbside of the radio terminal shelter to AN/TRC-47 No. 2 RCVR feedthrough connector on the signal entrance box.
- (5) Connect the coaxial cable from the second Antenna Assembly AT-588/TRC-42 on the rear curbside of the radio terminal shelter to AN/TRC-47 No. 2 XMTR feedthrough connector on the signal entrance box.
- (6) Connect the coaxial cable (250-foot) from one receiving antenna to the HF RCVR ANT PATH A feedthrough connector on the signal entrance box.
- (7) Connect the coaxial cable (250-foot) from the other receiving antenna to the HF RCVR ANT PATH B feedthrough connector on the signal entrance box.
- (8) Remove the protective screw-on caps from the connectors on the power entrance box (fig. 31).

- (9) Connect the cable connector of one power cable to the UTILITY POWER IN feedthrough connector on the power entrance box.
- (10) Connect the cable connector of the other power cable to the TECHNICAL POWER IN feedthrough connector on the power entrance box.
- (11) At each 10-kw generator, connect the tinned leads of the associated power cable as follows:
 - (a) Three green leads to connector L0.
 - (b) White lead to connector L1.
 - (c) Red lead to connector L2.
 - (d) Black lead to connector L3.
- (12) Ground the radio terminal shelter and 10-kw generators as follows:
 - (a) Remove the sledge hammer from the pioneer toolkit (D, fig. 4) on the inside of the door.
 - (b) Loosen the nut on the SHELTER GROUND stud (fig. 31) on the power entrance box, place the ground strap under the nut, and tighten the nut. Connect a ground strap to the ground terminal on the left skid of each 10-kw generator.
 - (c) Select the lowest, dampest sites within 10 feet of the radio terminal shelter and within 10 feet of each 10-kw generator and scoop out a small hole (about 6 inches deep) at each end of the three sites.
 - (d) Remove any paint or grease from the ground rod assemblies.
 - (e) Drive the ground rod assemblies into the holes until the top of each ground rod assembly is approximately 3 inches above the bottom of the hole.
 - (f) Loosen the collar on the ground rod assembly, place the ground braid between the collar and the rod, and tighten the collar.
 - (g) Saturate the ground around the ground rod assembly with water to keep the site moist.
- (13) Connect the power cable between the air conditioner and the POWER OUT AIR COND feedthrough

connector on the air conditioner power output box (fig. 32).

- (14) At all Radio Transmitters T-593/TRC-47, connect a strap between terminals 3 and 10 of plug P3 to enable plate voltage to be applied to the equipment. An alternate method is to construct a shorting plug (tip and sleeve shorted) and insert it into the MIC jack on the front panel.

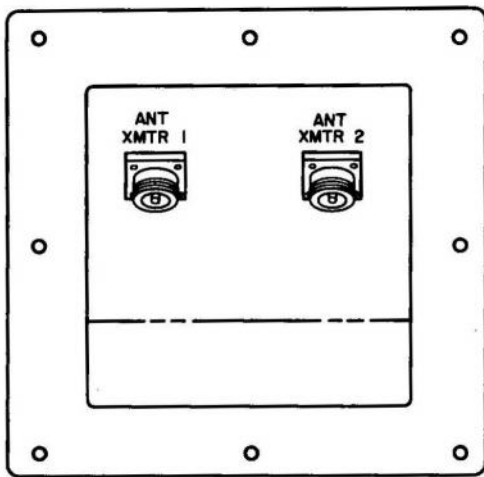
b. Subscriber Package.

- (1) Connect the coaxial cable between one Antenna Assembly AT-588/TRC-42 and the XMTR OUT receptacle on the subscriber package power and signal entrance box (fig. 33).
- (2) Connect the coaxial cable between the second Antenna Assembly AT-588/TRC-42 and RCVR IN receptacle on the subscriber package power and signal entrance box.
- (3) Ground the subscriber package as follows:
 - (a) Select the lowest, dampest site within 10 feet of the subscriber package and scoop out a small hole (about 6 inches deep).
 - (b) Remove any paint or grease from the ground rod assembly.
 - (c) Drive the ground rod assembly into the hole until the top of the ground rod assembly is approximately 3 inches above the bottom of the hole.
 - (d) Loosen the collar on the ground rod assembly and place the ground braid (on the right side of the power and signal entrance box) between the collar and rod. Tighten the collar.
 - (e) Saturate the ground around the ground rod assembly with water to keep the site moist.
- (4) Connect the power cable between the source of local power and POWER IN receptacle on the subscriber package power and signal entrance box. Construct the power cable by connecting the power cord (not supplied with AN/TSC-20) to

the female connector on the POWER IN receptacle.

c. Landline Connections. Facilities are provided at the subscriber packages and the radio terminal shelter for the connection of landline circuits. A full-duplex circuit may be connected between the subscriber package and the radio terminal shelter to supplement or replace the radio circuits between these equipments. At the radio terminal shelter, seven additional landline teletypewriter circuits may be connected to the equipment in the shelter. Facilities are also provided to connect an external telephone line to a telephone in the shelter. At the subscriber package, external terminals are provided for connecting an external two-wire telephone line to the equipment. If spiral-four cable is used for the landlines, it will be necessary to use a Telephone Cable Assembly CX-1512/U at each end since there are no spiral-four cable connectors provided on either the subscriber package or the radio terminal shelter.

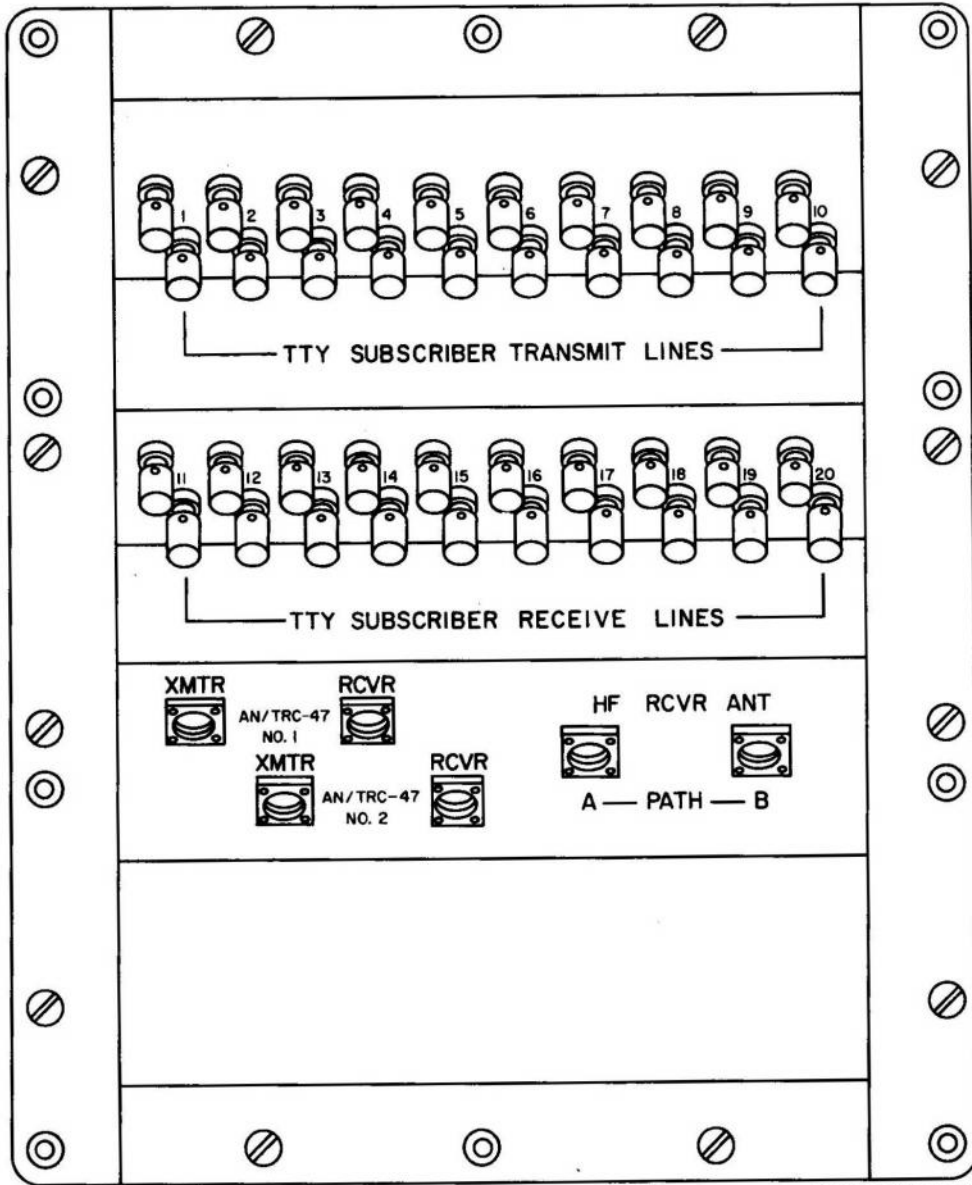
- (1) Two pairs of leads are required to connect a full-duplex circuit between one subscriber package and the radio terminal shelter. The subscriber packages are designated subscriber 1 and subscriber 2. If the landline is to be connected between subscriber 1 and the shelter, perform the procedures in (a) and (b) below. If the landline is to be connected between subscriber 2 and the shelter, perform the procedures in (c) and (d) below. If both subscriber packages are to be connected to the shelter, perform the procedures in (a) through (d) below. When landlines are connected to the subscriber packages, the straps at the power and signal entrance box must be changed as instructed in (e) below.
 - (a) At the subscriber 1 power and signal entrance box, connect one pair of leads (pair 1) to the EXTENSION LINES 1 terminals and the other pair of leads (pair 2) to the EXTENSION LINES 2 terminals.



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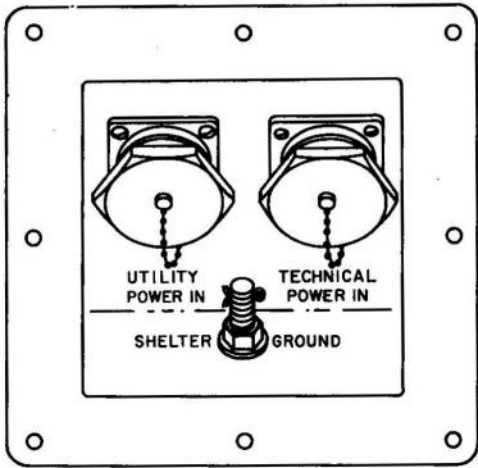
Figure 29. Hf transmitting antenna entrance box.

- (b) At the radio terminal shelter signal entrance box, connect the other end of pair 1 (subscriber 1) to the TTY SUBSCRIBER RECEIVE LINES terminals 18. Connect the other end of pair 2 (subscriber 1) to the TTY SUBSCRIBER TRANSMIT LINES terminals 9.
- (c) At the subscriber 2 power and signal entrance box, perform the procedure in (a) above.
- (d) At the radio terminal shelter signal entrance box, connect the other end of pair 1 (subscriber 2) to the TTY SUBSCRIBER RECEIVE LINES terminals 19. Connect the other end of pair 2 (subscriber 2) to the TTY SUBSCRIBER TRANSMIT LINES terminals 10.
- (e) At the subscriber package power and signal entrance box, change the following straps:
1. Remove one end of each strap connected to AN/TRC-27 XMTR terminals and reconnect to EXT LINES 1 terminals (fig. 73).
 2. Remove one end of each strap connected to AN/TRC-47 RCVR terminals and reconnect to EXT LINES 2 terminals.
- (2) If an external field telephone is used instead of the TA-43/PT in the subscriber package:
- (a) Connect the pair of leads from the external telephone EXTENSION LINES 3 to the terminals in the power and signal entrance box.
 - (b) Remove one end of each strap connected to TA-43 terminals and reconnect to EXT LINES 3 terminals.
- (3) Seven additional full-duplex teletypewriter circuits may be connected to the radio terminal shelter. Each teletypewriter circuit requires two pairs of leads. At the shelter signal entrance box, make the following connections:
- (a) Connect the send pair from teletypewriter circuit 1 to TTY SUBSCRIBER TRANSMIT LINES terminals 1. Connect the receive pair from teletypewriter circuit 1 to TTY SUBSCRIBER RECEIVE LINES terminals 11.
 - (b) Connect the send pair from teletypewriter circuit 2 through 7 to TTY SUBSCRIBER TRANSMIT LINES terminals 2 through 7 respectively. Connect the receive pair from teletypewriter circuits 2 through 7 to TTY SUBSCRIBER RECEIVE LINES terminals 12 through 17 respectively.
- (4) A spare two-wire circuit (TTY SUBSCRIBER TRANSMIT LINES terminals 8) is provided in the shelter signal entrance box. This two-wire circuit terminates at the black patch panel in the shelter and may be used for a two-wire land-line connection to external equipment.
- (5) Facilities are provided for connecting an external two-wire telephone circuit to Telephone TA-43/PT No. 3 in the shelter. Connect the external telephone circuit pair to TTY SUBSCRIBER RECEIVE LINES terminals 20 in the shelter signal entrance box.



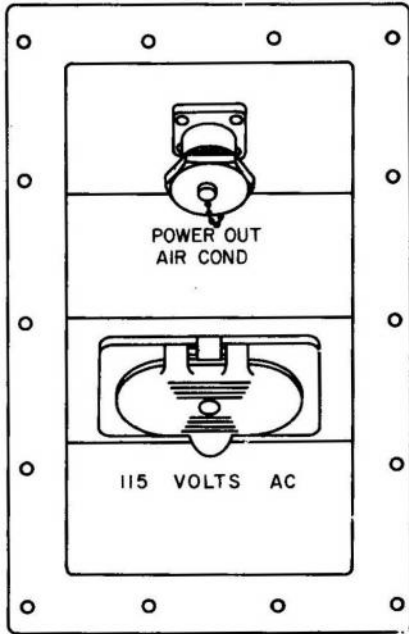
TM5895-288-12-48

Figure 30. Signal entrance box.



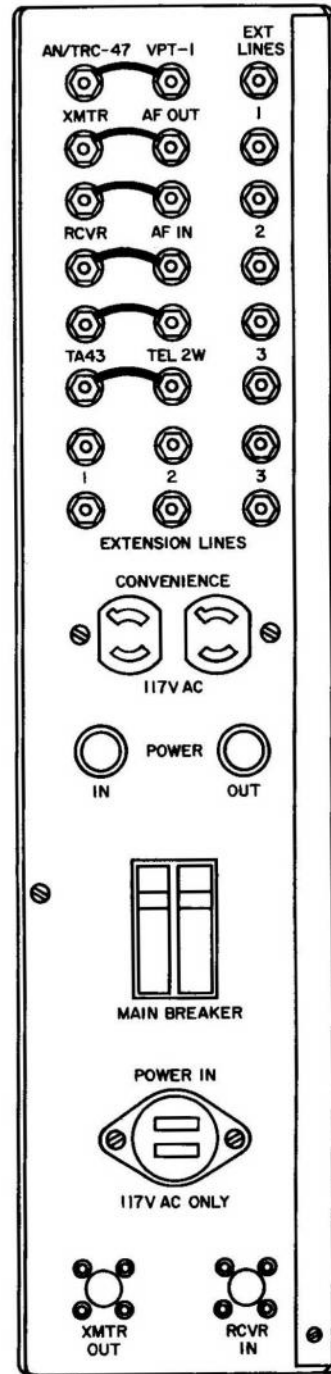
TM5895-288-12-47

Figure 31. Power entrance box.



TM5895-288-12-46

Figure 32. Air conditioner power output box.



TM5895-288-12-38

Figure 33. Power and signal entrance box.

Section II. INSTALLER'S CONTROLS, JACKS, AND INDICATORS

65. General

Note: This section covers only controls, jacks, and indicators that are used by the installer; controls, jacks, and indicators used by the operator are covered in chapter 3.

a. The controls, jacks, and indicators for the following equipments are described in their respective technical manuals.

- (1) Radio Set AN/TRC-47 (TM 11-212-10).
- (2) Converter, Single Sideband CV-157/URR (TM 11-266).
- (3) Receiver, Radio R-390/URR (TM 11-856).

- (4) Teletypewriter Set AN/FGC-25X (TM 11-5815-244-12).
- (5) Telephone Set TA-43/PT (TM 11-337).
- (6) Telephone Set TA-312/PT (TM 11-2155).
- (7) Terminal Telegraph Telephone VPT-1 (TM 11-5805-322-12).

b. Installer's controls, jacks, and indicators for all other equipments are described in paragraphs 66 through 74.

66. Current Limiter Panel, Installer's Controls (fig. 34)

Control	Function
KEYER LOOP CURRENT ADJUST CHANNEL 1 through 8 controls.	Adjusts the amount of dc in each teletypewriter transmit loop.
CONVERTER LOOP CURRENT ADJUST CHANNEL 1 through 8 controls.	Adjusts the amount of dc in each teletypewriter receive loop.

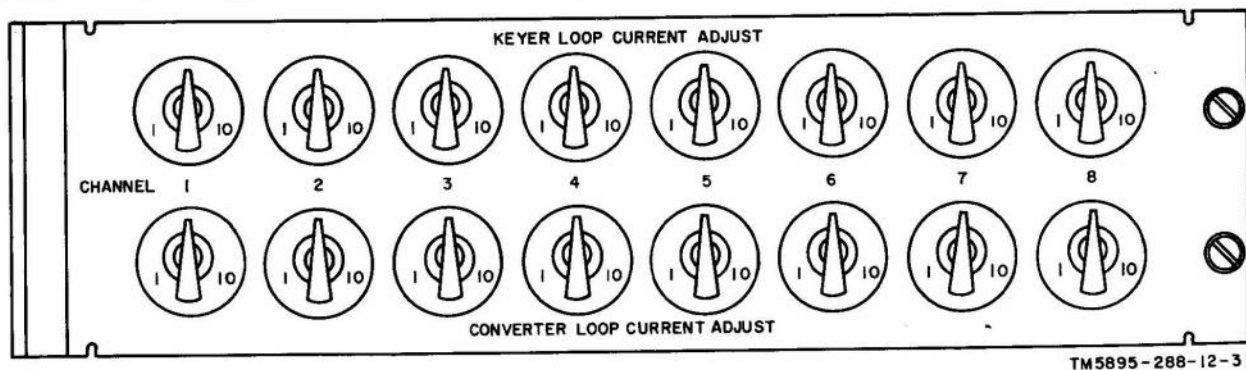
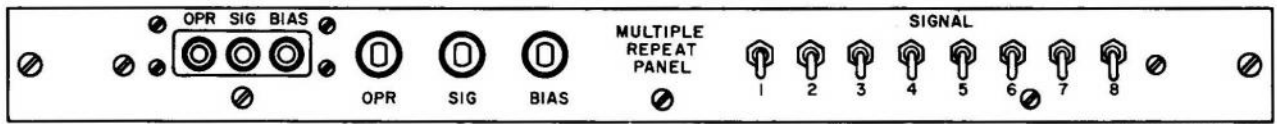


Figure 34. Current limiter panel, controls.

67. Multiple Repeat Panel, Installer's Controls, Indicators, and Jacks (fig. 35)

Control, indicator, or jack	Function
SIGNAL 1 through 8 switches (2-position toggle switch).	When in the up position, each switch applies the teletypewriter signal from the multiple repeat panel to a teletypewriter transmit loop.
OPR, SIG, and BIAS fuse lamps	Blown fuse indicator for OPR, SIG, or BIAS fuse, respectively.
OPR jack	Series jack used to patch a dc milliammeter or teletypewriter equipment into the operating loop.
SIG jack	Series jack used to patch a dc milliammeter or teletypewriter equipment into the signal loop.
BIAS jack	Series jack used to patch a milliammeter into the bias loop.



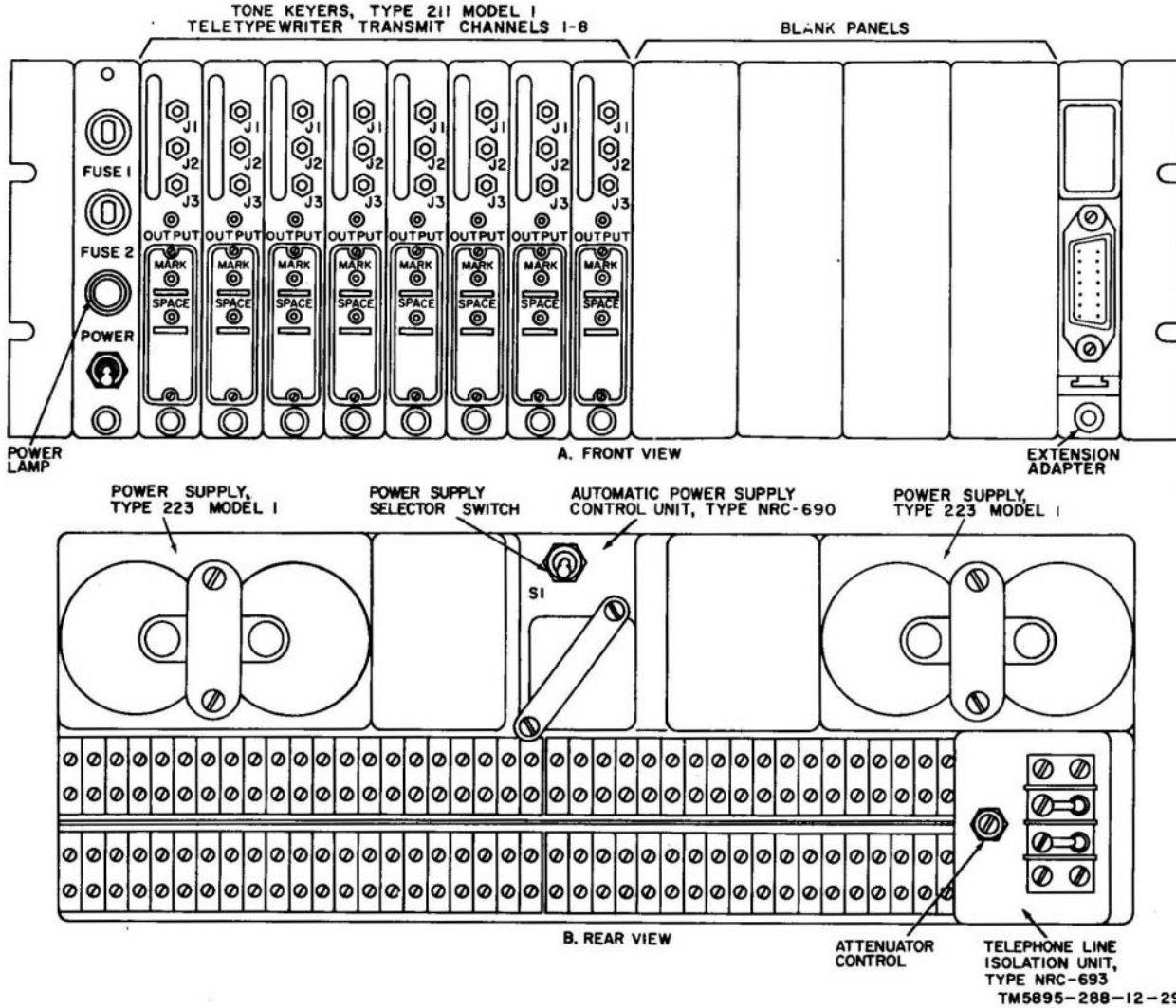
TM5895-288-12-83

Figure 35. Multiple repeat panel, controls.

68. Tone Keyer Shelf, Type 221 Model 2, Installer's Controls

This paragraph describes and locates

the various controls used by the installer. Controls and indicators used by the operator are described in paragraph 91.



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Figure 36. Tone keyer shelf, Type 221 Model 2, controls and indicators.

a. Tone Keyer Shelf (A, fig. 36).

Control	Function
OUTPUT	Adjusts the output signal level.
MARK	Adjusts the mark frequency.
SPACE	Adjusts the space frequency.

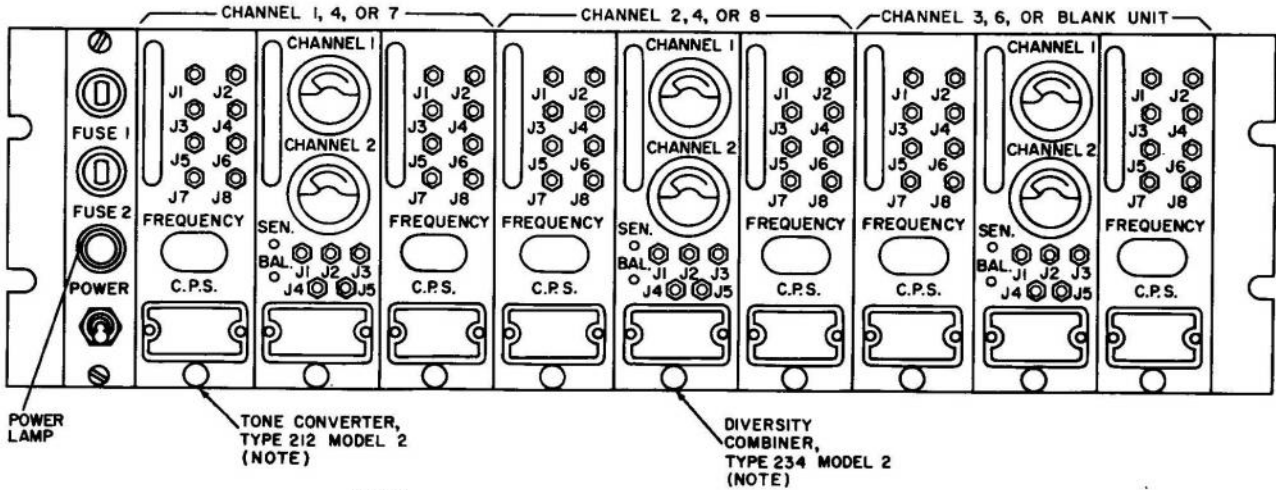
b. Isolation Unit (B, fig. 36).

Control	Function
Attenuator control	Adjusts the combined output signal level of all eight tone keyers. . .

69. Tone Converter Shelf, Type 222 Model 2, Installer's Controls and Indicators

various controls and indicators used by the installer. Controls and indicators used by the operator are described in paragraph 93.

This paragraph describes and locates the



NOTE -
TONE CONVERTERS, TYPE 212 MODEL 2 AND DIVERSITY COMBINERS, TYPE 234 MODEL 2 FOR TELETYPEWRITER RECEIVE CHANNELS 1, 2, AND 3 ARE MOUNTED ON TONE CONVERTER SHELF, TYPE 222 MODEL 2 NO. 1 AND THOSE FOR TELETYPEWRITER RECEIVE CHANNELS 4, 5, AND 6 ARE MOUNTED ON TONE CONVERTER SHELF, TYPE 222 MODEL 2 NO. 2. TONE CONVERTERS, TYPE 212, MODEL 2 AND DIVERSITY COMBINERS, TYPE 234 MODEL 2 FOR TELETYPEWRITER RECEIVE CHANNELS 7 AND 8 AND THE BLANK UNITS ARE MOUNTED ON TONE CONVERTER SHELF, TYPE 222 MODEL 2 NO. 3.

TM5895-288-12-33

Figure 37. Tone converter shelf, Type 222 Model 2, controls and indicators.

a. Diversity Combiner (fig. 37).

Control or indicator	Function
SEN. control	Adjusts levels for effective diversity operation with small relative variations in signal level.
BAL. control	Compensates for tolerance variations in amplifiers and associated circuits.
CHANNEL 1 meter	Indicates relative signal level supplied to path A.
CHANNEL 2 meter	Indicates relative signal level supplied to path B.

b. Isolation Unit (B, fig. 36).

Control	Function
Attenuator control	Adjusts the combined signal level of input to tone converters.

70. Demultiplexer, Type 249 Model 1, Installer's Controls

(fig. 38)

Control	Function
DIRECT PATH LEVEL ADJUST.	Adjusts the output signal level from the direct path portion.
TRANSLATED PATH LEVEL ADJUST.	
INPUT LEVEL ADJUST.	
	Adjusts the input signal level.

71. Multiplexer, Type 248 Model 1, Installer's Control

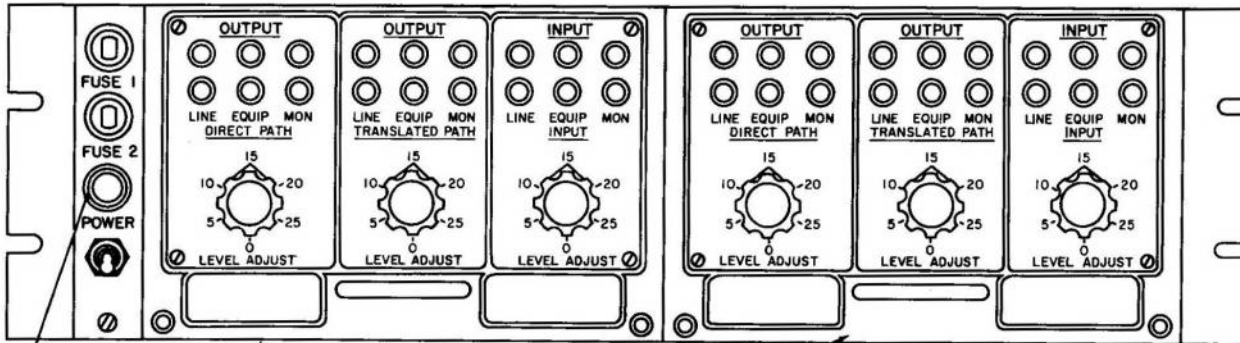
(fig. 39)

Control	Function
OUTPUT LEVEL ADJUST.	Adjusts the output signal level.

72. Hybrid Unit, Installer's Controls

(fig. 40)

Control	Function
BALANCE CONTROL 1	Adjusts the receive portion of the hybrid circuit.
BALANCE CONTROL 2	Adjusts the transmit portion of the hybrid circuit.



POWER LAMP

DEMULTIPLEXER, TYPE 249 MODEL 1 NO. 1 OR NO. 3 (NOTE)

DEMULTIPLEXER, TYPE 249 MODEL 1 NO. 2 OR NO. 4 (NOTE)

NOTE:
DEMULTIPLEXERS, TYPE 249 MODEL 1 NO. 1 AND NO. 2 ARE MOUNTED ON DEMULTIPLEXER SHELF, TYPE 250 MODEL 1 NO. 1 AND DEMULTIPLEXERS, TYPE 249 MODEL 1 NO. 3 AND NO. 4 ARE MOUNTED ON DEMULTIPLEXER SHELF, TYPE 250 MODEL 1 NO. 2

TM 5895-288-12-34

Figure 38. Demultiplexer shelf, controls and indicators.

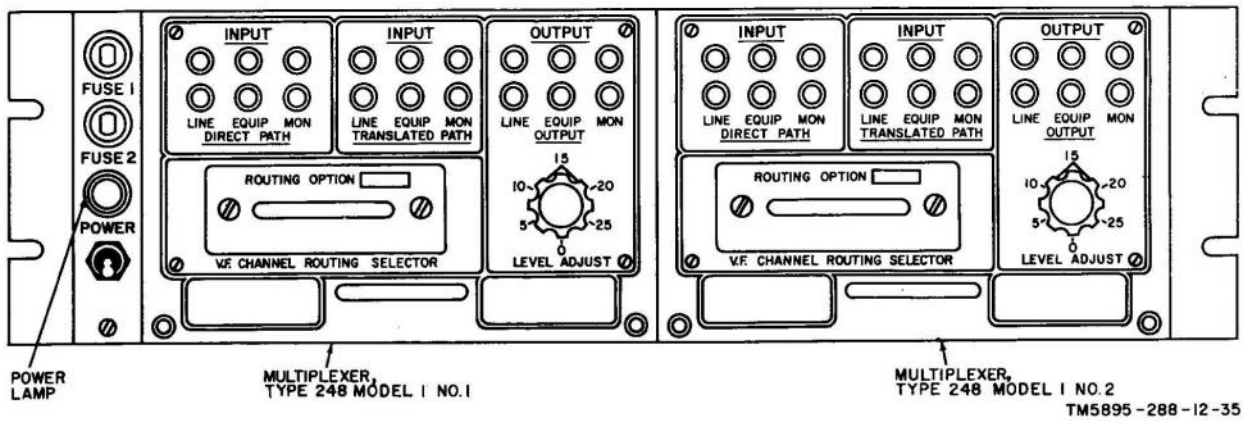


Figure 39. Multiplexer shelf, controls and indicators.

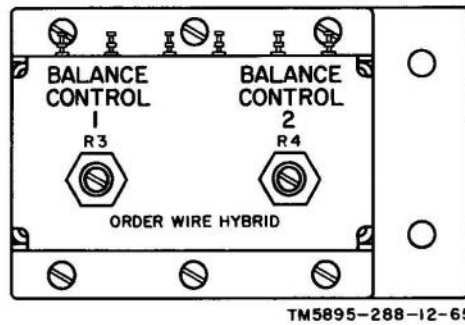


Figure 40. Hybrid unit, installer's controls.

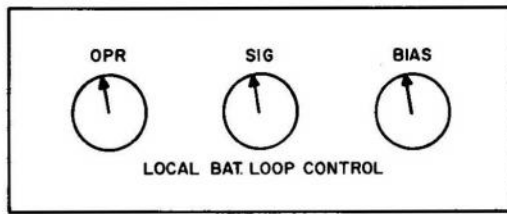
73. Local Battery Loop Control No. 1, Installer's Controls (A, fig. 41)

Control	Function
OPR	Adjusts the amount of dc in the operating loop in the multiple repeat panel.
SIG	Adjusts the amount of dc in the signal loop in the multiple repeat panel.
BIAS	Adjusts the amount of dc in the bias loop in the multiple repeat panel.

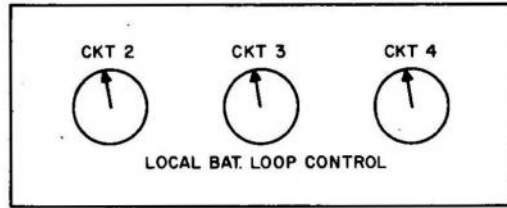
74. Subscriber Power Supply, Installer's Controls and Jacks (fig. 42)

This paragraph describes and locates the various controls used by the installer. Controls and indicators used by the operator are described in paragraph 108b.

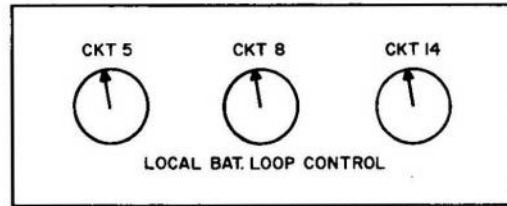
Control or jack	Function
SUPPLY 1 and SUPPLY 2 ADJ controls ..	Adjust the output current from each power supply.
ADJ 60MA jacks (2)	Used to patch the portable dc milliammeter in the circuit.



A. LOCAL BAT. LOOP CONTROL NO. 1

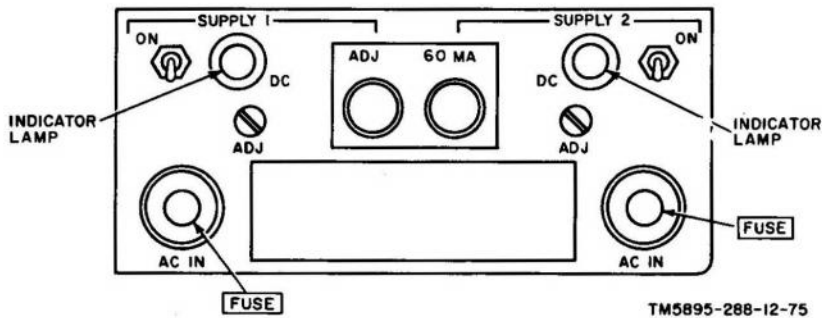


B. LOCAL BAT. LOOP CONTROL NO. 2



C. LOCAL BAT. LOOP CONTROL NO. 3
TM5895-288-12-18

Figure 41. Local battery loop control, controls.



TM5895-288-12-75

Figure 42. Subscriber power supply, controls and indicators.

Section III. PREOPERATIONAL PROCEDURES

75. General

This section covers the preoperational procedures for the AN/TSC-20. These procedures consist of calibrating and ad-

justing the components and system testing. These procedures are performed to assure adequate system performance. Where applicable, adjustments and calibration

procedures are referenced to the appropriate technical manual (appx I). All preliminary procedures such as presetting controls and starting the components are contained in paragraphs 109 through 117 for the radio terminal shelter and paragraph 130 for the subscriber packages. Arrange all teletypewriters in the radio terminal shelter for condition K (TM 11-5815-244-35) and the teletypewriters in the subscriber package as instructed in paragraph 84a. Adjust both VPT-1's in the shelter as instructed in paragraph 84b.

76. Receiver, Radio R-390/URR Calibration

a. Receive Circuit and Frequency Indicator Calibration.

- (1) Operate the FUNCTION switch to AGC.
- (2) Insert the headphone plug into the PHONES jack.
- (3) Operate the MEGACYCLE CHANGE and KILOCYCLE CHANGE controls to station WWV (2.5, 5, 10, 15, or 20 mc). Make sure the frequency indicator reads the exact WWV frequency.
- (4) Push in and turn the ZERO ADJ control fully clockwise.
- (5) Operate the BANDWIDTH KC switch to .1.
- (6) Slowly rotate the KILOCYCLE CHANGE control until a maximum indication is obtained on the CARRIER LEVEL meter.

Note: If the signal is too weak to give a CARRIER LEVEL meter indication, adjust the KILOCYCLES CHANGE control for maximum signal in the headset.

- (7) Rotate the ZERO ADJ control fully counterclockwise.
- (8) Tighten the DIAL LOCK control.

b. Calibration Oscillator Calibration.

- (1) Operate the FUNCTION SWITCH to CAL.
- (2) Remove the four hinged rack clamps.
- (3) Pull the R-390/URR out of the rack and tilt it so that the rear of the unit is facing up.

- (4) Remove the three screws from the rear panel and remove the rear panel.
- (5) Use the screwdriver mounted on the rear panel and adjust the TRIMMER ADJ control through the opening in the rear for a maximum indication on the CARRIER LEVEL meter.
- (6) Operate the FUNCTION switch to AGC. If a decrease is indicated on the CARRIER LEVEL meter, return the FUNCTION switch to CAL.
Note: Repeat the instructions in (5) and (6) above.
- (7) Push the R-390/URR into the rack and secure the four hinged rack clamps.

c. Bfo Calibration.

- (1) Operate the BFO switch to ON.
- (2) Adjust the BFO PITCH control until a zero beat is obtained in the headphones.
- (3) Note the position of the BFO PITCH control at zero beat. If the BFO PITCH control is not at 0, loosen the knob and position it at 0. Tighten the knob.
- (4) Operate the BFO switch to OFF.

77. Test Equipment Adjustment

a. *Test Set TS-140/PCM.* Operate the SG-15A/PCM and ME-22A/PCM as directed in TM 11-2096.

b. *Frequency Meter FR-67/U.* Operate the FR-67/U as directed in TM 11-2698.

c. Multiple Repeat Panel.

- (1) Connect a dc patch cord between the DC MA jack on the audio-dc patch panel and the OPR jack on the multiple repeat panel.
- (2) Loosen the two captive screws and swing out the dual speaker and amplifier panel to permit access to local battery loop control No. 1.
- (3) Adjust the OPR control on local battery loop control No. 1 for a reading of 60 on the dc milliammeter on the meter panel.
- (4) Move the dc patch cord from the OPR jack to the SIG jack on the multiple repeat panel.

- (5) Adjust the SIG control on local loop control No. 1 for a reading of 60 on the dc milliammeter.
- (6) Move the dc patch cord from the SIG jack to the BIAS jack on the multiple repeat panel.
- (7) Adjust the BIAS control on local battery loop control No. 1 for a reading of 30 on the dc milliammeter.
- (8) Remove the dc patch cord and secure the dual speaker and amplifier panel.

78. Demultiplexer, Type 249 Model 1, Level Adjustments

a. *General.* The four demultiplexers in the two demultiplexer shelves are adjusted in a similar manner as described in *b* below. The only difference in the adjustment procedures is in the jacks used to connect the test equipment to the demultiplexers and in the signal applied from the SG-15A/PCM.

b. *Procedure.*

Demultiplexer No.	Path	Insert patch cord From audio-patch panel No. 1 jack	To audio-dc patch panel jack	Set SG-15A/PCM to provide	Set INPUT LEVEL ADJUST control to	ADJUST OUTPUT LEVEL ADJUST control for
1	Direct	DEMUX 1 IN DEMUX 1 OUT CHAN 1A	SG-15A/PCM VU MTR	1 kc at -15 dbm ^a	25	0 vu
	Translated	DEMUX 1 IN DEMUX 1 OUT CHAN 2A	SG-15A/PCM VU MTR	4 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu
2	Direct	DEMUX 2 IN DEMUX 2 OUT CHAN 3A	SG-15A/PCM VU MTR	1 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu
	Translated	DEMUX 2 IN DEMUX 2 OUT CHAN 4A	SG-15A/PCM VU MTR	4 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu
3	Direct	DEMUX 3 IN DEMUX 3 OUT CHAN 1B	SG-15A/PCM VU MTR	1 kc at -15 dbm ^a	25	0 vu
	Translated	DEMUX 3 IN DEMUX 3 OUT CHAN 2B	SG-15A/PCM VU MTR	4 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu
4	Direct	DEMUX 4 IN DEMUX 4 OUT CHAN 3B	SG-15A/PCM VU MTR	1 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu
	Translated	DEMUX 4 IN DEMUX 4 OUT CHAN 4B	SG-15A/PCM VU MTR	4 kc at -10 dbm ^b or -5 dbm ^c	25	0 vu

^a Telegraph signals.

^b Voice signals.

^c Facsimile signals.

79. Multiplexer, Type 248 Model 1, Level Adjustments

a. Connect a vf patch cord between the SG-15A/PCM jack on the audio-dc patch panel and the MUX 1 IN CHAN 1 jack on audio patch panel No. 2 and another between the VU MTR jack on the audio-dc patch panel and the MUX 1 OUT jack on audio patch panel No. 2.

b. Set the SG-15A/PCM to provide a 1-kc signal at 0 dbm.

c. Adjust the OUTPUT LEVEL ADJUST control on multiplexer No. 1 for a reading of 0 on the vu meter.

d. Move the vf patch cord from the MUX 1 IN CHAN 1 jack to the MUX 2 IN CHAN 3 jack and from the MUX 1 OUT jack to the MUX 2 OUT jack.

e. Adjust the OUTPUT LEVEL ADJUST control on multiplexer No. 2 for a reading of 0 on the vu meter.

f. Remove all the vf patch cords.

80. Tone Keyer, Type 211 Model 1, Adjustments

a. *Loop Current Adjustment Procedures.*

(1) Connect a dc patch cord between

the TTY TRANSMIT GROUP CHAN LOOP jack on the black patch panel and DC MA jacks on the audio-dc patch panel.

- (2) Adjust the associated KEYER LOOP CURRENT ADJUST CHANNEL control on the current limiter panel for a reading of 60 on the dc milliammeter.
- (3) Remove the patch cord.

b. Frequency Adjustment Procedures. Channels 1, 3, 5, and 7 are arranged for normal keying; channels 2, 4, 6, and 8 are arranged for inverted keying. In normal keying, a *mark input signal* shifts the keyer output to a *higher frequency*. In inverted keying, a *mark input signal* shifts the keyer output to a *lower frequency*. For normal keying, always adjust the MARK control first; for inverted keying, always adjust the SPACE control first.

(1) *Normal keying.*

- (a) Connect a dc patch cord between the applicable odd-numbered TTY TRANSMIT GROUP CHAN LPG jack on the black patch panel and the DC MA jack on the audio-dc patch panel.
- (b) Connect the modified input cable from the FR-67/U INPUT receptacle to the associated KEYER OUTPUT jack on the dc patch panel.
- (c) The dc milliammeter should indicate 60. (If the TSEC/KW-26 is not installed at this time, insert a dummy plug into the ON LINE CRYPTO SET jack on the black patch panel to obtain the meter reading.)
- (d) Adjust the MARK control on the channel tone keyer until the frequency listed in the ((3) below) is indicated on the FR-67/U.
- (e) Insert a dummy plug into the other TTY TRANSMIT GROUP

CHAN LPG jack. The dc milliammeter should indicate 0.

- (f) Adjust the SPACE control on the channel tone keyer until the frequency listed in the chart ((3) below) is indicated on the FR-67/U.
 - (g) Remove the patch cords and dummy plugs.
- (2) *Inverted keying.*
- (a) Connect a dc patch cord between the applicable even-numbered TTY TRANSMIT GROUP CHAN LPG jack on the black patch panel and the DC MA jack on the audio-dc patch panel.
 - (b) Connect the modified input cable from the FR-67/U INPUT receptacle to the associated KEYER OUTPUT jack on the dc patch panel.
 - (c) Insert a dummy plug into the other TTY TRANSMIT GROUP CHAN LPG jack. The dc milliammeter should indicate 0.
 - (d) Adjust the SPACE control on the channel tone keyer until the frequency listed in the chart below is indicated on the FR-67/U.
 - (e) Remove the dummy plug ((c) above); the dc milliammeter should indicate 60. If the TSEC/KW-26 is not installed at this time, insert a dummy plug into the SUBSCRIBER TRANSMIT LINES SET jack on the black patch panel to obtain a meter reading.
 - (f) Adjust the MARK control on the channel tone keyer until the frequency listed in the chart ((3) below) is indicated on the FR-67/U.
 - (g) Remove the patch cords and dummy plugs.
- (3) *Adjustment chart.*

Channel	Input condition	Meter reading (ma)	Control adjusted	Frequency adjusted to (cps)	Patch DC MA jack (audio-dc patch panel) to black patch panel jack	Patch FR-67 U INPUT to dc patch panel jack
1 (normal)	Mark	60	MARK	2167.5	TTY TRANSMIT GROUP CHAN 1 LPG	KEYER OUTPUT 1
	Space	0	SPACE	2082.5		

Channel	Input condition	Meter reading (ma)	Control adjusted	Frequency adjusted to (cps)	Patch DC MA jack (audio-dc patch panel) to black patch panel jack	Patch FR-67/U INPUT to dc patch panel jack
2 (inverted)	Space	0	SPACE	807.5	TTY TRANSMIT GROUP CHAN 2 LPG	KEYER OUTPUT 2
3 (normal)	Mark Mark	60 60	MARK MARK	722.5 2337.5	TTY TRANSMIT GROUP CHAN 3 LPG	KEYER OUTPUT 3
4 (inverted)	Space Space	0 0	SPACE SPACE	2252.5 977.5	TTY TRANSMIT GROUP CHAN 4 LPG	KEYER OUTPUT 4
5 (normal)	Mark Mark	60 60	MARK MARK	892.5 2507.5	TTY TRANSMIT GROUP CHAN 5 LPG	KEYER OUTPUT 5
6 (inverted)	Space Space	0 0	SPACE SPACE	2422.5 1147.5	TTY TRANSMIT GROUP CHAN 6 LPG	KEYER OUTPUT 6
7 (normal)	Mark Mark	60 60	MARK MARK	1062.5 2677.5	TTY TRANSMIT GROUP CHAN 7 LPG	KEYER OUTPUT 7
8 (inverted)	Space Space	0 0	SPACE SPACE	2592.5 1317.5	TTY TRANSMIT GROUP CHAN 8 LPG	KEYER OUTPUT 8
	Mark	60	MARK	1232.5		

c. Level Adjustment Procedures.

- (1) Connect a vf patch cord between the applicable KEYER OUTPUT jack and the VU MTR jack.
- (2) Adjust the OUTPUT control (fig. 36) on the channel 1 tone keyer for a reading of - 4 on the VU meter.
- (3) Check the mark and space frequencies (b above) and readjust if necessary.
- (4) Remove all the patch cords.
- (5) Repeat procedures (1) through (4) above for each tone keyer.

d. Composite Output Level Adjustment Procedures.

- (1) Connect a vf patch cord between the TTY TERM out jack and the VR MTR jack.
- (2) Loosen the four screws and pull out the tone keyer shelf.
- (3) Adjust the attenuator control on the rear of the tone keyer shelf for a reading of 0 on the VU meter.
- (4) Slide the tone keyer shelf back into the rack and tighten the four screws.
- (5) Remove the patch cord.

81. Diversity Combiner, Type 234, Model 1 and Tone Converter, Type 212 Model 2, Adjustments

a. Diversity Combiner Balancing Procedure.

- (1) Operate the RECEIVE DEMULTI- PLEX switch of the channel being balanced (fig. 44) to the 2-CHAN- NEL DIVERSITY position.
- (2) Patch the output of a tone keyer to the input of a pair of cooperating tone converters (for example: KEYER OUTPUT 1 to CON- VERTER INPUT 1-1 and 1-2) as described in the chart in (8) below.
- (3) Adjust the SEN. control on the diversity combiner (fig. 37) for a maximum reading on either CHAN- NEL meter.
- (4) Adjust the BAL. control on the diversity combiner for equal read- ings on each CHANNEL meter.
- (5) Readjust the SEN. control on the diversity combiner for a reading of 0.9 ma on each CHANNEL meter.
- (6) Insert a dummy plug into the TTY TRANSMIT GROUP CHAN LPG jack associated with the tone keyer being used as indicated in the chart

in (8) below. Remove and insert the dummy plug at a rapid rate. The readings on each CHANNEL meter should not be more than 0.1 ma apart.

(7) Repeat the procedures described in (1) through (6) above for each teletypewriter channel.

Diversity combiner	From (dc patch panel)	To (dc patch panel)	Dummy plug (black patch panel)
Channel 1	KEYER OUTPUT 1	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 1 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 1-1	
	TONE MULTIPLE 3	CONVERTER INPUT 1-2	
Channel 2	KEYER OUTPUT 2	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 2 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 2-1	
	TONE MULTIPLE 3	CONVERTER INPUT 2-2	
Channel 3	KEYER OUTPUT 3	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 3 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 3-1	
	TONE MULTIPLE 3	CONVERTER INPUT 3-2	
Channel 4	KEYER OUTPUT 4	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 4 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 4-1	
	TONE MULTIPLE 3	CONVERTER INPUT 4-2	
Channel 5	KEYER OUTPUT 5	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 5 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 5-1	
	TONE MULTIPLE 3	CONVERTER INPUT 5-2	
Channel 6	KEYER OUTPUT 6	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 6 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 6-1	
	TONE MULTIPLE 3	CONVERTER INPUT 6-2	
Channel 7	KEYER OUTPUT 7	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 7 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 7-1	
	TONE MULTIPLE 3	CONVERTER INPUT 7-2	
Channel 8	KEYER OUTPUT 8	TONE MULTIPLE 1	TTY TRANSMIT GROUP CHAN 8 LPG jack
	TONE MULTIPLE 2	CONVERTER INPUT 8-1	
	TONE MULTIPLE 3	CONVERTER INPUT 8-2	

b. Tone Converter Loop Current Adjustment Procedures. Loop current adjustment procedures for channel 1 are given. Adjustments for channels 2 through 8 should be performed when communications center equipment is connected to the AN/TSC-20.

- (1) Connect a dc patch cord between the TTY RECEIVE GROUP CHAN 1 LOOP and DC MA jacks.
- (2) Adjust the CONVERTER LOOP CURRENT ADJUST CHANNEL 1 control on the current limiter panel for a reading of 60 on the dc milliammeter. Remove the patch cord.

82. Hybrid Unit Adjustments

a. Connect a vf patch cord between the SG-15A/PCM and ME-22/PCM jacks on the audio-dc patch panel.

b. Start the ME-22/PCM and the SG-15A/PCM as instructed in TM 11-2096; then remove the patch cord.

c. Connect a vf patch cord between the ENGR O/W A AMP IN (audio patch panel No. 1) and the SG-15A/PCM (audio-dc patch panel) and another between the ENGR OW OUT (audio patch panel No. 2) and the ME-22/PCM (audio-dc patch panel) jacks.

d. Set the INPUT IMPEDANCE switch on the ME-22/PCM to the 600 OHM position

and the DBM switch to 0 on SCALE B.

e. Operate the transfer switch to the hybrid position and remove the handset of the TA-312/PT from the cradle.

f. Loosen the captive screw and swing out audio patch panel No. 2 to permit access to the hybrid unit.

g. Set the SG-15A/PCM to provide a 1-kc signal at 0 dbm.

h. Adjust both BALANCE CONTROL 1 and BALANCE CONTROL 2 on the hybrid unit until the ME-22/PCM indicates maximum signal level attenuation; then, set the DBM switch successively to -10 and -20 and continue adjusting the balance controls until maximum attenuation has been reached.

Caution: Do not set the DBM switch on the ME-22/PCM to -20 until the balance controls have been adjusted to provide an attenuation of -20 dbm. Proceed step by step and set the DBM control successively from 0 to -10 to -20 to prevent damaging the meter needle.

i. Set the SG-15A/PCM to provide a 300-cps signal at +10 dbm.

j. Perform the adjustments given in *h* above.

k. Sweep the SG-15A/PCM from 300 cps through 3,000 cps while watching the meter indication on the ME-22/PCM.

l. If the meter indication shows an attenuation of less than -25 dbm at any point in the sweep, repeat the adjustments in *g* through *k* above until the attenuation is a minimum of -25 dbm at any point in the sweep.

m. Remove all patch cords.

83. Telephone Sets TA-43/PT and TA-312/PT Adjustments

a. TA-43/PT No. 1 and No. 2. Operate the circuit selector switch to LB. Set the buzzer volume control at LOW.

b. TA-312/PT. Operate the circuit selector switch to LB and the EXT-INT SWITCH to INT. Set the buzzer volume control at LOW.

c. TA-43/PT No. 3. The circuit selector switch setting depends on the type of telephone system used to provide local telephone service to the radio terminal shelter. Refer to TM 11-337 for a description of the types of telephone service.

84. Subscriber Package Adjustments

a. Teletypewriter Set AN/FGC-25X. The AN/FGC-25X is operated by using a 60 ma dc signal level. Connect the patch panel as shown in figure 73. Operate the switches as instructed in the chart below.

Component	Control	Position
Page printer	POWER switch	ON
Terminal box	SIGNAL switch	60
	BIAS switch	60
Perforator rear control panel	LINE 1 DC switch	OFF
	LINE 2 DC switch	OFF
	REPERFORATOR SIGNAL switch	60
	BIAS switch	60
	TEST switch	60 MA
	POWER switch	ON

b. Terminal Telegraph Telephone VPT-1. At the VPT-1 rear panel (TM 11-5805-232-12):

(1) Operate the 115VAC-230VAC switch to 115VAC.

(2) Operate the POWER switch to ON.

(3) Operate the EXT-INT switch to INT.

(4) Operate the 20 MA-60 MA switch to 60 MA.

(5) Operate the 2W-4W switch to 2W with a screwdriver.

c. Radio Set AN/TRC-47. Perform the tuning procedures in paragraph 116a, b, d, and e.

d. Subscriber Power Supply. Adjust the output of the subscriber power supply as follows:

(1) Insert the portable milliammeter plug into the SUPPLY 1 ADJ 60

MA jack (fig. 42). Adjust the SUPPLY 1 ADJ control with a screwdriver until the portable milliammeter indicates 60.

- (2) Remove the portable milliammeter plug from the jack and insert it into the SUPPLY 2 ADJ 60 MA jack. Adjust the SUPPLY 2 ADJ control with a screwdriver until the portable milliammeter indicates 60. Remove the portable milliammeter plug.

85. Radio Terminal Shelter Equipment Testing

Note: TSEC/KW-26 No. 1 and No. 2 must be installed for these tests.

a. Testing Teletypewriter Channel 1.

- (1) Connect a vf patch cord between the TTY TERM OUT jack on audio patch panel No. 2 (fig. 56) and the TTY TERM IN MUX A jacks on audio patch panel No. 1.
- (2) Prepare a test tape as directed in TM 11-5815-244-12.
- (3) Insert the test tape in the transmitter distributor of AN/FGC-25X No. 2.
- (4) Operate the STOP-START lever on AN/FGC-25X No. 2 to START.
- (5) Page and tape copy is prepared by the page printer and perforator respectively of AN/FGC-25X No. 2.
- (6) Operate the STOP-START lever to STOP.

b. Testing Teletypewriter Channels 2 through 8.

- (1) Follow the procedures described in a(1) through (4) above.
- (2) Patch from the TTY TRANSMIT GROUP ON LINE CRYPTO SET jack associated with channel 1 to the applicable TTY TRANSMIT GROUP LOOP jack on the black patch panel (fig. 54) associated with the teletypewriter transmit channel to be tested.
- (3) Patch from the TTY RECEIVE GROUP ON LINE CRYPTO SET jack associated with channel 1 to the applicable TTY RECEIVE

GROUP CHAN LOOP jack on the black patch panel.

- (4) Page and tape copy is prepared by the page printer and perforator respectively of AN/FGC-25X No. 2.
- (5) Operate the START-STOP lever on the transmitter-distributor to STOP.
- (6) Repeat the procedures described in (1) through (5) above for each channel.
- (7) Remove the patch cords.

c. Subscriber Link Teletypewriter Testing.

Note: TSEC/KW-9 No. 1, No. 2, and No. 3, and No. 4 must be installed for this test.

- (1) Connect a vf patch cord between the VPT-1-1 AF OUT and the VPT-1-1 AF IN jacks on audio patch panel No. 2 (fig. 56).
- (2) Insert a test tape in the transmitter-distributor of AN/FGC-25X No. 1.
- (3) Operate the STOP-START lever on AN/FGC-25X No. 1 to START. Page and tape copy of the test message is prepared by the page printer and perforator of AN/FGC-25X No. 1 respectively.
- (4) Connect a vf patch cord between the VPT-1-2 AF OUT and the VPT-1-2 AF IN jacks on audio patch panel No. 2.
- (5) Connect a dc patch cord between the KW-9-2 RECEIVE PRINTER and the KW-9-4 RECEIVE LOOP jacks and another between the KW-9-1 SEND TD SET and the KW-9-3 SEND LOOP jacks on the red patch panel. Page copy of the test message is prepared by the page printer of AN/FGC-25X No. 1.
- (6) Operate the STOP-START lever on the transmitter-distributor to STOP and remove all the patch cords.

86. Subscriber Package Equipment Local Testing

a. Connect jumper wires between the VPT-1 AF OUT and AF IN binding posts

on the power and signal entrance box (fig. 33).

b. Prepare a test tape as directed in TM 11-5815-244-12.

c. Insert the test tape in the transmitter-distributor of the AN/FGC-25X.

d. Operate the STOP-START lever on the AN/FGC-25X to START. Page and tape copy of the test message is prepared by the page printer and perforator respectively of the AN/FGC-25X.

e. Operate the STOP-START lever to STOP and remove the jumper wires.

87. System Testing

a. Hf Circuit Local Test.

- (1) Disconnect the coaxial cables (250 feet) from the HFRCVR ANT PATH A and PATH B receptacles at the signal entrance box.
- (2) Tune AN/FRT-53 No. 1 as described in paragraphs 114 and 115 for approximately 50 watts.
- (3) Tune R-390/URR No. 1 and No. 2 to the operating frequency of AN/FRT-53 No. 1.
- (4) Insert a test tape in the transmitter-distributor of AN/FGC-25X No. 2.
- (5) Operate the STOP-START lever on AN/FGC-25X No. 2 to START.
- (6) Start and operate the R-390/URR's and CV-157/URR's as described in TM 11-649. Page and tape copy of the test message is prepared by the page printer and perforator respectively of AN/FGC-25X No. 2.
- (7) Operate the transfer switch (A, fig. 4) to the dual speaker and amplifier position.
- (8) Set the volume control (fig. 48) on the left speaker of the dual speaker and amplifier panel to the midposition.
- (9) Operate the press-to-talk switch and speak into the mouthpiece of the TA-312/PT. The signal is heard in the dual speaker and amplifier panel.
- (10) Operate the STOP-START lever on

the transmitter-distributor to STOP.

b. *Vhf Circuit System Test.* The procedure for testing the circuit between the radio terminal shelter and subscriber package No. 1 is described in (1) through (10) below. To test the circuit to subscriber package No. 2, make the connections described in (11) below and then follow the procedure in (1) through (10) below.

- (1) At the radio terminal shelter, operate the RING switch on the VPT-1 (TM 11-5805-322-12) associated with the subscriber package being called.
- (2) At the subscriber package, operate the RING RESET switch on the VPT-1 to silence the call alarm.
- (3) At both locations, operate the push-to-talk switch on the TA-43/PT and speak into the transmitter. A duplex voice circuit is established between the radio terminal shelter and the subscriber package.
Note: In the radio terminal shelter, TA-43/PT No. 1 is connected to subscriber package No. 1 and TA-43/PT No. 2 is connected to subscriber package No. 2.
- (4) At the subscriber package, operate the RING switch on the VPT-1. The call alarm bell should operate and the SUBSCRIBER CALL lamp (fig. 46) associated with the subscriber package should light.
- (5) At the radio terminal shelter, operate the RING RESET switch. The call alarm bell should stop ringing and the SUBSCRIBER CALL lamp should go out.
- (6) At the radio terminal shelter, insert a test tape in the transmitter-distributor of AN/FGC-25X No. 1 and operate the START-STOP lever to START.
- (7) At the subscriber package, the test message should be received on the page printer and perforator of the AN/FGC-25X.
- (8) At the subscriber package, insert a test tape in the transmitter-distributor of the AN/FGC-25X and operate the START-STOP lever to START.

- (9) At the radio terminal shelter, the test message should be received on the page printer and reperforator of AN/FGC-25X No. 1.

Note: When exchanging test messages between subscriber package No. 2 and the radio terminal shelter, the test message will only be received on the reperforator of AN/FGC-25X No. 1 in the radio terminal shelter.

- (10) Operate the START-STOP lever on

both transmitter-distributors to STOP. Remove the patch cords (subscriber package No. 2 test only).

- (11) Connect a dc patch cord between the KW-9-1 SEND TD jack and the KW-9-3 SEND LOOP jack and another dc patch cord between the KW-9-2 RECEIVE PRINTER jack and the KW-9-4 RECEIVE LOOP jack.

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CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS, JACKS, AND INDICATORS

88. Radio Terminal Shelter Controls and Indicators

a. The controls, jacks, and indicators for the following equipments are described in their respective technical and commercial manuals.

- (1) Radio Set AN/TRC-47 (TM 11-212-10).
- (2) Converter, Single Sideband CV-157/URR (TM 11-266).
- (3) Receiver, Radio R-390/URR (TM 11-856).
- (4) Teletypewriter Set AN/FGC-25X (TM 11-5815-244-12).
- (5) Telephone Set TA-43/PT (TM 11-337).
- (6) Telephone Set TA-312/PT (TM 11-2155).
- (7) Terminal Telegraph Telephone VPT-1 (TM 11-5805-322-12).

- (8) 10-kw generator (Corps of Engineers, Manual stock No. 7610-C-1-0875).
- (9) Air conditioner (U. S. Army Corps of Engineers stock No. 7610-C-1040).
- (10) Transmitting Set, Radio AN/FRT-53 (commercial manual).
- (11) Test Set TS-140/PCM (TM 11-2096).
- (12) Frequency Meter FR-67/U (TM 11-2698).

b. Operator's controls, jacks and indicators for all other equipments and the shelter are described in paragraphs 89 through 107.

89. Lighting Controls (fig. 5 and 67)

Controls	Function
LIGHTS ODD switch -----	Applies ac power to the odd lights when in the ON position.
LIGHTS EVEN switch -----	
SPOTLIGHTS switch -----	
BLACKOUT switch -----	
Door interlock switch -----	Applies ac power to the even lights when in the ON position. Applies ac power to the spotlights when in the ON position. A two-position switch that functions with the door interlock switch; door interlock switch extinguishes odd, even, and spotlight lights when the door is opened and the BLACKOUT switch is in the NORMAL position; door interlock switch has no effect when the BLACKOUT switch is in the BYPASS position. Removes power from the odd, even, and spotlight lights when the door is opened and the BLACKOUT switch is in the NORMAL position.

90. Power Control and Distribution Panel Controls and Indicators (fig. 43)

Control or indicator	Function
CB3 circuit breaker -----	Applies ac power to the utility load. Apply ac power to the air conditioner. Applies ac power to the heater. Permits either generator to supply entire load during emergencies. Applies ac power to the technical load. AN/FRT-53 No. 1 receives ac power from CB26; AN/FRT-53
CB9 and CB10 circuit breakers -----	
CB15 circuit breaker -----	
CB21 circuit breaker -----	
CB27 circuit breaker -----	
CB26 and CB28 circuit breakers -----	

Control or indicator	Function																
CB27 circuit breaker ----- CB26 and CB28 circuit breakers ----- CB31, CB32, CB33, CB34, CB39, CB41, ± and CB42 circuit breakers.	emergencies. Applies ac power to the technical load. AN/FRT-53 No. 1 receives ac power from CB26; AN/FRT-53 No. 2 receives ac power from CB28. Apply ac power to the racks as follows: <table border="1"> <thead> <tr> <th>Circuit breaker</th> <th>Rack</th> </tr> </thead> <tbody> <tr><td>CB31</td><td>403</td></tr> <tr><td>CB32</td><td>407</td></tr> <tr><td>CB33</td><td>405A1</td></tr> <tr><td>CB34</td><td>405A2</td></tr> <tr><td>CB39</td><td>406</td></tr> <tr><td>CB41</td><td>404</td></tr> <tr><td>CB42</td><td>408</td></tr> </tbody> </table>	Circuit breaker	Rack	CB31	403	CB32	407	CB33	405A1	CB34	405A2	CB39	406	CB41	404	CB42	408
Circuit breaker	Rack																
CB31	403																
CB32	407																
CB33	405A1																
CB34	405A2																
CB39	406																
CB41	404																
CB42	408																
CB35 and CB38 circuit breakers -----	External convenience outlets receive ac power from CB35; internal convenience outlets receive ac power from CB38.																
CB40 circuit breaker -----	Applies ac power to the odd, even, and spotlights																
CB36 circuit breaker -----	Spare.																
Utility power input lamp -----	When lighted, indicates presence of utility power.																
Technical power input lamp -----	When lighted, indicates presence of technical power.																

91. Tone Keyer Shelf, Type 221 Model 2, Controls and Indicators (fig. 36)

a. Tone Keyer Shelf.

Control or indicator	Function
POWER switch ----- POWER lamp ----- FUSE 1 lamp ----- FUSE 2 lamp -----	Applies ac power to the tone keyer shelf. Indicates the presence of ac power. Indicates that FUSE 1 is blown. Indicates that FUSE 2 is blown.

b. Control Unit.

Control	Function
Power supply selector switch -----	Manually selects the power supply which will supply load.

92. Combined Function Panel Controls and Indicators (fig. 44)

Control or indicator	Function
TRANSMIT MULTIPLEX 1-2, 3-4, 5-6, and 7-8 switches.	Selects either 2- or 4-channel diversity operation. The eight transmit teletypewriter signals are applied to separate tone keyers when the switches are in the 2-CHANNEL DIVERSITY position. Teletypewriter signals from channel 1 are applied to the channel 2 tone keyer when the 1-2 switch is in the 4-CHANNEL DIVERSITY position. Teletypewriter signals from channels 3, 5, and 7 are applied to the channel 4, 6, and 8 tone keyers, respectively, when the 3-4, 5-6, and 7-8 switches are in the 4-CHANNEL DIVERSITY position.
RECEIVE DEMULTIPLEX 1-2, 3-4, 5-6, and 7-8 switches.	Selects either 2- or 4-channel diversity operation. The eight receive teletypewriter signals are derived from the separate tone converter pairs when the switches are in the 2-CHANNEL DIVERSITY position. Teletypewriter signals from channels 2, 4, 6, and 8 are combined with the signals from channels 1, 3, 5, and 7, respectively, when the switches are in the 4-CHANNEL DIVERSITY position.

Control or indicator	Function								
POWER MONITOR A and B lamps (14) --	When lighted, indicates the presence of power from the power supplies on the tone keyer, tone converter, multiplexer, and demultiplexer shelves.								
	<i>Lamps</i>								
	<i>Shelves</i>								
KEYER FUSE 1, 2, 3, 4, 5, 6, 7, and 8 lamps.	When lit, indicates tone keyer fuse in the respective teletypewriter channel is blown.								
	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">KEYER 1-8 and 1</td> <td style="width: 50%;">Tone keyer shelf.</td> </tr> <tr> <td>CONVERTER 1-3, 4-6, 7-8, 2, 3, and 4</td> <td>Tone converter shelves No. 1, 2, and No. 3.</td> </tr> <tr> <td>DEMUX 1-2, 3-4, 5, and 6</td> <td>Demultiplexer shelves No. 1 and No. 2.</td> </tr> <tr> <td>MUX 1-2 and 7</td> <td>Multiplexer shelf.</td> </tr> </table>	KEYER 1-8 and 1	Tone keyer shelf.	CONVERTER 1-3, 4-6, 7-8, 2, 3, and 4	Tone converter shelves No. 1, 2, and No. 3.	DEMUX 1-2, 3-4, 5, and 6	Demultiplexer shelves No. 1 and No. 2.	MUX 1-2 and 7	Multiplexer shelf.
KEYER 1-8 and 1	Tone keyer shelf.								
CONVERTER 1-3, 4-6, 7-8, 2, 3, and 4	Tone converter shelves No. 1, 2, and No. 3.								
DEMUX 1-2, 3-4, 5, and 6	Demultiplexer shelves No. 1 and No. 2.								
MUX 1-2 and 7	Multiplexer shelf.								

93. Tone Converter Shelf, Type 222 Model 2, Controls and Indicators

a. Tone Converter Shelf (fig. 37).

Control or indicator	Function
POWER switch -----	Applies ac power to the tone converter shelf. Indicates the presence of ac power. When lighted, indicates that FUSE 1 is blown. When lighted, indicates that FUSE 2 is blown.
POWER lamp -----	
FUSE 1 lamp -----	
FUSE 2 lamp -----	

b. Control Unit.

Control	Function
Power supply selector switch (located on rear of shelf).	Manually selects the power supply which will supply the load.

94. Multiplexer and Demultiplexer Shelf, Type 250 Model 1, Controls and Indicators

a. Multiplexers Shelf (fig. 39) or Demultiplexer Shelf (fig. 38).

Control or indicator	Function
POWER switch -----	Applies ac power to the multiplexer or demultiplexer shelf. When lighted, indicates the presence of ac power. When lighted, indicates that FUSE 1 is blown. When lighted, indicates that FUSE 2 is blown.
POWER lamp -----	
FUSE 1 lamp -----	
FUSE 2 lamp -----	

b. Control Unit

Control	Function
Power supply selector switch (located on rear of shelf).	Manually selects the power supply which is to supply the load.

95. Line Battery Power Supply Panel, Type 227 Model 1, Controls and Indicators
(fig. 45)

Control or indicator	Function
POWER switch ----- LOAD TRANSFER switch -----	Applies ac power to the line battery power supply panel. Transfers the load to line battery power supply designated No. 1 when in the No. 1 position and to line battery power supply designated No. 2 when in the No. 2 position.
D. C. OUTPUT SUPPLY No. 1 and SUPPLY No. 2 lamps.	When lighted, indicates the presence of dc power at the output of the respective line battery power supply.
A. C. INPUT SUPPLY No. 1 and SUPPLY No. 2 lamps	When lighted, indicates that the respective line battery power supply ac power input fuse is blown.
OUTPUT-D. C. SUPPLY No. 1 and SUPPLY No. 2 lamps.	When lighted, indicates that the respective line battery power supply dc power output fuse is blown.

96. Alarm Unit Controls and Indicators
(fig. 46)

Control or indicator	Function
KW-9 OVERHEAT and KW-26 OVERHEAT lamps --- ALARM STOP switches ----- ALARM DISABLED lamps -----	Indicates that the temperature in racks 404 and 408 respectively is above 95°F (35° C). Disables the alarm circuits for racks 404 and 408 when in the down position. Indicates that the alarm circuits for racks 404 and 408 are disabled.
SUBSCRIBER-1 CALL and SUBSCRIBER-2 CALL lamps.	Indicates that a ringing signal has been received from subscriber package No. 1 or No. 2.
Bell -----	Indicates that the temperature in rack 404 or 408 is above 95°F (35° C) or that a ringing signal has been received from the subscriber packages.

97. Standing Wave Ratio Meter SWR-1K Controls and Indicators
(fig. 47)

Control or indicator	Function
OFF-X1-X10 switch ----- Meter -----	A three-position switch that determines the meter range in the X1 and X10 position. Bypasses the meter in the OFF position. Indicates the amount of forward and reflected power and the standing wave ratio.

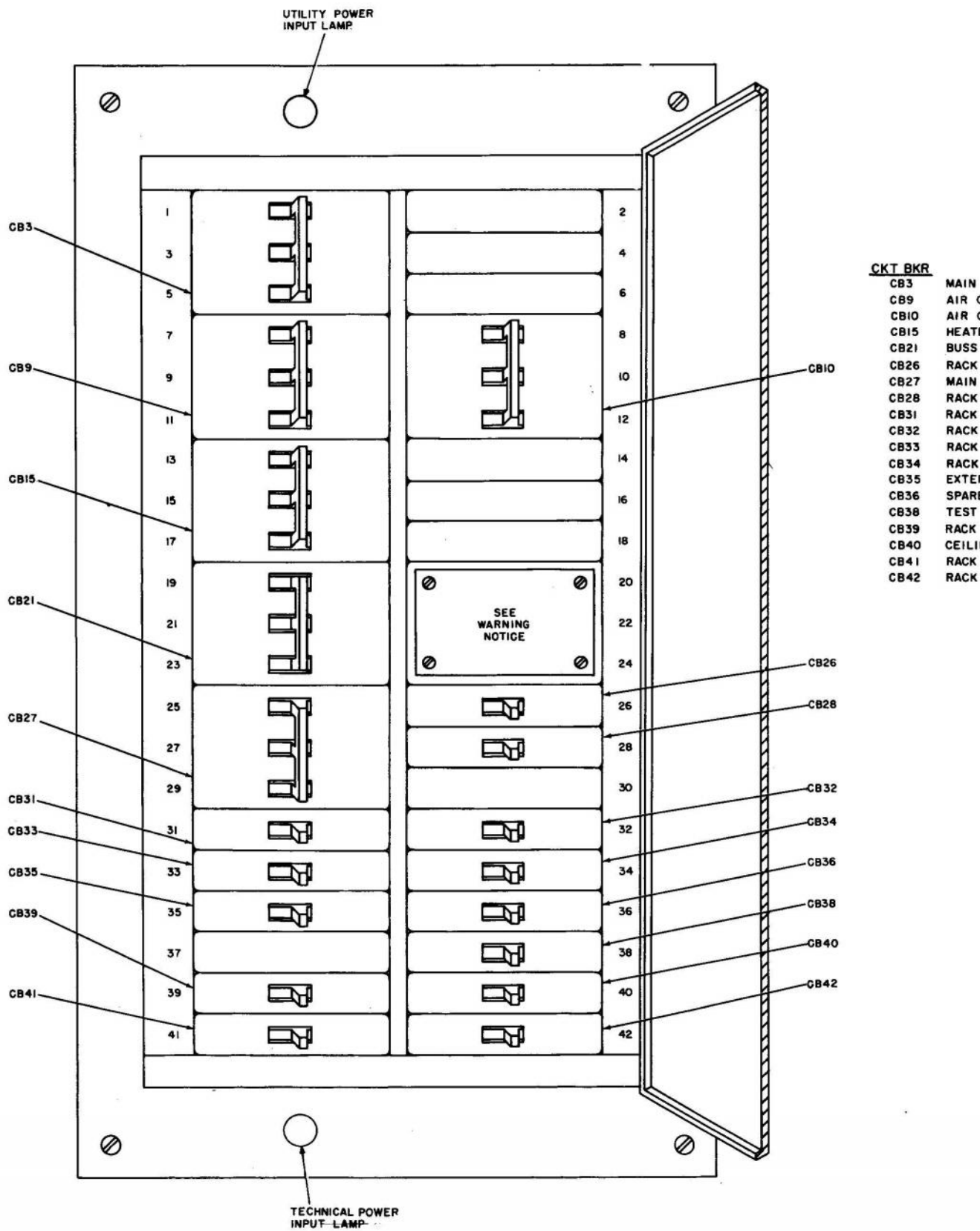
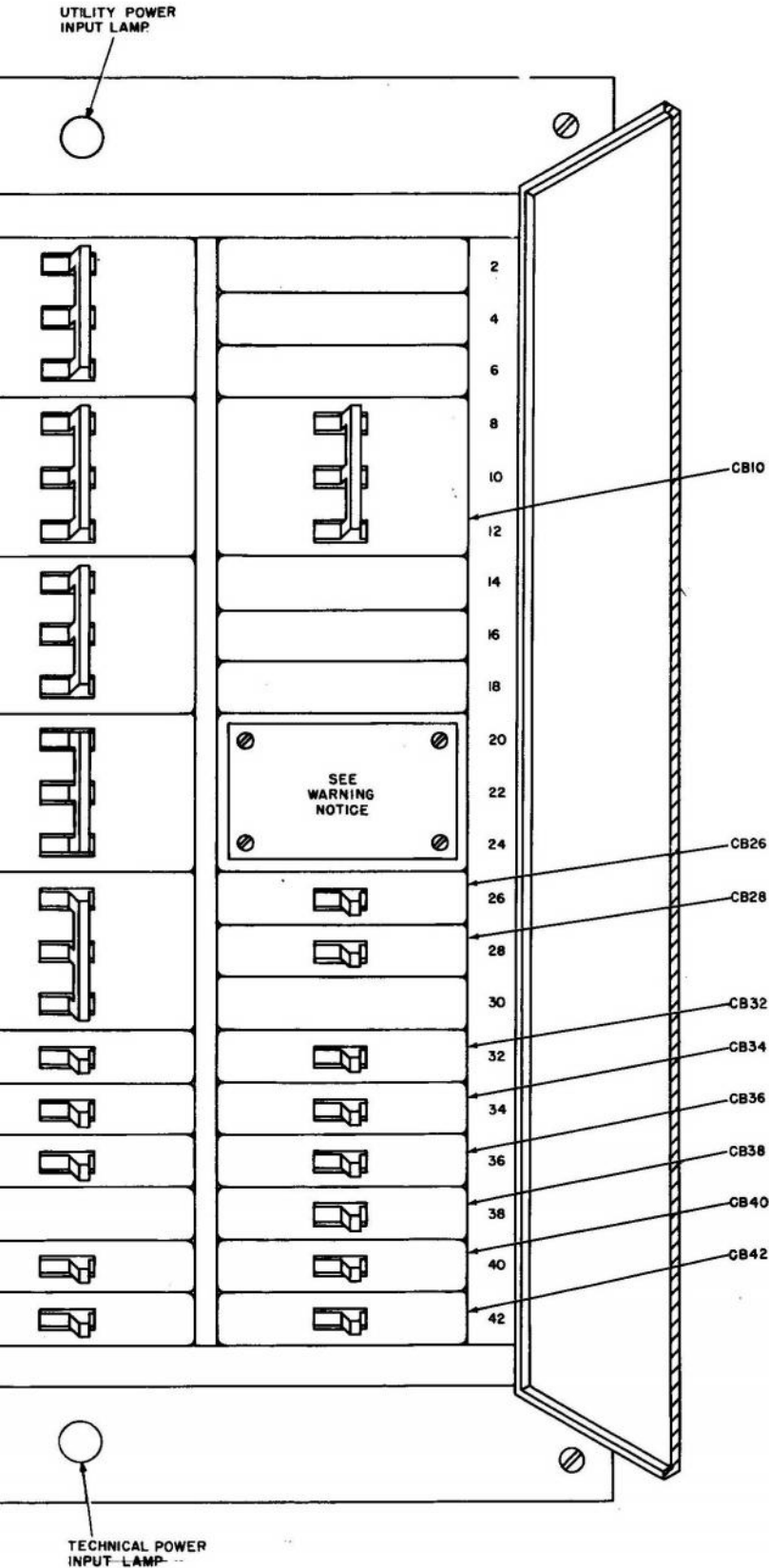


Figure 43. Power control and distribution panel, controls and indicators.



LEGEND:

<u>CKT BKR</u>	<u>CIRCUIT</u>	<u>RATING</u>
CB3	MAIN UTILITY	50A
CB9	AIR CONDITIONER NO.1	20A
CB10	AIR CONDITIONER NO.2	20A
CB15	HEATER	20A
CB21	BUSS CIRCUIT	70A
CB26	RACK 402 (MAIN)	20A
CB27	MAIN TECHNICAL	50A
CB28	RACK 402 (STANDBY)	20A
CB31	RACK 403	15A
CB32	RACK 407	15A
CB33	RACK 405A1	15A
CB34	RACK 405A2	15A
CB35	EXTERNAL CONVENIENCE OUTLETS	15A
CB36	SPARE	15A
CB38	TEST BENCH AND DESK CONVENIENCE OUTLETS	15A
CB39	RACK 406	15A
CB40	CEILING LIGHTS AND SPOTLIGHTS	15A
CB41	RACK 404	20A
CB42	RACK 408	30A

Figure 43. Power control and distribution panel, controls and indicators.

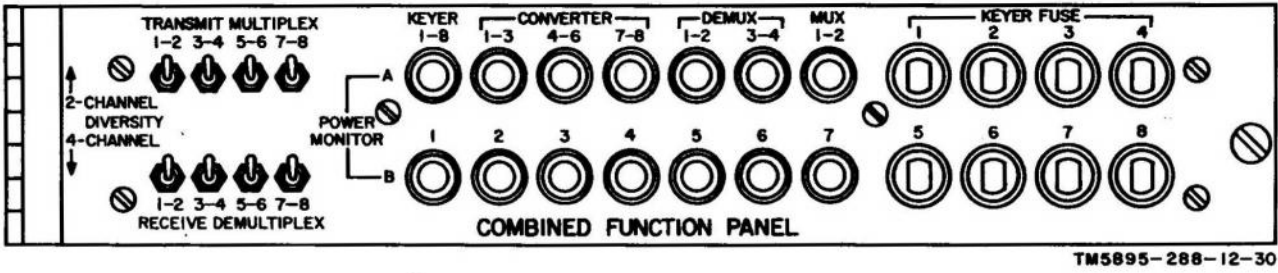


Figure 44. Combined function panel, controls and indicators.

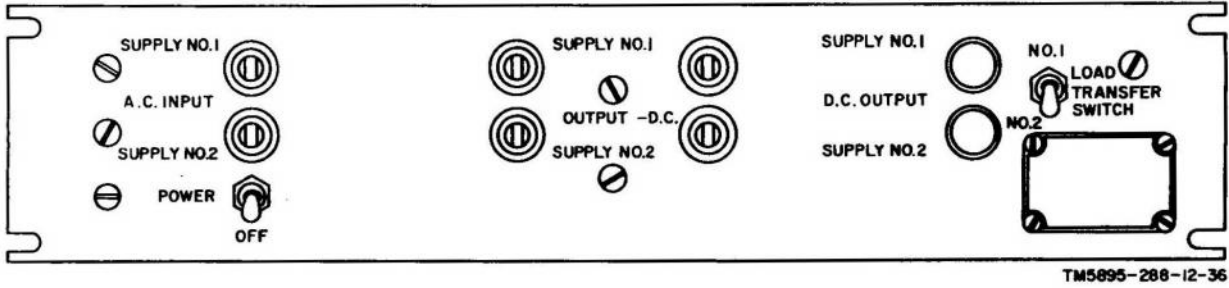


Figure 45. Line battery power supply panel, Type 227 Model 1, controls and indicators.

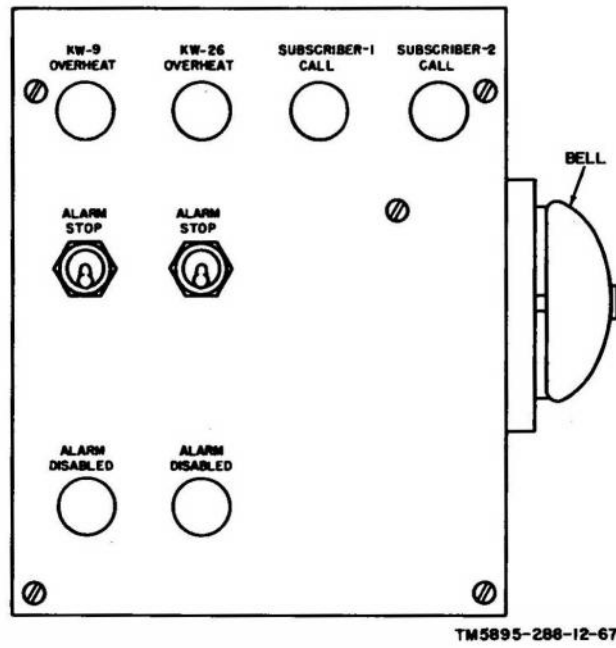
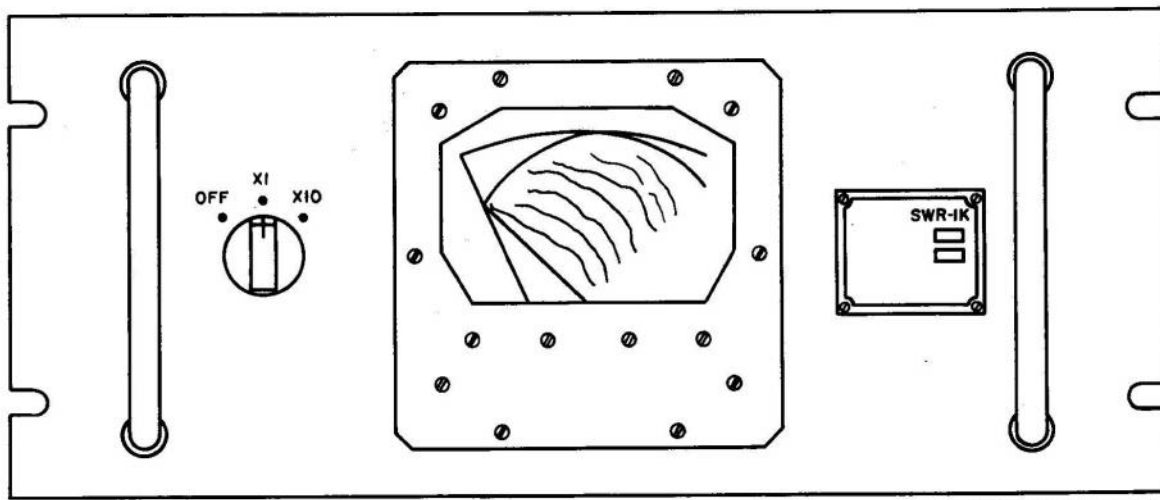


Figure 46. Alarm unit, controls and indicators.



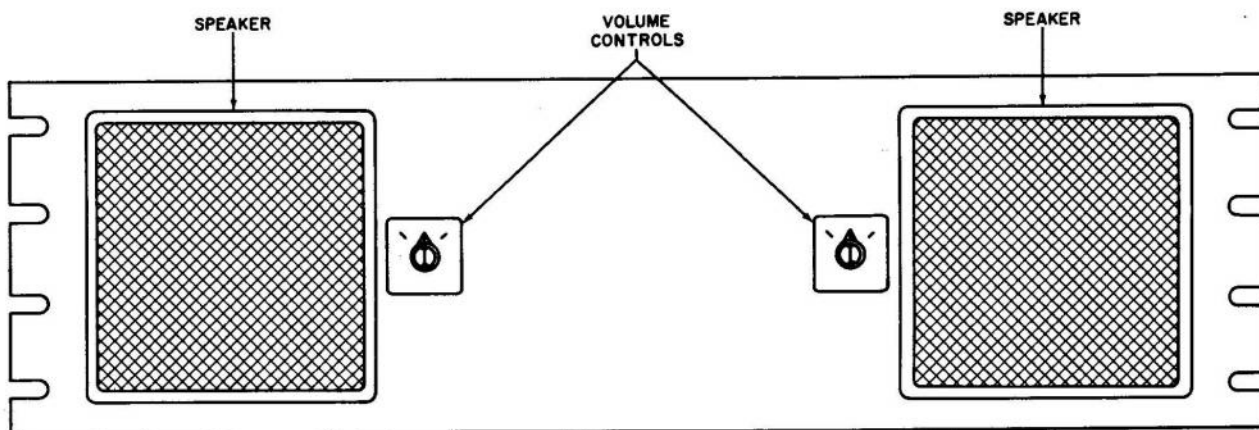
TM 5895-288-12-78

Figure 47. Standing wave ratio meter SWR-1K, controls and indicators.

98. Dual Speaker and Amplifier Panel Controls
(fig. 48)

The dual speaker and amplifier panel has two volume controls. The left volume

control adjusts the engineer's order wire received signal, which is applied to the left speaker. The right volume control adjusts the signal applied from the MON AMP IN jacks to the right speaker.

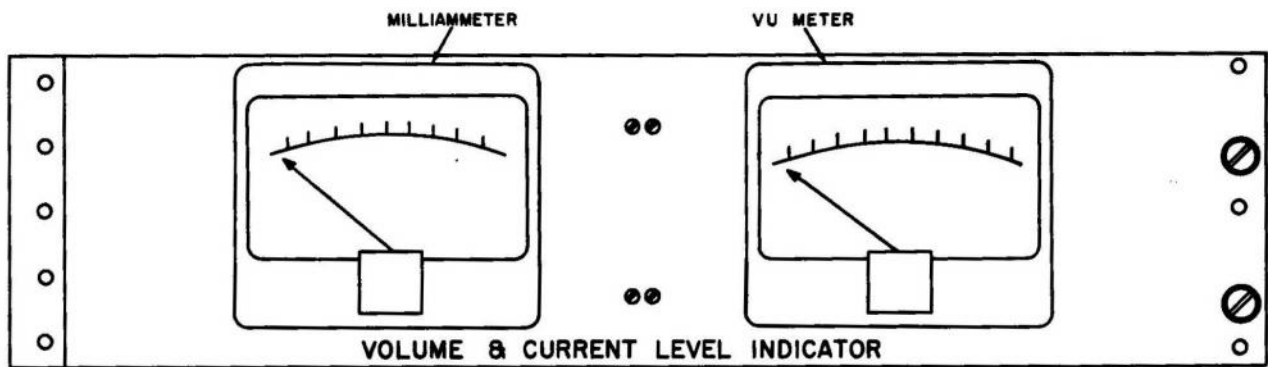


TM 5895-288-12-12

Figure 48. Dual speaker and amplifier panel, controls.

99. Meter Panel Indicators
(fig. 49)

Indicator	Function
Milliammeter -----	Indicates the amount and direction of dc current.
Vu meter -----	Indicates the vf signal level in volume units (vu).

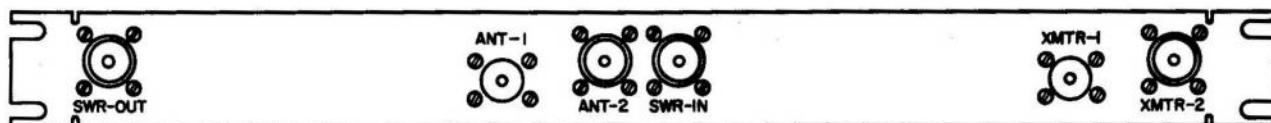


TM5895-288-12-28

Figure 49. Meter panel, indicators.

100. Antenna Patch Panel Connectors (fig. 50)

Connector	Function
SWR-OUT -----	Terminates the output of the SWR-1K. Terminates the coaxial cable leading to the hf transmitting antenna entrance box ANT XMTR1 receptacle. Terminates the coaxial cable leading to the hf transmitting antenna entrance box ANT XMTR2 receptacle. Terminates the input of the SWR-1K. Terminates the rf output of AN/FRT-53 No. 1. Terminates the rf output of AN/FRT-53 No. 2.
ANT-1-----	
ANT-2-----	
SWR-IN-----	
XMTR-1-----	
XMTR-2-----	



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Figure 50. Antenna patch panel, connectors.

101. Local Battery Loop Controls No. 2 and No. 3 Controls

a. Local Battery Loop Control No. 2 (B, fig. 41).

Control	Function
CKT 2, CKT 3, and CKT 4 controls-----	Adjust the amount of dc available at the three LOCAL BAT jacks in the audio-dc patch panel. <i>Control LOCAL BAT jack (viewed from front)</i> CKT 2 Right (JR1-2) CKT 3 Center (JR1-3) CKT 4 Left (JR1-4)

b. Local Battery Loop Control No. 3 (C, fig. 41).

Control	Function								
CKT 5, CKT 8, and CKT 14 controls-----	Adjust the amount of dc available at the BAT jacks in the red patch panel.								
	<table border="0"> <thead> <tr> <th>Control</th> <th>BAT jack</th> </tr> </thead> <tbody> <tr> <td>CKT 5</td> <td>KW-9-3 CONTROL MISC</td> </tr> <tr> <td>CKT 8</td> <td>KW-9-1 CONTROL MISC</td> </tr> <tr> <td>CKT 14</td> <td>KW-26-1 CONTROL MISC</td> </tr> </tbody> </table>	Control	BAT jack	CKT 5	KW-9-3 CONTROL MISC	CKT 8	KW-9-1 CONTROL MISC	CKT 14	KW-26-1 CONTROL MISC
Control	BAT jack								
CKT 5	KW-9-3 CONTROL MISC								
CKT 8	KW-9-1 CONTROL MISC								
CKT 14	KW-26-1 CONTROL MISC								

102. Red Patch Panel Jacks
(fig. 51)

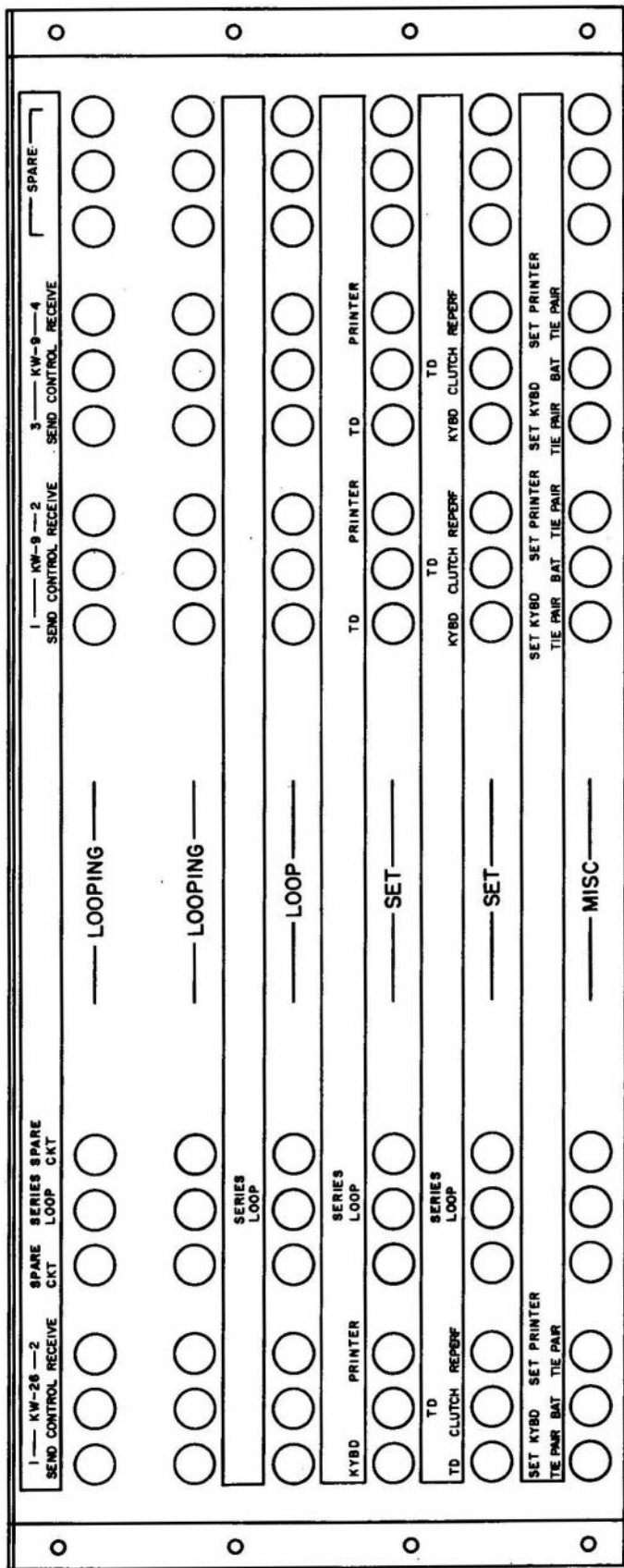
Each vertical group of KW-26 and KW-9 LOOPING, LOOP, and SET jacks on the red patch panel are associated with one send or receive circuit. The LOOPING jacks are used to connect test or monitoring equipment in series with the normal-through circuit. The LOOP jacks are used to terminate the circuit in equipment other than that associated with the normal-through circuit. The SET jacks are used to connect the terminating equipment normally associated with one normal-through circuit to the signal line (via the LOOP jacks) of another normal-through circuit. When the plug of a patch cord is inserted into a SET jack, it shorts the line with which it is

normally associated, and makes the terminating equipment available on the other end of the patch cord for patching to another circuit. The SET PRINTER TIE PAIR and SET KYBD TIE PAIR jacks located on the MISC row of the red patch panel, each provides access to a two-wire circuit to a control relay panel. The jacks associated with the KW-9's are connected to control relay panel No. 1 and those associated with the KW-26 are connected to control relay panel No. 2. Five SERIES LOOP jacks provide a means for patching additional dc circuits together. Five SPARE circuit groups and six spare MISC jacks are provided and may be used as required. Three BAT jacks provide 120 volts dc for use as required.

103. Control Relay Panels No. 1 and No. 2 Jacks and Indicators

a. Control Relay Panel No. 1 (fig. 52).

Jack or indicator	Function
SET KEYBD jacks -----	Used to patch teletypewriter signals directly into the respective TSEC/KW-9. Used to patch the output of a TSEC/KW-9 directly to a teletypewriter receiver. Provide access to the SET KYBD TIE PAIR and SET PRINTER TIE PAIR jacks associated with the TSEC/KW-9 on the red patch panel. Indicate that the respective TSEC/KW-9 is sending or receiving.
SET PRINTER jacks -----	
KEYBD TIE PAIR and PRINTER TIE PAIR jacks ----	
SEND INDICATOR and REC INDICATOR lamps-----	



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Figure 51. Red patch panel, jacks.

b. Control Relay Panel No. 2 (fig. 53).

Jack	Function
SET KEYBOARD TIE PAIR and SET PRINTER TIE PAIR jacks.	Provide access to the SET KYBD TIE PAIR and SET PRINTER TIE PAIR jacks associated with the TSEC/KW-26 on the red patch panel.

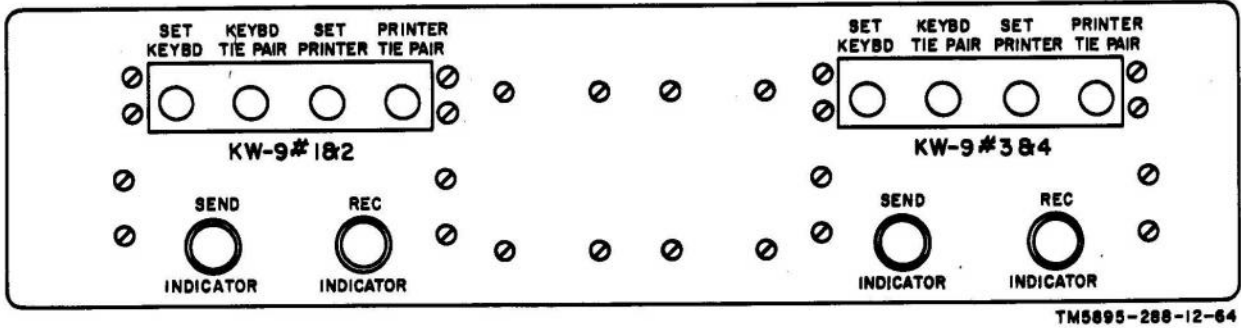


Figure 52. Control relay panel No. 1, jacks and indicators.

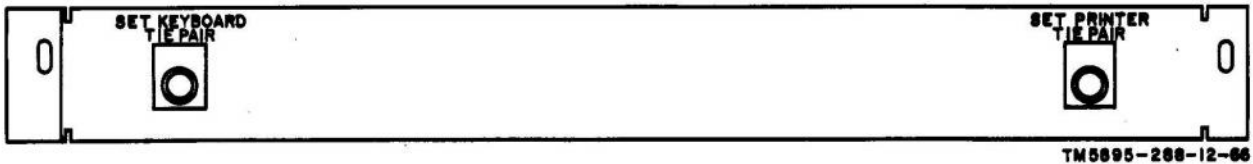


Figure 53. Control relay panel No. 2, jacks.

104. Black Patch Panel Jacks (fig. 54)

Each vertical row of jacks in both the TTY TRANSMIT GROUP CHAN 1 through 8 position and in the TTY RECEIVE GROUP CHAN 1 through 8 position are associated with one of the teletypewriter send and receive circuits. The LOOPING jacks are used to connect test or monitoring equipment in series with the normal-through circuit. The LOOP jacks are used to patch the circuit from a tone keyer or tone converter normally associated with one normal-through circuit to equipment normally associated with another normal-through circuit. When one end of a patch cord is inserted in a LOOP jack it shorts the cir-

cuit to the terminating equipment and makes the line circuit available at the other end of the patch cord for patching to another circuit. The SET jacks provide access to the terminating equipment. When one end of a patch cord is inserted in a SET jack it shorts the line circuit and makes the terminating equipment available at the other end of the patch cord for patching to another circuit. The jacks in the SHORT LINE group provide access to TTY SUBSCRIBER TRANSMIT LINES pair 8 in the signal entrance box and may be used as required. Five SPARE groups are also provided. Four groups of jacks at the extreme right end of the panel provide access to the normal-through inputs and outputs of the VPT-1's and TSEC/KW-9's.

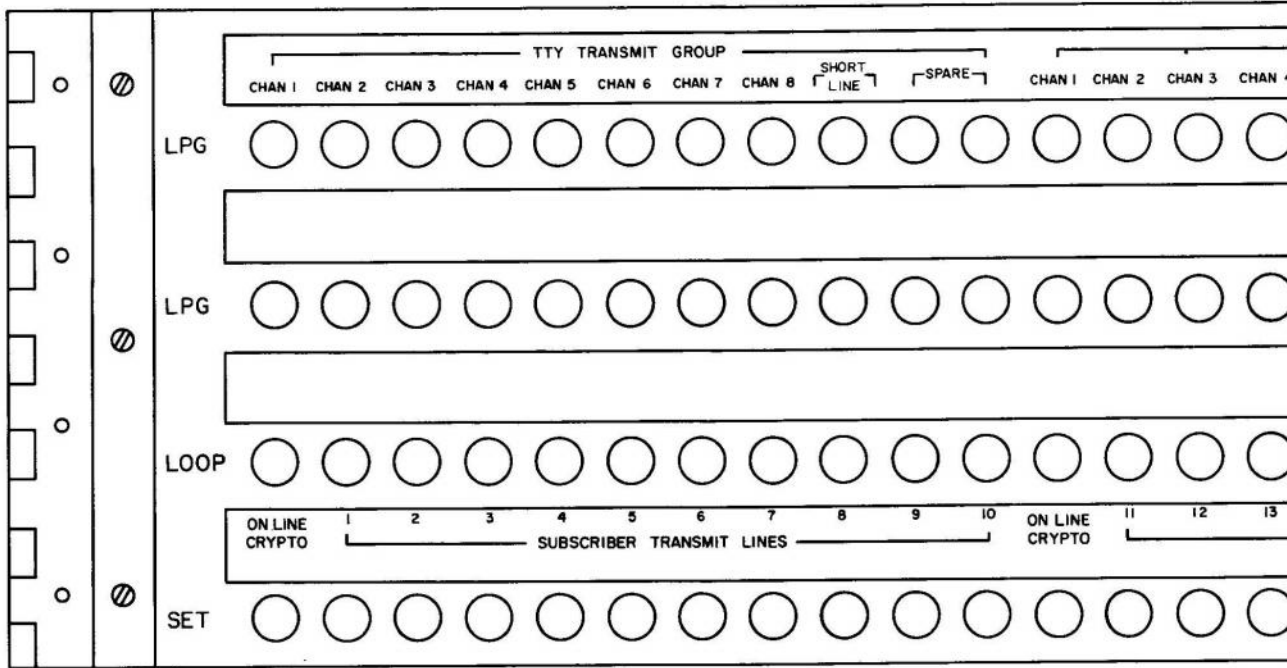
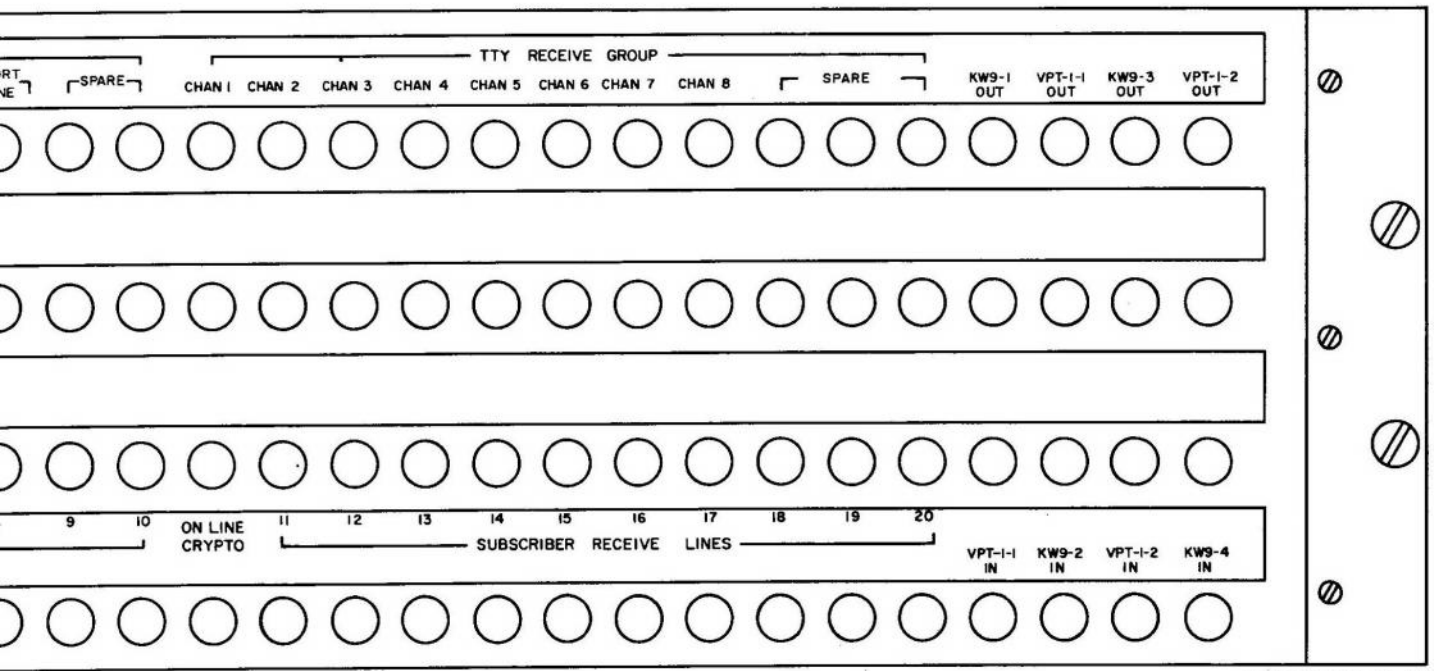


Figure 54. Black patch pane



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Figure 54. Black patch panel, jacks.

105. Dc Patch Panel Jacks
(fig. 55)

Jack	Function
KEYER INPUT 1, 2, 3, 4, 5, 6, 7, and 8 jacks -----	Dc jacks, used to patch equipment in series with the tone keyer input of the respective channel.
KEYER OUTPUT 1, 2, 3, 4, 5, 6, 7, and 8 jacks ---	Vf jacks, used to connect to the output of the respective tone keyer.
KEYER NEUTRAL MON jack -----	Monitor vf jack, used to measure the combined output from the tone keyers.
KEYER BAL OUTPUT and KEYER BAL MONITOR jacks.	Vf jacks, used to connect to the output of the isolation unit on the tone keyer shelf. When a plug is inserted into the KEYER BAL OUTPUT jack, the normalled-through connection is opened.
TONE INPUT 1 LINE and EQUIP and TONE INPUT 2 LINE and EQUIP jacks.	Vf jacks in the normalled-through circuit between the outputs of the demultiplexers and the inputs to the isolation units. The TONE INPUT 1 jacks are between demultiplexer No. 1 and the isolation unit on tone converter shelf No. 2. The TONE INPUT 2 jacks are between demultiplexer No. 3 and the isolation unit on tone converter shelf No. 3. When a plug is inserted into a LINE jack, a connection is made to the demultiplexers. The EQUIP jacks connect to the isolation units.
CONVERTER INPUT 1-1, 1-2, 2-1, 2-2, 3-1, 3-2, 4-1, 4-2, 5-1, 5-2, 6-1, 6-2, 7-1, 7-2, 8-1, and 8-2 jacks.	Vf jacks, used to connect to the input of the respective tone converters.
CONVERTER OUTPUT 1, 2, 3, 4, 5, 6, 7, and 8 jacks.	Dc jacks, used to patch equipment in series with the tone converter output of the respective channel.
TONE MULTIPLE 1, 2, and 3 jacks -----	Series vf jacks, used for optional patching.
2K OHMS LOADS 1 and 2 jacks -----	Dc jacks, used to connect a 2K ohm load to circuit.
600 OHMS LOAD jacks -----	Vf jack, used to connect a 600-ohm load to circuit.
10 DECIBELS INPUT and OUTPUT, 20 DECIBELS INPUT and OUTPUT, and 40 DECIBELS INPUT and OUTPUT jacks.	Vf jacks, used to connect a designated amount of loss into a circuit.
LOOPING MULTIPLE 1, 2, 3, and R jacks -----	Series dc jacks, used for optional patching.

106. Audio Patch Panels No. 1 and No. 2 and Audio-Dc Patch Panel Jacks
(fig. 56)

a. *Audio Patch Panels No. 1 and No. 2.*
The vf jacks on audio patch panel No. 1 (A, fig. 56) and audio patch panel No. 2 (B, fig. 56) in the LINE, EQUIP, and MON horizontal rows have similar functions. When one end of a patch cord is inserted into a LINE jack, it opens the normal-through circuit and makes the equipment

on the line side of the circuit available at the other end of the patch cord for patching to another circuit. The EQUIP jack operates the same as the LINE jack, except the equipment side of the circuit is made available on the end of the patch cord. The MON jacks are bridged across the equipment side of the circuit and permit it to be monitored.

b. *Audio-Dc Patch Panel (C, fig 56).*

Jack	Function
MISC XMTR 2 IN USB and LSB jacks -----	Vf jacks that provide access to the upper and lower sideband input respectively of AN/FRT-53 No. 2.

Jack	Function
MISC XMTR 2 IN MON jacks -----	Vf jacks used to monitor the upper or lower sideband input of AN/FRT-53 No. 2.
MISC MON AMP IN jacks -----	Vf jacks used to connect a signal to the input of the right speaker on the dual speaker and amplifier panel.
ME-22/PCM, VU MTR, and SG-15A/PCM jacks ----	Vf jacks used to connect to the designated test equipment.
DC MA jack-----	A dc jack used to connect to the multi-ammeter.
LOCAL BAT jacks (3)-----	Dc jacks, each connected to line battery power supply panel No. 2. Used to provide 120 volts dc.
SPARE jack-----	Spare vf jacks, for use as required.

107. Heater Control

The heater control (fig. 57) is a combination power switch and thermostat control. When the control is in the OFF position, no power is applied to the fan or heater element. The amount of heat produced is governed by the setting of the control in the AUTOMATIC position. Less heat is produced when the control is positioned near LO than near HI.

indicators for the following equipment are described in their respective technical and commercial manuals:

- (1) Radio Set AN/TRC-47 (TM 11-212-10).
- (2) Teletypewriter Set AN/FGC-25X (TM 11-5815-244-12).
- (3) Telephone Set TA-43/PT (TM 11-337).
- (4) Terminal Telegraph Telephone VPT-1 (TM 11-5805-322-12).

108. Subscriber Package Controls and Indicators

a. *General.* The controls, jacks, and

b. *Subscriber Power Supply* (fig. 42).

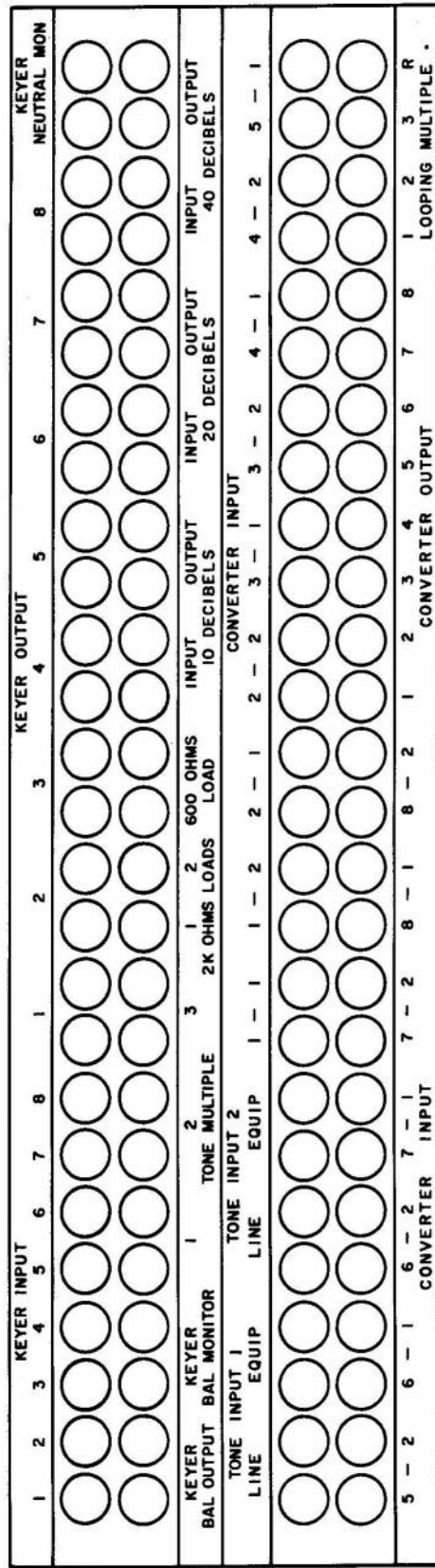
Control or indicator	Function
SUPPLY 1 and SUPPLY 2 power switches -----	Applies ac power when in the ON position. Indicate when the respective ac input fuse is blown. Indicates that dc power is available at the output.
SUPPLY 1 and SUPPLY 2 AC IN lamps -----	
SUPPLY 1 and SUPPLY 2 DC lamps -----	

c. *Portable Milliammeter* (fig. 14 and 58). The indicator in the portable milliammeter is a 100-0-100-ma meter. The portable milliammeter is used to measure

the dc output from the subscriber power supply.

d. *Power and Signal Entrance Box* (fig. 33).

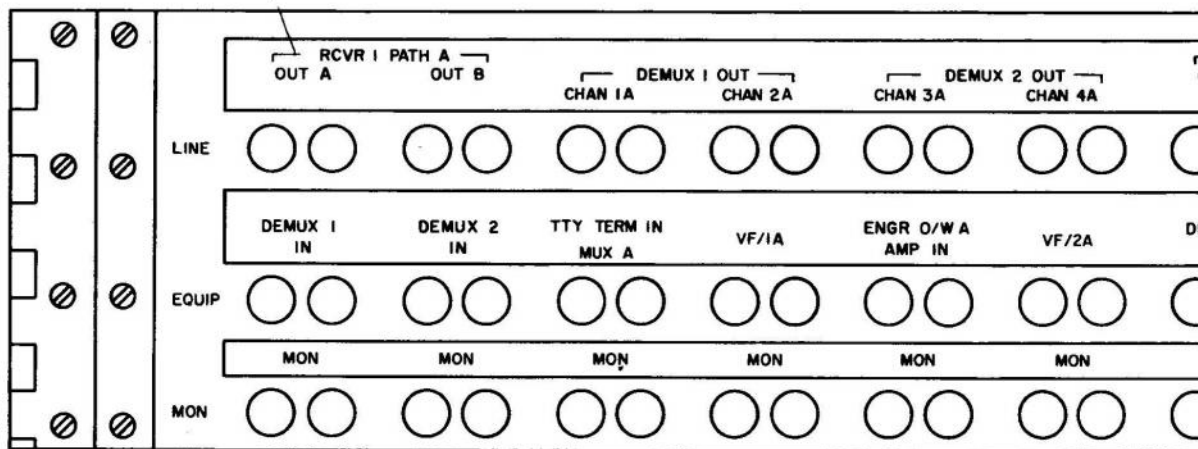
Control or indicator	Function
Binding posts -----	Used to connect external lines to equipment in subscriber package. Provides ac for maintenance purposes. POWER IN lamp lights when ac power is applied to the POWER IN receptacle. POWER OUT lamp lights when main circuit breaker is moved to the on position to indicate that power is applied to the equipment in the subscriber package.
CONVENIENCE outlets 117V AC-----	
POWER IN and OUT lamps -----	



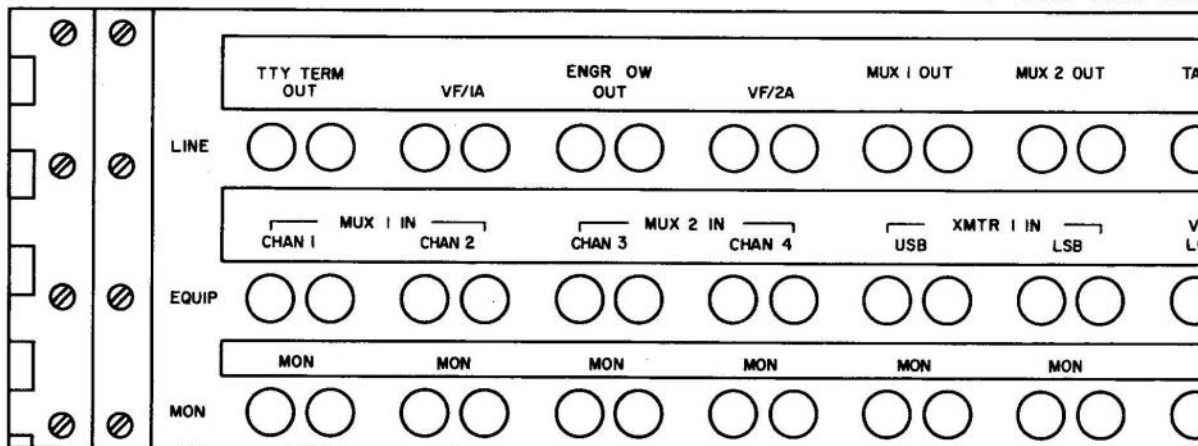
TM 5895-288-12-24

Figure 55. Dc patch panel, jacks.

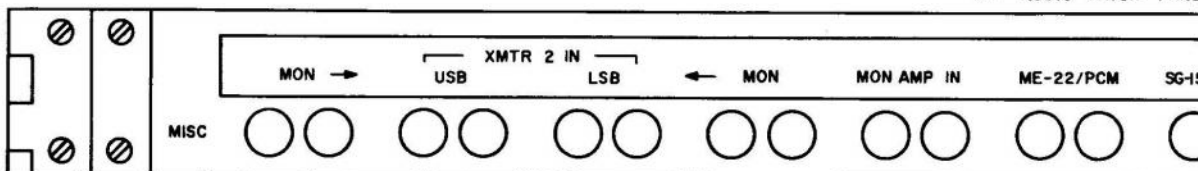
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A. AUDIO PATCH PANEL

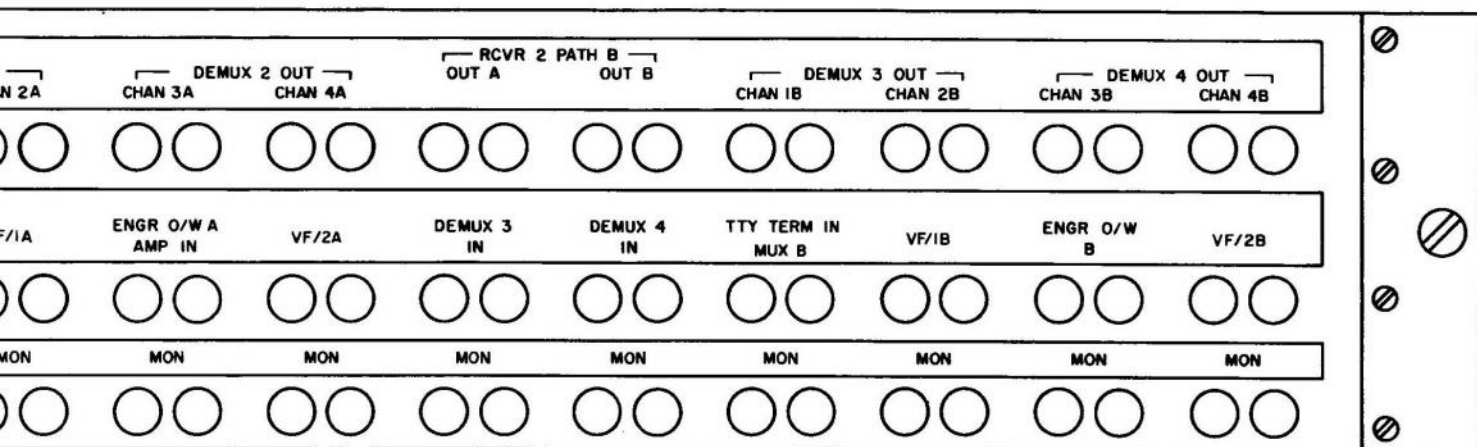


B. AUDIO PATCH PANEL

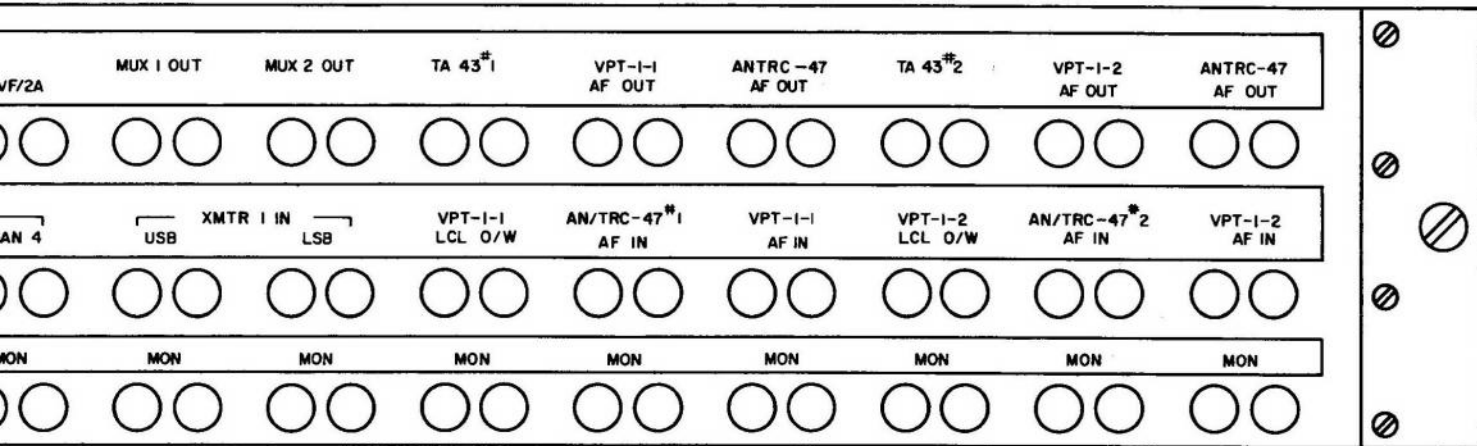


C. AUDIO-DC PATCH PANEL

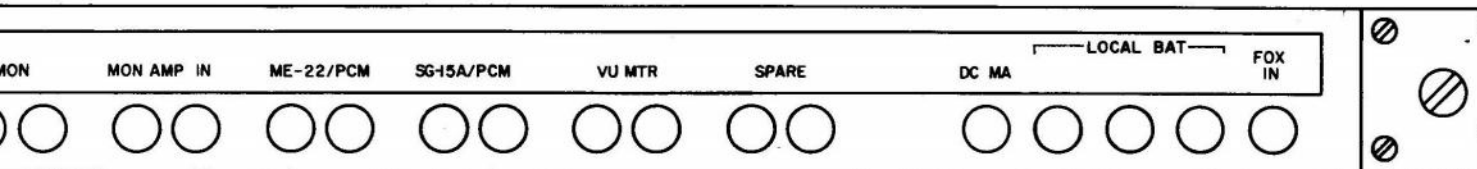
Figure 56. Audio and audio-dc



A. AUDIO PATCH PANEL NO 1



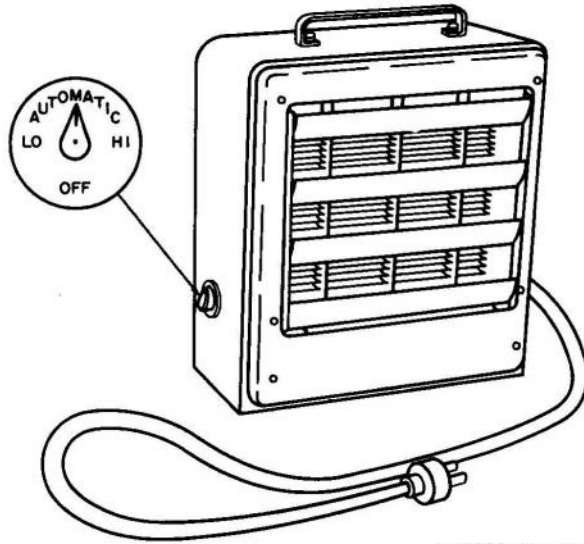
B. AUDIO PATCH PANEL NO 2



C. AUDIO-DC PATCH PANEL

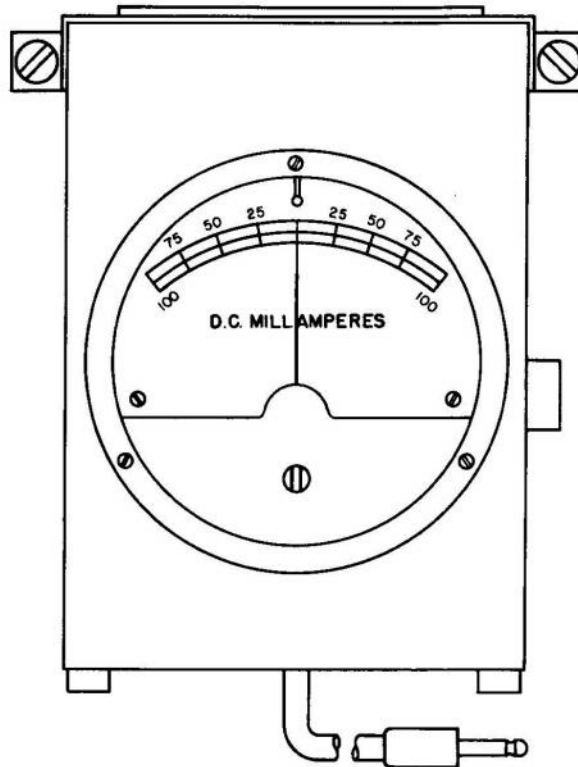
TM5895-288-12-26

Figure 56. Audio and audio-dc patch panel, jacks.



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Figure 57. Heater, control



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Figure 58. Portable milliammeter.

Section II. OPERATING PROCEDURES FOR RADIO TERMINAL SHELTER

109. Starting 10-Kw Generators

a. Operate all the circuit breakers in the power control and distribution panel to OFF.

b. Start and operate the 10-kw generators as described in the commercial manual for the generator set (para 12, 13, and 14).

110. Lighting

a. Operate circuit breakers CB3, CB27, and CB40 (fig. 43) to ON.

b. If the lights are to remain on when the door is opened, operate the BLACKOUT switch (fig. 5) to BYPASS. Operate the BLACKOUT switch to NORMAL for blackout conditions.

c. Operate the LIGHTS ODD and LIGHTS EVEN switches (fig. 5) to ON.

d. Operate the SPOTLIGHTS switch (fig. 5) to ON. Operate the individual spotlight power switches to on, if required.

111. Heating, Circulating Fresh Air, or Air Conditioning

a. Heating.

- (1) Plug the heater power cord into the outlet (A, fig. 71) on the front wall.
- (2) Operate circuit breaker CB15 (fig. 43) to ON.
- (3) Operate the heater control (fig. 57) to AUTOMATIC and position it for the desired temperature.

b. Circulating Fresh Air.

- (1) Operate circuit breakers CB9 and CB10 (fig. 43) to ON.
- (2) Operate the FAN-COOL-OFF switch on the air conditioner to FAN.

c. Air Conditioning.

- (1) Operate circuit breakers CB9 and CB10 (fig. 43) to ON.
- (2) Operate the FAN-COOL-OFF switch on the air conditioner to cool.
- (3) Adjust the THERMOSTAT and HUMIDISTAT controls for the desired temperature and humidity.

112. Preliminary Starting Procedure

Component	Control	Position
Dual speaker and amplifier panel (fig. 9) Each R-390/URR (fig. 9)	Volume controls	OFF
	FUNCTION switch	OFF
Each CV-157/URR (fig. 9)	LINE METER switch	OFF
	LINE GAIN control	0
	ANT TRIM control	0
	AGC switch	SLOW
	LIMITER control	OFF
	AUDIO RESPONSE switch	WIDE
	BREAK IN switch	OFF
	BANDWIDTH KC switch	16
	BFO PITCH control	0
	BFO switch	OFF
	LOCAL GAIN control	5
	RF GAIN control	5
	Power switch	OFF
	VU SELECT switch	OFF
	VU RANGE DB switch	0
	SQUELCH switch	OFF
	AFC switch	OFF
	MONITOR switch	OFF
	SB SELECT switch	LSB-B, USB-A
	AGC SELECT switch	REC
SB AGC control	0	
VERNIER control	0	
MONITOR GAIN control	0	

Component	Control	Position	
Each tone keyer, tone converter demultiplexer, and multiplexer shelf (fig. 9)	CARRIER SELECT switch	LC	
	AGC TIME switch	SLOW	
	CARRIER COMPENSATOR control	0	
	DRAFT INDICATOR control	0	
	POWER switch	Off (down)	
	Each line battery power supply panel (A and C, fig. 4)	POWER switch	OFF
		POWER switch	OFF
	FR-67/U (fig. 8)	POWER switch	OFF
	Each AN/FGC-25X (figs. 7 and 8)	MOTOR switches	OFF
		LIGHT switch	OFF
ME-22A/PCM (fig. 6)	POWER switch	OFF	
SG-15A/PCM (fig. 6)	POWER switch	OFF	
SWR-1K (A, fig. 4)	OFF-X1-X10 switch	X10	
Each VPT-1 (fig. 6)	POWER switch	OFF	
Each AN/TRC-47 (fig. 6)	POWER switch	OFF	
	PLATE switch	OFF	
Each AN/FRT-53 (fig. 6)	FIL switch	OFF	
	MAIN POWER circuit breakers	OFF	

113. Starting Procedure

With the controls set as outlined in the preliminary starting procedure (para 112), perform the steps as outlined in the following chart:

Component	Control	Position
Power control	CB 31, CB 33, CB 39, CB 41, CB 26, CB 28, CB 32, CB 34, and CB 42	ON
AN/FRT-53 No. 1	MAIN POWER circuit breaker (APP-4)	ON
	POWER switch (VOX-5)	ON
<i>Note: The VOX-5 should have a 48 hour warmup period for frequency stability. It may be operated without this warmup period, but retuning the AN/FRT-53 may be necessary.</i>	POWER switch (SBE-3)	ON
<i>Note: Adjust the LINE ADJUST switch to obtain a reading of 115, on the LINE meter.</i>	MAIN POWER circuit breaker (PS-4)	ON
SG-15A/PCM	OVERLOAD PLATE and SCREEN circuit breakers	OFF
	FINAL VOLTAGES switch	OFF
Each VPT-1	TRANSMITTER VOLTAGES switch	STANDBY
	POWER switch	ON
Each AN/TRC-47	POWER switch	ON
	FIL switch	ON
Each line battery power supply panel	POWER switch	On
	MOTOR switches	ON
Each AN/FGC-25X	LIGHT switch	ON
	POWER switch	On (up)
Each tone keyer, tone converter, demultiplexer, and multiplexer shelf	TRANSMIT MULTIPLEX 1-2, 3-4, 5-6, and 7-8 and RECEIVE DE-MULTIPLEX 1-2, 3-4, 5-6, and 7-8 switches	2-CHANNEL DIVERSITY (up)
Combined function panel	Volume control (left)	Midposition

Component	Control	Position
Each R-390/URR Each CV-157/URR AN/FRT-53 No. 2	FUNCTION switch POWER switch MAIN POWER circuit breaker (APP-4) POWER switch (VOX-5)	AGC ON ON ON

114. Transmitting Set, Radio AN/FRT-53 Preliminary Tuning Procedure

The tuning procedure for the AN/FRT-53 consists of determining the frequency to which the VOX-5 should be set and then tuning and adjusting the remaining components for the desired operation. Tuning and adjusting the components are detailed in paragraph 115. The frequency to which the VOX-5 should be set is determined by the desired transmitter output frequency. The VOX-5 is continuously tunable to frequencies between 2.0 and 4.0 mc. The AN/FRT-53 transmits frequencies between 2.0 and 32.0 mc. Determine the frequency to which the VOX-5 is set as follows:

a. If the desired transmitter output frequency is between 2.0 and 3.75 mc, add 0.25 mc to the desired transmitter output frequency. For example, if the desired transmitter output frequency is 2.375 mc, add 0.25 mc to 2.375 mc. The VOX-5 frequency should be 2.625 mc.

b. If the desired transmitter output frequency is between 3.75 and 4.25 mc, subtract 0.25 mc from the desired transmitter output frequency. For example, if the desired transmitter output frequency is 3.925 mc, subtract 0.25 mc from 3.925 mc. The VOX-5 frequency should be 3.675 mc.

c. If the desired transmitter output frequency is between 4.25 and 32.0 mc, set the BAND MCS switch on the SBE-3 so that the desired transmitter output frequency is between the first and second number on the BAND MCS dial; double the third number on the BAND MCS dial and add 0.25 mc; subtract the desired transmitter output frequency. For example, if the desired transmitter output frequency is 6.575 mc, set the BAND MCS switch on the SBE-3 so that 6.25 and 8.25 are the first and second numbers on the BAND MCS dial, re-

spectively; double the third number (5), which gives 10, and add 0.25 mc for a total of 10.25 mc; subtract 6.575 mc, which leaves 3.675 mc. Set the VOX-5 at 3.675 mc if the transmitter is to be operated at 6.575 mc. If the desired transmitter output frequency is 20.190 mc, set the BAND MCS switch on the SBE-3 so that 18.25 and 20.25 are the first and second numbers on the BAND MCS dial, respectively; double the third number (11), which gives 22 and add 0.25 mc for a total of 22.25 mc; subtract 20.190 mc, which leaves 2.060 mc. Set the VOX-5 at 2.060 mc if the transmitter is to be operated at 20.190 mc.

115. Transmitting Set, Radio AN/FRT-53 Tuning Procedure

Determine the frequency to which the VOX-5 must be set as outlined in paragraph 114. The overall tuning procedure involves tuning the VOX-5 (*a* below), tuning the SBE-3 (*b* below), tuning the PAL-1K (*c* below), adjusting the carrier and sidebands (*d* below), and tuning the antenna (*e* below).

a. *Tuning VOX-5.* Calibrate the VOX-5 at the checkpoint nearest its output frequency (para 114) and then tune the output.

- (1) Turn the BAND-MCS switch to 2-4.
- (2) Turn the XTAL switch to VMO.
- (3) Set the HFO, IFO, and BFO switches at OFF.
- (4) Turn the METER switch to HFO.
- (5) Set the BEAT switch at ON.
- (6) Insert the headset plug into the PHONES jack.
- (7) Turn the MASTER OSCILLATOR FREQUENCY knob until the dial is at the 50-kc point nearest the desired frequency (para 114).
- (8) Vary the CALIBRATE control to zero beat the signal. The zero beat will be heard in the headset and

will indicate on the ZERO BEAT indicator.

- (9) Remove the headset from the PHONES jack.
- (10) Set the BEAT switch at OFF.
- (11) Set the HFO switch at ON.
- (12) Turn the MASTER OSCILLATOR FREQUENCY knob until the desired frequency (para 114) is indicated on the dial.
- (13) Adjust the VOX-5 OUTPUT control to obtain a minimum reading on the VOX-5 meter.
- (14) Adjust the TUNING control for a maximum indication on the VOX-5 meter. The VOX-5 OUTPUT control may have to be decreased if the meter needle goes off scale at the high end.

b. Tuning SBE-3.

- (1) Turn the MF XTAL SW switch to VMO.
- (2) Turn the LSB and USB switches to OFF.
- (3) Turn the VOX GAIN and SQUELCH GAIN controls fully counterclockwise.
- (4) Set the XMTR switch at OFF.
- (5) Set the EXCITER switch at ON.
- (6) Turn the METER SW to MF.
- (7) Turn the CARRIER INSERT control fully clockwise.
- (8) Set the OUTPUT TUNING inner knob to the proper band.
- (9) Turn the OUTPUT TUNING outer disk until the desired frequency is indicated on the upper portion of the dial.
- (10) Adjust the OUTPUT control on the VOX-5 for a reading of 0 on the SBE-3 meter.
- (11) Adjust the MF TUNING control for a maximum on the SBE-3 meter. The VOX-5 OUTPUT control may have to be decreased if the SBE-3 meter reading is too high.
- (12) The frequency indicated on the lower scale of the main tuning dial should be the same as the frequency indicated on the VOX-5. Turn the METER SW switch to RF.
- (13) Adjust the OUTPUT TUNING outer disk for a maximum on the SBE-3

meter. The SBE-3 OUTPUT control may have to be decreased if the SBE-3 meter reading is too high.

- (14) Turn the SBE-3 OUTPUT control fully counterclockwise.

c. Tuning PAL-1K.

- (1) Set the DRIVER BAND and PA BAND switches at the desired transmitter frequency.
- (2) Set the PA TUNING and PA LOADING controls and PA LOADING switch as directed in the tuning chart.
- (3) Set the OVERLOAD PLATE SCREEN circuit breakers at ON.
- (4) Set the TRANSMITTER VOLTAGES switch at ON.
- (5) Turn the MULTIMETER switch to 1ST AMPL Ep.
- (6) Increase the SBE-3 OUTPUT control until a usable reading is obtained on the MULTIMETER.
- (7) Adjust the 1ST AMPL TUNING control for a maximum on the MULTIMETER.
- (8) Turn the MULTIMETER switch to PA Eg.
- (9) Adjust the PA GRID TUNING control for a maximum on the MULTIMETER.
- (10) Turn the SBE-3 OUTPUT control fully counterclockwise.
- (11) Set the MULTIMETER switch at PA Isg.
- (12) Set the FINAL VOLTAGES switch at ON.
- (13) Increase the SBE-3 OUTPUT control until the PA PLATE CURRENT meter indicates 300 ma.
- (14) Adjust the PA TUNING control for a dip on the PA PLATE CURRENT meter.
- (15) Increase the SBE-3 OUTPUT control until the PA PLATE CURRENT meter indicates 300 ma.
- (16) Adjust the PA LOADING control for a maximum on the SWR-1K.
- (17) Increase the SBE-3 OUTPUT control. The meter reading on the MULTIMETER, PA PLATE CURRENT meter, and the SWR-1K meter increases. A reading of 50 ma should not be exceeded on the

MULTIMETER and 600 ma on the PA PLATE CURRENT meter as the SWR-1K meter reading increases to 1,000 watts. Readjust the PA LOADING control and PA TUNING control ((14) above) as required if the MULTIMETER and PA PLATE CURRENT meter readings exceed the values.

Caution: Do not allow the power amplifier screen grid current to exceed 50 ma; the power amplifier tube may be damaged.

- (18) Turn the SBE-3 OUTPUT control fully counterclockwise.

d. Adjusting Carrier and Sidebands. The amount of carrier and sideband signals transmitted depends on the settings of the SBE-3 CARRIER INSERT, LSB GAIN, USB GAIN, and OUTPUT controls. The CARRIER INSERT control determines the amount of carrier transmitted. When the CARRIER INSERT control is fully counterclockwise, the carrier is reduced 55 db; when it is fully clockwise, full carrier is transmitted. If the carrier is to be reduced 55 db, perform the instructions in (1) through (10) below and then (22) and (23). If the carrier is to be reduced 20 db, perform the instructions in (11) through (18) below and then (22) and (23). For full carrier transmission, perform the instructions in (19) through (23) below.

- (1) Turn the CARRIER INSERT control fully counterclockwise.
- (2) Set the SG-15A/PCM to provide a 1,000-cps signal at 0 dbm.
- (3) Connect a vf patch cord between the SG-15A/PCM and the XMTR 1 IN USB jacks.
- (4) Operate the LSB and USB switches to CH 1.
- (5) Operate the METER SW switch to LSB.
- (6) Adjust the LSB GAIN control for a reading of 50 on the meter.
- (7) Operate the METER SW switch to USB.
- (8) Adjust the USB GAIN control for a reading of 50 on the meter.
- (9) Operate the METER SW switch to RF.
- (10) Increase the SBE-3 OUTPUT con-

trol. As the OUTPUT control is increased, the SWR-1K meter increases to 1,000 watts. If a reading of 1,000 watts cannot be obtained, increase the LSB GAIN and USB GAIN controls equally.

- (11) Perform the instructions in (1) through (5) above.
- (12) Adjust the LSB GAIN control for a reading of 45 on the meter.
- (13) Operate the METER SW switch to USB.
- (14) Adjust the USB GAIN control for a reading of 45 on the meter.
- (15) Operate the METER SW switch to RF.
- (16) Adjust the CARRIER INSERT control for a reading of 100 on the meter.
- (17) Increase the SBE-3 OUTPUT control until the reading on the SWR-1K meter is 1,000 watts.
- (18) Turn the CARRIER INSERT control fully clockwise.
- (19) Perform the instructions in (2), (3), and (4) above.
- (20) Adjust the LSB GAIN and USB GAIN controls equally until the meter reading is 100.
- (21) Increase the SBE-3 OUTPUT control until the reading on the SWR-1K meter is 1,000 watts.
- (22) Remove the vf patch cord.
- (23) Operate the LSB switch to CH 2.

e. Adjusting Doublet Antenna. If the doublet antenna is used for transmitting, the delta legs may need to be adjusted to reduce the standing wave ratio (swr). Adjust the delta legs as follows:

- (1) Turn the SBE-3 OUTPUT control fully counterclockwise.
- (2) Operate the FINAL VOLTAGES and TRANSMITTER VOLTAGES switches to OFF and STANDBY respectively.
- (3) Lower the doublet antenna, loosen the slotted bolts, and move the delta legs out from the center of the antenna approximately 9 inches. Tighten the slotted bolts and raise the doublet antenna.
- (4) Operate the FINAL VOLTAGES

and TRANSMITTER VOLTAGES switches to ON.

- (5) Increase the SBE-3 OUTPUT control. The swr indicated on the SWR-1K should be reduced. If the swr is not reduced, repeat (1) through (4) but move the delta legs toward the center. Repeat (1) through (4) until the swr is minimum (1.5 to 1 or less).

116. Radio Set AN/TRC-47 Tuning Procedure

The tuning procedures for the subscriber packages should be performed adjacent to the radio terminal shelter, if possible, before the subscriber packages are transported to their assigned sites. Tune the radio terminal shelter components and then tune the subscriber package components.

a. Preliminary Procedures. At the T-593/TRC-47, perform the following:

- (1) Operate the METER SWITCH to OFF.
- (2) Check to be sure that the proper crystals are in the crystal holders (TM 11-212-35).
- (3) Turn the L1 and L2 controls fully counterclockwise.
- (4) Turn the COUPLING control until the end of the shaft is at 5 on the coupling scale.
- (5) Set the OUTPUT control at the midposition.
- (6) Turn the MOD GAIN control fully counterclockwise.

b. T-593/TRC-47 Tuning Procedures.

- (1) Operate the PLATE switch to ON.
Caution: Antenna Assembly AT-588/TRC-42 should be connected to the T-593/TRC-47.
- (2) Operate the METER SWITCH to 1 TRIP Ig.
- (3) Slowly turn the shaft of L1 clockwise until a maximum indication (approximately 0.44) is obtained on the TUNING METER (approximately 0.44).

Caution: When tuning L1 and L2 to a frequency between 132 and 135 mc, two resonant points may occur. Be sure L1 and L2 are fully coun-

terclockwise and tune to the first point of resonance.

- (4) Operate the METER SWITCH to 2 TRIP Ig and adjust L2 for a maximum indication on the TUNING METER (approximately 0.44).
- (5) Operate the METER SWITCH to DRIVER Ig and adjust L3 for a maximum indication on the TUNING METER (approximately 0.24).
- (6) Operate the METER SWITCH to PA Ig and adjust L4 for a maximum on the TUNING METER (approximately 0.42).
- (7) Operate the METER SWITCH to PA Ip and adjust the PWR AMP tuning control for a minimum on the TUNING METER (approximately 0.22).
- (8) Turn the COUPLING control clockwise until a maximum indication is obtained on the TUNING METER.
- (9) Retune the PWR AMP control for a minimum indication on the TUNING METER.
- (10) Adjust the OUTPUT control for an indication of 0.22 on the TUNING METER.

c. Radio Terminal Shelter Modulation Adjustment Procedures. Adjust each T-593/TRC-47 for 100-percent modulation as follows:

- (1) Operate the PLATE switch to OFF.
- (2) Release the hinged rack clamps or screws and pull the T-593/TRC-47 out on its rack-mounted slides.
- (3) Remove the coaxial cable from the J1 cable connector at the rear.
- (4) Connect the 36-inch test cable (W101) between the J1 cable connector on the T-593/TRC-47 and the J101 connector on the OS-8C/U.
- (5) Refer to TM 11-1214A for Oscilloscope OS-8C/U adjustment and operating procedures.
- (6) Connect the OS-8C/U power cable to a 115-volt ac convenience outlet.
- (7) Operate the PLATE switch on the T-593/TRC-47 to ON.
- (8) Adjust the OUTPUT control on the OS-8C/U for sufficient carrier height on the screen.
- (9) Operate the HOR ATTEN switch

on the OS-8C/U to SWEEP and adjust the HOR GAIN control so the width of the waveform is approximately two-thirds the diameter of the screen.

- (10) Whistle intermittently into the mouthpiece of the appropriate TA-43/PT and slowly turn the MOD GAIN control clockwise.
- (11) Observe the OS-8C/U waveform. Continue whistling into the TA-43/PT and advancing the MOD GAIN control until overmodulation is indicated by a flattop on the waveform.
- (12) Continue whistling and turn the MOD GAIN control counterclockwise until the flattop on the waveform disappears.
- (13) Operate the PLATE switch to OFF and remove the 36-inch test cable from the J1 cable connector, and connect the coaxial cable to J1.
- (14) Slide the T-593/TRC-47 into the rack and secure it with the hinged rack clamps or screws.
- (15) Operate the PLATE switch to ON.
- (16) Speak into the mouthpiece of the appropriate TA-43/PT and adjust the OUTPUT control for an indication of 0.24 on the TUNING METER.

d. *Subscriber Package Modulation Adjustment Procedures.* At each subscriber package, adjust the T-593/TRC-47 for 100-percent modulation as follows:

- (1) Operate the PLATE switch to OFF.
- (2) At the power and signal entrance box, remove the coaxial cable from the XMTR OUT receptacle (fig. 33).
- (3) Remove any wires connected to the AN/TRC-47 XMTR and TA-43 binding posts. Connect jumper wires between the AN/TRC-47 XMTR and TA-43 binding posts.
- (4) Connect the power cable from Oscilloscope OS-8C/U to one of the CONVENIENCE 117 VAC outlets.
- (5) Connect the 36-inch test cable (W101) between the XMTR OUT receptacle and the J101 receptacle on the OS-8C/U.

- (6) Refer to TM 11-1214A for the OS-8C/U adjustment and operating procedures.
- (7) Repeat the instructions in c (7) through (12) above.
- (8) Operate the PLATE switch to OFF and remove the 36-inch test cable from the XMTR OUT receptacle. Disconnect the OS-8C/U.
- (9) Connect the coaxial cable that was removed in (2) above.
- (10) Remove the jumper wires between the AN/TRC-47 XMTR and TA-43 binding posts and reconnect the jumper wires that were removed in (3) above.
- (11) Operate the METER SWITCH to PA Ip and the PLATE switch to ON.
- (12) Speak into the mouthpiece of the TA-43/PT and adjust the OUTPUT control for an indication of 0.24 on the TUNING METER.

e. *R-748/TRC-47 Alignment Procedures.* Refer to the R-748/TRC-47 schematic diagram in TM 11-212-35 and perform the rf alignment procedures described below.

- (1) Determine the first local oscillator crystal frequency by using the following formula:

$$F_x = \frac{F_o - 20.7}{12}$$

Where F_x = frequency of crystal Y1

F_o = operating frequency desired

Example: If 132 mc is the desired operating frequency, the crystal frequency is:

$$F_x = \frac{F_o - 20.7}{12} = \frac{132 - 20.7}{12} = \frac{111.3}{12} = 9.275$$

F_x = 9.275 mc (frequency of crystal required)

- (2) Connect the negative lead of the TS-505/U to green test jack J7, and the positive test lead to black test jack J8.
- (3) Tune C5 for a maximum voltage reading at J7.
- (4) Disconnect the leads from the TS-505/U from jacks J7 and J8.

- (5) Connect the positive lead of the TS-505/U to yellow test jack J9, and the negative lead to black test jack J8.
- (6) With the signal from the transmitter being received at the antenna, adjust the SENSITIVITY control for an indication of approximately 15 volts on the TS-505/U.
- (7) Tune C12 for a minimum reading on the TS-505/U.

Note: If adjusting C12 has little or no effect on the TS-505/U, make a preliminary setting on C27, C24, C20, and C18 in that order, until an indication is obtained on the TS-505/U. Retune C12 for a minimum indication on the meter.

- (8) Tune C27 for a minimum indication.
- (9) Tune C24 for a minimum indication and retune C27. Keep readjusting both capacitors until the best indication (minimum reading) is obtained.
- (10) Tune C20 and then C18 for a minimum indication.
- (11) Disconnect the meter leads.

117. Receiver, Radio R-390/URR and Converter, Single Sideband CV-157/URR, Operating Procedures

Operate the R-390/URR and the CV-157/URR as described in TM 11-649. Adjust the CV-157/URR to provide a -10 dbm signal level to the demultiplexers.

118. Operating Engineer's Order Wire

Operate the full-duplex voice order wire circuit between the radio terminal shelter and the distant radio terminal as follows:

a. Transmitting.

- (1) Remove the handset of the TA-312/PT from the bracket.
- (2) Operate the press-to-talk switch and speak into the mouthpiece.

b. Receiving. Voice signals from the engineer's order wire circuit may be received on either the TA-312/PT or on the left speaker on the dual speaker and amplifier panel, as required, by operation of the transfer switch (A, fig. 4).

119. Operating Teletypewriter Set AN/FGC-25X No. 2

a. AN/FGC-25X No. 2 is used in a full-duplex radioteletype circuit between the radio terminal shelter and the distant radio terminal. Transmission is possible from the keyboard transmitter or the transmitter-distributor, and reception is possible on the page printer and the reperforator. The AN/FGC-25X is arranged to operate on condition K as described in TM 11-5815-244-35.

b. The normal-through arrangement of the jacks on the red patch panel causes both the page printer and reperforator to receive the incoming messages. To disable either the page printer or the reperforator, insert a dummy plug into its respective KW-26-2 RECEIVE jack on the red patch panel.

120. Operating Local Order Wire

A full-duplex voice order wire circuit is provided between the radio terminal shelter and each subscriber package. Use TA-43/PT No. 1 or No. 2, as applicable, to communicate with the TA-43/PT in the subscriber package.

a. Transmitting.

- (1) Remove the handset of TA-43/PT No. 1 or No. 2 from the bracket.
- (2) Operate the generator crank on TA-43/PT No. 1 or No. 2.
- (3) When the called party answers, operate the press-to-talk switch and speak into the mouthpiece.

b. Receiving. When a call is received from either subscriber package, the alarm unit will provide an audible and visual indication. The bell will ring and the appropriate call lamp will light.

- (1) Operate the RING RESET switch on the appropriate VPT-1 to silence the bell and extinguish the call lamp on the alarm unit.
- (2) Remove the handset of the appropriate TA-43/PT from the bracket and answer the call.

121. Operating Teletypewriter Set AN/FGC-25X No. 1

a. AN/FGC-25X No. 1 is used to provide teletypewriter communication between the radio terminal shelter and the subscriber packages. When used, both subscriber package circuits are connected normal-through to the red patch panel. The circuits from the subscriber package associated with AN/TRC-47 No. 1 is further connected normal-through from the red patch panel to AN/FGC-25X No. 1. The circuits from the subscriber package associated with AN/TRC-47 No. 2 are terminated in the red patch panel and must be patched to the components (keyboard, transmitter-distributor, page printer, or reperforator) of the AN/FGC-25X No. 1 as required. There is only sufficient tape transmitting and receiving equipment to terminate one full-duplex circuit from a subscriber package. The second subscriber package circuit (if used) can be terminated in the keyboard and page printer to provide full-duplex operation on both subscriber circuits. AN/FGC-25X No. 1 in the radio terminal shelter is arranged to operate on condition K, as described in TM 11-5815-244-35.

b. To patch the teletypewriter equipment to the circuit associated with subscriber package No. 2, connect a patch cord between the KW-9-1 SEND TD or KYBD SET jack to the KW-9-3 SEND LOOP jack on the red patch panel, and a second patch cord between the KW-9-2 RECEIVE PRINTER or REPERF SET jack to the KW-9-4 RECEIVE LOOP jack on the red patch panel.

122. Operation With Transmitting Set, Radio AN/FRT-53 No. 2

AN/FRT-53 No. 2 is normally kept in a standby condition. When operation with AN/FRT-53 No. 2 is desired, perform the starting procedure (para 113) and proceed as follows:

a. Move the rf patch cord on the antenna patch panel from the XMTR-1 to the XMTR-2 connector.

b. Tune AN/FRT-53 No. 2 as directed in paragraphs 114 and 115.

c. Connect a vf patch cord between the MUX 1 OUT jacks on audio patch panel No. 2 and the XMTR 2 IN USB jacks on audio-dc patch panel and another between the MUX 2 OUT jacks on audio patch panel No. 2 and the XMTR 2 IN LSB jacks on the audio-dc patch panel.

123. Operation With Communications Center

a. Seven teletypewriter transmit and receive circuits from a communications center may be connected to the AN/TSC-20. When connected, these circuits appear on the SUBSCRIBER TRANSMIT LINES SET jacks and the SUBSCRIBER RECEIVE LINES SET jacks on the black patch panel. Each transmit circuit is normal-through to a tone keyer and each receive circuit is normal-through to a tone converter. TA-43/PT No. 3 in the radio terminal shelter may be used to communicate with the communications center by connecting a pair of wires between TTY SUBSCRIBER RECEIVE LINES 20 binding posts and a telephone in the communications center.

b. The two standby vf channels between the radio terminal shelter and the distant radio terminal may be used to provide two additional four-wire voice or facsimile circuits as described in (1) or (2) below:

(1) If there are any unused SUBSCRIBER TRANSMIT or RECEIVE binding posts in the signal entrance box, the additional voice or facsimile input lines may be connected to these binding posts. This will make the circuits appear on the black patch panel inside the shelter. The circuits may then be connected to the rf radio circuit as follows:

- (a) Fabricate two patch cords for each circuit; each with a dc plug (PJ-055) on one end and a vf plug (double plug) on the other end. The cords should be long enough to reach from the black patch panel to audio patch panel No. 2.
- (b) Insert the dc plug into the SUBSCRIBER TRANSMIT or SUBSCRIBER RECEIVE LINES SET jack associated with the binding

posts in the signal entrance box being used for the transmit channel. Insert the other end of the cord (double plug) into the MUX 1 IN CHAN 2 EQUIP jack or audio patch panel No. 2.

(c) Insert the dc plug of a second patch cord into the SUBSCRIBER TRANSMIT or SUBSCRIBER RECEIVE LINES SET jack associated with the binding post in the signal entrance box being used for the receive channel. Insert the other end of the cord (double plug) into the DEMUX 2 OUT CHAN 4A LINE jack on audio patch panel No. 1.

(d) Patch the second vf circuit as described in (b) and (c) above, except, insert the double plug into the MUX 2 IN CHAN 4 EQUIP jack on audio patch panel No. 2 for the transmit channel and into the DEMUX 1 OUT CHAN 2A LINE jack on audio patch panel No. 1 for the receive channel.

(2) If there are no unused binding posts available on the signal entrance box, terminate the input line wires for each channel in a double plug and insert them directly into the applicable jack on audio patch panels No. 1 and No. 2 as described in (1)(b) through (d) above.

124. Operation Using One 10-Kw Generator

During normal operation, two 10-kw generators are used; one provides power for the technical load (all lights and communications equipment) and the other provides power for the utility load (heater and air conditioner). If one generator fails, the second generator may be used to carry the full power load, if one compressor in the air conditioner is shut off.

a. If the 10-kw generator supplying the technical load fails, supply power from the generator providing the utility load power as follows:

- (1) Operate circuit breakers CB27 and CB 10 to OFF.
- (2) Remove the lock and operate circuit breaker CB21 to ON.

b. To place the generator that normally provides the technical load back in service:

- (1) Operate circuit breaker CB21 to OFF and replace the lock.
- (2) Operate the circuit breaker on the generator to ON.
- (3) Operate circuit breakers CB27 and CB 10 to ON.

c. If the 10-kw generator supplying the utility load fails, supply power from the generator providing the technical load power as follows:

- (1) Operate circuit breakers CB3 and CB 10 to OFF.
- (2) Remove the lock and operate circuit breaker CB21 to ON.

d. To place the generator that normally provides the utility load back in service:

- (1) Operate circuit breaker CB21 to OFF. Replace the lock.
- (2) Operate the circuit breaker on the generator to ON.
- (3) Operate CB3 and CB 10 to ON.

125. Direct Routing of Traffic Between Subscriber Package and Distant Radio Terminal

Teletypewriter traffic between the subscriber package and the distant radio terminal is normally relayed at the radio terminal shelter. If required, this traffic may be patched directly to the hf radio circuit as follows:

a. *Subscriber Transmit Channel.* Connect a dc patch cord between the KW-9-2 RECEIVE LOOP jack and the KW-26-1 SEND LOOP jack at the red patch panel.

b. *Subscriber Receive Channel.* Connect a dc patch cord between the KW-9-1 SEND LOOP jack and the KW-26-2 RECEIVE LOOP jack on the red patch panel.

126. Four-Channel Diversity Operation

The AN/TSC-20 is normally operated on a two-channel diversity reception basis. To minimize the effects of fading on radio circuits, the equipment may be arranged for four-channel diversity operation as follows:

a. Notify the communications center that the *send and receive* teletypewriter circuits connected to channels 2, 4, 6, and 8

in the radio terminal shelter will be out of service.

b. Operate the TRANSMIT MULTIPLEX switches on the combined function panel (fig. 44) at the transmitting end of the circuit to 4-CHANNEL DIVERSITY.

c. Operate the RECEIVE MULTIPLEX switches on the combined function panel at the receiving end of the circuit to 4-CHANNEL DIVERSITY.

127. Operation With Monitoring Equipment

a. *General.* Monitoring equipment in the radio terminal shelter consists of the dual speaker and amplifier panel, the ME-22A/PCM, a dc milliammeter, and the vu meter. These components may be used during operation to determine the condition of teletypewriter or vf channels.

b. *Monitoring With Dual Speaker and Amplifier Panel.* The dual speaker and amplifier panel (right speaker) may be used to receive an audio signal. It may be patched into any vf circuit by use of the MON AMP IN jack on the audio-dc patch panel and a vf patch cord. The sound produced by the speaker is controlled by the right volume control.

c. *Monitoring Using ME-22A/PCM.* The ME-22A/PCM is used to measure the signal level in an operating vf circuit or to measure the output signal of a specific piece of equipment. Each vf circuit in the radio terminal shelter is equipped with monitor (MON) jacks and normal-through LINE and EQUIP jacks. The monitor jacks are used when only a comparative signal level measurement ((1) below) is required (for example: comparing the signal levels of a group of tone keyers or tone converters). The LINE and EQUIP jacks are used when an exact signal level measurement ((2) below) is required or when terminating the circuit in the ME-22A/PCM to measure the output signal level of a specific piece of equipment ((3) below).

(1) *Measuring comparative signal levels.*

(a) Operate the INPUT IMPEDANCE switch on the ME-22A/PCM to the BRIDGING position.

(b) Connect a vf patch cord between the ME-22/PCM jack on the audio-dc patch panel (fig. 56) and the MON jack on the audio patch panel for the equipment under test.

(2) *Measuring exact signal levels.*

(a) Connect a vf patch cord between the LINE jack in the circuit under test and the TONE MULTIPLE 1 jack.

(b) Connect a vf patch cord between the TONE MULTIPLE 2 jack and the EQUIP jack in the circuit under test.

(c) Operate the INPUT IMPEDANCE switch on the ME-22A/PCM to BRIDGING.

(d) Connect a vf patch cord between the TONE MULTIPLE 3 jack and the ME-22/PCM jack.

(3) *Measuring output signal level of a specific vf equipment.*

(a) Operate the INPUT IMPEDANCE switch on the ME-22A/PCM to the 600 OHM position.

(b) Connect a vf patch cord between the ME-22/PCM jack on the audio-dc patch panel and the equipment being tested.

d. *Measuring Dc Levels.* The dc milliammeter on the meter panel may be used to measure the current level of the teletypewriter channels. It may be patched into any teletypewriter circuit by connecting a dc patch cord between the DC MA jack and the LPG jack of the circuit under test.

e. *Monitoring Using Vu Meter.* The vu meter on the meter panel is used to measure the signal level in an operating vf circuit or to measure the output signal level of a specific piece of equipment. To use the vu meter, connect a vf patch cord between the VU METER jack and the jacks in the circuit under test the same as described for the ME-22/PCM (c above).

128. Operation With Landlines to Subscriber Packages

a. When landlines (field wire, spiral-four cable, etc) are used to interconnect

the subscriber packages and the radio terminal shelter, operate the switches on the AN/TRC-47 as follows:

- (1) Operate the R-748/TRC-47 POWER switch to OFF.
- (2) Operate the T-593/TRC-47 PLATE and FIL switches to OFF.

b. With the exception of the AN/TRC-47, the operational procedures are the same as described in the preceding paragraphs.

129. Stopping Procedure for Radio Terminal Shelter

The radio terminal shelter may be

completely shut down by setting circuit breakers CB3 and CB27 to OFF or by pressing the STOP button on the 10-kw generators. This procedure should be used only as an emergency measure, since the power to the individual equipment racks should be turned off before restarting to prevent the instantaneous application of the full power load to the generators. To perform the normal stopping procedure, operate all the circuit breakers, *except* CB3, CB27, and CB40, to OFF; then operate the circuit breaker on the 10-kw generator to OFF, and press the STOP button on the generator until the engine stops.

Section III. OPERATING PROCEDURES FOR SUBSCRIBER PACKAGE

130. Subscriber Package Starting Procedure

Note: Before operating the subscriber package using the AN/TRC-47, check to see that the tuning procedure (para 116) has been performed.

Component	Control	Position
Power and signal entrance box	MAIN BREAKER circuit	ON
Subscriber power supply	SUPPLY 1 switch	ON
	SUPPLY 2 switch	ON
VPT-1	POWER switch	ON
AN/TRC-47	POWER switch	ON
	FIL switch	ON
	PLATE switch	ON
AN/FGC-25X	MOTOR switches	ON
	LIGHT switch	ON

131. Operating Order Wire Circuit

A full-duplex voice order wire circuit is provided between each subscriber package and the radio terminal shelter. The TA-43/PT is used to communicate with the TA-43/PT in the radio terminal shelter as follows:

a. Transmitting.

- (1) Remove the handset of the TA-43/PT from the bracket.
- (2) Operate the generator crank on the TA-43/PT.
- (3) When the called party answers, operate the press-to-talk switch and speak into the mouthpiece.

b. *Receiving.* When a call is received from the radio terminal shelter, the call alarm bell will ring.

- (1) Operate the RING RESET switch on

the VPT-1 to silence the call alarm bell.

- (2) Remove the handset of the TA-43/PT from the bracket and answer the call.

132. Operating Teletypewriter Set AN/FGC-25X

The AN/FGC-25X is used in a full-duplex radioteletype circuit between the subscriber package and the radio terminal shelter. Transmission is possible from the keyboard transmitter or the transmitter-distributor, and reception is possible on the page printer or reperforator.

a. Transmitting.

- (1) To send from the keyboard, operate the SEND-LOCK switch to SEND and operate the keys.

- (2) To send from the transmitter-distributor, insert the tape in the transmitter-distributor and operate the STOP-START lever to START.

b. *Receiving.* Messages from the radio terminal shelter are received on the page printer or reperforator.

133. Remote Telephone Set Operation

A second telephone set may be connected in place of the TA-43/PT in the subscriber package to provide telephone service external to the subscriber package. Since the telephone circuit is derived from the VPT-1 in the subscriber package, additional equipment is required as described in TM 11-5805-322-12 to provide ringing signals to the telephone and to control the reset circuit in the VPT-1. When the additional equipment is installed, operate the external telephone as follows:

a. *Transmitting.*

- (1) Lift the handset from the retaining clips.
- (2) Operate the hand generator on the telephone set.
- (3) When the called party answers, operate the press-to-talk switch and speak into the transmitter.

b. *Receiving.* When the buzzer in the telephone set operates, press the external reset button and answer the call.

134. Operation With Landlines to Radio Terminal Shelter

a. When landlines (field wire, spiral-four cable, etc) are used to interconnect the radio terminal shelter and the subscriber package, operate the switches on the AN/TRC-47 as follows:

- (1) Operate the R-748/TRC-47 POWER switch to OFF.
- (2) Operate the T-593/TRC-47 PLATE and FIL switches to OFF.

b. With the exception of the AN/TRC-47, the operational procedures are the same as described in paragraphs 130 through 133.

135. Stopping Procedure for Subscriber Packages

The subscriber package may be completely shut down by setting the MAIN

BREAKER circuit breaker to OFF or by disconnecting the power cable at the power and signal entrance box. The individual components may be stopped by operating their associated switches (para 130) to OFF.

136. Operation Under Unusual Conditions

a. *Operation in Desert Climates.* When the AN/TSC-20 is used in hot, dry areas, observe the following precautions:

- (1) Keep the radio terminal shelter shaded from the sun if possible by locating it under trees, or by installing a tarpaulin over it.
- (2) Operate the air conditioner (para 111b or c).
- (3) Keep the equipment free from dust; use a soft-bristle brush to remove sand and other particles from surface of components.
- (4) Do not sweep inside the radio terminal shelter while the equipment is operating.
- (5) Keep the air cleaner and crankcase breather caps on the 10-kw generators free of sand.
- (6) Keep all vents on the air conditioner closed when not in use.

b. *Operation in Tropical Climates.* When the AN/TSC-20 is used in hot, humid areas, observe the following precautions:

- (1) Inspect the equipment for mold, mites, fungus, and metallic corrosion.
- (2) Keep the equipment clean and lubricate it frequently.
- (3) Dry the equipment thoroughly before operating.
- (4) Operate the air conditioner (para 111b or c).

c. *Operation in Artic Climates.* When the AN/TSC-20 is used in cold areas, observe the following precautions:

- (1) Operate the 10-kw generators in accordance with the instructions in the commercial manual for cold weather operation.
- (2) Operate the heater (para 111a).
- (3) Dry the equipment thoroughly before operating.
- (4) Keep the antenna couplers and terminators free of snow and ice.
- (5) Keep the antennas free of ice.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE

137. Scope of Maintenance

a. Operator's Maintenance. The operator's maintenance for the AN/TSC-20 consists of the following procedures, which may be performed without the use of any special tools or test equipment:

- (1) Preventive maintenance (para 139).
- (2) Visual inspection (para 142).
- (3) Replacement of fuses (para 144).
- (4) Replacement of batteries (para 145).
- (5) Replacement of indicator lamps (para 146).
- (6) Replacement of ceiling lights (para 147).

b. Organizational Maintenance. The maintenance duties normally performed by organizational maintenance personnel are listed in (1) through (7) below. All of the tools or special test equipment required are contained in the radio terminal shelter.

- (1) Preventive maintenance (para 139).
- (2) Lubrication (para 140).
- (3) Visual inspection (para 142).
- (4) Replacement of components (para 148).
- (5) Replacement of cables (para 149).

138. Tools, Materials, and Test Equipment

All tools, materials, and test equipment required for organizational maintenance are supplied as part of the AN/TSC-20 (appx II).

139. Preventive Maintenance Procedures

a. Use of DA Form 11-238. Items 1 through 12 on DA Form 11-238 (fig. 59 and 60) are items to be checked by the operator. Items 13 through 16, 19, 20, 22, 23, and 25 through 28 on DA Form 11-238 are items to be checked by the organizational maintenance personnel. Items not applicable to the AN/TSC-20 are lined out on the figure. Instructions for the use of the form appear on the form.

b. Additional Checklists. Each of the technical manuals listed in appendix I contains preventive maintenance procedures covering a specific component within the AN/TSC-20. The preventive maintenance routine is completed only when these additional procedures are performed in addition to the requirement in *a* above.

140. Lubrication

a. Recommended Lubricants. The following lubricants are recommended for the shelter and trailer components of the AN/TSC-20. The recommended lubricants for the communications components are covered in the individual equipment manuals.

- (1) Lubricating oil, general purpose, preservative (PL special) (FSN 9150-273-2389).
- (2) Grease, automotive and artillery (GAA) (FSN 9150-190-0905).

b. Lubrication Schedule. Lubricate the following items at the intervals indicated in the chart below.

Item	Fig. No.	Lubricant	Interval (months)
Two-wheel trailer:			
Wheel bearings	61	Grease	6
Spring shackle fittings	62	Grease	3
Jack gear rack	14	Grease	3
Winch gears	62	Grease	1
Winch bearings	62	Oil	1
Winch ratchet teeth	62	Grease	1

Item	Fig. No.	Lubricant	Interval (months)
Subscriber package:			
Caster fittings	62	Grease	3
Caster wheel fittings	62	Grease	3
Four-wheel trailer:			
Wheel bearings	61	Grease	6
King-pin fittings	63	Grease	3
Spring shackle fittings	63	Grease	3
Steering knuckle fittings	63	Grease	3
Winch gears	65	Grease	1
Winch bearings	65	Oil	1
Winch ratchet teeth	13	Grease	1
All contact surfaces in the area of steering pivot pin	64	Grease	1
Steering shaft fittings	64	Grease	3
Radio terminal shelter:			
Dolly jack fittings	66	Grease	3
Door hinges	3	Oil	1
Panel hinges and hinged clamps		Oil	1

c. *Lubrication Tools.* A grease gun (FSN 4930-256-3924) and the hand oiler supplied with Tool Equipment TE-50B are required for lubrication. The hand oiler is equipped with an adjustment knob beneath the handle to regulate the flow of oil.

d. *Two-Wheel Trailer Lubrication.*

- (1) *Wheel bearings* (fig. 61). Lubricate the wheel bearings in both wheels as follows:
 - (a) Turn the jack handle until the wheel clears the ground.
 - (b) Use a screwdriver and hammer, if necessary, to remove the grease cap.
 - (c) Locate and remove the cotter pin from its position in the castellated nut grooves.
 - (d) Turn the castellated nut counterclockwise and remove it from the wheel axle.
 - (e) Slide the keyed washer outward and remove it from the wheel axle.
 - (f) Release the handbrake and pull the wheel and drum assembly off the wheel axle.
 - (g) Remove the outer bearing from the wheel hub.
 - (h) Insert the wooden handle of the screwdriver through the wheel hub and place it against the inner bearing; then tap around the periphery gently until the bearing is

free. Remove the grease seal and the bearing.

- (i) Use a cloth to remove grease and dirt from the bearings, the grease cap, and the hub interior.
- (j) Soak the bearings and the grease cap in Cleaning Compound (FSN 7930-395-9542) and thoroughly clean the interior of the hub with a clean, lint-free cloth that has been saturated with the cleaning compound.

Warning: Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.

- (k) Use the moistened cloth to thoroughly clean the wheel axle.
- (l) Use a clean, dry, lint-free cloth to dry all of the parts.
- (m) Pack grease on both bearings and on both the inner and outer race surfaces inside the wheel hub.
- (n) Insert the inner bearing into the inner race at the drum end of the hub.
- (o) Reseat the grease seal behind the inner bearing. To accomplish this, align the grease seal in position and place a large flat block (preferably wood) over the grease seal; then tap the grease seal lightly into place (flush with the edge of the hub surface).

ADDITIONAL ITEMS FOR 20-JAN-60 ECHELON INSPECTIONS		CONDITION
26. INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.		✓
27. CHECK FOR NORMAL OPERATION.		✓
28. BEFORE SHIPPING OR STORING, REMOVE BATTERIES		✓

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

**20. LOOSE CONNECTION ON TERMINAL BOARD
TB407B TERMINAL 12, REFERRED TO
HIGHER ECHELON FOR REPAIR.**
aw

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING
RADAR, CARRIER, RADIOSONDE AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE

COMMUNICATIONS CENTRAL AN/TS-20

EQUIPMENT SERIAL NUMBER

0000

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

- For detailed Preventive Maintenance instructions see:
 - The Technical Manual (in TM 11 series) for the equipment. (See DA Pamphlet Number 310-4)
 - The Supply Bulletin (SB 11-100 series) for the equipment. (See DA Pamphlet Number 310-4)
 - The Department of the Army Lubrication Order. (See DA Pamphlet Number 310-4)

- The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon:
 - Enter Equipment Nomenclature and Serial Number.
 - Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled **CONDITION**, on the proper line, a notation regarding the condition, using symbols specified under **LEGEND**.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

TYPE OF INSPECTION

OPERATOR	2nd ECHELON	DATE	SIGNATURE
✓		<i>7 JULY 1961</i>	<i>PFC Albert Wolanski</i>
	✓	<i>9 JULY 1961</i>	<i>Cpl Arthur Haggel</i>

DA FORM 11-238
1 MAY 61

REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-248, 11-249, 11-250, AND 11-251; WHICH ARE OBSOLETE.

Figure 59. DA Form 11-238, pages 1 and 4.

LEGEND for marking conditions: Satisfactory, ✓. Adjustment, Repair or Replacement required, X. Defect corrected, ⊗.		DAILY CONDITION FOR MONTH OF <i>July 1961</i>														
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
NO.	DAILY ITEM	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1.	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (Transmitter, receiver, carrying cases, wire, cables, enclosures, tubes, spare parts, technical manuals).	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, JACKS, PLUGS, COMPONENT PANELS.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WEEKLY		1ST	2D	3D	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH
5.	CLEAN AND TIGHTEN EXTERIORS OF CASES, RACKS, MOUNTS, TRANSMISSION LINES.	✓														
6.	INSPECT CASES, MOUNTS, ANTENNA TOWERS AND EXPOSED METAL SURFACES FOR RUST, CORROSION.	✓														
7.	INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDOE STRAIN.	✓														
8.	CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.	✓														
9.	INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING.	✓														
10.	INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, RELAYS, TRANSFORMERS, MOTORS, PILOT LIGHTS, BLOWERS, ETC.	✓														
11.	CLEAN AND/OR INSPECT AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS.	✓														
12.	INSPECT STORAGE BATTERIES PER DIRT, LOOSE TERMINALS, SPILLAGE, CRACKS, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.	✓														
ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS		ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS														
13.	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER-PROOFING, TEARS, FRAYING.	✓														
14.	CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE.	✓														
ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS		ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS														
15.	INSPECT BEATING OF READILY ACCESSIBLE PLUCK-OUT ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, VIBRATORS, PLUG-IN COILS.															
16.	INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MIS-ALIGNMENT OF CONTACTS AND SPRINGS, PROPER SPRING TENSION.															
17.	INSPECT HARNESS CABLES FOR BIRT MIS-ALIGNMENTS OF SLICES, LOOSE MOUNTING, MOISTURE.															
18.	INSPECT RESISTORS, BURNING AND INSULATORS FOR CRACKS, CHIPPING, BURSTING, MOISTURE, DISCOLORATION.															
19.	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE.															
20.	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.															
21.	INSPECT TERMINALS OF LARGE FUSES, RELAYS AND RESISTORS FOR BIRT CORROSION, LOOSE CONNECTIONS.															
22.	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING AND OIL LEAKAGE.															
23.	INSPECT GENERATORS, AMPHIBINES, CONTACTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR.															
24.	INSPECT CATHODE RAY TUBES FOR BURNING, SCREEN LOSS.															
25.	CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE.															

2

3

CONTINUED ON PAGE 4

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Figure 60. DA Form 11-238, pages 2 and 3.

Caution: Bending or warping the grease seal will cause it to leak.

- (p) Slide the wheel assembly carefully onto the axle. Do not allow any oil, dirt, or grease to contaminate either the inner surface of the brakedrum or the brake linings.
 - (q) Slide the outer bearing into position in the outer hub race.
 - (r) Align the keyed washer on the wheel axle and slide it into place against the outer bearing.
 - (s) Replace the castellated nut by turning it clockwise on the wheel axle.
 - (t) Slowly rotate the wheel by hand and gradually tighten the castellated nut until a drag is noted in the rotation of the wheel. Back off a 1/4 turn on the castellated nut and spin the wheel to check for free rotation.
 - (u) Align the grooves of the castellated nut with the cotter pin hole through the wheel axle; insert the cotter pin and bend over the ends to secure it in place.
- Note:* If the castellated nut is turned appreciably while the cotter pin is being inserted, recheck the free rotation of the wheel.
- (v) Coat the exposed surfaces of the outer bearing with grease and replace the grease cap by tapping it lightly with a hammer. Make sure that it is securely seated in the hub.
 - (w) After greasing, turn the jack handles and lower the trailer wheels to the ground.
 - (x) Set the handbrake.
- (2) *Grease fittings* (fig. 63). Hold the grease gun nozzle firmly against each fitting. Apply the lubricant until grease oozes from the lubrication joint.
 - (3) *Winch gears* (fig. 62 and 65). Coat the gear teeth with grease. Turn the winch handle slightly after each application until all the teeth are coated.

- (4) *Winch bearings* (fig. 62). Apply a few drops of oil to the frame and drum bearings of the winch. Rotate the winch handle to work the lubricant into the contacting surfaces.

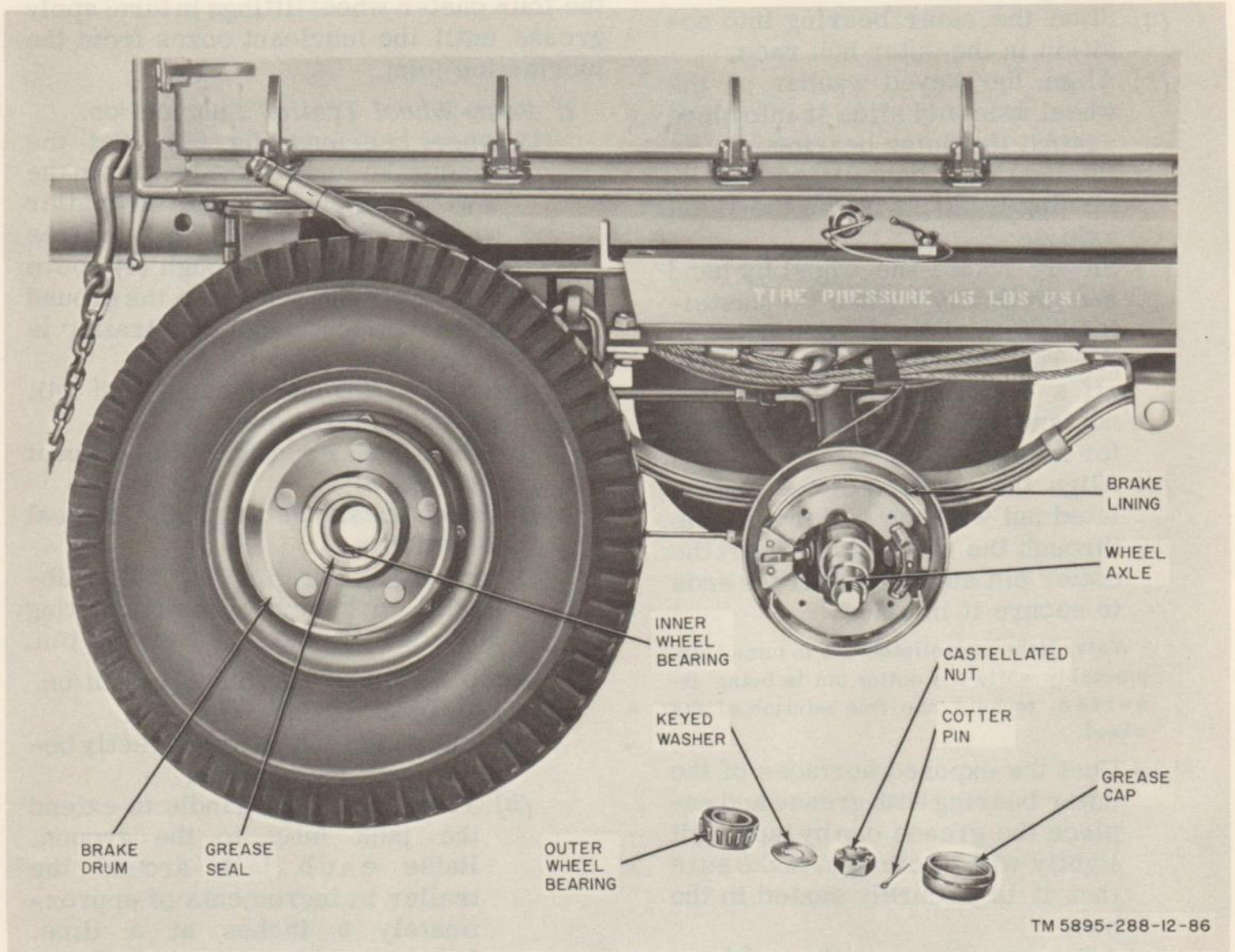
e. *Subscriber Package Lubrication* (fig. 62). Hold the grease gun firmly against each of the four caster fittings and each of the four caster wheel fittings in turn; apply grease until the lubricant oozes from the lubrication joint.

f. *Four-Wheel Trailer Lubrication.*

- (1) *Wheel bearings* (fig. 62). Set the handbrake and use the jack from the towing vehicle to elevate the trailer wheels. Repeat the procedures given in d(1)(b) through (x) above and lower the wheels to the ground when lubrication of the trailer is completed.
- (2) *Grease fittings* (fig. 63 and 64). Repeat d(2) above.
- (3) *Winch gears* (fig. 65). Repeat d(3) above.
- (4) *Winch bearings* (fig. 65). Repeat d(4) above.
- (5) *Steering pivot pin* (fig. 64). Liberally coat each of the contacting surfaces in the area of the pin.

g. *Radio Terminal Shelter Lubrication.*

- (1) *Dolly jack fittings* (fig. 66).
 - (a) Lubricate the fitting directly below each jack handle.
 - (b) Turn each jack handle to extend the jack fully to the ground. Raise each jack around the trailer in increments of approximately 6 inches at a time.
 - (c) Lubricate the upper jack fitting until the grease oozes out of the jack handle joint.
 - (d) Retract each jack to its normal position and again lubricate the fitting beneath the jack handle.
 - (e) Wipe all excess grease from the inner jack tubes. A light film of grease should be maintained on all exposed areas of the jack as a protection against rusting.
- (2) *Hinged components* (fig. 3). Apply 3 or 4 drops of oil at the top of each hinge.



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Figure 61. Wheel bearing disassembly and lubrication details.

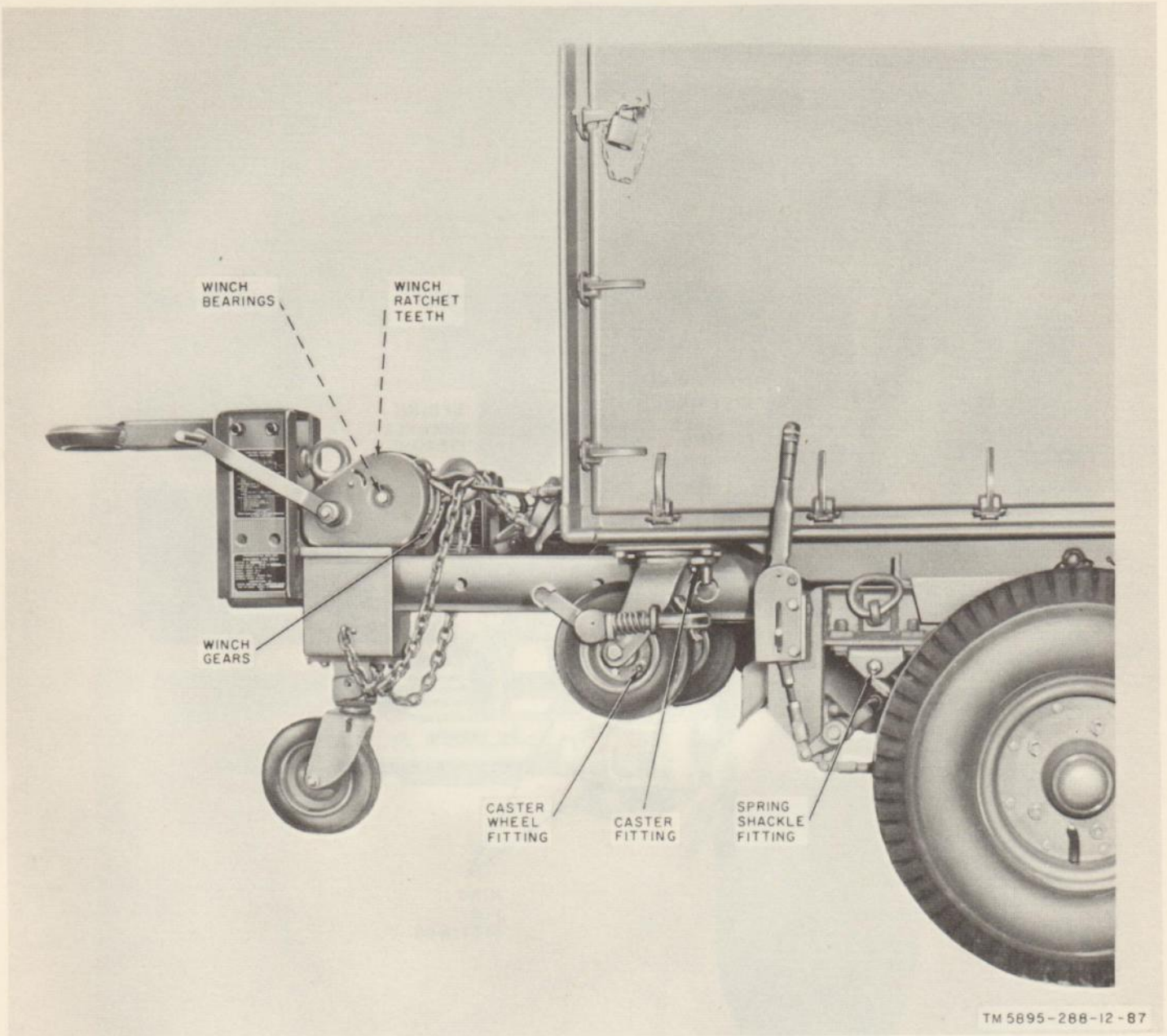
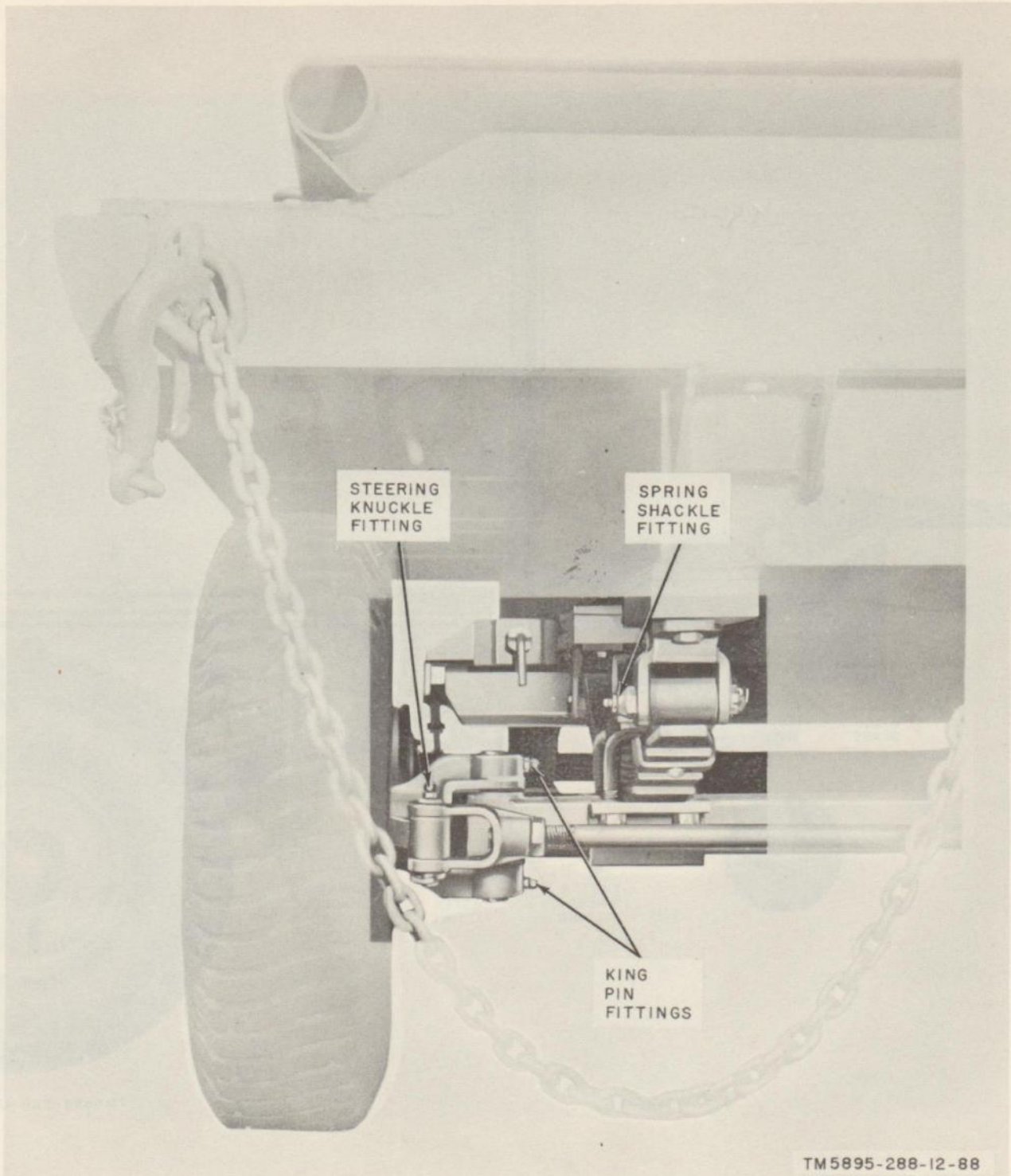


Figure 62. Two-wheel trailer and subscriber package lubrication points.



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Figure 63. Four-wheel trailer showing lubrication points, left-front view.

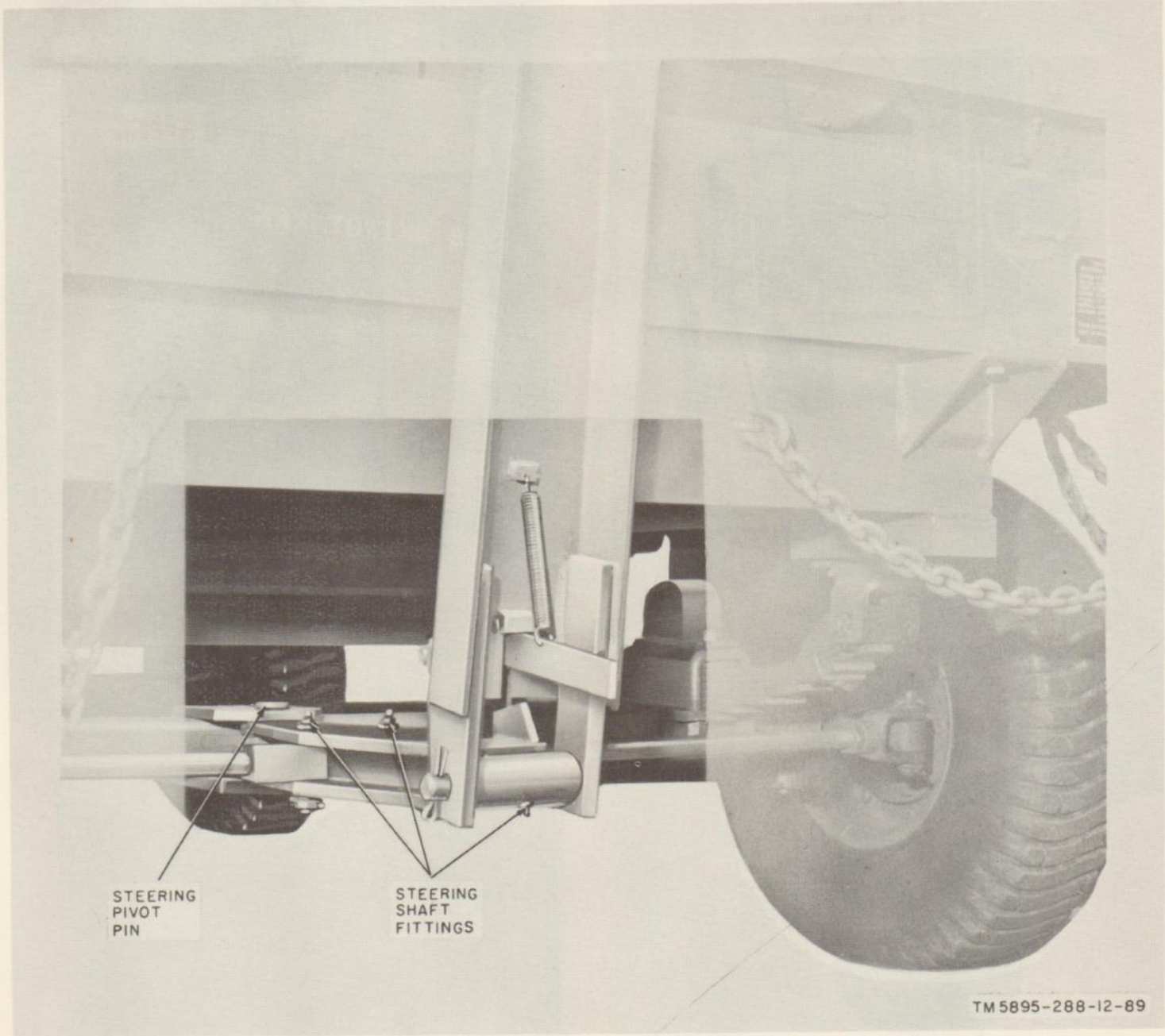


Figure 64. Four-wheel trailer showing lubrication points, right oblique view.

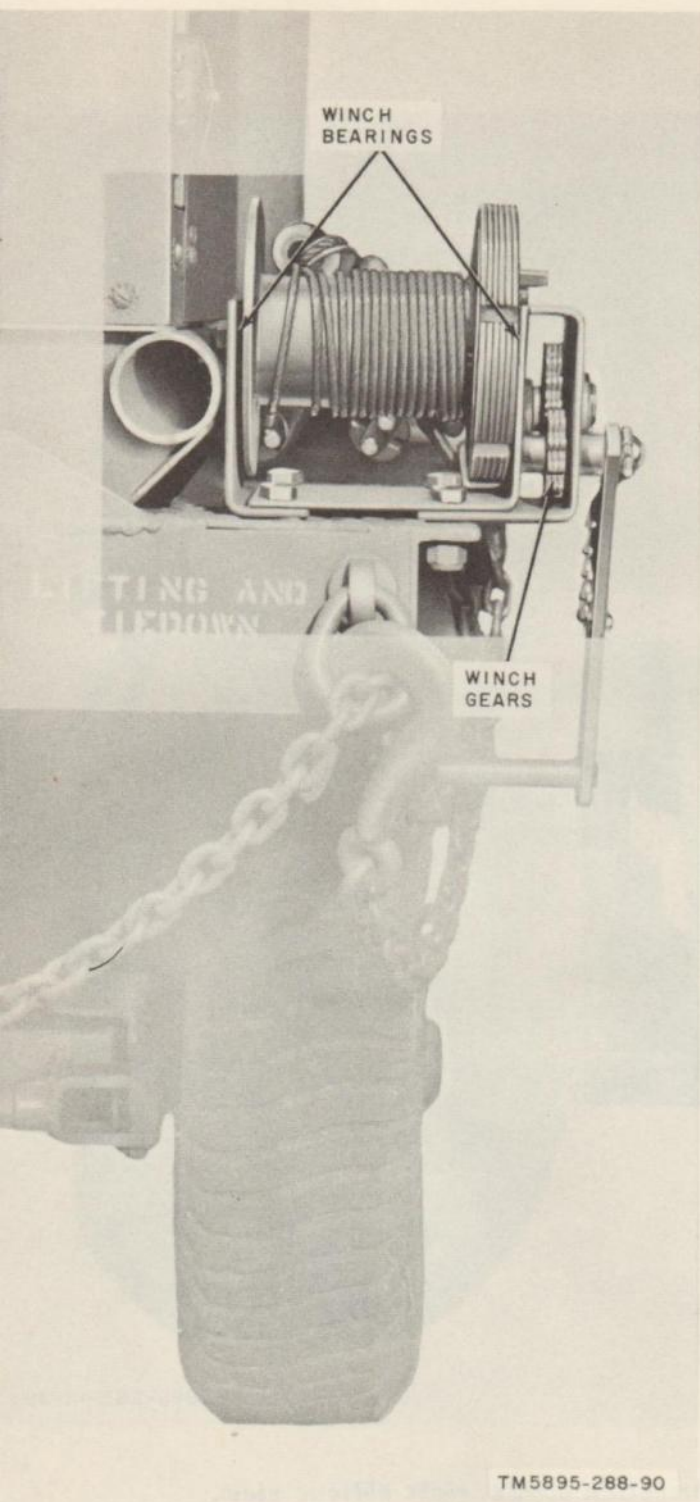


Figure 65. Four-wheel trailer winch, lubrication points.

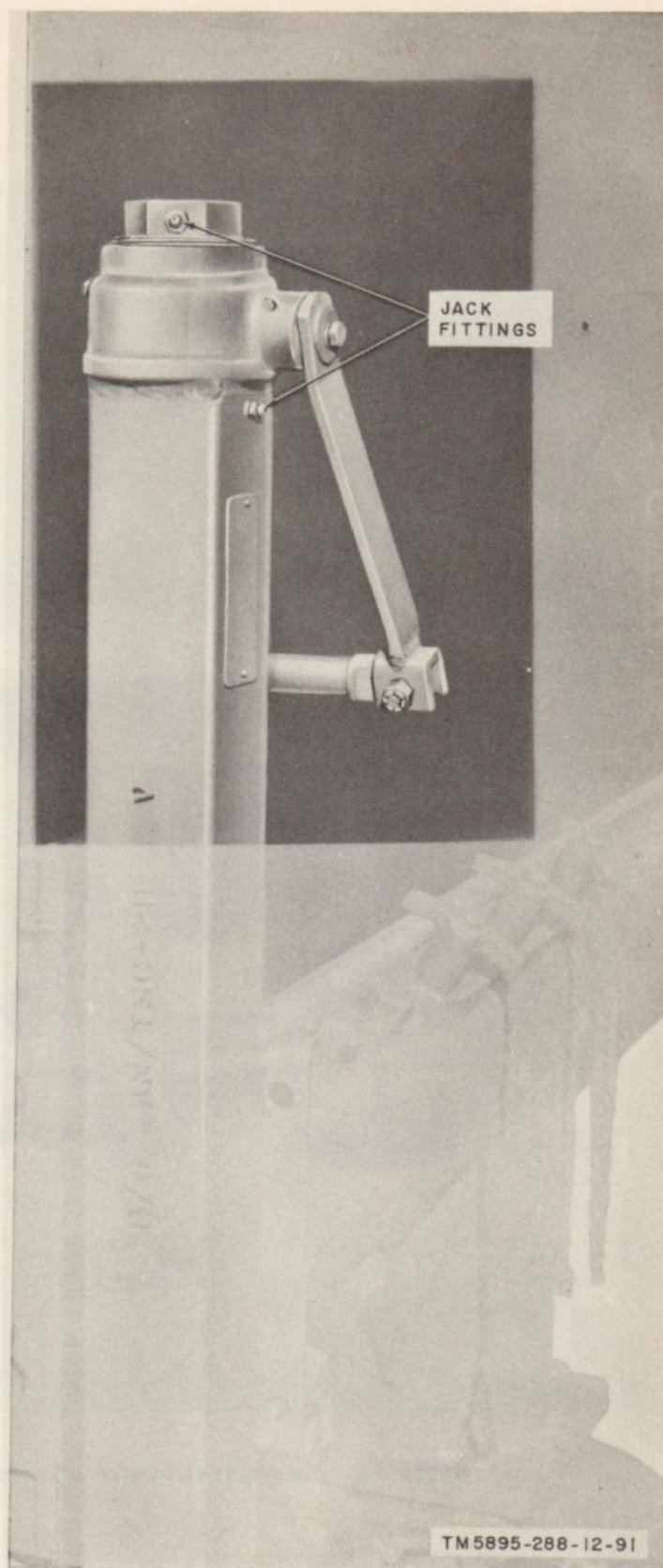


Figure 66. Partial side view of radio terminal shelter dolly, lubrication points.

Section II. CORRECTIVE MAINTENANCE

141. Troubleshooting

a. When a malfunction occurs in the equipment, a visual inspection (para 142) should be made of all equipment panels and cabling. If the trouble is not obvious, a more detailed check (b below) should be made.

b. When there are no indications that clearly localize the trouble, follow the testing and operating procedures in paragraphs 75 through 87, and 109 through 135. Note any abnormal indication in the equipment performance during the prescribed procedure. Whenever possible, substitute

spare equipment for suspect components or make the necessary patches to route traffic through alternate circuitry available in the AN/TSC-20. For example, if a fault is suspected in a demultiplexer, the demultiplexer not in use can be patched into the circuit. When trouble has been localized to a specific component, refer to the applicable literature listed in appendix I and follow the troubleshooting procedures set forth in the individual equipment manual.

c. The following illustrations provide additional information that may be required in the troubleshooting procedure.

Fig.	Subject
71	Radio terminal shelter, power and signal raceway diagram.
72	Radio terminal shelter power distribution, schematic diagram.
73	Subscriber package power distribution, schematic diagram.
74	Radio terminal shelter power distribution, wiring diagram.
75	Subscriber package power distribution, wiring diagram.
76	Radio terminal shelter signal distribution, schematic diagram.
77	Subscriber package signal distribution, schematic diagram.
78	Subscriber package signal distribution, wiring diagram.
79	Combined distribution frame.

142. Visual Inspection

a. *General.* A visual inspection is normally performed before any detailed troubleshooting procedures are attempted. In many instances, it is possible to observe equipment faults, such as loose connectors, blown fuses, or broken wiring, thus eliminating the need for further investigation.

b. *Operator's Visual Inspection.* The operator can visually check the items listed below:

- (1) All fuse indicators for a blown-fuse indication.
- (2) All front panel meters for incorrect readings.
- (3) All front panel controls for proper positioning.
- (4) All power control and distribution panel circuit breakers.
- (5) All connections at the power or signal entrance boxes.

c. *Organizational Maintenance Personnel Visual Inspection.* The organizational

maintenance personnel can check the following additional items:

- (1) The connections at interconnecting terminal blocks on the racks.
- (2) All of the wiring and connectors at the rear of the panels.
- (3) All power cords, to make sure that they are inserted in the associated power receptacles on the power strips.
- (4) The wiring in the combined distribution frame, for breaks or fraying.

143. Repairs and Adjustments

System malfunctions can be caused by defective wiring, defective parts within a component, or a defective antenna. If the malfunction is localized to the signal or power wiring, the defective wire must be repaired or replaced. If a fuse is defective, the fuse must be replaced (para 144). If a component is found defective, the entire component must be replaced (para

148). If an antenna is defective, the antenna cables should be checked.

144. Replacement of Fuses

To replace the fuses:

- a. Depress and turn the fuse cap counterclockwise.
- b. Remove the old fuse and insert a new fuse. Refer to paragraph 63 for the correct fuse values.
- c. Replace the fuse cap.

145. Replacement of Batteries

To replace batteries in Telephone Set TA-43/PT or TA-312/PT:

- a. Turn the battery compartment latch and open the hinged cover.
- b. Insert one Battery BA-30 with its center terminal down, and another Battery BA-30 with its center terminal up.
- c. Close and latch the battery compartment cover.

146. Replacement of Indicator Lamps

a. *Screw-In Indicator Lamps.* To replace the screw-in type indicator lamps:

- (1) Remove the indicator lamp cover by turning it counterclockwise.
- (2) Remove the indicator lamp by turning the lamp counterclockwise.
- (3) Replace the new indicator lamp.
- (4) Replace the indicator lamp cover.

b. *Bayonet Indicator Lamps.* To replace the bayonet indicator lamps:

- (1) Remove the indicator lamp cover by turning it counterclockwise.
- (2) Depress the indicator lamp and turn it one-quarter turn counterclockwise. Remove the lamp.
- (3) Insert a new indicator lamp.
- (4) Replace the indicator lamp cover.

147. Replacement of Ceiling Lights

To replace the ceiling lights:

- a. Remove the plastic cover by pulling it down.
- b. Remove the ceiling light from the retaining clips by pulling down on each end of the ceiling light.
- c. Insert the new ceiling light into the retaining clips.

d. Replace the plastic cover.

148. Replacement of Equipment

a. *General.* Most of the components of Communication Central AN/TSC-20 are rack-mounted. Access to each individual component depends on how the component is mounted. For example, the combined function panel and the black patch panel are hinge-mounted to the racks. Other Components are removed from the rack by loosening the captive screws and sliding the components forward. Still other components of the system, such as the VPT-1 and the T-593/TRC-47, are held in the rack by hinged rack clamps, which must first be loosened before these components can be removed. Follow the procedures below to remove a particular component.

b. *Hinge-Mounted Components.*

- (1) To open the hinge-mounted components, loosen the retaining screws and carefully swing the component out on its hinges. If it is necessary to remove a component, carefully tag and remove all wiring to the parts. The screws that hold the component to the hinge can then be removed.
- (2) To replace hinge-mounted components, attach the component to the hinge with screws. Connect all the wiring to the terminal boards. The component can then be swung into the rack and secured with the retaining screws.

c. *Slide-Mounted Components.* To replace slide-mounted components, proceed as follows:

- (1) Remove all front panel interconnecting cables.
- (2) Loosen the captive screws that hold the component to the rack.
- (3) Slide the component halfway out of the rack.
- (4) Remove all interconnecting cables and power cords from the rear panel.
- (5) Tilt the component downward (front panel down), release the slide latches, and remove the component from the rack.

- (6) Replace the component by tilting it downward and moving it halfway into the slides.
- (7) Reconnect all interconnecting cables and power cords on the rear panel.
- (8) Slide the component into its operating position in the rack.
- (9) Secure the component to the rack, use the captive screws.
- (10) Reconnect all the front panel interconnecting cables.

d. Drawer-Mounted Components. To replace the drawer-mounted components, proceed as follows:

- (1) Remove all the front panel interconnecting cables.
- (2) Loosen the captive screws.
- (3) Slide the component halfway out of the rack.
- (4) Remove all of the interconnecting cables and power cords from the rear panel.
- (5) Slide the component out of the rack.
- (6) Replace the component by sliding it halfway into the rack.
- (7) Reconnect all the interconnecting cables and power cords on the rear panel.
- (8) Slide the component fully into the rack.
- (9) Secure the component to the rack by tightening the captive screws.

e. Telephone Set TA-43/PT or TA-312/PT. The procedure for the replacement of the TA-43/PT or the TA-312/PT is the same. To replace the telephone proceed as follows:

- (1) Disconnect the wires from the LINE 1-2 binding posts.
- (2) Loosen and remove the holding screw on the right side of the holding bracket.
- (3) Loosen the wingnut that holds the retaining bracket and swing the retaining bracket down and out of the way.
- (4) Slide the telephone out of the holding bracket and remove the plate nut from the detent on the right side of the telephone.
- (5) Place the plate nut in the detent on

on the right side of the new telephone.

- (6) Slide the new telephone into the holding bracket.
- (7) Replace and tighten the holding screw on the right side of the holding bracket.
- (8) Swing the retaining bracket up to the horizontal position, push against the handset, and tighten the wingnut.
- (9) Connect the wires to the LINE 1-2 binding posts.

f. Transfer Switch. To replace the transfer switch, proceed as follows:

- (1) Remove the nuts and washers that hold the transfer switch to the mounting bracket.
- (2) Remove the transfer switch from the mounting bracket by lifting it from the mounting screws.
- (3) Tag and disconnect the leads from the transfer switch.
- (4) Connect the leads to the appropriate terminals on the new transfer switch.
- (5) Place the new transfer switch on the mounting screws. Replace the nuts and washers.

g. Alarm Unit. To replace the alarm unit, proceed as follows:

- (1) Disconnect the four plugs from the alarm unit.
- (2) Loosen and remove the nuts and washers that hold the alarm unit to the wall. Remove the alarm unit.
- (3) Place a new or repaired alarm unit on the holding studs. Replace and tighten the nuts and washers.
- (4) Reconnect all four plugs.

h. Fanhousing. To replace the fanhousing in rack 404 or 408, proceed as follows:

- (1) Remove the two capscrews and remove the filter grill.
- (2) Slide the enclosure out of the rack. Disconnect the power cord.
- (3) With an adjustable wrench, remove the fanhousing from the enclosure by removing the eight nuts on the rear of the enclosure.
- (4) Place the new fanhousing in the enclosure and secure it with eight nuts.

- (5) Reconnect the power cord and slide the enclosure into the rack.
- (6) Replace the filter grill; use two capscrews.

i. Subscriber Power Supply. To replace the subscriber power supply in the subscriber package, proceed as follows:

- (1) Tag and disconnect all the leads on the rear panel of the subscriber power supply.
- (2) Loosen the screws on the left side of the power and signal entrance box, and swing the front panel out.
- (3) Remove the four nuts and washers that hold the subscriber power supply to the bottom of the power and signal entrance box. Remove the power supply.
- (4) Position the new subscriber power supply in the bottom of the power and signal entrance box, and secure with the nuts and washers removed ((3) above).
- (5) Fasten the front panel of the power and signal entrance box with screws.
- (6) Connect the leads to the rear panel of the subscriber power supply.

j. Replacing 10-Kw Generator (fig. 67). To replace either of the two generators, proceed as follows:

- (1) Disconnect the power cable.
- (2) Apply the handbrake on the four-wheel trailer.
- (3) Remove the trailer ramps from storage and attach them to the appropriate ramp brackets.
- (4) Remove the four bolts that hold the 10-kw generator to the trailer.
- (5) With the clevis, attach block No. 1 to the outboard curbside loading ring.
- (6) With the clevis, attach block No. 2 to the outboard roadside unloading ring.
- (7) Place the control lock, located on the handle side of the winch, in the extreme left position.
- (8) Make sure the winch cable goes around block No. 2, under the 10-kw generator, around block No. 1, and back under the 10-kw generator, so that the winch cable hook can be

secured to the towing eye of the 10-kw generator on the roadside of the trailer.

- (9) Place the control lock on the winch in the extreme right position and turn the winch handle clockwise.
- (10) Turn the winch handle slowly until the 10-kw generator is on the ramp; then place the control lock in the extreme left position so that the winch cable can be let out.
- (11) Slowly turn the winch handle counterclockwise to slide the 10-kw generator down the ramp. Disconnect the winch cable hook from the 10-kw generator.
- (12) Use a vehicle to tow the 10-kw generator off the ramp.
- (13) Disconnect block No. 1 from the outboard curbside unloading ring and block No. 2 from the outboard roadside unloading ring.
- (14) Use the clevis to attach block No. 1 to the outboard roadside unloading ring.
- (15) Align the replacement 10-kw generator with the trailer ramps.
- (16) Secure the winch cable hook to the towing eye of the 10-kw generator.
- (17) Place the control lock, which is on the winch, in the extreme right position, and turn the winch handle clockwise until the 10-kw generator is in place on the four-wheel trailer. Make sure that the holes on the 10-kw generator skids are aligned with the mounting holes on the trailer. Disconnect the winch cable hook.
- (18) Secure the 10-kw generator to the trailer with four bolts, nuts, and washers.
- (19) Store block No. 1, block No. 2, and the winch cable hook, and replace the trailer ramps in their storage position under the four-wheel trailer.

k. Replacing Dolly Assembly Wheels (fig. 68). To replace a wheel on the dolly assembly, proceed as follows:

- (1) Apply the footbrakes to all the caster assemblies except the one on which the wheel is to be replaced.

- Chock all the caster assemblies on which the footbrakes are applied.
- (2) Raise the radio terminal shelter until the wheel is off the ground; use the leveling jack (fig. 2) nearest the wheel to be replaced.
 - (3) Remove the retracting pins, swing the caster assembly up, and replace the retracting pins.
 - (4) Remove the wheel bolt and the wheel.
 - (5) Place the new wheel in position. Replace and tighten the wheel bolt.
 - (6) Remove the retracting pins, swing the caster assembly down, and replace the retracting pins.
 - (7) Lower the caster assembly until the wheel is on the ground.

l. Replacing Four-Wheel Trailer Wheels (fig. 69). To replace a wheel on the four-wheel trailer, proceed as follows:

- (1) Apply the handbrake and chock the other wheels.
- (2) Use a lug wrench and loosen, but do not remove, the five nuts on the wheel to be replaced.
- (3) Raise the side of the four-wheel trailer with a jack until the wheel is off the ground.
- (4) Remove the five nuts and the wheel.
- (5) Position the new wheel on the five studs and replace the nuts.
- (6) Lower the trailer until it rests on the wheel. Tighten the nuts on the wheel. Remove the wheel chocks.

m. Replacing Two-Wheel Trailer Wheels. To replace a wheel on the subscriber package trailer, proceed as follows:

- (1) Lower the retractable landing wheel (fig. 14) and apply the handbrake.
- (2) Use a lug wrench and loosen, but do not remove, the five nuts on the wheel to be replaced.
- (3) Lower the stabilizing jack located on the same side of the trailer as the wheel being replaced, until the wheel clears ground.
- (4) Remove the five nuts and the wheel.
- (5) Position the new wheel on the five studs and replace the nuts.

- (6) Lower the trailer until it rests on the wheel. Tighten the nuts on the wheel.

n. Removing Dolly Assembly from Radio Terminal Shelter. To remove the dolly assembly from the radio terminal shelter, lower the radio terminal shelter to the ground in accordance with paragraph 51 and proceed as follows:

- (1) Make sure that all leveling jacks (fig. 2) are fully retracted.
- (2) Release the caster assemblies by removing the retracting pins, and lower the casters to the ground.
- (3) Remove the chain-leashed swivel-handle mounting studs and raise the longitudinal tubes from the radio terminal shelter.
- (4) Replace all 12 retracting pins so that the dolly assembly is supported by its caster assemblies. the radio terminal shelter site.
- (5) If only the leveling jacks are to be removed from the dolly assembly, make sure that the radio terminal shelter is resting on either the casters or on its skids; then fully retract the leveling jacks and loosen the jack-retainer screws. Slide the leveling jacks from the brackets.

o. Replacing Wheel of Subscriber Package Caster Assembly (fig. 70). To replace the wheel of a subscriber package caster assembly, proceed as follows:

- (1) Apply the footbrake on each caster assembly.
- (2) Lift the side of the subscriber package on which the wheel is to be replaced and support the subscriber package.
- (3) Release the footbrake of the wheel to be replaced, by lifting the footbrake lever.
- (4) Loosen the wheel bolt that holds the wheel to the wheel swivel yoke.
- (5) Remove the nut and the washer from the wheel bolt.
- (6) Carefully slide the wheel bolt from the wheel and wheel swivel yoke; remove the spacers and the wheel.
- (7) Slide the wheel bolt back into the wheel swivel yoke just enough to

hold one spacer, and replace the spacer.

- (8) Place the new wheel in the wheel swivel yoke and slide the wheel bolt partially into the wheel.
- (9) Replace the second spacer and slide the wheel bolt through the second spacer and wheel swivel yoke.
- (10) Replace the washer and the nut, and tighten.
- (11) Remove the support and lower the subscriber package.
- (12) If it is necessary to replace the entire caster assembly, remove the four bolts that hold the caster assembly to the subscriber package enclosure.

149. Replacement of Cables

Follow the procedures in *a* and *b* below to replace the air conditioner power cable and the 10-kw generator power cable.

a. Replacement of Air Conditioner

Power Cable. To replace the air conditioner power cable proceed as follows:

- (1) Operate circuit breakers CB9 and CB10 on the power control and distribution panel to OFF.
- (2) Remove the cable between the air conditioner and the air conditioner power output box.
- (3) Connect the new cable between the air conditioner and the air conditioner power output box.
- (4) Operate circuit breakers CB9 and CB10 to ON.

b. Replacement of 10-Kw Generator Power Cable. To replace the 10-kw generator power cable, proceed as follows:

- (1) Operate circuit breaker CB3 or CB27 to OFF.
- (2) Stop the 10-kw generator.
- (3) Replace the 10-kw generator power cable.
- (4) Start the 10-kw generator as described in paragraph 109.
- (5) Operate circuit breaker CB3 or CB27 to ON.

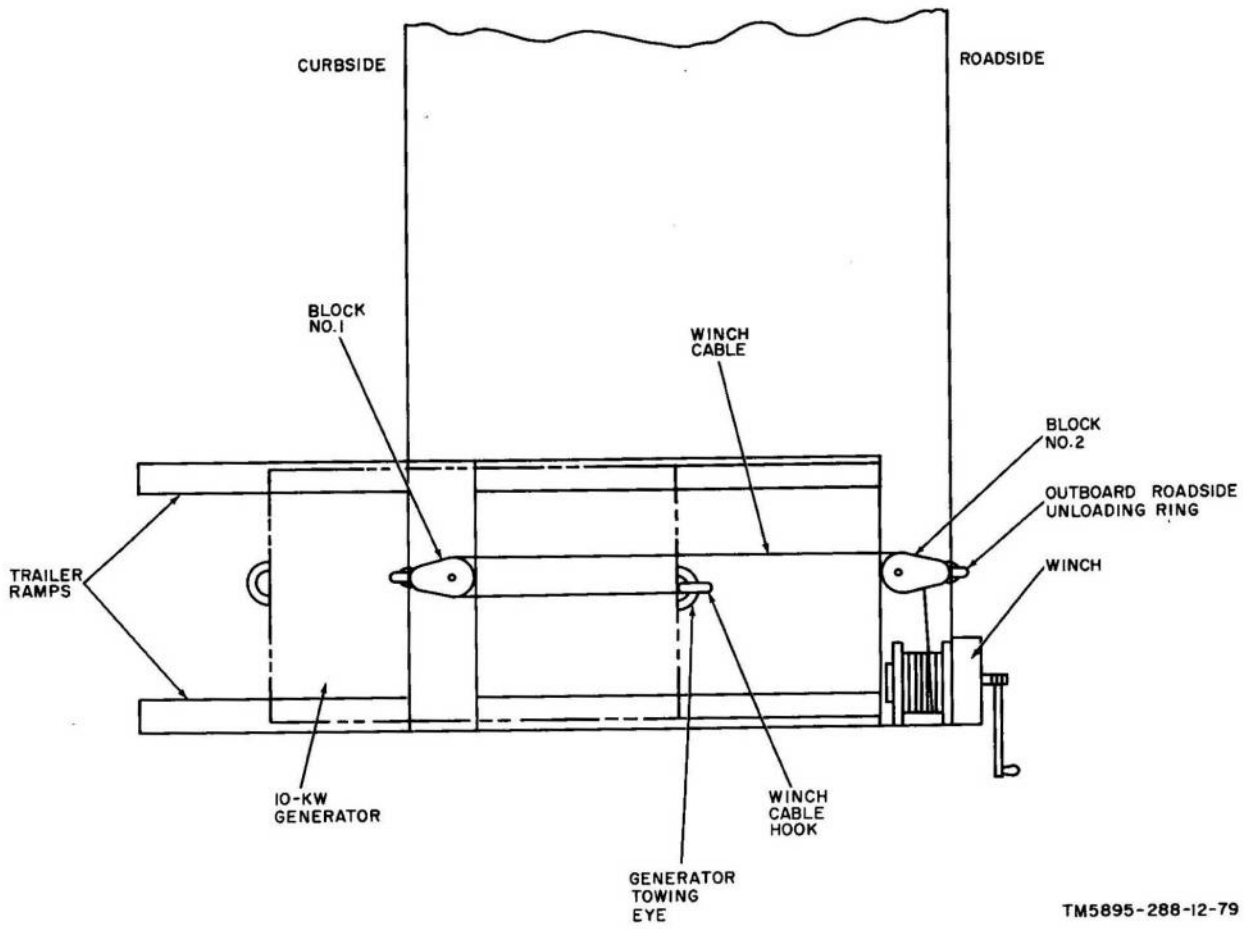


Figure 67. Winch cable arrangement for unloading 10-kw generator.

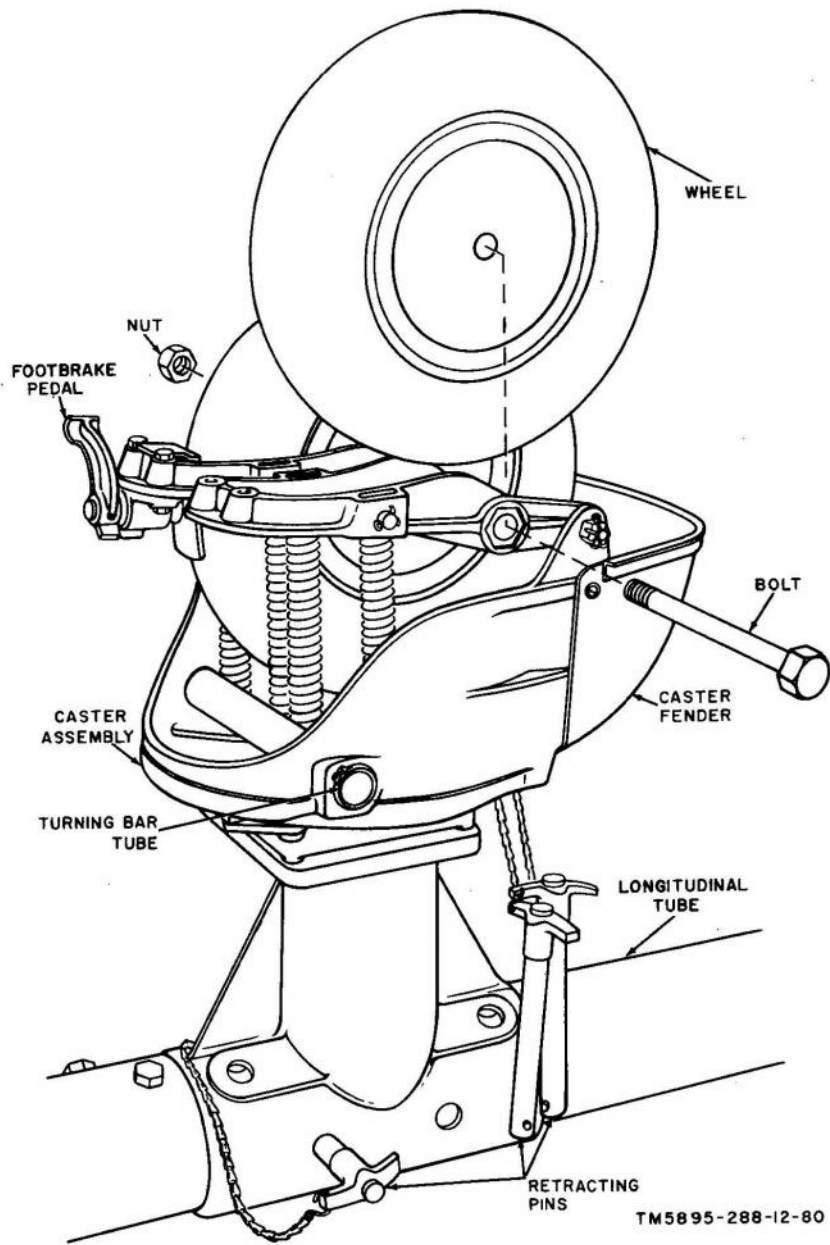


Figure 68. Dolly assembly wheel housing, exploded view.

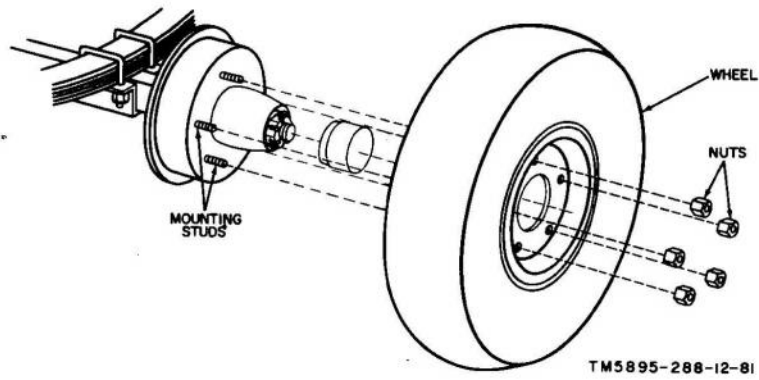


Figure 69. Four-wheel trailer wheel assembly, exploded view.

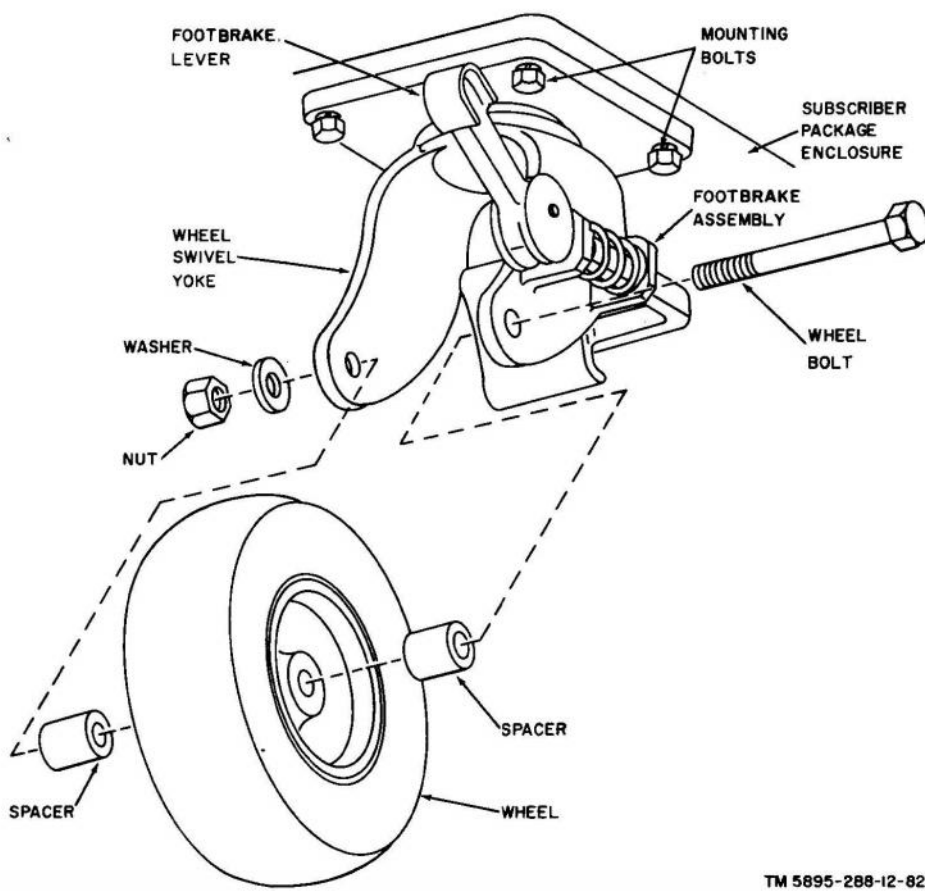


Figure 70. Subscriber package caster assembly, exploded view.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

150. General

All equipment normally mounted outside the radio terminal shelter during operation must be disassembled and stored in the shelter. Figure 16 shows the location and the correct position of the stored equipment.

151. Disassembly of Equipment

Turn off all power as described in paragraphs 129 and 135. Perform the procedures given in *c*, *d*, *e*, or *f* below to disassemble the particular antennas being used.

a. Ten-Kw Generators.

- (1) Disconnect the ground straps from the ground rod assemblies and remove the ground rod assemblies.
- (2) Disconnect the power cables from the power entrance box (fig. 31) on the radio terminal shelter.
- (3) Disconnect the leads of the power cable at each 10-kw generator.
- (4) Store the power cables on the reels provided on the four-wheel trailer (fig. 17).

b. Air Conditioner.

- (1) Disconnect the air conditioner power cable from the air conditioner power output box on the radio terminal shelter.
- (2) Disconnect the air conditioner power cable at the air conditioner and place it on the reel provided.
- (3) Loosen the adjustable band clamps and disconnect the flexible hose (fig. 20) from the top and bottom air conditioner openings on the radio terminal shelter.
- (4) Loosen the band clamps and disassemble all flexible hose from the Y-adapter and adapter mask. Place

all flexible hose in the flexible hose enclosure.

- (5) Loosen the eight corner screws from the upper front section of the air conditioner and the four center top screws, and remove the adapter mask.
- (6) Replace the eight corner screws and tighten the four center top screws ((5) above) on the air conditioner.
- (7) Store the adapter mask, the flexible hose enclosure, and the Y-adapter as instructed in paragraph 152.
- (8) Remove the eight chain-leashed retaining screws (fig. 18) from the outside channels of the mounting stand.
- (9) Release the handbrake and place the curbside of the four-wheel trailer flush against the mounting stand so that the air conditioner is aligned with the mounting space on the four-wheel trailer (fig. 19).
- (10) Attach block No. 1 (block nearest the winch cable hook) onto the center outboard roadside unloading ring and attach the winch cable hook to the air conditioner.
 - .1) Pull the air conditioner onto the four-wheel trailer; use the winch.
- (12) Secure the air conditioner to the four-wheel trailer by placing the hand knob screws through the air conditioner mounting brackets and tightening.
- (13) Disassemble the mounting stand (fig. 18) by disconnecting the braces and the mounting stand legs.
- (14) Place the mounting stand top on top of the air conditioner (fig. 17). Make certain that three channels are facing up.

- (15) Place the mounting stand legs on the mounting stand top and the cable reel on top of the mounting stand legs. Secure with tiedowns.

c. Double-Doublet Receiving Antenna.

- (1) Disconnect the coaxial cable (250-foot) from the signal entrance box (fig. 30) on the radio terminal shelter.
- (2) Disconnect the coaxial cable (250-foot) from the RAC-30A.
- (3) Loosen the nuts on each insulator of the RAC-30A, and disconnect the RG-86 transmission line.
- (4) Lower the antenna curtain with the halyards.
- (5) Disconnect the antenna curtain with the halyards.
- (6) Remove the stakes that hold the 100-foot guy rope. Remove the 100-foot guy rope.
- (7) Remove the strain insulators and store them and the 100-foot guy rope in the auxiliary material kit.
- (8) Remove the slotted bolts and disconnect the RG-86 transmission line from the cross-connect insulator (B, fig. 26). Place the RG-86 transmission line on the reel provided and store as instructed in paragraph 152.
- (9) Remove the 12-gage antenna wire from the cross-connect insulator. Mark the length and tag each section of 12-gage antenna wire; coil and store as instructed in paragraph 152. Store the cross-connect insulator in the auxiliary material kit.
- (10) Remove the stakes from the RAC-30A. Store the RAC-30A with the stakes in the coupler storage case.
- (11) Lower and disassemble both AB-38B/CR's as instructed in TM 11-2620A.
- (12) Repack the AB-38B/CR's as instructed in TM 11-2620A.
- (13) Store the AB-38B/CR's as instructed in paragraph 152.
- (14) Repeat procedures (1) through (13) above for the second double-doublet receiving antenna.

d. Doublet Transmitting Antenna.

- (1) Disconnect the coaxial cable (50-foot) from the hf transmitting antenna output box on the radio terminal shelter.
- (2) Disconnect the coaxial cable (50-foot) from the TRC-500 (fig. 27).
- (3) Loosen the nuts on each insulator of the TRC-500, and disconnect the downloads.
- (4) Remove the stakes from the TRC-500 coupler.
- (5) Store the coaxial cable (50-foot) and the TRC-500 as instructed in paragraph 152.
- (6) Loosen the halyards on both AB-38B/CR's and lower the antenna curtain.
- (7) Disconnect the antenna curtain from the halyards.
- (8) Remove all strain insulators, glass spreader insulators, and slotted bolts, and store them in the auxiliary material kit.
- (9) Mark the length and tag each section of the 12-gage antenna wire; coil and store as instructed in paragraph 152.
- (10) Lower and disassemble both AB-38B/CR's as instructed in TM 11-2620A.
- (11) Repack the AB-38B/CR's as instructed in TM 11-2620A.
- (12) Store the AB-38B/CR's, the guy wires, and the guy stakes as instructed in paragraph 152.

e. Sloping-Vee Receiving Antenna.

- (1) Disconnect the coaxial cable (250-foot) from the signal entrance box on the radio terminal shelter.
- (2) Disconnect the coaxial cable (250-foot) from the RAC-30A; coil and store it as instructed in paragraph 152.
- (3) Loosen the nuts on each insulator of the RAC-30A and disconnect the open line feed (fig. 24).
- (4) Remove the stakes from the RAC-30A coupler. Store the RAC-30A with the stakes in the coupler storage box.
- (5) Loosen the halyard and lower the

guy plate assembly; this lowers the entire antenna curtain.

- (6) Disconnect the ground wire on the RTB-5 terminators from the ground rod assemblies. Remove the ground rod assemblies.
- (7) Loosen the nuts on the insulator of each RTB-5 and disconnect the length of 12-gage antenna wire leading to the end of the antenna legs (D, fig. 24).
- (8) Remove the stakes from the RTB-5 terminators. Store both RTB-5's in the coupler storage box.
- (9) Disconnect the antenna legs from the ground stakes. Remove the strain insulators from the end of the antenna legs. Store the strain insulators in the auxiliary material kit.
- (10) Remove the ground stakes.
- (11) Mark the length and tag the antenna legs and the open line feed. Disconnect the antenna legs and the open line feed from the guy plate assembly (A, fig. 24).
- (12) Remove all strain insulators, ceramic spreader-insulators, and slotted bolts, and store them in the auxiliary material kit.
- (13) Remove the guy plate assembly from the halyard and store the guy plate assembly in the auxiliary material kit.
- (14) Coil all 12-gage antenna wire and store it as instructed in paragraph 152.
- (15) Lower and disassemble the AB-38B/CR as instructed in TM 11-2620A.
- (16) Repack the AB-38B/CR as instructed in TM 11-2620A.
- (17) Store the AB-38B/CR, the guy wires, and the guy stakes as instructed in paragraph 152.
- (18) Repeat the procedures given in (1) through (17) above for the second sloping-vee receiving antenna.

f. Sloping-Vee Transmitting Antenna.

- (1) Disconnect the coaxial cable (50-foot) from the hf transmitting antenna output box on the radio terminal shelter.

- (2) Disconnect the coaxial cable (50-foot) from the TRC-500 (fig. 23) coil, and store it as instructed in paragraph 152.
- (3) Loosen the nuts on each insulator of the TRC-500, and disconnect the open line feed (fig. 23).
- (4) Remove the stakes from the TRC-500 coupler. Store the TRC-500 as instructed in paragraph 152.
- (5) Loosen the halyard and lower the guy plate assembly; this lowers the entire antenna curtain.
- (6) Disconnect the ground wire on the TDR-002.5 terminators from the ground rod assemblies.
- (7) Disassemble the counterpoises and remove the spikes and the ground rod assemblies (D, fig. 23).
- (8) Disconnect the antenna legs from the terminator mounting stakes. Remove the strain insulators at the end of the antenna legs.
- (9) Remove the TDR-002.5's from the terminator mounting stakes by removing four mounting bolts.
- (10) Remove the terminator mounting stakes. Store the TDR-002.5 terminators and mounting stakes as instructed in paragraph 152.
- (11) Mark the length and tag the antenna legs, the counterpoises, and the open line feed.
- (12) Disconnect the antenna legs and the open line feed from the guy plate assembly (C, fig. 23).
- (13) Remove all strain insulators, glass spreader-insulators, and slotted bolts, and store them in the auxiliary material kit.
- (14) Remove the guy plate assembly from the halyard. Store the guy plate assembly in the auxiliary antenna kit.
- (15) Coil and store all 12-gage antenna wire as instructed in paragraph 152.
- (16) Lower and disassemble the AB-235/G as instructed in TM 11-687. Remove the pulley housing and the halyard.

- (17) Store the AB-235/G and the CY-1392/G as instructed in paragraph 152.

g. Radio Terminal Shelter.

- (1) Disconnect the ground strap from the SHELTER GROUND stud (fig. 31) on the power entrance box.
- (2) Disconnect the ground strap from the ground rod assembly. Remove the ground rod assembly; clean and store it as instructed in paragraph 152.
- (3) Disconnect all landlines from the signal entrance box (fig. 30) on the radio terminal shelter and from the subscriber packages and communications center.

h. Subscriber Package.

- (1) Disconnect the power cable from the subscriber package. Remove the female connector and insert it on the POWER IN receptacle.
- (2) Disconnect the ground strap from the subscriber package and from the ground rod assembly. Remove the ground rod assembly and clean it. Store the ground strap and the ground rod assembly in the subscriber package.
- (3) Disconnect the coaxial cables from the AT-588/TRC-42's. Disassemble the antenna assembly and store the AT-588/TRC-42's in the subscriber package.
- (4) Place the front cover on the subscriber package and secure all the latches.
- (5) Attach the ramps to the subscriber package trailer.
- (6) Roll the subscriber package to the trailer and align the subscriber package casters with ramps. (Make sure that the trailer handbrake is applied and the stabilizing jacks are fully extended (fig. 14).)
- (7) Attach the winch cable hook to the towing cable on the subscriber package.
- (8) Use the winch and pull the subscriber package up the ramps and secure to the trailer.
- (9) Remove the ramps and return them to their stored position.

- (10) Raise the stabilizing jacks.

152. Storage of Equipment

a. Replace Antenna Assemblies AT-588/TRC-42 in the cabinet under the test bench (C, fig. 4).

b. Replace the coupler storage case under the desk and secure it with the tie-down (C, fig. 16).

c. Place the heater and the Y-adaptor on top of the test bench and secure them with the tiedowns (D, fig. 16).

d. Place the ground rod assemblies in the ground rod assembly brackets (B, fig. 16). Close the ground rod assembly clamps and secure them by tightening the hand knobs. Place the Jacob staff in the ceiling brackets (A, fig. 16).

e. Replace the front and center post top and bottom mounting plates with mounting screws.

f. Replace the two front posts and the roadside center post; use appropriate nuts and washers.

g. Stack the three AB-38B/CR's between the two front posts and the center roadside post (B, fig. 16).

h. Place the flexible hose enclosure and the adapter mask on top of the fourth AB-38B/CR, and secure with tiedowns.

i. Place the fourth AB-38B/CR between the front two posts and the center roadside post on top of the stack (*g* above).

j. Replace the front holding bracket.

k. Replace the center curbside post (A, fig. 16); use the top and bottom nuts and washers.

l. Replace the rear holding bracket (B, fig. 16).

m. Replace the rear post top and bottom mounting plates with the mounting screws.

n. Replace the guy stake carrying case and mast section carriers.

o. Replace the rear posts; use the top and bottom nuts and washers.

p. Replace the storage brackets between the rear and center posts; use the front and rear bolts, nuts, and washers.

q. Replace the folding chair on the curbside of the rear and center posts, and secure it with the tiedown.

r. Replace the TDR-002.5 terminators (E, fig. 16) and terminator mounting stakes

by attaching them to the rear posts with mounting bolts.

s. Replace the TRC-500 coupler by attaching it to the rear posts with bolts and washers.

t. Use the attaching screws and replace the tiedown floor brackets (A, fig. 16).

u. Place Accessories Case CY-1392/G between the tiedown floor brackets.

v. Place the RG-86 transmission line reel, the 12-gage antenna wire coil, the coaxial cable coils, and TS-2C/TG on top of Accessories Case CY-1392/G, and secure with tiedowns.

w. Use the padlock and lock the door at the rear of the radio terminal shelter. Replace the padlock keys in the drawstring bag attached to the door hasp.

153. Shipment

a. *Securing Dolly Assembly to Radio Terminal Shelter.* If it is necessary to replace the dolly assembly (fig. 2) when the radio terminal shelter is resting on the ground, proceed as follows:

- (1) Roll the right- and left-side assemblies of the dolly assembly to their respective positions beside the radio terminal shelter; maintain a distance of approximately 3 feet between the assemblies and the radio terminal shelter walls.
- (2) Remove the six retracting pins from the right-side assembly by pressing down on the center button and pulling the retracting pin.
- (3) With a man at each end of the right side assembly, tip the top of the right-side assembly toward the radio terminal shelter curbside wall and, at the same time, keep the front and rear mounting brackets parallel to the radio terminal shelter wall.
- (4) Align the rear mounting bracket holes with the tapped holes in the dolly assembly mounting plates on the radio terminal shelter. Secure the mounting bracket to the plate; use the chain-leashed swivel-handle mounting studs.
- (5) Secure the front mounting bracket;

follow the procedures described in (4) above.

- (6) Repeat procedures (2) through (5) above to secure the left-side assembly to the roadside of the radio terminal shelter.

b. *Replacing Radio Terminal Shelter on Dolly Assembly.* If the radio terminal shelter rests on the ground or on its jacks during operation, its dolly assembly must be placed back into the supporting position for shipment. To place the dolly back into the supporting position, proceed as follows:

- (1) Remove the retracting pin at each caster assembly and swing each caster down, allowing it to rest on the ground.
- (2) At each leveling jack, lift the crank handle to its horizontal position and push inward until the crank handle is firmly engaged in the crank fitting.
- (3) Elevate the radio terminal shelter by turning each crank handle clockwise until all casters clear ground.
- (4) Align the holes on the caster assemblies and the longitudinal tube, and insert the retracting pins in the aligned holes.
- (5) Lower the radio terminal shelter by turning each crank handle counterclockwise until the radio terminal shelter rests on the caster assemblies.
Caution: Before lowering the radio terminal shelter, set the brakes with the footbrake pedal.
- (6) Return the crank handles to the vertical position by pulling outward until the crank handle is out of the crank fitting.

c. *Towing Radio Terminal Shelter on Dolly Assembly.*

- (1) Replace the tow bar assembly (fig. 2) by aligning it with the towing eyes and inserting the tow bar securing pins.
- (2) Release the brakes on the front caster assemblies with the footbrake pedal.
- (3) Pull out on the locking pin on the front caster assemblies and turn it to a horizontal position.

- (4) Position all the caster assemblies so that the caster fender is at the rear.
- (5) Lift the tow bar assembly and place the lunette in the pintle of the towing vehicle.
- (6) Secure the safety chains from the tow bar assembly to the towing vehicle.

d. Towing Four-Wheel Trailer.

- (1) Place the lunette in the pintle of the towing vehicle.
- (2) Secure the safety chains (fig. 13) from the four-wheel trailer to the towing vehicle.
- (3) Release the handbrake.

e. Towing Two-Wheel Trailer. The two-wheel trailer has an adjustable lunette (fig. 14) and may be towed in tandem.

- (1) Position the adjustable lunette according to the position of the pintle on the towing vehicle.

- (2) Place the lunette in the pintle of the towing vehicle.
- (3) Raise the retractable landing wheel.
- (4) Secure the safety chains from the two-wheel trailer to the towing vehicle.
- (5) Release the handbrake.
- (6) If the two-wheel trailers are to be towed in tandem, reverse the adjustable lunette assembly on the rear two-wheel trailer. This is done so that the rear lunette will be positioned properly for the pintle on the front two-wheel trailer. Pull the quick-release pin on the retractable tow bar and position it with the retractable landing wheel up. Repeat the procedures in (1) through (5) above on the rear two-wheel trailer.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

154. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedure outlined in paragraph 155 will be used to prevent further use of the equipment.

155. Methods of Destruction

Use any or all of the following methods to destroy the equipment:

a. Smash. Smash the controls, tubes, coils, relays, switches, capacitors, transformers, antenna masts, couplers, terminators, and meters; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

b. Cut. Cut all cables, cords, and wiring on the components; use axes, handaxes, or machetes.

c. Burn. Burn the cords and technical manuals; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Bend. Bend the panels and cabinets.

Warning: Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

e. Explode. If explosives are necessary, use firearms, grenades, or other high explosive.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

APPENDIX I

REFERENCES

Following is a list of publications applicable to Communications Central AN/TSC-20.

TM 11-212-10	Radio Set AN/TRC-47; Operator's Manual.
TM 11-212-20	Organizational Maintenance; Radio Set AN/TRC-47.
TM 11-212-35	Field and Depot Maintenance; Radio Set AN/TRC-47.
TM 11-266	Single Sideband Converter CV-157/URR (Field Maintenance).
TM 11-337	Telephone Sets TA-43/PT and TA-263/PT.
TM 11-649	Radio Receiving Sets AN/FRR-40 and AN/FRR-41.
TM 11-687	Radio Sets AN/TRC-24, AN/GRC-75, AN/GRC-78, AN/GRC-81; Radio Terminal Sets AN/TRC-35, AN/GRC-76, AN/GRC-79, AN/GRC-82; Radio Relay Set AN/TRC-36; and Radio Repeater Sets AN/GRC-77, AN/GRC-80 and AN/GRC-83.
TM 11-856	Radio Receiver R-390/URR.
TM 11-1214A	Oscilloscope OS-8C/U.
TM 11-2096	Test Set TS-140/PCM; Signal Generators SG-15/PCM and SG-15A/PCM; and Decibel Meters ME-22/PCM and ME-22A/PCM.
TM 11-2155	Telephone Set TA-312/PT.
TM 11-2208	Test Sets TS-2/TG, TS-2A/TG, TS-2B/TG, and TS-2C/TG (Teletypewriter Signal Distortion).
TM 11-2620A	Antenna Supports AB-38B/CR and AB-38C/CR.
TM 11-2629	Antenna Kit for Double-Douplet Receiving Antenna.
TM 11-2656	Antenna Kit MX-741/FR and Transmission Line Kit MX-737/FR.
TM 11-2698	Frequency Meter FR-67/U.
TM 11-5122	Direct Current Generator G-43/G.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-5805-201-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Telephone Set TA-312/PT.
TM 11-5805-256-12P	Operator's, Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Telephone Set TA-43/PT.
TM 11-5805-257-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Generators, Ringing Hand G-42/PT and G-42A/PT.
TM 11-5805-322-12	Operator's and Organizational Maintenance Manual: Terminal, Telegraph Telephone (Voice Plus Telegraph, Stelma Model VPT-1).
TM 11-5810-207-12P	Operator's, Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Electro-Mechanical On-Line, Off-Line Teletypewriter Cipher Machine TSEC/KW-9.
TM 11-5810-213-15P	Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Range Adapter Test Set TSEC/ST-3.

TM 11-5810-214-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Teletypewriter Security Equipment TSEC/KW-26B.
TM 11-5815-244-12	Operation and Organizational Maintenance: Teletypewriter Sets AN/FGC-25, AN/FGC-25X, AN/FGC-26, AN/FGC-52, AN/FGC-52X, and AN/FGC-57.
TM 11-5815-244-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List, and Maintenance Allocation Chart: Teletypewriter Sets AN/FGC-25 and AN/FGC-25X.
TM 11-5815-244-35	Field and Depot Maintenance Manual: Teletypewriter Sets AN/FGC-25, AN/FGC-25X, AN/FGC-26, and AN/FGC-57.
TM 11-5820-214-10P	Basic Issue Items List: Converter, Single Sideband CV-157/URR.
TM 11-5820-214-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Converter, Single Sideband CV-157/URR.
TM 11-5820-276-35P	Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Cabinet, Electrical CV-1119/U and CV-1119A/U.
TM 11-5820-277-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Oscillator, Radio Frequency O-330/FR.
TM 11-5820-296-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Antenna Accessories Group OA-1398/GRC.
TM 11-5820-307-10P	Operator's Maintenance Repair Parts and Special Tools List: Radio Set AN/TRC-42.
TM 11-5820-307-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Radio Set AN/TRC-42.
TM 11-5820-357-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Receiver, Radio R-390/URR.
TM 11-5965-224-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Handsets H-60/PT and H-165/U.
TM 11-6625-207-10	Teletypewriter Test Sets TS-1060/GG; Operator's Manual.
TM 11-6625-207-20	Teletypewriter Test Set TS-1060/GG and TS-1060A/GG; Organizational Maintenance, Second Echelon.
TM 11-6625-218-12	Operation and Organizational Maintenance: Frequency Meter AN/TSM-16.
TM 11-6625-239-12	Operation and Organizational Maintenance Manual: Electronic Multimeters TS-505A/U, and TS-505B/U, and Multimeters TS-505C/U and TS-505D/U.
TM 11-6625-239-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Electronic Multimeters TS-505/U, TS-505A/U, TA-505B/U, TS-505C/U, and TS-505D/U.
TM 11-6625-251-12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Decibel Meters ME-22/PCM and ME-22A/PCM.

TM 11-6625-252-12P

Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Oscilloscopes OS-8B/U and OS-8C/U.

TM 11-6625-254-15P

Operator, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Test Set, Teletypewriter TS-2/TG, TS-2A/TG, TS-2B/TG, and TS-2C/TG.

TM 11-6625-274-12

Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.

APPENDIX II

TABLE OF COMPONENTS

<u>Quantity</u> (each)	<u>Item</u>	<u>Quantity</u> (each)	<u>Item</u>
1	Shelter, Electrical Equipment S-141/G (Modified)	3	Multiplexer and Demultiplexer Shelf, type 250 model 1
2	Transmitting Set, Radio AN/FRT-53	2	Multiplexer, type 248 model 1
1	Antenna patch panel	4	Demultiplexer, type 249 model 1
1	Decibel Meter ME-22A/PCM	2	Line Battery Power Supply Panel, type 227 model
1	Signal Generator SG-15A/PCM	4	Line Battery Power Supply type 228 model 1
1	Frequency Meter FR-67/U	2	Communications Security Equipment TSEC/KW-26
2	Terminal, Telegraph Telephone VPT-1	1	Control relay panel No. 2
2	Radio Set AN/TRC-47	1	Red patch panel
1	Control relay panel No. 1	3	Telephone Set TA-43/PT
4	Communications Security Equipment TSEC/KW-9	1	Telephone Set TA-312/PT
2	Fan housing	1	Alarm unit
2	Teletypewriter Set AN/FGC-25X	1	Transfer switch
1	Current limiter panel	1	Combined distribution frame
1	Multiple repeat panel	1	Power control and distribution panel
1	Dual speaker and amplifier panel	9	Equipment rack
2	Receiver, Radio R-390/URR	1	Test Set, Electron Tube TV-7U
2	Converter, Single Sideband CV-157/URR	1	Electronic Multimeter TS-505A/U
1	Meter panel	1	Teletypewriter Test Set TS-1060/GG
1	Black patch panel	1	Test Set TS-2C/TG
1	Dc patch panel	1	Oscilloscope OS-8C/U
1	Audio-dc patch panel	1	Multimeter TS-352/U
1	Tone Keyer Shelf, type 221 model 2	8	Ground rod assembly
8	Tone Keyer, type 211 model	1	Tool Set TE-113
6	Automatic Power Supply Control Unit, type NRC-690	1	Tool Kit TE-50
12	Power Supply, type 223 model 1	1	Desk
4	Telephone Line Isolation Unit, type NRC-693	1	Test bench and storage cabinet
1	Combined function panel	1	Safe
1	Audio patch panel No. 1	1	Overhead storage cabinet
1	Audio patch panel No. 2	1	Folding chair
1	Hybrid unit	1	Blackout curtain
3	Tone Converter Shelf, type 222 model 2	1	Pioneer tool kit
16	Tone Converter, type 212 model 2	1	Wastepaper basket
8	Diversity Combiner, type 234 model 1	1	Clock
		1	First aid kit
		1	Fire extinguisher
		1	Lantern
		1	Pencil sharpener
		1	Message tray and supports

<u>Quantity</u> <u>(each)</u>	<u>Item</u>	<u>Quantity</u> <u>(each)</u>	<u>Item</u>
1	Tack board	1	Teletypewriter Set AN/FGC-25X
1	Broom		Call alarm
1	Ash tray	1	Telephone Set TA-43/PT
1	Droplight	1	Subscriber power supply
1	Shelter dolly	1	Ground rod
1	Heater	2	Antenna Assembly AT-588/TRC-42
1	Compass		Headset-Handset H-144/U
1	Steel measuring tape (100 ft)	1	Crystal headset
4	Antenna Assembly AT-588/TRC-42 and masts	6	Single patch cords
2	Coaxial cable (250 ft)	7	Single shorting plugs
3	Coaxial cable (100 ft)	8	Dummy plugs
1	Coaxial cable (50 ft)		Technical Instructions for General Purpose Transmitters Model SBT-1K.
	12-gage antenna wire (5,000 ft)		Instructions for Frequency Shift Tone Keyer Type 211, Model 1.
	RG-86 transmission line (250 ft)		Instructions for Frequency Shift Tone Converter Type 212, Model 2.
4	Antenna Support AB-38B/CR		Instructions for Transistor Power Supply Type 223, Model 1.
1	Mast AB-235/G		Instructions for Line Battery Power Supply Type 228, Model 1.
1	TRC-500 coupler		Instructions for Diversity Combiner Type 234, Model 1.
2	TDR-002.5 terminator		Instructions for Multiplexer, Demultiplexer, and Shelf Type 248, 249 and 250, Model 1.
2	RTB-5 terminator		Instruction Manual and Parts List, Generator Set Electric, Model CE-105-AC/WK8.
2	RAC-30A coupler		Handbook of Service and Maintenance Instructions and Parts Catalog for Air Conditioner Model F-6B-CE.
1	Jacob staff		
1	Air conditioner adapter mask		
1	Y-adapter		
3	Flexible hose		
1	Four-wheel trailer		
2	10-kw generator		
1	Air conditioner		
2	Power cable (50 ft)		
1	Air conditioner mounting stand		
1	Sling assembly		
2	Subscriber packages each consisting of:		
1	Two-wheel trailer		
1	Terminal, Telegraph Telephone VPT-1		
1	Radio Set AN/TRC-47		
2	Communications Security Equipment TSEC/KW-9		

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as *part of* the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by Model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this col-

umn. When requisitioning, enter the nomenclature and description.

e. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items", the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

h. Illustrations. The "Item No." column lists the reference symbols used for identification of the items in the illustration or text of the manual.

Section II. FUNCTIONAL PARTS LIST

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ITEM NO
	5895-897-7976		COMMUNICATION CENTRAL AN/TSC-20:					
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
			GROUP 1 ANTENNA GROUP			1		
			GROUP 1A H. F. ANTENNA SYSTEM					
	5895-885-5992		DISSIPATOR, TRANSMITTER: TMC TR500			2		
	5975-886-3259		GROUND ROD: Adler part No. 1047-147D (Not installed)			2		
	5970-663-3122		INSULATOR ASSEMBLY: TMC part No. A-102 (Not installed)			2		
	5905-885-5918		RESISTOR: plug-in ferrule type; TMC part No. RR-115-150 (Not installed)			16		
	5950-885-5896		TRANSFORMER: TMC part No. TR-103 (Not installed)			1		
	5950-885-5895		TRANSFORMER: TMC TR-132 (Not installed)			2		
	5935-581-4367		TERMINATOR, TRANSMITTER: Wind Turbine TDR-002.5 (Not installed)			2		
			GROUP 3 SUBSCRIBER PACKAGE					
	5985-545-7191		ANTENNA ASSEMBLIES AT-588/TRC-42: (Installed in equip)			1		
	5820-503-1093		RADIO SET AN/TRC-47: (Installed in equip)			1		
	5805-503-2775		TELEPHONE SET TA-43/PT: (Installed in equip)			1		
	5815-519-5644		TELETYPEWRITER AN/FCC-25X: (Installed in equip)			1		
			GROUP 4 SINGLE SIDEBAND STATION					
	6625-229-1087		AUDIO OSCILLATOR SG-15-PCM: (Installed in equip)			1		
	5965-391-0562		LOUDSPEAKER LS-139/G: (Installed in equip)			1		
	6625-643-1740		OSCILLOSCOPE OS-B/U: (Installed in equip)			1		
	5820-039-7339		RECEIVING SET, AN/FRR-41: (Less Cabinet CY-119/D) (Installed in equip)			1		

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(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS	
							FIGURE NO	ITEM NO
			AN/TSC-20 (continued)					
	5820-503-2775		TELEPHONE SET TA-43/PT: (Installed in equip)			2		
	5815-519-5644		TELETYPEWRITER AN/FGC-25X: (Installed in equip)			2		
	6625-242-5023		TEST SET TS-352: (Installed in equip)			1		
	6625-376-4939		TEST SET, ELECTRON TUBE TV-7: (Installed in equip)			1		
	6625-542-6106		TEST SET TS-1060: (Installed in equip)			1		
	5180-356-4602		TOOL KIT TE-50: (Installed in equip)			1		
	5820-503-1093		VHF EQUIPMENT AN/TRC-47: (less converter) (Installed in equip)			4		
	6625-243-0562		VTVMTS-505: (Installed in equip)			1		
			GROUP 4A HOUSEHOLD AND MISCELLANEOUS ITEMS					
	6230-117-0928		FLASHLIGHT MX-212/U: (Not installed)			1		
	6240-886-3256		SPOT LAMP: with swivel base; Specialty Elec EZ-24BM (Not mounted)			2		
			RUNNING SPARES AND ACCESSORY ITEMS					
			SINGLE SIDEBAND STATION GROUP					
			GROUP 1A AMPLIFIER-TYPE 414A (21 SHELTER)					
	5920-284-9494		FUSE, CARTRIDGE: 3/4 amp; Bussman part No. AGC-.75			10		
			GROUP 1B COMBINED FUNCTIONAL PANEL (1047-407B2)					
	5980-356-2188		FUSE, CARTRIDGE: 3 AG, 1/8 amp, 250 v; Littelfuse part No. 312.125			10		

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ITEM NO
			AN/TSC-20 (continued)					
			GROUP 1F FREQUENCY SHIFT TONE KEYS-TYPE 221, MODEL 1					
	5920-284-7777		FUSE, CARTRIDGE: 1/2 amp; "Slo-Blo"; Littelfuse No. 313.500			15		F1 F2
	6240-223-9100		LAMP, GLOW: bayonet base; GE Co part NE51			3		I1
			AUTOMATIC POWER SUPPLY CONTROL UNIT-NRC 690					
	5945-873-2641		RELAY, ARMATURE: spdt; plug-in type; Potter and Brumfield part No. KRPSD			2		K1
			TRANSISTOR POWER SUPPLY TYPE 223, MODEL 1					
	5895-885-0613		BOARD, PRINTED CIRCUIT: Northern Radio Co part No. 773			2		
			GROUP 1G HOUSEHOLD ITEMS AND MISCELLANEOUS					
	6240-886-3281		LAMPS, INCANDESCENT: 50 w, 120 v, Adler part No. 152-3-1			1		
			GROUP 1I LINE BATTERY SUPPLY ASSEMBLY (1047-500816)					
	5920-730-4343		FUSE: 0.175 amps, Slo-Blo, 3AG, Littelfuse part No. 313.175			5		
			GROUP 1K OUTPUT RELAY PLUG-IN ASSEMBLY NRC 692					
	5945-615-1457		RELAY, OUTPUT: octal base mt; Sigma 72A0Z-160-TS-ICP			3		K201
			WIRE MOLD INSTALLATION (1047-40085)					
	6210-886-3263		LAMP, INCANDESCENT: 60 w, 18 in lg, 115 v - 125 v; Adler part No. 163-32-2			3		

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APPENDIX IV

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

- (1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical sequence with their components listed alphabetically immediately below the assembly listing.
- (2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations.
 - (a) *Service.* To clean, to preserve, and to replenish fuel and lubricants.
 - (b) *Adjust.* To regulate periodically to prevent malfunction.
 - (c) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.
 - (d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.
 - (e) *Replace.* To substitute service assemblies, subassemblies and parts for unserviceable components.
 - (f) *Repair.* To restore an item to serviceable condition through

correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

- (g) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.
 - (h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.
 - (i) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.
 - (j) *Overhaul.* To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.
- (3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon

responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

- (4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.
- (5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

- (1) *Tools required for maintenance functions.* This column lists tools,

test, and maintenance equipment required to perform the maintenance functions.

- (2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) symbol indicates the echelons allocated the facility.
- (3) *Tool code.* This column lists the tool code assigned.

2. Mounting Hardware

The basic entries of the maintenance allocation chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

3. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
COMMUNICATIONS CENTRAL AN/TSC-20 (V)	service	X						Shelter and Exteriors of Equipment in Shelter
	adjust	X	X				13	Interiors of Equipment in Shelter
				X			2,4,5,6,7,8,11	Operating Adjustments and Line-Up-Using Built-in Facilities.
	inspect		X		X		2,3,4,5,6,7,8,11,14	Adjust for Minimum Bias-Adjust Plug-in Assemblies
	test	X	X				12,13	All adjustments
					X		5,13	Operating Tests-Using Built-in Facilities. Continuity, Voltage, and Resistance Tests
	align			X			2,4,5,6,9,11	Test Oscillators, Filters, Relays, and Signal Levels
	repair				X		1,2,3,4,5,6,7,9,11,14	All Testing
	rebuild			X			2,3,4,5,6,9,11	All alignment
					X		2,4,5,6,7,9,11,12	Rebuild Function in 4th echelon Pertains to Power Supply only.
AIR CONDITIONER 36,000 BTU/HR, KECO MODEL F6B-CE	replace			X			10,11,12,13,14	Corps of Engr. responsibility
ANTENNA SYSTEM	repair			X				
CABLE ASSEMBLY, POWER (Shelter to Generator; Shelter To Air Cond.)	replace		X					
	repair			X				
DOLLY, AIR CONDITIONER AND GENERATOR	replace		X					
	repair			X				
	rebuild				X			
DOLLY, SHELTER	replace				X			Wheel change
	repair	X						Fabrication of Brackets, Tow Bars, etc.
DOLLY, SUBSCRIBER PACKAGE ASSEMBLY	rebuild					X		
	replace	X						
	repair			X				
	rebuild					X		

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOL REQUIRED	(9) REMARKS
AN/TSC-20(V) (continued) ENCLOSURE, SUBSCRIBER PACKAGE	replace repair rebuild		X	X				
LINE BATTERY SUPPLY ASSEMBLY	replace repair rebuild		X	X		X		
GENERATOR, GASOLINE POWERED, 10 KW, HOL-GAR MODEL CE-105-AC/WK8 MAST AB-235/G	replace					X		Corps of Engr. Responsibility -
SHELTER S-141 (MODIFIED)	replace repair rebuild		X	X		X		
ALARM UNIT ASSEMBLY (400B25)	replace repair rebuild		X	X		X		
COMBINED DISTRIBUTION FRAME (IDF/MDF Box Ass'y- 400B17)	replace repair rebuild			X		X		Not replaceable as a unit
HEATER, ELECTROMODE MODEL CI-5A	replace repair rebuild		X	X		X		
OSCILLOSCOPE OS-8C/U	replace			X				Separate MAC
PANEL, LINE BATTERY POWER SUPPLY-TYPE 227, MODEL 1	replace repair rebuild		X	X		X		
LINE BATTERY POWER SUPPLY (PLUG-IN) TYPE 228 MODEL 1	replace repair rebuild		X	X		X		
PANEL, PATCHING, RED	replace repair rebuild		X	X		X		
PANEL, POWER CONTROL AND DISTRIBUTION 400B1	replace repair rebuild			X		X		
PANEL, POWER ENTRANCE-414A1	replace rebuild					X		Not replaceable as a unit

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/TSC-20(V) (continued)								
PANEL, POWER OUT PUT-AIR CONDITIONER	replace repair rebuild			X		X		Not replaceable as a unit
PANEL, SIGNAL ENTRANCE-413A	repair rebuild			X		X		
BACK FOR RADIO SET AN/TRC-47	replace repair rebuild				X X			
DECIBEL METER ME-22/PCM	replace repair rebuild		X					Separate MAC
PANEL, PATCHING, ANTENNA 403B 1	replace repair rebuild		X	X		X		Separate MAC
RADIO SET AN/TRC-47 (Less Ant. AS-813/TRC-47; Less CV-542/TRC-47)	replace		X					Separate MAC
ANTENNA ASSEMBLY AT-588/TRC-42	replace		X					Separate MAC
SIGNAL GENERATOR SG-15A/PCM	replace		X					Separate MAC
STANDING WAVE RATIO INDICATOR SWR-1K	replace		X					Commercial Item
VOICE PLUS TELEGRAPH TERMINAL VPT-1	replace		X					Separate MAC
BACK, RECEIVING 406A1	replace repair rebuild				X X			
PANEL, DUAL SPEAKER, WITH AMPLIFIER TYPE 414A	replace repair rebuild		X			X		
PANEL, MULTIPLE REPEAT	replace repair rebuild		X X			X		
RADIO RECEIVER R-390/URR	replace		X					Separate MAC
SINGLE SIDEBAND CONVERTER CV-157/URR	replace		X					Separate MAC
BACK FOR TSEC/KW-9	replace repair rebuild				X X			
ELECTRO-MECH. ON-LINE, OFF-LINE TTY CYPIER MACHINE TSEC/KW-9	replace		X					Separate MAC
FAN, COOLING-MODEL 2E610B	replace repair rebuild		X	X		X		

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/TSC-20(V) (continued)								
PANEL, CONTROL RELAY (404B4) KW9	replace repair rebuild		X	X		X		
BACK, FOR TSEC/KW 26B	replace repair rebuild				X	X		
FAN, COOLING-MCLEAN 2EB610B	replace repair rebuild		X	X		X		
PANEL, CONTROL RELAY (408B3) KW-26	replace repair rebuild		X	X		X		
TELETYPEWRITER SECURITY EQUIPMENT TSEC/AW26B BACK, TELETYPEWRITER MOUNTING (405A1)	replace repair rebuild				X			Separate MAC
TELETYPEWRITER AN/FGC-25X (Less Table FN-65/G) BACK, TELETYPEWRITER MOUNTING, 405A2	replace repair rebuild				X	X		Separate MAC
FREQUENCY METER AN/TSM-16 (Replaces FR-67/U) PANEL, CURRENT LIMITER (405B9)	replace repair rebuild		X	X		X		Separate MAC
TELETYPEWRITER AN/FGC-25X (Less Table FN-65/G) BACK, VOICE FREQUENCY TELETYPE (407A1)	replace repair rebuild				X	X		Separate MAC
FREQUENCY SHIFT TONE CONVERTER SHELF TYPE 222 MODEL 2	replace repair rebuild		X	X		X		
DIVERSITY COMBINER-TYPE 234, MODEL 1	replace repair rebuild		X	X		X		
FREQUENCY SHIFT TONE CONVERTER TYPE 212 MODEL 2	replace repair rebuild		X	X		X		

AN/TSC-20 (V)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH.	2ND ECH.	3RD ECH.	4TH ECH.	5TH ECH.	TOOLS REQUIRED	REMARKS
AN/TSC-20(V) (continued)								
FREQUENCY DETERMINING NETWORK, TYPE 212Z4 thru Z7	replace repair rebuild		X	X		X		
FREQUENCY DETERMINING NETWORK, TYPE 212Z12 thru Z15	replace repair rebuild		X	X		X		
OUT PUT RELAY "LUG-IN ASSEMBLY, NRC 692	replace repair rebuild		X	X		X		
POWER SUPPLY, TRANSISTORIZED-TYPE 223, MODEL 1	replace repair rebuild		X	X		X		
AUTOMATIC POWER SUPPLY CONTROL UNIT-NRC 690	replace repair rebuild		X	X		X		
TELEPHONE LINE ISOLATION UNIT-NRC 693	replace repair rebuild		X	X		X		
FREQUENCY SHIFT TONE KEYS SHELF, TYPE 224 MODEL 1	replace repair		X	X		X		
FREQUENCY SHIFT TONE KEYS-TYPE 211, MODEL 1	replace repair rebuild		X	X		X		
FREQUENCY DETERMINING NETWORKS, TYPE 211Z4 thru Z7	replace repair rebuild			X		X		
FREQUENCY DETERMINING NETWORKS, TYPE 211Z thru Z15	replace repair rebuild			X		X		
POWER SUPPLY, TRANSISTORIZED-TYPE 223, MODEL 1	replace repair rebuild		X	X		X		
AUTOMATIC POWER SUPPLY CONTROL UNIT-NRC-690	replace repair rebuild		X	X		X		

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH	2ND ECH	3RD ECH	4TH ECH	5TH ECH	TOOLS REQUIRED	REMARKS
AN/TSC-20(V) (continued)								
TELEPHONE LINE ISOLATION UNIT, NRC-693	replace repair rebuild		X					
MULTIPLEXER AND DEMULTIPLEXER SHELF-TYPE 250 MODEL 1	replace repair rebuild		X			X		
DEMULTIPLEXER-TYPE 249, MODEL 1	replace repair rebuild		X			X		
LINE AMPLIFIER NRC 765	replace repair rebuild		X			X		
MODULATOR AND CARRIER SUPPLY-NRC-766	replace repair rebuild		X			X		
MULTIPLEXER, TYPE 248, MODEL 1	replace repair rebuild		X			X		
IN PUT COUPLER-NRC-767	replace repair rebuild		X			X		
LINE AMPLIFIER IRC 765	replace repair rebuild		X			X		
MODULATOR AND CARRIER SUPPLY-NRC-766	replace repair rebuild		X			X		
POWER SUPPLY, TRANSISTORIZED TYPE 223, MODEL 1	replace repair rebuild		X			X		
AUTOMATIC POWER SUPPLY CONTROL UNIT-NRC-690	replace repair rebuild		X			X		
ORDER WIRE HYBRID ASSEMBLY (407B18)	replace repair rebuild		X			X		

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/TSC-20 (V) (continued)								
PANEL, COMBINED FUNCTION	replace repair rebuild	X	X	X	X	X		
PANEL, METER ASSEMBLY-501B6	replace repair rebuild	X	X	X	X	X		
PANEL, PATCHING, AUDIO FREQUENCY	replace repair rebuild	X	X	X	X	X		
PANEL, PATCHING, AUDIO-D. C.	replace repair rebuild	X	X	X	X	X		
PANEL, PATCHING, D. C. (BLACK) 407B9	replace repair rebuild	X	X	X	X	X		
PANEL, PATCHING, D. C. TYPE 240, MODEL 2	replace repair rebuild	X	X	X	X	X		
PANEL, POWER SUPPLY, LINE BATTERY, TYPE 227 MODEL 1	replace repair rebuild	X	X	X	X	X		
POWER SUPPLY (PLUG-IN) LINE BATTERY TYPE 228, MODEL 1	replace repair rebuild	X	X	X	X	X		
RANGE ADAPTER TSEC/ST-3 SWITCH ASSEMBLY, INTERLOCK (400B9)	replace repair rebuild	X	X	X	X	X		Separate MAC
TELEPHONE SET TA-43/PT	replace repair rebuild	X	X	X	X	X		Separate MAC
TELEPHONE SET TA-312/PT	replace repair rebuild	X	X	X	X	X		Separate MAC
TEST SET TS-2/TG	replace repair rebuild	X	X	X	X	X		Separate MAC
ELECTRONIC MULTIMETER TS-505/U	replace repair rebuild	X	X	X	X	X		Separate MAC
TEST SET, TELETYPEWRITER TS-1060A/GG	replace repair rebuild	X	X	X	X	X		Separate MAC

AN/TSC-20 (V)

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/TSC-20(V) (continued)								
TRANSMITTING SET, RADIO AN/FRT-53	service inspect test replace repair align rebuild		X X X X X		X		24 15, 5, 16, 17, 21, 2, 3, 23, 24, 25 15, 5, 16, 17, 18, 19, 20 21, 2, 3, 23, 24, 25 15, 5, 16, 17, 18, 19, 20 21, 2, 3, 22, 24, 25	Preventive Maintenance Preventive Maintenance
RADIO FREQUENCY AMPLIFIER, MODEL RFD-1/PAL-1K	service inspect test replace repair rebuild		X X X X X					Preventive Maintenance Preventive Maintenance Preventive Maintenance
VARIABLE FREQUENCY OSCILLATOR, MODEL VOX-3 (O-330/FR)	service inspect test replace		X X X X					Preventive Maintenance Preventive Maintenance Preventive Maintenance Separate MAC
TRANSMITTING MODE SELECTOR, SBE-3	service inspect test replace repair rebuild		X X X X X					Preventive Maintenance Preventive Maintenance Preventive Maintenance
EXCITER UNIT, AO-101	service inspect replace repair rebuild		X X X X			X		Preventive Maintenance Preventive Maintenance
POWER SUPPLY, MODEL A-1397	service inspect test replace repair rebuild		X X X X X			X		Preventive Maintenance Preventive Maintenance Preventive Maintenance

AN/TSC-20(V)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH	2ND ECH	3RD ECH	4TH ECH	5TH ECH	TOOLS REQUIRED	REMARKS
AN/TSC-20(V) (continued)								
POWER SUPPLY, MODEL PS-4/PAL-1K	service inspect test replace repair rebuild		X					Preventive Maintenance Preventive Maintenance Preventive Maintenance
AUXILIARY POWER PANEL, MODEL APP-4	inspect replace repair rebuild		X			X		Preventive Maintenance
POWER SUPPLY-MODEL PS-5/PAL-1K	service inspect test replace repair rebuild		X			X		Preventive Maintenance Preventive Maintenance Preventive Maintenance
STANDING WAVE RATIO INDICATOR, MODEL SWR-1K	inspect replace repair		X					Preventive Maintenance
TUBE TESTER TV-7/U	rebuild		X					Directional Coupler Ass'y
WIREMOLD INSTALLATION	replace repair rebuild		X			X		Separate MAC

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	1ST ECH	2ND ECH	3RD ECH	4TH ECH	5TH ECH	TOOL CODE	REMARKS
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DISTORTION TEST SET TS-383/GG					+	1	
ELECTRONIC MULTIMETER TS-505/U					+	2	
ELECTRONIC VOLTMETER ME-30B/U					+	3	
FREQUENCY METER FR-67/U					+	4	
MULTIMETER TS-352/U					+	5	
OSCILLOSCOPE OS-B/U					+	6	
TEST SET, TELETYPEWRITER TS-1060/GG					+	7	
TEST SET, TS-2/TG					+	8	
TEST SET, TS-140/PCM					+	9	
TEST SET, RELAY TS-1194/U					+	10	
TOOL EQUIPMENT TE-113					+	11	
TOOL EQUIPMENT, GENERAL MECHANICS					+	12	
TOOL KIT TK-115/U					+	13	
TRANSFORMER, VARIABLE TF-171/USM					+	14	
AUDIO OSCILLATOR TS-421/U					+	15	
FREQUENCY METER AN/URM-32					+	16	
POWER SUPPLY PP-1243/U					+	17	
FREQUENCY METER AN/USM-26					+	18	
FREQUENCY METER AN/URM-79					+	19	
FREQUENCY METER AN/URM-80					+	20	
WATTMETER TS-1279/U					+	21	
TEST SET, ELECTRON TUBE TV-2/U					+	22	
TEST SET, ELECTRON TUBE TV-7/U					+	23	
TOOL KIT TK-87/U					+	24	
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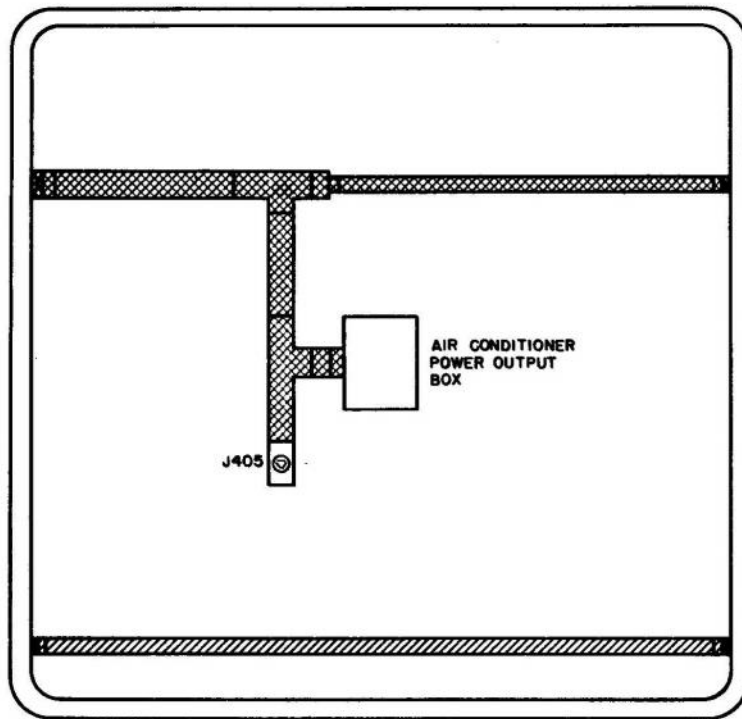
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operating procedures	128	116

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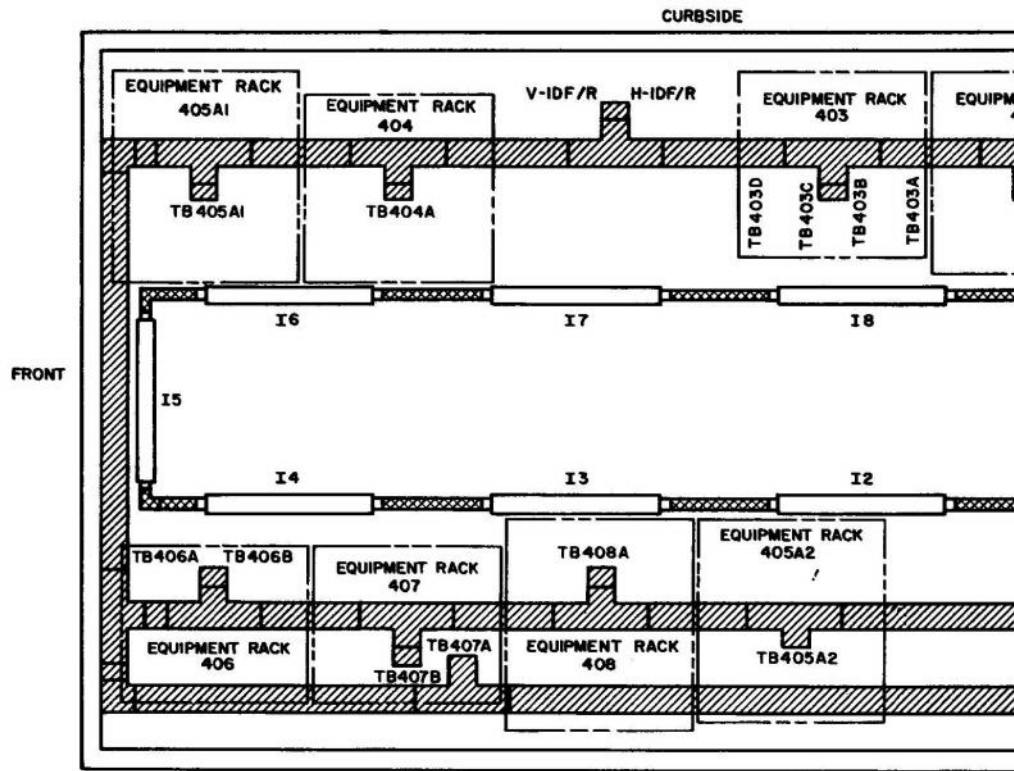
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A. INTERIOR VIEW OF FRONT WALL



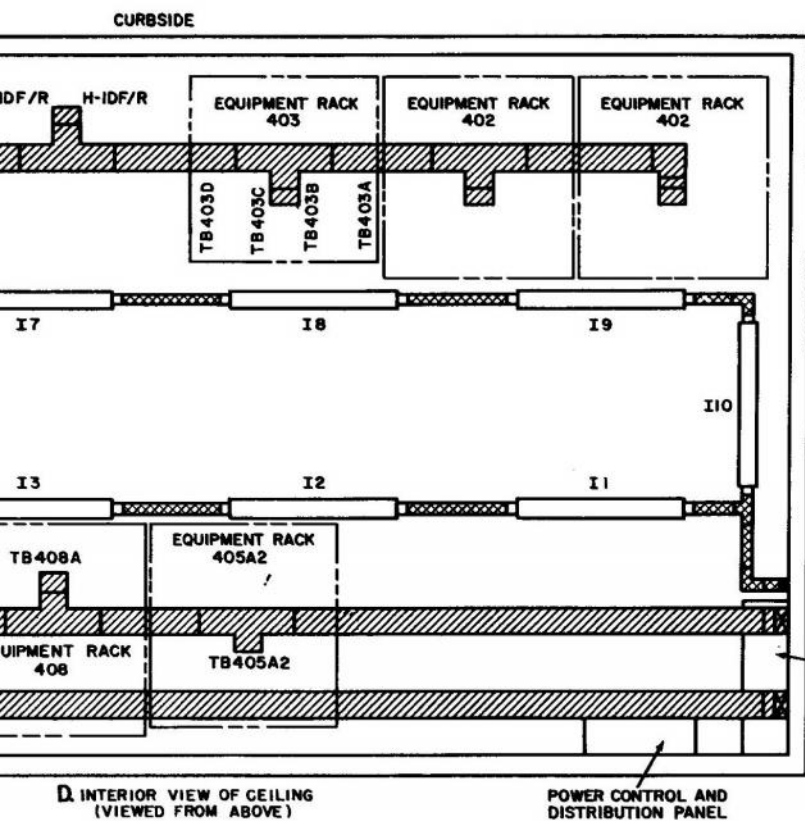
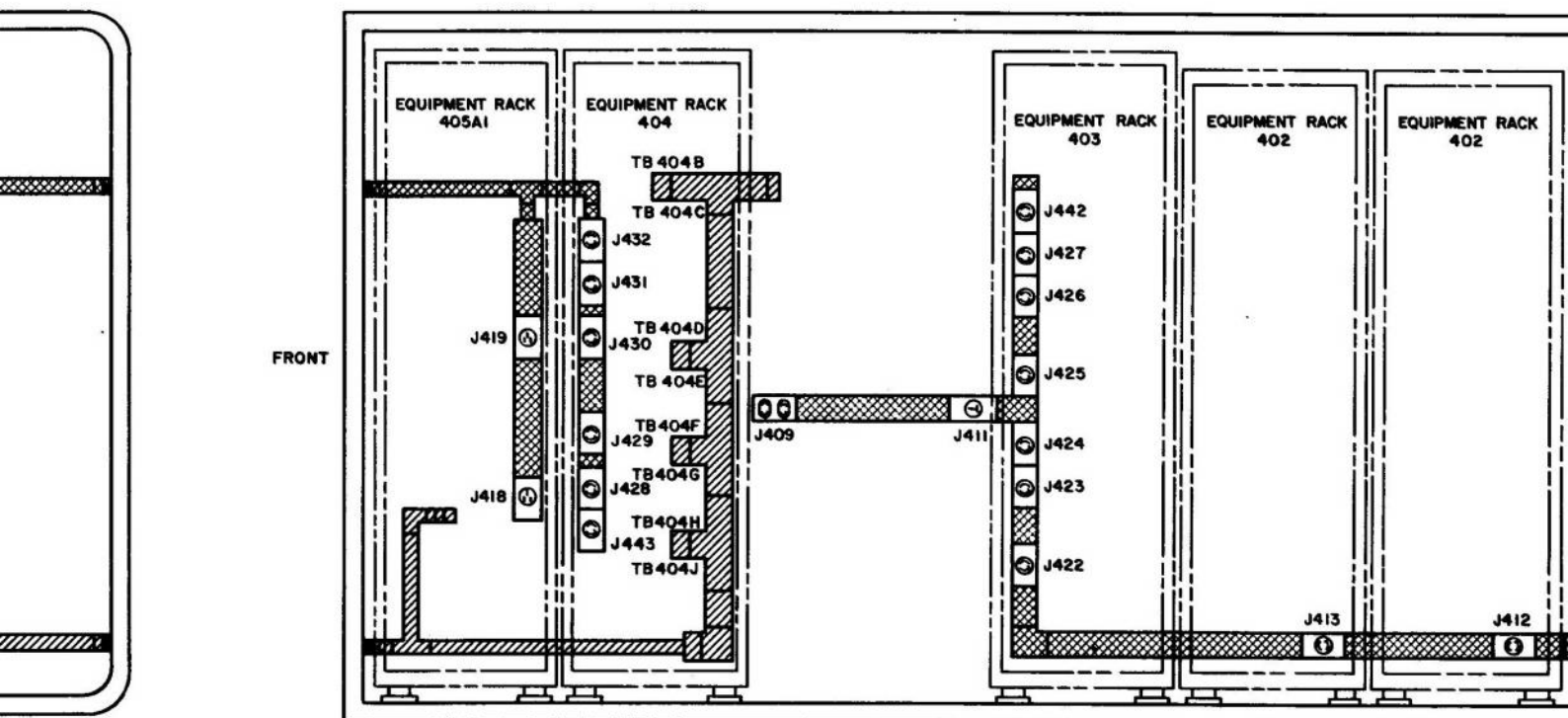
FRONT



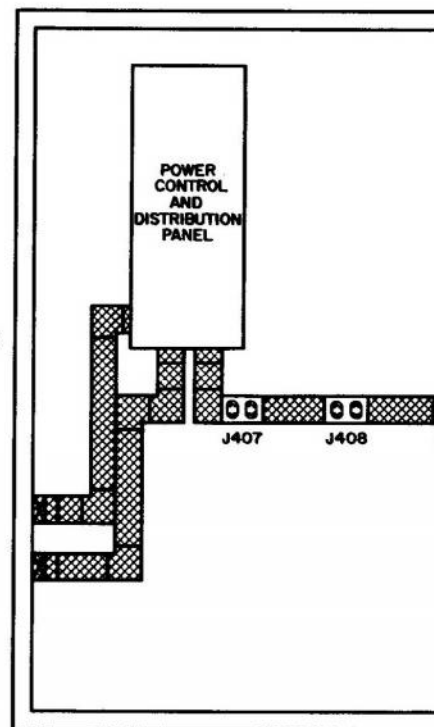
CURBSIDE

ROADSIDE

D. INTERIOR VIEW OF CEILING (VIEWED FROM ABOVE)



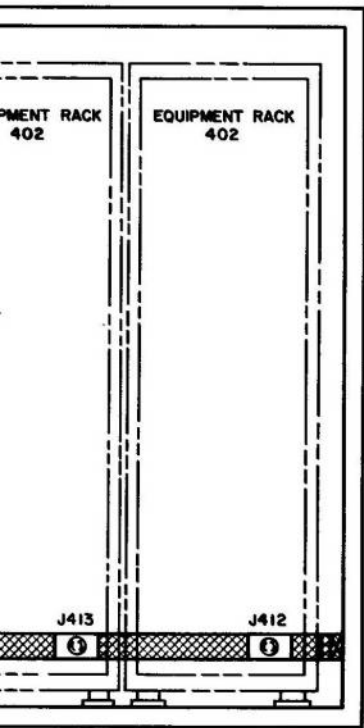
B. INTERIOR VIEW OF CURBSIDE WALL



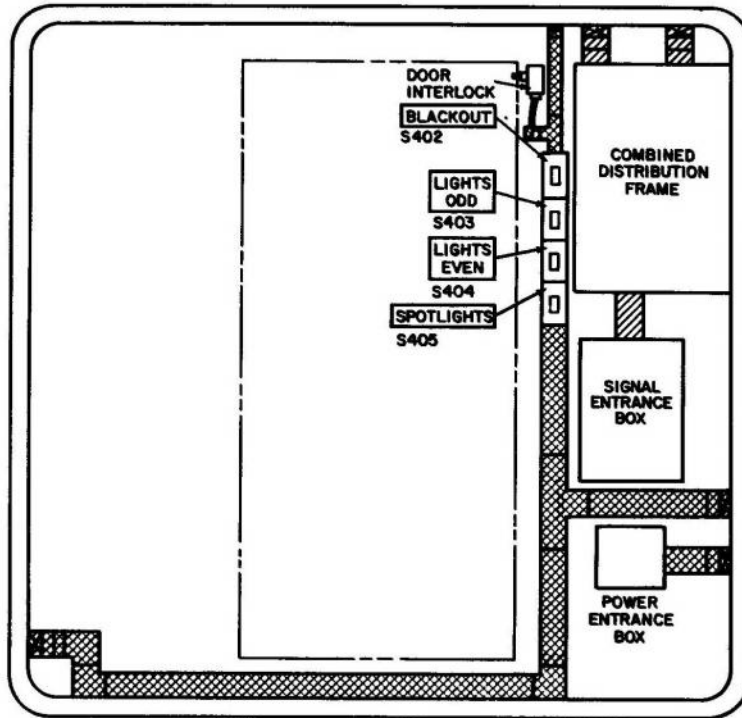
D. INTERIOR VIEW OF CEILING (VIEWED FROM ABOVE)

POWER CONTROL AND DISTRIBUTION PANEL

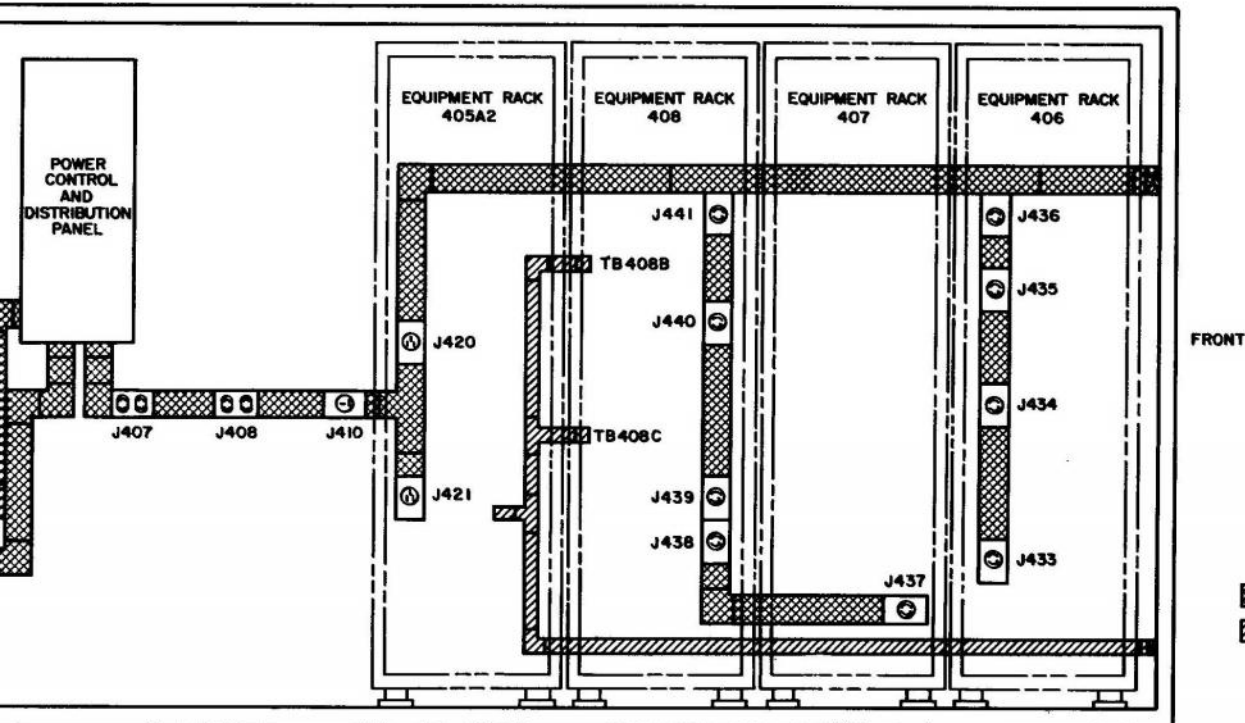
Figure 71. Radio terminal shelter, power and signal raceway diagram.



REAR

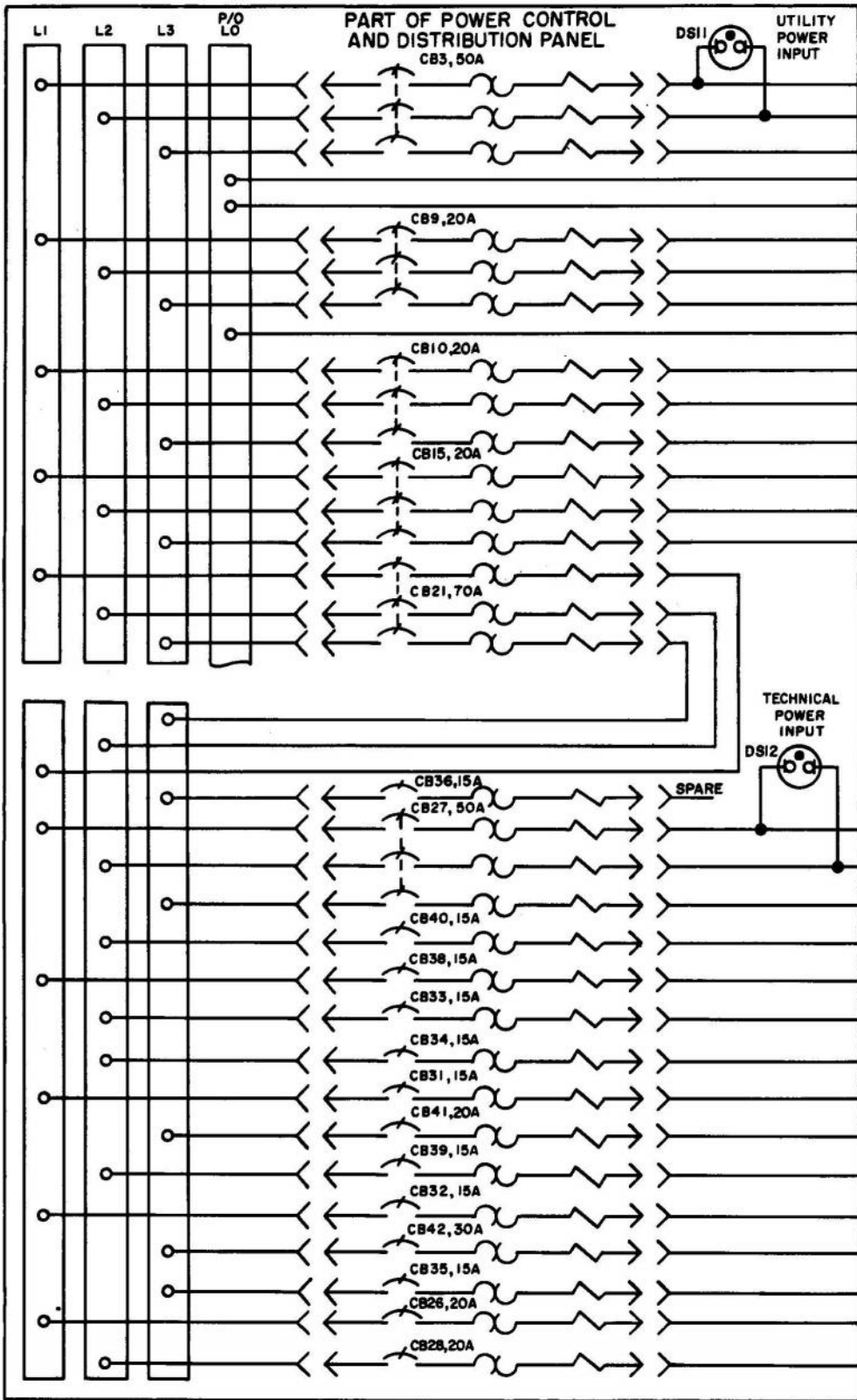


C. INTERIOR VIEW OF REAR WALL



E. INTERIOR VIEW OF ROADSIDE WALL

TM5895-288-12-25



P/O PO
DISTRIB

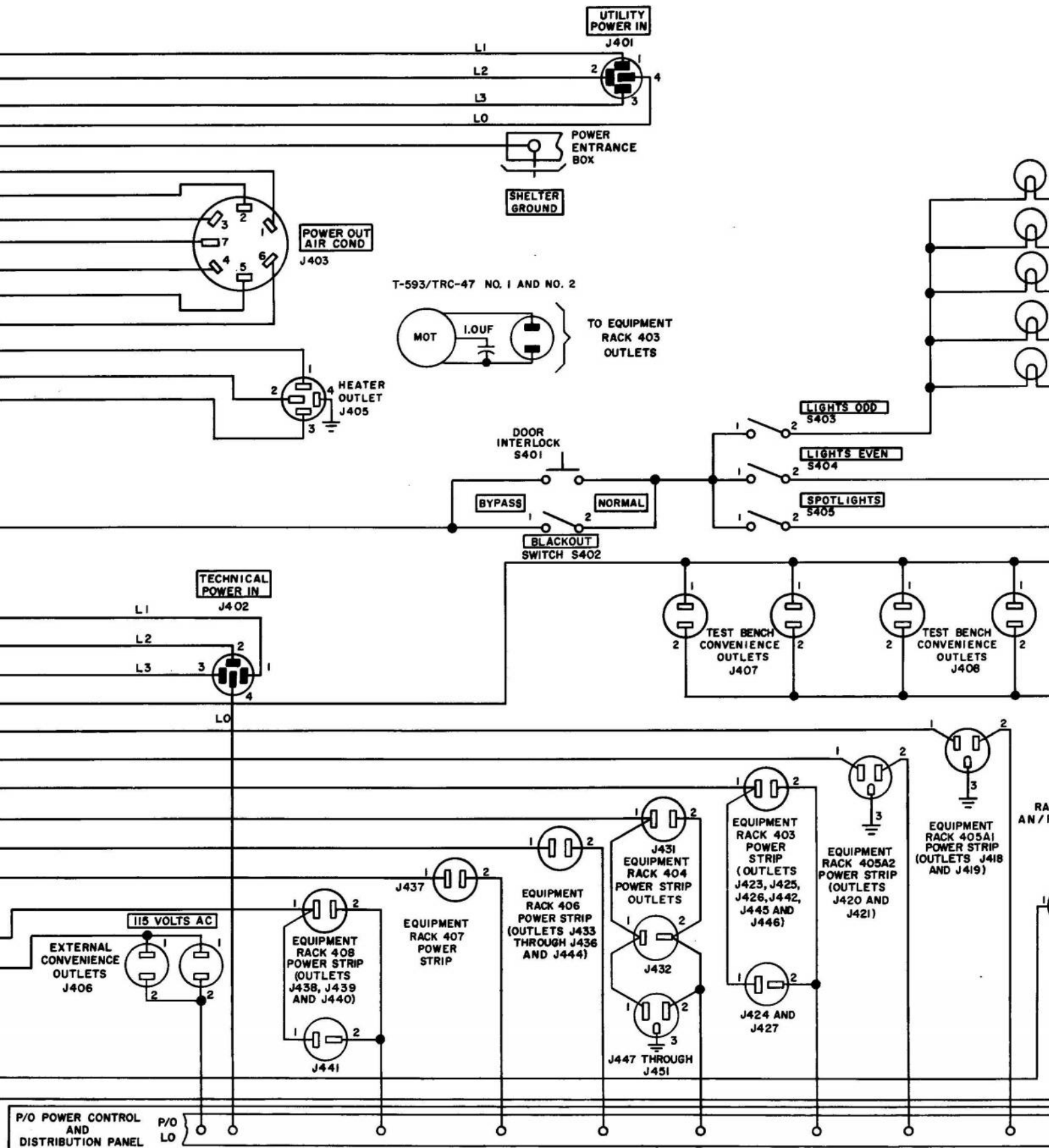
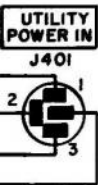


Figure 72. Radio terminal shelter power distribution, schematic diagram.

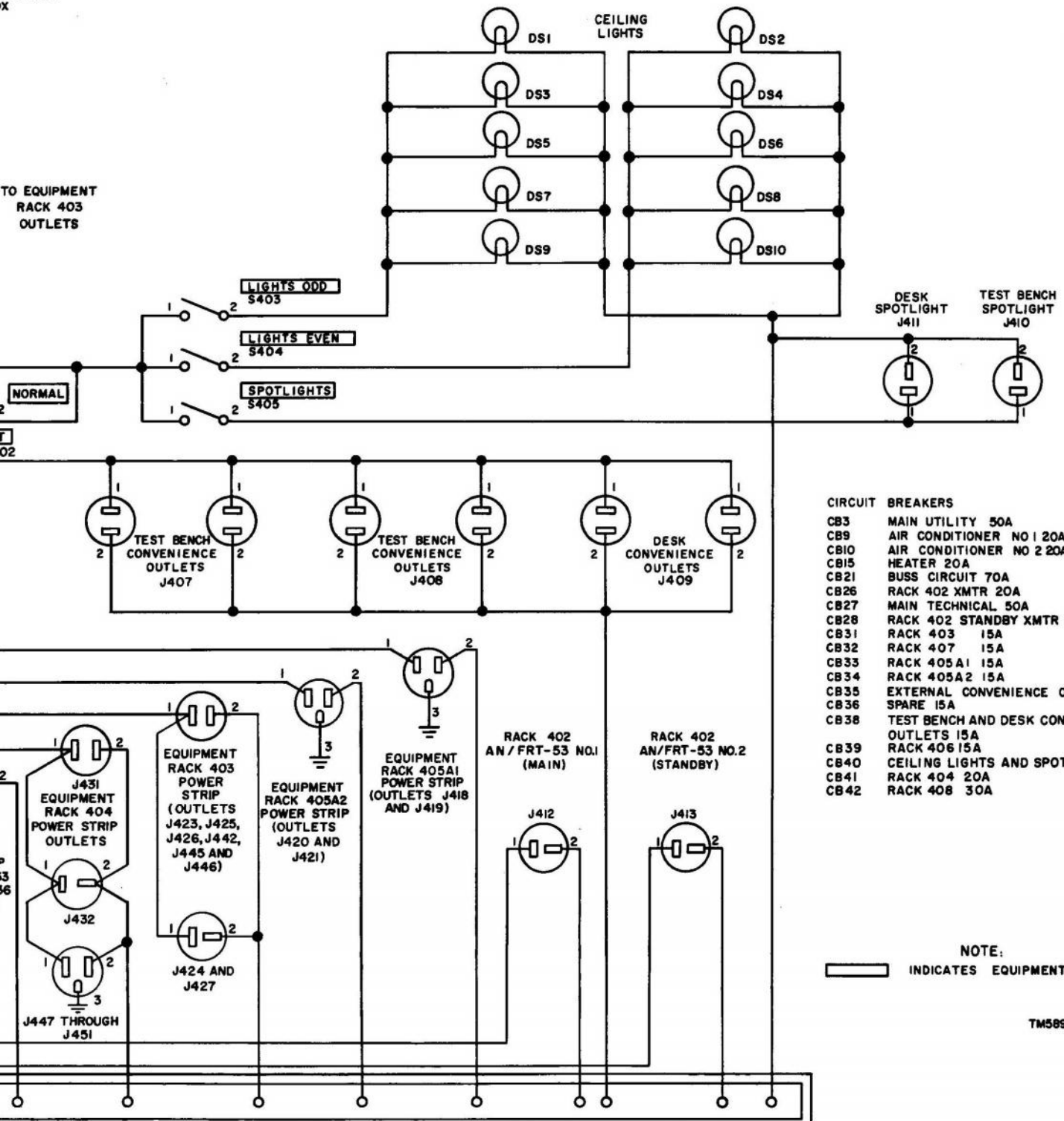


POWER
ENTRANCE
X

TO EQUIPMENT
RACK 403
OUTLETS

NORMAL

02



- CIRCUIT BREAKERS**
- CB3 MAIN UTILITY 50A
 - CB9 AIR CONDITIONER NO 1 20A
 - CB10 AIR CONDITIONER NO 2 20A
 - CB15 HEATER 20A
 - CB21 BUSS CIRCUIT 70A
 - CB26 RACK 402 XMTR 20A
 - CB27 MAIN TECHNICAL 50A
 - CB28 RACK 402 STANDBY XMTR 20A
 - CB31 RACK 403 15A
 - CB32 RACK 407 15A
 - CB33 RACK 405A1 15A
 - CB34 RACK 405A2 15A
 - CB35 EXTERNAL CONVENIENCE OUTLETS 15A
 - CB36 SPARE 15A
 - CB38 TEST BENCH AND DESK CONVENIENCE OUTLETS 15A
 - CB39 RACK 406 15A
 - CB40 CEILING LIGHTS AND SPOTLIGHTS 15A
 - CB41 RACK 404 20A
 - CB42 RACK 408 30A

NOTE:
 INDICATES EQUIPMENT MARKING

TM5895-288-12-40

c diagram.

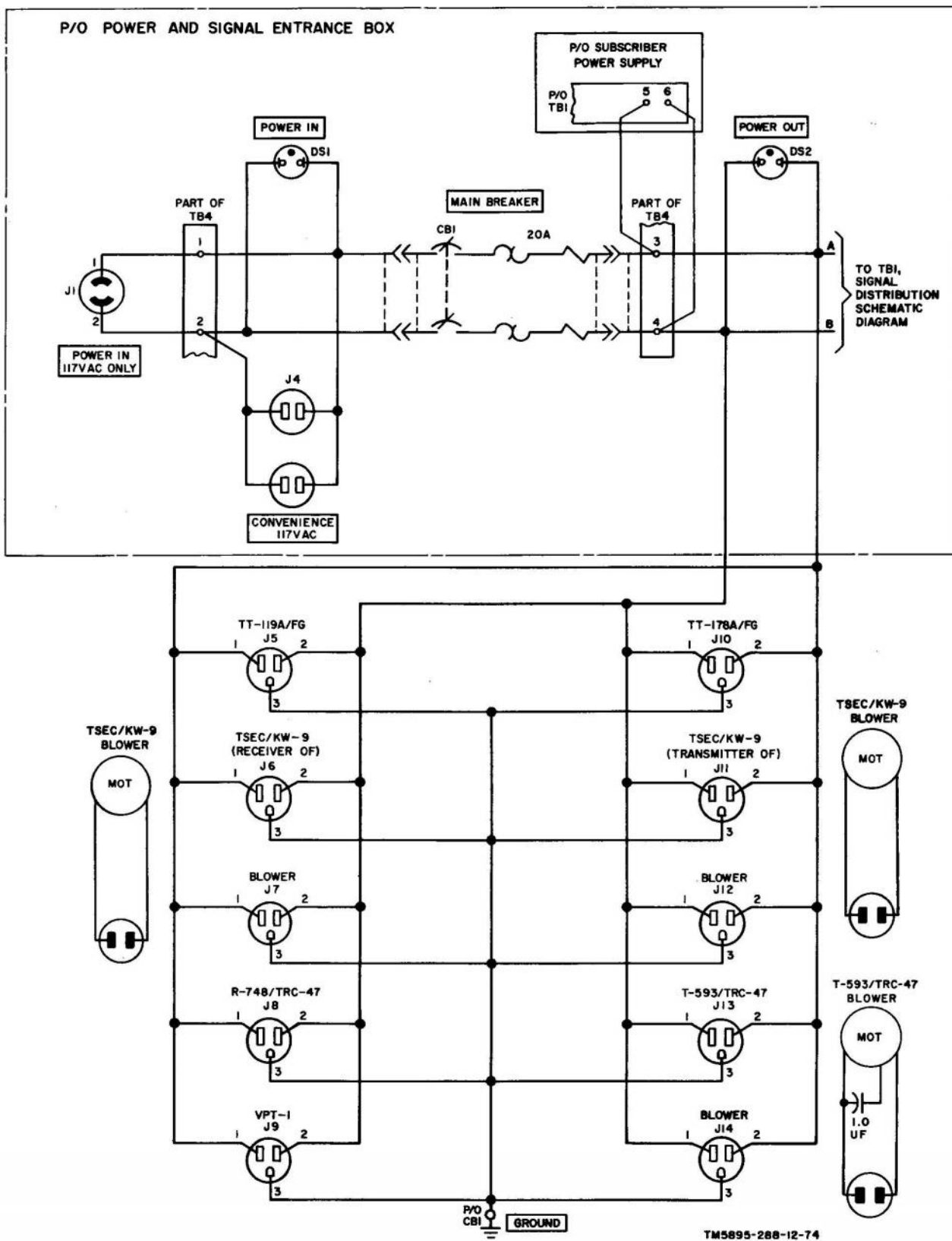


Figure 73. Subscriber package power distribution, schematic diagram.

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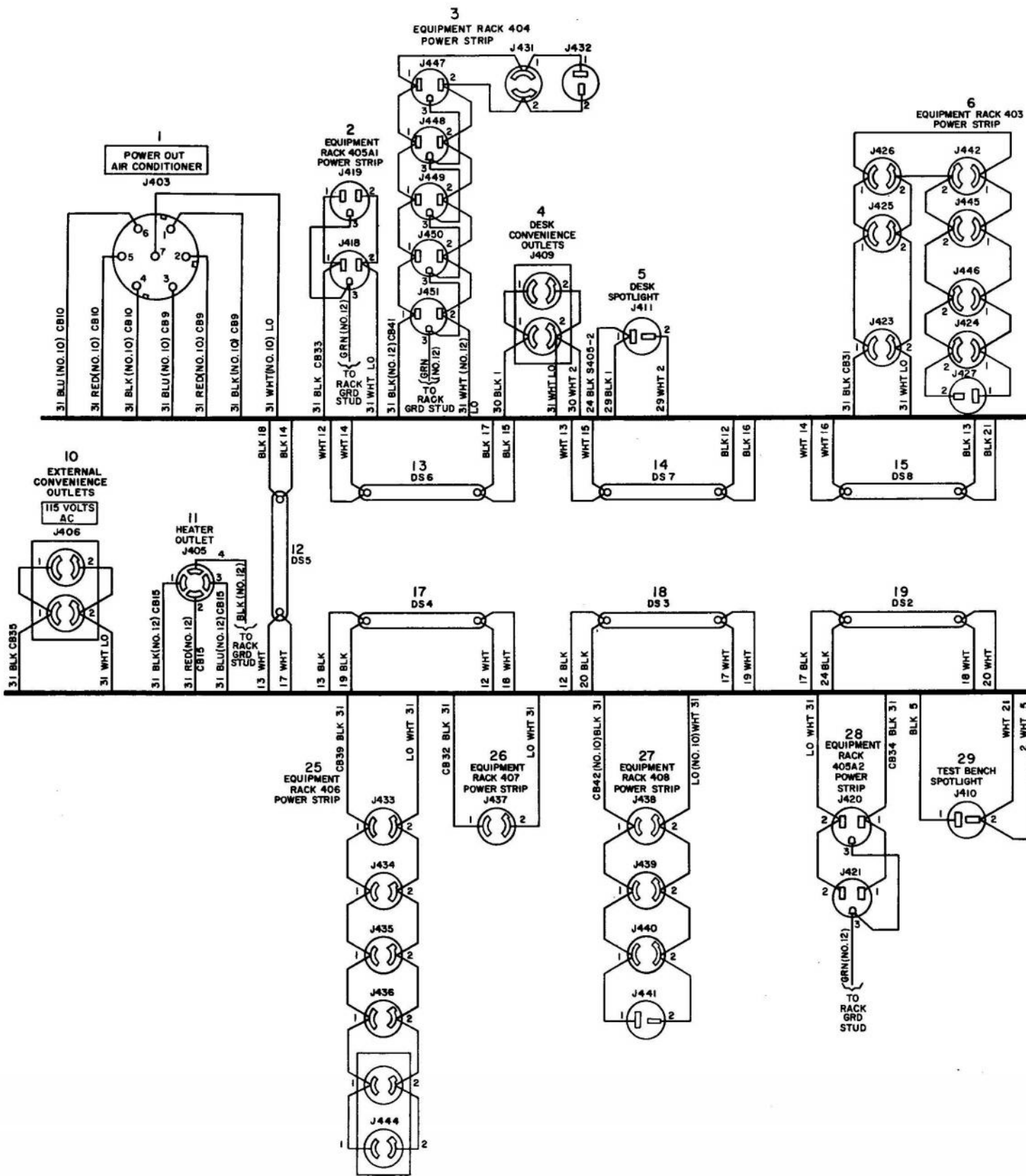
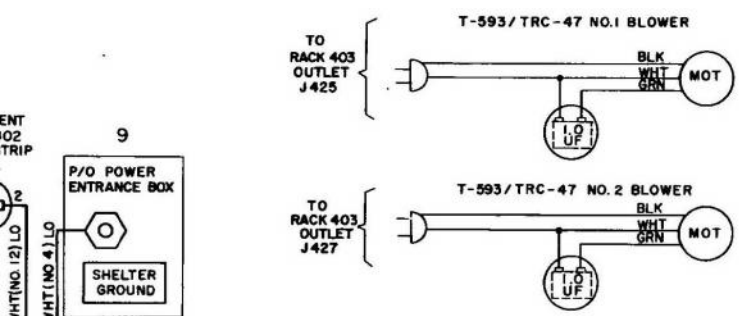


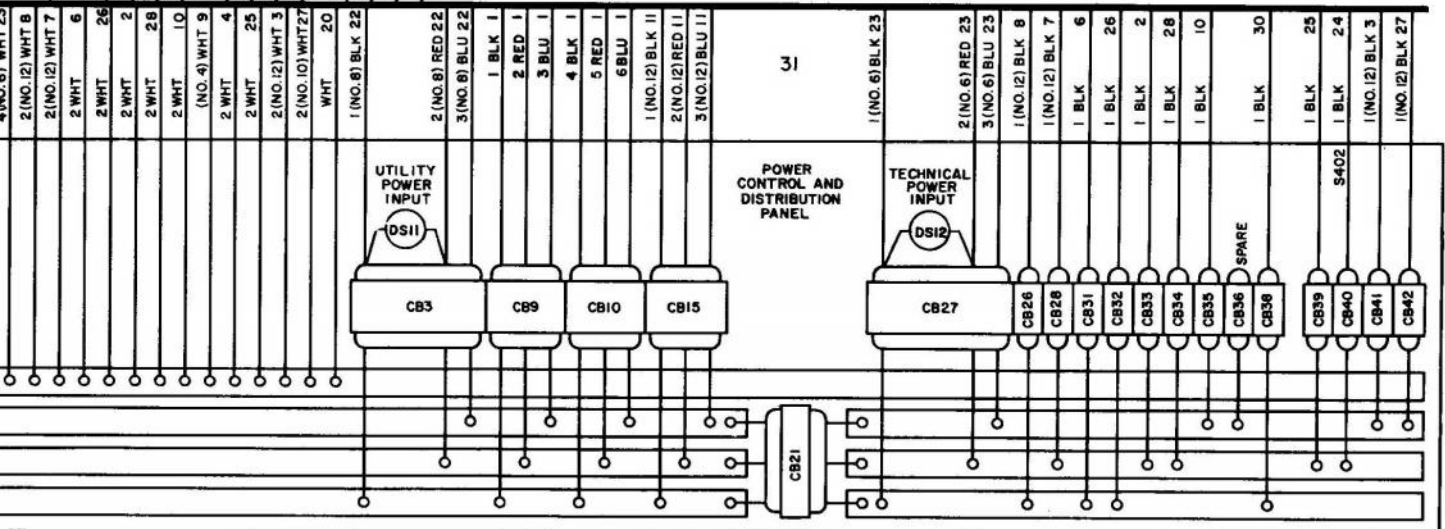
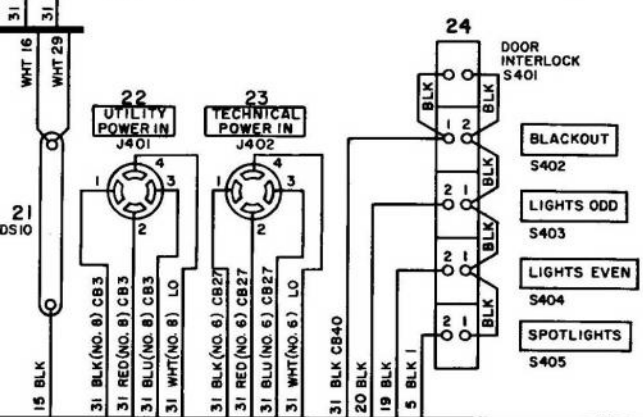
Figure 74. Radio terms

ENT NO. 2 TRIP



NOTES:

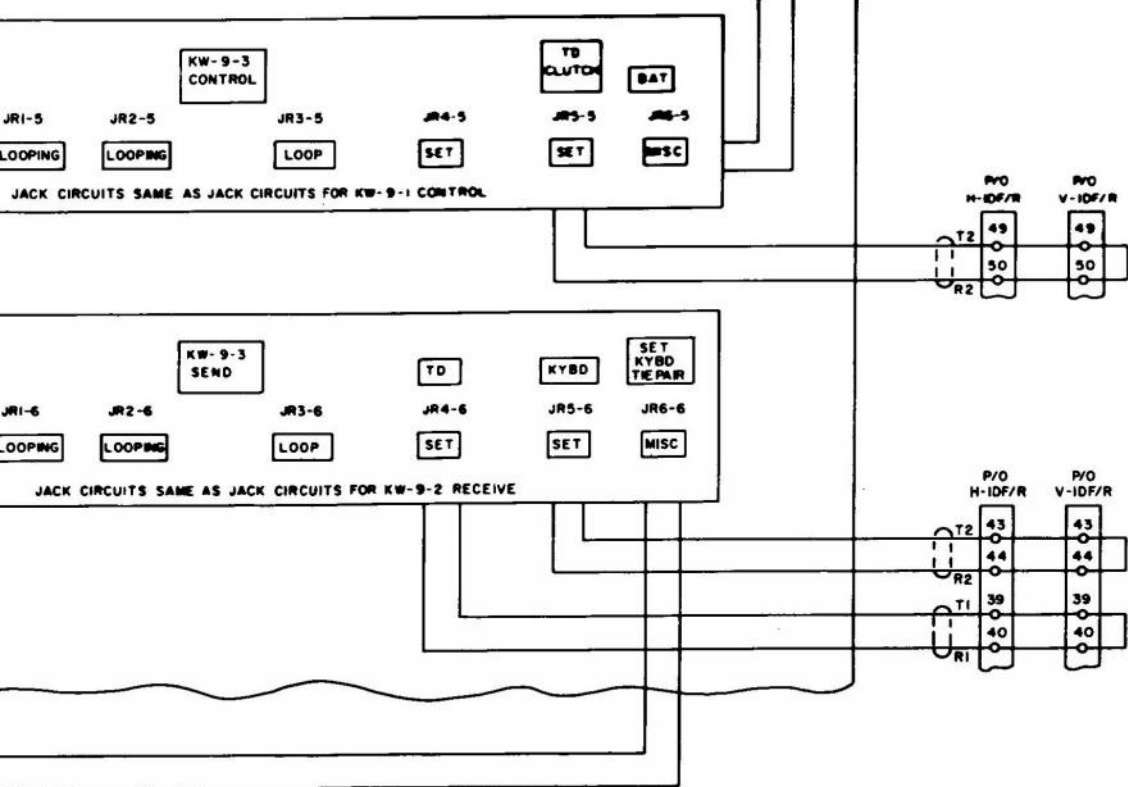
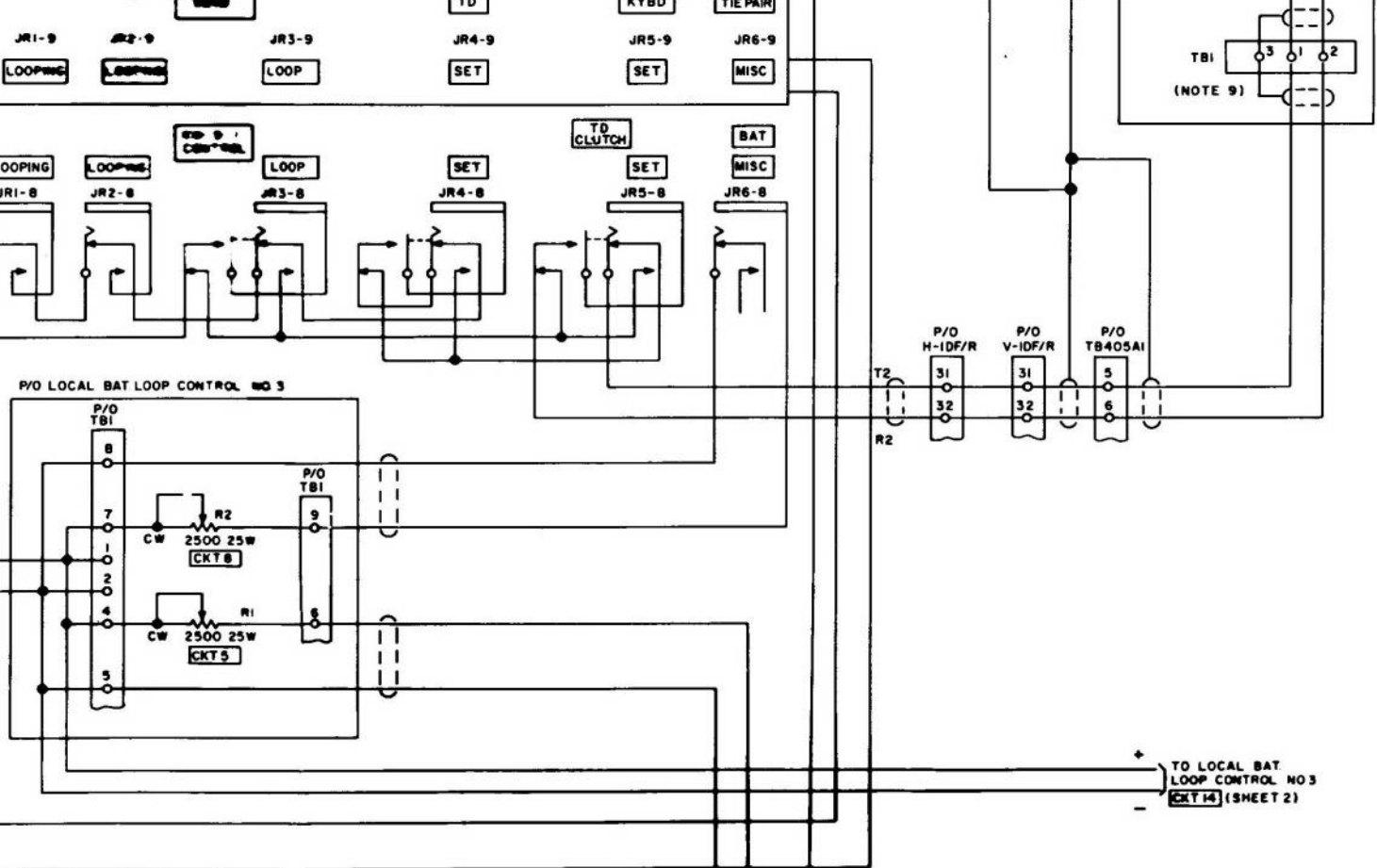
1. ALL WIRES ARE NO. 14 AWG UNLESS OTHERWISE SPECIFIED.
2. PHASES ARE AS FOLLOWS:
L1 = ØA
L2 = ØB
L3 = ØC
LO = NEUTRAL
3. INDICATES EQUIPMENT MARKINGS
4. THE NUMBER NEAREST THE COMMON BASE LINE CORRESPONDS TO THE STATION NUMBER TO WHICH THE WIRE RUNS; THE REMAINING WIRE NUMBER CORRESPONDS TO THE STATION TERMINAL NUMBER.



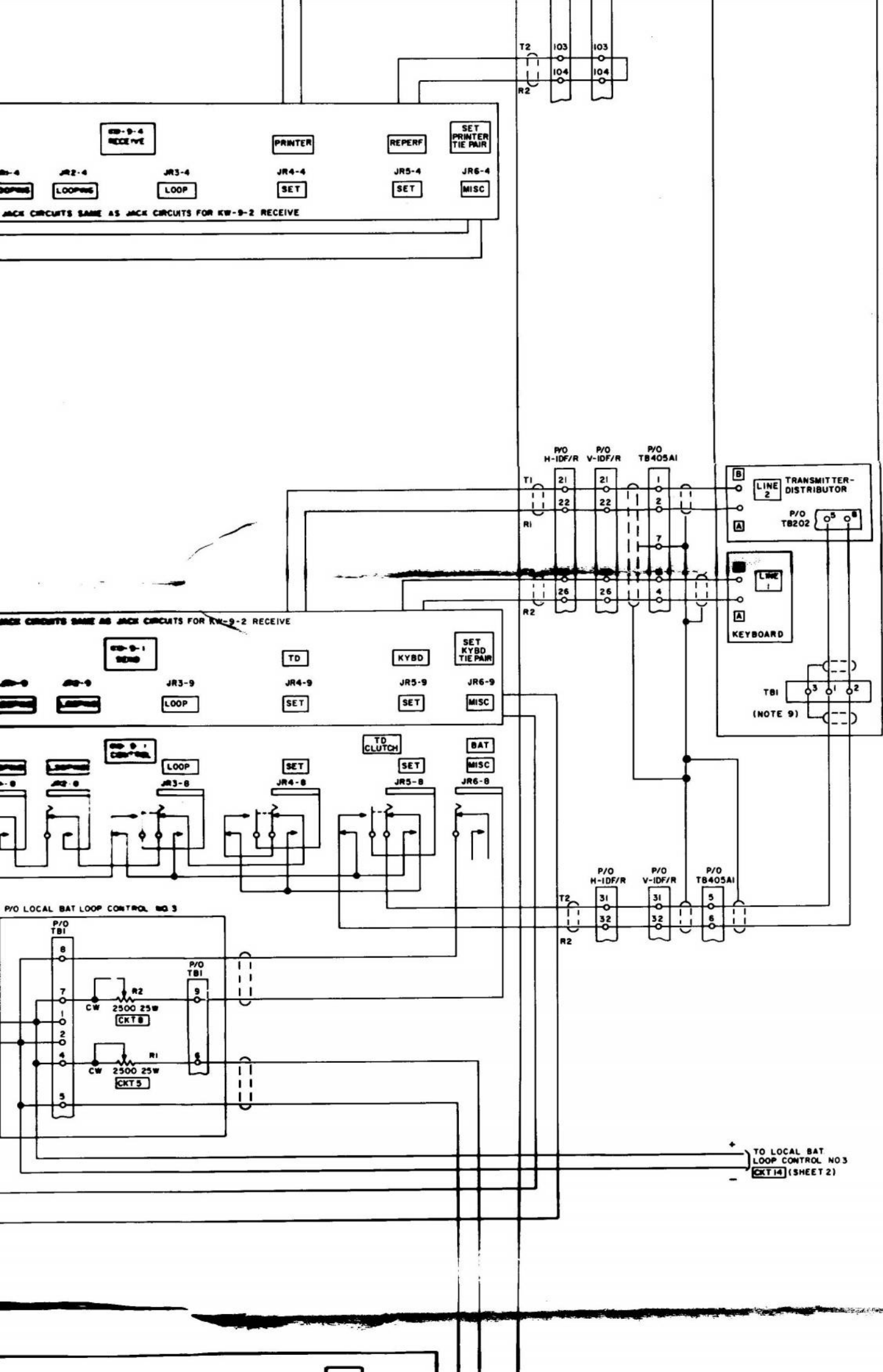
TM5895-288-12-41

ion, wiring diagram.

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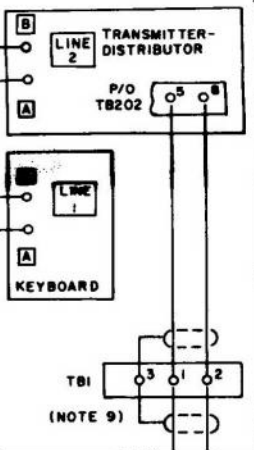
TM5895-288-12-42 ①



JACK CIRCUITS SAME AS JACK CIRCUITS FOR KW-9-2 RECEIVE

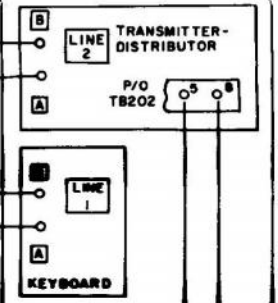
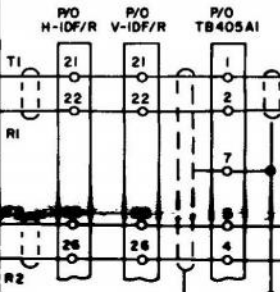
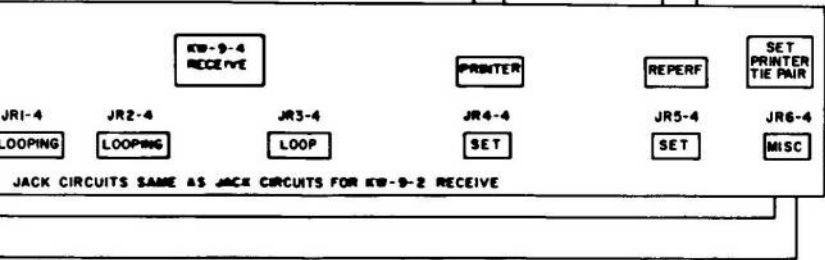
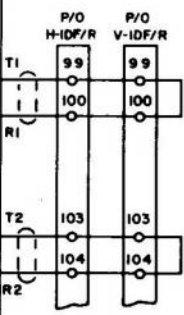
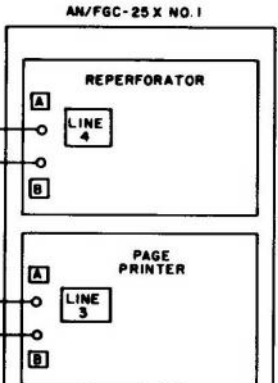
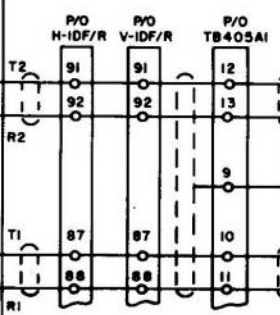
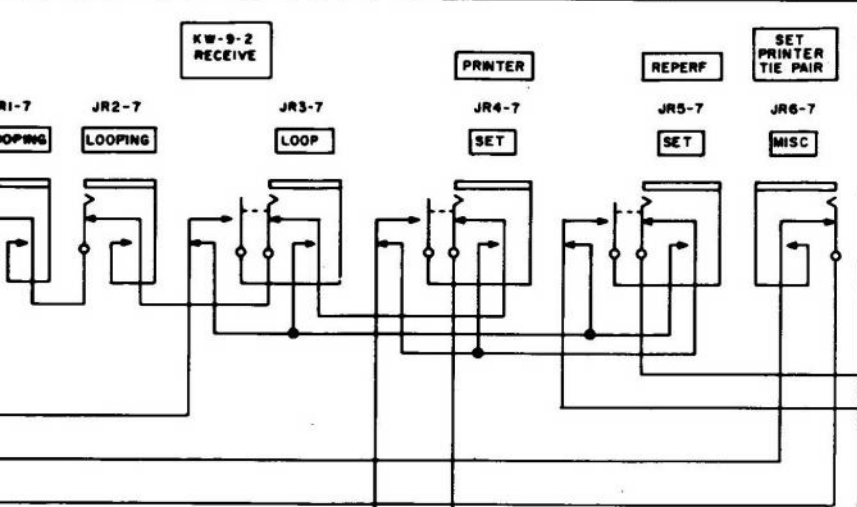
JACK CIRCUITS SAME AS JACK CIRCUITS FOR KW-9-2 RECEIVE

P/O LOCAL BAT LOOP CONTROL NO 3

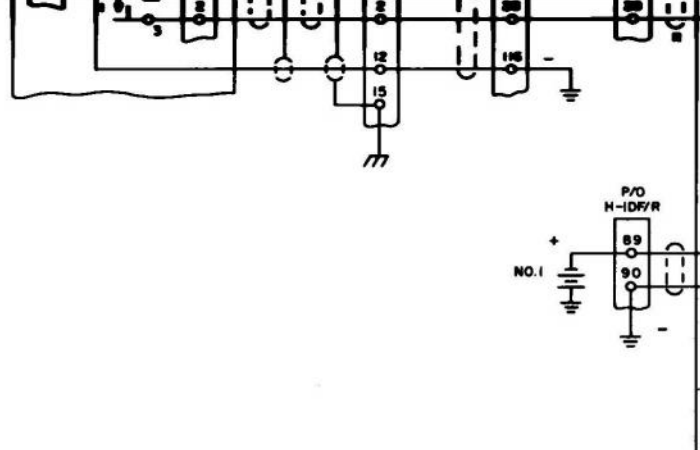
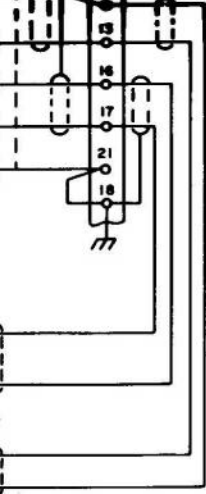


TO LOCAL BAT LOOP CONTROL NO 3
 CKT 14 (SHEET 2)

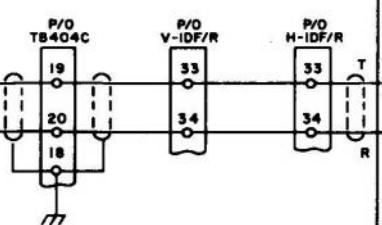
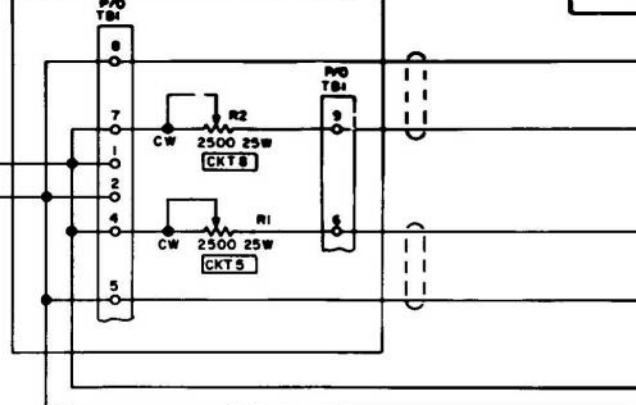
P/O RED PATCH PANEL



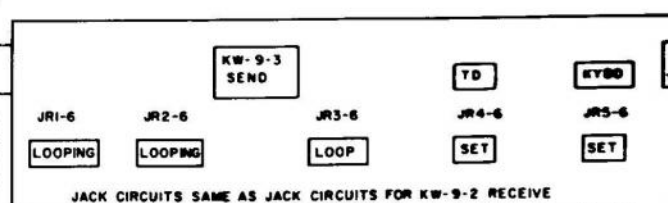
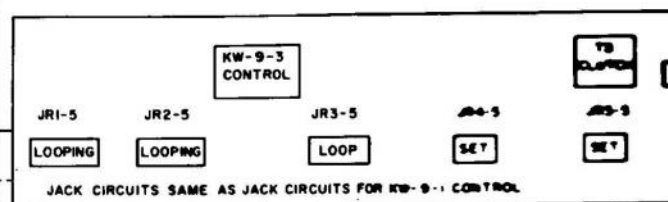
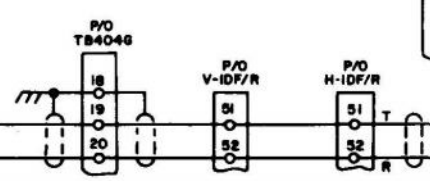
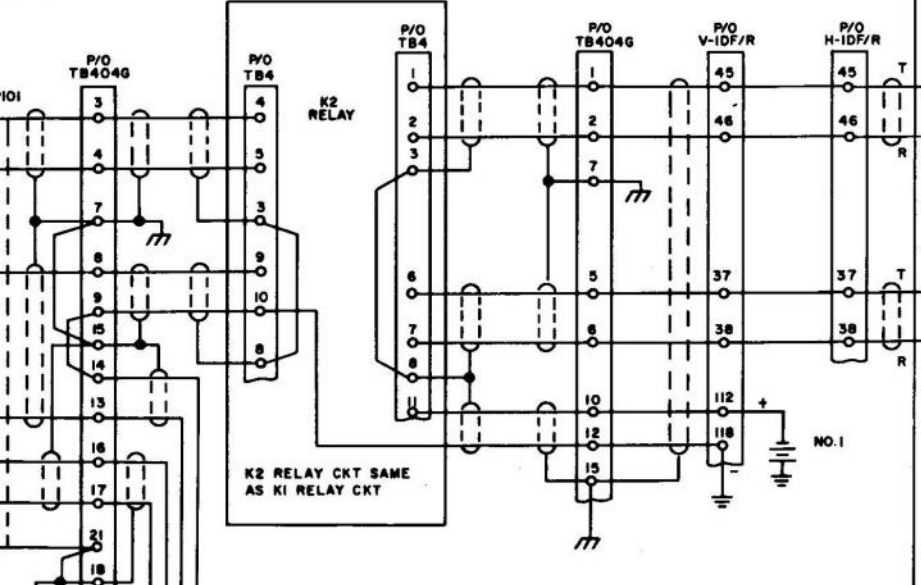
JACK CIRCUITS SAME AS JACK CIRCUITS FOR KW-9-2 RECEIVE

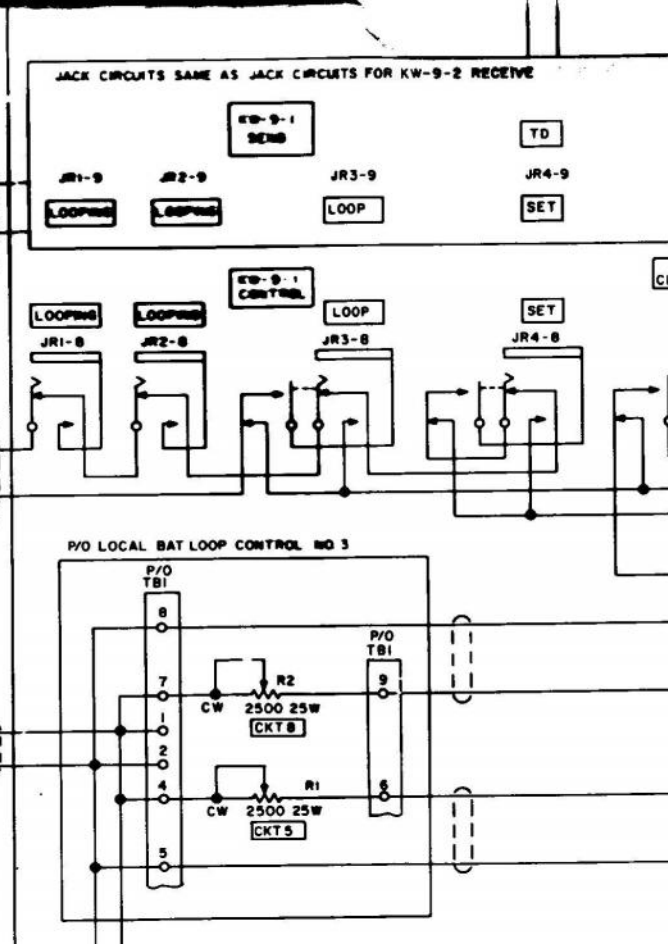
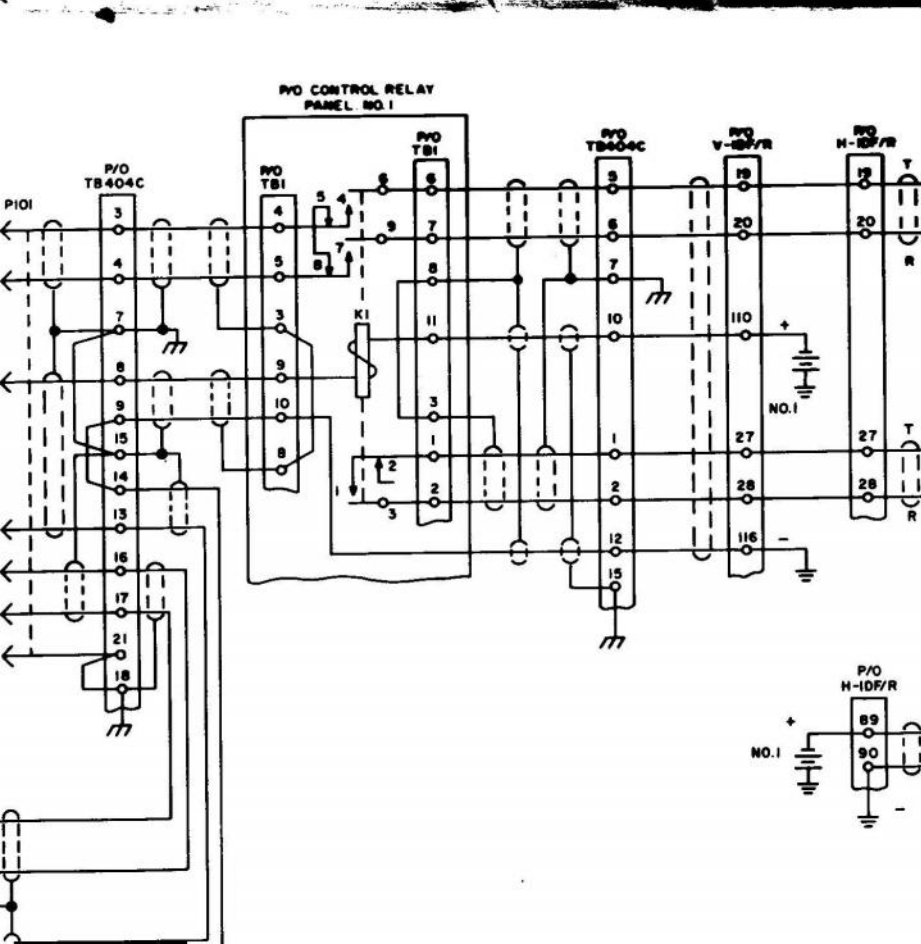
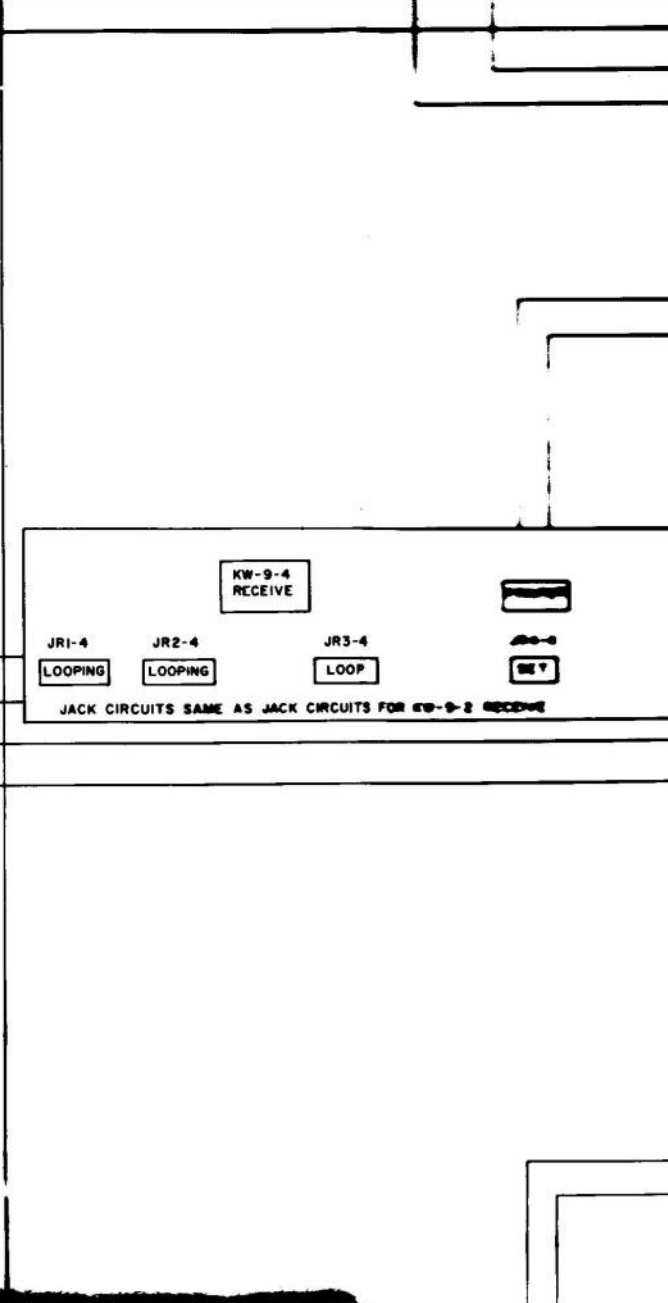
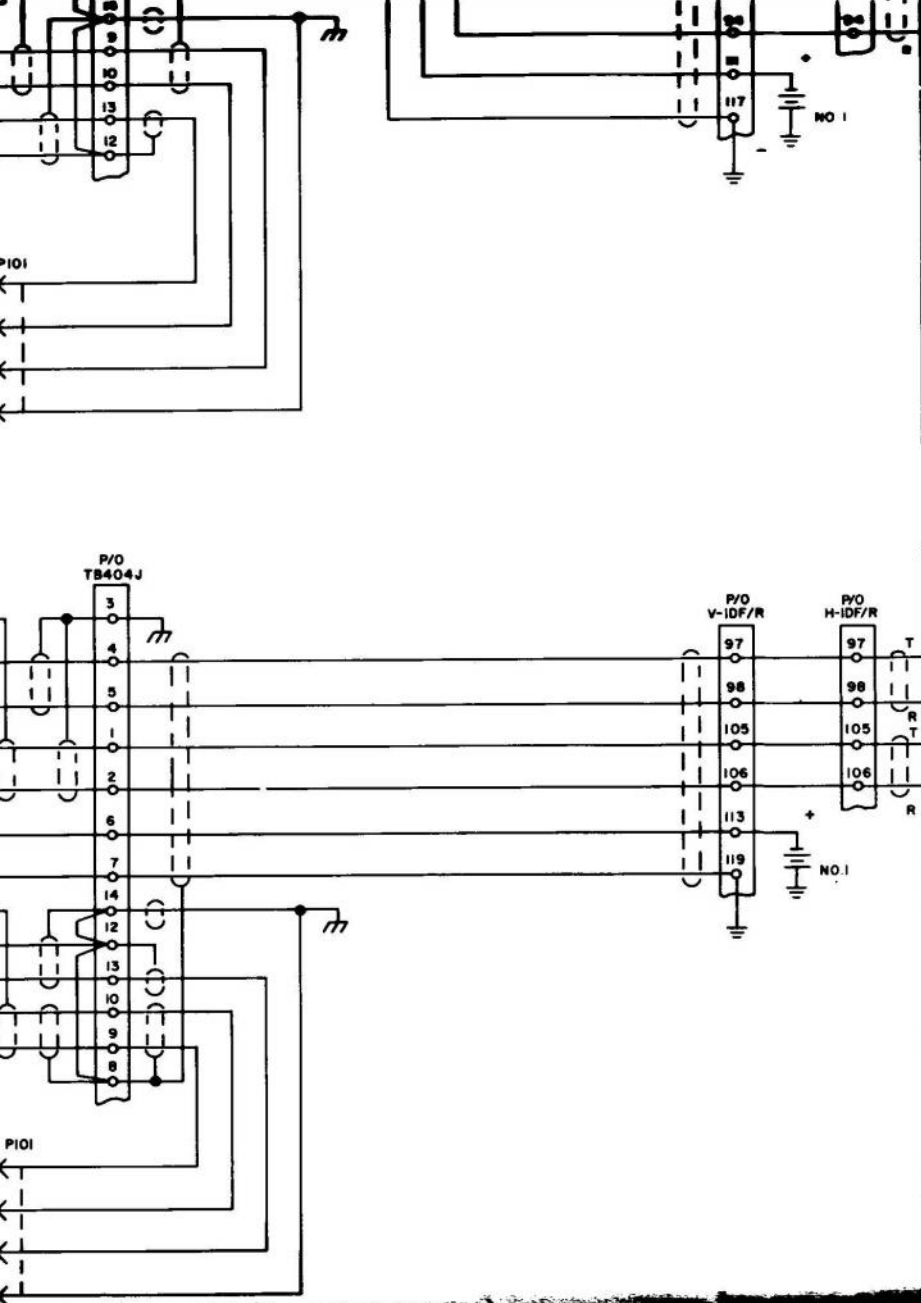


P/O LOCAL SET LOOP CONTROL SB 3

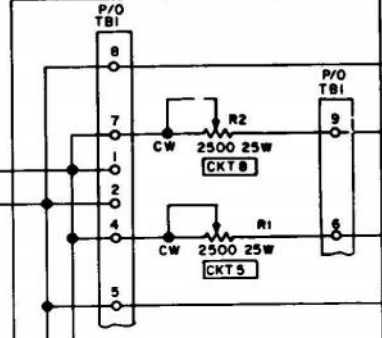


P/O RELAY CONTROL PANEL NO.1

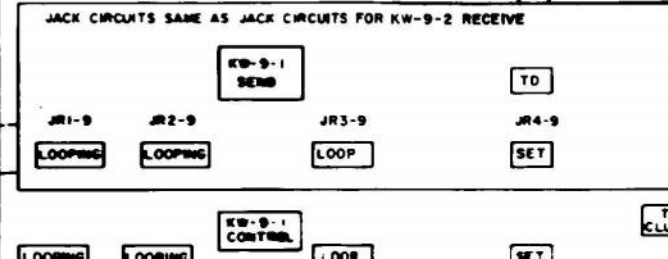
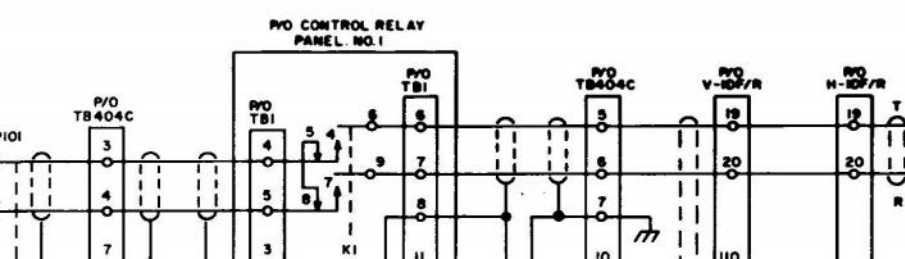
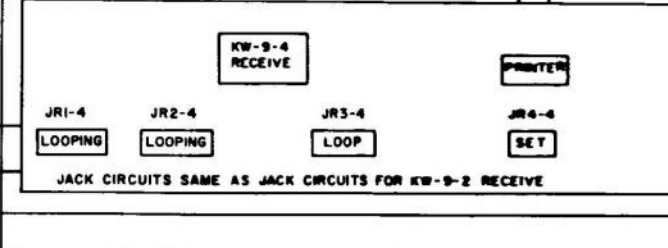
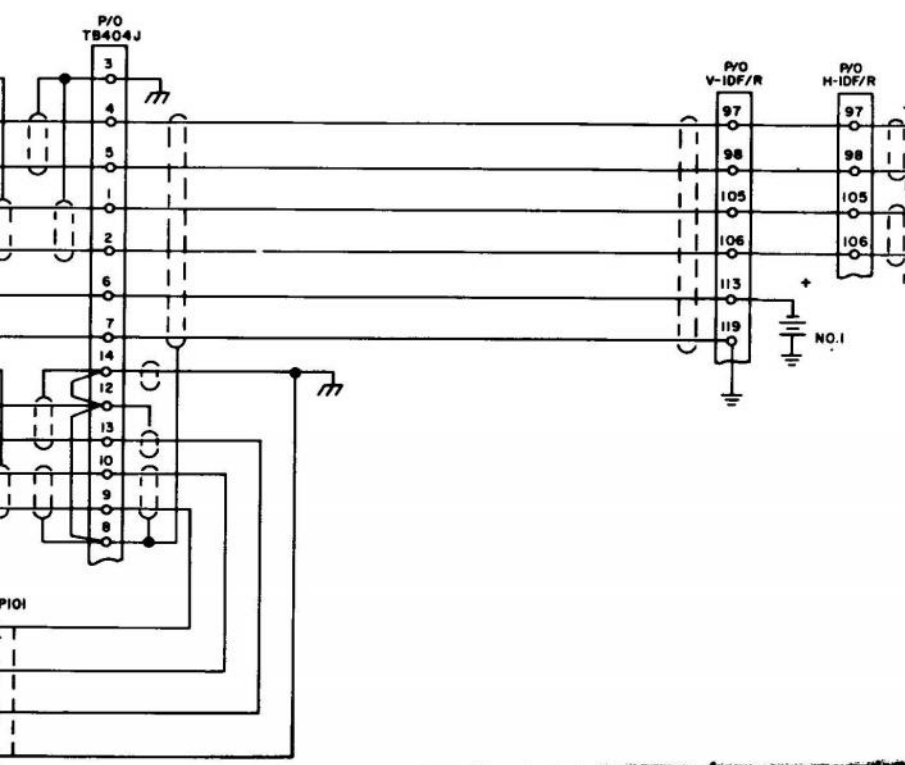
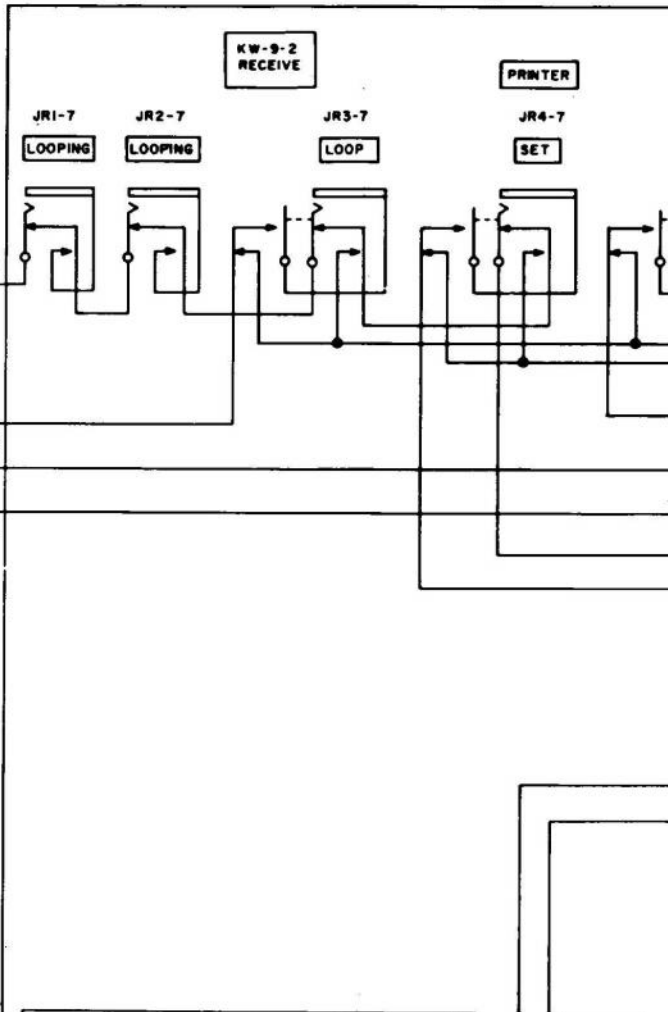
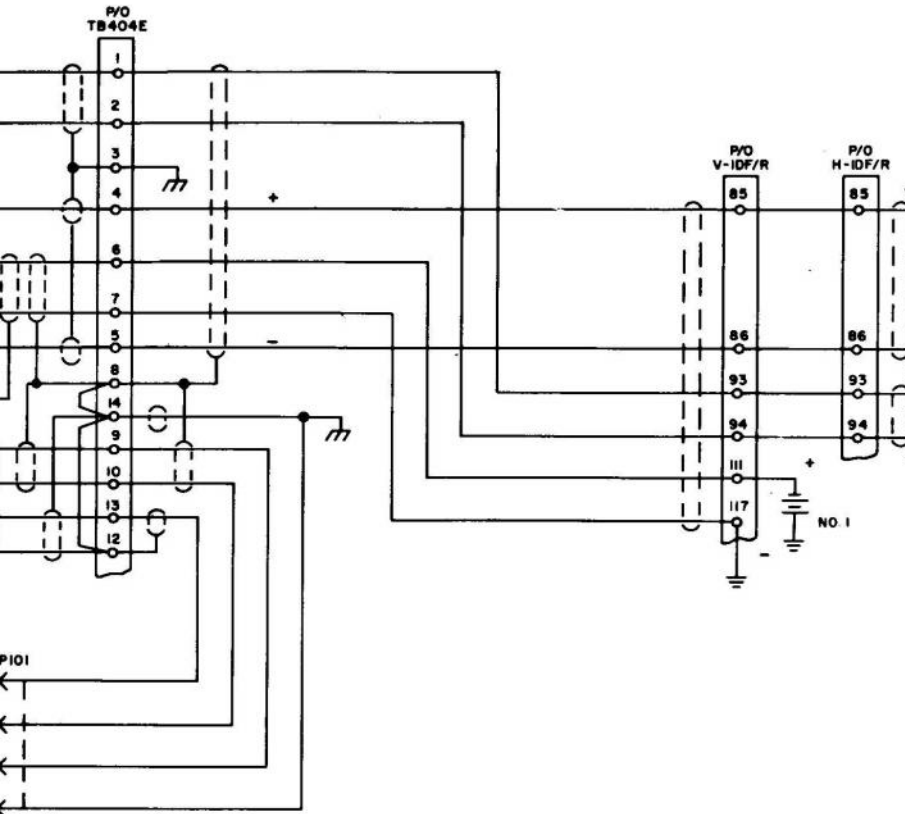




P/O LOCAL BAT LOOP CONTROL NO 3



P/O RED PATCH PANEL



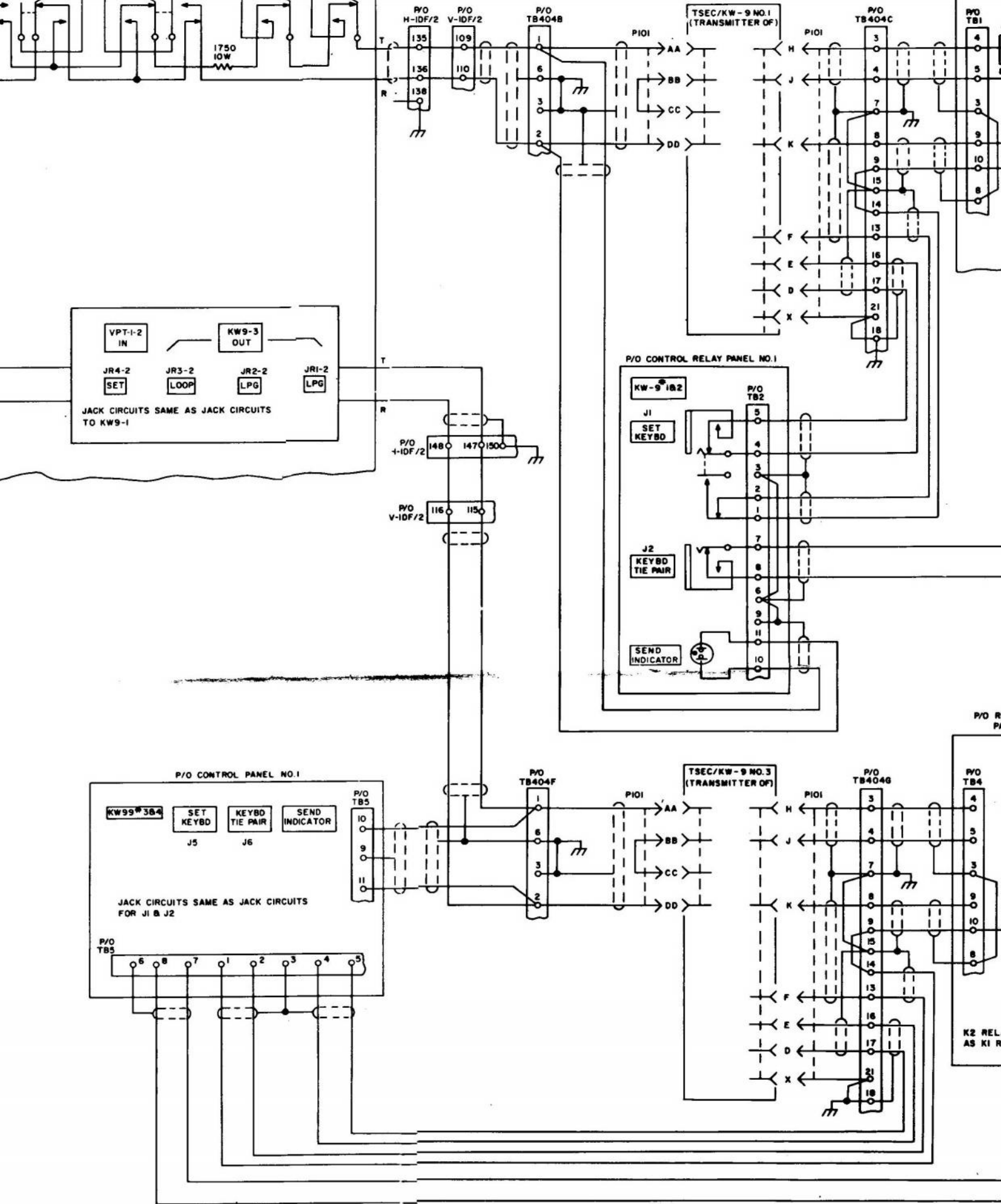
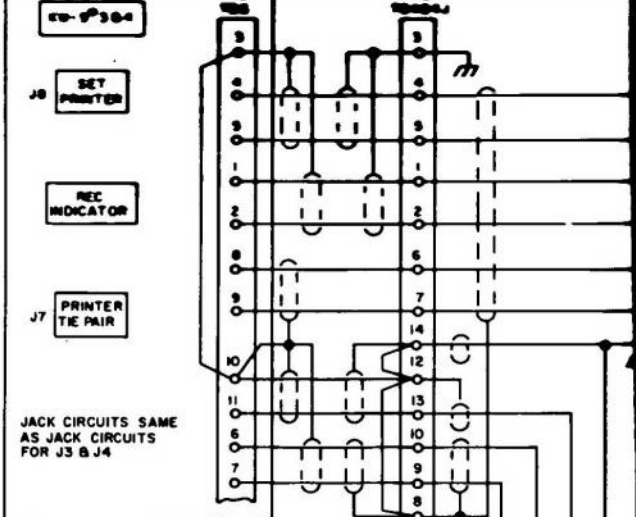
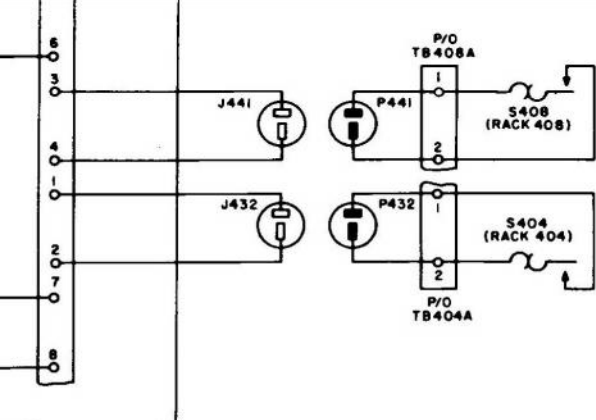
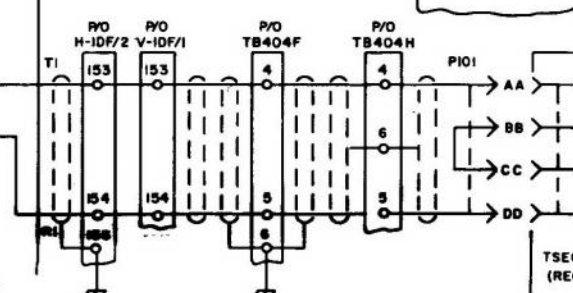
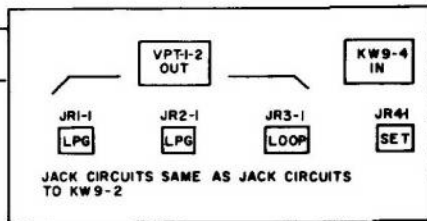


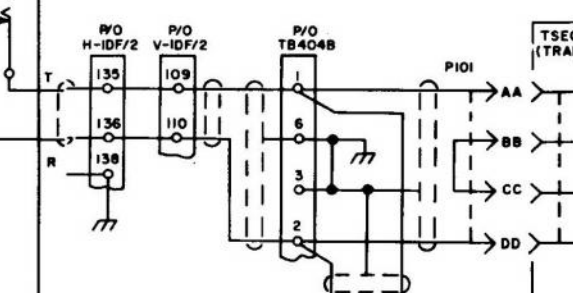
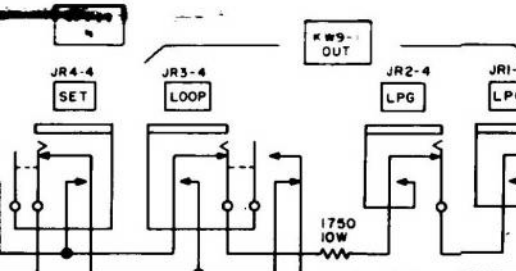
Figure 76 (1). Radio terminal shelter signal distribution, schematic diagram, part 1 of 4.



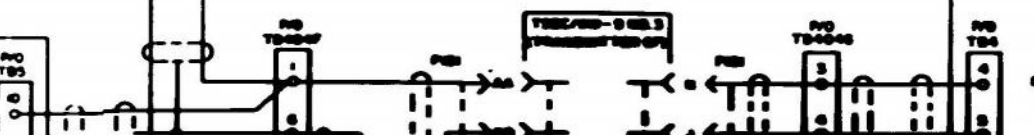
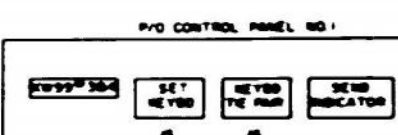
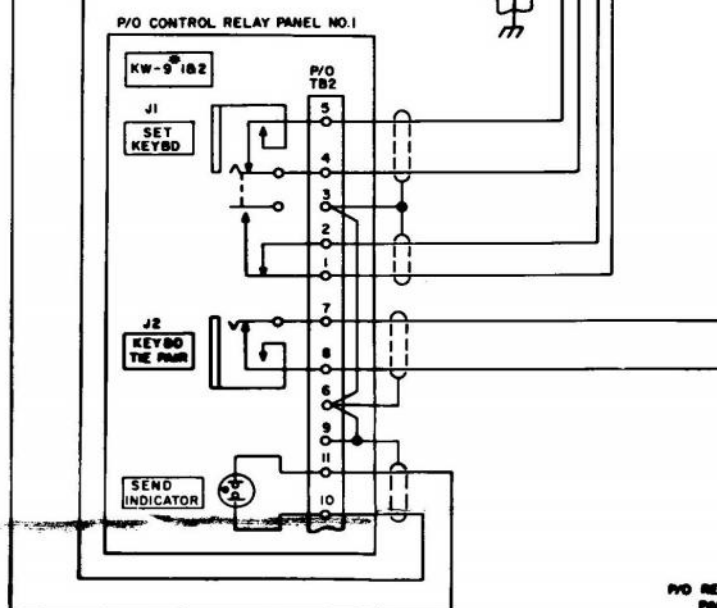
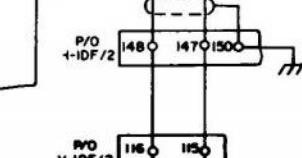
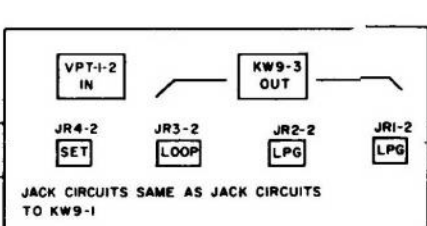
P/O BLACK PATCH PANEL

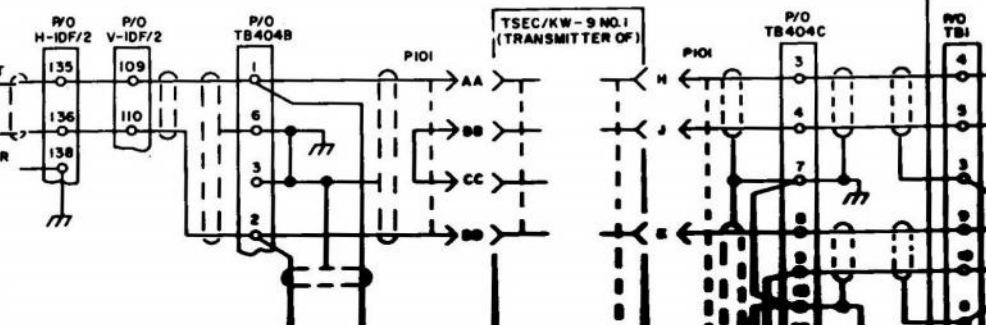
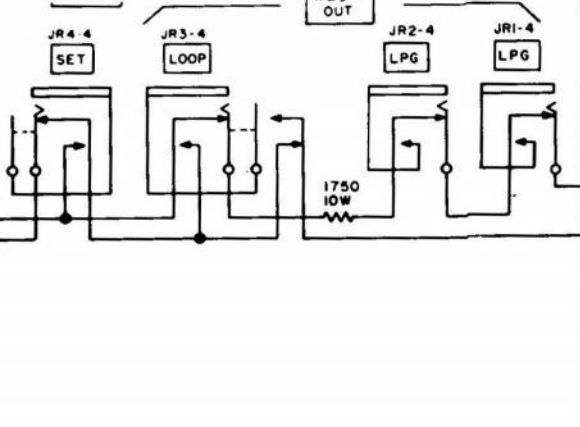
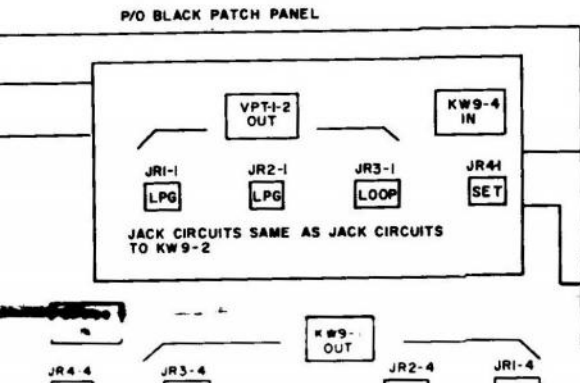
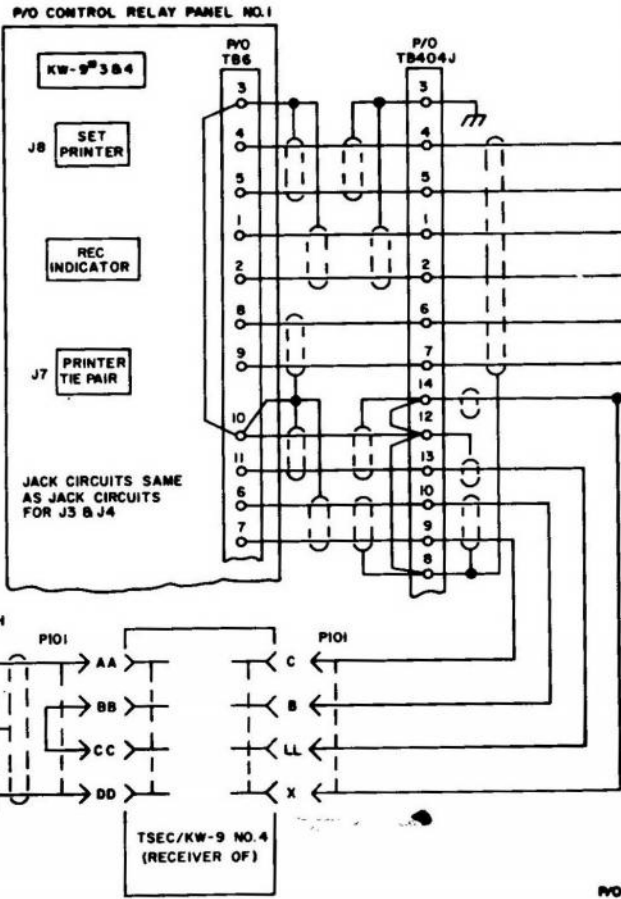
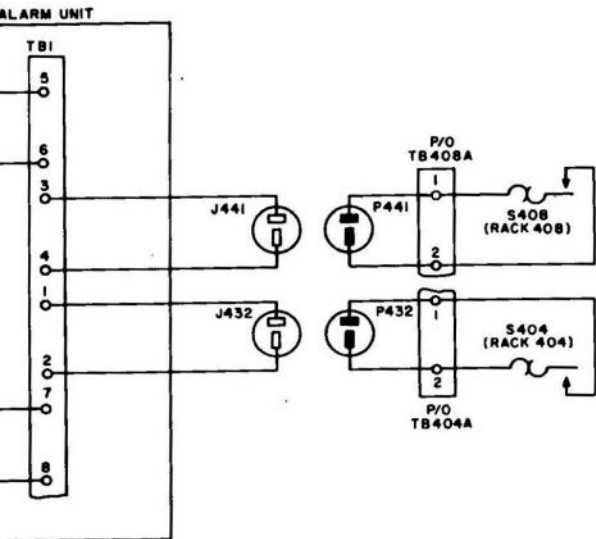
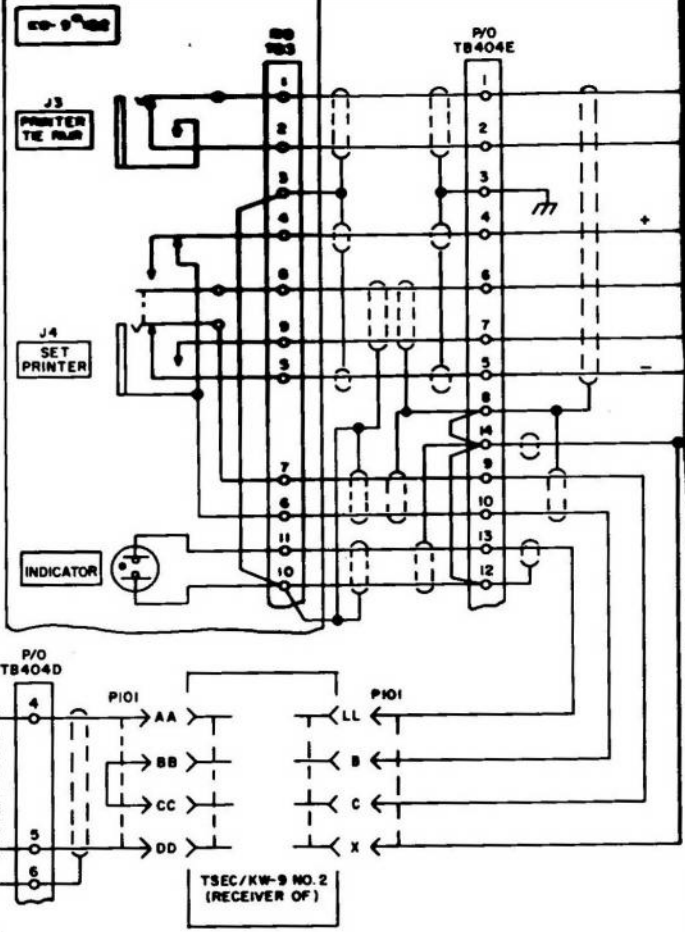
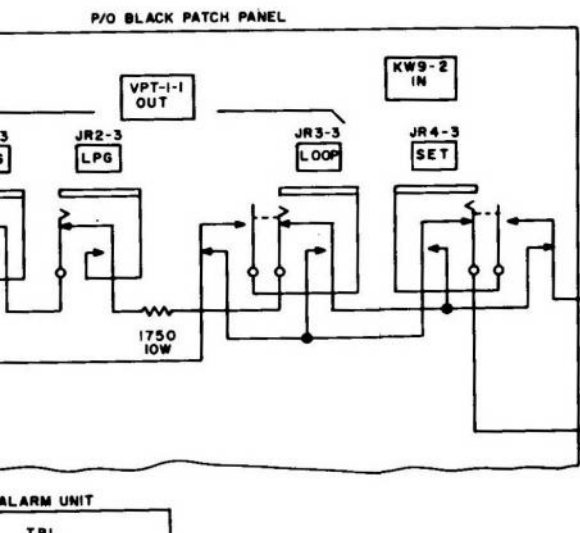


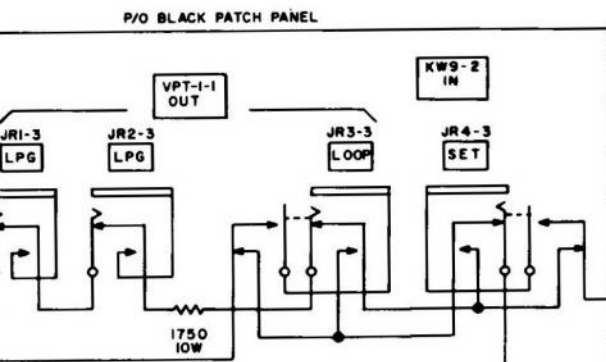
TSEC/KW-9 NO.4 (RECEIVER OF)



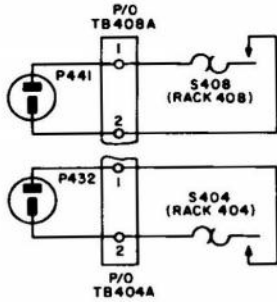
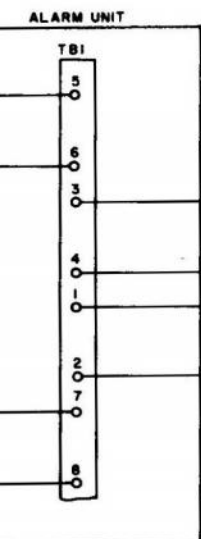
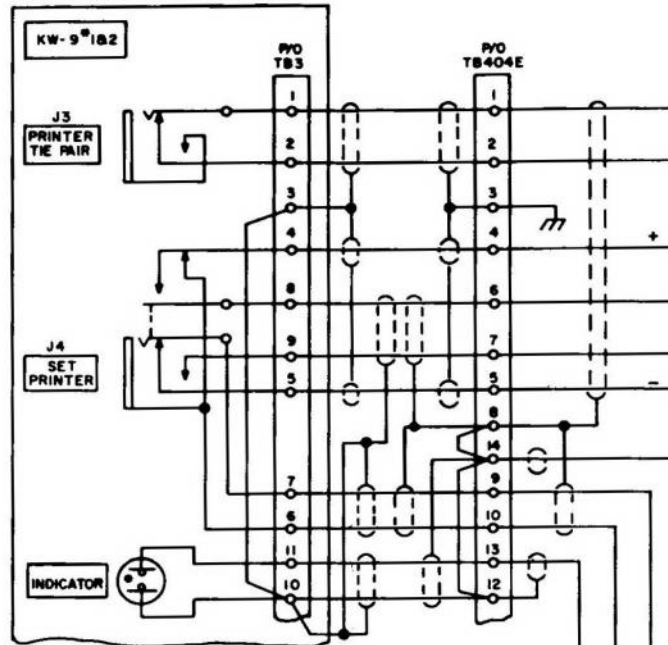
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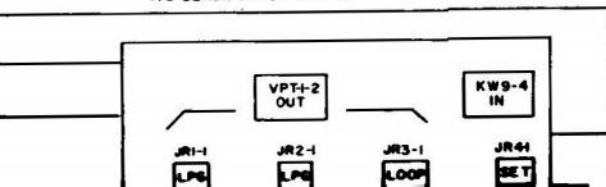




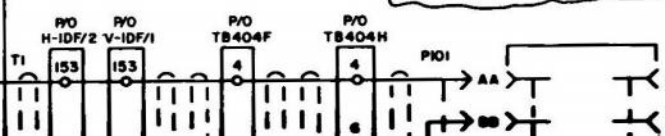
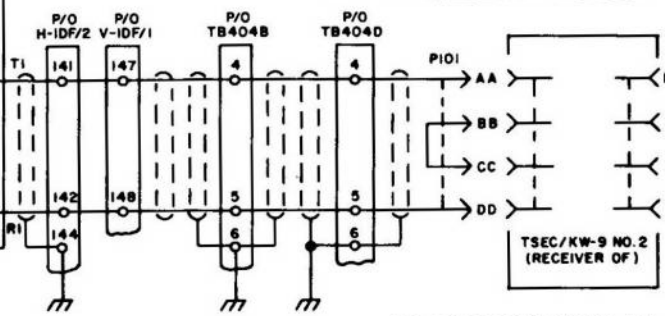
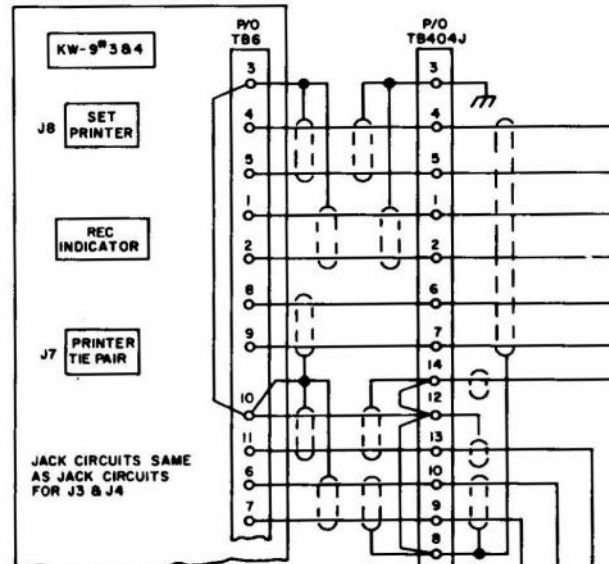
P/O CONTROL RELAY PANEL NO. 1

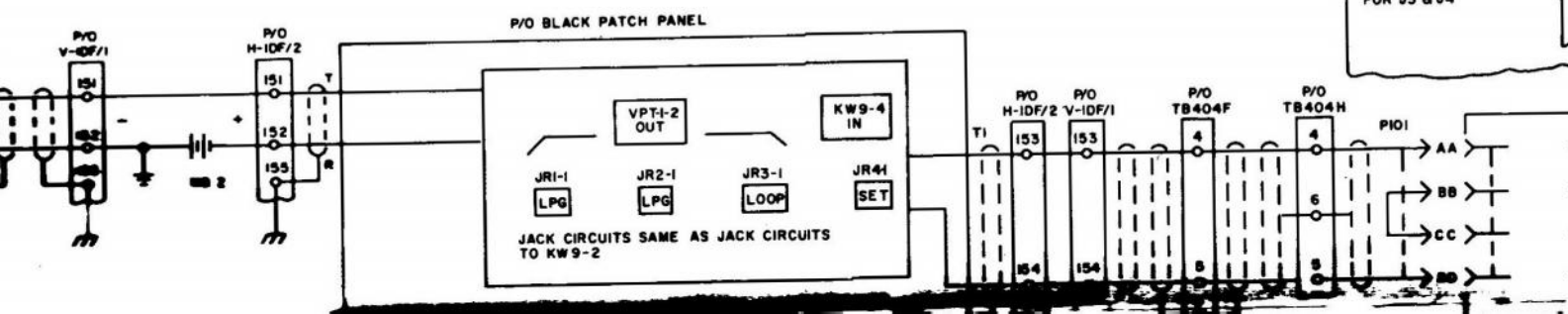
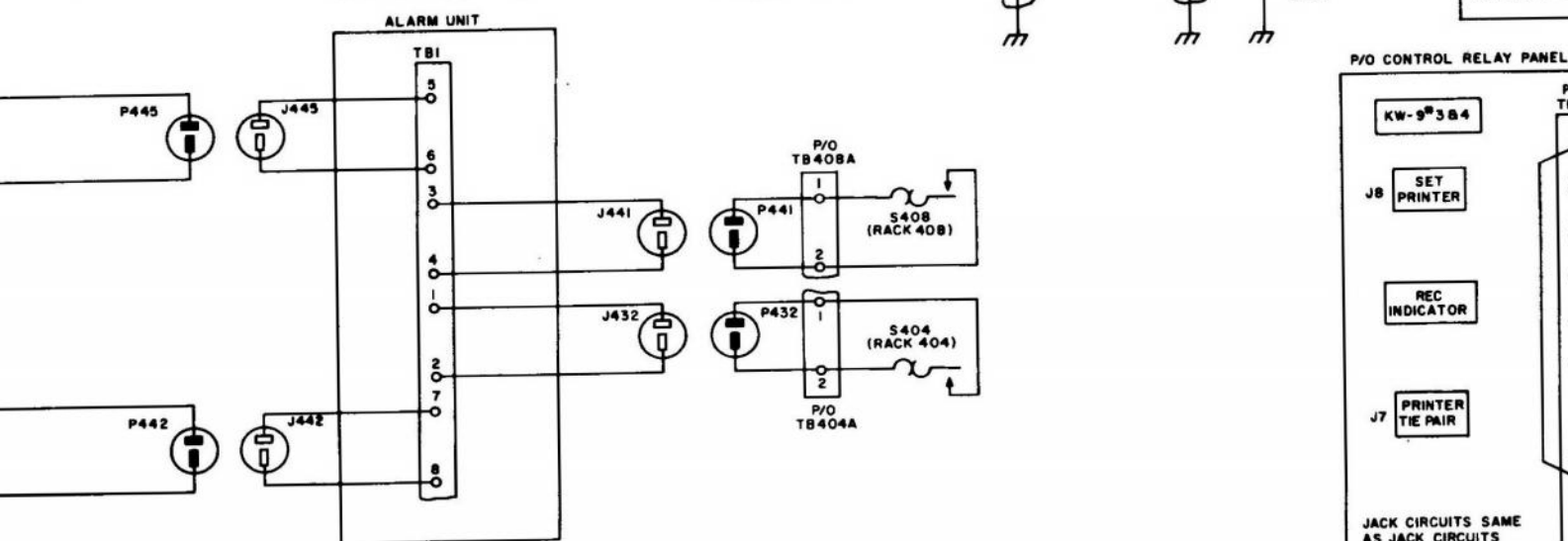
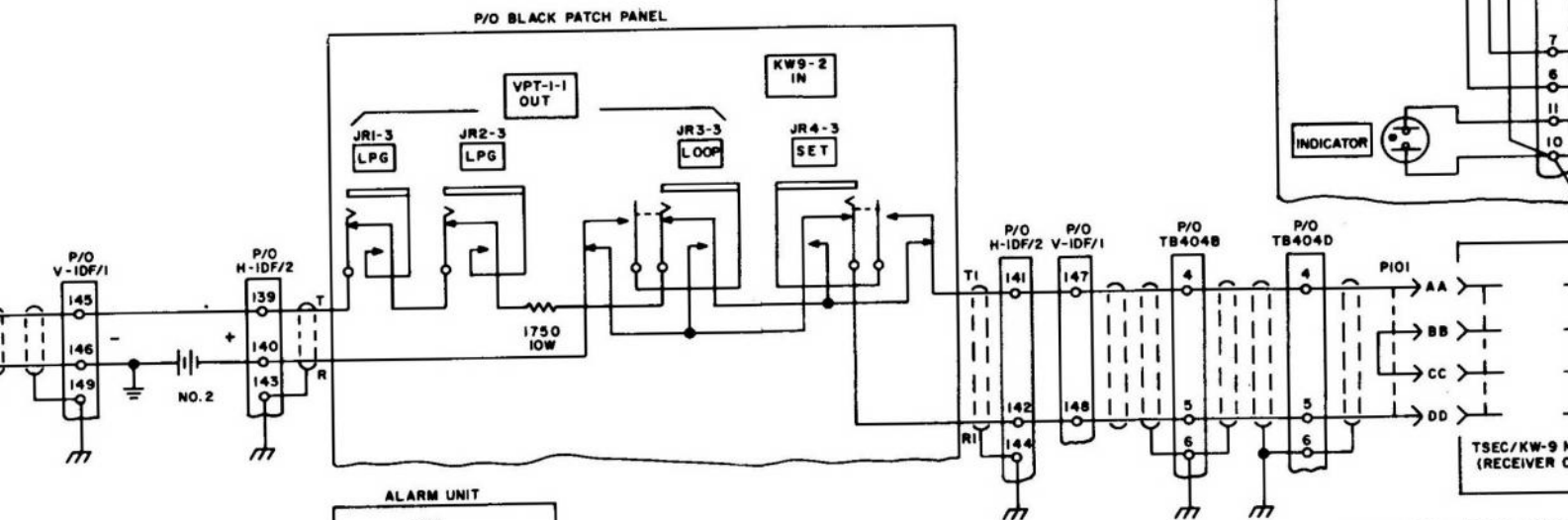


P/O BLACK PATCH PANEL



P/O CONTROL RELAY PANEL NO. 1





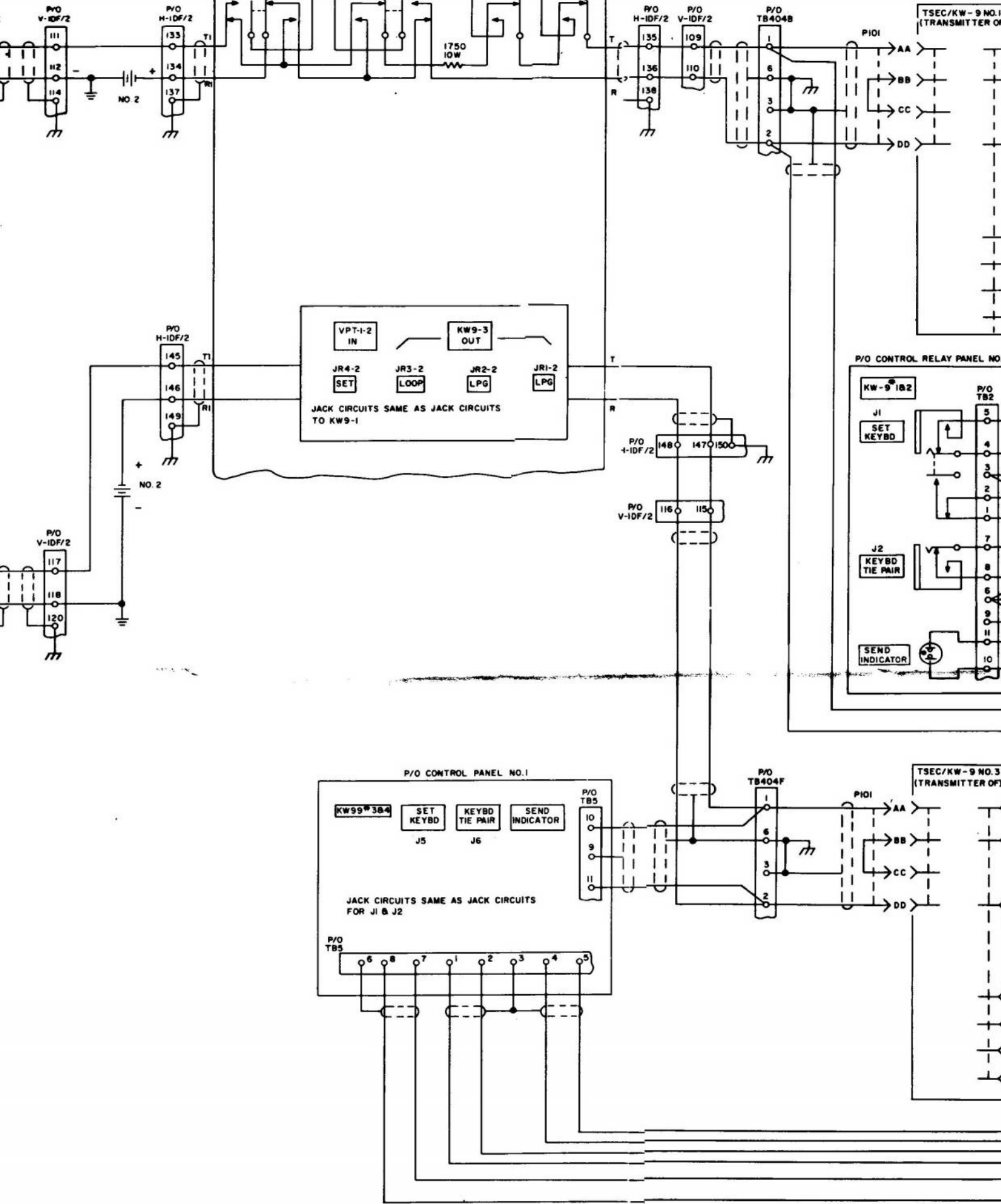
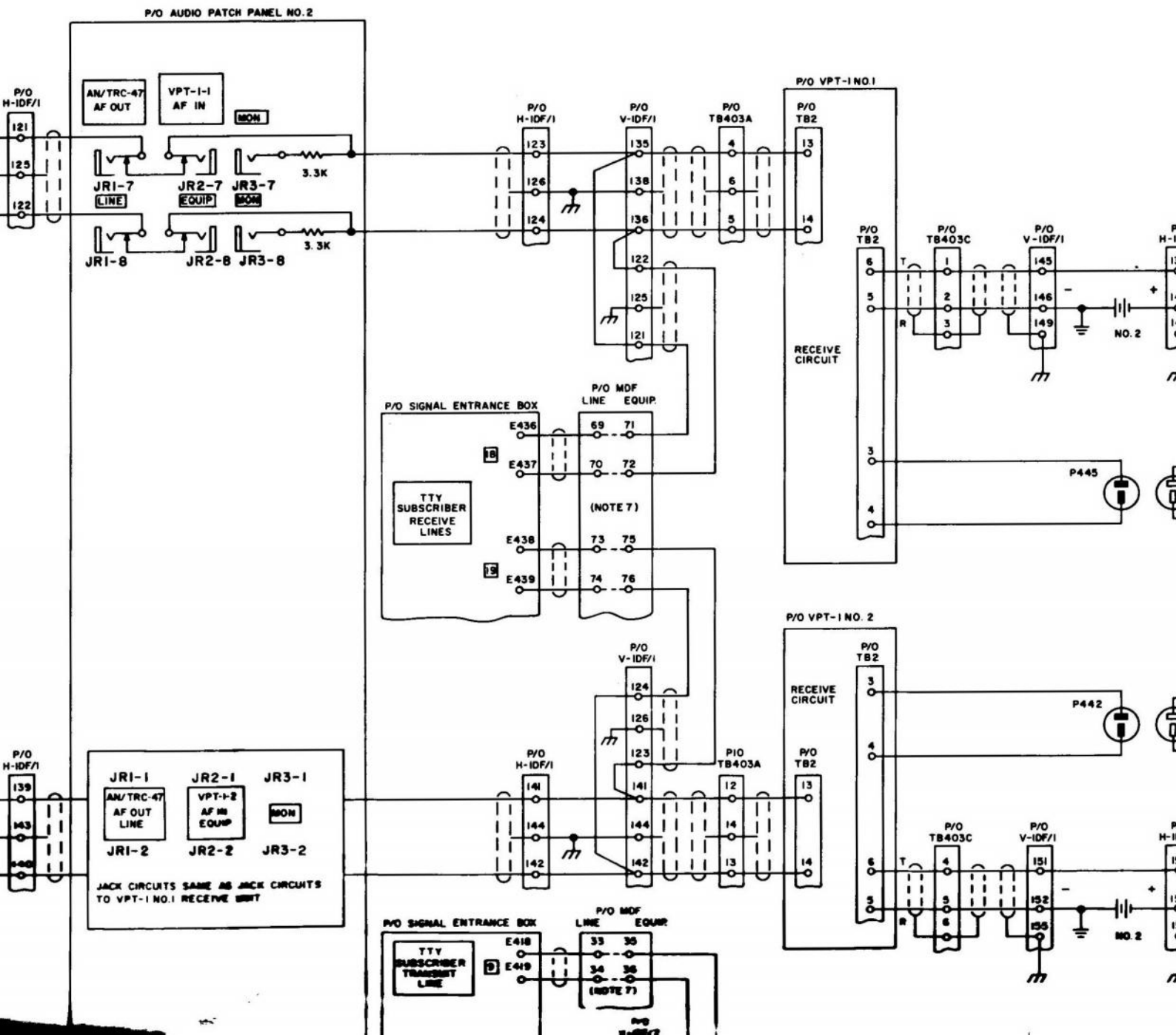
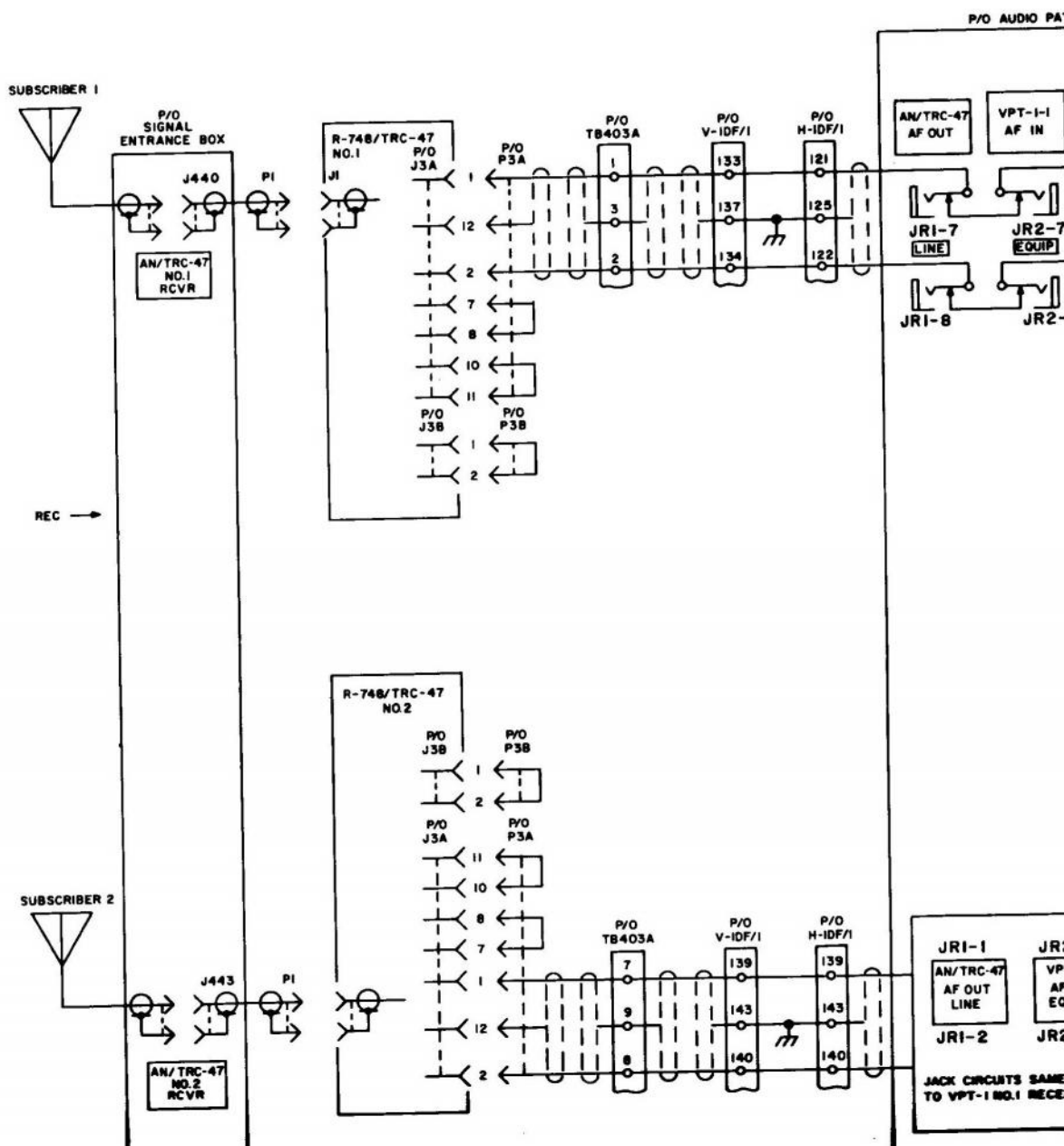
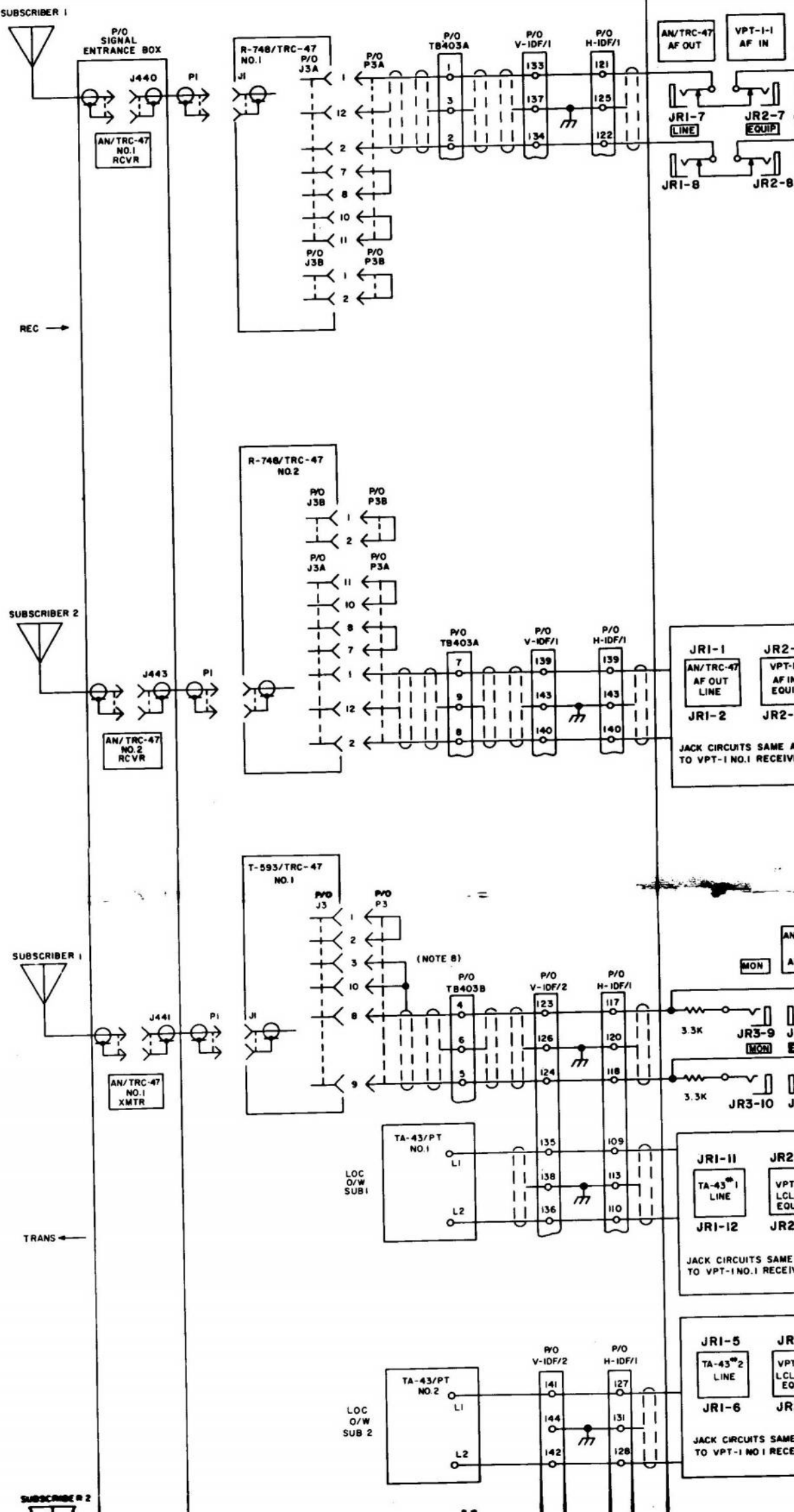
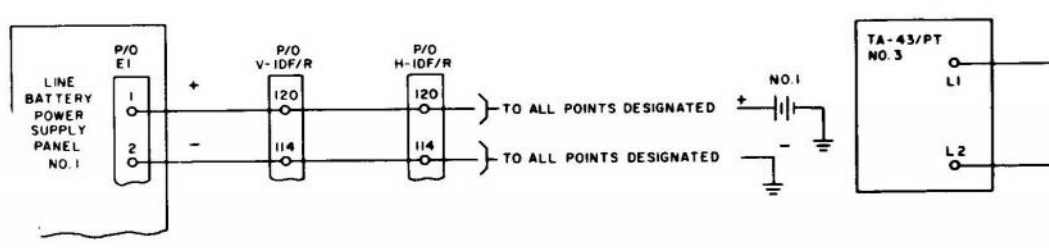
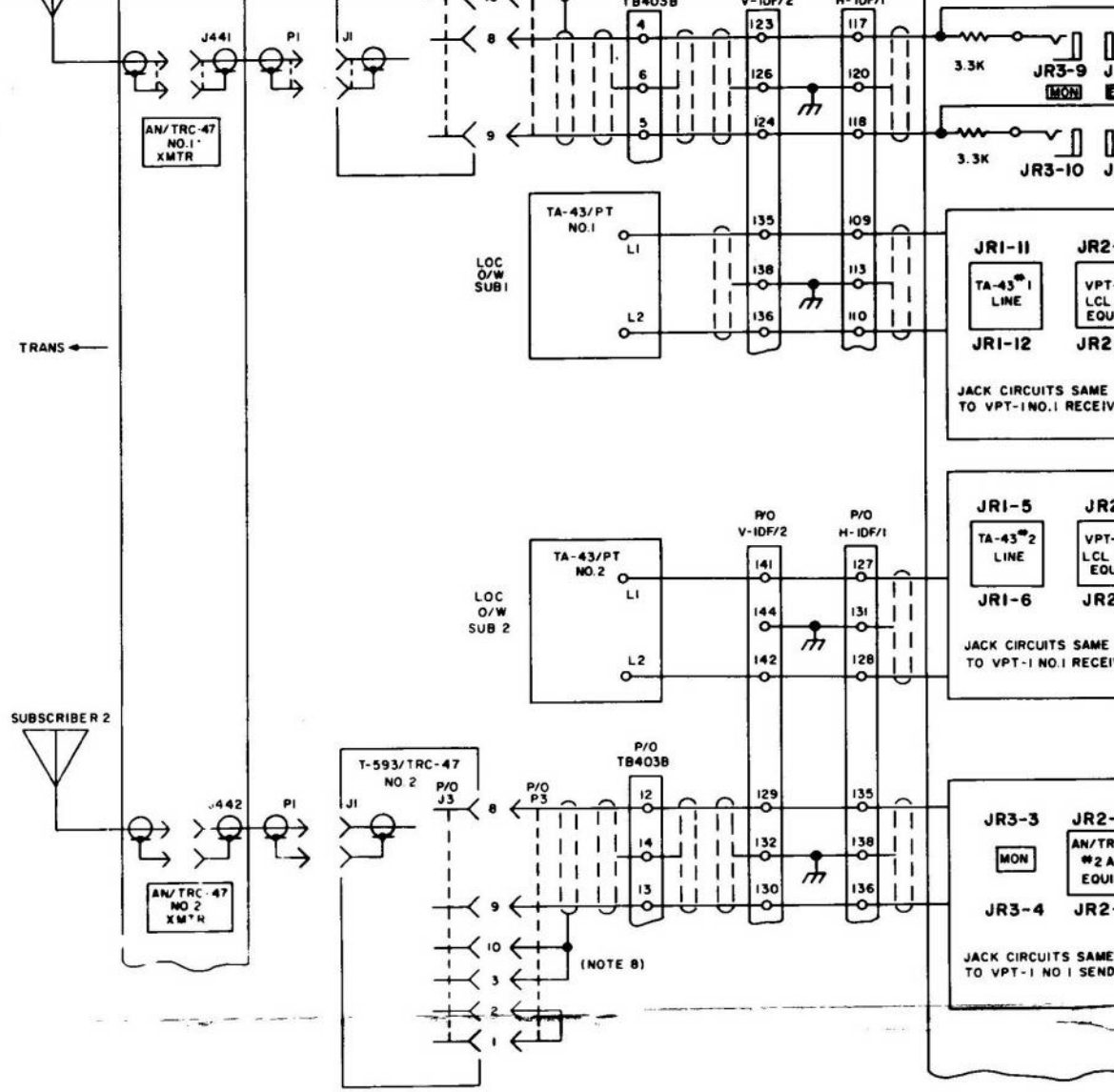


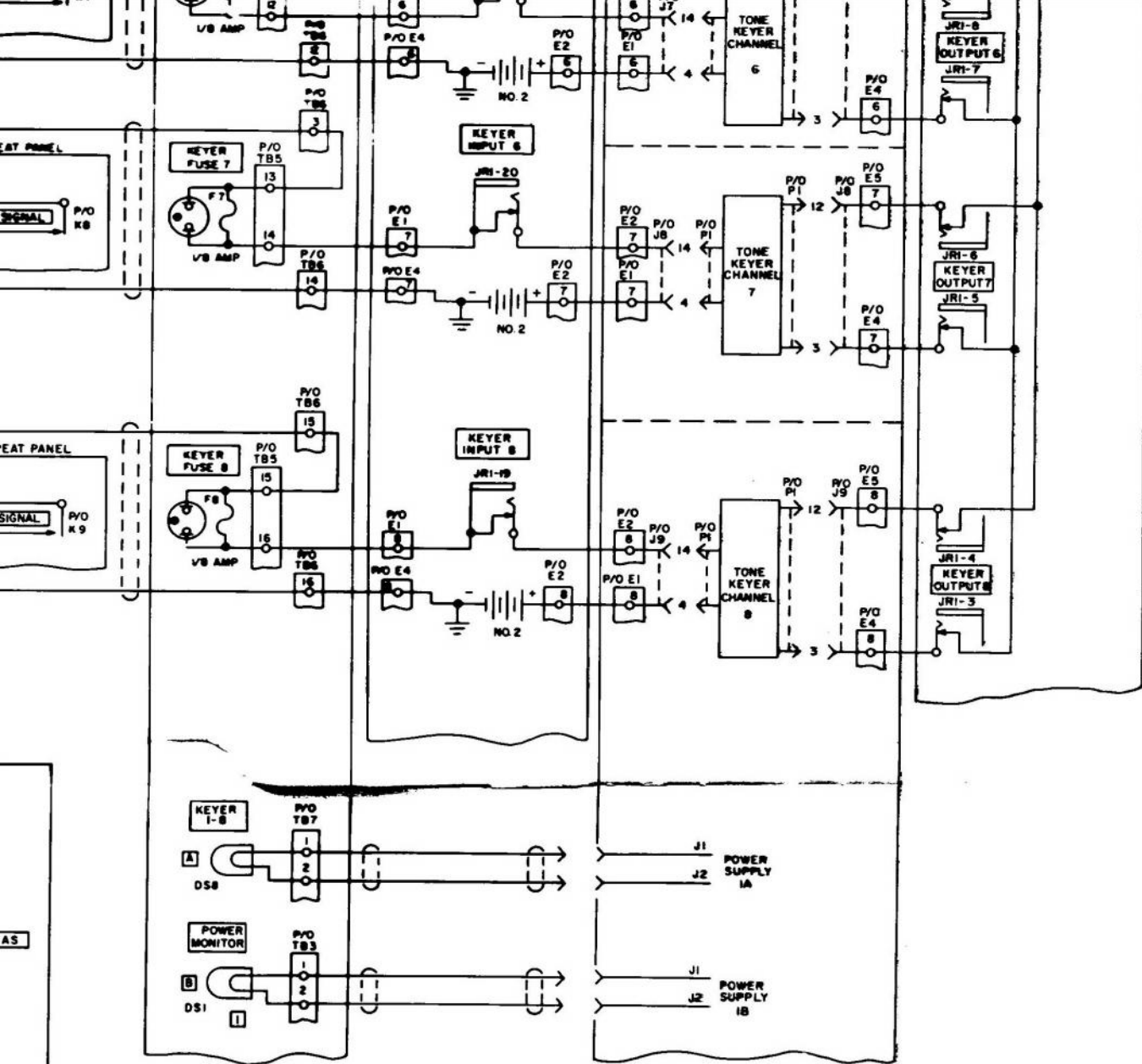
Figure 76 (1) . Radio terminal shelter signal distribution, schematic diagram, part 1 of 4.

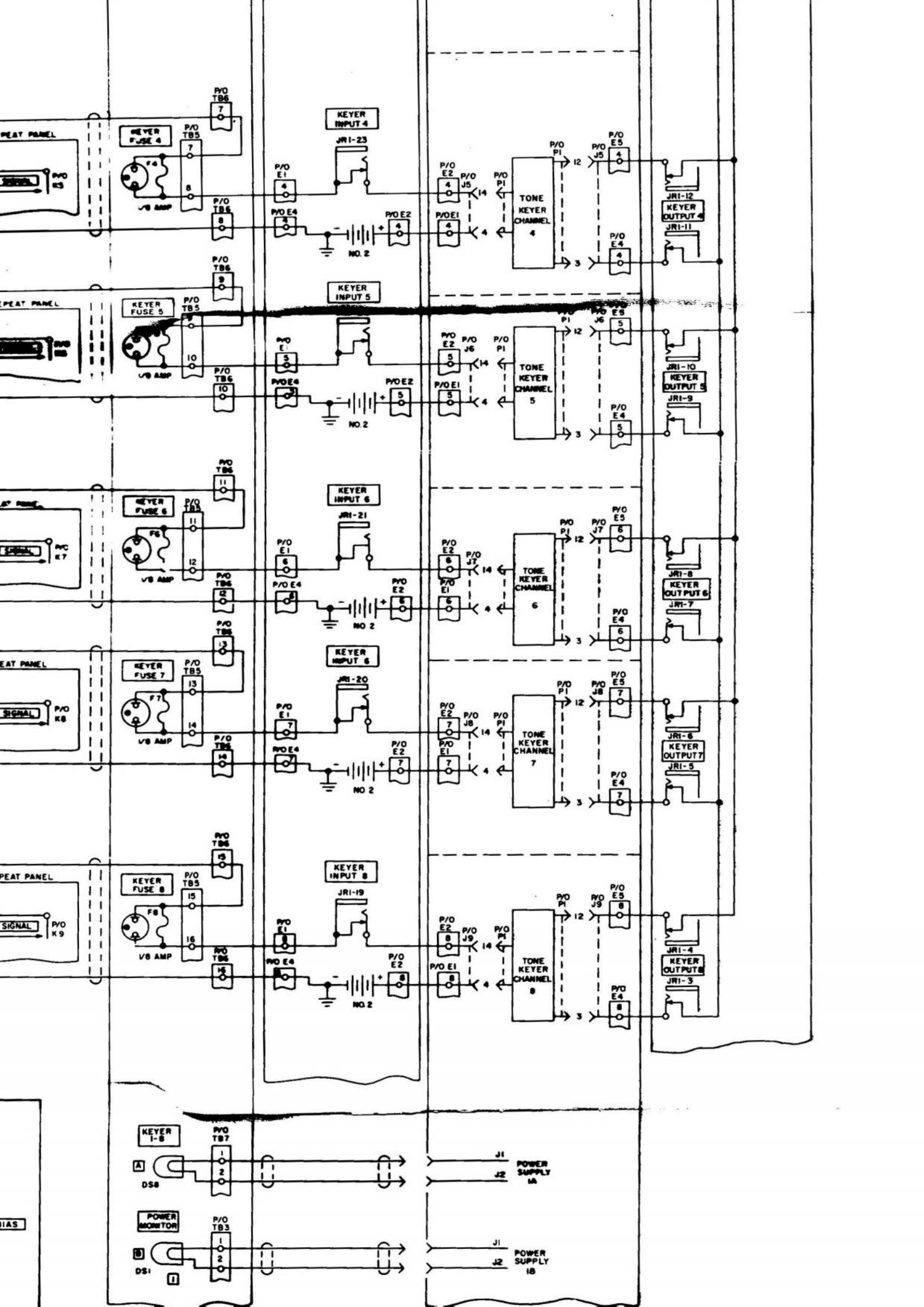


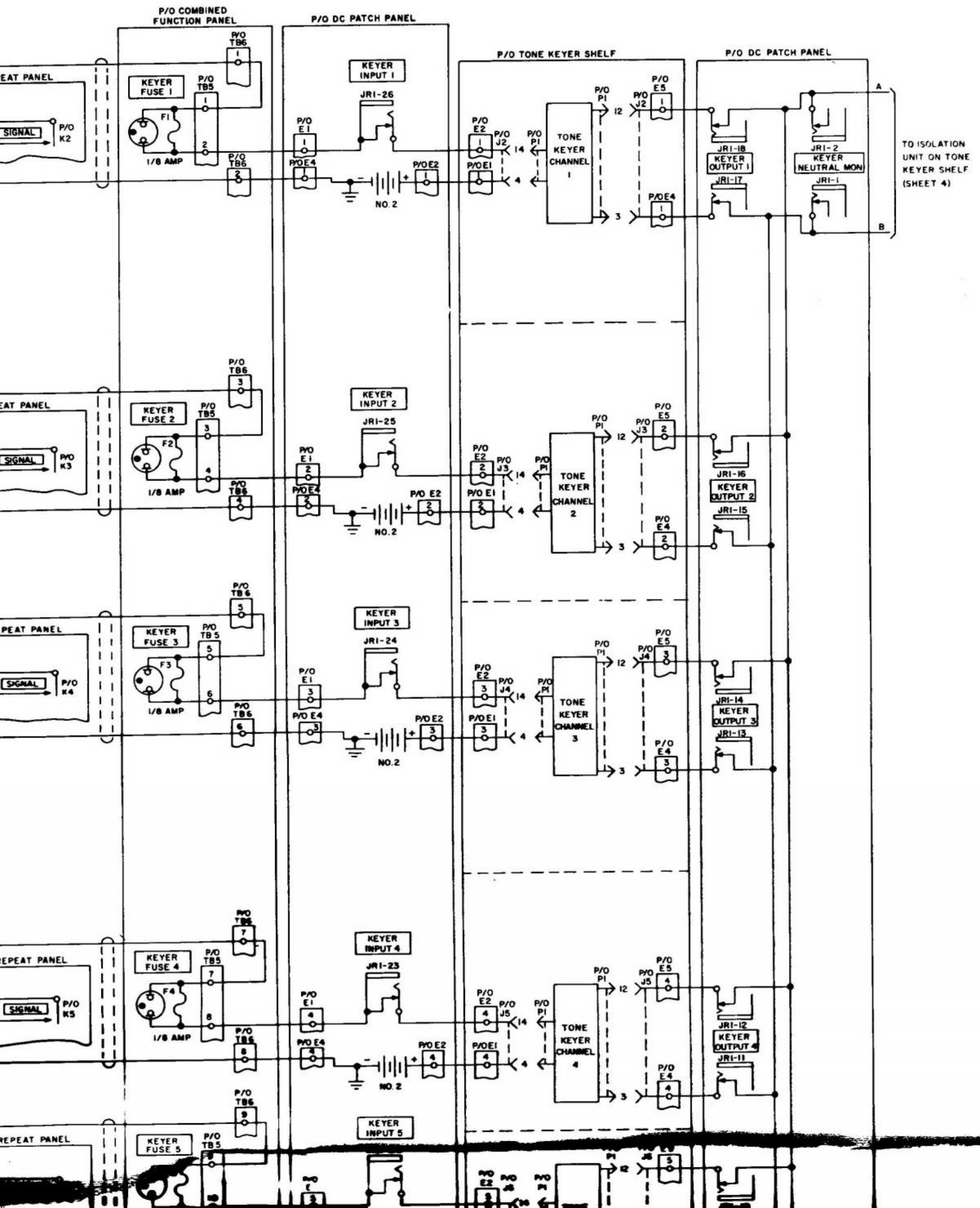


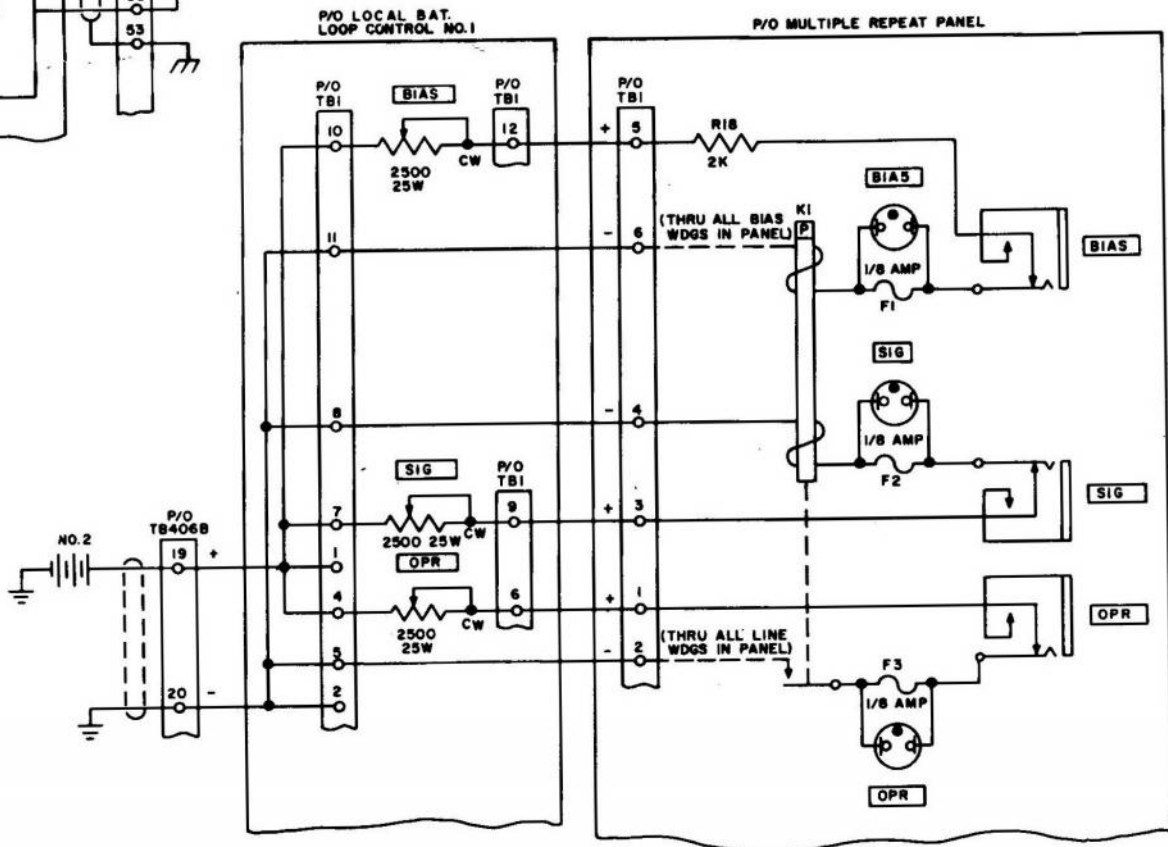
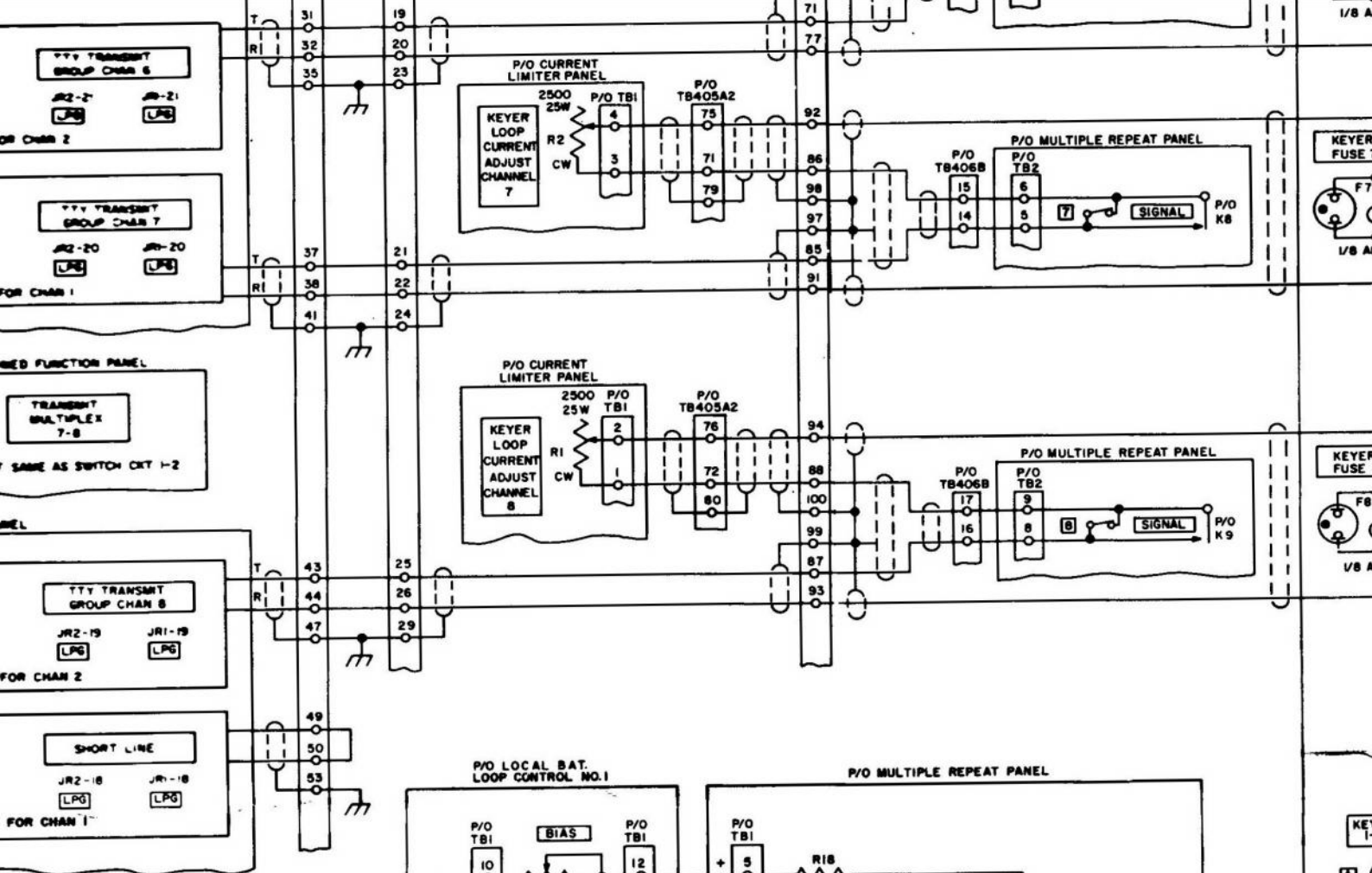












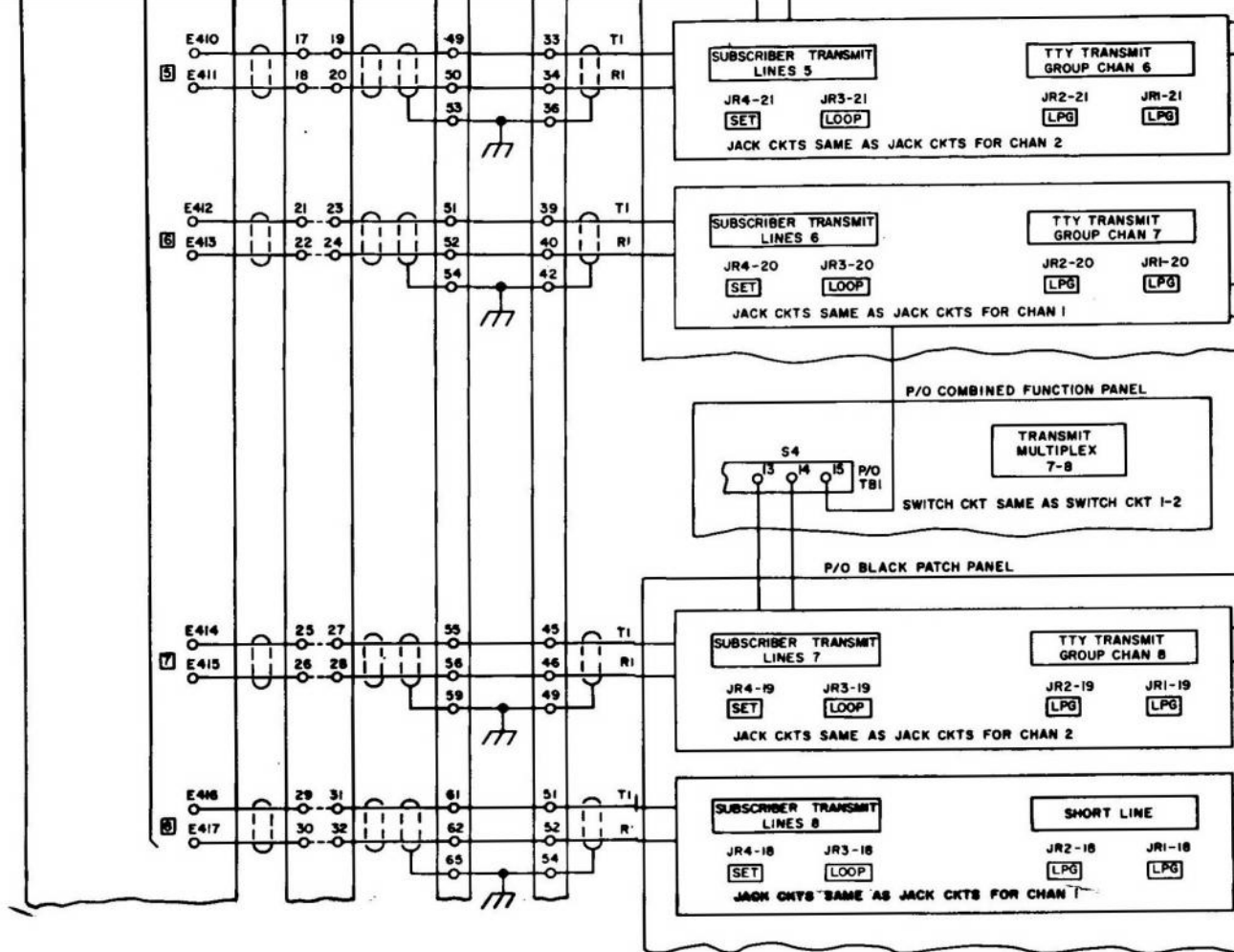
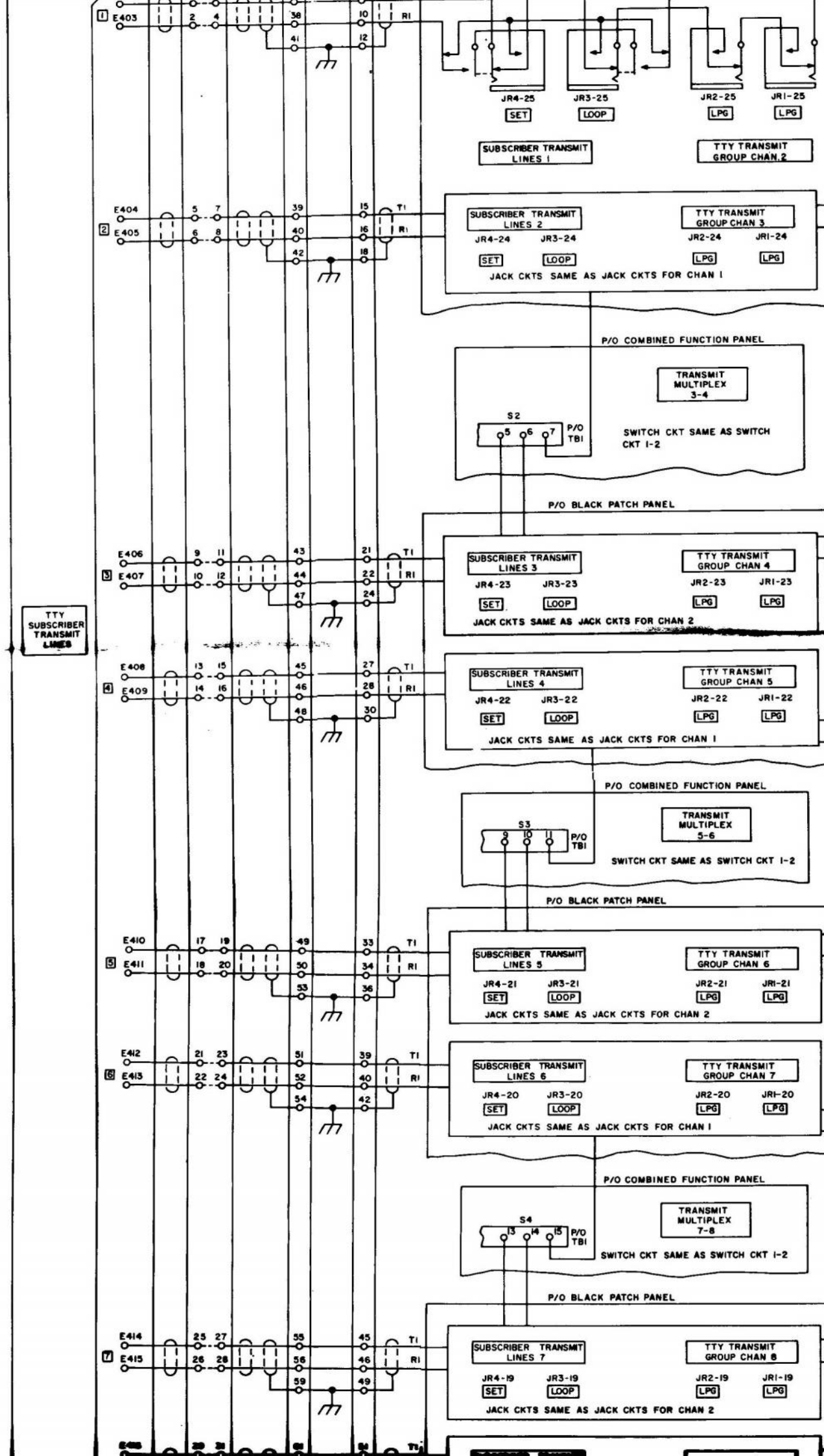
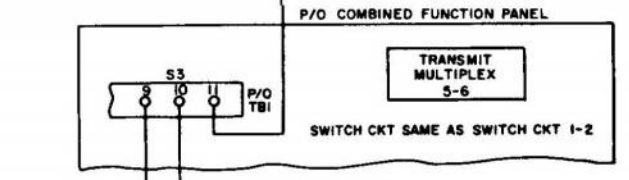
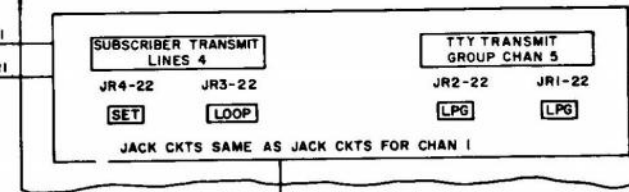
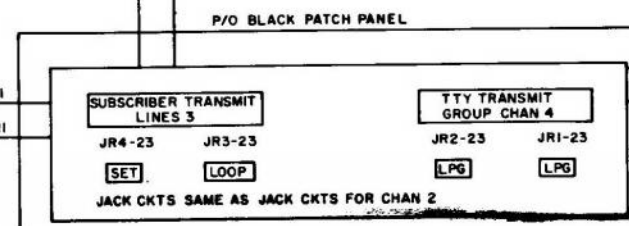
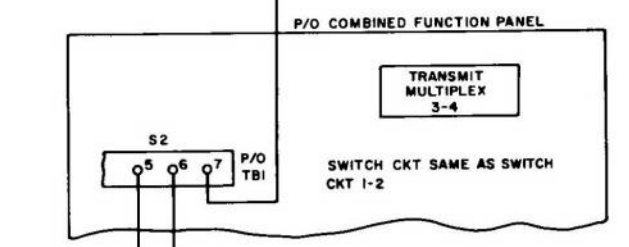
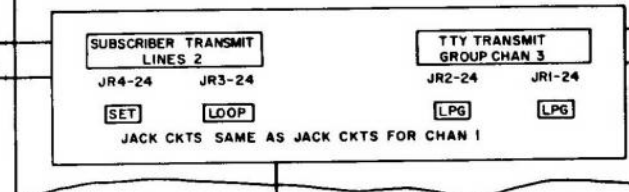
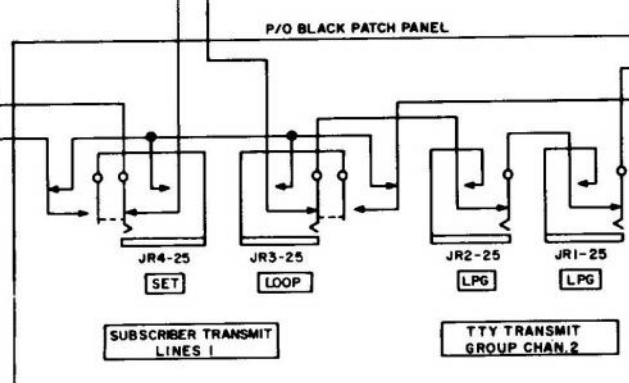
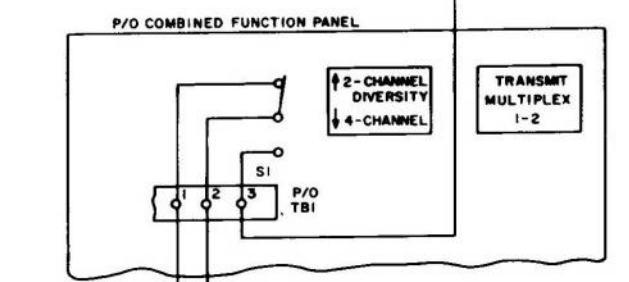
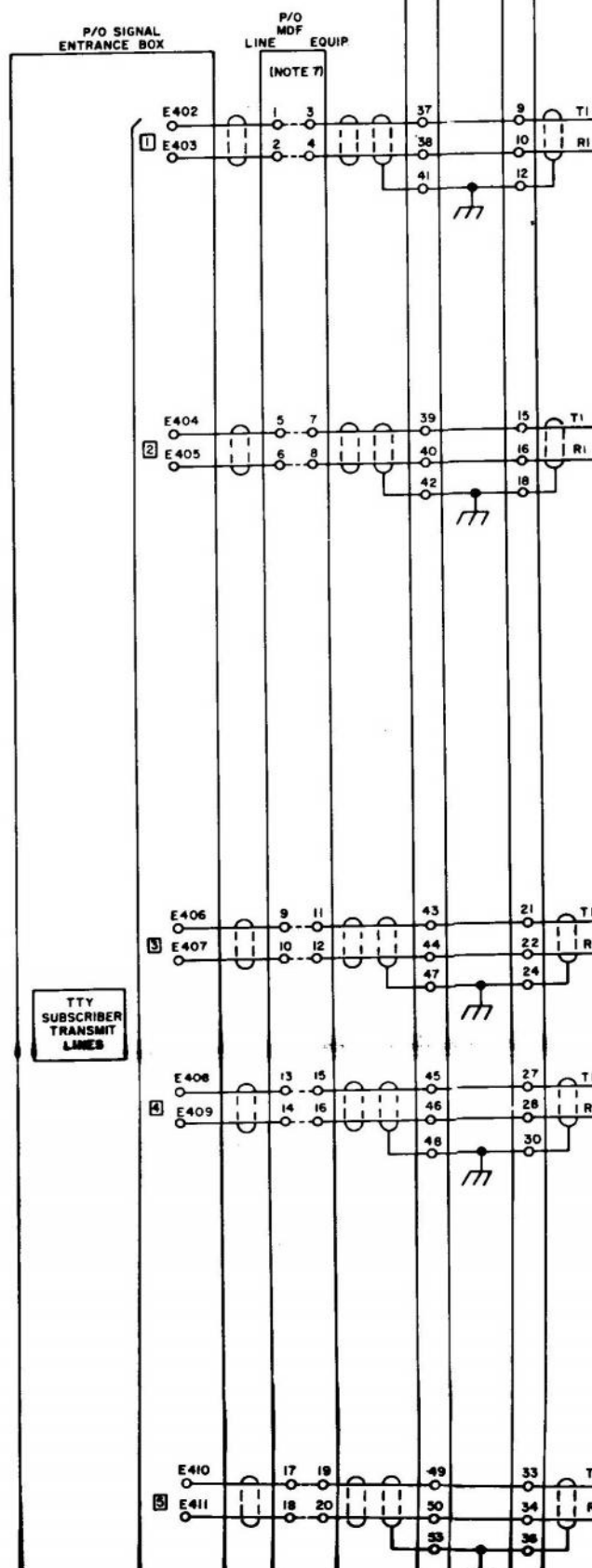
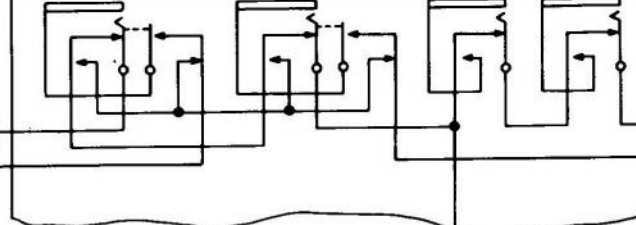
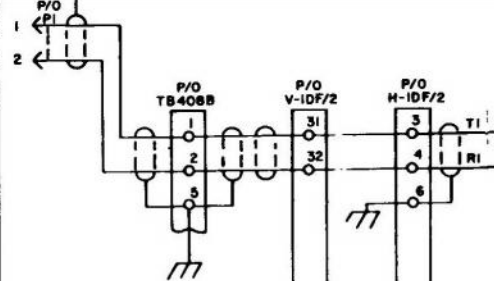
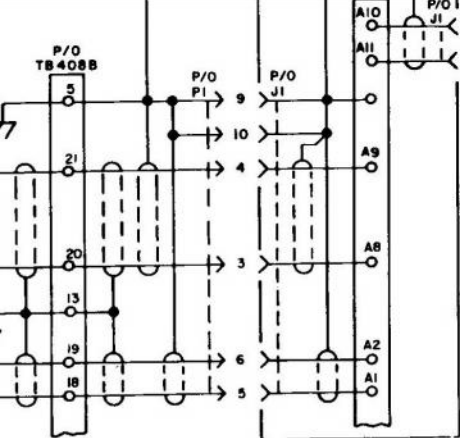


Figure 76 (2). Radio terminal shelter signal distribution, schematic diagram, part 2 of 4.





TTY SUBSCRIBER TRANSMIT LINES

(NOTE 7)

SUBSCRIBER TRANSMIT LINES 1

TTY TRANSMIT GROUP CHAN 2

SUBSCRIBER TRANSMIT LINES 2

TTY TRANSMIT GROUP CHAN 3

SUBSCRIBER TRANSMIT LINES 3

TTY TRANSMIT GROUP CHAN 4

SUBSCRIBER TRANSMIT LINES 4

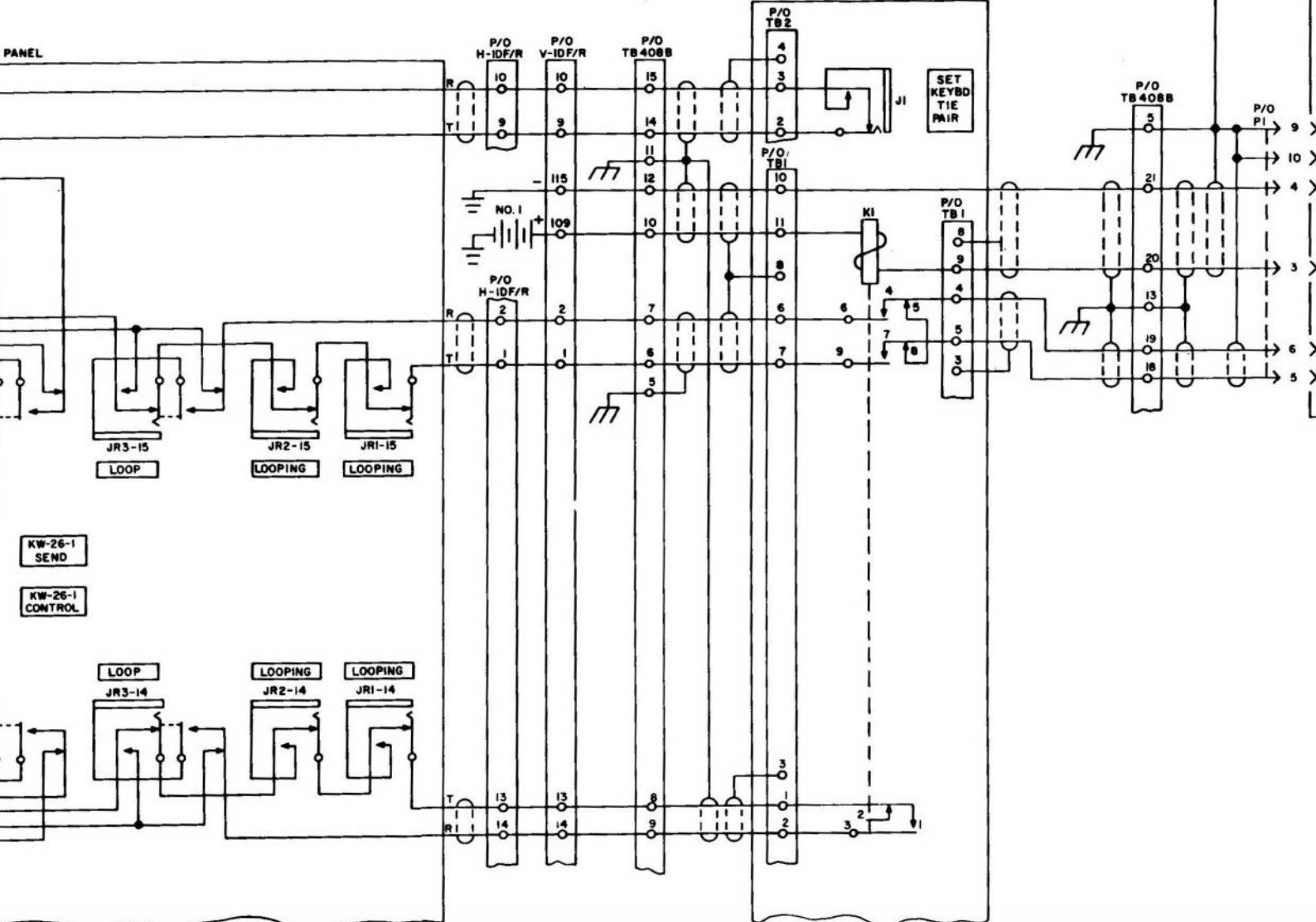
TTY TRANSMIT GROUP CHAN 5

SUBSCRIBER TRANSMIT LINES 5

TTY TRANSMIT GROUP CHAN 6

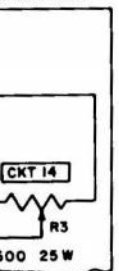
PANEL

P/O CONTROL RELAY
PANEL NO. 2

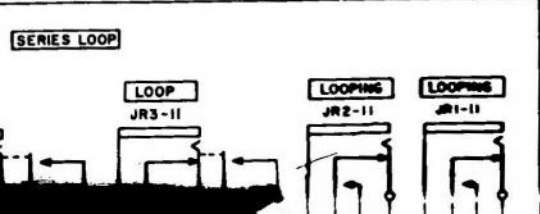


KW-26-1
SEND
KW-26-1
CONTROL

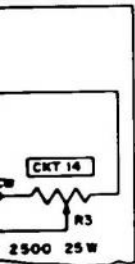
AL BAT
CONTROL NO. 3



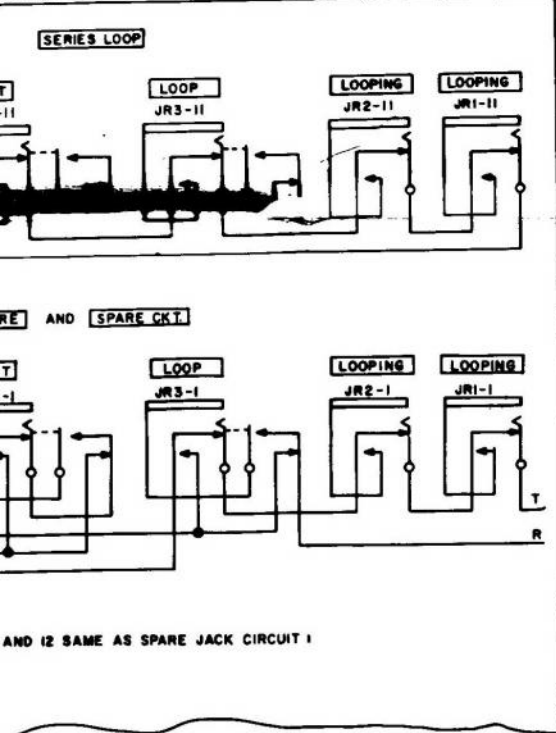
RED PATCH PANEL

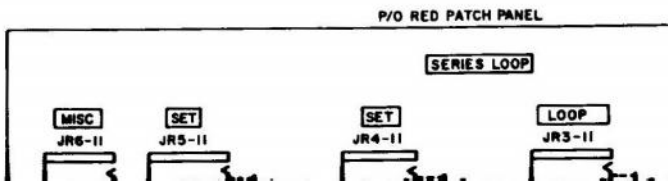
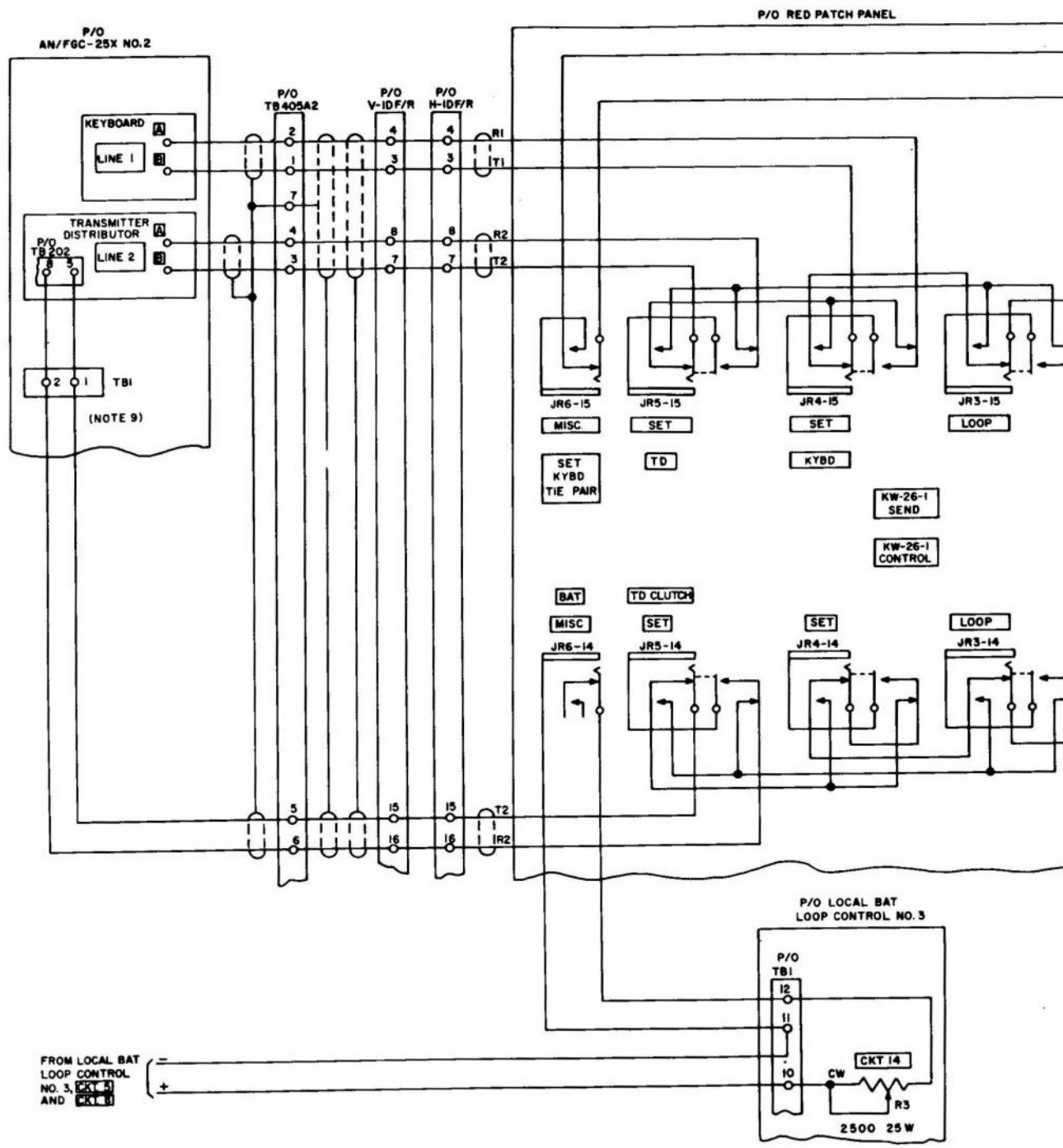


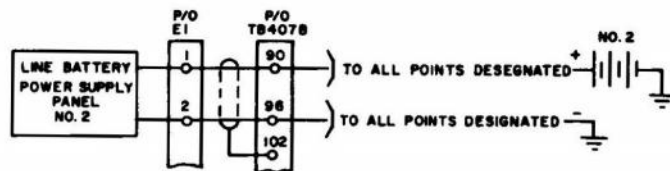
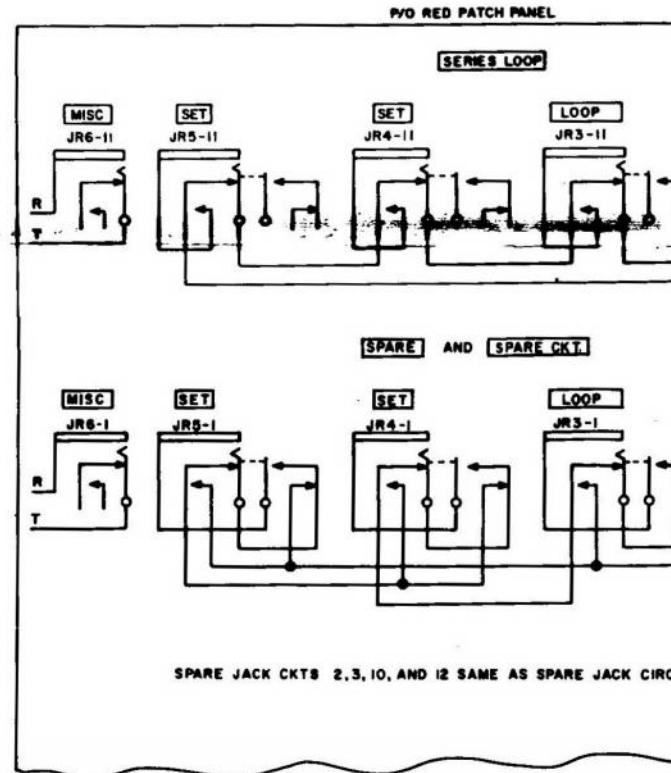
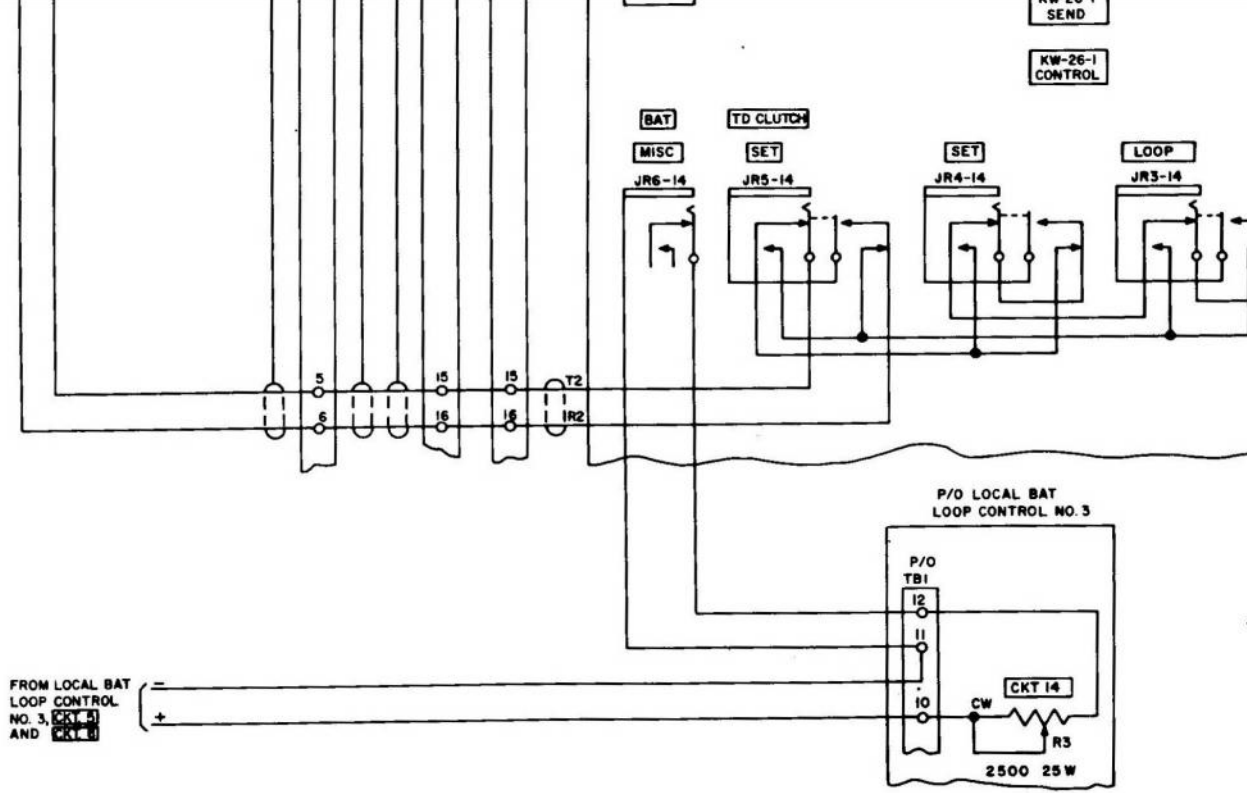
LOCAL BAY
CONTROL NO 3



RED PATCH PANEL

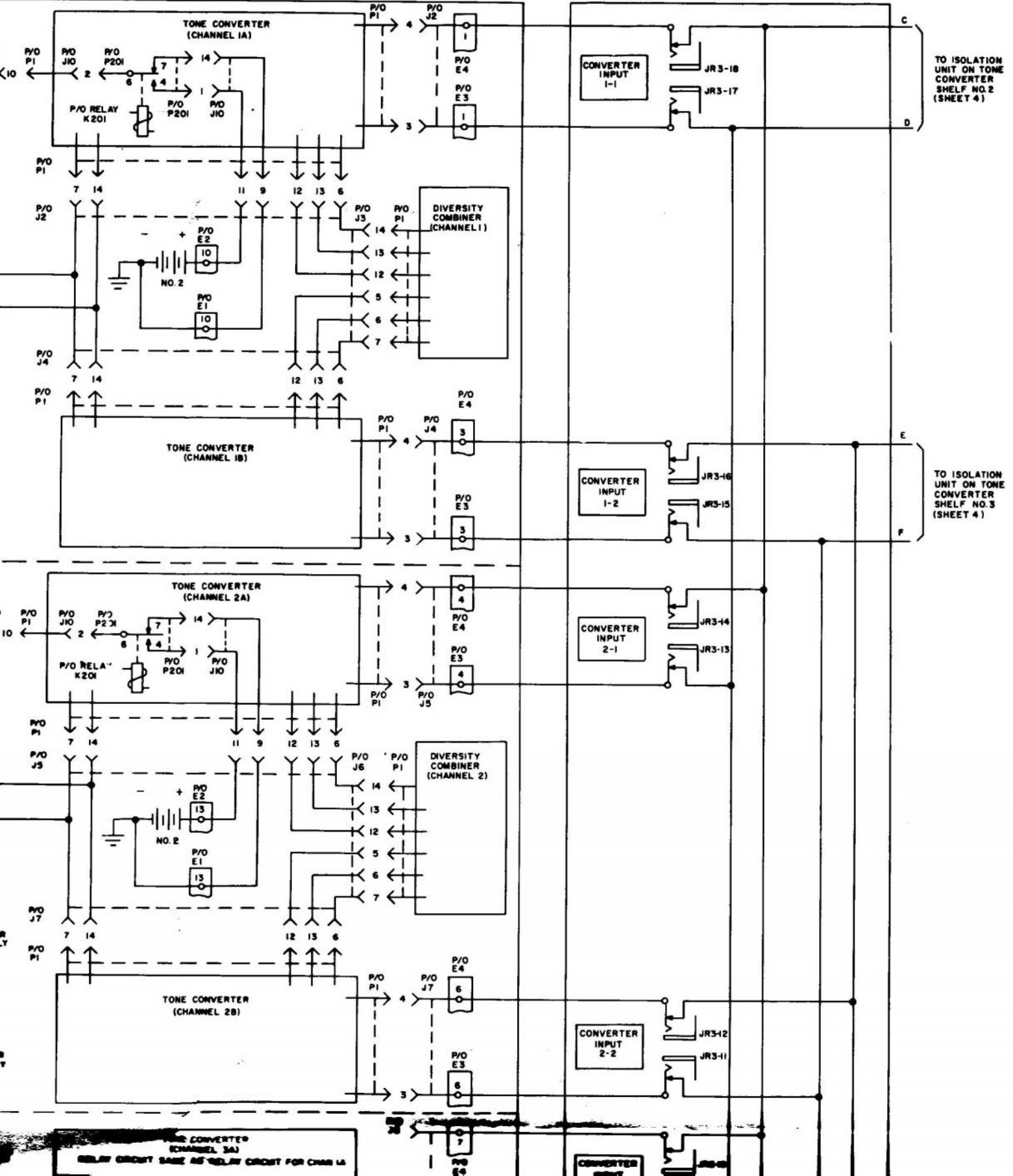


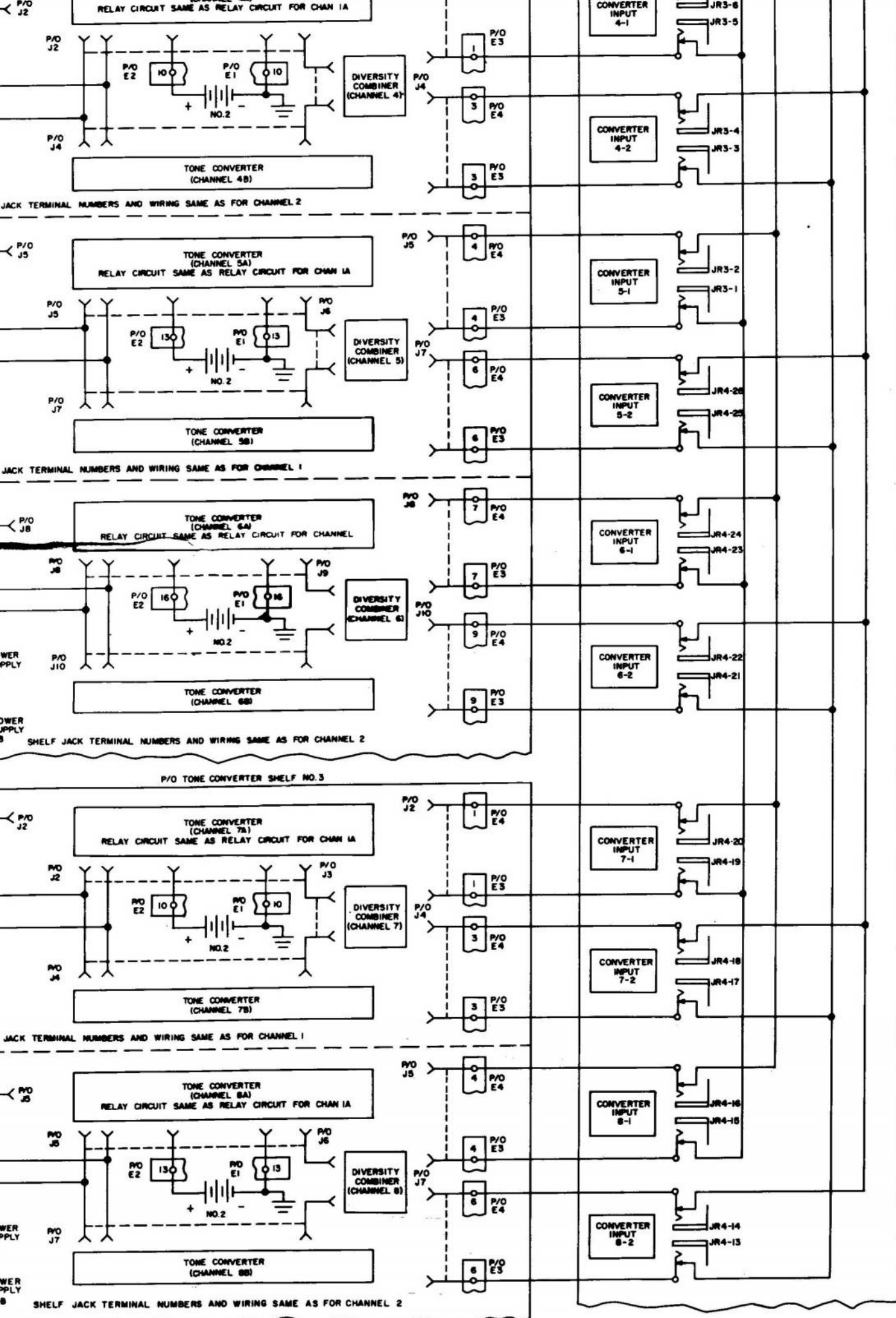


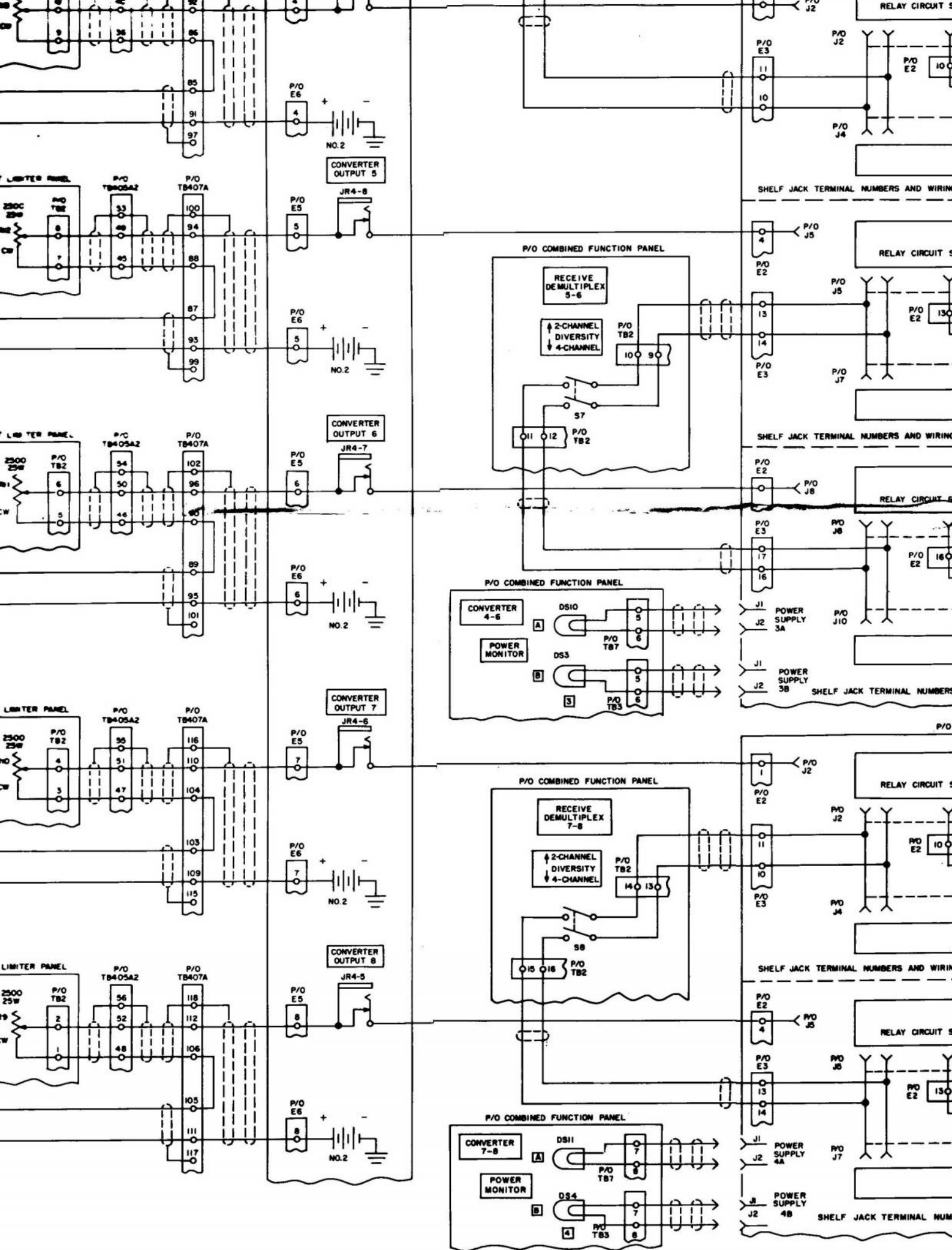


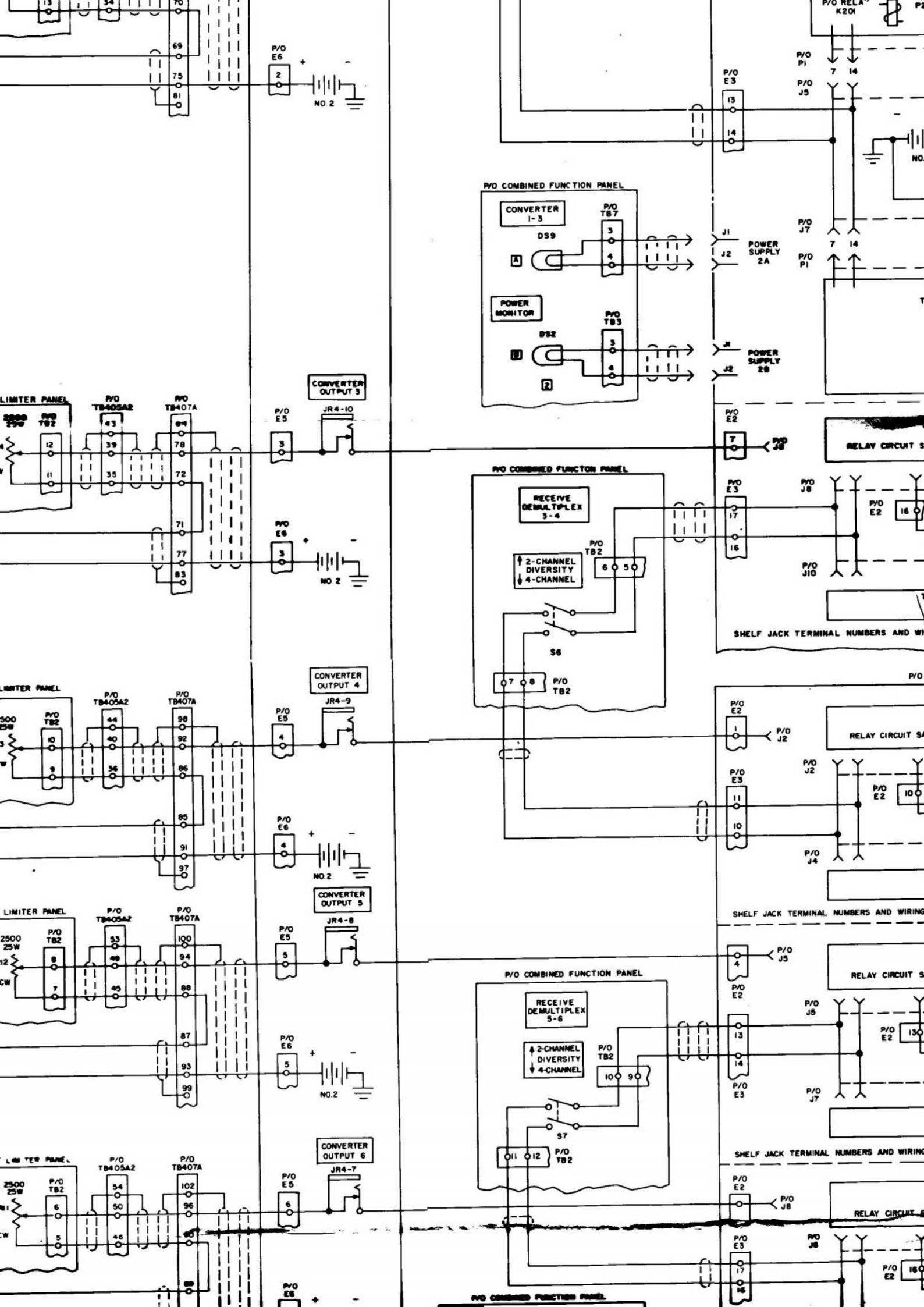
P/O TONE CONVERTER SHELF NO.1

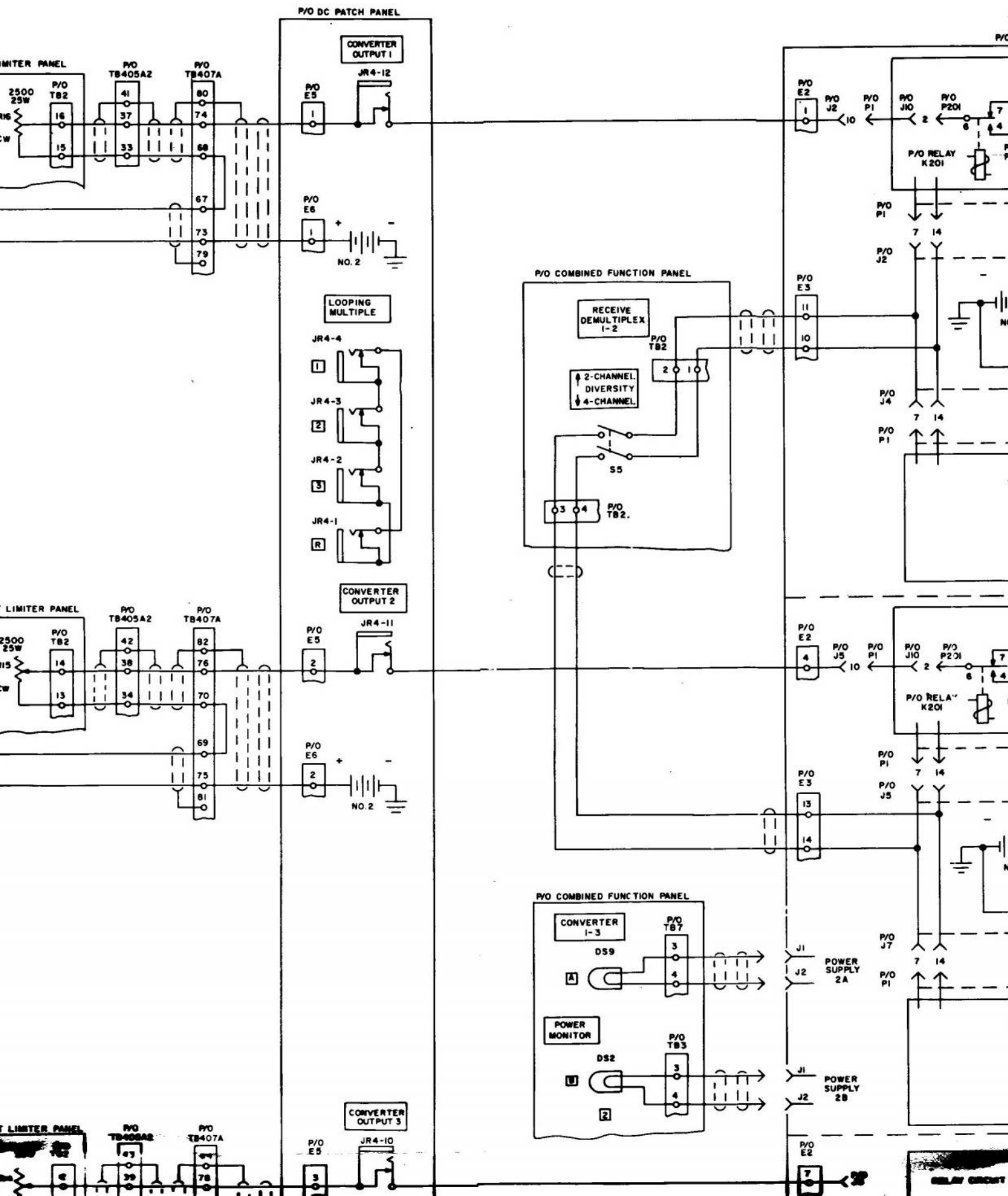
P/O DC PATCH PANEL











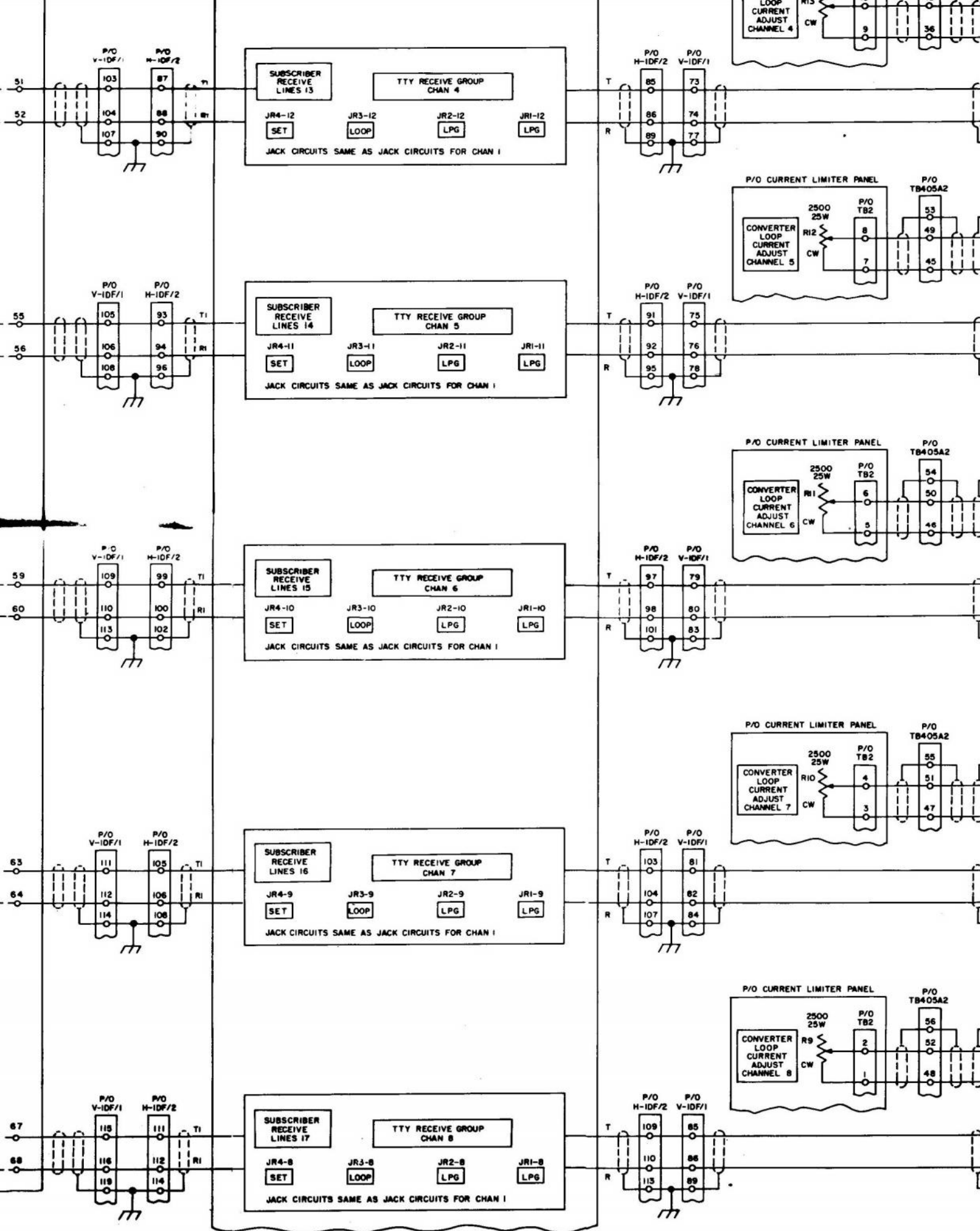
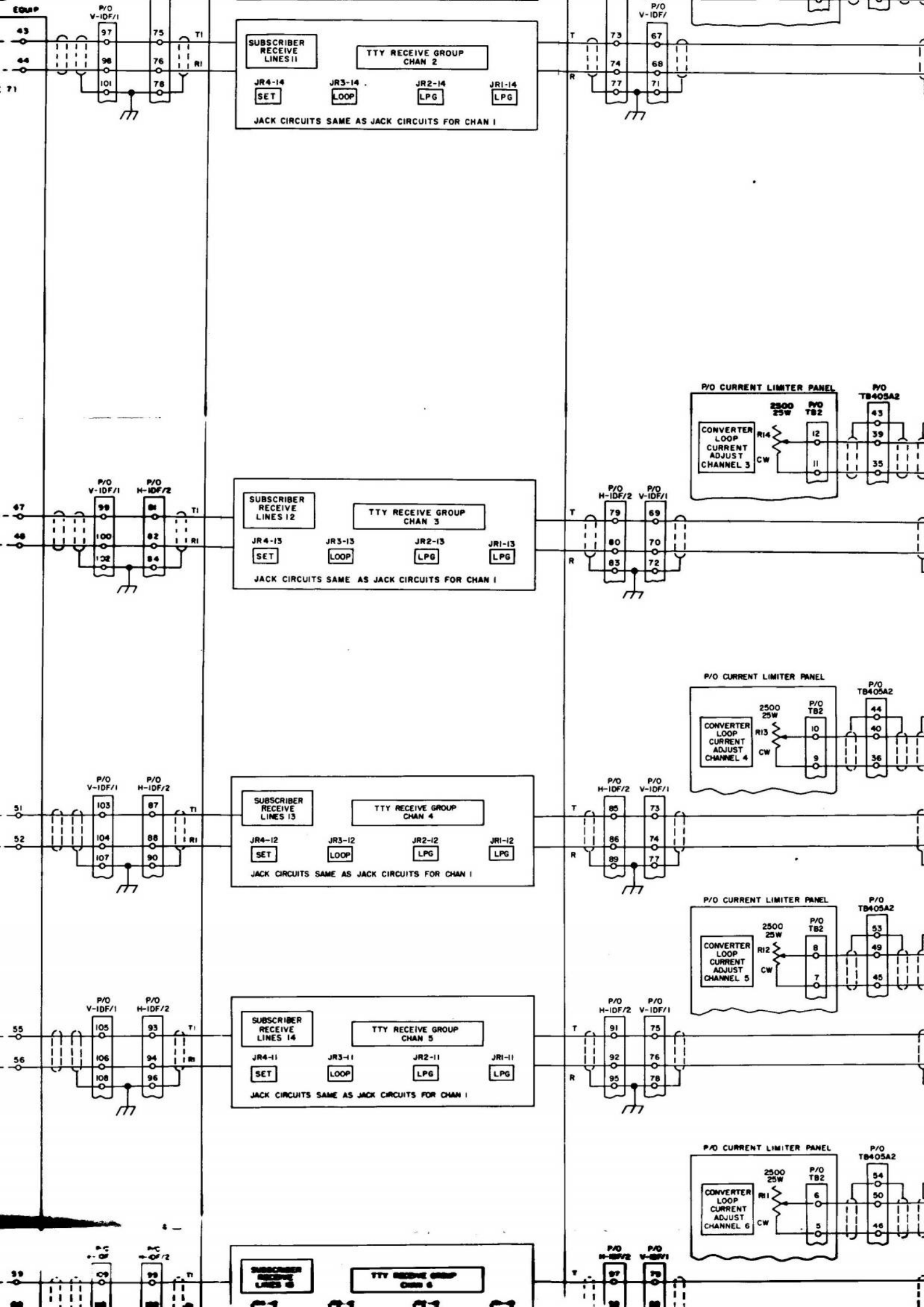
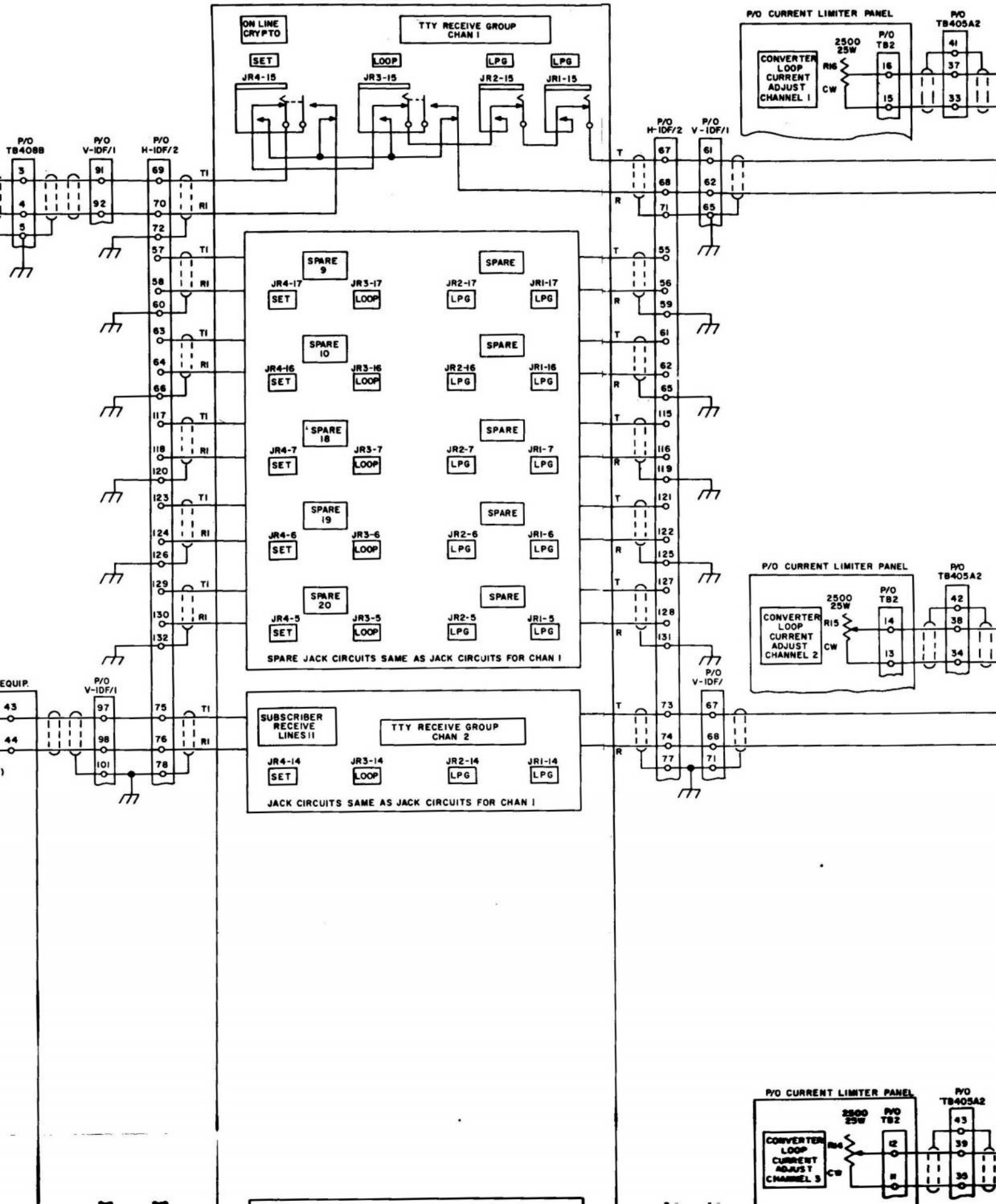


Figure 76 (3). Radio terminal shelter signal distribution, schematic



P/O BLACK PATCH PATCH



ON LINE CRYPTO

TTY RECEIVE GROUP CHAN 1

SET JR4-15

LOOP JR3-15

LPG JR2-15

LPG JRI-15

P/O CURRENT LIMITER PANEL

CONVERTER LOOP CURRENT ADJUST CHANNEL 1

2500 25W P/O TB2

R16 CW

16 15

P/O TB405A2

41 37 33

SPARE JACK CIRCUITS SAME AS JACK CIRCUITS FOR CHAN 1

SPARE 9	SPARE
JR4-17 SET	JR3-17 LOOP
JR2-17 LPG	JRI-17 LPG
SPARE 10	SPARE
JR4-16 SET	JR3-16 LOOP
JR2-16 LPG	JRI-16 LPG
SPARE 18	SPARE
JR4-7 SET	JR3-7 LOOP
JR2-7 LPG	JRI-7 LPG
SPARE 19	SPARE
JR4-6 SET	JR3-6 LOOP
JR2-6 LPG	JRI-6 LPG
SPARE 20	SPARE
JR4-5 SET	JR3-5 LOOP
JR2-5 LPG	JRI-5 LPG

P/O CURRENT LIMITER PANEL

CONVERTER LOOP CURRENT ADJUST CHANNEL 2

2500 25W P/O TB2

R15 CW

14 13

P/O TB405A2

42 38 34

SUBSCRIBER RECEIVE LINES II

TTY RECEIVE GROUP CHAN 2

JR4-14 SET

JR3-14 LOOP

JR2-14 LPG

JRI-14 LPG

JACK CIRCUITS SAME AS JACK CIRCUITS FOR CHAN 1

P/O CURRENT LIMITER PANEL

CONVERTER LOOP CURRENT ADJUST CHANNEL 3

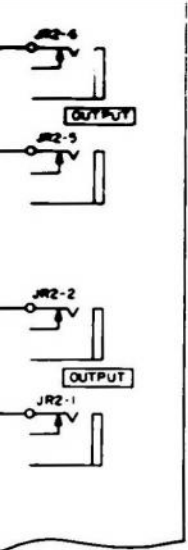
2500 25W P/O TB2

R14 CW

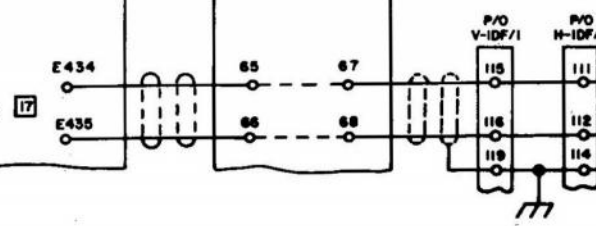
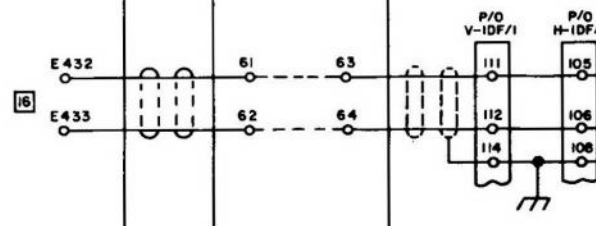
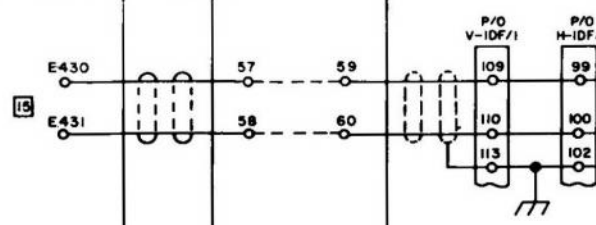
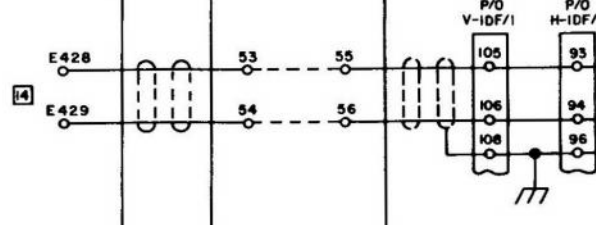
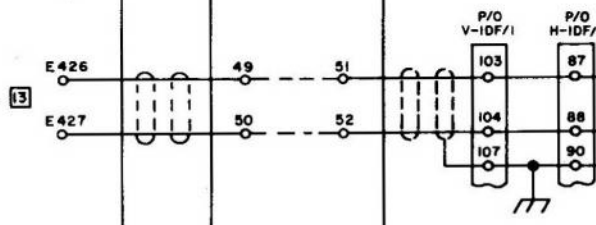
12 11

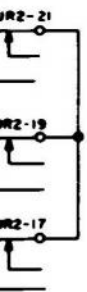
P/O TB405A2

43 39 35



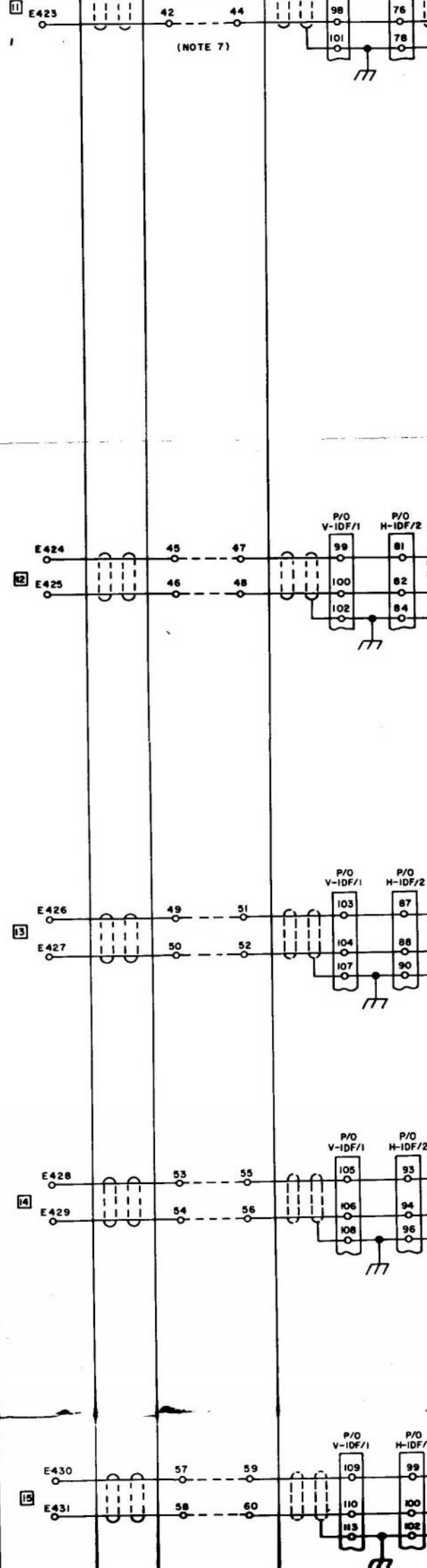
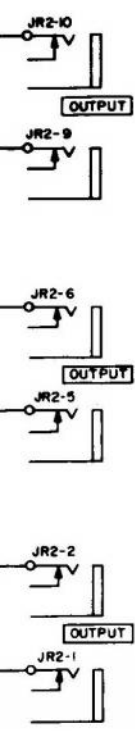
TTY
SUBSCRIBER
RECEIVE
LINES



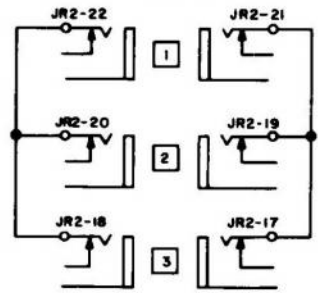


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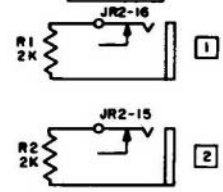
2



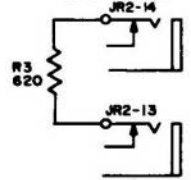
TONE MULTIPLE



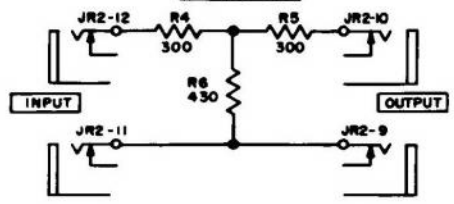
2K OHMS LOADS



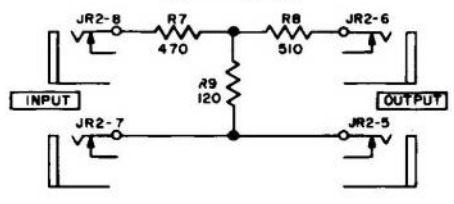
600 OHMS LOADS



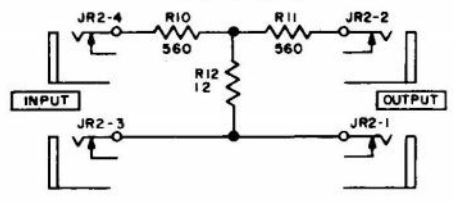
10 DECIBELS

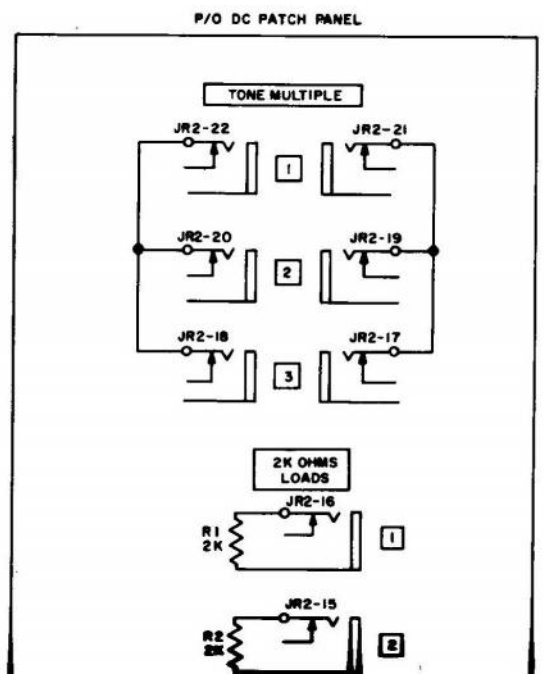
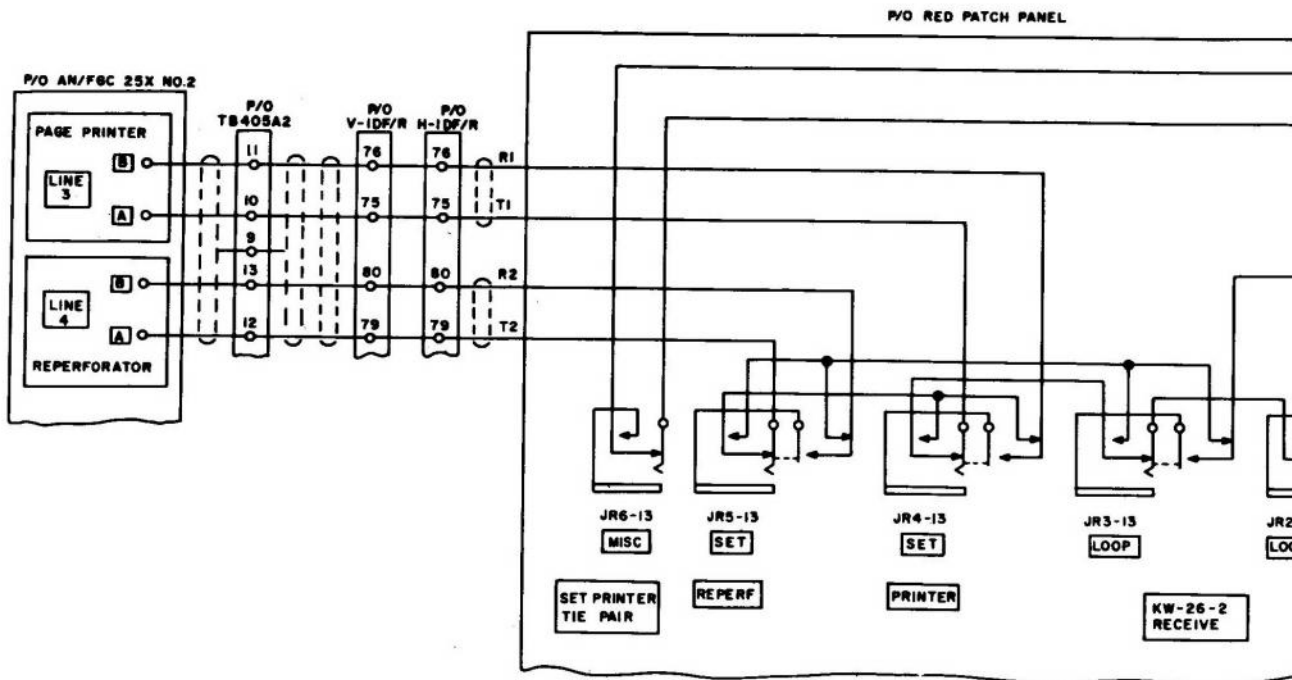


20 DECIBELS



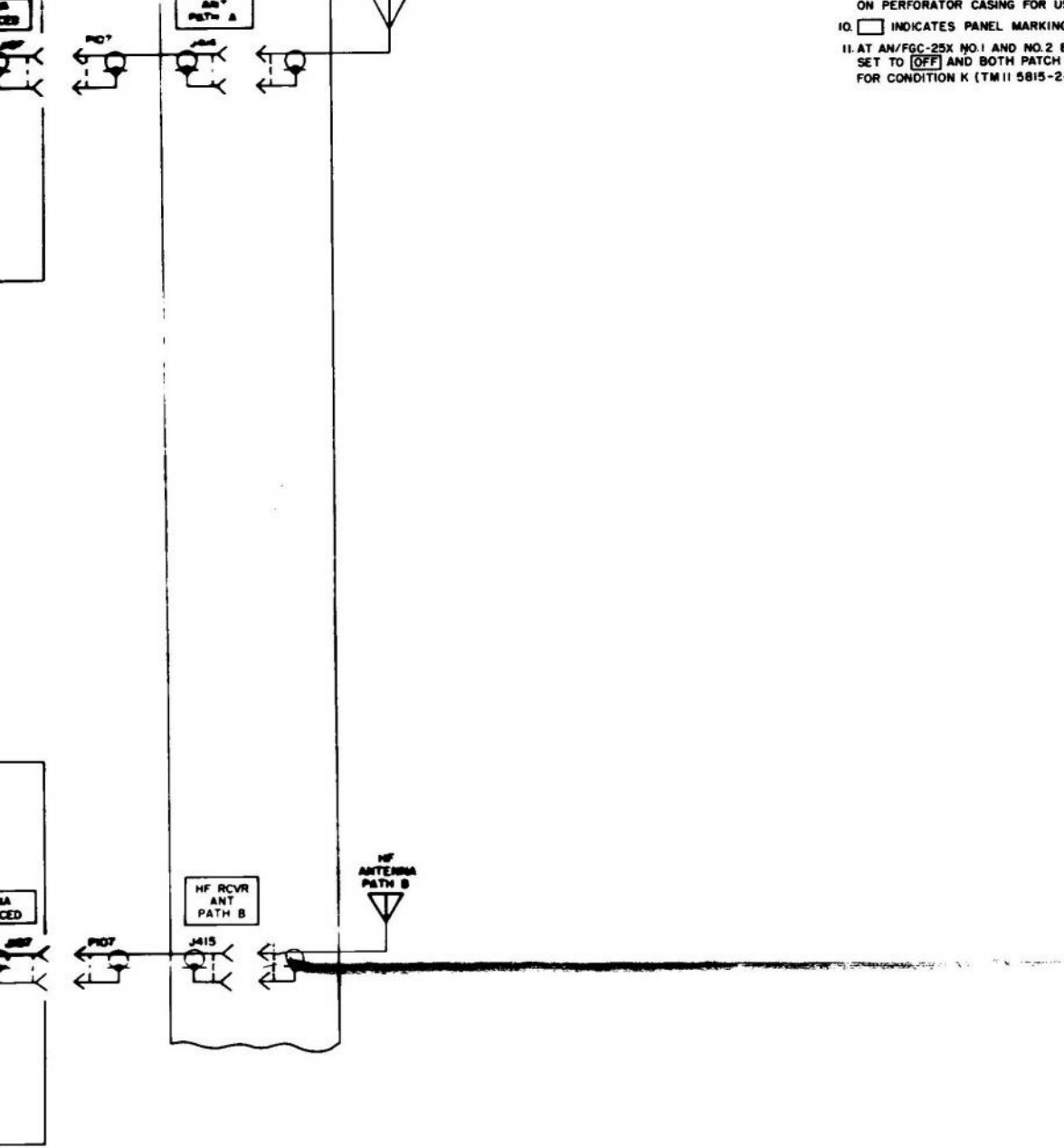
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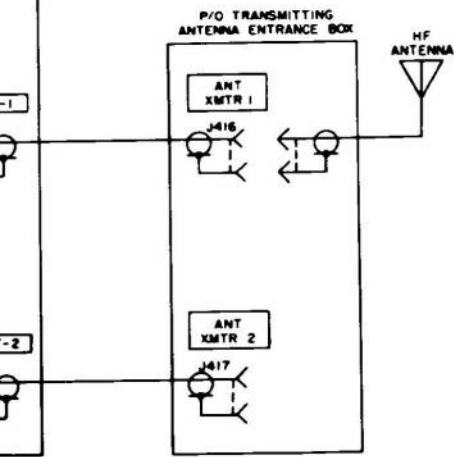




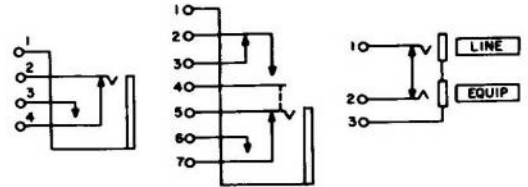
ON PERFORATOR CASING FOR USE IN THIS SYSTEM ONLY.

- 10. INDICATES PANEL MARKING
- 11. AT AN/FGC-25X NO.1 AND NO.2 BOTH DC SWITCHES SHOULD BE SET TO OFF AND BOTH PATCH PANELS SHOULD BE ARRANGED FOR CONDITION K (TM 11 5815-244-35).

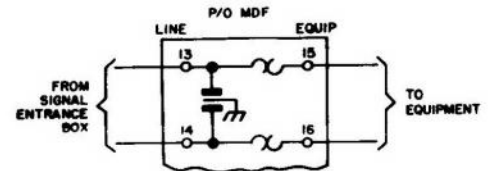




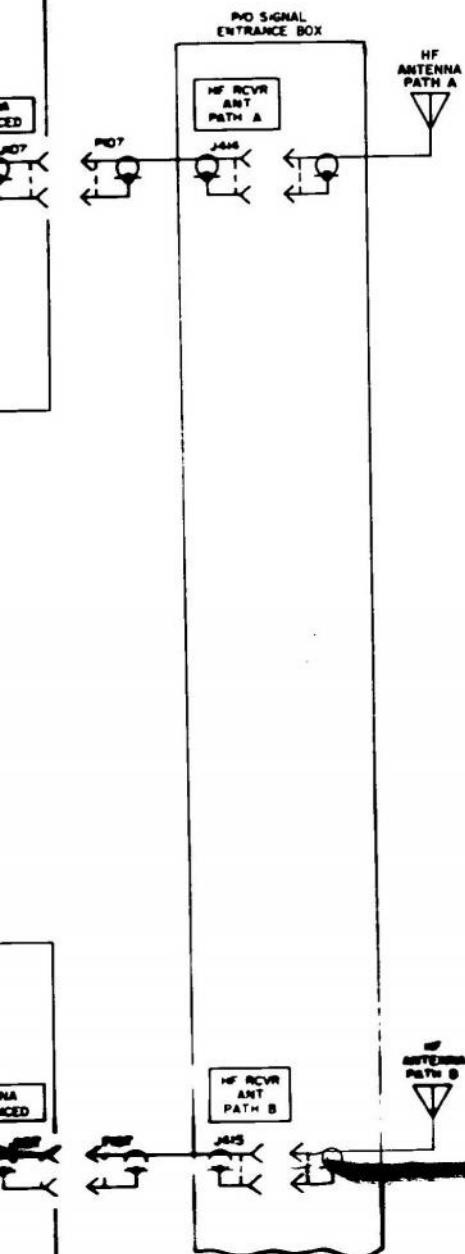
- NOTES:
1. JACKS ARE NUMBERED TO FACILITATE LOCATION OF JACKS ON PATCH PANELS A TYPICAL EXAMPLE IS JR5-8 WHICH MEANS JACK ROW 5 (COUNTING FROM TOP TO BOTTOM), JACK 8 (COUNTING FROM RIGHT TO LEFT ON FRONT PANEL).
 2. P/O MEANS PART OF.
 3. INDICATES RACK GROUND.
 4. ALL RESISTANCE VALUES ARE IN OHMS.
 5. INDICATES COAXIAL CABLE RG-8/U.
 6. TYPICAL EXAMPLES OF JACKS USED IN RADIO TERMINAL SHELTER ARE SHOWN BELOW

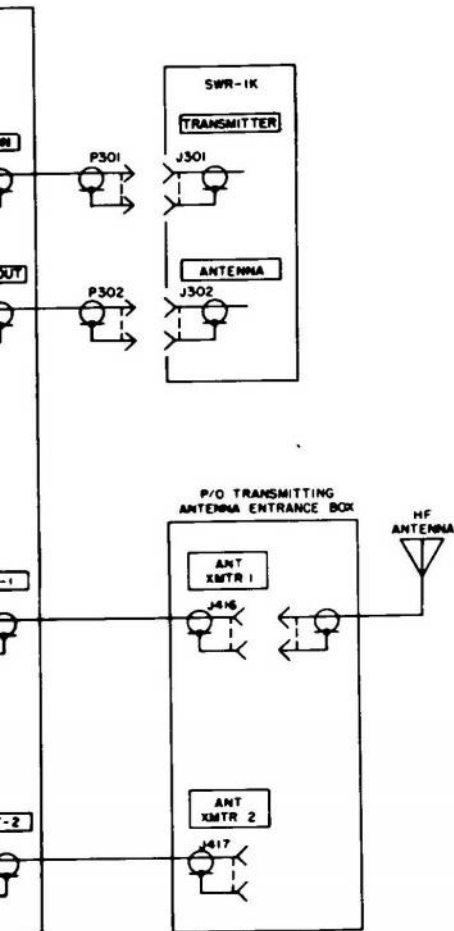
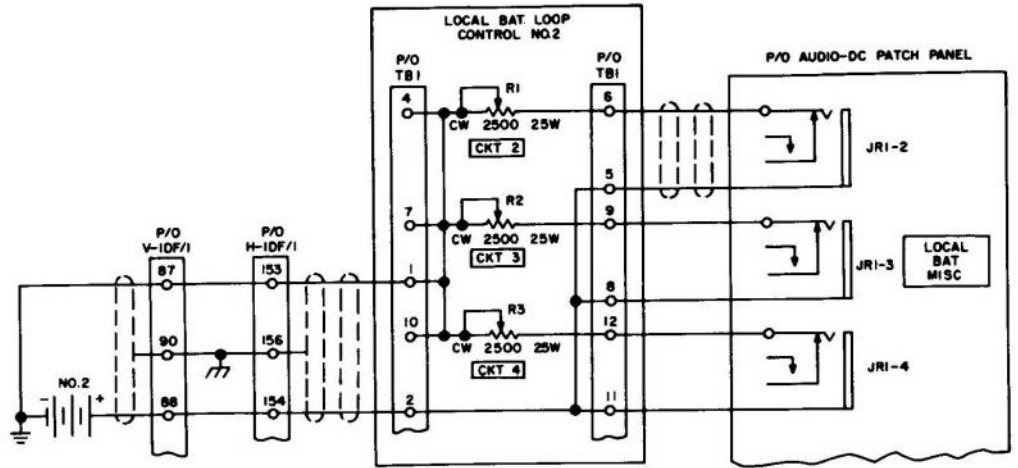


7. DASHED LINES REPRESENT HEAT COILS AND CARBON BLOCKS WHICH PROTECT EACH LINE. A TYPICAL LINE THROUGH THE MDF IS SHOWN BELOW.

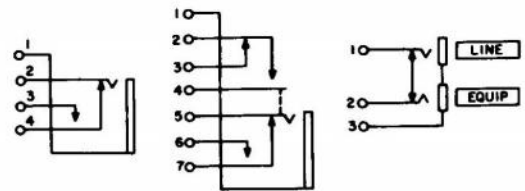


8. STRAP BETWEEN TERMINALS 3 AND 10 OF PLUG P3 NOT REQUIRED IF SHORTING PLUG (TIP AND SLEEVE SHORTED) IS USED IN **[MIC]** JACK ON FRONT PANEL.
9. TERMINAL BOARD TBI (NOT PART OF AN/FGC-25X) IS MOUNTED ON PERFORATOR CASING FOR USE IN THIS SYSTEM ONLY.
10. INDICATES PANEL MARKING
11. AT AN/FGC-25X NO.1 AND NO.2 BOTH **[DC]** SWITCHES SHOULD BE SET TO **[OFF]** AND BOTH PATCH PANELS SHOULD BE ARRANGED FOR CONDITION K (TM 11 5815-244-35).

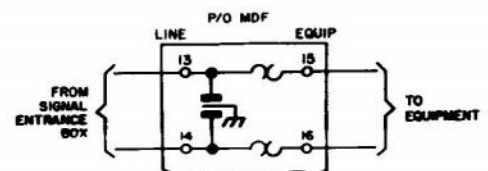


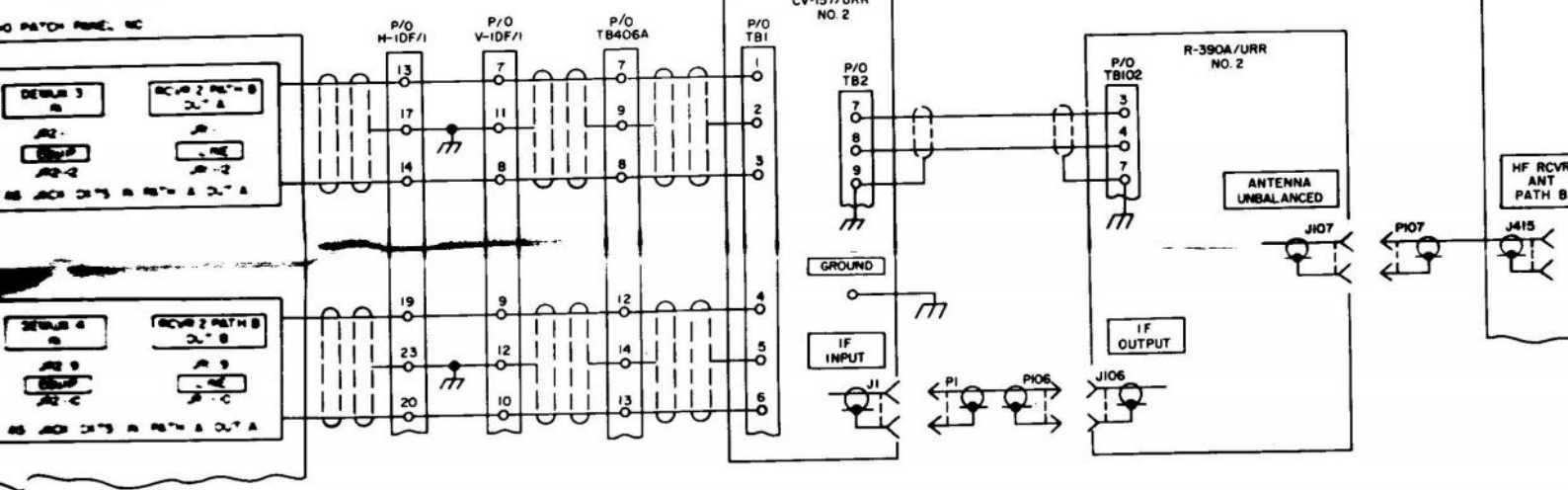
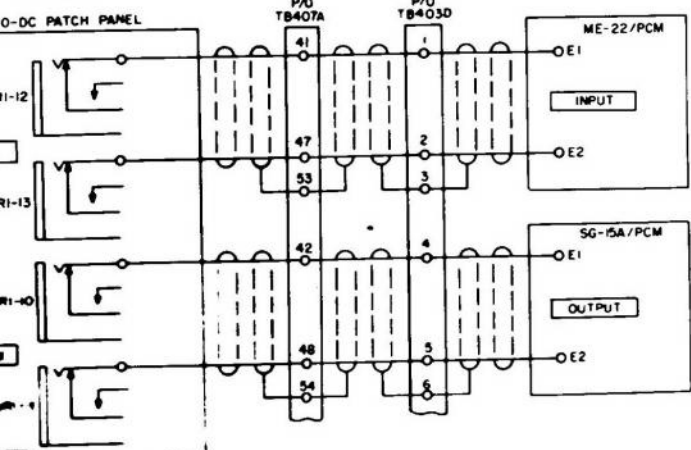
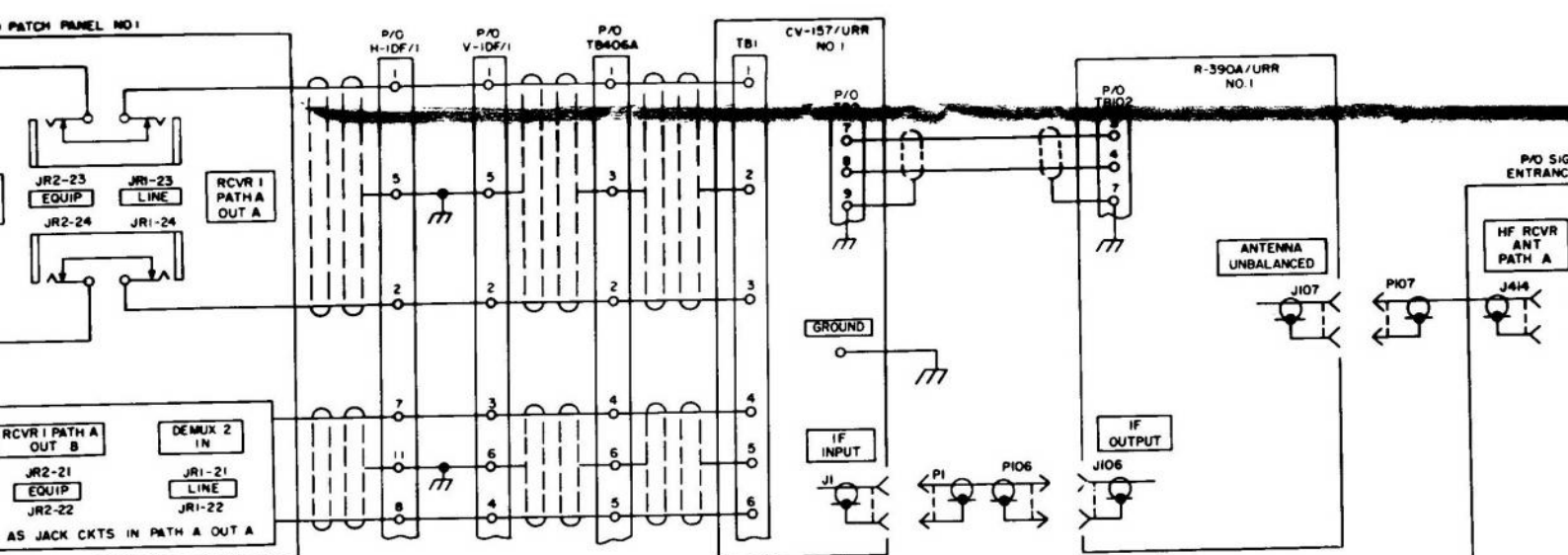
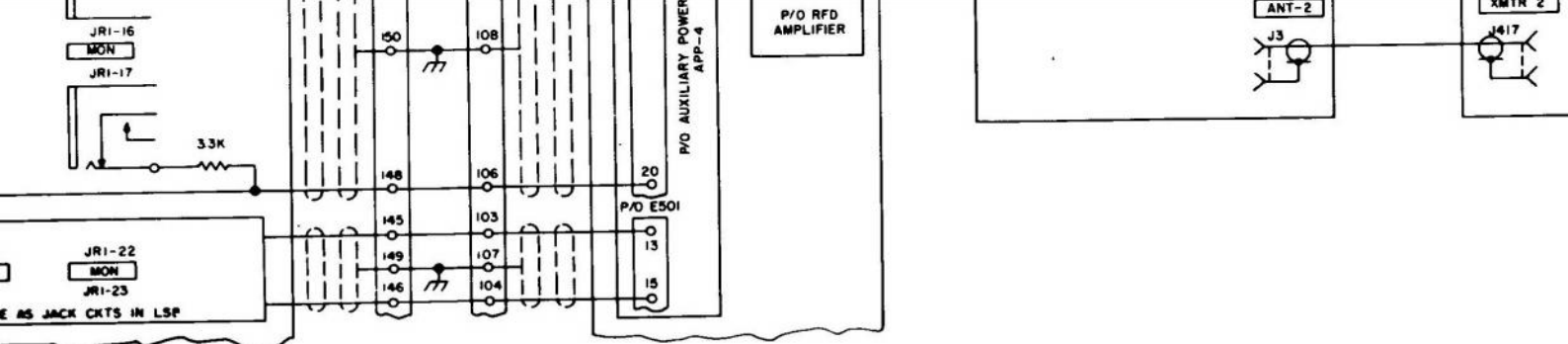


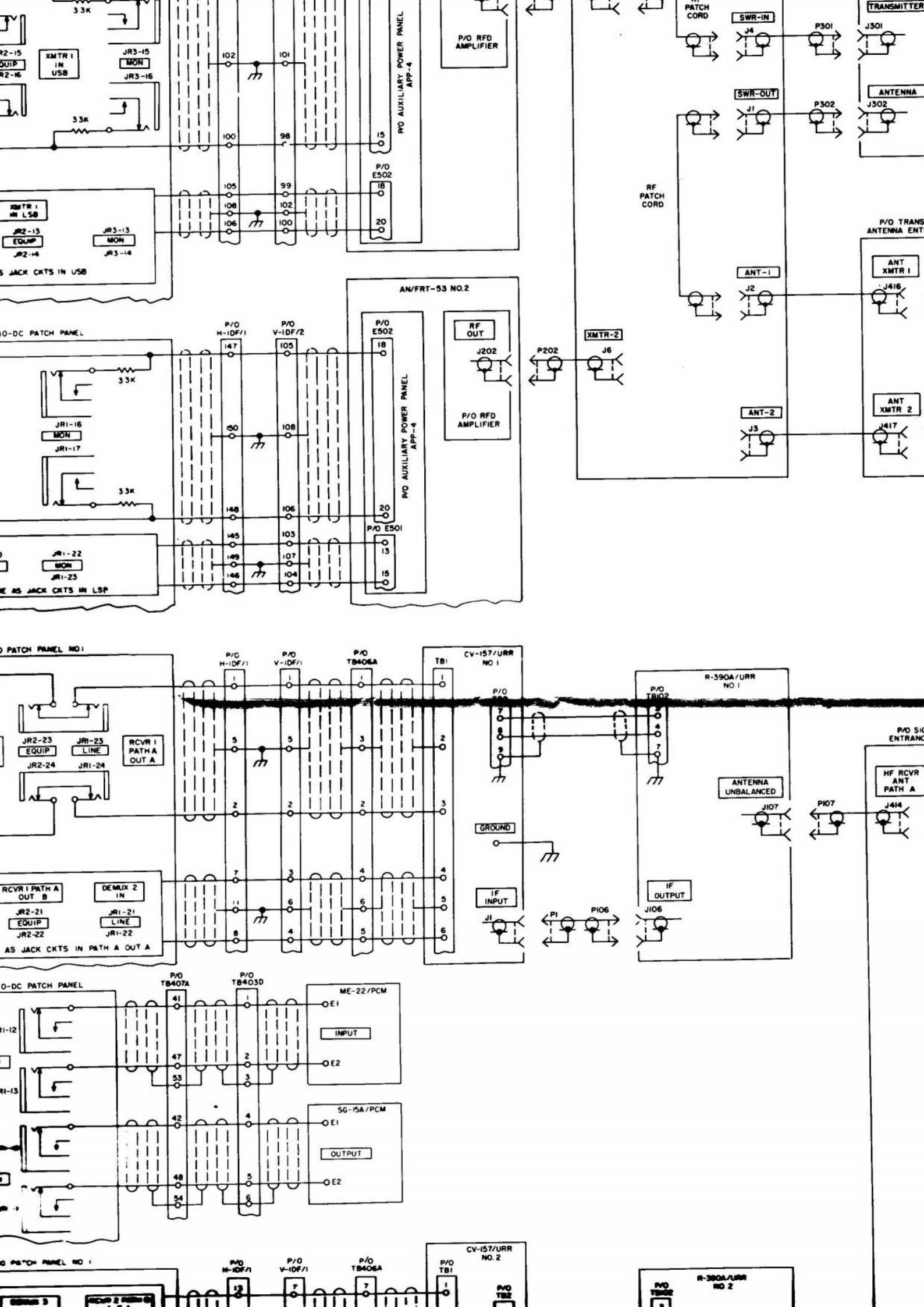
- NOTES:
1. JACKS ARE NUMBERED TO FACILITATE LOCATION OF JACKS ON PATCH PANELS A TYPICAL EXAMPLE IS JR5-8 WHICH MEANS JACK ROW 5 (COUNTING FROM TOP TO BOTTOM), JACK 8 (COUNTING FROM RIGHT TO LEFT ON FRONT PANEL).
 2. P/O MEANS PART OF.
 3. /// INDICATES RACK GROUND.
 4. ALL RESISTANCE VALUES ARE IN OHMS.
 5. C INDICATES COAXIAL CABLE RG-8/U.
 6. TYPICAL EXAMPLES OF JACKS USED IN RADIO TERMINAL SHELTER ARE SHOWN BELOW

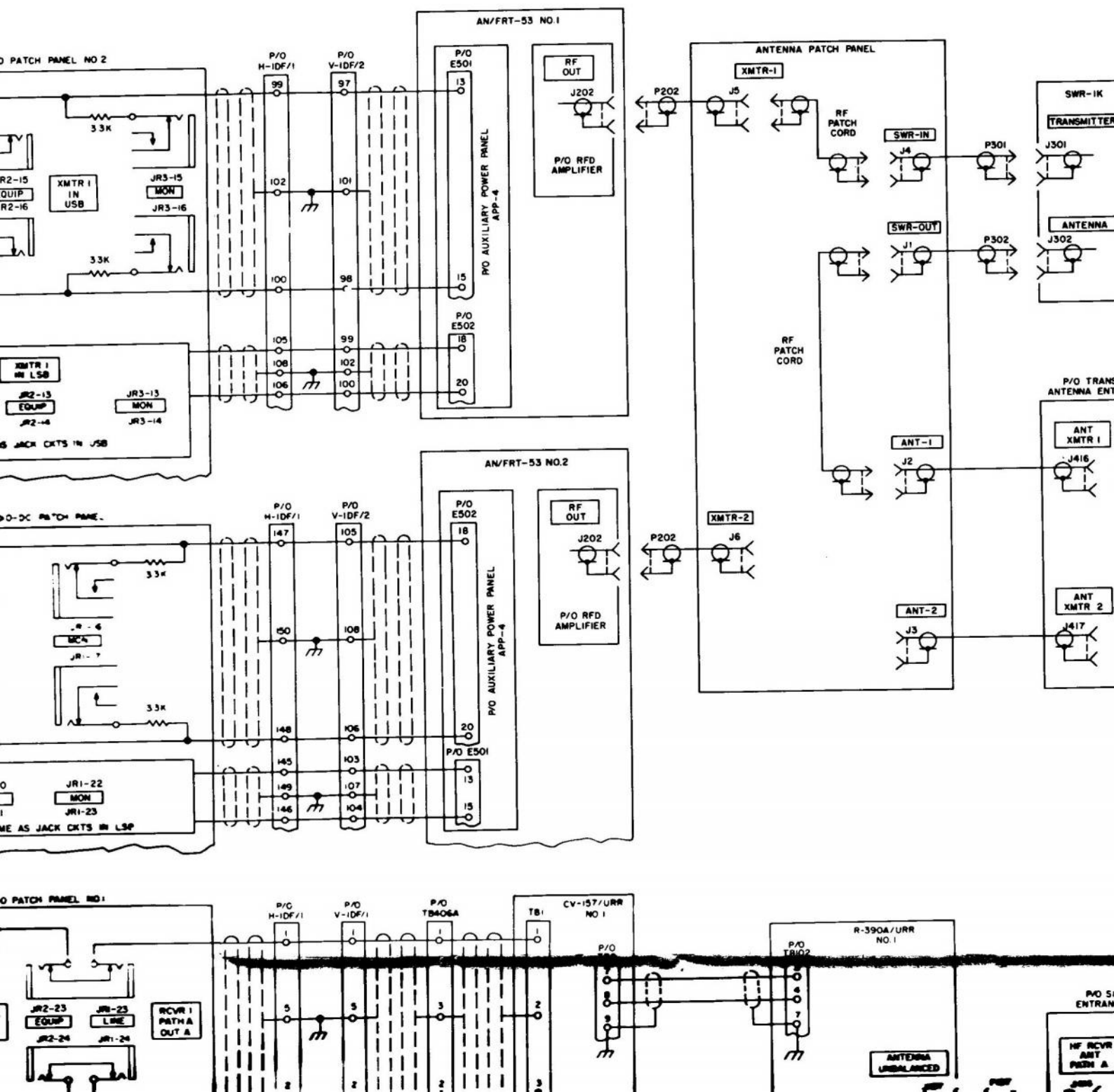


7. DASHED LINES REPRESENT HEAT COILS AND CARBON BLOCKS WHICH PROTECT EACH LINE. A TYPICAL LINE THROUGH THE MDF IS SHOWN BELOW.









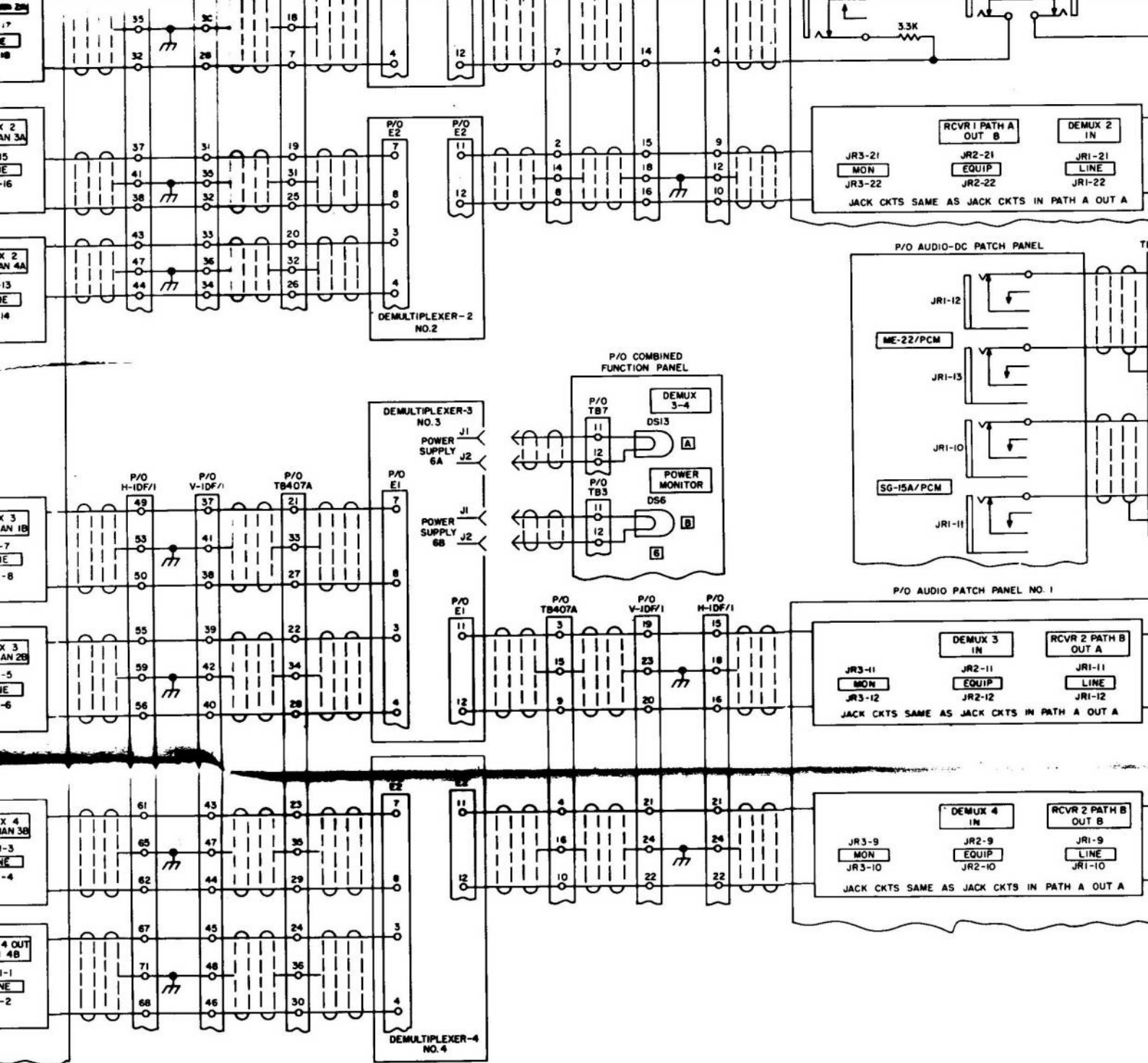
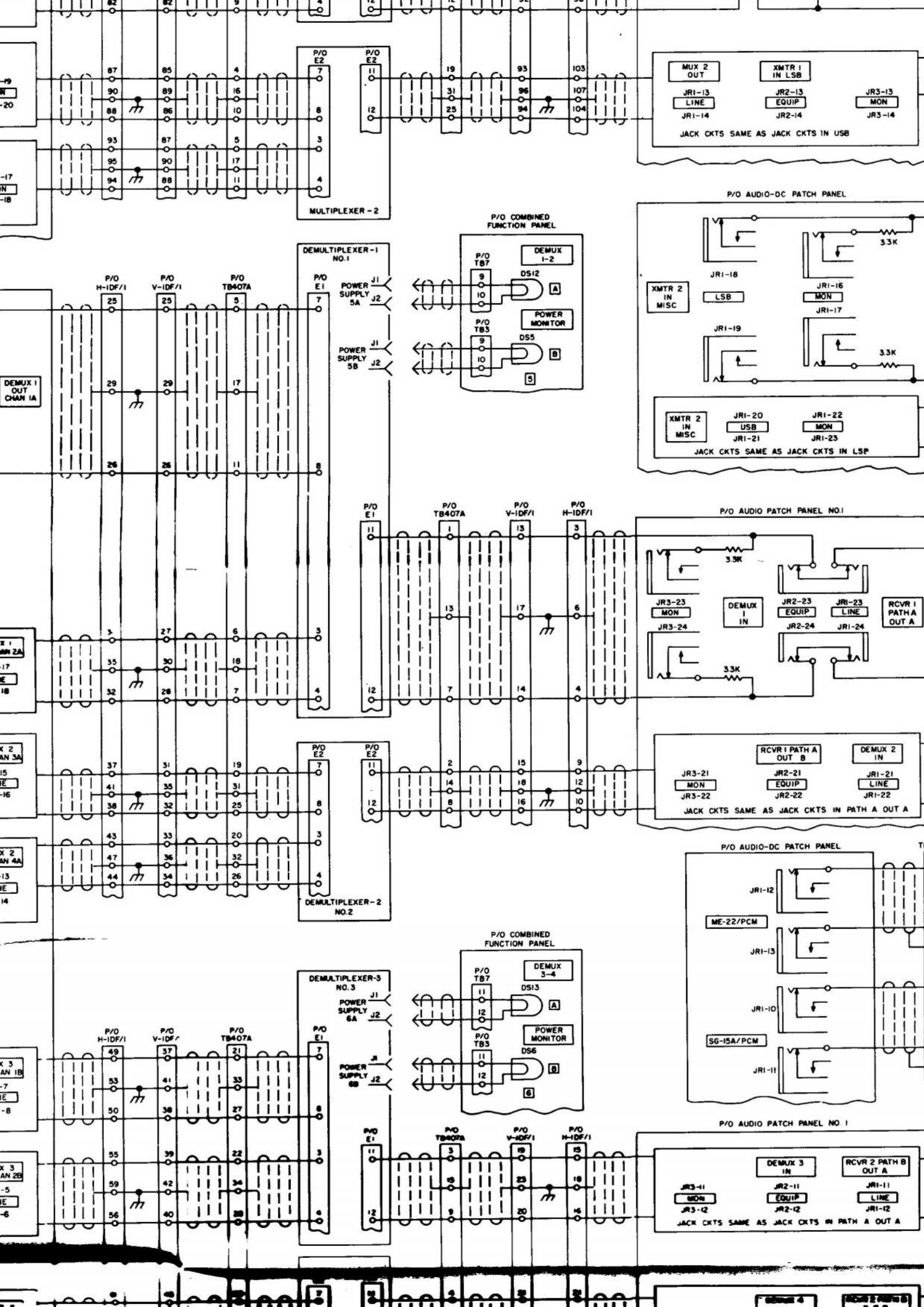
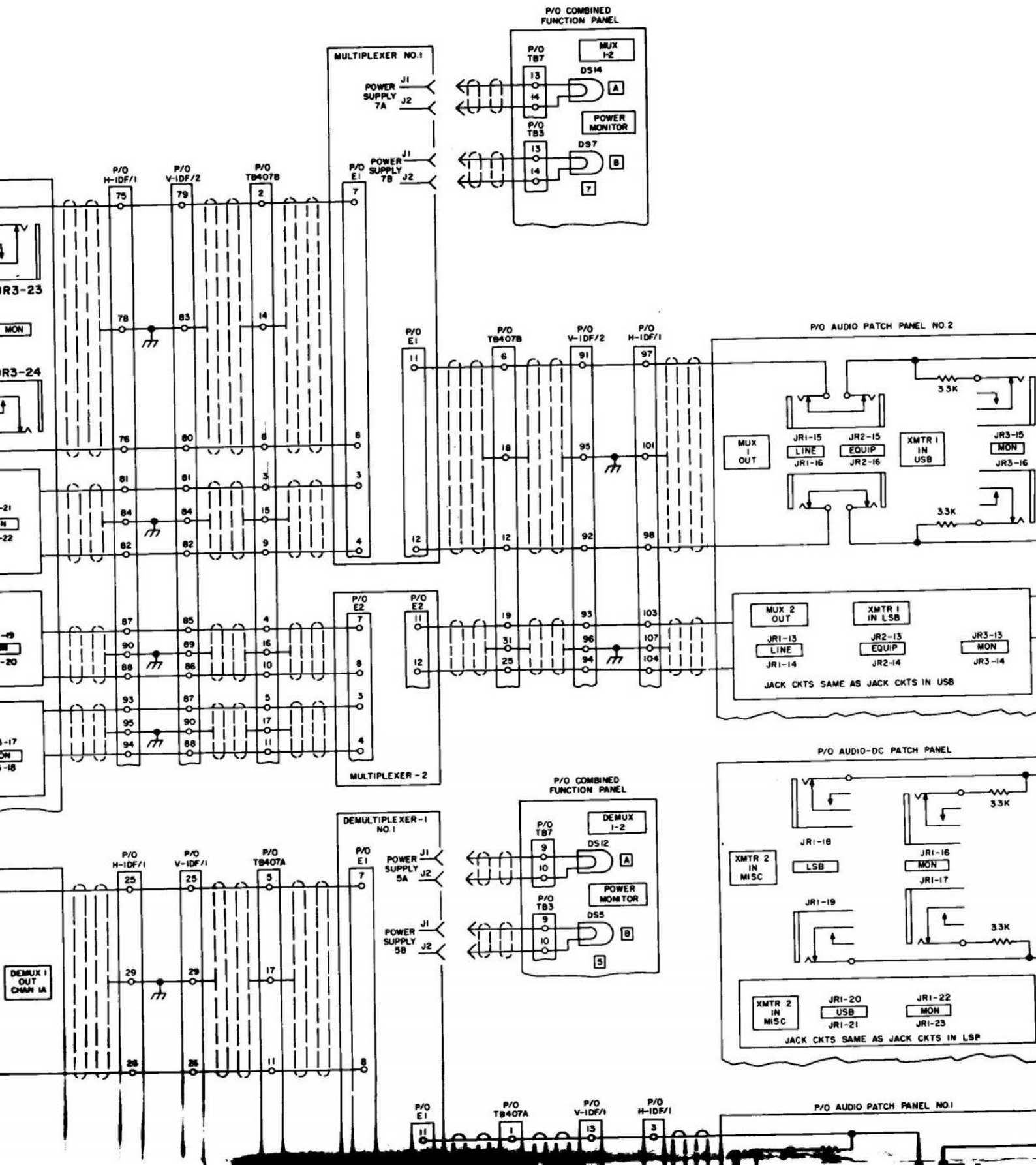
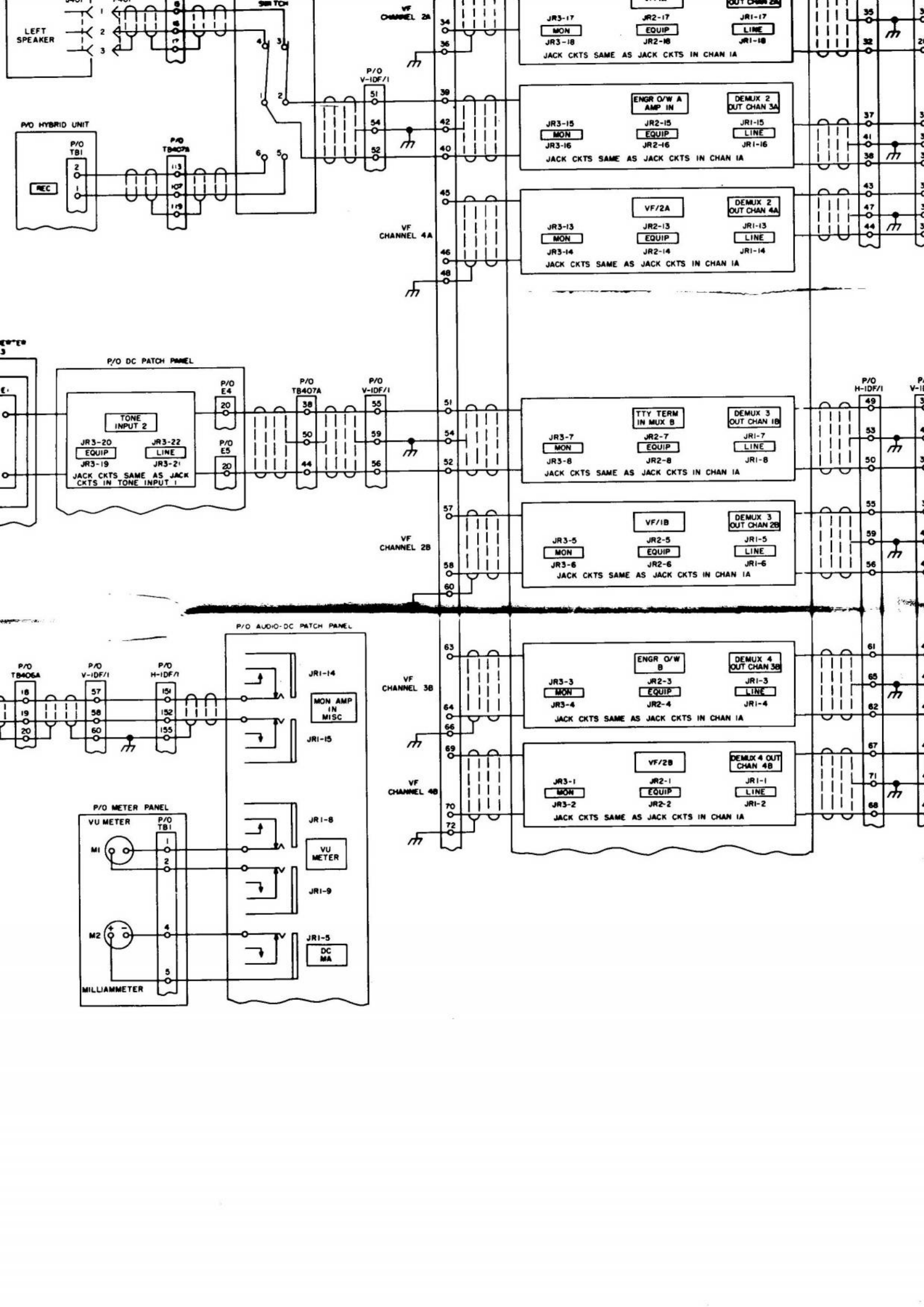
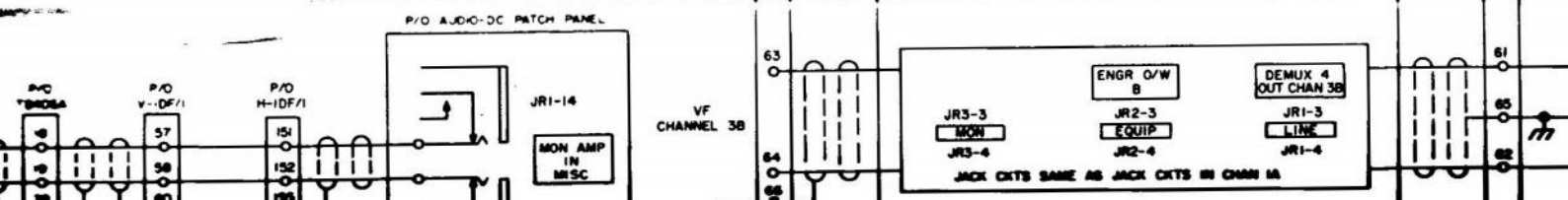
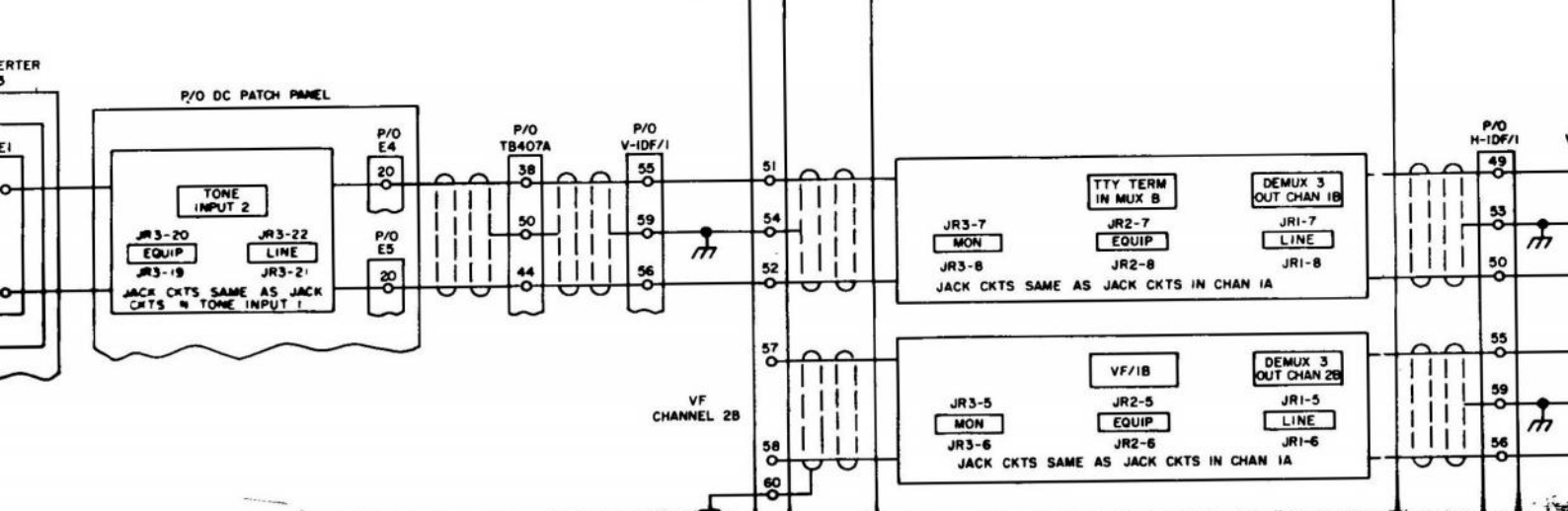
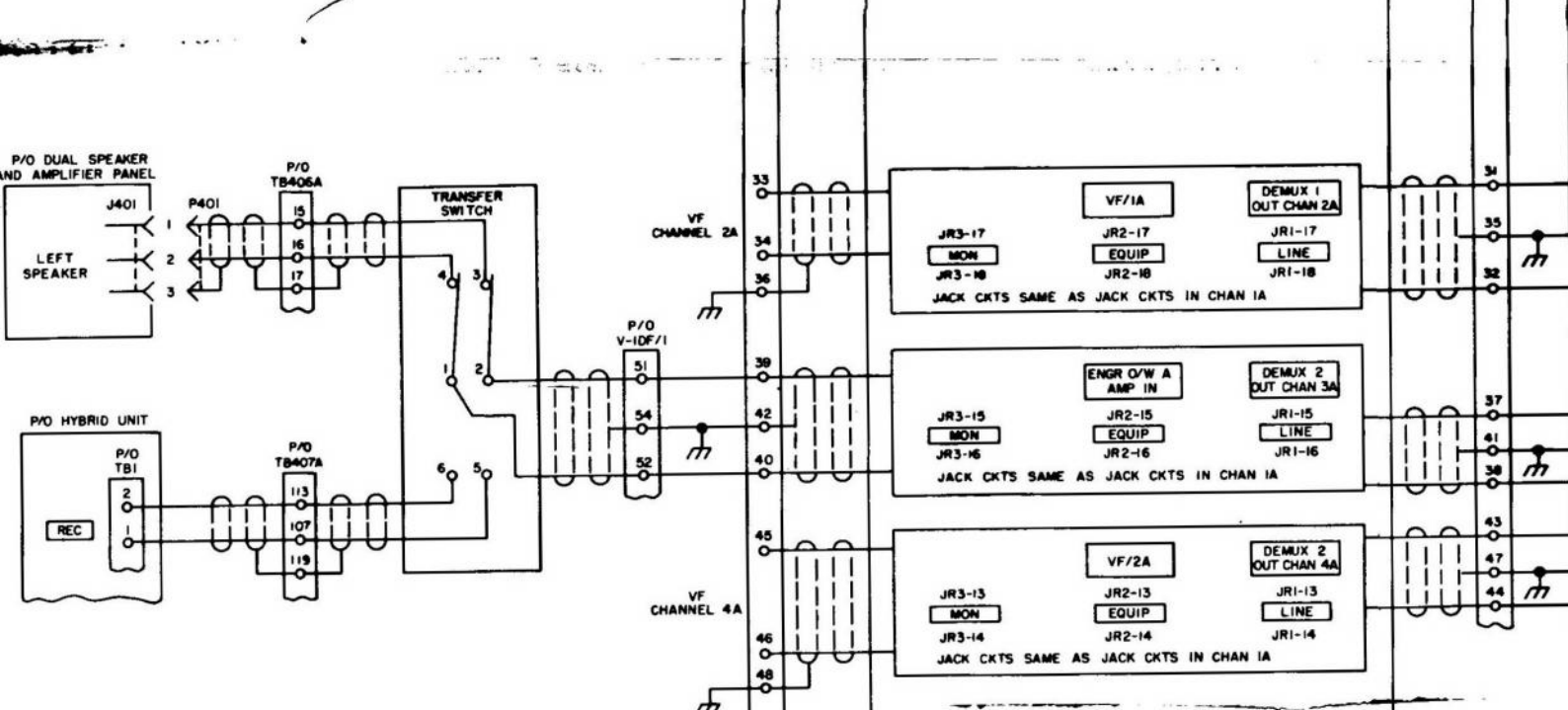
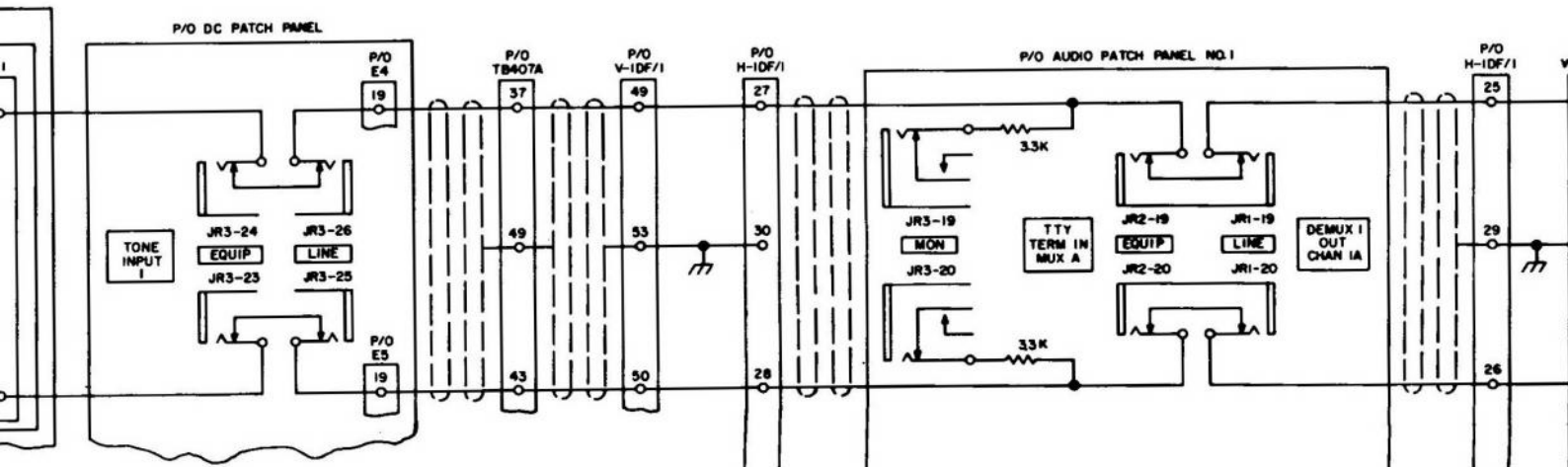
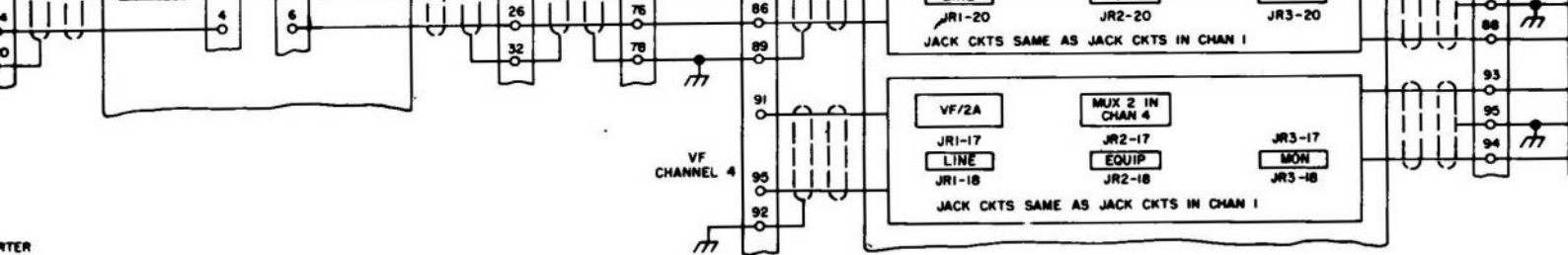


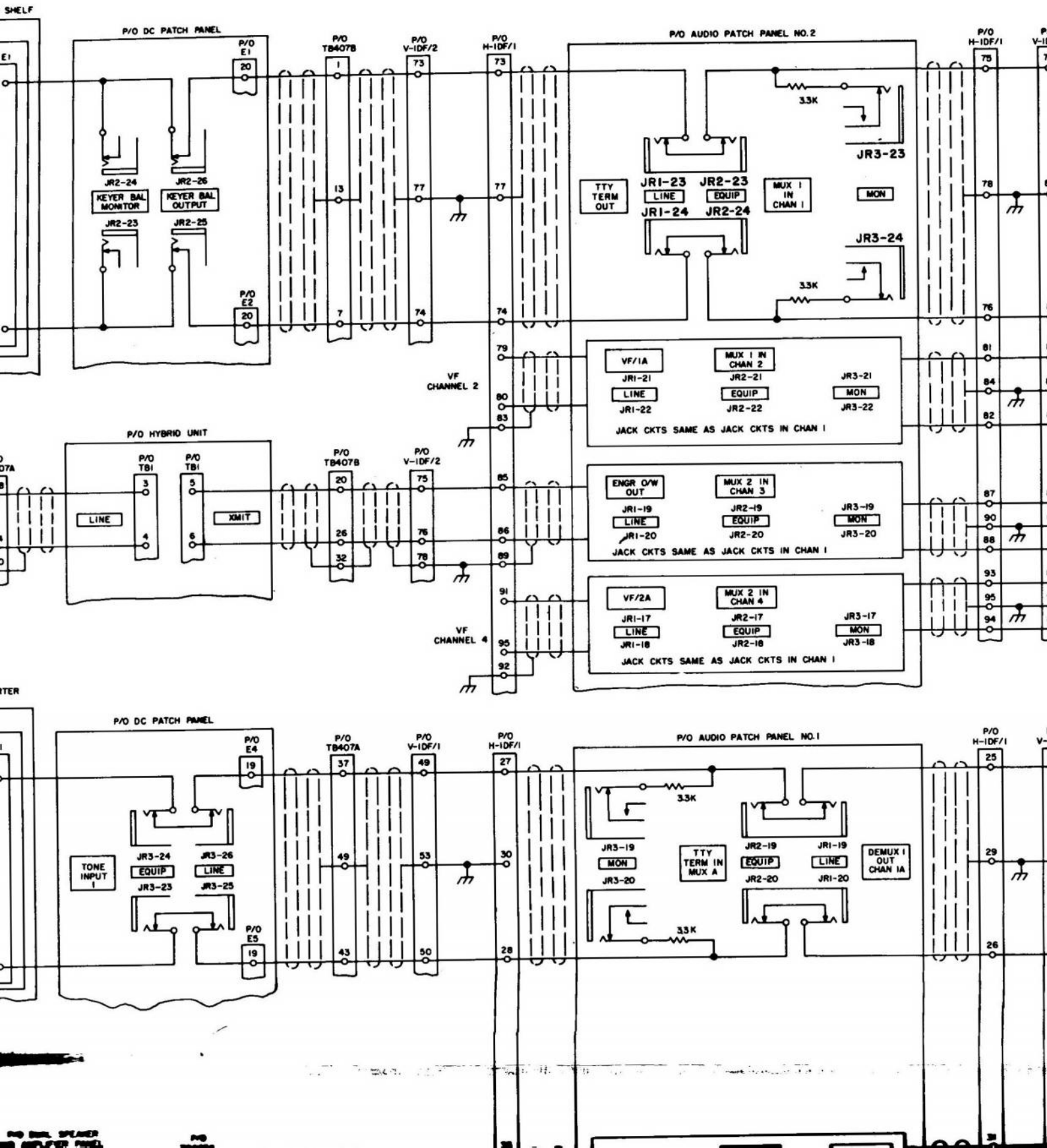
Figure 76 (4). Radio terminal shelter signal distribution, schematic diagram

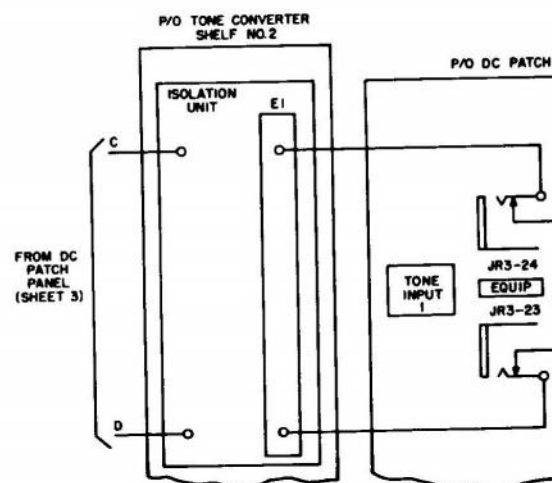
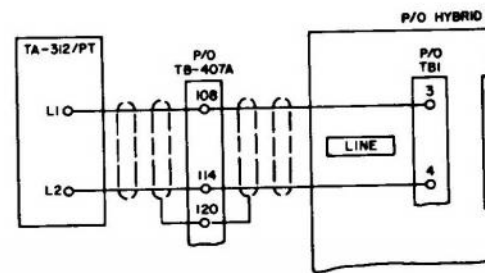
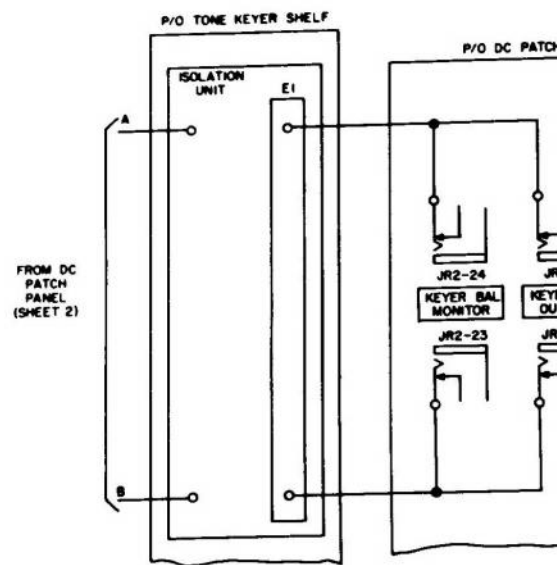


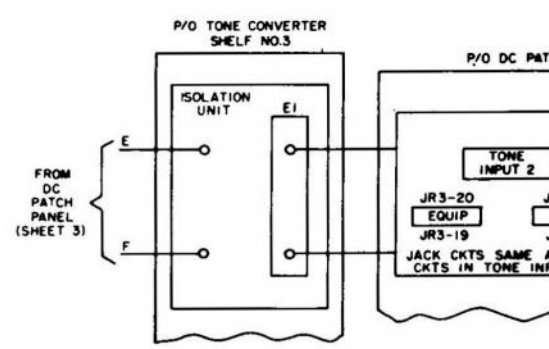
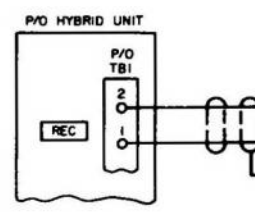
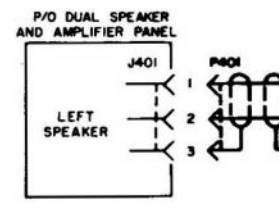
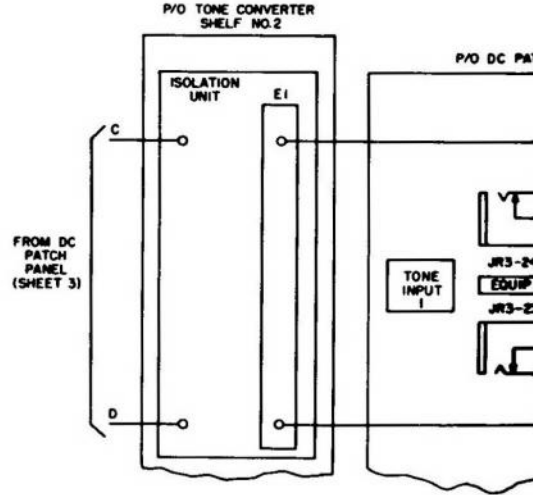
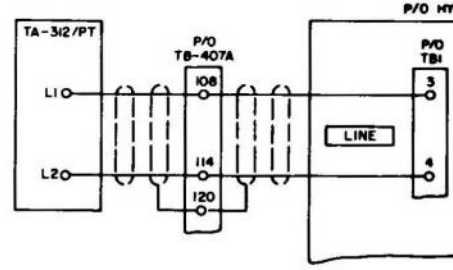


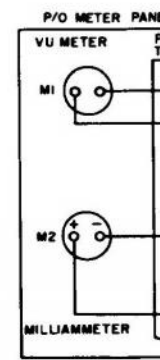
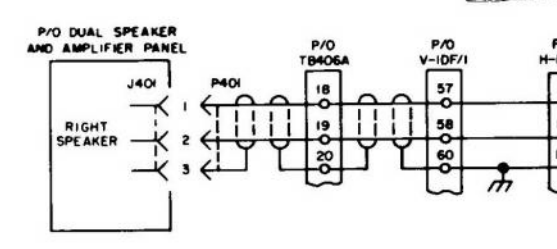
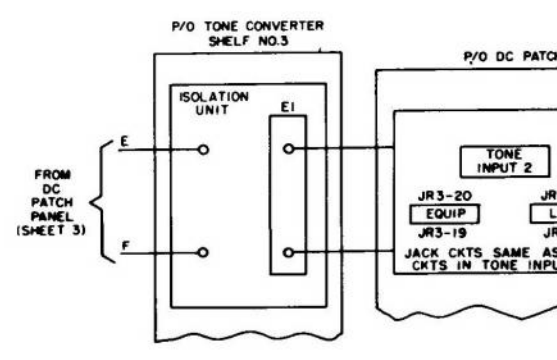
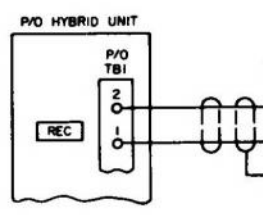
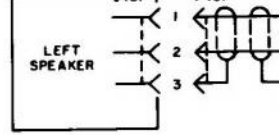


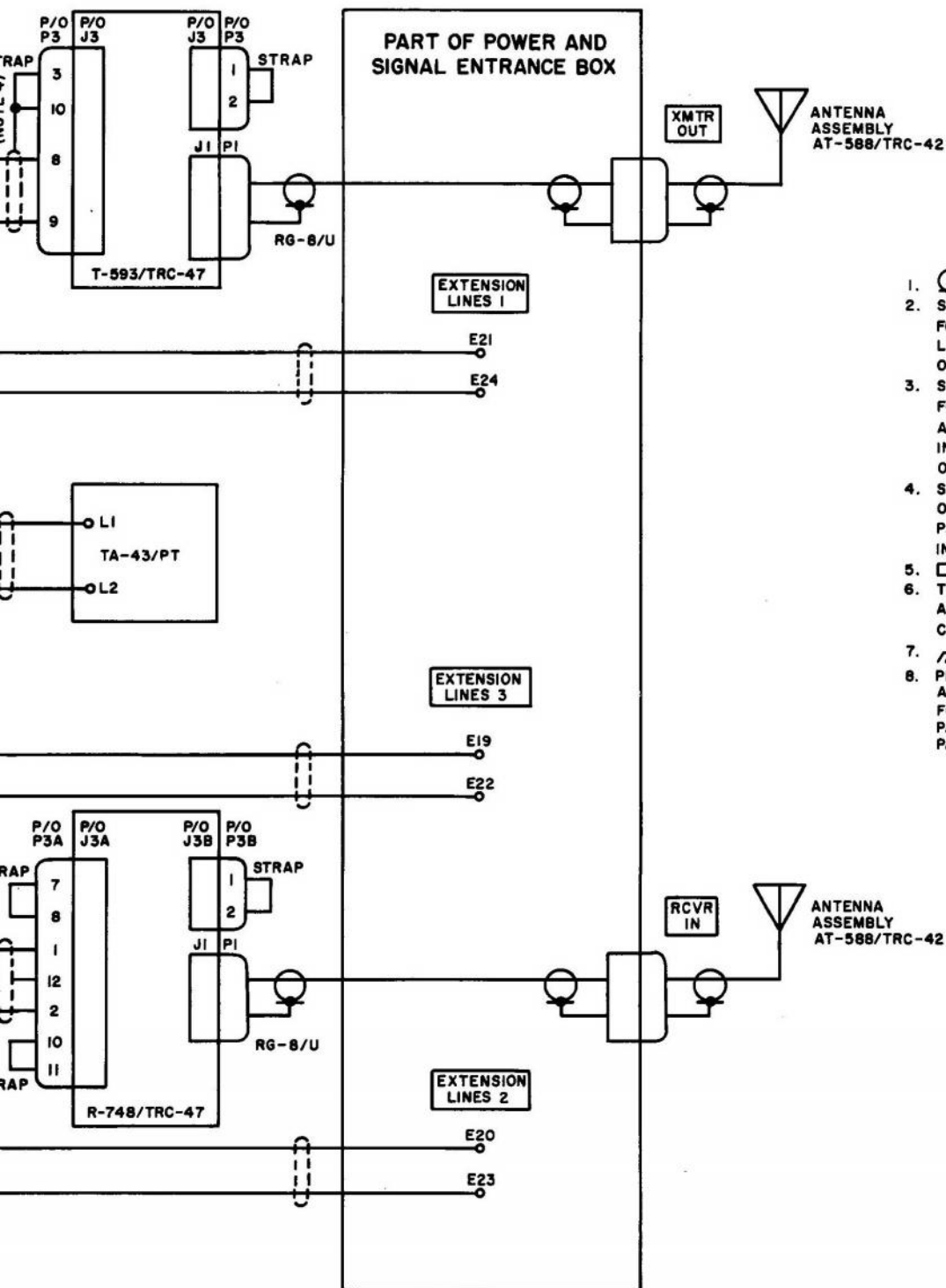












NOTES:

1. INDICATES COAXIAL CABLE RG-8/U.
2. SOLID LINES INDICATE STRAPS CONNECTED FOR OPERATION WITH AN/TRC-47; DASHED LINES INDICATE ALTERNATE STRAPS FOR OPERATION WITH LANDLINES.
3. SOLID LINES INDICATE STRAPS CONNECTED FOR OPERATION WITH TELEPHONE TA-43/PT AT SUBSCRIBER PACKAGE; DASHED LINES INDICATE ALTERNATE STRAPS FOR OPERATION WITH EXTERNAL VF CKT.
4. STRAP BETWEEN TERMINALS 3 AND 10 OF PLUG P3 NOT REQUIRED IF SHORTING PLUG (TIP AND SLEEVE SHORTED) IS USED IN **MIC** JACK ON FRONT PANEL.
5. INDICATES PANEL MARKING.
6. TERMINAL BOARD T81 (NOT PART OF AN/FGC-25X) IS MOUNTED ON PERFORATOR CASING FOR USE IN THIS SYSTEM ONLY.
7. INDICATES RACK GROUND.
8. PLUG AND JACK NUMBERS FOR TT-119A/FG AND TT-178A/FG ARE IN PARENS AND THOSE FOR TT-119/FG AND TT-178/FG ARE NOT IN PARENS. IN ADDITION, MAKE THE FOLLOWING PATCHED CONNECTIONS:

TT-178/FG		TT-178A/FG	
FROM	TO	FROM	TO
P47	J47	P201	J201
P46	J46	P202	J202
P41	J41	P209	J209
P43	J43	P210	J210
P48	J48	P211	J211
P42	J42	P212	J212

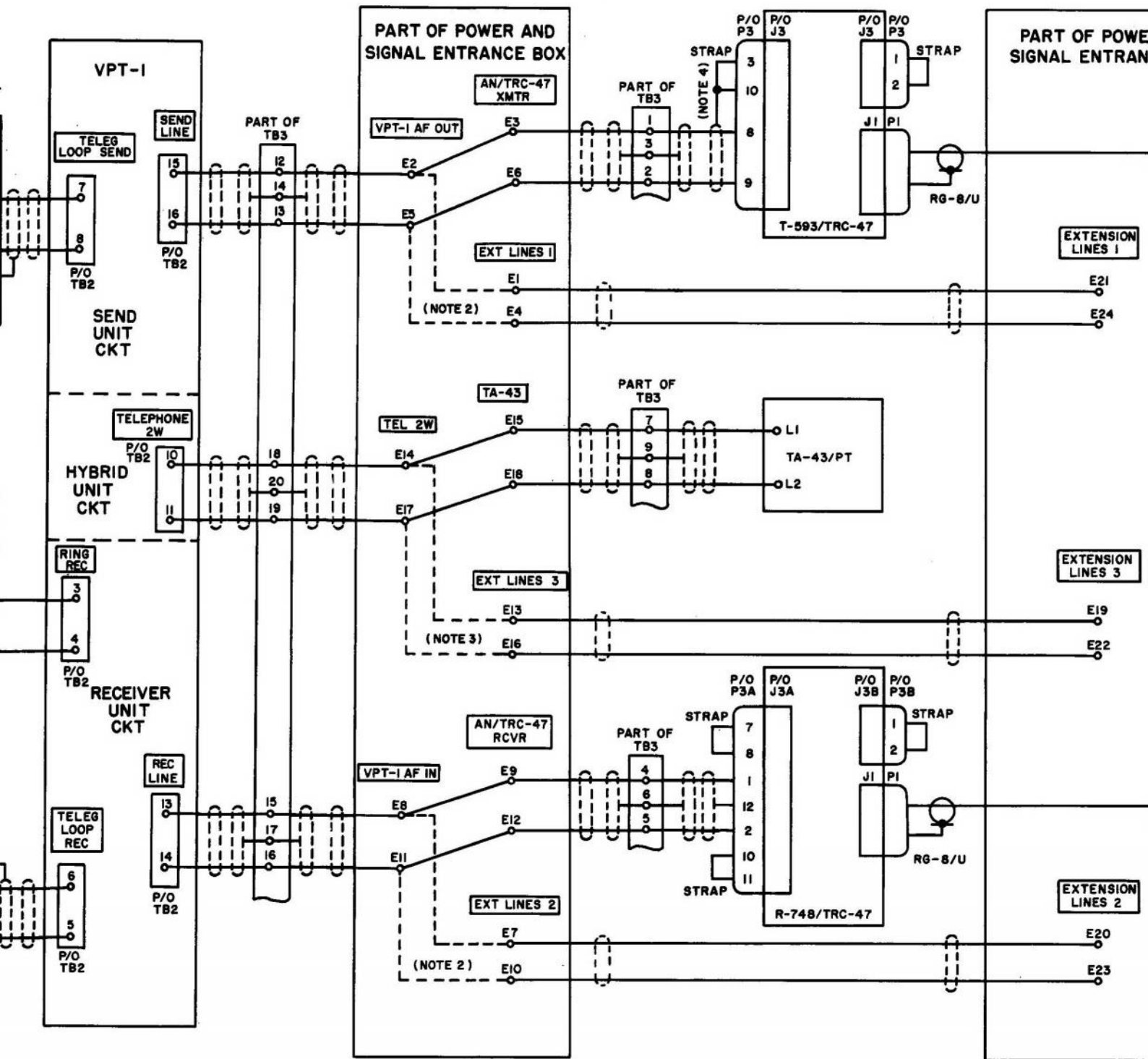
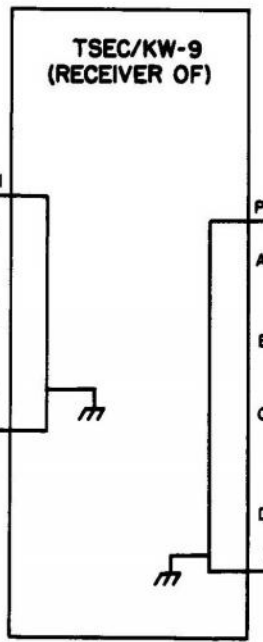
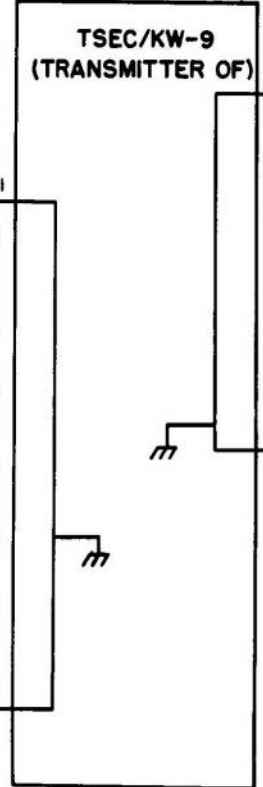
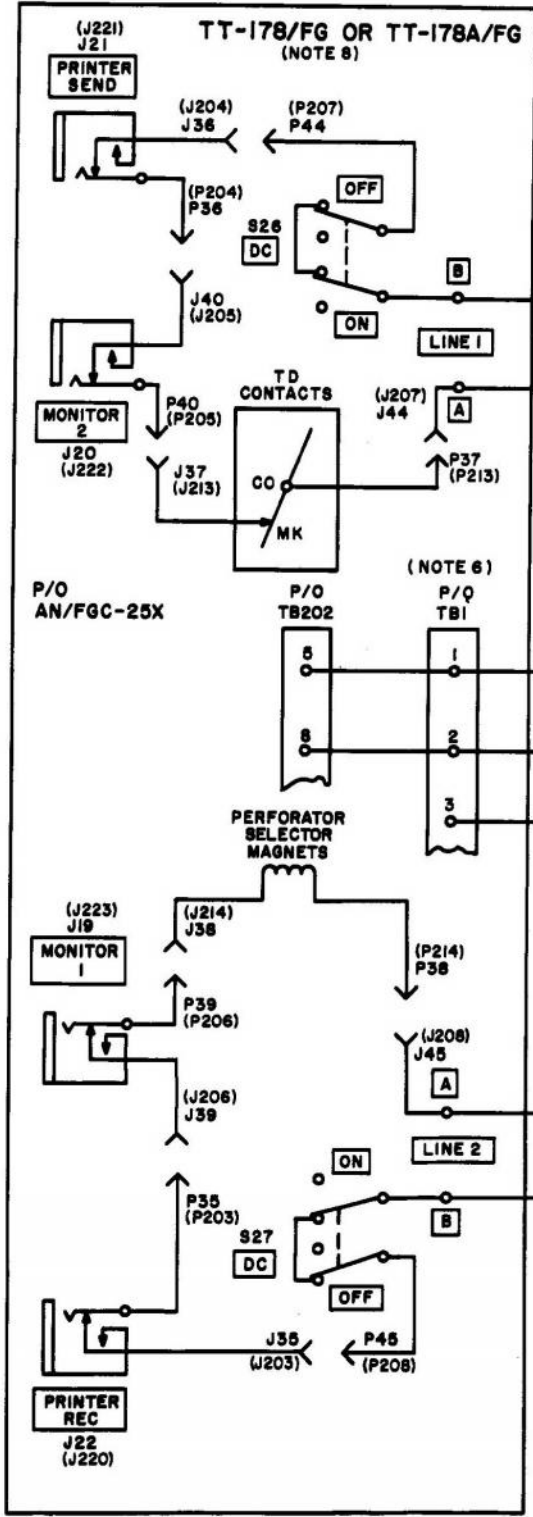
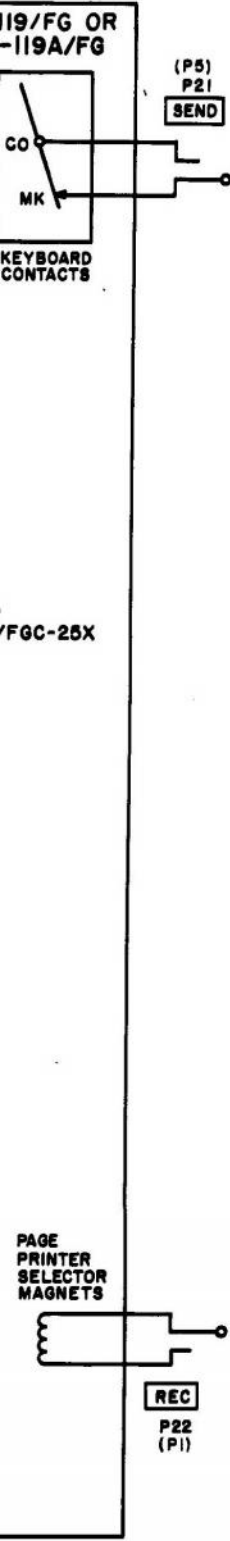
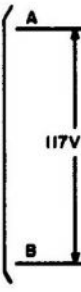


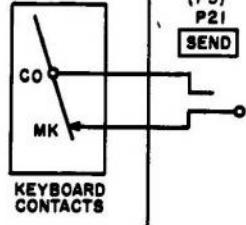
Figure 77. Subscriber package signal distribution, schematic diagram.



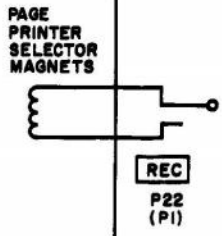
FROM TB4, POWER DISTRIBUTION SCHEMATIC DIAGRAM



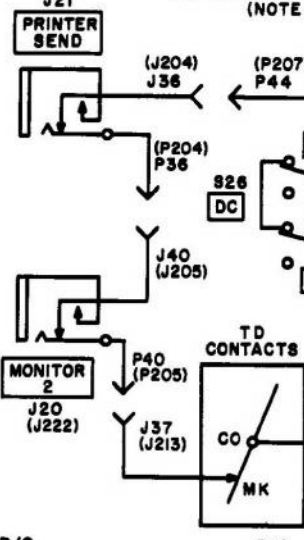
**TT-119/FG OR
TT-119A/FG**



P/O
AN/FGC-25X

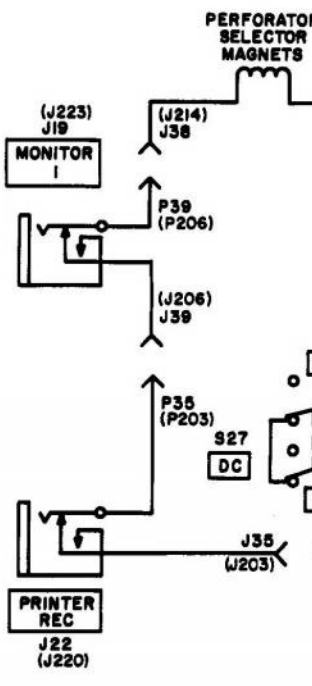


TT-178/FG (NOTE 1)

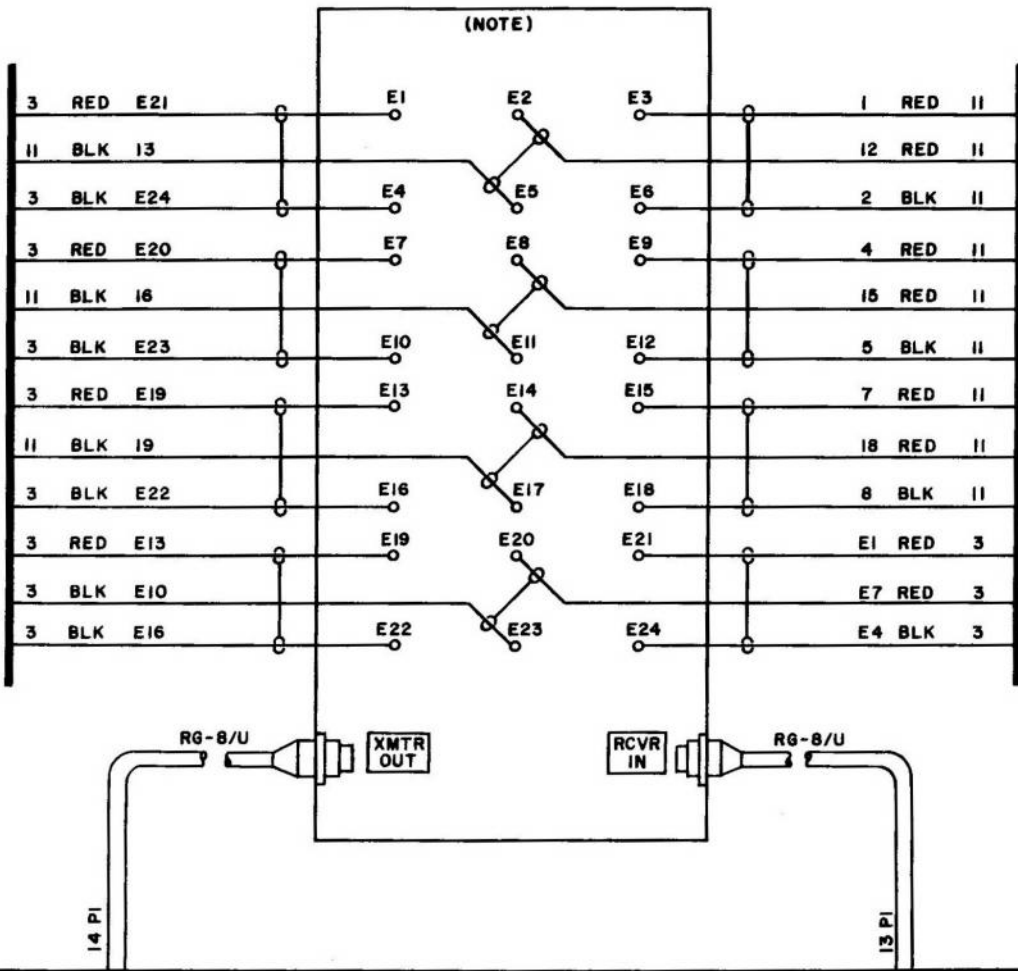


P/O
AN/FGC-25X

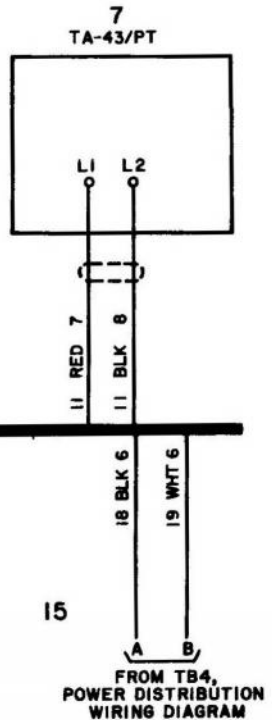
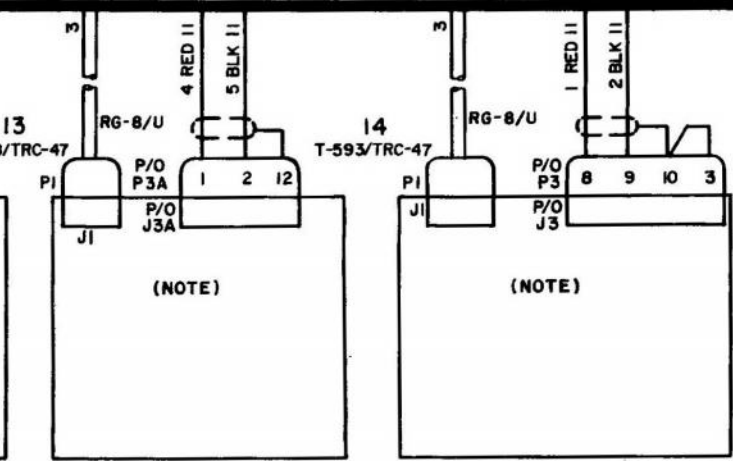
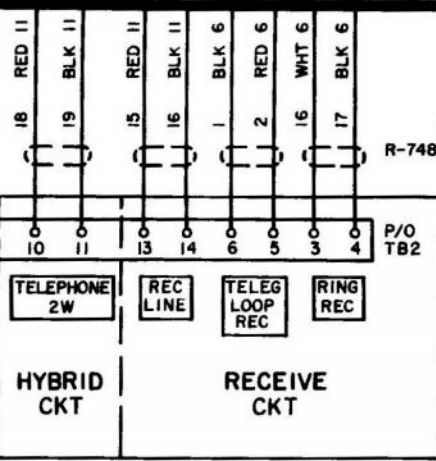
P/O
TB202



3
PART OF
POWER AND SIGNAL
ENTRANCE BOX



o20 o21



NOTE:
REFER TO SCHEMATIC
DIAGRAM FOR STRAPPING
OPTIONS.

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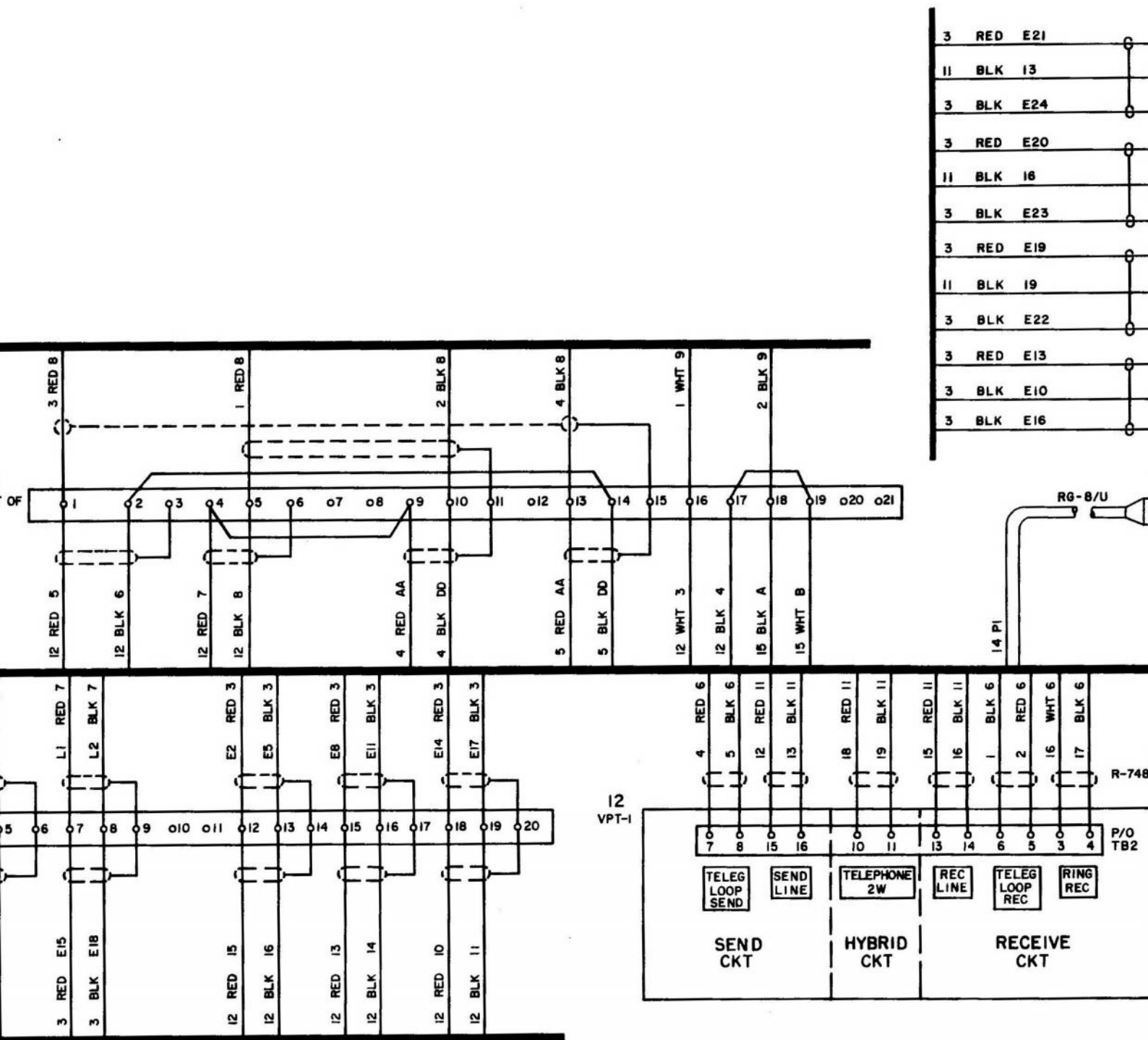


Figure 78. Subscriber package signal distribution, wiring diagram.

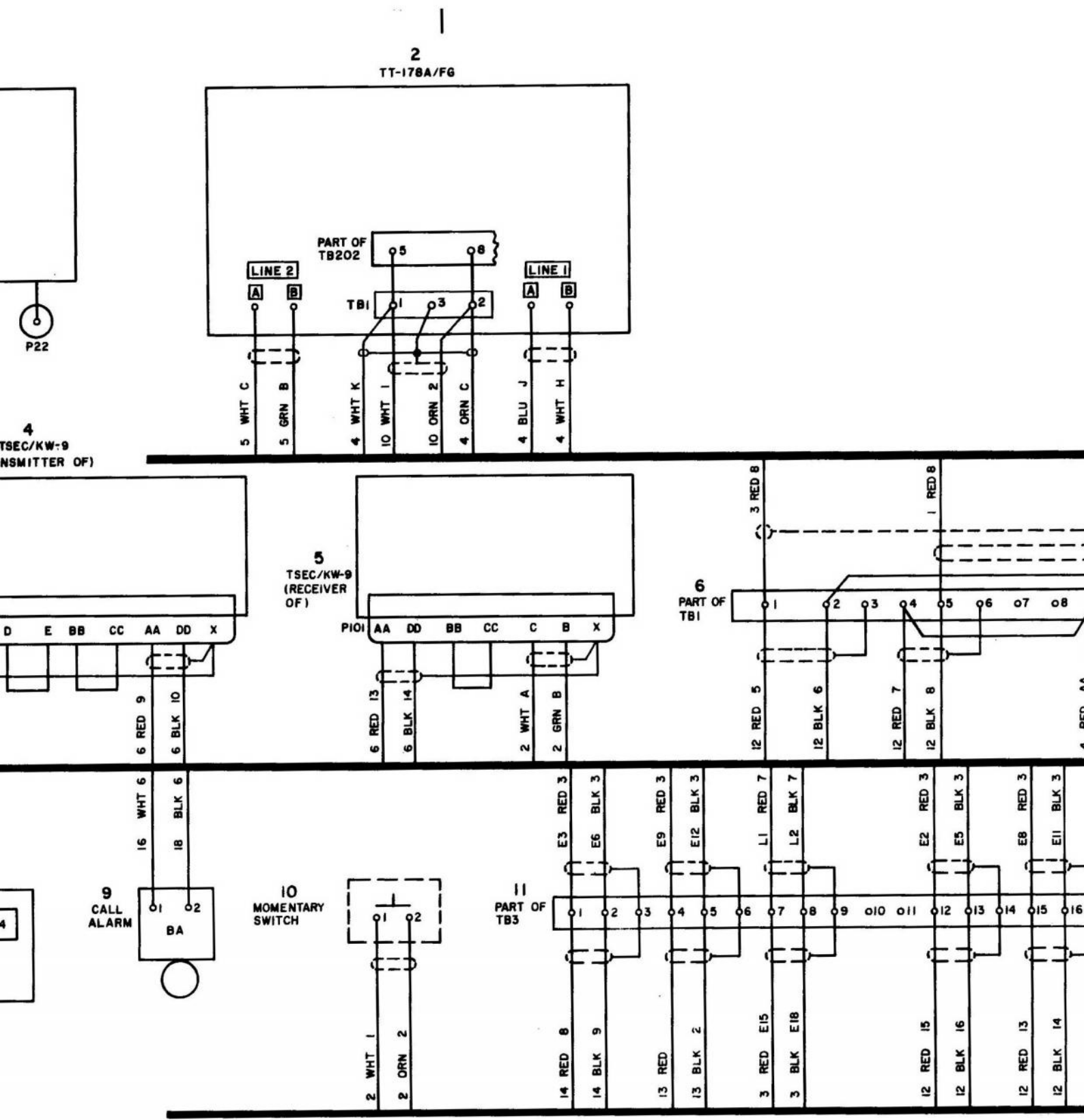
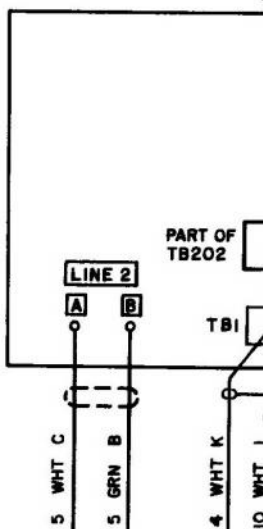
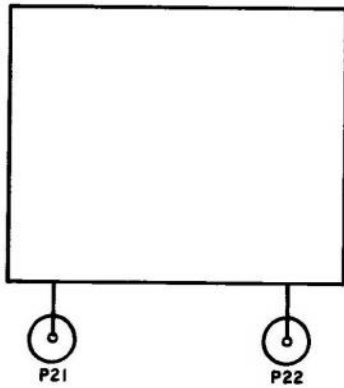
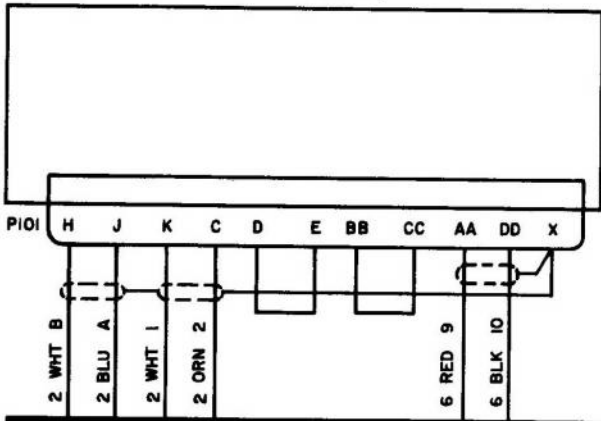


Figure 78. Subscriber package

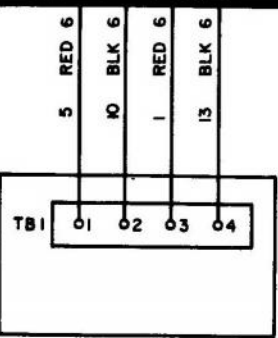
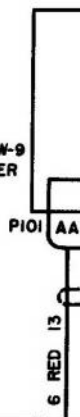
1
TT-119A/FG



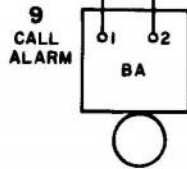
4
TSEC/KW-9
(TRANSMITTER OF)



5
TSEC/KW-9
(RECEIVER OF)



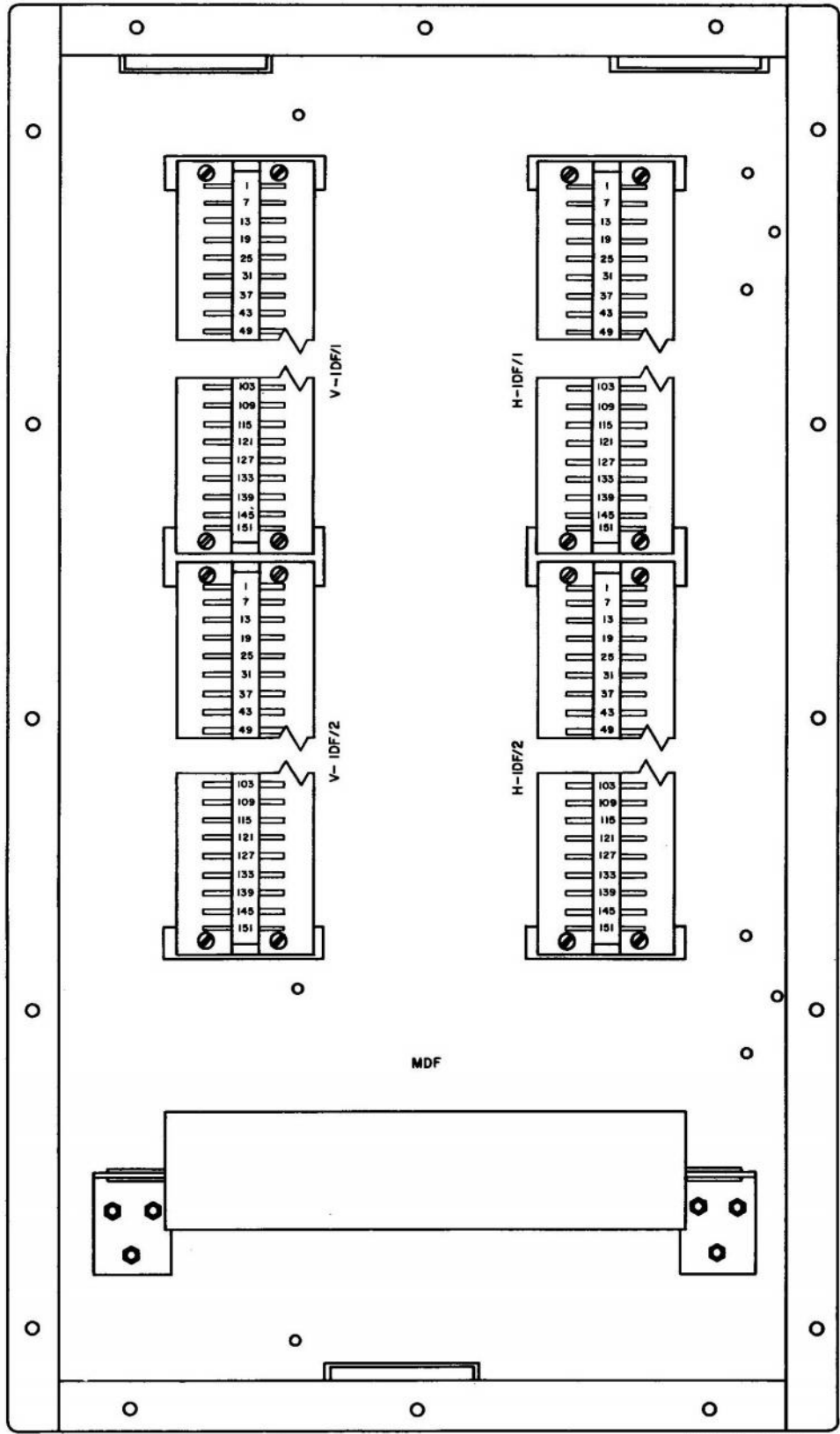
8
SUBSCRIBER
POWER
SUPPLY



9
CALL
ALARM

10
MOMENTARY
SWITCH





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Figure 79. Combined distribution frame.

By Order of Secretary of the Army:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
Tech Stf, DA (1) except
CSigO (18)
Tech Stf Bd (1)
USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADB (2)
USAABELCTBD (1)
USAAVNBD (1)
USAAATBD (1)
ARADCOM (2)
ARADCOM, Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
MDW (1)
Armies (2)
Corps (2)
Instl (2)
Fort Monmouth (63)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC FA (2)
USATC Inf (2)
USAOMC (3)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENDEP (none)
Sig Sec, GENDEP (5)
Sig Dep (12)

WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USA Caribbean Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
JBUSMC (2)
AFSSC (1)
Units org under fol TOE: (2 cy ea UNOINDC)
11-7
11-16
11-57
11-97
11-98
11-117
11-155
11-157
11-500 (Tms AA-AE & RA-RT) (4)
11-557
11-587
11-592
11-597

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320-50.

TM 11-5895-288-12 COMMUNICATIONS CENTRAL AN/TSC-20 - 1962