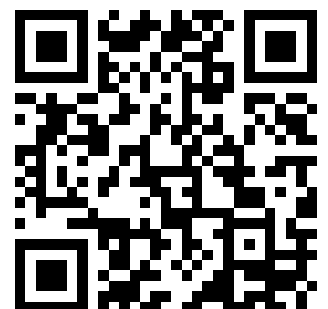
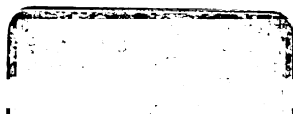

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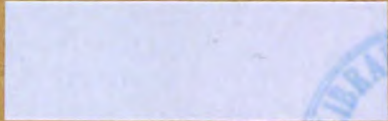




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TM 11-2619

WAR DEPARTMENT TECHNICAL MANUAL



RADIO CONTROL CENTRAL AN/TRQ-1 ()

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WAR DEPARTMENT

29 JULY 1944

WAR DEPARTMENT,
WASHINGTON 25, D. C., 29 July 1944.

TM 11-2619, Radio Control Central AN/TRQ-1 () is published
for the information and guidance of all concerned.

[AG 300.7 (19 May 1944).]

BY ORDER OF THE SECRETARY OF WAR :

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For explanation of symbols, see FM 21-6.

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DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN — When ordered by your commander.

- HOW** — 1. **Smash**—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. **Cut** —Use axes, handaxes, machetes.
3. **Burn** —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. **Explosives**—Use firearms, grenades, TNT.
5. **Disposal** —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- WHAT** — 1. **Smash**—All receivers by sledge hammer blows directed at front panels to buckle ganged capacitors and obliterate dial apertures; all tubes; remote control units; typewriters by blows on keyboard; coupling units; battery charger; battery by crushing the case; power unit cooling and oil systems; etc.
2. **Cut** —Coaxial cables, speaker leads, wiring.
3. **Burn** —Set wiring, anything inflammable.
4. **Bend** —Antenna equipment, variable capacitor plates.
5. **Bury or scatter**—Everything possible.

DESTROY EVERYTHING

SAFETY NOTICE

VOLTAGES PRESENT WITHIN THESE EQUIPMENTS CAN CAUSE DEATH ON CONTACT. BE CAREFUL, THEREFORE, WHEN PANELS ARE REMOVED. ONLY NORMAL CARE IS NECESSARY, HOWEVER, WHEN HANDLING EXPOSED WIRING, SINCE NO VOLTAGES IN EXCESS OF 115 VOLTS ARE PRESENT.

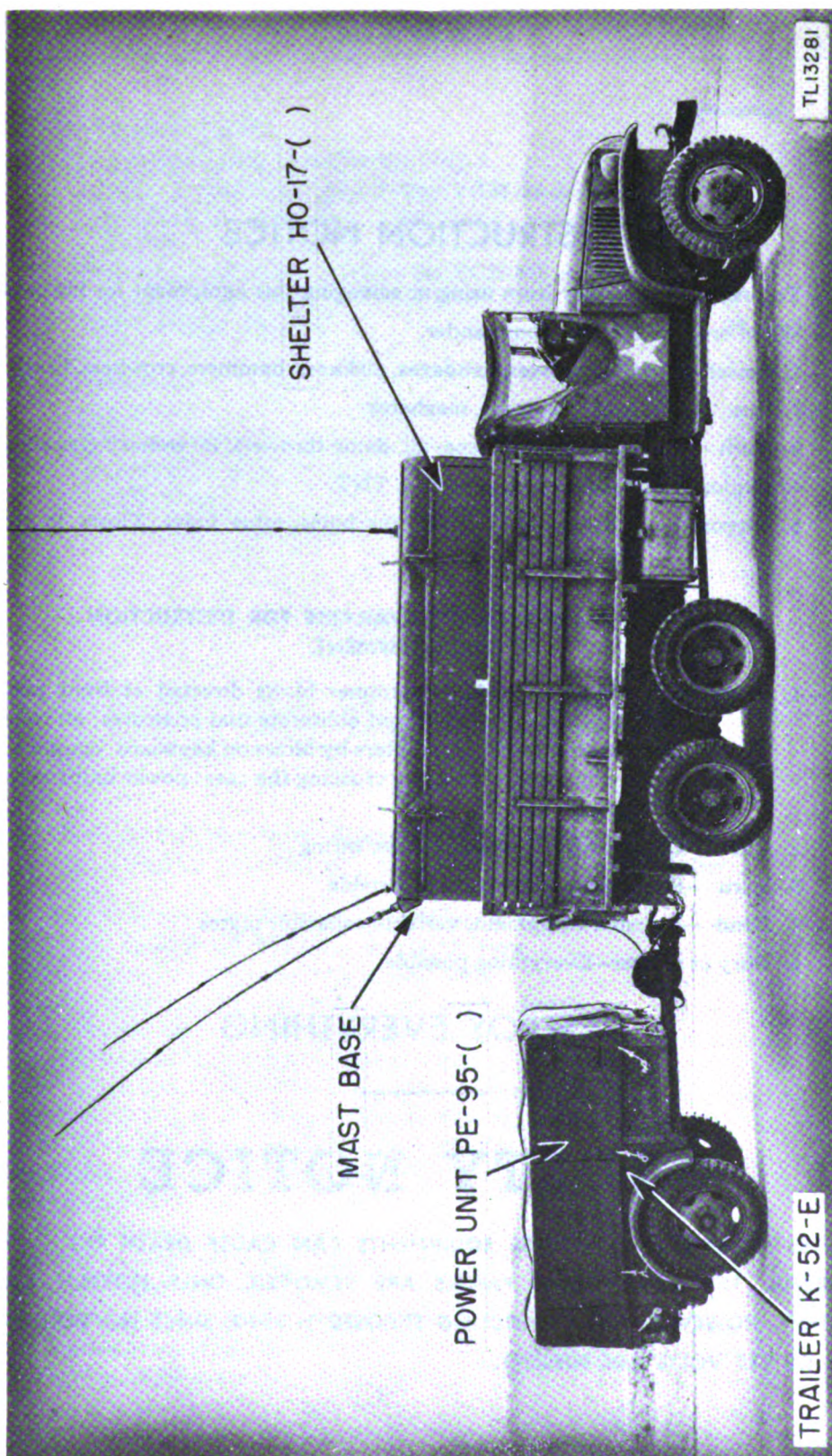


Figure 1. External view of truck and trailer, placement of whip antennas indicated.

RESTRICTED

SECTION I DESCRIPTION

1. GENERAL.

a. Description. Radio Control Central AN/TRQ-1 () is a four-position, radio-control-intercept station and is installed in Shelter HO-17-() (fig. 1 and fig. 2).^{*} The entire radio equipments and shelter are usually mounted on a 2½-ton, 6 x 6 cargo truck. The main power source for the control central equipment is Power Unit PE-95-() which is installed in Trailer K-52-E. The control central has four operating positions, each position having provision for wire communication with, and remote control of, a radio transmitting station. The transmitting station can be located anywhere within a 1-mile radius of the control central. Three of the operating positions have as required equipment, two monitoring receivers, a remote-control coupling unit, a typewriter for maintaining a log of operations and for transcribing messages, and a telegraph key. The fourth position has as its required equipment, two receivers of different design which afford more extended high-frequency coverage, a 12-position telephone switchboard with terminal facilities for eight telephone circuits, a remote-control coupling unit (similar to those at the other positions), a typewriter, a key, a receiver-transmitter unit for communication with other control centers, and a frequency meter for general utility use in all four positions (fig. 4). Other standard components of the installation are a 12-volt storage battery, a battery-charger, the 115-volt power unit mounted in a trailer (previously mentioned), a blackout interlock switch, a heater, a fan, two circuit breakers, and an Interphone Control Box BC-606-() which is connected between the trailer and truck proper, to permit control of Radio Set SCR-828-A while in motion.

b. Frequency Ranges. (1) Positions 1, 2, and 4 of the control central system monitor the frequency bands from 150 kc to 18,000 kc through the use of Radio Receivers BC-342-() and BC-344-(). Radio Receiver BC-342-() covers from 1,500 kc to 18,000 kc; Radio Receiver BC-344-() from 150 kc to 1,500 kc.

(2) Position 3 of the control central system monitors the frequency ranges from 1.25 mc to 143 mc; Radio Receiver BC-794, a Hammarlund Super-Pro, covering from 1.25 mc to 40 mc, and a Hall-crafter Model S-36 covering the ranges from 28

mc to 143 mc. Radio Set SCR-828-A which is also at position 3, provides frequency-modulated, two-way communication with other similar installations operating in the ranges between 27 mc and 38.9 mc, on any one of four preselected, band-switch controlled channels (fig. 3).

NOTE: The remote transmitter operates at variable frequencies, as directed by control central, to zero beat with the intercepted signal.

2. POWER REQUIREMENTS.

a. Power Unit PE-95-() which is mounted in Trailer K-52-E, supplies 115-volt, 60-cycle ac to all electrically-operated components of Radio Control Central AN/TRQ-1 () with the exception of the following:

- (1) Radio Set SCR-828.A.
- (2) All Remote Control Units C-103/TRQ-1.
- (3) Frequency Meter Set SCR-211-().
- (4) Switchboard BD-72-().

b. Radio Set SCR-828-A and Remote Control Units C-103/TRQ-1 are powered by a 12-volt storage battery and associated charger, and are connected so that charging is possible while the battery is being used; Frequency Meter Set SCR-211-() and Switchboard BD-72-() are powered by means of self-contained batteries.

3. COMPONENT PARTS.

Quantity	Article
1	Antenna Assembly AS-93/MRQ-2.
4	Antenna Control Box C-109/MRQ-2.
1	Antenna Coupling Unit CU-23/TRQ-1 includes the following: 2 Lamp LM-27; 1 in use, 1 running spare. 4 Tube JAN-6AC7. 1 Tube JAN-6X5GT.
1	Axle RL-27-B.
1	Battery: storage; 12-volt; SAE 8T.
1	Battery Charger PP-78 ()/MRQ-2 includes: 2 TM11-2527.
4	Box BX-19-A: (for running spare receiving tubes, fuses, and lamps).
1	Broom, Floor, Sears, Roebuck & Co., No. 11F06606, or equal.

^{*}Wherever symbol () appears in conjunction with equipment nomenclature, it indicates all models and procurement of that equipment.

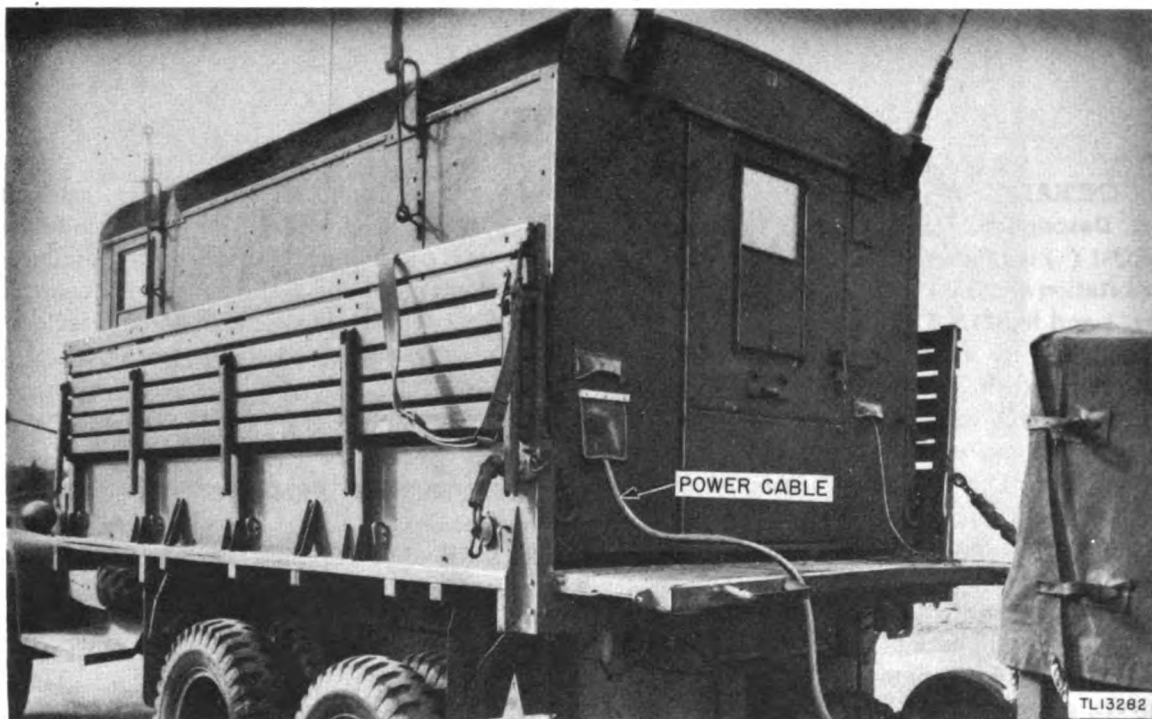


Figure 2. Radio Control Central AN/TRQ-1 (), external view showing Shelter HO-17().

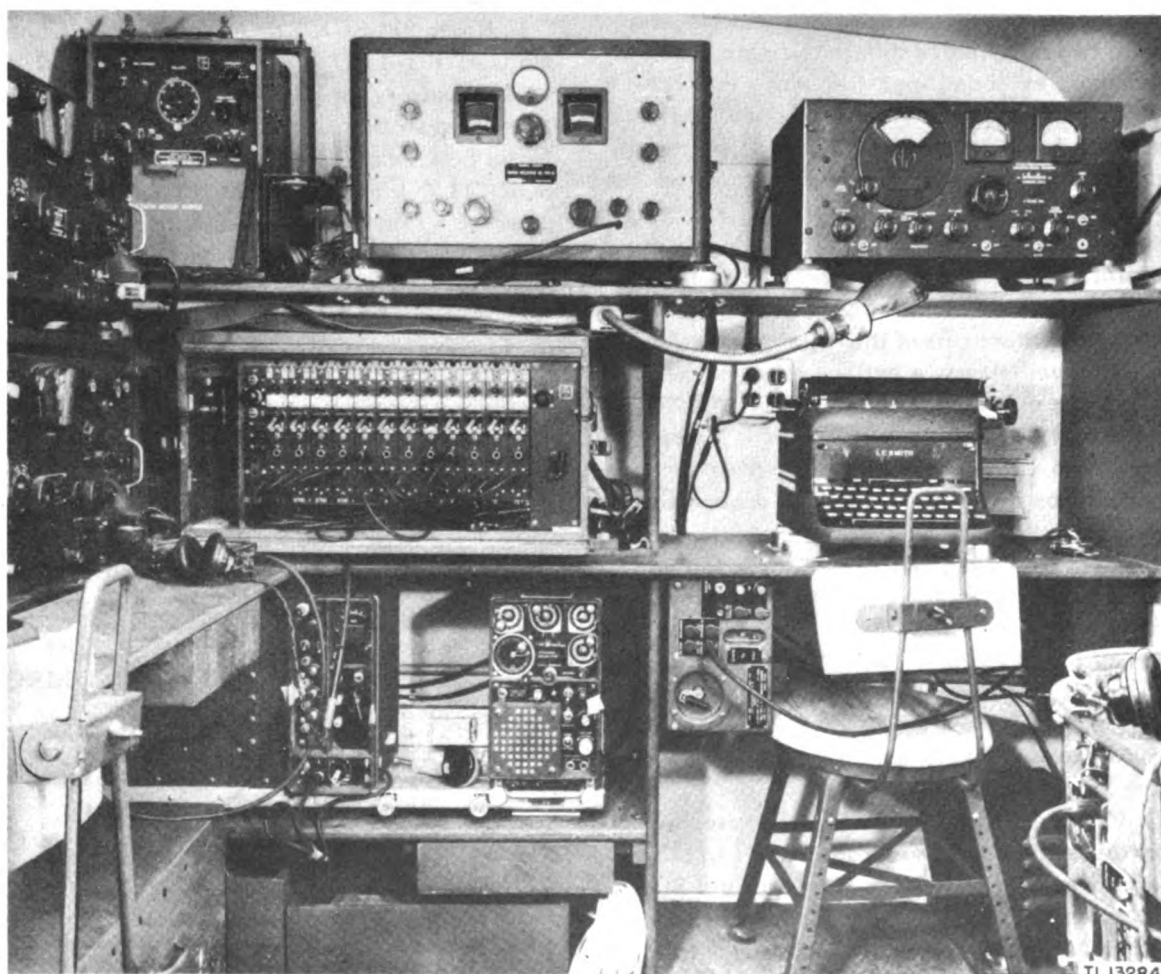
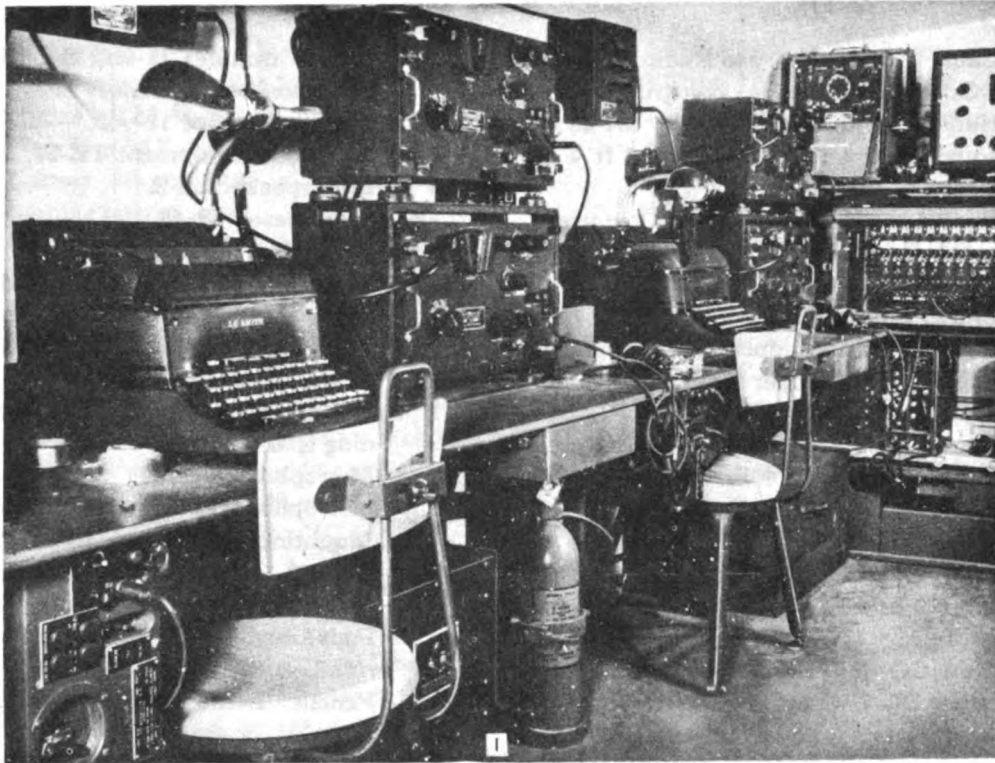


Figure 3. Radio Control Central AN/TRQ-1 (), position 3.



- 1 Position 1 and 2
- 2 Position 4

Figure 4. Radio Control Central AN/TRQ-1 (), interior view.

Quantity	Article	Quantity	Article
1	Cable [power supply to Radio Receiver BC-794-()] same construction as Hammarlund Mfg. Co., No. SA-35 or equal, except length shall be 8 ft 4 in.	1	Lamp: trouble; 12-volt d-c with 25-ft extension cord includes: 1 lamp, 50-watt, 12-volt.
4	Chair: type No. 440.	1	Linesman Equipment TE-21.
5	Chest Unit H-19/U or equal; 4 in use, 1 running spare.	4	Loudspeaker LS-3.
1	Chest CY-71/MRQ-2 (battery).	3	Mast Base MP-48.
1	Clock: type A-6 or equal.	3	Mast Base Bracket MP-50.
2	Cord: 10-ft, 1-conductor, approximately No. 7AWG copper braid (for grounding connection to GP-168).	7	Mast Sections MS-49 and MS-54: 1 each in use, 3 each running spares.
4	Cord CD-201: (for Key J-41-A).	7	Mast Sections MS-50 to MS-52: 3 each in use, 4 each running spares.
6	Cord CD-307-A: 4 in use, 2 running spares.	7	Mast Sections MS-53; 1 in use, 6 running spares.
2	Cord CD-318-A: running spare.	2	Microphone T-17.
6	Cord CD-370: (Radio Receivers BC-342-() and BC-344-() to power outlet a-c).	2	Microphone T-45: running spares.
2	Cord CG-62/TRQ-1: 3 ft; Radio Receiver BC-794 and Hallicrafter type S-36 receiver, or equal, to Antenna Control Box C-109/MRQ-2.	6	Mounting FT-178: for Radio Receivers BC-342-() and BC-344-().
1	Cord CG-62/TRQ-1: 8 ft; Mounting FT-237-() to Mast Base MP-48.	1	Mounting FT-237-().
2	Cord CG-67/MRQ-2: 15 ft; Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23/TRQ-1 and Antenna Control Box C-109/MRQ-2 to Mast Base MP-48.	10	Pads: memorandum; white; 8" x 10½"; ruled.
1	Cord CG-67/MRQ-2: 8 ft; Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23/TRQ-1.	12	Pencils: Dixon's Eldorado 188, No. 3-5/10 2H, or equal.
1	Cord CG-67/MRQ-2: 3 ft; Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23/TRQ-1.	1	Power Supply Unit RA-84 includes: 1 dust cover. 10 Fuse FU-27; 1 in use, 9 running spares. 5 Tube JAN-80; 1 in use. 5 Tube JAN-5Z3; 1 in use.
1	Cord CG-67/MRQ-2: 2 ft 6 in.; Mast Base MP-48 to Antenna Coupling Unit CU-23/TRQ-1.	3	Radio Receiver BC-342-(). Each set includes 2 TM11-850N.
6	Cord CG-68/MRQ-2: 2 ft; Radio Receivers BC-342-() and BC-344-() to Antenna Control Box C-109/MRQ-2.	3	Radio Receiver BC-344-(). Each set includes 2 TM11-850N.
3	Cord CX-132/TRQ-1: 5 ft; Radio Receivers BC-342-() or BC-344-() to Loudspeaker LS-3.	1	Cord CX-142/MRQ-2: Battery Charger PP-78()/MRQ-2 to d-c and a-c junction box.
1	Cord CX-138/MRQ-2: Mounting FT-237-() to Cord CX-139/MRQ-2.	1	Cord CX-144/TRQ-1: 5 ft; Hallicrafter type S-36 receiver or equal to Loudspeaker LS-3.
1	Cord CX-139/MRQ-2: Interphone Control Box BC-606-() to Cord CX-138/MRQ-2.	1	Cord CX-144/TRQ-1: 9 ft; Radio Receiver BC-794 to Loudspeaker LS-3.
2	Lamp: 50-watt; 12-volt; for trouble lamp; running spare.	4	Cord CX-269/U: Remote Control Unit C-103/TRQ-1 to d-c junction box.
		4	Cord CD-268: radio receiver to Remote Control Unit C-103/TRQ-1.
		1	Dynamotor DM-64: for Radio Receiver BC-923-A (part of Radio Set SCR-828-A).
		1	Dynamotor DM-65: for Radio Transmitter BC-924-A (part of Radio Set SCR-828-A).
		1	Extinguisher: 4-lb size; carbon-dioxide; with mounting.

<i>Quantity</i>	<i>Article</i>	<i>Quantity</i>	<i>Article</i>
1	Frame FM-59: for 2 Reels DR-4.	4	Tube JAN-6C5; 1 in use.
1	Frequency Meter Set SCR-211-() includes 2 TM 11-300.	12	Tube JAN-6F6; 3 in use.
1	Fuse Box MX-154/MRQ-2 includes: 7 fuses, 30-amp, 125-volt; 2 in use; 5 running spares.	12	Tube JAN-6K7; 3 in use.
1	Ground clamp and braid assembly: for grounding Shelter HO-17-() (mobile) to truck; Hallicrafter part No. 114D061, or equal.	4	Tube JAN-6L7; 1 in use.
6	Headset HS-33: 4 in use, 2 running spares.	4	Tube JAN-6J7; 1 in use.
6	Headset Adapter MC-385: for Headset HS-33; 4 in use, 2 running spares.	4	Tube JAN-6N7; 1 in use.
1	Heater: electric; 1,500-watt; 115-volt.	12	Tube JAN-6SK7; 3 in use.
1	Interphone Control Box BC-606-().	4	Tube JAN-6SJ7; 1 in use.
4	Key J-41-A.	8	Tube JAN-6H6; 2 in use.
2	Key J-45: running spares.	1	Radio Receiver BC-923-A (part of Radio Set SCR-828-A).
12	Lamp: 50-watt; 115-volt; screw type base; for emergency light and lamp fixtures; 6 in use, 6 running spares.	1	Radio Transmitter BC-924-A (part of Radio Set SCR-828-A).
1	Radio Receiver S-36: Hallicrafter Co. includes:	4	Remote Control Unit C-103/TRQ-1.
	8 Tube JAN-6H6; 2 in use.	150 ft.	Rope RP-5
	4 Tube JAN-6J5; 1 in use.	1	Shelter HO-17-().
	10 Tube JAN-6V6; 2 in use.	1	Spring clip for Interphone Control Box BC-606-().
	10 Tube JAN-6AC7/1852; 2 in use.	2	Stake GP-16: for grounding connections.
	4 Tube JAN-6SK7; 1 in use.	1	Switchboard BD-72-().
	7 Tube JAN-954; 1 in use.	2	TM 11-601: for Radio Set SCR-808-A and SCR-828-A.
	7 Tube JAN-955; 1 in use.	2	TM 11-2619 for Radio Control Central AN/TRQ-1 ().
	4 Tube JAN-OD3/VR-150: 1 in use.	1	Tool Equipment TE-41.
	5 Tube JAN-5U4G; 1 in use.	1	Trailer K-52-E includes Power Supply PE-95-() and TM 11-904.
	4 Tube JAN-6SL7GT; 1 in use.	1 set	Tubes: running spares for Radio Control Central AN/TRQ-1 () includes the following:
	5 Tube JAN-6AB7; 1 in use.		13 JAN-6C5.
	7 Tube JAN-956; 1 in use.		9 JAN-6F6.
12	Lamp LM-27; 2 in use, 10 running spares.		14 JAN-6K7.
	6 Lamp LM-52; 1 in use, 5 running spares.		7 JAN-6L7.
	6 Fuse FU-27; 1 in use, 5 running spares.		6 JAN-6R7GT.
	2 TM 11-867.		8 JAN-5W4.
1	Radio Receiver BC-794 includes:		12 JAN-6K7GT.
	1 crystal; quartz, resonator type.		3 JAN-OD3/VR-150.
	1 Cabinet CH-104.		5 JAN-6V6GT.
	4 Lamp LM-25; 2 in use, 2 running spares.		4 JAN-6SL7GT.
	2 Lamp LM-52; 1 in use, 1 running spare.		2 JAN-6J5.
	1 Cable; power-supply.		5 JAN-6H6.
	1 Cable; auxiliary battery.		4 JAN-6SK7.
	2 TM 11-866.		10 JAN-6AC7.
			1 JAN-6AB7.
			2 JAN-954.
			2 JAN-955.
			2 JAN-956.
			1 JAN-5U4G.
			3 JAN-6SJ7.
			1 JAN-6AG7.

Quantity	Article
2	JAN-815.
1	JAN-12SA7.
2	JAN-12SG7.
2	JAN-12SJ7.
3	JAN-12SC7.
1	JAN-6J7.
1	JAN-6SJ7.
1	JAN-6N7.
1	JAN-5Z3.
1	JAN-80.
1	JAN-6X5GT.
4	Typewriter MC-88: complete with cover.
100 ft	Wire: antenna; stranded and enameled No. 12 B & S gauge.
2 reels	Wire W-110-B: on 2 Reels DR-4; 1/2 mile on each reel.

4. DESCRIPTION OF COMPONENT PARTS. A description of component parts appears below.

5. ANTENNAS. Four antennas are provided for use with Radio Control Central AN/TRQ-1 ().

a. Three whip antennas are ordinarily used in the equipment. Facing the rear of the truck, the antenna for operation positions 1, 2, and 4 is

mounted at the rear left of the shelter roof; the position 3 antenna is at the right rear, and the antenna for Radio Set SCR-828-A is mounted at the front left-hand corner. Each of the antennas is inserted in an individual Mast Base MP-48, and is rigidly supported by a Mast Base Bracket MP-50. The position 1, 2 and 4 antenna is a six-section unit (Mast Sections MS-49 to MS-54); the other pair of antennas are identical, consisting of three sections each (Mast Sections MS-50 to MS-52).

b. Auxiliary Antenna Assembly AS-93/MRQ-2 is used for operating positions 1, 2, and 4 when increased gain is needed. The assembly consists of a single-wire antenna and counterpoise combination, the antenna proper being supported by four Lance Poles PO-2, suitably guyed. When this antenna is used, it is clipped to the left rear mast base. It is fully described in TM 11-2610.

6. ANTENNA COUPLING UNIT CU-23/TRQ-1.

This consists of an untuned, five-tube coupling unit, which permits the operation of three receivers from a single antenna, without interaction (figs. 5, 6, and 7). It is mounted on the left side of the shelter, adjacent to the mast base of the three-position whip antenna. The coupler is con-

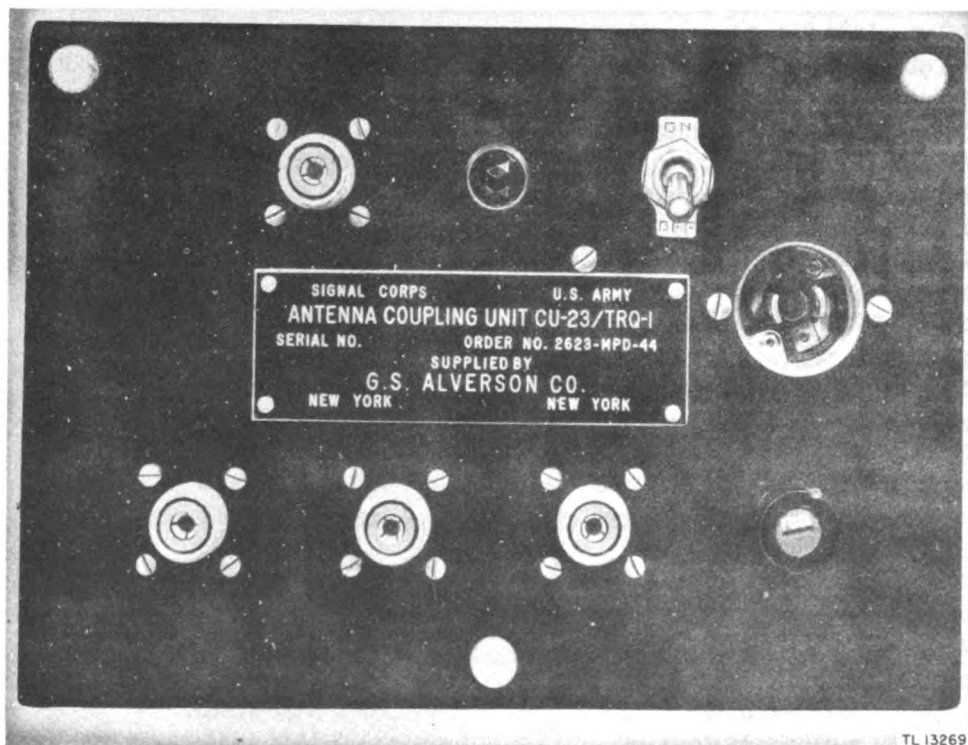
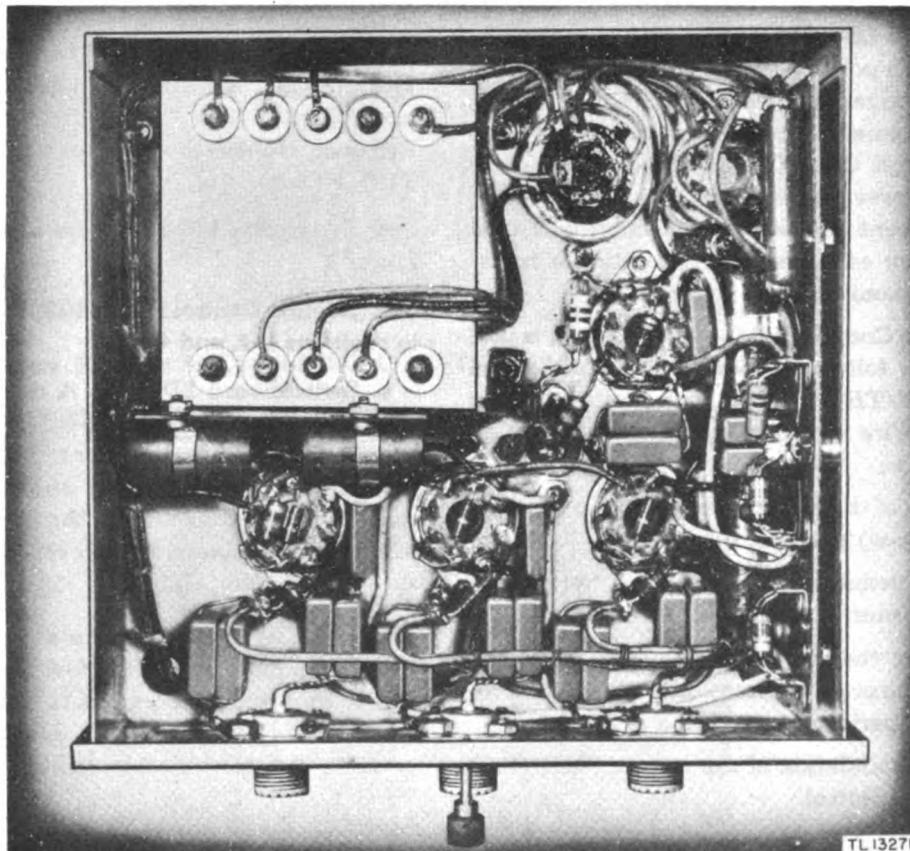


Figure 5. Antenna Coupling Unit CU-23/TRQ-1, front view.



TL 13270

Figure 6. Antenna Coupling Unit CU-23/TRQ-1, top view of chassis.



TL 13271

Figure 7. Antenna Coupling Unit CU-23/TRQ-1, bottom view of chassis.

nected to the antenna through coaxial Cord CG-67/MRQ-2.

7. EQUIPMENTS AT POSITIONS 1, 2, AND 4.

These consist of three separate sets of identical equipments, comprising the following components:

a. **Radio Receiver BC-342-**(). This radio receiver covers the frequency ranges from 1.5 mc to 18 mc. A complete description of the receiver is found in TM 11-850-N.

b. **Radio Receiver BC-344-**(). This radio receiver covers the frequency ranges from 150 kc to 1,500 kc. For a complete description of this receiver, refer to TM 11-850-N. Radio Receiver BC-344-() is mounted directly above Radio Receiver BC-342-() in each operating position.

c. **Antenna Control Box C-109/MRQ-2.** This control box is used to switch the antenna to either receiver at each of the three positions, as required, through a coaxial cable. Three Cords CG-67/MRQ-2 connect the Antenna Coupling Unit CU-23/TRQ-1 to each of the antenna control boxes. Two separate Cords CG-68/MRQ-2 connect each antenna control box to each pair of Radio Receiver BC-342-() and Radio Receiver BC-344-().

d. **Speaker LS-3 and Headsets.** These are provided in each position. The speaker is connected to either receiver in any of the three positions, as required. Connection between speaker and set is made through Cord CX-132/TRQ-1. Headsets are used to prevent confusion between operators and to prevent feedback when control central operators are each remotely operating a transmitter and monitoring its output.

e. **Remote Control Unit C-103/TRQ-1.** This unit permits the following operations from Control Central AN/TRQ 1 at all four positions, using telephone Wire W-110 to transmitter truck (figs. 8, 9, and 10).

- (1) Keying of the remote transmitter in continuous-wave (c-w) position.
- (2) Transmission of radio receiver outputs to the remote transmitter operators.
- (3) Turning the remote transmitter high-voltage supply on or off in phone operation, thus controlling the periods of operation.
- (4) Voice modulation of the remote transmitter from control central.

(5) Monitoring of the transmitted signal. Remote Control Unit C-103/TRQ-1 is described in paragraphs 22 and 35. Cord CD-268 connects the receiver to the remote control unit; Cord CX-269/U connects the unit to the d-c junction box.

1. **Typewriter MC-88.** Typewriter MC-88 on shock mounts is provided at all four operating positions.

8. EQUIPMENTS AT POSITION 3. These consist of the following:

a. **Radio Receiver BC-794 (Hammarlund superpro).** Radio Receiver BC-794 is connected to its Power Supply Unit RA-84 through a nine-conductor cable. Power Supply Unit RA-84 is connected to the 115-v a-c outlet at the rear of the equipment through a two-conductor cord. Antenna connection is made from the antenna binding post through Cord CG-62/TRQ-1 (3 ft) to the Antenna Control Box C-109/MRQ-2 located on ceiling between Receiver BC-794 and Receiver S-36. For a complete description of this receiver, refer to TM 11-866.

b. **Radio Receiver (Halcrafter S-36).** Radio Receiver S-36 is also used in this position. See TM 11-867 for a complete description of the unit. Power connection is made to the rear of the set through a two-conductor cord and attached plug. The antenna connection is made to the same Antenna Control Box C-109/MRQ-2 as for Radio Receiver BC-794 by means of Cord CG-62/TRQ-1 (3 ft).

c. **Typewriter MC-88.** Same as in positions 1, 2, and 4.

d. **Remote Control Unit C-103/TRQ-1.** Same as in positions 1, 2, and 4.

e. **Switchboard BD-72-**(). A detailed description of Switchboard BD-72-() is given in TM 11-330. Power to Switchboard BD-72-() is derived from six Batteries BA-30 contained in the switchboard. Connection to the L terminal block at the rear left side of Shelter HO-17-() is made through a 10-pair Cable WC-535.

1. **Radio Set SCR-828-A.** For a detailed description of Radio Set SCR-828-A see TM 11-601. Power supply for the set is a 12-volt storage battery. Antenna connection to Mast Base MP-48 is made through a coaxial cable, Cord CG-52/TRQ-1.

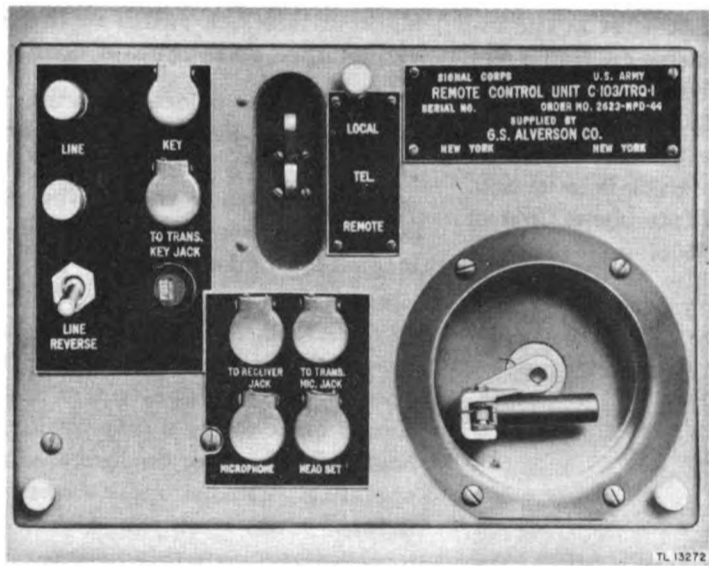


Figure 8. Remote Control Unit C-103/TRQ-1, front view.

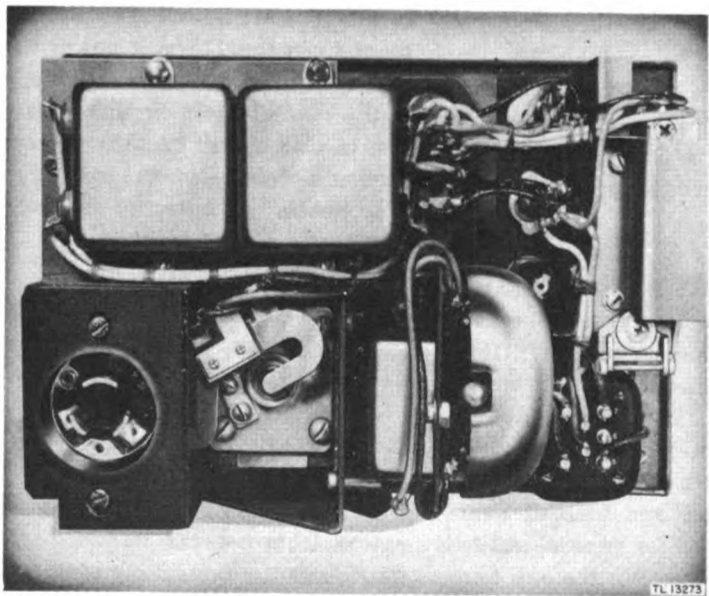


Figure 9. Remote Control Unit C-103/TRQ-1, top view of chassis.

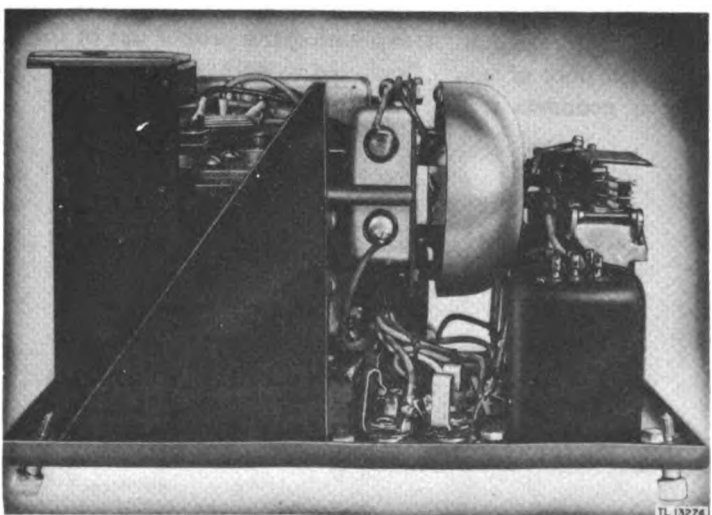


Figure 10. Remote Control Unit C-103/TRQ-1, bottom view of chassis.

g. Interphone Control Box BC-606- (). The interphone box is connected between Radio Set SCR-828-A and the truck cab by means of Cords CX-138/MRQ-2 and CX-139/MRQ-2. Remote operation (fig. 11) of Radio Set SCR-828-A is possible, therefore, while the truck is in motion. For a complete description of Interphone Control Box BC-606- () see TM 11-601.

h. Battery. Storage Battery SAE-8T referred to in paragraph 4d(6) above, is a 12-volt, 168-ampere storage Ordnance battery and supplies power to Radio Set SCR-828-A and to Remote Control Units C-103/TRQ-1.

9. BATTERY CHARGER PP-78- ()/MRQ-2 Battery Charger PP-78- ()/MRQ-2, a selenium rectifier type, operates from the 115-volt, 60-cycle, a-c power supply, and charges the 12-volt battery at a 10- or 20-ampere rate.

10. POWER UNIT PE-95- (). Power Unit PE-95- () is mounted in Trailer K-52-E and forms a completely mobile generating unit. It provides approximately 10 kw of single-phase, 60-cycle ac at 115 volts. A complete description of the unit is given in TM 11-904.

11. FREQUENCY METER SET SCR-211- (). This frequency meter set is completely described in Instruction Book for Frequency Meter Set SCR-211 or in TM 11-300. It has a self-contained power supply consisting of 10 batteries; 6 Batteries BA-2, 22½ volts each for B supply, and 4 Batteries BA-30, 1½ volts each for filament supply. It is shock-mounted and located near operating position 3. It is used for general utility frequency measurement throughout the unit and as an aid in setting the frequency of the remote transmitter.

12. BLACKOUT INTERLOCK SWITCH. A switch which is located adjacent to the rear door of the shelter puts out all the lights or connects the

blackout interlock switch so that all lights are extinguished when the rear door is opened.

13. FAN. A fan is located on the right rear wall of the shelter near the ceiling and derives its power from the 115-volt source. It is used for general ventilation and for the comfort of the operating personnel. It is controlled by a switch located on the fan motor.

14. HEATER. A 2-kw heater is located on the floor at the right center of Shelter HO-17- (). It operates from the 115-volt, a-c source, and is turned on or off by a switch on the front of the heater. It is used for the increased comfort of the operating personnel under adverse climatic conditions.

15. CIRCUIT BREAKERS. Two circuit breakers mounted in box on the left rear wall of Shelter HO-17- () are adjusted to disconnect the equipment from the 115-volt power supply when the supply current drain is excessive, as for example, in the case of short circuits in any of the equipments. One circuit breaker protects all a-c operated equipment with the exception of the heater. The heater is protected by the second circuit breaker.

16. CLOCK. A Longine-Wittnauer, 8-day, spring-operated clock is mounted on the wall over the door. It is used as a time standard whenever necessary, as for example in logging time-of-operations.

17. FIRE EXTINGUISHER, MODEL FF4. This fire extinguisher is of the standard type using carbon dioxide as the fire-killing element. It is mounted for convenient use when needed.

18. TECHNICAL MANUALS. Technical manuals explaining the proper use of the equipments are included as part of the equipment and should be referred to when necessary.

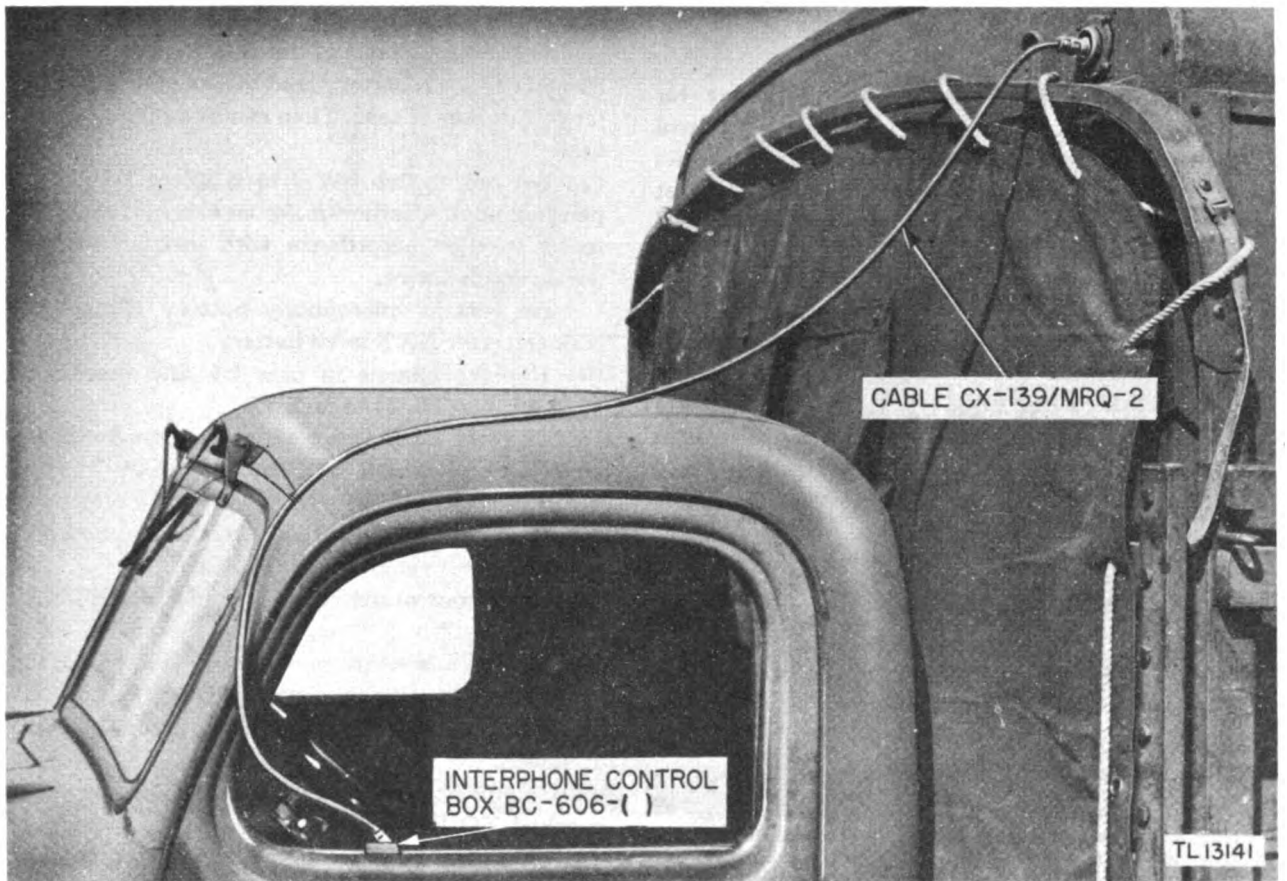


Figure 11. Truck cab showing Interphone Control Box BC-606 ().

SECTION II

INSTALLATION AND OPERATION

19. INSTALLATION PROCEDURE. Radio Control Central AN/TRQ-1() is supplied installed in Shelter HO-17-(), transported by a 2½ ton, 6 x 6 cargo truck, along with Trailer K-52-E which contains Power Unit PE-95-(), also previously installed. To place the control central in operating condition, follow the procedure outlined in the following paragraphs.

20. ANTENNAS. Assemble mast sections for each of the three antennas used for the control central, screwing each antenna securely into its Mast Base MP-48. All connections between mast sections must be tightened with pliers and all junctions taped to prevent loose and noisy joints.

CAUTION: Use pliers with care to avoid crushing or denting mast sections.

21. POWER UNIT PE-95-().

a. Connect two-conductor power cable through entrance hole at rear of Shelter HO-17-() and attach its lug terminals to the 115-v a-c terminals on Power Unit PE-95-().

b. Check gas, oil, water, and battery connections and start Power Unit PE-95-() as directed in TM 11-904.

c. Close both circuit breakers on wall at left side of rear door of Shelter HO-17-() by placing in the ON position.

d. Power should now appear at all a-c outlets.

NOTE: There are three types of power outlets used; two pin outlets for 115 v ac; three pin outlets for 12 v dc; four pin outlets for a combination of both 115 v ac and 12 v dc. These outlets are used to prevent making the wrong connections from the various components to the power source.

22. REMOTE CONTROL UNITS C-103/TRQ-1.

NOTE: It is important that all cords and plugs not needed for the operation to be performed be removed from jacks on the remote control unit.

a. Connect the telephone line from the remote transmitter to be controlled to the proper J block terminals; Terminal J1 to operating position 1, terminal J2 to operating position 2, etc.

b. If the length of telephone Wire W-110 does not exceed 1 mile in length (approximately two reels), no relay battery will be required at the remote end of the line [in Radio Control Central

AN/TRQ-1-()]. If the length of telephone Wire W-110 is from 1 to 3 miles long an external relay battery of 12 volts will be required at the remote end for proper operation.

c. To prepare these units for use proceed as follows:

(1) Open the remote control unit by removing the thumbscrews on the panel and sliding the chassis far enough out of the case to permit Plug P1-68 (PL-2) on battery lead to be removed from jack J7 in rear of case. Then remove chassis from case.

(2) Set link switch SW-2 to EXT or INT depending upon whether or not an external relay is to be used in accordance with instructions of paragraph b above.

(3) Be certain microphone battery leads are connected for EXT mike battery.

(4) Replace chassis in case by first inserting Plug PL-68 (PL-2) in jack J7.

(5) Connect d-c battery plug PL-1 to d-c battery outlet on wall of Shelter HO-17-() by means of Cord CX-269/U.

(6) Connect telephone leads to binding posts on front panel of remote control unit.

(7) Place control switch SW-3 in TELEPHONE position.

(8) Plug headset into jack marked HEADSET.

(9) Plug microphone (either Chest Unit H-19 or Microphone T-17) into jack marked MICROPHONE.

(10) Connect Cord CD-268 from receiver to jack marked TO RECEIVER.

(11) Turn on receiver that is connected to remote control unit and listen in headset for signals.

(12) Call operator at other end of line by rapidly turning crank of hand generator.

(13) Plug hand key Cord CD-201 into jack marked KEY on panel of remote control unit.

(14) Set control switch to REMOTE position when ready to start operation.

(15) To operate the remote transmitter, be certain the remote operator is ready, and then press hand key.

NOTE: Type of operation to be used will be set up by operator at transmitter.

(16) If relay does not operate due to improper line polarity, set LINE REVERSE switch to opposite position.

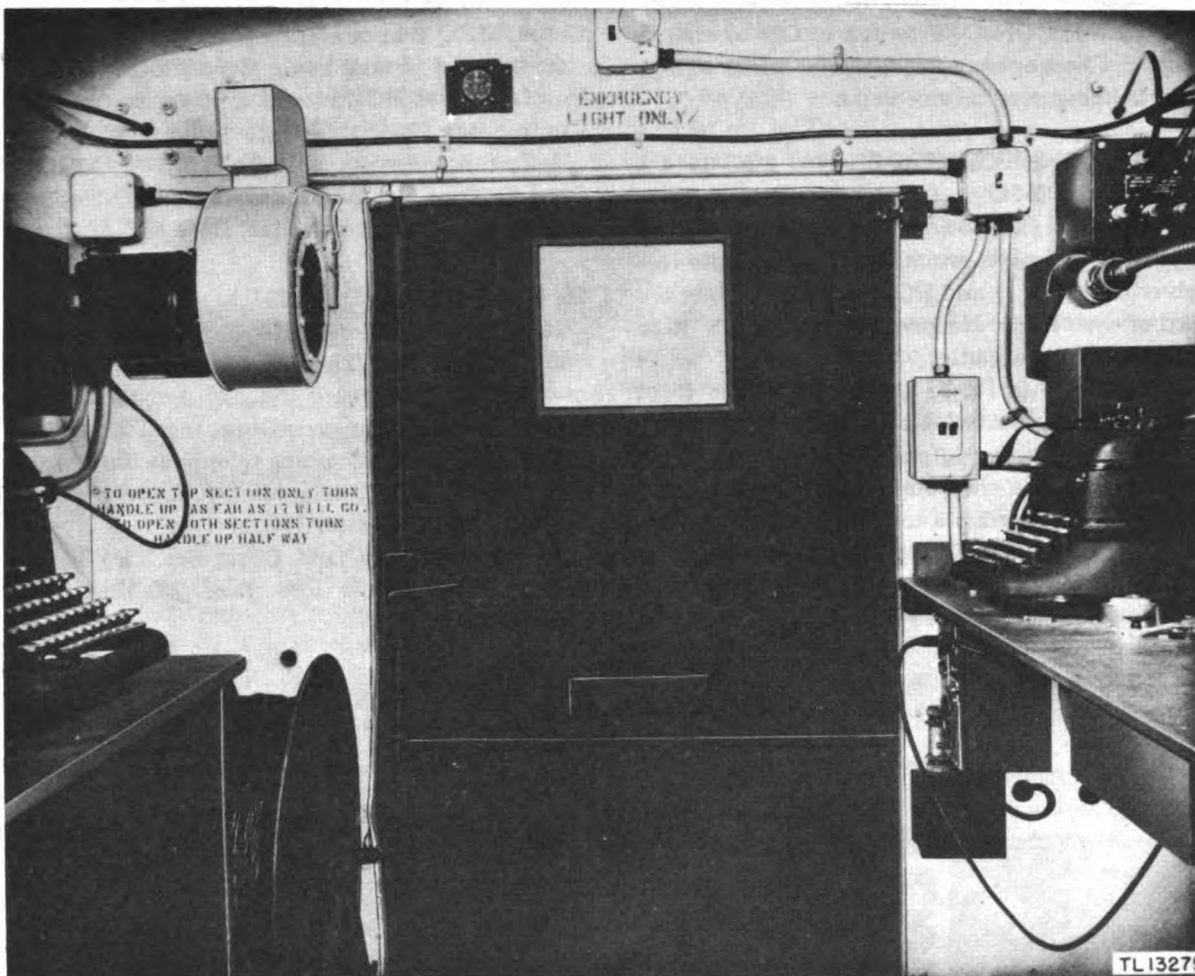


Figure 12. Interior Shelter HO-17(), rear view.

23. ANTENNA COUPLING UNIT CU-23/TRQ-1.

a. Connect the power cord to a 115-volt, a-c outlet.

b. Connect the input terminal of the antenna coupling to Antenna Mast Base MP-48, at the left rear of Shelter HO-17-() (fig. 12) by means of Cord CG-67/MRQ-2 (2 ft 6 in.).

c. Connect coaxial cable cord CG-67/MRQ-2 from the Antenna Control Box C-109/MRQ-2 at each operating position 1, 2, and 4 to the 3 output terminals of the Antenna Coupling Unit CU-23/TRQ-1.

d. Turn the coupling unit ON-OFF switch to ON.

e. No further adjustment is required.

24. BATTERY CHARGER PP-78 ()/MRQ-2.

- a. Connect the charger power cord to the combination a-c and d-c outlet.
- b. For a 20-ampere charging rate, put switch on charger in the HIGH position; for the 10-ampere rate, place switch in LO position. In any event, shelter should have adequate ventilation.
- c. Turn the ON-OFF switch to ON to charge battery. Charger may be operated while equipment is being used or vice versa.

25. INTERCEPT RECEIVERS BC-342(), BC-344(), BC-794, AND S-36.

- a. Connect the power Cords CD-370 to the 115-volt, a-c outlets provided for each Radio Receiver BC-342-() and BC-344-(). Connect a-c cord of each Radio Receiver BC-794 and S-36 to its respective a-c outlet.
- b. Insert Plug PL-55 on Cord CD-268 from each Remote Control Unit C-103/TRQ-1 into the proper receiver output jack.
- c. To monitor the loudspeaker output, connect Loudspeaker LS-3 to Radio Receivers BC-342-() and BC-344-() by using Cord CX-132/TRQ-1 with Plug PL-68 at each end. Radio Receivers S-36 and BC-794 have speaker cords

fastened to the screw terminals marked SPEAKER at the back of either set. The cords terminate in Plug PL-68 making for rapid connection to Loudspeaker LS-3.

d. Connect coaxial cable Cord CG-68/MRQ-2 from each Radio Receiver BC-342-() and BC-344-() to its respective Antenna Control Box C-109/MRQ-2 at operating positions 1, 2, and 4.

e. Connect coaxial cable Cord CG-62/TRQ-1 from Receiver BC-794 and S-36 to its Antenna Control Box C-109/MRQ-2.

f. Connect coaxial cable Cord CG-67/MRQ-2 from Antenna Control Box C-109/MRQ-2 at position 4 to the right rear Mast Base MP-48.

26. SWITCHBOARD BD-72().

- a. Insert 6 Batteries BA-30 into the switchboard battery box. The box is accessible from the rear of the switchboard (fig. 13). For the correct battery installation procedure, see TM 11-330.
- b. Connect the incoming telephone lines to the terminals on the L telephone junction block at the left rear of Shelter HO-17-().
- c. Connect Head and Chest Set TD1 by inserting Plug PL-58 into Jack JK-37 on the switchboard.

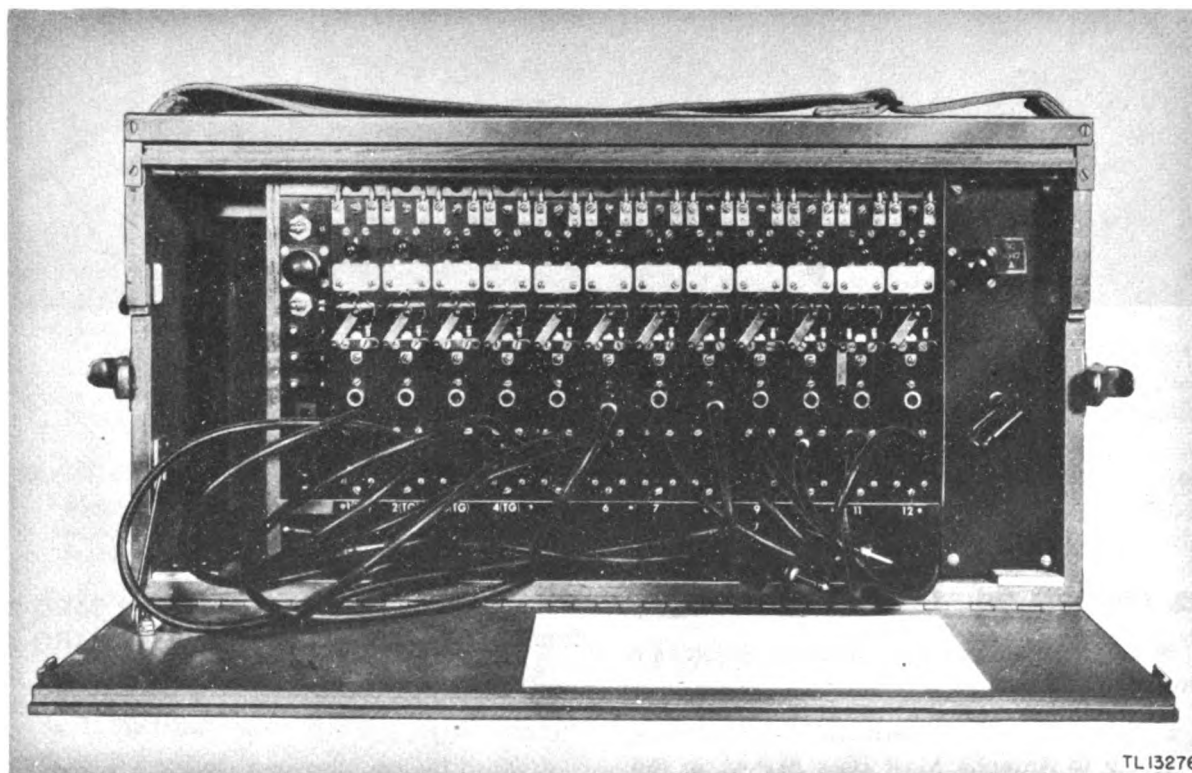


Figure 13. Switchboard BD-72().

27. RADIO SET SCR-828-A.

a. Connect coaxial cable cord CG-62/TRQ-1 (8 ft 6 in.) from Mounting FT-237-() to the left front Mast Base MP-48.

b. Connect headset and microphone to their respective jacks on the unit.

c. Interphone Control Box BC-606-() is installed in the truck cab to operate Radio Set SCR-828-A while the control central is in motion. Connect the interphone cable Cord CX-139/MRQ-2 to the five-contact socket on front of shelter. Connect Cord CX-138/MRQ-2 to Terminal Strip TS-401 on Mounting FT-237-() as follows:

(1) At Interphone Control Box BC-606-().

Terminal No. 1—none	Terminal No. 6—red
Terminal No. 2—green	Terminal No. 7—none
Terminal No. 3—blue	Terminal No. 8—black
Terminal No. 4—none	Terminal No. 9—none
Terminal No. 5—none	Terminal No. 10—none

(2) At Terminal Strip TS-401 on Mounting FT-237-().

Terminal No. 1—white	Terminal No. 6—none
Terminal No. 2—none	Terminal No. 7—none
Terminal No. 3—red	Terminal No. 8—black
Terminal No. 4—none	Terminal No. 9—green
Terminal No. 5—none	Terminal No. 10—blue

d. Refer to TM 11-601 for detailed operating instruction for Radio Set SCR-828-A.

28. AUXILIARY EQUIPMENT AND WIRING.

a. The two circuit breakers on the left rear wall of the shelter must be closed or the equipment will not function.

b. The switch adjacent to the rear door is wired in parallel with the interlock switch. When the switch is in the ON position, the shelter lights will be on; when the switch is in the OFF position the lights will only stay on when the shelter rear door is closed.

c. Plug the fan and heater into the 115-volt a-c line and turn switches to ON and check for proper operation.

d. The d-c line activating Remote Control Units C-103/TRQ-1 is fused with a 30-ampere plug fuse in Fuse Box MX-154/MRQ-2. If units do not operate, check fuse and replace, if open. Overload protection for Radio Set SCR-828-A, which is powered by the same line, is provided by fuses located in the same fuse box.

29. OPERATION OF THE EQUIPMENTS.

a. Radio Receivers BC-342(), BC-344(), S-36,

and BC-794. For specific operating instructions, see applicable TM 11-850-N, 850-N, 867, 866 respectively.

b. Remote Control Unit C-103/TRQ-1.

(1) To turn on remote control unit, plug in microphone.

(2) To communicate with the remote transmitter, place the control switch on TELEPHONE position and turn hand generator crank rapidly. Listen for reply and then push microphone switch on chest set to TALK.

(3) To transmit receiver output to remote transmitter operator, connect output of receiver to remote control unit using Cord CD-268. Remote operator will now hear received signals if volume is turned high enough.

(4) To permit the control central operator to key the remote transmitter, the remote transmitter operator is instructed to adjust the transmitter for that operation. The LINE REVERSE switch [par. 22c(16)] is now adjusted so that closing the key activates the relay which controls the remote transmitter. Remote control operation is now possible if the key is plugged into the remote control unit.

(5) To permit phone transmissions from the remote transmitter by the control central operator, the remote transmitter operator is instructed to adjust the transmitter for phone operation. The polarity-reversing switch is adjusted, as described above, for control central to take over transmitter operation. Closing and opening of a key will now permit the control central operator to turn the modulated transmitter on or off. The operators may now also voice modulate the remote transmitter. To monitor this type of transmission, only a headset may be used at control central. Loudspeaker monitoring in this application will cause violent feedback. Additional information on voice operation may be found in TM 11-281 as furnished with Radio Set AN/MRQ-2.

30. OTHER EQUIPMENTS. Details on operation of the other equipments which are listed below and are used in Radio Control Central AN/TRQ-1() may be found in the instruction books or technical manuals pertaining to them.

a. Radio Set SCR-828-A; TM 11-601.

b. Switchboard BD-72-(); TM 11-330.

c. Frequency Meter Set SCR-211-(); TM 11-300.

d. Power Unit PE-95-(); TM 11-904.

e. Battery charger; TM 11-2527.

31. ANTENNA COUPLING UNIT CU-23/TRQ-1. Connection of position 1, 2, and 4 radios to the antenna through the coupling unit will permit simultaneous operation of all three receivers without interaction between sets. The gain and selectivity of the individual receivers will not be affected by the use of the coupler.

32. TRANSMITTER COORDINATION. When Radio Control Central AN/TRQ-1 () intercepts a signal on a frequency to which the remote transmitter is to be tuned, the control central operator informs the remote transmitter operator by telephone of the frequency settings on the intercept receiver dial. If more accurate determination is required, Frequency Meter Set SCR-211- () is used. The control central operator now transmits the output of his receiver over the telephone lines to the remote transmitter operator, who then tunes the transmitter master oscillator to zero beat with the received signal. When the zero beat signal condition is achieved, if the signal is c-w, the operator at the remote transmitter signals the control central to turn off the receiver-beat-frequency-oscillator, and checks the zero-beat setting. He then adjusts his transmitter for the type of modulation or c-w signal that is to be

transmitted, and puts the transmitter under the control of the operator at Radio Control Central AN/TRQ-1 ().

33. OPERATING PRECAUTIONS.

a. When operations of remote control central are concluded, be sure to turn off both circuit breakers when leaving the shelter.

b. After observing precaution a, above, turn off Power Unit PE-95- ().

c. When any of the Remote Control Units C-103/TRQ 1 are not in use, remove the microphone cords to eliminate unnecessary battery drain.

d. Do not charge battery with shelter door closed for long periods of time due to the accumulation of acid fumes which are dangerous to personnel and hard on equipment.

e. To prevent damage to mast sections and mast bases, do not attempt to move truck through woods or other areas with overhead obstructions while mast sections are installed.

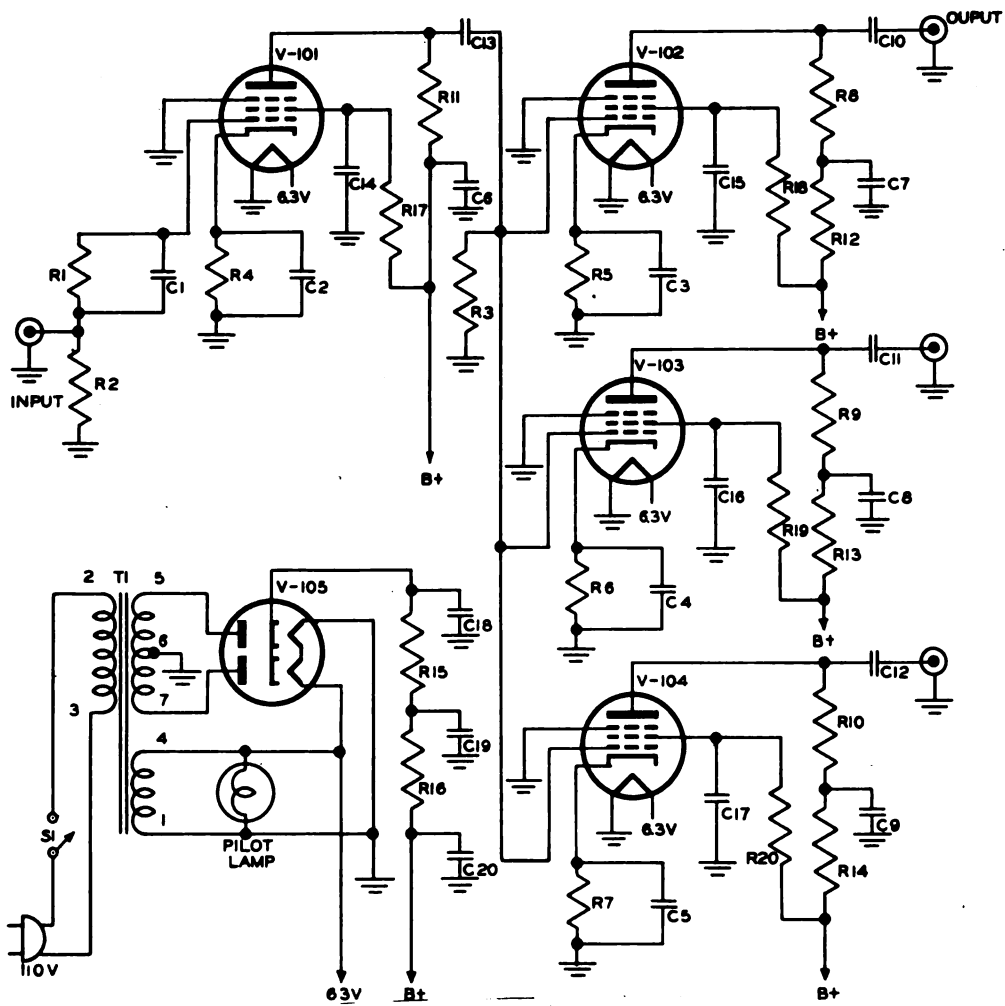
f. Be sure Frequency Meter Set SCR-211- () and Radio Set SCR-828-A are turned off when not being used. This will eliminate excessive battery drain and consequent shortening of battery life.

SECTION III FUNCTIONING OF PARTS

34. ANTENNA COUPLING UNIT. The Antenna Coupling Unit CU-23/TRQ-1 is a resistance-coupled video type amplifier (similar to type used in television units) which is designed to permit the operation of three radio receivers simultaneously, without any parasitic coupling effects between them. The coupling units use five tubes, four VT-112 (6AC7/1852) type pentode tubes and 1 type VT-126B (6X5GT) full-wave rectifier. Although, ideally, a 600-ohm input transmission line is recommended, an ordinary whip antenna or a single long wire antenna gives satisfactory results when connected to the input grid of one of the VT-112 tubes. An overload network, which consists of a 500-mmf capacitor connected in parallel with a 1-megohm resistor, is inserted across the input, effectively producing a large negative bias on the grid when a large input signal tends to drive the grid positive. The output of the first tube is capacitively coupled to the grids of the three isolating amplifier tubes which follow. The

isolating amplifier tubes are so adjusted that they develop a low-plate impedance of approximately 150 ohms. The low impedance permits uniform gain over a wide frequency range (1.5 mc to 18 mc). Plate and screen voltages for the various circuits are provided by the output of the rectifier tube. The rectified output is filtered by three 8-mf capacitors and through the decoupling action of two 1,000-ohm resistors. The rectifier input voltage is 115-volt, 60-cycle ac. (fig. 14).

35. REMOTE CONTROL UNIT C-103/TRQ-1. The Remote Control Unit C-103/TRQ-1 provides a means for keying and controlling the modulated transmission of a remotely located transmitter. Power supply for the remote control unit is a 12-volt, heavy-duty, storage battery. A relay, key, and polarity-reversing switch comprise the basic components of the control unit. The relay offers high impedance to audio frequencies, and thus provides a means for controlling the transmitter



APPARATUS LEGEND

RESISTORS

- R1 1 MEGOHM
- R2-R3 560 OHMS
- R4 220 OHMS
- R5-R10 INC 150 OHMS
- R11-R14 INC 1000 OHMS
- R15-R16 INC 1000 OHMS
- R17-R20 INC 6000 OHMS
- R15-R16 TWO WATT CAP.
- ALL OTHERS 1/2 WATT

CONDENSERS

- C1-510 MMF 500 WV
- C2-C5 0.05 MF 400 WV
- C6-C13 0.01 MF 500 WV
- C14-C17 100 MMF 500 WV
- C18-C20 10 MF 450 WV

- S-1 ON-OFF SWITCH
- 3 AMPS-250 VOLTS

T-1 TRANSFORMER

V-101-V-104
JAN-6AC7 VT112

V-105
JAN-6X5GT VT 126 B

TL 13267

Figure 14. Antenna coupling unit, schematic diagram.

without interfering with telephone operation (fig. 15).

36. RADIO RECEIVERS BC-342- (), BC-344- (), S-36, and BC-794. For a complete discussion on the detailed operation of the above receivers, refer to the technical manuals which are listed below:

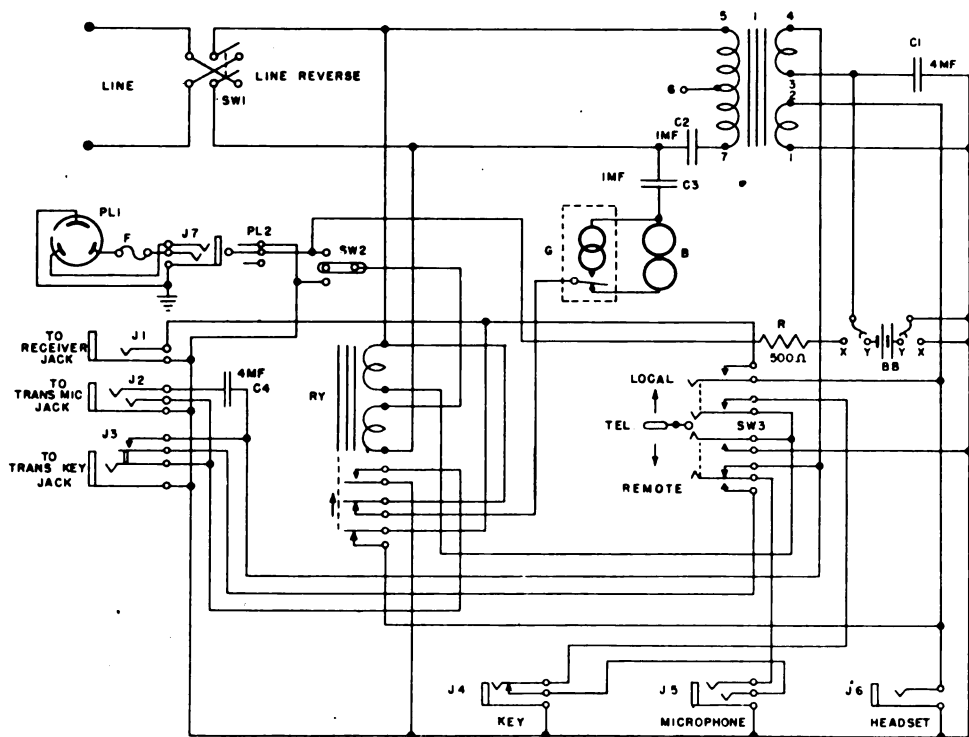
- Radio Receiver BC-342- () TM 11-850-N
- Radio Receiver BC-344- () TM 11-850-N
- *Radio Receiver BC-787 TM 11-867
- Radio Receiver BC-794 TM 11-866

*The information contained in TM 11-867 is also applicable to Radio Receiver S-36.

37. SWITCHBOARD BD-72- (), RADIO SET SCR-828-A, AND FREQUENCY METER SET SCR-211- (). For a complete discussion of the operation of the equipments listed above, refer to the technical manuals which are listed below:

- Switchboard BD-72- () TM 11-330
- Radio Set SCR-828-A TM 11-601
- Frequency Meter SCR-211- () TM 11-300

38. POWER SUPPLY PE-85- (). For a complete discussion of the power supply, refer to TM 11-904.

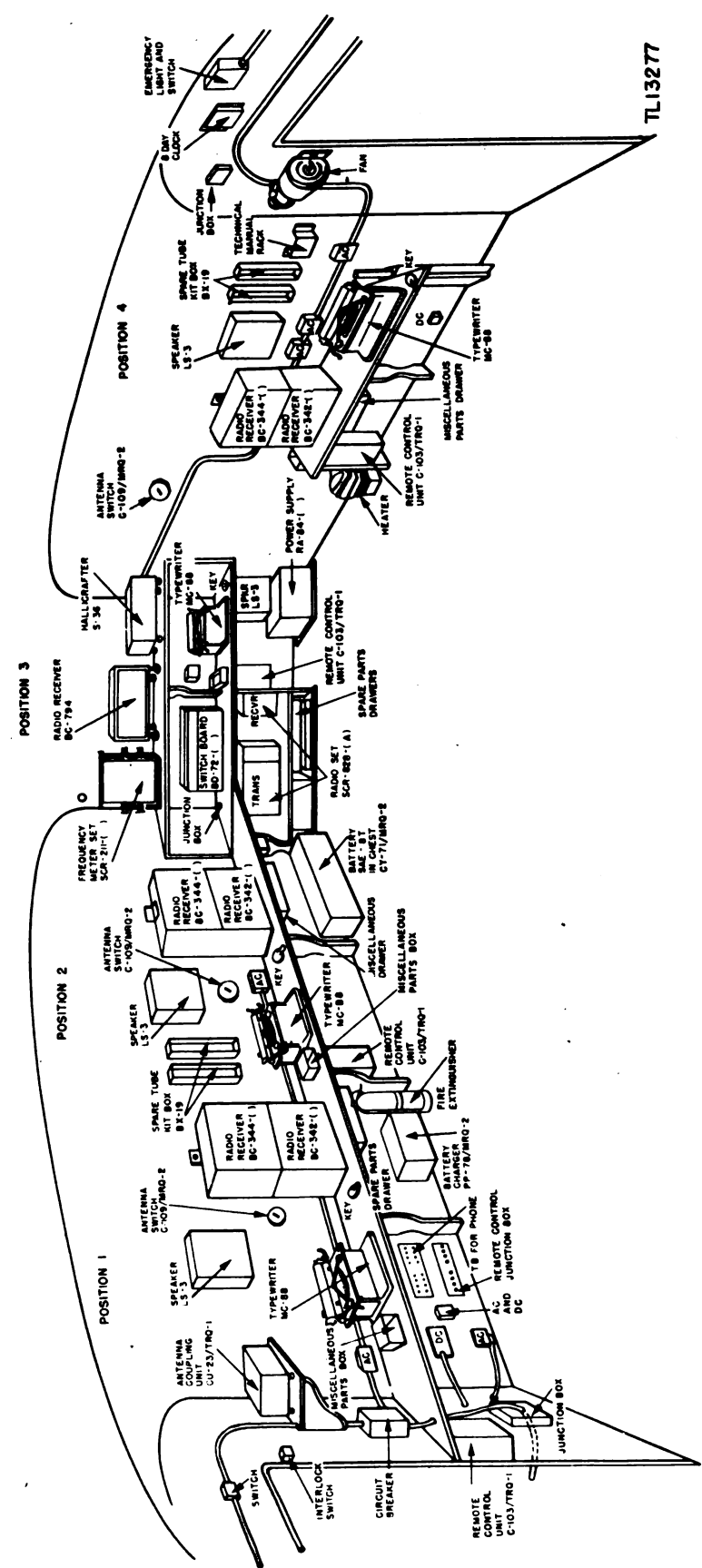


NOTE:
POSITION X-X FOR EXTERNAL MIC BATTERY
POSITION Y-Y FOR INTERNAL MIC BATTERY

REF. NO.	DESCRIPTION	REF. NO.	DESCRIPTION
B	RINGER, BELL, TYPE MC-131, POLARIZED	PL1	PLUG, MALE, HUBBELL TWISTLOCK NO. 7558, OR EQUAL
BB	BATTERY, TYPE BA-27, 4 1/2 VOLT	PL2	PLUG, TYPE PL-88
C1	CAPACITOR, TYPE CA-275, 4 MF 50 VOLT	R	RESISTOR, 500 OHM, 1 WATT, METAL FILM TYPE
C2	CAPACITOR, TYPE CA-389, 1 MF 800 VOLT	RY	RELAY, CLARE TYPE A OR EQUAL, DOUBLE COIL, TOTAL RESISTANCE 80 OHMS, TOTAL INDUCTANCE 0.7 HENRIES, ONE TYPE A CONTACT AND TWO TYPE B CONTACTS.
C3	CAPACITOR, TYPE CA-389, 1 MF 800 VOLT	SW1	SWITCH, DPDT, 3 AMP, 250 VOLT, TOGGLE, SINGLE HOLE MOUNTING TYPE
C4	CAPACITOR, TYPE CA-275, 4 MF 50 VOLT	SW2	SWITCH, LINK AND SCREW TYPE
F	FUSE, SIZE 3AG, 2 AMP, 250 VOLT, TYPE FU-27	SW3	SWITCH, TELEPHONE LEVER TYPE, TWO THROW LOCKING, TOP PILES OF TWO TYPE A CONTACTS AND BOTTOM PILES OF ONE TYPE A AND ONE TYPE C CONTACTS, CHICAGO ELECTRIC OR EQUAL.
G	GENERATOR, HAND, TYPE GN-38	T	TRANSFORMER, TYPE C-280
J1	JACK, TYPE JK-34A		
J2	JACK, TYPE JK-33A		
J3	JACK, YAXLEY NO. 3, OR EQUAL		
J4	JACK, YAXLEY NO. 2A, OR EQUAL		
J5	JACK, TYPE JK-33A		
J6	JACK, TYPE JK-34A		
J7	JACK, TYPE JK-33A		

TL13268

Figure 15. Remote control unit, schematic diagram.



TL13277

Figure 16. Interior layout, specific part location.

SECTION IV

MAINTENANCE

NOTE: Unsatisfactory performance of this equipment will be reported immediately on W. D., A. G. O. Form No. 468. If Form No. 468 is not available see TM 38-250.

38. INSPECTION.

a. General. To insure reliable and proper continuous operation of Radio Control Central AN/TRQ-1() its major components must be inspected regularly. Familiarity with the equipments may be obtained not only by frequent operation, but also by continued reference to the technical manuals and instruction books written about the various components. These are as follows:

- (1) TM 11-850, Radio Receivers BC-312-(), BC-312-()X, BC-342-(), BC-314-(), and BC-344-().
- (2) TM 11-866, Radio Receiver BC-794.
- (3) TM 11-867, Radio Receiver BC-787.
- (4) TM 11-904, Power Units PE-95-(*).
- (5) TM 11-601, Radio Set SCR-808 and SCR-828.
- (6) TM 11-330, Switchboards BD-71 and BD-72, and BD-72-B.
- (7) TM 11-300, Frequency Meter Sets SCR-211-().

b. Routine Inspection Checks.

- (1) Check oil, water, anti-freeze, and gasoline of Power Unit PE-95-() every 24 hours. Change oil at regular periods.
- (2) Check the power cable between power unit and shelter.
- (3) Replace all defective lamps in truck and trailer, tail lights, head lights, etc.
- (4) Check Frequency Meter Set SCR-211-() batteries regularly. Check storage batteries in Shelter HO-17-() and Power Unit PE-95-(). Charge, clean, and add water when necessary.
- (5) Check standard equipment as per maintenance suggestions in applicable instruction book and technical manuals.
- (6) Check and maintain Antenna Coupling Unit CU-23/TRQ-1 and Remote Control Unit C-103/TRQ-1 as per drawings referred to in paragraph 39a (10).
- (7) Use Tool Set TE-41 for minor repairs. Major repairs should only be undertaken by qualified personnel of the fourth and fifth echelons, with proper and adequate test equipment.
- (8) Look for frayed conductors which may cause intermittent or unreliable operation.

- (9) Look for broken conductors which may cause equipment shut-down.
- (10) Inspect closely for chafed insulation which can cause short circuits between conductors.
- (11) Look for moisture between contact prongs of plugs which may cause short circuits.
- (12) Replace any cables or plugs broken by rough handling.
- (13) Be careful to keep oil, gasoline, acid, and other harmful material away from wiring and insulation.

40. TROUBLE ISOLATION (figs. 16, 17, 18, and 19).

a. When trouble occurs in the equipment, track the trouble down to a single unit in the equipment. This is easily done because it is obvious that all trouble may be set into one of the following categories.

- (1) Failure of a single unit or of the entire system which is supplied by Power Unit PE-95-().
- (2) Failure of a single unit or of all equipment, storage-battery supplied.
- (3) Failure of any equipment operated by dry batteries.
- (4) Failure of antenna equipment.

b. The trouble break-down analysis may be carried a step further as follows:

- (1) Complete failure of all power-supply-operated equipment can only be due to one of the following:
 - (a) Defective Power Unit PE-95-().
 - (b) Defective power cable between Shelter HO-17-() and Trailer K-52-E.
 - (c) Defective or tripped circuit breaker. If tripped, look further for source of trouble.
- (2) Complete failure of all 12-volt storage-battery-operated units can only be due to one of the following:
 - (a) Defective battery.
 - (b) Defective battery connections.
 - (c) Defective cabling
- (3) Complete failure of any dry-battery-operated unit can only be due to one of the following:
 - (a) Internal circuit trouble.
 - (b) Dead batteries.
 - (c) Defective cabling.

(4) Trouble in antenna equipment will manifest itself in one of the following ways:

(a) Weak signal in the equipment served by a particular antenna.

(b) Noisy reception on equipment served by a particular antenna.

(c) Intermittent reception in equipment served by a particular antenna.

(d) Weak or complete failure of reception in equipments served by Antenna Coupling Unit CU-23/TRQ-1, if coupler is at fault.

c. Using the above data, trouble isolation to a single unit should be relatively simple. An information chart and a trouble chart which further facilitate trouble isolation are indicated below.

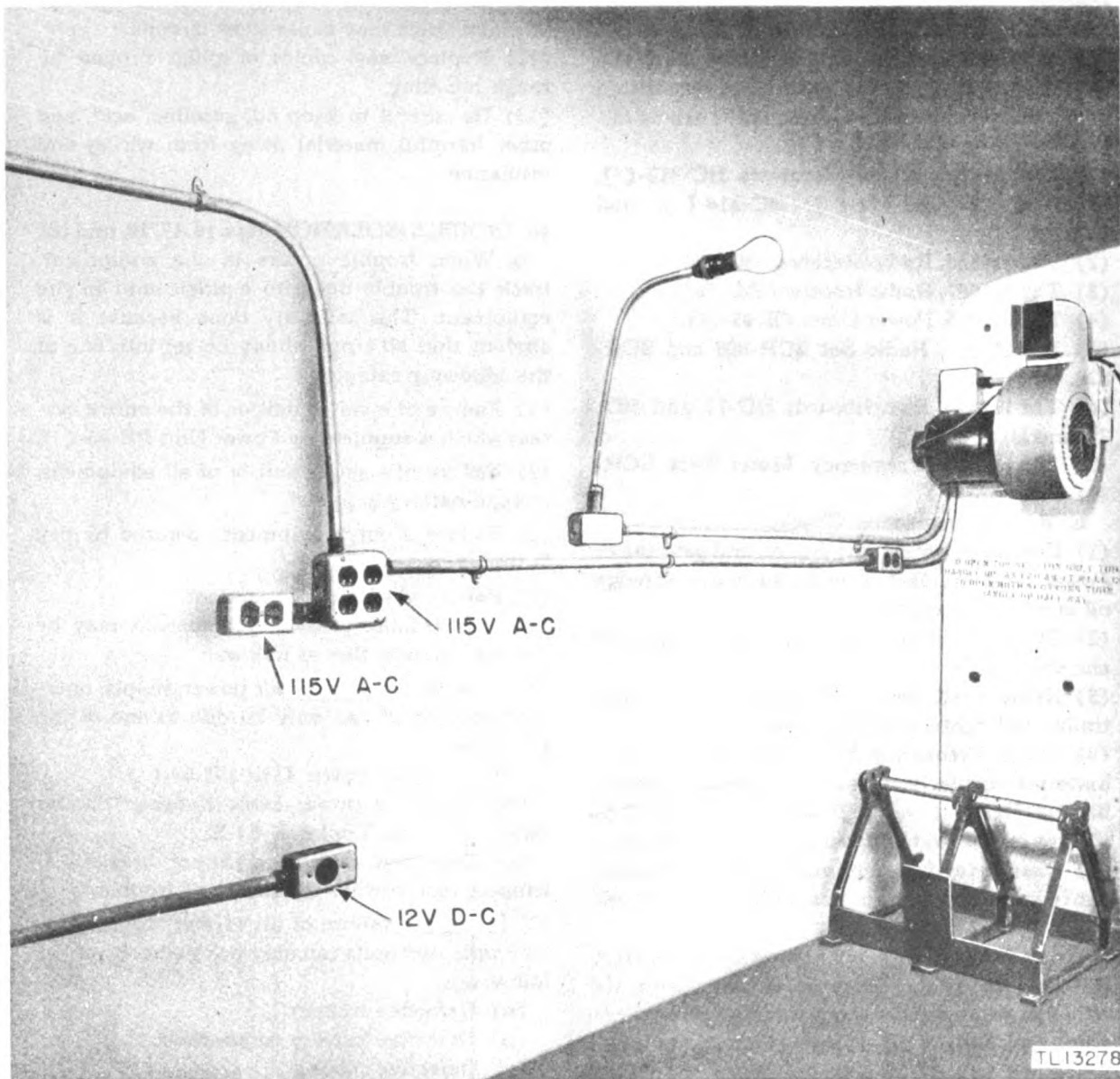


Figure 17. Interior layout, cabling layout, right side.

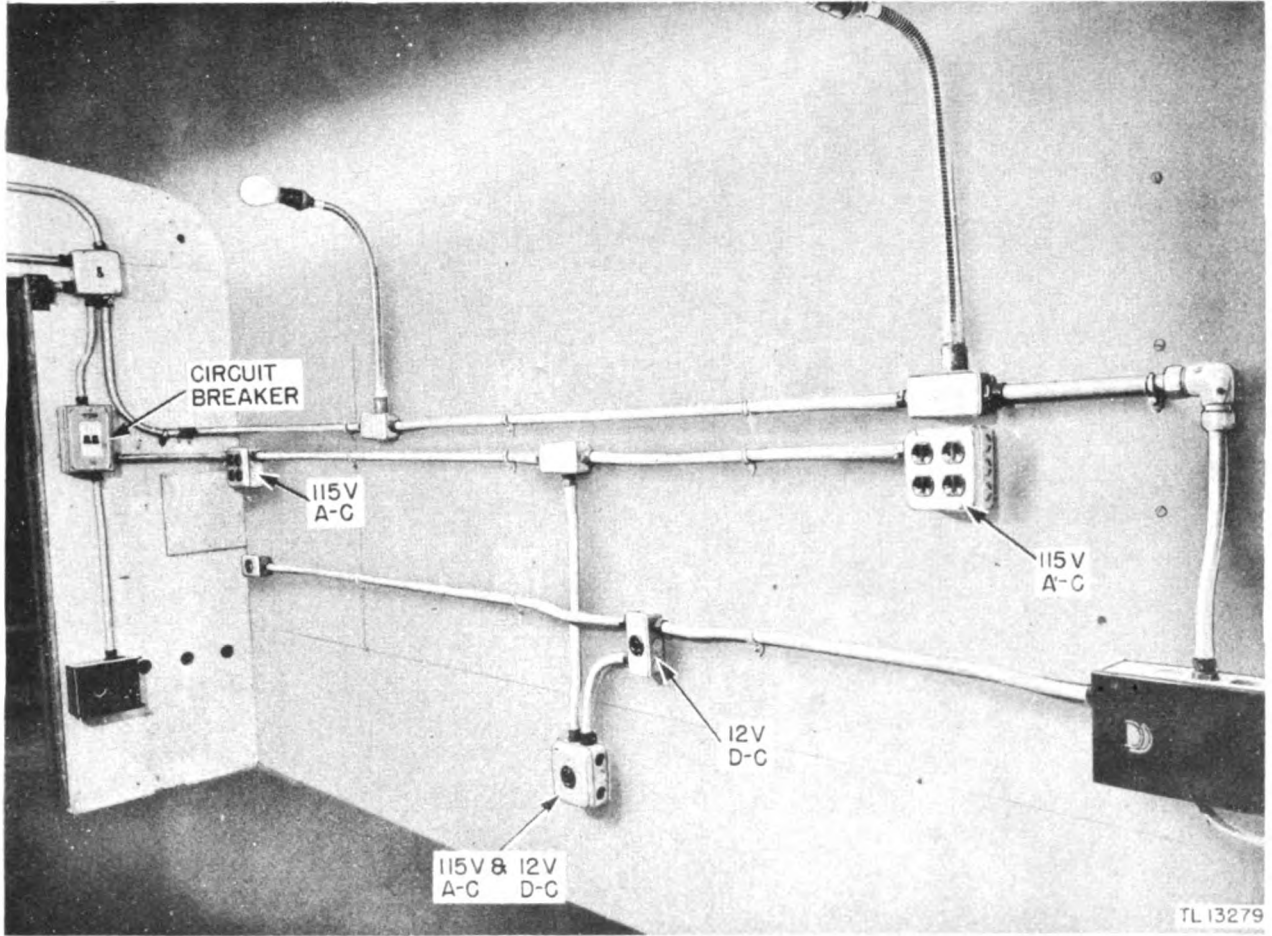


Figure 18. Interior layout, cabling layout left side.

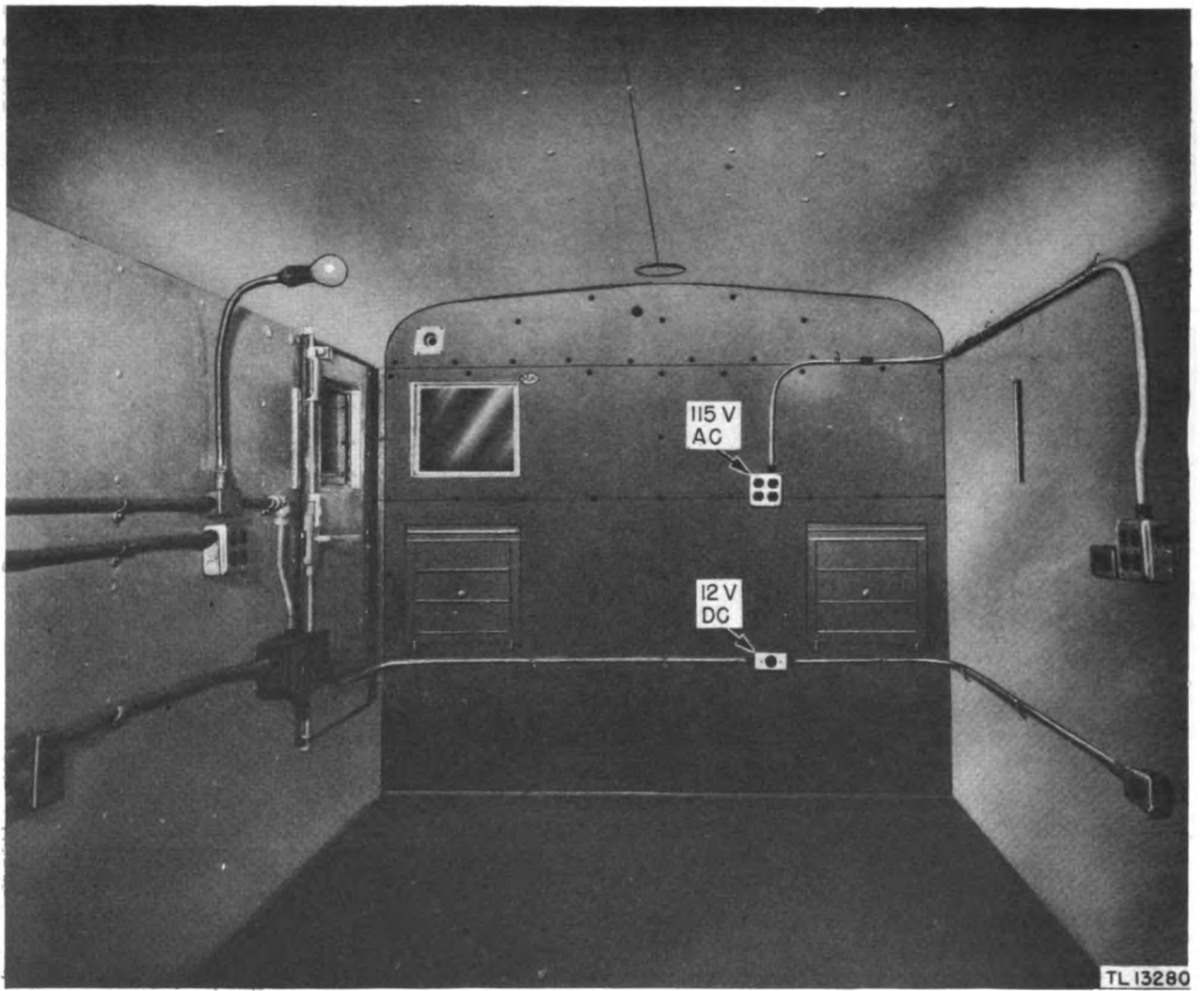


Figure 19. Interior layout, cabling layout, front view.

INFORMATION CHART

NOTE: All positions indicated looking from rear towards front of truck.

Par. 41.

<i>Unit</i>	<i>Power source</i>	<i>Antenna coupling</i>	<i>Antenna</i>	<i>Location</i>
Radio Receiver BC-342-()	Power Unit PE-95-()	Yes	Rear left side	Position 1, 2, 4.
Radio Receiver BC-344-()	Power Unit PE-95-()	Yes	Rear left side	Position 1, 2, 4.
Radio Receiver BC-794	Power Unit PE-95-()		Rear right side	Position 3.
Radio Receiver S-36	Power Unit PE-95-()		Rear right side	Position 3.
Radio Set SCR-828-A	12-v storage battery		Front left center	Position 3.
Switchboard BD-72-()	Self-contained dry battery			Position 3.
Remote Control Unit C103/TRQ-1	12-v storage battery			All positions.
Antenna Coupling Unit CU-23/TRQ-1	Power Unit PE-95-()		Rear left side	Above and to left of position 1.
Frequency Meter Set SCR-211-()	Self-contained batteries			Position 3.
Power Unit PE-95-()				On Trailer K-52-E.
Typewriter MC-88				All positions.
Fan	Power Unit PE-95-()			Right of rear door upon entry.
Heater	Power Unit PE-95-()			Floor to left of position 4.
Speaker LS-3	Radio			All positions.
Circuit breaker	Power Unit PE-95-()			Left of rear door upon entry.
Interlock switch	Power Unit PE-95-()			Left of door at entrance.
Battery SAE-8T				On floor, position 2.
Charger	Power Unit PE-95-()			On floor, position 1.
Longine-Wittnauer clock	Self-wind			On wall above door.

TROUBLE CHART

<i>Symptom</i>	<i>Probable cause</i>	<i>Remedy</i>
Par. 42.		
All electrically-powered equipment, in all positions inoperative.	Power failure.	Check circuit breaker, cabling between Shelter HO-17-() and Power Unit PE-95-() (as per TM on power supply).
All battery-powered equipment inoperative.	Battery failure.	Check battery connections; battery wiring to battery.
Weak signal, all positions, all equipments.	Poor location.	Move to new location.
Weak signals on all receivers in position 1, 2, and 4.	Antenna assembly.	Check antenna, cables, connectors, antenna switches, and antenna coupling unit. Clip on and try Antenna AS-93/MRQ-2.
Weak signals in position 3, both receivers.	Antenna assembly.	Check antenna, cables, antenna switch, and connectors.
Weak signals in positions 1, 2, and 4, single receiver, other receiver normal.	<ol style="list-style-type: none"> 1. Internal failure. 2. Cabling or antenna switch. 3. Speaker or headset. 	<ol style="list-style-type: none"> 1. See TM 11-850-N. 2. Check cabling, connectors, and antenna switch. 3. Check. Replace if defective.
Weak signals in position 3, single receiver, other receivers normal.	<ol style="list-style-type: none"> 1. Internal failure. 2. Cables. 3. Antenna switch. 4. Poor battery connection. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check cabling. 3. Check antenna switch. 4. Check battery, battery connections.
Improper operation of remote control unit and transmitter.	Weak battery.	<ol style="list-style-type: none"> 1. Check battery. Place on charge or replace. 2. Check cabling to batteries and connections at battery. 3. Try alternate position of LINE REVERSE switch on remote control unit. 4. Rectify trouble at other end.
Remote control unit and transmitter inoperative.	Power failure.	<ol style="list-style-type: none"> 1. Check polarized plugs, cabling connectors, and 12-volt battery. 2. Rectify trouble at other end.
Transmitter operation not satisfactory.	<ol style="list-style-type: none"> 1. Power failure. 2. Antenna assembly. 	<ol style="list-style-type: none"> 1. Check connectors, cable battery connection, battery. 2. Check antenna cable and connectors. 3. Try alternate position of LINE REVERSE switch on remote control unit. 4. Rectify trouble at other end.

TROUBLE CHART (cont.)

<i>Symptom</i>	<i>Probable cause</i>	<i>Remedy</i>
Improper operation of all Remote Control Units C-103/TRQ-1.	Power failure.	Check 12-volt battery, battery cabling, connectors.
Improper operation, single Remote Control Unit C-103/TRQ-1.	<ol style="list-style-type: none"> 1. Internal failure. 2. Power failure. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check cabling and connectors to battery supply.
Frequency Meter Set SCR-211-() operation unsatisfactory	<ol style="list-style-type: none"> 1. Internal failure. 2. Power failure. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check self-contained batteries.
Switchboard BD-72-() operation unsatisfactory.	<ol style="list-style-type: none"> 1. Internal failure. 2. Power failure. 3. Outside wiring failure. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check self-contained batteries. 3. See applicable TM.
Inoperative Antenna Coupling Unit CU-23/TRQ-1.	<ol style="list-style-type: none"> 1. Internal failure. 2. Power failure. 	<ol style="list-style-type: none"> 1. See paragraph 34. 2. Check cabling, connectors, outlets. <p>NOTE: In emergency connect antenna directly to set.</p> <ol style="list-style-type: none"> 3. Check tubes in antenna coupler.
Extraneous noise, all receivers.	<ol style="list-style-type: none"> 1. Poor location. 2. Man-made static. 3. Power line intermittent or improperly filtered. 	<ol style="list-style-type: none"> 1. Change location. 2. Locate noise source and remedy it. 3. Check line connectors, grounded connections, noise elimination system.
Noise in position 1, 2, and 4 receivers.	<ol style="list-style-type: none"> 1. Antenna assembly. 2. Antenna Coupling Unit, CU-23/TRQ-1. 3. Antenna switch. 	<ol style="list-style-type: none"> 1. Check antenna, connectors, cabling. 2. See trouble chart on Antenna Coupling Unit CU-23/TRQ-1. 3. Check antenna switch.
Noise in position 3 receivers.	<ol style="list-style-type: none"> 1. Antenna assembly. 2. Power failure. 3. Headset (leads). 4. Antenna switch. 	<ol style="list-style-type: none"> 1. Check antenna, connectors, and cabling. 2. Check outlet connectors, connections, cabling, battery connection from receiver of Radio Set SCR-828-A 3. Replace headset with pair known to be in good order.
Noise on individual set in positions 1, 2, and 4.	<ol style="list-style-type: none"> 1. Antenna switch. 2. Poor cabling. 3. Internal failure. 4. Bad outlet connection. 	<ol style="list-style-type: none"> 1. Check antenna switch 2. Check cabling. 3. See applicable TM. 4. Check plug and outlet connections.

TROUBLE CHART (cont.)

<i>Symptom</i>	<i>Probable cause</i>	<i>Remedy</i>
Noise on individual set in position 3.	Same as above.	Same as above.
Circuit breaker continues opening. Throws power off.	<ol style="list-style-type: none"> 1. Low-resistance short. 2. Overload on line. 3. Component unit drawing excessive current. 	<ol style="list-style-type: none"> 1. Check power wiring. 2. Check and ascertain which unit is drawing excessive current by removing one plug at a time.
Transmitter output low.	<ol style="list-style-type: none"> 1. Internal failure. 2. Antenna assembly not loading transmitter properly. 3. Storage battery weak or defective. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check antenna, connectors, and cabling. 3. Check storage battery for dead cell or low charge.
Noisy switchboard operation.	<ol style="list-style-type: none"> 1. Internal switchboard failure. 2. Defective cabling. 3. Weak or noisy batteries. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check cabling and connectors for poor joints. 3. Replace weak or noisy batteries.
Noisy remote control in one position.	<ol style="list-style-type: none"> 1. Internal failure. 2. Bad cabling. 	<ol style="list-style-type: none"> 1. See applicable TM. 2. Check cabling and connectors.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 ()

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orign stock	3d ech	4th ech	5th ech	Depot stock
	2A264-93	ANTENNA ASSEMBLY AS-93/MRQ-2.	1				*	*	*
	3C472-23	ANTENNA COUPLING UNIT CU-23-()/TRQ-1.	1				*	*	*
	6H227	AXLE RL-27-B: (for Frame FM-59-()).	1				*	*	*
	3B221	BATTERY: storage; vehicular; 12-v; SAE 8T.	1				*	*	*
	2Z1119	BOX BX-19-A: (for running spare receiving tubes, fuses, and lamps).	4				*	*	*
	2C1738	BOX C-109/MRQ-2: antenna control.	4			*	*	*	*
	3H229-78	CHARGER PP-78-()/MRQ-2: battery; RCP-16, Radio Controls Inc., or equal.	1				*	*	*
	4B420-19	CHEST UNIT H-19-()/U: WED-173249, or equal.	4	1		*	*	*	*
	2C1738	CONTROL BOX BC-606-() : interphone.	1			*	*	*	*
	2Z2499-71	CHEST CY-71/MRQ-2: battery.	1			*	*	*	*
	2Z1305-1	CLAMP: ground; with braid assembly for grounding Shelter HO-17 (mobile to truck); Hallicrafter DO61.	1		*	*	*	*	*
	2Z1958	CLOCK: Longines-Wittnauer A-6, or equal.	1			*	*	*	*
	3E3100-120	CORD: 10'; single-conductor; approx. No. 7 AWG copper braid; for ground connection to Stake GP-16.	2		*	*	*	*	*
	3E1201	CORD CD-201: (for Key J-41).	4			*	*	*	*
	3E1307A	CORD CD-307-A: (headset extension).	4	2		*	*	*	*
	3E1318	CORD CD-318-A: (microphone connection).	1	2		*	*	*	*
	3E1370	CORD CD-370: (connects Receivers BC-342-() and BC-344-() to a-c power outlet).	6		*	*	*	*	*
	1F430-62	CORD CG-62/TRQ-1: 3'; (connects Radio Receiver BC-794-() and Hallicrafter S-36 to Antenna Control Box C-109/MRQ-2).	2		*	*	*	*	*
	1F430-67	CORD CG-67/MRQ-2: 15'; (connects Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23-()/TRQ-1).	1		*	*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	1F430-62	CORD CG-62/TRQ-1: 8'; (connects Mounting FT-237-() to Mast Base MP-48-A).	1		*	*	*	*	*
	1F430-67	CORD CG-67/MRQ-2: 15'; (connects Antenna Control Box C-109/MRQ-2 to Mast Base MP-48-A)	1		*	*	*	*	*
	1F430-67	CORD CG-67/MRQ-2: 8'; (connects Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23-()/TRQ-1).	1		*	*	*	*	*
	3E1268	CORD CD-268: (connects radio receivers to Remote Control Unit C-103-()/TRQ-1).	4		*	*	*	*	*
	1F430-67	CORD CG-67/MRQ-2: 3'; (connects Antenna Control Box C-109/MRQ-2 to Antenna Coupling Unit CU-23-()/TRQ-1).	1		*	*	*	*	*
	1F430-67	CORD CG-67/MRQ-2: 2' 6"; connects Mast Base MP-48-A to Antenna Coupling Unit CU-23-()/TRQ-1.	1		*	*	*	*	*
	1F430-68	CORD CG-68/MRQ-2: 2'; (connects Radio Receivers BC-342-() and BC-344-() to Antenna Control Box C-109/MRQ-2).	6		*	*	*	*	*
	3E6000-132-60	CORD CX-132/TRQ-1: 5'; (connects Radio Receiver BC-342-() or BC-344-() to Loudspeaker LS-3).	3		*	*	*	*	*
	3E6000-138	CORD CX-138/MRQ-2: connects Mounting FT-237-() to Cord CX-139/MRQ-2.	1		*	*	*	*	*
	3E6000-139	CORD CX-139/MRQ-2: connects Interphone Control Box BC-606-() to Cord CX-138/MRQ-2.	1		*	*	*	*	*
	3E6000-142	CORD CX-142/MRQ-2: connects Battery Charger PP-78-()/MRQ-2 to d-c, a-c junction box.	1		*	*	*	*	*
	3E6000-144-60	CORD CX-144/TRQ-1: 5'; (connects Hallicrafters S-36 receiver, or equal, to Loudspeaker LS-3).	1		*	*	*	*	*
	3E6000-144-108	CORD CX-144/TRQ-1: 9'; (connects Radio Receiver BC-794-() to Loudspeaker LS-3).	1		*	*	*	*	*
	3E6000-269	CORD CX-269/U: (connects Remote Control Unit C-103-()/TRQ-1 to d-c junction box).	4		*	*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orign stock	3d ech	4th ech	5th ech	Depot stock
3H1664A		DYNAMOTOR DM-64-A: (for Radio Receiver BC-923-()).	1			*	*	*	*
3H1664/B10		BRUSH: low-voltage; with spring, pigtail, and cap assembled; Wincharger dwgs A-5195 and A-5195-1.	2	2			*	*	*
3H1664/B11		BRUSH: high-voltage; with spring, pigtail, and cap assembled; Wincharger dwgs A-5196 and A-5196-1.	2	2			*	*	*
3DKA10-197.1		CAPACITOR: mica; filter; 10,000 mmf.	2			*	*	*	*
2Z8688.5		CONNECTOR: female, straight; Jones S-318-AB.	1			*	*	*	*
3H1665A		DYNAMOTOR DM-65-A: (for Radio Transmitter BC-924-()).	1			*	*	*	*
3H1665A/B10		BRUSH: low-voltage; with spring, pigtail, and cap assembled; Wincharger dwg A-5816.	2	2			*	*	*
3H1665/B11		BRUSH: high-voltage; with spring, pigtail, and cap assembled; Wincharger dwgs 5864 and A-5864-1.	2	2			*	*	*
3DA5-18		CAPACITOR: mica; filter; 5,000-mmf; Cornell Dubilier.	4			*	*	*	*
2Z7403-3		CONNECTOR: female; straight; Jones S-312-AB.	1			*	*	*	*
6Z3785		EXTINGUISHER: 4-lb; carbon-dioxide; model FF-4; Randolph Laboratories, Chicago, Ill., or equal, (with mounting).	1			*	*	*	*
2Z4659		FRAME FM-59-() : for 2 Reels DR-4.	1			*	*	*	*
2C1411.5		FREQUENCY METER SET SCR-211-() .	1			*	*	*	*
3Z2030		FUSE: plug; 30-amp; 125-v.	2	5	*	*	*	*	*
3Z2853-154		FUSE BOX MX-154/MRQ-2.	1			*	*	*	*
2B833		HEADSET HS-33.	4	2		*	*	*	*
4A985		HEADSET ADAPTER MC-385-() : (for Headset HS-33).	4	2	*	*	*	*	*
2Z5020		HEATER: electric; 1,500-w; 115-v; Model No. AA-15; Electric Air Heater Co., or equal.	1			*	*	*	*
3Z3441		KEY J-41.	4			*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	3Z3445	KEY J-45.	2			*	*	*	*
	6Z6815-13	LAMP: screw base; 50-w; 115-v (for emergency light and lamp fixtures).	6	6		*	*	*	*
	6Z6898	LAMP: trouble; 12-v dc; with 25' extension cord; Hubbell 7572 or equal.	1			*	*	*	*
	6Z6812:7	LAMP: screw base; 12-v; 50-w; GE 50A, or equal.	1	2		*	*	*	*
	6Q63521	LINEMAN'S EQUIPMENT TE-21.	1			*	*	*	*
	2Z6303.1	LOUDSPEAKER LS-3.	4			*	*	*	*
	2A2088-48A	MAST BASE MP-48-A.	3			*	*	*	*
	2A2090-50	BRACKET MP-50: mast base.	3			*	*	*	*
	2A2349	MAST SECTION MS-49.	7	3	*	*	*	*	*
	2A2350	MAST SECTION MS-50.	7	4	*	*	*	*	*
	2A2351	MAST SECTION MS-51.	7	4	*	*	*	*	*
	2A2352	MAST SECTION MS-52.	7	4	*	*	*	*	*
	2A2353	MAST SECTION MS-53.	7	6	*	*	*	*	*
	2A2354	MAST SECTION MS-54.	7	3	*	*	*	*	*
	2B1617	MICROPHONE T-17.	2			*	*	*	*
	2B1645	MICROPHONE T-45.	2			*	*	*	*
	2Z6721-237	MOUNTING FT-237-().	1			*	*	*	*
	2Z6718	MOUNTING FT-178: (for Radio Sets BC-342-() and BC-344-()).	6			*	*	*	*
	3H4496-84	POWER SUPPLY UNIT RA-84-().	1			*	*	*	*
	2C4342	RADIO RECEIVER BC-342-().	3			*	*	*	*
	2C4344	RADIO RECEIVER BC-344-().	3			*	*	*	*
	2C4537-36.1	RADIO RECEIVER: 27.8-mc-143-mc; Hallicrafters S-36.	1			*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orn stock	3d ech	4th ech	5th ech	Depot stock
2C4794		RADIO RECEIVER BC-794-()	1			*	*	*	*
2C4923		RADIO RECEIVER BC-923-()	1			*	*	*	*
2C6596-924		RADIO TRANSMITTER BC-924-()	1			*	*	*	*
2C684-103		REMOTE CONTROL UNIT C-103-()/TRQ-1.	4			*	*	*	*
6Z7926		ROPE RP-5.	1			*	*	*	*
3Z7700-17		SHELTER HO-17.	1						*
2Z2708.17		SPRING CLIP: (for Interphone Control Box BC-606-()).	1		*	*	*	*	*
5B4416		STAKE GP-16: (for grounding connections).	1		*	*	*	*	*
4C9972		SWITCHBOARD BD-72: (telephone).	1			*	*	*	*
6D13025		TECHNICAL MANUAL TM11-601: (for Radio Sets SCR-808-() and SCR-828-()).	2						*
6R38041		TOOL EQUIPMENT TE-41.	1						*
6J952		TRAILER K-52-()	1						*
6M1688		TYPEWRITER MC-88: (complete with cover).	4			*	*	*	*
1A28		WIRE: antenna; stranded; enameled; No. 12 B&S gauge; Belden, or equal; (100' coil).	1		*	*	*	*	*
1B110B.1		WIRE W-110-B: (on 2 Reels DR-4; 1/2 mile on each reel).	2			*	*	*	*
6Z815		BASE.	1			*	*	*	*
3Z246		BINDING POST TM-146.	2			*	*	*	*
6Z1735		CAP.	1			*	*	*	*
6Z23151		CONNECTOR: body.	1			*	*	*	*
3E2130		CORDAGE CO-130.	1			*	*	*	*
6Z815		RECEPTACLE: twist-lock; Hubbell No. 7466.	1			*	*	*	*
6Z1727.1		PLUG: polarized; Hubbell No. 7059.	1			*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)
 a. Remote Control Unit C-103()/TRQ-1

Rel symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R	3Z6050-63	RESISTOR: fixed; carbon; 500-ohm \pm 10%; 1-w; Erie type; (bakelite insulation; 13/16" long x 5/16" diam; axial wire leads, 1-1/2" long).	1			*	*	*	*
C1 C4	3DB4-139	CAPACITOR: fixed; paper; 4-mf \pm 10%; 50 v dc (working); Micamold type CA275; (hermetically sealed; mineral oil impregnated; metal can, 2-3/4" long x 2-7/16" wide x 1" thick; 2 terminals spaced 1" apart; 2 mounting feet with 3/16" hole; mounting center 2-3/8").	2			*	*	*	*
C2 C3	3DB1-389	CAPACITOR: fixed; paper; 1-mf; 600 v dc (working); Micamold type CA389; (hermetically sealed; mineral oil impregnated; metal can, 2-3/4" long x 2-3/16" wide x 1 1/16" thick; 2 terminals spaced 1" apart; 2 mounting feet with 3/16" hole; mounting center 2-3/8").	2			*	*	*	*
S1	3ZK9845-19	SWITCH: toggle; Cutler-Hammer 8803-K3; (SPST; 3-amp; 250-v; bakelite body; over-all dimensions, 1-1/8" long x 5/8" wide x 1/2" long; bushing 15/32" diam).	1			*	*	*	*
SW1	3Z9849-60-1	SWITCH: toggle; Cutler-Hammer 8825-K4; (DPDT; 3-amp; 250-v; bakelite body; over-all dimensions, 1-5/16" long x 3/4" wide x 1/2" long; bushing 15/32" diam).	1			*	*	*	*
	4B371	RINGER MC-131: polarized; Bell.	1			*	*	*	*
	3A27	BATTERY BA-27: 4-1/2-v.	1			*	*	*	*
	3Z1927	FUSE FU-27: cartridge, 2-amp; 250-v; Littelfuse size 3AG; (1-1/4" long, 1/4" diam).	1			*	*	*	*
	4B838	GENERATOR GN-38: (hand).	1			*	*	*	*
J1 J6	2Z5534-A	JACK JK-34-A: single-contact; (over-all size 1-1/8" x 5/16" diam).	2			*	*	*	*
J2 J5	2Z5533-A	JACK JK-33-A: two-contact; (over-all size 1-1/4" x 1" diam).	2			*	*	*	*
J3	2Z5572-12	JACK: single-contact, with set of normally open contacts operated by main contact bushing.	1			*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

a. Remote Control Unit C-103-1 /TRQ-1 (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
J4	2Z5540	JACK: one set of normally closed contacts.	1				*	*	*
PL1	6Z7813-2	PLUG: male; Hubbell twistlock; (2-5/16" x 1-3/4" x 1-1/8" diam).	1			*	*	*	*
RY	2Z7588-55	RELAY: double-coil; (30-ohm coils; one set type-A contacts and two sets type-3 contacts; 4-3/16" x 1-3/16" x 1-9/16").	1				*	*	*
SW2	2Z1239.27/1	SWITCH: link and screw type; (2-11/16" x 7/8" x 3/8").	1				*	*	*
SW3	3Z9580-17	SWITCH: telephone lever type; (DT locking; top piles of two type-A contacts, and bottom piles of one type-A and one type-C contact; Chicago Electric; 3-3/4" x 1-1/4" x 1/2").	1				*	*	*
	2Z9880	TRANSFORMER: type C-280; (2-1/2" x 1-7/8" x 2-1/2").	1			*	*	*	*
	3Z3275	FUSE HOLDER: cartridge; Littelfuse type 1075; (2-1/2" long x 11/16" diam).	1			*	*	*	*
	2Z3352.50	JACK COVERS: Crowe nameplate No. 3501; (3/8" mounting hole; 3/4" x 5/8" x 1/4").	6			*	*	*	*
	b. Antenna Coupling Unit CU-23-1 /TRQ-1								
R1	3ZK6801-59	RESISTOR: fixed; carbon; 1-meg ± 10%; 1/2-w; Erie type; (bakelite insulation 7/16" long x 7/32" diam; axial wire leads, 1-1/2" long).	1			*	*	*	*
R2	3Z6056-17	RESISTOR: fixed; carbon; 560-ohm ± 10%; 1/2-w; Erie type; (bakelite insulation 7/16" long x 7/32" diam; axial wire leads, 1-1/2" long).	2			*	*	*	*
R3									
R4	3Z6022-12	RESISTOR: fixed; carbon; 220-ohm ± 10%; 1/2-w; Stack-pole type; (bakelite insulation; 7/16" long x 7/32" diam; axial wire lead, 1-1/2" long).	1			*	*	*	*
R5	3Z6015-11	RESISTOR: fixed; carbon; 150-ohm ± 10%; 1/2-w; Allen-Bradley type EB; (bakelite insulation; 1/2" long x 1/8" diam axial wire leads, 1-1/2" long).	6			*	*	*	*
R6									
R7									
R8									
R9									
R10									

* Indicates stock available.

34 43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)
 b. Antenna Coupling Unit CU-23()/TRQ-1 (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R11 R12 R13 R14	3Z4567	RESISTOR: fixed; carbon; 1,000-ohm \pm 10%; 1/2w; Erie type; (bakelite insulation; 7/16" long x 7/32" diam; axial wire leads, 1-1/2" long).	4			*	*	*	*
R15 R16	3Z6100-39	RESISTOR: fixed; carbon; 1,000-ohm \pm 10%; 2-w; IRC type BT-2; (bakelite insulation 1-3/4" long x 5/16" diam; axial wire leads, 1-1/2" long).	2			*	*	*	*
R17 R18 R19 R20	3Z66683	RESISTOR: fixed; carbon; 68,000-ohm \pm 10%; 1/2-w; Erie type; (bakelite insulation; 7/16" long x 7/32" diam; axial wire leads, 1-1/2" long).	4			*	*	*	*
C1	3K2051122	CAPACITOR: fixed; mica; 510-mmf \pm 10%; 500 v dc (working); Sangamo type CM20B511K; (bakelite insulation; 25/32" long x 7/16" wide x 7/32" thick; axial wire leads, 1-1/4" long).	1			*	*	*	*
C2 C3 C4 C5	3DA50-113.2	CAPACITOR: fixed; paper; 50,000-mmf \pm 10%; 600 v dc (working); Solar type XTM; (hermetically sealed mineral oil impregnation; metal can, 1-5/16" long x 3/4" diam; axial wire leads, 2" long).	4			*	*	*	*
C6 C7 C8 C9 C10 C11 C12 C13	3K3551222	CAPACITOR: fixed; mica; 10,000-mmf \pm 10% (two 5,000-mmf \pm 10%, in parallel); Sangamo type CM35B512K; (bakelite insulation; 13/16" long x 13/16" wide x 5/16" thick; axial wire leads, 1-1/4" long).	8			*	*	*	*
C14 C15 C16 C17	3K2010111	CAPACITOR: fixed; mica; 100-mf \pm 10%; Sangamo type CM20A101K; (bakelite insulation; 25/32" long x 7/16" wide x 7/32" thick; axial wire leads, 1-1/4" long).	4			*	*	*	*
C18 C19 C20	3DB60-60	CAPACITOR: fixed; electrolytic; 4-section; 10-, 10-, 10-, 10-mf; 450 v dc (working); Cornell-Dubilier type UP; (hermetically sealed; metal can, 2-1/2" long x 1-1/2" diam; 8 terminals on 2" diam, 4 on 5/8" diam, 4 on 1-1/16" diam).	1			*	*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)
b. Antenna Coupling Unit CU-23()/TRQ-1 (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Ordn stock	3d ech	4th ech	5th ech	Depot stock
T1	2Z9619-66	TRANSFORMER: filament and power; (primary 115-v ac, 60-c; secondary No. 1, 600-v; center-tapped; secondary No. 2, 6.3-v; 2-amp; hermetically sealed; 7 glass terminals on bottom; over-all dimensions 4-3/6" x 3" x 3-1/8"; four 1/8" mounting holes on 2-1/2" x 4" mounting center).	1			*	*	*	*
V101	2J6AC7	TUBE VT-112: JAN-6AC7.	4			*	*	*	*
V102		TUBE VT-126-B: JAN-6X5GT.	1			*	*	*	*
V103	2J6X5GT/G	FUSE HOLDER: cartridge type; Littelfuse type 1075; (2-1/2" long x 11/16" diam).	1			*	*	*	*
V104	3Z3375	FUSE FU-27: cartridge; 2-amp; 250-v; Littelfuse size 3AG; (1-1/4" long x 1/4" diam).	1			*	*	*	*
V105	3Z1927	CONNECTORS: Amphenol 83-1R; coaxial cable connectors; (1-1/16" long x 1" wide x 1" diam; 9/16" long, bushing 5/8" diam; 4 mounting holes on 3/4" mounting center).	4			*	*	*	*
	2Z7111.61	CONNECTOR HOOD: Amphenol 83-1H; coaxial cable hood; (13/16" long x 1" wide x 1" diam; 1/2" hole opening to 3/4" hole; 4 mounting holes on 3/4" mounting center).	2			*	*	*	*
	2Z5040-360	PILOT LIGHT: 6.3-v; screw-base; Mazda No. 44; (1-1/8" long x 3/8" diam).	1			*	*	*	*
	2Z25927	ON-OFF PLATE: 15/32" hole; ON and OFF on each side; (1" long x 5/8" wide).	1			*	*	*	*
	2Z7098-10	SOCKET: receiver-tube; Standard Octal Cinch No. 9880; (moulded-bakelite; 1-1/8" diam; mounts by means of cadmium-plated metal saddle with 1-1/2" mounting center).	5			*	*	*	*
	22K8678.71								

* Indicates stock available.

§ 43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

c. Antenna Assembly AS-93/MRQ-2

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Ordn stock	3d ech	4th ech	5th ech	Depot stock	
	2A264B-57	ANTENNA WIRE ASSEMBLY AT-57/MRQ-2.	1			*	*	*	*	
	2A700-58	COUNTERPOISE AT-58/MRQ-2.	1			*	*	*	*	
	2A1324	GUY GY-24A.	2			*	*	*	*	
	2A2108	MAST CAP AND GUY ASSEMBLY.	2			*	*	*	*	
	d. Interphone Control Box BC-606-()									
	2C1617A/C4	CLAMP: mounting; WE.	1			*	*	*	*	
	2C1617A/C3	COVER: dust; WE.	1			*	*	*	*	
	2C1738A/J1	JACK: headset and microphone; 3-conductor; WE.	1			*	*	*	*	
	2C4460-683A/K1	KNOB: volume control; knurled; 1" x 1/2"; WE.	1			*	*	*	*	
	2Z7288-3	POTENTIOMETER: 50,000-ohm; IRC type CP; taper B.	1			*	*	*	*	
	2C6494A/R1	RECEPTACLE AND CAP: magnetic microphone; (receptacle; Amphenol AN-3102-14S-2S; cap: Amphenol 9760,-14-G, less chain).	1			*	*	*	*	
	3Z6200-6	RESISTOR: carbon; insulated; 2,000-ohm; 1/2-w ± 5%; IRC-BT-1/2.	1			*	*	*	*	
	2C4403A/S2	SWITCH: toggle; SPST; small case; Hart & Hegeman special.	1			*	*	*	*	
	4E9900-700A	TERMINAL STRIP: 8 pair contacts; WE 700A.	1			*	*	*	*	
	e. Control Box C-109/MRQ-2									
	2Z5838	KNOB: pointed; black, (part of Centralab switch 2542, B & W WW246).	1			*	*	*	*	
	2Z8799-239	SOCKET: SO-239, coaxial.	3			*	*	*	*	
	3Z9825-58.13	SWITCH: Centralab 2542.	1			*	*	*	*	
	f. Axle RL-27-B									
	6H227A/15	BEARING: needle; (supports shaft).	4						*	
	6H227A/8.1	BUSHING: bearing; nonlocking.	1						*	
	6H227A/9.1	BUSHING: bearing; locking.	1						*	
	6H227A/18	PIN: (holds bushing).	2						*	
GC-15	6H915	CRANK GC-15.	1						*	

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

g. Microphone T-17(-)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
3E2076A		CORD CO-76-A: 5'; 3-conductor.	1				*	*	*
2Z7168		PLUG PL-68.	1				*	*	*
3Z8109		SWITCH SW-109: (for all models except Microphone T-17-D).	1				*	*	*
3Z8217		SWITCH SW-217: (for Microphone T-17-D).	1				*	*	*
3Z10161		TERMINAL TM-161: (terminates cord at plug end).	3				*	*	*
h. Microphone T-45									
2B1589/1		SHIELD: breath.	1				*	*	*
2B1589		UNIT MICROPHONE MC-419.	1				*	*	*
i. Linecom's Equipment TE-21									
6Q4523A		BELT LC-23-A: (sizes 20, 22, 24, 26, and 28).	1				*	*	*
6Q27024		CLAMP LC-24.	1				*	*	*
6Q28205		CLIMBERS LC-5.	1				*	*	*
6Q49001		HAMMER HM-1.	1				*	*	*
6R4607		PLIERS TL-107.	1				*	*	*
6R16810		SCREWDRIVER TL-106.	1				*	*	*
6R56013A		WRENCH LC-25-A.	1				*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)
 1. Tool Equipment TE-41

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orign stock	3d ech	4th ech	5th ech	Depot stock
6Q335		ALIGNMENT TOOL: neutralizing; compensating.	1		*		*	*	*
6Q2044		BAG BG-44.							
6Z1372		BRUSH TL-72.	1		*		*	*	*
6G184-1		CARBON TETRACHLORIDE: 8-oz.	1				*	*	*
6Q38033-8		FILE: flat; 8".	1				*	*	*
6Q38500-6		FILE TL-133.	1				*	*	*
6Z4002		FLASHLIGHT TL-122.	1				*	*	*
6Q49712		HAMMER: machinist; ball peen; 12-oz.	1				*	*	*
6Q51131-5		HANDLE: file; 5-1/4".	1				*	*	*
6Z5030		HANDLE: metal; cone-socket type; SS White Dental Co. 15, or equal.	1				*	*	*
6Q52208		HOLDING TOOL: 8" reach; Bonnell K8.	1				*	*	*
6Q60229		KNIFE TL-29.	1				*	*	*
6R15999		SCREWDRIVER: Phillips 1A.	3				*	*	*
6R15600		SCREWDRIVER: 4" blade.	3				*	*	*
6R15811		SCREWDRIVER: 5" blade; insulated wood handle.	1				*	*	*
6R16890		SCREWDRIVER: 10" blade.	1				*	*	*
6R16410		SCREWDRIVER TL-105: 8" blade; 5/16" tip; insulated wood handle.	1				*	*	*
6N7531		SOLDER M-31: resin-core.	1				*	*	*
6R24618		SOLDERING IRON: electric; 100-w; 12-v.	1				*	*	*
6R24617		SOLDERING IRON TL-117: electric; 100-w; 105-120 v; 3/8" tip.	1				*	*	*
6R24503H		SOLDERING IRON TL-132: jeweler No. 2; with handle; 3-oz.	1				*	*	*
6N8583		TAPE TL-83: friction, 3/4", 1/2-lb roll.	1				*	*	*
6N8692		TAPE TL-192: rubber; 15' roll.	1				*	*	*

* Indicates stock available.

43. MAINTENANCE PARTS LIST FOR RADIO CONTROL CENTRAL AN/TRQ-1 () (cont.)

1. Tool Equipment TE-41 (cont.)

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spaces	Orgn stock	3d ech	4th ech	5th ech	Depot stock
6R41065C		TOOL: switchboard; WE 265C; contact burnisher.	1				*	*	*
6R42167		BLOW TORCH TL-130: gasoline; 1-pt; flat.	1				*	*	*
6R38005/2C		TWEEZERS: nicked-steel; 5".	1				*	*	*
6G22203		VARNISH: glyptol; blue; 4-oz can; GE 1153.	1				*	*	*
1B7.1		WIRE W-7: ball; No. 18; single; solid; soft drawn; DCC; annunciator.	8				*	*	*
1B140		WIRE W-140: No. 18; single; flexible; glazed cotton braid; color-coded black; Belden remote, or equal.	40				*	*	*
6R55230		WRENCH: hex; Bristol 6.	3				*	*	*
6R55231		WRENCH: hex; Bristol 8.	3				*	*	*
6R57400		WRENCH: hex; 5/64"; Allen or equal.	3				*	*	*
6R55496		WRENCH: hex; L-shaped; 3/32" across flats.	3				*	*	*
6Z7070-1		MIRROR: mouth; contra-angle; 7/8" plane; cone-socket stem; without handle; White Dental Co. 53, or equal.	1				*	*	*
6R1913		DRIVER: nut; hollow-shaft.	1				*	*	*
6G1007		OIL: lubricating; 3/4-oz.	1				*	*	*
6Z7500-000		SANDPAPER: flint; #000.	1				*	*	*
6N4102		PASTE: soldering; 2-oz.	1				*	*	*
R4719-7A		PLIERS: combination; side cutting; 7-1/2".	1				*	*	*
R4712-6		PLIERS: chain; short-nose; 6".	1				*	*	*
6R4513		PLIERS: TL-13.	1				*	*	*
6R4603		PLIERS: TL-103.	1				*	*	*
R4626		PLIERS: TL-126: chain; long-nose; without cutters; 6 or 6-1/2" long.	1				*	*	*
6R15371		SCREWDRIVER: optician; 2-1/2" blade.	1				*	*	*
6R55502		WRENCH SET: midget; Williams 1285-P with 1519 superplier.	1				*	*	*
6R55006		WRENCH TL-111: single end; Crescent A-16.	1				*	*	*
3A30		BATTERY BA-30.	2				*	*	*

* Indicates stock available.

Order No. 2140-MPD-44, 1100, 20 July 44

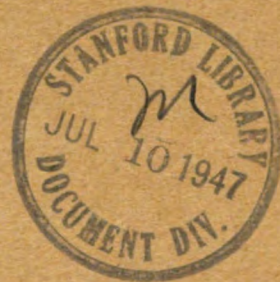
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TM 11-2620

WAR DEPARTMENT TECHNICAL MANUAL

ANTENNA SUPPORT AB-38/CR



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WAR DEPARTMENT • 3 OCTOBER 1944

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[AG 300.7 (17 May 44).]

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For explanation of symbols, see FM 21-6.

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DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN — When ordered by your commander.

HOW — 1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut — Use axes, handaxes, machetes.
3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives — Use firearms, grenades, TNT.
5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT — 1. Smash — Mast sections, mast couplings, boom sections, and mast bases with sledge or anything available.
2. Cut — Guys, mast sections, boom sections, hauling rope, mast bases, everything possible.
3. Burn — Guys, all wood parts of other components.
4. Bend — Antenna clamp, mast shoe, mast section couplings.
5. Bury or scatter — Everything possible.

DESTROY EVERYTHING

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SECTION I DESCRIPTION

1. GENERAL.

Antenna Support AB-38/CR is an eight-section assembly which can be set up as either a single 50-foot mast or as two 25-foot masts. At least two men are required to erect the equipment properly. Each mast

is pivot-supported at the base (fig. 1) and when properly adjusted and guyed will maintain a fixed vertical position.

2. USE.

Antenna Supports AB-38/CR are used to properly

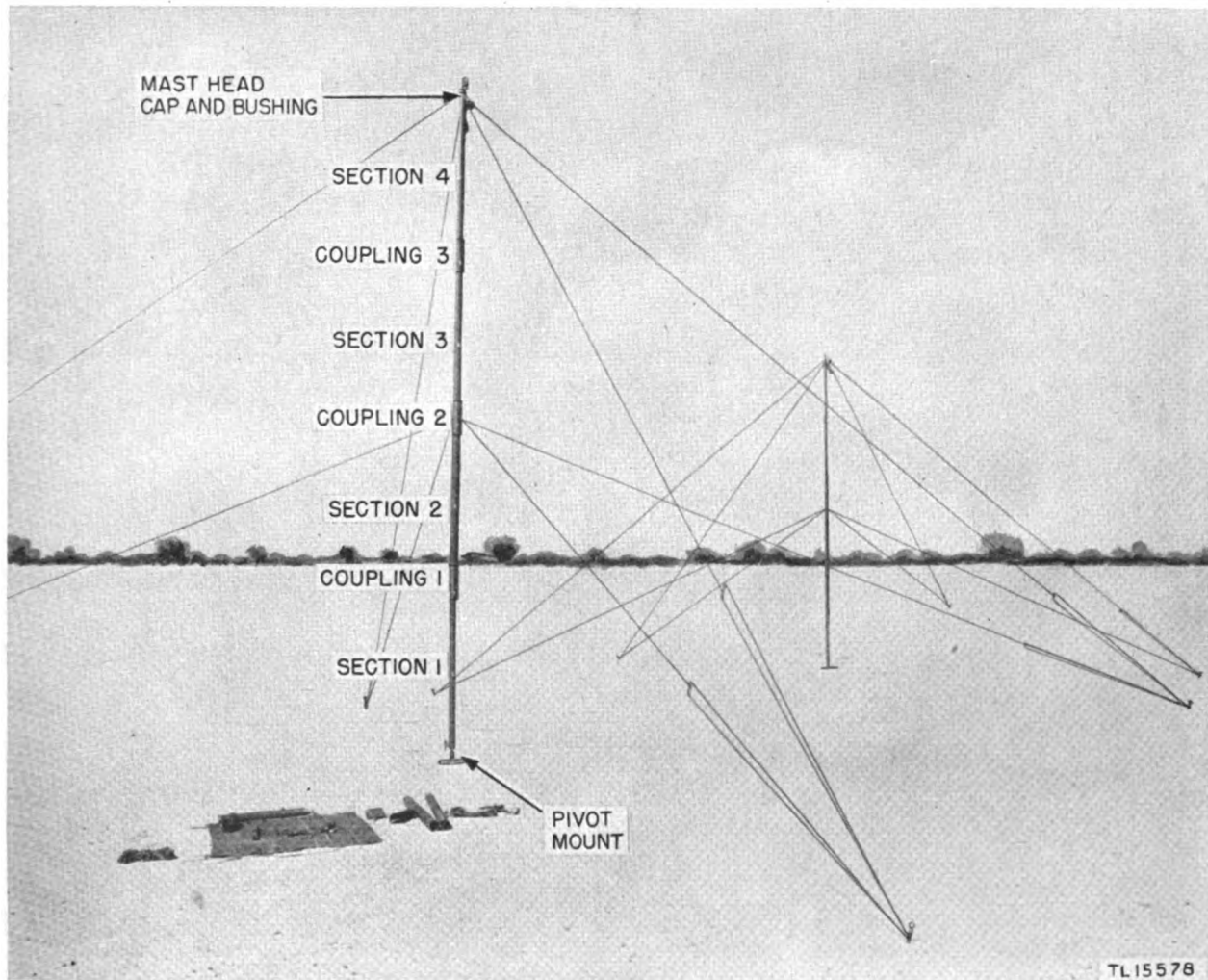


Figure 1. Antenna Supports AB-38/CR (25-foot).

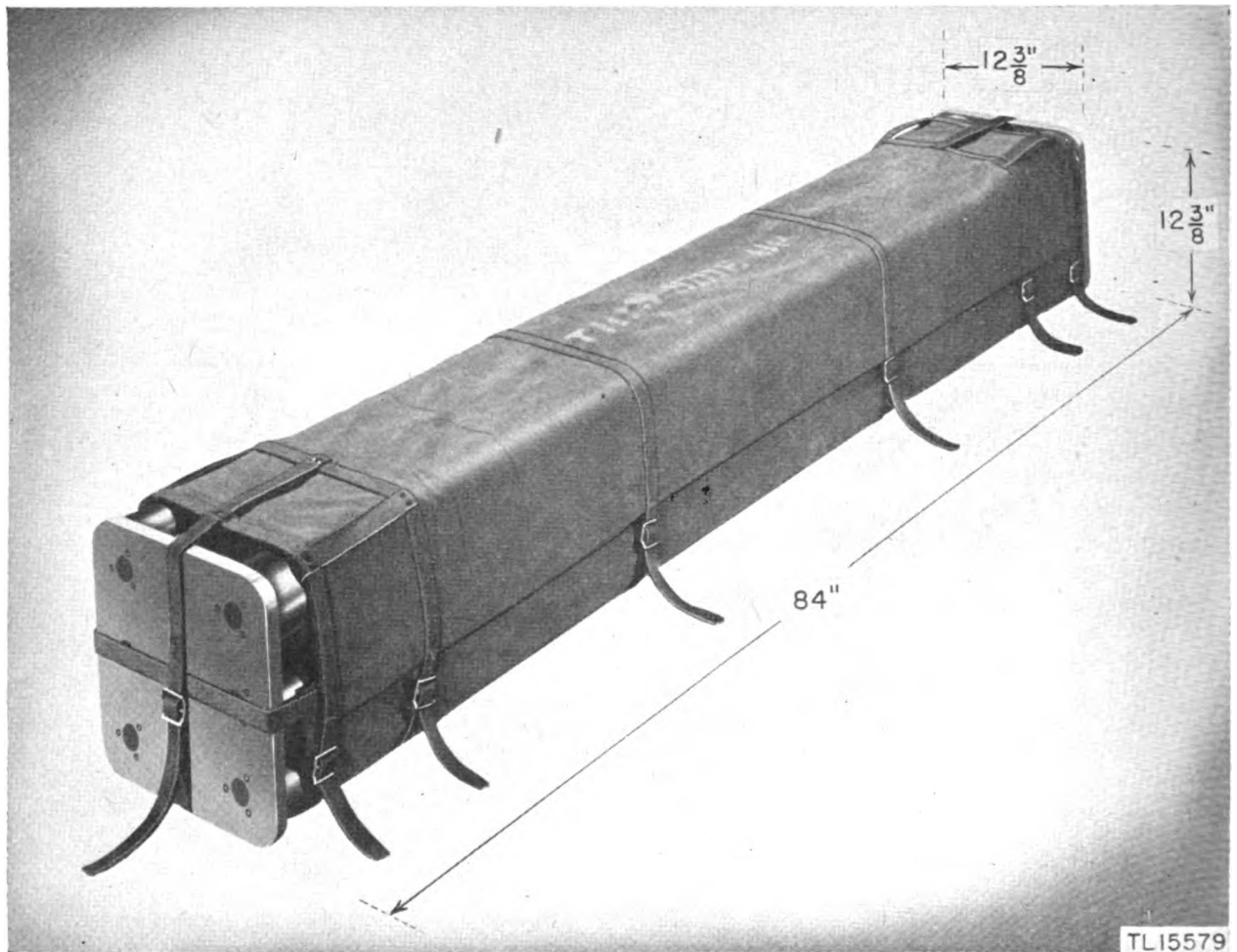


Figure 2. Antenna Support AB-38/CR, packed for shipment.

suspend half-rhombic and coaxial antennas in the field.

3. WEIGHTS AND DIMENSIONS.

The entire equipment necessary to erect either one 50-foot mast or two 25-foot masts is packed in a canvas holder and weighs 120 pounds (fig. 2). The dimensions of the equipment packed in this holder, ready to be moved, are height, $12\frac{3}{8}$ inches; depth, $12\frac{3}{8}$ inches; width, 84 inches. (7.45 cubic ft.)

4. LIST OF COMPONENTS.

Item	Quantity
4" diam mast section, 6'3" long-----	4
3½" diam mast section, 6'3" long-----	2
3½" diam mast section, 6'3" long, machined for mast head bushing-----	2
3" diam boom section, 6'3" long-----	2
Mast head bushing-----	2
Clamping sleeve-----	2

Item	Quantity
Clamping nut-----	2
Guy band-----	2
Boom end (top)-----	1
Boom end (bottom)-----	1
3½"-4" coupling-----	4
4" guy coupling-----	2
3½" guy coupling-----	1
3" boom coupling-----	1
#9x1¼" long FH wood screw-----	8
#6x7/8" long RH wood screw-----	2
#8x¾" long RH wood screw-----	8
#6x¾" long RH wood screw-----	2
#8x1½" FH brass wood screw-----	8
#10-32x5/8" FH machine screw-----	8
#10-32x1¼" FH machine screw-----	4
¼"-20x1" Parker Kalon thumbscrew-----	8
5/16"-18x1¼" hex.-head cap screw, slotted--	21
5/16"-18x1½" hex.-head cap screw, slotted--	7

<i>Item</i>	<i>Quantity</i>	<i>Item</i>	<i>Quantity</i>
5/16" shoulder bolt.....	2	68' guy rope (black), top of 50' and 25' masts.....	4
#10-32 hex. nut.....	12	58' guy rope (orange), aux. on 50' mast and lower on 25' mast.....	4
1/4"—20 hex. machine screw nut.....	2	50' guy rope (bronze), lower on 50' mast, top on 25' mast.....	4
1"—20 hex. nut.....	2	44' guy rope (green), aux. on 50' mast, bottom of 25' mast.....	4
#8-32 wingnuts.....	2	Hauling rope.....	1
#10 shakeproof lockwasher.....	8	Boom guy rope.....	2
1/4" shakeproof lockwasher.....	2	Halyard rope.....	2
1 1/16" ID plain washer.....	2	2' short loop rope for guy tiedown.....	8
Rectangular plain washer.....	24	Socket wrench.....	2
Rectangular tapped washer.....	28	Sledge hammer for driving stakes.....	1
No. 1 plain snap hook.....	16	Saw for repairing broken sections.....	1
No. 1 swivel-eye snap hook.....	2	Canvas cover for packing mast.....	1
No. 2 swivel-eye snap hook.....	2	Canvas bag for metal stakes, spikes, saw, wrench, (3) 5/16" cap screw, (3) threaded washers.....	1
1 1/8" diam ring.....	31	Technical manual.....	2
Fastener FT-9.....	18	68' guy rope (black) with snap hook, ring and Fastener FT-9.....	1
4" boat cleat.....	2	50' guy rope (bronze) with snap hook, ring, and Fastener FT-9.....	1
1/4" screw anchor shackles.....	2	5/16"—18 x 1 1/2" hex.-head cap screw, slotted.....	3
Stakes GP-2, for hard ground.....	10	Rectangular tapped washer.....	3
Wood stakes for soft ground.....	8	2' short loop rope for guy tiedown.....	4
Base spikes.....	8		
Base plate.....	2		
Base pin.....	2		
Safety chain.....	2		
Mast shoe.....	2		
Pulley housing.....	2		
Pulley.....	2		
Antenna clamp.....	1		

SECTION II

INSTALLATION

5. SELECTING A SITE FOR THE MASTS.

A prime factor in selecting a mast site should be the radio transmission conditions of the area under consideration. Next, the point of the mast base location should be determined by the available ground conditions. The most favorable mast location is a flat, level area devoid of trees and high shrubs, firm

enough to hold the stakes, and free from large rocks which might interfere with driving the stakes. If such an area is not available, the next choice should be a flat, level triangular area without trees or high shrubs, which would accommodate the individual mast or masts and guys when completely assembled and lying on the ground. If flat, level ground is not

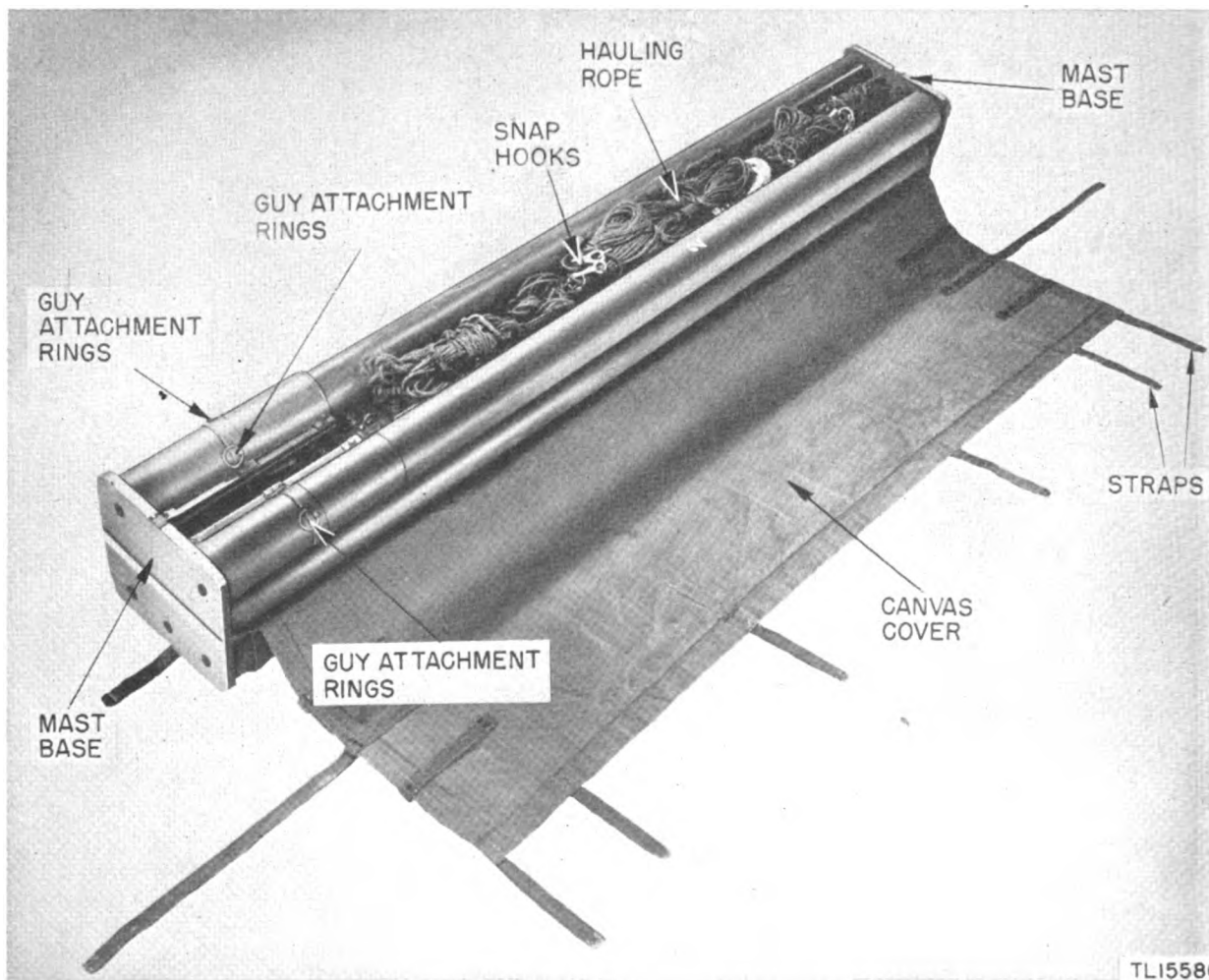


Figure 3. Antenna Support AB-38/CR, bag open.

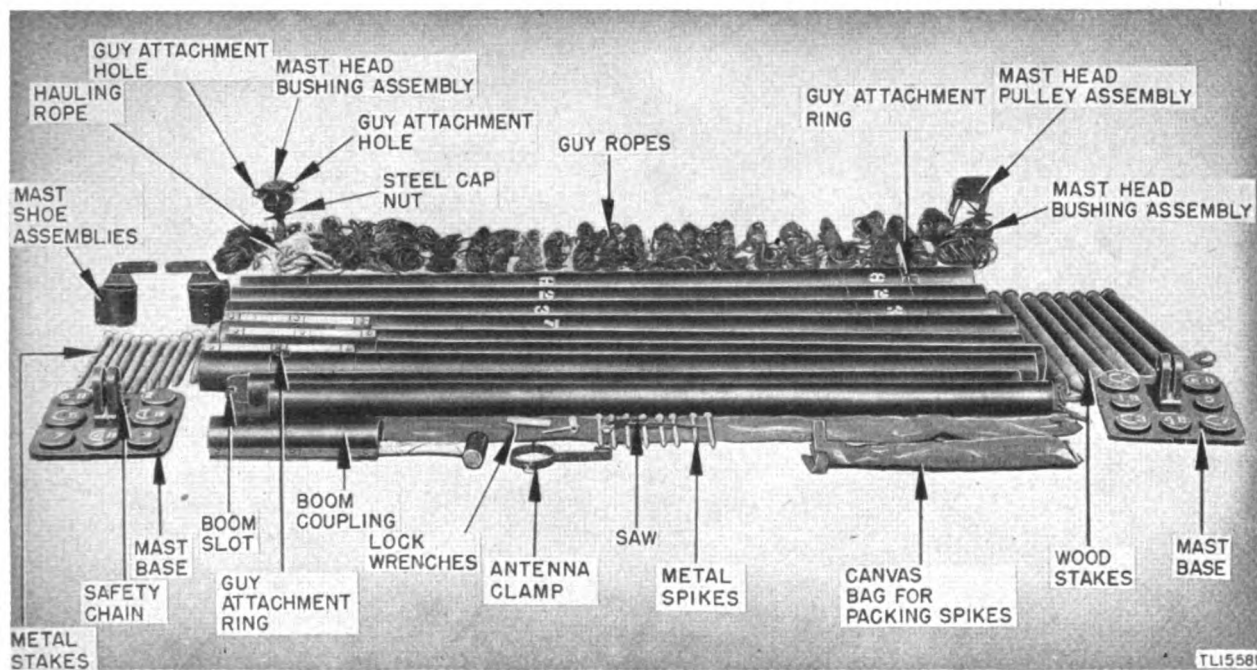


Figure 4. Antenna Support AB-38/CR, unpacked.

obtainable, sloping or uneven ground may be used if one or more extra men are available to adjust the lengths of the various guys while the mast is being raised, so that it will not buckle, sway, or go beyond the vertical position.

6. UNPACKING EQUIPMENT.

Set the equipment at the site selected, open the straps, and lay open the canvas cover (fig. 3). Notice carefully how the various small components are packed so that they may be repacked in similar fashion, when necessary. Remove the mast bases and lay out the equipment as shown in figure 4. Observe while unpacking that the 3-inch boom sections are telescoped into the 3½-inch mast sections, and that one of the 3½-inch mast sections is packed inside one of the 4-inch sections. Notice also that the various guy ropes have different-colored Fasteners FT-9 attached to them. These facilitate the selection of guy ropes of different lengths. The guy ropes, which have a small metal ring attached to them, are connected to the snap hook on top of the boom, when the mast is being raised. These rings are referred to throughout the text as boom-attachment rings.

7. INITIAL ASSEMBLY PROCEDURE.

a. Fifty-foot Mast.

- (1) Place the base plate on the ground at the point selected.
- (2) Remove stones beneath the plate and level the dirt so that the base plate sets firmly on the ground.
- (3) Remove the 8-inch spikes from the canvas bag and drive them through the four holes in the base plate.
- (4) Hook the mast shoe to the base-plate bracket. Put the peg on the end of the safety chain, through the matching holes, and insert the cotter pin (fig. 5).
- (5) Lay the eight numbered mast sections on the ground in a straight line and *in numerical sequence*, with section number 1 closest to the base (fig. 6), with *all numbers facing up*.
- (6) Insert section one into the mast shoe, section two into section one, section three into section two, etc. Insert each section to the spacer stop, which is located between each section coupling.
- (7) Tighten all screws at all couplings with the socket wrenches supplied with the equipment (fig. 7).

b. Twenty-five Foot Masts.

- (1) Place the base plate on the ground at the point selected.

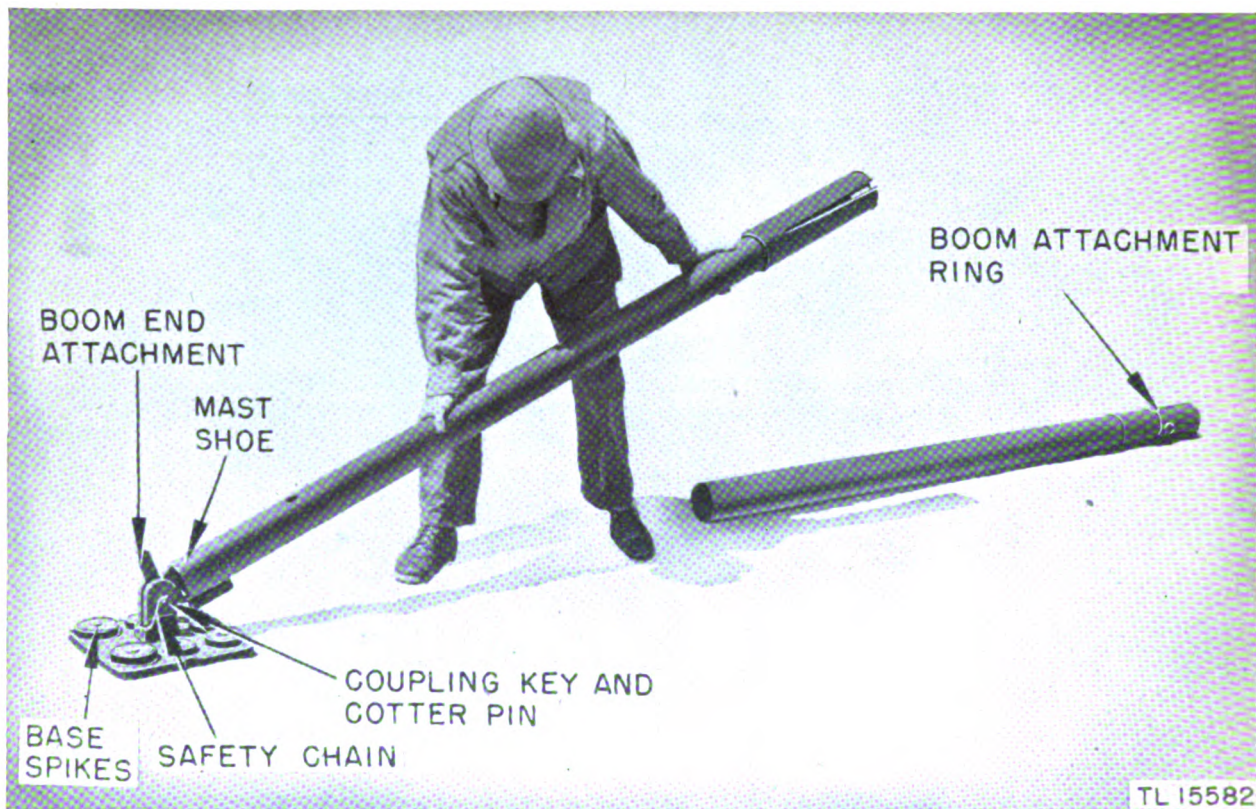


Figure 5. Preliminary installation.

(2) Remove stones beneath the plate and level the dirt so that the base plate sets firmly on the ground.

(3) Remove the 8-inch spikes from the canvas bag and drive them through the four holes in the base plate.

(4) Hook the mast shoe to the base-plate bracket. Put the peg on the end of the safety chain, through the matching holes, and insert the cotter pin (fig. 5).

(5) Lay numbered section one through four on the ground in a straight line and *in numerical sequence*, with section one closest to the base, with *all numbers facing up*.

(6) Loosen the screws and remove the coupling from the top of section 4.

(7) Insert section one into the mast shoe, section two into section one, section three into section two, etc. Insert each section to the spacer stop, which is located between each section coupling.

(8) Tighten all screws at all couplings with the socket wrenches supplied with the equipment (fig. 7).

8. INSTALLING THE MAST-HEAD CAP ASSEMBLY.

a. Fifty-foot Mast.

(1) Place the mast-head cap (complete with pulley assembly and halyard) so that the bushing faces the top of section 8 (fig. 8).

(2) Loosen the four Parker Kalon thumbscrews and turn the bushing while exerting a steady downward pressure. When the slot at the upper end of section 8 is in line with the positioning screw in the mast-head bushing (fig. 8), the bushing will slide into section 8 and the four tapped holes in the bushing and in section 8 will coincide. Turn the four thumbscrews so that the two units are held together rigidly.

(3) The mast sections should now be lying on the ground so that one of the guy attachment holes is facing up.

(4) Fit the pulley on the mast-head assembly so that it lies half way between this hole and the next hole in the side most favorable for attaching the antenna.

(5) Tighten the steel cap nut so that the pulley is held in position.

b. Twenty-five-foot Mast Coupling No. 4 Removed.

(1) Place the mast-head cap (complete with pulley assembly and halyard) so that the bushing faces the top of mast section 4.

(2) Loosen the four Parker Kalon thumbscrews and turn the bushing while exerting a steady downward pressure. When the slot on the end of section 4 is in line with the positioning screw in the mast-head bushing, the bushing will slide into section 4 and the tapped holes in the bushing and in section 4 will coincide. Turn the four thumbscrews so that the two units are held together rigidly.

(3) The mast sections should now be lying on the

ground so that one of the guy attachment holes is facing up.

(4) Fit the pulley on the mast-head assembly so that it lies half way between this hole and the next hole in the side most favorable for attaching the antenna.

(5) Tighten the steel cap nut so that the pulley is held in position.

9. ANTENNA CLAMP AND HALYARD INSTALLATION.

a. Fifty-foot Mast.

(1) Attach the antenna clamp to the mast at section 7 (fig. 9) near coupling 7.

(2) Pull the halyard through the pulley in the mast head cap assembly, even up the two ends, and fasten to the boat cleat on the mast shoe at the base of the

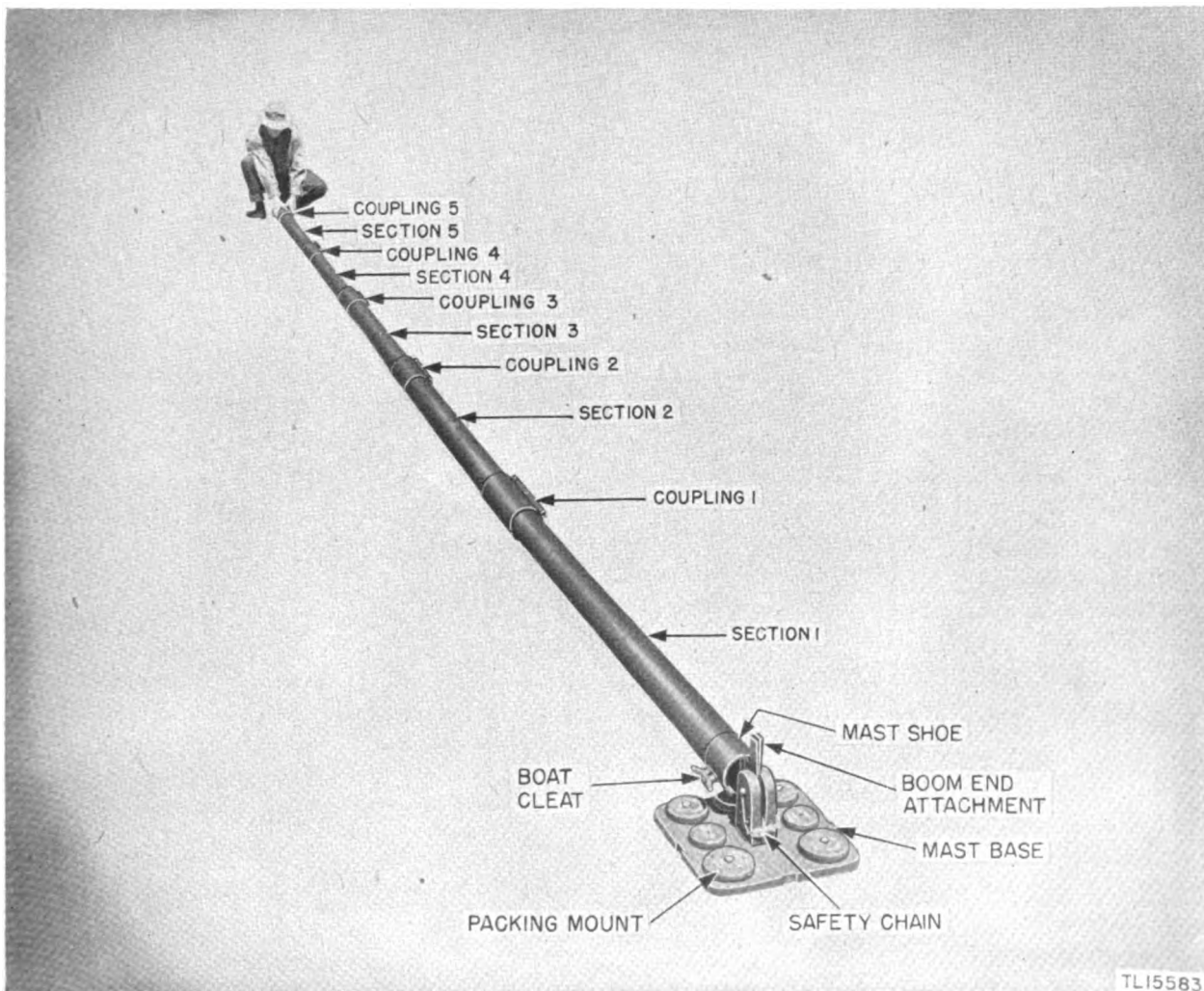


Figure 6. Antenna Support AB-38/CR, section assembly.

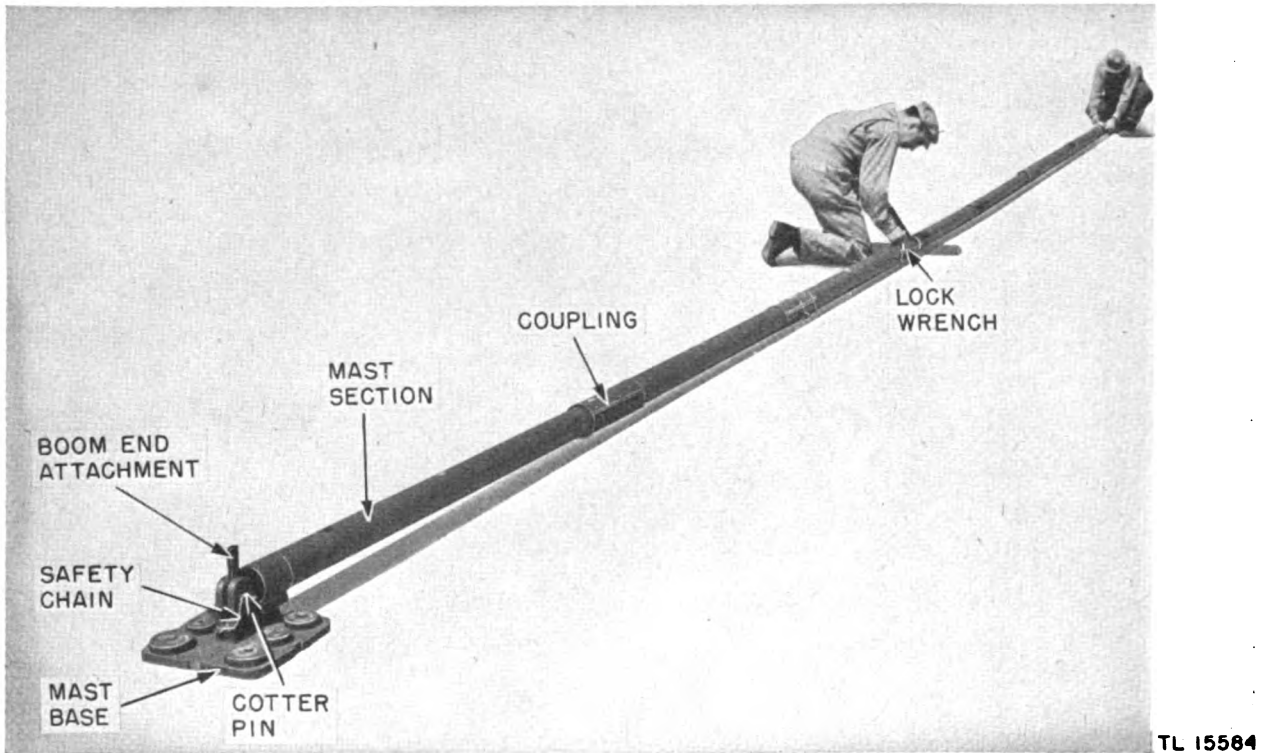


Figure 7. Antenna Support AB-38/CR, tightening the mast sections.

unit. If properly set, antenna clamp will line up with pulley in the mast head assembly and will support the coaxial antenna when installed.

b. Twenty-five-foot Mast.

- (1) Attach the antenna clamp to the mast at section 3, near coupling 2.
- (2) Pull the halyard through the pulley in the mast head cap assembly, even up the two ends, and fasten to the boat cleat on the mast shoe at the base of the unit. If properly set, antenna clamp will line up with pulley in the mast head assembly.

10. BOOM ASSEMBLY AND ATTACHMENT (25- OR 50-FOOT MAST).

a. Assemble the two sections of the boom with the boom coupling and tighten the screws in the coupling.

b. Insert the slotted shaft at the bottom end of the boom into the pin in the metal strip welded at right angles to the mast shoe (fig. 10). Lay the boom down atop the mast proper. Be certain that the ring on top of the boom is above the adjacent snap hook.

11. STAKE LOCATION.

a. Fifty-foot Mast.

- (1) Drive a stake midway and adjacent to section 6 (fig. 11).
- (2) Using a guy rope of suitable length as a standard, measure the distance from this stake to one side of the base plate.
- (3) Now measure a similar distance from the base plate, using each of the three remaining sides of the base plate as a starting point. At each of these other points drive a stake. These stakes will form a square, with each stake point about 35 feet distant from the base plate.

b. Twenty-five-foot Mast.

- (1) Drive a stake about 10 feet beyond and in a straight line with the mast (about 35 feet from the base).
- (2) Using a guy rope of suitable length as a standard, measure the distance from this stake to one side of the base plate.

(3) Now measure a similar distance from the base plate, using each of the three remaining sides of the base plate as a starting point. At each of these other points drive a stake. These stakes will form a square, with each stake point about 35 feet distant from the base plate.

NOTE: Use metal stakes in hard ground, wood stakes in soft ground.

12. GUY INFORMATION.

All guys are color coded on the Fasteners FT-9 to distinguish the lengths. Each 68-foot guy has a black colored Fastener FT-9. These are used for the top of the 50-foot mast, or the top of one 25-foot mast. Some of the 50-foot guys are coded orange. These are used as auxiliary guys on the 50-foot mast and as bottom guys on the 25-foot mast. Other 50-foot

guys are coded bronze and are used as middle guys on the 50-foot mast, and top guys on one 25-foot mast. The short guys are coded green and are used as auxiliary guys on the bottom of the 50-foot mast, regular guys in the bottom of the 25-foot mast.

13. ATTACHING GUYS.

NOTE: Each guy is equipped with a short loop rope for attaching guy to stake.

a. Fifty-foot Mast.

(1) Select a 50-foot guy and a 68-foot guy minus boom attachment rings (coded bronze and black, respectively on the fasteners). Hook the bronze-coded guy onto a guy attachment ring at coupling 4, the black-coded guy to a guy attachment hole at the mast head assembly (fig. 12).

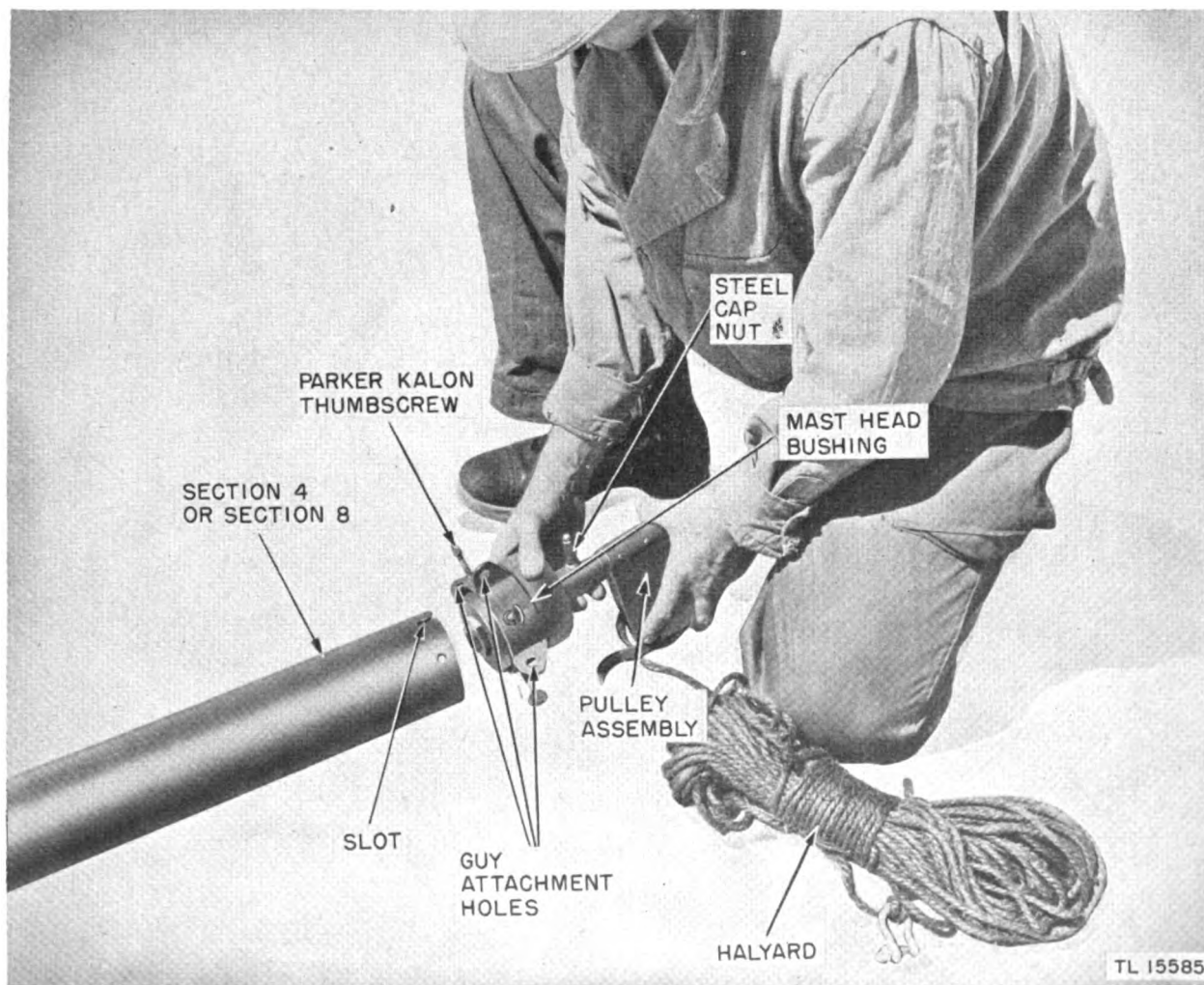


Figure 8. Installing the mast-head cap assembly.

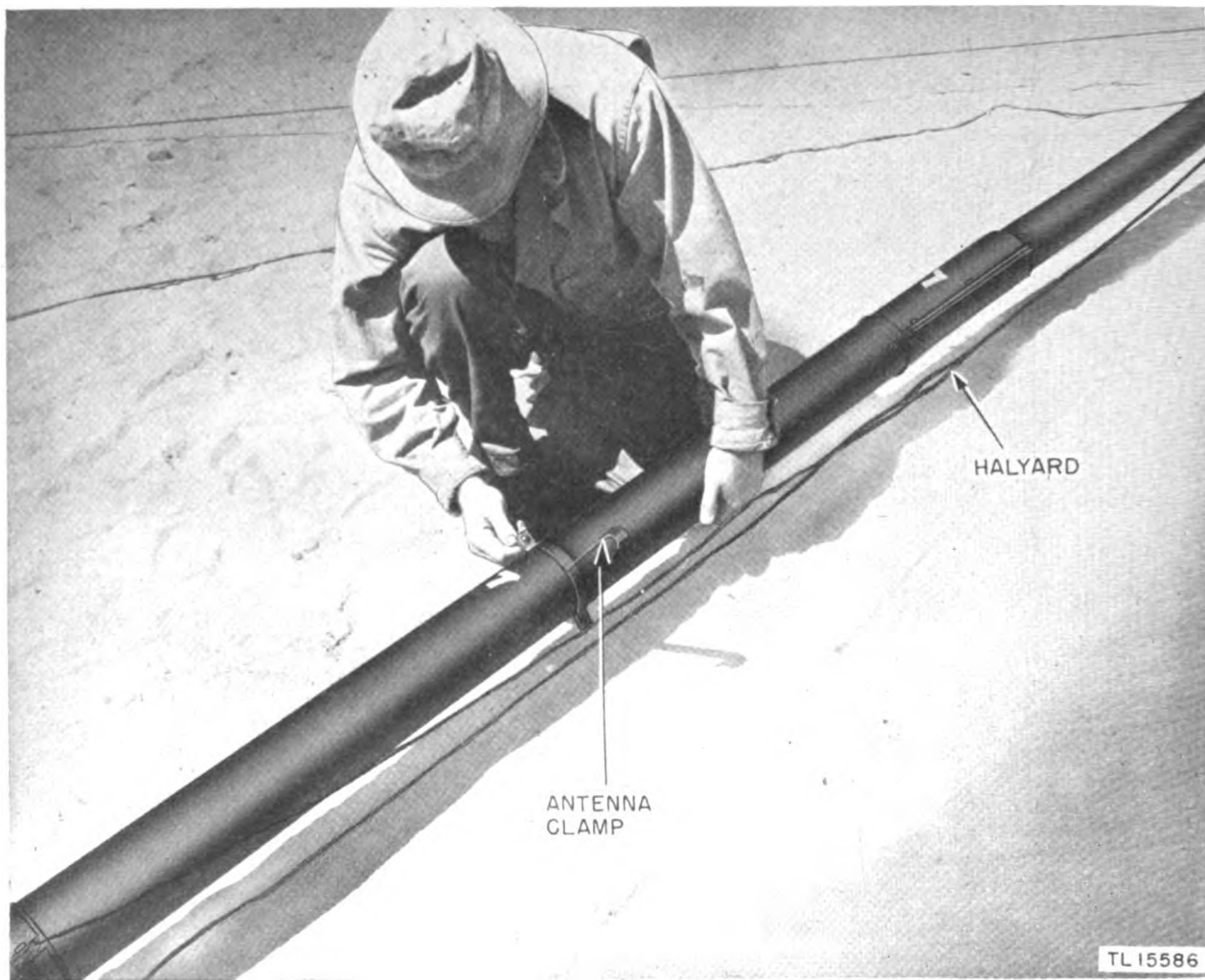


Figure 9. Antenna clamp attachment.

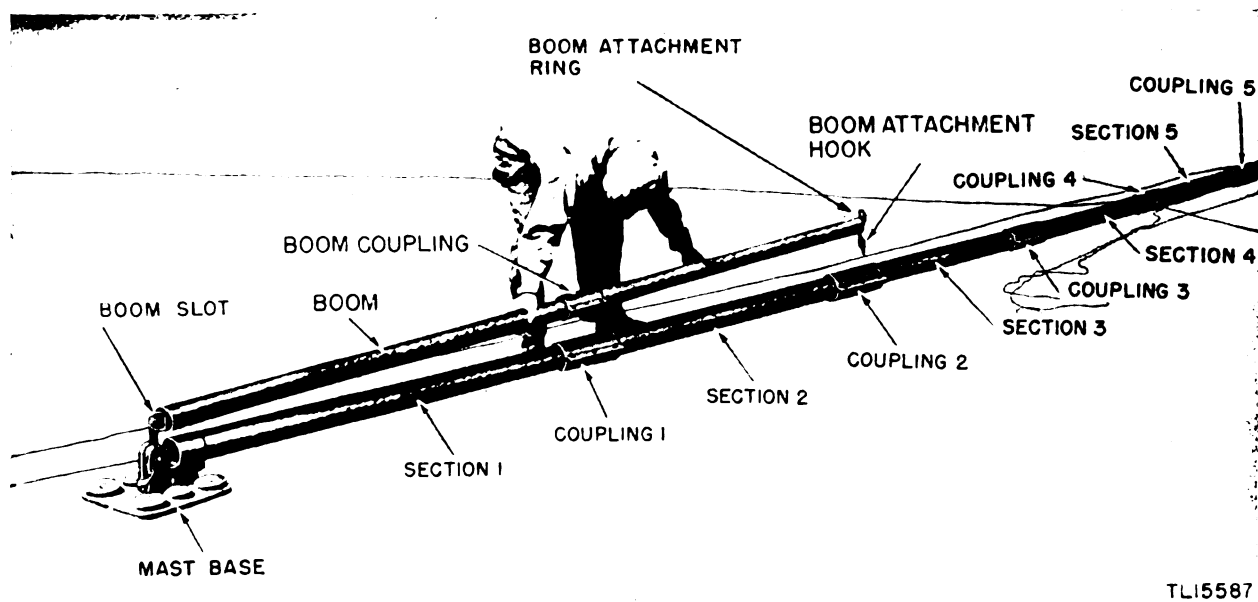


Figure 10. Attaching boom and mast shoe assembly.

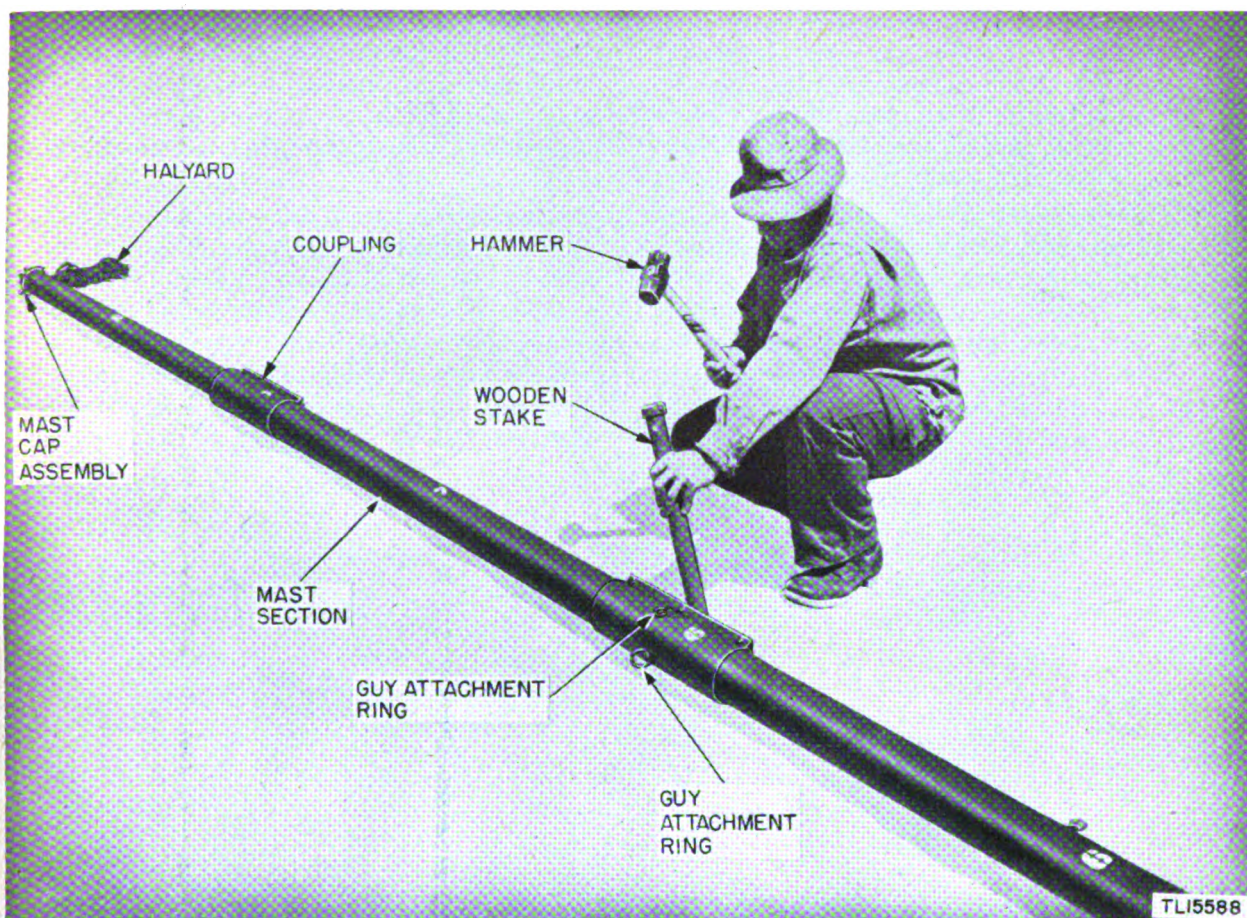


Figure 11. Positioning of first stake.

(2) Run these out to one of the stakes to either the right or left of the antenna mast unit.

(3) Tie around the stake selected, drawing up slack by adjusting Fasteners FT-9.



Figure 12. Guy attachment detail.

(4) Lift the two ropes from the selected stake, carry the two guy ends over to the stake driven adjacent to section 6, and tie firmly around this stake (fig. 13).

(5) Select two other 50-foot guys (without boom attachment rings), hook them to two other side rings at the coupling 4, and extend each to the stakes to the right and left of the mast.

(6) Adjust the tension of these by varying the positions of the slide Fasteners FT-9.

(7) From the guy attachments at the mast head assembly, run two 68-foot guys (coded black, and less boom attachment rings) and extend each to the same stake to which the corresponding 50-foot guy was run, and tie down firmly (fig. 13).

(8) Connect the snap hooks on the 50- and 68-foot guys equipped with boom attachment rings to the guy attachment rings at the No. 4 coupling and to the guy attachment holes at the mast cap assembly position, respectively. Run each of these guys down the length of the mast. The boom attaching ring in the 50-foot guy should extend about 3 feet beyond the mast base. The boom attachment ring on the 68-foot guy should extend about 1 foot beyond the base. If these ring positions do not coincide with the figures given, loosen the ring and readjust to the proper position. When properly adjusted, connect the two boom attachment rings to the snap hook at the free end of the boom (figs. 14, 15).

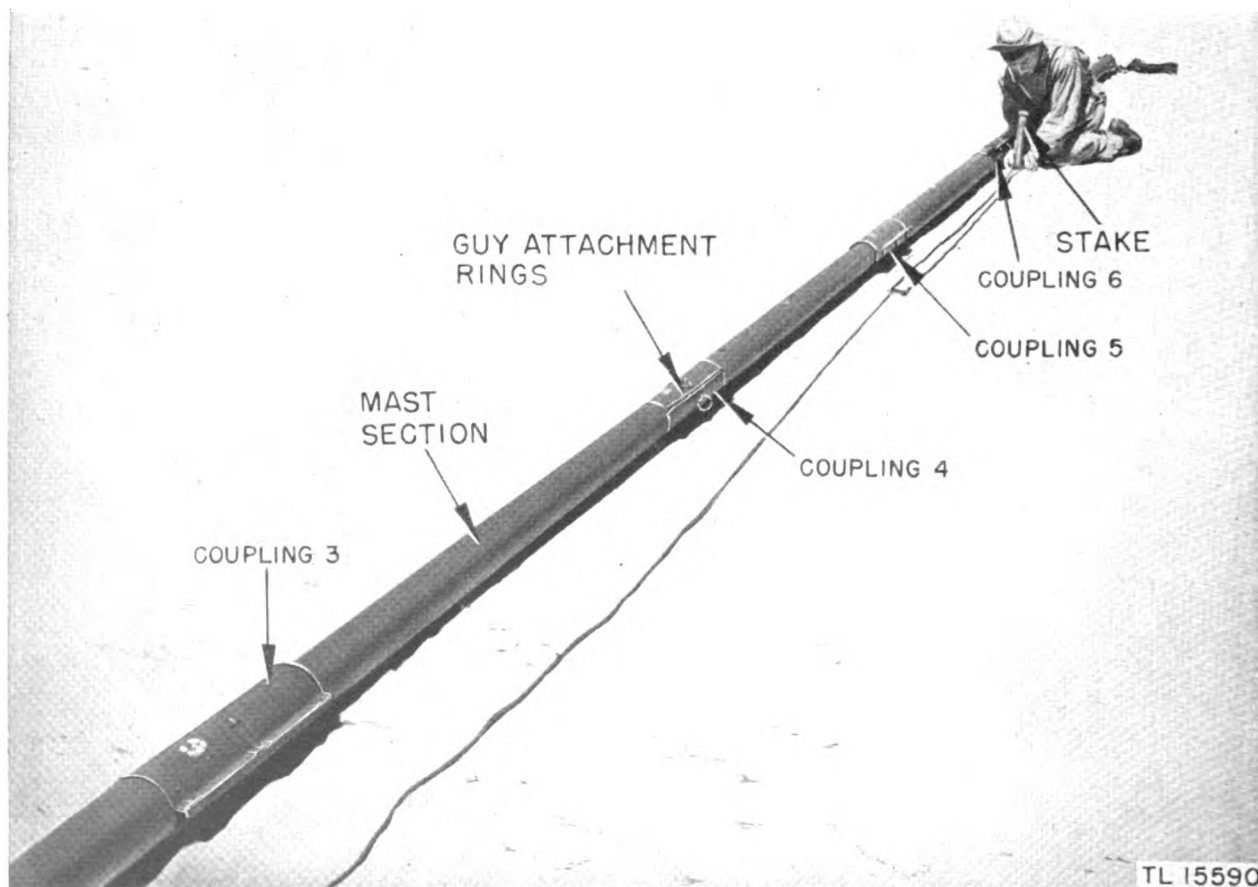


Figure 13. Guy connection detail.

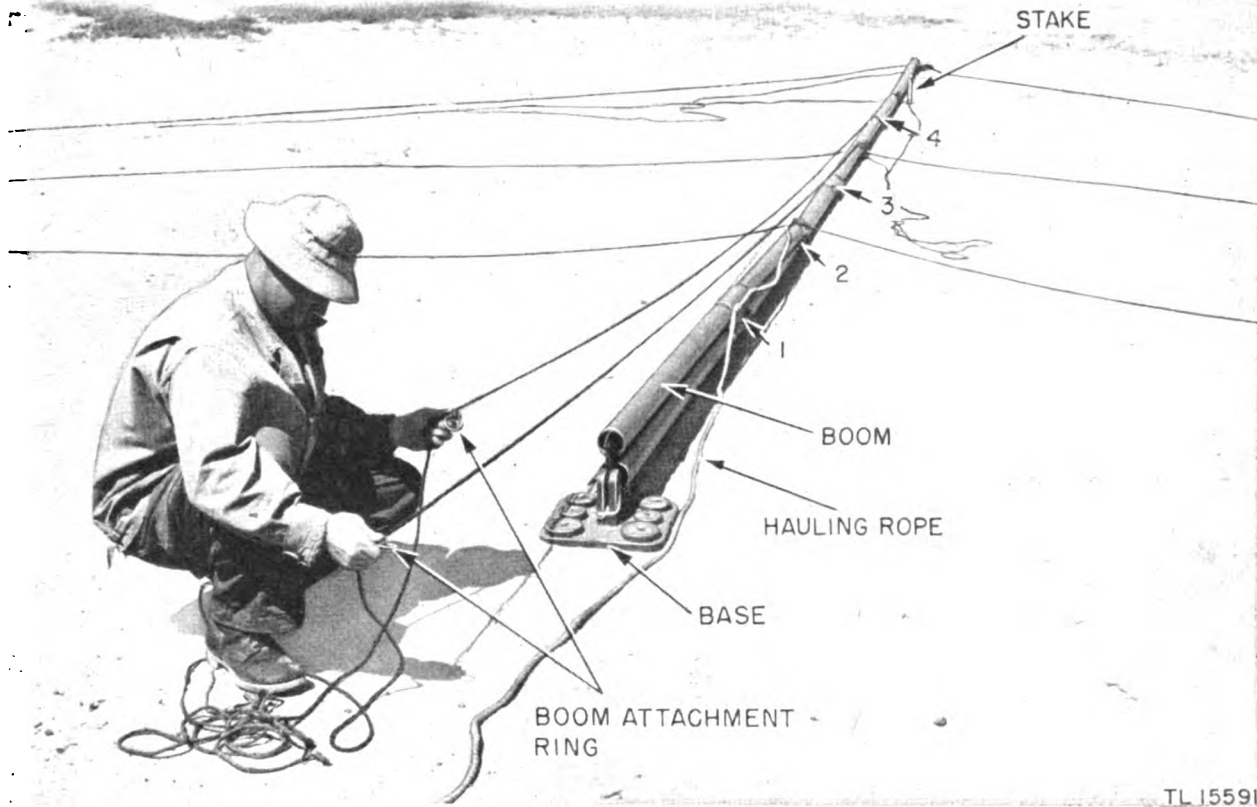


Figure 14. Boom-attachment ring measurement.

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b. Twenty-five-foot Mast.

- (1) Select a pair of bronze and green, or black and orange, coded guy ropes. Connect the shorter of the two onto a guy attachment ring at coupling 2. Connect the longer (bronze or black) guy to a guy attachment hole at the mast head assembly.
- (2) Run these out to one of the stakes to either the right or left of the antenna mast unit.
- (3) Tie around the stake selected, drawing up slack by adjusting Fasteners FT-9.
- (4) Lift the two ropes from the selected stake, carry the two guy ends over to the stake driven ten feet beyond the end of the mast (par. 11b (1)), and tie guys firmly to this stake.
- (5) Select two other guys (minus boom attachment rings) and hook them to the two outside side rings at the coupling 2. Tie other ends of guys to the two stakes at the right and left of the antenna mast, respectively.

- (6) Adjust the tension of these guys by varying the positions of the slide Fasteners FT-9.
- (7) From the guy attachment holes at the mast head assembly, run two guy ropes to the same two stakes indicated in paragraph 13b (5) and tie down firmly.
- (8) Connect the snap hook on two guys equipped with boom attachment rings to the snap guy attachment rings at the No. 2 coupling and the mast cap assembly positions. Run each of these guys the length of the mast. The boom attaching ring in the guy from the upper part of the mast should extend 4 feet 6 inches beyond the mast base. The boom attachment ring in the guy from the lower part of the mast should extend between 4 feet and 6 inches and five feet beyond the mast base. If these ring positions do not coincide with the figures given, loosen the ring and readjust to the proper position. When properly adjusted, connect the two boom attachment rings to the snap hook at the free end of the boom.

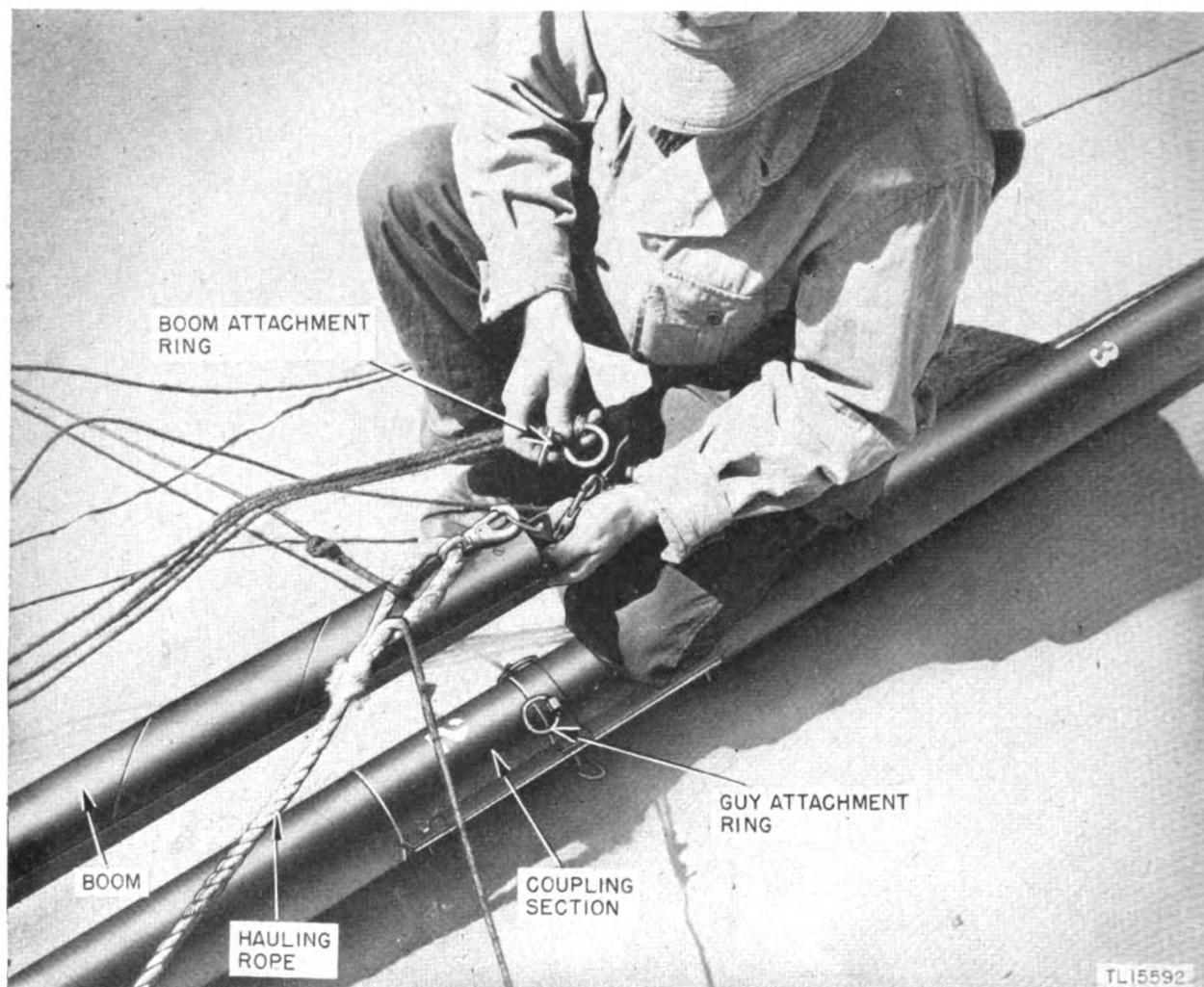


Figure 15. Hauling rope and boom ring attachment detail.

14. ATTACHING HAULING ROPE (25- OR 50-FOOT MAST).

a. The $\frac{1}{2}$ -inch hauling rope is equipped with a snap hook. Two lines for guying the boom are attached to the same hook. Attach the snap hook to the ring in the top of the boom (fig. 15).

b. Attach the two boom guys to the stakes at both sides of the mast as shown in figure 16. Adjust the Fasteners FT-9 to make the guys taut, while boom is still lying on mast.

15. RAISING THE MAST.

a. Fifty-foot Mast.

- (1) Check all guys to make certain they are all free and clear.
- (2) Raise the boom to a vertical position.
- (3) Using at least two men, pull on the $\frac{1}{2}$ -inch hauling rope attached to the boom (fig. 17).

(4) The mast should start leaving the ground at the mast head. When the mast head is about 1 foot from the ground, the middle coupling should be leaving the ground. The mast in this position will sag between these two points (fig. 17). If this condition does not occur, release the hauling rope and readjust the position of the boom attachment ring on one of the guy ropes and try again for the above condition.

(5) When the mast comes off the ground under the steady pull at the hauling rope, the boom will approach the ground (fig. 18).

While the man at the end of the hauling rope continues pulling steadily backward, the other man should seize the boom as it approaches the ground, push it slowly toward the ground and hold it there by applying his foot to the boom (fig. 19).

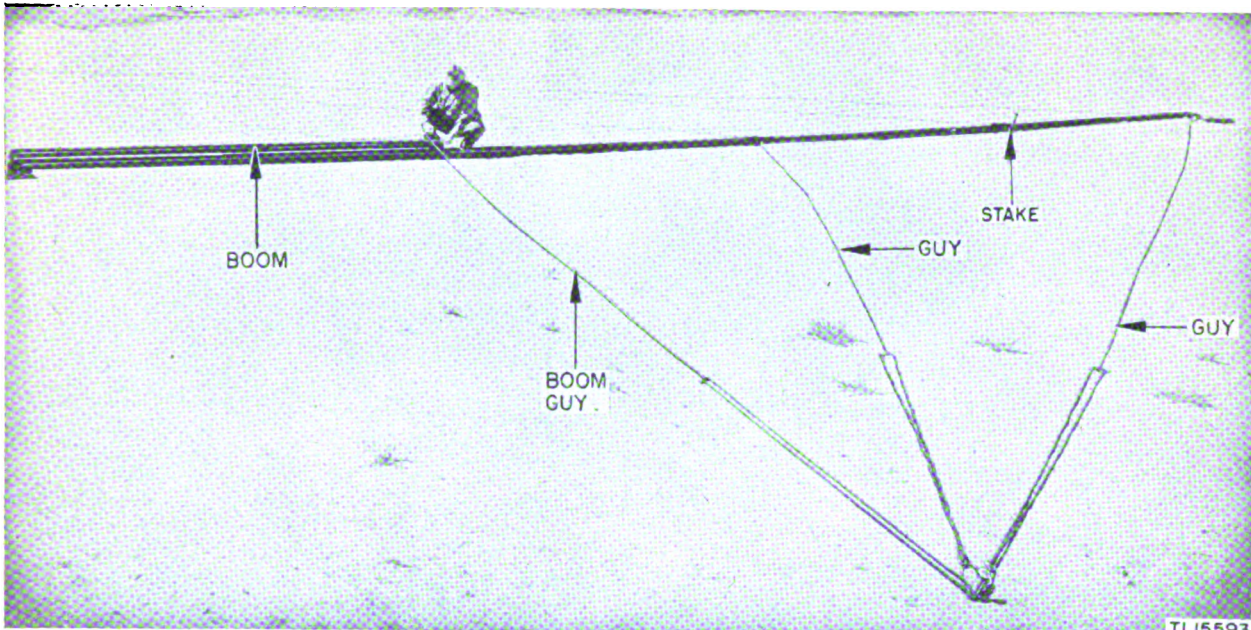


Figure 16. Boom guy detail.

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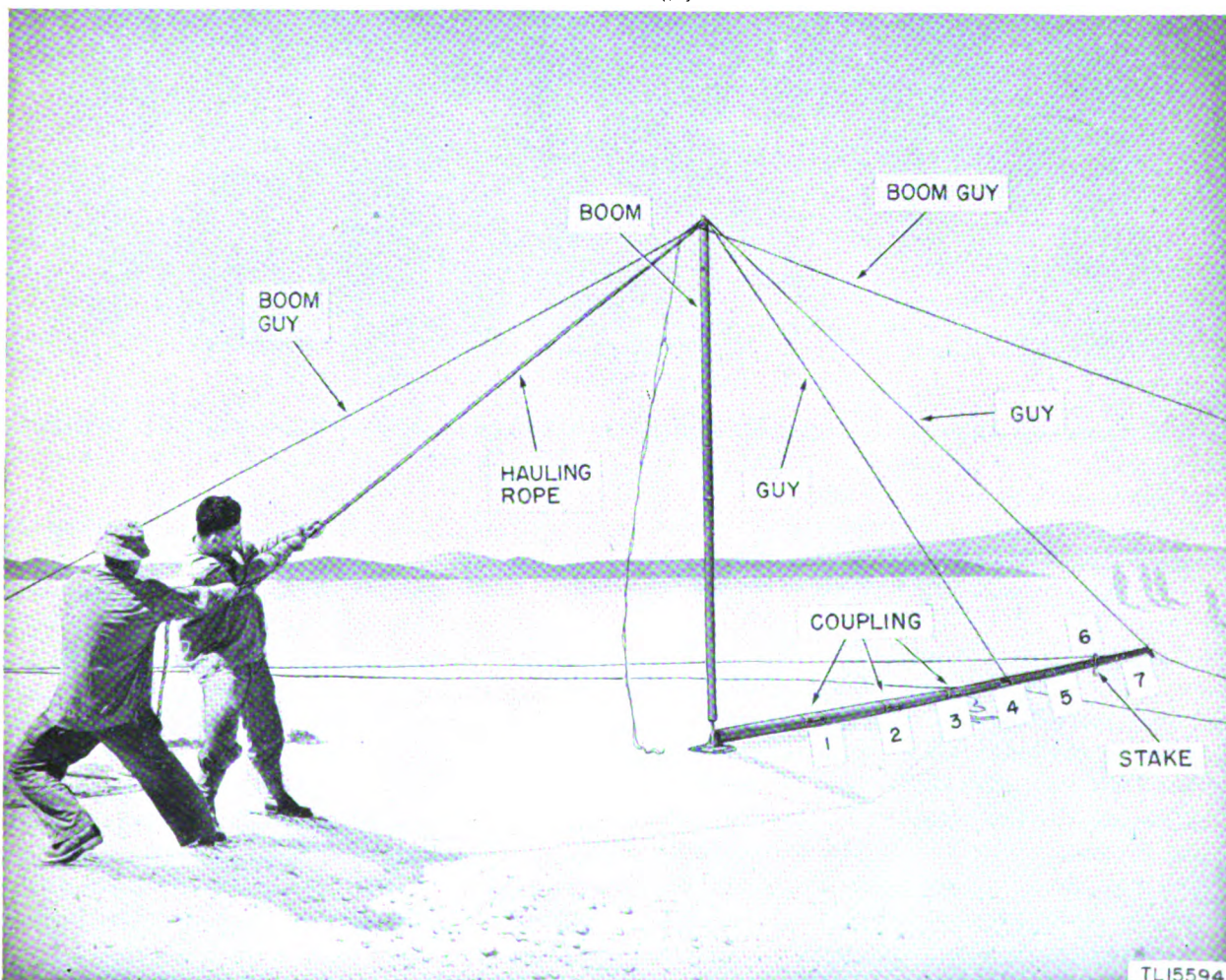


Figure 17. Raising the boom to a vertical position.

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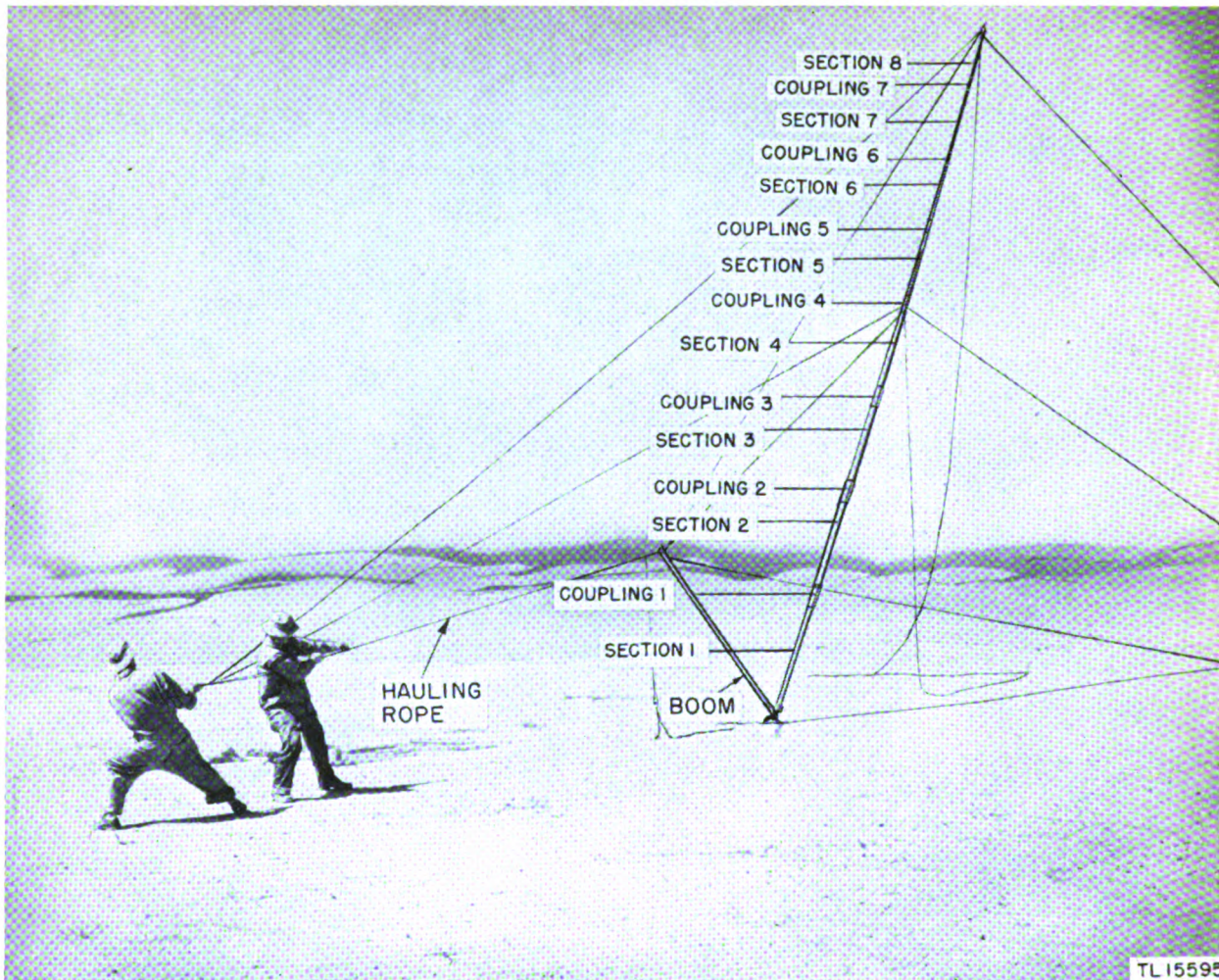


Figure 18. Mast approaching the vertical position.

(6) The mast will now be erect and can easily be held there by the pressure being exerted on the boom. The other man should now walk to the opposite side of the mast and inspect it for proper vertical position. If not in perfect vertical position, the tensions on the various guy ropes must be varied by readjusting the various Fasteners FT-9.

(7) When the mast is vertical, the boom attaching rings are disconnected from the boom and attached to the remaining forward stake. Be certain to have the guys taut at all times when transferring them from the boom end to the stake (figs. 20 and 21).

b. Twenty-five-foot Mast. The procedure for raising the 25-foot mast is identical with that for the 50-foot mast, except that there should be no sag when the mast is leaving the ground (fig. 22).

16. HOISTING A COAXIAL ANTENNA.

a. Assemble the parts of the antenna and lay it on

the ground at the base of the mast. Check that the hoisting bracket is securely fastened to the antenna just below the middle insulator.

b. Unroll the coaxial transmission line along the ground to avoid twisting the antenna as it is raised. Then fasten this transmission line to the stub cable at the bottom of the antenna.

c. Attach the shackle on the halyard to the eye in the longer side of the hoisting bracket on the antenna. Attach the snap hook on the halyard to the eye in the other side of this bracket.

d. Raise the antenna to the top of the mast by one man pulling down on the inside halyard rope while another man holds back slightly on the outside rope at a distance of about 20 feet from the mast so as to guide the antenna as it rises and keep it from swaying and getting snagged on the guys.

e. When the antenna bracket meets the jaws of

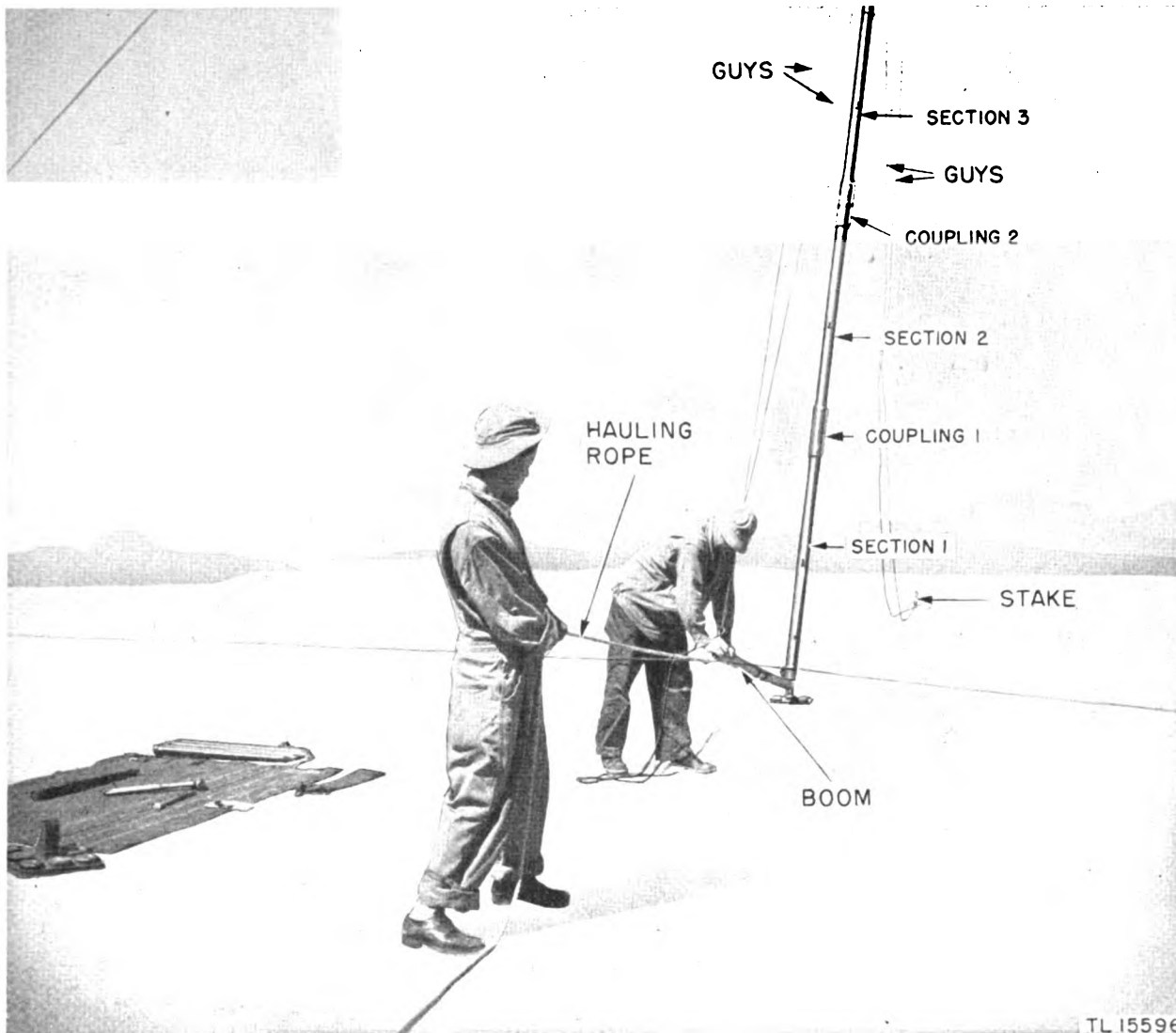


Figure 19. Boom approaching the ground.

the pulley at the top of the mast, be careful that this bracket enters these jaws properly. Then pull the hoisting rope taut and fasten it to the cleat on the mast shoe.

f. Engage the bottom of the antenna staff with the hook of the antenna clamp on the mast by gently swinging the antenna transmission line to bring them together.

g. Drive a stake into the ground about 20 feet from the mast on the side from which the antenna extends, pull the outside halyard rope taut and fasten it to this stake.

h. Tie a knot around the transmission line with the loose part of the halyard between the stake and the cleat on the mast shoe and gently pull the trans-

mission line through this knot so as to hold the antenna staff in the antenna clamp on the mast (figs. 24 and 25).

17. HOISTING A HALF-RHOMBIC ANTENNA.

a. Connect the shackle on the halyard to the ring on the insulator at the middle of the antenna wire and then pull down on the inside halyard rope until this ring is at the pulley at the top of the mast. Fasten the halyard to the cleat on the mast shoe.

b. Fasten the two ends of the antenna wire to stakes in the ground, the location of the stake being established by extending the antenna wire its full length in each direction from the center.

c. Install a counterpoise below the originating end of the antenna and connect it to the transmission line through the binding post on the coupling unit. If a terminating resistance is required for the antenna, install a counterpoise below the terminating end of the antenna and connect it to the resistance unit.

18. LOWERING THE ANTENNA.

Lower antenna from top of mast and disconnect it from the halyard.

19. PREPARATION FOR LOWERING THE MAST.

a. Disconnect the two front guys from the stake and connect the boom attaching rings to the snap hook on the boom.

b. Check guy at top of mast for tautness and guy in middle of mast for looseness, to extent of approximately 12 inches slack.

20. LOWERING THE MAST.

a. While one man holds hauling rope, the other must lift the boom slowly to allow the mast to move away from the boom toward the ground.

b. When boom is beyond the first man's reach, he must catch the hauling rope and assist in lowering the mast.

21. GUYS.

Disconnect all guys from the mast and from the stakes and wind each securely in a separate bundle.

22. PREPARATION.

Loosen the upper and middle cap screws on each mast coupling, leaving lower cap screw tight. Loosen all cap screws on boom coupling and mast shoe.

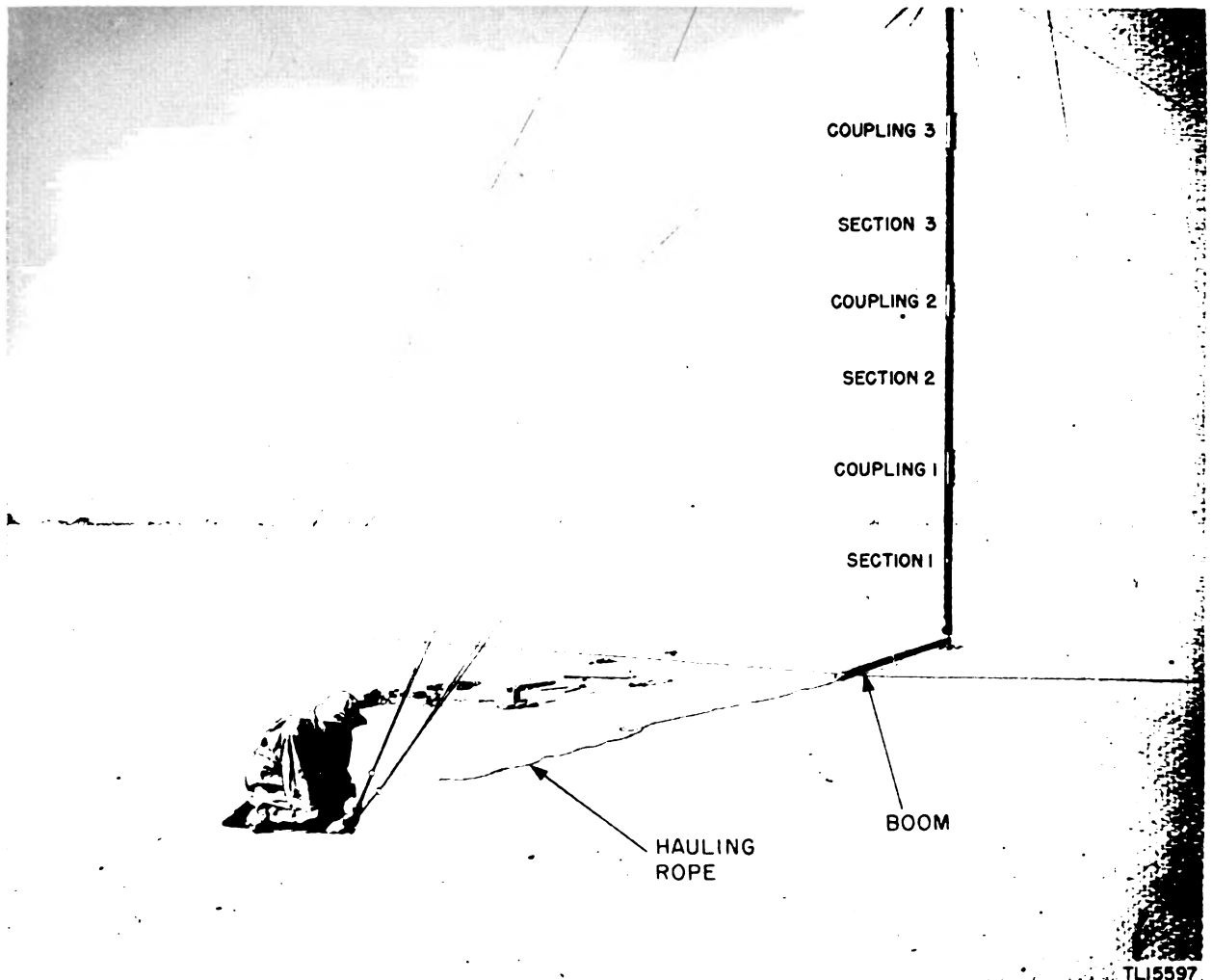


Figure 20. Stake erection and completion of mast erection.

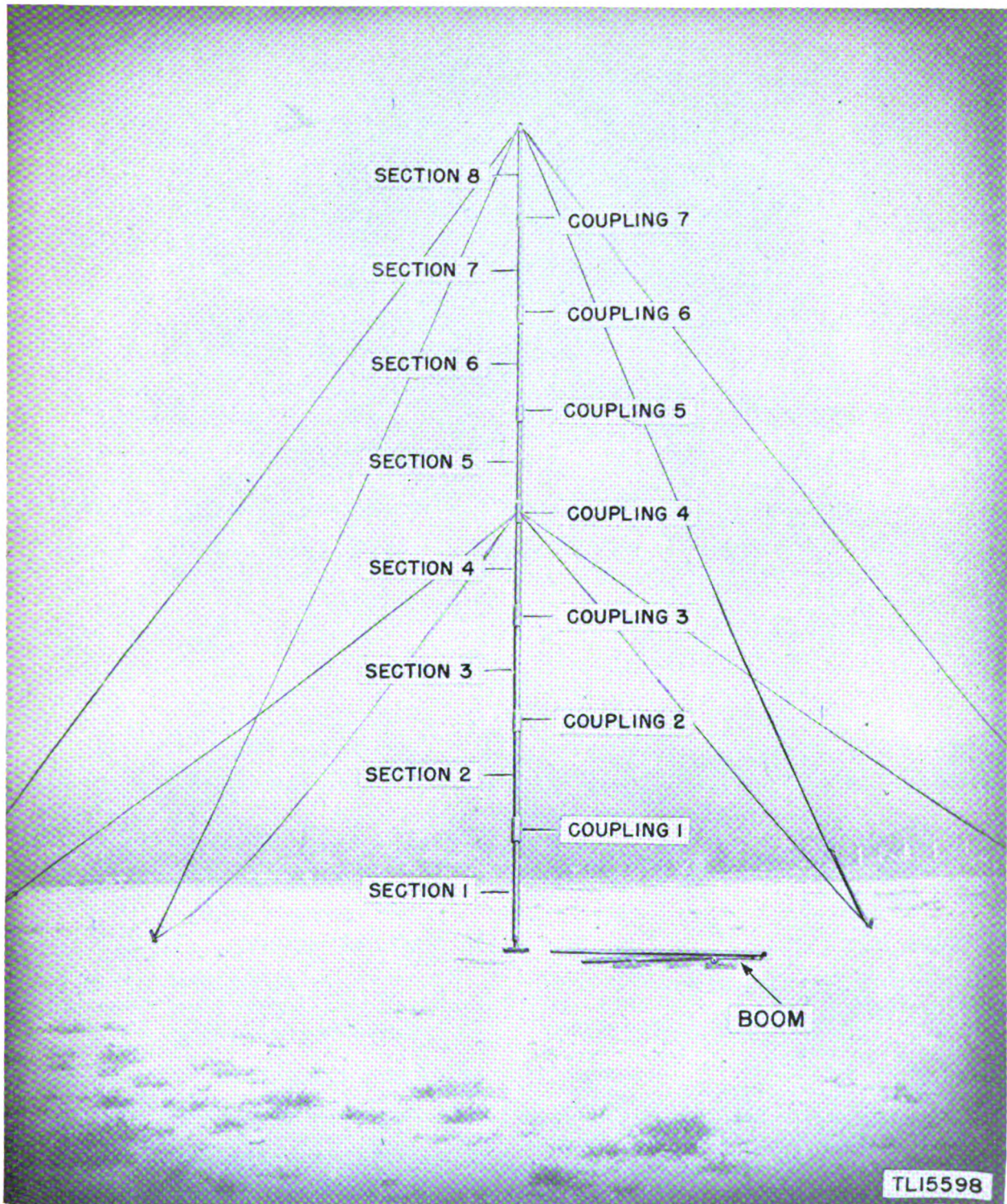
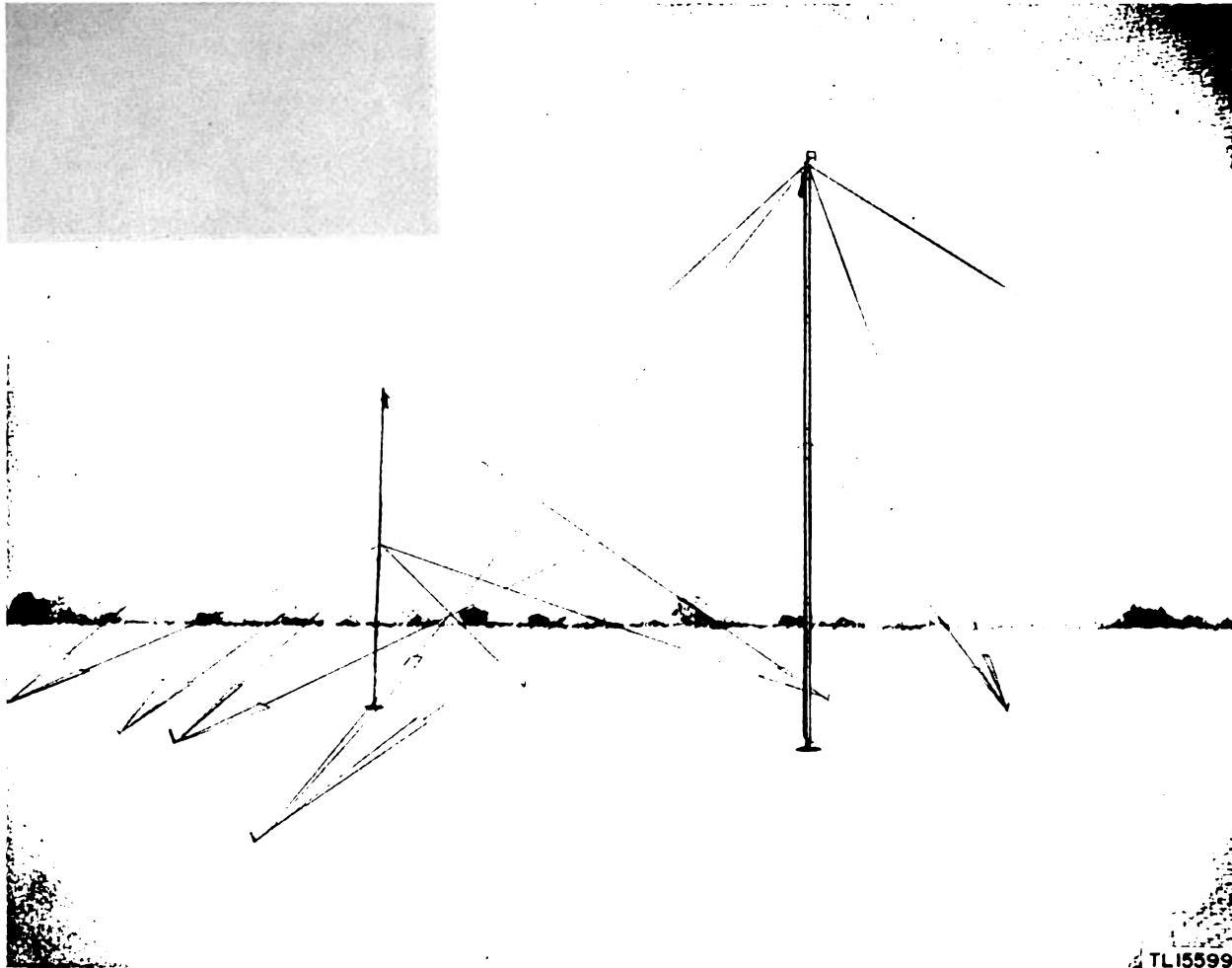


Figure 21. Fifty-foot mast erected.



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Figure 22. Twenty-five-foot masts erected.

23. BOOM.

Remove boom from mast and separate boom sections from coupling.

24. MAST.

Separate each mast section from coupling on its lower end. The number on coupling will be the same as on mast section to which it remains connected. Remove lower section from shoe.

25. BASE PLATE.

Remove the four spikes and put them in the canvas bag. Lift base plate from ground.

26. MAST-HEAD BUSHING.

Remove the mast-head bushing. On the two 25-foot masts, rejoin coupling 4 back to mast section 4 after removing mast head bushing.

27. COAXIAL CABLE CLAMP.

Remove coaxial antenna clamp.

28. PREPARATION FOR PACKING.

Place section 8 inside section 6. Place one boom section inside section 1 and the other inside of section 4.

29. SHOE.

Disconnect shoe from base plate.

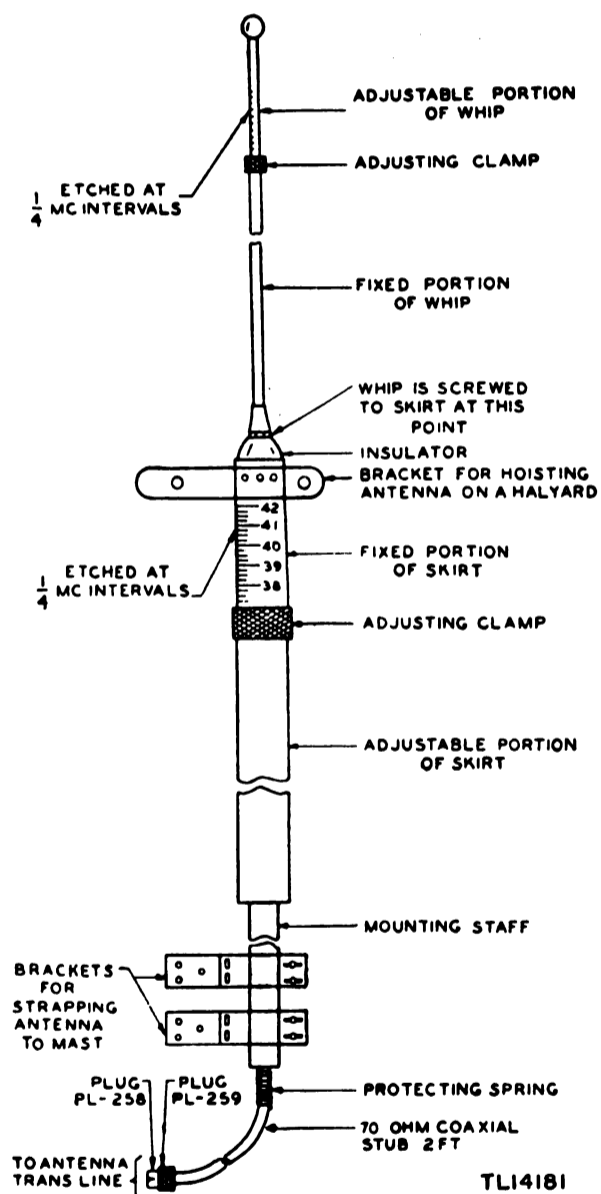


Figure 24. Typical coaxial antenna, showing detail.

30. STAKES.

Pull up stakes. If metal, place in canvas bag.

31. PACKING.

a. Lay canvas cover on ground with yellow stripes visible.

b. Place the two base plates on the ground at opposite ends of the yellow stripes with the base plate plugs 4B opposite the middle stripes.

c. Place mast sections 3, 4, and 7 on the yellow stripes opposite base plugs with corresponding numbers and the couplings nearest to the plugs designated in addition to the section numbers (fig. 23).

d. Place the other four mast sections on the ground to the left and right of sections 3, 4, and 7, in accordance with their designations on the base plugs.

e. Station a man at each of the two base plates. Each man must raise a base plate to a vertical position with the plugs on the side toward the other base plate.

f. Assemble the mast sections on base plate plugs as shown in figure 3. Place mast head bushings in trough formed by the sections just before the last section on top is placed on its plug.

g. Raise canvas cover halfway up over the two sides or the bundle of sections and pull the end straps across the base plate to hold the bundle together.

h. Place all the remaining parts including the technical manual into the trough formed by the sections.

i. Draw the canvas cover across the top of bundle and fasten all of the straps to complete the packing as shown in figure 2.

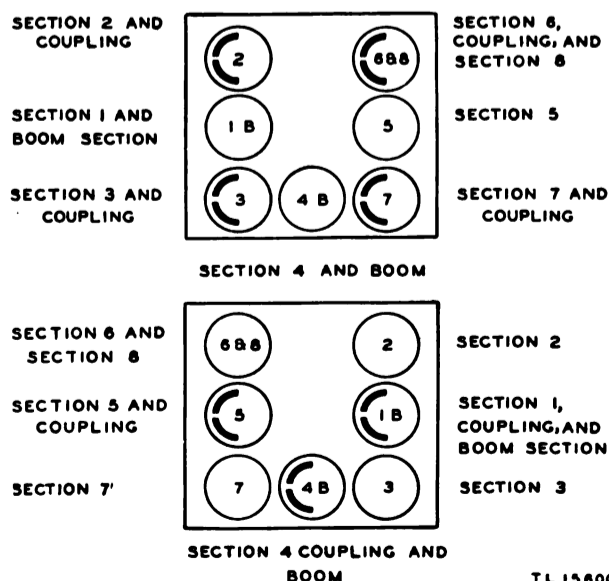


Figure 23. Base packing layout.

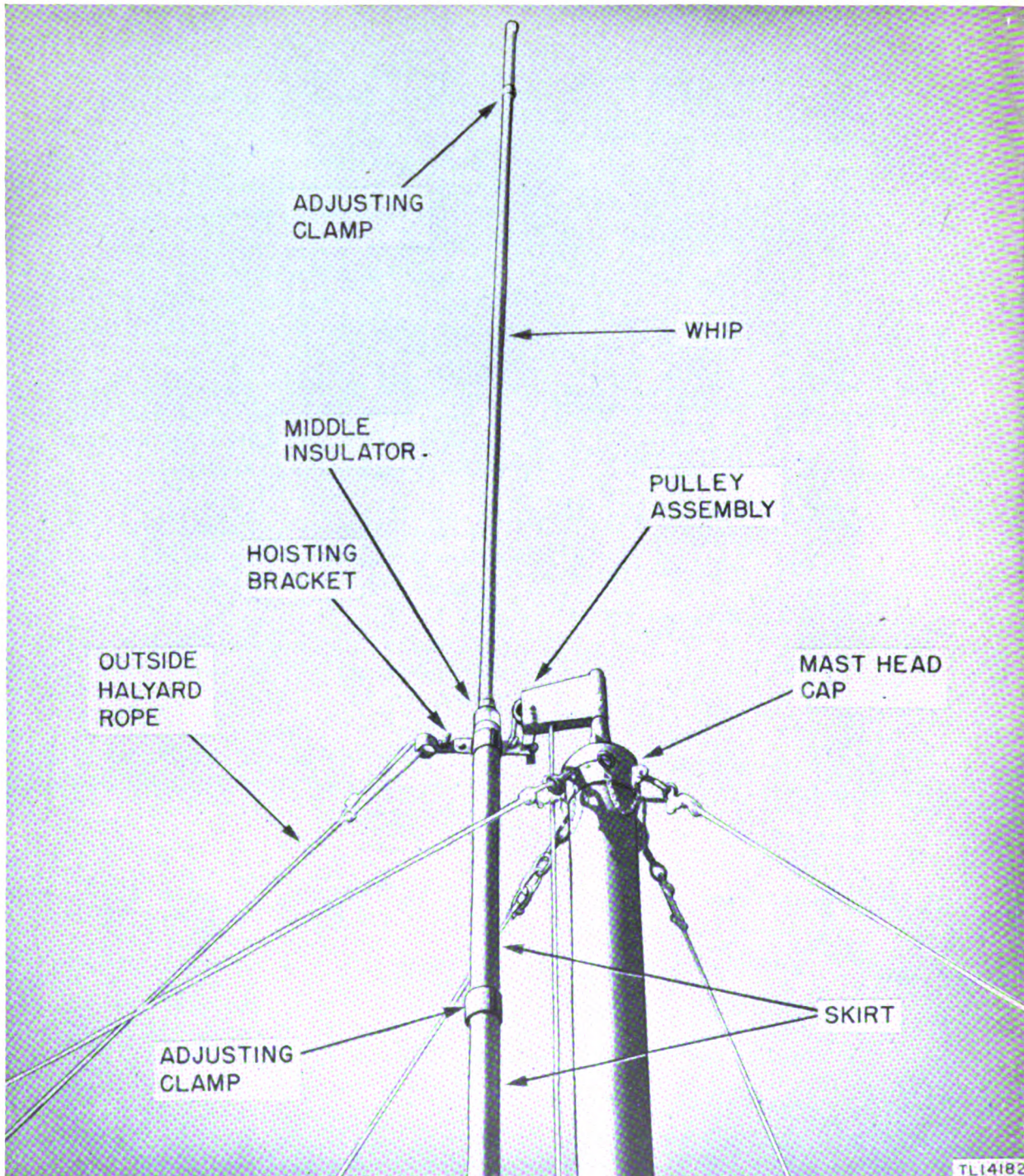


Figure 25. Typical coaxial antenna installed.

SECTION III

MAINTENANCE

NOTE: Failure or unsatisfactory performance of equipment will be reported on W.D., A.G.O. Form No. 468. If this form is not available, see TM 38-250.

32. GENERAL.

A maintenance parts list has not been authorized for this equipment. This equipment will be replaced as a complete unit.

1.35:11-2621

TM 11-2621

WAR DEPARTMENT TECHNICAL MANUAL

REMOTE CONTROL EQUIPMENT AN/TRA-2



RESTRICTED. DISSEMINATION OF RESTRICTED MATTER.—The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 236, AR 380-5, 15 Mar 1944.)

WAR DEPARTMENT • NOVEMBER 1944

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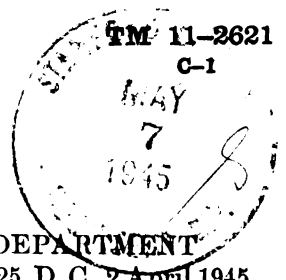
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TECHNICAL MANUAL
REMOTE CONTROL EQUIPMENTS
AN/TRA-2 AND AN/TRA-2A

WAR DEPARTMENT
WASHINGTON 25, D. C., 2 April 1945

CHANGES }
No. 1 }

TM 11-2621, 7 November 1944 (24 August 1944) is changed as follows:

The title of this manual is changed to read "REMOTE CONTROL EQUIPMENTS AN/TRA-2 AND AN/TRA-2A."

The classification RESTRICTED is removed from the manual.

1. General

This manual describes * * * Unit C-113/TRA-2.

Note (Added). All information contained in TM 11-2621 and in this change concerning Remote Control Equipment AN/TRA-2, Remote Control Unit C-112/TRA-2, and Control Unit C-113/TRA-2 applies also to Remote Control Equipment AN/TRA-2A, Remote Control Unit C-112A/TRA-2, and Control Unit C-113A/TRA-2, respectively.

2. Components

b. CONTROL UNIT C-113/TRA-2. The carrying case of Control Unit C-113/TRA-2 is also part of the unit and is not considered as a separate component. The three cords * * * to the cover.

5. General

b. Control Unit C-113/TRA-2 * * * of the transmitter.

c. To operate from * * * T-3 as follows:
Remove strap between terminals 1 and 3;
Remove strap between terminals 2 and 4;
Strap terminals 3 and 2.

d. Pilot light * * * changed (fig. 9).

8. Functioning of Parts

a. CONTROL UNIT C-113/TRA-2.

(14) R3 is a 20,000-ohm current limiting resistor for pilot light.

9. Functioning of Circuits

c. RADIO REMOTE CONTROL, TWO-WIRE.

(5) The radio transmitter is * * * F and D. The contacts of relay RL1 connect the transmitter to the field-wire pair, and operate antenna and plate-voltage control relay. Contacts 2 and 5 * * * Control Unit C-113/TRA-2.

SECTION IV

MAINTENANCE

Note (Added). Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form 54 (unsatisfactory report). If either form is not available prepare the data according to the sample form reproduced in figure 14.1.

Footnote at bottom of page 13 is rescinded.

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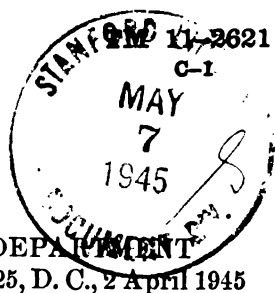
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Footnote at bottom of page 13 is rescinded.

WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT			
FOR	TECHNICAL SERVICE Signal Corps	MATERIEL	DATE 1 Feb 45
FROM	ORGANIZATION 175 Signal Repair Co.		STATION APO 102
TO	NEXT SUPERIOR HEADQUARTERS Supply Sec. Hq Fourth Army Sig Sv.	STATION APO 110	TECHNICAL SERVICE Signal Corps

COMPLETE MAJOR ITEM			
NOMENCLATURE BC-123-A	TYPE Ground, vehicular	MODEL A	
MANUFACTURER American Radio Corp	U. S. A. REG. NO. Order No. 1234-Phila-45	SERIAL NO. 12345	DATE RECEIVED 5 Jan 45
EQUIPMENT WITH WHICH USED (if applicable) Radio Set SCR-456-A Tank, Medium, M4			

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE			
PART NO. Sig C Stk. No. 3E47-2	TYPE Capacitor C20:fixed; 1-mf; 500 vdcw	MANUFACTURER American Radio Corp	DATE INSTALLED when manufactured
DESCRIPTION OF FAILURE AND PROBABLE CAUSE (if additional space is required, see back of form) Capacitor C20 shorts out due to humid operating conditions			
DATE OF INITIAL TROUBLE 15 Jan 45	TOTAL TIME INSTALLED		TOTAL PERIOD OF OPERATION BEFORE FAILURE
	YEARS -	MONTHS -	DAYS -
	YEARS 0	MONTHS 0	DAYS 5
			HOURS -
			MILES -
			ROUNDS -
BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.			
TRAINING OR SKILL OF USING PERSONNEL RECOMMENDATIONS (if additional space is required, see back of form)			
POOR	FAIR	GOOD	
		X	Substitute capacitor designed for tropical operation

ORIGINATING OFFICER	
TYPED NAME, GRADE, AND ORGANIZATION E. A. WILSON, 1st Lt., Sig C. 175 Sig Repair Co.	SIGNATURE <i>E. A. Wilson</i>

FIRST ENDORSEMENT		
TO CHIEF	TECHNICAL SERVICE	OFFICE
NAME, GRADE, AND STATION	STATION	DATE

Instructions

- It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in materiel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
- This form will be used for reporting manufacturing, design, or operational defects in materiel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of materiel.
- This form will not be used for reporting failures, isolated material defects or malfunctions of materiel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
- Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 2).
- It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
- When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
- This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
- Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. FORM No. 468
20 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1942, which may be used until existing stocks are exhausted.

U. S. GOVERNMENT PRINTING OFFICE 16-41540-1

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Figure 14.1 WD AGO Form 468 with sample entries.

13.1. Unsatisfactory Equipment Report (Added)

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, WD AGO Form 468 should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form 54 should be filled out and forwarded through channels.

c. If either form is not available, Form 468 (fig. 14.1) may be reproduced, filled out, and forwarded through channels. When Army Air Forces Form 54 is required but unavailable, reproduce Form 468 and forward it through channels in accordance with directions on Form 468.

13.2. Maintenance Parts for Remote Control Equipment AN/TRA-2 (Added)

a. The following information was compiled on 8 March 1945. The appropriate sections of the ASF Signal Supply Catalog for Remote Control Equipment AN/TRA-2 are:

Organizational Spare Parts

SIG 7-AN/TRA-2 (when published)

SIG 7-H-19/U

SIG 7-HS-30

Higher Echelon Spare Parts

SIG 8-AN/TRA-2 (when published)

SIG 8-H-19/U

SIG 8-HS-30

b. For the latest index of available catalog sections, see ASF Signal Supply Catalog SIG 2.

APPENDIX I (Added)

PREVENTIVE MAINTENANCE

1. Meaning of Preventive Maintenance

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of radio communication depends upon each set's being *on the air* when it is needed and upon its *operating efficiency*. It is vitally important that radio operators and repairmen maintain their radio sets properly.

Note.—The operations in appendixes I and II are first and second echelon (organization operators and repairmen) maintenance. Some operations in appendix III are higher echelon maintenance.

2. Description of Preventive Maintenance Techniques

a. GENERAL. Most of the electrical parts used in Remote Control Equipment AN/TRA-2 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This appendix contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations, namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout

this manual the lettering system for the six operations will be as follows:

- F—Feel.
- I—Inspect.
- T—Tighten.
- C—Clean.
- A—Adjust.
- L—Lubricate.

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubrication operations, equipment becomes undependable and subject to break-down when it is most needed.

b. FEEL. The feel operation is used most often to check rotating machinery, such as blower motors, etc., and to determine if electrical connections, bushings, etc., are overheated. Feeling indicates the need for lubrication or the existence of similar types of defects requiring correction. The maintenance man must become familiar with the normal operating temperatures of motors, etc., in order to recognize signs of overheating.

Note. It is important that the feel operation be performed as soon as possible after shut-down and always before any other maintenance is done.

c. INSPECT. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidences of minor trouble. Although

these defects may not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize the signs of a defective set. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) **Overheating**, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(2) **Placement**, by observing that all leads and cabling are in their original positions.

(3) **Cleanliness**, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity locations, look for fungus growth and mildew.

(4) **Tightness**, by testing any connection or mounting which appears to be loose.

d. TIGHTEN, CLEAN, AND ADJUST. These operations are self-explanatory. Specific procedures to be followed in performing are given wherever necessary throughout appendix I.

Caution: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. (See app. III.)

e. LUBRICATE. Lubrication refers to the application of grease or oil to the bearings of motors or other rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

3. Capacitors

a. INSPECT (I). (1) Inspect the terminals of large fixed capacitors for corrosion and loose connections. Carefully inspect the mountings to discover loose mounting screws, studs,

or brackets. Examine the leads for poor insulation, for cracks, and for evidences of dry rot. Frayed strands on the insulation should be cut away. If the wire is exposed, wrap it with friction tape. The terminals of the capacitors should not be cracked or broken.

(2) Thoroughly inspect the case of each large fixed capacitor for leaks, bulges, and discoloration.

b. TIGHTEN (T). Tighten loose terminals, mountings, and connections on the capacitors, whenever they are observed. Do not break the bushing or damage the gasket.

c. CLEAN (C). Clean the case of fixed capacitors, the insulating bushings, and connections that are dirty or corroded. The capacitor cases and bushings can usually be cleaned with a dry cloth, but if the deposit of dirt is hard to remove, moisten the cloth in a dry-cleaning solvent.

4. Resistors

a. GENERAL. Various types of resistors are used in Remote Control Equipment AN/TRA-2. The connections to the various resistors are either of the pigtail or solder-lug type.

b. INSPECT (I). Inspect the coating of the vitreous-enameled resistors for signs of cracks and chipping, especially at the ends. Examine the bodies of all types of resistors for blistering, discoloration, and other indications of overheating. Inspect leads and all other connections for corrosion, dirt, dust, looseness, and broken strands in the connecting wires. Check the security of all mountings. Do not attempt to move resistors with pigtail connections, because there is danger of breaking the connections at the point when they enter the body of the resistor. Such defects cannot be repaired.

c. TIGHTEN (T). Tighten resistor connections and mountings whenever they are found loose. If a resistor is allowed to remain loose, vibration may break the connection or damage the body.

d. CLEAN (C). (1) Clean all carbon resistors with a small brush.

(2) The vitreous-enameled resistors must be kept clean to avoid leakage between the terminals. They will ordinarily be wiped with a dry cloth. However, if the dirt deposit is unusually hard to remove, use a dry-cleaning solvent.

(3) Resistors with discolored bodies cannot be cleaned. Discoloration indicates that there has been overloading and overheating at some time prior to the inspection. The discoloration is probably due to circuit trouble which requires analysis and correction.

5. Fuse

a. GENERAL. The fuse used in Remote Control Equipment AN/TRA-2 is of the glass-body type. This fuse (F1) is easily removed for inspection, and should be thrown away when blown.

b. INSPECT (I). Inspect the fuse caps for evidence of burning, charring, and corrosion; the fuse holder for dirt, loose connections, and proper tension.

c. TIGHTEN (T). The tension of the fuse holder may be increased by pressing the sides closer together. If necessary, use a pair of pliers to adjust the tension.

d. CLEAN (C). Clean fuse ends with emery cloth; then wipe them with a clean cloth.

6. Relays

Relays R1 and R101 are considered normal if: the exterior is free from dirt or dust; the contacts are not burned, pitted, or corroded; the contacts are lined up and correctly spaced; the moving parts travel freely and function in a satisfactory manner; the connections to the relay are tight; the wire insulation is not frayed or torn; the relay assembly is securely mounted; the field coil shows no signs of overheating.

a. INSPECT (I). (1) Inspect the relay to detect defects. The contacts may be examined with the aid of a flashlight and mirror.

(2) The mechanical action of the relays should be checked to make certain that when the moving and stationary contacts come together they make positive contact and are directly in line with each other.

b. TIGHTEN (T). Tighten all loose connections and mounting screws, but do not apply enough force to damage the screw or to break the parts it holds.

c. CLEAN (C). (1) *Relay exterior.* Brush the exterior of the relay with a soft brush. If it is very dirty, clean it with a brush dipped in dry-cleaning solvent. If loose connections

are found, they should be inspected. If they are dirty or corroded, remove and clean them and replace carefully.

(2) *Relay contacts.* When it is necessary to clean relay contacts, burnish them with a clean blade of the contact burnishing tool. Place the blade between the contacts of the relay, press the contacts together with slight pressure, and move the blade back and forth. If the contacts require further cleaning, apply dry-cleaning solvent with a toothpick and clean the contacts with the flat side of a clean dry toothpick or similar material, again burnish using a clean blade of the burnishing tool. If a burnishing tool is not available, clean the contacts with dry-cleaning solvent and a toothpick as prescribed, and polish the contacts with a piece of smooth, *hard-finish paper*. Soft paper will disintegrate and leave particles on the contacts.

7. Switches

a. INSPECT (I). (1) Inspect the mechanical action of each switch and, while so doing, look for signs of dirt or corrosion on all exposed elements. In some cases, it will be necessary to examine the elements of the switch visually; in others, the action of the switch is checked by flipping the control knob or toggle.

(2) Examine the rotary switches (S101 and S102) to see if the contacts are clean. The inspection is visual. The rotary members should make good contact with the stationary members; and as the former slides into the latter, a spreading of the stationary contact leaves should be noticeable. The switch action should be free. The wiping action of the contact usually removes any dirt at the point of contact.

b. CLEAN (C). The exterior surfaces of switches are cleaned with a stiff brush moistened with dry-cleaning solvent.

c. LUBRICATE (L). Lubrication is not required.

8. Coils and Transformers

a. INSPECTION (I). Inspect coils CH1 and T1 and transformers T2 and T3 for cleanliness of mounting supports. Check all connections.

b. TIGHTEN (T). Tighten any coil mountings or connections found loose by resoldering wires or tightening screws

c. **CLEAN (C).** Clean the cases with a soft brush.

9. Terminal Block

a. **INSPECT (I).** (1) Inspect the terminal block for cracks, breakage, dirt, and loose connections or mounting screws.

(2) Carefully examine the connections for mechanical defects, dirt, and corrosion.

b. **TIGHTEN (T).** Tighten loose screws, lugs, and mounting bolts. When tightening screws, be sure to select a screwdriver of correct size; do not exert too much pressure.

c. **CLEAN (C).** Clean the terminal block with a dry brush. When necessary, use a cloth moistened with a dry-cleaning solvent. If a solvent is used, the block must be thoroughly wiped with a cloth and then brushed to remove the lint.

10. Cords and Cables

The cables in Remote Control Equipment AN/TRA-2 can be regarded as the life lines of the equipment. The condition of the cabling must be closely observed. Equipment operated in all kinds of weather and moved on all kinds of roads subjects cabling to a great deal of punishment.

a. **INSPECT (I).** Inspect the cables for cracked or deteriorated insulation, frayed or cut insulation at the connecting and supporting points, and improper placement which places the cables or connections under strain. Also watch for kinks and improper supports.

b. **TIGHTEN (T).** Tighten all loose cables.

c. **CLEAN (C).** Clean connections on cables when they are dirty or corroded. Corroded connectors are cleaned with #0000 sandpaper. It is important that the entire surface of the connector be cleaned.

11. Pilot Light

A pilot light is used to indicate when power has been applied to the circuit. It is easily removed and replaced.

a. **INSPECT (I).** Inspect the pilot light assembly for loose lamp; loose mounting screws; and loose, dirty, or corroded connections.

b. **TIGHTEN (T).** Tighten loose mounting screws and resolder any loose connections. If

the connections are dirty or corroded, they should be cleaned before soldering.

(2) A loose lamp should be screwed tightly into the socket.

12. Jacks

Jacks require very little attention, and then only at infrequent intervals. Occasionally it will be necessary to tighten the mounting nut, clean the contacts, or increase the spring tension. Remove dirt with a brush and dry-cleaning solvent; remove corrosion with a piece of crocus cloth followed by a clean cloth. Increase spring tension, when necessary. It is recommended that the action of the jack be tried after each adjustment. Be careful to keep all soldered connections intact.

13. Cabinets and Chassis

The cabinets which house the various components of Remote Control Equipment AN/TRA-2 are constructed of plywood.

a. **INSPECT (I).** Inspect the outside and inside of each cabinet thoroughly, paying strict attention to every detail. Check the binding posts, the jack cover assemblies, and pilot light assembly. Examine the pilot light jewel for cracks and breaks. Inspect the panels for loose knobs, switches, and jacks.

b. **CLEAN (C).** Clean each cabinet, outside and in, with a clean dry cloth. Use dry compressed air to blow out all accumulated dirt and dust. Repaint any surface that is found scratched, rusted, or chipped.

c. **TIGHTEN (T).** Tighten all mounting bolts, panel screws, plugs, and control knobs found loose.

14. Headset, Microphones, and Loudspeaker

These auxiliary items of equipment are essential to the operation of the radio set, hence the operator must give them the same care as the radio set itself.

a. **INSPECT (I).** Inspect all external surfaces for dirt and corrosion. See that all cable connections are tight and that plugs and jacks fit together properly.

b. **CLEAN (C).** Clean all items of the equipment in accordance with the instructions outlined previously for relays, cords, jacks, cabinets, etc.

APPENDIX II (Added)

ITEMIZED PREVENTIVE MAINTENANCE

1. Introduction

For ease and efficiency of performance, preventive maintenance on Remote Control Equipment AN/TRA-2 will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on remote control equipment at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in appendix I. These general instructions are not repeated in this appendix. When performing preventive maintenance, refer to appendix I if more information is required for the following items. Perform all work with the power removed from the equipment. After preventive maintenance has been performed on a given day the equipment should be put into operation and checked for satisfactory performance.

2. Common Materials Needed

The following materials will be needed in performing preventive maintenance:

Common hand tools (TE-41 or equivalent).

Clean cloth.

#0000 sandpaper.

Crocus cloth.

Contact burnishing tool.

Solvent, Dry-cleaning, Federal Specification P-S-661a.

Note. Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning, Federal Specification P-S-661a, is available, as a cleaning fluid, through established supply channels. Oil, Fuel, Diesel, U. S. Army Specification 2-102B, may be used for cleaning purposes when dry-cleaning solvent is not at

hand. Carbon tetrachloride, or fire-extinguishing liquid (carbon tetrachloride base), will be used, if necessary, *only on contact parts of electronic equipment.*

3. Item 1. Exterior of Remote Control Equipment AN/TRA-2

OPERATIONS.

ITC Cabinet.

ITC Jacks.

ITC Pilot light.

IT Control knob.

REMARKS. Tighten headset volume control knob when found loose. Choose a screw driver of the proper size.

4. Item 2. Interior of Remote Control Unit C-112/TRA-2

PRELIMINARY STEPS. Remove Remote Control Unit C-112/TRA-2 from its case.

OPERATIONS.

ITC Capacitors.

ITC Resistors.

ITC Relay.

ITC Coils and transformers.

ITC Switches.

5. Item 3. Control Unit C-113/TRA-2

PRELIMINARY STEPS. Remove Control Unit C-113/TRA-2 from its case.

OPERATIONS.

ITC Capacitors.

ITC Resistors.

ITC Fuse.

ITC Relay.

ITC Switches.

ITC Coils and transformers.

ITC Terminal blocks.

ITC Cords and cables.

6. Item 4. Headset, Microphone, and Loudspeaker

- IC Headset.
- IC Microphone.
- IC Loudspeaker.

7. Preventive Maintenance Check List

The following list is a summary of the preventive maintenance operations to be performed on Remote Control Equipment AN/TRA-2. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. The echelon column indicates which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	Operations	Item	When performed							
			Before operation	After operation	Daily	Weekly	Monthly	Semiannually	Yearly	Echelon
1	ITC	Exterior of Remote Control Equipment AN/TRA-2.	.....	.....	X	.....	.....	.....	.....	1st
2	ITC	Interior of Remote Control Unit C-112/TRA-2.	.....	.....	.....	.....	X	.....	.....	2d
3	ITC	Control Unit C-113/TRA-2.	.....	.....	.....	.....	X	.....	.....	2d
4	IC	Headset, microphones, and loudspeaker.	.....	.....	X	.....	.....	.....	.....	1st

F	I	T	C	A	L
Feel	Inspect	Tighten	Clean	Adjust	Lubricate

APPENDIX III (Added)

MOISTUREPROOFING AND FUNGIPROOFING REMOTE CONTROL EQUIPMENT AN/TRA-2

1. General

The operation of Signal Corps equipment in tropical areas, where temperature and relative humidity are extremely high, requires special attention. The following items represent problems which may be encountered in operation:

- a.* Resistors, capacitors, coils, chokes, transformer windings, and other components fail.
- b.* Electrolytic action takes place in resistors, coils, chokes, and transformer windings causing eventual break-down.
- c.* Hook-up wire insulation and cable insulation break down. Fungus growth accelerates deterioration.
- d.* Moisture forms electrical leakage paths on terminal boards and insulating strips.

2. Treatment

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. See TB SIG 13, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing, and the supplies and equipment required in this treatment.

3. Step-by-step Instructions for Treating Remote Control Unit C-112/TRA-2

- a.* PREPARATION. Make all repairs and adjustments necessary for proper operation of the equipment. Replace any defective parts.
- b.* DISASSEMBLY. Disassemble the equipment

so that necessary masking and thorough drying of the equipment can be accomplished.

- (1) Release two catches and open cover.
- (2) Loosen four captive screws and remove the chassis from the case. The case is not to be treated.

c. CLEANING. With the equipment disassembled, thoroughly clean the units to prevent sealing in dirt or dust with the varnish. Remove all dirt, corrosion, fungus, grease, oil, sand, and gravel, since any of these will prevent a continuous film or seal of varnish. Use a clean paint brush, such as that supplied with moistureproofing and fungiproofing kits, for dusting between the closely mounted components on the chassis. If available, use a blower or compressed-air hose to blow out loose dirt. Remove rust or corrosion with fine sandpaper or by scraping. Use dry-cleaning solvent to remove grease and oil.

d. MASKING. After a thorough cleaning, mask all points where the varnish might interfere with electrical continuity, moving parts, or the making of adjustments. For masking large areas and odd-shaped parts, mold paper over and around the parts and secure the edges with masking tape. Apply the adhesive masking tape directly to small areas.

- (1) Mask contacts and sleeve openings of jacks J101, J102-1, J103-1, J102-2, J103-2, J102-3, and J103-3. (See fig. 19.)
- (2) Mask contacts of wafer switches S101 and S102. (See fig. 20.)
- (3) Tighten the four binding posts (LINE 1 and LINE 2) to prevent varnish from covering contact areas.

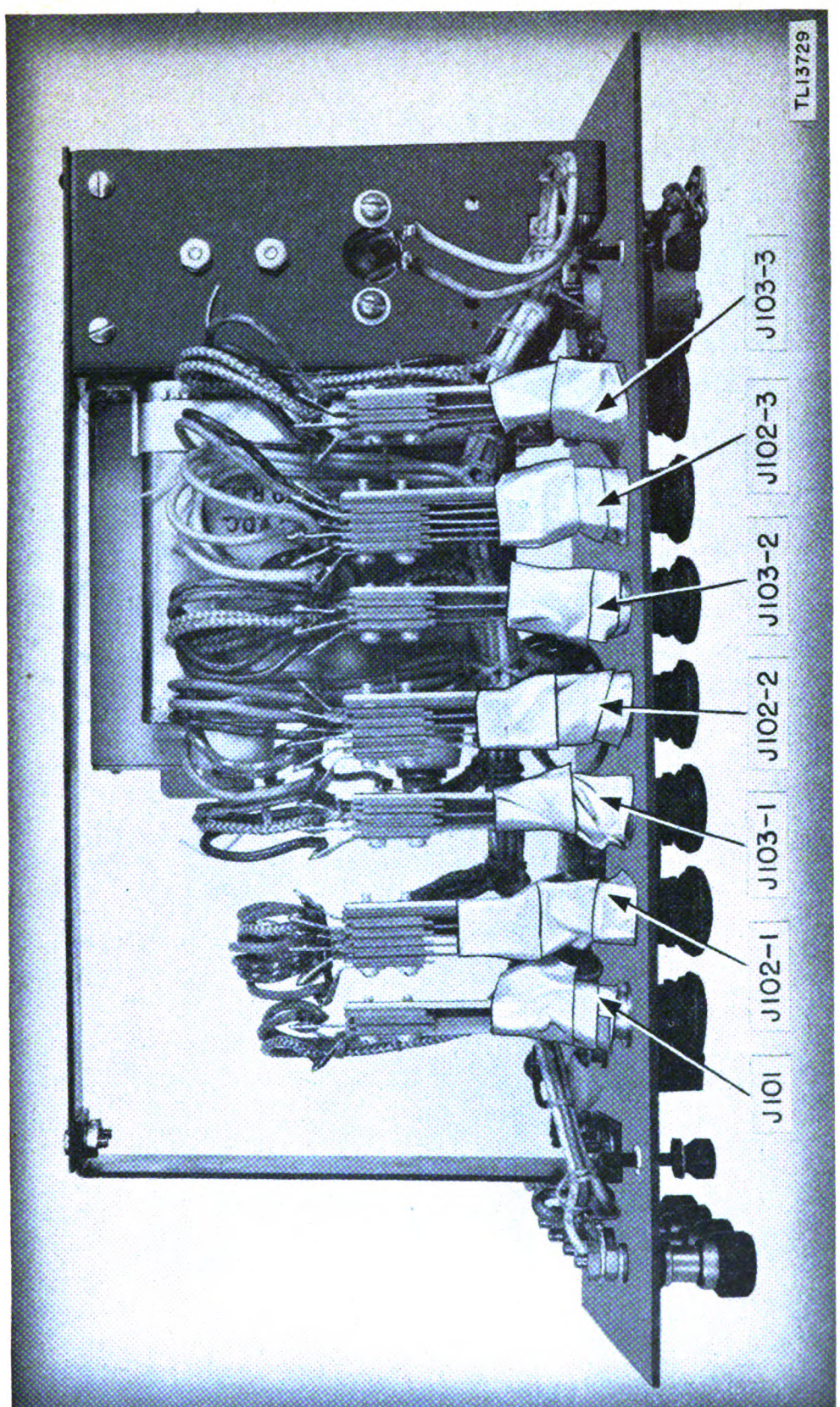


Figure 2b. Application of matching tape to jacks of Remote Control Unit C-11278A-2.

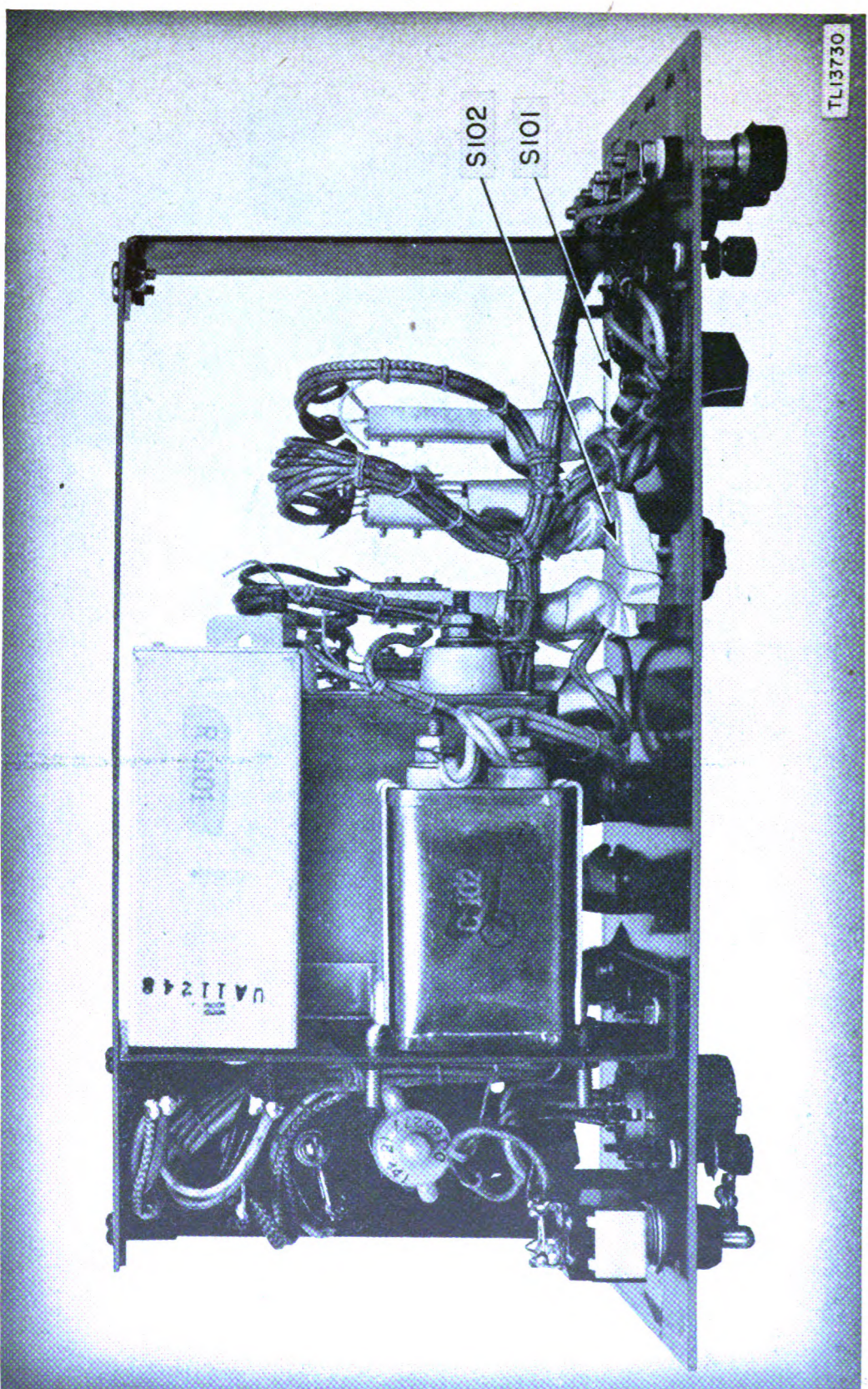


Figure 20. Application of masking tape to select switches of Remote Control Unit C-119/TK4-8.

e. DRYING. (1) After cleaning and masking, heat the equipment in an oven to expel all residual moisture. This may be done with electric lamps in an oven improvised from a box or, preferably, in an oven designed to prevent wastage of heat. If necessary, a steel drum or box may be mounted on blocks and heated with a gasoline burner, or a field kitchen oven may be used.

(2) For adequate drying, bake the equipment at 160° F., for 2 to 3 hours. This temperature should be maintained as closely as possible; higher temperatures cause waxes and insulations to soften excessively. Even at correct temperature the equipment must be inspected often during the drying operation for evidences of insulation destruction.

(3) Use any controlling thermostats and thermometers available. Place the thermostat in the hottest part of the oven. Turn equipment frequently, about every 30 minutes, to insure even distribution of heat.

(4) If an oven is improvised, make sure to put vents near the top and bottom to allow moisture-laden air to be driven off and replaced with fresh dry air. Good circulation provides better drying in minimum time.

Note. If it is necessary to use lower drying temperature than 160° F., or if the temperature must be reduced to prevent melting of waxes and insulating compounds, increase the baking time approximately 1 hour for every 10° drop below 160° F.

f. VARNISHING. The dried equipment should be sprayed as soon as it is removed from the oven and while still hot. This prevents re-absorption of moisture from the air. Using a spray gun, apply three thin coats of moisture-proofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec No. 71-2202 (Signal Corps stock No. 6G10053), or equal). Air-dry the equipment between coats until the varnish is no longer tacky (15 to 20 minutes). Use a brush to touch up parts missed by the spray. Retouch the points where pigtailed enter resistors and capacitors, and the exposed

ends of insulation around wiring connections. This is particularly necessary where wiring has been hidden by the masking, such as around the wafer switches.

Caution: Varnish spray may have toxic effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten handkerchief, cheesecloth, or other cloth material over nose and mouth.

g. REASSEMBLY. (1) After varnish is dry, remove all masking tape.

(2) Remove sticking adhesive with dry-cleaning solvent.

(3) Replace chassis in case and tighten the captive screws.

(4) Test operation to insure correct functioning of parts.

h. MARKING. Mark the letters MFP and the date of treatment near the most conspicuous or most important nameplate on the equipment and in such a location that the marking will not become obliterated or rubbed off. In the absence of a nameplate, place the marking where it can be read easily and is not subject to wear.

Example: MFP—8 June 1944.

4. Step-by-Step Instructions for Treating Control Unit C-113/TRA-2

a. PREPARATION. See paragraph 3a above.

b. DISASSEMBLY. See paragraph 3b above.

c. CLEANING. See paragraph 3c above.

d. MASKING. After a thorough cleaning, mask all points where the varnish might interfere with electrical continuity, moving parts, or the making of adjustments. For masking large areas and odd-shaped parts, mold paper over and around the parts and secure the edges with masking tape. Apply the adhesive masking tape directly to small areas.

(1) Mask contacts and sleeve openings of jacks J1 and J2 as shown in figure 21.

(2) Mask selenium rectifier assembly RE1 as shown in figure 22.

(3) Tighten the two binding posts (LINE) to prevent varnish from covering contact areas.

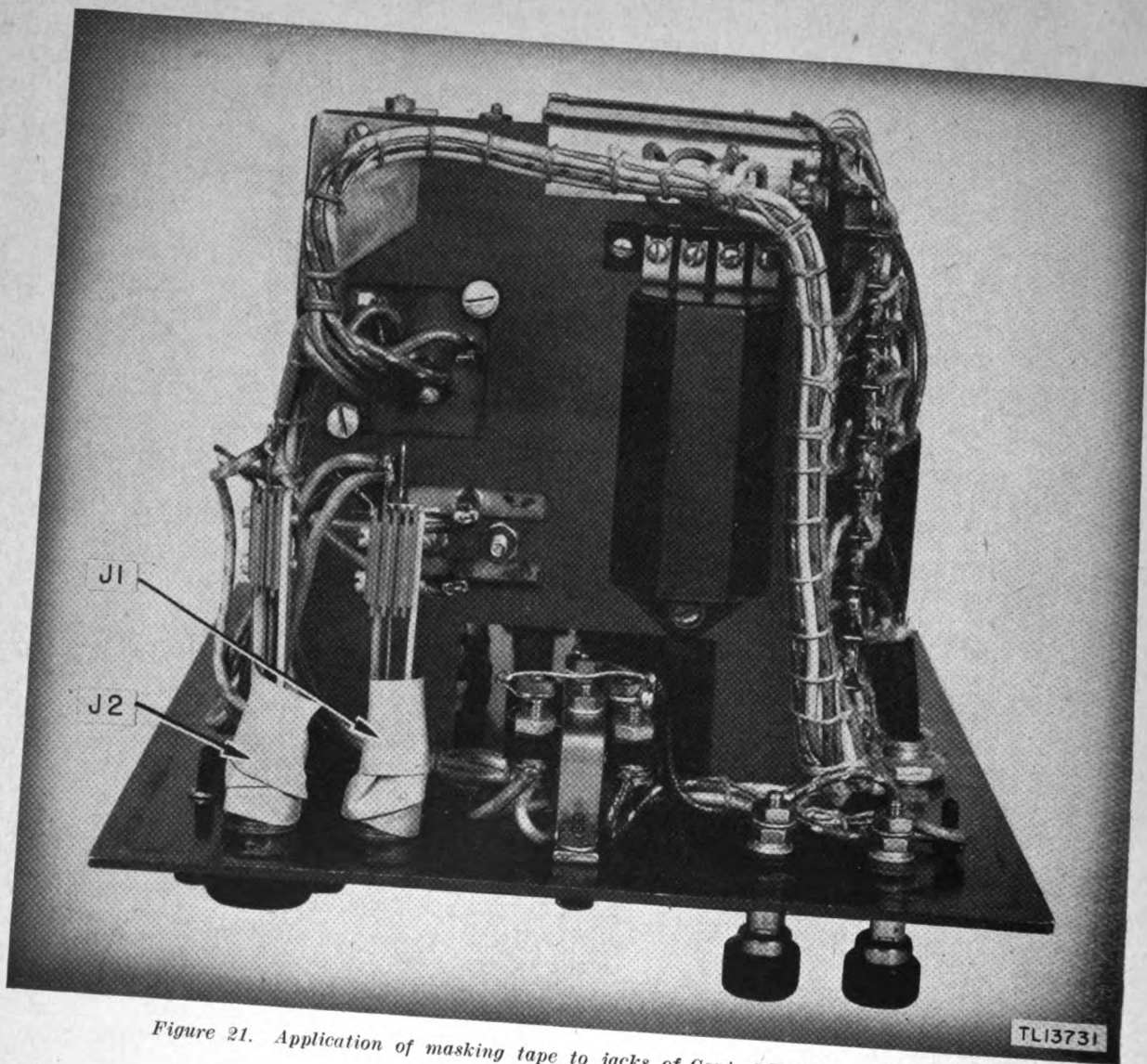


Figure 21. Application of masking tape to jacks of Control Unit C-113/TRA-2.

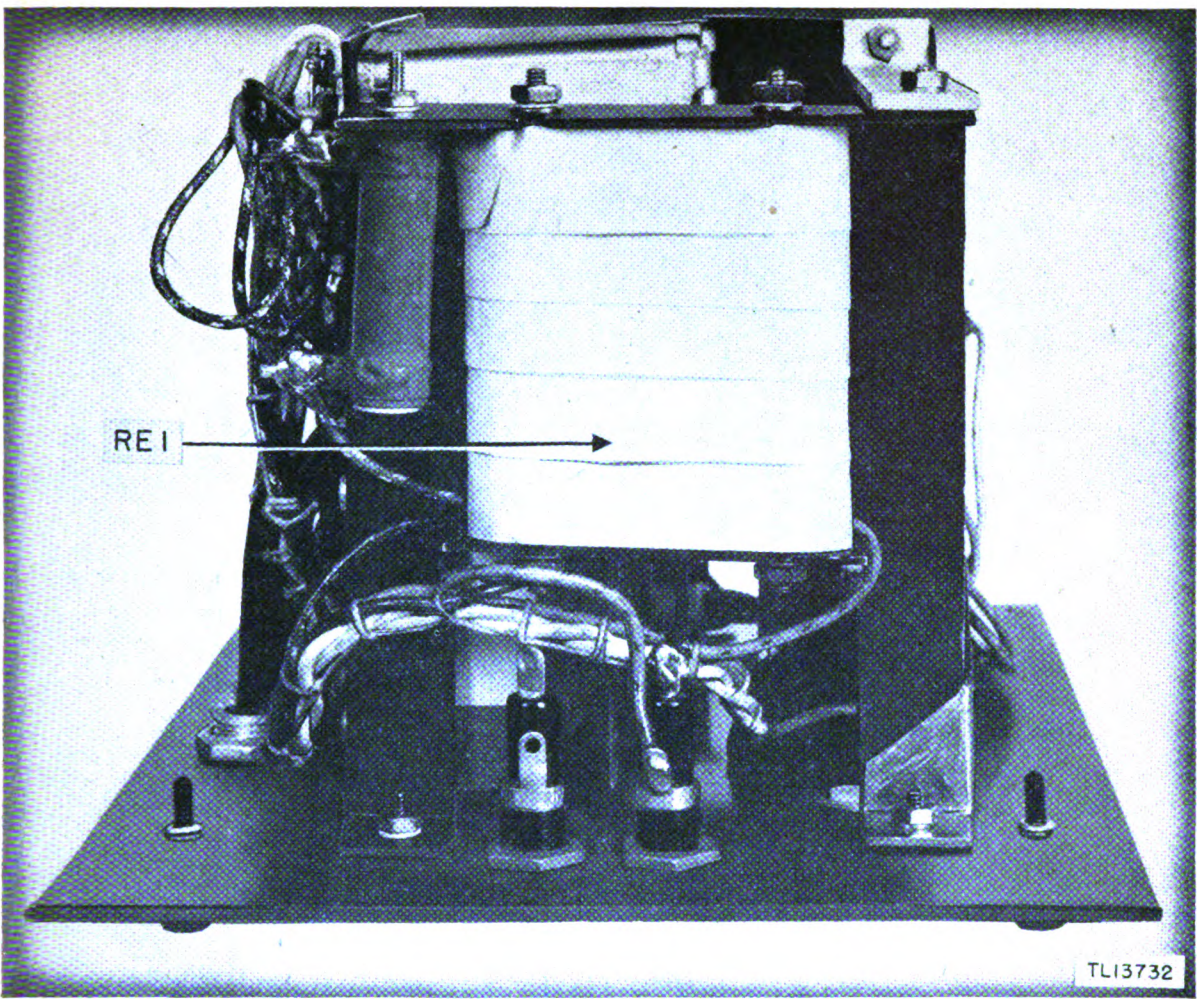


Figure 22. Application of masking tape to selenium rectifier assembly of Control Unit C-113/TRA-2.

e. DRYING. See paragraph 3e above.

g. REASSEMBLY. See paragraph 3g above.

f. VARNISHING. See paragraph 3f above.

h. MARKING. See paragraph 3h above.

[AG 300.7 (1 Mar 45)]

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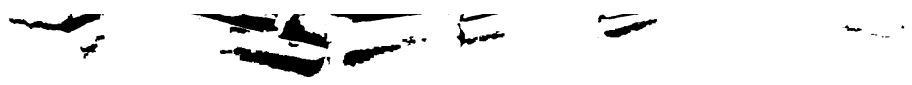
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11-592 (5); 11-597 (5).

Refer to FM 21-6 for explanation of distribution formula.



WAR DEPARTMENT TECHNICAL MANUAL
TM 11-2621

REMOTE CONTROL EQUIPMENT AN/TRA-2



WAR DEPARTMENT • NOVEMBER 1944

RESTRICTED. DISSEMINATION OF RESTRICTED MATTER.—The information contained in restricted documents and the essential characteristics of restricted material may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 23b, AR 380-5, 15 Mar 1944.)

WAR DEPARTMENT,
WASHINGTON 25, D. C., 7 November 1944.

TM 11-2621, Remote Control Equipment AN/TRA-2, is published for the information and guidance of all concerned.

[AG 300.7 (17 Aug 44).]

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Chief of Staff.

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IC 11 (5); plus modified par. 9a.
(For explanation of symbols see FM 21-6.)

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DESTRUCTION NOTICE

WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut—Use axes, handaxes, machetes.
3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives—Use firearms, grenades, TNT.
5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT—1. Smash—Relays, jacks, capacitors, resistors, chokes, loudspeaker, headsets, microphones.
2. Cut—Cords, wiring, straps.
3. Burn—Cases, charts, technical manuals.
4. Bend—Panels.
5. Bury or scatter—Any or all the above items after destruction.

DESTROY EVERYTHING

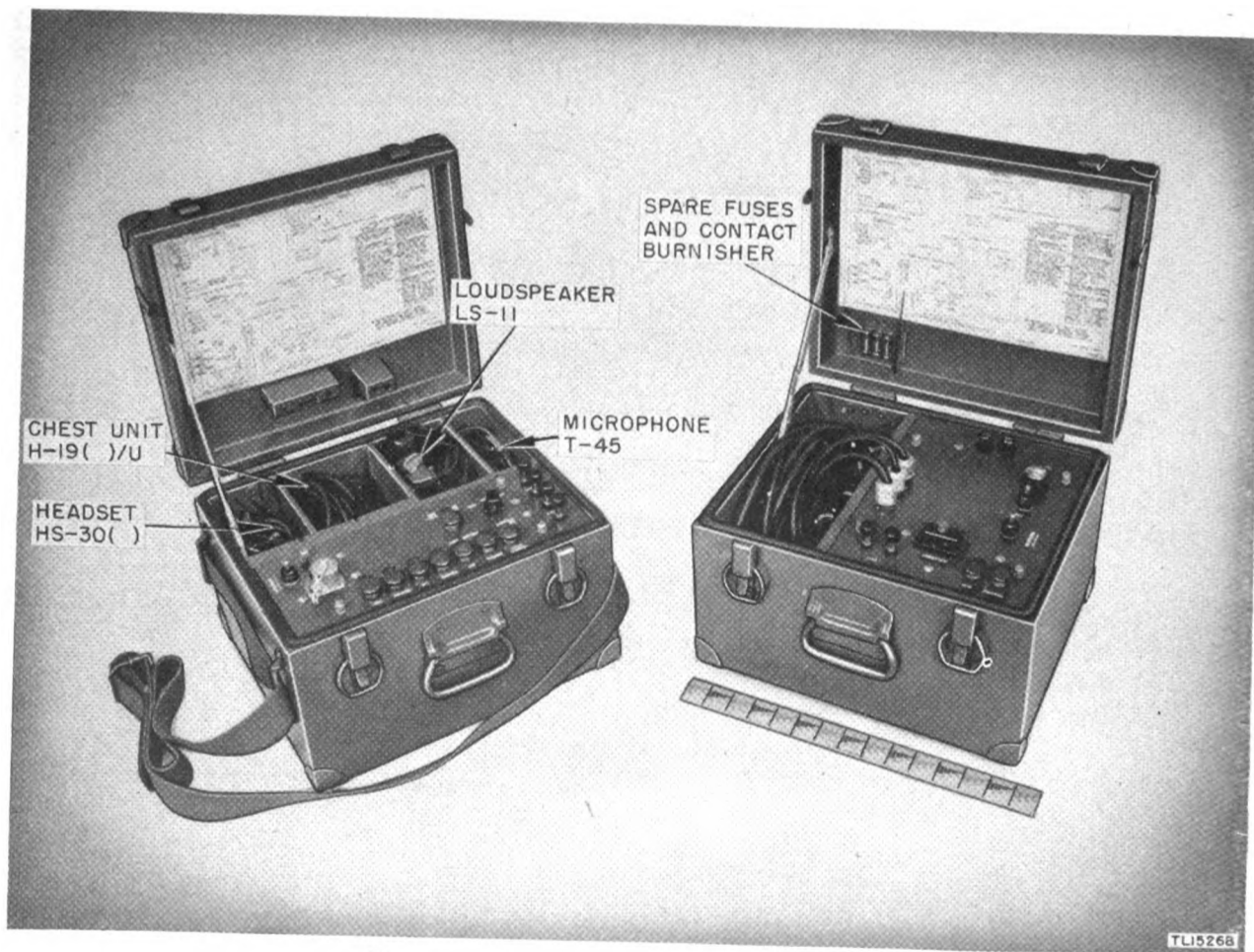


Figure 1.—Remote Control Equipment AN/TRA-2

RESTRICTED

SECTION I

DESCRIPTION

1. General

This manual describes the installation, operation, and maintenance of Remote Control Equipment AN/TRA-2. The complete equipment consists of two separate man-transportable units in individual carrying cases and is shown in figure 1 with the accessories properly stored. Remote Control Equipment AN/TRA-2 provides for the remote control of Radio Set AN/TRC-1 or equivalent radio communication equipment. The two major components are Remote Control Unit C-112/TRA-2 (fig. 2) and Control Unit C-113/TRA-2 (fig. 3). Control Unit C-113/TRA-2 operates from a 115- or 230-volt, 50- to 60-cycle, a-c power source. Remote Control Unit C-112/TRA-2 operates from current supplied by Control Unit C-113/TRA-2.

2. Components

a. REMOTE CONTROL UNIT C-112/TRA-2. The carrying case of Remote Control Unit C-112/TRA-2 is part of the unit and is not considered a separate component. The other components, which are stored in the case, are:

- 1 Headset HS-30 () equipped with Cord CD-874 () and Plug PL-55.
- 1 Chest Unit H-19 () /U (chest unit D-173249) equipped with cord and Plug PL-68.
- 1 Microphone T-45 equipped with Cord CD-318 () and Plug PL-68.
- 1 Loudspeaker LS-11 with cord and Plug PL-55.

b. CONTROL UNIT C-113/TRA-2. The carrying case of Control Unit C-113/TRA-2 is also part of the unit and is not considered as a separate component. The three cords attached to the unit are stored in the case. Three spare fuses and a contact burnisher are attached to the cover.

3. Description

a. CONTROL UNIT C-113/TRA-2. Control Unit C-113/TRA-2 is housed in a plywood case, painted olive drab, with metal corner reinforcements and a metal carrying handle. The hinged cover, when closed, is held in contact with a weatherproof strip by two trunk catches mounted on the case. When the cover is opened, it is held by a substantial stay brace equipped with a latch feature. A compartment is provided for storage of the cords and plugs for connection to the radio set and to the a-c line. Located on the panel are the microphone and head set jacks, the LINE binding posts, line protectors, power switch, pilot light, operating fuse, spare fuse, and the INTERCOM. switch.

b. REMOTE CONTROL UNIT C-112/TRA-2. Remote Control Unit C-112/TRA-2 is housed in a case similar to Control Unit C-113/TRA-2 but is equipped with a carrying strap. The two cases differ internally in compartments. Compartments are provided in the Remote Control Unit C-112/TRA-2 case for storage of the components listed in paragraph 2*a*. Located on the panel are three pairs of jacks for three sets of microphones and headsets, HEADSET VOLUME control, jack for loudspeaker, binding posts for LINE 1 and LINE 2, a seven-pin receptacle for Cord CX-104/TRC-1, and the INTERCOM. switch.

c. WEIGHTS AND DIMENSIONS PACKED FOR SHIPPING. Control Unit C-113/TRA-2 and Remote Control Unit C-112/TRA-2 are packed in separate outer corrugated board cartons. Each carton is labeled respectively, "One Control Unit C-113/TRA-2, Stock No. 2C681-113 and One Remote Control Unit C-112/TRA-2, Stock No. 2C681-112." Both cartons are shipped together in one wooden crate labeled, "One Remote Control Equipment AN/TRA-2, Stock No. 2S5006-2." The over-all dimensions, weight and cubic volume of the wooden crate are as

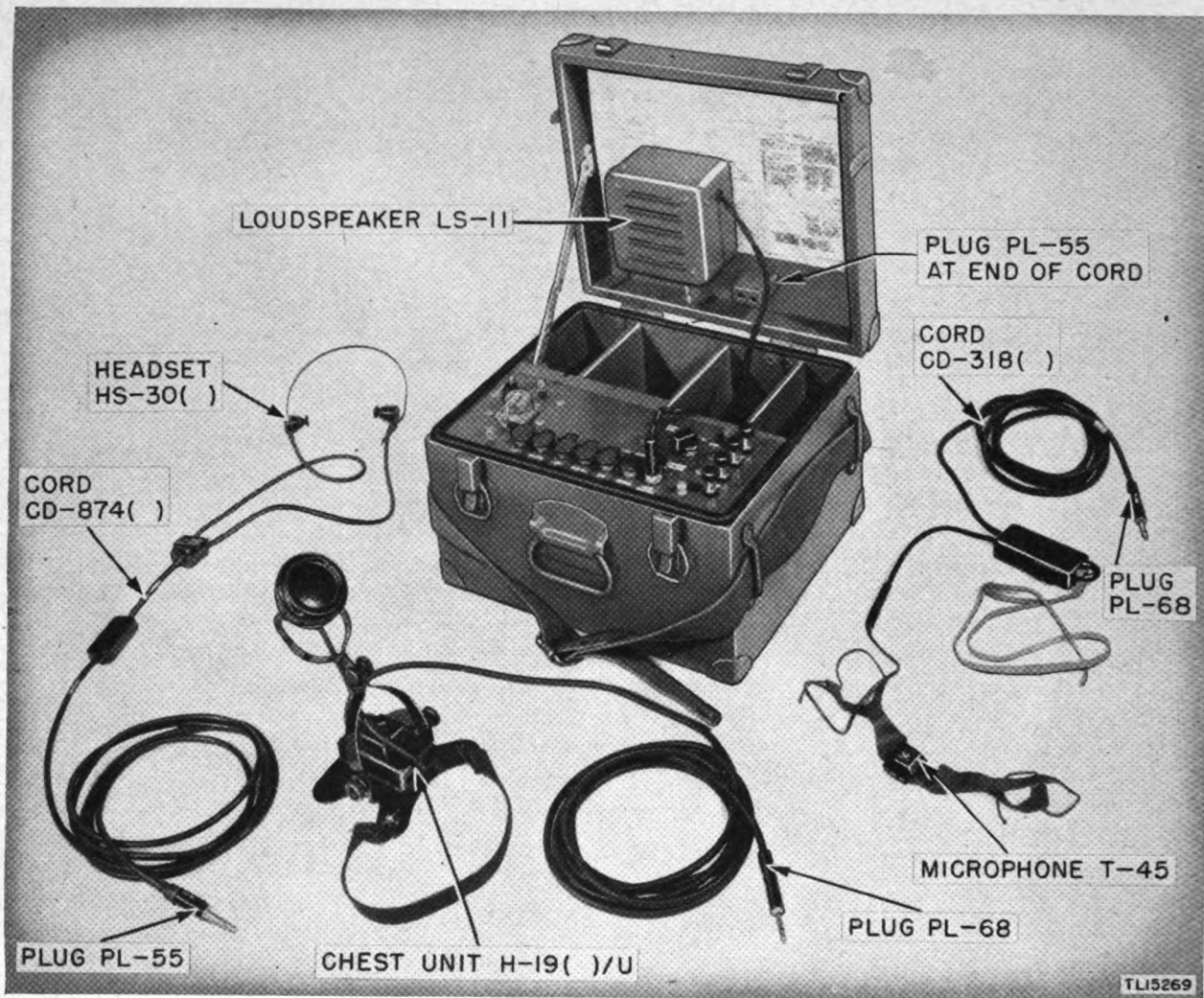


Figure 2. Remote control unit C-112/TRA-2.

follows: Height 15 $\frac{3}{4}$ ", Width 31 $\frac{3}{4}$ ", Depth 17 $\frac{1}{4}$ ", Weight 98 pounds, Volume 5 cubic feet.

4. Methods of Operation

Control Unit C-113/TRA-2 and Remote Control Unit C-112/TRA-2 are used with Radio Set AN/TRC-1 in three basic applications or methods of operation.

a. AUTOMATIC RELAY OPERATION. This method of operation is used to increase the range of a transmitter by automatic relay to a distant receiver when the relay transmitter and receiver are separated by more than 10 feet. Control Unit C-113/TRA-2 is located at the relay transmitter and Remote Control Unit C-112/TRA-2 is located at the relay receiver. When the distance between the relay transmitter and receiver is 10 feet or less, Remote Control Equip-

ment AN/TRA-2 is not required, as Cord CX-104/TRC-1 can then be used to interconnect the transmitter and receiver.

b. RADIO REMOTE CONTROL, TWO-WIRE. This method of operation provides for the remote control of the radio transmitter at the communication center, with wired intercommunication without radio transmission between the two locations. The transmitter also may be operated from its location. Signals received on the radio receiver are transmitted simultaneously over the field-wire circuit to the remote point. Control Unit C-113/TRA-2 and Radio Set AN/TRC-1 are required at the communication center, and Remote Control UNIT C-112/TRA-2 is required at the remote point.

c. RADIO REMOTE CONTROL, FOUR-WIRE. This method of operation permits the radio receiver and

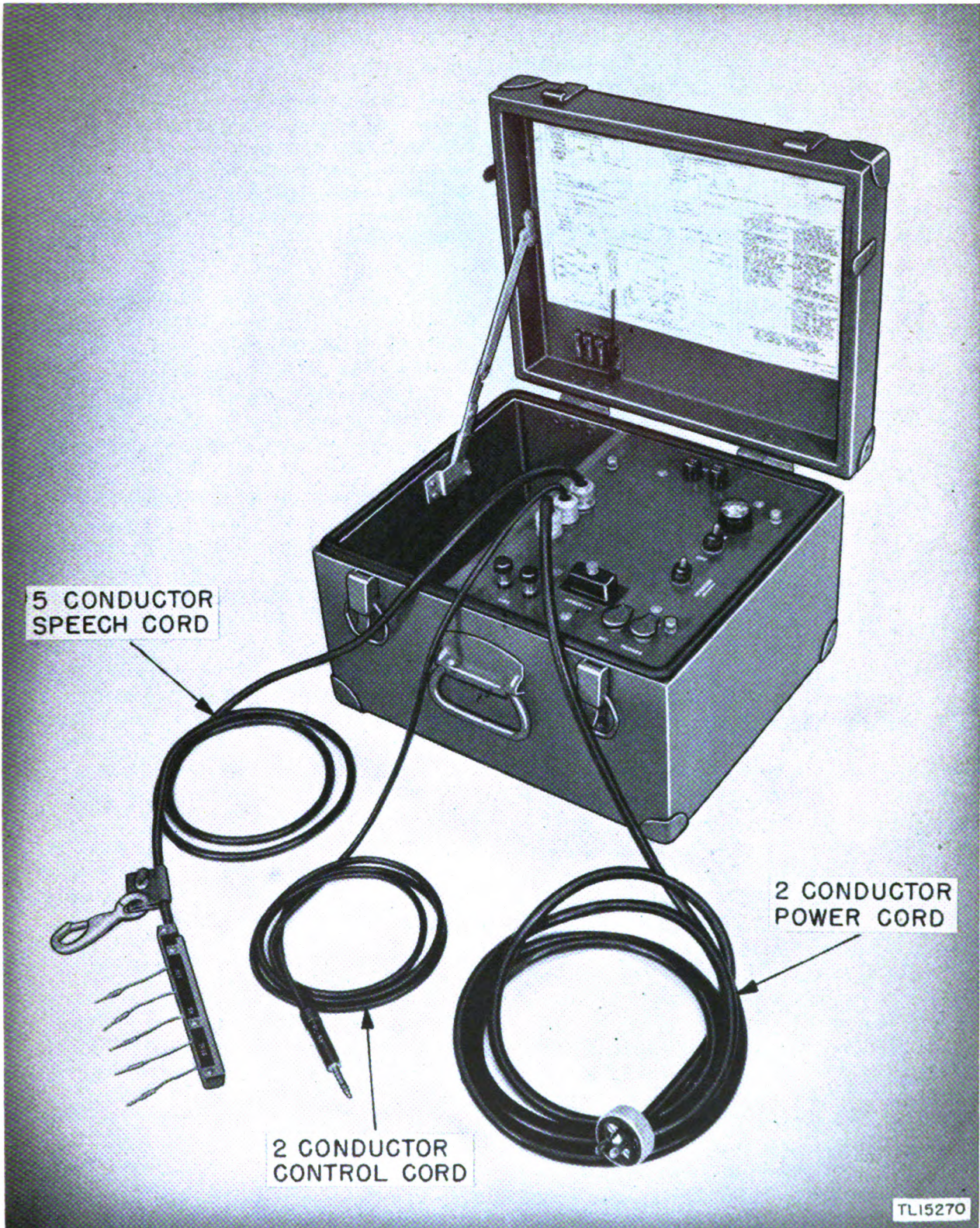


Figure 3. Control unit C-113/TRA-2.

transmitter to be at separate locations, each location being wired to the communication center by a pair of field wires. The transmitter may be controlled at its location, or from the communication center. Signals received on the radio receiver are received at the communication center over field wire, but are not relayed to the operator at the transmitter. Remote Control Unit C-112/TRA-2 is required at the communication center. Radio Receiver R-19 ()/TRC-1 is installed at one remote location, and Con-

trol Unit C-113/TRA-2 and Radio Transmitter T-14 ()/TRC-1 are required at the other remote point.

Note. Control Unit C-113/TRA-2 may be used in conjunction with telegraph (teletype) operation of Radio Set AN/TRC-1. Remote Control Unit C-112/TRA-2 is not required in telegraph installations, but may be used to provide voice intercommunication over a field-wire line, not exceeding 2 miles, between a telegraph terminal and the radio station for cueing purposes.

SECTION II

INSTALLATION AND OPERATION

5. General

The installation of the equipment is governed by the application, the service to be rendered, and the location. In all three basic methods of operation, automatic relay operation; radio remote control, 2-wire; and radio remote control, 4-wire, separation of the equipment is limited to 2 miles of Field Wire W-110-B, or a maximum loop resistance of 400 ohms for any one pair.

a. A single pair of field wire is connected to LINE 1 terminals for automatic relay operation and for radio remote control, 2-wire operation. Two pairs of field wire, one pair to LINE 1 terminals and one pair to LINE 2 terminals, are connected for radio remote control, 4-wire operation.

b. Control Unit C-113/TRA-2 is provided with three fixed cords: a 6-foot, 5-conductor *speech* cord; a 6-foot, 2-conductor *control* cord; and a 10-foot, 2-conductor *power* cord (fig. 3). The speech cord, terminating in a special five-pin connector, and the control cord, terminating in Plug PL-68, connect to Radio Transmitter T-14()/TRC-1 in the three methods of operation. The power cord, terminating in a standard outlet plug, connects to the 115-volt a-c power source of the transmitter.

Note. To operate from a 230-volt, 50- to 60-cycle power source, remove the unit from the case and change the straps on power transformer T-3 as follows:

- Remove strap between terminals 1 and 3;
- Remove strap between terminals 2 and 4;
- Strap terminals 3 and 4.

The pilot light is wired across one-half of the transformer, therefore the wiring should not be changed (fig. 9).

c. Remote Control Unit C-112/TRA-2 requires a single pair field wire to connect it to Control Unit C-113/TRA-2 for all three methods of operation.

6. Installation

a. **AUTOMATIC RELAY OPERATION.** (1) Connect the equipment as shown in figure 4. Separate the transmitting and receiving antennas by a distance sufficient

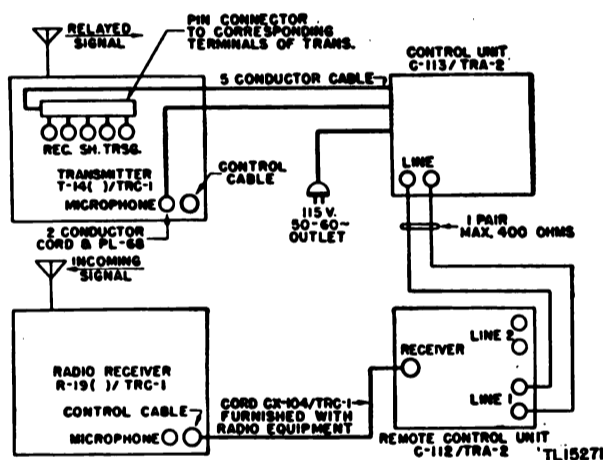


Figure 4. Automatic relay operation, cording diagram.

to prevent reception of spurious transmitter harmonics. This distance will depend upon the choice of crystal frequencies. Select the crystals according to the interference charts in TM 11-2601.

(2) Set LINE SWITCH of Remote Control Unit C-112/TRA-2 to 2-wire position.

(3) Set Radio Transmitter T-14()/TRC-1 controls as follows:

- (a) LINE switch to ON position.
- (b) CABLE COMPENSATOR to position 8.
- (c) CARRIER CONTROL switch to position 2.

(4) Set Radio Receiver R-19()/TRC-1 controls as follows:

- (a) LINE switch to ON position.
- (b) SQUELCH switch to ON position and turn ADJUST control for squelch operation.
- (c) CHANNEL switch to SINGLE CHANNEL position.

- (d) METER SWITCH to position 6.
- (e) AUDIO GAIN control to register a reading of plus 1 dbm on the meter during average voice peaks when a voice-modulated signal is being received.

b. **RADIO REMOTE CONTROL, 2-WIRE** (1) Connect as shown in figure 5.

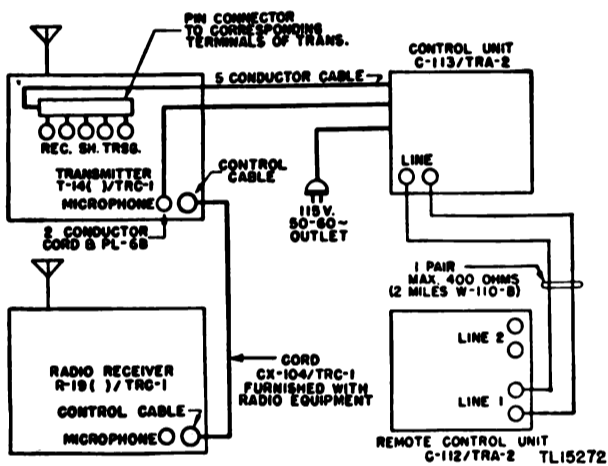


Figure 5. Radio remote control, 2-wire, cording diagram.

- (2) Set LINE SWITCH of Remote Control Unit C-112/TRA-2 to 2-wire position.
- (3) Set Radio Transmitter T-14()/TRC-1 controls as follows:
 - (a) CABLE COMPENSATOR to maximum.
 - (b) CARRIER CONTROL switch to position 1.
- (4) Set Radio Receiver R-19()/TRC-1 controls as follows:
 - (a) AUDIO GAIN to obtain sufficient volume at Remote Control Unit C-112/TRA-2.
 - (b) METER SWITCH to position 6 only when output level does not exceed plus 6 dbm.

Caution: Greater output may result in injury to meter.

- c. RADIO REMOTE CONTROL, 4-WIRE. (1) Connect as shown in figure 6.

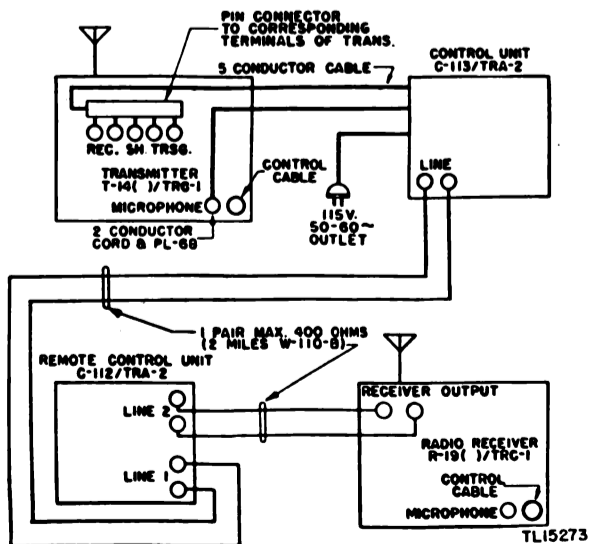


Figure 6. Radio remote control, 4-wire, cording diagram.

- (2) Set LINE SWITCH of Remote Control Unit C-112/TRA-2 to 4-wire position.

- (3) Set Radio Transmitter T-14()/TRC-1 controls as follows:

- (a) CABLE COMPENSATOR to maximum.
- (b) CARRIER CONTROL switch to position 1.

- (4) Set Radio Receiver R-19()/TRC-1 controls as follows:

- (a) AUDIO GAIN to obtain sufficient volume at Remote Control Unit C-112/TRA-2.

- (b) METER SWITCH to position 6 only when output level does not exceed plus 6 dbm.

Caution: Greater output may result in injury to meter.

7. Operation

- a. GENERAL For all applications set power switch to ON position; pilot lamp should light. Handset TS-15() or H-23()/U furnished with Radio Transmitter T-14()/TRC-1 is plugged into the jacks at the lower right-hand corner of Control Unit C-113/TRA-2 (fig. 7). Refer to figure 8 for front panel of Remote Control Unit C-112/TRA-2. Facilities are available for plugging in three sets of headsets and microphones. Either Chest Unit H-19()/U or Lip Micro-

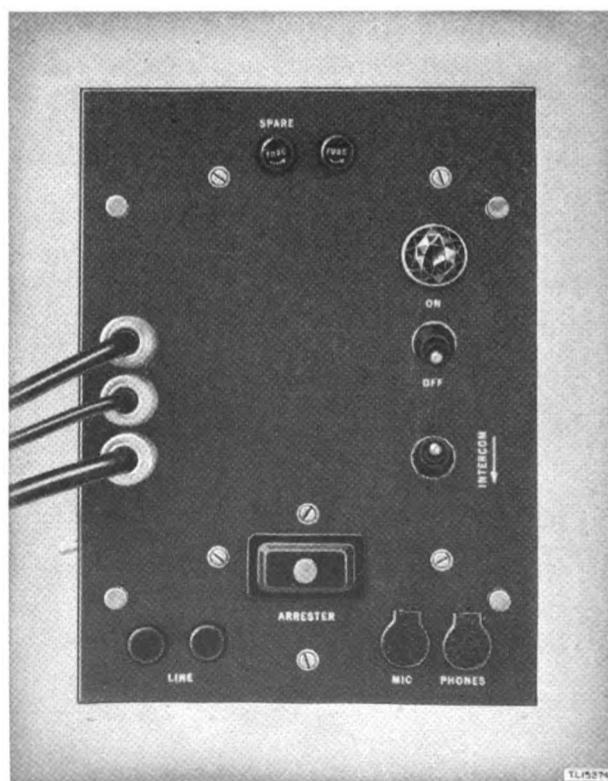


Figure 7. Control unit C-113/TRA-2, front panel.

phone T-45, or both may be used. Normally Loudspeaker LS-11 is plugged into the loudspeaker jack. Headsets may be used for radio remote control, 2-wire (fig. 5) and radio remote control, 4-wire (fig. 6). The loudspeaker is not generally used for automatic relay operation (fig. 4). Plugging in a headset automatically disconnects the loudspeaker. Check position of LINE SWITCH for proper position to correspond to the particular method of operation. Rotate counterclockwise for installations corresponding to figures 4 and 5 (2-wire service) and clockwise for installations corresponding to figure 6 (4-wire service).

b. OPERATING INSTRUCTIONS FOR CONTROL UNIT C-113/TRA-2. (1) *Radio transmission.* Operate switch on Handset TS-15() or H-23()/U and hold while talking. The voice will modulate Radio Transmitter T-14()/TRC-1 and will also be transmitted by field wire to Remote Control Unit C-112/TRA-2.

(2) *Intercommunication* (figs. 4 and 5). Operate INTERCOM. switch in the direction of the arrow on the panel and hold to prevent modulation of the transmitter. Operate thumb switch on handset and hold only while talking. *Release thumb switch when listening.*

Note. Intercommunication feature is not provided for installations corresponding to figure 6 (4-wire service). In an

emergency, however, where intercommunication is essential without modulating the transmitter, rotate LINE SWITCH counterclockwise to the 2-wire position. Operate as outlined above. Restore LINE SWITCH to 4-wire position when normal operation is resumed.

c. OPERATING INSTRUCTIONS FOR REMOTE CONTROL UNIT C-112/TRA-2. (1) *Radio transmission.* Operate push-button switch on Chest Unit H-19 ()/U (chest unit D-173249) or cord switch of Lip Microphone T-45, and hold while talking.

Caution: Restore switch of either type microphone to re-establish radio reception. Radio signals will not be received either at Control Unit C-113/TRA-2 or at Remote Control Unit C-112/TRA-2 while microphone switches are held operated.

(2) *Intercommunication* (fig. 4). Operate INTERCOM. switch in the direction of the arrow on the panel and hold when necessary to increase listening level, but only if it does *not* interfere with operation of radio. This switch need not be used on installations corresponding to figure 5.

Note. Privacy of intercommunication feature is under the control of the operator at Control Unit C-113/TRA-2 only. If operator at Remote Control Unit C-112/TRA-2 desires that the communication does not modulate the transmitter, he should request the operator at Control Unit C-113/TRA-2 to operate the INTERCOM. switch.

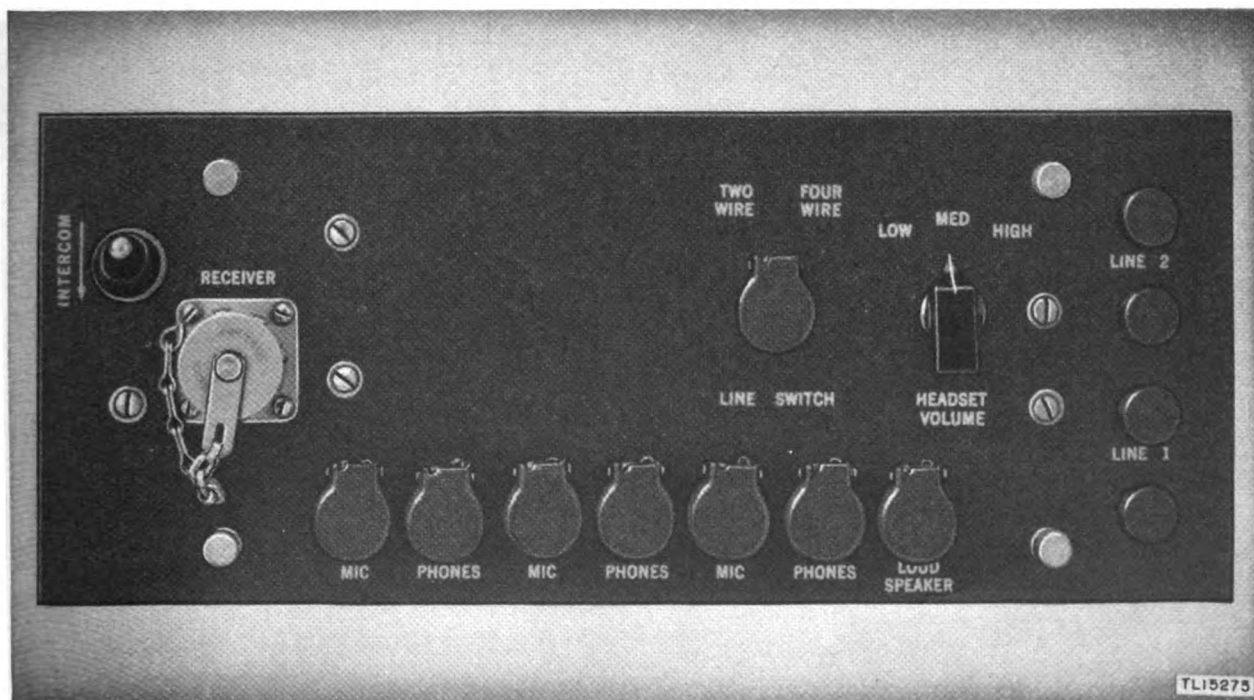


Figure 8. Remote control unit C-112/TRA-2, front panel.

SECTION III

FUNCTIONING OF PARTS

8. Functioning of Parts

a. CONTROL UNIT C-113/TRA-2. The functions of the components will be described using the circuit designations appearing on the schematic diagram (fig. 9) and the tabulation.

(1) A1-1 and A1-2 are protector blocks to protect each side of the line from lightning, by providing a low-resistance path through a small gap to ground.

(2) A2-1 and A2-2 are carbon blocks used in protector blocks A1-1 and A1-2.

(3) C1-1 and C1-2 are 2-mf blocking capacitors to prevent direct current from flowing in phones, also line coupling capacitors.

(4) C2 and CH1 are filters to smooth ripple of rectified alternating current.

(5) Fuse F1 provides overload protection for rectifier.

(6) J1 and J2 are jacks for Plugs PL-68 and PL-55 of Handset TS-15() or H-23()/U.

(7) P1 is a special five-pin connector for cable between Control Unit C-113/TRA-2 and Transmitter T-14()/TRC-1.

(8) P7, control Plug PL-68, plugs into microphone input jack of Transmitter T-14()/TRC-1 to operate antenna and plate-voltage relay.

(9) P6 is a power plug used to connect to the a-c line.

(10) P8 and P9 are line terminals for line termination.

(11) PL1 is the pilot lamp.

(12) R1 is a 2,000-ohm resistor, to reduce the volume of the adjacent receiver.

(13) R2 is a 4,700-ohm bleeder resistor across output of rectifier to improve regulation.

(14) R2 is a 20,000-ohm current limiting resistor for pilot light.

(15) RL1 is a control relay. Its primary function is to break the radio receiver circuit and to establish a voice-modulation circuit to the radio transmitter.

(16) S1 is the power switch which controls the input to the unit.

(17) S2 is the intercommunication switch which opens voice-modulation input and control circuits to radio transmitter.

(18) Induction coil T1 is an autotransformer, microphone-to-line. It matches the input impedance of Remote Control Unit C-112/TRA-2 and is equipped with a winding for sidetone reduction.

(19) T2 and TH1 are the volume limiting transformer and thermistor. These two devices provide automatic level control of the input to the radio transmitter.

(20) T3 is a step-down power transformer for the rectifier.

(21) V1 is a varistor which absorbs clicks in the headset circuit.

(22) RE1 is a selenium rectifier of the dry-plate, full-wave, bridge type. It converts a-c power to d-c.

b. REMOTE CONTROL UNIT C-112/TRA-2. The functions of the components will be described using the circuit designations appearing on the schematic diagram (fig. 10) and the tabulation.

(1) C101 is an 8-mf capacitor used in series with one winding of control relay to block direct current from that winding.

(2) C102 is a 2-mf, line coupling capacitor.

(3) J101 is a jack for plug-in of loudspeaker.

(4) J102-1, J102-2, and J102-3 are jacks for plug-in of headsets.

(5) J103-1, J103-2, and J103-3 are jacks for plug-in of microphones.

(6) P101 and P102 are line terminals for termination of line 1.

(7) P103 is a 7-pin, female control cable receptacle for connecting Cord CX 104/TRC-1 to Radio Receiver R-19()/TRC-1.

(8) P104 and P105 are line terminals for termination of line 2.

(9) R101, a 4,000-ohm resistor, R102, a 10,000-ohm resistor, and S101 make up a 3-position volume control to control volume of headsets.

(10) R103-1 and R103-2, 100-ohm resistors, are for relay control, and are used only on automatic relay operation (fig. 4).

(11) R104-1, R104-2, and R104-3, 250-ohm resistors, compensate for insertion of one to three headsets.

(12) S102 is the line switch which separates line 1 from line 2 on remote control, 4-wire operation.

(13) S103 is the intercommunication switch which increases INTERCOM. listening level on automatic relay operation.

(14) RL101 is a combination relay and autotransformer, microphone-to-line, and matches the input impedance of Control Unit C-113/TRA-2. The contacts control the sidetone reduction circuit, and disconnect the loudspeaker circuit.

(15) V101 is a varistor which absorbs clicks in the headset circuit.

9. Functioning of Circuits

a. GENERAL. Refer to figure 17 showing figures 9 and 10 combined, or to figure 18 showing a simplified arrangement of figure 17. Control Unit C-113/TRA-2 and Remote Control Unit C-112/TRA-2 are shown connected by the single-pair line required for all three methods of operation.

(1) Pins TRSG of the 5-pin connector P1 connect to the voice-modulation input circuit of Radio Transmitter T-14()/TRC-1. Pins REC connect to the audio output of Radio Receiver R-19 ()/TRC-1. Plug P7 connects to MICROPHONE input jack of the transmitter and serves to control antenna and plate-voltage relay of the transmitter on the operation of relay RL1 of Control Unit C-113/TRA-2.

(2) Microphone and relay operating voltage for both units is obtained from the rectifier in Control Unit C-113/TRA-2.

b. AUTOMATIC RELAY OPERATION. Both the radio transmitter and receiver are turned on and controls adjusted as outlined in paragraph 6. Control Cord CX-104/TRC-1 connects Remote Control Unit C-112/TRA-2 to Radio Receiver T-19()/TRC-1.

(1) The carrier of the distant transmitter operates relay RL101 in the relaying receiver through the squelch circuit. The contacts of this relay transfer to the *make* side applying ground to pin *F* of receptacle P103. Pin *D* is permanently grounded to the chassis of the receiver, so that the circuit is completed across pins *F* and *D*. Relay RL1 and RL101 of the remote control equipment energize in series, from the positive side of the rectifier, through the coil between terminals 1 and 2 of relay RL1 and one side of the field-wire pair, to relay RL101, through the coil between terminals 8 and 4, resistor R103-1, switch S103, pins *F* and *D*, resistor R103-2, and the coil between terminals 6 and 1, to the other side of the field-wire pair, through the coil between terminals 3 and 9, to the negative side of the rectifier.

(2) Contacts 4 and 5 of relay RL1 close a circuit

from grounded sleeve of MICROPHONE jack, through sleeve and tip of plug P7 to operate antenna transfer and plate-voltage relay in the transmitter. Contacts 11 and 12, on closing, couple one side of the field-wire pair through capacitor C1-2 to the voice-modulation input of the transmitter.

(3) The output of the radio receiver is connected across pins *A* and *C* and is coupled to the field-wire pair through capacitor C102. The audio output of the receiver is therefore coupled by means of the field-wire pair to the audio-input side of the radio transmitter for radio relay of the signal.

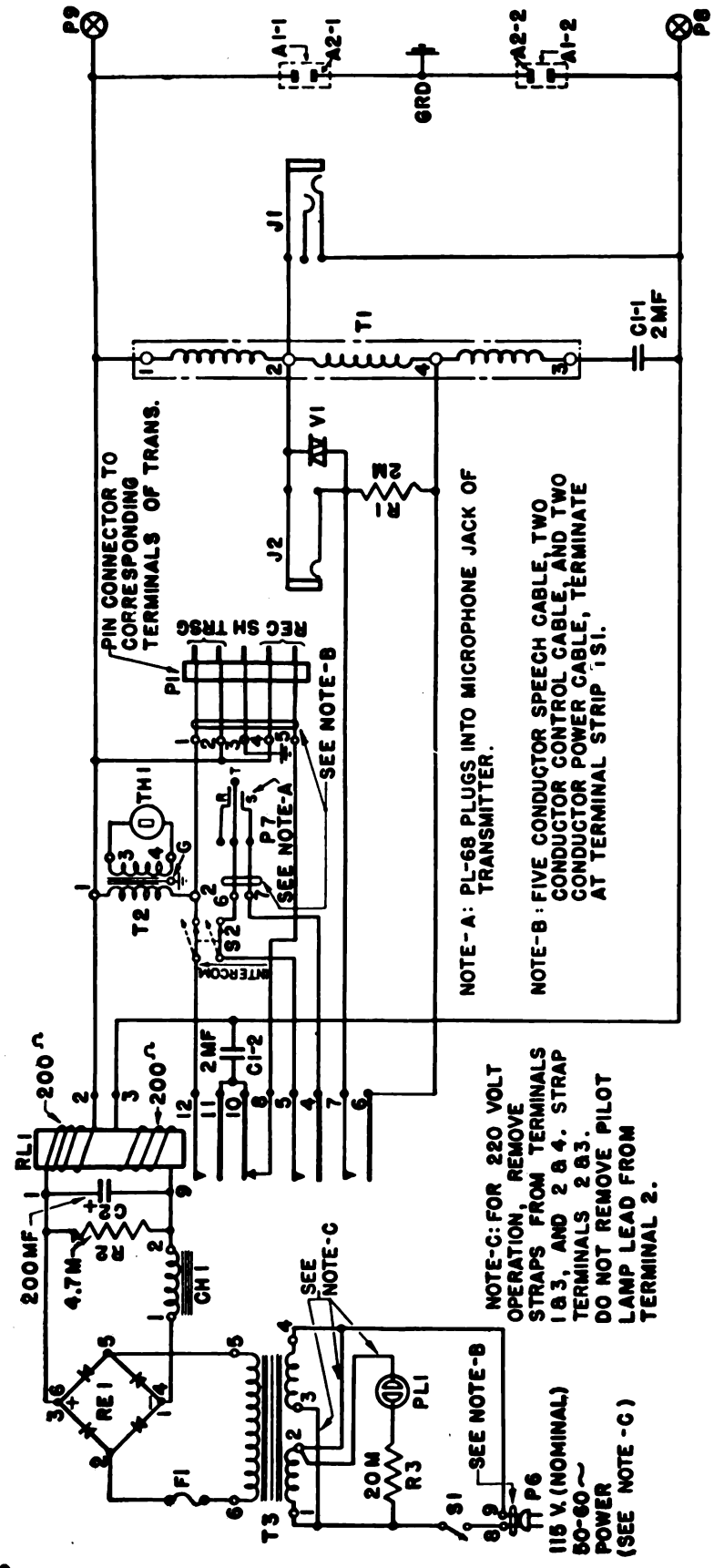
(4) The output of the radio receiver is also in parallel (multiple) with the headset circuit of Remote Control Unit C-112/TRA-2 and with the handset circuit of Control Unit C-113/TRA-2. Radio signals are therefore received at both locations. The radio transmitter may be operated from either unit, as well as by the automatic relay circuit described. Also, intercommunication without modulating the transmitter is provided. Since the circuits involved in these features are those functioning directly for the other two methods, they will be described under their respective headings. Also circuits irrelevant to the specific method, automatic relay operation, have not been described.

(5) Control Unit C-113/TRA-2 is equipped with an automatic device to limit the audio-input level to the transmitter to prevent over-modulation. The components of this device are transformer T2 and thermal element TH1. Thermal element TH1 has a negative coefficient of resistance. The functioning of this device is more important in automatic relay operation than in the other methods, since the input level may be high.

(6) The primary of the transformer is connected across the audio input to the transmitter. As the voltage across the primary increases, the sensitive thermal element across the secondary heats. The negative coefficient of resistance characteristic of the thermal element introduces a resistive shunt load across the input circuit through the reflected impedance to the primary. The increase in load reduces the input level.

(7) The volume limiting effectiveness of the device begins at approximately 0 dbm when connected across a 500-ohm line. Its regulation characteristics maintain a uniform input level to the transmitter within plus or minus 2 dbm, throughout the range of approximately 0 dbm to plus 15 dbm.

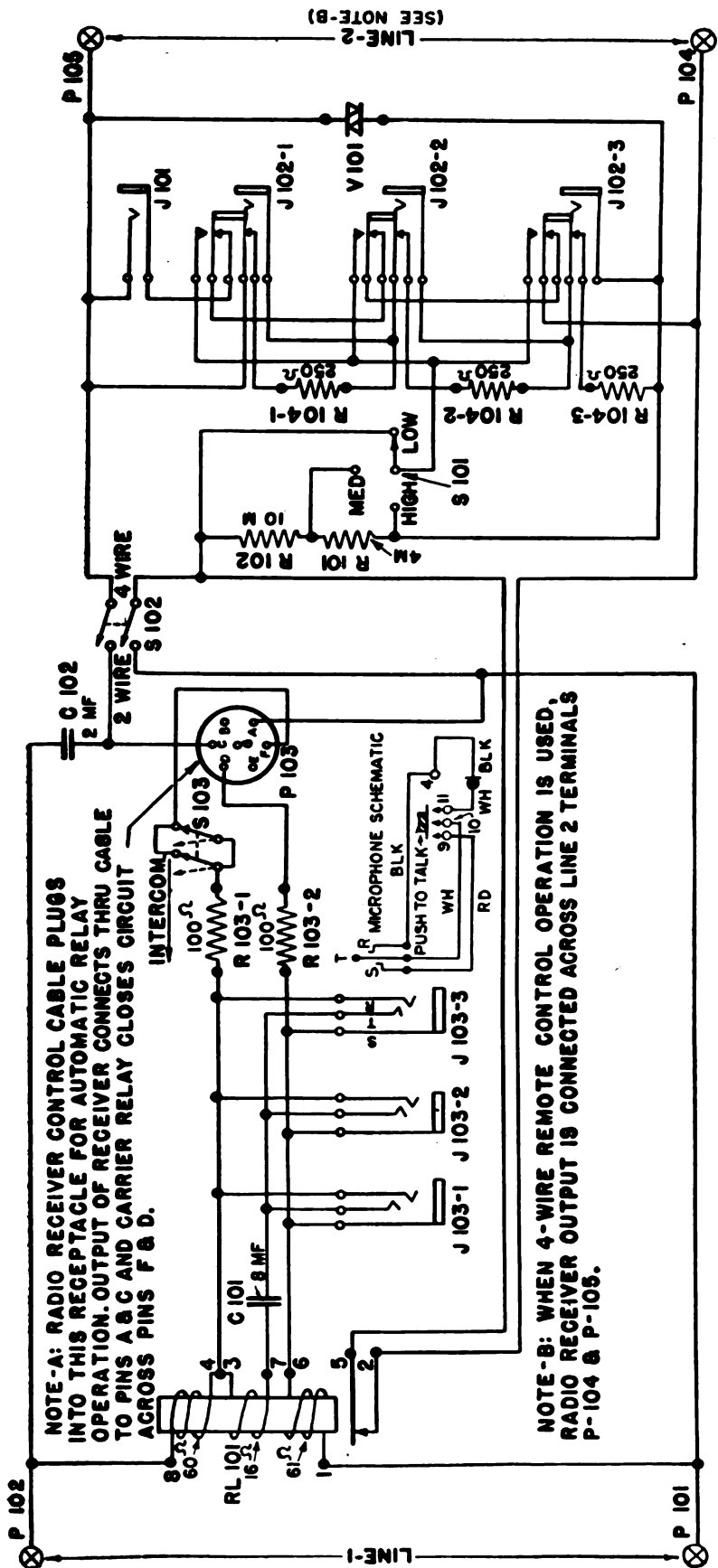
c. RADIO REMOTE CONTROL, TWO-WIRE. The



DESIGNATION	ITEM	DESIGNATION	ITEM
A1-1	PROTECTOR BLOCK	RL1	RELAY, CONTROL
A1-2	"	S1	SWITCH, POWER
C1-1	CAPACITOR 2 MF 200V	S2	SWITCH, INTERCOMMUNICATION
C1-2	CAPACITOR 2 MF 200V	T1	INDUCTION COIL
G2	CAPACITOR 200MF 150V	T2	VOLUME LIMITING TRANSFORMER
CH1	CHOKE COIL 4 HY AT 100 MA	T3	POWER TRANSFORMER
FI	FUSE 125 MA	TH1	VOLUME LIMITING THERMISTOR
J1	JACK, MICROPHONE	V1	VARIATOR
J2	JACK, HEADSET	RE1	SELENIUM RECTIFIER
PI	PIN CONNECTOR, SPECIAL	TS1	TERMINAL STRIP

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Figure 9. Control unit C-113/TRA-2, schematic diagram.



REMOTE CONTROL UNIT C-112/TRA-2			
DESIGNATION	ITEM	DESIGNATION	ITEM
C 101	CAPACITOR 8 MF 200 V	R 104-1	RESISTOR 250 OHM 1/2 W
C 102	CAPACITOR 2 MF 200 V	R 104-2	RESISTOR 250 OHM 1/2 W
J 101	JACK, LOUD SPEAKER	R 104-3	RESISTOR 250 OHM 1/2 W
J 102-1	JACK, HEADSET	S 101	SWITCH, VOLUME
J 102-2	JACK, HEADSET	S 102	SWITCH, LINE (SCREW SLOT)
J 102-3	JACK, HEADSET	S 103	SWITCH, INTERCOMMUNICATION
J 103-1	JACK, MICROPHONE	RL 101	RELAY, CONTROL
J 103-2	JACK, MICROPHONE	V 101	VARIATOR
J 103-3	JACK, MICROPHONE		

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Figure 10. Remote control unit C-112/TRA-2, schematic diagram.

radio transmitter is controlled from Control Unit C-113/TRA-2 by the operation of the microphone push button. Relay RL1 energizes through the following circuit: from the positive side of the rectifier, through the coil between terminals 1 and 2 of relay RL1, primary winding between terminals 1 and 2 of induction coil T1, microphone switch, and through coil 3-9, to the negative side of the rectifier. Contacts 11 and 12, on *making*, closes the circuit to the audio input of the transmitter, and contacts 4 and 5 close antenna and plate-voltage, control relay circuit as previously described.

(1) The direct current of the microphone circuit traced above is caused to fluctuate above and below the steady-state value by the varying resistance of the microphone when activated by a sound wave. The varying current produces an alternating magnetic field in the induction coil which induces an alternating voltage of voice frequencies across terminals 1 and 3, and through capacitor C1-1 to the field-wire pair. The alternating voltage is also applied through capacitor C1-2 and contacts 11 and 12 to the voice-modulation input of the transmitter.

(2) The voltages induced in the windings between terminals 1 and 2 and 3 and 4 are in opposition to a portion of the voltage induced in the winding between terminals 2 and 4, across which the phones are connected. The opposition voltage reduces the level of the speaker's voice in the receiver of the handset to provide the anti-sidetone feature.

(3) The headset circuit of Remote Control Unit C-112/TRA-2 is a series circuit from one side of the field-wire pair, through contacts 2 and 5, the volume control, sleeve and tip of three sets of jacks and coupling capacitor, to the other side. When no headsets are connected a series resistor replaces them. The loudspeaker circuit is similar except that it is in series with a set of transfer contacts on each of the three jacks. This circuit is broken when a headset is plugged in to automatically disconnect the loudspeaker.

(4) The volume control for the headsets consists of two resistors and a 3-position switch. R101, 4,000 ohms, and R102, 10,000 ohms, are in series in the headset circuit for LOW volume setting; only R101, 4,000 ohms, is in series for MED setting. The volume control is shunted when set to HIGH position.

(5) The radio transmitter is also controlled from Control Unit C-112/TRA-2 by the operation of the microphone push button. Relays RL1 and RL101 energize in series through the same circuit previously

traced for automatic relay operation (par. 9b), except that the circuit is completed through the microphone instead of across pins *F* and *D*. The contacts of relay RL101 connect the transmitter to the field-wire pair, and operate antenna and plate-voltage control relay. Contacts 2 and 5 of relay RL101 open and reduce the sidetone level of the speaker's voice in the headsets when used, by causing the circuit to follow the LOW setting path of the volume control. When the loudspeaker is being used, these contacts remove it from the circuit. The three coils of relay RL101 constitute an autotransformer similar in purpose and operation to the induction coil described previously. The winding between terminals 3 and 7 and capacitor C-101 match the impedance of the microphone to the input impedance of Control Unit C-113/TRA-2.

(6) The audio output of the radio receiver at pins REC is coupled to the field-wire pair through capacitor C1-2 and is bridged to the induction coil of Control Unit C-113/TRA-2 and to the headset circuit of Remote Control Unit C-112/TRA-2, providing for the transmission of radio signals to both locations. Resistor R1, 2,000 ohms, is in series with jack J2 to reduce the volume in the receiver of the handset. This resistor is shunted by contacts 6-7 of relay RL1 for all other circuits.

(7) INTERCOM. switch S2 opens the audio-input circuit to the transmitter established by contacts 11 and 12 of relay RL1 and opens the control circuit to the antenna transfer and plate voltage relay established by contacts 4 and 5 to prevent operation of the transmitter when relay RL1 energizes on the push-to-talk circuit. The communication is thereby confined to the field wire between the two units.

d. RADIO REMOTE CONTROL, 4-WIRE. The operation of the circuits for this method of operation are identical to those previously described for radio remote control, 2-wire, except for the circuit function of LINE SWITCH S102, and changes in circuiting involved in the connection of the radio receiver output to LINE 2 terminals. In this application the LINE SWITCH is set to 4-wire position, opening both sides of the field-wire transmission circuit at the input to the headset circuit of Remote Control Unit C-112/TRA-2. Intercommunication through the field wire is therefore not possible since the circuit to the headset is open. Also, signals received by the radio receiver are not transmitted to Control Unit C-113/TRA-2 for the same reason. Remote control of the transmitter by the push-to-talk circuit remains the same as for other applications.

SECTION IV

MAINTENANCE

10. General

a. Figures 11 and 12 are internal views of Control Unit C-113/TRA-2; figures 13 and 14 are internal views of Remote Control Unit C-112/TRA-2. Figures 15 and 16 are wiring diagrams of Control Unit C-113/TRA-2 and Remote Control Unit C-112/TRA-2, respectively. Control Unit C-113/TRA-2 and Remote Control Unit C-112/TRA-2 have only a few moving parts which are frequently used. Therefore, they should require only a minimum of maintenance. All electrical equipment of this type, however, must be kept free of grit and dirt to prevent failure caused by improper contact. The units are well gasketed to prevent the entrance of foreign matter, but under severe field conditions, some dust may filter through. Routine maintenance should include the cleaning and dusting of the components, preferably by air hose.

b. Burnish contacts that are found corroded or dirty. Use burnisher sparingly and only when necessary, particularly on the contacts of the relays. Inspect the wiring and soldered connections for any signs of corrosion and correct as necessary. Contact pressure on jack springs need not be at any given value, but pressure in excess of 50 grams should exist to provide proper follow-up of the contacts. Relay contact pressures should, however, be kept close to the values given in this maintenance section and for that reason should be made only by personnel trained in adjusting telephone equipment. The relays are designed to withstand vibration, temperature changes, and long service. When adjustment is necessary, it should be made by trained personnel who have the proper tools and equipment.

11. Control Unit C-113/TRA-2

Dust or foreign matter should not be allowed to accumulate on the disks of the rectifier stacks. Be

Note. Failure or unsatisfactory performance of equipment will be reported on WD AGO Form 468. If this form is not available, see TM 38-250.

careful not to chip the weatherproof enamel coating. The relay is to be maintained to the following adjustments:

- a.* Air gap between armature and core 0.018 inch minimum, 0.027 inch maximum.
- b.* Air gap between contacts 0.008 inch.
- c.* Contact pressure 20 grams.
- d.* Operating current 0.018 ampere.
- e.* Release current 0.008 ampere.

12. Remote Control Unit C-112/TRA-2

The relay of this unit is to be maintained to the following adjustments:

- a.* Air gap between armature and core 0.023 inch minimum, 0.027 inch maximum.
- b.* Air gap between contacts 0.008 inch.
- c.* Contact pressure 20 grams.
- d.* Operating current 0.0285 ampere.
- e.* Nonoperating current 0.024 ampere.
- f.* Release current 0.012 ampere.
- g.* To check the winding between terminals 3 and 7, it should operate relay on a current of 0.084 ampere.

13. General Discussion of Trouble Conditions

The ability to locate and correct trouble in any electrical device must be developed by a thorough understanding of the functioning of the device. No manual can anticipate and point out all the combination of faults which may develop. There are, however, a few likely abnormal conditions which are pointed out below for guidance.

a. Relays do not energize on operation of push-to-talk microphone buttons.

(1) Check fuse on Control Unit C-113/TRA-2; at the same time note position of power switch. If fuse is blown, determine the cause before a new fuse is inserted. A few possible causes are as follows:

(a) Break-down of 200-mf electrolytic capacitor. Disconnect one side and check for short with ohmmeter.

(b) Check for a possible short between the two windings of relay RL1. The windings between ter-

minals 1 and 2, and 3 and 9 should measure approximately 200 ohms each. Disconnect one terminal of each winding to test.

(2) Check power transformer and rectifier circuit wiring. An ohmmeter test of the secondary of the transformer (terminals 5 and 6) should show a resistance value of approximately 60 ohms. The primary winding between terminals 1 and 2 is approximately 300 ohms, and approximately 325 ohms between 3 and 4. Output voltage of rectifier unit (across terminals 1 and 9 of relay RL1) is approximately 60 volts with a line voltage of 115 volts.

b. Relay RL1 operates through local circuit but relay RL101 does not energize at its local circuit:

- (1) Open circuit in the field-wire pair.
- (2) Check windings of relay RL101.

c. INTERCOM. feature not operating.

- (1) Check position of LINE SWITCH of Remote

Control Unit C-112/TRA-2 for proper position. Recall that for the intercommunication feature, LINE SWITCH should be set to 2-wire position.

- (2) Check capacitors C1-1 and C-102 for opens.

d. Reverse operation (operation of microphone push button cuts in radio receiver instead of transmitter):

- (1) Look for reversed five-conductor speech cable.
- (2) Check to make sure that letters designating the pins on the block agree with, and are connected to, corresponding lettered terminals of the transmitter.

e. Relays functioning, radio equipment functioning, but voice transmission inoperative:

- (1) Check connection of Cord CX-104/TRC-1 and five-conductor speech cable and associated pin connector. Check two-conductor control cable and connections into MICROPHONE jack of transmitter.

- (2) Check all contacts of relay RL1 in Control Unit C-113/TRA-2.

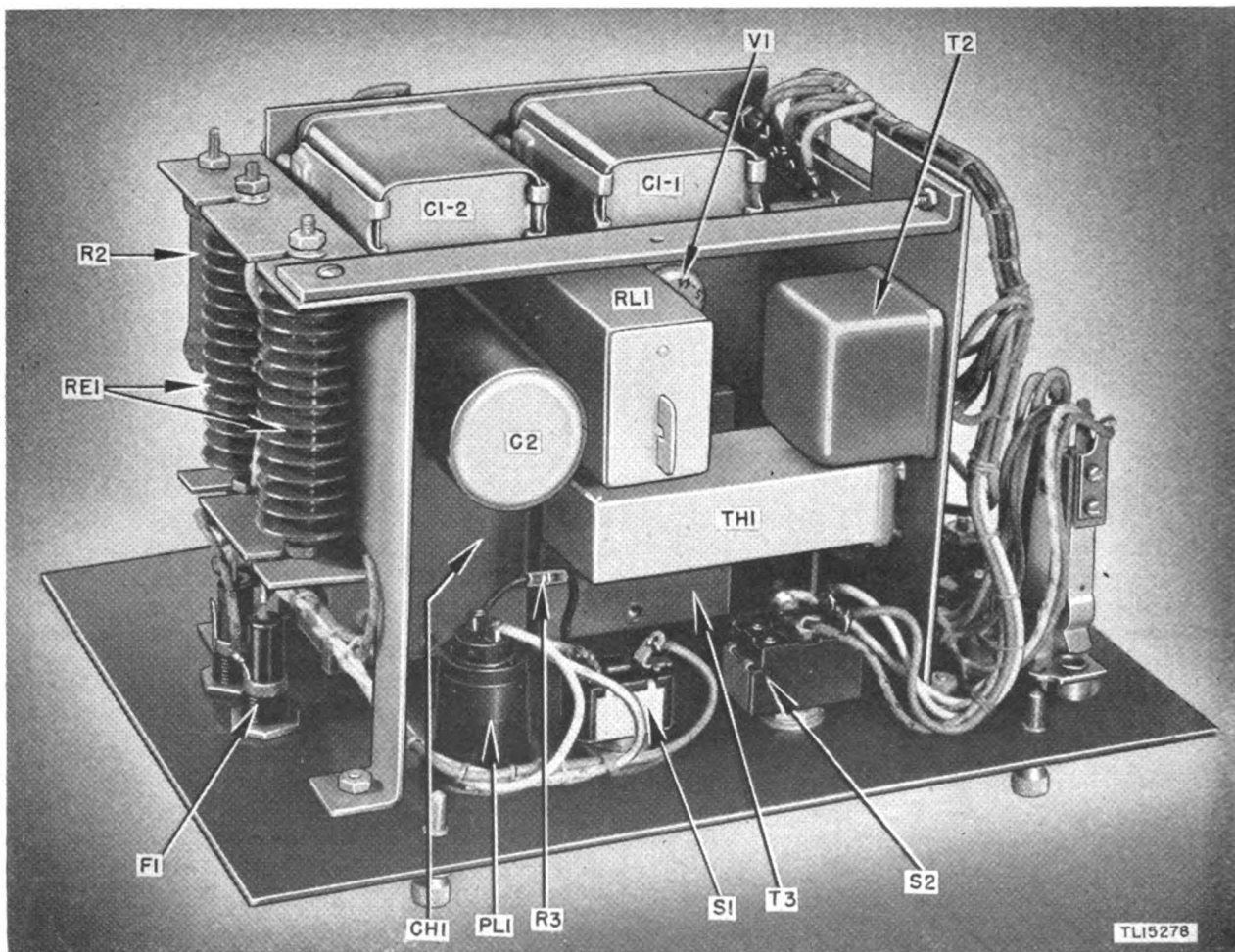


Figure 11. Control unit C-113/TRA-2, right rear view.

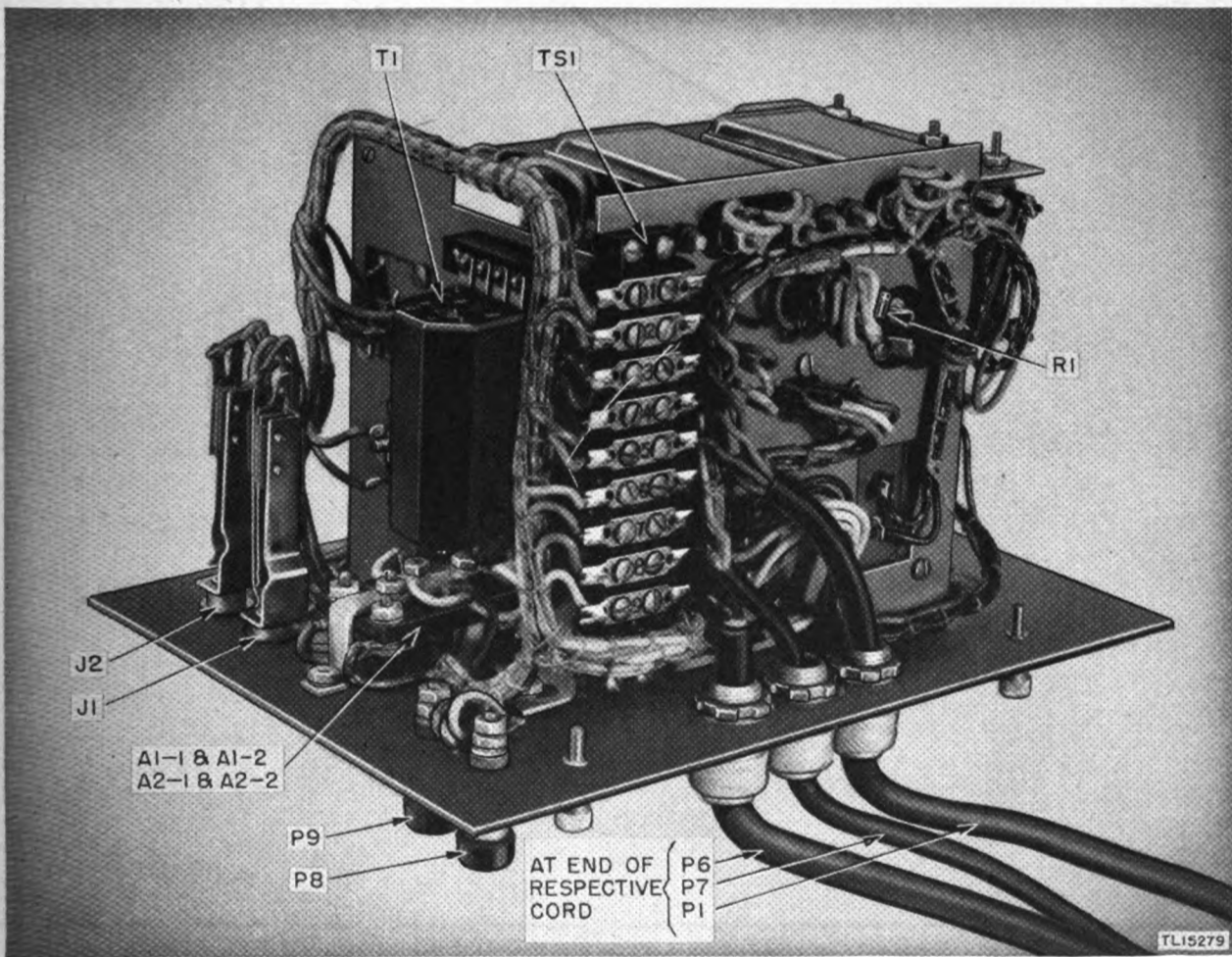


Figure 12. Control unit C-113/TRA-2, left rear view.

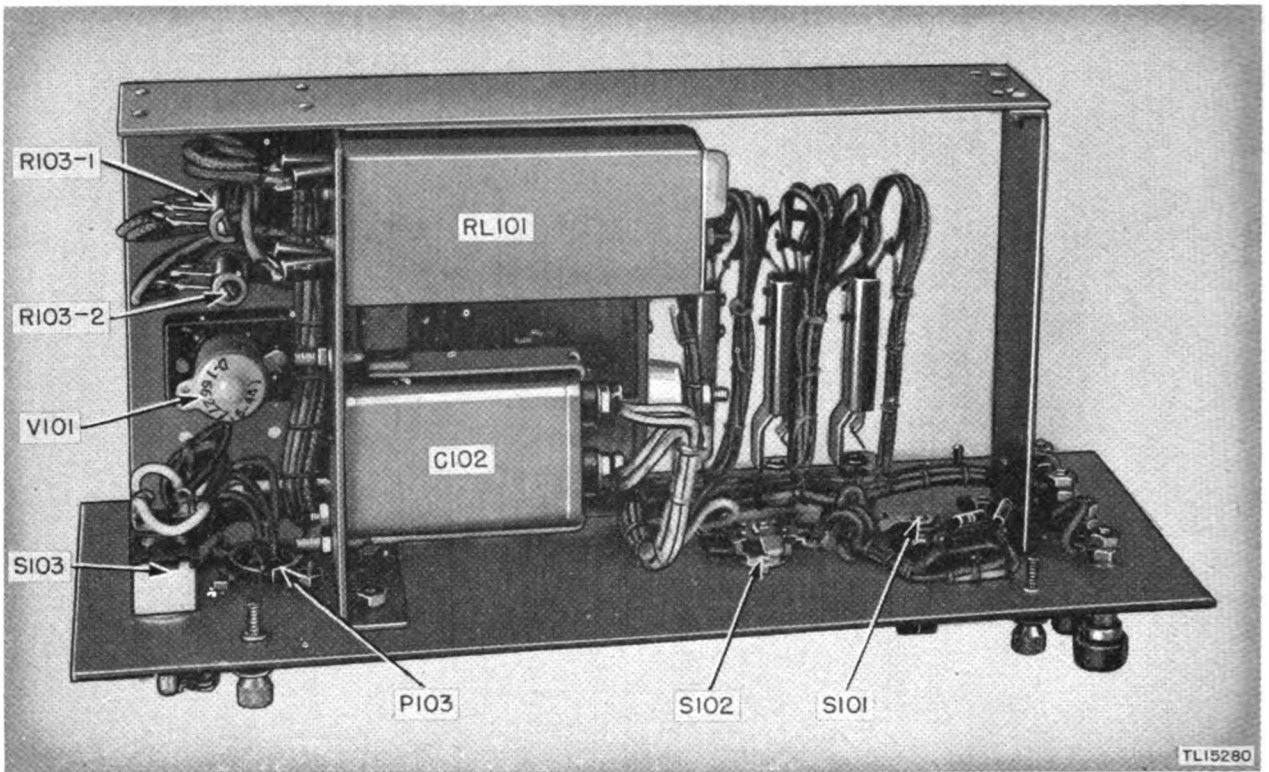


Figure 13. Remote control unit C-112/TRA-2, top view.

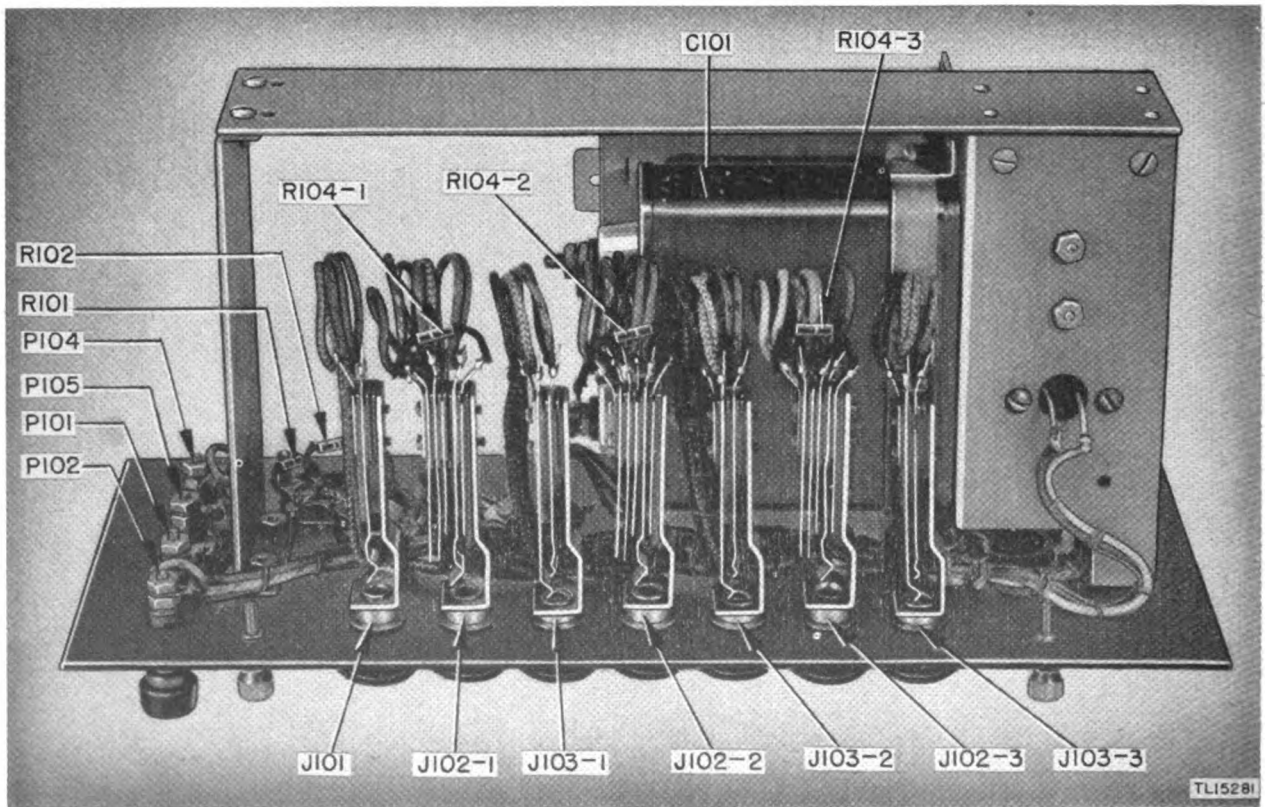


Figure 14. Remote control unit C-112/TRA-2, bottom view.

SECTION V
SUPPLEMENTARY DATA

14. Maintenance Parts List for Control Unit C-113/TRA-2

Ref. symbol	Signal Corps stock No.	Name of part and description	Quantity per unit	Running spares	Organization stock	3d ech.	4th ech.	5th ech.	Depot stock
P8, P9	3Z314 3Z9849.39-1/B1	BINDING POST TM-214 BOOT: rubber; Cutler-Hammer No. 86971W6; assembled with nickel-plated brass washer, Cutler-Hammer No. 816-132F1; special nut, Cutler-Hammer No. 86971W5; neoprene washer, Cutler-Hammer No. 16-900-5; for weatherproofing of toggle switches, Cutler-Hammer No. 8803K5	2 2			(*) (*)	(*) (*)		(*) (*)
	6Q14561	BURNISHER: contact; steel with rubber insulated handle; 3/4" x 1/4" x 3/8"; for relay contacts; W. E. type 1A.	1		(*)	(*)	(*)		(*)
	3G1837-6.9	BUSHING: bakelite; 1/2" diam x 3/16" high with 3/16" hole thru center and 1/32" guide hole on outer surface; insulates binding post; FTR-UP-12042.	2			(*)	(*)		(*)
C2	3DB200-8	CAPACITOR: dry electrolytic; 200-mf -0, +55%; 150-v d-c (working); temperature range -40 to +85° C; encased in cylindrical can 4 1/4" x 1 1/8" diam; Sprague Mfg. No. 6187 special.	1			(*)	(*)		(*)
C1-1, C1-2	3DB2.202H	CAPACITOR: fixed; paper; 200-v d-c (working); rectangular can 1 3/4" x 2 3/8" x 1"; 2 porcelain insulated terminals 3/4" high, spaced 3/4" apart; Tobe Deutchman type TRS-202-H.	2			(*)	(*)		(*)
A2-1, A2-2	2ZK700-8	CARBON BLOCK: molded; 1 1/4" x 3/8" x 5/8"; line protection; W. E. type No. 26.	2			(*)	(*)		(*)
CH-1	2C684-113/C1	COIL: choke; filter; 3-h; 5-ma; approximately 70-ohm; steel shield case, 2 soldered lug terminals; over-all dimensions, 1 9/16" x 2 1/2" x 1 7/8"; 4 each 6-32 tapped mounting holes; 1 3/4" mounting centered on length, 1 3/8" mounting centered on width; FTR-UA-12001.	1			(*)	(*)		(*)
T1	3C315-58	COIL: induction; common battery telephone type; 3 winding antistatone; 4 terminal lug connections; metal case; over-all dimensions, 3" x 1 1/2" x 1 3/4", with single mounting hole on one end; FTR-702-A.	1			(*)	(*)		(*)
F1	3Z2571-15.1	FUSE: 150-ma; slow blow; glass body; 1 1/4" x 1/4" diam; Bussman type 3AG.	1	(*)	(*)	(*)	(*)		(*)
	3ZK3275.4	FUSE HOLDER: single-circuit; bakelite insulation; 1/32" hole mounting type; over-all dimensions, 2" x 5/8" diam; Bussman type HKM.	1			(*)	(*)		(*)
	6Z4847-3	GRIP: cord; complete with compression nut and grommet; fits cord size 0.375 to 0.437"; over-all dimensions, 1 3/16" x 1" diam; bore of body 7/16", 3/8" conduit; Pyle National Co. No. DB-4.	1			(*)	(*)		(*)
	6Z4847-4	GRIP: cord; complete with compression nut and grommet; fits cord size 0.312 to 0.375"; over-all dimensions, 1 1/16" x 1" diam; bore of body 7/16", 3/8" conduit; Pyle National Co. No. DB-438.	1			(*)	(*)		(*)
	6Z4847-5	GRIP: cord; complete with compression nut and grommet; fits cord size 0.250 to 0.312"; over-all dimensions, 1 1/16" x 1" diam; bore of body 7/16", 3/8" conduit; Pyle National Co. No. DB-4516.	1			(*)	(*)		(*)
J1	2Z5531.26	JACK: telephone; special; sleeve tip and ring, no contacts; over-all dimensions, 3 1/2" x 1 1/16" x 3/16"; 3/16"-32 thread on sleeve; single panel mounting; FTR-UA-12053.	1			(*)	(*)		(*)

*Indicates stock available.

14. Maintenance Parts List for Control Unit C-113/TRA-2—Continued

Ref. symbol	Signal Corps stock No.	Name of part and description	Quantity per unit	Running spares	Organization stock	3d ech.	4th ech.	5th ech.	Depot stock
J2	2Z5531.25	JACK: telephone; special; sleeve and tip, no contacts; over-all dimensions, $3\frac{1}{2}$ " x $\frac{9}{16}$ " x $\frac{9}{16}$ "; $\frac{3}{8}$ "-32 thread on sleeve; single panel mounting; FTR-UA-12054.	1			(*)	(*)		(*)
PI-1	2C684-113/L1	LABEL: circuit; laminated vinylite; $9\frac{3}{8}$ " x $6\frac{1}{8}$ "; schematic wiring diagram; FTR-UP-24145.	1		(*)	(*)	(*)		(*)
	2Z5889-3	LAMP: pilot; neon; bayonet type; over-all dimensions, $1\frac{1}{2}$ " long x $\frac{5}{16}$ " diam; W. E. JCG No. 991.	1		(*)	(*)	(*)		(*)
P6	2Z5885-12	LAMP MOUNTING ASSEMBLY: clear facet jewel $1\frac{1}{2}$ " diam; metal housing; over-all dimensions, $2\frac{1}{8}$ " x $1\frac{1}{2}$ " diam; panel mounting; for neon lamp; Dial Light Co. type No. NE915.	1			(*)	(*)		(*)
P1	6Z1727	PLUG: male; 10 amp, 250 v; 15 amp, 125-v; 2 parallel blade prongs; metal body with cord clamps; $\frac{3}{8}$ " diam cord hole; over-all dimensions, $1\frac{1}{2}$ " diam x $1\frac{3}{4}$ " long; for power supply outlet; Hubbell 7057.	1			(*)	(*)		(*)
P7	2Z3025-5	PLUG: male; 5-pin prongs attached to insulated wire; mounted on black bakelite insulation strip with metal jacket; over-all dimensions, $6\frac{1}{4}$ " x $3\frac{3}{4}$ " x $\frac{5}{8}$ "; for connection to transmitter; FTR-UA-12056, special.	1			(*)	(*)		(*)
AI-1	2Z7168	PROTECTOR BLOCK: ceramic with carbon insert; over-all dimensions $1\frac{1}{4}$ " x $\frac{3}{8}$ " x $\frac{1}{4}$ " with $\frac{3}{16}$ " wide x $\frac{3}{16}$ " high slot through center to hold carbon block; for line protection; W. E. type No. 27.	1		(*)	(*)	(*)		(*)
AI-2	4E927	RECTIFIER: selenium; half-wave; output, 56 v, 130 ma; ambient temp 50° C; 14 disks, 12 disks active; 18-v per disk max 75-ma; center-tapped for full-wave bridge circuit; over-all dimensions, $3\frac{1}{2}$ " x $1\frac{1}{2}$ " diam; bolt mounting at each end; FTR-UA-12005.	2			(*)	(*)		(*)
RE1	3H4956-60	RELAY: telephone; 4-pole, 3 make contacts and 1 break; 2 concentric coils, each 200 ohms; d-c operation; rectangular case with dust cover; over-all dimensions, $5\frac{1}{2}$ " x $1\frac{1}{2}$ " x $1\frac{1}{4}$ "; FTR-UR-1145.	2			(*)	(*)		(*)
RL1	2Z7598-26	RESISTOR: fixed; carbon; 2,000-ohm $\pm 5\%$; $\frac{1}{2}$ -watt; bakelite insulation; $\frac{3}{8}$ " long x $\frac{1}{8}$ " diam; Allen-Bradley type EB.	1			(*)	(*)		(*)
R1	3RC20BE20J	RESISTOR: fixed; carbon; 20,000 ohm $\pm 5\%$; $\frac{1}{2}$ -watt; bakelite insulation; $\frac{3}{8}$ " long x $\frac{1}{8}$ " diam; Allen-Bradley type EB.	1			(*)	(*)		(*)
R2	3Z6620-1	RESISTOR: fixed; wire-wound; 4,700-ohm $\pm 5\%$; 8-watt; 2 terminal lug connections; over-all dimensions, $2\frac{1}{2}$ " long x $\frac{5}{8}$ " diam; IRC type DG with C coating.	1			(*)	(*)		(*)
R3	3Z6470-30	SCREW: panel; special; knurled head; $\frac{3}{8}$ " long, $\frac{5}{16}$ " diam; threaded portion $8-32$ x $\frac{3}{8}$ "; over-all length $1\frac{1}{8}$ "; to secure control unit to case; FTR-UP-24048.	4		(*)	(*)	(*)		(*)
S2	6L20808-18K	SWITCH: toggle; on momentary off action; molded bakelite body; over-all dimensions, exclusive of terminals and handle, $1\frac{1}{4}$ " x $\frac{3}{4}$ " x $\frac{3}{4}$ "; bushing $\frac{1}{2}$ " long x $\frac{1}{16}$ " diam; $\frac{5}{8}$ " long handle; for intercommunication; Cutler-Hammer 8829K4.	1			(*)	(*)		(*)
S1	3Z9849.39 1	SWITCH: toggle; (SPST); molded bakelite body with metal jacket; overall dimensions, exclusive of terminals and handle, $1\frac{1}{4}$ " x $\frac{5}{8}$ " x $\frac{5}{8}$ "; bushing $\frac{1}{2}$ " long x $\frac{1}{16}$ " diam; $\frac{5}{8}$ " long handle; for power supply control; Cutler-Hammer 8803K5.	1			(*)	(*)		(*)
TH1	4Z7440.1	THERMISTOR: over-all dimensions, $3\frac{1}{2}$ " x $1\frac{3}{8}$ " x $\frac{1}{8}$ "; 2 each 8-32 bolt mounting, $\frac{5}{8}$ " mounting centered; thermistor-type volume limiter with 2 solder lug terminals; W. E.—D167019.	1			(*)	(*)		(*)
T3	2Z9612.108	TRANSFORMER: power; primary, 115 or 230-v a-c, 50-60-cycles; secondary, 78-v a-c; over-all dimensions, $2\frac{1}{2}$ " x $2\frac{1}{4}$ " x $1\frac{1}{8}$ "; 4 each 6-32 tapped mounting holes at each corner; $1\frac{3}{4}$ " mounting centered on length,	1			(*)	(*)		(*)

T2	229614-92	1½" mounting centered on width; with 6 terminal soldering lugs; FTR-UA-12000.					(*)	(*)	(*)
VI	429737	TRANSFORMER: volume limiting; inductance of primary 0.58-h, 1-v at 300 cps; bridging loss of 2 db at no dbm level in a 600-ohm circuit at 1,000 cps with 5 megohms across secondary; over-all dimensions, 1½" x 1½" x 1¼"; 2 each 6-32 tapped mounting holes, 1½" mounting centered diagonally across; with 5-terminal soldering lugs; for volume control; FTR-UA-12002.					(*)	(*)	(*)
		VARISTOR: thalium-copper-oxide rectifier; over-all dimensions, 1½" long x ¾" diam stack; mounted on moulded bakelite base 1½" x 1" x ¼"; click eliminator for phone circuit; W.E. D-166297.							

15. Maintenance Parts List for Remote Control Unit C-112/TRA-2

P-101, P-102, P104, P-105.	3Z314	BINDING POST TM-214					(*)	(*)	(*)
	3Z9849-39-1/B1	BOOT: rubber; Cutler-Hammer No. 86971W6; assembled with nickel-plated brass washer, Cutler-Hammer No. 816-132F1; special nut, Cutler-Hammer No. 86971W5; neoprene washer, Cutler-Hammer No. 16-900-5; for weatherproofing of toggle switches, Cutler-Hammer No. 8803K5.					(*)	(*)	(*)
	3G1837-4.4	BUSHING: special; bakelite; OD ¾", ID ½", ¼" thick; insulates jacks from panel; FTR-UP-24053.					(*)	(*)	(*)
	3G1837-6.9	BUSHING: bakelite; ½" diam x ¾" high with ¼" hole thru center and ½" guide hole on outer surface; insulates binding post; FTR-UP-12042.					(*)	(*)	(*)
C-102.	2Z1612.2	CAP AND CHAIN: aluminum; 1½" diam x ¼" H; chain 3½"; cover for female receptacle AN3102-16S-IS; Amphenol No. 9760-16.					(*)	(*)	(*)
	3DB2.202H	CAPACITOR: fixed; paper; 2-mf ± 10%; 200-v d-c (working); rectangular can 1¼" x 2½" x 1"; 2 porcelain-insulated terminals ¼" high, spaced ¼" apart; Tobe Deutschman type TRS-202-H.					(*)	(*)	(*)
C-101.	3DB8-121	CAPACITOR: fixed; paper; 8-mf ± 10%; 200-v d-c (working); rectangular can 3¾" x 3½" x 1¼"; 2 porcelain insulated terminals 1½" high, spaced 1½" apart; Tobe Deutschman type TRS-802-U.					(*)	(*)	(*)
	3E1318	CORD CD-318					(*)	(*)	(*)
	3E1874	CORD CD-874: 10-ft.					(*)	(*)	(*)
	4B420-19	CHEST SET H-19()/U					(*)	(*)	(*)
	2C684-112/G1	GASKET: neoprene; 1¼" square with ¾" diam hole, ½" thick; seals receptacle; FTR-UP-24157.					(*)	(*)	(*)
	2B830	HEADSET HS-30()					(*)	(*)	(*)
	3C1838-14.5	INSULATOR: phenolic; 7/16" diam x 1/16" thick with ¼" hole through center; insulates binding post; FTR-UP-24055.					(*)	(*)	(*)
J102-1, J102-2, J102-3.	2Z5531.24	JACK: telephone; special, 5 contacts, one break, one make and break; over-all dimensions, 3½" x ¼" x ¼"; ¼"-32 thread on sleeve; single panel mounting; FTR-UA-12052.					(*)	(*)	(*)
J103-1, J103-2, J103-3.	2Z5531.26	JACK: telephone; special; sleeve tip and ring, no contacts; over-all dimensions, 3½" x ¼" x ¼"; ¼"-32 thread on sleeve; single panel mounting; FTR-UA-12053.					(*)	(*)	(*)
J101	2Z5531.25	JACK: telephone; special; sleeve and tip, no contacts; over-all dimensions, 3½" x ¼" x ¼"; ¼"-32 thread on sleeve; single panel mounting; FTR-UA-12054.					(*)	(*)	(*)
	2Z3352.51	JACK COVER ASSEMBLY: olive drab, wrinkle-finish; over-all dimensions, 1" long x ¾" wide x ¼" deep; FTR-UA-12043.					(*)	(*)	(*)

*Indicates stock available.

15. Maintenance Parts List for Remote Control Unit C-112/TRA-2—Continued

Ref. symbol	Signal Corps stock No.	Name of part and description	Quantity per unit	Running spares	Organization stock	3d ech.	4th ech.	5th ech.	Depot stock
	2ZK5822-22	KNOB: bar; pointer; black bakelite; white line engraved; 1/4" shaft diam; over-all dimensions, 1 1/4" long x 7/16" wide x 5/8" deep; center circular section 3/4" diam; Eby No. UA-12045.	1		(*)	(*)	(*)		(*)
	2C684-112/L1	LABEL: circuit; laminated vinylite; 12" x 4 1/2"; FTR-UP-24139	1		(*)	(*)	(*)		(*)
	2C684-112/L2	LABEL: hook-up; laminated vinylite; 12" x 8 1/4"; block diagram and oper. inst.; FTR-UP-24140.	1		(*)	(*)	(*)		(*)
	6C51	LOUDSPEAKER LS-11	1		(*)	(*)	(*)		(*)
	2B1645	MICROPHONE T-45	1		(*)	(*)	(*)		(*)
	6L3506-32-1	NUT: steel; 3/8"-32; 3/8" diam counterbored ring, 3/8" across flats, 1/4" high; holds jack cover to jacks and switch; FTR-UP-24037 special.	8		(*)	(*)	(*)		(*)
	2ZK3096-31	RECEPTACLE: female; 7-contact; molded black bakelite; 1" x 3/8" diam; in aluminum shell; flush chassis mounting with 4 mounting holes; 1 1/2" square base; body dimensions 2 3/2" x 1" diam; Amphenol No. AN3102-16S-1S.	1			(*)	(*)		(*)
RL-101	2Z7598-25	RELAY: telephone; single-pole, break-contact; 3 concentric coils, 16, 60, and 61 ohms; d-c operation; rectangular case with dust cover; over-all dimensions, 5" x 1 5/8" x 1 1/4"; FTR-UR-1146.	1			(*)	(*)		(*)
R-104-1, R-104-2, R-104-3	3Z6025-55	RESISTOR: fixed; carbon; 250-ohm $\pm 5\%$; 1/2-watt; Allen-Bradley type EB.	3			(*)	(*)		(*)
R-101	3Z6400-55	RESISTOR: fixed; carbon; 4,000-ohm $\pm 5\%$; 1/2-watt; bakelite insulation; 3/8" long x 1/2" diam; Allen-Bradley type EB.	1			(*)	(*)		(*)
R-102	3Z6610-10	RESISTOR: fixed; carbon; 10,000-ohm $\pm 5\%$; 1/2-watt; bakelite insulation; 3/8" long x 1/2" diam; Allen-Bradley type EB.	1			(*)	(*)		(*)
R-103-1, R-103-2	3Z6010-146	RESISTOR: fixed; wire-wound; 100-ohm $\pm 5\%$; 2-watt; IRC type AA with C coating.	2			(*)	(*)		(*)
	6L20808-18K	SCREW: panel; special; knurled head; 3/8" long x 3/16" diam; threaded portion 8-32 x 3/8"; over-all length 1 1/2"; to secure control unit to case; FTR-UP-24048.	4		(*)	(*)	(*)		(*)
	2Z9049.14	STRAP: carrying; webbing type 3, olive drab; 9" long x 1 1/2" wide, with metal buckle and metal tip on end; per US spec. 6-185C with amend. No. 1; FTR-UA-12046.	1		(*)	(*)	(*)		(*)
S102	3Z9825-62.120	SWITCH: rotary; (DPST); single wafer; 3/8" diam hole mounting; bakelite insulation; special type 22 for screwdriver actuation; 1" x 3/8"; 1/4" diam shaft; line switch; Oak Mfg. No. UA-12031.	1			(*)	(*)		(*)
S101	3Z9825-62.121	SWITCH: rotary; 1-pole, 3-position; bakelite insulation; single wafer; type 27; 3/8" diam hole mounting; 1 1/4" x 1 1/4"; 1/4" shaft 3/8" long; Oak Mfg. No. UA-12030.	1			(*)	(*)		(*)
V101	4Z9737	VARIABLE: thalium-copper-oxide rectifier; over-all dimensions, 1 1/2" long x 7/8" diam stack; mounted on moulded bakelite base 1 5/8" x 1" x 1/4"; click eliminator for phone circuit; W. E. D-166297.	2			(*)	(*)		(*)

16. Maintenance Parts List for Chest Unit H-19 ()/U

4B1109F/19	CAP: transmitter; W. E. Co. No. P456235.	1	(*)	(*)	(*)	(*)
3E4036-9-1	CORD: 9'; 2-conductor; W. E. Co. No. D166789; (connects transmitter to switch)	1	(*)	(*)	(*)	(*)
3E4036-120-12	CORD: 10'; 3-conductor; W. E. Co. No. D167013; complete with Plug PL-68.	1	(*)	(*)	(*)	(*)
4B420-19/G1	GASKET: 1.875" x 3.312" x 1/4"; Garlock 7021; compressed asbestos fiber sheet packing per W. E. Co. HES671310-5; (seals switchblock).	1	(*)	(*)	(*)	(*)
6L6632-8-1.7B	SCREW: machine; brass; fillister-head; No. 6-32 x 1/2"; black nickel finish; (mounts switchblock).	4	(*)	(*)	(*)	(*)
4B1357/4	STRAP ASSEMBLY: consists of adjustable strip of black cotton webbing 3/4" wide and 19" long; with snap clip on each end; per W. E. Co. ES673136-2.	1	(*)	(*)	(*)	(*)
3Z9819-4	SWITCHBLOCK ASSEMBLY: W. E. Co. HES671275-5, complete with button; spring contacts, and screws; per W. E. Co. HES671310-6.	1	(*)	(*)	(*)	(*)
4B1356/2	TRANSMITTER CASE: W. E. Co. HES671417-2; complete with cord, stud, capacitor, spring contacts, and screws; per W. E. Co. HES671418-1.	1	(*)	(*)	(*)	(*)
4B1109F/3	TRANSMITTER UNIT: W. E. Co. No. D141914.	1	(*)	(*)	(*)	(*)

17. Maintenance Parts List for Headset HS-30 ()

2B1300	INSERT M-300	2	(*)	(*)	(*)
3Z10161	TERMINAL TM-161: ring; tip-solderless	4	(*)	(*)	(*)
3Z10163	TERMINAL TM-163: spade; tip-solderless	2	(*)	(*)	(*)

*Indicates stock available.

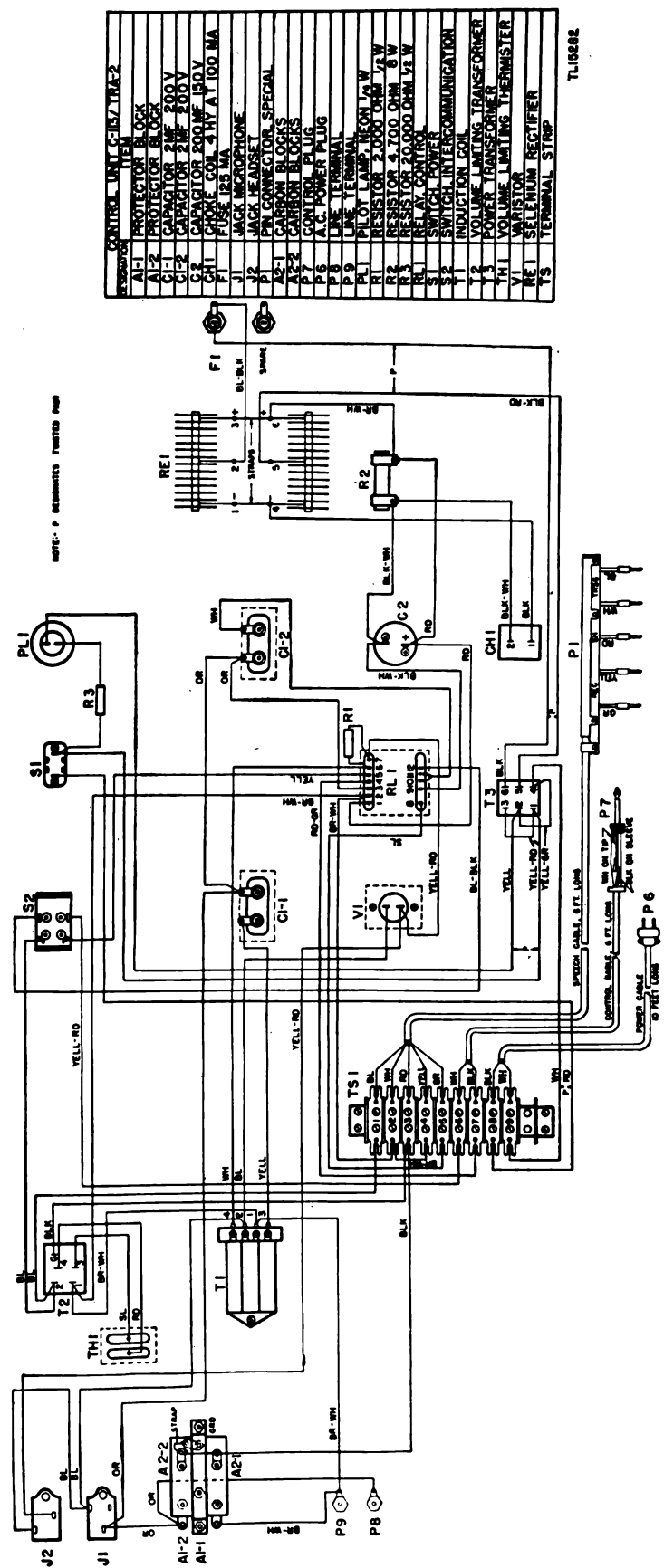


Figure 15. Control unit C-113/TRA-2, wiring diagram.

RESERVATION	ITEM
C 102	CAPACITOR 5MF 200 V
C 101	CAPACITOR 5MF 200 V
J 101	JACK, LOUD SPEAKER
J 102-1	JACK, HEADSET
J 102-2	JACK, HEADSET
J 102-3	JACK, HEADSET
J 103-1	JACK, MICROPHONE
J 103-2	JACK, MICROPHONE
J 103-3	JACK, MICROPHONE
P 101	LINE TERMINAL LINE 1
P 102	LINE TERMINAL LINE 1
P 103	CONTROL CABLE RECEPTACLE
P 104	LINE TERMINAL LINE 2
P 105	LINE TERMINAL LINE 2
R 101	RESISTOR 4,000 OHM 1/2 W
R 102	RESISTOR 10,000 OHM 1/2 W
R 103-1	RESISTOR 100 OHM 2 W
R 103-2	RESISTOR 100 OHM 2 W
R 104-1	RESISTOR 250 OHM 1/2 W
R 104-2	RESISTOR 250 OHM 1/2 W
R 104-3	RESISTOR 250 OHM 1/2 W
S 101	SWITCH, VOLUME
S 102	SWITCH, LINE (SCREW SLOT)
S 103	SWITCH, INTERCOMMUNICATION
RL 101	RELAY CONTROL
V 101	VARIATOR

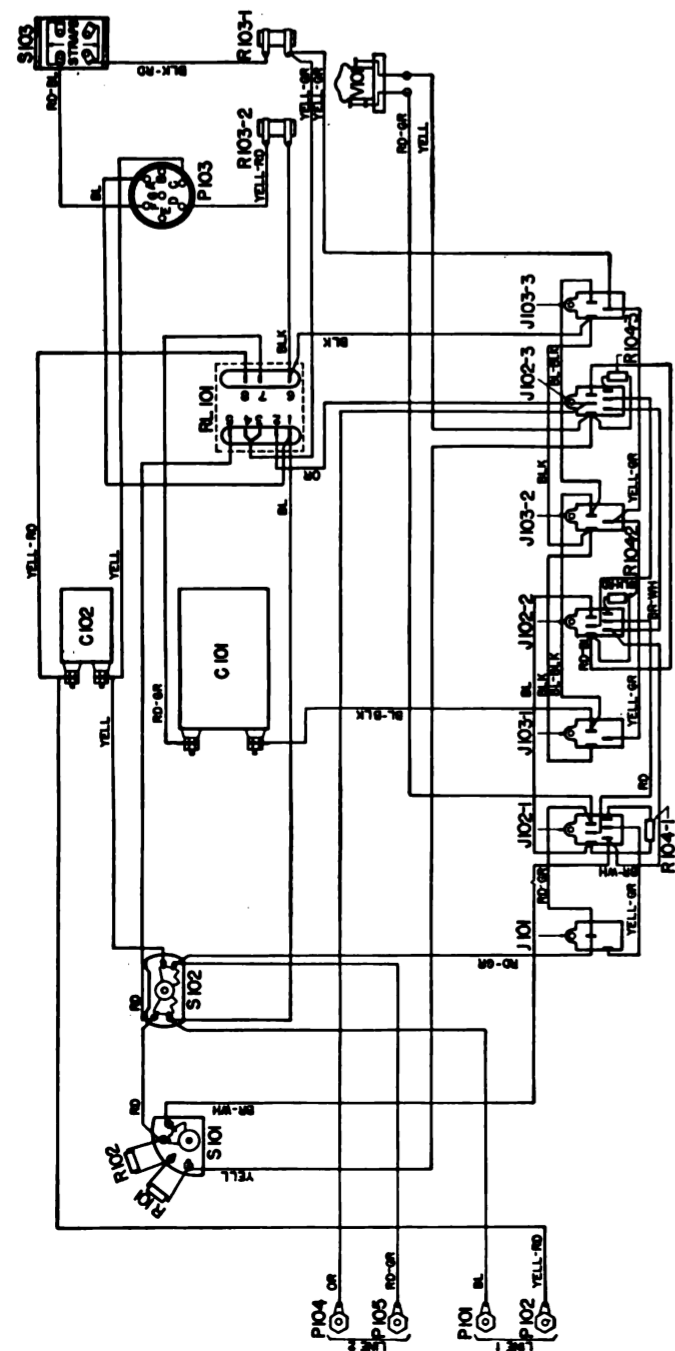


Figure 16. Remote control unit C-112/TRA-2, wiring diagram.

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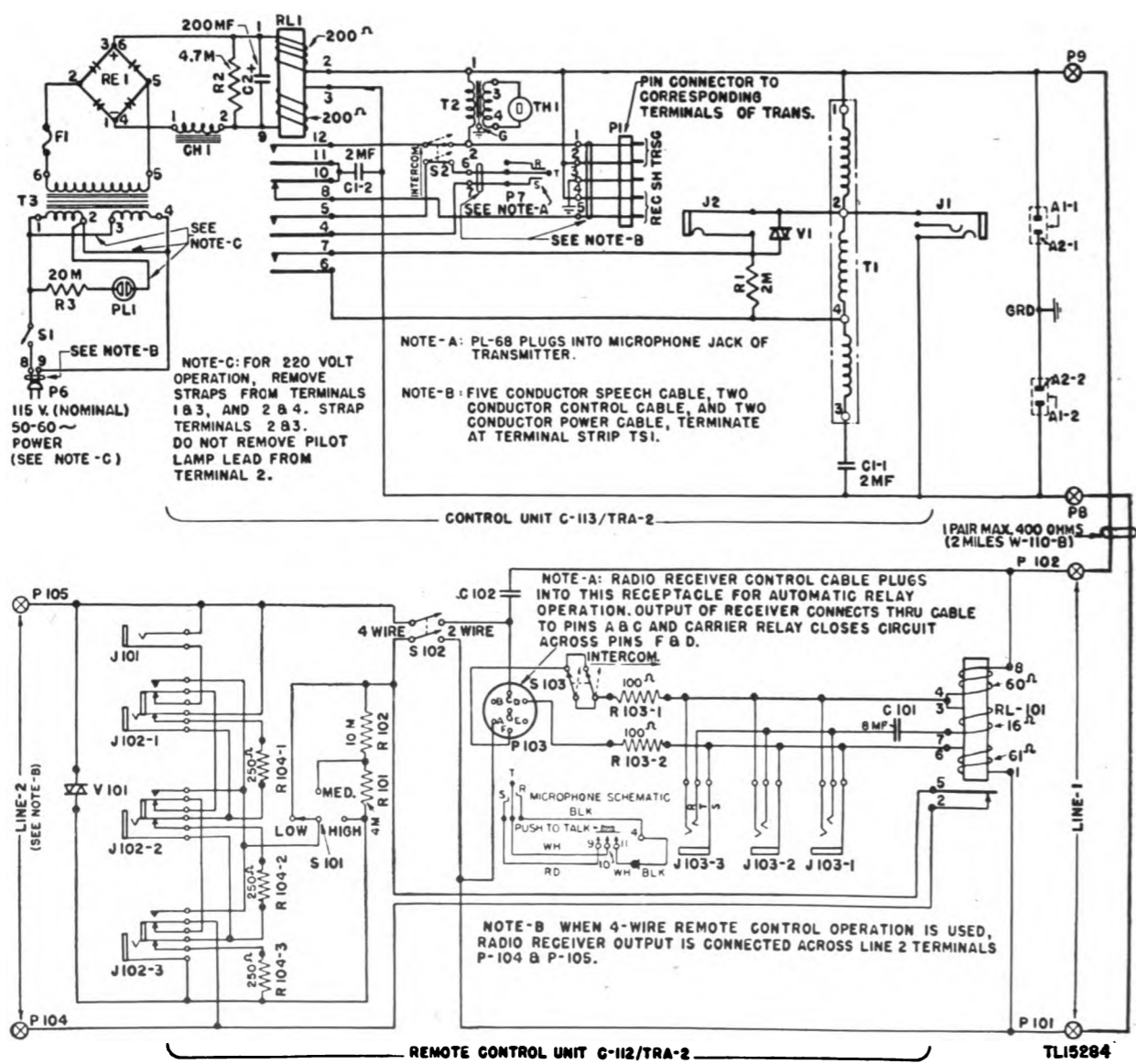
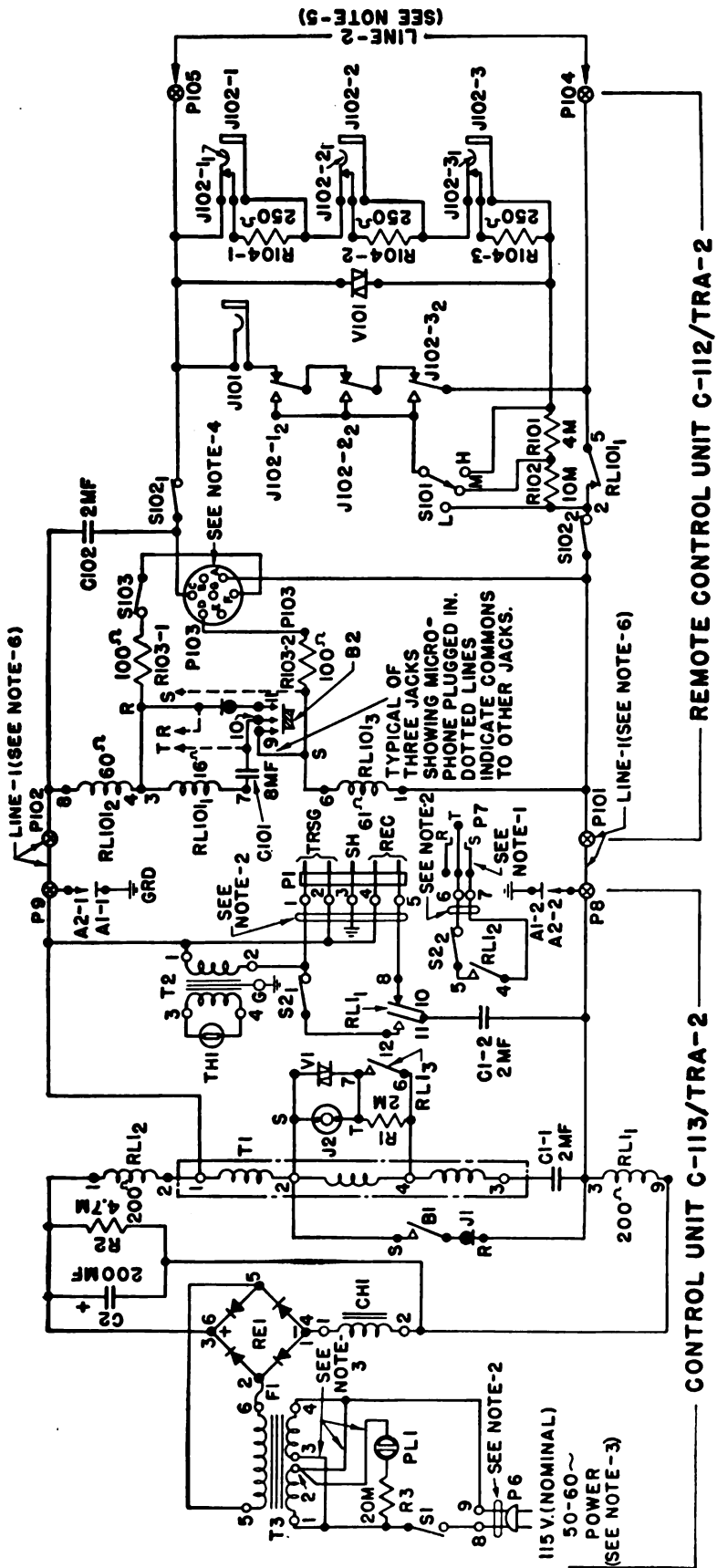


Figure 17. Over-all schematic diagram.



TL15561

- and similarly Coils RL101, RL101a, and RL101b, are 3 concentric windings of Relay RL101.
8. Associated contact springs of relays, jacks, and switches are designated by the respective component designation and a subscript numeral indicating the number of contact sets operated by the same component.
 9. Back contacts of relays and jacks (contacts closed when component is in non-operated condition) are shown black, and front contacts (contacts closed when component is in operated condition) are shown white.
 10. S, T, and K represent sleeve, tip and ring of jacks and plugs replaced by the schematic symbol of the device connected by such means, for simplification of the circuit diagram.
 11. B1 and B2 are push-to-talk buttons of respective microphones.

Figure 18. Simplified over-all schematic diagram.

- Notes:**
1. Plug PL-68 plugs into microphone, jack of transmitter.
 2. 5-conductor speech cable, 2-conductor control cable, and 2-conductor power cable, terminate at Terminal Strip TS1.
 3. For 220-volt operation, remove straps from terminals 1 and 3, and 2 and 4. Strap terminals 2 and 3. Do not remove pilot lamp lead from terminal 2.
 4. Radio-receiver control cable plugs into this receptacle for automatic relay operation. Output of receiver connects through cable to pins A and C and carrier relay closes circuit across pins F and D.
 5. When 4-wire remote control operation is used, radio-receiver output is connected across line 2 terminals, P104 and P105.
 6. Wiring between units consists of 1 pair maximum 400 ohms (2 miles W-110-B).
 7. Coils RL1, RL1a, and RL1b, are three concentric windings of Relay RL1;



