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WAR DEPARTMENT TECHNICAL MANUAL

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TELEGRAPH SETS

TG-5, TG-5-A, AND TG-5-B

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WAR DEPARTMENT TECHNICAL MANUAL
TM 11–351

This manual supersedes TM 11–351, 22 September 1941, including C 1, 23 January 1942, C2, 22 July 1943; TB 11–351–1, 23 June 1944, and TB 11–351–2, 4 November 1944.

TELEGRAPH SETS

TG-5, TG-5-A, AND TG-5-B

WAR DEPARTMENT *JUNE 1945*

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WAR DEPARTMENT

Washington 25, D. C., 15 June 1945

TM 11–351, Telegraph Sets TG–5, TG–5–A, and TG–5–B, is published for the information and guidance of all concerned.

[AG 300.7 (21 Dec 44)]

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G. C. MARSHALL
Chief of Staff

OFFICIAL:

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The Adjutant General

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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—Interrupter, relay, key, terminal blocks, and case.

2. Cut—Chassis wiring, cords, and case.

3. Burn—All remaining equipment, smashed parts, Technical Manuals, circuit labels, and traffic diagrams.

4. Bury or scatter—All of the above pieces after destroying their usefulness.

DESTROY EVERYTHING

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Figure 1. Telegraph Set TG–5–B in use.

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PART ONE
INTRODUCTION

Section I. DESCRIPTION OF TELEGRAPH SETS TG–5, TG–5–A, AND TG–5–B

1. General

a. CHARACTERISTICS. Telegraph Set TG–5–(*) is a portable, open-circuit, field set designed for telegraph communication over short lines. The set may be used on ground return circuits obtained by simplexing a telephone circuit, or on other ground return or metallic circuits. The range of the equipment will vary with the type of line wire used, the condition of the wire, whether the wire is wet or dry, and whether the wire is on the ground or in the air. The telegraph set will operate satisfactorily over field wire circuits of any length likely to be encountered within divisions or subordinate units, provided the lines are well constructed.

b. NOMENCLATURE. Telegraph Sets TG–5, TG–5–A, and TG–5–B are referred to in this manual as Telegraph Set TG–5–(*). Such nomenclature refers to any one or all of the above three models. Similarly, Relay BK–7–(*) refers to Relays BK–7, BK–7–A, and BK–7–B; Case CS–49–(*) refers to Cases CS–49 and CS–49–A; Key J–41–(*) refers to Keys J–41 and J–41–A; Interrupter BZ–7–(*) refers to Interrupters BZ–7–A, BZ–7–C, BZ–7–J, and BZ–7–N; and Interrupter BZ–5–(*) refers to Interrupters BZ–5 and BZ–5–G.

2. Description

a. CASE CS–49–(*) (fig. 2). The case is made of heavy olive-drab canvas with leather reinforced bottom and corners. The cover is hinged at the back, overlaps the sides and front, and fastens in front with a snap fastener. Sewed to the sides of the case is an adjustable carrying strap approximately 2 inches wide and 85 inches long.

b. Box (figs. 3, 4, and 5). The box which contains the circuit elements of Telegraph Set TG–5–(*) is constructed of sheet metal and is approximately 5½ inches high, 10 inches long, and 5½ inches deep. The box is provided with a hinged front and cover. When closed, the cover projects over the front edge of the box and holds the front in place. In the closed position a spring catch on the front engages with a hasp mounted on the cover and serves to hold the cover closed. When open, the front folds down

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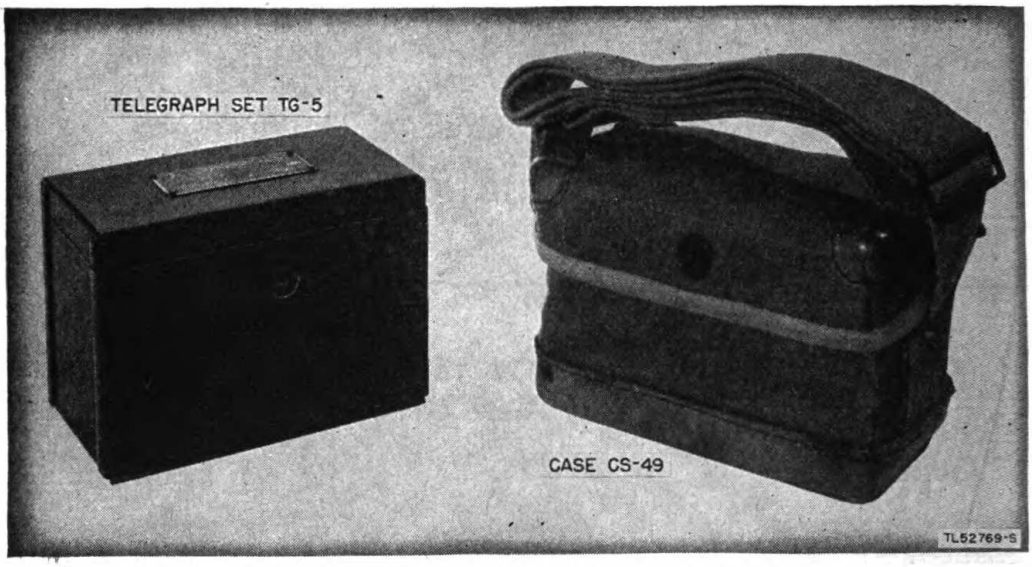


Figure 2. Telegraph Set TG–5 and Case CS–49.

to form a shelf upon which Key J–41–(*) is mounted. A wiring diagram of Telegraph Set TG–5–(*) is mounted on the inside of the cover. On the inside of the box, near the back, a compartment is provided for installing one Battery BA-2. To the right of this compartment a space is provided for storing the headset when not in use. In the rear of the box, a hinged door, held in place by a locking screw, provides access to the battery compartment which is designed to hold two Batteries BA–30. (See fig. 6.)

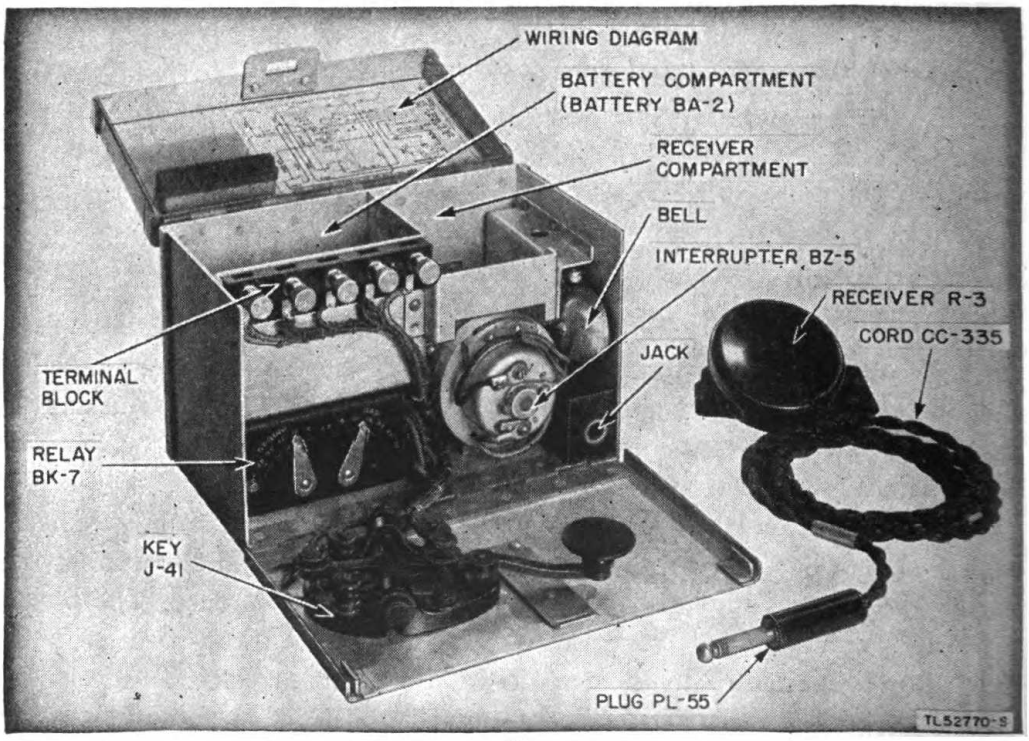


Figure 3. Telegraph Set TG–5, cover open.

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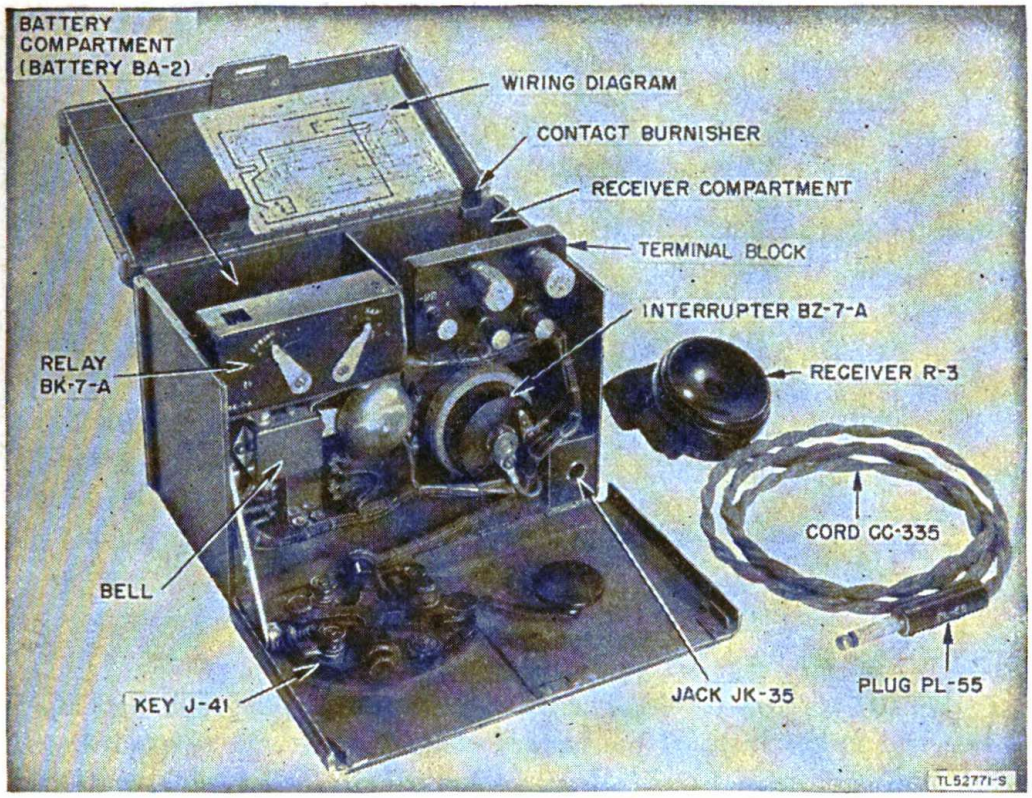


Figure 4. Telegraph Set TG–5–A, cover open.

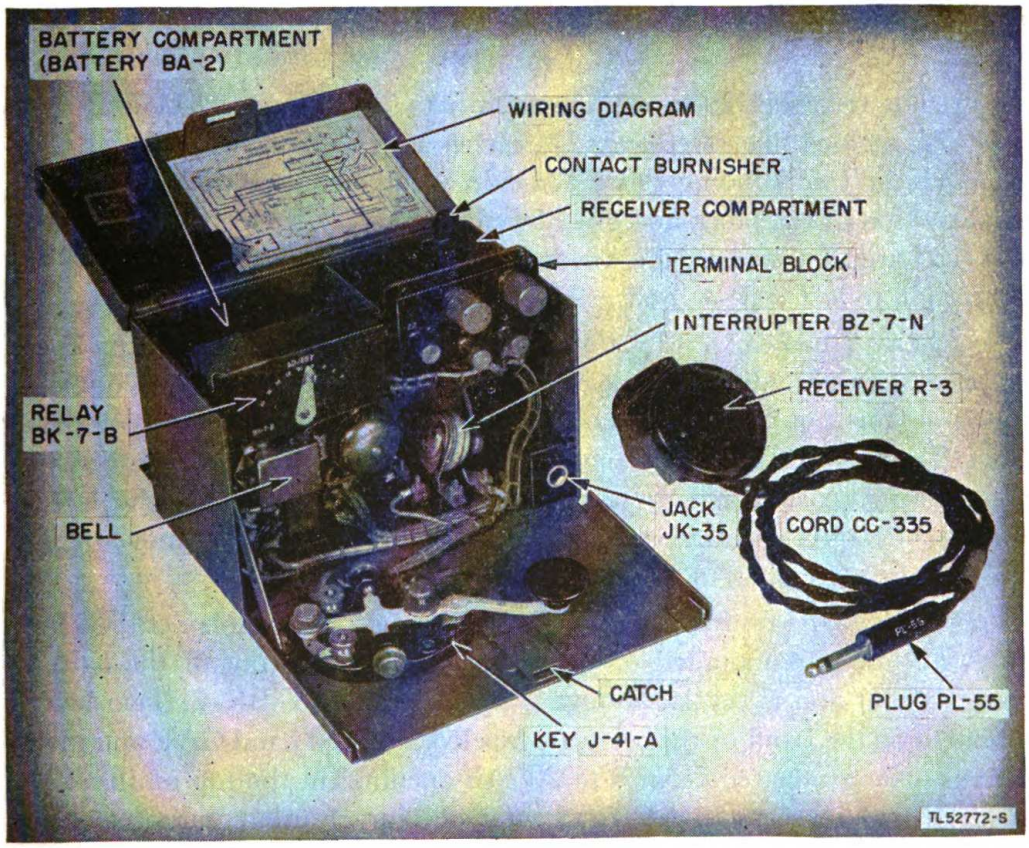


Figure 5. Telegraph Set TG–5–B, cover open.

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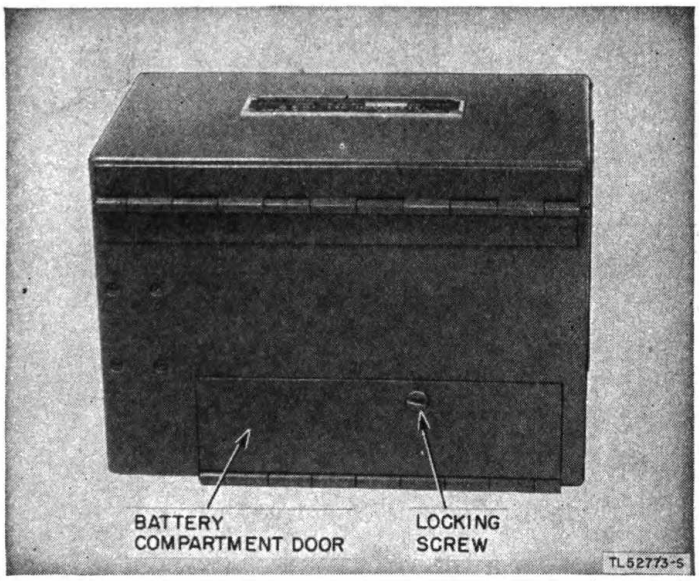


Figure 6. Telegraph Set TG–5–B, rear view.

c. TERMINAL BLOCK. (1) The terminal block on Telegraph Set TG–5 is fastened to the front of the battery compartment with two screws. It consists of a piece of bakelite 4 inches long, 7/16 inches wide, and 5/16 inches thick. Five Binding Posts TM–150 are mounted on the terminal block and are labeled from left to right −3V, +, 22V−, L1, and L2. (See fig. 3.)

(2) The terminal block on Telegraph Sets TG–5–A and TG–5–B consists of a molded phenolic block 2⅞ inches long, 1⅝ inches wide, and ⅜ inches thick. Two Binding Posts TM–175 are mounted on the upper right-hand portion of the block and are labeled L1 and L2. Three Binding Posts TM–150 are mounted on the lower portion of the block and are labeled, from right to left −3, +, and −22. (See figs. 4 and 5.)

d. RELAY BK–7–(*). (1) *Relay BK–7.* Relay BK–7 is used in Telegraph Set TG–5 only. The relay is contained in a black bakelite housing and is mounted on the left side of the box just below the battery compartment. The front of the relay contains two levers for the adjustment of the relay spring tension and the armature air gap. The lever on the left is labeled SPRING and the one on the right GAP. Both levers move over a scale graduated from 0 to 30. (See fig. 3.)

(2) *Relay BK–7–A.* Relay BK–7–A is part of Telegraph Set TG–5–A only. The relay is mounted on a bracket directly in front of the battery compartment and is similar in appearance to RELAY BK–7. Two levers mounted on the front of the relay are labeled SPRING and GAP and move over a scale graduated from 0 to 20. An opening, in the top of the relay case, provides access to the relay contacts for cleaning purposes. (See fig. 4.)

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(3) *Relay BK–7–B.* Relay BK–7–B is part of Telegraph Set TG–5–B only. The relay is mounted on a bracket in front of the battery compartment and is similar in appearance to Relays BK–7 and BK–7–A. One lever, mounted on the front of the relay case, is labeled ADJUST and moves over a scale graduated from 0 to 40. The armature remains in a fixed position in this relay and the lever adjusts only the spring tension on the movable contact. An opening, in the top of the relay case, provides access to the relay contacts. This opening is provided with a small clip-on metal cover. (See fig. 5.)

e. BELL (figs. 3, 4, and 5). The bell used in Telegraph Set TG–5–(*) is a d-c vibrator type and is fitted with a 1¼-inch gong. A small screw on the side of the bell frame provides a means of adjusting the distance between the fixed contact and the movable contact mounted on the clapper arm. In Telegraph Set TG–5 the bell is mounted between the receiver compartment and the right side of the case. In Telegraph Sets TG–5–A and TG–5–B the bell is mounted directly under the relay.

f. INTERRUPTER BZ–5 (fig. 3). Interrupter BZ–5 is part of Telegraph Set TG–5 only. The interrupter (howler) serves as a local tone source for the operator and consists of a double carbon button mounted against the diaphragm of a telephone receiver. When operating, the interrupter produces a steady tone of approximately 1,000 cycles per second. The interrupter is mounted in front of the receiver compartment by means of two screws through the bottom of the box.

g. INTERRUPTER BZ–5–G. Interrupter BZ–5–G consists of two single carbon buttons mounted side by side against a common transmitter diaphragm and this combination mounted directly over two receiver diaphragms. When operating, the interrupter produces a continuous tone of approximately 1,000 cycles.

h. INTERRUPTERS BZ–7–A, BZ–7–C, AND BZ–7–J (fig. 4). Interrupter BZ–7–A, BZ–7–C, or BZ–7–J is part of Telegraph Set TG–5–A only and is mounted by means of two screws through the bottom of the box, immediately in front of the receiver compartment. It consists of a single carbon button mounted against a receiver diaphragm. When operating, the interrupter produces a continuous tone of approximately 1,000 cycles per second.

Note. Interrupter BZ–5 and Interrupters BZ–7–A, BZ–7–C, and BZ–7–J will operate only in the vertical position.

i. INTERRUPTER BZ–7–N (fig. 5). Interrupter BZ–7–N is part of Telegraph Set TG–5–B and is mounted in front of and below the receiver compartment. This interrupter is electrically similar to Interrupter BZ–7–A but much smaller in size, and is designed to operate when held in any position.

j. JACK JK–35 (figs. 3, 4, and 5). Jack JK–35 is a tip-sleeve type jack with an extra set of contacts, equivalent to a single-pole, double-throw

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switch, operated by the tip spring. The jack is mounted in the lower right-hand corner of the box.

k. KEY J–41–(*) (figs. 3, 4, and 5). Key J–41–(*) is an open-circuit telegraph type key mounted on a molded phenolic base which, in turn, is mounted on the folding front portion of the box. The key contains two sets of contacts, one set toward the front of the key lever and the other at the back. In the normal position, the front contacts are open and the back contacts are closed. Three binding posts, two on the right and one on the left, are provided for connecting the key into the circuit. A knurled screw and locknut at the rear of the key lever provides a means of adjusting the opening between the front contacts. Another knurled screw and locknut toward the front of the lever is used to adjust the tension of the spring which keeps the front contacts open. The key lever is mounted on the frame by means of two knurled screws threaded through the sides of the frame.

l. HEADSET HS–20 (figs. 3, 4, and 5). Headset HS–20 consists of Receiver R–3, Cord CC–335, and Plug PL–55.

(1) The receiver is the magnetic type having a d-c resistance of approximately 80 ohms. The receiver is contained in a watch type case having an adjustable web headband fastened to brackets on the sides of the case.

(2) The cord consists of approximately 4 feet of two-conductor, twisted, rubber- and braid-covered cord terminating in Plug PL–55.

3. Packing for Export

Telegraph Set TG–5–(*) is packed for export in the following manner:

a. One dustproof bag containing 4 ounces of silica gel is placed in the large battery compartment, and two dustproof bags each containing 1 ounce of silica gel are placed in the rear battery compartment.

b. The telegraph set is placed in its carrying case and the cover snapped shut.

c. The telegraph set is then placed in a fiberboard container with the front of the set up. The strap is neatly folded on the front of the case. One pound of silica gel in a dustproof bag is placed beside the folded strap.

d. The fiberboard container is then closed, sealed, and wrapped in a moistureproof and vaporproof paper. (See fig. 7.)

e. This container and wrapping is then placed in a fiberboard box and sealed with gummed tape.

f. If more than one telegraph set is to be shipped at one time, six sets are placed in a nailed wooden crate approximately 23 inches wide, 23 inches deep, and 23 inches long. (See fig. 8.)

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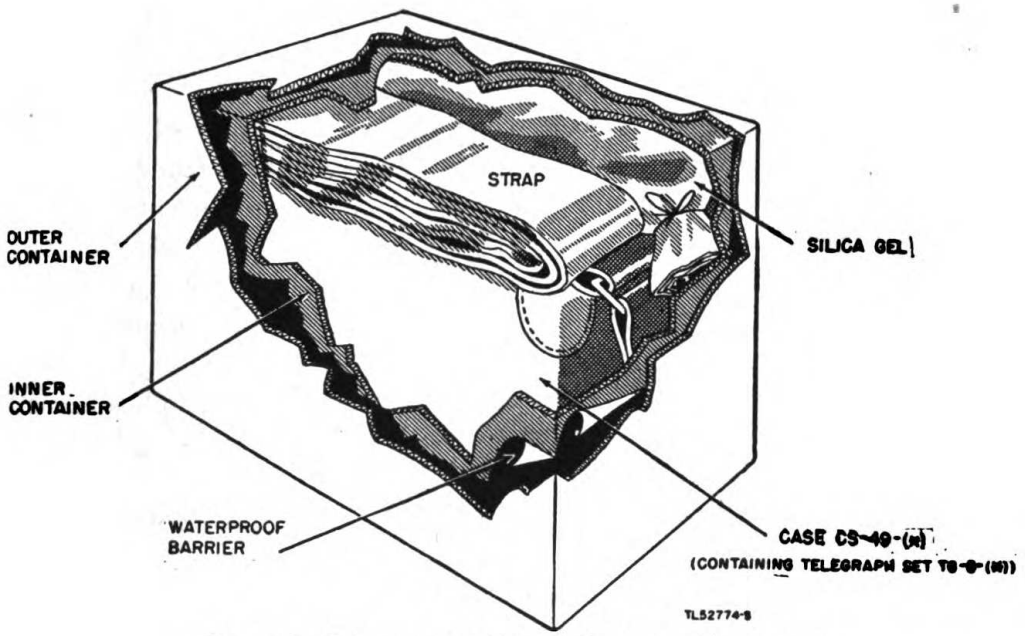


Figure 7. Telegraph Set TG–5–B, packed for export.

4. Differences in Models of Telegraph Set TG–5–(*)

The differences in models of components of Telegraph Set TG–5–(*) are described in paragraph 2. Operation is the same for all models with the exception of the adjustment of Relay BK–7–(*). This adjustment is covered in section V. Telegraph Set TG–5 weighs approximately 6 pounds and Telegraph Sets TG–5–A and TG–5–B weigh approximately 7 pounds, including batteries.

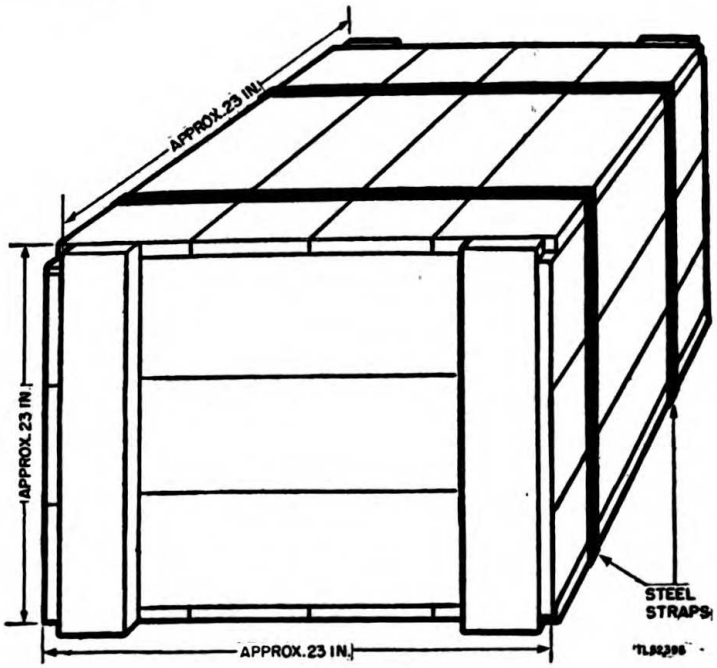


Figure 8. Packing case.

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Section II. APPLICATION

5. General

Telegraph Set TG–5–(*) may be connected directly to each other by metallic or ground return circuits, or may be used in conjunction with existing wire systems to provide additional communication channels. In either case operation of the telegraph set is the same. The telegraph set can also be used as a tone keyer for voice-modulated radio sets, permitting transmission of International Morse Code over radio sets originally designed for voice operation only.

a. When used on metallic or ground return lines, two telegraph sets may be connected in series as terminal stations and one or more telegraph sets connected in series with them as intermediate stations. No more than three or four telegraph sets however, can be so connected and still operate properly.

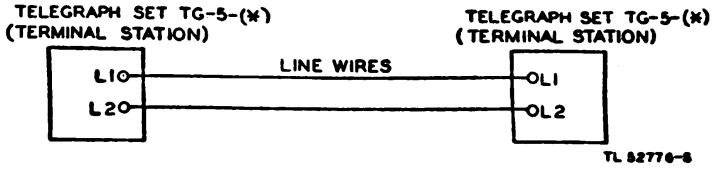


Figure 9. Block diagram, Telegraph Set TG–5–(*), metallic circuit.

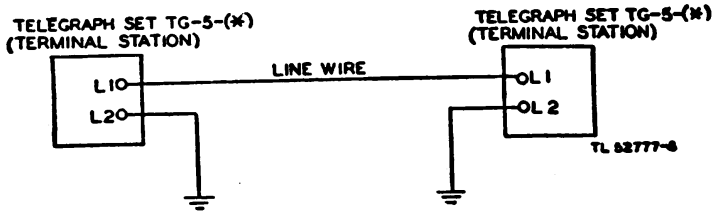


Figure 10. Block diagram, Telegraph Set TG–5–(*), ground return circuit.

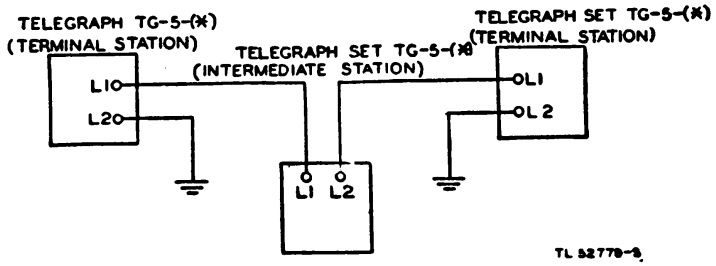


Figure 11. Block diagram, Telegraph Set TG–5–(*), ground return circuit with intermediate station.

b. When used in conjunction with existing wire systems, two telegraph sets may be connected in series as terminal stations or one or more connected in series with them as intermediate stations on a simplex, phantom,

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or simplex-phantom circuit by use of repeating coils contained in the equipment with which they are operated.

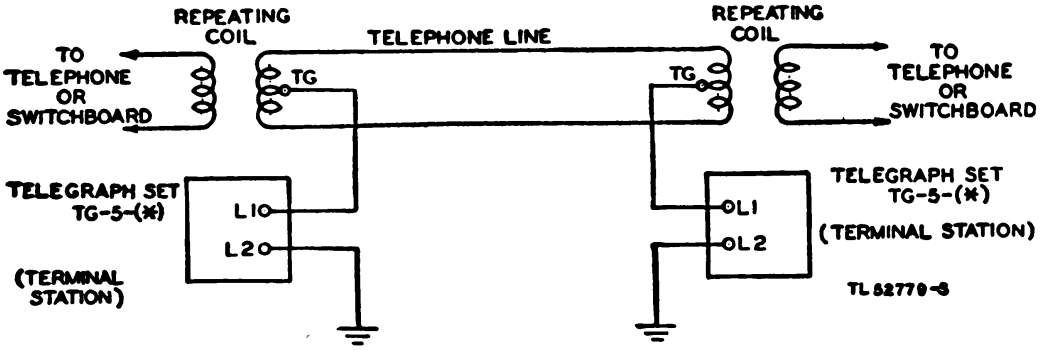


Figure 12. Block diagram, Telephone Set TG–5–(*), simplex circuit.

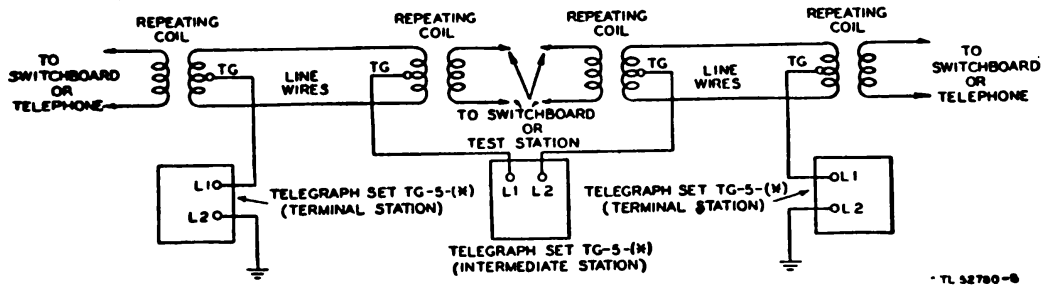


Figure 13. Block diagram, Telegraph Set TG–5–(*), simplex circuit with intermediate station.

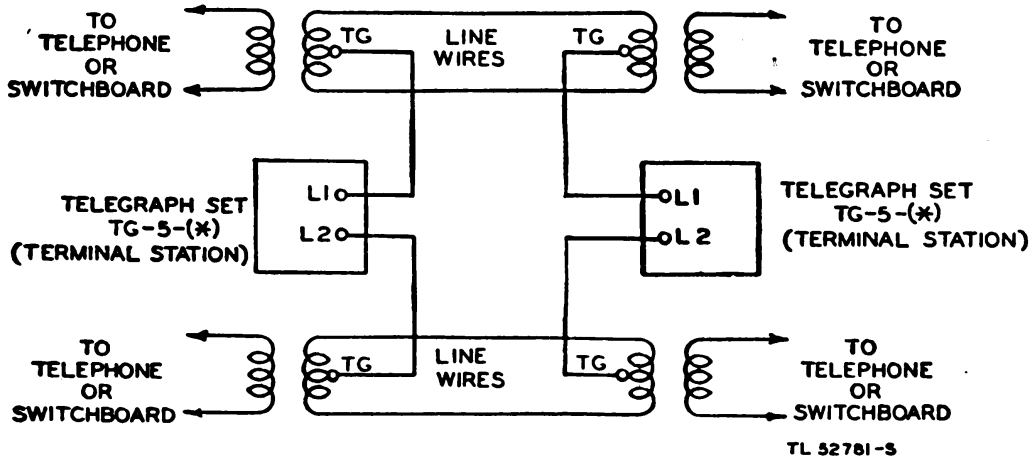


Figure 14. Block diagram, Telegraph Set TG–5–(*), phantom circuit.

c. Telegraph Set TG–5–(*) will operate satisfactorily as a tone keyer with any Signal Corps radio using a standard carbon button microphone, such as Radio Sets SCR–300, SCR–508, SCR–510, SCR–608, SCR–610, and SCR–619. An adapter cord is necessary to permit the use of the telegraph set as a tone keyer. This cord consists of a two-conductor cord terminating in Plug PL–55 on one end and Plug PL–68 on the other. The cord is so wired that the tip and sleeve of Plug PL–68 are connected together and through the cord to the sleeve of Plug PL–55. The ring of Plug PL–68

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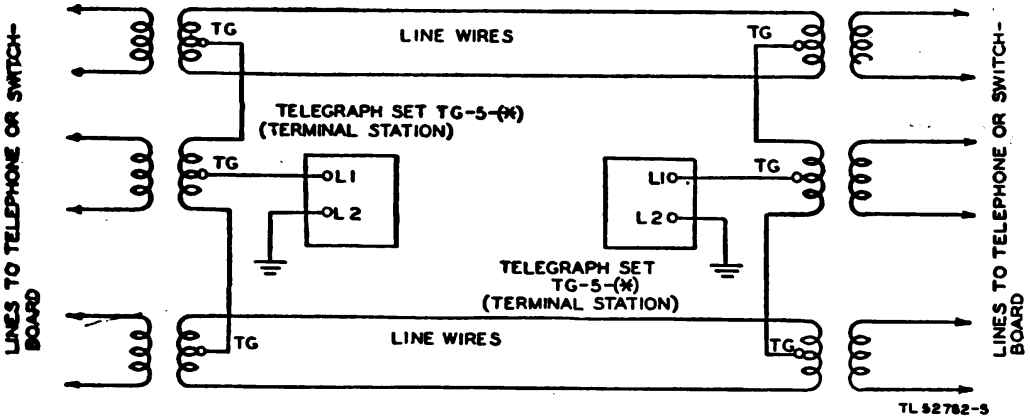


Figure 15. Block diagram, Telegraph Set TG–5–(*), simplex-phantom circuit.

is connected through the cord to the tip of Plug PL–55 in series with a 400-ohm, ½-watt resistor. The resistor is connected in the circuit to prevent r-f feedback which results in steady tone modulation in some cases.

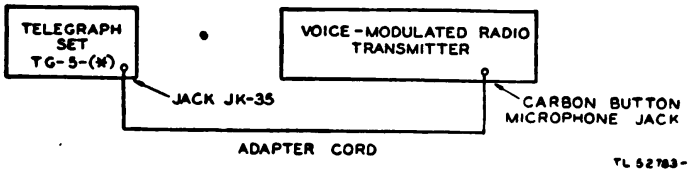


Figure 16. Block diagram, Telegraph Set TG–5–(*), used as a tone keyer on voice-modulated radio set.

6. Range

The range of Telegraph Set TG–5–(*) is dependent on the type, construction, and condition of the wire lines used, weather conditions, adjustment of the relay, condition of the battery in the set, and the type of telegraph sets working together. When the conditions given above are at their best, the following ranges can be expected on a simplex circuit:

a. Two Telegraph Sets TG–5–A working together will operate satisfactorily, at a speed of 20 words per minute (wpm), over 50 miles of wet Wire W–110–B. On dry Wire W–110–B the sets will operate satisfactorily when the total resistance of the line does not exceed 23,000 ohms.

b. Two Telegraph Sets TG–5–B working together will operate satisfactorily at a speed of 15 wpm, over 50 miles of wet Wire W–110–B. On dry Wire W–110–B the sets will operate satisfactorily when the total resistance of the line does not exceed 72,000 ohms.

c. Telegraph Set TG–5–A working with Telegraph Set TG–5–B will operate satisfactorily, at a speed of 20 wpm, over 30 miles of wet Wire W–110–B. Over dry Wire W–110–B the sets will operate satisfactorily when the resistance of the line does not exceed 26,000 ohms.

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Section III. INSTALLATION AND ASSEMBLY

7. Uncrating, Unpacking, and Checking

Telegraph Sets TG–5–(*) are packed in a nailed wooden box as shown in figure 8. Each wooden box contains six telegraph sets which are individually packed in fiberboard packing boxes. (See fig. 7.) To unpack the telegraph sets follow the procedure outlined below.

a. Place the wooden box in a convenient place for opening.

b. Cut and remove the steel straps.

c. Remove the nails from the top and sides of tne box with a nail puller, and remove the top. Do not pry off the top of the box as this may cause damage to the equipment.

d. Remove the individually packaged telegraph sets from the wooden box.

e. Open the top of each fiberboard container and remove the inner fiberboard container and moistureproof wrapping.

f. Remove the moistureproof wrapping from the inner fiberboard container.

g. Open the top of the inner container.

h. Withdraw the telegraph set from the inner container.

i. Open the case and remove the telegraph set.

j. Open the telegraph set and remove the silica gel from the battery compartment.

k. Open the rear battery compartment and remove the silica gel.

l. Carefully inspect the equipment for possible damage during shipment.

8. Locating

Locate Telegraph Set TG–5–(*) where it will not be subject to adverse weather conditions. Place the telegraph set in an upright position in a manner providing convenient access to the key. A wooden frame is desirable for holding the telegraph set in position if it is to be installed semipermanently on a table or other flat surface.

9. Installation of Batteries

a. INSTALLING BATTERY BA–2. (1) Open the cover of the set.

(2) Place one Battery BA–2 in the battery compartment.

(3) Connect the positive lead (red wire) to + terminal on the terminal block.

(4) Connect the negative lead (black wire) to the −22 terminal on

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the terminal block on Telegraph Set TG–5–A or TG–5–B, or to the terminal marked 22V— on Telegraph Set TG–5.

b. Installing Batteries BA–30 (fig. 17). (1) Open the battery compartment in the rear of the telegraph set.

(2) Place one Battery BA–30 in the battery compartment so that the bottom (negative contact) is against the spring mounted on the right side of the compartment.

(3) Place a second Battery BA–30 in the compartment so that the bottom presses against the positive contact of the first battery installed and the positive contact presses against the flat metal spring on the left side of the compartment.

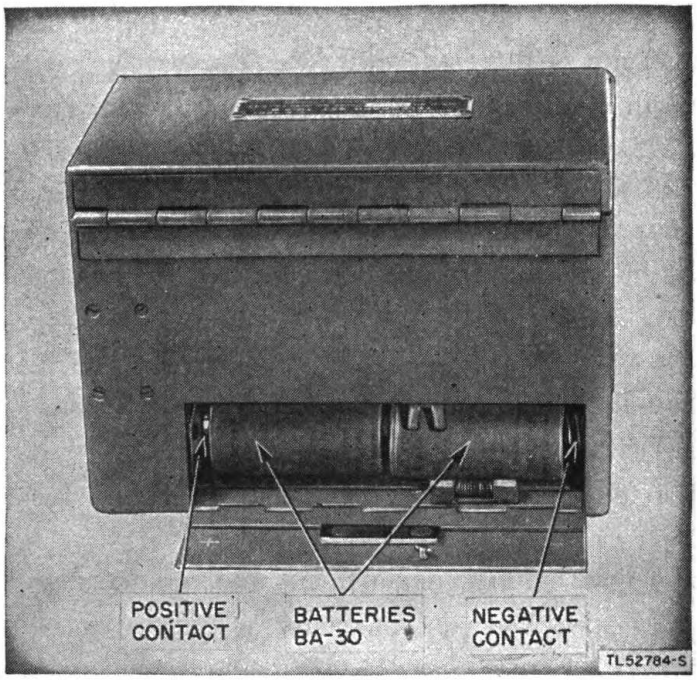


Figure 17. Batteries BA–30 installed in Telegraph Set TG–5–B.

c. External Battery. (1) If Batteries BA–30 are not available, any 3-volt d-c source of power may be used by connecting the positive lead to the terminals on the terminal block marked + and the negative lead to the terminal marked —3. Remove any batteries installed in the rear battery compartment before connecting an external battery and be sure that the voltage of the external source does not exceed 3 volts.

(2) If Battery BA–2 is not available, any 22½-volt d-c source of power may be used by connecting the positive lead to the terminal marked + on the terminal block and the negative lead to the terminal marked —22 on the terminal block of Telegraph Set TG–5–A or TG–5–B or to the terminal marked 22V— on Telegraph Set TG–5. Remove any Battery BA–2 from the telegraph set before connecting an external source of power and be sure the voltage of the external source does not exceed 22½ volts.

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10. Connection of Incoming Lines
(fig. 18)

a. Remove Telegraph Set TG–5–(*) from Case CS–49–(*).

b. Open the cover.

c. Starting approximately 4 inches from the ends of the wires to which the telegraph set is to be connected, strip off about 2 inches of insulation. Scrape and clean the bared metal of the wires.

d. If the telegraph set is being connected to a metallic circuit, connect one wire of the line to the terminal marked L1 on the terminal block of the telegraph set. Connect the other line wire to the terminal marked L2. (See fig. 18.)

e. If the telegraph set is being connected to a ground return circuit, connect the line wire to either line terminal L1 or L2. Connect the remaining line terminal to a good ground. (See TM 11–755.)

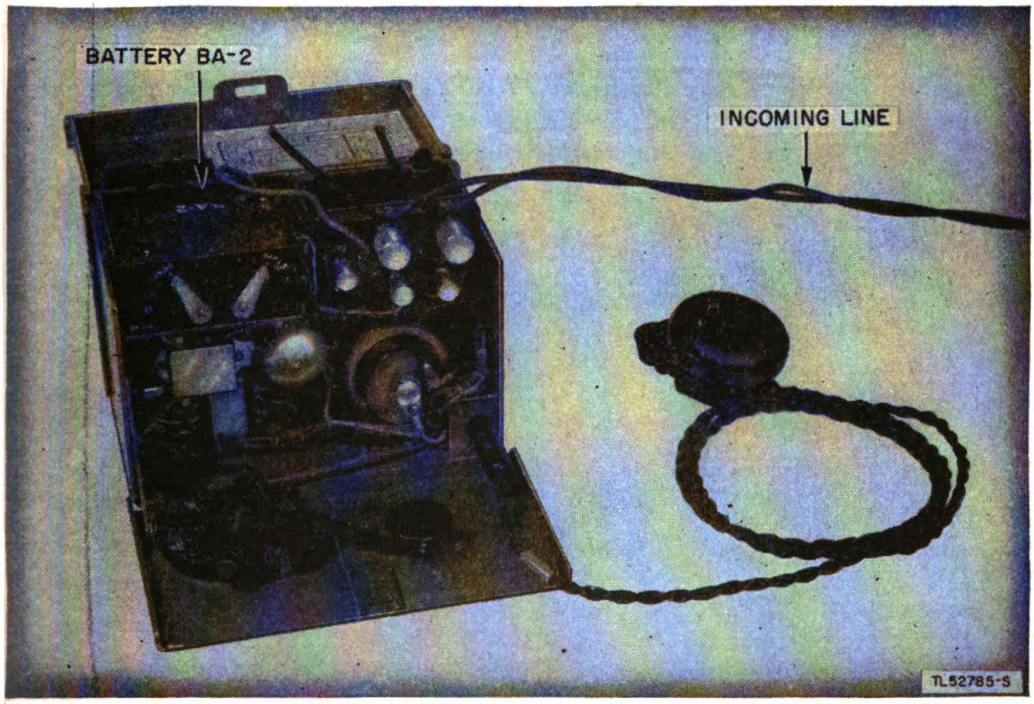


Figure 18. Telegraph Set TG–5–A ready for use.

11. Connection of Telegraph Set TG–5–(*) for Use as a Tone Keyer

a. Connect a shorting wire across line terminals L1 and L2 of Telegraph Set TG–5–(*).

b. Insert Plug PL–55 of the adapter cord into the headset jack on the telegraph set.

c. Insert Plug PL–68 into the microphone jack of the transmitter.

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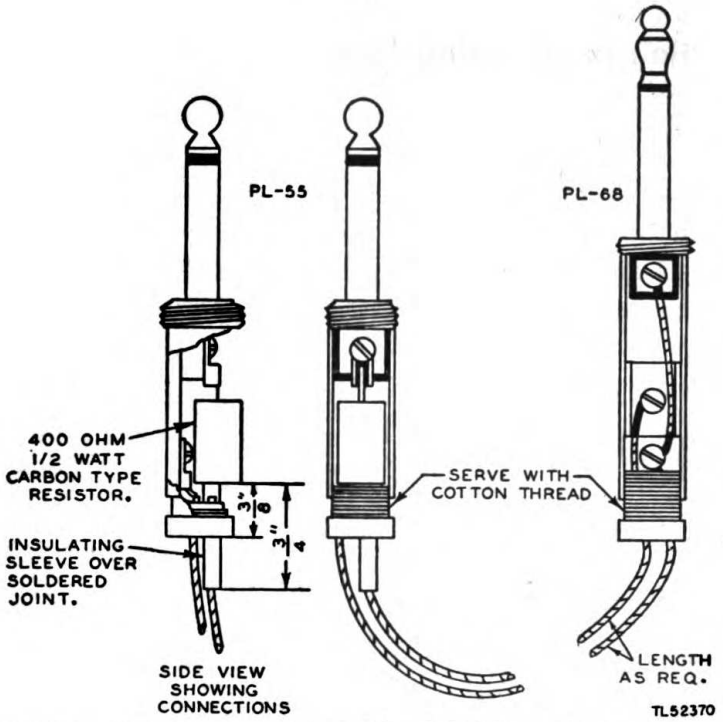


Figure 19. Wiring of Plug PL–55 and Plug PL–68 for use as adapter cord with Telegraph Set TG–5–(*).

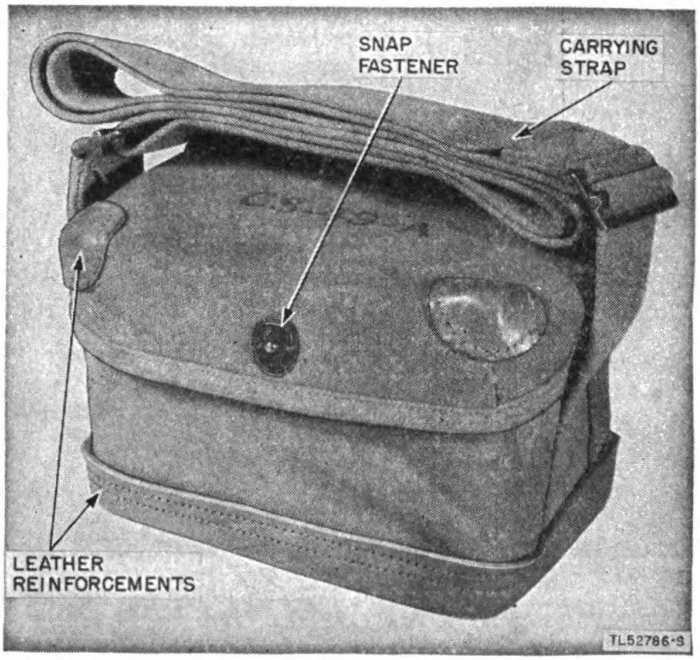


Figure 20. Telegraph Set TG–5–B packed for transportation or storage.

12. Repacking for Transportation and Storage
(fig. 20)

a. Remove the line wires from the terminal block.

b. Close and fasten the front and cover of the telegraph set.

c. Place the telegraph set in Case CS–49–(*). Fasten the cover.

Note. If Telegraph Set TG–5–(*) is to be transported or stored for a period longer than 2 days, remove the batteries from the set.

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Section IV. INITIAL ADJUSTMENTS

13. Preliminary Tests

a. CALLING CIRCUIT. Install the batteries in the set. Short circuit the line terminals L1 and L2 while alternately operating the key. The bell should be heard when the key is depressed and not when the key is released.

b. TRANSMITTING AND RECEIVING CIRCUIT. Insert the headset plug in the jack. The interrupter should operate and produce a faint tone. Short the line terminals and operate the key while holding the receiver to the ear A loud tone should be heard in the receiver when the key is depressed but not when released.

14. Preliminary Adjustments

a. KEY J-41-(*). (1) Loosen the locknuts on the four adjusting screws.

(2) Operate the key slowly and adjust the screws on either side of the frame until the key lever moves freely without sidewise motion. Tighten the locknuts on these two screws.

(3) Turn the adjusting screw on the rear of the key lever until the back contact closes when the key is unoperated and opens when it is operated and the desired clearance is obtained between the front contacts. Tighten the locknut.

(4) Adjust the screw on the front of the key lever until the desired spring tension is obtained. Tighten the locknut.

b. ADJUSTMENT OF BELL. Short terminals L1 and L2 with a screw driver or short piece of wire and depress the key. If the bell does not ring proceed as follows:

(1) Insert a screw driver in the slot of the adjusting screw which protrudes through the top of the bell frame.

(2) Turn the screw clockwise as far as it will go.

(3) Hold down the key lever.

(4) Turn the screw counterclockwise until the bell begins to ring.

c. RELAY BK-7-(*). Adjustment of Relay BK-7-(*) is covered in section V.

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PART TWO

OPERATING INSTRUCTIONS

Note. For instructions to prevent use of equipment by the enemy, see the destruction notice in the front of this manual.

Section V. PROCEDURE FOR OPERATION

15. Adjustment of Relay BK–7–(*)

a. GENERAL. The resistance of the relay in Telegraph Set TG–5–(*) is a fixed value and it is necessary, therefore, to adjust the armature so that it will make and break its contacts properly with various values of current flowing through the relay winding. The resistance of the external circuit connected to terminals L1 and L2 determines the value of this current. Consequently the relay must always be adjusted for the circuit over which the set is to operate and may need to be adjusted frequently as the resistance of that circuit changes or as stations are added to or removed from that circuit. With normal line battery installed in the telegraph set, there is a limit to the possible adjustment and if that limit is reached without obtaining satisfactory operation, it may be necessary to increase the voltage on the line as described in paragraph 16.

b. RELAYS BK–7 AND BK–7–A. When the pointers on Relays BK–7 and BK–7–A are set at 0, the armature spring tension is least and the air gap smallest. At this setting, a current of approximately 1.0 to 1.5 milliamperes is required to operate the relay. If, however, a stronger current flows through the relay winding, the spring tension will not be strong enough to break the contacts quickly after the current ceases to flow and clear signals will not be obtained. The correct adjustment of the relay consists of properly balancing the pull of the spring on the armature against the pull of the magnetic force developed when current flows through the relay. The best adjustment for any condition is that which gives satisfactory operations with the smallest values of GAP and SPRING pointer settings. Therefore, for all adjustments, obtain the smallest GAP pointer setting which will allow the relay to operate and the smallest spring pointer setting that will open the contacts sharply. To adjust the relay with the telegraph set connected to a line, follow the procedure outlined below.

(1) Place the headset plug across the line terminals with the tip of the plug touching one terminal and the sleeve the other, to determine if another station is using the line. If a station is transmitting, clicks will be heard in the receiver.

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(2) If the line is free, place the plug in the jack.

(3) Set the SPRING and GAP pointers to indicate 0.

(4) Press the key, hold the receiver to the ear, and slowly move the GAP pointer until tone is heard in the receiver.

(5) Release the key. If the tone does not stop, increase the SPRING pointer setting until the tone stops.

(6) If the tone still does not stop when the SPRING pointer is moved to its highest setting, increase the GAP setting slightly, return the SPRING pointer to zero, and again increase the SPRING pointer setting until the tone stops.

(7) Call the most distant station on the line and request it to transmit for testing.

(8) If the distant station's transmission fails to actuate the relay, proceed as described in paragraph 16.

(9) Call any other stations on the line, and, if necessary, make further adjustments of the relay.

c. Relay BK–7–B. No adjustment of the armature gap is provided on Relay BK–7–B. When the ADJUST pointer is set at 0, the armature spring tension is at a minimum and approximately 0.2 milliamperes as required to operate the relay. If, however, a stronger current flows through the relay winding, the spring tension will not be strong enough to break the contacts quickly after the current ceases to flow and clear signals will not be obtained. The best possible adjustment is one which will give satisfactory operation with the smallest ADJUST pointer setting. To adjust the relay with the telegraph sets connected to the line follow the procedure outlined below.

(1) Test for a clear line as described in *b*(1) and (2) above.

(2) Set the ADJUST pointer to 0 on the dial.

(3) Depress the key and hold the receiver to the ear; tone should be heard in the receiver.

(4) Increase the ADJUST pointer setting until the tone stops.

(5) Alternately press and release the key while holding the receiver to the ear to determine if the signals stop sharply when the key is released.

(6) If the signals do not stop sharply when the key is released, increase the ADJUST pointer setting until they do.

(7) Proceed as described in *b*(7), (8), and (9) above.

16. Additional Line Battery

If, by placing the tip and sleeve of the headset plug across the line terminals L1 and L2, it is determined that a distant station is transmitting and the relay cannot be adjusted as described in paragraph 15 to give satisfactory operation, proceed in the following manner:

a. Add another Battery BA–2 in series with the one already in the set.

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b. Call the distant station and inform it that the line battery has been increased to 45 volts. Request the distant station to increase its line battery to the same value and to transmit for further test.

c. Adjust the relay as described in paragraph 15.

d. If satisfactory operation still cannot be obtained, add a third Battery BA–2 in series with the other two and repeat the procedure given in *b* and *c* above.

Caution: It is possible to cause serious damage to the set by adding an excessive amount of line battery. If the keys of two or more sets are depressed simultaneously, the combined voltage of all the batteries in the sets will be impressed upon the series circuit containing all the relays. Add only enough voltage to assure satisfactory operation, and no more.

17. Operation

a. TRANSMITTING. Operate the key in accordance with instructions given in TM 11–459.

b. RECEIVING. During reception, use may be made of either the bell or interrupter contained in the telegraph set. If use of the bell is desired, remove the headset plug from the jack.

c. BREAK-IN. If during reception it is desired to break in on the transmission, slowly depress and release the key. This action will cause faulty operation of the relay at the transmitting station and will indicate to the operator that a break-in is desired.

d. CONTINUOUS OPERATION. If the set is to be operated continuously, keep the headset plugged into the telegraph set. Call signals are then received only in the headset, which must be worn to prevent missing a call.

e. STAND-BY OPERATION. Remove the headset plug from the jack. Call signals will then be indicated by the ringing of the bell.

Section VI. EQUIPMENT PERFORMANCE CHECK SHEET

18. Purpose and Use of Equipment Performance Check Sheet

a. GENERAL. The equipment performance check sheet (par. 19) will help the operator to determine whether Telegraph Set TG–5–(*) is functioning properly. The check sheet gives the item to be checked, the conditions under which the item is checked, the normal indications, and the corrective measures that the operator can take. Items 1, 2, and 3 are performed when preparing the equipment for use, items 4, 5, and 6 are checked when starting, items 7 and 8 during operation, and items 9 and 10 when stopping operation. Items 7 and 8 should be checked at least once during a normal operating period or at least four times each day during continuous operation.

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b. ACTION. Information given in the action or condition column represents an action that must be taken in order to check the indications given in the normal indications column.

c. NORMAL INDICATIONS. The normal indications listed include the visible and audible signs that the operator will perceive when he checks the items listed. If the indications are not normal, the operator should apply the recommended corrective measures.

d. CORRECTIVE MEASURES. The corrective measures listed are those that the operator can make without turning the equipment in for repairs. Reference to item five in the table indicates that the correction of the trouble cannot be effected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative, or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained, and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

19. Equipment Performance Check Sheet

	Item No.	Item	Action or condition	Normal indication	Corrective measure
PREPARATORY	1.	Batteries BA–30	Install batteries in rear compartment.		
	2.	Batteries BA–2	Install in top battery compartment.		
	3.	Line	Connect line to terminals L1 and L2.		
START	4.	Relay	Insert headset plug in jack. Alternately depress and release key.	Tone heard in receiver when key is depressed and not when released.	Adjust relay. (See par. 15.)
	5.	Transmitting circuit.	Call distant station.	Distant station answers.	See paragraph 16.
	6.	Receiving circuit.	Distant station transmitting.	Signals heard in receiver.	Adjust relay (par. 15). See paragraph 16.
EQUIPMENT PERFORMANCE	7.	Transmitting circuit.	Key operated.	Transmission possible to distant station.	Check batteries.
	8.	Receiving	Key unoperated.	Reception possible from distant station.	Check batteries.

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	Item No.	Item	Action or condition	Normal indication	Corrective measure
STOP	9.	Batteries-----	Remove batteries.		
	10.	Line---------	Disconnect line.		

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PART THREE

PREVENTIVE MAINTENANCE

Section VII. PREVENTIVE MAINTENANCE TECHNIQUES

20. Meaning of Preventive Maintenance

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment 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 primary function of preventive maintenance is the prevention of break-downs and, therefore, the need for repair. The primary function of trouble shooting and repair is the location and correction of existing defects. The importance of preventive maintenance cannot be overemphasized. The entire system of wire communication depends upon each set being *in operation* when it is needed and also upon its *operating efficiency.*

Note. The operations in section VII are considered first- and second-echelon (organization operators and repairmen) maintenance.

21. Description of Preventive Maintenance Techniques

a. GENERAL. Most of the parts used in Telegraph Set TG–5–(*) 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 section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the following lettering system will be used for the six operations:

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 the general knowledge of field needs. For

* The feel and lubricate operations are not applicable to Telegraph Set TG–5–(*).

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example, 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 performance of necessary tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down.

b. FEEL. The feel operation is used most often to check for overheating.

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 minor 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 defective equipment. 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 accumulations 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 for performing them are given in paragraphs 23 through 34 whenever necessary.

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, moistureproof and fungiproof it again by applying the varnish with a small brush. See section X for details of moistureproofing and fungiproofing.

e. LUBRICATE. Lubrication means the addition of oil or grease to form a film between two surfaces that slide against each other, in order to prevent mechanical wear from friction.

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22. Common Materials Needed

Note. The tools and materials listed below must be at hand before starting the preventive maintenance procedures.

The following is a list of the tools and materials needed for performing preventive maintenance operations on Telegraph Set TG–5–(*).

Long-nose pliers.
Diagonal pliers.
3½ inch cabinet screw driver.
Solvent, Dry Cleaning, Federal spec No. PS–661a.
Burnisher Signal Corps stock No. 4A2805A/5.
Neat's-foot oil.
Bristle brushes.
Saddle soap.
Cleaning cloths.
Crocus cloth.

Note. Gasoline will not be used as a cleaning fluid for any purpose. Solvent, dry-cleaning, is available as a cleaning fluid through established supply channels. Oil, fuel, diesel, may be used for cleaning purposes when dry-cleaning solvent is not on hand. Carbon tetrachloride will be used as a cleaning fluid only where specified for cleaning contact parts of electrical equipment, or as specified where inflammable solvents cannot be used because of the fire hazard. Oil, fuel, diesel, *will not* be used for cleaning electrical contacts.

23. Box, Exterior

a. INSPECT (I). Inspect the box for damaged places, dirt, dust, rust, corrosion, and loose, damaged, or missing screws.

b. TIGHTEN (T). With a suitable screw driver, tighten all screws snugly.

c. CLEAN (C). With a clean, dry cloth, wipe all dirt and dust off the box.

Note. In order to perform the preventive maintenance operations contained in the following paragraphs, it will be necessary to open the box and rear battery compartment.

24. Rear Battery Compartment

a. INSPECT (I). Inspect the battery compartment for dirt, dust, corrosion, and loose or missing battery contact springs.

b. CLEAN (C). With a soft bristle brush, remove all dirt, dust, and foreign matter from the battery compartment. Carefully clean the battery contact springs with crocus cloth to insure good electrical connections.

25. Line Battery Compartment

a. INSPECT (I). Inspect the battery compartment for dirt, dust, and other foreign matter.

b. CLEAN (C). With a soft bristle brush, remove all dirt, dust, and foreign matter.

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26. Terminal Block

a. INSPECT (I). Inspect the terminal block for cracks, chips, or breaks. Check for loose and damaged terminals. Inspect the terminal block and terminals for dirt, dust, and corrosion. Check for loose connections.

b. TIGHTEN (T). Tighten all loose terminals and loose connections.

c. CLEAN (C). Remove all dirt, dust, and foreign matter on the terminal block and terminals, using a soft bristle brush.

27. Receiver R–3

a. INSPECT (I). Inspect the receiver for dirt, dust, and chipped, cracked, or broken places. Inspect the exterior only. Inspect the headband for tears or frayed edges.

b. CLEAN (C). Wipe all dirt, dust, and other foreign matter from the receiver with a clean, dry cloth.

28. Cord CC–335

a. INSPECT (I). Inspect the cord for dirt, dust, oil, grease, and damaged or broken insulation. Examine the cord, where it enters the receiver, for worn or frayed insulation.

b. CLEAN (C). Wipe off all dust and dirt using a clean, dry cloth. If it becomes necessary to remove oil or grease, use dry-cleaning solvent.

29. Plug PL–55

a. INSPECT (I). Inspect the plug for bent or broken parts. Check for an accumulation of dust and dirt.

b. CLEAN (C). Wipe off the plug with a clean rag moistened in dry-cleaning solvent.

30. Case CS–49–(*)

a. INSPECT (I). Inspect the case for torn or frayed portions. Check for breaks or cracks in the leather corners and bottom. Inspect the snap fastener to see that it is mounted firmly in the case.

b. CLEAN (C). With a clean, dry cloth wipe all dirt and dust off the case. Use saddle soap and neat's-foot oil to clean the leather portions of the case. Wash the strap with soap and water.

31. Interrupters BZ–5–(*) and BZ–7–(*)

a. INSPECT (I). Inspect the external portion of the interrupter for accumulations of dirt, dust, and other foreign matter. Check for dents, cracks, and breaks in the case. Check for loose connections.

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b. TIGHTEN (T). Tighten all loose connections.

c. CLEAN (C). Clean the external portion of the case with a soft bristle brush.

32. Relays BK–7–A and BK–7–B

a. INSPECT (I). Inspect the relay case for accumulation of dirt and dust. Check to see that there are no chipped or broken parts. Inspect the relay contacts for pitted or worn places. Inspect the metal cover on Relay BK–7–B for bent portions and see that it is in place.

b. CLEAN (C). Clean the exterior of the case with a clean, dry cloth. Carefully burnish the relay contacts with the burnisher furnished with the telegraph set. Place the burnisher between the contacts and press the contacts together lightly with the tips of the fingers. Move the burnisher back and forth until the contacts are clean and smooth.

c. ADJUST (A). Adjust the contacts as described in paragraph 15 when putting the set back into operation.

Note. The contacts of Relay BK–7 cannot be burnished without removing the relay from the set. This procedure is covered in section XI.

33. Bell

a. INSPECT (I). Inspect the exterior portion of the bell for dirt, dust, rust, and other foreign matter. Remove the bell cover and check the contacts for pitted or worn spots. Check for loose connections.

b. CLEAN (C). Carefully remove all dirt, dust, and other foreign matter on the bell, using a soft bristle brush. Be careful not to disconnect or damage any of the wiring. Burnish the contacts with a contact burnisher. Place the burnisher between the contacts and move it back and forth until the contacts are smooth and bright.

34. Key J–41–(*)

a. INSPECT (I). Inspect the key for broken or worn parts. Check for loose connections. Inspect the key for missing parts.

b. TIGHTEN (T). Tighten all loose screws except those used for adjustments. Tighten all loose connections.

c. CLEAN (C). Clean all dirty or worn contacts with a contact burnisher. Place the contact burnisher between the contacts. Press the contacts together by exerting a light pressure on the key lever. Move the burnisher back and forth until the contacts are clean and bright.

d. ADJUST (A). Adjust the key, before operation, as described in paragraph 14.

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Section VIII. PREVENTIVE MAINTENANCE CHECK LIST

35. Preventive Maintenance Check List

a. For ease and efficiency of performance, preventive maintenance on Telegraph Set TG–5–(*) will be broken down into daily, weekly, and monthly items.

Note. The time intervals for performing the preventive maintenance outlined in the preceding paragraphs and the check list may be reduced at any time by the local commander. However, for best performance of the equipment, perform the operations at least as frequently as called for in the check list.

b. The general techniques involved and application of FITCAL operations in performing preventive maintenance on individual parts are discussed in section VII. These general instructions are not repeated in this section. Personnel performing preventive maintenance will refer to section VII when more detailed information is required on the items listed in the following schedule. After preventive maintenance has been performed on a given day, the equipment will be put into operation and checked for satisfactory performance.

Item	Operation	Description	When performed			Echelon
			Daily	Weekly	Monthly	
1	I, T, C	Box, exterior (par. 23)----------	*			1st
2	I, C	Rear battery compartment (par. 24).		*		1st
3	I, C	Line battery compartment (par. 25).		*		1st
4	I, T, C	Terminal block (par. 26)------		*		1st
5	I, C	Receiver R–3 (par. 27)--------		*		1st
6	I, C	Cord CC–335 (par. 28)--------		*		1st
7	I, C	Plug PL–55 (par. 29)----------		*		1st
8	I, C	Case CS–49–(*) (par. 30)------		*		1st
9	I, T, C	Interrupters BZ–5–(*) and BZ–7–(*) (par. 31).			*	1st
10	I, C, A	Relays BK–7–A and BK–7–B (par. 32).			*	2d
11	I, C	Bell (par. 33)----------			*	2d
12	I, T, C, A	Key J–41–(*) (par. 34)--------			*	2d

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

* The feel and lubricate operations are not applicable to Telegraph Set TG–5–(*).

Section IX. LUBRICATION

Lubrication of this equipment is not required.

Section X. MOISTUREPROOFING AND FUNGIPROOFING

36. General

When operated in tropical areas where temperature and relative humidity are extremely high, Signal Corps equipment requires special attention. These are some of the problems met:

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a. Capacitors, coils, etc., fail because of the effects of fungus growth and excessive moisture.

b. Electrolytic action, often visible in the form of corrosion, takes place in coils, etc., 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 blocks and insulating strips, causing flash-overs and crosstalk.

e. Moisture provides leakage paths between battery terminals.

37. Treatment

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, 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.

Caution: Varnish spray may have poisonous effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth. Never spray varnish or lacquer near an open flame. Do not smoke in a room where varnish or lacquer is being sprayed. The spray may be highly explosive.

38. Telegraph Set TG–5–(*)

a. PREPARATION. Make all repairs and adjustments necessary for the proper operation of the equipment.

b. DISASSEMBLY. (1) Raise the cover of the telegraph set and open the front panel.

(2) Remove the bell and disconnect the attached leads.

(3) Remove the two screws which hold the jack mounting to the right side of the case, and pull jack forward. Do not disconnect the wiring.

(4) Remove the screws from the binding post mounting plate and expose the back of the plate. Do not disconnect the wiring.

(5) Remove Battery BA–2 from the line battery compartment.

(6) Open the door to the rear battery compartment and remove the two Batteries BA–30. The batteries are not to be treated.

c. CLEANING. Clean all dirt, dust, rust, fungus, oil, grease, etc., from the equipment to be processed.

d. MASKING (fig. 21). Cover the following parts with masking tape:

(1) Telegraph key.

(2) Spring and key contacts of jack.

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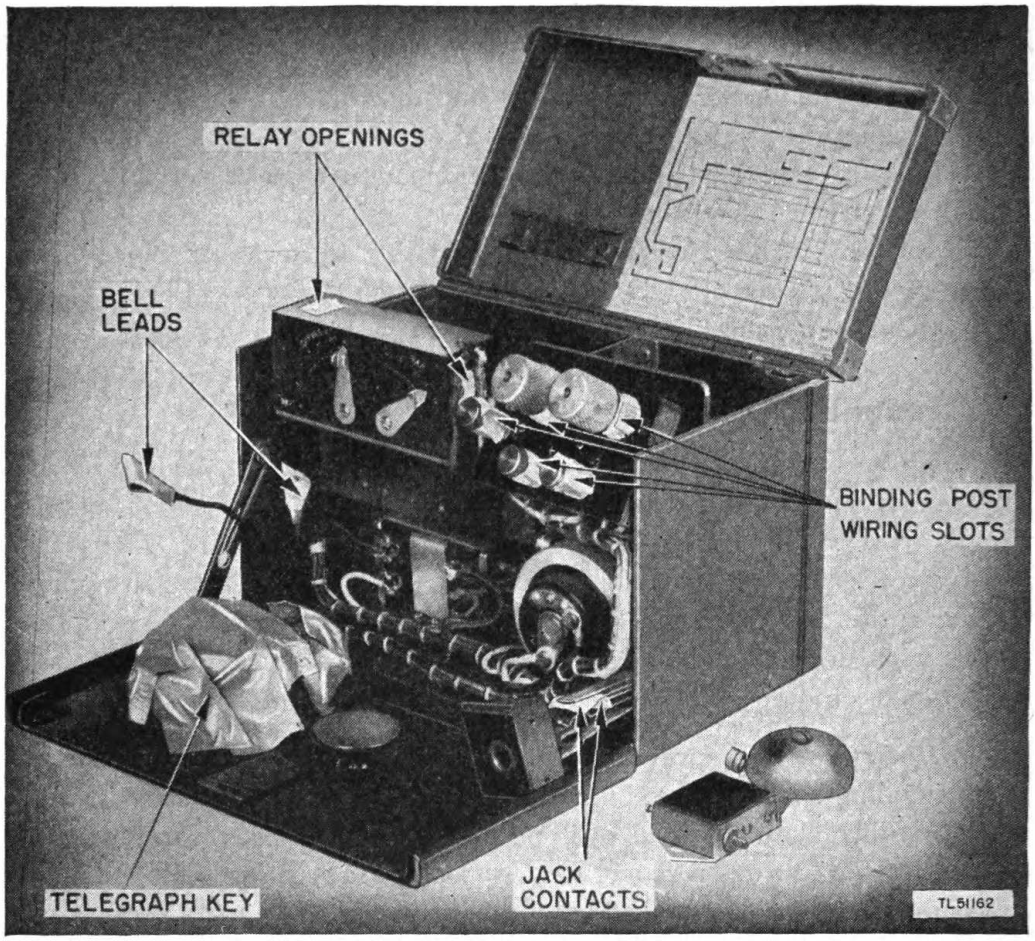


Figure 21. Telegraph Set TG–5–A disassembled and masked.

(3) Openings in relay cover base, and adjusting arm.

(4) Binding post wiring slots.

(5) Terminals of leads disconnected from bell.

(6) Battery contacts in rear battery compartment.

e. DRYING. Place all equipment, except the batteries, in an oven or under heat lamps and dry for 2 to 3 hours at 160° F. Do not apply heat to the batteries.

f. VARNISHING. (1) Apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, spec No. 71–2202 (stock No. 6G1005.3), or equal, with a spray gun. Allow each coat to air-dry for 15 to 20 minutes before applying the next coat.

(2) Apply varnish immediately after the equipment is dried. If varnish is not applied immediately, moisture condenses on the equipment. Varnish applied over the moisture peels off readily after the varnish has dried.

(3) Remove the cover from the bell and varnish the coils, using a brush.

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g. REASSEMBLY. (1) Remove all masking tape being careful not to peel varnish from nearby areas.

(2) Reassemble the telegraph set and test its operation.

h. MARKING. Mark the letters MFP and the date of treatment near the nameplate on cover.

Example: MFP—3 Feb 45.

39. Moistureproofing and Fungiproofing After Repairs

If, during repair, the coating of protective varnish has been punctured or broken, and if complete treatment is not needed to reseal the equipment, apply a brush coat to the affected part. Be sure the break is completely sealed.

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PART FOUR

AUXILIARY EQUIPMENT

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PART FIVE

REPAIR INSTRUCTIONS

Note. 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 41.

Section XI. THEORY OF TELEGRAPH SET TG–5–(*)

40. Circuit Elements

a. RECEIVER. The receiver is of the magnetic type. It consists of two coils, connected in series, wound on the pole pieces of a permanent magnet mounted in a watch type case. The resistance of the coil windings is approximately 80 ohms. A thin metal diaphragm is placed immediately over the pole pieces of the magnet and is held in place by a screw cap which serves as an earpiece and protects the inside of the case from dust and dirt. Cord CC–335 is fastened by screw type terminals to the ends of the coil inside the case and the opposite end of the cord is terminated in Plug PL–55.

b. RECEIVER JACK. The receiver jack consists of two fixed and two movable contacts mounted on a metal frame which, in turn, is mounted on a phenolic block fastened to the box. In the normal position the two bottom contacts are closed and the top contacts open. When the plug is inserted in the jack the tip spring is forced up, opening the bottom set of contacts and closing the top set of contacts.

c. CAPACITOR CA–210. The capacitor consists of two 0.25 microfarad units inclosed in a metal can. Leads for each section are brought out separately.

d. BELL. The bell contains two coils of wire, connected in series, and mounted side by side on the bell frame. The total resistance of the coils is approximately 16 ohms. A soft-iron armature is mounted directly over the coils. One end of this armature is pivoted on the bell frame, and the other end is provided with a metal clapper. Two contacts are provided, one mounted on the armature and the other fastened to the bell frame. In the normal position these two contacts are closed. When direct current is applied to the bell terminals, current flows through these contacts and through the coils. Current flowing through the coils produces a magnetic field which attracts the armature and opens the contacts.

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When the contacts open, current ceases to flow through the coil, the armature returns to its normal position, and the contacts close, allowing current to flow, and the cycle repeats. This movement of the armature causes the clapper to strike the gong and a ringing sound results.

e. INTERRUPTER. The interrupter consists of a carbon button transmitter mounted against the diaphragm of a magnetic type receiver and wired in series with it. When direct current flows through the receiver section, the receiver diaphragm is attracted toward the receiver pole pieces. Since this diaphragm is mounted directly against the transmitter button, the button moves with it and causes an increase in the transmitter resistance. This increase in resistance causes a reduction in the amount of current flowing through the receiver which allows the diaphragm to move outward. When the diaphragm moves outward it presses against the transmitter button, reduces the resistance of the transmitter, and again allows more current to flow through the receiver. This action repeats itself as long as the interrupter is connected in the circuit.

f. RELAY BK–7 AND BK–7–A. Relay BK–7 and BK–7–A consist of a coil of wire, a movable horseshoe shaped core, two fixed, and one movable contact mounted inside a phenolic case. The coil is wound on a phenolic bobbin and the ends connected to a terminal strip mounted on the end of the relay case. The resistance of the coil in Relay BK–7 is 150 ohms and in Relay BK–7–A, 600 ohms. One leg of the core slides inside the coil and the opposite leg passes outside the bottom of the coil. A small rack is screwed to this leg approximately at its center. This rack meshes with a pinion gear mounted on a shaft passing through the sides of the relay case. Movement of a pointer fastened to this shaft outside the relay case causes the pinion gear to rotate, which in turn moves the core. The relay contacts are mounted directly in front of the end of the core. A movable contact is pivoted at its center and the bottom is fastened to a small spring. The opposite end of this spring is fastened to a piece of string, which in turn is fastened to a shaft passing through the sides of the relay case. When the shaft is turned by a pointer fastened to it on the outside of the case, the spring tension on the movable contact is increased or decreased accordingly. Therefore, by adjustment of these two levers the gap between the movable contact and the core, and the spring tension on the contact, can be adjusted. The two fixed contacts are mounted to the relay case by means of a screw through the contact near the bottom end. The distance between these two contacts and the movable contact can be adjusted by two screws threaded through the end of the relay case. These two fixed contacts are connected to the terminal strip on the end of the relay by flat metal conductors. The movable contact is connected by a flexible wire to a solid conductor which terminates at the terminal strip.

g. RELAY BK–7–B. Relay BK–7–B is constructed in the same man-

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ner as Relay BK–7 and BK–7–A except that the core of the relay winding remains in a fixed position and no provisions are made for the adjustment of the air gap between the movable contact and the core. The resistance of the relay winding in Relay BK–7–B is 4,400 ohms.

41. Theory of Operation

a. Line Circuit. (1) The L2 binding post, relay winding, key, and L1 binding post are connected in series, and form the line circuit.

(2) Incoming current, flowing through terminal L2, the relay winding, rear contact of the key, and out through terminal L1, operates the relay, thereby closing a local circuit in the set. (See figs. 22 and 23.)

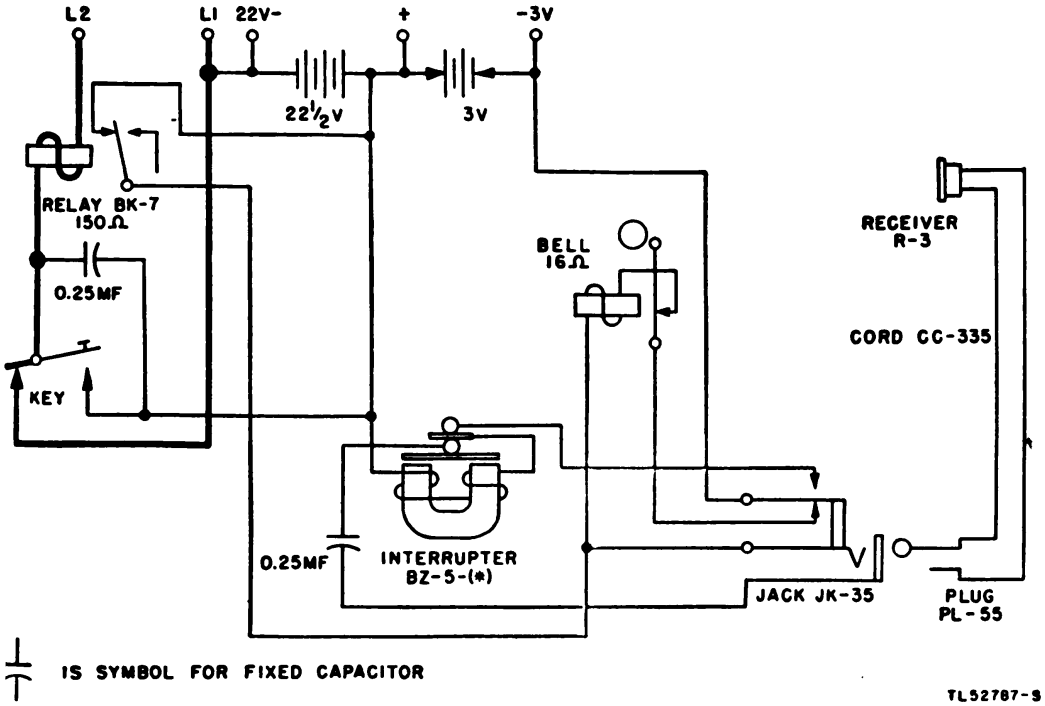


Figure 22. Line circuit, Telegraph Set TG–5.

(3) Outgoing current is furnished by a 22½-volt battery (Battery BA–2) which is connected in series with the front contact of the key and terminal L1. Depressing the key closes the circuit to the battery and allows current to flow through the key lever and front contact of the key, the relay winding, over the line, and back to the battery. (See figs. 24 and 25.)

(4) Sparking between the contacts of the key, caused by the magnetic field surrounding the relay breaking down through the winding, is suppressed by placing a 0.25 microfarad capacitor in parallel with the contacts. (See figs. 24 and 25.)

b. Local Circuits. (1) The bell, or signaling circuit, consists of the bell, relay contacts, 3-volt d-c supply, and the break contacts of the jack.

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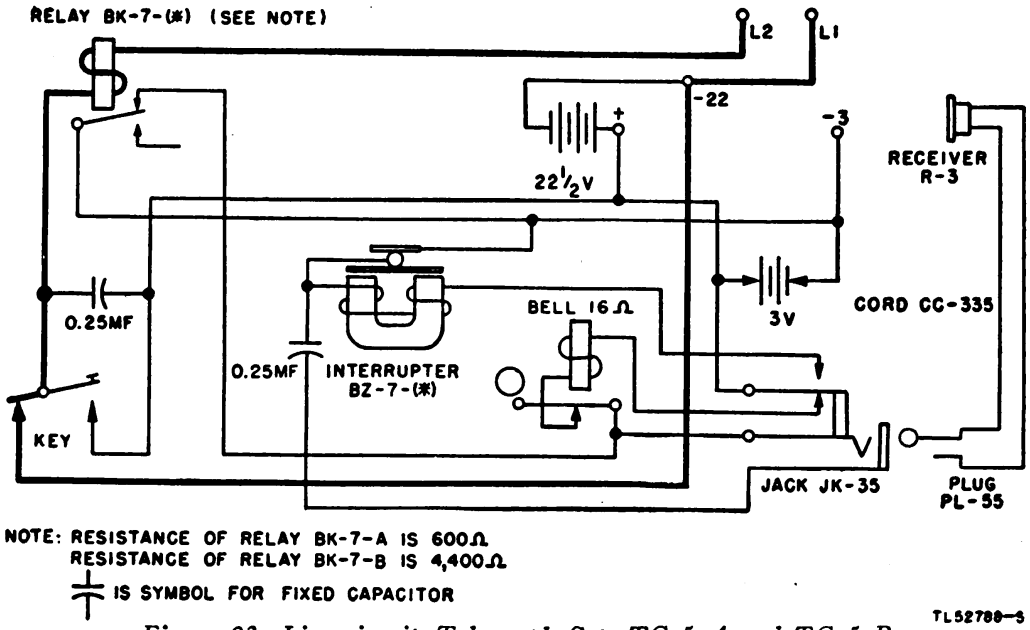


Figure 23. Line circuit, Telegraph Sets TG–5–A and TG–5–B.

The parts are wired in series, and are controlled by the operation of the relay in the line circuit. (See figs. 26 and 27.)

(2) The interrupter circuit consists of the interrupter, make contact of the jack, and a 3-volt d-c supply. Inserting the plug of the headset in the jack closes the make contact, opens the bell circuit, and puts the interrupter in operation. (See figs. 28 and 29.)

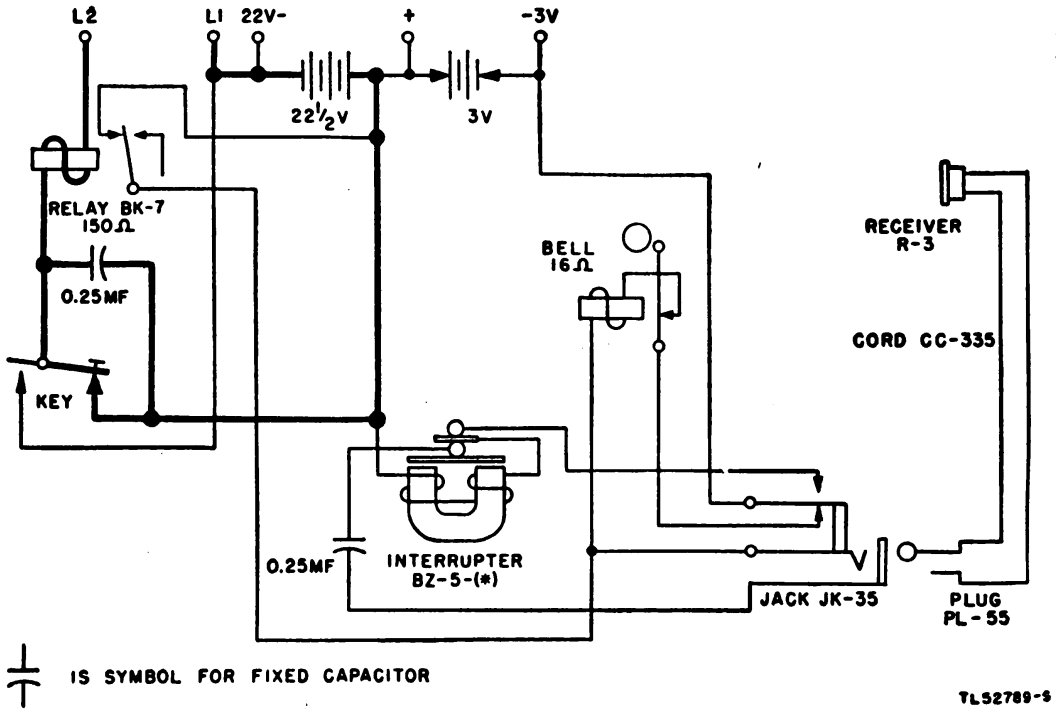


Figure 24. Transmitting circuit, Telegraph Set TG–5.

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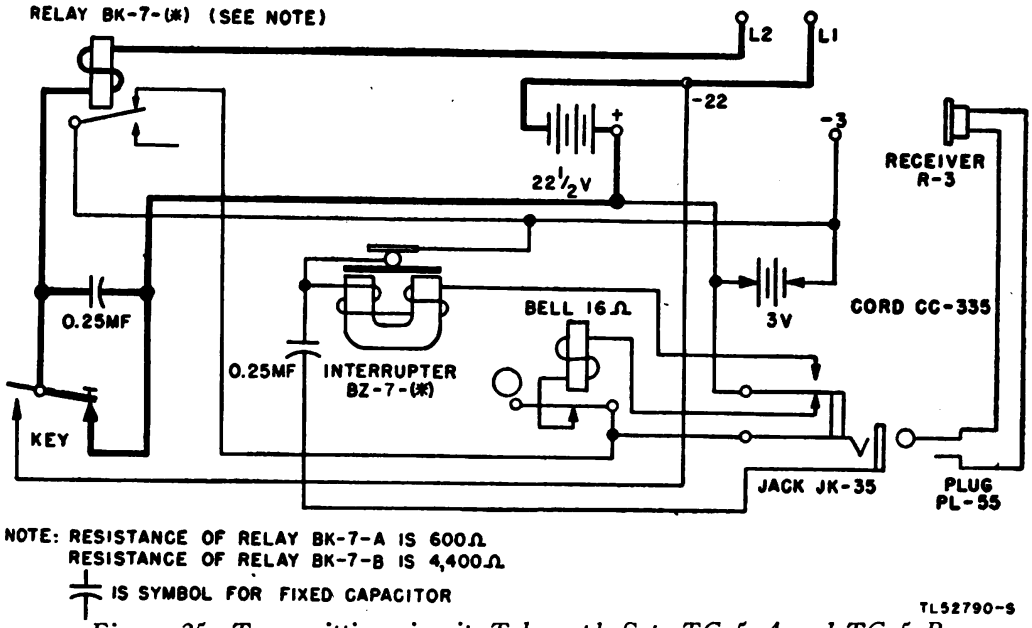


Figure 25. Transmitting circuit, Telegraph Sets TG–5–A and TG–5–B.

(3) The receiving circuit consists of the Receiver R–3, plug, jack, and relay contacts, and a 0.25 microfarad capacitor connected in series and the combination connected in parallel with the interrupter. When the relay contacts are closed, the varying voltage across the interrupter is impressed across the receiver causing a tone of approximately 1,000 cycles to be heard in it. Shorting of the battery in the interrupter circuit by the receiver is prevented by the capacitor in series with the receiver.

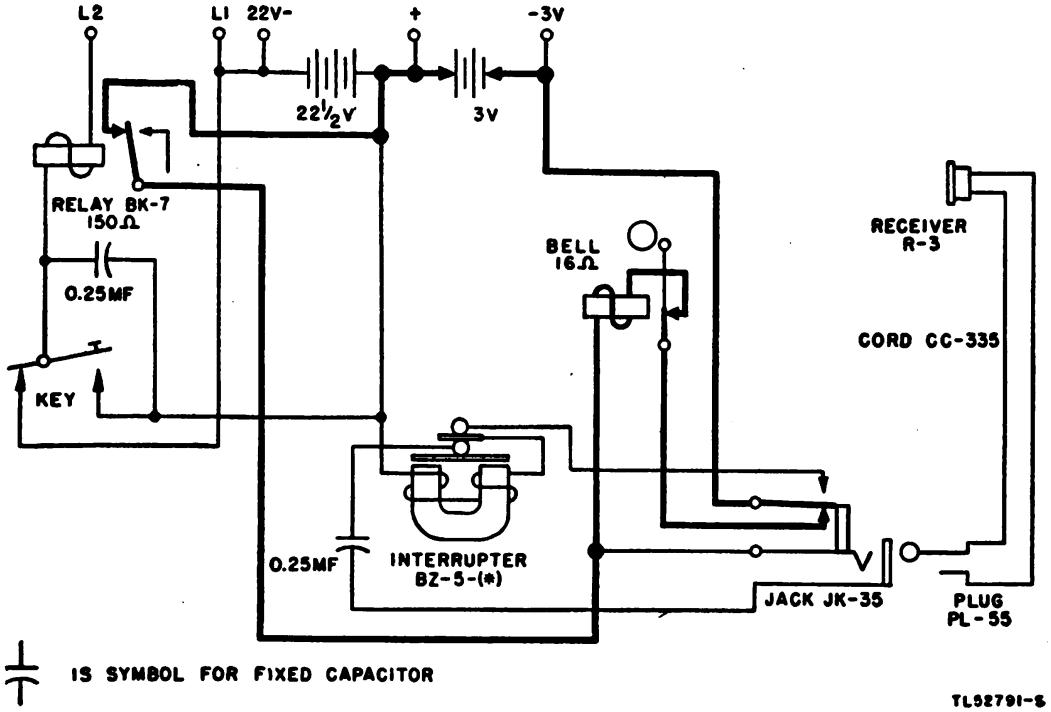


Figure 26. Signaling circuit, Telegraph Set TG–5.

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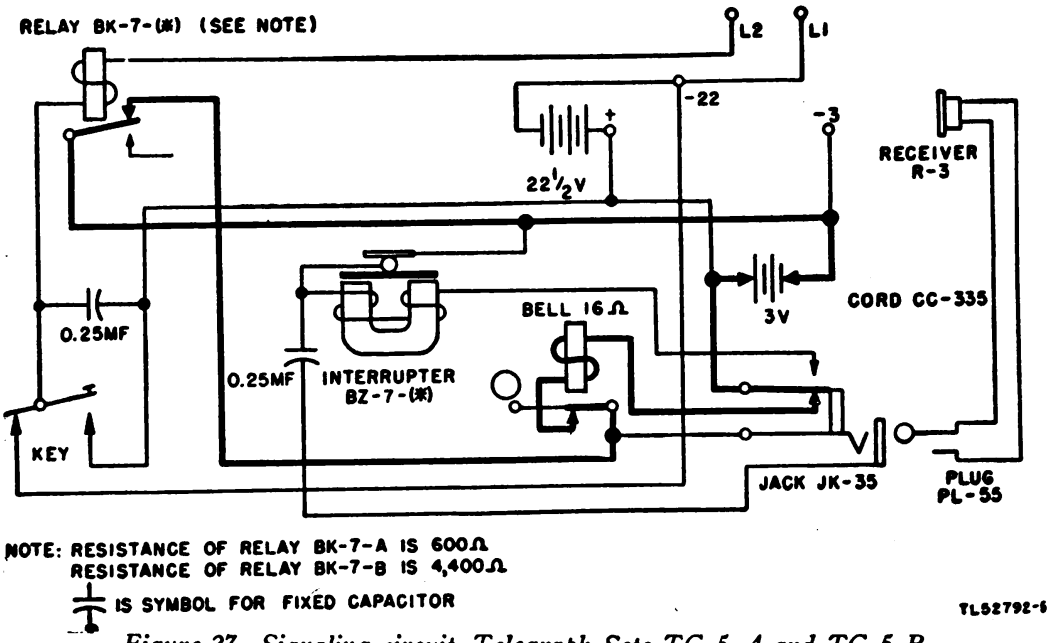


Figure 27. Signaling circuit, Telegraph Sets TG–5–A and TG–5–B.

Section XII. TEST EQUIPMENT

42. General

A voltohmmeter is the only test equipment normally required for field maintenance of Telegraph Set TG–5–(*). Two voltohmmeters which are available in the field are Voltohmmeter I–166 and Test Set TS–26/TSM.

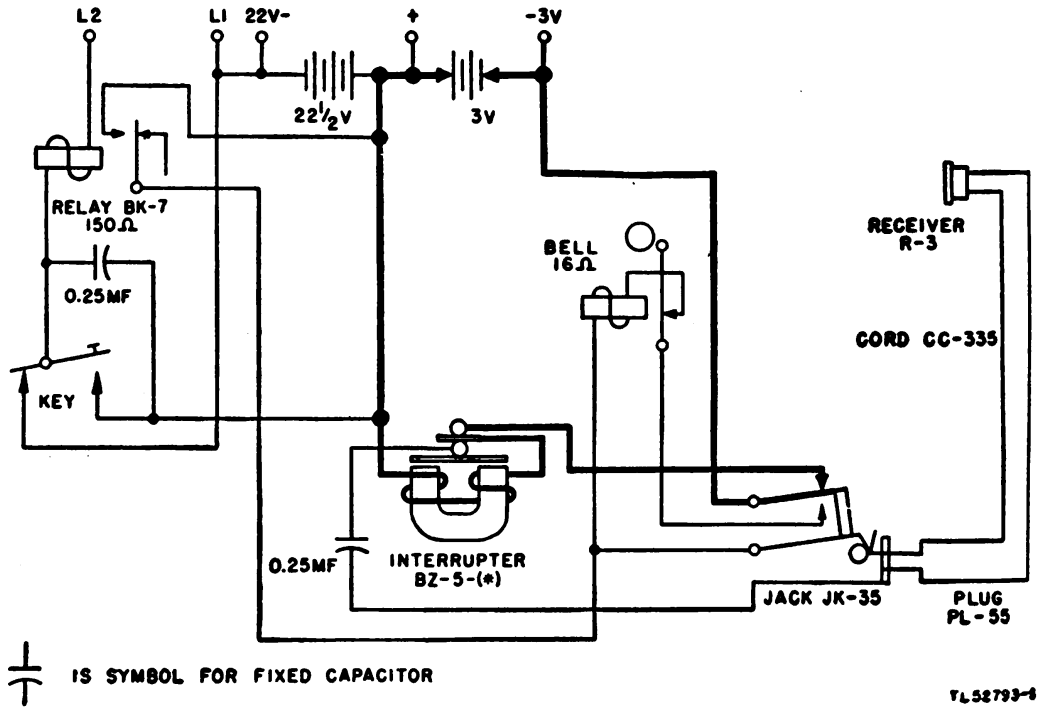


Figure 28. Interrupter circuit, Telegraph Set TG–5.

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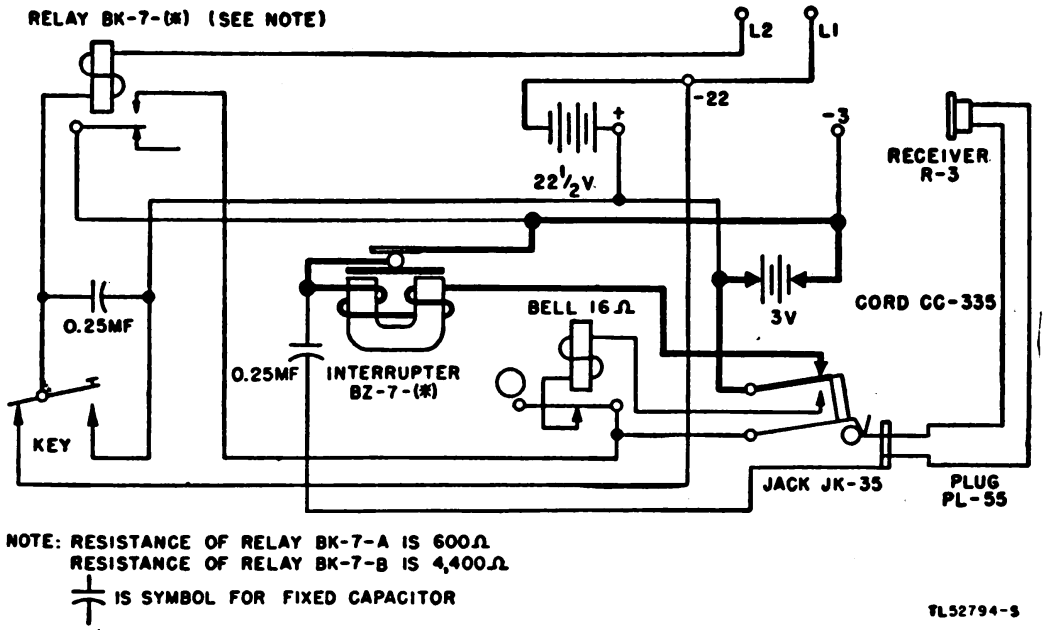


Figure 29. Interrupter circuit, Telegraph Sets TG–5–A and TG–5–B.

Caution: Before using a voltohmmeter for checking resistances in Telegraph Set TG–5–(*), always remove the batteries from the telegraph set to prevent damage to the voltohmmeter.

43. Voltohmmeter I–166

This test set is contained in Test Equipment IE–29. Voltohmmeter I–166 can be used for making continuity, voltage, and resistance measurements.

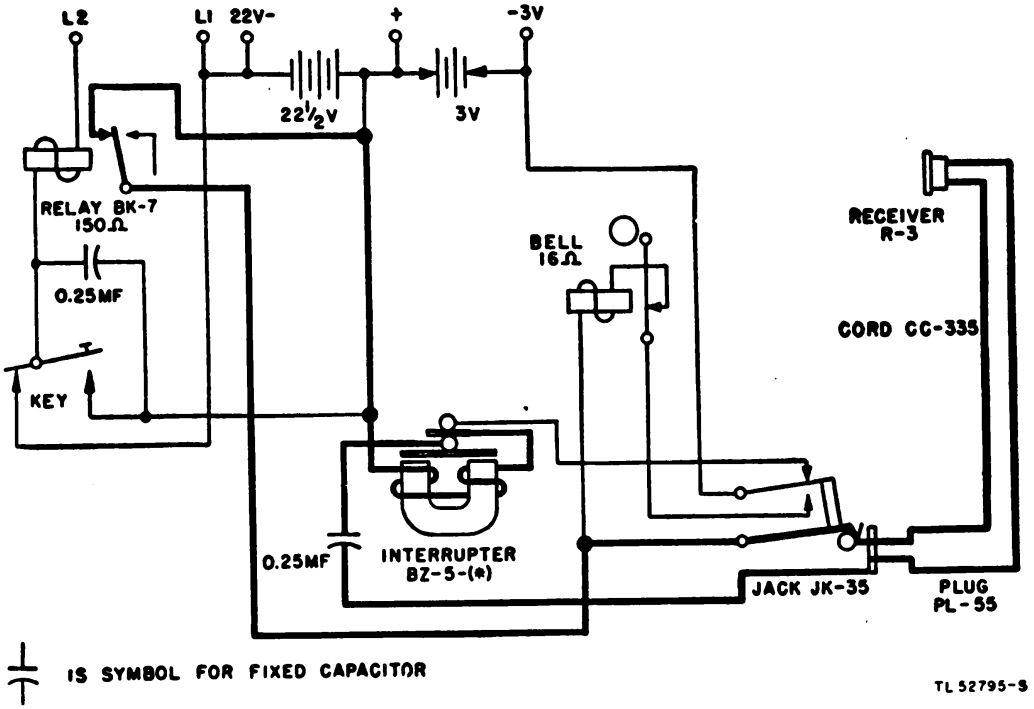


Figure 30. Receiving circuit, Telegraph Set TG–5.

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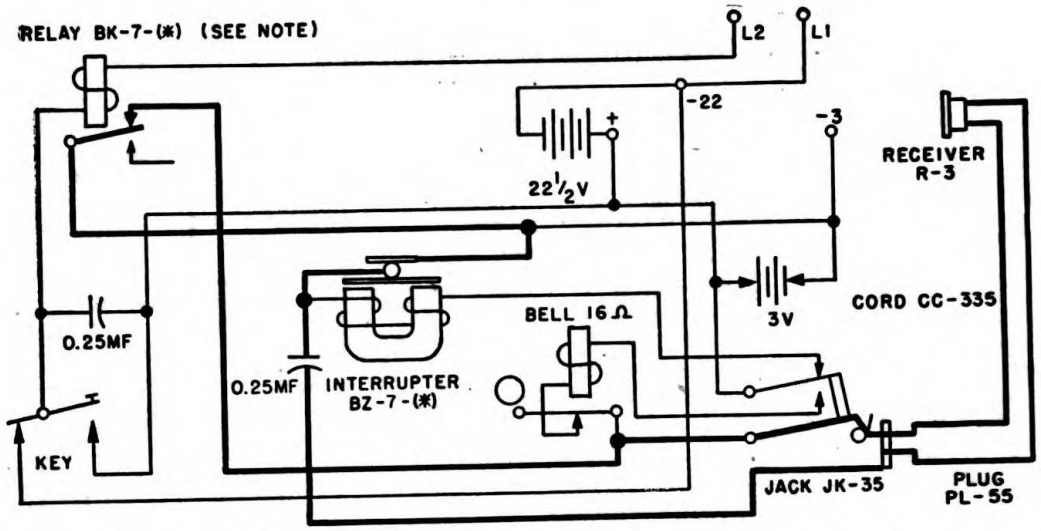


Figure 31. Receiving circuit, Telegraph Sets TG–5–A and TG–5–B.

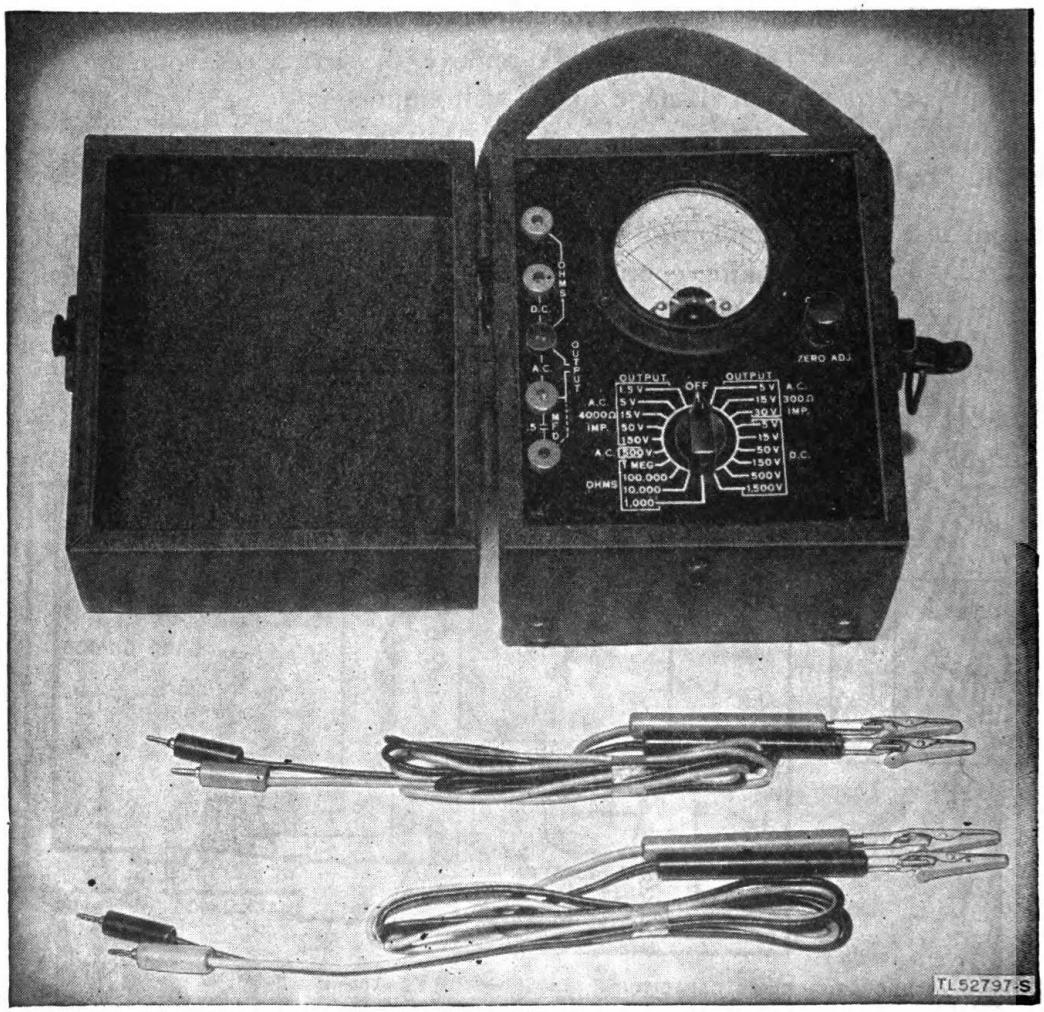


Figure 32. Voltohmmeter I–166.

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For operation and use of Voltohmmeter I–166, see TM 11–2613.

44. Test Set TS–26/TSM

This test set can be used for making continuty, voltage, and resistance measurements. For operation and use of Test Set TS–26/TSM, see TM 11–2017.

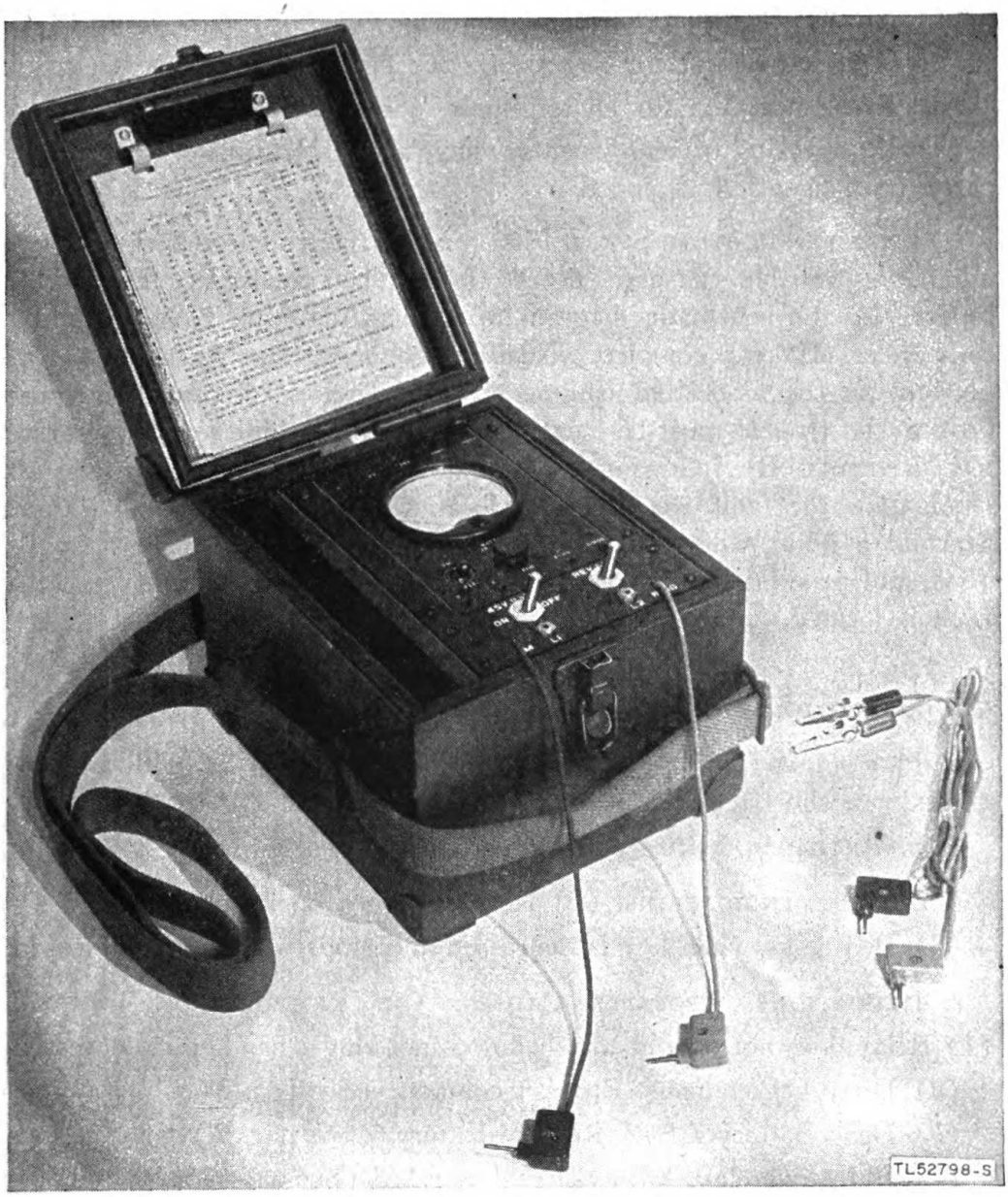


Figure 33. Test Set TS–26/TSM.

Section XIII. TROUBLE SHOOTING

45. General

No matter how well equipment is designed and manufactured, faults

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occur in service. When such faults occur, the repairman must locate and correct them as rapidly as possible. This section contains general information to aid personnel engaged in the important duty of trouble shooting.

a. TROUBLE-SHOOTING DATA. Take advantage of the material supplied in this manual to help in the rapid location of faults. Consult the following trouble-shooting data when necessary:

(1) Trouble-shooting chart. (See par. 49.)

(2) Complete schematic diagrams. (See figs. 34 and 35.)

(3) Resistance data for all terminals. (See par. 48.)

(4) Illustrations of components which aid in locating or identifying parts. (See figs. 3, 4, 5, and 6.)

b. TROUBLE-SHOOTING STEPS. First analyze the trouble report to determine the probable cause of the trouble. When analyzing the trouble report, use the schematic diagram to localize the fault to a particular component. Make a complete visual inspection of the wiring and connections to the associated equipment. If no wires or connections are broken, the trouble must be located by making continuity and resistance measurements. By following the circuit with a systematic process of elimination, the fault can usually be located in the shortest possible time. Start at a point where the circuit is known, from the analysis, to be good, and proceed step-by-step, eliminating parts of the circuit until the fault is located.

46. Line and Bell Circuit

a. PROCEDURE. (1) Short the line terminals L1 and L2 with a screw driver or a short piece of wire.

(2) Alternately depress and release key.

b. NORMAL INDICATIONS. (1) Relay is heard operating.

(2) Bell rings when key is depressed and stops when key is released.

c. INDICATIONS, PROBABLE CAUSES, AND REMEDIES OF TROUBLE.

(1) Relay does not operate and bell does not ring when key is depressed.

(*a*) Dirty key contacts. Burnish contacts. (See par. 34.)

(*b*) Dead Battery BA–2. Replace battery. (See par. 9.)

(*c*) Defective relay. Adjust or replace relay. (See pars. 15, 16, and 56.)

(*d*) Defective wiring. Check and repair wiring.

(2) Relay operated but bell does not ring when key is depressed.

(*a*) Dead Batteries BA–30. Replace batteries. (See par. 9.)

(*b*) Bell contacts out of adjustment. Adjust contacts. (See par. 14*b*.)

(*c*) Relay out of adjustment. Adjust relay. (See pars. 15 and 16.)

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(*d*) Defective bell. Replace bell. (See par. 54.)

(*c*) Defective wiring. Check and repair wiring.

(3) Relay operates and bell rings when key is depressed. Bell continues to ring when key is released.

(*a*) Key contacts not opening fully. Adjust key. (See par. 14*a*.)

(*b*) Relay out of adjustment. Adjust relay. (See pars. 15 and 16.)

(4) Bell rings when shorting wire is placed across terminals L1 and L2 before key is depressed.

(*a*) Relay out of adjustment. Adjust relay. (See pars. 15 and 16.)

(*b*) Capacitor shorted. Replace capacitor. (See par. 55.)

47. Transmitting and Receiving Circuit

a. PROCEDURE. (1) Short line terminals L1 and L2 with a screw driver or a short piece of wire.

(2) Insert headset plug in jack.

(3) Alternately depress and release key.

b. NORMAL INDICATIONS. (1) Relay is heard operating.

(2) Loud tone heard in receiver when key is depressed. Tone stops when key is released.

c. INDICATIONS, PROBABLE CAUSES, AND REMEDIES OF TROUBLE. (1) Relay does not operate. No tone heard in receiver.

(*a*) Dirty key contacts. Clean key contacts. (See par. 34.)

(*b*) Dead Battery BA–2. Replace battery. (See par. 9.)

(*c*) Defective relay. Adjust or replace relay. (See pars. 15, 16, and 56.)

(2) Relay operates. No tone heard in receiver.

(*a*) Dead Battery BA–30. Replace batteries. (See par. 9.)

(*b*) Relay out of adjustment. Adjust relay. (See pars. 15, 16, and 56.)

(*c*) Defective interrupter. Replace interrupter. (See par. 53.)

(*d*) Defective headset. Replace headset.

(*e*) Defective capacitor. Replace capacitor. (See par. 55.)

(*f*) Defective wiring. Check and repair wiring.

(3) Relay operates and tone is heard in receiver when key is depressed. Tone continues when key is released.

(*a*) Key contacts not opening fully. Adjust key. (See par. 14*a*.)

(*b*) Relay out of adjustment. Adjust relay. (See pars. 15 and 16.)

(4) Tone heard in receiver as soon as terminals L1 and L2 are shorted and before the key is depressed.

(*a*) Relay out of adjustment. Adjust relay. (See pars. 15 and 16.)

(*b*) Capacitor shorted. Replace capacitor. (See par. 55.)

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48. Circuit Measurements

a. GENERAL. If, after making the repairs suggested in the preceding paragraphs, satisfactory operation of the telegraph set still cannot be obtained, or trouble is traced to circuit wiring, measure the resistance of various parts of the circuit between the points indicated in the following chart. If any of the resistances obtained differ materially from

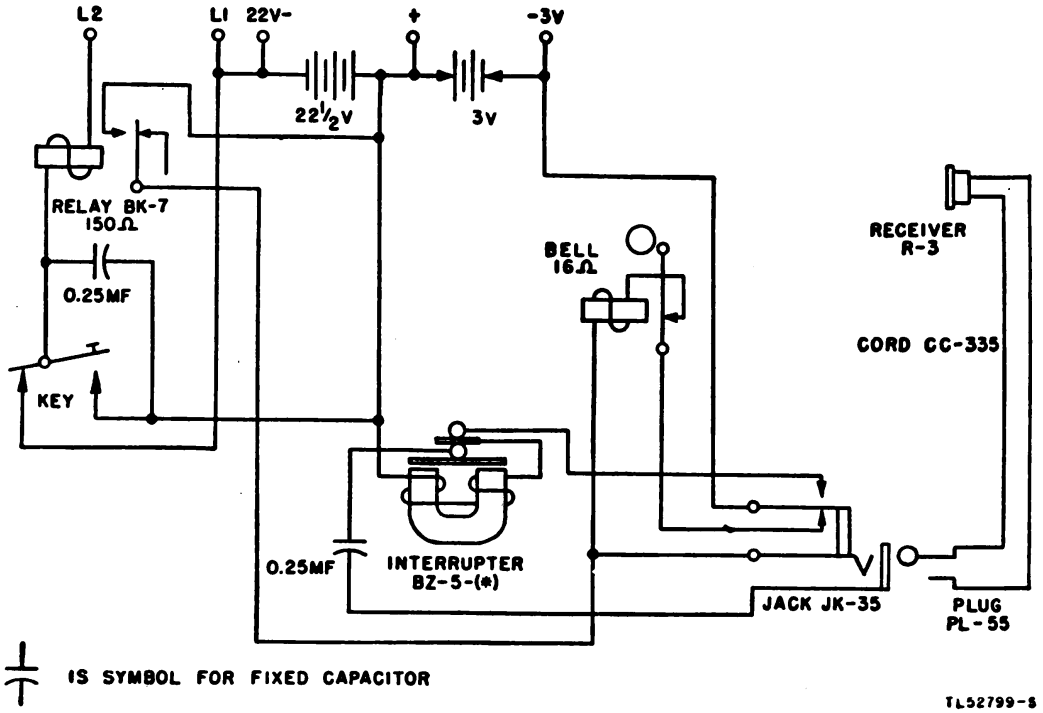


Figure 34. Circuit diagram, Telegraph Set TG–5.

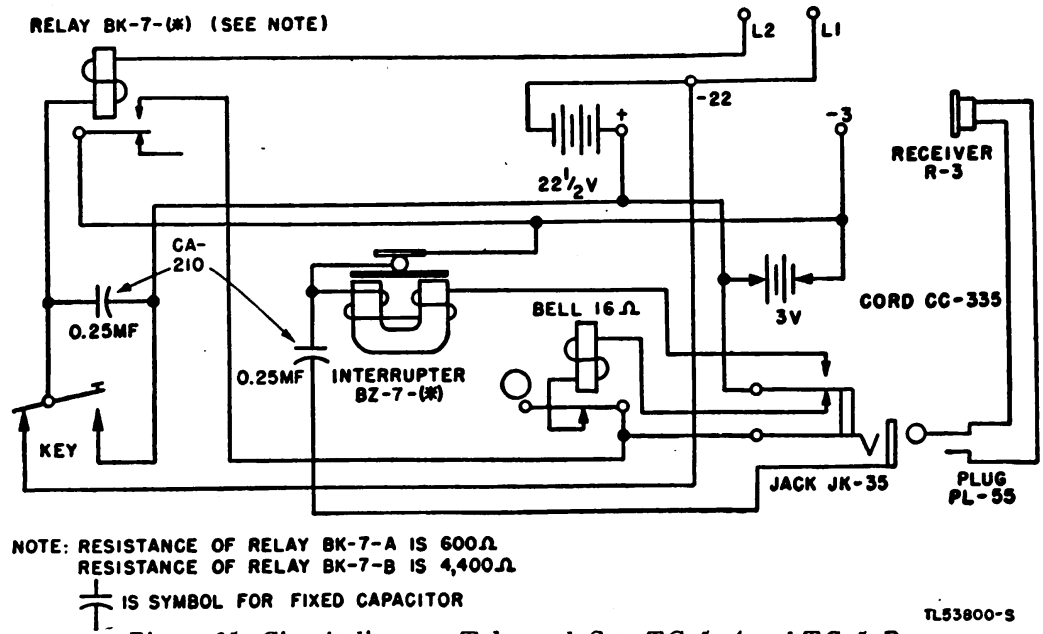


Figure 35. Circuit diagram, Telegraph Sets TG–5–A and TG–5–B.

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those given in the chart, check the wiring of that portion of the circuit against the circuit diagrams (figs. 34 and 35) and the wiring diagram in the cover of the telegraph set.

b. RESISTANCE CHART.

Between (points of measurement)	Resistance (ohms)
Telegraph Set TG–5	
−3 and + (plug in, key open)	350*
−3 and + (plug in, key closed)	350*
−3 and L2 (plug in, key closed)	650*
+ and L2 (plug in, key closed)	180
+ and L2 (plug out, key closed)	180
22V— and L2 (plug out, key open)	180
22V— and L2 (plug in, key open)	180
Telegraph Set TG–5–A	
−3 and + (plug in, key open)	700*
−3 and + (plug in, key closed)	700*
+3 and L2 (plug in, key closed)	1,000*
+ and L2 (plug in, key closed)	700
+ and L2 (plug out, key closed)	700
22— and L2 (plug out, key open)	700
22— and L2 (plug in, key open)	700
Telegraph Set TG–5–B	
−3 and + (plug in, key open)	700*
−3 and + (plug in, key closed)	700*
−3 and L2 (plug in, key closed)	5,000*
+ and L2 (plug in, key closed)	4,500
+ and L2 (plug out, key closed)	4,500
22— and L2 (plug out, key open)	4,500
22— and L2 (plug in, key open)	4,500

* Resistance may vary + or — 250 ohms.

49. Trouble-shooting Chart

Symptom	Probable trouble	Correction
No transmission; normal reception.	Battery BA–2 dead.	Replace Battery BA–2.
	Dirty front key contact.	Burnish contact.
No reception; normal transmission.	Dirty back key contact.	Burnish contact.
No reception and no transmission.	Open relay winding.	Replace relay.
	Dirty key contacts.	Burnish contacts.
	Dirty relay contacts and dead Battery BA–2.	Burnish contacts and replace Battery BA–2.
Relay operates but no tone heard in receiver. Headset plug in jack.	Dirty relay contacts.	Burnish contacts.
	Dead Batteries BA–30.	Replace Batteries BA–30.
	Defective interrupter.	Replace interrupter.
	Dirty jack contacts.	Burnish contacts.
	Defective headset.	Replace headset.
Relay operates but bell does not ring. Headset plug removed from jack.	Dirty relay contacts.	Burnish contacts.
	Dead Batteries BA–30.	Replace Batteries BA–30.
	Dirty bell contacts.	Burnish contacts.
	Defective bell.	Replace bell.
	Dirty jack contacts.	Burnish contacts.

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Section XIV. REMOVAL AND REPLACEMENT OF PARTS

50. General

When trouble has been localized to a specific unit, it is necessary to gain access to the defective part to inspect, adjust, or replace it. Parts are either directly accessible or are reached by removing other parts. Consult the wiring diagram on the equipment when replacing parts to be certain that the wiring color code is followed accurately.

Note. Those parts of replaced units which can be salvaged should be retained by the repairman for his own use. If the repairman has no use for them, they should be disposed of through the established channels for salvage. It will be particularly advantageous to retain parts of replaced headsets and interrupters as these units vary in design when produced by different manufacturers. Possession of such parts may enable the repairman to make emergency repairs which would be impossible otherwise.

51. Terminal Block

a. TELEGRAPH SET TG–5. (1) Remove the two screws from the back of the terminal block inside the battery case.

(2) Pull the terminal block away from the mounting. Be careful not to lose the bakelite spacer from behind the terminal block.

(3) Unsolder the leads from the terminals.

(4) Install a replacement terminal block by reversing the above procedure. When resoldering the wires on the terminal block be sure to follow the wiring diagram on the equipment.

b. TELEGRAPH SETS TG–5–A AND TG–5–B. (1) Remove the two screws from the back of the terminal block inside the receiver compartment.

(2) Pull the terminal block away from the mounting. Be careful not to lose the bakelite spacer from behind the terminal block.

(3) Unsolder the leads from the terminals.

(4) Install a replacement terminal block by reversing the above procedure. Follow the wiring diagram on the equipment for the proper color code of the wires.

52. Jack

a. TELEGRAPH SET TG–5. (1) Remove the two screws which hold the jack to the right side of the box.

(2) Pull the jack free of the box.

(3) Unsolder the leads from the terminals.

(4) Install a replacement jack by reversing the above procedure. Follow the wiring diagram on the equipment for the proper color coding of wires.

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b. TELEGRAPH SETS TG–5–A AND TG–5–B. (1) Remove the two screws holding the front of the receiver compartment to the side of the box. Remove the two screws holding the front of the receiver compartment to the battery compartment.

(2) Pull the metal plate and terminal block free of the box.

(3) Remove the two screws that hold the jack to the side of the box.

(4) Unsolder the two leads from the terminals of the rear battery compartment.

(5) Pull the jack free of the box.

(6) Unsolder the leads from the terminals.

(7) Install a replacement jack by reversing the above procedure. Follow the color code on the wiring diagram mounted on the equipment when installing a replacement jack.

53. Interrupter

a. TELEGRAPH SET TG–5. (1) Remove the three leads labeled 1, 2, and 3 from the front of the interrupter.

(2) Remove the two screws that hold the interrupter to the bottom of the case.

(3) Pull the interrupter part way out of the box.

(4) Remove the two leads labeled + and Z from the side of the interrupter.

(5) Install a replacement interrupter by reversing the above procedure. (See MWO SIG 11–351–2.) Follow the wiring diagram on the equipment for the proper color coding of wires.

b. TELEGRAPH SETS TG–5–A AND TG–5–B. (1) Remove the two leads labeled 1 and 2 from the front of the interrupter.

(2) Remove the two screws that hold the interrupter to the bottom of the box.

(3) Remove the two leads labeled + and Z from the side of the interrupter.

(4) Install a replacement interrupter by reversing the above procedure. Follow the wiring diagram on the equipment for the proper color coding of wires.

54. Bell

a. TELEGRAPH SET TG–5. (1) Remove the three screws which hold the metal plate over the bell to the side of the box.

(2) Remove the two screws which hold the front of the receiver compartment to the battery compartment.

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(3) Remove the two screws, one on each side of the bell cover, which hold the bell to the side of the box.

(4) Pull the bell free of the box. Be careful not to lose the insulated spacers and washers.

(5) Remove the two leads from the bell terminals.

(6) Install a replacement bell. Follow the wiring diagram on the equipment for the proper color coding of wires.

b. TELEGRAPH SETS TG–5–A AND TG–5–B. (1) Remove the two screws that hold the bell to the front of the battery compartment.

(2) Pull the bell free of the box. Be careful not to lose the insulated spacers and washers.

(3) Remove the two leads from the bell terminals.

(4) Install a replacement bell by reversing the above procedure.

55. Capacitor

a. TELEGRAPH SET TG–5. (1) Remove the bell (par. 54), jack (par. 52), and interrupter (par. 53) to permit access to the wiring form.

(2) Remove the two screws from the bracket in the receiver compartment.

(3) Remove the bracket and capacitor from the box.

(4) Cut the lacing on the wiring form far enough to remove the capacitor leads.

(5) Unsolder the capacitor leads from the terminals.

(6) Install a replacement capacitor by reversing the above procedure. Follow the wiring diagram on the equipment for the proper color coding of wires.

(7) Relace the wiring.

b. TELEGRAPH SETS TG–5–A AND TG–5–B. (1) Remove the bell. (See par. 54.)

(2) Remove the two screws that hold the bracket to the bottom of the box.

(3) Remove the capacitor and terminal plate from the box.

(4) Unsolder the capacitor leads from the terminal plate.

(5) Install a replacement capacitor by reversing the above procedure. Check the wiring diagram on the equipment for the proper color coding of wires.

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56. Relay

a. TELEGRAPH SET TG–5. (1) Remove the interrupter. (See par. 53.)

(2) Remove the four screws from the bottom of the box that hold the relay in place.

(3) Slide the relay to the right and out of the box.

(4) Unsolder the four leads from the end of the relay.

(5) Install a replacement relay by reversing the procedure given above. Check the wiring diagram on the equipment for proper color coding of wires.

b. TELEGRAPH SET TG–5–A AND TG–5–B. (1) Unsolder the leads from the relay terminals.

(2) Remove the four screws which hold the relay to the relay mounting plate. Remove the relay from the plate.

(3) Install a replacement relay by reversing the above procedure. Check the wiring diagram on the equipment for the proper color coding of wires.

57. Key

a. Remove the three leads from the key by loosening the knurled nuts.

b. Remove the two screws that hold the key to the shelf.

c. Install a replacement key by reversing the above procedure. Check the wiring diagram on the equipment for proper color coding of wires.

58. Front Cover Catch

a. TELEGRAPH SET TG–5. The catch on Telegraph Set TG–5 is riveted to the front cover and no attempt should be made to replace it.

b. TELEGRAPH SET TG–5–A. (1) Remove the two screws that hold the catch to the front cover.

(2) Install a replacement catch.

c. TELEGRAPH SET TG–5–B. (1) Remove the four screws that hold the catch to the front cover.

(2) Install a replacement catch.

Section XV. SPECIAL PROCEDURES

59. Adustment of Relays BK–7 and BK–7–A
(figs. 36 and 37)

a. GENERAL. (1) Remove the relay from the box. (See par. 56.)

(2) Turn the relay so that the contact end is up. Turn the top right-hand contact adjusting screw in as far as it will go. Turn the top left-hand contact adjusting screw out as far as it will go.

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b. ADJUSTMENT OF ARMATURE. (1) Check the contact alignment.

(2) If the armature is not in line with the contacts, adjust it by means of the pivot screws on the back and front of the relay, until the three contacts are in line.

(3) Tighten the armature pivot screw until there is no sideward movement of the armature, but the armature still moves freely back and forth.

c. ARMATURE GAP ADJUSTMENT. (1) Set the GAP adjustment lever to 0.

(2) Loosen the lever setscrew.

(3) Set the lever to 20 and tighten the setscrew.

(4) Move the lever in the direction of 0 until the relay core touches the armature.

(5) Move the lever back two notches.

(6) Loosen the setscrew and move the lever to 0. Retighten the setscrew.

d. SPRING TENSION ADJUSTMENT. (1) Loosen the SPRING adjustment lever setscrew.

(2) Turn the spring tension adjustment screw in the back of the relay until the armature has just enough tension placed upon it to pull it back to the rear contact.

Note. Turning the screw in a clockwise direction increases the spring tension on the armature; turning the screw in a counterclockwise direction decreases the spring tension on the armature.

(3) Set the SPRING adjustment lever to 0 and tighten the setscrew.

e. CONTACT ADJUSTMENT. (1) Turn the left contact adjusting screw in until the break contact pushes the armature up to the relay core.

(2) Turn the top right contact adjusting screw out until the make contact touches the armature.

(3) Back the break contact up one-half turn of the adjusting screw to obtain the proper contact separation and armature travel.

f. REPLACEMENT OF RELAY. Replace the relay in the box. (See par. 56.)

60. Adjustment of Relay BK–7–B

(figs. 38 and 39)

a. GENERAL. (1) Remove the four screws from the bottom of the relay.

(2) Take the relay off the mounting bracket.

(3) Remove the metal contact cover from the relay.

(4) Remove the three screws from the top of the relay that hold the bakelite cover in place.

(5) Lift the cover off the relay. Do not pry off the cover.

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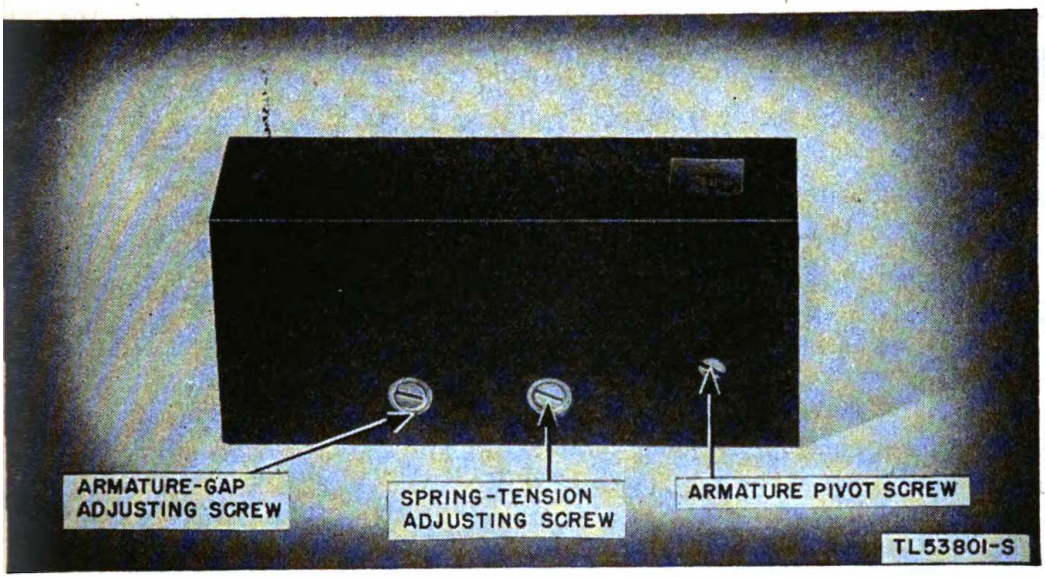


Figure 36. Rear view, Relay BK–7–A.

b. CONTACT ADJUSTMENT. (1) Increase the spring tension, by means of the ADJUST lever, so that the armature is held firmly against the rear contact.

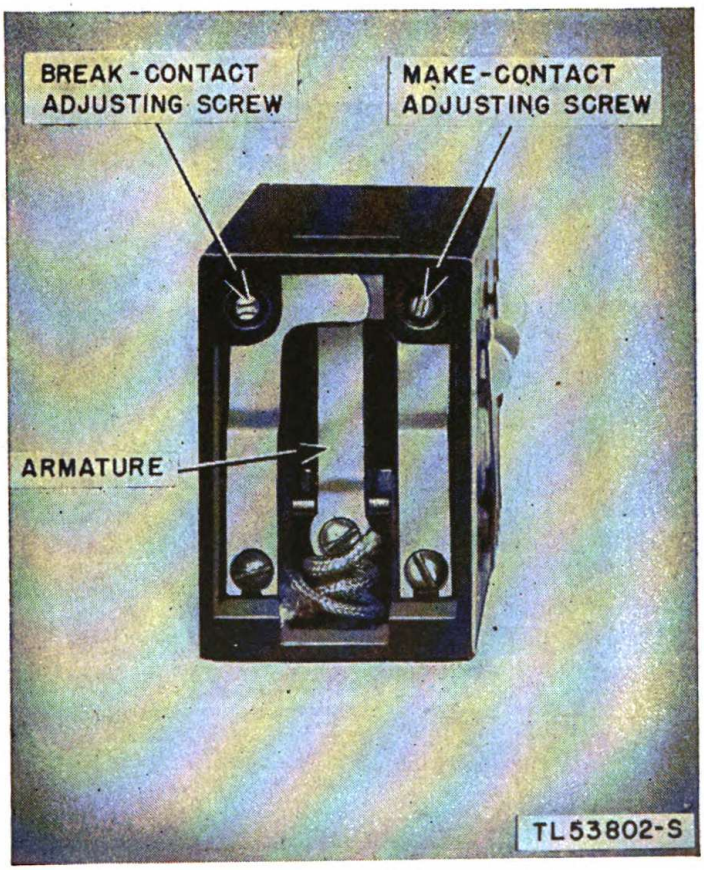


Figure 37. Contact end, Relay BK–7–A.

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(2) Turn the relay so that the contact end is up. Turn the top right-hand adjusting screw in as far as it will go.

(3) Turn the top left-hand adjusting screw in until the armature touches the relay core. Do not increase the pressure against the armature after it touches the core.

(4) Connect the batteries and headset to the telegraph set.

(5) Back the top right-hand contact adjusting screw out until the front contact touches the armature; at which time interrupter tone will be heard in the receiver.

(6) Back the top left-hand adjusting screw out one-fourth turn. The interrupter tone in the receiver should stop, and the proper armature travel and contact separation be obtained.

c. Spring Tension Adjustment. (1) Loosen the ADJUST lever setscrew, until the lever moves freely without affecting the spring tension on the armature.

(2) Turn the spring tension adjustment screw in the back of the relay until the armature has just enough tension placed upon it to pull the armature back to the rear contact.

Note. Turning the screw in a clockwise direction increases the spring tension. Turning the screw in a counterclockwise direction decreases the spring tension on the armature.

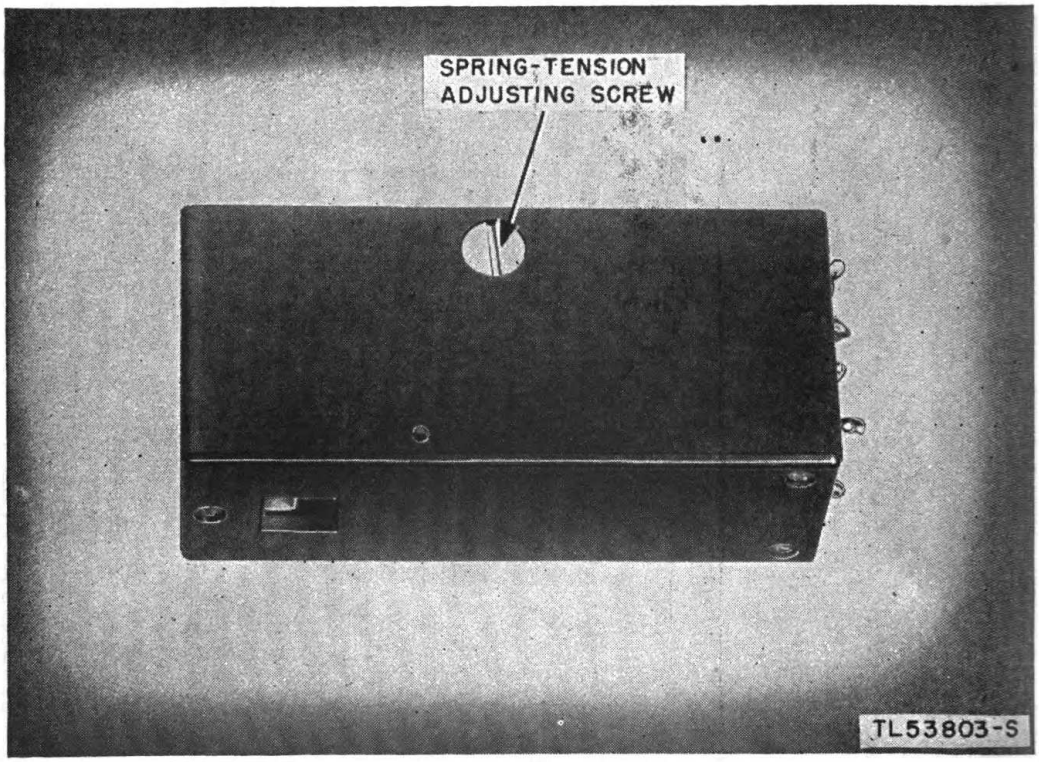


Figure 38. Rear view, Relay BK–7–B.

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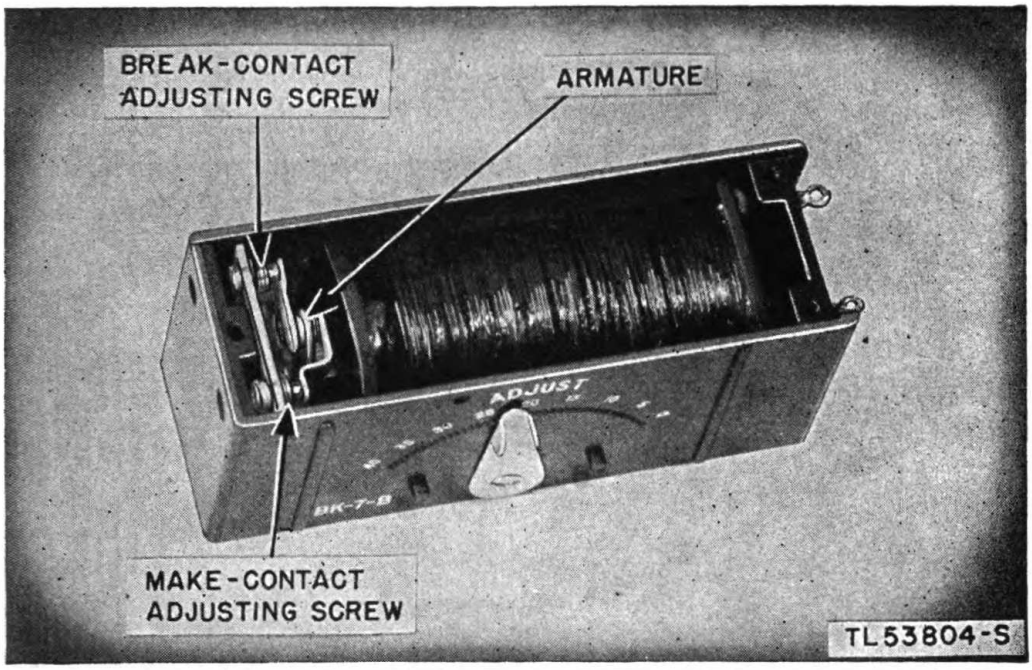


Figure 39. Contact end, Relay BK–7–B.

(3) Set the ADJUST lever to 0, and tighten the setscrew. Be careful when tightening the setscrew not to change the spring tension.

d. Replacement of Relay. (1) Replace the bakelite cover and screws which hold it in place.

(2) Replace the metal contact cover.

(3) Place the relay on the relay mounting bracket.

(4) Replace the four screws in the bottom of the relay.

61. Burnishing and Adjusting Contacts of Jack JK–35

a. Adjustment of Jack Contacts. (1) Remove the jack. (See par. 52.)

(2) Bend the tip contact of the jack so that it rests firmly upon the phenolic spacer that is secured to the metal base.

(3) Adjust the float contact so that it rests firmly upon the phenolic spacer on the top of the tip contact. Do not put sharp bends in the contact springs.

(4) Bend the break contact up until it touches the float contact and forces the float contact off the phenolic spacer just enough to see light under it.

(5) Adjust the make contact so that a clearance equal to the thickness of the screw driver end of Knife TL–29 is attained between the make and float contacts.

(6) Insert the plug in the jack and check the operation of the jack. The

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float should separate from the break contact before contacting the make contact. The make and break contacts should follow the float before breaking contact with it. Remove the plug.

b. Burnishing Contacts. (1) Place the contact burnisher between the break and float contacts. Be sure the contact burnisher is clean.

(2) Move the contact burnisher back and forth until the contacts are clean.

(3) Insert the plug in the jack.

(4) Place the contact burnisher between the float and make contacts.

(5) Move the contact burnisher back and forth until the contacts are clean.

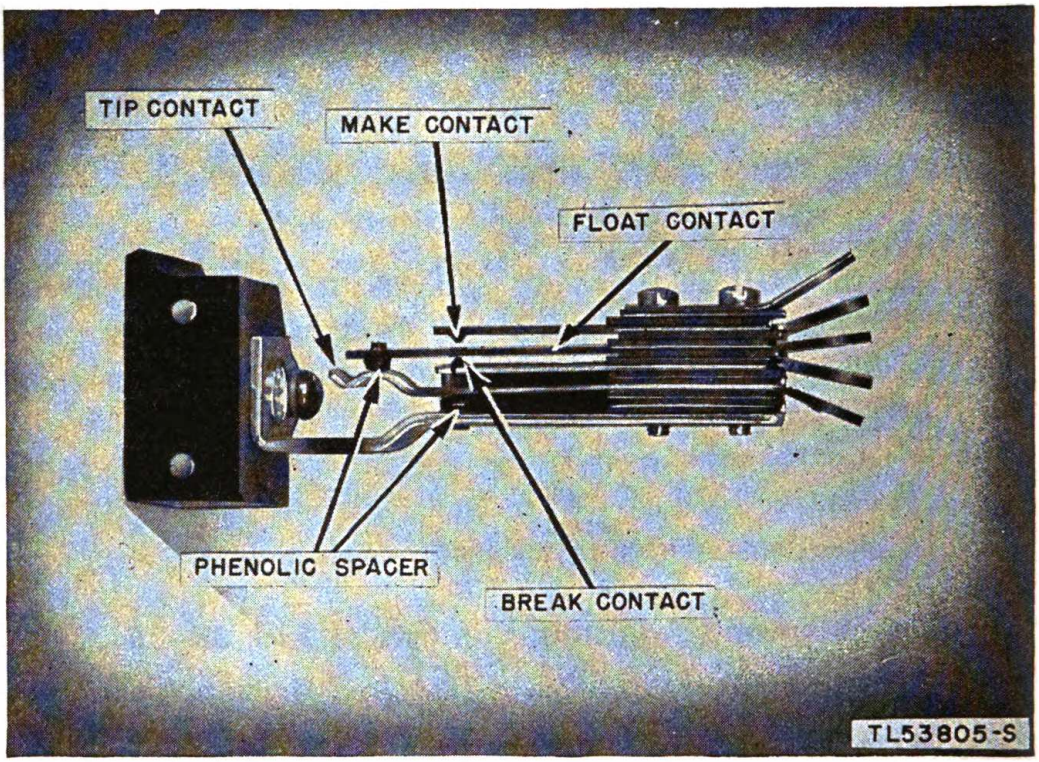


Figure 40. Jack JK–35.

62. Painting and Refinishing

When any painted portion of the box has been scarred or damaged, rust and corrosion can be prevented by touching up the bared surfaces in the following manner:

a. Clean the surface of the unit to be refinished with sandpaper (#00 or #000). All the finish need not be removed except where the surface film is broken.

Caution: Do not use steel wool, although it permits rapid removal of rust. Minute particles of steel wool frequently enter the equipment and cause harmful internal shorting or grounding of the circuits.

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b. Spray two coats of enamel, olive-drab, low-gloss, air-drying (stock No. 6G428), or equal, on the case. Air-dry between applications.

63. Unsatisfactory Equipment Report

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

WAR DEPARTMENT
UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: Signal Corps — MATÉRIEL	DATE: 20 Jan 45	
FROM	ORGANIZATION: 92d Div. Sig. Co.	STATION: APO 911-New York, N.Y.	
TO	NEXT SUPERIOR HEADQUARTERS: Signal Officer, Fifth Army	STATION	TECHNICAL SERVICE

COMPLETE MAJOR ITEM

NOMENCLATURE: Telegraph Set	TYPE: TG-5	MODEL: B	
MANUFACTURER: R.B. Blank, Inc.	U. S. A. REG. No.	SERIAL No.: 121	DATE RECEIVED: 3 Jan. 45
EQUIPMENT WITH WHICH USED (*If applicable*)			

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART No.: Sig. C. Stock No. 30400	TYPE: Capacitor CA-210	MANUFACTURER: R.L. White Co.	DATE INSTALLED: 9 Jan 45

DESCRIPTION OF FAILURE AND PROBABLE CAUSE (*If additional space is required, use back of form*)
Capacitor shorted out due to excessive moisture

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
11 Jan 45			2				12		

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN
Operation under conditions of extreme moisture. Replaced capacitor with one of higher voltage rating

TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS (*If additional space is required, use back of form*)
POOR	FAIR	GOOD	
	✓		Replace with capacitor of 450-volt rating

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION	SIGNATURE
J.J. Post, Capt. 92 Div. Sig. Co.	J.J. Post

FIRST ENDORSEMENT

TO CHIEF	TECHNICAL SERVICE: Signal Officer, Washington, 25, D.C.	OFFICE	
NAME, GRADE, AND STATION		STATION	DATE

Instructions

1. 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 matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel 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.
4. 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).
5. 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.
6. 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.
7. 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.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
30 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.

TL53806-S

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

Figure 41. War Department Unsatisfactory Equipment Report with sample entries.

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(fig. 41), 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, prepare the data according to the sample form reproduced in figure 41.

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APPENDIX I

MAINTENANCE PARTS

The following information was compiled on 1 April 1945. The appropriate sections of the ASF Signal Supply Catalog for Telegraph Set TG–5–(*) are:

SIG 7–TG–5, Organizational Spare Parts for Telegraph Set TG–5.
SIG 8–TG–5, Higher Echelon Spare Parts for Telegraph Set TG–5–( ).

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

Ref symbol	Signal Corps stock No.	Name	Ref symbol	Signal Corps stock No.	Name
Fig. 5	4A2805A/5	BURNISHER		6L3102–56	NUT, bell mounting.
Fig. 5	2B832	HEADSET HS–20		6L3104–40	NUT, capacitor mounting.
Fig. 5	4Z416	BELL			
Fig. 35	3D201	CAPACITOR CA–210.		6L6256–3.59	SCREW, catch mounting.
Fig. 7	4A349A	CASE CS–49–A		6L6256–3.5A	SCREW, bell mounting.
Fig. 5	4A2805B/12	CATCH, front cover.		6L6256–5.7AO	SCREW, bell mounting.
Fig. 5	4A2805B/28	CIRCUIT DIAGRAM.			
Fig. 5	4Z5007 ( )	INTERRUPTER BZ–7–( )			
Fig. 40	2Z5535	JACK JK–35			
Fig. 5	3Z3441A	KEY J–41–A			
Fig. 5	4A2007B	RELAY BK–7–B			
Fig. 5	2Z9405.22	TERMINAL BLOCK ASSEMBLY.			
	4A2005/49	BUSHING, bell mounting.			

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APPENDIX II

REFERENCES

1. Army Regulations

AR 380–5, Safeguarding Military Information.

2. Parts Lists

SIG 1,	Introduction to ASF Signal Supply Catalog.
SIG 2,	Complete Index to ASF Signal Supply Catalog.
SIG 3,	List of Items for Troop Issue.
SIG 4–1,	Allowances of Expendable Supplies.
SIG 4–2,	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5,	Stock List of all Items.
SIG 6,	Sets and P & I Control List.
SIG 7–TG–5,	Organizational Spare Parts for Telegraph Set TG–5.
SIG 8–TG–5,	Higher Echelon Spare Parts for Telegraph Set TG–( ).
SIG 10,	Signal Supply Catalog Fixed Plant Maintenance Lists.
SB 11–6,	Dry Battery Supply Data.

3. Technical Manuals on Test Equipment

TM 11–2017, Test Set TS–26/TSM.
TM 11–2613, Voltohmmeter I–166.

4. Painting, Preserving, and Lubrication

TB SIG 123, Preventive Maintenance Practices for Ground Signal Equipment.

5. Shipping Instructions

U.S. Army spec No. 100–14A, Army-Navy General Specifications for Packaging and Packing for Oversea shipment.

6. Decontamination

TM 3–220, Decontamination.

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7. Demolition

FM 5–25, Explosives and Demolitions.

8. Camouflage

FM 5–20, Camouflage, Basic Principles.

9. Other Technical Publications

FM 21–6, List of Publications for Training.
FM 21–7, List of War Department Films, Film Strips, and Recognition Film Slides.
FM 21–8, Military Training Aids.
FM 21–40, Defense Against Chemical Attack.
FM 24–5, Signal Communication.
TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 29, Impedance Unbalance Tests for Coils C–161 and C–228.
TB SIG 37, Grounding Requirements and Procedure Applicable to Wire Communication and Associated Electrical Apparatus.
TB SIG 66, Winter Maintenance of Signal Equipment.
TB SIG 69, Lubrication of Ground Signal Equipment.
TB SIG 72, Tropical Maintenance of Ground Signal Equipment.
TB SIG 75, Desert Maintenance of Ground Signal Equipment.
TB SIG 96, Repair Instructions for Field and Long Range Tactical Wire.
TB SIG 101, Longe-range Tactical Wire W–143.
TB SIG 121, Instructions for Tying and Use of Weave Tie for Field Wires and Cables.
TB SIG 123, Preventive Maintenance Practice for Ground Signal Equipment.
TB SIG 150, Wire Dispenser MX–301/G.
TB 11–430–1, Maintenance of Batteries in Nontemperate Areas.
TM 1–455, Electrical Fundamentals.
TM 11–430, Batteries for Signal Communication Except Those Pertaining to Aircraft.
TM 11–432, Code Practice Equipment.
TM 11–450, Training of Signal Communication Personnel.
TM 11–456, Wire Telegraphy.
TM 11–459, Instructions for Learning International Morse Code Characters.
TM 11–462, Signal Corps Reference Data.
TM 11–498, Fundamentals of Telephony and Manual Telegraphy.
TM 37–250, Basic Maintenance Manual.

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10. Forms

WD AGO Form 468, Unsatisfactory Equipment Report.
AAF Form 54, Unsatisfactory Report.

11. Abbreviations

AAF	Army Air Forces
AGO	Adjutant General's Office
ASF	Army Service Forces
d-c	direct-current
fig	figure
mf	microfarad
No	number
par	paragraph
rcvr	receiver
spec	specification
subpar	subparagraph
term	terminal
v	volt (s)
WD	War Department
xmtr	transmitter

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