

CONFIDENTIAL

Directions for Using the
TWO-WAY T. P. S. SET
Type SCR-76

Field Pamphlet
No. 3

(For enclosure in the Type SCR-76 Set and
to remain constantly with the set box.
To be issued only as a component part
of this set.)

Signal Corps, U. S. Army

8-24-18

**Directions for Using the Two-Way T. P. S. Set
Type SCR-76.**

Directions for Using the Two-Way T. P. S. Set, Type SCR-76.

The SCR-76 set is a receiving and transmitting set for T. P. S. communication (ground telegraphy). It is to be used at stations when two-way T. P. S. communication is necessary, in place of the SCR-71 T. P. S. power buzzer and the SCR-72 vacuum tube amplifier combination. The set comprises a power buzzer for transmitting, a vacuum tube amplifier for receiving, a 10 volt storage battery for operating both, and the necessary ground rods, leads, etc. For a detailed description of the set, see Radio Pamphlet No. 15.

Installation of the Set.

To set up a station the following steps are necessary:

- I. Proper location of the base line or lines.
- II. Installation of the grounds.
- III. Connection of the set.

These steps can be carried out simultaneously if a sufficient number of men are available.

I. Location of the Base Line.

The base line of a T. P. S. station is the imaginary straight line joining the two grounded ends of the line wires. When two stations are to communicate with each other, their base lines should be located so that they will make equal angles with an imaginary straight line joining the centers of the two bases, the angles considered being on the same side of this line and on the side of the base lines to-

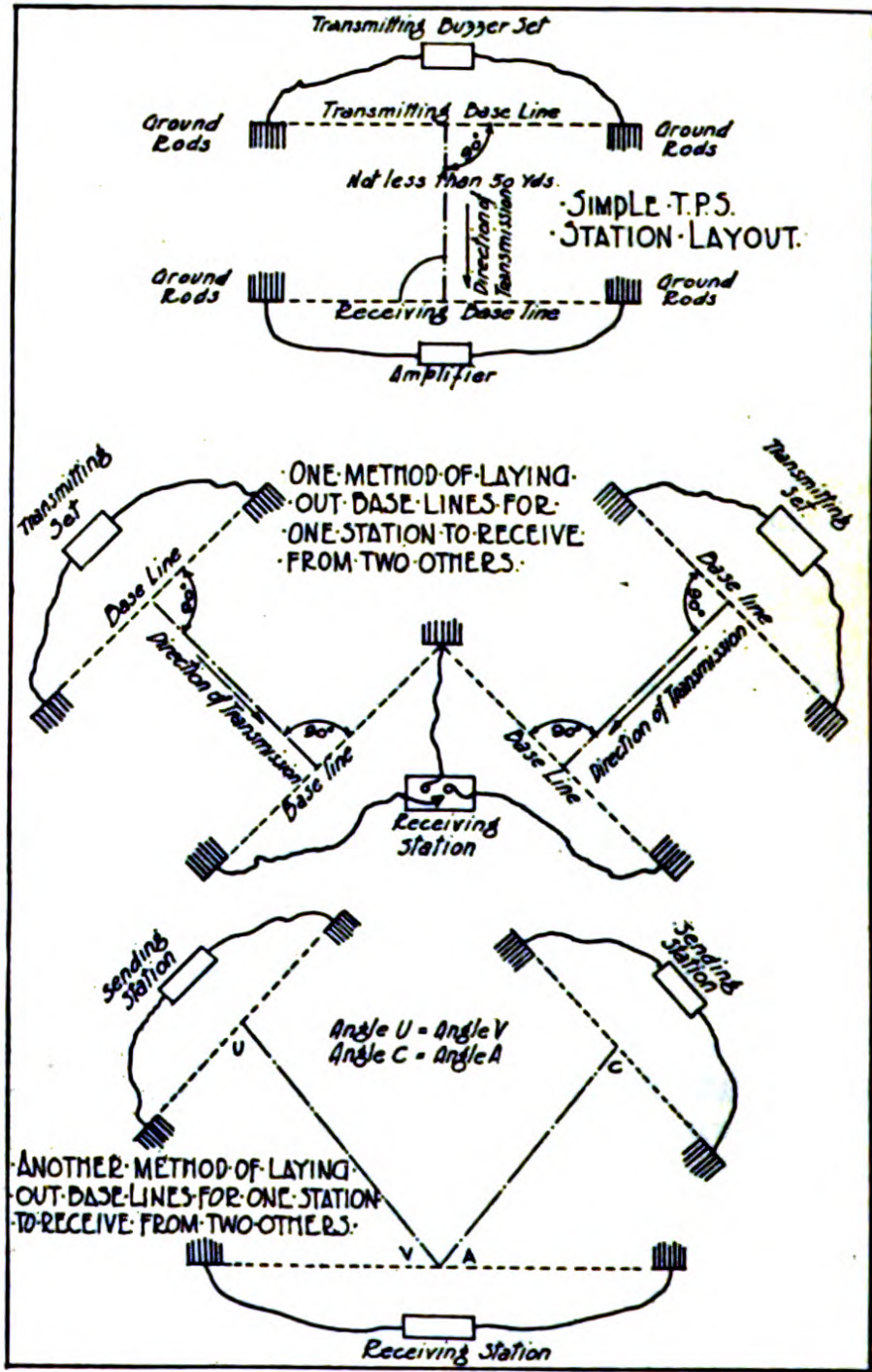


Fig. 1—How to Lay Out Base Lines.

ward the opposite station. This arrangement is generally secured with the aid of the compass supplied with the set. The best position of the base lines is that in which the angles are right angles (90 deg.), the two base lines then being parallel and facing each other. This is simply obtained by sighting an imaginary line from one station to the other and placing the base lines perpendicular to that line. The accompanying drawing, Fig. 1, shows the proper arrangement of base lines for several types of station.

When two or more stations are to communicate with one common station, the latter is established first and the other stations are then established according to the general rule given above, and shown in Fig. 1. When one station is to communicate with a number of other stations, a selector switch is used, as shown in Fig. 2. A number of base lines are laid out radially at the one station, and any one of them may be connected to the set box by means of the selector switch. All the other stations establish their base lines perpendicularly to the imaginary line joining them with the central station. The latter then selects, by means of the switch, the base line properly placed relative to any station with which it is desired to communicate.

II. Installation of the Grounds.

After the direction of the base line has been determined, a ground connection is made at each end of the base, the grounds being separated by a distance of approximately 500 ft.

The base line wire is run out from the set box by means of the breast reel on which is wound 500 ft. of wire. One end of the wire is connected to the set box, as explained below. At the other end, drive four

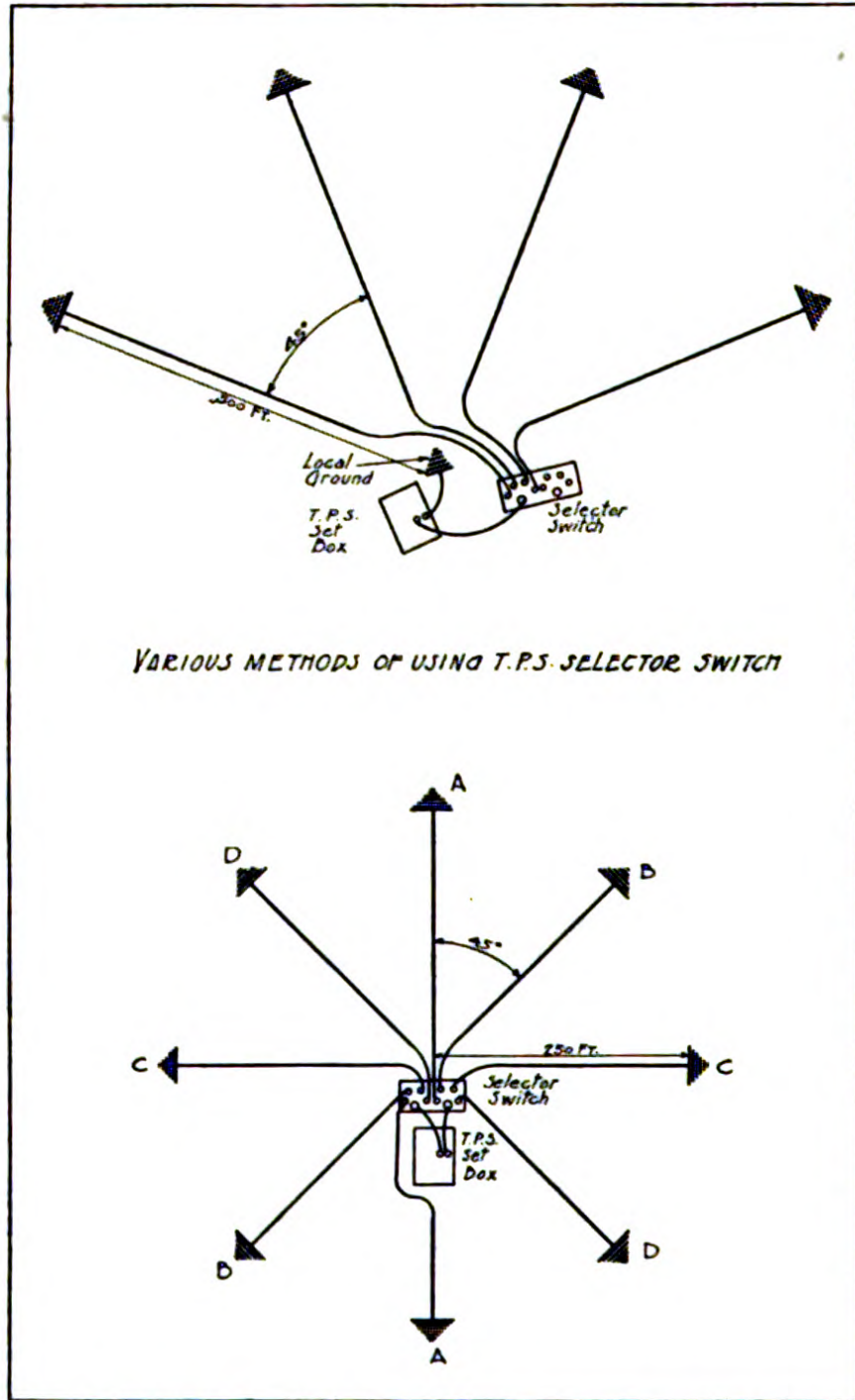


Fig. 2—Two Ways of Laying Out a Central T. P. S. Station.

to six ground stakes as deep as possible into the ground, in a straight line coinciding with the line of the base, and with at least 2 ft. separation between adjacent stakes. All the stakes are connected together by means of a wire which is then spliced to the line wire.

Near the set box, drive another group of four to six stakes into the ground and interconnect them similarly. This ground is connected to the other line wire from the set box.

Special care should be taken to use only line wires having perfect insulation for connecting the ground rods to the set box. These line wires may be buried in the ground if desired in order to protect them somewhat from shell fire; this, however, may increase the difficulties in case it is necessary to repair the wire after it has been cut by a shell. Inspect the line wires frequently to see that they are in good condition. If splices have to be made, insulate them carefully. Never use lead covered cable for these leads.

In order to make ground connections of low resistance, it is often useful to bury tin cans, shell cartridges, pieces of pipe, etc., in addition to the ground rods or in place of them, in cases of emergency. All these metallic masses should be carefully interconnected and connected to the line.

If possible, moisten the ground around each ground connection by pouring some water over the ground stakes after they have been driven in.

III. Connecting Up the Set.

While the base line is being established, the set box can be connected up by one or two men in the following manner:

1. Lay the set box flat on its back side, take the telephone head sets out of the bottom compartment and then carefully lock the latter. Set the box upright and place the 10-volt storage battery beside it.

2. Open the metal front door. Connect the two battery wires which are fastened to the operating panel, to the storage battery terminals, giving due regard to the proper polarity.

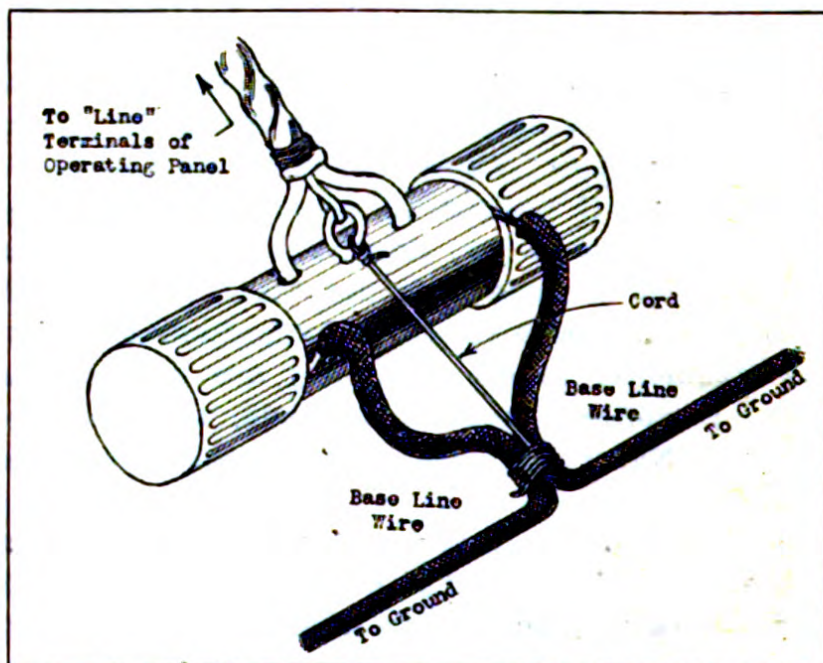


Fig. 3—Method of Tying Line Wire to Special Connector.

3. Connect the free ends of the two base line wires to the special double connector, which is connected to the "Line" binding posts of the operating panel.

4. To relieve any mechanical strain on the special connector, tie the two line wires together with a piece of cord, about 6 or 8 in. away from the connector and tie one end of this cord through or around the metal ring in the center of the connector, Fig. 3.

5. Connect a telephone head set by means of the telephone plug or the telephone binding posts.

Method of Operation.

After the set is connected up, certain adjustments are required to bring it into operating condition.

I. Adjustments for Transmitting.

1. Place the switch of the operating panel in the "Transmit" position.

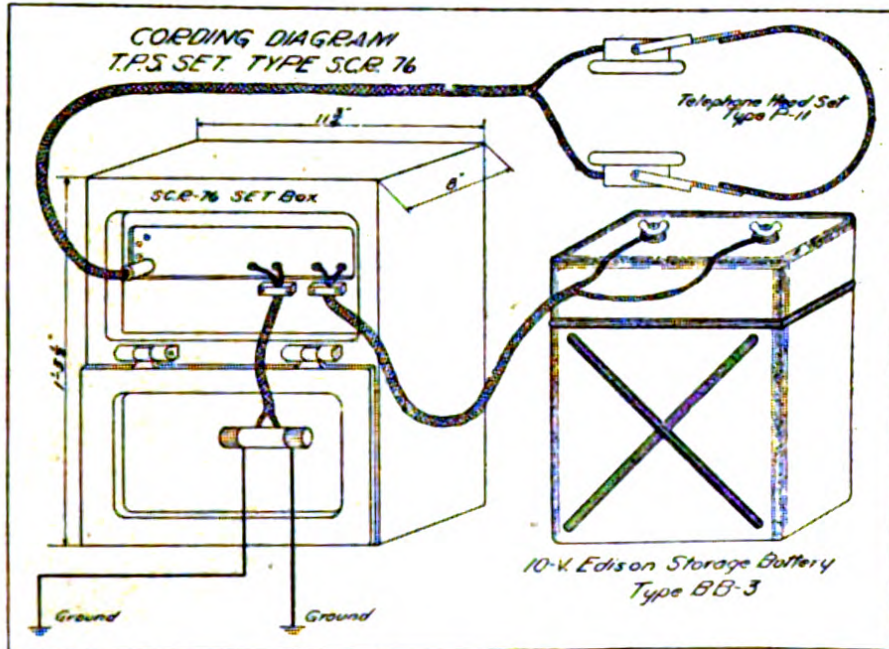


Fig. 4—Cording Diagram of Type SCR-76 Set.

2. Open the top cover of the box and by means of the special wrench to be found in this cover, fasten the desired weight to the power buzzer armature, according to the frequency it is desired to obtain.

The following adjustments of the weights give roughly the frequencies indicated in the following table. Where frequency or tone is of particular importance, it should be checked by some frequency measuring device. A device for this purpose will probably be supplied in the near future.

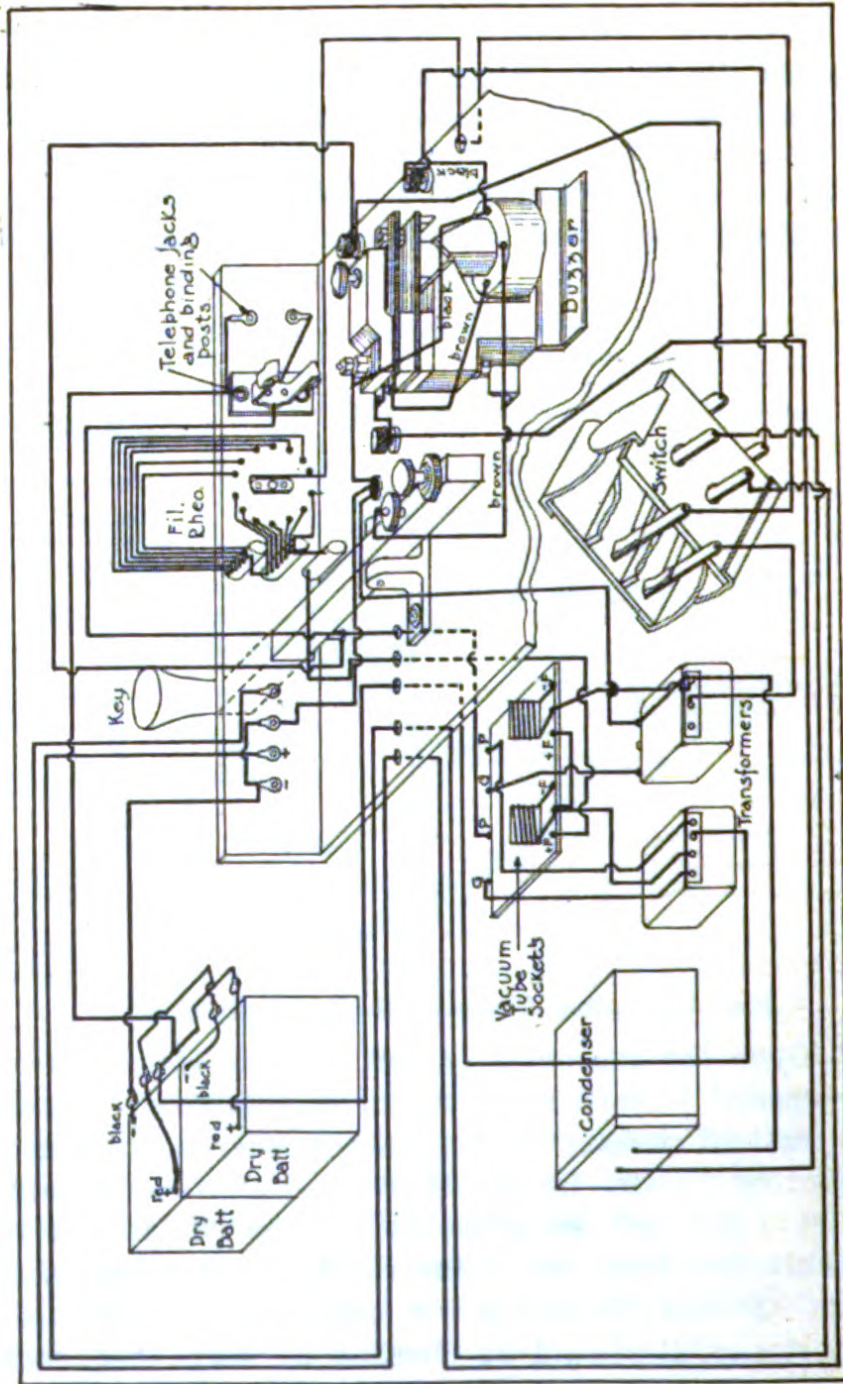


Fig. 5—Diagram of Actual Circuit Connections.

Large weight out..... 630 cycles per second.
 Large weight in..... 700 cycles per second.
 2 small weights out.. 830 cycles per second.
 1 small weight out... 980 cycles per second.
 1 small weight in.... 1150 cycles per second.
 No weights 1380 cycles per second.

3. Unlock the buzzer adjusting screw. Straighten out the telegraph sending key and depress it so that the buzzer will vibrate. Hold the key down and adjust the buzzer adjusting screw until a good clear note is obtained, then locking the screw in this position. As the current input into the ground is greater, the tighter the adjustment, the screw should be turned down as far as possible and retain a clear tone. If the tone is ragged, it is very difficult to eliminate interference at the receiving station.

4. Close the top cover. The set is now in operating condition for transmitting.

II. Adjustments for Receiving.

1. Place the switch of the operating panel in the "Receive" position.

2. Observe that both vacuum tubes are glowing by looking through the glass covered openings in the top cover. If not readily seen, move the filament rheostat toward the "maximum" position. In normal reception the filaments should not be heated any brighter than is necessary to obtain sufficient amplification. The life of the tubes is shortened by too bright operation.

3. Check up that the two dry batteries are connected with the correct polarity and close the top cover again.

4. Put on the telephone head set. The set is now in operating condition for receiving.

5. When the reception is very faint, move the fila-

ment rheostat toward the "maximum" position to increase the amplification.

6. While waiting for signals, or listening in for enemy information, check up that the filaments of both vacuum tubes are glowing, frequently, as an assurance that the set is in operating condition and that nothing is being missed.

Precautions.

When the set is not in use, the transmit-receive switch must be placed in the "off" position so that there will be no possibility of running down batteries unnecessarily.

Always keep the set box dry and waterproof. Keep the rubber gaskets on the covers clean so that they will keep moisture out of the box. In case of rain, cover the operating panel of the set with the rubber curtain furnished for this purpose.

Do not operate the set on run down batteries. Check up the voltage of the storage battery (10 volts) and of each dry battery separately (20 volts) by means of the voltmeter furnished with the set. The lower limit of working voltage for the dry batteries is 17 volts per battery.

It is impossible to operate the set for receiving messages with only one vacuum tube inserted, or with one tube broken or burned out. Two good tubes in place are essential. At least two spare tubes should be kept on hand at all times. This will be a sufficient supply to take care of the requirements between times of getting new supplies from the depot.

Take note that the two contact points on the buzzer vibrator are clean and not pitted or burned. If they require cleaning or truing up, remove them by means of the wrench, and gently rub them against some emery cloth on a plane surface. Do not use the file

unless absolutely necessary. Replace the contacts carefully, with their surfaces in plane contact. Be sure to place the upper contact on the upper armature and the lower one on the lower armature. Do not interchange them.

Keep the connection leads as dry as possible. Frequently inspect the base line wires, as they may be broken by shell fire and this makes communication impossible.

Parts List

In ordering this set or parts of this set, specifications must be made by names and type numbers as listed below, exactly. The designation printed in bold face type, *only*, will be used in requisitioning, making property returns, etc.

In ordering *complete* sets, it is not necessary to itemize the parts; simply specify, "2 Sets, Two-Way T. P. S., Type SCR-76." If *all* the parts listed under a group heading are desired, it is not necessary to itemize the parts, simply specify, for example, "1 Equipment, Type PE-13."

The Type SCR-76 Set is not complete unless it includes all of the items listed below.

SET, TWO-WAY T. P. S., TYPE SCR-76.

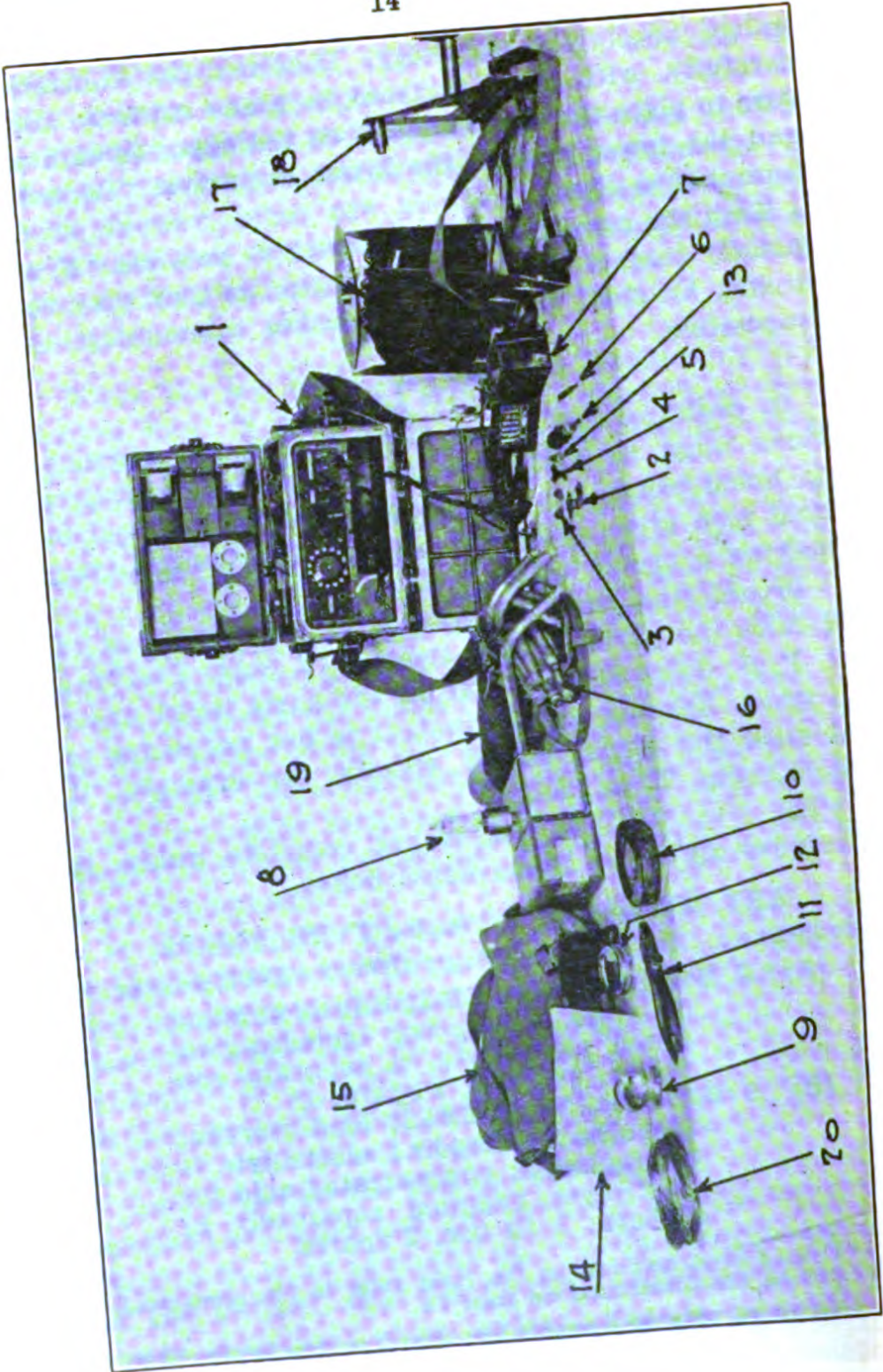
EQUIPMENT, (A) TYPE PE-13* OR (B) TYPE PE-11; Power *

(A)* 2 Batteries, Type BB-3; Edison storage; 10 volts, 3 amp-hr.; includes powdered electrolyte in separate container; 1 in use, 1 spare, or

(B) 3 Batteries, Type BB-23; lead storage; 10 volts, 20 amp-hr.; electrolyte is not included; concentrated acid for electrolyte supplied separately in carboys; 1 in use, 2 spares.

*** Figures in parenthesis at the right refer to the corresponding part in the illustration on page 14.**

*** Not to be shipped overseas.**



EQUIPMENT, TYPE RE-3; T. P. S.

- 1 Set Box, Type BC-21; T. P. S.; 15½ in. x 11¾ in. x 8 in.; weight 32 lb.. (1)
- 1 Weight, Type WT-2; large; for vibrator (2)
- 2 Weights, Type WT-3; small; for vibrator (2)
- 2 Contacts, Type CN-1; upper; for vibrator; spare (3)
- 2 Contacts, Type CN-2; lower, for vibrator; spare (3)
- 1 Wrench, Type TL-6; for changing vibrator weights (4)
- 1 Gauge, Type TL-7; air gap; for vibrator (5)
- 1 File, Type TL-5; contact; for vibrator (6)
- 2 Head Sets, Type P-11; telephone.... (Not shown)
- 4 Batteries, Type BA-2; dry; 2 in use, 2 spare (7)
- 4 Tubes, Type VT-1; vacuum; 2 in use; 2 spare (8)
- 1 Switch, Type SW-16; selector; issued as required (Not shown)
- 1 Compass, Type I-1; luminous dial.... (9)
- 1 Tape, Friction, Roll, Spec. 569-B; ¾ in..... (10)
- 1 Pliers, Type TL-19; universal..... (11)
- 1 Voltmeter, Type I-10; d. c.; 0 to 10 volts and 0 to 50 volts; with leads. (12)
- 1 Screwdriver, Type TL-2..... (13)
- 1 Cloth, Emery, Sheet, 11 in. x 8 in.... (14)
- 1 Bag, Type BG-13; carrying; 10 in. x 7¼ in. x 3 in..... (15)

EQUIPMENT, TYPE GD-3; Ground

- 12 Rods, Type GP-4; ground; 18¾ in. x ⅝ in.; weight 5 lb. 14 oz..... (16)
- 2 Drums, Type DR-3; for breast reel; 8 in. x 8½ in..... (17)
- 1 Reel, Type RL-6; breast; 9 in. x 11 in. x 4½ in..... (18)

- 1000 Ft. Wire, Type W-4; No. 16 B & S gauge, modified N. E. C. lamp cord; in two 500-ft. lengths, each wound on drum, type DR-3; net weight, 20 lb..... (17)
- 1 Bag, Type BG-3; carrying; for wire, ground rods, etc..... (19)
- 60 Ft. Wire, Type W-5; No. 30 B & S gauge, 16 strands, soft copper, braided; in two 30-ft. lengths, each wound in 3-in. coil..... (20)

Carrying Units

The above parts of the Type SCR-76 set may be assembled in seven carrying units, as follows:

- 1.—One set box, type BC-21, 15½ in. x 11¾ in. x 8 in.; including telephone head sets, dry batteries, vacuum tubes, etc.; total weight, 39 lb.
- 2.—One bag, type BG-3, containing 12 ground rods, 2 spools of wire and 2 coils of wire; total weight, 6½ lb.
- 3 and 4.—Two batteries, type BB-3; 11 in. x 10½ in. x 7 in.; weight, 31 lb. each.
- 5.—One bag, type BG-13, containing compass, volt-meter, tape, screwdriver, pliers, emery cloth, selector switch, and breast reel if desired; total weight, 4 lb. 9 oz.
- 6.—One reel, type RL-6; 9 in. x 4½ in. x 11 in.; weight 4½ lb.
- 7.—Two drums, type DR-3; each with 500 ft. of wire, type W-4; total weight, 24½ lb.

Renewable Parts Estimated as Monthly Requirements per set in use.

- ½ Set, type SCR-76.
- 6 Rods, type GP-4.
- 1000 Ft. Wire, type W-4.
- 30 Ft. Wire, type W-5.
- 2 Cords, type CO-4, for telephone head sets.
- 4 Batteries, type BA-2.
- 2 Tubes, type VT-1.

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