FOR OFFICIAL USE ONLY

RADIO RECEIVING SETS

Type SCR-54
Type SCR-54-A

and

DETECTOR EQUIPMENT

Type DT-3-A

Confidential

Communication
Radio Pamphlet
No. 3

Signal Corps, U. S. Army

Third Edition, Revised to
10-24-18.

5

Radio Receiving Sets
Type SCR-54 and
Type SCR-54-A
and
Vacuum Tube Detector Equipment
Type DT-3-A

THE RADIO receiving sets, type SCR-54 and SCR-54-A form the standard units for the reception on the ground of signals from airplanes, and in general, of all damped wave signals or modulated wave signals. The principal use for these sets may perhaps be said to be that in connection with the work of the fire control airplanes in directing the fire of the artillery. But in addition, they are used for so many other classes of radio work, that they may indeed be considered among the most important radio sets.

The type SCR-54 set is very similar to the French type A-1 receiving set. The type SCR-54-A set is an improved American product, designed along the same general lines as the type SCR-54 but differing in some respects, both mechanical and electrical, to improve the operating characteristics. The type A-2 and A-2-B antenna units are normally furnished as parts of these sets. These antennæ are fully described in Radio Pamphlet No. 2. With their use the receiving sets have a wave length range of approximately from 150 to 650 meters. If properly operated, they afford quite sharp tuning. This feature and their compact, rugged and simple construction have made them of very considerable value on the Western front.

Type SCR-54 Set

As shown in the wiring diagram, Fig. 1, the type SCR-54 receiving set comprises a primary (antenna) circuit and a secondary circuit, both of which may be tuned by means of the variable capacitance and variable inductance comprised in both circuits. The secondary circuit may also be made aperiodic by placing the switch M on the position marked "AP." This connects the condenser in or disconnects it from the circuit. Across the secondary condenser is connected the detector and telephone circuit. A separate buzzer circuit is installed in the cover of the box to excite the set when adjusting the crystal detector.

The adjustable capacitance in each circuit is a variable air condenser which is adjusted by means of an insulating handle, marked "Primary" or "Secondary," mounted directly on the rotating shaft of the condenser. The relative amount of capacitance in the circuit, corresponding to the various positions of

these handles, is indicated by a pointer fastened to the shaft, which moves over a dial graduated from 0 to 90. The position 0 corresponds to the minimum and the position 90 to the maximum capacitance of the condenser. The two condensers are

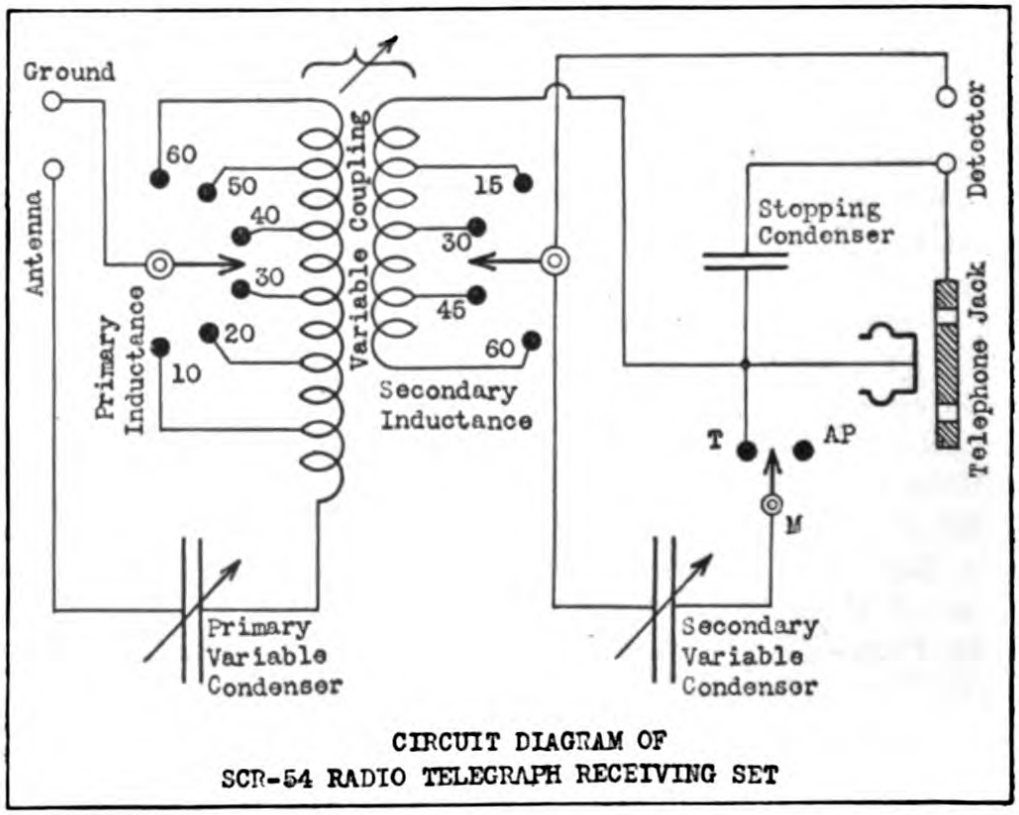

Fig. 1—Schematic Wiring Diagram of the Type SCR-54 Set.

identical in design, and have a maximum capacitance of 500 micro-mfd.

The primary and secondary inductances are varied by means of two dial switches marked "P" and "S," respectively. The primary inductance comprises 60 turns of wire divided into six steps of 10 turns each, while the secondary inductance comprises 60 turns divided into four steps of 15 turns each. These two inductance coils are wound on separate wooden cylinders so arranged that their relative positions may be readily varied.

The coupling of the two circuits, which is accomplished by the mutual induction effect of these two coils, is varied by changing the relative mechanical positions of the coils. The secondary coil may be rotated by means of a handle marked "Coupling," and a pointer moving over a scale graduated from 0 to 90 indicates its position. When in the zero position, the axes of the two coils are at right angles to each other, and the degree of coupling

is zero. When in the position "90," their axes are parallel, and the coupling is a maximum.

The telephone and detector circuit shunts the secondary condenser. This circuit consists of a crystal detector connected in series with the telephone receivers, which are shunted by a so-called stopping condenser. The latter is a .002 mfd. mica condenser. Two crystal detectors are furnished with the set; one of them is enclosed in a glass tube, which protects the crystal from dust or dirt. The other is open, having no such protective casing. Either one may be used by screwing it to the two binding posts of the set marked "Detector."

The buzzer circuit is mounted in a compartment of the set box cover, and consists of a small buzzer connected in series with a dry battery, type BA-4 and a switch. The buzzer is energized when this switch is closed.

A spare dry battery for the buzzer, a screw-driver, the enclosed detector, some spare wire and spare crystals are normally stored in compartments or metal clips in the cover. Two type P-11 telephone head sets are kept in a special compartment in the box. The set box, when closed, may be carried by a leather strap attached to it.

Method of Operating

The first step in putting the set in operating condition is to select a suitable place and set up the antenna. The set box is then installed in a dry and protected place, and the aerial and ground (or counterpoise) leads are connected to their respective terminals on the operating panel, and the telephone head set plugged into the jack.

With the installation thus completed, the first step is to adjust the crystal detector. To do this, place the "coupling" handle near the maximum position, and connect a short piece of wire from the terminal clip in the buzzer circuit to the "antenna" or "ground" terminal of the operating panel. Close the buzzer switch to energize the buzzer, and carefully explore the surface of the crystal with the spring contact point until a sensitive spot is found, as evidenced by a good audible sound in the telephone receiver. The short wire running from the buzzer to the panel is then removed and the buzzer stopped by opening the buzzer switch. Care should be taken not to disturb the crystal adjustment by mechanical vibration or shock. This adjustment is very delicate, and, if destroyed, it must be restored before any signals can be received.

With the crystal adjusted, the set is then ready for tuning. The procedure varies somewhat according to whether the wave length of the station it is desired to receive is known or not.

(a) **Wave Length of Signals Unknown.**—The switch M in the center of the panel is thrown to the position "AP" (aperiodic). This disconnects the secondary condenser, and makes the secondary circuit responsive to signals of any wave length. The coupling is made a maximum, and the secondary inductance dial switch S placed at the position "60." The primary inductance switch P is then placed successively at the positions marked 10, 20, 30, 40, 50 and 60, and, at each point, the handle of the primary condenser is slowly turned over its full range, until the loudest signals are obtained in the telephone. The station is then identified by its call letters, and if it is the station desired, tuning of the set is completed as explained below. It may happen however, that in this search for signals, several stations are heard, simultaneously or for different positions of the handles. The process of searching is kept up until the desired station, as identified by its call letters, is heard with the greatest intensity.

The coupling pointer is then moved towards the minimum position, so that the signals will be just loud enough to be easily read. The switch M is placed in the position T (tune), which connects the secondary condenser in the secondary circuit. The secondary circuit is then tuned by operating the secondary inductance dial switch S and the secondary condenser in the same way that was followed in tuning the primary. The secondary circuit is in tune when the signals are heard loudest. The set is then ready for operation.

If necessary, the strength of the signals may be increased by increasing the coupling, but this should not be done unless the signals become too faint to be read, since increasing the coupling increases the likelihood of interference by other sending stations. When the coupling is changed, some slight adjustments of the primary and secondary condensers will be found to improve the signals.

(b) **Wave Length of Signals Known.**—When the receiving operator has been advised of the wave length of the signals he is to pick up, the process of tuning in is somewhat facilitated by the use of the table of wave lengths which is pasted in the cover of the box.

The primary circuit of the set is first tuned, as explained above, with the switch on "AP," the secondary inductance on

"60," and with maximum coupling. After the signals have been identified and the primary has been tuned to give maximum loudness, the coupling is reduced as before, and the switch M moved to T. The secondary inductance setting to be used is then given in the table. Thus, for a wave length of 280 meters, the setting may be 30 or 45. It is best to use the higher value 45. The final secondary adjustment is then made as before by means of the secondary condenser.

Use of a Vacuum Tube Detector with the SCR-54 Set

It is sometimes desirable to use a vacuum tube detector in place of the crystal detector supplied with the set. In this case, the telephone stopping condenser of the set must be short circuited by inserting a dummy brass plug in the telephone jack. The crystal detector is then disconnected, and wires are connected from the detector binding posts of the set to the proper terminals of the vacuum tube detector set. The telephone receivers should not be plugged in, as before, in the jack of the set box, but must be connected to the proper terminals or jack of the vacuum tube detector box.

Precautions, Sources of Trouble, Maintenance

In using this set, care should be taken to always keep it in as dry a place as possible. It should be kept in a clean condition, especially the operating panel, the contacts, binding posts, dial switch studs, etc., and the telephone jacks. Oil or grease on these contacts will make the connections uncertain and unsteady and impair or even prevent the satisfactory operation of the set. The set should be handled carefully to avoid warping the condenser plates or otherwise damaging the set. No foreign substance should be placed in the set box.

Care should be taken that the telephone receiver cords do not get wet, for the resulting leakage of current in them would considerably decrease the strength of the signals and introduce annoying noises. The telephones do not require any adjustment, and the ear-pieces should always be kept screwed up tight. The telephone receivers should never be taken apart, since their adjustment at the factory is very accurate and permanent. If it becomes necessary to remove the cord connections from either the telephones or the plug, the wires must be reconnected as found, according to their different colors. This is important since otherwise the permanent magnets will be

partially demagnetized and the efficiency of the telephone receivers will be seriously impaired.

In packing the set for transportation, the telephone head set receivers are placed face to face so that the diaphragms will be

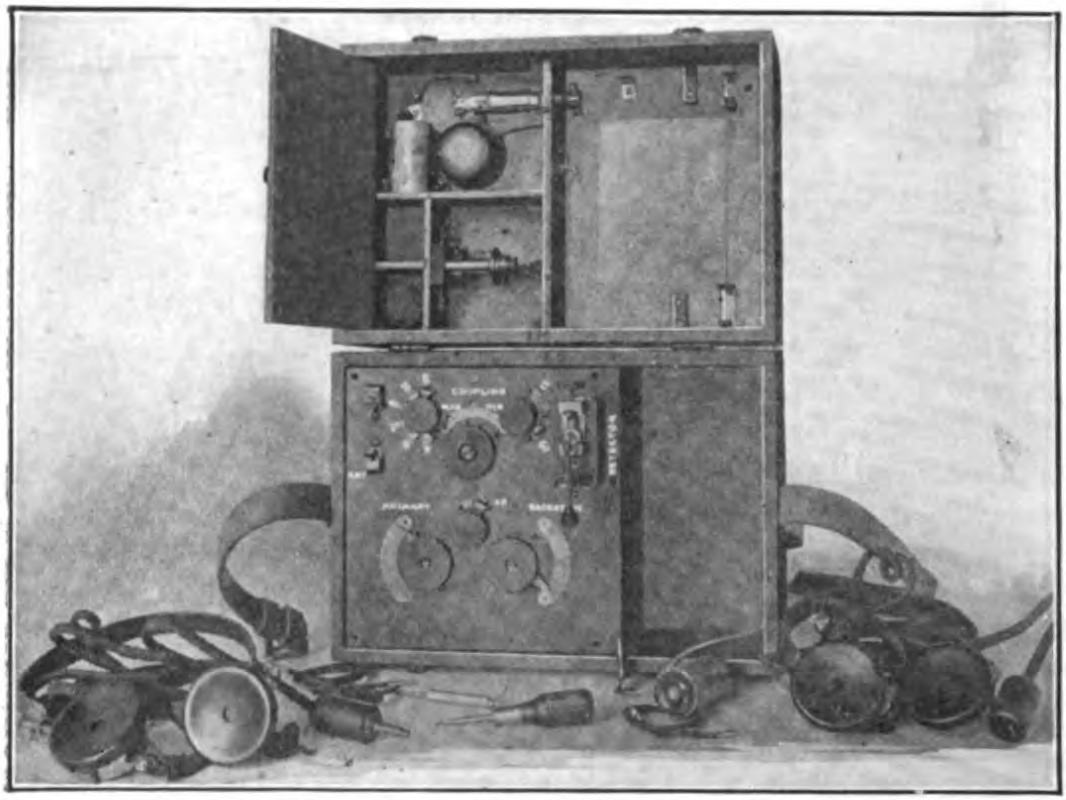

Fig. 2—Operating Panel and Cover Accessories of the Type SCR-54 Set.

protected and kept free of mud and dirt. The telephone cord is then wound around the head band in such a way as to hold the receivers together. The telephone plug is finally slipped inside the coil thus formed by the connection cord, and the entire set is carefully replaced in its compartment in the set box.

Among the troubles most frequently encountered are those considered below.

It may happen that the buzzer does not work. This may be due to a poor adjustment of the buzzer vibrator, or to a run down dry battery.

If the radio set does not work it may be because the crystal detector is not making contact with a sensitive spot. Readjust it with the aid of the buzzer.

No sound in the receivers may be due to the fact that the telephone plug is not all the way in the jack, or that it is dirty. In this case see that the plug is clear in, or remove it and wipe it off with a clean cloth. Also, the dummy brass plug may be

in the telephone jack. This would prevent operation entirely with the crystal detector.

Scratching noises in the telephone may be the result of a wet connection cord, or the connection at the plug or at either telephone receiver may be loose.

If the antenna or ground connection is loose, or if the aerial or lead-in wire is grounded through a branch of a tree, or in some other way, the set will fail to operate. Make sure of good insulation all around.

It sometimes happens that a wire will break inside the set box. This generally occurs to one of the wires connecting the secondary inductance coil to the various taps of the secondary dial switch. One way to discover this fault is to turn the "coupling" handle back and forth; the signals may then suddenly stop for a certain position of the handle, although they will be audible with the handle on either side of this position. Finally, a plate of one of the variable air condensers may become warped and short circuit the condenser. This is generally evidenced by the fact that the condenser, when varied over its whole range, does not change the loudness of the signals.

In active service, receiving sets are required to be in continuous working condition. To insure this, spare parts must be kept on hand at all times in order to replace defective parts with the least possible delay. Such spare parts should include spare crystals, telephones and telephone cords. Complete extra sets should always be in stock at the central radio supply station to provide for replacements promptly when sets are destroyed. The sets in use should also be frequently tested to determine their condition and readiness for an intensive and continuous activity. The condenser and inductance circuits should be tested to make sure that each part of each circuit is in perfect working condition. Testing of circuit parts may be simply done with a head phone and dry cell, a click through closed circuits, and the absence of a click through the condenser circuits, being the indication which should be noted.

Reception of Airplane Signals

When receiving signals from an airplane, such as in fire control work, some special precautions are necessary, due to the constantly changing distance between the sending and receiving sets, and the possibility of the airplane going so far away that the signals become too faint to be read.

In the case of a prearranged shoot, the airplane will always fly above or near his receiving station before starting out over the target, and will send his call letters. This will give the receiving operator an opportunity to tune his set. He should tune in accord with the procedure outlined in an earlier paragraph, but he should not reduce the coupling as much as he would if communicating with a ground station. This rule is followed in order that the signals, which grow fainter as the airplane flies farther away, may be audible for the greatest range which will be needed. The operator thus constantly remains in touch with the airplane without readjustment of his set. Once the airplane has reached the target, and his distance to the battery no longer increases, the operator should reduce the coupling in order to reduce interference with the signals from his airplane.

Another point of importance is that sometimes good reception is obtained with the secondary circuit aperiodic (switch M in the position AP), and the primary alone tuned to the sending station. This may occur when very few stations are working, but that adjustment of the set gives no protection against interference from a nearby station which may start to send while communication is going on. It is therefore absolutely necessary to always tune both the primary and secondary circuits.

Type SCR-54-A Set

As previously stated, the SCR-54-A radio receiving set is in many respects identical with the SCR-54 set. A wiring diagram of the former is given in Fig. 3. The main point in which the newer set differs from the SCR-54 set is that the buzzer circuit, instead of being installed independently in the cover of the box, is mounted on the operating panel, with a pull type switch which closes it on the primary radio circuit. The buzzer circuit consists of a dry battery, type BA-4, a small buzzer, a switch, and the first section (10 turns) of the primary inductance coil. The dry battery used to energize the buzzer is mounted in spring clips in the same compartment in which the telephone head sets are packed. The switch is in the center of the panel, and is closed when the button is pulled up. The buzzer winding is shunted by a 45-ohm resistance.

The switch M, which connects or disconnects the secondary condenser, is placed to the right of the buzzer switch, and is marked as on the SCR-54 set.

Only one glass enclosed crystal detector is furnished with this set, and this is permanently mounted on the operating panel. The two binding posts marked "Detector" are to permit the use of a vacuum tube detector or any other kind of detector

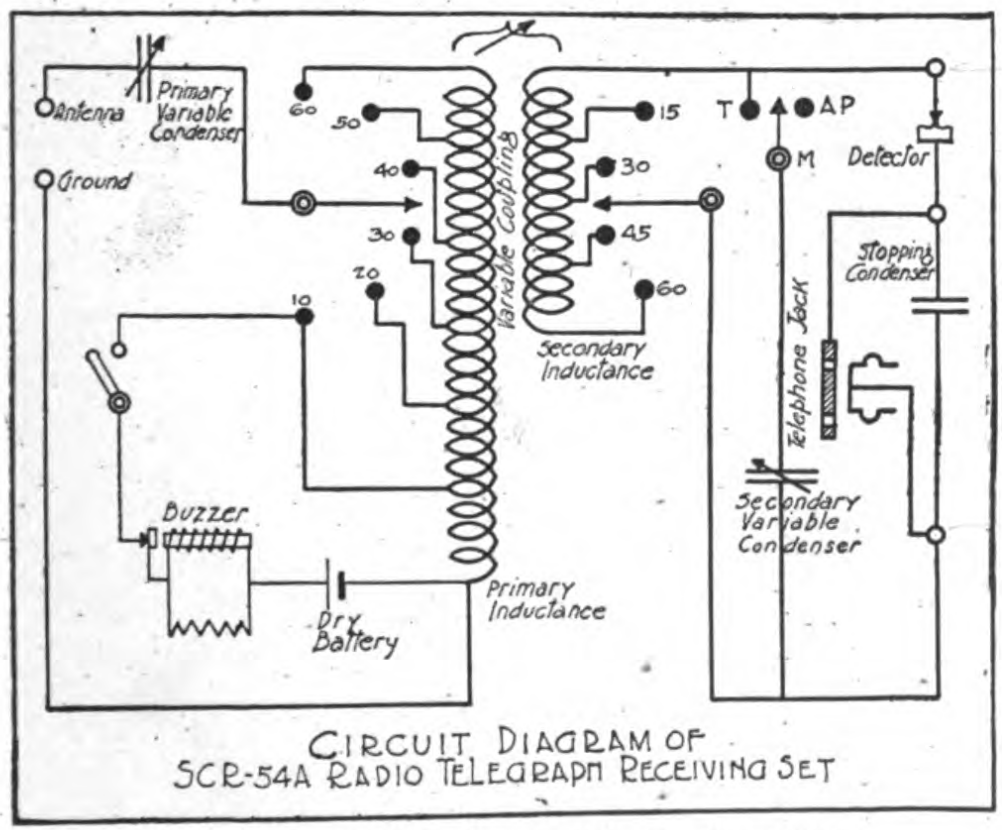

Fig. 3—Schematic Wiring Diagram of the Type SCR-54-A Set.

as explained in a later paragraph. Two emergency telephone binding posts on the operating panel are connected in parallel with the telephone jacks, to allow the use of telephone receivers having no connection plug.

Each set is calibrated individually, throughout the range of wave length, and this greatly facilitates the operation of tuning in, as will be seen below.

In the cover of the box is a screw-driver, a spare dry battery for the buzzer, some spare wire, spare crystals, and replacement parts for the crystal detector. In all other respects, the set is not fundamentally different from the type SCR-54 set.

Method of Operation

The method of operating the type SCR-54-A set will be explained only wherein it differs from that of the type SCR-54 set. The telephone head set is first plugged in, and the coupling

handle placed near the maximum position. The buzzer is then energized by pulling out the buzzer switch button. The surface of the crystal is explored with the spring point until a sensitive

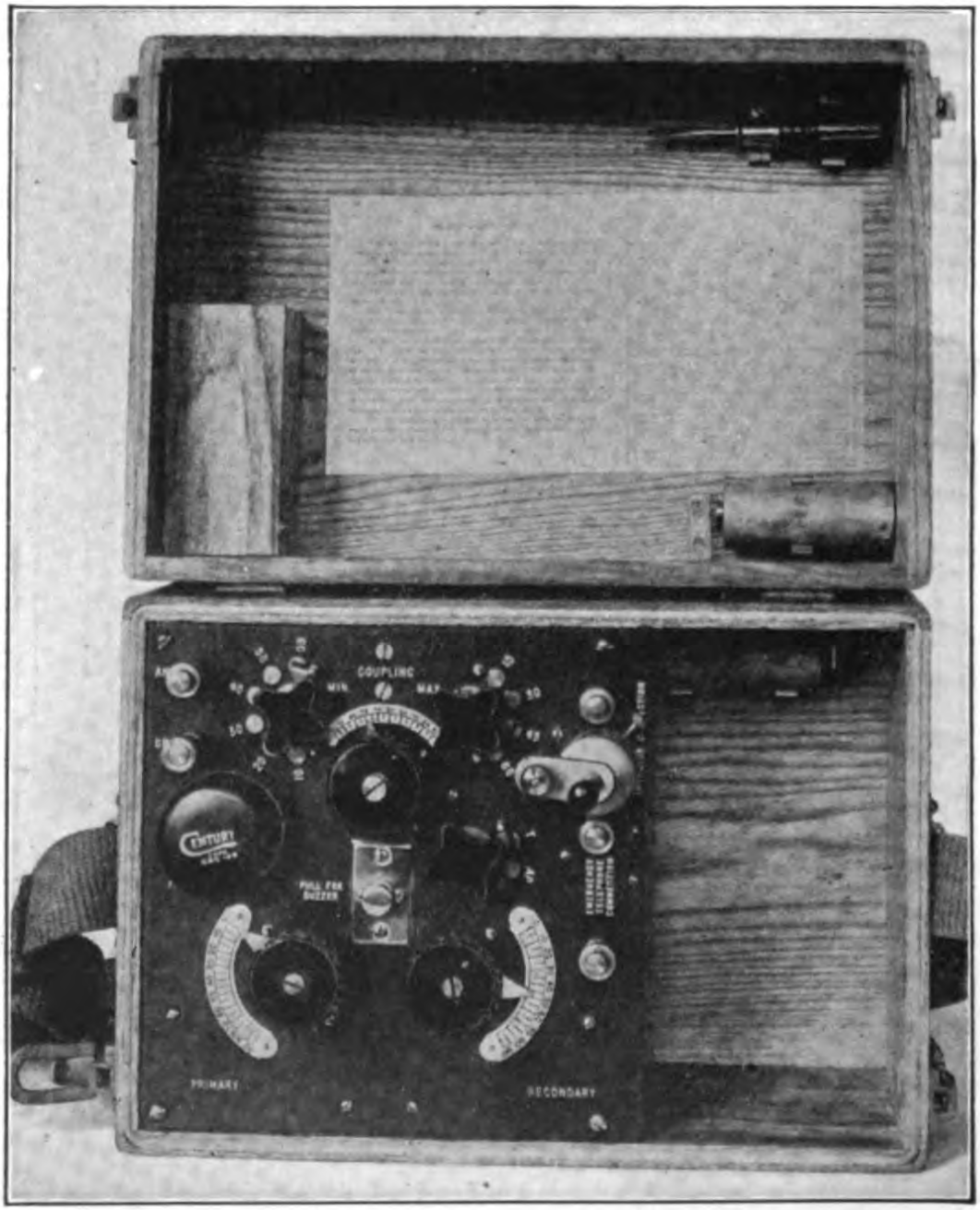

Fig. 4—Operating Panel of the Type SCR-54-A Set.

spot is found. The buzzer switch is then pushed in to stop the buzzer. This should be done gently, so that the vibration will not cause the crystal adjustment to be disturbed.

If the wave length of the signals to be received is unknown to the receiving operator, the method of tuning the set will

be exactly the same as that outlined for the SCR-54 receiving set.

When the wave length of the signals to be received is known, the procedure is quite different. The proper settings of the secondary inductance and of the secondary condenser are obtained from the calibration table pasted in the cover of the set box for the wave length it is desired to receive. The secondary adjustments being thus made, the switch M is placed in the

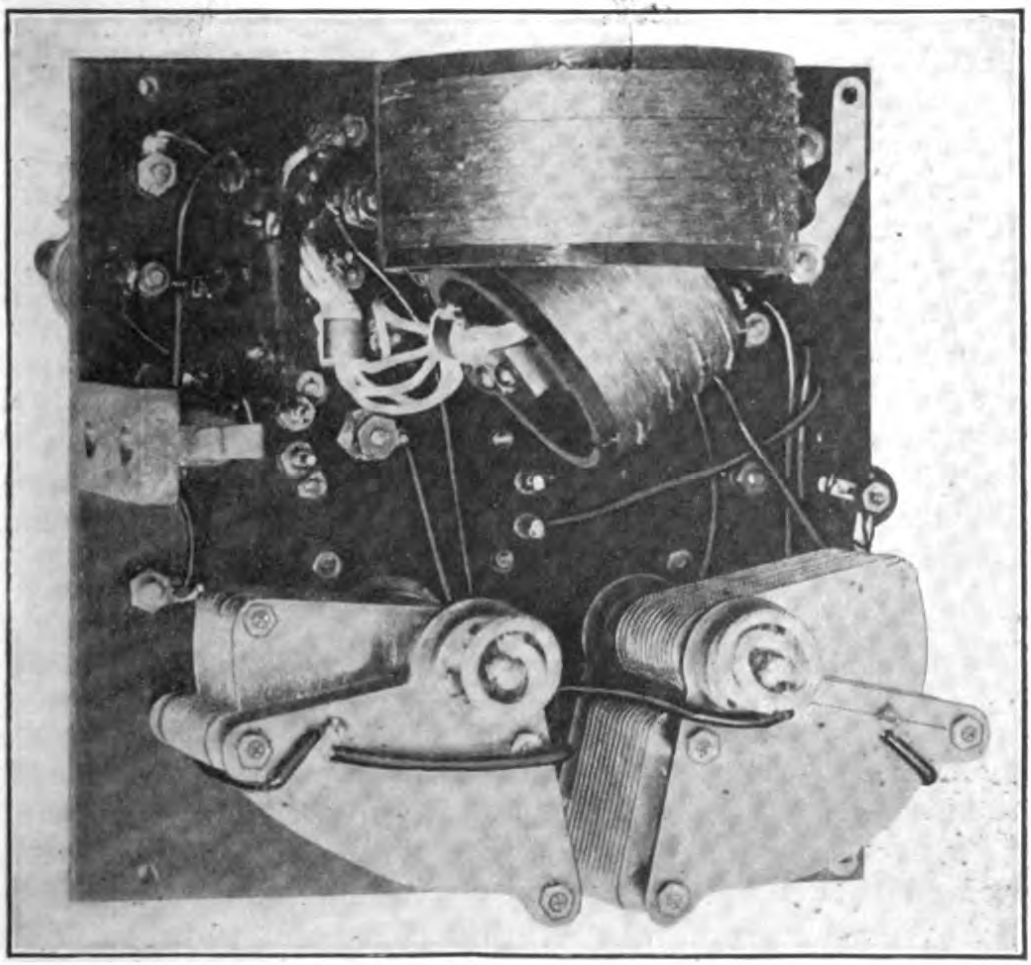

Fig. 5—Mounting of Apparatus on Under Side of Operating Panel, Type SCR-54-A Set.

position T, and the coupling handle turned near the "60" or maximum mark. The primary circuit is then tuned by placing the primary inductance dial switch successively in its various positions, and for each position rotating the primary condenser handle until a maximum sound is produced in the telephone receiver. The coupling handle is then turned toward the minimum mark so that the signals will be just loud enough to be easily read. Some very slight changes in the settings of both variable condensers may then be found to improve the tuning.

This method of tuning is very much more rapid and certain than that used with the SCR-54 set. If the value of wave length it is desired to pick up is not marked in the table, the settings of the nearest wave length should be used. Some slight changes in the final adjustments, after the coupling has been reduced, will bring them to the correct value.

It is also possible to tune the set approximately to the wave length which has been predetermined, even before signals are received. The wave length of the secondary circuit is calibrated for all positions of the secondary inductance and capacitance switches. The secondary circuit may thereby be used as a wavemeter for adjusting the primary circuit. This is accomplished as follows:

The secondary inductance and condenser handles are adjusted to the values indicated in the table opposite the wave length nearest to the one at which it is desired to receive. The buzzer is then started and the primary adjusted to produce the maximum sound in the receivers. This will indicate that the primary and secondary circuits are in tune at approximately the desired wave length. The coupling should then be reduced and the set may be considered ready for the expected signals. When these actually come, a slight readjustment of both primary and secondary will probably produce a sharper tuning.

Use of a Vacuum Tube Detector with the SCR-54-A Set

When it is desired to use a vacuum tube detector, or any other form of detector, with the SCR-54-A receiving set, the wire point of the crystal detector of the set should be lifted off the surface of the crystal, and the emergency telephone binding posts short circuited by means of a piece of wire. (If avoidable, do not use the wire furnished in the cover of the box, as this is intended for repairs in case of trouble in the radio circuits of the set.) Wires are then connected from the "Detector" binding posts of the set to the proper binding posts or clips of the vacuum tube detector box. The telephone receiver should not be plugged into the jack of the set, but, instead, should be connected to the proper terminals or jack of the vacuum tube detector box.

For information on "precautions, sources of trouble, and maintenance," and on the special work of "reception from airplanes" with the SCR-54-A set, see the corresponding subheads of the instructions pertaining to the type SCR-54 set, these being identical for both sets.

Vacuum Tube Detector Equipment Type DT-3-A

When using the SCR-54 or SCR-54-A receiving sets for receiving long distance signals, it may be found that the crystal detector of the set is not sensitive enough and will give only very faint signals. A vacuum tube detector may then be used to advantage. Such a device is provided in the Type DT-3-A equipment. While this detector is used primarily with the two

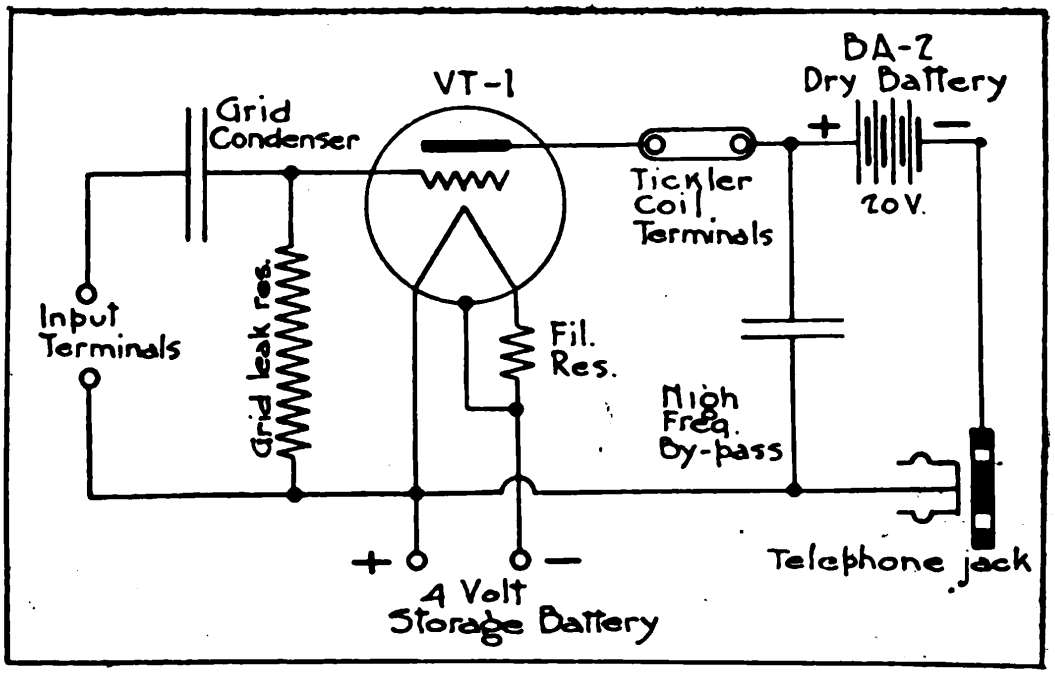

Fig. 6—Schematic Wiring Diagram of the Type DT-3-A Detector Equipment.

receiving sets described in this pamphlet, it does not form a component part of these sets and must be ordered separately, if needed.

A circuit diagram of this equipment is given herewith, from which the principle of operation may be easily understood. The detector comprises an ordinary three-electrode vacuum tube and a grid condenser and grid leak resistance. The filament is heated to the proper temperature by a 4-volt storage battery, and the plate current is furnished by a 20-volt type BA-2 dry battery. The tube used is a type VT-1. No grid battery is required, the grid potential being obtained through the grid leak resistance.

To connect up the vacuum tube detector box to the set box of the type SCR-54 or SCR-54-A set, proceed as directed in the paragraphs under the directions for operating the receiving sets,

which are headed "Use of Vacuum Detector, etc." The two wires are brought from the detector terminals of the SCR-54 or SCR-54-A set box to the "Input" terminals of the vacuum tube detector box. The 4-volt storage battery is connected to the "Battery" terminals, with the proper polarity, and the telephone receivers are plugged into the telephone jacks of the vacuum tube detector box. No detector adjustment is required and the operation of tuning in the receiving set is not altered in any way.

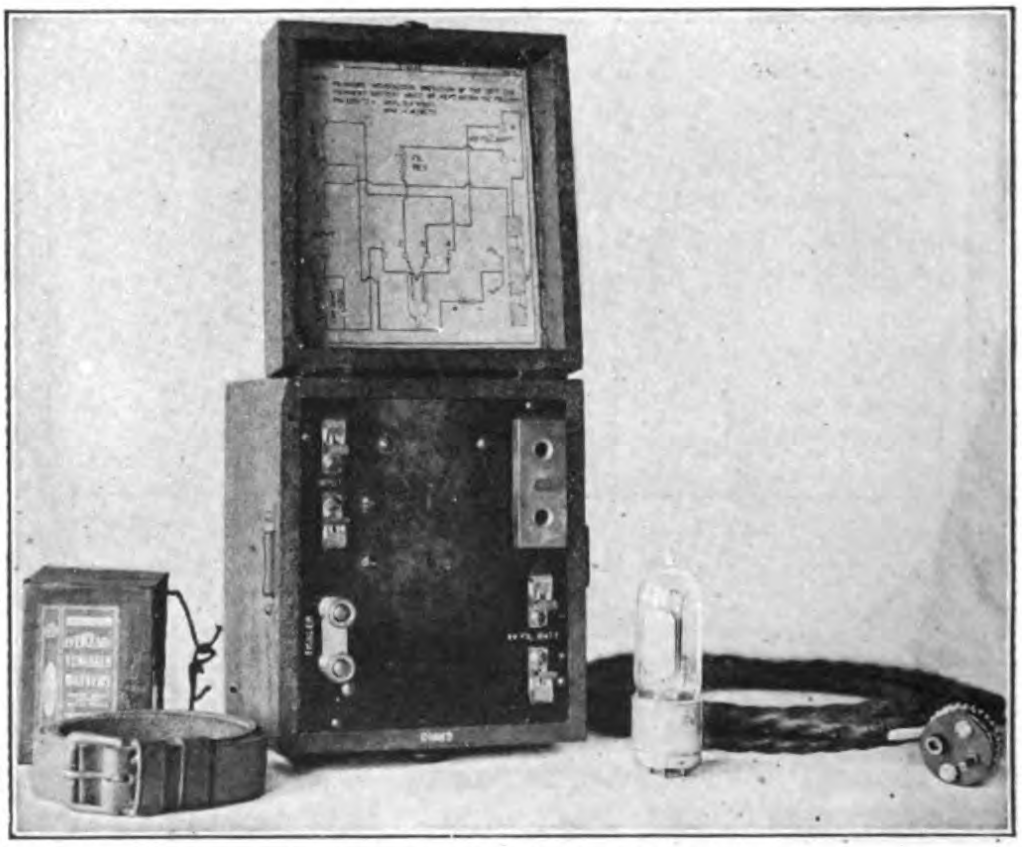

Fig. 7—Operating Panel of the Type DT-3-A Detector.

The DT-3-A equipment also permits the reception of undamped wave signals with the SCR-54 or SCR-54-A receiving set, although this should be considered a makeshift and one not to be depended upon for work of any great importance. To receive undamped waves, connect a suitable tickler coil to the "Tickler" terminals of the detector, after having removed the short circuiting strap which is normally connected across these terminals. Couple this coil with the receiving set inductances with such a degree of coupling that a note will be heard in the telephone receivers. The principle of heterodyne reception is explained in Radio Pamphlet No. 1.

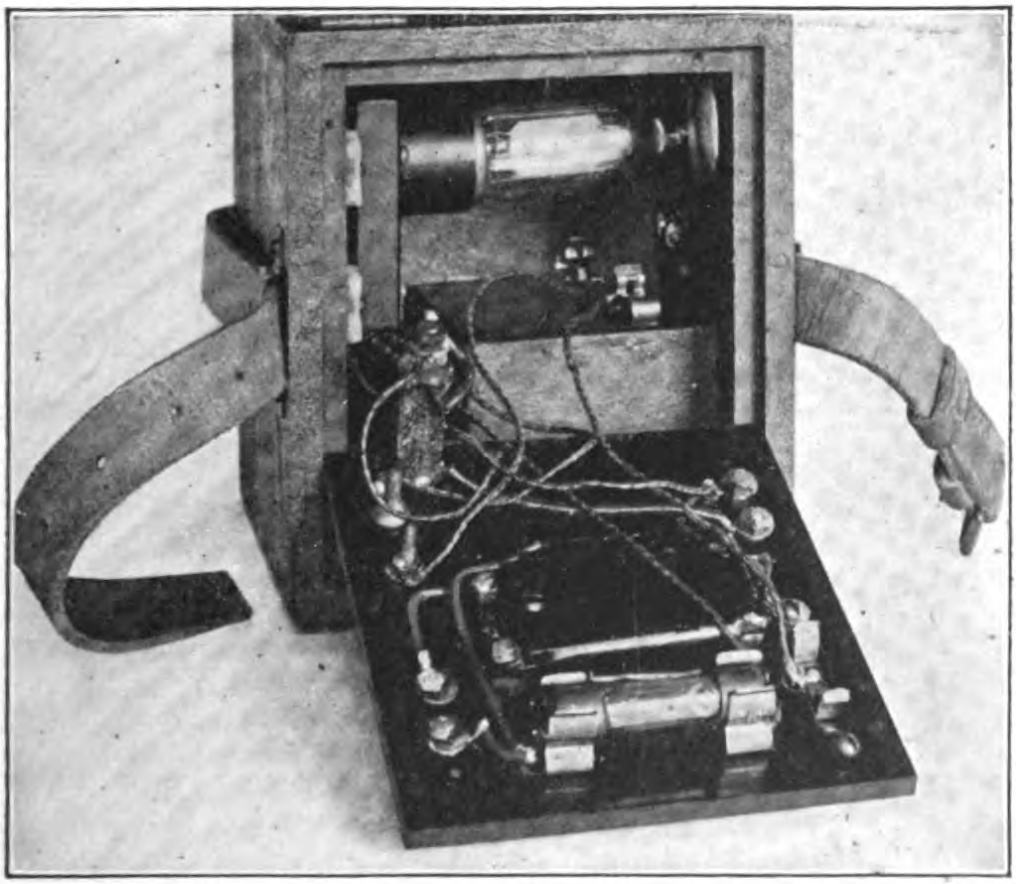

Fig. 8—DT-3-A Panel Removed Showing Vacuum Tube.

Parts Lists

In ordering this set or parts of this set, specification 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, Radio Receiving, Type SCR-54." 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 RC-1."

The set is not complete unless it includes all of the items listed in the component parts table, below.

SET, RADIO RECEIVING, TYPE SCR-54

EQUIPMENT, TYPE RC-1; Receiving

1	**Set Box, Type BC-14;** receiving
1	**Strap, Type ST-5;** carrying, for BC-14
2	**Head Sets, Type P-11;** telephone
4	**Crystals, Type DC-1;** mounted detector; 1 in use, 3 spares
2	**Batteries, Type BA-4;** buzzer; 1 in use, 1 spare
1	**Screwdriver, Type TL-2;** Stanley No. 25, or equivalent, 4 in. long
30 ft.	**Wire, 7-Strand, No. 30 B&S Gauge, Rubber Covered, White Silk, Braided;** spare
3	**Springs, Detector Contact;** 1 in use, 2 spares

EQUIPMENT, TYPE A-2; Antenna

2	**Mast Sections, Type MS-1;** top; same as type MS-2, but without steel coupling tube
8	**Mast Sections, Type MS-2;** intermediate
6	**Guys, Type GY-1;** 43 ft., complete
3	**Guys, Type GY-2;** 22 ft., complete
4	**Reels, Type RL-3;** hand; one for antenna and lead-in wire, and one for each set of 3 guys
6	**Stakes, Type GP-1;** guy; 3 in use for each mast
2	**Plates, Type MP-2;** upper guy; complete with mast tube; one for each mast
1	**Plate, Type MP-3;** lower guy; for 29-ft. mast
2	**Plates, Type MP-1;** antenna, complete with Electrose No. 4500 insulators connected to plate with closed wire link; other end provided with open wire hook to receive antenna wire thimble

1 **Antenna, Type AN-1;** 150 ft. antenna wire with thimble at each end; the thimble for the 29-ft. mast end has connected to it a 50-ft. lead-in of No. 16 B & S gauge, single conductor, new code lamp cord, weather-proofed

2 **Connections, Type GD-1;** ground; ground mat with 20 ft. No. 16 B & S gauge, single conductor, new code lamp cord, weather-proofed; 1 in use, 1 spare

2 pr. **Bags, Type BG-1;** carrying; for masts

1 **Bag, Type BG-2;** carrying, for antenna and accessories

1 **Hammer, Type HM-1;** 2 lb.; two-face engineer's 16-in handle

1 **Twine, Type TW-1;** coil; 35-ft.; for measuring distance of guy pins from masts

1 **Marker, Type MR-1;** guy pin; for locating direction of ground pins from masts

SET, RADIO RECEIVING, TYPE SCR-54-A

EQUIPMENT, TYPE RC-1-A; Receiving

1 **Set Box, Type BC-14-A;** radio receiving; weight, 11 lb. 8 oz.

1 **Strap, Type ST-5;** carrying, for BC-14-A

2 **Head Sets, Type P-11;** telephone

6 **Crystals, Type DC-1;** detector, mounted, spare; galena

2 **Batteries, Type BA-4;** dry; for buzzer; 1 in use, 1 spare

1 **Screwdriver, Type TL-2;** Stanley No. 25, 4 in. long, or equivalent

30 ft. **Wire, Type W-20;** wound in coil; 1½ in. outside diameter

2 **Springs, Type M-14;** detector contact; spares

EQUIPMENT, TYPE A-2-B; Antenna

6 **Mast Sections, Type MS-5;** bamboo; 13 ft. long; iron tipped at both ends; total weight, 16 lb.

6 **Insulators, Type IN-7;** mast top; 3 in use, 3 spares

750 ft. **Wire, Type W-1;** antenna; No. 22 B & S gauge, 7 strand, soft tinned copper, bare; net weight 8 lb. 12 oz.; to be in one piece and wound on spool of 6 in. outside diameter

75 ft. **Wire, Type W-4;** lead-in; No. 16 B & S gauge, modified N. E. C. lamp cord, Spec. 3040, wound on 8 in. coil; total weight, 1 lb. 8 oz.

2 lb. **Wire, Type W-2;** No. 14 B & S gauge, soft drawn copper, bare; in one piece wound in 7 in. coil

1 **Mat, Type MT-2;** ground; 9 ft. x 20 in.; total weight, 3 lb. 4 oz.

14 **Stakes, Type GP-3;** ground; 1 in. x 1 in. x ⅛ in. angles; total weight, 35 lb.

8 **Insulators, Type IN-5;** hard rubber; 5½ in. x ⅝ in.; total weight, 10 oz.

6 **Couplers, Type FT-2;** pole; 4 in. x 5 in. x 1 in.; total weight, 4 lb.

200 ft. **Cord, Type RP-3;** sash; No. 5; olive drab

4 **Reels, Type RL-3;** hand; 11¾ in. x 10 in.

1 **Pliers, Type TL-20;** universal; 8 in.; similar to Fairbanks combination pliers No. 70; drop forged steel with blue handle and polished head

¼ lb. **Tape, Friction, Spec. 569-B;** ¾ in.

1 **Hammer, Type HM-1;** 2 lb.; 16 in. handle

¼ lb. **Marlin, Type RP-2;** wound in 2 coils

CHEST, TYPE BC-26; carrying

Carrying Units

The above parts of the type SCR-54-A set are assembled in two carrying units, as follows:

1. Carrying Chest; 1 ft. 3⅞ in. x 3 ft. 9⅝ in. x 11½ in.; containing receiving and antenna equipments, but not including bamboo masts; total weight, 155 lb.
2. Six Bamboo Mast Sections; 13 ft. long; total weight, 16 lb.

EQUIPMENT, TYPE DT-3-A; Vacuum Tube Detector

1 **Set Box, Type BC-19-A;** vacuum tube detector; 7½ in. x 7⅛ in. x 6⅝ in.; weight, 4 lb. 12 oz.

1 **Strap, Type ST-6;** carrying; 2 ft. 8 in. x 1 in. x ⅛ in.

2 **Tubes, Type VT-1;** vacuum; 1 in use, 1 spare

2 **Batteries, Type BA-2;** dry; 1 in use, 1 spare

2 **Cords, Type CD-40;** extension; 6-ft., No. 16 B & S gauge, 2-conductor, battery plug on one end, spade clips on other end; 1 in use, 1 spare