THE SCR–127 SET.

Equipment.

1 set, type SCR–127 less the following equipment:
- 3 cincha bands, type ST–7.
- 1 equipment, type LE–1.
- 3 frames, type M–1.
- 6 straps, with snap hooks at each end.

1 wave meter, type SCR–125–A.
1 head set, type P–11.

GENERAL CONSTRUCTION OF THE SCR–127 SET.

Information.

The SCR–127 set is designed to transmit and to receive continuous wave radio telegraph signals. It is intended for communication between cavalry organizations and is built to be packed and transported on mules. The wave length range for both transmitting and receiving is from 550 to 1,100 meters.

The transmitting and receiving circuits are connected to the antenna, as desired, by a triple-pole, double-throw switch, mounted on the front of the set box panel. (See Fig. 84.)

Directions.

1. Place the set box type BC–7 on some convenient support. Unfasten the three latches and lower the front door. (See Fig. 84.) Study the various controls on the panel and their markings. Notice the four large tuning knobs on the lower edge of the panel.

Questions.

(1) *Which current does the ammeter on the panel read?*

(2) *Locate the "antenna tuning" and the "transmit" wave length control knobs. What is the purpose of the small knob located beneath the "antenna tuning" knob?*

(3) *What is the purpose of the lever located beneath the transmit wave length knob?*

(4) *Locate the antenna and ground binding posts.*

(5) *For what are the binding posts on the right-hand side of the panel used?*

Information.

Four VT–2 vacuum tubes are used in the transmitter of the SCR–127. One of the tubes is used as an oscillator or generator of electrical impulses. The other three tubes, connected in parallel, are

used to amplify the impulses generated by the oscillator tube. In this way the power supplied to the antenna is more than that generated by one tube. In addition, the antenna in no way affects the frequency of the impulses generated by the oscillator tube so that the wave length on which the set transmits is entirely independent of the antenna used.

The vacuum tube circuit of the transmitter is inductively coupled to the antenna circuit. (See Fig. 85.)

The wave length of the transmitter is controlled by a variometer which is located in the right of the set box. The antenna circuit is tuned by a variometer located at the left of the set box. When the " Transmit Wave length " variometer is adjusted to a certain wave length, it is necessary to tune the antenna circuit to this wave length. When the two circuits are in tune the " Antenna Current " meter will give the highest reading.

Directions.

2. Remove the four screws holding the two brackets to the operating table formed by the front of the set box and allow the front to drop. Remove the leads from the binding posts marked " Key " at the lower right-hand side of the panel. Release the latches at the top and pull the panel out; then with an outward and upward motion remove the panel and the attached parts from the box. This leaves all the parts exposed as in Fig. 86. From the diagram (Fig. 87) and the set box itself answer the following questions.

Questions.

(6) *Where is the antenna tuning variometer? How is it constructed? Is it in the circuit when receiving?*

(7) *Where is the wave-length change variometer? What is its use?*

(8) *Where is the transformer which couples the antenna circuit with the power amplifier? Does it use fixed or variable coupling? Is it inductively or directly coupled?*

(9) *Which is the oscillator tube socket?*

(10) *What is the purpose of the switch in parallel with the resistance* R_3*?* (See Fig. 87.)

(11) *How many of the transmitting tubes are used as amplifiers?*

(12) *Which of the transmitting tubes have their plates in parallel?*

(13) *In what circuit is the key?*

(14) *In what circuit is the ammeter?*

(15) *Is the frame of the set grounded?*

(16) *Is there any grid leak in the transmitting tube circuit?*

(17) *How is the change from transmit to receive made?*

Information.

Power is supplied to the transmitter of the set by the hand-driven generator, type GN–29. (See Fig. 93.) This unit consists of

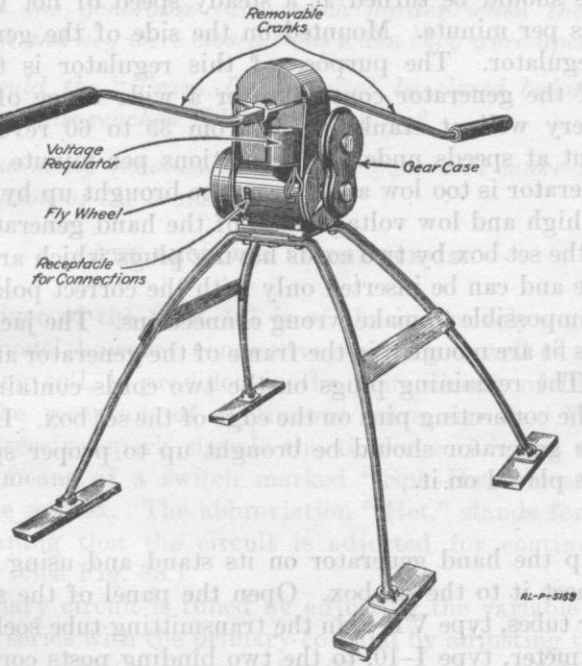

Fig. 93.—Hand-driven generator, type GN–29.

a double current generator supplying direct current at 8 volts and at 350 volts pressure. The 8-volt side of the generator is used to light the filaments of the transmitting tubes, while the 350-volt side supplies the plate current for the same tubes. When the set box, type BC–7, is used in the SCR–130 set, 12 volts are supplied to the transmitting tube filaments; while as stated above, only 8 volts are supplied when used in the SCR–127 set. To make up for this difference in voltage the switch S_3 (Fig. 87) must be closed when the set box is used with the hand generator and opened when used in the

SCR–130 set. The generator is driven through a train of gears at high speed. The gear train is turned by two cranks which are slipped on the squared shaft protruding from the sides at the top of the gear box. The cranks should be placed on this shaft so that they are opposite each other as shown in Fig. 93. Two men standing beside the generator, but facing in opposite directions, operate the cranks, one man at each crank. Marked on the top of the gear box of the generator is an arrow which shows the direction in which the cranks are to be turned. For the proper operation of the generator the cranks should be turned at a steady speed of not less than 35 revolutions per minute. Mounted on the side of the generator is a voltage regulator. The purpose of this regulator is to hold the voltage of the generator constant over a wide range of speed. It will do very well at crank speeds from 35 to 60 revolutions per minute, but at speeds under 35 revolutions per minute the voltage of the generator is too low and can not be brought up by the regulator. The high and low voltage sides of the hand generator are connected to the set box by two cords having plugs which are not interchangeable and can be inserted only with the correct polarity. It is therefore impossible to make wrong connections. The jacks in which these plugs fit are mounted in the frame of the generator and properly marked. The remaining plugs on the two cords contain two holes which fit the connecting pins on the edge of the set box. In operating the set the generator should be brought up to proper speed before any load is placed on it.

Directions.

3. Set up the hand generator on its stand and using the proper cords connect it to the set box. Open the panel of the set box and insert four tubes, type VT–2, in the transmitting tube sockets. Connect a voltmeter, type I–10, to the two binding posts corresponding to the two pins on the edge of the panel on which the plug of the low voltage lead of the generator fits. Be sure that the connections are correct in polarity.

4. Open the "Trans.-Rec." switch on the panel and have two men turn the hand generator cranks at 25 revolutions per minute. Read the voltage as indicated by the type I–10 voltmeter. Close the "Trans.-Rec." switch to the "Trans." side of the switch. Press the key and again read the voltage.

5. Repeat the above for each of the following crank speeds, putting down your results in a rough table: 30, 35, 40, 45, and 50.

Questions.

(18) *Was the voltage high enough to light the tube filaments properly at a crank speed of 25 revolutions per minute?*

(19) *What change took place in the voltage reading when the "Trans.-Rec." switch and the key were closed?*

(20) *With the "Trans.-Rec." switch and the key closed when the crank speed was changed from 35 to 50 revolutions per minute, was there much change in the voltage?*

(21) *Did the generator turn much harder when the "Trans.-Rec." switch and key were closed than when they were open? Why?*

(22) *Should the "Trans.-Rec." switch be closed before or after the generator has reached full speed? Why?*

(23) *How many revolutions does the generator make for a complete revolution of the crank?*

THE RECEIVER OF THE SCR-127.

Information.

The receiver of the SCR-127 is of the inductively coupled type. In a later model, however, conductive coupling as well as the secondary receiving coil, is provided in the plate circuit of the detector tube for the reception of continuous wave signals. When it is desired to receive spark signals the tickler coil is cut out of the circuit by means of a switch marked "Spk-Het" located on the panel of the set box. The abbreviation "Het." stands for "Heterodyne," meaning that the circuit is adjusted for continuous wave reception. (See Fig. 88.)

The primary circuit is tuned by adjusting the variable condenser which is in series with the primary coil and by adjusting the amount of inductance in the primary coil. The primary coil has one tap which is connected to a switch on the panel of the set box. When the switch is thrown to "SW" (short wave) only part of the coil is in use, and when thrown to "LW" (long wave) the entire coil is in use. The secondary circuit is tuned by adjusting the variable condenser, connected across the secondary coil. In a later model of the SCR-127 set the secondary coil also has one tap which is connected to the same switch provided for the primary coil. This is so arranged that when the switch is in the position "SW" only parts of each of the primary and secondary coils are in use. When it is in the "LW" position the entire circuits of the primary and secondary coils are in use.

Information.

Power for the receiver is supplied entirely by dry cells so that no storage batteries are needed. This is made possible by the fact that the normal filament current of the VT–5 tube is 0.2 of an ampere, and that this amount of current can be supplied by the dry cell for some length of time. The battery box, type BC–102 (see Fig. 89) is designed to carry 12 batteries, type BA–10. Three of these batteries are connected in series and used to supply the filament current to the VT–5 tubes. The remaining nine batteries are spares and are used as needed. The plate current for the receiving tubes is supplied by two batteries, type BA–8 in series. Space is provided in the battery box for carrying type BA–8 batteries, the two in use and two spares. The negative side of the 45-volt plate battery is connected to the negative side of the filament battery so that only one lead is needed to connect this point to the set box. The cord provided for connecting the battery box to the set box consists of three braid-covered wires, one for the common lead mentioned above, one for the positive 45-volt connection, and one for the positive filament connection. This cord has a plug on one end which fits on three pins extending out from the edge of the set box. Terminals are provided on the other end of the cord for connecting to terminals in the battery box. A small groove is provided in the end of the battery box through which this cord may be laid when the lid of the battery box is closed. The compartments of the battery box not used for batteries are to be used for carrying tubes, head sets, etc.

Directions.

8. Place the battery box type BC–102 on some convenient support. Release the catches on the sides of the box and drop down the front cover. Notice the positions of the batteries and parts (including spare parts).

Questions.

(39) *Where are the terminals to which the BA–10 batteries are connected?*

(40) *Where are the terminals to which the BA–8 batteries are connected?*

(41) *How are the BA–10 cells held in place?*

(42) *Where are spare vacuum tubes kept?*

(43) *Is it possible to close the cover of the battery box when the battery cord is connected from the box to the receiver? Explain your answer.*

EXPERIMENT No. 1.

TO CONNECT UP AND TUNE THE SCR–127 SET.

Information.

In connecting up the SCR–127 set, ready for operation, there are two main divisions of the work; namely, connecting the set as a receiver and connecting the set as a transmitter. The set may be connected up as a transmitter without fully connecting it up as a receiver and vice versa. In like manner the tuning of the set as a transmitter differs from the tuning of the set as a receiver. A definite method should be followed in doing all these things.

Directions.

9. *To connect up the set as a transmitter.*—Erect the set box on its legs. The set box should be so placed that the antenna and ground leads will easily reach the proper binding posts on the panel. Place the hand generator on the right side of the set box and the battery box on the left.

a. Open up the front cover of the set box, pull down on the catches which hold the panel closed, and open the panel.

b. Insert four VT–2 tubes in the four transmitting tube sockets in the set. Close switch "S_3." (Fig. 87.)

c. Close the panel, being sure that the catches are properly locked, and open the "Trans.-Rec." switch so that it does not make contact on either side.

d. Connect the high voltage generator lead to the two pins marked "+350" and "—350."

e. Connect the low voltage generator lead to the two pins marked "+12" and "—12" volts.

f. Connect the antenna lead-in wire to the post marked "Ant"

g. Connect the wire from the counterpoise or other ground system used to the post marked "Gnd."

Questions.

(*44*) *Why is it necessary to follow certain steps in their proper order when connecting up the SCR–127 set?*

(*45*) *Why is it important to have the connecting leads connected with proper polarity? Can this be done incorrectly? If so, how?*

Directions.

(10) *To tune the transmitter.*—The next step, after having made all of the connections as previously given, is to tune the transmitting

side to the desired or specified wave length. In order to do this properly the following steps are gone through:

a. Turn the "Transmit Wave Length" pointer to *exactly* the desired wave length and lock it in that position by means of the small lever under the knob.

b. Have the generator cranks turned at 35 to 40 revolutions per minute.

c. Throw the "Trans.-Rec." switch to the "Trans." side. The filaments of the VT-2 tubes should glow a dull red.

d. Close the key.

e. Turn the "Antenna Tuning" knob slowly and watch the antenna ammeter. As the knob is turned the ammeter will start indicating and will gradually increase in reading up to a certain point. As the knob is turned still further the reading of the ammeter will decrease. That position of the "Antenna Tuning" knob which gives the greatest reading on the antenna ammeter is the correct adjustment. The final adjustment to obtain the greatest reading should be made with the small knob just under the "Antenna Tuning" knob. This small knob is a vernier or fine adjustment of the larger knob.

f. Open the key.

g. Open the "Trans.-Rec." switch and have the generator stopped. The set is now adjusted for transmitting on the wave length to which the pointer of the "Transmit Wave Length" adjustment is set.

Questions.

(46) *Why is the "Transmit Wave Length" pointer locked after it is set to the desired wave length?*

(47) *How long did it take the men turning the generator to bring it up to the required speed?*

(48) *Why is it necessary to adjust the "Antenna Tuning" knob so that a maximum reading occurs on the ammeter?*

Directions.

11. *To connect up the set as a receiver.*—After having made all of the connections given under the paragraphs entitled "To Connect Up the Set as a Transmitter," the following additional connections will be needed in order that the receiving side of the set maybe ready for operation:

a. Open the panel to the set and insert three VT–5 tubes and adapters in the receiving tube sockets. (Be sure that the "Trans.-Rec." switch is open.)

b. Open the switch S_6 (Fig. 87) and close the panel, being sure that it locks into place.

c. Open the battery box, type BC–102, and then remove the lid of the " B " battery compartment, placing the box so that it appears as in Fig. 89. Insert a battery, type BA–8, in the lower of the " B " battery compartments. The battery should be inserted with its top up and with the negative lead toward the back of the box. Guide the negative lead through the hole in the bottom of the right side of the compartment and pull the battery up aganst that side. Insert another battery, type BA–8, in the upper "B " battery compartment with its top down and with the positive lead toward the back of the box. Guide the positive lead through the hole in the bottom of the right side of the compartment and pull the battery up against that side of the compartment. Connect the positive and negative leads coming through the holes to the binding post marked " Black —" " Red +." Connect the remaining red lead to the post marked "+ 40 V Red " and the remaining black lead to the post marked "— 40 V Black." When spare batteries, type BA–8, are carried, they are placed alongside the two just connected in the " B " battery compartment. Replace the cover to the " B " battery compartment.

d. After having prepared six cells, type BA–10, for service, place them in the upper long narrow compartment in the battery box. Numbering the six cells from left to right, connect them in series-parallel as follows, using pieces of insulated wire cut to the necessary lengths:

(1) Carbon of No. 1 to carbon of No. 4.
(2) Zinc of No. 1 to carbon of No. 2.
(3) Zinc of No. 2 to carbon of No. 3.
(4) Zinc of No. 3 to zinc of No. 6.
(5) Carbon of No. 4 to wing nut back of binding post marked " Carbon +."
(6) Zinc of No. 4 to carbon of No. 5.
(7) Zinc of No. 5 to carbon of No. 6.
(8) Zinc of No. 6 wing nut back of binding post marked " Zinc —."

NOTE.—If only three cells are used, connect them in series and make connections to the wing nut terminals with proper polarity. The remaining cells should be left disconnected as spares.

When the six cells, type BA–10, have been connected as described above clamp them in place by means of the wooden rod which fits over their tops. If spare batteries, type BA–10, are to be carried, they should be placed in the lower compartment and clamped in place with the wooden rod provided.

e. The cord, type CD–88, has a connecting block on one end and three leads of different colors on the other end. Connect the red and white lead to the binding post marked " + 40 V Red," the white lead to the post marked " Carbon +," and the black lead to the post marked " Zinc —." Lay the cord in the groove in the upper edge of the right side of the battery box and close the lid of the box, clamping it shut.

f. Plug the connecting block of the cord, type CD–88, on the three pins marked " +40 V," " +Fil.," and " —Fil." into the receptacle on the left edge of the panel of the set box.

g. Plug one or two head sets, type P–11, into the jacks provided on the left side of the panel. (If available head sets are not provided with cord plugs, the cord clips may be connected to the two binding posts marked "Aux. Tel.")

h. Put on one of the head sets and adjust it to fit the head comfortably.

i. If the receiving side only of the set is to be used, omit the items given under *b*, *c*, *d*, and *e*, in Direction 9.

12. *To connect up the set both as a transmitter and as a receiver.*— After the set has been properly erected:

a. Open up the front cover of the set box, pull down on the catches holding the panel closed, and open the panel.

b. Insert four VT–2 tubes in the transmitting tube sockets and three VT–5 tubes and adapters in the receiving tube sockets. Close switch S_3 and open switch S_6. (Fig. 87.)

c. Close the panel, being sure that the catches are properly locked, and open the " Trans.-Rec." switch so that it does not make contact on either side.

d. Connect the high voltage generator lead to the pins marked " +350 " and " —350."

e. Connect the low voltage generator lead to the two pins marked "+ 12 " and "— 12 " volts.

f. Connect the antenna lead-in wire to the post marked "Ant."

g. Connect the wire from the counterpoise, or other ground system used, to the post marked " Gnd."

h. Open the battery box, type BC–102, and then remove the lid of the " B " battery compartment, placing the box so that it appears as in Fig. 89. Insert a battery, type BA–8, in the lower of the " B " battery compartments. The battery should be inserted with its top up and with the negative lead toward the back of the box. Guide the negative lead through the hole in the bottom of the right side of the

compartment and pull the battery up against that side. Insert another battery, type BA–8, in the upper "B" battery compartment with its top down and with the positive lead toward the back of the box. Guide the positive lead through the hole in the bottom of the right side of the compartment and pull the battery up against that side of the compartment. Connect the positive and negative leads coming through the holes to the binding post marked "Black—" "Red +". Connect the remaining red lead to the post marked "+ 40 V Red" and the remaining black lead to the post marked "—40 V Black." When spare batteries, type BA–8, are carried, they are placed alongside the two just connected in the "B" battery compartment. Replace the cover to the "B" battery compartment.

i. After having prepared six cells, type BA–10, for service, place them in the upper long narrow compartment in the battery box. Numbering the six cells from left to right connect them in series-parallel as follows, using pieces of insulated wire cut to the necessary lengths:

(1) Carbon of No. 1 to carbon of No. 4.
(2) Zinc of No. 1 to carbon of No. 2.
(3) Zinc of No. 2 to carbon of No. 3.
(4) Zinc of No. 3 to zinc of No. 6.
(5) Carbon of No. 4 to wing nut back of binding post marked "Carbon +."
(6) Zinc of No. 4 to carbon of No. 5.
(7) Zinc of No. 5 to carbon of No. 6.
(8) Zinc of No. 6 wing nut back of binding post marked "Zinc —."

NOTE.—If only three cells are used, connect them in series and make connections to the wing-nut terminals with proper polarity. The remaining cells should be left disconnected as spares.

When the six cells, type BA–10, have been connected as described above, clamp them in place by means of the wooden rod which fits over their tops. If spare batteries, type BA–10, are to be carried, they are placed in the lower compartment and clamped in place with the wooden rod provided.

j. The cord, type CD-88, has a connecting block on one end and three leads of different colors on the other end. Connect the red and white lead to the binding post marked "+ 40 V Red.", the white lead to the post marked "Carbon +," and the black lead to the post marked "Zinc —." Lay the cord in the groove in the upper edge of the right side of the battery box and close the lid of the box, clamping it shut.

k. Plug the connecting block of the cord, type CD–88, on the three pins marked "+40 V", "+Fil.," and "—Fill." into the receptacle on the left edge of the panel of the set box.

l. Plug one or two head sets, type P–11, into the jacks provided on the left side of the panel. (If head sets are to be used not having plugs on the end of their cords they may be connected to the two binding posts marked "Aux. Tel.")

m. Check all connections to see that they are correct.

n. Put on one of the head sets and adjust it to fit the head comfortably.

Question.

(49) *Why is it necessary to have the "Trans.-Rec." switch open as in Direction 11, a?*

Information.

To tune the receiver.—In tuning the receiver several different cases will occur. They are as follows:

a. Tuning in a C. W. signal of known wave length.

b. Tuning in a damped wave signal of known wave length.

c. Tuning in a C. W. signal of unknown wave length.

d. Tuning in a damped wave signal of unknown wave length.

Directions.

13. To tune the receiver of the set to a C. W. signal of known wave length proceed as follows. After the receiving side has been connected up as directed above:

a. Throw the "Trans.-Rec." switch to the "Rec." side.

b. Place the "Spk.-Het." switch on "Het."

c. Set the "LW–SW" switch and the secondary condenser to the desired wave length as given by the calibration of the set.

d. Vary the primary condenser until a distinct double click is heard, and set the primary condenser about 5° to either side of the point where this double slick is heard.

e. The receiving side of the set should now be in tune on the desired wave length, but due to inaccuracies which may occur, the setting may not be exact enough to pick up the signal sought. It is therefore advisable to swing the secondary condenser slowly over an arc of about 10° (the middle point of which is the setting given by the calibration of the set) until the sought-for signal is heard.

f. Upon hearing the desired signal, stop turning the secondary condenser by its knob and make the final accurate adjustment by means of the small vernier knob located just under the secondary condenser knob.

g. A small further adjustment of the primary condenser may now be made in order to increase the loudness of the signal.

14. To tune the receiver to a damped wave signal of known wave length proceed as follows:

a. Same as *a* above.

b. Same as *b* above.

c. Same as *c* above.

d. Same as *d* above.

e. Place the "Spk.-Het." switch on "Spk."

f. Same as *e* above.

g. Same as *f* above.

h. Same as *g* above.

15. To tune the receiver to a C. W. signal of unknown wave length proceed as follows:

a. Same as *a* under Direction 12.

b. Same as *b* under Direction 12.

c. Set the "LW–SW" switch on "SW." Set the secondary condenser on about 5° and vary the primary condenser until the double click is heard, indicating that the circuits are in tune.

NOTE.—For every position of the secondary condenser there should be a corresponding position of the primary condenser at which the primary or antenna circuit is in tune with the secondary circuit. In searching for a signal of unknown wave length, the method should be to vary both condensers at the same time, attempting at all times to keep the primary condenser close to that point where its circuit is in tune with the secondary.

d. Starting with the secondary condenser at about 5° and the primary condenser at the point where it is in tune, slowly turn both condensers, as outlined above, over their entire scale. Repeat this several times until you are sure that the signal is not obtainable. (The primary condenser should increase as the secondary is increased.)

e. Set the "LW–SW" switch on "LW" and repeat *d.*

f. When the desired signal is found under either *d* or *e*, engage the vernier knobs of the primary and secondary condensers and make the final adjustments for a loud, clear signal of a readable pitch with these knobs.

16. To tune the receiver to a damped wave signal of unknown wave length, proceed as follows:

a. Follow exactly the procedure outlined under Direction 11 until the desired signal is found. When found, the natural tone of the damped wave will be badly distorted.

b. Throw the "Spk.-Het." switch to "Spk.", and, if necessary, retune slightly both the primary and secondary condensers. The

damped wave signal should now be heard with its natural tone, but much weaker than when heard under *a*.

NOTE.—Damped waves may be received with the "Spk.-Het." switch on "Het.", if the change in tone is not objectionable. The receiver will be far more sensitive than with the switch on "Spk."

EXPERIMENT No. 2.

CALIBRATION OF THE RECEIVER SECONDARY.

Directions.

17. Erect two complete antenna systems, separated by about 300 yards, for the SCR–127 set. On the first antenna (set A) connect up, ready for transmission, one SCR–127 set, and on the other antenna another SCR–127 set (set B) which is to have its receiver secondary calibrated.

18. Start transmitting with set A on 500 meters. Tune set B to receive the signal. Set B is now tuned to receive 500 meters. Read in degrees the setting of the secondary receiving condenser and put it down in a table similar to the one shown below.

Wave length.	Secondary condenser setting.	Setting of SW–LW switch.
500		
525		
550		
575		
600		
625		
650		
675		
700		
725		
750		
775		
800		
825		
850		
875		
900		
925		
950		
975		
1,000		
1,025		
1,050		
1,075		
1,100		

Transmit with set "A" on 525 meters and again tune in with set "B." Record the reading in the table. Continue this process in steps of 25 meters until the entire wave length range has been covered.

Information.

The SCR–127 set must primarily receive from another SCR–127 set; therefore it is desirable that its receiving side be calibrated with an SCR–127 transmitter. It would be easier to calibrate it by the

use of a wave meter, but in that case the wave meter calibrations and those of other SCR–127 transmitters might not be identical. As a variation of about 1° on the secondary condenser is sufficient to tune out the desired signal it will be seen that accuracy is very important.

EXPERIMENT No. 3.

CHECKING THE CALIBRATION OF THE TRANSMITTERS OF SEVERAL SETS.

Information.

When three or more sets are to operate in a net it is very important that the transmitting wave-length calibrations of all of the sets shall be identical; that is, any one set should receive all other sets operating on the same wave length, on the same setting of the secondary receiving condenser. In order to accomplish this it is sometimes necessary to check or recalibrate all of the sets involved. Although the oscillator of the SCR–127 set is originally quite accurately calibrated, sometimes, due to rough handling, or to other causes, the calibrations may be thrown off.

Directions.

19. Set up two antenna systems. Pick out one set, to be known as the " master set," and connect it up to one antenna ready for transmitting. To the other antenna connect another set ready for receiving. With the master set transmit successively on wave lengths from 500 to 1,100 meters in steps of 25 meters.

20. Receive each of these transmissions on the other sets and fill out accurately a table similar to the one given below, showing all receiving adjustments on which each of the transmissions is received.

Wave length.	Primary condenser.	Secondary condenser.	Setting of SW–LW switch.
500			
525			
550			
575			
600			
625			
650			
675			
700			
725			
750			
775			
800			
825			
850			
875			
900			
925			
950			
975			
1,000			
1,025			
1,050			
1,075			
1,100			

Disconnect the master set and place it aside. Connect to the antenna of the master set one of the sets whose calibrations have been checked and start it to transmitting on 500 meters according to its new calibration. Tune in the transmitted signal with the remaining receiving set. If it is received on the same adjustments used for the master set when it was transmitting on 500 meters, then the 500-meter calibration of the set under test is correct. If it is received on a different adjustment, the calibration is inaccurate and must be corrected.

21. To do this, adjust the receiving sets to the settings on which the master set was received on 500 meters. Gradually vary the transmitted wave length of the set under test until it is heard by the adjusted receiving sets. It will then be transmitting on 500 meters by the calibrations of the master set. A piece of paper should be pasted over the scale of the master oscillator and a mark made on the paper exactly opposite the end of the pointer, this mark being labeled "500". The above process is repeated in steps of 25 meters until the entire wave length range of the set has been covered. The next set to be checked is then put through the same process.

EXPERIMENT No. 4.

TUNING A SET HAVING A BURNED OUT ANTENNA AMMETER.

Directions.

22. Connect up the set properly for transmitting, and if the burned out antenna ammeter has not been short-circuited, do so with a piece of fairly heavy copper wire. Throw the "Trans.-Rec." switch to "Trans.", have the generator turned, and hold down the key.

METHOD "A".

Slowly turn the antenna variometer (with the wave length variometer set at the desired wave length) until the men turning the generator notice a very perceptible increase in the load. As the antenna variometer is still further turned the generator load will again become lighter. At the position of the antenna variometer half way between the points where the increased load is first noticed and where the load again becomes lighter, the antenna circuit is approximately in tune with the master oscillator circuit. The set is then transmitting fairly well on the desired wave length.

METHOD "B".

Light and adjust the lamp on an SCR–125–A wave meter and couple the wave meter to the master oscillator circuit of the set by

holding the side of the wave meter marked " Plane of Coil " against the knob of the wave length variometer. Start the set to transmitting and close the key. Set the wave meter to the desired wave length and vary the wave length variometer until the wave meter lamp indicates that the circuits are in tune. Then, without disturbing the adjustments of either the wave meter or the wave length variometer, move the wave meter over and couple it to the antenna circuit by wrapping one or two turns of the lead-in wire around it. Slowly turn the "Antenna Tuning " variometer until the wave meter lamp again indicates that the circuits are in tune. The set is then transmitting on the desired wave length with all circuits in tune.

Information.

With the SCR-127 and 130 sets, tuning the set to transmit on a given wave length is entirely dependent on readings of the antenna ammeter. Accordingly, some method becomes necessary to tune the set when this meter is out of service. Of the two methods given, the first may be employed with no additional apparatus and will give fairly good results. The second method is dependent on the availability of an SCR–125–A wave meter, but when properly used will give excellent results. Sometimes, in using the second method, trouble is experienced in getting an indication that the circuits are in tune, with the wave meter coupled to the wave length variometer. This is due to weak oscillations in the oscillator tube of the set and may be overcome by tuning the set by the first method and then coupling the wave meter to the antenna circuit for the final adjustment. It is to be remembered that the calibrations on the SCR–125–A wave meter and the master oscillator variometer may not be the same, due to inaccuracies in manufacture, and therefore a set transmitting on, say, 860 meters by the wave meter, may not be on exactly the same wave length as one which was set by the calibrations on the set. It will be noticed that in both of the above methods the calibrations on the set are used in determining the wave length. In general, the calibrations on the set are more accurate than those on the SCR–125–A wave meter.