

THE 40-FOOT UMBRELLA ANTENNA.

Equipment.

- 1 equipment, type A-1-A consisting of: 1 antenna, type AN-4; six 75-foot lengths and antenna cord, complete with insulators and guy ropes.
- 1 counterpoise, type CP-3; six 90-foot lengths of counterpoise wire.
- 1 cord, type CD-89; set box to counterpoise block, type BL-2 on one cord.
- 13 reels, type RL-3; 6 for antenna, 6 for counterpoise, 1 for antenna lead-in.
- 6 stakes, type CP-2.
- 2 hammers, engineer's, 2-pound, 2-face.
- 2 bags, BG-6.
- 1 bag, BG-7.
- 2 connectors, type M-6, spares for antenna wires.
- 1 mast section, type MS-1.
- 12 mast sections, type MS-2.
- 1 mast section, type MS-3.
- 1 mast cap, type MF-4; complete with 50-foot lead-in wire.

GENERAL CONSTRUCTION OF THE ANTENNA.

Information.

The umbrella antenna is used with the SCR-127, SCR-159, and SCR-130 sets. The antenna equipment consists of a 40-foot sectional mast, antenna wire, counterpoise, guy ropes, and ground stakes. The mast consists of 10 sections of wooden tubing each 4 feet 2 inches long. With the metal coupling tube this length is increased to 5 feet 2 inches over all. Of the 10 sections used for the mast there are 8 central sections, 1 bottom section, and 1 top section. The central sections have a metal coupling tube on one end and a hole in the other end. The top section has a hole in both ends. One end of the top section slips on the coupling tube of the upper central section. A mast cap (coupling block for the antenna wires) is fitted into the other end. The bottom section has a coupling tube similar to those of the central sections, while its lower end is fitted with an electrose insulator.

The antenna is of the umbrella type with six radiating wires, each 75 feet long, suitably insulated at the open ends, and held as nearly

horizontal as possible by guy-rope extensions, 90 feet long, the outer ends of which are made fast to ground stakes. The standard counterpoise has six radiating insulated wires. Both antenna and counterpoise wires are carried on hand reels for convenience in packing for quick reeling and unreeling when setting up and taking down the mast.

Directions.

1. Examine the various parts of the antenna equipment and determine the relation of the various parts to one another.

Questions.

- (1) *How many radiating wires are there in the antenna?*
- (2) *What is this type of antenna called?*
- (3) *How many sections are used in the 40-foot mast? How do the top and bottom sections differ from the others? How are the sections connected together?*
- (4) *How are the antenna wires supported at the end away from the mast?*
- (5) *How are the antenna wires fastened to the mast?*
- (6) *How is the mast insulated from the ground?*
- (7) *How many counterpoise wires are used? What types of wires are used for the counterpoise?*
- (8) *How is the counterpoise system placed?*
- (9) *How are the counterpoise and the antenna wires carried?*
- (10) *How are the antenna wires insulated from the mast?*
- (11) *How is the mast raised, and how are the sections added?*
- (12) *How many men are needed to erect the 40-foot umbrella antenna?*
- (13) *With which sets is the 40-foot umbrella antenna used?*

Information.

The antenna should be erected in a clear space at least 225 feet in diameter. The antenna wires must not touch an object such as a tree, building, etc., nor should they cross over any power lines or roads. The lead-in wires must be run as directly to the set as possible. In case of severe climatic conditions, such as strong winds, a guy plate may be placed between the fourth and fifth sections of the mast (counting from the top) and additional guy ropes attached.

In rainy weather, it is advisable to loosen the guy ropes. If this is not done, the water will shrink the guy ropes, and this will cause the mast either to buckle or to break.

The minimum number of men that can erect the 40-foot mast for the antenna is five. Six or more should be used whenever possible. Three men are stationed at the end of the antenna and guy ropes, two men raise the mast and add the sections, while one man directs the operations so that the mast will be erect and straight at all times. The procedure is as follows:

a. Before going into the field, the men are numbered from 1 to 6; No. 1 is the section chief, No. 2 the key operator, and No. 3 the log operator. The other three men may be assigned at will.

b. When the suitable location is selected, No. 1 will order the truck stopped near the point at which the mast is to be erected. All of the men will then get off the truck except No. 6 who will hand out the equipment to the others. No. 2 arranges the mast sections in the order in which they are to go up, being sure the bottom insulator is screwed on. Nos. 3, 4, and 5 open the bags and place the antenna wires, counterpoise wires, and stakes in separate piles. No. 2 takes the top section, and placing the mast cap on one end of it, puts the other end on the ground. The mast cap has eight sockets which hold the metal balls on the ends of the antenna wires. The antenna lead-in wire is permanently fastened to it. Men, Nos. 4, 5, and 6 will each attach an antenna wire to the mast cap by means of the ball and socket provided. No. 2 puts his in the second socket from the lead-in; No. 5 in the second from that of No. 4's; No. 6 two sockets from that of No. 5. Nos. 4, 5, and 6 unreel and lay out on the ground these three antenna wires and the guy ropes fastened to them. The antenna wires extend radially from the mast and should divide the circle into three equal parts, that is, they should make angles of 120° with each other. While Nos. 4, 5, and 6 are laying out the first three wires, No. 2 holds the top section and No. 3 attaches the other three antenna wires to the mast cap. There will be one vacant socket. Nos. 4, 5, and 6 lay out the last three antenna wires and remain in position at the end of their guy ropes. The last wires should go half way between the other wires, thus dividing the circle into six equal parts. Each time Nos. 4, 5, and 6 lay out an antenna wire, they will also take a stake with them and leave it at the end of the wire. The guy ropes will be fastened to these stakes after the mast is erected. All hand reels should be left at the ends of the wires.

c. It is the duty of the three men at the end of the guy ropes to keep the mast upright while the sections are being added. They do

this by keeping the correct strain on the guy ropes, walking toward or away from the mast as directed by No. 1.

d. The mast is set up by adding the sections. No. 2 raises the mast, and No. 3 adds the sections. Having added all the sections, including the bottom one, the base of the mast is permitted to rest on the ground. No. 2 now takes out both hammers, one of which he lays down for No. 4. No. 2 then drives the stake for No. 4, who ties down his antenna. No. 2 then goes toward No. 5, driving stakes and tying down, while No. 4 takes the second hammer and goes toward No. 6, driving stakes and tying down the antenna wires. Stakes should be driven at an angle slanting away from the mast. After all the stakes have been driven, No. 2 and No. 4 bring the hammers back and leave them near the base of the mast. No. 2 will then connect up the set that is to be used. No. 3 lays out the counterpoise connection block and attaches the counterpoise wires. He will then assist No. 2 in connecting up the net. Nos. 4, 5, and 6, after all the guy ropes are tied down, will lay out the counterpoise wires directly under the antenna wires which they have carried out.

e. In taking down the antenna, it is not necessary to untie the guy ropes from the stakes. Nos. 4, 5, and 6 take their positions at the ends of the guy ropes which they held before. They will steady the mast while No. 2 raises it and No. 3 withdraws the sections. No. 2 holds the top section until all antenna wires are reeled in and the connectors removed from the mast cap. The antenna wires and guy ropes are untied and reeled up by the men who laid them. Each time Nos. 4, 5, and 6 reel up an antenna wire, they will bring a stake with them. After they have completed the antenna wires, they will reel up the counterpoise wires. Nos. 2 and 3 disconnect the set and pack the equipment.

EXPERIMENT NO. 1.

SETTING UP THE 40-FOOT MAST.

Directions.

2. Erect the 40-foot mast for the umbrella antenna as described in the procedure given above. The duties of each member of the group will be in accordance with this procedure.

3. Remove the mast and antenna and prepare them for transportation.

4. Repeat this experiment acting each time as a different number in the group, the particular assignment of numbers being designated by the instructor.

5. Dismantle the equipment and prepare it for transportation.