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# USER HANDBOOK

# for

# BRAID AERIALS 1·5 TO 16 Mc/s

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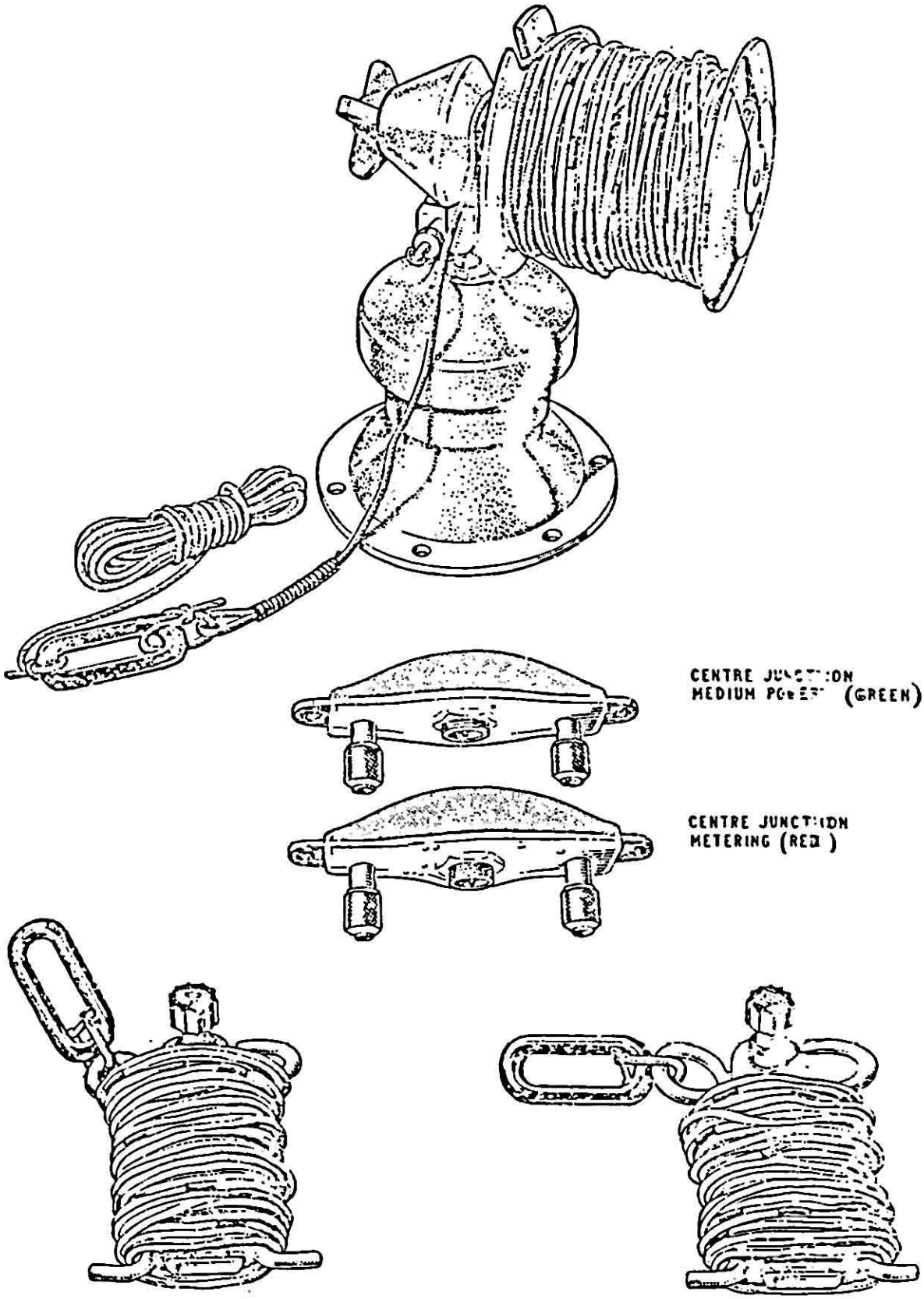


FIG.1 BRAID AERIALS

## I L L U S T R A T I O N S

# CHAPTER 1
# THE DIPOLE AERIAL

## Section 1. General

1.1 The Braid Dipole Aerial is suitable basically for sky-wave working, but will also give improved ranges for ground-wave working.

1.2 It is light, strong, and variable over a wide range of frequencies.

1.3 Two types of Centre Junction are available, both of which are waterproof:

(a) Aerial Element, Centre Junction, Medium Power (ZA.54395), coloured green, can be used with a transmitter RF power output of up to 400W, it does not provide metering facilities.

(b) Aerial Element, Centre Junction, Metering (ZA.54151), coloured red, provides metering facilities for aerial current (primarily for Station Radio C.13). It must not be used when the transmitter output power exceeds 50 watts.

1.4 Table 1 shows the composition of the Braid Dipole Aerial (see also fig. 5).

TABLE 1.

| Item | Ref. No. | No. Required |
|---|---|---|
| Aerial Element, Dipole, 75 feet, max. | ZA.54150 | 2 |
| Aerial Element, Centre Junction, Metering, Red | ZA.54151 | ) |
| Aerial Element, Centre Junction, Medium Power, Green. | ZA.54395 | ) Alternatives ) |

1.5 The braid cable used in the quarter-wave sections (the elements) is made from multi-strand tinned copper wire interwoven with terylene thread and wound over a terylene core. It has a breaking strain of over 150 lb.

1.6 The braid elements are marked every foot with small pieces of sleeving on the braid. These serve as markers when the elements are reeled out for an ordered frequency.

1.7 The free end of the braid element is terminated in a copper tag and protected for the first four inches of its length by rubber sleeving. The other end of the braid element is secured to the terminal on the frame.

1.8 The light alloy frame is used for stowing the full 75 feet of braid cable element, or to house the unused length when erected.

1.9 The centre of the frame contains a chart which shows the correct lengths (in feet) of braid cable element for frequencies of from 3.0 to 16.0 Mc/s., The chart can be pulled out for use by means of the black finger hold protruding from the base of the frame. It is spring loaded to make it self-returning.

1.10 The frequency coverage of the braid dipole aerial can be extended downwards to 1.5 Mc/s by using two additional elements, one for each arm, to increase the overall length of the aerial. (See fig. 5).

1.11 If a fault develops in either centre junction it cannot be repaired and must be exchanged. A temporary repair can be made if the braid aerial is broken by tying it together with a reef knot.

1.12 The dipole aerial should be suspended from two masts or from other convenient supports (see fig. 5). It is recommended that the aerial be erected as high as possible and broadside to the direction in which it is required to work.

1.13 The feeder normally used between the dipole and the transmitter is a 50-feet connector of Uni-radio No. 70 cable. When a feeder is supplied as part of an installation, it should be used.

1.14 An aerial tuning unit is not normally required with a dipole aerial, the feeder being taken directly to the transmitter aerial socket.

1.15 Table 2 shows the weights and overall dimensions of the various items.

TABLE 2

| | Length | Width | Thickness | Weight |
|---|---|---|---|---|
| Aerial Elements | 5-in. | $3\frac{1}{4}$-in. | $1\frac{1}{2}$-in. | 9-Oz. |
| Centre Junction, Metering | $4\frac{1}{4}$-in. | $1\frac{3}{8}$-in. | $1\frac{3}{4}$-in. | 5-oz. |
| Centre Junction, Medium Power | $5\frac{1}{4}$-in. | $1\frac{3}{8}$-in. | $1\frac{3}{4}$-in. | 5-oz. |
| Feeder U.R. 70 | 50-ft. | - | $\frac{1}{4}$-in. | - |

## Section 2. Adjustment and Setting Up

2.1 If the transmitter power output is greater than 50 watts, use Aerial Element Centre Junction, Medium Power. If the maximum power output is below 50 watts, use Aerial Element, Centre Junction, Metering.

2.2 Pull out the "Frequency/Aerial Length" chart from one of the Aerial Elements, Dipole, 75-ft. and look up the length of aerial required for the ordered frequency. For example, if the ordered frequency is 3.6 Mc/s then the number opposite this frequency on the chart will be 62 (see fig. 3).

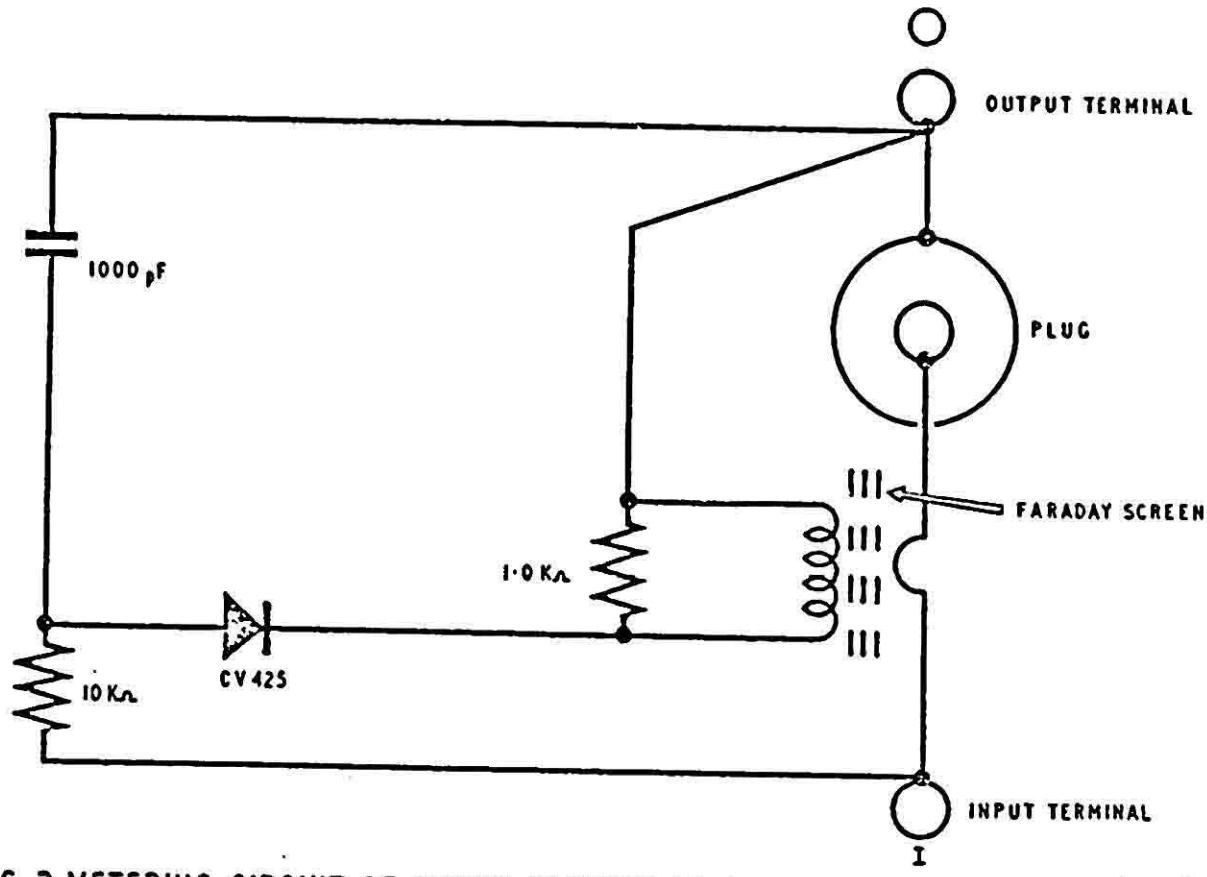


FIG. 2 METERING CIRCUIT OF AERIAL ELEMENT CENTRE FUNCTION METERING (RED)

2.3 Unwind the braid cable to the sixty-second marker and make two half hitches around the hook opposite the insulator.

2.4 Insert the copper tag, attached to the free end of the braid cable, through the hole in one end of the centre junction and secure it to the nearest terminal (see fig. 5). The rubber tubing must be so positioned that it protects the braid cable from abrasion where it passes through the hole in the centre junction.

2.5 Repeat the above procedure with a second Aerial Element, Dipole, 75-ft. A dipole aerial should have the same length of element on each side of the centre junction.

2.6 Connect one end of the co-axial feeder to the plug on the centre junction, connect the other end to the transmitter output socket.

2.7 The aerial should now have the appearance of the aerial shown in the upper drawing of fig. 5 and may be hoisted into position using suitable lengths of cord attached to the chain insulators. It is emphasised that the aerial should be as high as possible at both ends and will give best results when erected broadside to the distant station.

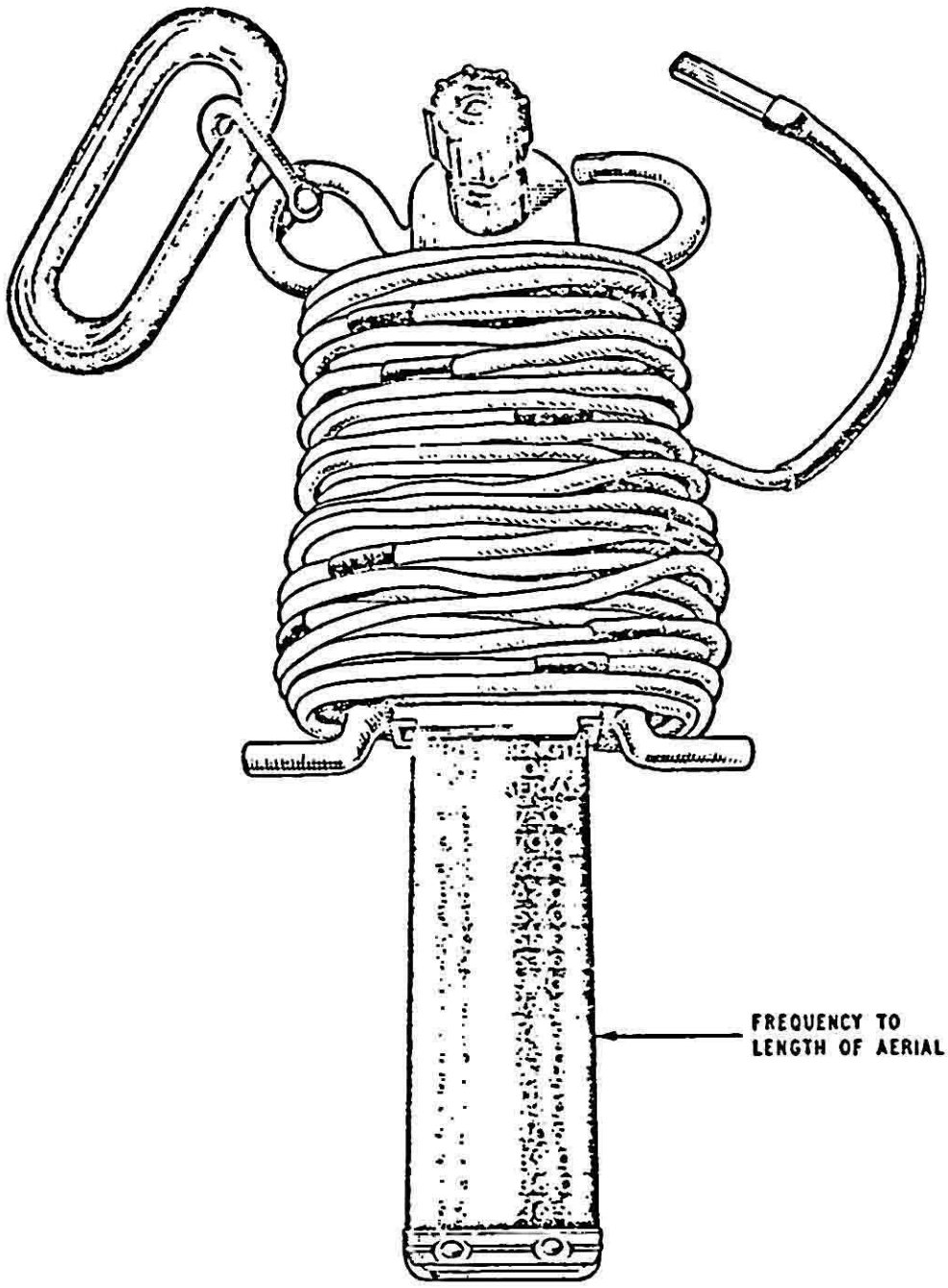


FIG. 3 AERIAL ELEMENT, DIPOLE, 75 FEET

NOTE: The aerial should be erected well clear of overhead wires and power lines in order to prevent absorption of the signal and danger from electrical shock and burns.

## Section 3. Extending the Frequency Range

3.1 To extend the frequency range of the aerial from 3 Mc/s down to 1.5 Mc/s, an additional Element Dipole 75 feet can be connected in series with each element of the existing dipole (see fig. 5).

3.2 To determine the lengths of the four elements required for, say, 1.7 Mc/s, multiply this figure by two (1.7 x 2 = 3.4) and refer to one of the "frequency/length of aerial" charts. Opposite 3.4 is the figure 66, therefore, unwind four elements dipole to the sixty-sixth marker and make two half-hitches around the hook on each former. Note that, under 3 Mc/s, the chart may not be accurate enough for all transmitters and the operator should refer to the User Handbook for the equipment.

3.3 Connect the two Elements Dipole 75 feet to the centre junction as before, then connect the free ends of the two outer sections to the terminals on the formers of the inner pair of elements. The strain on the cable of the outer sections should be taken up by tying the braid cable to the insulators of the inner sections and leaving a loop between the insulator and the terminal (see fig. 5).

3.4 It is advisable, whenever possible, to provide additional support for the longer dipoles. Two extra masts could be used at the junctions of the inner and outer elements of each limb, care being taken to insulate these points from contact with the masts.

3.5 If it is desired to use the dipole aerial at frequencies higher than 16 Mc/s, shorter lengths of element can be used.

3.6 To determine the number of markers required, the higher ordered frequency should be divided by two. The number of markers opposite this figure should also be divided by two. Table 3 gives some typical examples.

TABLE 3

Examples of extending the frequency range of the dipole

| | "Frequency/Length of Aerial" Chart | | |
|---|---|---|---|
| Higher ordered frequency | Half higher ordered frequency | Number of markers | Half the number of markers |
| 32.0 Mc/s | 16.0 Mc/s | 14 | 7 |
| 26.0 " | 13.0 " | 17 | $8\frac{1}{2}$ |
| 22.4 " | 11.2 " | 19.5 | $9\frac{3}{4}$ |
| 13.4 " | 9.2 " | 22.5 | $11\frac{3}{4}$ |

## Section 4. Testing and Maintenance

4.1 For test purposes the internal connections to the terminals on the centre junctions are identifiable as follows:-

(a) "0" to outer or shell of the plug
(b) "I" to inner or centre of the plug

} see Figs. 2 and 4.

4.2 The braid cable and feeder should be kept free from kinks, twists, and excessive strain.

4.3 If the braid cable is broken, a temporary repair may be made by tying the broken ends together, using a reef knot. Repeated breakages, however, will shorten the element and limit the lowest frequency for which the dipole can be used.

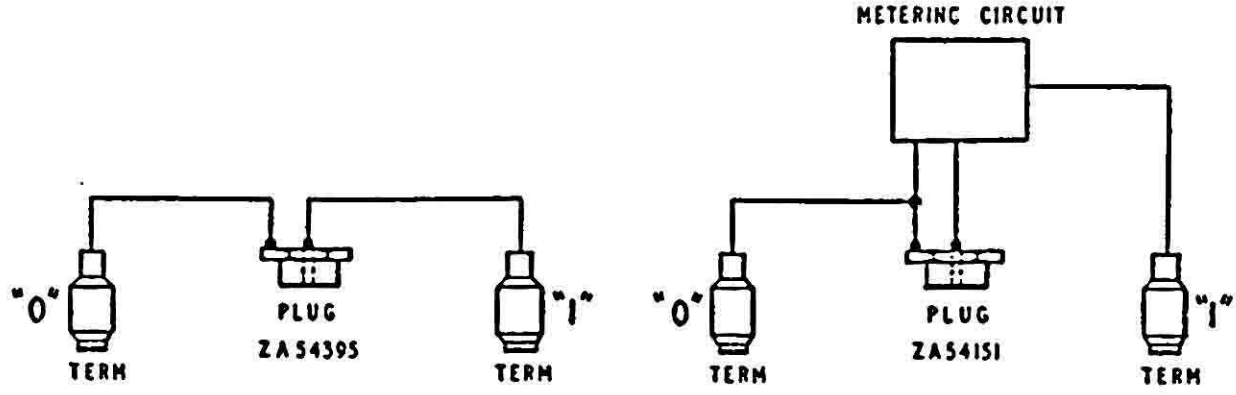


FIG.4 BLOCK DIAGRAM - CENTRE JUNCTIONS

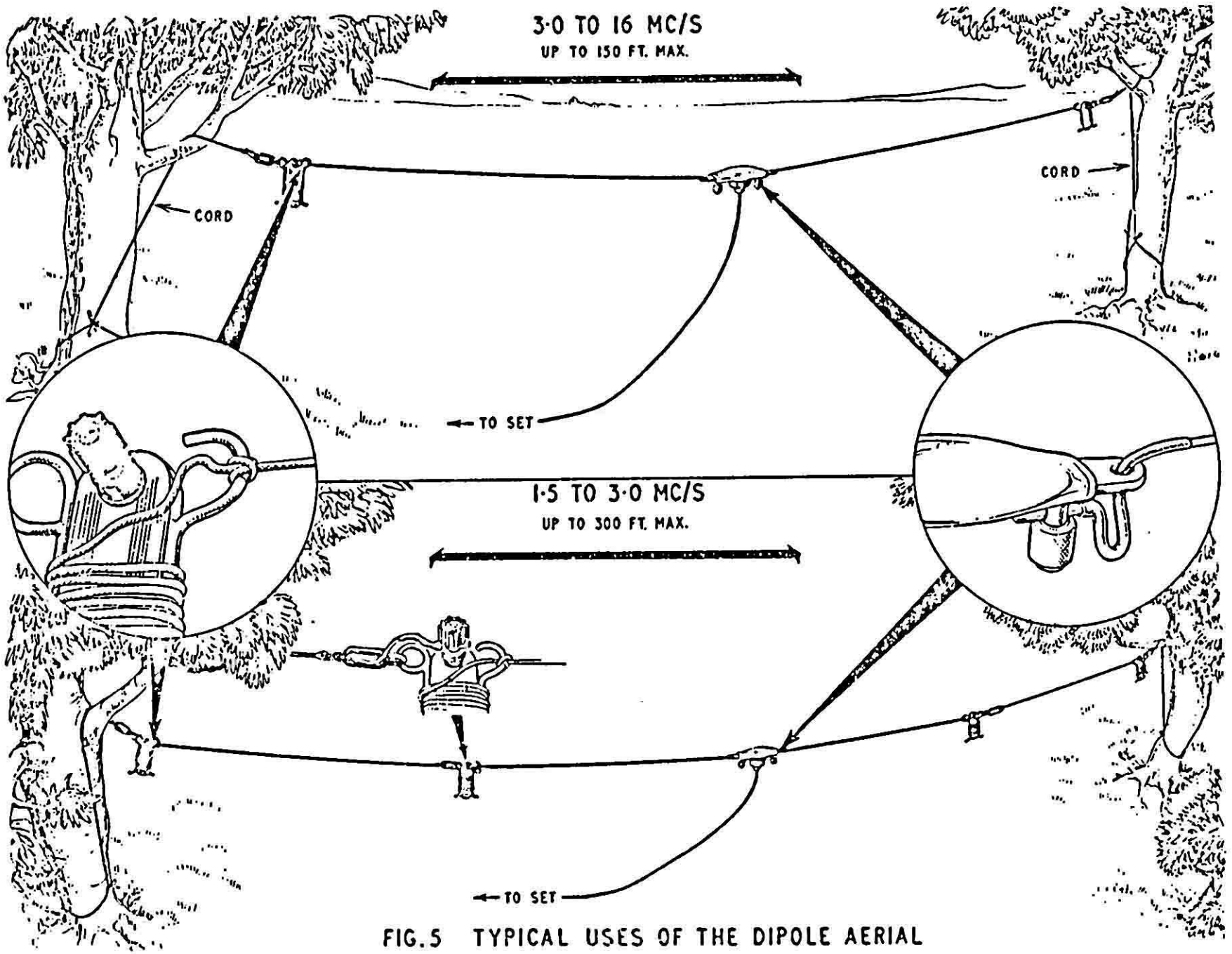


FIG.5 TYPICAL USES OF THE DIPOLE AERIAL

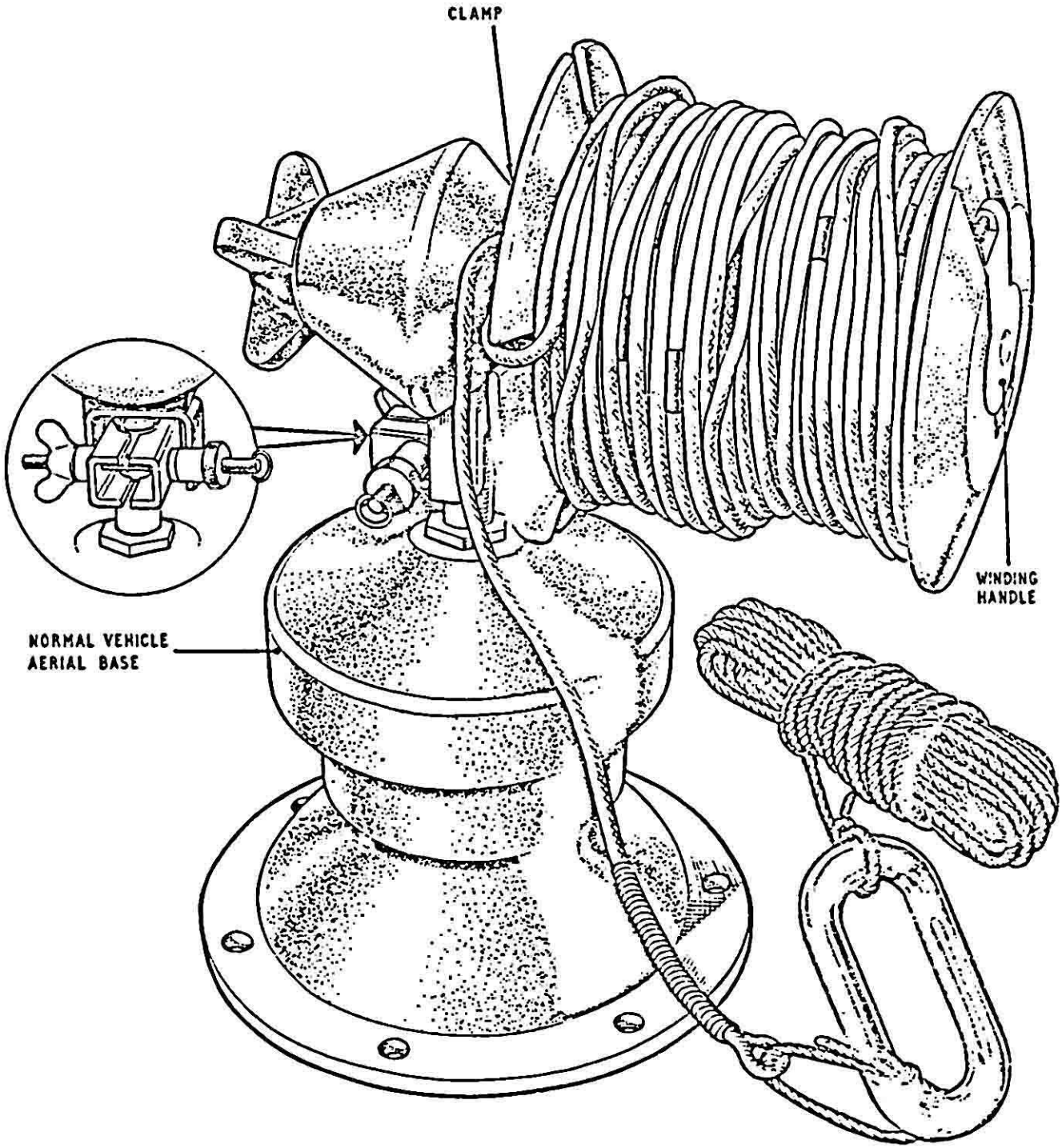


FIG. 6 AERIAL END FED 150 FT. MAXIMUM

# CHAPTER 2

# AERIAL, END FED, 150 FT. MAX

## Section 5. General

5.1 The Aerial, End Fed, 150-ft. Max. (fig. 6) is intended for sky-wave working. It may also be erected vertically, by means of an insulated mast, to provide greater ground wave ranges than the whip aerial. It is easier to erect than a dipole, but is less efficient.

5.2 The braid cable used for the end fed aerial is identical to that used in the Aerial, Element, Dipole, 75-ft., namely, terylene thread and tin-plated copper wire interwoven over a terylene core. The total length of the braid cable is 150 feet and it has a breaking strain of over 150 lb.

5.3 If the braid cable is accidentally broken a temporary repair may be made by tying the broken ends together in a reef knot. Excessive breakage will effect the calibration of the aerial and a damaged braid cable should always be changed as soon as possible.

5.4 An Aerial Tuning Unit, normally provided with the radio equipment for working into rod aerials, must be used with the end fed aerial.

5.5 The correct designation of the end fed aerial is "Aerial, End Fed, 150 feet, Max. ZA.54152". Weights and dimensions are as follows:-

TABLE 4.

| Item | Height | Width | Depth | Weight |
|---|---|---|---|---|
| Aerial End Fed | 8¾-in. | 7-in. | 5-in. | 3-lb. 11-oz. |

5.6 The braid cable of the end fed aerial is marked for different frequency bands by pieces of yellow sleeving on the cable. Each piece of sleeve is marked with a frequency range for which the length of cable is suitable. This approximates to three-quarter wavelength at that frequency, and is applicable to frequencies down to 4.5 Mc/s. Where there are two pieces of sleeving, one yellow and the other black, this combination indicates that the length of braid cable approximates to one quarter wavelength of the frequency marked on the yellow sleeve, and is intended for use on sites where it is difficult or impossible to use a three-quarter wave aerial, or, at the lower frequency ranges, where a three-quarter wave aerial would be too long for convenience in handling.

NOTE: The aerial should be erected well clear of overhead wires and power lines to avoid both absorption of the signal and danger from electrical shock and burns.

## Section 6. Setting Up and Adjustment

6.1 Undo the metal wing-nut on the normal aerial base and remove the whip aerial.

6.2 Insert the stub on the end fed aerial assembly into the socket on the aerial base, turn the reel broadside to the direction in which the aerial will be taken and tighten the metal wing-nut firmly by hand.

6.3 The "U" shaped projection on the underside of the conical boss prevents the reel from turning under the weight and tension of the aerial. The two straight edges of the fitting should rest against the terminal and wing-nut assembly as in fig. 6.

6.4 Find out the ordered frequency and then reel out the braid cable until a marker is reached which corresponds to the ordered frequency. (The lower frequencies require longer lengths of aerial, higher frequencies shorter lengths).

6.5 Should there be a black marker beside the yellow marker covering the ordered frequency, this should be ignored under normal site conditions, and the braid cable reeled out until a yellow marker is found which covers the ordered frequency.

6.6 If the site makes it impossible to reel out a three-quarter wave aerial (yellow marker only), use a quarter wave aerial (black and yellow markers). The yellow marker then shows the frequency range for which the length of braid cable is suitable as a quarter wave aerial.

6.7 When the appropriate marker has been found, the braid cable should be reeled off about six inches past the marker, taken through the nearest slot in the end wall of the reel, the reel then given a three-quarter turn in the "winding in" direction, and the polythene wing-nut tightened to clamp the braid between the end of the reel and the conical boss.

6.8 The cable must not cross in the clamp, nor the markers be clamped.

6.9 The free end of the braid aerial may now be hoisted to a suitable high point, or to a mast. The free end should be as high as possible.

6.10 If the site is too small to use a three-quarter wavelength of braid aerial, use a quarter wavelength marked by the black markers. For instance, Table 4 shows a series of markers (for convenience the first off the reel). Between 42 and 45 feet (14-15/13-14 Mc/s), 43 feet is marked 4.5 to 5.0 Mc/s, and this is approximately a quarter wavelength at 4.5-5.0 Mc/s. (The normal three-quarter wavelength for this frequency will be found much farther on, near the other end.

6.11 Other black markers will be found marking quarter wavelengths of braid for frequencies down to 1.2 Mc/s.

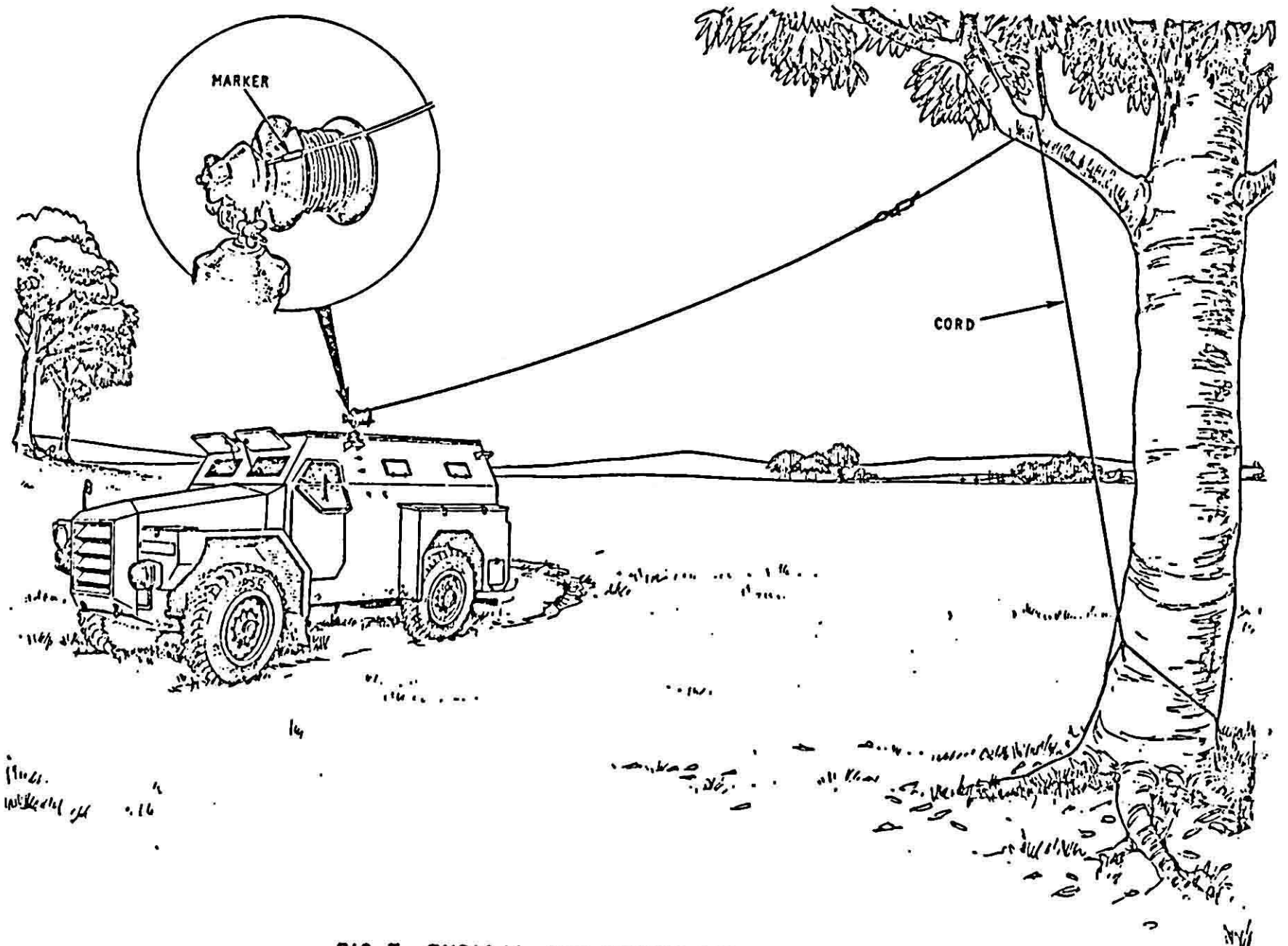


FIG. 7 TYPICAL USE OF THE END FED AERIAL

TABLE 5

Examples of Marker/Frequency Relation

| Length of Braid | Marker Colours | Frequency | Relationship to Wavelength |
|---|---|---|---|
| 33 feet | Yellow | 19.0 - 21 Mc/s | 3/4 Wave |
| 34 " | " | 17.5 - 19.0 " | " " |
| 36 " | " | 16.0 - 17.5 " | " " |
| 39 " | " | 15.0 - 16.0 " | " " |
| 42 " | " | 14.0 - 15.0 " | " " |
| 43 " | Yellow/Black | 4.5 - 5.0 " | 1/4 " |
| 45 " | Yellow | 13.0 - 14.0 " | 3/4 " |

## Section 7. Maintenance

7.1 The braid cable should be kept clean and free from kinks and twists, both when in use and when wound on the reel.

7.2 If the aerial is broken, the ends may be tied together in a reef knot. If a piece of cable has been cut right out of the braid aerial, the missing piece should be made up by reeling out an equivalent length after the appropriate marker has been reached. A damaged braid cable should always be exchanged at the earliest opportunity.