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AUSTRALIAN MILITARY FORCES



USER HANDBOOK, A510 WIRELESS STATION

1956

MILITARY BOARD

Army Headquarters.
Melbourne.

1 Apr. 56

Issued by Command of the Military Board.

W. M. Knight

7610-010-0284

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1956

Serial No.	AAO's	AMENDMENTS

SYNOPSIS

The A510 wireless set is a lightweight, man-pack transmitter-receiver for operation principally by long range infantry patrols. It functions in the high frequency band from 2 to 10 megacycles per second, and has facilities for either "VOICE" or "CW" working. The operator can set up four crystal controlled channels within this band, and select the required frequency by means of a switch on the panel of the transmitter unit. The transmitter-receiver operates from two dry batteries, $1\frac{1}{2}$ volts, and $90/-7\frac{1}{2}$ volts. The set units are hermetically sealed, and are normally carried in special pouches attached to the web equipment.

Complete Equipment Schedule No. 1636 is the only authorised list of components for the Wireless Station A510. This User Handbook should not be quoted when submitting demands on Ordnance.

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frontispiece

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USER HANDBOOK, A510 WIRELESS STATION

CHAPTER ONE—GENERAL DESCRIPTION

SECTION 1 — PURPOSE AND FACILITIES.

1. The A510 wireless set is a crystal controlled, low power, lightweight transmitter-receiver, designed primarily for use by long range infantry patrols. It can be used as a man-pack station on the move, in a vehicle, or as a ground station. For the ground station role, improved aerial systems are provided to achieve greater range.

2. Operation can be either "VOICE" or "CW" in the frequency range 2 to 10 megacycles per second (Mc/s).

3. The set is carried in two special pouches on the standard webbing equipment in place of the basic pouches. Fig. 1 shows one method of carrying the equipment when operating on foot. Other, perhaps



FIG. 1 - MAN-PACK STATION.

more convenient, methods will no doubt be discovered by operators as they become more accustomed to the equipment. For example, one webbing shoulder strap may be used to carry, in sling fashion, the transmitter at one end, and the receiver at the other.

SECTION 2 — WORKING RANGES AND AERIALS.

4. Communication distances are governed by the aerial system used. With a mar-pack station, using a rod aerial, the maximum range would be about 2 miles for "VOICE" and 4 miles for "CW". With a horizontal dipole system on sky wave operation, a "CW" range of 120 miles may be achieved.

5. The power available for transmission is restricted by the necessity for reducing weight to a minimum. To use this power as effectively as possible, the following aerials are supplied with each complete station :-

Aerials, flexible, 8-ft. (Aust.) ~ (rod aerial)
- 2 (one spare)

Aerials, end-fed, adjustable, 135-ft. ~ (wire
aerial) - 1

Aerials, lightweight, 68-ft. - (dipole wire
aerial) - 2 (per dipole
aerial).

6. Detailed descriptions, working ranges, and methods of erection are given in Chapter Two.

SECTION 3 — POWER SUPPLY AND CONSUMPTION.

7. Power is obtained from two dry batteries; the LT battery ($1\frac{1}{2}$ volts), and the HT battery (90 volts). The LT battery, carried in a separate sealed compartment in the bottom of the receiver unit, is used by both the transmitter and the receiver. The HT battery incorporates a $7\frac{1}{2}$ volts bias battery, and is carried in the transmitter unit in the same manner as the LT battery. The HT bias battery is also used by both units.



FIG. 2.
TRANSMITTER, A510 AND RECEIVER, A510

8. The power output is approximately 0.15 watts for "VOICE" (unmodulated), and 0.5 watts for "CW".

9. The normal life of the batteries is approximately 14 hours for continuous operation with a ratio of 1 minute send/5 minutes receive.

10. These batteries are not issued from Ordnance with the station but will be maintained separately, and drawn from stores as required. **THEY MUST NOT BE STORED IN WS A510 TRANSIT CASES.**

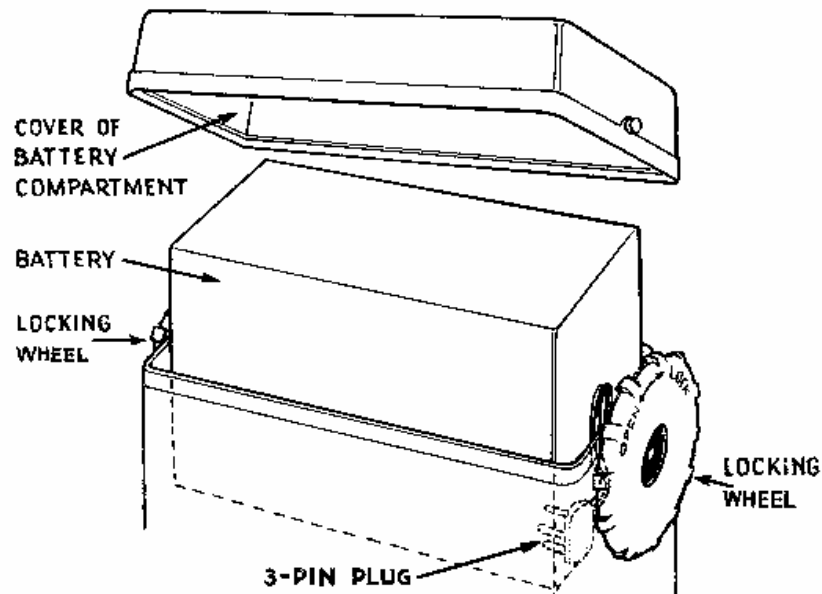


FIG. 3 - RT BATTERY HOUSING

SECTION 4 - GENERAL DESCRIPTION.

11. The set consists of two units, a transmitter and a receiver, each housed in a light, cast aluminum alloy case. Both units are hermetically sealed, and must not be opened by unqualified persons. For ease of replacement without breaking the main seals, the dial illumination lamps, crystals, and batteries are all in separate, sealed compartments, readily accessible without the use of tools.

12. Carrying handles are provided on each unit for ease of handling.

13. The transmitter, carried on the left, and

the receiver on the right of the man, appear to be separate units, but are inter-dependent in operation. Neither will operate until the inter-connecting plug and socket are securely joined.

Receiver. (Fig.4)

14. The receiver is a conventional 5 valve, reflexed super-heterodyne, with one stage of tuned RF amplification, having the sensitivity of a high grade communication receiver. There is sufficient power output available from the receiver to drive two pairs of headsets in parallel.

15. Tuning is continuous over the frequency range 2 to 10 Mc/s in two bands, 2 to 4.5 Mc/s (blue scale), and 4.5 to 10 Mc/s (orange scale).

16. Netting is obtained independently of the distant station simply by tuning the receiver to zero beat against its own transmitter crystal.

17. Receiver controls, as marked on the panel (shown here in inverted commas and capitals), and other items on the receiver are explained below, and illustrated in Fig.4.

- (a) "FREQUENCY BAND". This switch selects the blue band (2 to 4.5 Mc/s), or the orange band (4.5 to 10 Mc/s). The colours are clearly marked, and correspond with the colours on the frequency dial scale. The switch has a wide arc of travel.
- (b) "FREQUENCY". This is the frequency control knob, the position of which can be fixed by rotating the "LOCK" lever anti-clockwise through 90 degrees. The frequency is indicated on the dial scale which is located in the centre of the panel. The dial scale shows the blue band (2 to 4.5 Mc/s), and the orange band (4.5 to 10 Mc/s).
- (c) "Humidity indicator". Immediately below the frequency dial scale is a humidity indicator which is normally a blue colour, but turns pink if moisture has leaked into the receiver, in which case the set should be

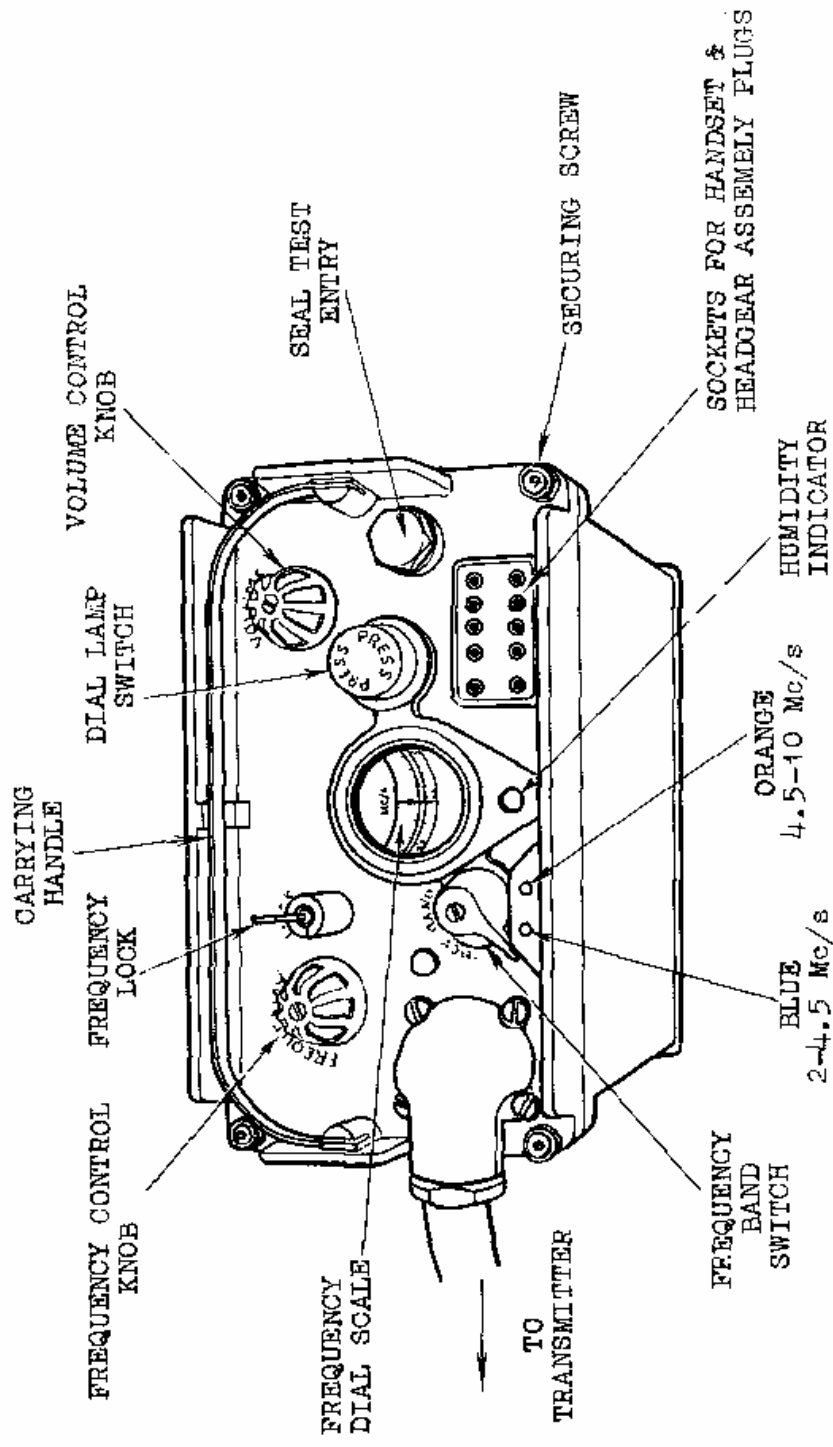


FIG.4 - RECEIVER, A510 - CONTROLS

returned to base when possible.

- (d) Dial lamp switch. The rubber cap near the frequency dial scale covers a press-switch which, when pressed, actuates the pilot lamp when the function switch on the transmitter is set at "R".
- (e) "VOLUME". This control is situated in a corner of the panel opposite the frequency control knob. It increases or decreases the sound to the ear.
- (f) Five-pin sockets. These accept the handset or headgear assembly plugs, or one of each, as required.
- (g) Seal test entry. The hexagonal bolt on the right of the dial lamp switch seals the entry for leak testing (by R.Aust.Sigs. or RAEME personnel).

18. As previously mentioned, the LT battery is situated in the bottom compartment of the receiver unit. The battery is held firmly by a channel shaped holder, and two locking wheels secure the lid of the compartment. The battery connection is made by means of a 2-pin plug in the side of the battery.

Transmitter. (Fig.5)

19. The transmitter is a 4-valve, crystal oscillator-grid modulated, power amplifier transmitter. Its various features are described below; those shown in inverted commas and capitals are as marked on the panel:-

- (a) "AERIAL". The position of this terminal was chosen in order to keep the rod aerial as far away as possible from the operator's body when the set is carried on the man. The three radial pins at the top of the terminal form a polarized plug on which the bayonet type socket in the base of the aerial tuning inductor, or "rod tuner" as it is commonly called, (see para. 46) is mounted when a rod aerial is used. In the centre of this plug is a spring-loaded

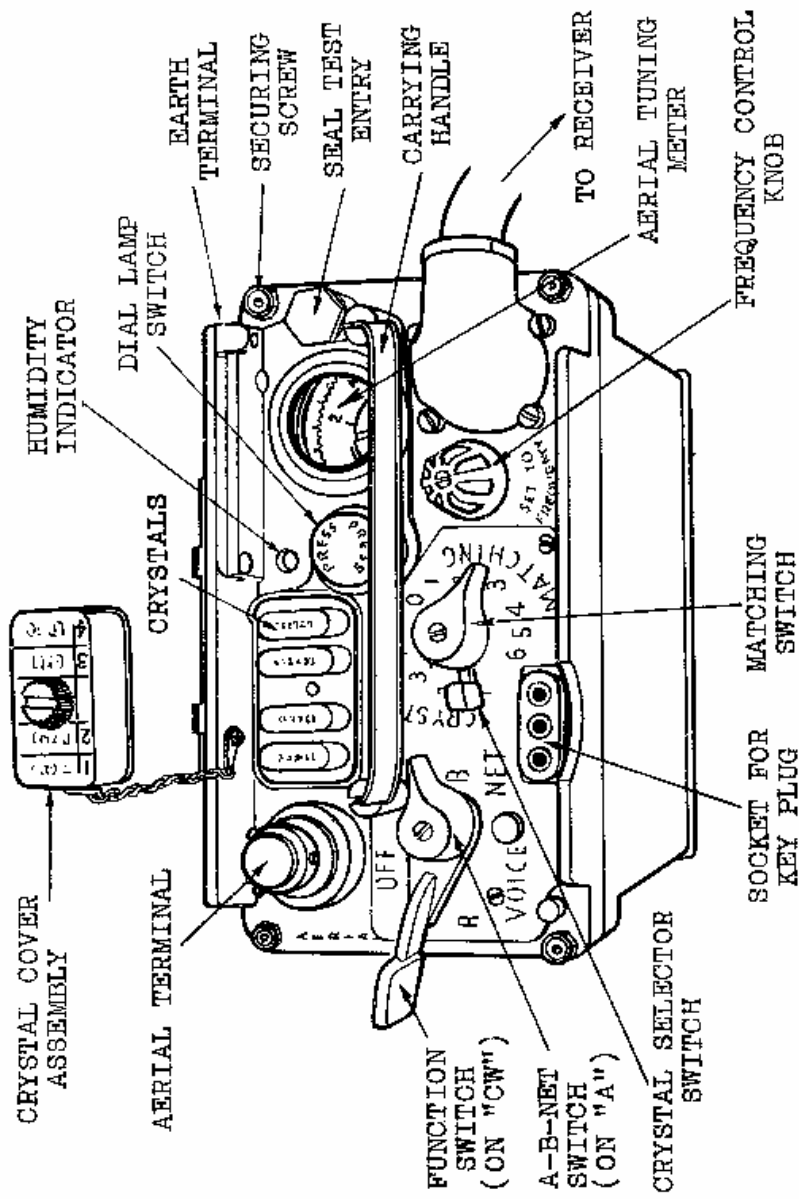


FIG. 5 - TRANSMITTER, A510 - CONTROLS

button which, when depressed, clears holes in the aerial terminal for insertion of dipole or end-fed aerial leads. (With these aeriels the rod tuner is not used.)

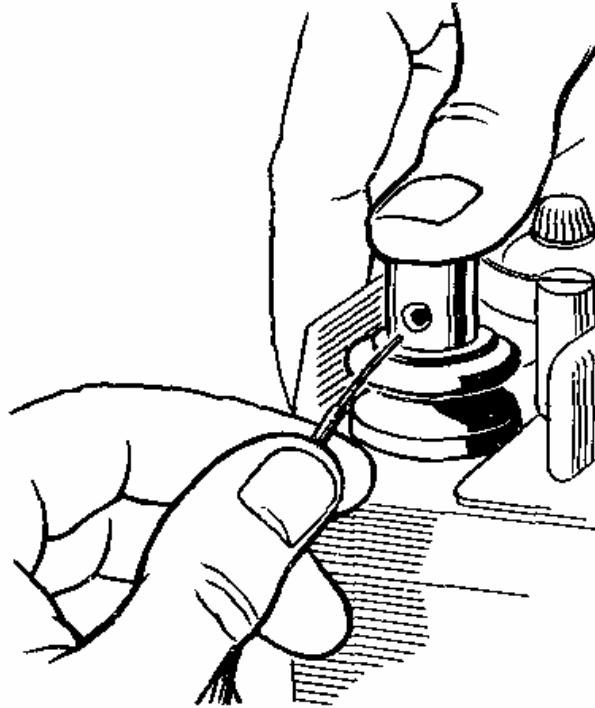


FIG.6 - INSERTING WIRE AERIAL LEAD

(b) "OFF-CW-R-VOICE". This function switch is operated by a lever knob. Once the station is on the air, complete control is exercised by manipulation of this lever knob. When switching from "R" to "VOICE", pressure on the knob must be maintained until speech is finished. Its strong return spring returns the lever knob to "R" when pressure is relaxed. The long lever used has the following advantages :-

- (i) Little force is required to operate it.
 - (ii) It projects from the side of the pouch so that it can be seen when the set is "on".
 - (iii) It is in a safe position when "off".
- The operating positions were chosen so that

- the lever, and therefore the operator's hand, are as far from the aerial terminal as possible on "VOICE". The lever should be pressed with the ball of the left thumb, the four fingers of the hand resting on the outside face of the case, well below the rod tuner.
- (c) "A-B-NET". This control is mounted on the same spindle as the function switch. The three positions are used for -
- "A" - Long wire end-fed aerial.
 - "B" - Long wire aerial, rod aerial, and dipole.
 - "NET" - To net receiver to transmitter.
- (d) Crystal sockets. To the right of the aerial terminal is the multiple socket for four miniature crystals. This is protected by an easily removed cover, and is itself sealed.
- (e) "CRYSTAL". This switch is mounted on the same spindle as the "MATCHING" switch, and selects the required crystal.
- (f) "MATCHING". This switch is used, in the main, only for long wire aeriails.
- (g) "SET TO FREQUENCY". This control sets the transmitter to the ordered frequency, and tunes the power amplifier.
- (h) Humidity indicator. } As for Receiver
- (j) Seal test entry. } [para. 17(c) and (g).]
- (k) Dial lamp switch. This is identical with the switch on the receiver but operates under different conditions. The switch functions when the transmitter function switch is on "CW" or "VOICE", and the "A-B-NET" switch is in any one of its three positions. To enable the transmitter to be tuned at night under conditions of wireless silence, the dial lamp switch will also function when the function switch is on "R" and the "A-B-NET" switch is on "NET".
- (l) Aerial tuning meter. The frequency dial scale, and meter scale (marked "AER. TUNE")

are seen through the one window, the frequency dial scale being off-set to enable the meter to be more easily read.

- (m) "EARTH" (Fig.7). On the outer flange near the aerial tuning meter is an earth terminal to which connection is made by *DEPRESSING* the leaf spring, inserting the earth wire through the counter-sunk hole in the outer flange, and then releasing the leaf spring.

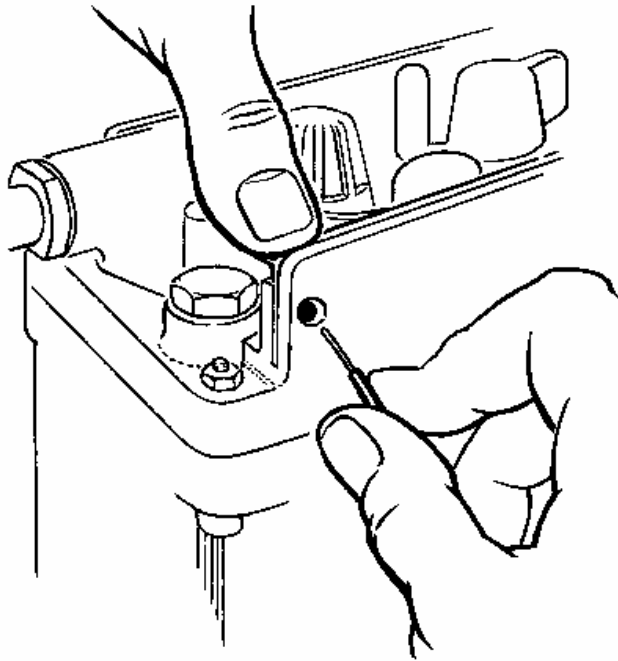


FIG.7 - INSERTING GREEN EARTH LEAD FROM COUNTERPOISE OR LEAD FROM DIPOLE FEEDER

20. The HT bias battery is housed in the sealed compartment in the bottom of the transmitter unit, in exactly the same manner as the LT battery is housed in the receiver, but connection is made by means of a 3-pin plug and socket.

SECTION 5 - ACCESSORIES.

Headgear assembly and handset - General.

21. These assemblies use new types of microphone and receiver insets which are hermetically sealed, and were developed specifically for Service use.

22. The microphone inset has a red body with a black stripe across its face to indicate a carbon microphone. (A white stripe would indicate an electro-magnetic microphone.)

23. The receiver inset has a green body with a white stripe across its face to indicate an electro-magnetic receiver.

24. The WS A510 is capable of working with either or both of these assemblies plugged in, and, in fact, two of either can be used at one time. Both assemblies are described in the following paragraphs. Microphone and receiver headgear assemblies, SI, lightweight.

25. The assembly comprises two ear pads holding the insets and horn, and is carried on the head by a head strap and neckband. There are two electro-magnetic receivers connected in parallel, and one carbon microphone, with a single drop lead terminating in a 5-pin plug on 6 feet of cord. The cord is of a new miniature design which should retain its flexibility under all but extremely cold conditions. The assembly generally is of robust construction, and will withstand a considerable amount of rough usage. When working "CW" the microphone horn may be removed from the assembly.

26. The parts of the headgear are described below :-

(a) Right ear pad. This is the major item of the assembly as it carries one receiver inset and the microphone inset, together with the microphone horn. It comprises a central portion housing the receiver, a shroud, and a cavity for the microphone. The shroud is designed to exclude only a limited amount of noise so that an officer does not have to shout instructions to an operator. It is designed to fold back off the lower part of the ear to allow circulation of air under hot or humid conditions.

(b) Cover plate. This is held in place by the

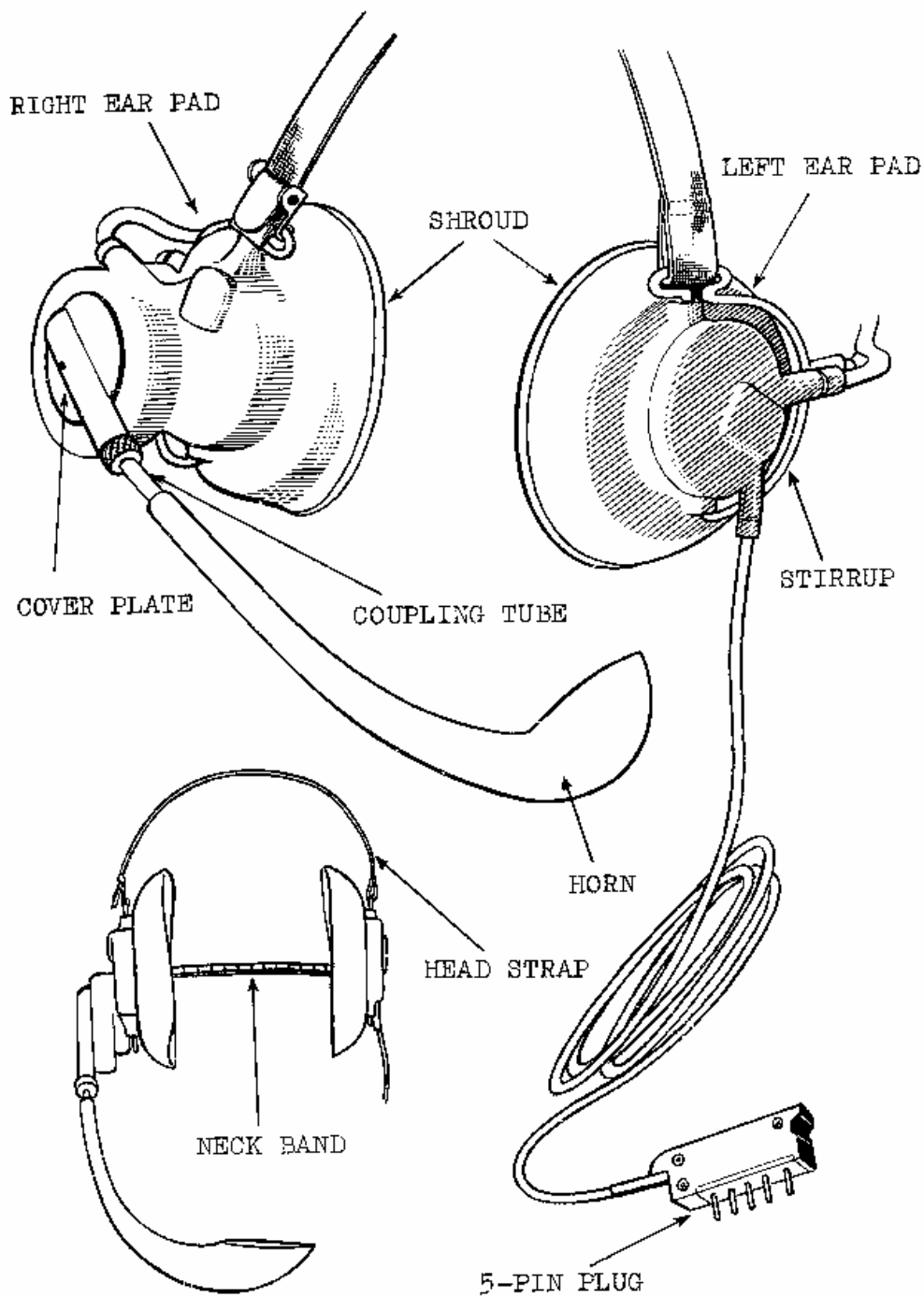


FIG. 8 - MICROPHONE AND RECEIVER HEADGEAR ASSEMBLIES,
SI, LIGHTWEIGHT

lip around the microphone cavity, and may be rotated to position the horn correctly. There is a small hole in the centre of the cover plate. This hole damps resonances from the horn, and must *NOT* be blocked.

- (c) Coupling tube. The bend in this tube may be used, by rotating the tube, to move the horn into or away from the centre of the mouth.
- (d) Horn. The horn is made of polythene, and can withstand considerable abuse - but do not jump on it! To adjust it to the correct position (centrally in front of the mouth, and just touching the lips) rotate, as necessary, the cover plate, the coupling tube, and the horn itself. It is also possible to slide the horn along the coupling tube for length adjustment.
- (e) Left ear pad. This carries the second receiver inset and a terminal plate. It has two cable entries; one accepts the cable from the right ear pad, and the other takes the connector for the assembly.
- (f) The stirrups. These couple the ear pads to the neck band and head strap.
- (g) Neck band. This spring steel band provides the necessary lateral pressure to hold the ear pads on the ears. The pressure may be adjusted by bending this band. *USE GENTLE PRESSURE WHEN BENDING.*
- (h) Head strap. This adjustable strap takes the full weight of the assembly.

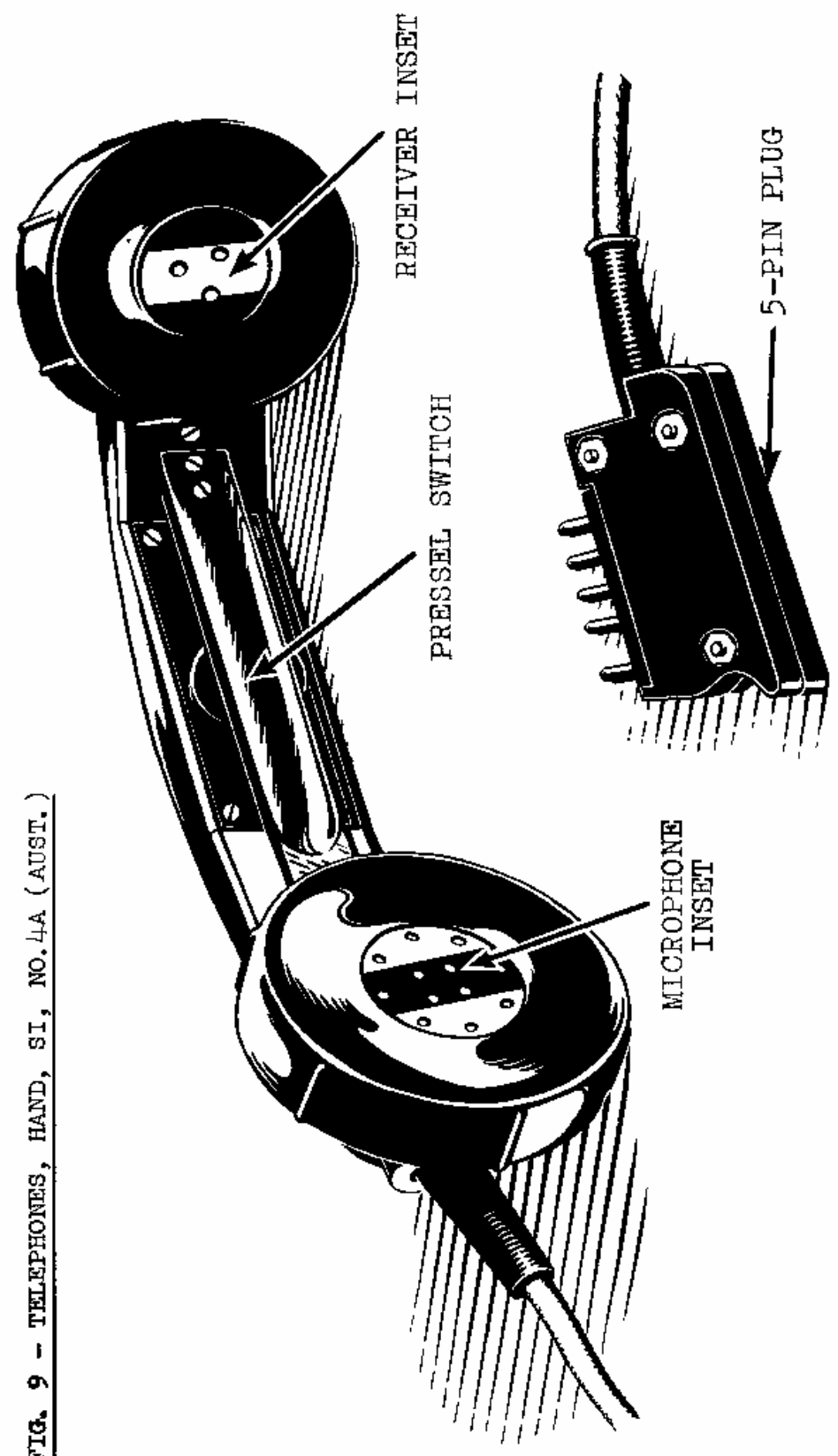
Use of steel helmets with headset assembly.

27. When wearing a steel helmet over the headset assembly, the helmet strap is placed under the wire neck band.

Telephones, hand, SI, No. 4A (Aust.).

28. This handset has been designed as small as possible, consistent with variations in the sizes of human heads. It is the standard lightweight handset,

FIG. 9 - TELEPHONES, HAND, SI, NO. 4A (AUST.)



fitted with the same electro-magnetic receiver and carbon microphone as used on the headset described above. It has a pressel switch which *must be pressed while talking on the A510 wireless set.* This switch does not affect send/receive switching, and could be held pressed continuously. The handset is fitted with the same type of miniature cord and 5-pin plug as used on the headset assembly.

WARNING

If at any time you are tempted to remove the microphone or receiver insets of the headgear assembly or telephone handset, remember that this is BAD FOR THEM! Their connecting wires are very light and easily broken. If left alone both assemblies will give good service. Should it be necessary in emergency to remove the insets for inspection, refer to Chapter Four, paras. 84-87 for guidance.

Keys, telegraph, lightweight, (Aust.), No.1.

29. This key was designed as a lightweight, sealed item for use on all field wireless sets. It has fixed adjustments of 0.013 inch travel, and

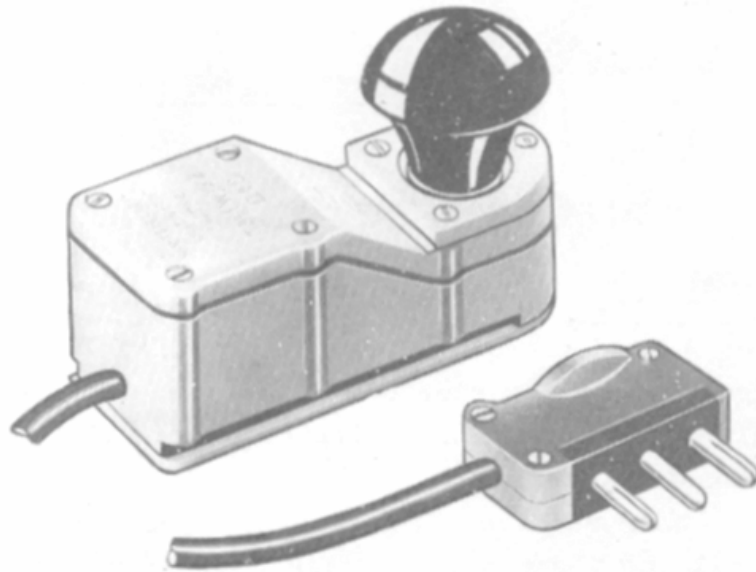


FIG.10

KEYS, TELEGRAPH, LIGHTWEIGHT, (AUST.), NO.1

10-ounce pressure.

30. It is probable that operators who have been trained on a standard key will take a little time to become accustomed to the new key. With practice, however, good working speeds will soon be attained.

31. Grooves at the base of the key, and a corresponding guideway on the side of the transmitter enable the key to be attached to the set.

Cases, spares, A510.

32. This small tin contains the crystals (Crystal units, Style DE) which are obtained from Signals, and the spare dial illumination lamps (Lamps, pilot, 1.5V, G.E.C. type 112). A small plastic pouch (Pouches, style D crystal units) is provided as additional protection for the crystal units. The pilot lamps screw into holders on one side of the tin.

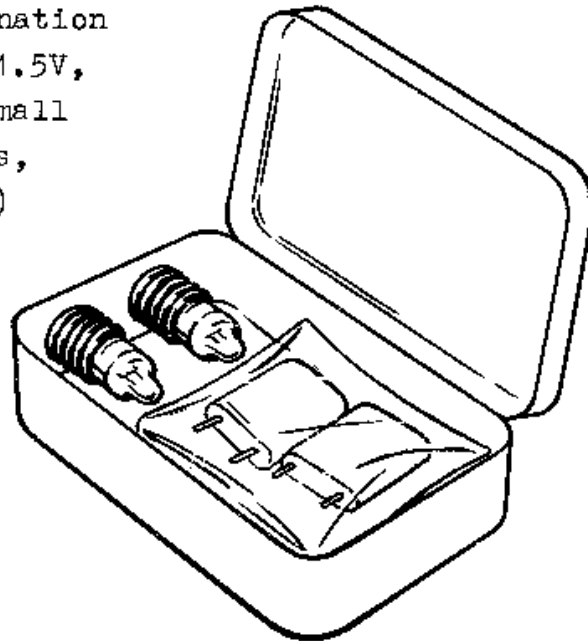


FIG. 11 - CASES, SPARES, A510

SECTION 6 - TRANSIT AND CARRYING EQUIPMENT.

Cases, transit, A510. (Fig. 12)

33. A wooden transit case is provided for transporting the complete station. It is intended for vehicular transportation of the station, not by troops on foot.

34. When received from Ordnance the case contains all the items shown in Fig. 14, except the batteries and crystal units which are issued separately.

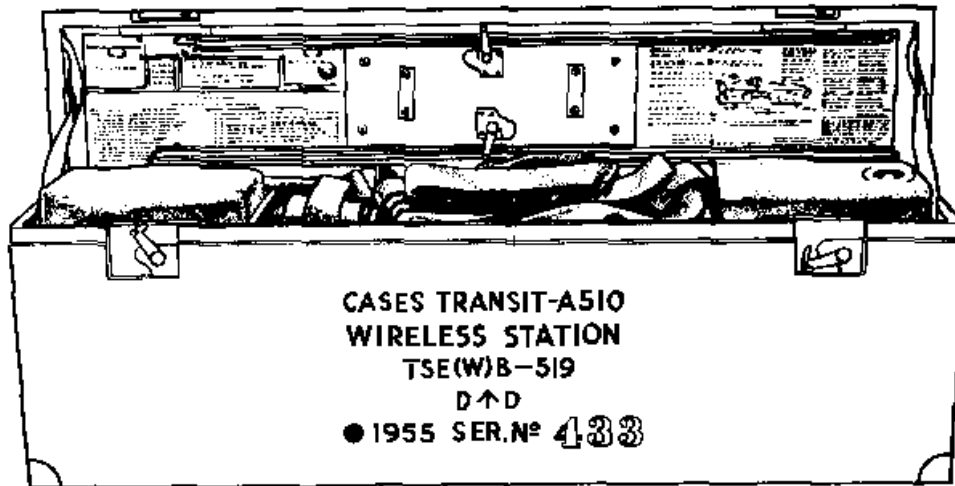


FIG. 12.

35. The inside face of the lid bears plates which show packing details and operating instructions. Webbing carrying equipment.(Fig.13)

36. The following items of webbing equipment are provided for man-carriage of the A510 set, its aeriaks and accessories :-

Cases, carrying, flexible aerial (also carries the rod tuner and the handset).

Pouches, receiver, A510.

Pouches, transmitter, A510.

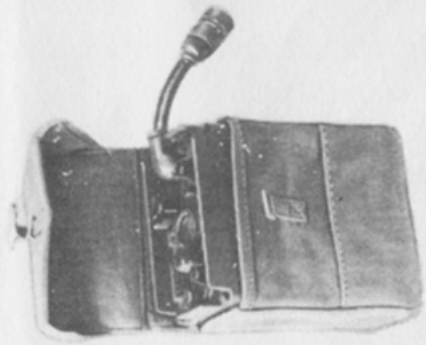
Satchels, signals, No.1, or Satchels, signals, No.1, Mk. 1/1.

37. It will not always be necessary to carry a complete station when operating on foot, but should this be required, the complete station can be accommodated in the items illustrated in Fig. 13.

SECTION 7 - WEIGHTS AND DIMENSIONS.

38. The weights and dimensions of all items comprising the complete working station are shown in Table 1. Of these, items 2, 5, and 17 are not received in the initial issue but are demanded separately. All items listed are illustrated in Fig.14.

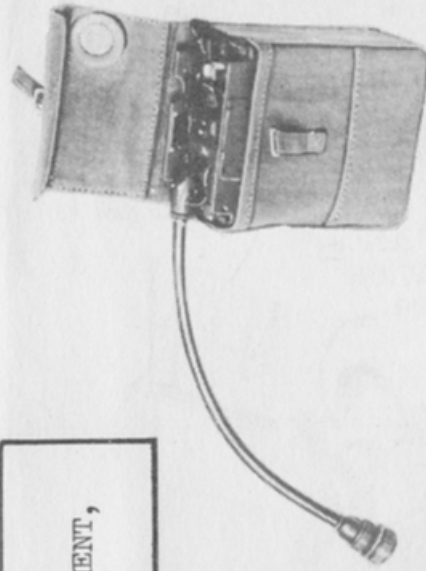
FIG. 13
WEBBING CARRYING EQUIPMENT,
WS A510.



**POUCHES, RECEIVER, A510
WITH RECEIVER.**



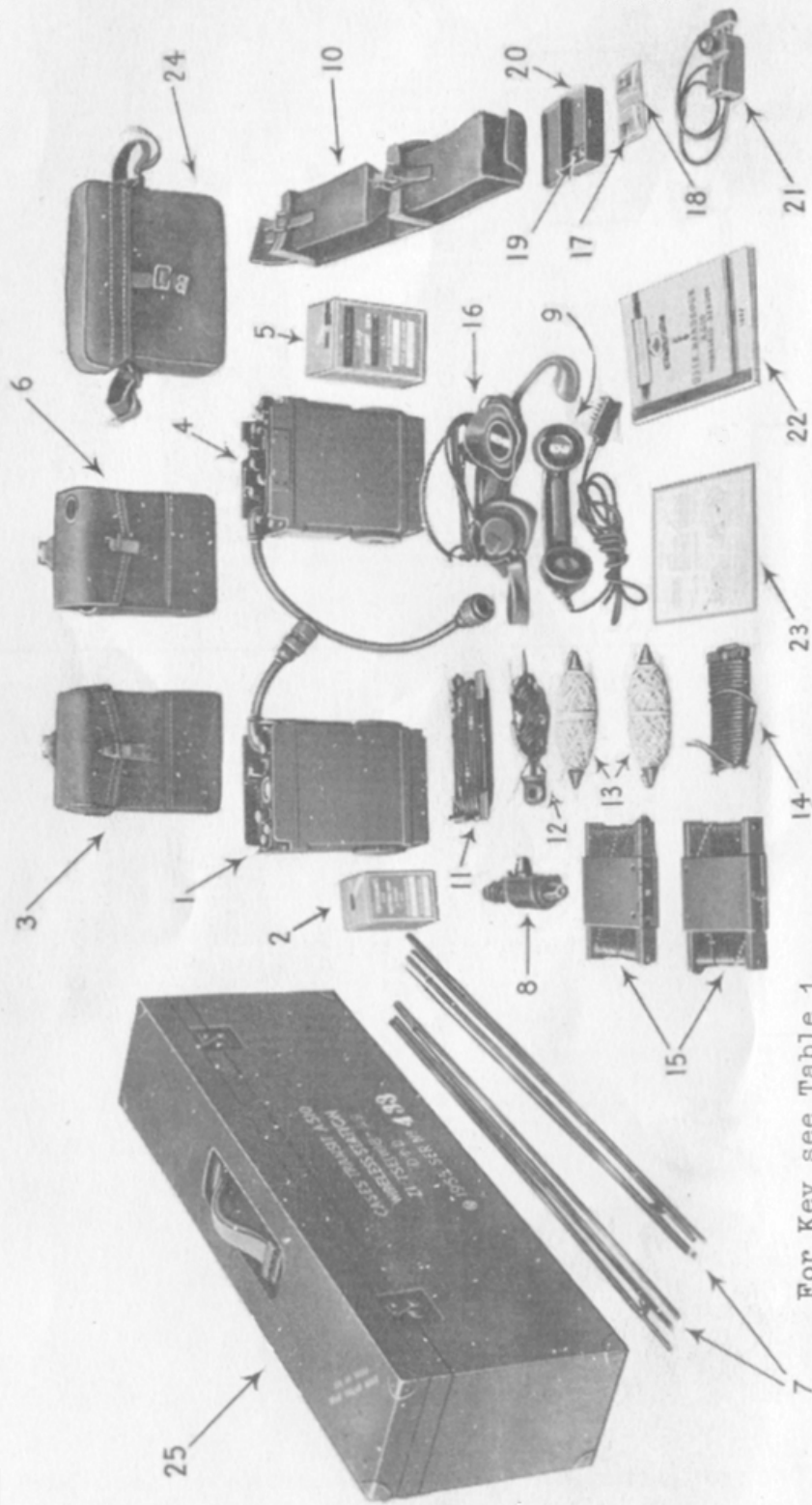
**SATCHELS, SIGNALS, NO. 1
WITH CONTENTS**



**POUCHES, TRANSMITTER, A510
WITH TRANSMITTER.**



**CASES, CARRYING, FLEXIBLE AERIAL, WITH TWO
ROD AERIALS, ROD TUNER AND HANDSET.**



For Key see Table 1.

FIG. 14 - LAY-OUT OF COMPLETE A510 STATION.

TABLE 1 - WIRELESS STATION A510 - WEIGHTS AND DIMENSIONS

Item No. (See Fig. 14)	No. per Station	Ordnance Nomenclature	Weight		Dimensions		Remarks
			lb.	oz.	Inches		
1	1	RECEIVERS, A510	7	6	8½x5½x3½		
2	1	BATTERIES, dry, L.T., 1.5-volt	1	4	4x2½x2½		Issued separately.
3	1	POUCHES, receiver, A510		15	10x7½x4		Holds items 1 and 2. Filled weight 9 lb. 9 oz.
4	1	TRANSMITTERS, A510	7	0	8½x5½x3½		
5	1	BATTERIES, dry, H.T. bias, 90/7.5-volt	2	13	5½x3½x2½		Issued separately.
6	1	POUCHES, transmitter, A510		14	10x7½x4		Holds items 4 and 5. Filled weight 10 lb. 11 oz.
7	2	AERIALS, flexible, 8-ft. (Aust.)	(each) 4		26½ (each section)		
8	1	INDUCTORS, tuning, 8-ft. flexible aerial		10	6½ long		
9	1	TELEPHONES, hand, SI, No. 4A (Aust.)		10	8½ long		With 72-in. of cord.
10	1	CASES, carrying, flexible aerial		11½	27½ long		Holds items 7, 8, 9. Filled weight 2 lb. 7½ oz.
11	1	AERIALS, end-fed, adjustable, 135-ft.		13	7½x3½ *		*Dimensions of aerial bobbin.
12	1	COUNTERPOISE ASSEMBLIES		3½	7½ *		*Length of counterpoise spika.
13	2	CORDS, aerial, weighted	(each) 7		6½ *		*Length of bobbin.
14	1	FEDERS, aerial, 70-ohms		8	5½x2½x1		
15	2	AERIALS, lightweight, 68-ft.	(each) 12		6½x4½x1*		*Dimensions of serial bobbin.
16	1	MICROPHONE AND RECEIVER HEADGEAR ASSEMBLIES, SI, lightweight		11	8½ span		With 72 inches of cord.
17	10	CRYSTAL UNITS, style D.E.			-		Issued separately.
18	1	POUCHES, style D crystal units		2½	-		Holds item 17.
19	2	LAMPS, pilot, 1.5-V., G. E. C. type 112					
20	1	CASES, spares, A510					
21	1	KEYS, telegraph, lightweight, (Aust.), No. 1		5	3½x2½x1½		Holds items 17, 18, 19.
22	1	USER HANDBOOK, A510 wireless station			2½x1½x1		
23	1	CHARTS, instruction, A510		4	8½x5½		Early stations issued with "PROVISIONAL NOTES".
24	1	SATCHELS, signals No. 1, or No. 1 Mk. 1/1		1½	6½x5½		
25	1	CASES, transit, A510		4	11x9x3		Holds items 11 to 23.
			15	14	30½x11x6½		When received from Ordnance contains all items except 2, 5, and 17. Filled weight=41 lb. 5 oz.

CHAPTER TWO

AERIALS AND COMMUNICATION DETAILS

SECTION 8 – GENERAL.

Definitions.

39. The two methods of communication used, "Ground Wave" and "Sky Wave", are defined below :-

- (a) Ground Wave communication means the transmission of radio energy along the earth's surface. It is more reliable than Sky Wave communication but can only be used over short distances, and is useless in dense scrub and jungle.
- (b) Sky Wave communication is used for long distance communication, and is the only practical method when working in dense scrub or jungle. In this method, radio energy, transmitted skywards, is reflected earthwards by a "ceiling" called the ionosphere. The height of this "ceiling" is changing continually, and this is one of the causes of signals fading in strength, a common fault in sky wave communication.

Ground wave communication with WS A510.

40. Despite the low output of the A510 wireless set, the following communication distances are typical of those that can be achieved under average conditions, when using ground waves :-

	<u>"VOICE"</u> Miles	<u>"CW"</u> Miles
(a) Rod aerial to rod aerial -		
Sets on men	2	4
Sets on ground	3	6
(b) Wire aerial to wire aerial		
	5	10

41. In order to achieve these distances, it is necessary to observe carefully the instructions which follow. Where conditions are below average, (poor

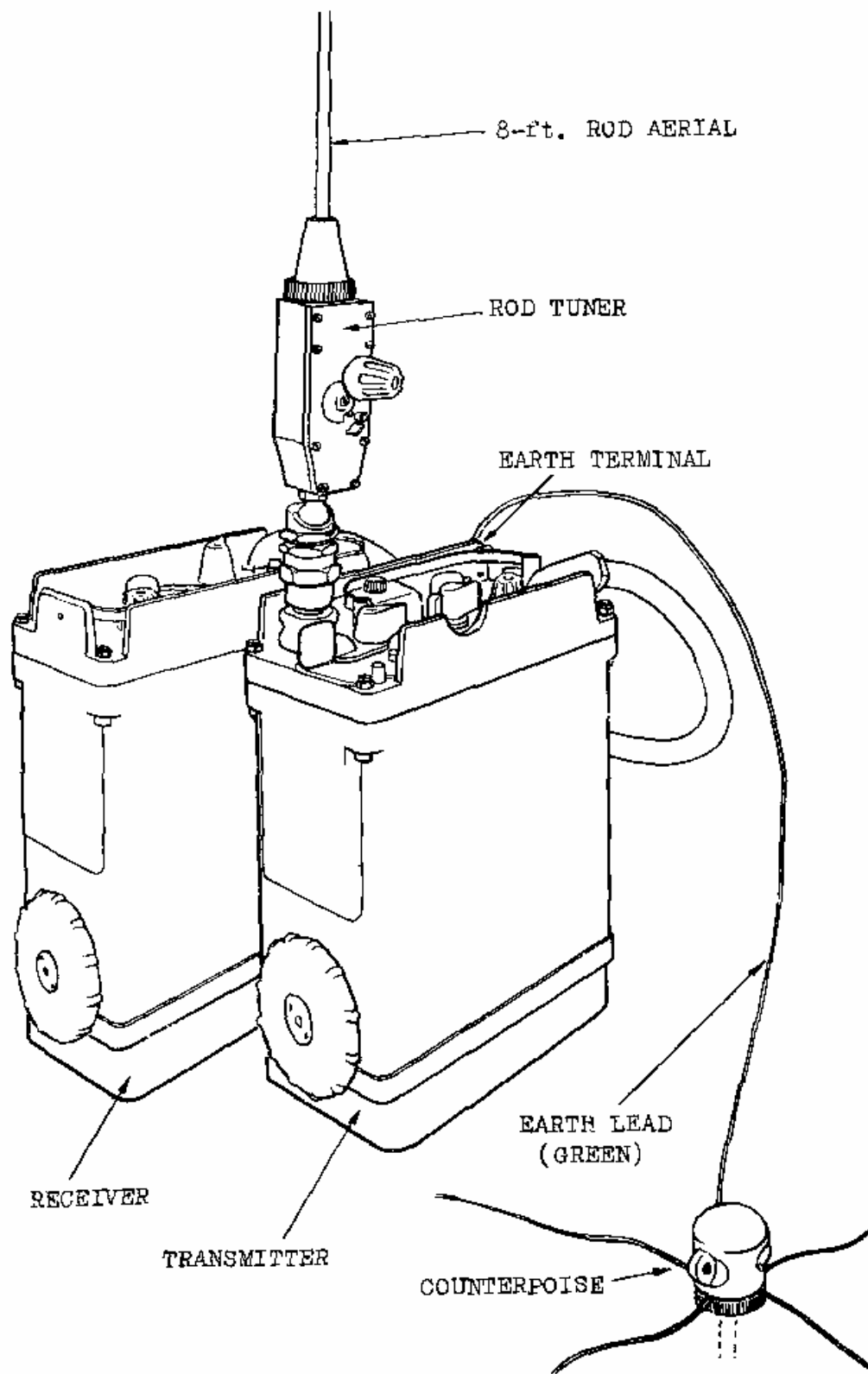


FIG. 15 - ROD AERIAL GROUND STATION

siting or terrain, unsuitable frequency, etc.), further measures are suggested to assist operators to obtain better results. If these measures are taken under good conditions, distances in excess of those shown may be achieved. (Communication up to 7 miles has been made with rod to rod, and with sets on the ground.)

Sky wave communication with WS A510.

42. It is not possible to predict accurately the ranges obtainable when using sky wave communication as these will vary with locality, time of day and year, weather conditions, etc. However, if the aerials are set up correctly, and correct frequencies are chosen, it should generally be possible to achieve 40 miles communication on "VOICE", and about 120 miles on "CW".

It cannot be too strongly emphasised that the use of local frequency prediction charts is necessary to get the best possible sky wave communication from your A510.

43. When using sky wave communication the area above the aerial should be clear. Improvement can often be effected by adjusting the height of the aerial, particularly the horizontal dipole aerial. Generally speaking, such an aerial 30 feet above earth will provide satisfactory operation for ranges up to 30 miles. When necessary, increase in aerial height will usually improve transmission and reception, and the rule here is "the lower the frequency, the higher the aerial". The best height of aerial is roughly equivalent to the length of wire unwound from one aerial bobbin for a given frequency (maximum 68 feet), but this is an ideal which will not often be possible in jungle conditions.

In emergencies, when orthodox methods have failed to improve sky wave reception, lower-

ing of the aerial to approximately 2 ft. above the earth may often make signals heard more clearly above background noise. Changing direction of aerial may also improve conditions.

SECTION 9 — THE ROD AERIAL.

(2-10 Mc/s)

General.

44. This aerial [Aerials, flexible, 8-ft. (Aust.)] is by far the easiest to set up. A trained operator can assemble a rod aerial station in less than 2 minutes, and have it "on the air" in a further 2 minutes. However, its use limits the operator to ground wave operation, and it is therefore only suitable for short distance communication. The WS A510 and its rod aerial can be used in any of the following roles :-

		<u>Expected range in miles</u>	
		<u>VOICE</u>	<u>CW</u>
(a) Set on man	..	2	4
(b) Set in mobile vehicle		2	4
(c) Set on ground, and using counterpoise	..	3	6

45. The rod aerial has a nylon cord running through its four mating sections. Near one end (the thickest end of the rod) the cord has a button affixed to it. At the opposite end is a small ferrule. The cord is primarily intended to prevent loss of the rod sections, *NOT* for their complete assembly, except in certain circumstances when conditions are more difficult; at night, for example. The Rod Tuner (Inductors, tuning, 8-ft. flexible aerial).

46. The rod tuner is part of the aerial system of the rod aerial station, and is, in effect, a variable inductance designed to tune the rod aerial. It is attached to the transmitter unit by a bayonet plug and socket, and above that, a ball and socket joint enables movement of the aerial to the position required by the operator. Above the ball and socket

joint is a tuning knob which controls the variable inductance. A small indicator, which revolves when the tuning knob is turned, gives *APPROXIMATE* indication of tuning only; *correct tuning of the rod aerial is achieved by watching the aerial tuning meter on the transmitter unit.* (See Drill in FIG.30.) A locking switch is provided to lock the tuning knob when the correct position has been found. The other end of the rod tuner is prepared to take the bottom section of the rod aerial.

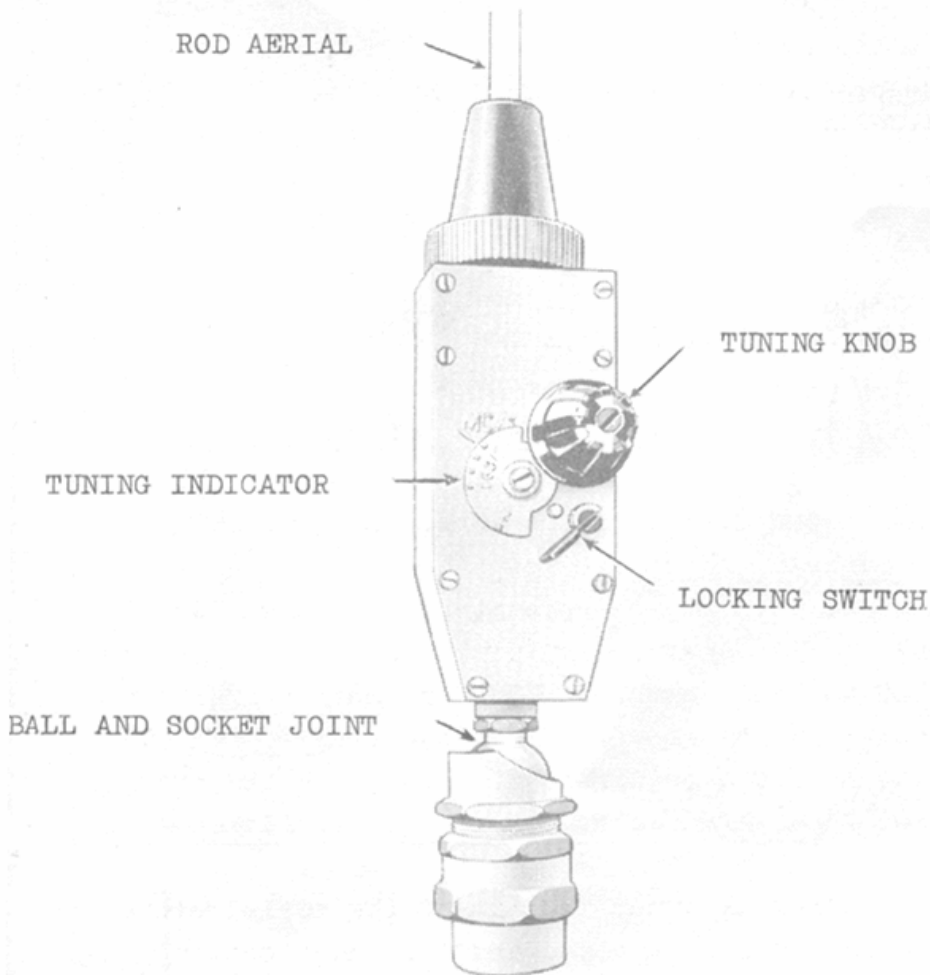
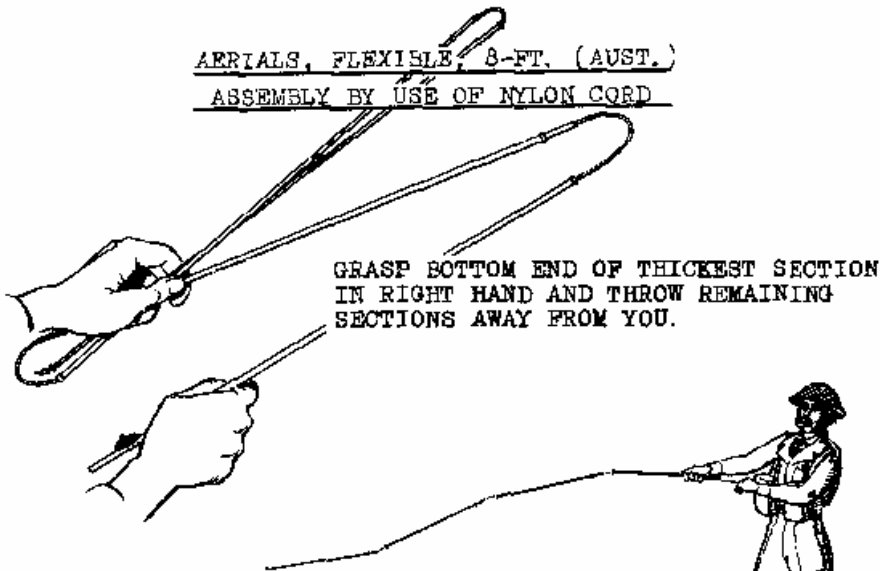


FIG.16 - THE ROD TUNER
(Inductors, tuning, 8-ft. flexible aerial)

AERIALS, FLEXIBLE, 8-FT. (AUST.)
ASSEMBLY BY USE OF NYLON CORD



SECTIONS WILL THUS BE GUIDED
TOGETHER AND PARTIALLY MATED.

COMPLETE MATING OF SECTIONS BY HAND,



ROD AERIAL SHOULD THEN BE INSERTED IN ROD TUNER
ON TRANSMITTER UNIT.

FIG. 17

NOTE

The rod aerial can be accurately tuned when receiving by listening to atmospheric noise, and tuning the rod tuner for maximum noise. The tuning position so obtained will normally be the same as that given by watching the aerial tuning meter for maximum deflection. This alternative method should be used when it is not possible to establish communication by the normal method.

Assembling the rod aerial.

47. In daylight conditions the sections should be joined together by hand, and then fitted to the rod tuner.

48. Should it be necessary to assemble the rod aerial during night time, the operator should proceed as shown in Fig.17. With a little practice this operation can be performed in a few seconds. As operators become more proficient, the possibility of damage to the nylon cord will decrease.

Use this method as little as possible as it reduces the life of the aerial sections as well as the nylon cord. It is almost as quick to join the sections together by hand.

Precautions to be observed when using the rod aerial.

49. (a) Set on man. Do not tune near trees. If you must it may be better to re-tune the rod tuner when receiving from the distant station, or tune carefully for maximum atmospheric noise.

(b) Set in vehicle. Before tuning, connect a wire from the earth terminal on the transmitter to the frame of the vehicle. Keep the aerial away from metallic objects as far as possible. If communication is

unsatisfactory, try turning the vehicle through a circle, testing at different vehicle directions for an improvement.

- (c) Set on ground. Both in tuning and operating, try to keep arms and body as far as possible from the aerial. In particular, try to keep your body away from the rod tuner. If possible use the counterpoise spike with the counterpoise wires spread out. Connect the green counterpoise wire to the transmitter earth terminal.

To increase range of the rod aerial station.

50. The following hints will help to increase the range of the rod aerial station :-

- (a) If operating below 4 Mc/s. Increase frequency if possible.
- (b) If operating below 7 Mc/s. Attach a 16-ft. length of wire (any wire) to the top section

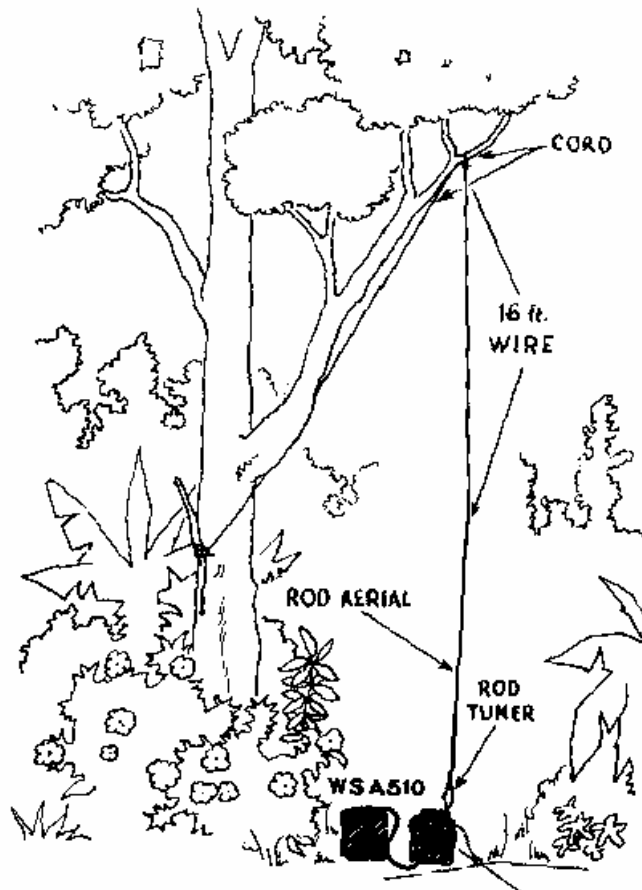


FIG. 18 - EXTENSION OF ROD AERIAL

of the rod aerial, and suspend the other end from a tree of suitable height, as shown in Fig. 18.

*KEEP THE AERIAL WIRE
AS FAR AS POSSIBLE FROM
THE TREE.*

Then re-tune the rod tuner. This method of improvisation should increase the range by approximately 100 per cent.

- (c) If operating above 7 Mc/s. Remove the rod aerial and rod tuner from the transmitter unit, and suspend a 24-ft. length of any available wire from a convenient tree. Attach the free end direct to the aerial terminal. In this method, aerial tuning is performed by turning the frequency control knob on the transmitter.

- (d) Use the counterpoise whenever possible.

51. Further increases in range can only be obtained by correct use of the end-fed and dipole aeriels described in Sections 10 and 11.

SECTION 10 — THE END-FED AERIAL AND ACCESSORIES.

(2-10 Mc/s)

General.

52. The end-fed aerial (Aerials, end-fed, adjustable, 135-ft.) is simpler to erect than the dipole aerial. It is depicted in the accompanying illustrations, and on the bobbin insulator. The bobbin also displays a chart which indicates the number of links of the aerial to be used for each frequency. The frequency ranges mentioned (A and B) correspond to the A and B positions of the A-B-Net switch on the transmitter unit.

53. The aerial consists of eight different lengths of wire. The first terminates at the open end in an insulator, and at the other in the "eye"

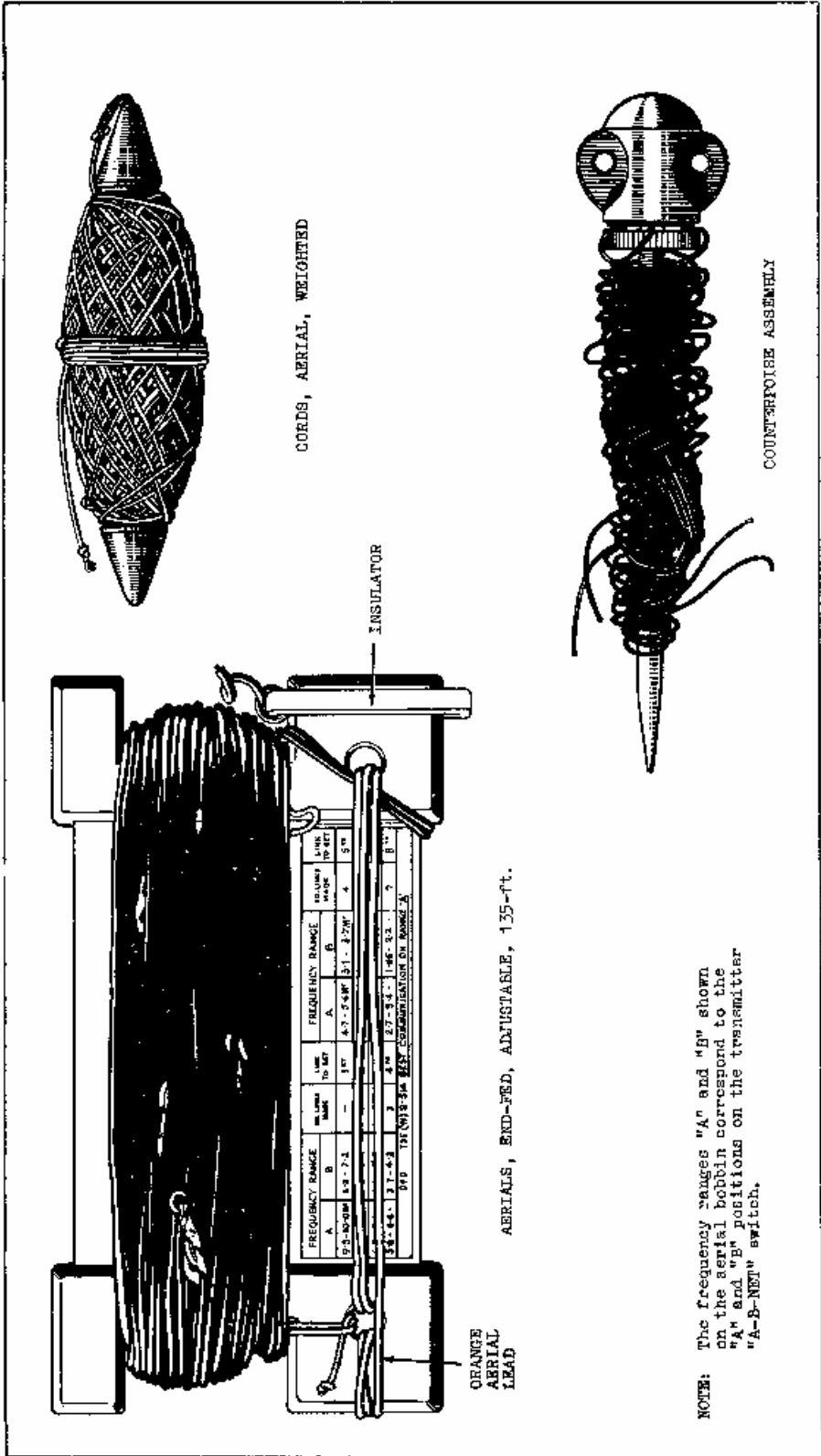


FIG. 19 -- END-FED AERIAL COMPONENTS

half of a link assembly.

54. The next length starts with the "hook" half of the link assembly, and terminates in the "eye" half, as do all the remaining lengths. Each link is numbered on the linkage components in the order of erection, and as shown on the bobbin chart.

NOTE

Aerials may be encountered in which the links are not numbered. These are earlier models which will gradually be replaced.

55. For safe keeping, each length of aerial is joined to the next by a few inches of nylon cord. Fig. 20 shows the make-up of this aerial assembly.

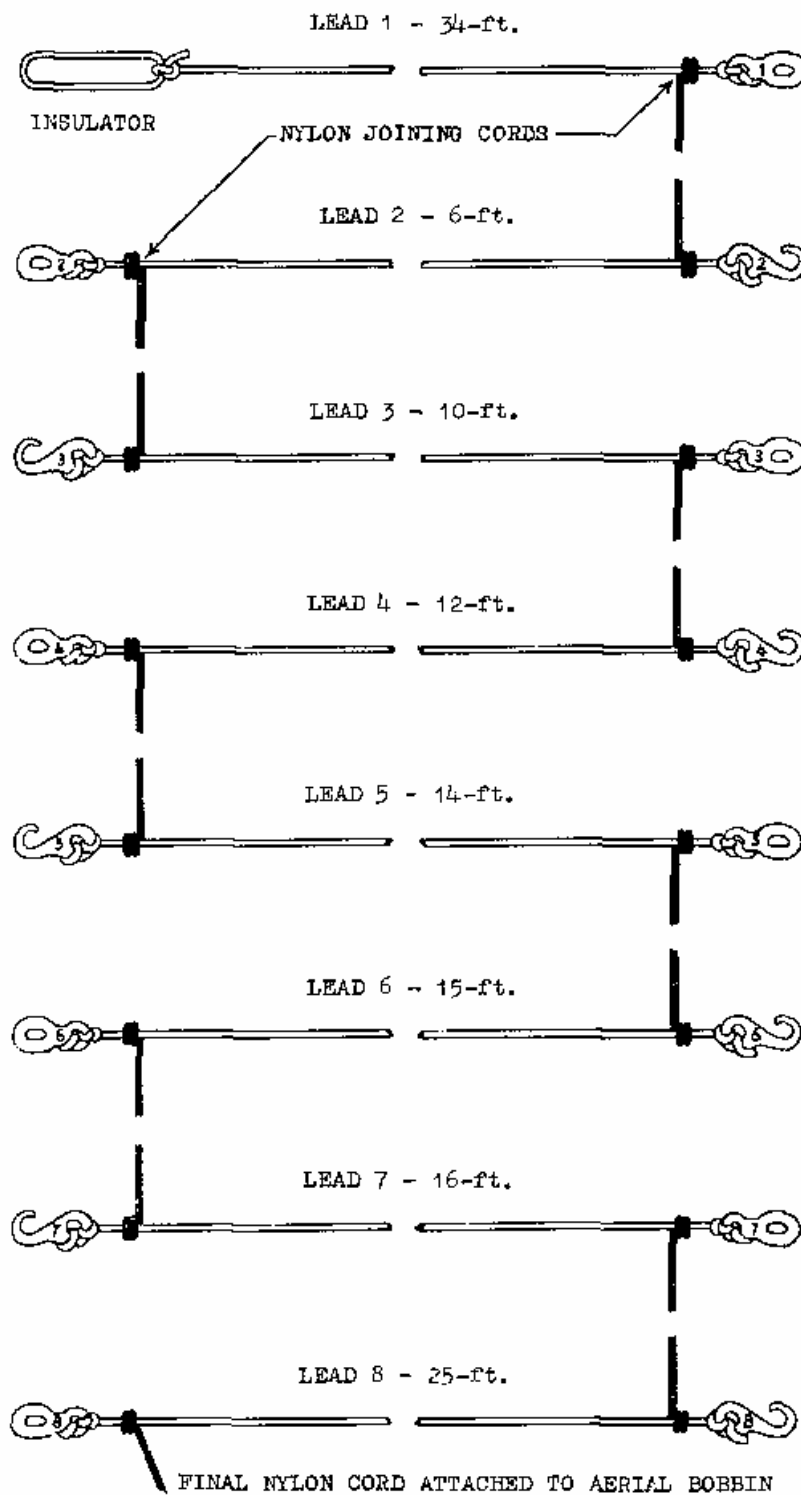
IMPORTANT

Each link of the aerial is different in length from the others, (See Fig. 20 for link lengths), and the frequencies obtained depend on the links used. The links are wound on the bobbin in the reverse order to that shown in the chart. It follows that great care must be taken to preserve this order, and to avoid damage or loss of any of the links. It is advisable to examine the aerial frequently, and to ensure that the nylon joining cords are securely fastened to the linkage components, and that all links are present.

56. Also attached to the aerial bobbin is an orange lead-in wire for connection to the final link of the aerial and the transmitter unit.

57. The following figures give an indication of the ranges that can be expected with the end-fed aerial :-

<u>Ground Wave</u>		<u>Sky Wave</u>	
VOICE	CW	VOICE	CW
6	12	25	75



LAST EYE IN USE IS JOINED TO HOOK ON 3-ft. ORANGE AERIAL LEAD TO SET

FIG. 20 - COMPOSITION OF END-FED AERIAL

REMEMBER

A horizontal or inclined aerial must be used to receive and transmit sky wave signals satisfactorily.

Erection of the end-fed aerial.

58. (a) Locate a suitable tree.
- (b) Unwind the aerial cord, and, holding the free end, throw the bobbin over the highest possible branch.
- (c) Connect the free end of the cord to the insulator on the aerial.
- (d) Unwind as much of the aerial as required in the direction approximately at right angles to the line of the distant station.
- (e) Haul on the aerial cord to raise the aerial to the required height. Make fast the cord to the tree.

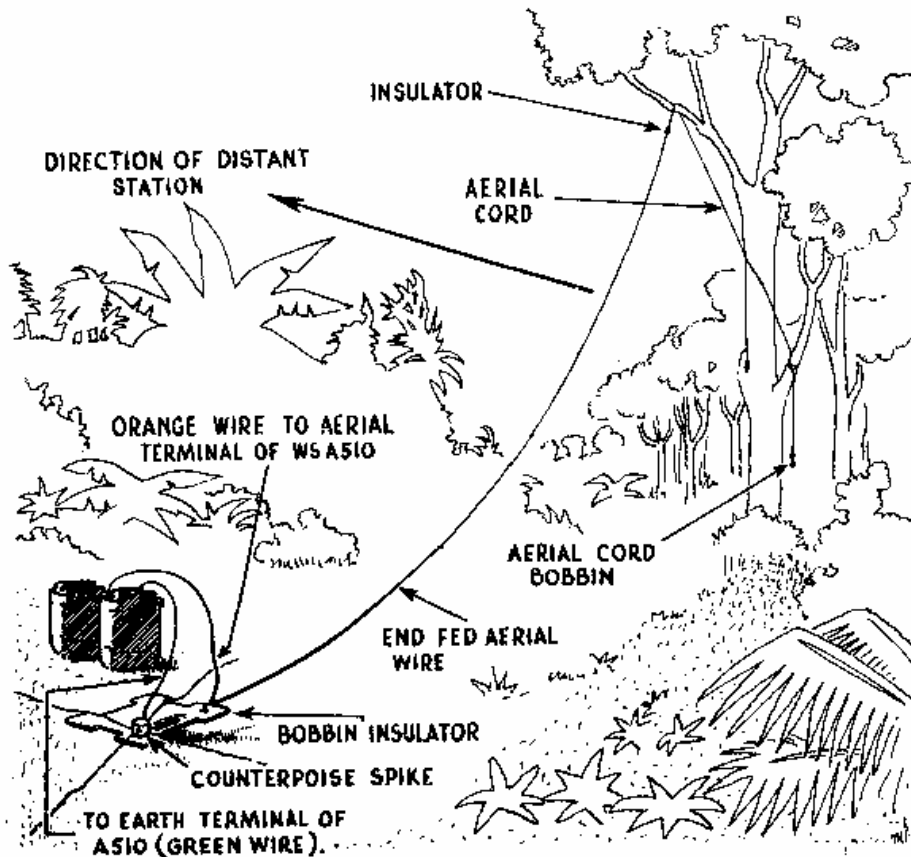


FIG. 21 - END-FED AERIAL ERECTED

NOTE

The maximum breaking strain of the cord is 55-64 lb. The minimum breaking strain of the aerial wire is 64 lb. This is purposely arranged to avoid breaking the aerial when undue strain is exerted in hoisting it. NEITHER THE AERIAL WIRE NOR THE CORD WILL BEAR THE WEIGHT OF A MAN, HOWEVER SMALL - SO DON'T TRY TO SWING ON THEM!

- (f) Attach the last link of the selected aerial to one end of the orange lead on the aerial bobbin, and the other end of the orange lead to the aerial terminal on the transmitter. *KEEP THE ORANGE LEAD OFF THE GROUND.*
- (g) Drive the counterpoise spike through one hole in the aerial bobbin into the earth in such a position that the aerial is kept off the ground as much as possible.
- (h) Spread out the four black wires of the counterpoise at 90 degree intervals, i.e., in roughly the shape of a cross. Then attach the green lead of the counterpoise to the earth terminal on the transmitter.

NOTE

1. *The "A" condition should be used whenever possible.*
2. *It is important to use the counterpoise when working with an end-fed aerial in the "A" or the "B" condition but is more particularly so in the "B" condition.*
3. *For ground wave operation, the nearer the aerial is to the vertical, the better.*

SECTION 11 — THE DIPOLE AERIAL AND ACCESSORIES.

(3.3-10 Mc/s)

General.

59. The dipole aerial, consisting of two "Aerials, lightweight, 68-ft.", is more efficient than the end-fed aerial for sky wave operation, but has little, if any, advantage for ground wave operation. Transmission frequency with this aerial is from 3.3 to 10 Mc/s.

60. The aerial and its accessories (except "Cords, aerial, weighted", which are already depicted in Fig. 19) are shown in Fig. 22.

61. Information regarding the lengths of aerial to be used for given frequencies is contained in a chart on the inside of one flap of the dipole aerial holder. The other flap depicts a method of erecting a horizontal dipole aerial.

62. The preferred arrangement for sky wave communication is to have the dipole strung between two masts, thus keeping the wire horizontal. (See Fig. 23). Trees may be used when masts are not available, but it is important to keep the aerial clear of foliage.

63. The inclined dipole (Fig. 25) is less efficient, and more prone to produce misleading tuning indications. Despite this, it is still slightly more efficient than the end-fed aerial for sky wave working.

64. The following ranges in miles can be expected with each arrangement of the dipole aerial :-

	<u>Ground Wave</u>		<u>Sky Wave</u>	
	VOICE	CW	VOICE	CW
Inclined dipole ..	6	12	30	90
Horizontal dipole ..	4	8	40	120

*THE BEST SKY WAVE RESULTS WILL
BE OBTAINED WHEN A HORIZONTAL
AERIAL IS USED AT THE NEAR AND
THE DISTANT STATION.*

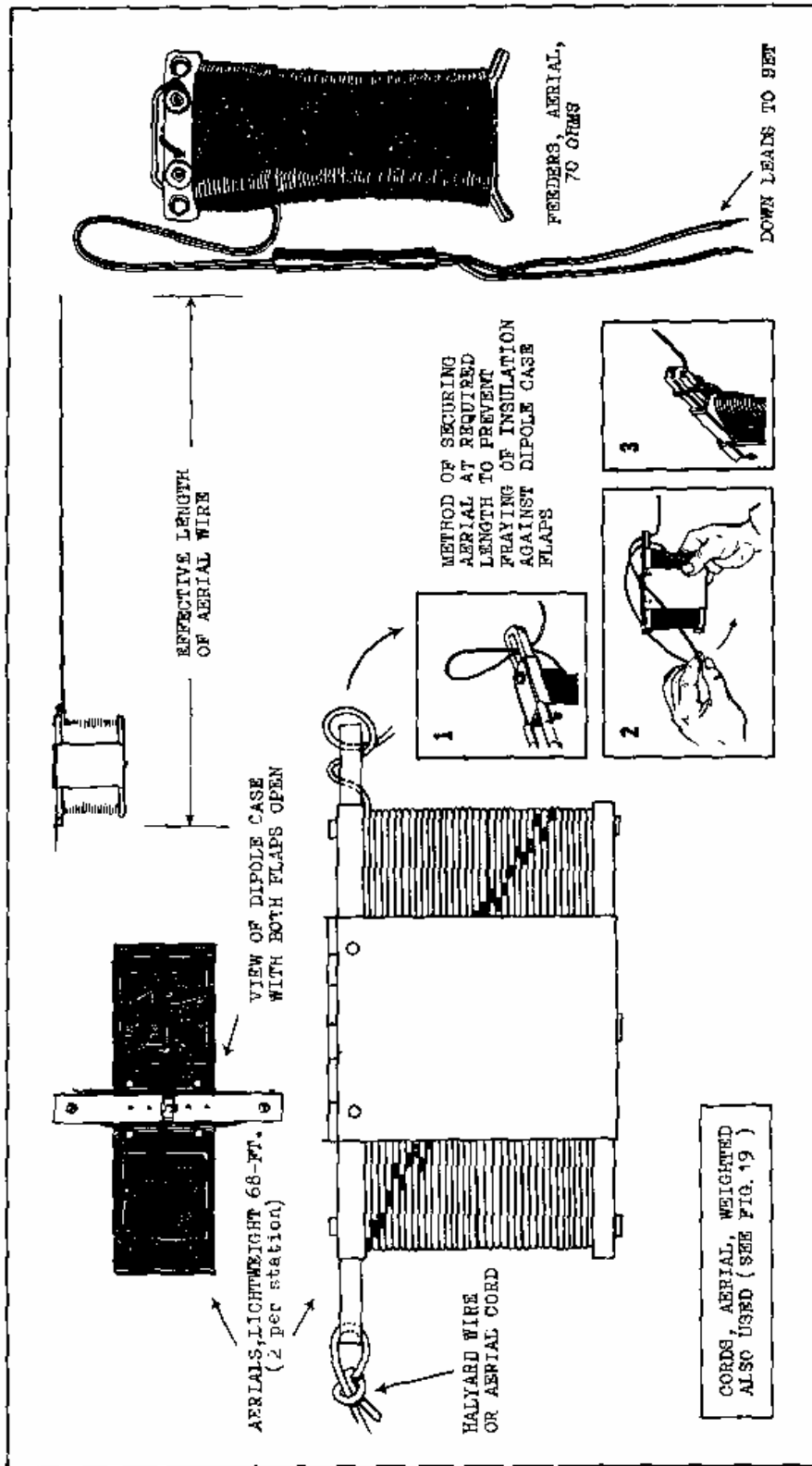


FIG. 22 - DIPOLE AERIAL COMPONENTS

Erection of dipole aeriaks.

65. (a) Select the aerial site, remembering that the aerial should preferably be broadside, i.e., at right angles, to the line of communication.
- (b) Set up masts, or locate suitable trees, which should be approximately 140 feet apart, to allow for changes of frequency which will necessitate changes of aerial length.
- (c) Unwind both spools until you have unwound on each a length of wire corresponding to the desired frequency. (A chart showing the correct lengths will be found on the inside of the dipole case flap.) Lay the wire along the ground approximately beneath the intended aerial position.

NOTE

- 1 : *The red marker beads on the aerial wire are at one foot intervals to enable the unwinding of correct lengths.*
 - 2 : *The aerial wire must be unwound to the EXACT length shown, otherwise the tuning indicator will not be a reliable guide.*
 - 3 : *The length of each dipole case should be included in the effective length of aerial. (See Fig. 22).*
- (d) If setting up between trees, unwind the aerial cord, and, using the bobbin as a throwing device, throw it over the highest possible branch of the lower tree. Attach the cord to the dipole case as shown in Fig. 22. Then move to the other tree, and select a branch on about the same level as that of the lower tree. (This is to ensure that the aerial is as near the horizontal as possible.) Repeat the drill with the other bobbin.

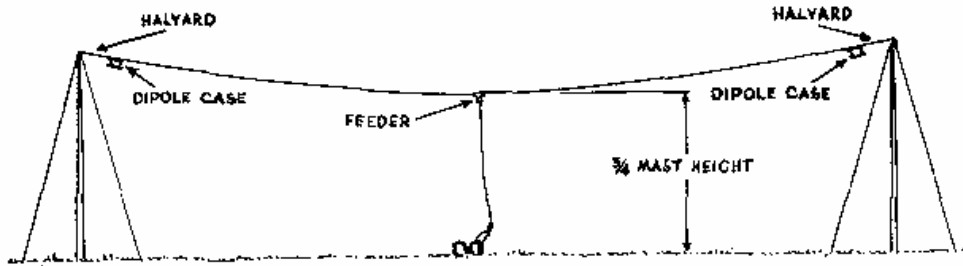


FIG. 23 - DIPOLE AERIAL SET UP BETWEEN MASTS

- (e) If setting up between masts, attach the halyards to the dipole cases as shown in Figs. 22 and 23.
- (f) Attach the ends of the aerial wires to the feeder terminals as shown in Fig. 24.
- (g) Hoist the aeriels by means of the aerial cords or the halyards.

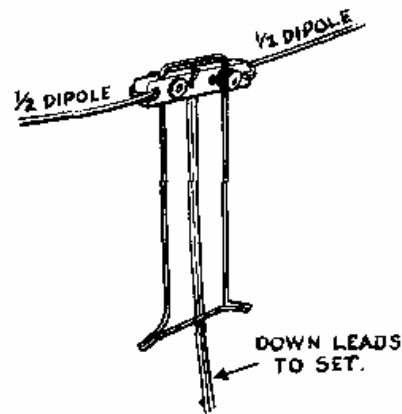


FIG. 24 - DIPOLE FEEDER ARRANGEMENT

NOTE

- 1 : In the mast set-up do not hoist the feeder point higher than $\frac{3}{4}$ height of the supporting points of the aerial. The aerial is lightweight, and has a maximum breaking strain of 64 lb. Too much tension on the halyard, which is more robust than the aerial, will result in a broken aerial wire.
- 2 : In the tree set-up the aerial cord is weaker than the aerial wire but the warning still holds good, except that too much tension will break the aerial cord.

- (h) Press down the spring-loaded button in the aerial terminal on the transmitter unit, and insert one side of the dipole feeder wire. The other side of the dipole feeder wire should be inserted into the earthing hole near the aerial tuning meter of the transmitter unit.

The counterpoise is not used with the horizontal dipole.

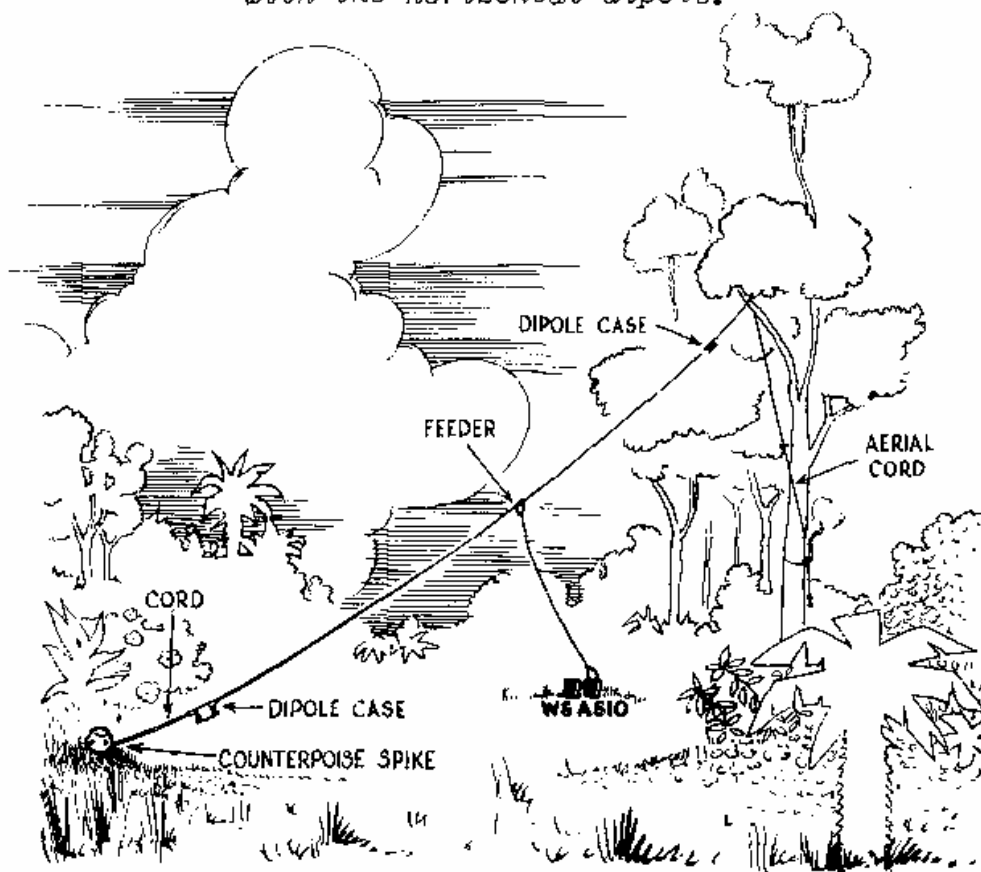
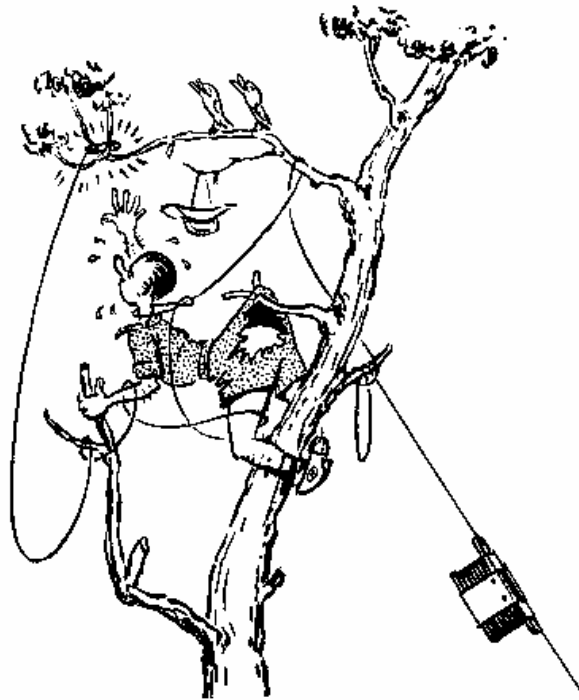


FIG. 25 - INCLINED DIPOLE ERECTED

- (j) If setting up an inclined aerial, make sure that the dipole case at the lower end is not making contact with the ground. Use the counterpoise spike to secure the lower end by attaching a cord from it to the dipole case as shown in Fig. 25 but do NOT spread out counterpoise wires.

When closing down the station and winding the aerial wires back on their spools, be sure to wind the wires *SIDE BY SIDE*. *THIS IS MOST IMPORTANT.*



When dismantling station, lower the aerial, disconnect the cord, then pull the cord from the bobbin end. — — — —
DON'T ATTEMPT TO THROW THE BOBBIN BACK OVER THE TREE AS THIS OPERATOR DID!

CHAPTER THREE — OPERATION

SECTION 12 — PRELIMINARY.

Action on receipt of station.

66. When a station is received, it should be checked to make certain that it contains all the items shown in Complete Equipment Schedule No.1636.

Report any deficiencies at once.

67. The equipment should function properly as soon as it has been correctly set up. If it does not respond to the operating instructions laid down in this chapter, the fact should be reported at once, so that action to repair or replace it may be taken without losing time.

Crystals.

68. Lift the transmitter carrying handle and unscrew the crystal cover. Plug crystals of the required frequencies into the sockets in the transmitter unit. In the spaces provided on the crystal

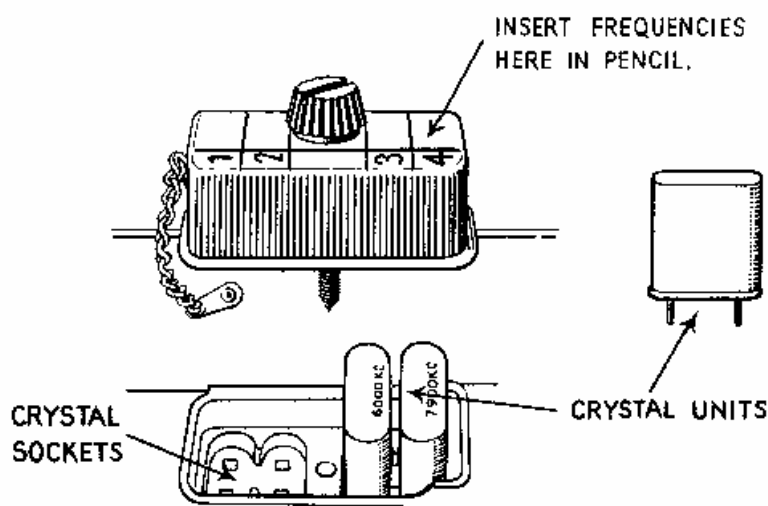
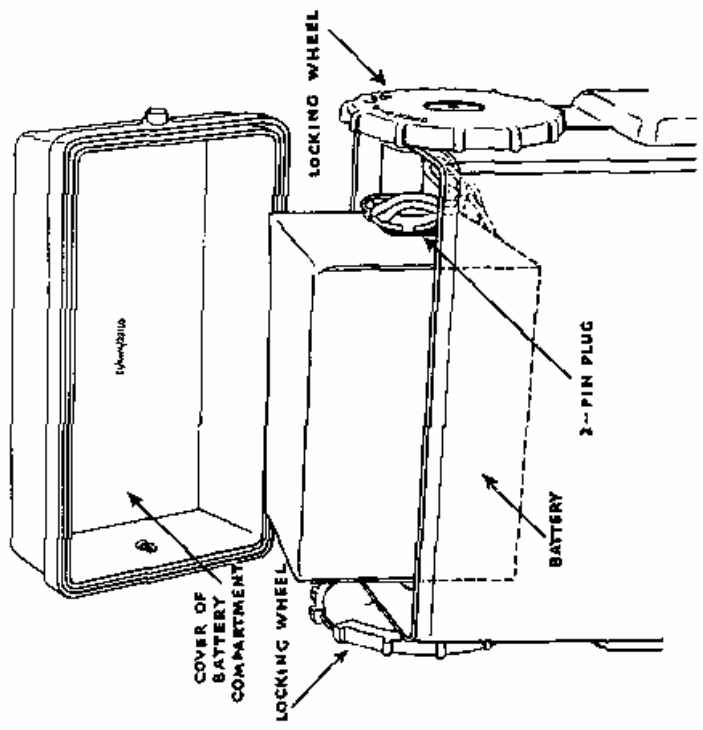
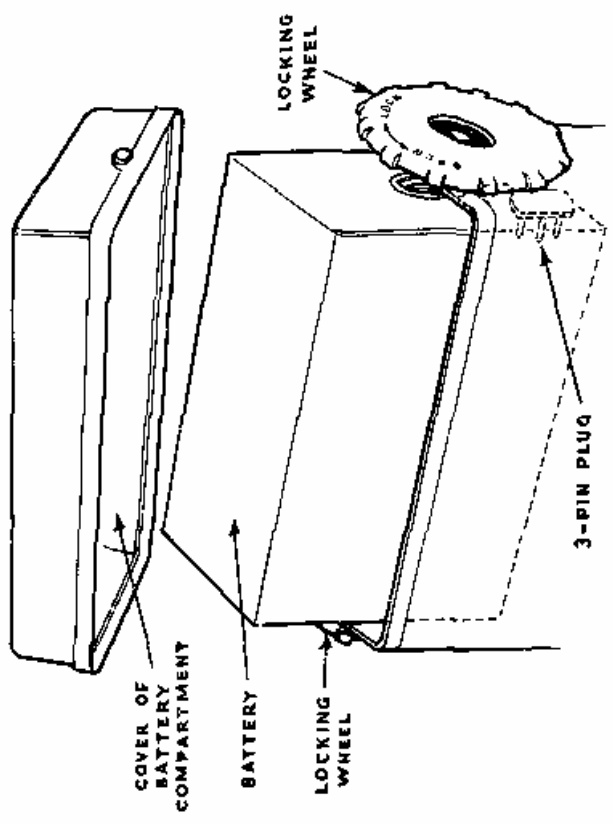


FIG. 26 - CRYSTAL UNITS AND COVER

cover, mark up in pencil the frequencies of the crystals inserted in sockets 1, 2, 3, and 4. (These frequencies are stamped on the crystal cases, usually



LT BATTERY FITTED IN RECEIVER



HT BATTERY FITTED IN TRANSMITTER

FIG. 27 - FITTING OF BATTERIES

in kilocycles, e.g., 7490. It is possible that they may be marked in megacycles, e.g., 7.490). Replace the cover, ensuring correct seating, and screw down firmly.

Fitting batteries. (See Fig.27)

69. Turn the set units over and rotate the locking wheels in the direction indicated thereon to unlock the battery compartments. Remove the covers. Connect the batteries to the set by means of the plugs provided, and fit the batteries firmly into the compartments - LT (the smaller battery) in receiver, HT bias in transmitter. Replace the covers and lock the compartments.

Testing batteries. (See Fig. 28)

70. Screw the transmitter and receiver inter-connecting plug and socket (1) firmly together. Set A-B-NET switch (2) to "NET".

LT battery : Set function switch (3) to "CW". The aerial tuning meter (4) in the transmitter should read within the red band on the "AER. TUNE" scale.

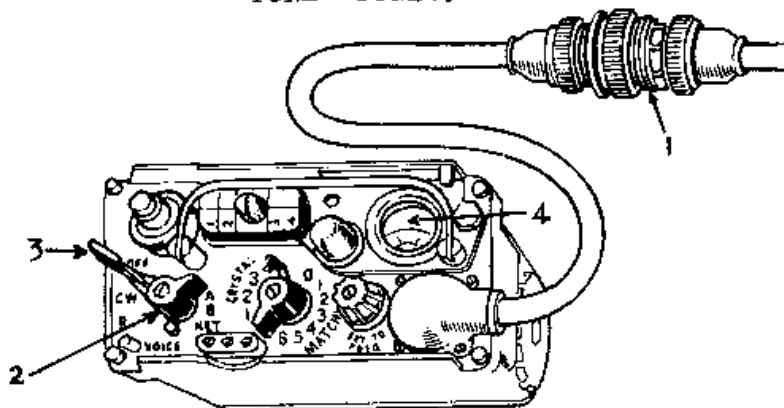


FIG.28 - TESTING BATTERIES

HT battery : Hold function switch (3) on "VOICE". The aerial tuning meter (4) in the transmitter should read within the red band on the "AER. TUNE" scale.

Switch off by setting function switch (3) to "OFF".

SECTION 13 — SETTING UP STATION.

71. Turn to Figs. 30, 31, and 32 which illustrate the method of setting up the rod aerial, end-fed aerial, and dipole aerial stations respectively. The procedure is common to all stations. It does not include details of aerial erection which are fully described in Chapter Two, and are necessary preliminaries to the setting up procedure.

SECTION 14 — NETTING.

72. It does not matter how good the wireless set you are using may be, you will not have good signals on a group of stations unless they are all accurately tuned to the same ordered frequency. This is called "NETTING", a very important operation *which must be thoroughly understood by all operators.*

73. With the WS A510, netting is obtained independently of other stations by tuning the receiver to zero beat against its own transmitter crystal. When the transmitter has been tuned to a given frequency, a whistle will be heard in the earphones if the receiver is netted to the same frequency. This whistle must be brought to "Silent Point" or

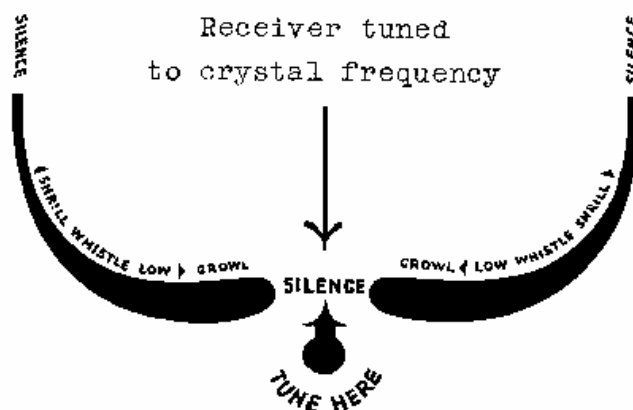


FIG. 29 - FINDING THE SILENT POINT

"Zero Beat" so that signals from the distant station can be heard when the function switch is turned to "R". "Silent Point" (or "Zero Beat") is depicted in Fig. 29, and the sequence of tuning and netting operations is shown in Figs. 30, 31 and 32 for rod aerial, end-fed aerial, and dipole aerial stations respectively.

IMPORTANT

Check netting at frequent intervals as various conditions such as the heat of the day or state of your batteries can cause the frequency to vary slightly, enough to put you off net. A check at intervals of approximately 15 minutes is recommended.

"Ghost" signals.

74. The A510 wireless set is known to produce "ghost" signals. These are spurious signals, that is, echoes of the true signal.

75. It is important to be able to recognize ghosts when you encounter them because *if you net to a ghost you will not receive the distant station.* The ghosts are **not** so strong as the genuine signal, and usually have background noise, whereas the true signal has none.

76. With new batteries such ghosts will only be heard at twice the operating frequency.

Example : Your operating frequency is 2020 Kc/s. Your ghost will be heard on 4040 Kc/s on the low (blue) band.



77. When your batteries have been in use for some hours you will hear a weak ghost at approximately 2050 Kc/s, and other weak ghosts throughout the band.

Learn the characteristics of your set, and "lay" the ghosts by ascertaining at what positions on the receiver dial the ghosts of each crystal may be found.

SECTION 15 — OPERATING INSTRUCTIONS.

78. The methods of tuning and operating the rod aerial, end-fed aerial, and dipole aerial stations are shown pictorially in Figs. 30, 31, and 32 respectively. The procedures are very simple, and operators will quickly learn how to use their sets to the best advantage. The following points should be remembered.

Rod aerial station. (2 to 10 Mc/s)

- (a) Always use the transmitter "A-B-NET" switch in the "B" position.

End-fed aerial station. (2 to 10 Mc/s)

- (b) The transmitter "A-B-NET" switch can be used in either "A" or "B" position depending on which table on the aerial bobbin is used. Use table "A" with the switch at "A" whenever possible.
- (c) The counterpoise should be used, and its four black wires spread out on the ground. The green wire goes to the transmitter earth terminal.

Dipole aerial station. (3.3 to 10 Mc/s)

- (d) Always use the transmitter "A-B-NET" switch in the "B" position.
- (e) No counterpoise is used with the horizontal dipole aerial.
- (f) When using the inclined dipole, use the counterpoise spike to hold the cord connection to the lower dipole bobbin to the ground. Do not spread out the counterpoise wires, keep them all wrapped around the spike.

OPERATION OF WIRELESS STATION AS10 WITH ROD AERIAL

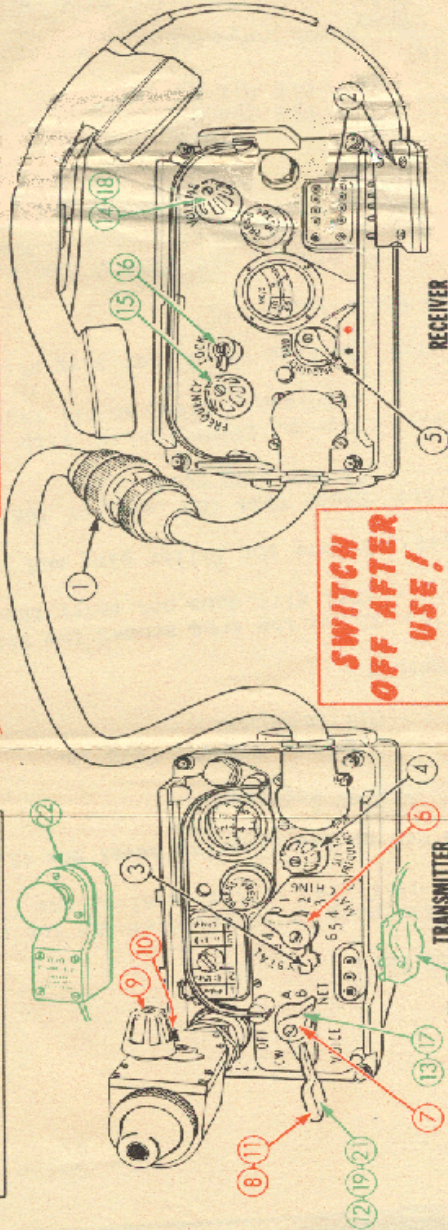
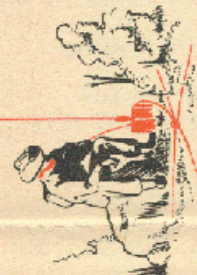
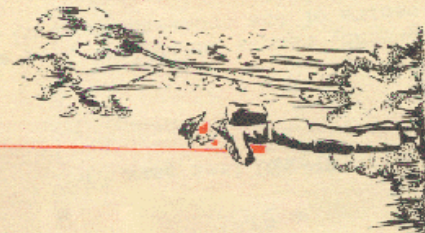
SETTING UP RECEIVER AS10 AND TRANSMITTER AS10

- 1 INTERCONNECTING PLUG AND SOCKET, join, and screw firmly together.
- 2 HANDLE - HANDLE and TUNING. Plug either or both in sockets.
- 3 TRANSMITTER - CRYSTAL SELECTOR SWITCH. Select crystal of desired frequency by turning to number corresponding with number and frequency shown on cover for crystal units.
- 4 TRANSMITTER - FREQUENCY CONTROL. Turn to set transmitter to ordered frequency.
- 5 RECEIVER - FREQUENCY BAND SWITCH. Set to appropriate band - BLUE - 2-4.5 Mc/s. ORANGE-4.5 to 1.0 Mc/s.

FREQUENCY RANGE 2-10 Mc/s.

TUNING TRANSMITTER AS10

- 6 MARCHING SWITCH - Set to "0".
- 7 A-B-KEY SWITCH - Turn to "B".
- 8 FUNCTION SWITCH - Hold on "VDIOP".
- 9 ROD TUNING KNOB - Adjust to give max. reading in serial tuning meter.
- 10 ADD NUMBER LOCKING SWITCH - Turn clockwise to lock tuning knob on rod tuner.
- 11 FUNCTION SWITCH - Allow to return to "P".



As frequencies of 2-10 Mc/s. band, prescribed method of tuning does not necessarily give best results. Where operation at these frequencies is necessary it is preferable that timing operations be given an actual check with base before stations are sent out on patrol.

Operations 12 to 18 should be repeated intervals of approximately 15 minutes to check setting. Various conditions such as the heat of the day or state of your batteries may cause the frequency to vary slightly, enough to put the set off key.

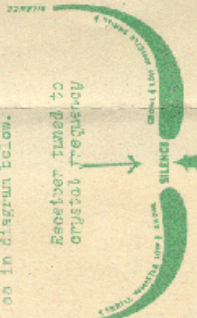
NOTE

FIG. 30

VOICE OPERATION

- 12 TRANSMITTER - FUNCTION SWITCH. Turn to "P".
- 13 TRANSMITTER - A-B-KEY SWITCH. Turn to "B".
- 14 RECEIVER - VOLUME CONTROL KNOB. Turn fully clockwise (UP).
- 15 RECEIVER - FREQUENCY CONTROL KNOB. Turn CAREFULLY about required frequency on dial scale until whistle is heard. Refer to "ZERO BEAT" or "Silent Point" on in diagram below.

Receiver tuned to crystal frequency
- 16 RECEIVER - FREQUENCY LOCK. Turn anti-clockwise CAREFULLY without altering tuning point.
- 17 TRANSMITTER - A-B-KEY SWITCH. Turn to "P".
- 18 RECEIVER - VOLUME CONTROL KNOB. Adjust for comfort of hearing.
- 19 TRANSMITTER - FUNCTION SWITCH. Hold on "VOICE". Speak in normal voice, DO NOT SCOUT. If using handset, press handset switch.



C.W. OPERATION

- 20 TRANSMITTER - PLUG FOR KEY. Plug in and proceed as for "VOICE" operations 12 to 19. Until key is plugged in distant station will not be heard.
- 21 TRANSMITTER - FUNCTION SWITCH. Turn to "CW".
- 22 TRANSMITTER - KEY. Send.
- 23 TRANSMITTER - PLUG FOR KEY. Remove before returning to "VOICE" operation.

OPERATION OF WIRELESS STATION AS10 WITH END-FED AERIAL

SETTING UP RECEIVER AS10 AND TRANSMITTER AS10

- 1 INTERCONNECTING PLUG AND SOCKET. Join, and screw firmly together.
- 2 RECEIVER - HANDSET AND HEADSET. Plug either or both in sockets.
- 3 TRANSMITTER - CRYSTAL SELECTOR SWITCH. Select crystal of ordered frequency by turning to number corresponding with number and frequency shown on cover for crystal units.
- 4 TRANSMITTER - FREQUENCY CONTROL KNOB. Turn to set transmitter to ordered frequency.
- 5 RECEIVER - FREQUENCY BAND SWITCH. Set to appropriate band - BLUE - 2-4.5 Mc/s. ORANGE-4.5 to 10 Mc/s.

FREQUENCY RANGE
2-10 M.C.

TUNING TRANSMITTER AS10

- 6 MATCHING SWITCH - Set to "0".
- 7 A-B-SET SWITCH - Turn to "A" or "B" to agree with serial length and frequency range chosen from serial bobbin chart.
- 8 FUNCTION SWITCH - Hold on "VOICE".
- 9 MATCHING SWITCH - Turn until maximum reading obtained on serial tuning meter.
- 10 FREQUENCY CONTROL KNOB - Slightly re-adjust for maximum reading on serial tuning meter.
- 11 FUNCTION SWITCH - Allow to return to "0".

ENSURES AERIAL LENGTH IS CORRECT

VOICE OPERATION

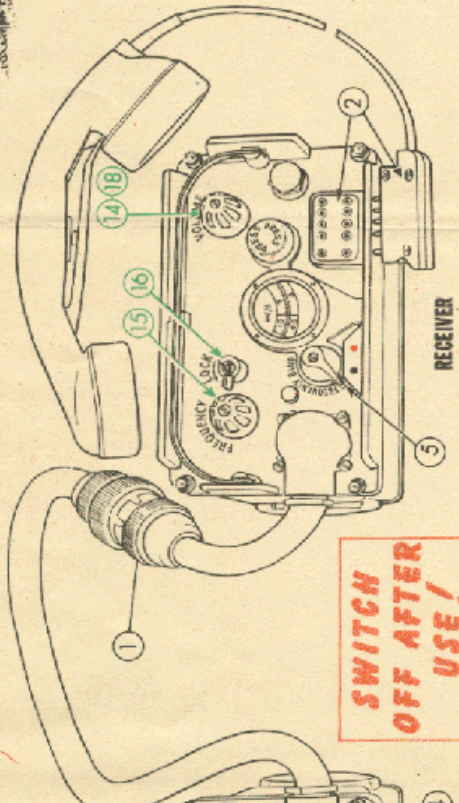
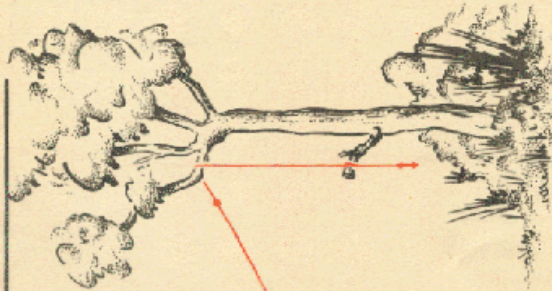
- 12 TRANSMITTER - FUNCTION SWITCH. Turn to "0".
- 13 TRANSMITTER - A-B-SET SWITCH. Turn to "REV".
- 14 RECEIVER - VOLUME CONTROL KNOB. Turn fully clockwise (UP).
- 15 RECEIVER - FREQUENCY CONTROL KNOB. Turn CAREFULLY about required frequency on dial scale until whistle is heard. Reduce to "ZERO BEAM" or "Silent Point" as in diagram below.



- 16 RECEIVER - FREQUENCY LOCK. Turn anti-clockwise CAREFULLY without altering tuning point.
- 17 TRANSMITTER - A-B-SET SWITCH. Turn to "A" or "B" as applicable.
- 18 RECEIVER - VOLUME CONTROL KNOB. Adjust for comfort of hearing.
- 19 TRANSMITTER - FUNCTION SWITCH. Hold on "VOICE". Speak in normal voice, DO NOT SCOTT. If using handset, press handset switch.

C.W. OPERATION

- 20 TRANSMITTER - PLUG FOR KEY. Plug in and proceed as for "VOICE" operations 12 to 15. Until key is plugged in distant station will not be heard.
- 21 TRANSMITTER - FUNCTION SWITCH. Turn to "0".
- 22 TRANSMITTER - KEY. Send.
- 23 TRANSMITTER - PLUG FOR KEY. Remove before returning to "VOICE" operation.



SWITCH OFF AFTER USE!

If fading occurs on ground wave operation when in the "A" position, try changing to "B".

NOTE

Use position "A" on the A-B-SET switch whenever possible as this position gives the greatest range.

FIG. 31

OPERATION OF WIRELESS STATION AS10 WITH DIPOLE AERIAL

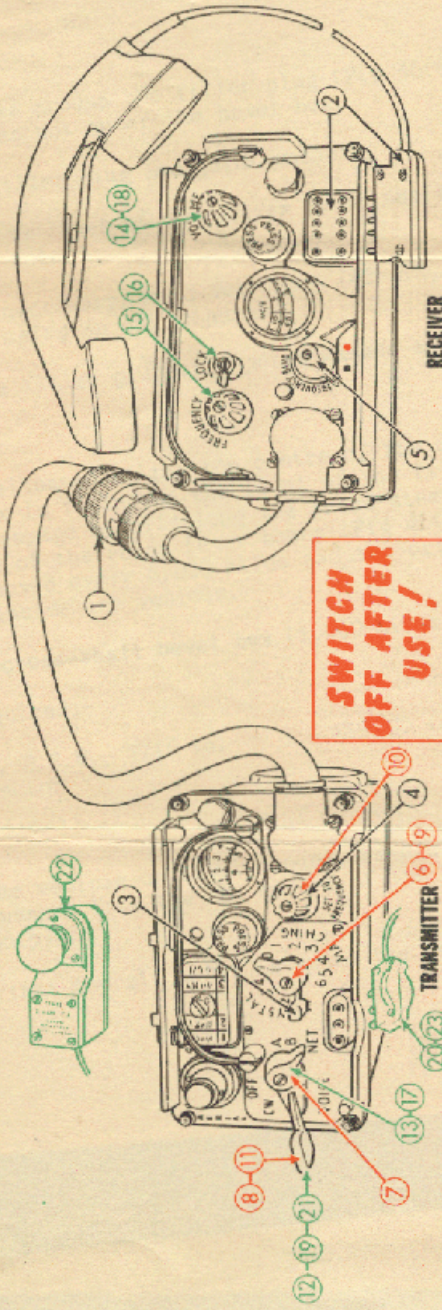
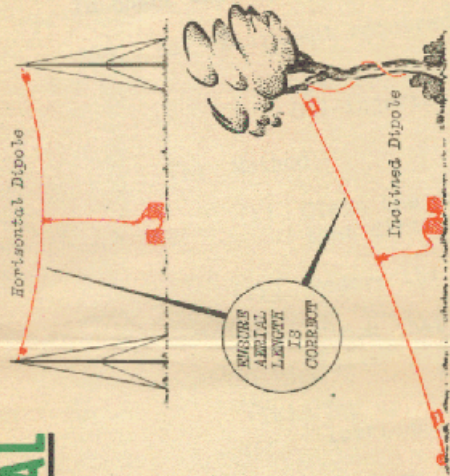
SETTING UP RECEIVER AS10 AND TRANSMITTER AS10

- 1 INTERCONNECTING PLUG AND SOCKET. Join, and screw firmly together.
- 2 RECEIVER - HANDSET AND HEADSET. Plug either or both in sockets.
- 3 TRANSMITTER - CRYSTAL SELECTOR SWITCH. Select crystal of ordered frequency by turning to number corresponding with number and frequency shown on cover for crystal units.
- 4 TRANSMITTER - FREQUENCY CONTROL KNOB. Turn to set transmitter to ordered frequency.
- 5 RECEIVER - FREQUENCY BAND SWITCH. Set to appropriate band - BLUE - 2-1.5 Mc/s. ORANGE-1.5 to 10 Mc/s.

FREQUENCY RANGE 3.3-10 Mc/s.

TUNING TRANSMITTER AS10

- 6 MATCHING SWITCH - Set to "0".
- 7 A-B-NET SWITCH - Set to "B".
- 8 FUNCTION SWITCH - Hold on "VOICE".
- 9 MATCHING SWITCH - Turn until maximum reading obtained on aerial tuning meter. "0" IS INVARIABLE BEST POSITION WITH DIPOLE AERIAL.
- 10 FREQUENCY CONTROL KNOB - Slightly re-adjust for maximum reading on aerial tuning meter.
- 11 FUNCTION SWITCH - Allow to return to "0".



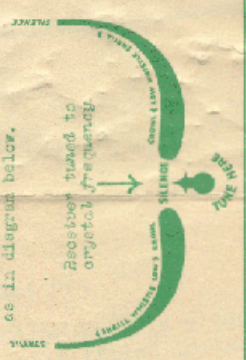
NOTE ONE
When changing frequency, dipole aerial lengths must be altered to agree with about inside dial on cover. EXACT LENGTHS given on cover.

NOTE TWO
If HORIZONTAL dipole used, it does not matter which way feeder connections are made to net. If INCLINED dipole used, reversal of connections may give better results. ONLY DISTANT STATION CAN INFORM YOU WHICH IS BETTER. (Aerial tuning meter is not a reliable guide in the inclined dipole set-up; it is quite possible for it to give a wrong indication to the best connection).

FIG. 32

VOICE OPERATION

- 12 TRANSMITTER - FUNCTION SWITCH. Turn to "V".
- 13 TRANSMITTER - A-B-NET SWITCH. Turn to "NET".
- 14 RECEIVER - VOLUME CONTROL KNOB. Turn fully clockwise (UP).
- 15 RECEIVER - FREQUENCY CONTROL KNOB. Turn CAREFULLY about required frequency of dial scale until whistle is heard. Refer to "ZERO BEAT" or "silent Point" as in diagram below.



- 16 RECEIVER - FREQUENCY LOCK. Turn anti-clockwise CAREFULLY without altering tuning point.
- 17 TRANSMITTER - A-B-NET SWITCH. Turn to "B".
- 18 RECEIVER - VOLUME CONTROL KNOB. Adjust for comfort of hearing.
- 19 TRANSMITTER - FUNCTION SWITCH. Hold on "VOICE". Speak in normal voice, DO NOT SHOUT. If using handset, press presset switch.

C.W. OPERATION

- 20 TRANSMITTER - PLUG FOR KEY. Plug in and proceed as for "VOICE" operators 12 to 19. Until key is plugged in distant station will not be heard.
- 21 TRANSMITTER - FUNCTION SWITCH. Turn to "CW".
- 22 TRANSMITTER - KEY. Send.
- 23 TRANSMITTER - PLUG FOR KEY. Remove before returning to "VOICE" operation.

REPEAT AT FREQUENT INTERVALS TO CHECK NET

CHAPTER FOUR — USER MAINTENANCE

SECTION 16 — GENERAL.

79. No equipment or installation can be expected to work properly unless it is kept in first-class condition by regular maintenance, conscientiously carried out. This maintenance is the responsibility of the NCO or man who is in direct charge of the equipment, and responsible for its operation, NOT of workshop or repair staffs, though workshop personnel may be called upon to carry out certain maintenance tasks.

80. The WS A510 is primarily for use by the Infantryman who is not normally expected to make any adjustments or attempt any repairs. Damage can only result from tampering with the sealed units of the set. Repairs must be left to R.Aust.Sigs., or RAEME technicians. However, emergencies may arise when simple, temporary repairs may be carried out by the operator to enable him to keep his set in action. In such cases the set should be inspected by qualified personnel on return to base.

81. The station will remain in *good working order* if the following simple instructions are observed :-

- (a) Keep all parts of the station clean and dry. Watch plug holes particularly, to see that no water settles in them. Keep all plugs clean and dry.
- (b) Keep fixing screws tight.
- (c) Watch the humidity indicators in the transmitter and receiver units. Should they show PINK, moisture has entered the units which must be exchanged as soon as conditions permit.
- (d) Take especial care of aerial gear. Keep it as clean as conditions permit, and replace damaged items as soon as possible.

- When re-winding aerial wires, wind them side by side, and as neatly as possible.
- (e) Report at once any fault in the station or any loss of components.

SECTION 17 – REPLACEMENT OF FAULTY PILOT LAMPS.

82. (a) Remove the rubber cover assembly marked "PRESS" by unscrewing it by hand.
- (b) Remove the defective lamp and coil spring (See Fig. 33).

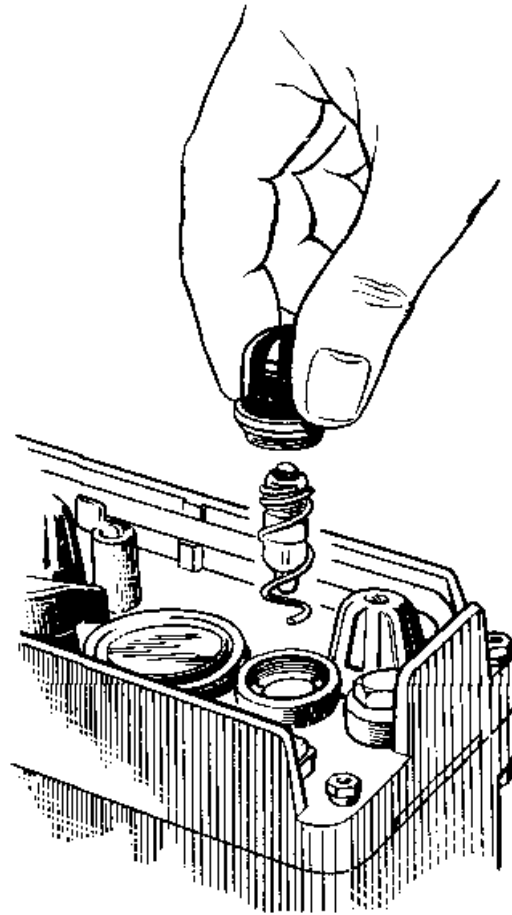


FIG. 33 - REPLACEMENT OF PILOT LAMP

- (c) Remove the defective lamp from the spring and substitute a new lamp. The base of the lamp should be screwed TWO TURNS into the close coils of the spring. The base of the lamp should be well clear of the spring.

- (d) Insert the lamp and its spring into the lamp housing on the panel, with the head of the lamp downwards.
- (e) Replace the rubber cover assembly in the housing.

SECTION 18 — REMOVAL OF RECEIVER AND MICROPHONE INSETS FOR INSPECTION.

83. It should seldom, if ever, be necessary to remove insets from the headset or handset assemblies, and the practice should be confined to emergencies only. If the headset does not work, try the handset in both sockets. If the handset works in each socket, obviously the fault is in the headset. If either a defective headset or handset *must* be used it may be possible to carry out emergency repairs when the fault is confined to broken connections to an inset.

84. To remove the receiver insets from the headset, follow the procedure shown in Fig. 34. Treat the insets very carefully as the connecting wires are very light.

85. The procedure for removing the microphone inset is as follows :-

- (a) Fold back the retaining lip opposite the horn, and lift the cover plate clear.
- (b) Fold back the retaining lip opposite the cable entry, and lift the inset clear carefully.

86. If any lead is found to be broken, it may be possible to rejoin it temporarily.

87. The handset insets are removed by unscrewing the cover of the microphone and receiver compartments. Again care should be exercised with the delicate wirings.

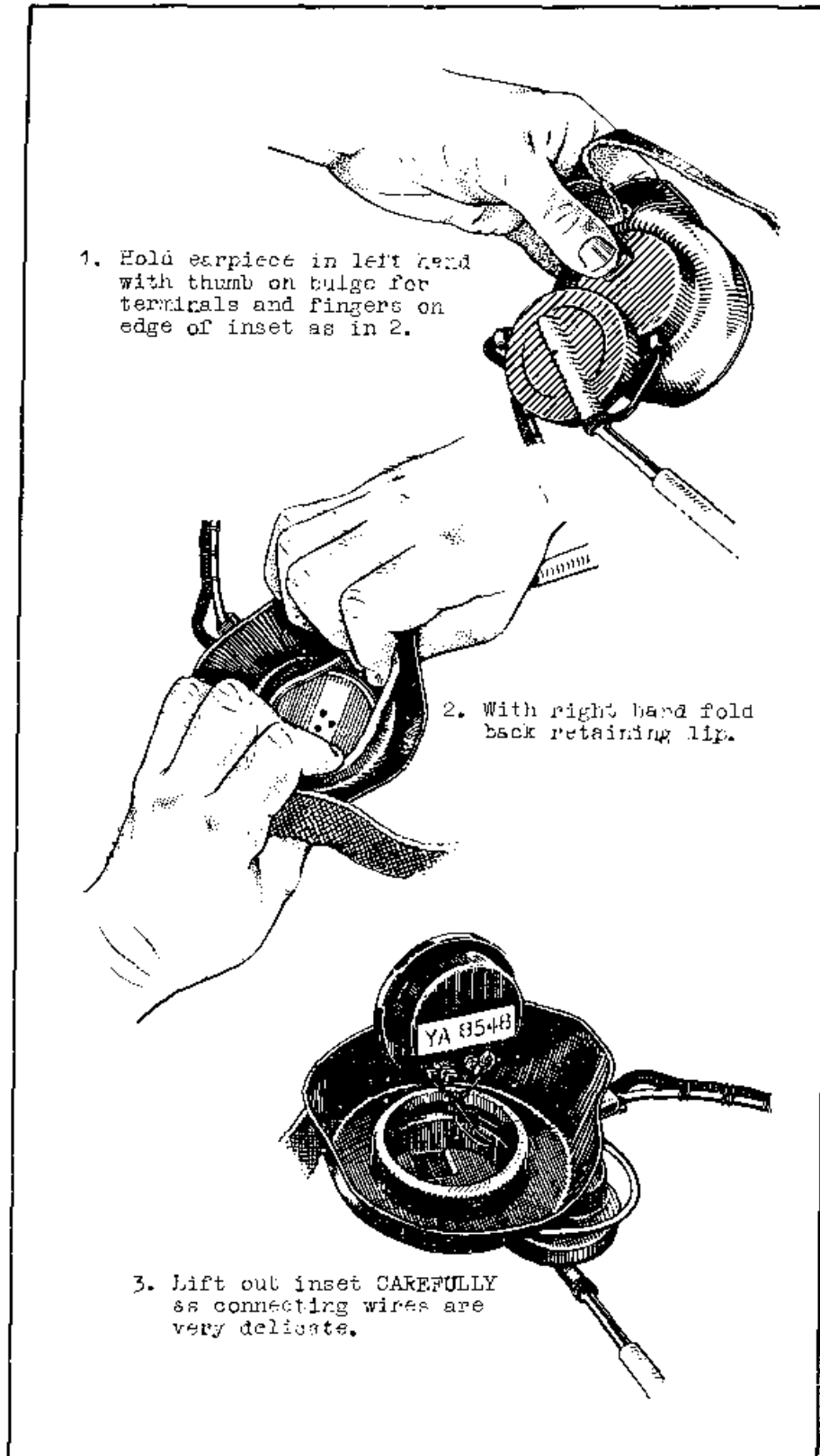


FIG. 34 - REMOVAL OF RECEIVER INSETS

SECTION 19 — FAULT LOCATION

88. The operator's duties in regard to tracing faults in his set are very limited in nature. If the set will not function correctly the following Table will indicate whether the fault is external, and within his power to rectify. In no circumstances will the set be opened by operators or any unqualified person.



TABLE 2 - FAULT FINDING CHART

Symptom	Possible fault	Action
1. Humidity indicators appear pink.	Interior of set is moist.	Return set to base at earliest opportunity.
2. Set appears dead.	(a) Batteries. (b) Switches in wrong positions. (c) Plugs not making contact. (d) Headset or handset faulty.	(a) Test as detailed in para. 70. If confirmed faulty, change batteries. (b) Re-set and check. (c) Ensure plugs not damaged, then wipe clean pins and sockets and re-connect. (d) Change. See para. 83 for emergency repairs.
3. Receiver noise heard but no signals sent or received.	(a) Switches in wrong position. (b) Faulty aerial connection. (c) Internal fault.	(a) Double check. (b) Check aerial connection; clean socket. (c) Report.
4. Set not sending on any channel but O.K. on receive.	(a) Faulty microphone (VOICE), if aerial meter gives tuning indication. (b) Faulty pressel switch (VOICE), if aerial meter gives tuning indication. (c) Faulty plug connection to transmitter from key (CW). (d) Internal fault.	(a) Change headset or handset. For emergency repairs see para. 83. (b) Replace handset. (c) Change key if adjustment not possible. (d) Report.
5. Set defective on certain frequencies but O.K. on others.	(a) Faulty crystal. (b) Internal fault.	(a) Replace. (b) Report.

REMEMBER THAT THE STATION IS YOUR RESPONSIBILITY,
ITS EFFICIENCY MAY WIN AN ACTION OR SAVE LIVES -
PERHAPS YOUR LIFE. IT IS ROBUST AND RELIABLE BUT
NOT INDESTRUCTIBLE. CARE FOR IT AND IT WILL SERVE
YOU WELL.

RESTRICTED



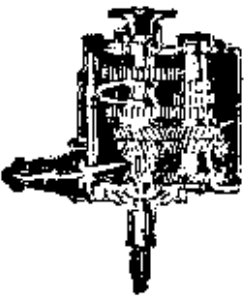
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