WORKING INSTRUCTIONS

NEW ZEALAND WIRELESS SET No. ZC1, MK.II.

NOT TO BE PUBLISHED

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PART 1.

GENERAL DESCRIPTION AND OPERATION
FIRST-LINE MAINTENANCE

WSB 3-A.

NEW ZEALAND WIRELESS SET No. ZC.1, MK.II.

PART 1.

Addenda

ERRATA.—The moving contact of SIA/4 should be connected to the junction of R2A and R7A, NOT to ground as shown.

ADDENDA.—A .0001 Mica Condenser designated C8H is connected from the output end of choke L9B to ground.

A .0001 Mica Condenser designated C8I is connected from the output end of choke L9C to ground.

The item C8A-G on page 40 should therefore read C8A-I.

NEW ZEALAND WIRELESS SET
No. ZC.1, Mk. II.

PART 1.

General Description and Operation.
First Line Maintenance.

CONTENTS.

ILLUSTRATIONS.

PLATES.

DIAGRAMS.

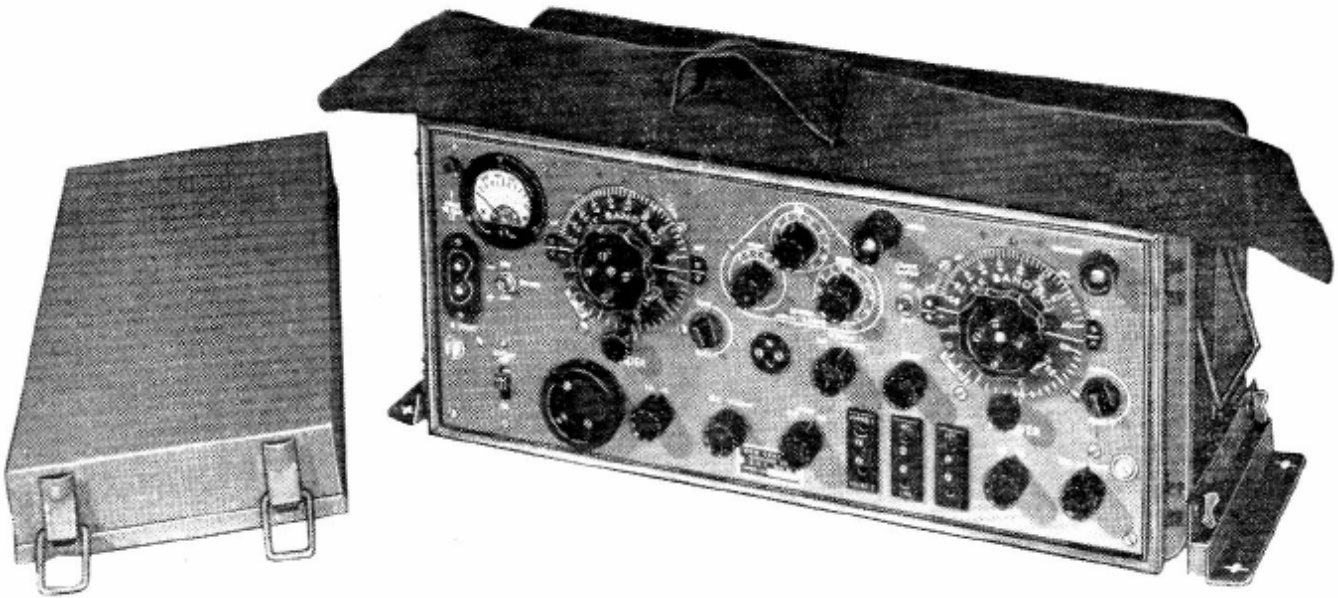


PLATE 1.—VIEW OF SET FITTED ON RESILIENT MOUNTINGS.

Chapter 1

General Description

1. Purpose of the W.S. No. ZC1, Mark II:

.01 The ZC1, Mark II. set was designed to replace WS. No. ZC1, Mark I., providing additional facilities, particularly in connection with WT.

.02 All practicable steps have been taken to make the set more suitable for use in damp, tropical climates.

.03 It may be used on the ground or in a vehicle.

.04 With an Amplifier, RF, No. ZA1, MK. II., it may be used for longer range or air support communications.

2. Range:

.01 The range of working will vary with the frequency and the type of aerial used.

.02 Typical ground-wave ranges in miles which may be expected when operated in average rolling country are:

Aerial System:	R.T.	M.C.W.	C.W.
Between Moving Vehicles.			
8 ft. whip ..	10-15	10-15	12-18
12 ft. whip ..	15-20	15-20	20-25
Between Ground Stations.			
16 ft. whip ..	20	20	25
34 ft. rod ..	20-30	20-30	25-35

.03 Considerably greater ranges may be obtained by the use of horizontal aerials and sky wave working.

3. Brief Description:

.01 Wireless set ZC1, Mark II., is built into a substantial reinforced steel cabinet, the whole unit being mounted on resilient mountings from which it is readily removable.

.02 The chassis proper is held in its cabinet by means of two screws, accessible from the front panel which, when turned counter-clockwise, eject the chassis from the cabinet.

.03 A removable metal cover is fitted to the front of the cabinet in such a way that a water-tight seal is obtained. This cover, which is held in position by means of four clips, renders the apparatus free from ingress of moisture, water, insects, etc., during the time the set is not in use. A canvas hood or cover is used as a protection from rain whilst the set is actually in use.

.04 As an additional precaution, further measures have been taken to render the internal components suitable for tropical use. All paper condensers are sealed within separate metal containers after being treated. All transformers are impregnated and sealed within metal containers while other parts of the set, including hookup wire, inductances, etc., are treated with a non-vegetable wax or lacquer.

.05 The sender and receiver are both designed to operate on any frequency between eight mc/s and two mc/s (8 mc/s to 2 mc/s). This they do in two bands as follows:

H.F. Band 8.0 to 4.0 mc/s.
L.F. Band 4.0 to 2.0 mc/s.

Switching from one band to the other is accomplished by means of band switches.

.06 The sender power output varies between 1.6 and 2.0 watts depending upon the aerial length and characteristics, and the frequency used.

.07 Types of emission:

(a) CW Telegraphy.
(b) MCW Telegraphy.
(c) RT.

.08 The set is fitted for "break in" operation when sending either MCW or CW. By this means, when receiving telegraphy, the operator may interrupt the transmission. "Break in" working is possible from remote control units (see Chapter 3, Section 1.02).

.09 On R/T, "Press-to-talk" switching is used to change from receive to send, whether operation is from set or Remote Control unit.

.10 The BFO, for the reception of CW signals, is automatically brought into operation when the emission switch is turned to CW.

.11 A pitch control, on the front panel, enables the operator, when receiving CW, to change the pitch of the received signal without moving the receiver tuning dial (see Chapter 2, Section 5.17).

.12 A Crash limiter is provided to limit strong impulses from atmospherics, or similar interference. At the same time weak signals are reduced in strength only to a slight extent (see Chapter 2, Section 7.01).

.13 On CW and MCW, the receiver volume control becomes an RF sensitivity control and AVC becomes inoperative. On RT the receiver volume control varies the audio gain, with AVC on the RF and IF stages.

.14 Provision is made for rapid changes of frequency.

.15 The set is shown in Plate 1.

4. Power Supply:

.01 Power for the set is supplied by means of the 12V secondary battery (consisting of two 6v. batteries in series) rated at 85 Ah. at the 10 hour rate; HT is supplied by a built-in, vibrator type HT unit.

.02 The condition of the batteries may be checked by pressing the button, marked "Press to Read LT," located on the top left-hand corner of the panel.

.03 To reduce the current consumption during a listening watch, turn OFF the SENDER ON/OFF switch.

.04 The current consumption under normal operation is as follows:

Receive (sender valves off) ..	2.8 amps.
Receive (sender valves on) ..	3.8 amps.
Send CW	4.4 amps.
Send RT or MCW	4.9 amps.

.05 One 12 volt battery may be expected, under normal working conditions (i.e., one period sending, three periods receiving) to operate the set continuously for:

C.W.	R.T.	M.C.W.
21 (hrs.)	20 (hrs.)	20 (hrs.)

5. Aerials:

.01 The sets are supplied complete with Aerials, 34 ft. steel (N.Z.), consisting of three 6-ft. Sections (rod), totalling 18 ft. and four 4 ft. Sections (whip), totalling 16 ft. An adaptor enables the whip sections to be mounted on the top of the three 6 ft. sections to give a total of 34 ft.

.02 Up to three sections of the whip aerial may be used with Aerial bases No. 8 (N.Z.) for mobile work.

.03 Any of the following aerials may be used, where circumstances permit, without any additional equipment:

Inverted L, not exceeding $\frac{1}{4}$ wave length.

T aerial, i.e., vertical wire with two equal horizontal spreaders in line, when height plus length of one spreader does not exceed $\frac{1}{4}$ wave length.

.04 A half-wave, end-fed aerial may be used by employing a coupling condenser between the aerial and ground terminals.

.05 Tables giving lengths for the different types of aerials are given at Appendix 1.

.06 "Signal Training Pamphlet No. 2, Part IX." is worth reading.

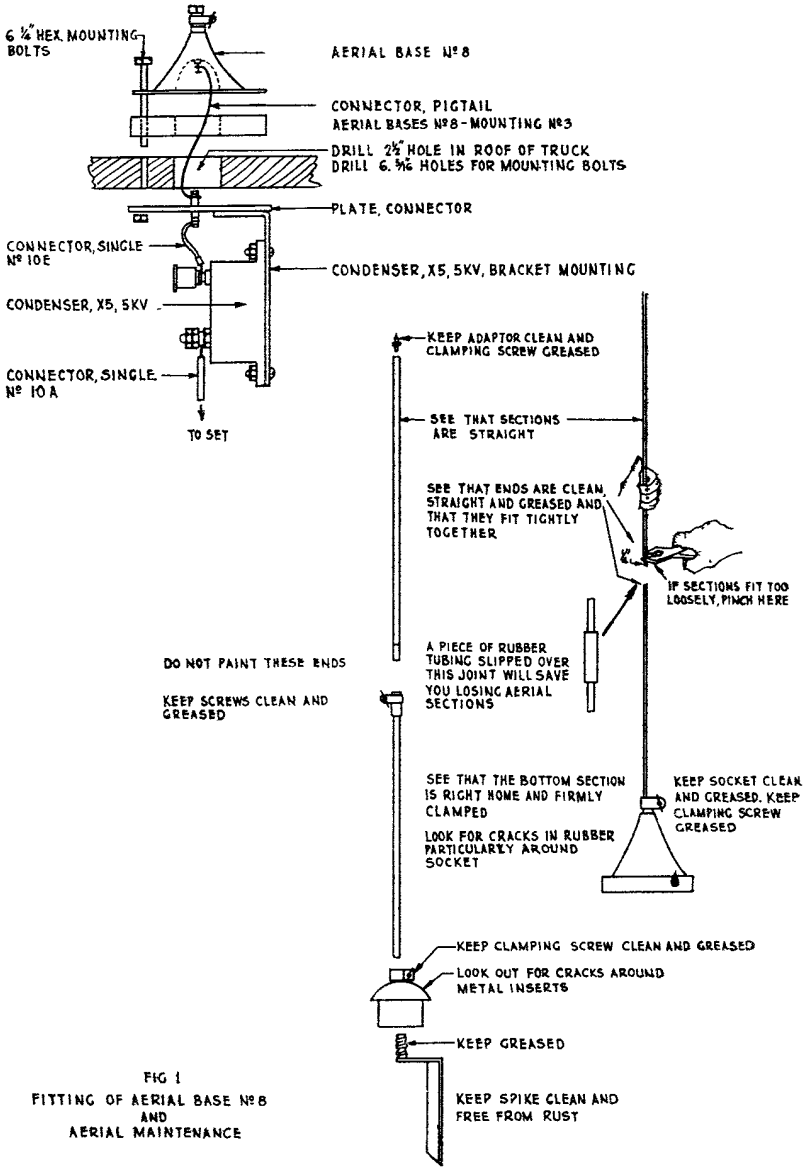


FIG 1

FITTING OF AERIAL BASE Nº 8
AND
AERIAL MAINTENANCE

Chapter 2

How to Work the Set

1. Introduction:

.01 Before attempting to erect a station, become familiar with the accessories and their uses. (See station list and diagrams.)

.02 Before putting the set into operation, become familiar with the controls and their functions as described hereunder.

2. Erection of a Station in a Truck:

.01 Mount set on bench in truck and bolt down resilient mounting. Fit slide for key, WT, 8 amp, on bench.

.02 Remove cover and stow in rack.

.03 Plug in the Receivers, Microphone, Hand No. 7, and Key, placing key in slide.

.04 See that BATTERY SWITCH is OFF.

.05 Insert polarised plug of Connector, Twin, LT, into socket on left-hand end of set.

.06 Connect other end to terminals on bulk-head of truck, being careful that POSITIVE LEAD GOES TO POSITIVE TERMINAL, AND NEGATIVE LEAD TO NEGATIVE TERMINAL.

.07 Fit Aerial base, No. 8, etc., to Roof of truck as shown in Fig. 1.

.08 Connect Terminals on Plate, Connector, No. 2, to Insulated Terminal on Condenser, X5, 5KV, by means of Connector, single No. 10 E.

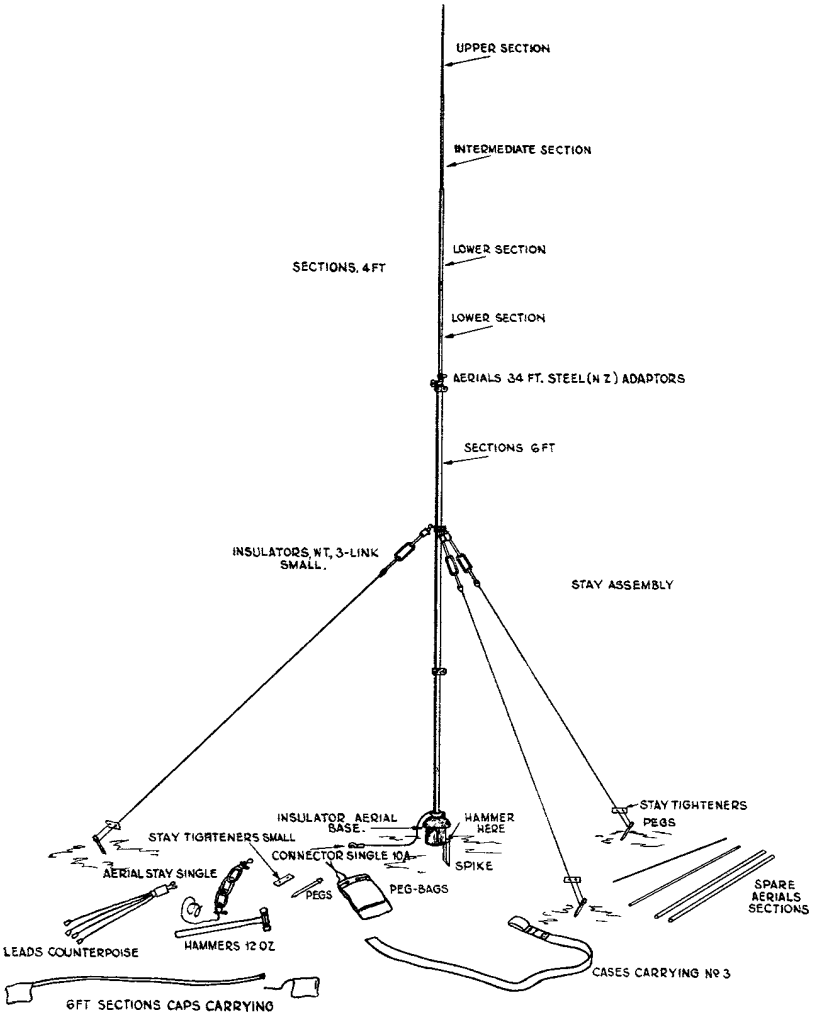
.09 Connect other terminal on Condenser to Aerial Terminal on set by means of one Connector, Single, No. 10A.

.10 Insert whip aerial into Aerial base, No. 8. Two sections will be sufficient for most purposes. Use intermediate and upper sections. For longer ranges and lower frequencies when clear of power lines, the lower section can be added, giving a total of 12 feet. The full 16 feet should only be used if truck is stationary. Remember, the enemy has ears. DO NOT use a bigger aerial than absolutely necessary.

.11 Connect GROUND terminal of set to ground terminal provided on vehicle by means of the Lead, Earth.

.12 Place batteries in position, clamp down, and connect to leads provided on vehicle. Carefully check polarity, (i.e., see that POSITIVE is connected to POSITIVE and NEGATIVE is connected to NEGATIVE). Switch main switch to BATT. 1.

.13 Stow remainder of gear in racks provided.



ERECTION OF AERIALS 34FT FIG 2

3. Erection of a Ground Station:

.01 Unclip metal cover and place (upside down) on ground.

.02 Stand set upon cover. See that BATTERY Switch is OFF.

.03 Plug in Receivers; Microphone, Hand No. 7 and Key, fitting key into key slide on top of case.

.04 Place batteries on left of set. Connect to set by means of plug of Connector, Twin, LT. Observe polarity carefully at batteries.

.05 Drive Aerial 34 feet Steel, spike, into ground about 2 feet behind set. Screw on Insulator, Aerial Base.

.06 If 16 foot aerial only is required, place Adaptor in Insulator and clamp tightly. Assemble whip aerial and insert into adaptor, clamping tightly. Aerial should be no bigger than necessary to give adequate communication.

.07 For 34 foot aerial, assemble the 6 foot sections and clamp together, fitting stay assembly at top of SECOND Section. Fit adaptor into top section, insert 16 foot whip into Adaptor and tighten clamps. Drive in Pegs and erect aerial (see Fig. 2).

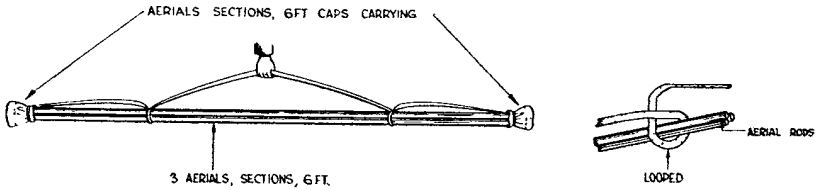
NOTE: For frequencies between 6 and 7 megacycles use 30 feet only, i.e., only 3 whip aerial sections. For frequencies between 7 and 8 megacycles use aerials not exceeding 26 feet, i.e., only 2 whip sections.

.08 Otherwise aerial length may be in excess of one quarter wavelength.

.09 Connect base of aerial to AERIAL Terminal of set by means of a Connector, Single, No. 10A.

.10 Lay out Leads, Counterpoise, No. 2, and connect to GROUND Terminal of set.

.11 If a wire aerial is used, connect the "lead-in" directly to the AERIAL Terminal of set.



HOW TO CARRY 6FT AERIAL SECTIONS

FIG. 3.

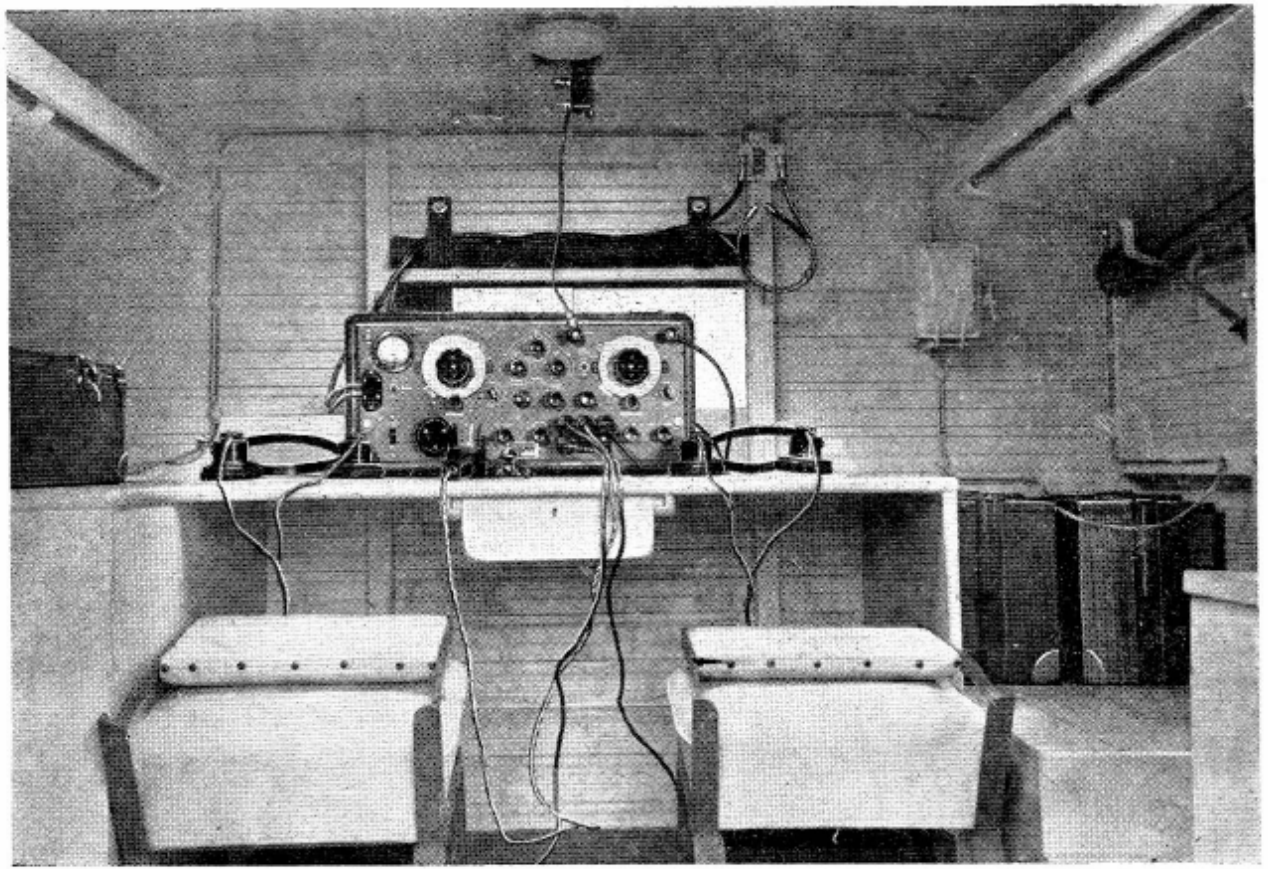


PLATE 2.—MOBILE STATION.

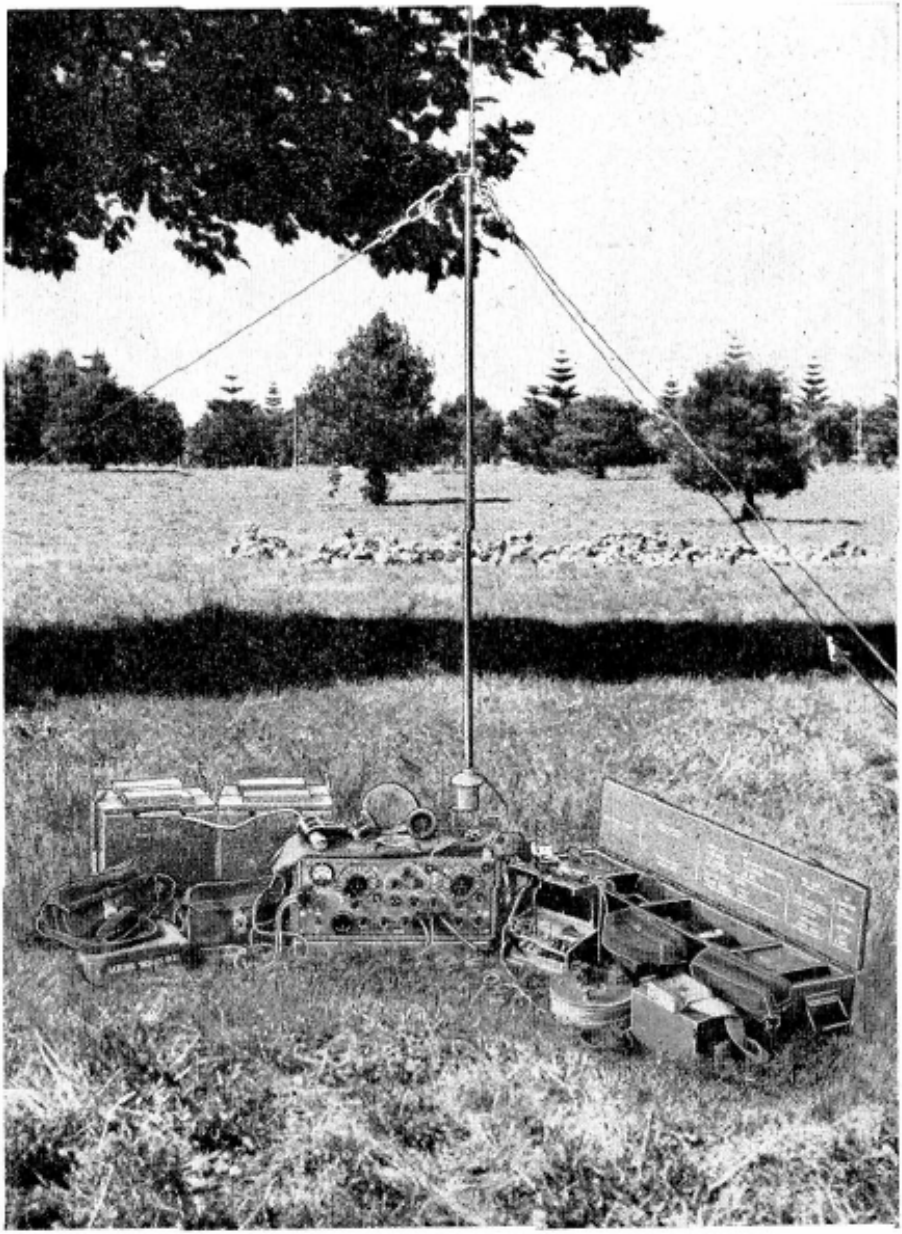


PLATE 3.—GROUND STATION.

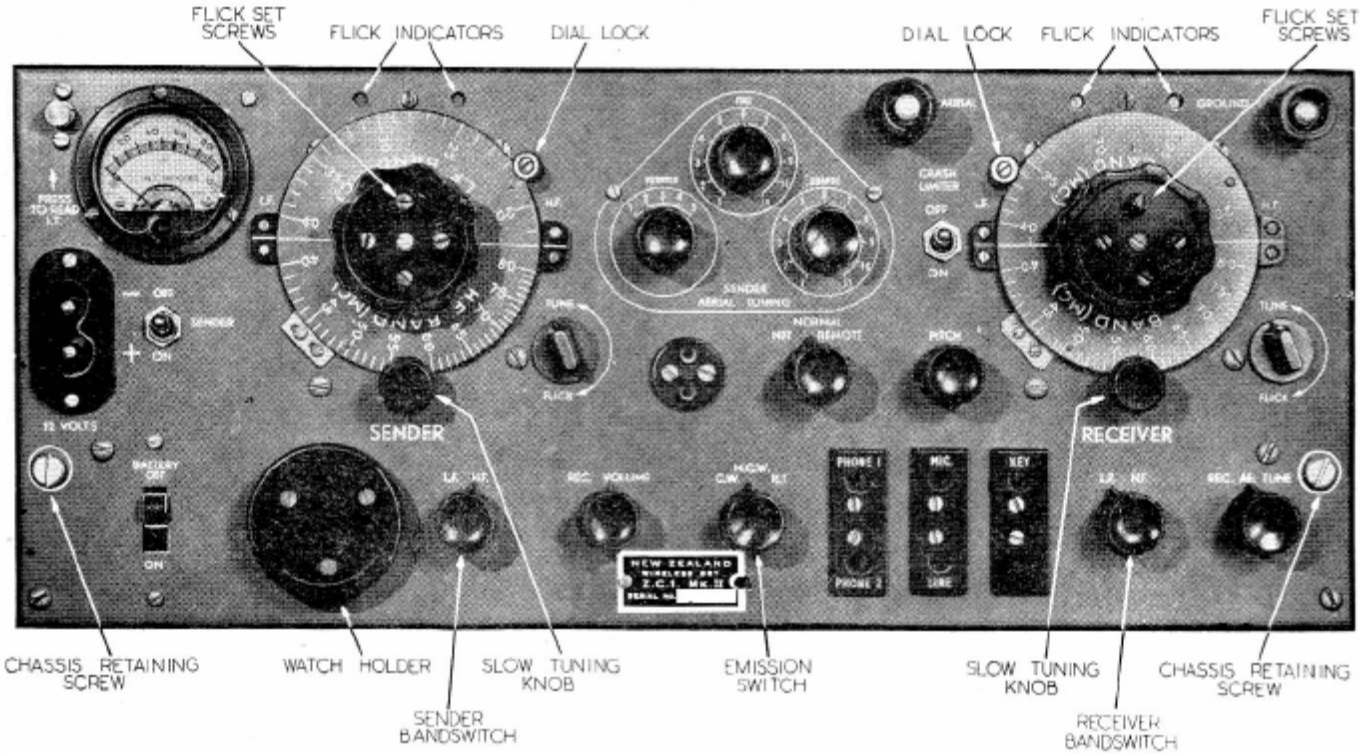


PLATE 4.—FRONT PANEL.

4. Description of Tuning Dials:

.01 SENDER and RECEIVER tuning dial mechanisms are identical and each provides for two pre-set or "FLICK" frequencies.

.02 Each dial has four knobs for its operation:

(a) MAIN, which is a large fluted knob and which carries the scale plate. It is directly coupled to the main shaft of the tuning condenser.

(b) SLOW, which is the small bakelite knob mounted just below the scale plate, which it drives by friction. It is used for fine adjustment of the main dial.

(c) FLICK-TUNE, which is the small metal knob fitted close to the scale plate at 4 o'clock.

(d) DIAL LOCK, which is the small metal knob fitted close to the scale plate at 2 o'clock on the sender dial and at 10 o'clock on the receiver dial. To lock the main dial in position, this is turned in a clockwise direction.

.03 Behind the SCALE PLATE are two movable discs, each with a single V-shaped notch cut in the edge. These are the Flick plates. They can be clamped tightly to the main shaft by means of the pairs of set screws (BLUE and RED respectively), which project through the main knob.

.04 Behind the panel are two springs, one associated with each Flick plate. Except when the FLICK-TUNE knob is at TUNE, these springs bear on the edges of the Flick plates. If the notch on either plate passes under the end of the associated spring, the spring falls into the notch and holds the plate in that position. Simultaneously a small coloured disc appears in one or other of the two holes in the panel above the scale plate. These indicate which plate is engaged, the RED disc appearing when the Flick plate controlled by the RED set screws is engaged and so on.

.05 When FLICK-TUNE knob points to TUNE:

(a) Flick Springs are lifted clear of the Flick plate.

(b) SLOW knob is pressed against the edge of the scale plate.

(c) This allows the MAIN dial to be turned slowly by turning the SLOW knob.

.06 When FLICK-TUNE knob points to FLICK:

(a) SLOW knob is moved clear of the scale plate.

(b) Flick Springs are allowed to bear on the Flick plates, ready to drop into the notches when MAIN knob is turned.

.07 When the BLUE set screws in the MAIN knob are unscrewed half a turn, the corresponding Flick plate is freed from the main shaft. If the notch in the plate is engaged by the Flick Spring, the plate is prevented from turning with the MAIN dial. If the MAIN dial is therefore adjusted to a particular frequency, say 3.5 mc/s, and the Flick plate then clamped by tightening the BLUE screws, the notch in the plate will come under the flick spring every time the dial is turned to 3.5 mc/s.

.08 The RED flick can be adjusted similarly.

.09 The Flick Springs bear in the notches strongly enough to hold the dial in position against ordinary vibration, whilst permitting it to be moved to another position by turning the MAIN knob.

.10 In the intermediate position, that is when the FLICK-TUNE knob points to the right, the SLOW knob bears on the scale plate while the Flick Springs bear on the edges of the Flick plates. This enables the SLOW knob to be used for fine adjustment of the main dial when setting up the FLICK frequencies.

.11 When the Flick frequencies are NOT being used, after the set is tuned, LOCK THE DIALS by means of the Dial Locks.

5. Receiver Operation (See Fig. 4):

.01 Unless sender is NOT to be used, turn SENDER ON/OFF switch at left of panel to ON.

.02 Turn BATTERY SWITCH to ON.

.03 Press button marked PRESS TO READ LT. Check batteries by noting position of needle of meter relative to reference mark.

.04 While valves are heating (approx. 30 seconds) arrange controls.

.05 For frequencies from 1.9 to 4 megacycles, set RECEIVER BAND SWITCH to LF position. For frequencies from 4 to 8 megacycles, set to HF position.

.06 Set EMISSION SWITCH for CW, MCW or RT as required.

.07 Set NETTING switch to Normal position.

.08 Set REC. VOL. control to maximum (fully clockwise) position.

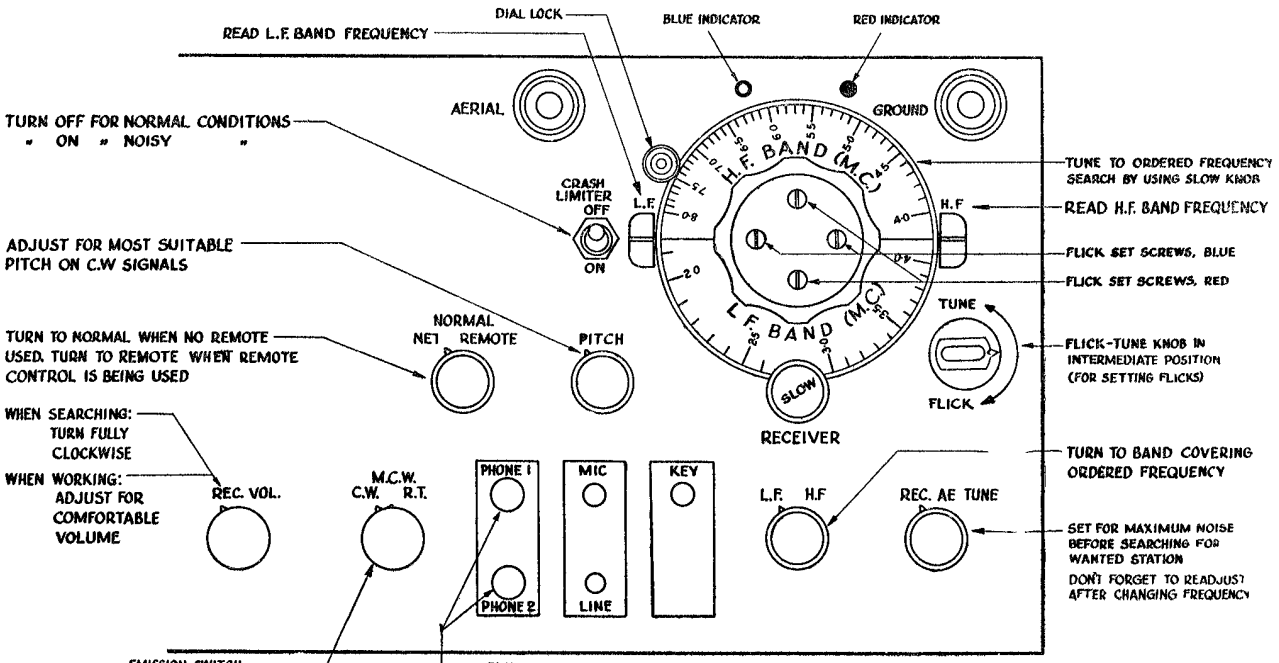
.09 Check that CRASH LIMITER is OFF.

.10 Check that Receiver DIAL LOCK is unlocked.

.11 Turn RECEIVER Dial to frequency desired.

.12 Unless FLICK is to be used, turn Receiver FLICK-TUNE knob into TUNE position.

.13 Turn REC. AE. TUNE condenser into position at which maximum noise is heard.



RECEIVER TUNING CONTROLS
FIG.4

.14 If on CW, set PITCH control to position where a fairly low-pitched hissing noise is heard.

.15 Search for signals carefully about the desired frequency, turning the RECEIVER dial by means of SLOW control until desired signal is heard or until dial reads 2 divisions ABOVE the frequency desired. If desired signal not heard, search carefully between 2 divisions above and 2 divisions below until signal is heard. If station still NOT heard, a wider search should be made, say over 5 to 10 divisions each side.

.16 Adjust REC. VOL. control for comfortable signal strength.

.17 If on CW, adjust PITCH control for most readable note. Much use can be made of this control when trying to read signals subjected to interference or jamming.

.18 If FLICK is not being used turn DIAL LOCK in clockwise direction to lock dial.

6. Receiver Flick Adjustment:

.01 Check that DIAL LOCK is disengaged.

.02 Turn receiver FLICK-TUNE knob to the right, to a position half way between FLICK and TUNE, and rotate RECEIVER dial until BLUE flick indicator appears.

.03 Unscrew the BLUE set-screws HALF A TURN.

.04 Tune in required signal carefully and adjust receiver for best performance.

.05 Carefully tighten BLUE set-screws.

.06 Place FLICK-TUNE knob at FLICK position.

.07 Turn dial away from FLICK position, then return it carefully. Check that adjustment is still correct; if not, repeat .01 to .07 above.

.08 Set RED Flick, using similar procedure.

7. Crash Limiter:

.01 If atmospherics are troublesome, switch ON the CRASH LIMITER. The REC. VOL. control should be kept as low as practicable, otherwise signals will be masked by the interference.

8. Sender Operation (Control Station) (See Fig. 6):

.01 Set SENDER TUNING DIAL to allotted frequency, adjusting the Flick mechanism, if used, in a similar manner to that described under Receiver Flick Adjustment (Sec. 6 above). If Flick mechanism is not to be used, lock the dial.

.02 Set SENDER AERIAL TUNING controls as follows:
(a) COARSE to 1.
(b) VERNIER to 3.
(c) FINE to 6.

.03 Set switches as follows:—
(a) EMISSION switch to CW.
(b) BATT. switch to ON.

.04 Press WT key. Meter should read about 15 M.A.

.05 Adjust SENDER AERIAL TUNING controls in the following order for the MAXIMUM anode current:—
COARSE.
FINE
VERNIER.

.06 Check that set sends and side tone is heard when key is pressed, and that set receives normally with key up.

.07 Turn EMISSION SWITCH to MCW and check as above.

.08 Turn EMISSION SWITCH to RT and check press-to-talk.

.09 Set EMISSION SWITCH to CW and the NET-NORMAL-REMOTE switch to NET, and tune receiver to the silent point (see fig. 5) adjusting Flick mechanism as before if required. Return NET-NORMAL-REMOTE switch to NORMAL.

.10 Adjust REC. AE. TUNE control to position of maximum noise.

FINDING THE SILENT POINT (ZERO BEAT)

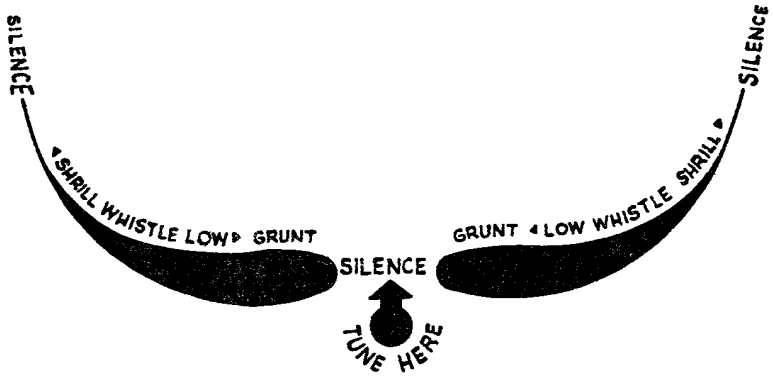


FIG. 5.

9. Sender Operation (Out Station):

.01 IMPORTANT. For security reasons, all SENDER tuning adjustments, e.g., AERIAL TUNING, MUST be made with the EMISSION switch at CW. The method of tuning the sender for group working by an out station, is fully described under Netting, Section 10.

.02 In "One to One" working, Netting is not essential, but is most desirable, as the link would otherwise occupy more than its share of the frequency band.

.03 It may happen, however, that two stations, working together, may be ordered to send on different frequencies. Each SENDER will then be set to its allotted frequency as described in 8.01 to 8.10 inclusive (omitting 8.09 because in this case the RECEIVERS will be tuned to the frequency of the distant station).

10. Netting:

.01 The procedure for NETTING is given in full in Signal Training (All Arms) Pam. 5, Chap. 3, Sec. 24. Before the time fixed for the commencement of the Tuning Call, all stations are required to prepare their sets as described below.

.02 CONTROL STATION will tune his sender and receiver to the ordered Spare Frequency (RED), as in Sec. 8 above, or by Netting to a Wave-meter. He will then tune to the ordered Normal Frequency (BLUE) in the same way.

.03 OUT-STATIONS will:

(a) Put BATTERY switch ON and SENDER ON/OFF switch ON at least one minute before tuning call is to commence.

(b) Set up Receiver, as in Sec. 5.01 to 5.10.

(c) Turn FLICK-TUNE knob to right (i.e., intermediate position between FLICK and TUNE).

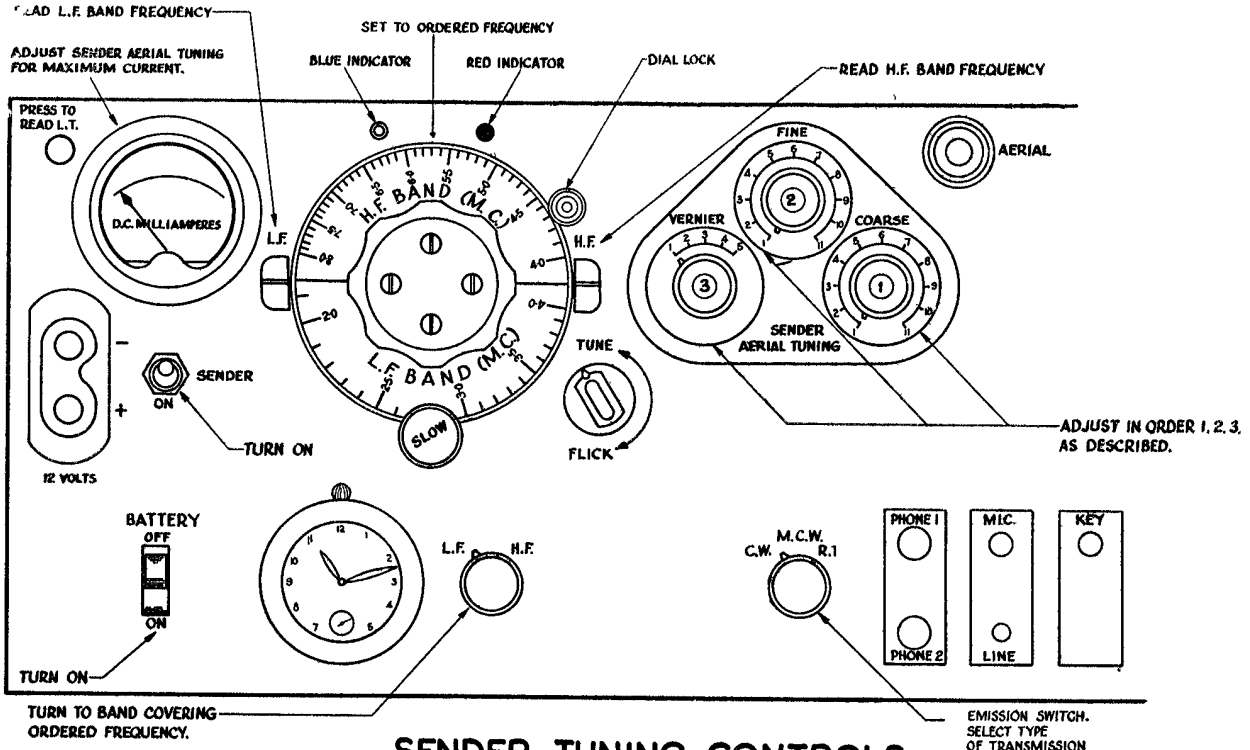
(d) Turn SENDER MAIN dial to engage BLUE Flick spring. Unscrew BLUE set-screws one half-turn.

(e) Turn SENDER MAIN dial to engage RED Flick spring. Unscrew RED set-screws one half-turn.

(f) Repeat (d) and (e) for RECEIVER dial.

(g) Set SENDER and RECEIVER dials at frequency nominated for first Tuning call (Normal or BLUE frequency).

.04 When Tuning Call is due, CONTROL STATION will:



SENDER TUNING CONTROLS
FIG.6.

(a) Give TUNING CALL .. for 1 minute.
(b) Pause .. .. .. for 30 seconds.
(c) Give NETTING CALL .. for 1 minute.
(d) Pause .. .. .. for 1 minute.
(e) Then call all out-stations and check the net (See S.T.A.A. Pam. 34, Chap. 3, Sec. 24, Para. 7).

.05 OUT-STATIONS will search for, and tune in, Control Station as described in 5.13 to 5.17.

.06 During pause after tuning call, OUT-STATIONS will place:—NETTING switch to NET; EMISSION switch to MCW; SENDER dial to approximate setting.

.07 On commencement of Netting call, carefully set SENDER DIAL to zero beat with control station. Adjustment of REC. VOL. control may make it easier to obtain satisfactory zero beat.

.08 Carefully lock BLUE set-screws of the Sender dial.

.09 Place FLICK-TUNE knob at FLICK, checking adjustment as before, finally setting to NORMAL position.

.10 When Netting call ends, AND NOT BEFORE, Out-Stations will press key and adjust SENDER AERIAL TUNING, etc., as in 8.05 to 8.10, and the key released. The EMISSION SWITCH will finally be set for CW, MCW or RT as required.

.11 Netting on the second (or spare) Flick frequency is done similarly, using, however, the RED set-screws.

11. Netting to a Wavemeter.

.01 When it is essential that a group should operate exactly on the allotted frequency, the Control Station's SENDER must be set by Netting to a Wavemeter.

.02 The procedure followed by the Control Station in setting his sender is very similar to that followed by an Out-Station when netting to Control.

12. "Break-in" Operation.

.01 "Break-in" operation used in W.S. No. ZC.1 Mk. II., is a means of automatically changing from Receiver to Send by pressing the key, the set changing back to Receive when the key is released.

.02 Instructions for the use of "break-in" operation are given in SIGNAL TRAINING (ALL ARMS) PAMPHLET 5, PART 2, SEC. 33.

13. Flick Working. Changing system of transmission, Wireless Silence.

.01 The procedure for changing frequency, changing the system of transmission and for ordering wireless silence are given in S.T.A.A. Pam. 5, Chap. 3, Sec. 27.

Chapter 3

WIRELESS SET NO. ZC.1, MK.II.—REMOTE CONTROL UNIT.

1. General.

.01 This unit provides the following facilities when used in conjunction with a W.S. No. ZC.1, Mk. II.

.02 "Press-to-talk" R/T or "break-in" CW or MCW either from set unit or distant unit. (Note.—EMISSION SWITCH must be set by operator at wireless set.)

.03 Transmission of speech through buzzer-call switchboard by either unit to wireless set, with send-receive control from either unit.

.04 Two units may be used for ordinary telephone conversation without speech being emitted.

.05 Operator at unit connected to exchange can call and talk to exchange without interfering with the reception or transmission being carried out by other unit.

2. Description of Apparatus.

.01 Remote control equipment for W.S. No. ZC.1, Mk. II., comprises:—

Wireless Set No. ZC.1, Mk. II., Remote Control Units:—	2
Wireless Set No. ZC.1, Mk. II., Remote Connectors, Plug	2
Receivers, Headgear, Double, Type F ..	2
Microphone, Hand, No. 8 (N.Z.)	2
Connectors, Twin: No. 13	2
No. 16	2

.02 Wireless Set No. ZC.1, Mk. II.: Remote Control Unit, is physically similar to Remote Control Unit A. It is self-contained in a metal case, with hinged lid, which swings open, giving partial protection to the unit when operated in bad weather. The buzzer, T, Mk. I., "plugs in" for easy replacement purposes, and adjustment screws are accessible when unit is in working position. The case is carried by means of a canvas sling to which is attached a small pouch, for carrying Connector, Plug, with its twin rubber-covered lead, and plug, single, No. 10, also Connectors, Twin, No. 16 (N.Z.).

.03 Connectors, Twin, No. 13, consists of 100 yards of cable, electric, D3, twisted, wound on a Reel, cable, No. 2, and terminated at each end by a two pin, two socket coupler (Coupler No. 1), which is fitted with a clamping ring for locking to a similar coupler. One side of the reel is fitted with clamps to hold the couplers when not in use.

.04 The Microphones and Receivers headgear, for the units are carried in separate satchels. NOTE.—It is important that the correct microphone (a carbon microphone No. 8 (N.Z.)), be used in the unit and NOT one of the dynamic type.

3. Weights and Dimensions.

Description	Weight. Lb.	Dimensions (Ins.). Length.	Height.	Width.
Wireless Set No. ZC.1, MK.II.	9¾	9	5¾	5½
Remote Control Unit Connectors, Twin, No. 13	7¼	—dia. 8½—		4
Receivers, Headgear, Key and Microphones, Hand No. 8 (N.Z.) in satchel	3½	11	9	4½

4. Working Instructions for W.S. No. ZC.1, MK. II. Remote Control Unit.

.01 Plate 5 is a general view of the unit, Fig. 11 is a schematic diagram of the unit, while Fig. 7 shows the unit and its accessories, connected to wireless set and exchange lines.

5. Connecting Up.

.01 Switch set OFF. Insert 2-pin plug carrying twin lead and Plug, single, No. 10, into its socket at right hand end of control unit.

.02 Insert plug No. 10 into jack marked LINE on W.S. No. ZC.1, MK. II.

.03 At both control units, plug headphones and microphone into proper jacks on remote controls.

.04 Turn NET-NORMAL-REMOTE Switch on W.S. No. ZC.1, MK. II., to REMOTE position. Switch set ON.

.05 Attach double spade connector of Connector No. 16 to left hand and middle terminals on unit marked CONTROL if using two control units.

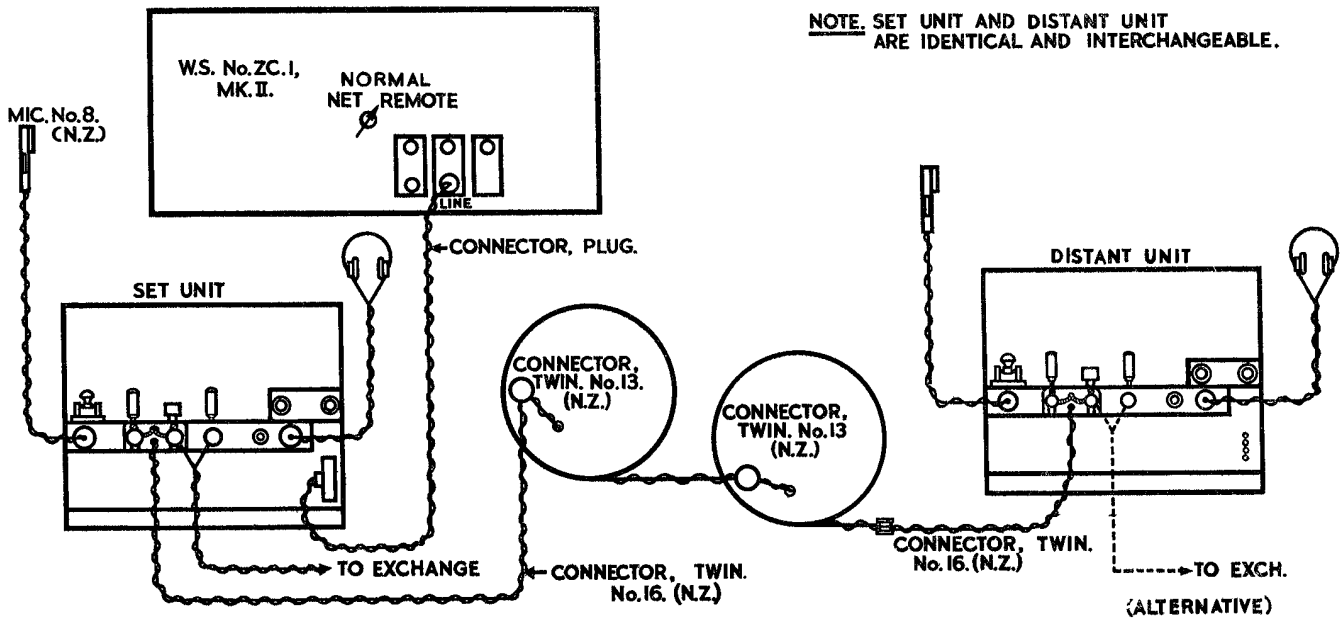


FIG. 7.—W.S. No. ZC.1, MK. II., REMOTE CONTROL UNITS. DIAGRAM OF CONNECTIONS.

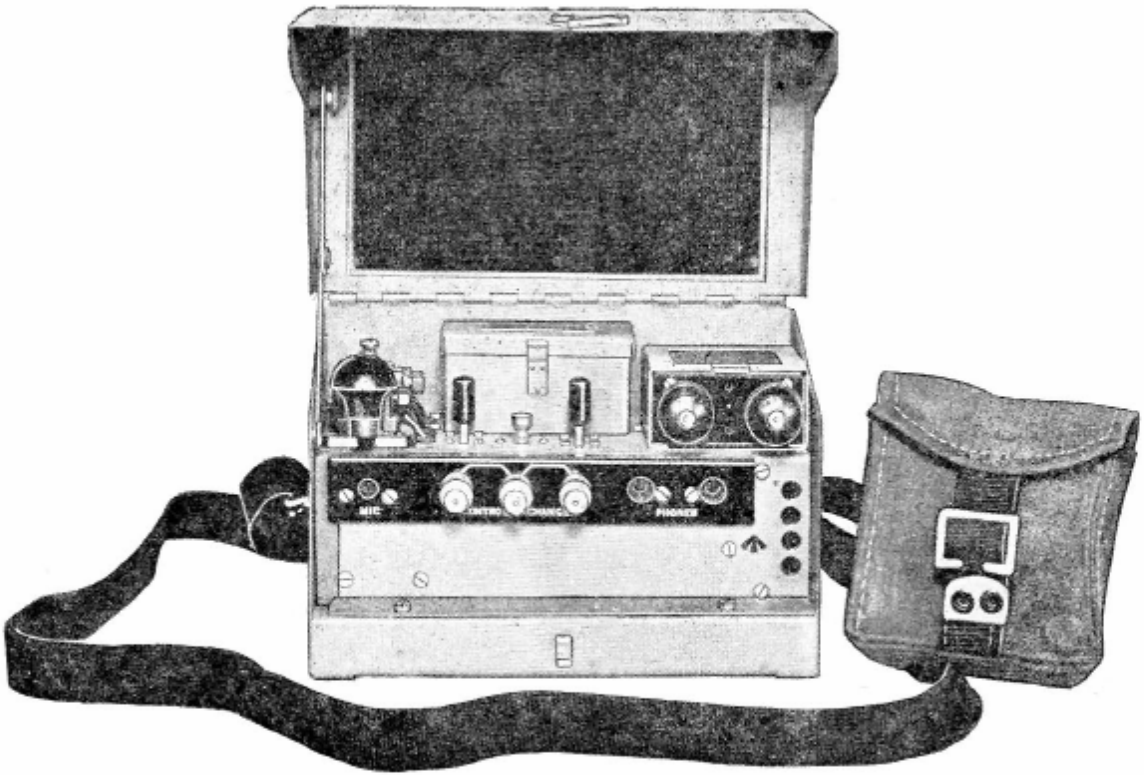


PLATE 5.—W.S. No. ZC.1, MK. II., REMOTE CONTROL UNIT.

.06 Run out one or two connectors No. 13 as required.

.07 If using two drums, connect them by means of the Couplers, No. 1, and lock by means of the clamping rings.

.08 Join the Connector, No. 13, to the Connector, No. 16 by means of their Couplers, No. 1, and lock.

.09 To connect to exchange, the line from exchange should be connected to the right hand and middle terminals on the units, which are marked EXCHANGE. The line is usually connected to the set control unit, but may be connected to the distant control unit, and switching from send to receive is done by the operator of that unit.

As the operator at the distant unit can NOT select the type of emission or adjust the volume, it is usual to connect to the set unit.

.10 Key switches of both units should be in the NORMAL position.

6. Operation—Two Control Units and W.S. No. ZC.1, MK. II.

.01 Operator tunes set using set control unit, and establishes communication.

.02 Operators at either unit can send or receive on R/T, using "press-to-talk," or they can work "break-in" CW or MCW.

.03 Intercommunication between units. Set right-hand key switch to SPEAK REMOTE UNIT. Call operator by speech, and if he does not reply, press the centre switch marked PRESS TO CALL. This should wake him up.

.04 Operator at other unit, before pressing his pressel-switch to reply, should set his right-hand switch to SPEAK REMOTE UNIT position. CAUTION.—Right-hand switch MUST be set back to NORMAL position in order to send or receive.

Since keying or pressing pressel-switch at either unit in NORMAL position, operates the sender, it is obviously essential that only one operator should send at one time.

7. Operation—One Control Unit and Exchange.

.01 To call switchboard operator, set right-hand switch to SPEAK EXCHANGE and left-hand switch to CONNECT EXCHANGE and press CALL button.

.02 When communication is established with the exchange or a subscriber to the exchange, return right-hand switch to NORMAL position. Leave left-hand switch on CONNECT EXCHANGE position. It is now possible

for speech from the exchange line to be sent when set is switched to SEND by operator pressing key on set control unit.

.03 Upon hearing the word "over," operator at control should change from send to receive, or vice versa, by releasing or pressing key.

8. Two Control Units and Exchange, Exchange Connected to Set Unit.

.01 As above for working exchange, except that either control unit can do send-receive switching. However, it is desirable that control be from set unit so that operator can disconnect receiver from line by setting right-hand key switch to SPEAK EXCHANGE position, otherwise telephone conversations between unit and exchange may be masked by receiver noise.

.02 Set operator can switch to exchange and talk, while distant operator can use his remote unit to operate set in normal manner.

9. Two Control Units and Exchange, Exchange Connected to Distant Unit.

.01 Operation is similar to the case (8) except that distant operator can speak to exchange, and either control unit can control send-receive switching, etc.

.02 It is possible for all three units to intercommunicate by placing:—

(a) On set unit, right-hand switch to SPEAK REMOTE UNIT.

(b) At distant unit, left-hand switch to CONNECT EXCHANGE position, right-hand switch to NORMAL position. Caution: Operator at distant unit must NOT close pressel switch until set operator has turned his right-hand key switch to SPEAK REMOTE position.

10. Notes.

When exchange wishes to call remote unit, he should call by speech first before buzzing.

If set unit is speaking to exchange as in 8.01 or 9.01, and the distant unit calls; or when two units are working in normal position, and exchange calls; the buzzer call will be heard as a faint buzz only.

Operator at set should check settings of receiver volume and tuning and see they are correct, if it should be necessary for him to leave set unattended.

11. Adjustment of Buzzer. ("T" MK. I.)

.01 Loosen the two LOCK discs, half a turn is sufficient.

.02 Unscrew both contact knobs a few turns.

.03 Press CALL button, screw in left-hand contact knob until loudest buzz is heard, irrespective of quality or pitch.

.04 Screw in other contact knob slowly until a clear moderately high-pitched note is heard. Buzzer may not start with a very high note.

.05 Press CALL button several times to make certain buzzer starts correctly.

.06 Tighten the LOCK discs, making sure that pitch of note is not changed by so doing.

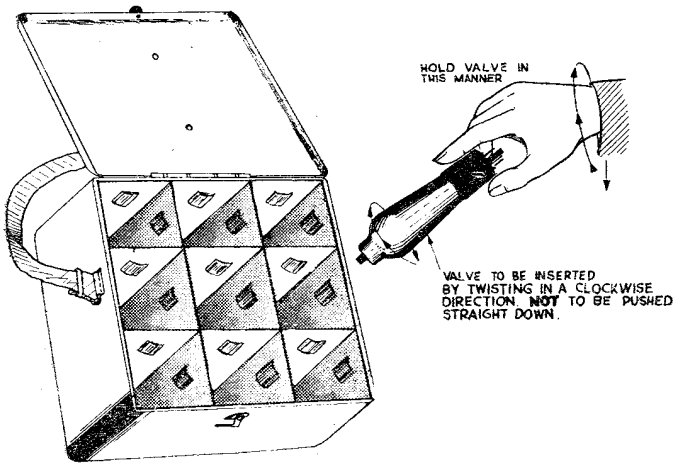


FIG. 8.—HOW TO PUT VALVES IN CASE, SPARE VALVES AND VIBRATOR.

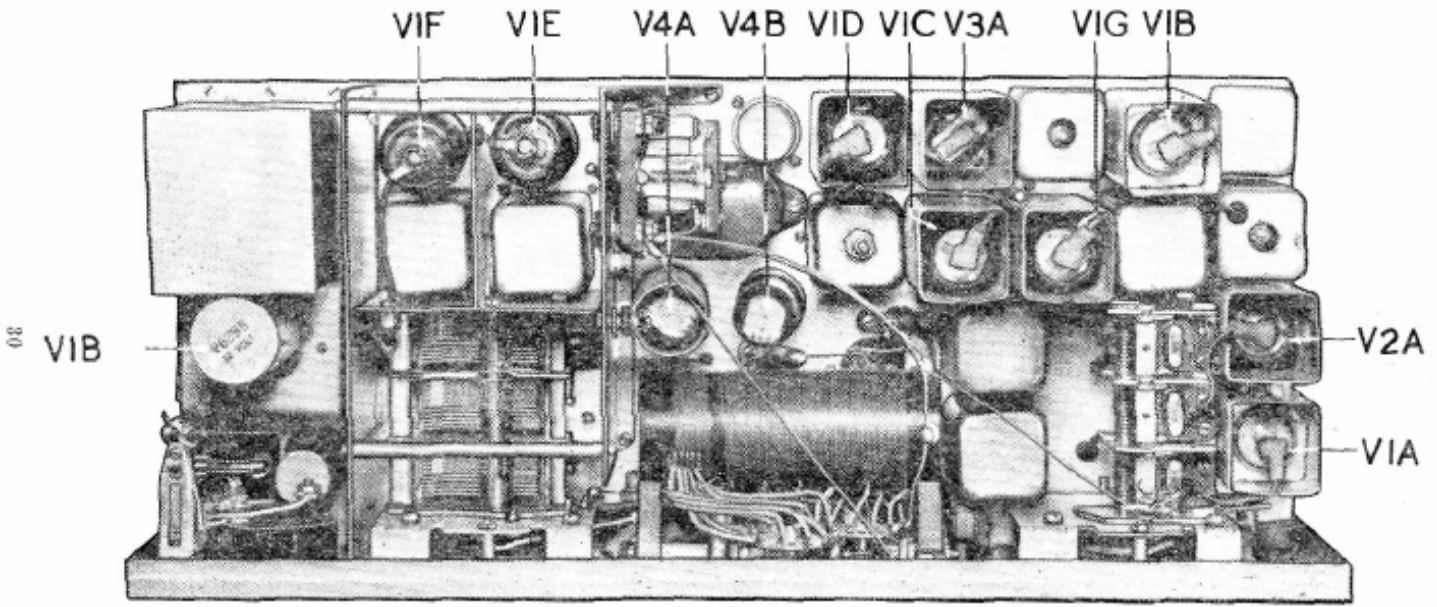


PLATE 6.—W.S. No. ZC.1, MK. II.—TOP VIEW OUT OF CASE.

Chapter 4

LOOKING AFTER THE SET.

1. Your Job—and Why it is Important.

.01 This chapter is NOT written to make you an expert electrician, able to repair every sort of breakdown. There are plenty of electricians in R. Signals to do that, and you have plenty of work of your own without trying to do theirs. But you MUST be able to do THREE things:

.02 Test the set to see whether every bit of it is working. This is rescribed on page 48 under "Daily Maintenance."

.03 Go over the outside of the set, cleaning and straightening, to keep the controls, etc., running smoothly. By looking for parts which are beginning to wear out or come undone, you will often be able to put in "a stitch in time" and prevent a breakdown which would otherwise have happened. The "Weekly Maintenance" paragraph, page 32, tells how to do it.

.04 Repair the more common faults which may occur in the field. Some rules to help you in this are given in "Running Repairs" on page 54.
The vital thing is that you should find out and report anything wrong, AS SOON AS POSSIBLE, so that the electricians can repair it BEFORE THE BATTLE; half way through is TOO LATE, DO IT NOW!

2. Connecting Up the Set, and Changing Parts.

.01 When connecting leads, see that the terminals are screwed down tightly.

.02 When inserting or removing plugs, don't push or pull on the cords. Hold the plug firmly with the thumb and fingers.

.03 Never take the set out of its case except to change valves, vibrator, or fuse. When you do, unscrew the two securing screws in a counter-clockwise direction, unscrewing one a little and then the other a little, and so on. Do not force the screws. Unscrewing will eject the chassis from the case.

3. Daily Maintenance.

.01 Make all the tests in order given on page 48 every day, even if the set is not going to be used.

.02 If you notice any change from the normal operation of any of the controls, then report. Breakdowns can often be prevented if any abnormal operation is reported.

DO IT NOW!

4. Weekly Maintenance.

.01 EVERY WEEK, without being told, you should:—

.02 Do your Daily Maintenance Tests for the day.

.03 Clean the outside of the set with a clean dry cloth. DON'T use Brasso, or water, or petrol.

.04 Check Aerials. (See Fig. 1.)

.05 Controls. Try ALL of them and see that they are NOT jamming nor turning so freely that their settings would alter through the vibration of the vehicle. See that NO knobs are coming off. If they are, have them tightened by the Electrician, Signals.

.06 General. Check all cords and plugs for wear. Examine aerial base and leads. Examine battery leads. Check over microphones and receivers.

.07 Check the equipment against the complete station list on page 46. Make sure all spare valves and fuses and spare vibrator are "good."

.08 REPORT AT ONCE:—

(a) Any faults found which you cannot right.

(b) Any missing pieces.

TO-MORROW MAY BE TOO LATE.

DO IT NOW!

5. Monthly Maintenance.

This is NOT your job. The Electrician, R. Sigs., will inspect and overhaul your set.

6. Running Repairs.

.01 If the set, or any part, works badly, or stops working, try the cure for the particular failure as shown in Table 2, page 54.

.02 DO NOT put faulty valves, fuses or vibrators back in the case. Exchange them for sound ones, and put the sound ones in the case.

7. Remember.

Don't be afraid of your set. Get to know it; treat it with consideration and it won't let you down. It may get you and your friends out of a hole one day.

Notes

APPENDIX I.

SELECTION AND USE OF AERIALS.

.01 Because of the great improvement in communication which can be obtained by careful choice of aerials, the following notes will assist you to make the correct choice.

.02 There are two separate paths by which wireless waves can travel from Sender to Receiver:—

(a) They may go direct along the surface of the earth. These are called GROUND WAVES.

(b) They may shoot upward into the sky and be reflected back to earth again by certain ionised layers in the upper atmosphere. These are called SKY WAVES.

.03 GROUND WAVES become steadily weaker as they pass over the earth, finally becoming too weak to be received properly.

The longer the waves, the further they go.

.04 SKY WAVES are not affected by the intervening country, because they leave the earth at the Sender and return at the Receiver.

.05 The IONISED LAYERS vary in density and height with the time of day and season. Their power of reflection is greater for low than for high frequencies.

Waves of too LOW a frequency are greatly weakened by passage through the layers.

Waves of too HIGH a frequency are not reflected.

The frequency must therefore be carefully chosen.

.06 A sky wave of a certain frequency may be reflected if it strikes the layers at a flat angle, but will penetrate and NOT be reflected if it strikes at too steep an angle.

Therefore, for longer hops use higher frequencies.

This is the opposite to ground waves.

.07 An aerial generally radiates most energy in directions at right angles to itself. Therefore:—

(a) A VERTICAL aerial is used for GROUND WAVES because it radiates most of the power horizontally.

(b) A HORIZONTAL aerial is used for SKY WAVES because it radiates most of the power upwards.

.08 WAVELENGTH and FREQUENCY.

The WAVE LENGTH of a wireless wave is the distance between two successive crests of a wave, generally measured in metres.

The waves travel through space with the speed of light (three hundred million metres per second).

The FREQUENCY is the number of crests which pass any one point in one second.

The distance between crests multiplied by the number of crests passing per second is the distance travelled per second by the wave, that is its speed.

Thus, Wavelength $\times$ Frequency = Speed.

300 million divided by wavelength in metres = Frequency in cycles per sec.

300,000 divided by wavelength in metres = Frequency in kilocycles per sec.

300,000 divided by Frequency in kilocycles = Wavelength in metres.

300 divided by Frequency in megacycles = Wavelength in metres.

.09 TYPES OF AERIAL.

For GROUND WAVES.

The following types of aerial are suitable for use with W.S. No. ZC.1, MK. II., without any extra equipment:—

(a) Aerials substantially vertical—Table A applies.

(b) Vertical rod.

(c) Inverted L—A wire slightly less than $\frac{1}{4}$ wavelength long with up to one-third of the top end suspended horizontally.

(d) T —A T-shaped wire such that length of vertical part plus half the top is just under $\frac{1}{4}$ wavelength.

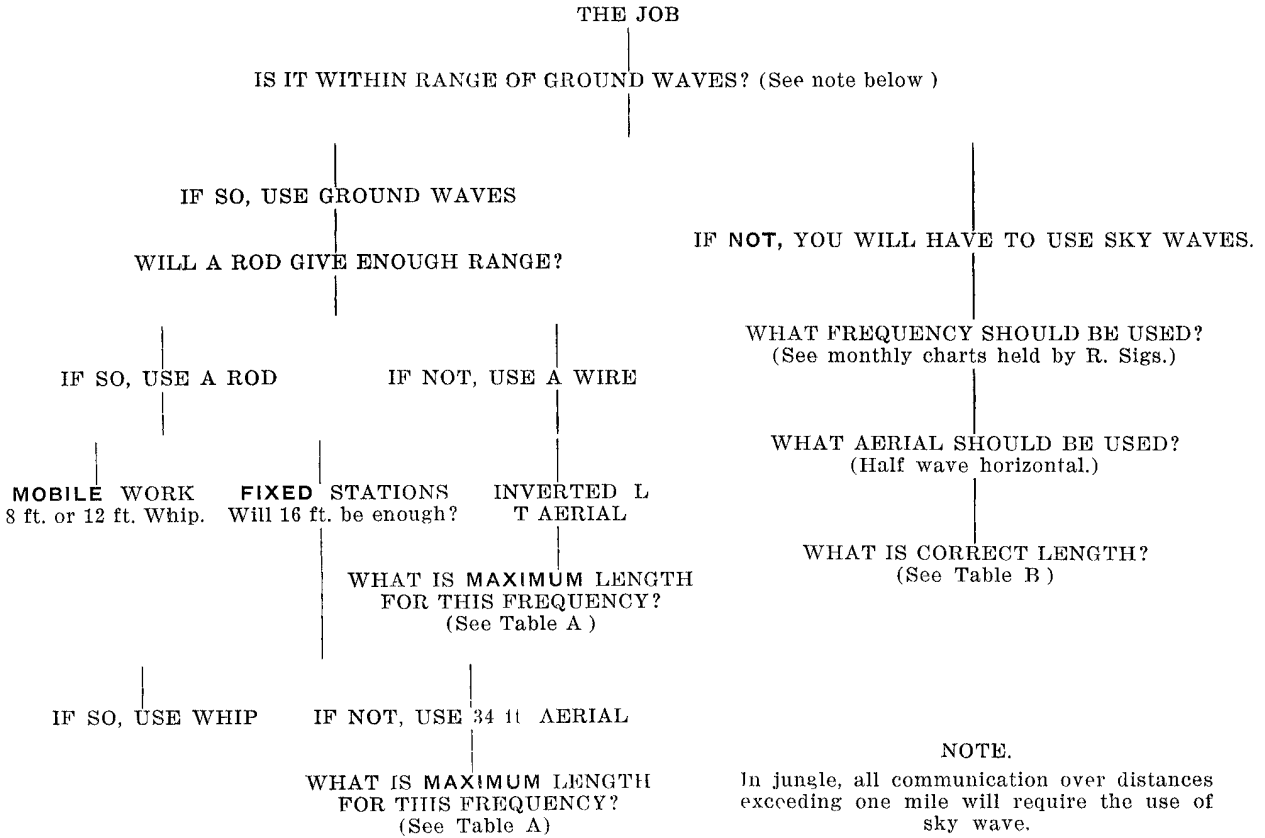
For SKY WAVES.

The following type of aerial can be used with W.S. No. ZC.1, MK. II. with the addition of a coupling condenser connected from AERIAL terminal to GROUND terminal.

(a) Half-wave horizontal—A wire suspended horizontally with one end brought down vertically to the set AERIAL Terminal. Table B shows the the length.

.10 The Tables A and B and the chart which follow will help you to decide on the best type of aerial to use for a particular job.

THE AERIAL FOR THE JOB.



NOTE.

In jungle, all communication over distances exceeding one mile will require the use of sky wave.

TABLE A—QUARTER WAVELENGTHS IN FEET.

NOTE.—These lengths refer to:—

(1) Total length of a vertical rod aerial.
(2) Total length of an inverted L aerial.
(3) Length of vertical part plus one horizontal arm of a T aerial.

Mc/s	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	234	212	195	180	167	156	146	137	130	123
2	116	111	106	101	97	93	90	87	84	81
3	78	75	73	71	69	67	65	63	61	60
4	58	56	55	54	53	52	51	50	49	48
5	47	46	45	44	43	42	42	41	40	39½
6	39	38½	38	37	36½	36	35½	35	34½	34
7	33½	33	32½	32	31½	31	31	30½	30	29½
8	29	29	28½	28	28	27½	27	27	26½	26
9	26	25⅔	25⅓	25	25	24½	24½	24	24	23½
10	23½	Calculated as 95% of a quarter wavelength								

$$\frac{234}{\text{frequency in Mc/s.}} \text{ feet}$$

Including length of Connector, single, 10A, if used.

TABLE B—HALF WAVELENGTHS IN FEET.

NOTE.—These lengths refer to total length of inverted L half-wave aerial.

Mc/s	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	467	425	390	359	334	312	292	275	260	246
2	233	223	213	203	195	187	180	173	167	161
3	156	151	146	142	138	134	130	126	123	120
4	117	114	111	109	106	104	102	100	98	96
5	94	92	90	88	87	85	84	82	81	79
6	78	77	76	74	73	72	71	70	69	68
7	67	66	65	64	63	62	62	61	60	59
8	58	58	57	56	56	55	54	54	53	52
9	52	51	51	50	50	49	49	48	48	47
10	47	Calculated as 95% of a half wavelength								

$$\frac{467.5}{\text{frequency in Mc/s.}} \text{ feet}$$

Including lead-in.

NEW ZEALAND WIRELESS SET ZC.1, MK. II.

Table of Component Values.

RESISTORS.				
Schematic Reference.	Value.	Type.	Wattage.	Tolerance. + or −
*R1A	20,000 ohms	Carbon	2	20%
R2A-G	50,000 „	„	½	„
*R3A	25,000 „	„	2	„
R4A-D	.5 megohm	„	½	„
*R5A	10 „	„	„	„
*R6A-C	.25 „	„	„	„
R7A-E	1 „	„	„	„
R8A-D	100,000 ohms	„	„	„
R9A-B	.5 megohm	Potentiometer	—	—
R10A-B	2,000 ohms	Carbon	½	20%
R11A-B	200 „	„	„	„
R12A	1,000 „	„	„	„
*R13A	1,400 „	„	2	„
R14A	55 „	WW	½	5%
R15A	50 „	Carbon	„	20%
R16A	15,000 „	„	1	„
R17A	20,000 „	„	½	„
R18A	10,000 „	„	„	„
*R19A	500 „	„	2	„
R20A	200 „	WW	1	1%
R21A	20 „	WW	2	5%
R22A	100 „	Carbon	1	20%

*Indicates nominal value shown. Substitute values or combinations of values may be used. These are tabulated on next page.

Table of Substitute Resistors.

Schematic Reference.	Nominal Value.	Nominal Wattage.	Substitute.	Connection Arrangement.
*R1A	20,000 ohms	2	2/40,000 ohm 1 watt 2/10,000 ohm 1 watt	Parallel Series
*R3A	25,000 ohms	2	2/50,000 ohm 1 watt 2/47,000 ohm 1 watt	Parallel Parallel
*R5A	10 megohms	½	1/10 megohm 1/3 watt 2/5 megohm ½ watt	— Series
*R6A-C	.25megohms	½	1/250,000 ohm 1/3 watt 1/240,000 ohm 1/3 watt 1/200,000 ohm 1 watt 1/200,000 ohm ½ watt	— — — —
*R13A	1,400 ohms	2	1/1,000 ohm 2 watt and 1/400 ohm 2 watt 2/2,800 ohm 1 watt	Series Parallel
*R19A	500 ohms	2	2/1,000 ohm 1 watt	Parallel

Table of Component Values.—(Continued.)

CONDENSERS.				
Schematic Reference.	Value.	Type.	Voltage Rating.	Tolerance. + or —
C1A	15 mmfd.	Silvered mica	—	20%
C2A-C	—	Plessey gang modified	—	—
C2D-F	—	„ „ „	—	—
C3A	5-35 mmfd.	Variable	—	—
C4A	.02 mfd.	Paper, metal cased Insulated	400	20%
C5A-B	.02 mfd.	Paper, metal cased	400	„
C6A-H	.1 mfd.	„ „ „	400	30%
C7A-J	3-30 mmfd.	Philips air trimmer	—	—
C8A-G	.0001 mfd.	Postage stamp mica	400	20%
C9A-B	500-1200 mmfd.	Semi fixed	—	—
C10A	.0005 mfd.	Postage stamp mica	400	10%
C11B-C	„	„ „ „	400	20%
C12A	.0015 mfd.	„ „ „	400	10%
C13A-D	.00008 mfd.	Philips mica	400	2½%
C14A-C	.25 mfd.	Paper, metal cased	400	20%
C15A-E	.00005 mfd.	Mica postage stamp	400	„
C16A-M	004 mfd.	„ „ „	400	„
C17A	.02 mfd.	Paper, metal cased Insulated	600	„
C18A-F	10 mfd.	Double section electrolytic	450	—
C19A-B	25 mfd.	Metal cased tubular electrolytic	25	—
C20A	5 mmfd.	Silvered mica	400	20%
C21A-B	.001 mfd.	Mica postage stamp	400	„
C22A-C	.00025 mfd.	„ „ „	400	„
C23A-B	.011 mfd.	Mica	1,800	10%

Table of Component Values.—(Continued.)

INDUCTANCE

Code	Purpose
L1A-L2A*	Aerial, Receiver
L3A-C	Chokes, R.F., Anode
L4A-L5A*	Interstage, Receiver
L6A-L7A*	Oscillator, Receiver
L8A	Transformer, I.F., No. 1
L8B	Transformer, I.F., No. 2
L9A-C	Chokes R.F., H.T.
L10A	I.F., Oscillator (BFO)
L11A-B*	Loading, Aerial tuning
L12A	Amplifier, power, tank, L.F.
L13A	Amplifier, power, tank, L.F.
L14A	Chokes, H.F., parasitic suppressor
L15A-L16A*	Driver, tuning
L17A-L18A*	Master, oscillator
L19A	Chokes, A.F., Modulation reactor
L20A	Chokes, A.F., Filter
L21A	Chokes, R.F., L.T.

*Indicates wound on one former and not separately demandable.

TRANSFORMERS

Code	Purpose
T1A	Telephone
T2A	Microphone
T3A	Vibrator

SWITCHES

Code	Type
S1A	9 pole, 2 position
S2A	4 pole, 3 position
S3A	6 pole, 3 position
S4A-B	On-Off, S.P., No. 1
S5A-B	1 pole, 11 position
S6A	3 pole, 3 position (3-ganged)
S7A	Push, D.P.D.T.
S8A	On-Off, S.P., 10 amp.

RELAYS

Code	Type
A — 3	3 pole, 2 position
B — 1	1 pole, 2 position

JACKS

Code	Type
J1 (AB)	Telephone
J2 (AB)	Mic.-Line
J3A	Key

VALVES

Code	Type
V1A-G	6U7G
V2A	6K8G
V3A	6Q7GT
V4A-B	6V6GT/G

METERS

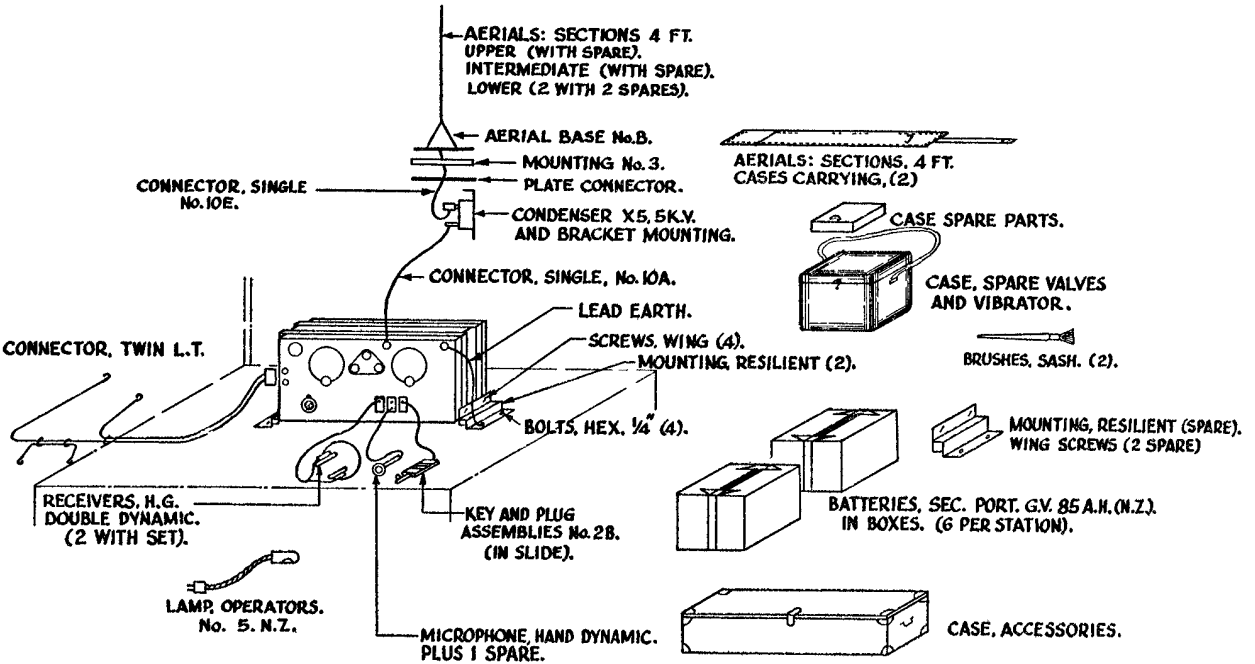
Code	Type
M1	Ammeter, D.C., 2½" or 2", 0-100 M.A.

FUSES

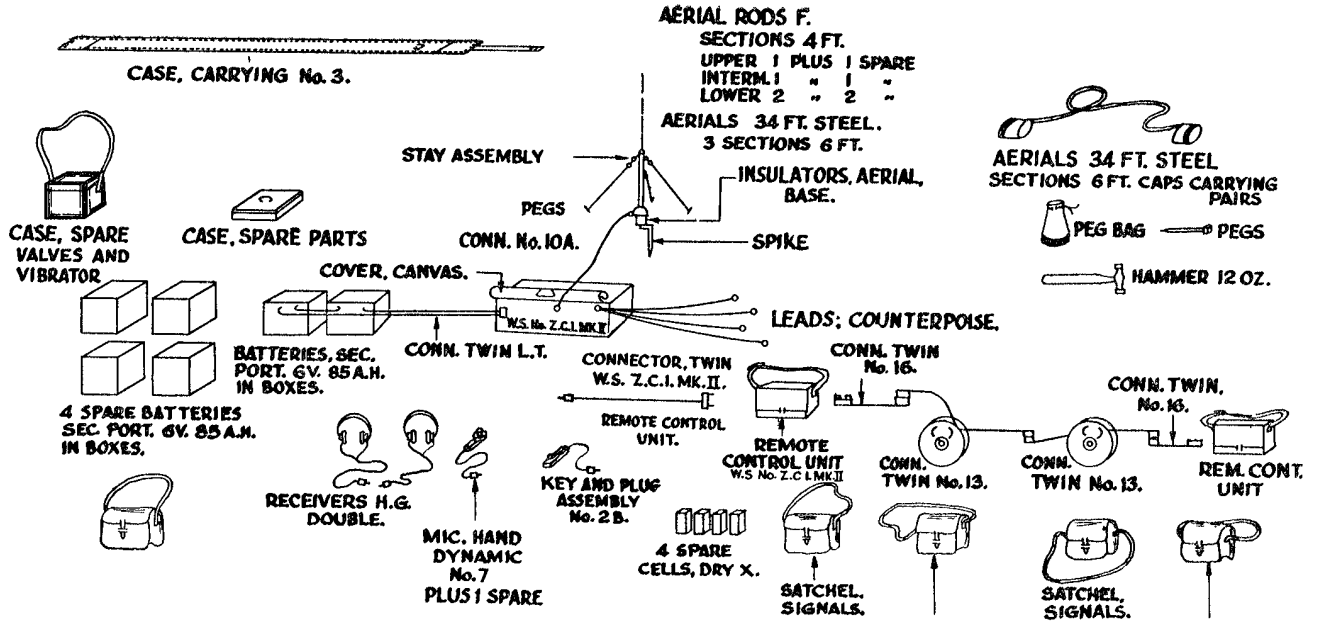
Code	Type
F1	15 amp., 1¼" × ¼"

VIBRATORS

Code	Type
V1B	12v., Synchronous



W.S. Z.C.1. MK.II. AS TRUCK STATION.
FIG. 9



W.S. No. Z.C.I. MK.II., AS A GROUND STATION.

FIG. 10.

WEIGHTS AND DIMENSIONS.

Item.	Total Weight (lbs.)	Length (ins.) each	Width (ins.) each	Height (ins.) each
SET KIT.				
(a) Wireless Set No. ZC. 1, MK. 11, complete with covers.	58½	22¼	10½	10
(b) Batteries, secondary, portable, 6v, 85 Ah in boxes (2).	120	11	17	13
(c) Ditto (spare) (4).	240	11	34	13
(d) Satchel, signals. containing 2 microphones, 2 pairs receivers and key.	7	11	4½	8
(e) Case, accessories, containing remainder of Set Kit and 4 spare cells, dry, x.	35	43	9½	7½
TOTAL WEIGHT OF SET KIT.	460½			
REMOTE CONTROL KIT. 2 PER STATION.				
(a) Remote control Units.	19½	9	5½	5¾
(b) Satchel, signals, containing 2 microphones and 2 receivers.	7	11	4½	8
(c) Satchel, signals, containing connector twin No. 13.	16½	11	4½	9
TOTAL WEIGHT OF REMOTE CONTROL KIT.	43			

WEIGHTS AND DIMENSIONS—continued.

Item.	Weight (lbs.)	Length (ins.)	Width (ins.)	Height (ins.)
STANDARD AERIAL KIT.				
(a) Aerial base, mounting plate connector, condenser and bracket.	3	5	5	8½
(b) 8 Sections, 4ft. in case.	4	50½	2¼	2
(c) 3 Sections, 6 ft. with caps, carrying.	10	72	4	3
(d) Stay - assemblies and spares.	2			
(e) Insulator, aerial base, with spike and adaptor, and remainder of kit.	8	16	4	4
TOTAL WEIGHT OF AERIAL KIT.	27			
TOTAL WEIGHT OF COMPLETE STATION	530½			

Item No.	N.Z. Part No.	ITEM.	Min. for Work.	Essential Spares.	TOTAL.
		Section W2.			
1	WB0071	Bulbs, 6v., J.	1	3	4 (b)
		Section Z1.			
2	GA200	Key and Plug Assemblies, No. 2B (NZ)	1	—	1 (a) or (c)
3	GA201-2	slides	1	—	1 (a) or (c)
4	GA104	Lamps, operators, No. 5 (NZ)	1	—	1 (b)
5	GA300	Microphones, Hand, No. 7, complete	1	1	2 (c)
6	GA302	Receivers, headgear, double, type F, complete	2	—	2 (c)
7	SS1	Satchels, signals	1	—	1
		Valves, WT type—			
8	VGT2	6Q7GT	1	1 (d)	2
9	VG1	6K8G	1	1 (d)	2
10	VG3	6U7G	7	4 (d)	11
11	VGT/G4	6V6GT/G	2	1 (d)	3
12	VB1	Vibrators, 12v., 7-pin	1	1 (d)	2
13	WS3	Wireless Sets, No. ZC. 1, Mk. II.	1	—	1
14	2GA103	Cases, accessories	1	—	1
15	2GA101	Cases, spare parts	1	—	1 (a)
16	2GA102	Cases, spare valves and vibrator	1	—	1 (a)
17	2B104	Connectors, twin, LT	1	—	1 (a)
18	2GA105	Covers, canvas	1	—	1
19	F1	Fuses, 15-amp	1	3 (b)	4
20	AE113	Leads, earth	1	—	1 (a)
21	A152	Mountings, resilient	2	1 (a)	3
22	A152-4	Screws, wing	4	2 (b)	6
23	WSB3A	Working Instructions, Part 1	1	—	1 (a)
		Section Z2.			
24	B100	Batteries, secondary, portable, 6v., 85AH (NZ)	2	4	6
25	B103	Boxes	2	4	6
		REMOTE CONTROL KIT.			
		Section W2.			
26	WB0200	Cells, dry X	4	4 (a)	8
		Section Z1.			
27	2RC101	Connectors, plug, remote control, W.S. No. ZC. 1, Mk. II.	2	—	2 (e)

28	RC201	Connectors, twin, No. 13 (NZ)	2	—	2 (c)
29	RC301	Connectors, twin, No. 16 (NZ)	2	—	2 (e)
30	GA303	Microphones, hand, No. 8 (NZ)	2	—	2 (c)
31	GA302	Receivers, headgear, double, type F, complete	2	—	2 (c)
32	RCU1	Remote Control units, W.S. No. ZC. 1. Mk. II.	2	—	2
33	SS1	Satchels, signals	4	—	4
		STANDARD AERIAL KIT.			
		Section F.			
34	GA203	Hammers, 12 oz.	1	—	1 (a)
		Section Z1.			
35	AE200	Aerial bases, No. 8 (NZ)	1	—	1 (f)
36	AE202	Mountings, No. 3	1	—	1 (f)
37	AE203	Plates, connector, No. 2	1	—	1 (f)
		Aerials, 34 ft., steel (NZ)—			
38	AE107	Adaptors	1	—	1 (a)
39	AE102	Insulators, aerial base	1	—	1 (a)
40	AE104	spikes	1	—	1 (a)
41	AE105	Stay assemblies	1	—	1 (a)
42	AE105-7	Stays, single	—	1	1 (a)
43	AE-105-5	Stay-tighteners, small	—	1	1 (b)
44	AE106	Pegs	3	1	4 (a)
45	AE106-1	Peg-bags	1	—	1 (a)
46	AE108-3	Sections, 4 ft. upper	1	1	2
47	AE108-2	intermediate	1	1	2
48	AE108-1	lower	2	2	4
49	AE108-4	cases, carrying	1	—	1
50	AE101	6-ft.	3	—	3
51	AE101-8	caps, carrying, pairs	1	—	1
52	AE111	Connectors, single, No. 10 A	2	—	2 (a)
53	AE112	No. 10 E	1	—	1 (f)
54	AE204	Condensers, X5, 5KV (NZ)	1	—	1 (f)
55	AE204-1	Brackets, mounting	1	—	1 (f)
56	AE110	Leads, counterpoise, No. 2	1	—	1 (a)
57	AE205	W S. No. ZC. 1, Mk. II. Aerial Coupling Unit	1	—	1 (g)

(a) Carried in Case, accessories.
(b) Carried in Case, spare parts.
(c) Carried in Satchels, signals.
(d) Carried in Case, spare valves and vibrator.
(e) Carried in pouch, strap carrying, Remote Control Unit W.S. No. ZC. 1, Mk. II.
(f) When not mounted in vehicle, carried in Case, accessories.
(g) Separately demandable—for use with Aerials, horizontal, half-wave, end fed.

TABLE 1. TESTS FOR DAILY

Part of Set Tested.	No.	Test.	What Should Happen.
Receiver	1	(a) Connect batteries as Section 3.04, Chap. 2. (b) Plug in operator's lamp. (c) Plug in Receivers headgear. (d) Turn NET - NORMAL - REMOTE switch to NORMAL. (e) Turn RECV. VOL. knob full clockwise. (f) Switch BATTERY OFF-ON switch to ON position. (g) Turn Receiver BAND switch to HF. (h) Turn CRASH LIMITER knob OFF.	Operator's light should light. After 30 secs. hiss heard in Receivers headgear.
	2	(a) Turn RECEIVER DIAL from 8.0 to 4.0 Mc/s. (b) During (a) above keep REC.AE TUNE knob adjusted for maximum noise.	(a) Fairly strong hiss should be heard over whole range. Hiss is somewhat louder towards HF end of range.
	3	(a) Turn Receiver BAND switch to LF. (b) During (a) above keep REC.AE TUNE knob adjusted for maximum noise.	(a) As 2 (a) above.
	4	(a) Tune to a position of loud noise. (b) Turn CRASH LIMITER knob to ON position, then to OFF position.	(a) Noise should decrease when in ON position.
Sender CW operation NOT TO BE TESTED IF UNDER WIRELESS SILENCE.	5	(a) Turn SENDER ON/OFF switch ON. (b) Plug in Key. (c) Turn knob CW-MCW-RT to CW position. (d) Turn SENDER AERIAL TUNE Knobs to position 1. (e) Turn Sender BAND switch to HF. (f) Press Key.	(a) ANODE meter should show reading of from 15 to 20 milliamperes. (b) Receiver hiss should disappear and MCW Sidetone should be heard in receivers headgear.

What Should NOT Happen	What is Likely to be Wrong.	What to Do About It.
(a) Lamp does NOT light. NO hiss in receivers headgear.	(a) Leads from battery not connected.	Check connector twin LT to batteries and set.
(b) Lamp does NOT light, but hiss IS heard.	(b) Bulb burnt out.	Replace bulb.
(c) Lamp lights but NO hiss is heard.	(c) Receivers headgear faulty.	See that plug is properly in PHONE 1 or PHONE 2. If available try another Receivers headgear.
(a) Weak hiss heard.	(a) Low batteries.	Check by pressing PRESS TO READ LT switch.
	(b) Valve or valves defective.	Report.
	(c) Receiver badly out of alignment.	Report.
(a) As 2 (a) above.	(a) As 2 (a) above.	Report.
(a) No change in noise.	(a) Internal fault.	Report.
(a) No ANODE meter reading.	(a) Key or key connection faulty.	See that key plug is properly in KEY jack. See that key contacts are clean. DO NOT USE A FILE.
(b) On tuning SENDER dial from 8.0 to 4.0 the ANODE meter should NOT alter its reading more than 5 M.A.	(b) SENDER section badly out of alignment.	Report.
(a) Receiver hiss should not continue.	(a) Internal fault.	Report.
(b) Receiver hiss stops but no MCW sidetone heard in receivers headgear.	(a) Internal fault.	Report.

TABLE 1 (continued). TESTS FOR DAILY

Part of Set Tested.	No.	Test.	What Should Happen.
	6	(a) Turn SENDER BAND Switch to LF.	(a) ANODE meter should show reading of from 15 to 18 Milliamperes.
	7	(a) Operate key.	(a) ANODE meter pointer should move upwards when key is depressed and return when released.
	8	(a) Connect Aerial. (b) Adjust SENDER dial to your allotted operating frequency. (c) Depress Key. (d) Adjust SENDER AERIAL TUNE Knobs in accordance with Chap. 3, Sec. 6.12 to 6.14.	(a) ANODE meter should rise to between 30 and 40 M.A.
	9	(a) Turn CW-MCW-RT switch to MCW position.	(a) ANODE meter should rise or kick slightly. (b) MCW sidetone should be heard.
Sender R/T operation NOT TO BE TESTED IF UNDER WIRELESS SILENCE.	10	(a) Release Key. (b) Plug in microphone. (c) Turn knob CW-MCW-RT to RT position. (d) Press Pressel switch on microphone.	(a) ANODE meter should indicate slightly less than the reading obtained in 8 (a) above.
	11	(a) Speak loudly into microphone with Pressel switch depressed.	(a) ANODE meter needle kicks. (b) Sidetone heard in receivers headgear.
Netting of Sender and Receiver.	12	(a) Release Pressel switch on microphone. (b) Turn NET - NORMAL - REMOTE knob to NET position. (c) Turn CW-MCW-RT switch to CW position. (d) Adjust SENDER tuning dial to 4.0. (e) Tune RECEIVER tuning dial over 4.0.	(a) High pitched whistle becoming lower then higher heard as RECEIVER tuning dial is turned slowly.

What Should NOT Happen	What is Likely to be Wrong.	What to Do About It.
(a) On Tuning SENDER dial from 4.0 to 2.0 the ANODE meter should not alter its reading more than 5 M.A.	(a) SENDER section badly out of alignment.	Report.
(a) ANODE meter should NOT remain steady.	(a) Key circuit short circuited.	See that key plug is pushed properly home in jack, NOT HALF WAY OUT.
(a) No or little change in ANODE meter reading.	(a) Aerial connections faulty, or wrong type of aerial.	Check connections and type of aerial.
	(b) Aerial tuning inductance or switches faulty.	Report.
(a) No change in ANODE meter reading.	(a) Internal fault.	Report.
(b) No MCW sidetone heard.	(b) Internal fault.	Report.
(a) No ANODE reading.	(a) Connections to microphone pressel switch defective.	See that microphone plug is properly in jack marked MIC. Try other microphone.
(a) No movement of meter needle.	(a) Defective microphone.	Try other microphone.
	(b) Internal fault.	Report.
(a) No sidetone heard.	(a) Defective microphone.	Try other microphone.
	(b) Internal fault.	Report.
(a) No whistle heard.	(a) Wrong tuning.	See that both SENDER and RECEIVER dials are set correctly.
	(b) Internal fault.	Report.
(b) Zero beat (see fig. 6) obtained at different readings of SENDER and RECEIVER dials.	(a) RECEIVER or SENDER out of alignment.	Report.

TABLE 1 (continued). TESTS FOR DAILY

Part of Set Tested.	No.	Test.	What Should Happen.
	13	(a) Turn Receiver BAND switch to H.F. (b) Turn Sender BAND switch to H.F. (c) Adjust SENDER tuning dial to 7.0. (d) Tune RECEIVER tuning dial over 7.0.	(a) As in 12 (a) above.
Tuning Dial Index Resetting.	14	(a) Set SENDER Red flick mechanism at 7.0. (b) Set RECEIVER Red flick mechanism with receiver tuned to Zero beat when on NET position as in 12 above. (c) Turn both RECEIVER and SENDER tuning dials into Red flick position twice from the right and twice from the left.	(a) Not higher than a low or middle pitched note should be heard in receivers headgear.
	15	(a) Set SENDER Blue flick mechanism at 4.0. (b) Set RECEIVER Blue flick mechanism with receiver tuned to Zero beat when on NET position as in 12 above. (c) Turn both RECEIVER and SENDER tuning dials into Blue flick position twice from the right and twice from the left.	(a) A whistle higher pitched than a growl should not be heard in receivers headgear.
General.	16	(a) Check all controls.	(a) Controls should feel "smooth" and operate.

What Should NOT Happen	What is Likely to be Wrong.	What to Do About It.
(a) As in 12 (a) above.	(a) As in 12 (a) (b) (a) above.	As in 12 above.
(a) High pitched note is heard.	(a) Screws clamping not properly tightened.	Tighten screws.
	(b) Faulty detent mechanism.	Report.
(a) High pitched note is heard.	(a) Screws clamping not properly tightened.	Tighten screws.
	(b) Faulty detent mechanism. Internal fault.	Report.
(a) Controls jam, feel "rough" or fail to operate.	(a) Internal fault.	Report.

TABLE 2. RUNNING REPAIRS.

Failure.	Possible Cause.	Possible Cure.
A. **POWER SUPPLY.**		
(1) No METER reading when PRESS TO READ LT button pressed.	(a) Battery connections defective. (b) Battery connections reversed.	Check connections, making sure that Positive lead goes to Positive terminal and Negative lead to Negative terminal.
(2) No ANODE meter reading when key depressed. Receiver completely dead. Vibrator does NOT "Buzz." Valves do NOT light.	(a) Fuse blown due to sticking vibrator or some internal fault.	Remove vibrator, replace fuse. Then if fuse blows, Report. If fuse remains intact fit spare vibrator. If still faulty. Report.
(3) No ANODE meter reading when key depressed. Receiver completely dead. Vibrator does NOT "Buzz." Valves light.	(a) Faulty vibrator.	Replace.
B **RECEIVER.**		
(1) Receiver completely dead. Vibrator "Buzzes" Valve or valves do NOT light	(a) Valve or valves faulty.	Replace valves, REMEMBERING— If V1A is burnt out V2A will not light and vice versa. If V1B " " V3A " " " " If V1C " " V1D " " " " So that if TWO valves do NOT light try each valve SEPARATELY before replacing BOTH. See that all valves shown above are lighting. If not replace.
(2) Receiver dead or weak. Vibrator "Buzzes." Valves all light.	(a) Loose clips valves connection.	Tighten.
	(b) Valve or valves faulty. REMEMBER THAT a valve may light and STILL BE FAULTY.	Replace valves in turn in the following order—V1C, V3A, V1B, V2A, V1A.
(3) Receiver O.K. on RT and MCW. No whistle on stations when CW-MCW-RT switch turned to CW.	(a) Valve V1D faulty.	Replace.

(4) Receiver very noisy.	(a) Loose aerial connections.	Check, tighten where loose. Report.
	(b) Loose valves or clips valve connection.	Tighten where loose. Report.
C. **SENDER.**		
(1) No ANODE meter reading when key depressed on CW or MCW. Send Receive keying relay does NOT operate.	(a) Key plug NOT pushed home.	Push key plug right home in key jack.
	(b) Key connections faulty.	Examine plug and key connections, repair if possible, otherwise report.
(2) No ANODE meter reading on CW MCW or RT. Valves V4A and V4B not lighting.	(a) Valves V4A or V4B faulty.	Replace. REMEMBER that if V4A is burnt out V4B will NOT light and vice versa, so observe caution as in B (1).
(3) No ANODE meter reading on CW, MCW, or RT.	(a) Valve V4A defective.	Replace.
(4) ANODE meter reads approx. 60 milliamperes on CW, MCW, and RT.	(a) Clips valve connection, valves V1E or V1F loose.	Tighten.
	(b) Valves V1E or V1F faulty.	Replace in turn.
(5) Sender operates on RT. No MCW sidetone heard in receivers headgear on CW or MCW.	(a) Valve V1G faulty.	Replace.
	(b) Internal fault.	Replace.
(6) Sender operates on CW and MCW. No kick of ANODE meter needle when speaking loudly into microphone on RT.	(a) Microphone, hand dynamic, plug NOT pushed home.	Push plug right home in MIC Jack.
	(b) Microphone, hand dynamic, plug or connections faulty.	Try other microphone, hand dynamic.
	(c) Valves V1G or V4B faulty.	Replace in turn.
(7) RECEIVER and SENDER operating correctly but NO whistle heard when NETTING.	(a) Internal fault.	Report.

Notes

REMOTE CONTROL UNIT, WIRELESS SET ZC.I, MKII.

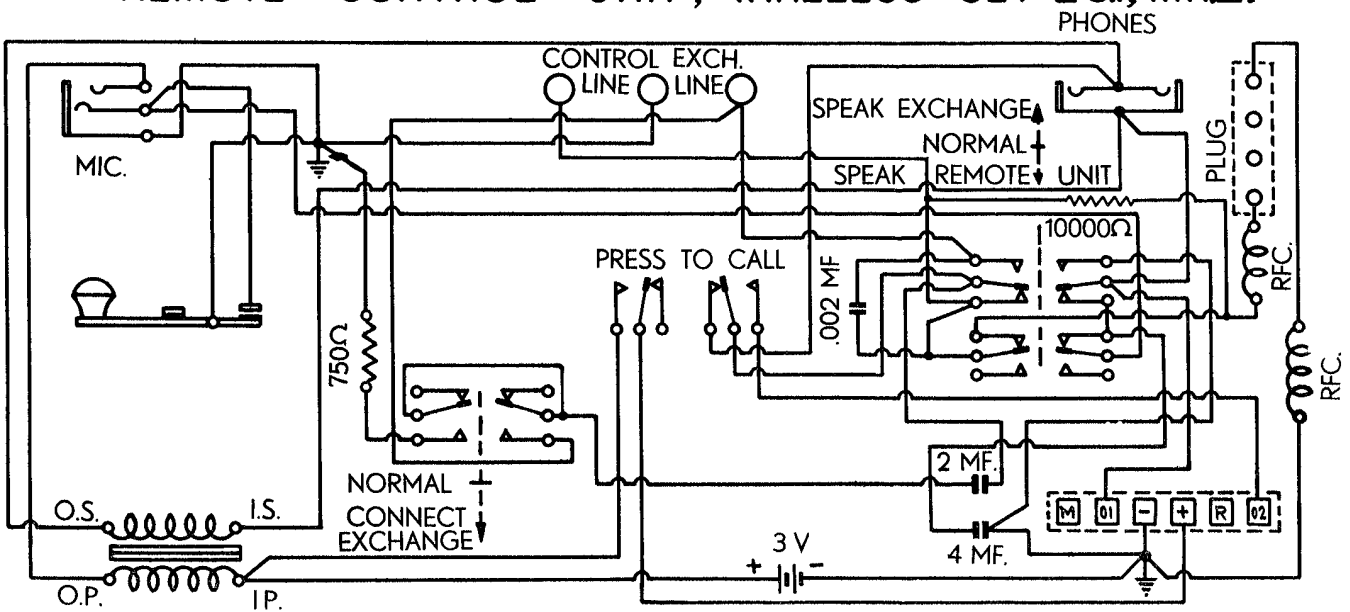


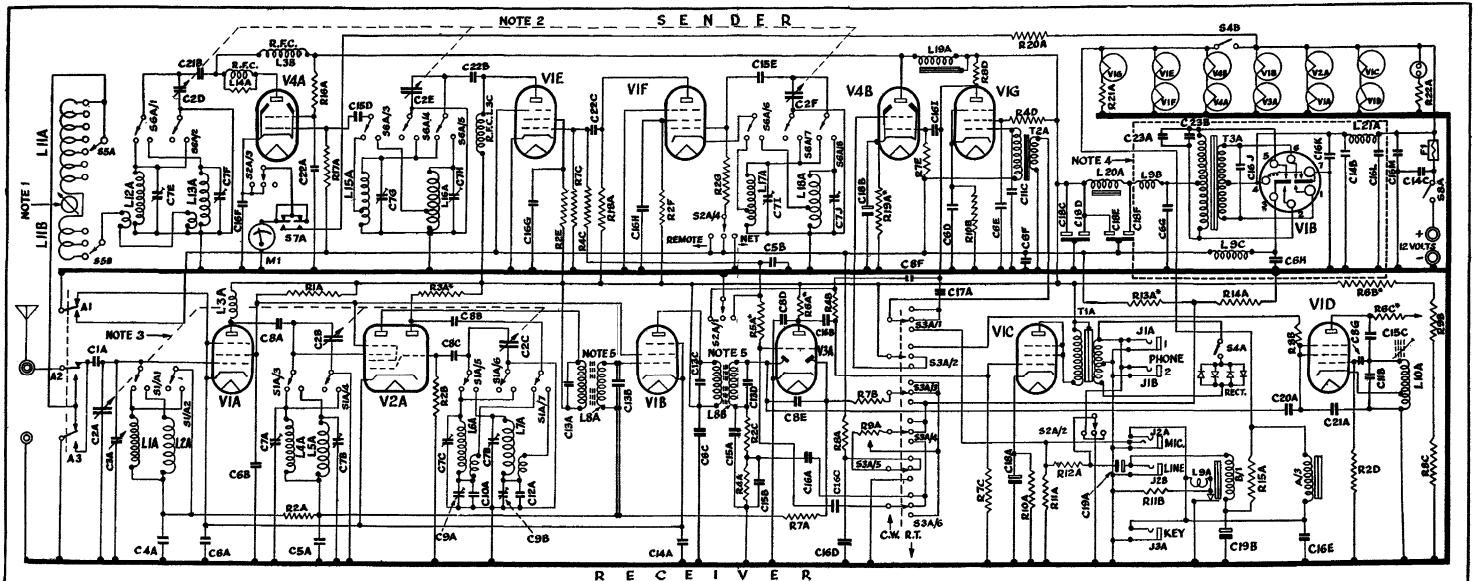
FIG. 11.

TABLE 3.

TABLE OF SWITCHING.

Refer Schematic (Fig. 12).

Code	Contacts	Type	Purpose	Shown in Position
S1A	S1A/1 S1A/2 S1A/3 S1A/4 S1A/5 S1A/6 S1A/7	9 Pole, 2 Pos.	RECEIVER, BAND SWITCH	LF
S2A	S2A/1 S2A/2 S2A/3 S2A/4	4 Pole, 2 Pos.	NET-NORMAL-REMOTE	NORMAL
S3A	S3A/1 S3A/2 S3A/3 S3A/4 S3A/5 S3A/6	6 Pole, 2 Pos.	CW-MCW-RT	MCW
S4A	S4A	1 Pole, 2 Pos.	CRASH LIMITER, ON/OFF	OFF
S4B	S4B	1 Pole, 2 Pos.	SENDER, ON/OFF	OFF
S5A	S5A	1 Pole, 11 Pos.	SENDER AERIAL TUNE, COARSE	—
S5B	S5B	1 Pole, 11 Pos.	SENDER AERIAL TUNE, FINE	—
S6A	S6A/1 S6A/2 S6A/3 S6A/4 S6A/5 S6A/6 S6A/7 S6A/8	3 Ganged — 3 Pole, 2 Pos.	SENDER, BAND SWITCH	LF
S7A	S7A	2 Pole, 2 Pos. Press	PRESS-TO-READ L.T.	NORMAL
S8A	S8A	1 Pole, 2 Pos.	L.T. BATTERY, ON/OFF	OFF



NOTE 1. "VERNIER ANT. CCT. TUNING CONTROL" - METAL DISC ROTATABLE WITHIN FORMER OF AERIAL TUNING COILS.

NOTE 2. C2 D,E,F GANGED CONDENSERS - SENDER TUNING.

NOTE 3. C2A,B,C GANGED CONDENSERS - RECEIVER TUNING.

NOTE 4. ALL COMPONENTS SHOWN ENCLOSED IN DOTTED LINE ARE IN POWER SUPPLY UNIT.

NOTE 5. CONDENSERS C13A-D INTEGRAL WITH I.F. UNIT.

NOTE 6. S1A/1-7 "RECEIVER BANDSWITCH" SHOWN IN L.F. POSITION.

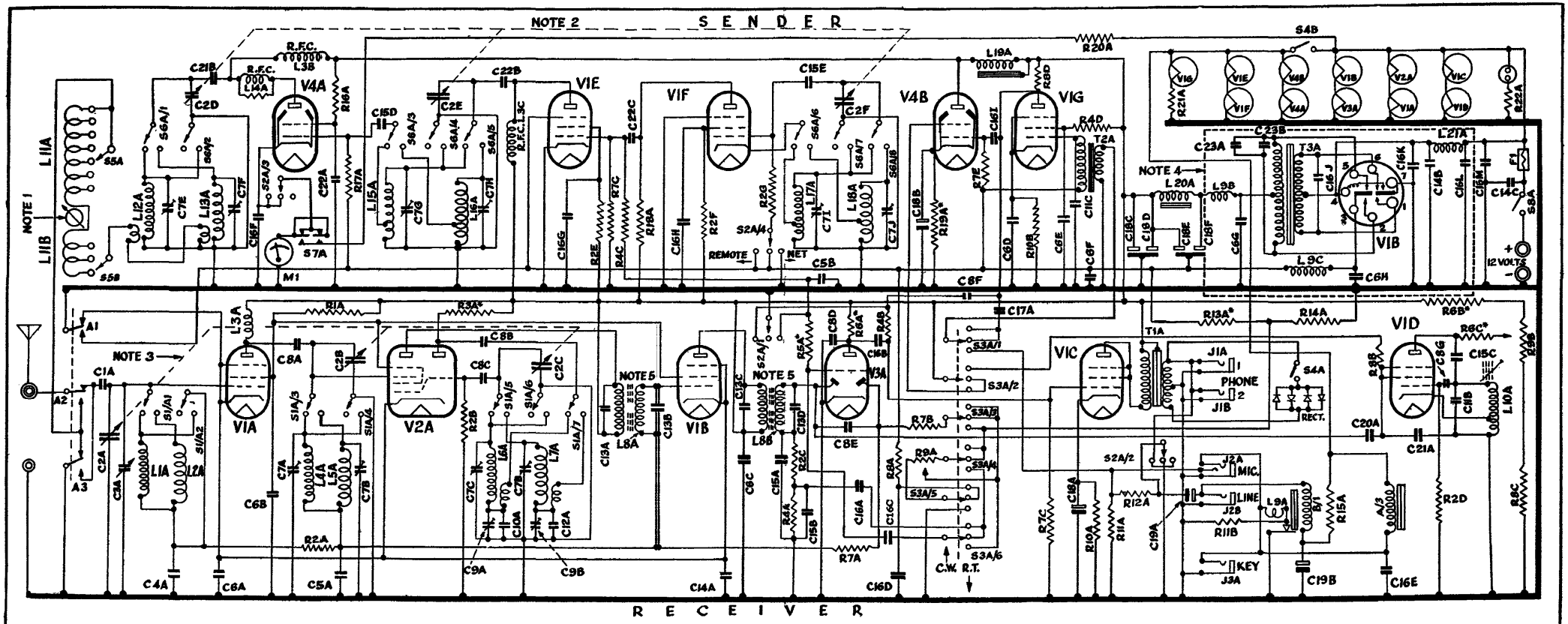
S2A/1-4 "NET-NORMAL-REMOTE" SWITCH SHOWN IN NORMAL POSITION - ALL 4 MOVING ARMS TO RIGHT FOR NET AND TO LEFT FOR REMOTE.

S3A/1-6 "CW-MCW-RT" SWITCH SHOWN IN M.C.W. POSITION - ALL 6 MOVING ARMS DOWN FOR R.T. UP FOR C.W.

S6A/1-8 "SENDER BANDSWITCH" SHOWN IN L.F. POSITION.

S7A "PRESS TO READ LT" SWITCH - ARMS MOVE DOWN TO READ LT.

WIRELESS SET NO. ZC.1, MK. II. - SCHEMATIC. FIG. 12.



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