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AUSTRALIAN MILITARY FORCES

Handbook
(Z A A 4 8 7 3)

FOR

WIRELESS SETS
No. 22 (AUST.)
& No. 122 (AUST.)

1945

PREPARED FOR THE MASTER GENERAL OF THE ORDNANCE AND ISSUED UNDER THE DIRECTION OF THE COMMANDER-IN-CHIEF HEADQUARTERS, AUSTRALIAN MILITARY FORCES

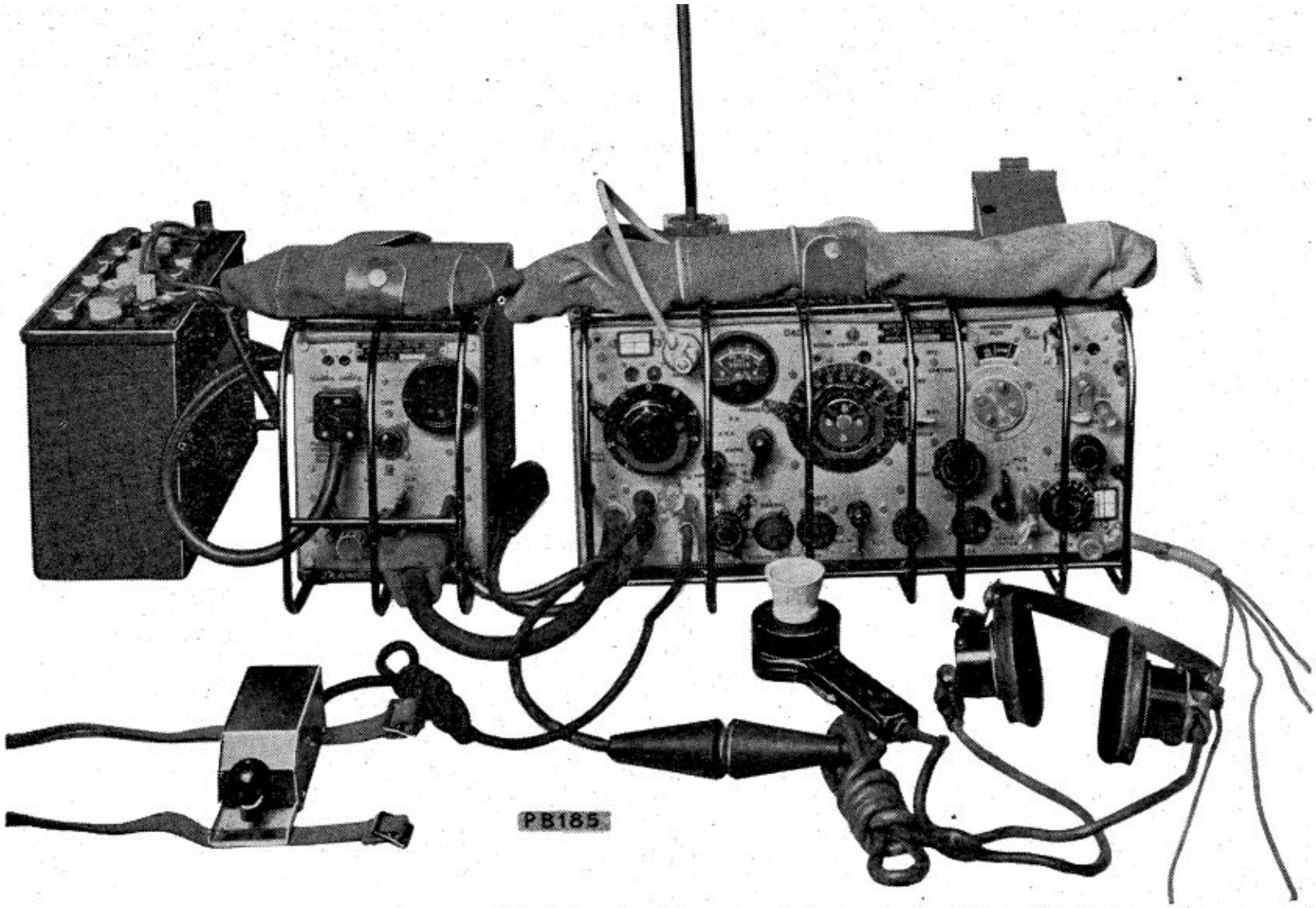

Plate 13. WIRELESS SET No. 22 (Aust.) — View of Complete Station

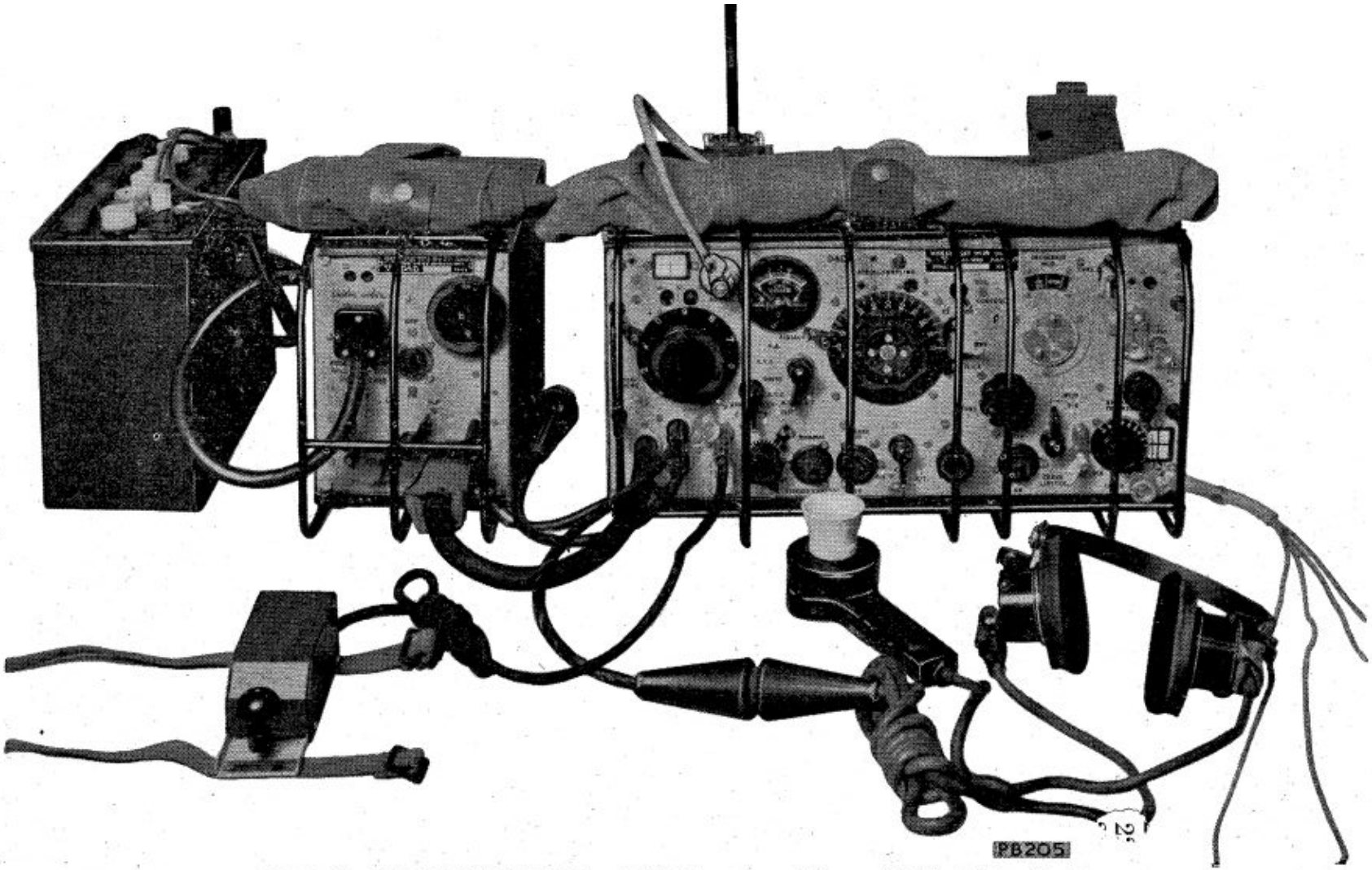

Plate 15. WIRELESS SET No. 122 (Aust.) — View of Complete Station.

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WIRELESS SETS
NO. 22 (AUST.) & NO. 122 (AUST.)

HANDBOOK

Chapter 1

GENERAL DESCRIPTION

1.1 General Features.

Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) is a combined Sender/Receiver intended for use as :

(i) Ground Station.
(ii) Vehicle Station
(iii) Manpack Station

Features of its design are high efficiency and light weight. The equipment is designed for operation on C.W., M.C.W., and R/T and its frequency range is such that it can be used to communicate with all other generally used types of Army wireless sets.

When used as a Man-Pack station the complete Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) equipment, including batteries and aerial equipment is arranged in such a manner that the loading for any one of the three men comprising the station personnel does not exceed 35 lbs. See page 2 for method of carrying.

1.2 Frequency Range.

The Sender/Receiver tunes over the frequency range from 2 to 8 Mc/s. (150 to 37.5 metres) covered in two bands, i.e. 2 to 4 Mc/s. (150 to 75 metres) and 4 to 8 Mc/s. (75 to 37.5 metres)

The circuits of the Sender/Receiver are so associated that the main tuning control of the receiver is also the tuning control for the sender. By use of the "Netting Trimmer," the sender is always automatically adjusted to transmit signals on the same frequency as those being received.

1.3 Crystal Operation (W.S. 122).

Provision is made for operation of the transmitter with crystal controlled oscillator. Two crystals may be used, from which either the fundamental or second harmonic frequencies may be transmitted.

MAN-CARRIED STATION

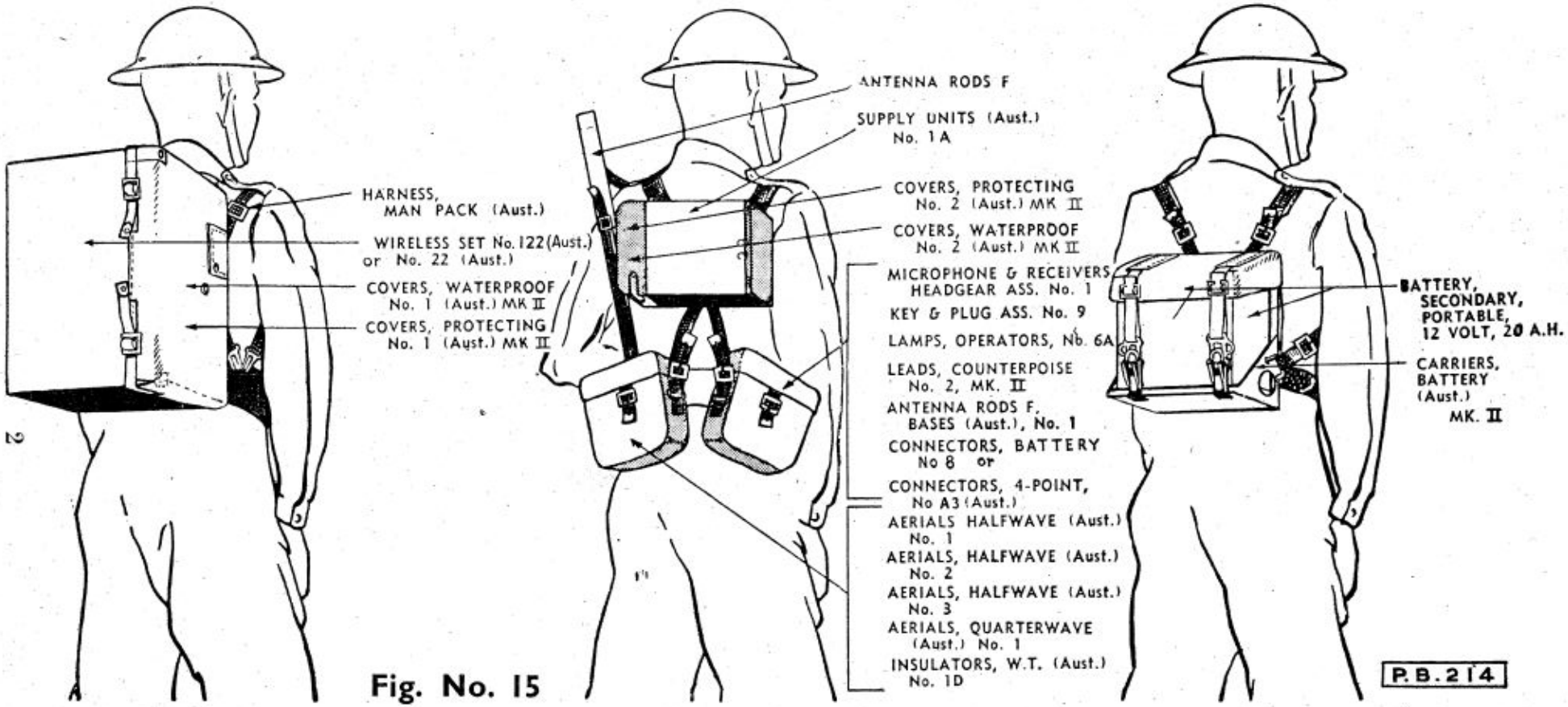


Fig. No. 15

1.4 Valves.

Ten valves are used in the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) and three of these are common to both sender and receiver.

The receiver is a seven valve super-heterodyne capable of receiving C.W. (W/T) or modulated signals (R/T and M.C.W.).

The sender is a two valve Master Oscillator/Power Amplifier type which is plate modulated under R/T or M.C.W. conditions. Four additional valves are used for R/T or M.C.W. operation. Refer to Block Diagrams on pages 4 and 5 for details.

2. POWER SUPPLY

2.1 Power Unit.

Power Supply for the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) is furnished by Supply Units No. 1A, a vibrator-operated unit energised from a 12 volt secondary battery. In the Truck or Ground Station installations two 6 Volt—75 Ah. batteries are used, whilst for Man-Pack operation a single 12 Volt—20 Ah. battery is employed.

The supply unit is arranged for either "High" or "Low" power operation of the sender. In addition it supplies the voltage needed for the receiver.

Change-over from High Power to Low Power sender supply is effected by means of a switch on the front panel of Supply Units No. 1A. Relays built in to the supply unit, and actuated by the Sender/Receiver relays, change the power supply from "SEND" to "RECEIVE." See Fig. 4 for the Circuit Diagram and Plates 4, 5 and 6 for further details.

2.2 Current Consumption.

The approximate current consumptions under the different conditions of operation of the Sender/Receiver unit are given in Table I

TABLE 1.—CURRENT CONSUMPTION.

Conditions	*Battery Drain (Amps.) (Approx.)*	*Approx. Hours Working*	
		12V.–75Ah.	*12V.–20Ah.*
"SEND" H.P. M.C.W.—C.W.—R/T	6·3		
"RECEIVE"	2·0		
Listening Watch ..	0·9		
Normal Working, 3 hrs. "RECEIVE" to 1 hr. "SEND"	3·5	20	5

Note.—On "RECEIVE" all Sender/Receiver valve filaments are "On." On "LISTENING WATCH" the "SENDER" filaments are switched "Off."

BLOCK DIAGRAMS OF CIRCUIT

Sender Receiver

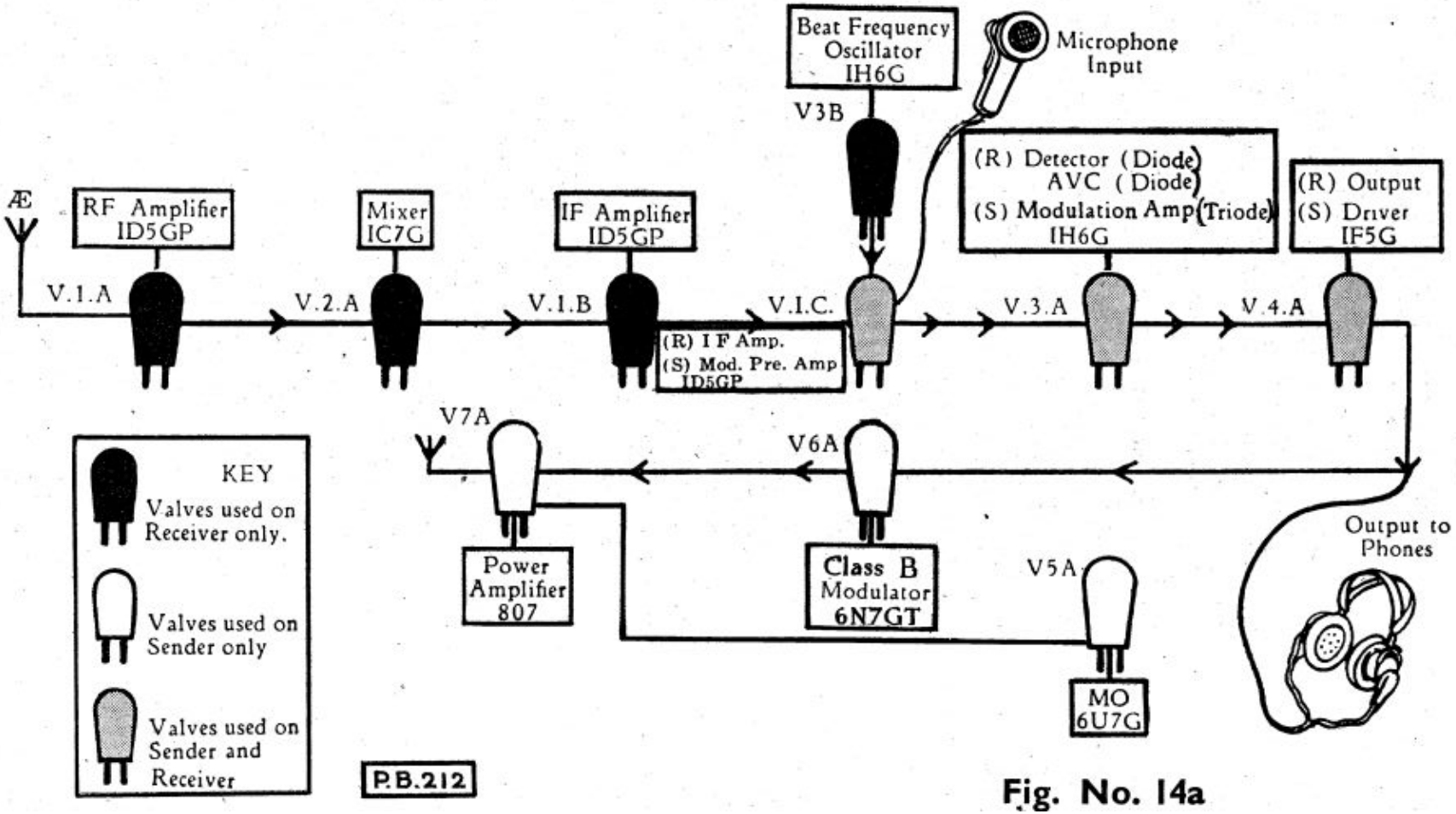
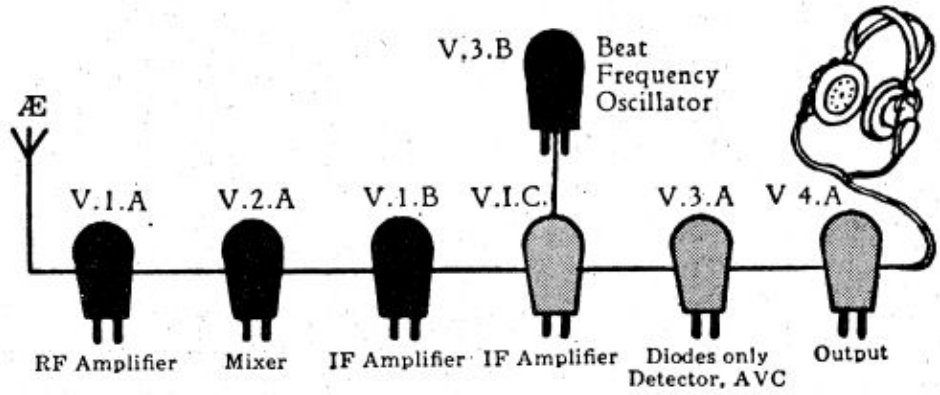


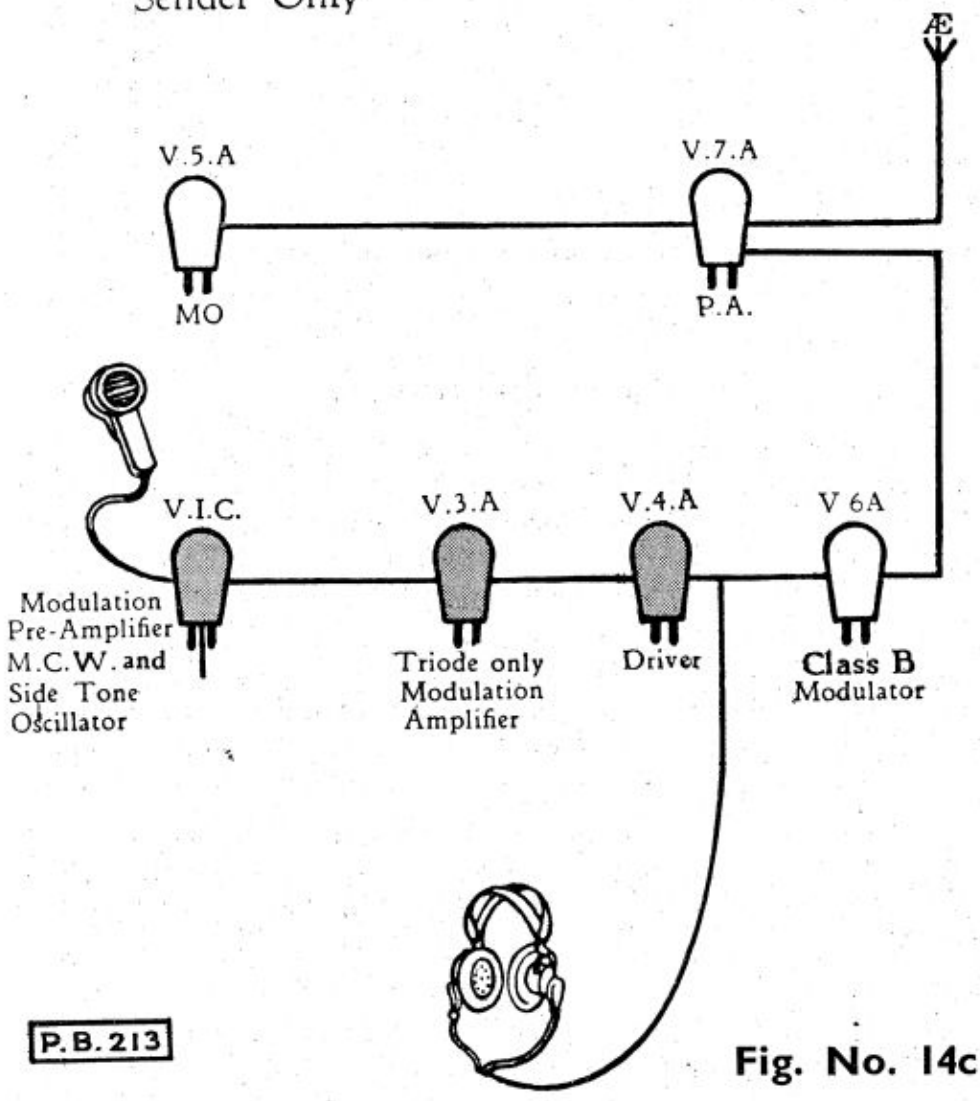
Fig. No. 14a

Receiver Only

Fig. No. 14b



Sender Only



P.B.213

Fig. No. 14c

2.3 Output Voltage.

The Supply Units No. 1A will deliver the following D.C. voltages to the Sender/Receiver. (On load.)

"RECEIVE"	150 Volts
"SEND"	—
L.P. M.C.W.—C.W.—R/T ..	180 Volts
H.P. C.W.	360 Volts
H.P. M.C.W.—R/T	260 Volts

3. WEIGHTS AND DIMENSIONS

TABLE 2.—WEIGHTS AND DIMENSIONS.

Arrangement of Set	*Weight (lbs.)*	*Length (ins.)*	*Width (ins.)*	*Height (ins.)*
Sender/Receiver Unit	34	17½	10½	8½
Supply Unit	20	6	10½	8½
Sender/Receiver Unit and Supply Unit in Carrier No. 1	65½	24¾	10½	10½

Note.—Only permanently attached connectors included in weights.

4. CONNECTIONS

The Sender and the Receiver are assembled as one unit. Three drop leads are permanently attached to the Sender/Receiver unit. Two of these terminate in 5-pin snatch plugs for the Microphone and Receivers Headgear Assemblies No. 1 whilst the third is terminated in a 12-pin socket which connects to the 12-pin plug on Supply Units No. 1A.

Alternative battery connectors are used. With the Man-Pack station Connectors, 4Pt. No. A3 (Aust.) consisting of a four pin plug for connection to the power supply unit and hooked lugs for connection to the 12-Volt 20Ah. battery is used.

Connectors, Battery (Aust.) No. 8 or Connectors 4 point No. A4 (Aust.) which terminates in two Niphan plugs for connection to the two 6-Volt 75Ah. batteries is employed for the Truck or Ground Station.

The earth connection from Supply Units No. 1A case to the Sender/Receiver unit case is made by means of Connectors, Single, No. 10D one end of which is permanently attached to the supply unit.

5. THE COMPLETE STATION

Details of the stores required for complete Stations, Wireless Sets, No. 22 (Aust.) or Wireless Sets, No. 122 (Aust.) are given in Appendix "1" for the three conditions of use described in Para. 1. Many of these stores are standard service equipment, and call for no comment, but attention is drawn to the following points :—

(i) **Battery Fuse.**

A rewirable fuse is included in the battery circuit and is fitted in clips at the top of the inner face of the power-unit panel. The reel of spare fuse wire is housed on the top of the chassis inside the case.

(ii) **Headhones and Microphones.**

The Microphone and Receivers—Headgear assembly comprises a pair of moving-coil telephones and a moving-coil microphone wired in a common head harness, the microphone handle incorporating a pressel switch. This type of acoustic equipment gives exceptionally good intelligibility, especially under noisy conditions such as exist in a vehicle in motion.

(iii) **Immersion Covers.**

Covers, Immersion, No. 1 Mk. II for sender/receiver, and No. 2 Mk. II for Supply Unit, No. 1A, are provided so that the Set may be made completely waterproof when required for beach landings, river crossing or similar operations.

Where there is a possibility of the equipment being totally immersed, a special plastic compound should be applied to the seals of the immersion covers. This compound is an ordnance store—HAA0458 Compound, Plastic—and is available through normal channels

IMMERSION COVERS

ADJUST IMMERSION COVERS SO THAT STRAIN BUCKLES PULL IMMERSION COVER TIGHTLY DOWN TO SET

SEE THAT THE COVER FITS CORRECTLY ALL ROUND

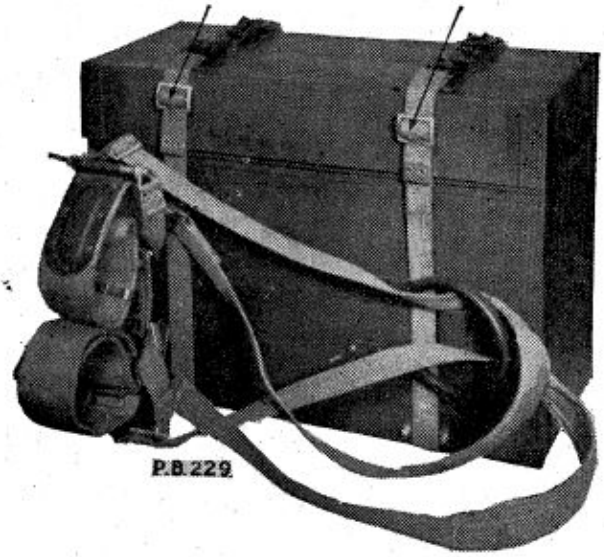


Plate No. 20

(iv) **Battery for Man-carried station.**

Batteries, secy., port.—12-volts, 20Ah. (Aust.) with its carrier (Carriers, Battery, Mk. II) is used with the man-carried station, and if the battery is fully charged should give about 4 hours normal working on H.P.

(v) **Connecting Leads.**

Connector, Single, No. 10A. Used for Aerial connection on ground station. Should be carried in Satchels, Signals, No. 1A.

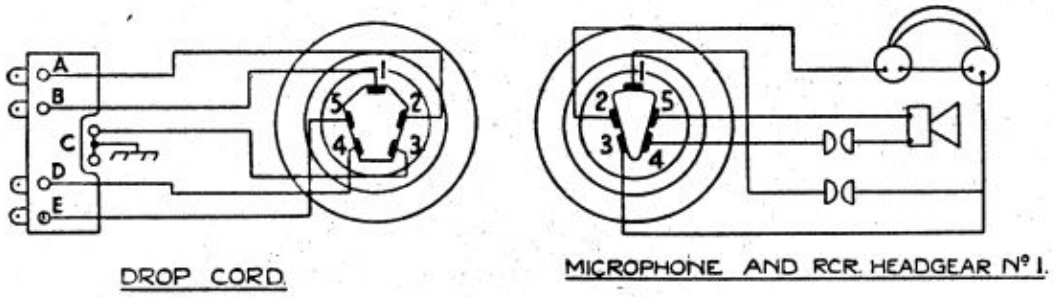
Connectors, Single, No. 10C. Used for Aerial connections in vehicle, from the aerial terminal on Set to Condenser, X5, 5KV, Mk. II and Connectors, Single, No. 10E (Aust.) from this condenser to the aerial base.

Note :—These Connectors are not removed from the Vehicle when the Set is taken out for use as a ground station.

Connectors, Battery (Aust.) No. 8 or Connectors, 4-point, No. A4 (Aust.). Lead from battery to Power Unit. In the case of the vehicle-station, this lead is not removed from the vehicle when the Set is used as a ground station. A separate lead for ground-station use (Connectors, 4-point, No. A3) is carried in Satchel, Signals, No. 1A.

For other Connectors, refer to complete stations list (Appendix 1).

VIEW LOOKING INTO PLUG SHOWING CONTACTS.



A	TELEPHONE	+	RED.
B	RELAY	+	GREEN.
C	RELAY TELEPHONE	−	YELLOW.
D	MICROPHONE	+	BLACK.
E	MICROPHONE	−	GREY

Fig. No. 9

6. AERIALS AND COMMUNICATION DETAILS

6.1. Introduction.

The aerials supplied with the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) are :

(i) Antenna Rods "F," Sections 1, 2, and 3.

(ii) Aerials Vertical, 34-ft. Steel.

(iii) Aerials, Half-Wave (Aust.)—
No. 1.
No. 2.
No. 3.
Aerials, Quarter-Wave (Aust.)—
No. 1

Item (i) is intended primarily for use with the vehicle and Manpack Stations. Items (ii) and (iii) are intended for Ground station operation or for use with a vehicle station when the vehicle is stationary. Item (iii) also is used for Manpack operation

6.2. Antenna Rods, "F," Installation.

Three sections—Nos. 1, 2, and 3—of this aerial are used in conjunction with Aerial Bases No. 10, Mountings, aerial base, No. 3, and Condensers X5, 5-kV, Mk. II (Aust.) No. 2 in the vehicle installation. The condenser is used to isolate the Sender/Receiver unit from the aerial itself to prevent damage to the set should the aerial come in contact with overhead supply lines.

The aerial is connected to the condenser by means of Connectors, Single, No. 10E (Aust.), whilst Connectors, Single, No. 10C, is used to join the Sender/Receiver to the isolating condenser. This aerial is used on the move but for maximum range under stationary conditions the Half-wave or Quarter-wave aerials or Aerials, Vertical, 34-ft., Steel, should be used.

6.3. Aerials, Vertical, 34-ft., Steel.

This aerial consists of:

(i) A base insulator and spike (Insulators, ebonite, "B").
(ii) Six Antenna rods, "D," sections. (Total, 18 feet.)
(iii) An adaptor.
(iv) Four Antenna rods, "F," sections. (Total, 16 feet.)
(v) The necessary stayplates, pickets, etc.

The aerial is used with the Ground Station and is connected to the Sender/Receiver unit by means of Connectors, single, No. 10A

6.4. Wire Aerials.

Four of these aerials are provided for use with Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.). Each aerial is intended for operation over two frequency ranges and is, therefore, constructed of two lengths separated by an insulator. The change from one frequency range to another is effected by means of a jumper wire terminating in a spade lug which may be either connected or disconnected from a terminal to short-circuit or open-circuit the insulator. Three of the aerials are half-wave types whilst the fourth is a quarter-wave type.

Details of the approximate frequency coverages of each aerial are given in Table 3.

TABLE 3.—OPERATING FREQUENCIES OF WIRE AERIALS.

Aerial	*Length—ft.*	*Use for Frequencies*
Half-wave (Aust.) No. 1	188 145	2·0 Mc/s. to 2·6 Mc/s. 2·6 Mc/s. to 3·4 Mc/s.
Half-wave (Aust.) No. 2	109 85	3·4 Mc/s. to 4·4 Mc/s. 4·4 Mc/s. to 5·6 Mc/s.
Half-wave (Aust.) No. 3	67 56½	5·6 Mc/s. to 6·8 Mc/s. 6·8 Mc/s. to 8·0 Mc/s.
Quarter-Wave (Aust.) No. 1	50 25	2·0 Mc/s. to 4·0 Mc/s. 4·0 Mc/s. to 8·0 Mc/s.

6.5. Counterpoise.

Leads, Counterpoise, No. 2, Mk. II (Aust.), is provided for use with Aerials, Vertical, 34-ft., Steel and the wire aerials. The use of this counterpoise will in many cases improve radiation on "SEND" and the Signal/Noise ratio on "RECEIVE." This is particularly the case when the set is working over very dry ground. In wet locations an earth pin will give similar results to those obtained with the counterpoise.

6.6. Range.

The range of the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) will depend upon whether Ground Wave or Sky Wave transmission is used.

If Ground Wave transmission is used the ranges to be expected are as shown in Table 4.

TABLE 4.—RANGE IN MILES (GROUND WAVE).

Aerial	*R/T.*		*M.C.W.*		*C.W.*	
	Jungle	*Normal*	*Jungle*	*Normal*	*Jungle*	*Normal*
12 ft. Rod on Move-Truck Station	3–5	20–30	4–6	25–35	6–8	40–50
16 ft. rod—Ground Station	3–5	20–30	4–6	25–35	6–8	40–50
34 ft. rod—Ground Station	5–7	30–40	6–8	40–45	8–10	50–60
Quarter-Wave Wire Aerial	7–9	40–50	8–10	50–60	10–12	60–70

It should be realised that these ranges are theoretical and will vary with conditions of terrain, siting of the station, atmospheric conditions, and the state of the batteries.

If Sky Wave transmission is used C.W. ranges of up to 500 miles throughout the major portion of the 24 hours can be expected when the correct type of aerial is used. Here again variables such as the season of the year, the frequency used, and the prevailing atmospheric conditions must be taken into consideration.

The frequencies used for Sky Wave transmission should be selected only after a study of the Frequency Prediction Charts issued monthly by SO in C. Select a frequency as near as possible to the optimum for the distance, the time of the day, and the location.

Appendix 7 details the method of selecting the correct aerial for any given set of conditions. This Appendix must be studied thoroughly and understood if reliable communications are to be established and maintained.

6.7. Test Aerials.

A test aerial is provided in the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) to enable the transmitter to be tested without radiating a signal. It is used by setting the "AE. SELECTOR" switch to "TEST." See Table 6 for control settings, Appendix 6 for Meter readings and Paras. 9.3—9.5 for testing procedure.

6.8. Aerial Coupling Equipment.

Where tactical or other considerations call for it the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) may be operated remotely from rod aerials.

Aerial Units, "J," (Aust.) is designed for this purpose. With the aid of this unit the set may be operated at distances of 15, 30, or 45 feet from the aerial without serious loss of power and without affecting the tunability of either the Sender output circuits or the aerial coupling unit itself.

The Aerial Unit ,"J" (Aust.), is coupled to the Sender/Receiver by means of a pair of Connectors, Twin, No. 22 (Aust.), and from one to three Connectors, Twin, No. 15, depending upon the distance separating the Sender/Receiver from the Aerial Units, "J" (Aust).

For further information see Chapter 3.

6.9. Protecting the Sender/Receiver and Supply Unit.

With the aid of :—

(*a*) Covers, Protecting,
(*b*) Covers, Waterproof,
(*c*) Covers, Immersion,

The Wireless Set No. 22 (Aust.) or W.S.122 (Aust.) and Supply Units No. 1A are safeguarded against mechanical damage and damage due to the ingress of moisture, rain, and salt-water spray.

(i) Covers, Protecting, No. 1, Mk. II and No. 2, Mk. II.
These are similar to the grilles used with Wireless Sets No. 19 but, being constructed of duralumin, are lighter than the types previously used.

The Covers, Protecting, clip over the front of the Sender/Receiver Unit and the Supply Unit No. 1A to protect the controls from damage. Covers, Protecting, No. 1, Mk. II, is used with the Sender/Receiver Unit and Covers, Protecting, No. 2, Mk. II, is used with Supply Units No. 1A. They are fitted by engaging the channel section of the Protecting Cover in the top rolled edge of the Sender/Receiver or Supply Unit case and bearing down on the cover until it springs into place on the rolled section at the bottom of the equipment case.

Before Covers, Protecting, No.1, Mk. II, or No. 2, Mk. II, are fitted, the top edge of Covers, Waterproof, No. 1, Mk. II or No. 2, Mk. II, is laid along the top rolled section of the equipment case and held in position when Covers, Protecting, are fitted.

(ii) Covers, Waterproof, No. 1, Mk. II, and No 2, Mk II.

These covers are canvas covers which fit over Covers, Protecting, to keep rain from the front of the Sender/Receiver and the Supply Unit. The Sender/Receiver can be operated with the waterproof covers in place; when not required they are rolled up and fastened by their securing straps at the top of the Sender/Receiver and Supply Unit cases.

Covers, Waterproof, No. 1, Mk. II, is used on the Sender/Receiver and Covers, Waterproof, No. 2, Mk. II, is used on the Supply Unit.

Note.—Covers, Protecting, No. 1 and No. 2, and Covers, Waterproof, No. 1 and No. 2, will be fitted to the Sender/Receiver and the Supply Unit except when Covers, Immersion, No. 1, Mk. II, and No. 2, Mk. II, are used.

(iii) Covers, Immersion, No. 1, Mk. II, and No. 2, Mk. II.

These covers are provided so that Wireless Set No. 22 (Aust.) or W.S.122 (Aust.) may be made completely waterproof when required for a beach landing, river crossing, or similar operation. When the immersion covers are properly fitted both the Sender/Receiver Unit and the Supply Unit are completely buoyant. Covers, Immersion, No. 1, Mk. II, is used on the Sender/Receiver Unit and Covers, Immersion, No. 2, Mk. II, is used on the Supply Unit.

To fit the Immersion Covers first remove Covers, Protecting, and Covers, Waterproof, from the set and the Supply Unit. Place the Immersion Cover over the front of the case of the Sender/Receiver Unit or the Supply Unit.

Make sure that the rubber sealing gasket fits properly all around the rolled edge of the case and pass the strap fitted to the Immersion Cover around the back of the equipment case. With the levers of the "Quick-release" catches facing outwards tighten the strap as much as possible by means of the "D's." Complete the sealing of the Immersion

Cover by moving the levers of the "Quick-release" catches inwards until they lie flat on the lid of the Immersion Cover.

Warning.—The Covers, Immersion, No. 1 and No. 2, must be handled with care when not attached to the Set and Power Supply. They must **not** be used as seats, to support the Set, etc., as this will result in straining the covers and causing them to leak.

6.10. Remote Control.

Wireless Set No. 22 (Aust.) or W.S. No. 122 (Aust.) may be operated from a distance by means of Wireless Remote Control Units, "F," No. 1 and No. 2 (Aust.).

Wireless Remote Control Unit, "F," No. 1 (Aust.) is operated by the operator of Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) and is installed in close proximity to the Sender/Receiver Unit. Wireless Remote Control Unit, "F," No. 2 (Aust.) is operated at the remote point which may be up to one mile distant from the No. 1 Unit, using D3 cable.

Both the No. 1 and the No. 2 Units are capable of changing Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) over from "SEND" to "RECEIVE" but neither unit can select the type of transmission or reception. This function is vested in the operator of Remote Control Unit, "F," No. 1 (Aust.) who monitors the remote control, tunes the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.), and adjusts the "M.C.W.–C.W.–R/T." switch as required.

The Remote Control Unit, "F," No. 1 may have associated with it :

(i) Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.).
(ii) Telephone Exchange No. 1.
(iii) A Separate Sender.
(iv) Near Receiver No. 1.
(v) The Remote Line connecting to Remote Control Unit, "F," No. 2 (Aust.).
(vi) Operator No. 1.

Associated with Remote Control Units, "F," No. 2, are :

(i) Telephone Exchange No. 2.
(ii) Near Receiver No. 2.
(iii) The Remote Line connecting to Remote Control Unit, "F," No. 1 (Aust.).
(iv) Operator No. 2.

6.11. Operating Facilities—Remote Control Unit, "F," No. 1 (Aust.).

The following facilities are available from the No. 1 Unit :

(i) Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.).
Provided that the function switch—"M.C.W.–C.W.–R/T. is set by Operator No. 1, the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.), can be operated in the normal manner through Unit No. 1.

(ii) No. 1 Exchange.
This Exchange can call Operator No. 1 and request either the use of Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.), or a through connection to Operator No. 2. Exchange cannot ring Operator No. 1 but as this operator monitors Unit No. 1 he can hear Exchange. Operator No. 1 can ring Exchange No. 1.

(iii) Separate Sender.
This may be used to re-broadcast :
(a) Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) or,
(*b*) Operator No. 2, Exchanges No. 1 or No. 2, or Near Receiver No. 2.

(iv) Near Receiver No. 1.
This may be re-broadcast by Operator No. 1 over Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.).

(v) No. 1 Operator.
This operator may use Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) on M.C.W., C.W., or R/T. on either "SEND" or "RECEIVE." While this is being done :
(*a*) Exchange No. 1 or Operator No. 2 may use the Separate Sender, or
(*b*) Exchange No. 1 may be connected to Unit No. 2 or through this unit to Exchange No. 2 or Near Receiver No. 2.

6.12. Operating Facilities Remote Control Unit, "F," No. 2 (Aust..)

(i) Exchange No. 2.
This exchange may ring or be rung by Operator No. 2. Exchange can call Operator No. 2, and request to be put through to Operator No. 1 or Exchange No. 1. Through Operator No. 2, Exchange No. 2 can request the use of Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) or the Separate Sender on R/T.

(ii) Near Receiver No. 2.
This receiver may be listened to by :
(*a*) Operators No. 1 or No. 2.
(*b*) Exchanges No. 1 or No. 2.
or it may be re-broadcast on Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) or on the Separate Sender.

(iii) Operator No. 2.
May ring Exchange No. 2, Operator No. 1, or Exchange No. 1. May ask Operator No. 1 to make available Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) for M.C.W., C.W. or R/T. operation on "SEND" or request the use of the Separate Sender.
May listen to Wireless Set No. 22 (Aust.) or Near Receiver No. 2. May enable Exchange No. 2 to ring Operator No. 1 or to use Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) or the Separate Sender on R/T.

Chapter 2

WORKING INSTRUCTIONS

7. VALVES

Ten valves are required for Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.). Details of the types and purposes of these valves are given in Table 5.

TABLE 5.—VALVES.

Valve	*Type*	*Purpose*
V1A	1D5GP	Receiver R.F. Amplifier
V1B	1D5GP	Receiver I.F. Amplifier
V1C	1D5GP	Receiver I.F. Amplifier Sender M.C.W. Oscillator Sender Speech Amplifier
V2A	1C7G	Receiver Frequency Changer
V3A	1H6G	Sender Speech Amplifier Receiver 2nd Detector and A.V.C.
V3B	1H6G	Receiver B.F.O.
V4A	1F5G	Receiver Output Sender Modulator Driver Amplifier
V5A	6U7G	Sender Master Oscillator
V6A	6N7GT	Sender M.C.W.—R/T. Modulator
V7A	807	Sender Power Amplifier

7.1. Inserting the Valves.

To insert the valves in the Sender/Receiver unit :

(i) Uncouple the 12 pt. connector from Supply Units No. 1A.
(ii) Unscrew the six screws from the Sender/Receiver Front Panel.
(iii) Withdraw the set from its case by pulling on the handles at each end.
(iv) Fit shields to valves V1A, V1B, V1C, V2A, V3A, and V3B.

Note.—Before fitting the shields make sure that the earthing lugs are in position on each valve base.

(v) Place the valves in their respective sockets. *See* Fig. 8.)
(vi) Pull the spring retaining rings over the tops of the valves. Make sure that the springs do not come into metallic contact with the valve shields.

(vii) Replace the Sender/Receiver in its case, tighten the securing screws, and plug the 12pt. connector into Supply Units No. 1A.

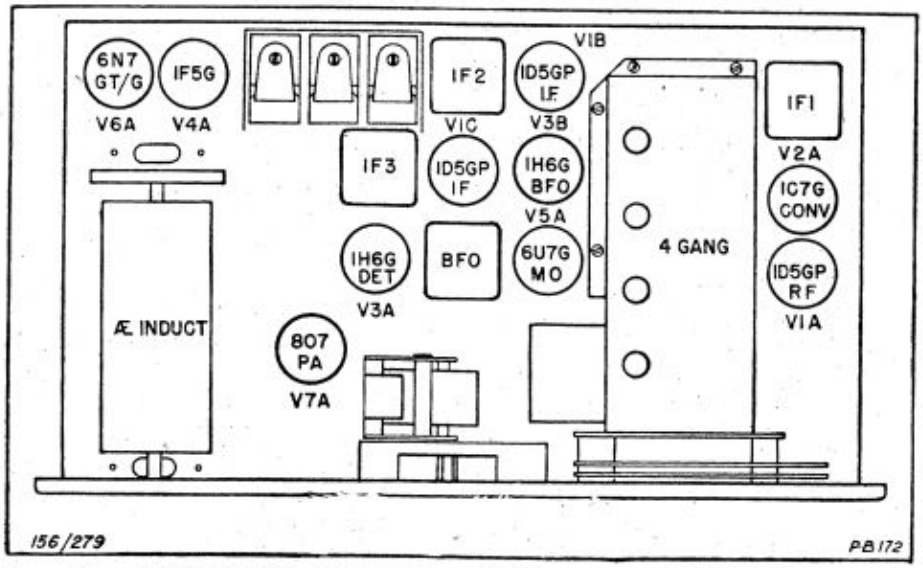


Fig. 8. WIRELESS SET No. 2 (Aust.) and WIRELESS SET No. 122 (Aust.)—Position of Valves

8. CONNECTING-UP

8.1 Preliminary.

(i) Roll up the waterproof cover and stow it at the top of the set.

(ii) Plug in the 12pt. connector from the set to the plug on Supply Units No. 1A.

(iii) Insert the plug of Connectors, Battery (Aust.) No. 8 or Connectors, 4pt., No. A3 (Aust.) in the socket on Supply Units No. 1A and make sure that the other end of the connector is correctly connected to the batteries.

(iv) Make sure that the cases of the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) Sender/Receiver unit and the Supply Units No. 1A are joined together by means of Connectors, Single, No. 10D, which is permanently attached to the case of Supply Units No. 1A.

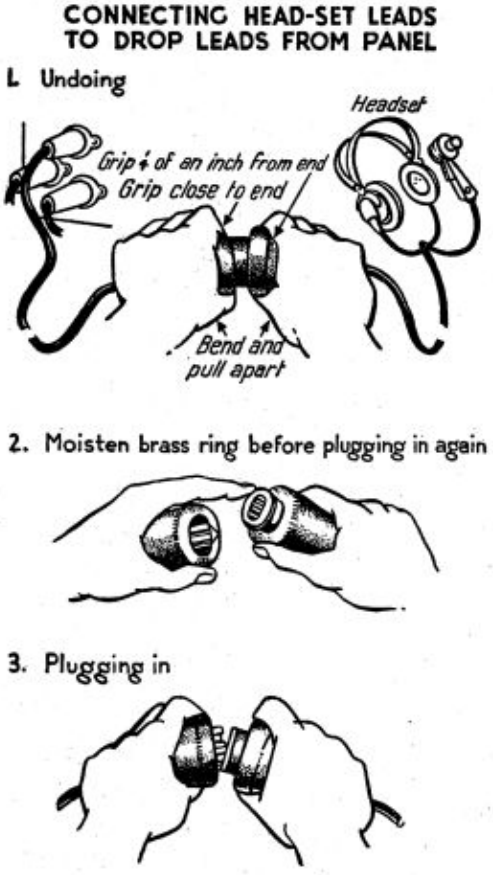


Fig. 16

(v) Erect the appropriate aerial and connect it to the Sender/Receiver "AERIAL" terminal.

(vi) When the set is to be used as a Ground Station connect Leads, Counterpoise, No. 2, Mk. II to the Sender/Receiver "EARTH" terminal.

Note.—When the set is installed in a vehicle the aerial is joined to the Sender/Receiver through an aerial blocking condenser (Condensers X5, 5-kV., Mk. II mounted near the vehicle aerial insulator on the inside of the vehicle. The Sender/Receiver "EARTH" terminal is connected to the vehicle chassis via a convenient point on the vehicle bonding system.

8.2. Preliminary Adjustments.

Make the following preliminary adjustments :

(i) See that the switch on Supply Units No. 1A is in the "Off" position—up.

(ii) Set the "H.P /L.P." switch on Supply Units No. 1A to the "H.P." position—right.

(iii) Set the "Normal/Remote" switch to the "NORMAL' position—up.

(iv) Set the "R.F.GAIN" and "L.F.GAIN" knobs fully clockwise—i.e., in the maximum position.

(v) Set the "CRASH LIMITER" switch in the "Off" position —up.

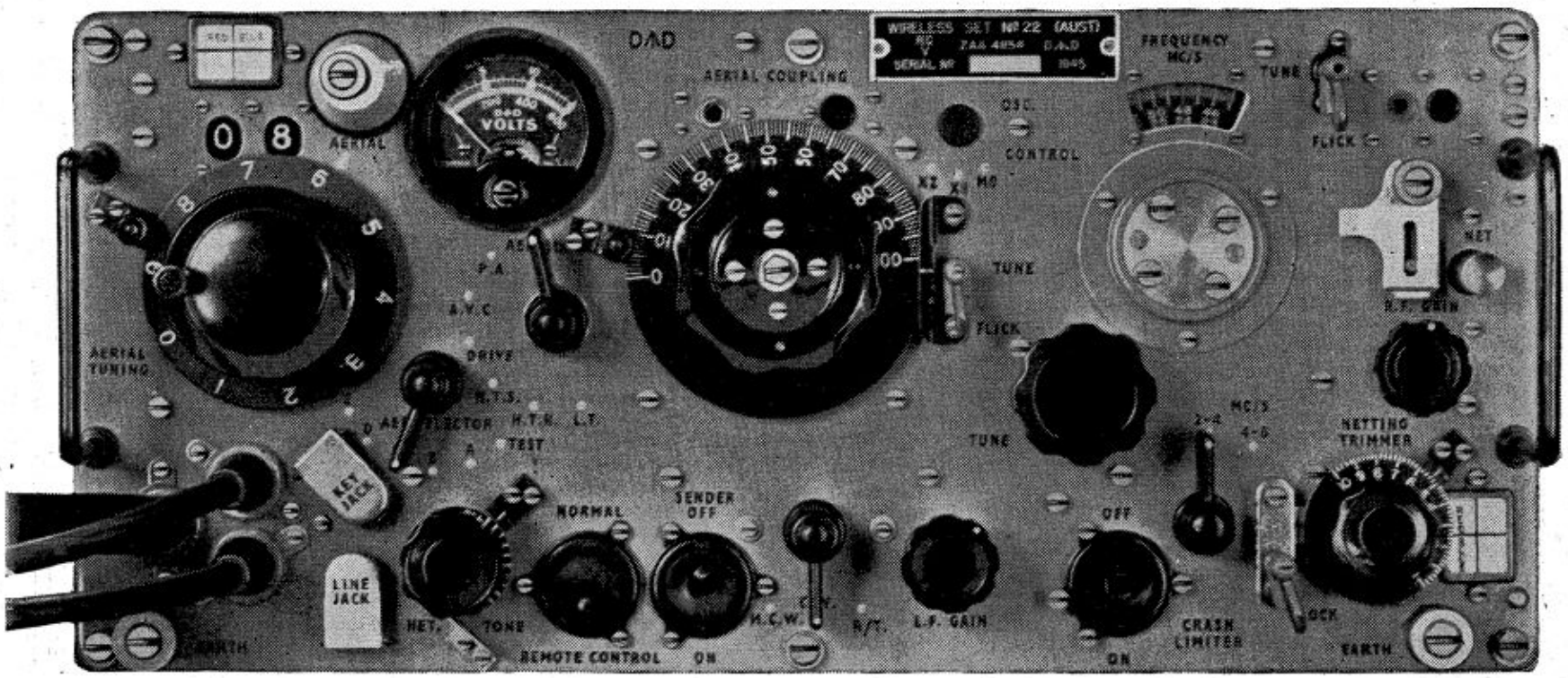
(vi) Set the "M.C.W.–C.W.–R/T." switch to the "C.W." position'

(vii) Set the wave change switch to either 2–4 Mc/s. or 4–8 Mc/s as required.

(viii) Place the "SENDER" switch in the "OFF" position—up.

(ix) Place the "FLICK" locks in the "FREQ.Mc/s." and "AERIAL COUPLING" dials in the "TUNE" position and release the lock on the "AERIAL TUNING" dial.

(x) Plug Microphone and Receivers Headgear, Assemblies No. 1 into one of the Sender/Receiver drop leads.



PB176

Plate 3. WIRELESS SET No. 22 (Aust.) Chassis — Front View

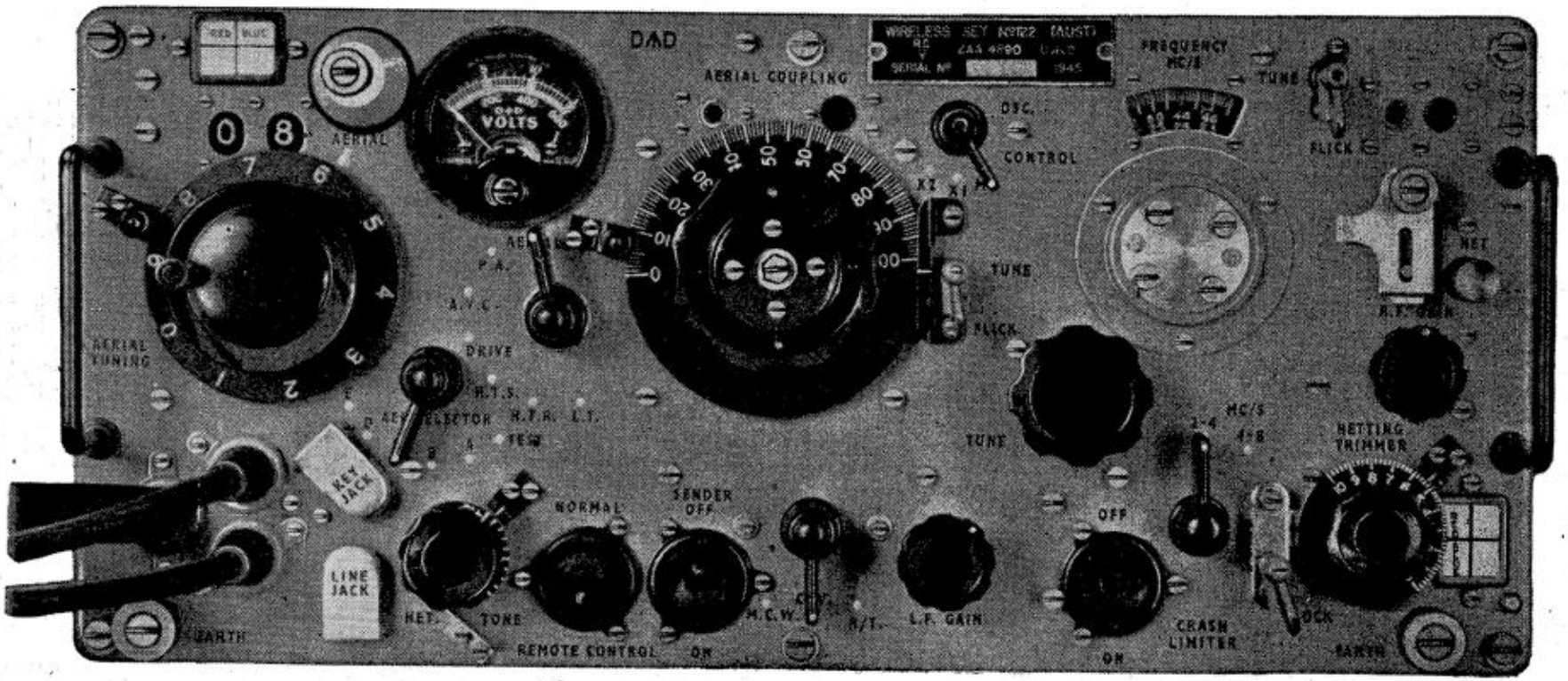


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Plate 16. WIRELESS SETS No. 122 (Aust.) Chassis — Front View.

TABLE 6.—"AERIAL SELECTOR," "AERIAL COUPLING," AND "AERIAL TUNING" SETTINGS.

Freq. Mc/s.	*Test Aerial*			*12–ft. Vertical Aerial*			*34–ft. Vertical Aerial*		
	Aerial Selector	*Aerial Coupling*	*Aerial Tuning*	*Aerial Selector*	*Aerial Coupling*	*Aerial Tuning*	*Aerial Selector*	*Aerial Coupling*	*Aerial Tuning*
2·0	Test	88	14	A	87	58·5	A	71	40·5
2·5	,,	81	12	,,	83	41·5	,,	65	35·5
3·0	,,	75	10·5	,,	80	32	,,	59	28
3·5	,,	69	9·5	,,	75	25	,,	51	22·5
4·0	,,	63	8·5	,,	71	21	,,	44	19
4·5	,,	52	8·5	,,	63	18	,,	28	17·5
5·0	,,	51	7·5	,,	62·5	15·5	,,	20	15·5
5·5	,,	45	7	,,	58	14	,,	8	13·5
6·0	,,	40	6·5	,,	53	12·25	E	20·5	10·5
6·5	,,	34	6	,,	50	11	D	13	9
7·0	,,	27	5·5	,,	44	10	C	20	7·5
7·5	,,	24	5·25	,,	39·5	9	,,	18	6·5
8·0	,,	12·5	5	,,	28·5	8·25	,,	17·5	6·25

AERIAL: HORIZONTAL

Freq. Mc/s.	*Aerials, Half-Wave (Aust.)*	*Length*	*Aerial Selector*	*Aerial Coupling*	*Aerial Tuning*
2·3	No. 1	188 ft.	E	66	43
3·0	No. 1	145 ft.	,,	65	28
3·9	No. 2	109 ft.	,,	59	19·5
5·0	No. 2	85 ft.	,,	49	14
6·2	No. 3	67 ft.	,,	41	11
7·3	No. 3	56 ft. 6 ins.	,,	35·5	8·5

Freq. Mc/s.	*Aerials, Quarter-Wave (Aust.) No.1—50 ft.*			*Freq. Mc/s.*	*Aerials, Quarter-Wave (Aust.) No. 1—25 ft.*		
	Aerial Selector	*Aerial Coupling*	*Aerial Tuning*		*Aerial Selector*	*Aerial Coupling*	*Aerial Tuning*
2·0	A	66	51·5	4·0	A	46	24
2·5	,,	59	37	4·5	,,	35	21
3·0	,,	52	28·5	5·0	,,	33	18
3·5	,,	42	22·5	5·5	,,	24	15·5
4·0	,,	31	18·5	6·0	,,	15	14
				6·5	E	46	8
				7·0	,,	38	7·5
				7·5	,,	28	7·25
				8·0	,,	6	7

9. OPERATING INSTRUCTIONS

9.1. "RECEIVE"—C.W.

To adjust the receiver for reception of C.W. signals :

(i) Switch on Supply Units No. 1A.

(ii) Set the meter switch to "L.T." and then to "H.T.R." The meter should read 12 volts and 150 volts respectively.

(iii) Set the "HET.TONE" knob to its 455 kc/s. "lock" position.

(iv) Set the "Aer. Selector" switch, the "Aer. Coupling" dial and the "Aer. Tuning" dial to the approximate positions shown in Table VI for the frequency of the desired signal. For maximum receiver sensitivity, some slight readjustment may be necessary to the setting of the "Aerial Tuning" and "Aerial Coupling." The necessity for this may be checked by changing the settings of the "Aerial Coupling" to a setting slightly higher or lower than that specified in Table 6, and readjusting the "Aerial Tuning" each time, selecting finally the combination of settings which results in maximum noise being obtained from the receiver. When this condition is obtained, search for the signal by rotating the "Freq. Mc/s" dial.

(v) Tune the "Freq. Mc/s" dial to zero beat the incoming signal.

(vi) Adjust the "Het. Tone" control for the desired beat note.

9.2. "RECEIVE"—M.C.W.–R/T.

(i) Switch the "M.C.W.–C.W.–R/T." switch to "M.C.W." or R/T., depending on which type of signal is to be received.

(ii) Repeat operations (i), (ii), and (iv) of Para. 9.1.

(iii) Set the meter switch to "A.V.C." Maximum "dip" of the meter will indicate the correct tuning setting.

(iv) Under all normal conditions of operation, there will be no necessity to retard the "R.F. Gain" control.

9.3. "SEND"—Preliminary Adjustments.

Complete the preliminary adjustments set out in Para. 8.2 and then :

(i) Plug the transmitting key into the "KEY JACK" on the Sender/Receiver unit.

(ii) Place the "SENDER" switch in the "ON" position—down.

(iii) Allow the "SENDER" valves to warm up for at least a minute.

9.4. "SEND"—C.W. Tuning with Test Aerial.

A.—**Master Oscillator Control.**

(i) Set the "Osc. Control" switch to M.O.

(ii) Set the "Netting Trimmer" dial to 5 Div.

(iii) Set the "Aer. Selector" switch to the "Test" position.

(iv) Set the wave-change switch to either 2–4 Mc/s. or 4–8 Mc/s. as required.

(v) Set the "Freq. Mc/s." dial to the frequency at which it is desired to send.

(vi) Set the "Aer. Tuning" and "Aer. Coupling" dials to the appropriate readings as shown in Table 6.

(vii) Set the Meter switch to the "Test" position.

(viii) Close the transmitter key and rotate the "Aer. Tuning" dial until the maximum "Dip" point on the meter is reached. If this is below 65 ma., increase the "Aer. Coupling" condenser dial setting and decrease the "Aer. Tuning" dial setting until maximum dip is again recorded by the meter.

(x) Repeat the foregoing procedure until, at the last adjustment of the "Aer. Tuning" dial, the maximum dip is 65 ma.

Note.—On "P.A." the meter reads 150 ma. full scale (on the 15-volt scale).

B.—**Crystal Control (W.S.122 (Aust.)).**

(i) Set the "Osc. Control" switch to the crystal which it is desired to use, X1 or X2.

(ii) Crystals of frequencies from 1–8 Mc/s may be used in the W.S. 122 under the following conditions :

(iii) If the crystal frequency is within the range 1–2 Mc/s. transmission may only be carried out on twice the crystal frequency. In this case set the wave-change switch to 2–4 Mc/s.

(iv) If the crystal frequency is in the range 2–4 Mc/s., set the wave-change switch to 2–4 Mc/s. for transmission on the crystal frequency, or to 4–8 Mc/s. for transmission on double the crystal frequency.

(v) If the crystal frequency is higher than 4 Mc/s., transmission may be only carried out on the crystal frequency. In this case, set the wave-change switch to 4—8 Mc/s.

(vi) After the conditions of operation of the crystal have been determined, set the "Freq. Mc/s." dial to the frequency at which it is desired to send.

(vii) Set the "Aer. Tuning" and "Aer. Coupling" dials to the appropriate readings as shown in Table 6.

(viii) Set the "Aer. Selector" switch to the "Test" position.

(ix) Close the transmitting key and rotate the "Aerial Tuning" dial until the maximum "dip" point on the meter is reached. If this is below 65 ma., increase the "Aer. Coupling" condenser dial setting and decrease the "Aer. Tuning" dial setting until maximum dip is again recorded by the meter.

(x) Repeat the foregoing procedure until at the last adjustment of the "Aer. Tuning" dial, the maximum dip is 65 ma.

9.5. "SEND"—M.C.W.—R.T. Tuning with Test Aerial.

A.—Master Oscillator Control.

(i) Repeat (i) to (viii) of Para. 9.4A.

(ii) Either leave the transmitting key in the "open" position or withdraw its plug from the "KEY JACK."

(iii) Set the "M.C.W.–C.W.–R/T." switch to "R/T."
(iv) If not already connected, plug a Microphone and Receivers Headgear, Assemblies No. 1, into one of the drop leads on the Sender/Receiver Unit.
(v) Close the Pressel switch on the microphone and rotate the "AERIAL TUNING" dial until the maximum "dip" point on the meter is reached.
(vi) If this is below 45 mA. increase the "AERIAL COUPLING" condenser dial setting and decrease the "AERIAL TUNING" dial setting until maximum "dip" is again recorded on the meter.
(vii) Repeat (vi) until at the last adjustment of the "AERIAL TUNING" dial the maximum dip is at 45 mA.
(viii) If M.C.W. transmission is required now change the Function Switch accordingly.

B.—**Crystal Control (W.S.122 (Aust.)).**

(i) Repeat (i) to (viii) of para. 9.4B.
(ii) Repeat (ii) to (viii) of Para. 9.5A.

Note.—The P.A. Loading adjustment must be made on an unmodulated R/T transmission with both M.O. and crystal control.

9.6. Voltage Readings—"SEND."

On "SEND" the following plate voltage readings should be obtained when the meter switch is set to "H.T.S."

(i) "SEND" L.P. (M.C.W.–C.W.–R/T.) .. .. 180 volts
(ii) "SEND" H.P. (M.C.W.–R/T.) .. .. .. 260 volts
(iii) "SEND" H.P. (C.W.) .. .. 360 volts

When the meter switch is set to "L.T." it should read 12 volts.

10. NETTING

10.1. Introduction.

Good operation cannot be expected from a group of stations unless they are accurately tuned to the same frequency.

The tuning of a group of stations to the same frequency is called "NETTING." To perform this operation satisfactorily individual operators in the groups all must :

(i) Know how to tune the Wireless Set No. 22 (Aust.) or W.S. 122 (Aust.) quickly and accurately to the required frequency. The procedure to be followed has been described in Paras. 9.1 to 9.5.
(ii) Understand and carry out accurately the "Netting Drill" detailed later in this chapter. Remember always that the "Control Station" is right and the instructions emanating from it *must be obeyed.*

NETTING is always carried out before a signal "exercise" and for obvious reasons should be an extremely brief operation.

10.2. Methods of Netting.

NETTING may be carried out in several ways—

(i) Netting at a distance.
  (*a*) Control Station using a wavemeter.
  (*b*) Control Station relying on its own calibration.
  (*c*) Crystal Control (W.S.122 (Aust.)).

(ii) Netting in Harbour.
  (*a*) Control Station using a wavemeter.
  (*b*) Control Station relying on its own calibration.
  (*c*) All Sets adjusted by passing the wavemeter from Set to Set.
  (*d*) Crystal Control (W.S. 122 (Aust.)).

System (ii) should always be used in preference to system (i), where possible, as under normal conditions no interception is possible.

The Control Station should always be netted by means of a wavemeter when one is available (W.S. 22 and W.S. 122 with M.O. control).

Method (ii) (*c*) is used when it is possible to bring all the Sets together, and it is imperative that no interception of the "Netting instructions" shall take place.

Methods i (*c*) and ii (*d*) are made use of when crystal control of the Sender is used. (W.S. 122 only.)

11. NETTING INSTRUCTIONS

11.1. Introduction.

Before starting operations the Operator will have been told the frequency on which he is to work, the call signs, group code names, the time at which Netting is to start, and details of the Netting signals.

Fifteen minutes before Netting is due to start the set should be switched on and the "Sender" On/Off switch set to "On." (The key and the Microphone pressel switch should be left "open.")

This is because the Sender/Receiver takes 15 minutes to settle down, i.e., for the "warm-up frequency shift" to be overcome. Spend the time making tests for Daily Maintenance as outlined in Table 7.

FINDING THE SILENT POINT

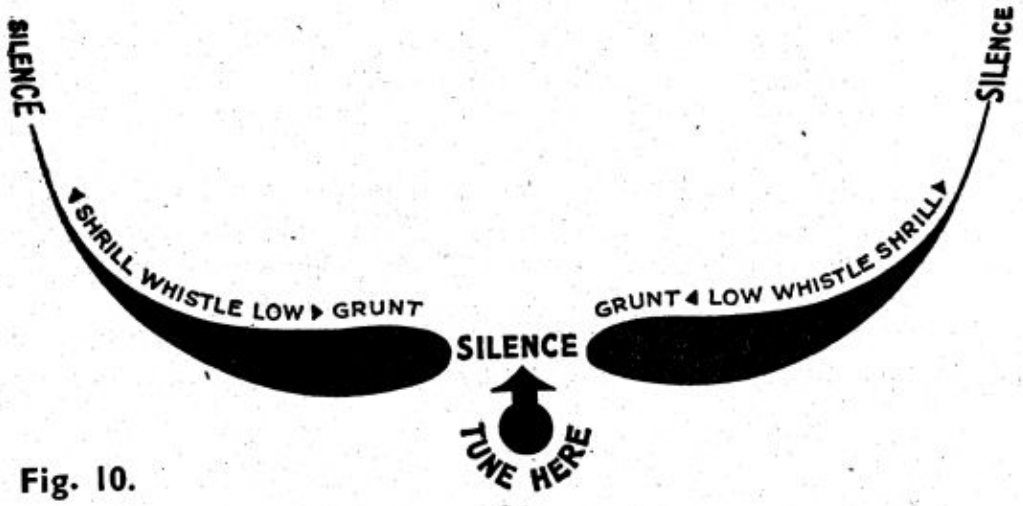

Fig. 10.

There are two distinct operations to be carried out before Netting is completed. These are :

(i) Setting the Control Station to the ordered frequency and adjusting the set so that its Receiver and its Sender frequency is exactly the same.

(ii) Bringing the "out" stations to the same frequency as the Control Station, both on "SEND" and "RECEIVE."

Note.—These operations must be carried out for "one to one" working as well as for "group" working.

11.2 NETTING AT A DISTANCE.

The Control Station frequency may be set by either of two methods :

(*a*) By using a wave-meter.

(*b*) By relying on the calibration of the "FREQ.Mc/s." dial.

The first method gives a high degree of accuracy and should be used whenever possible. With the second method it will often be found that the calibration of the dial is not perfectly accurate. However the Electrician, Signals, who checks the set will be able to tell the operator the errors which exist so that allowance may be made for them.

(*a*) Using a Wavemeter.

(i) Prepare the Set for netting by placing the "flick" controls on the "Freq. Mc/s." and "Aer. Coupling" dials to "Flick."

(ii) Engage the dials at the "Red" setting by rotating the dials until the flags drop into the red windows. At the same time a click is heard and felt. Loosen the appropriate "Flick" screws. Repeat this procedure at the "Blue" setting. A tool for this operation is clipped to the front panel.

(iii) Tune the "FREQ. Mc/s." dial to the ordered frequency. Turn the "R.F. GAIN" and "A.F. GAIN" controls fully clockwise. Set the "WAVE CHANGE SWITCH" to the ordered frequency band. Place the "NORMAL/REMOTE" switch in the "NORMAL" position, the meter switch to "A.V.C.," and the "M.C.W.–C.W.–R/T." switch to "R/T." Tune the "AERIAL COUPLING" and "AERIAL TUNING" dials to the approximate positions listed in Table 6 for the particular frequency and type of aerial being used.

(iv) Place the wavemeter near the Aerial lead, switch on, and set it accurately to the ordered frequency. Tune in the wavemeter signal.

Note.—When the wavemeter method of Netting is employed care should be taken to ensure that an input signal only just sufficient

to give a perceptible "dip" on the A.V.C. meter is used. The wavemeter should be placed far enough away from the set to provide an A.V.C. meter reading of "10" on the 15 volt scale of the meter when the set is tuned to resonance.

(v) Set the Function Switch to "C.W." and the "HET. TONE" dial to the **455 kc/s. "lock" position.** Tune for zero beat with the wavemeter signal.

(vi) Return the Function Switch to "R/T.," depress the "NET" button, and adjust the "NETTING TRIMMER" until "Zero Beat" is obtained in the headset of the Microphone and Receivers Headgear, Assemblies No. 1 used with the Sender/Receiver unit.
Lock the "NETTING TRIMMER" and whilst doing so listen in order to ensure that Zero Beat is not lost. Then release the "NET" button. Log the setting of the "NETTING TRIMMER" on the calibration tablet.

(vii) Lock the "FREQ. Mc/s." dial screws of the correct colour for the "Blue" frequency.

(viii) Turn the "Freq. Mc/s." dial off the ordered frequency and then re-engage the "Flick." Check that the Set meter reading and the zero beat are the same as before. If there is any variation, loosen lock and repeat operations (v) (vi), (vii) and (viii).

(ix) Repeat (i) to (viii) for the "Red" frequency if it is used.

Note.—If re-netting is necessary the appropriate "FLICK" screws must be loosened with the Flick lock in the "FLICK" position and with the mechanism engaged. Complete the tuning as per 11.3.

(*b*) **Without a Wavemeter.**

(i) Prepare the set for "NETTING." (*See* Para. 11.2 (a) (i) (ii) and (iii). Set the "FREQ. Mc/s." dial as accurately as possible to the ordered frequency making allowances for any known inaccuracy in this control.

(ii) Depress the "Net" button, and adjust the "Netting Trimmer" until the maximum "dip" is obtained on the set meter. Lock the "Netting Trimmer" and check that this operation does not alter the meter reading. Next, release the "Net" button and log the setting of the "Netting Trimmer" on the calibration tablet. If the maximum point of the dip is difficult to discern, a check may be made by listening in the headphones and tuning for the centre of the carrier.

(iii) Lock the "Freq. Mc/s." dial screws of the correct colour.

(iv) Turn the "Freq. Mc/s." dial off the ordered frequency and re-engage the "Flick." Check that the meter reading or sound in the headphones is the same as before. If it is not, loosen dial locks and repeat operations (i) to (iv).

Note.—If re-netting is necessary the appropriate "FLICK" screws must be loosened with the Flick lock in the "FLICK" position and with the mechanism engaged.

(v) Repeat (i) to (iv) for the "Red' frequency if it is used.

Note.—After making the above adjustments both the "FREQ. Mc/s." dial and the "NETTING TRIMMER" must be left strictly alone unless complete re-tuning is to be carried out. Complete the tuning as per 11.3.

(*c*) **Crystal Control.**

(i) Set the "Osc. Control" switch to the crystal which it is desired to use—X1 or X2.

(ii) Prepare the Set for Netting (*see* Para. 11.2, a, (i), (ii) and (iii).

(iii) Set the "Wave Change Switch" and "Freq. Mc/s." dial to the correct positions as determined by reference to Para. 9.4, b, (i) to (vi).

(iv) Depress the "Net" button and adjust the "Freq. Mc/s." dial until the maximum "dip" is obtained on the Set meter. If the maximum point of the dip is difficult to discern, a check may be made by listening in the headphones and tuning for the centre of the carrier.

(v) Lock the "Freq. Mc/s." dial screws of the correct colour.

(vi) Turn the "Freq. Mc/s." dial off the ordered frequency and re-engage the "Flick." Check that the meter reading or sound in the headphones is the same as before ; if it is not, loosen the dial locks and repeat operations (iv) to (vi).

Complete the tuning as per para. 11.3.

11.3. Aerial Circuits Tuning.

With the "Aer. Coupling" dial set to the figure specified in Table 6 for the type of aerial and the frequency used, the tuning adjustments to the aerial circuits are made as follows :—

(i) Turn the "M.C.W.–C.W.–R/T." switch to "C.W." and the meter switch to "P.A." Hold the key down.

(ii) Adjust the "AERIAL TUNING" control for maximum "dip" on the set meter. The meter should then read 65 mA. on the 15 volt scale. If it is below or above this reading change the setting of the "AERIAL COUPLING" dial slightly and readjust the "AERIAL TUNING" control for maximum "dip." Continue making these two adjustments until a reading of 65 mA. is obtained.

(iii) Lock the "AERIAL COUPLING" dial screws of the correct colour for the "Blue" frequency.

(iv) Turn the "AERIAL COUPLING" dial away from its setting and then re-engage the "FLICK." Check that the meter reading is the same as before. If it is not repeat operations (ii), (iii) and (iv).

Note.—If re-netting is necessary the appropriate "FLICK" screws must be loosened with the Flick lock in the "FLICK" position and with the mechanism engaged.

(v) Log the setting of the "AERIAL TUNING" control on the calibration tablet.

(vi) Repeat (ii) to (v) for the "Red" frequency if it is used.

Note.—For M.C.W. and R/T. operation proceed as indicated in Para. 11.3 (i) to (vi) but with the "M.C.W.–C.W.–R/T." switch turned to R/T and with a reading of 45 mA. on the set meter when the latter is switched to "P.A." If M.C.W. transmission is required turn the Function Switch to M.C.W. after completing adjustment of the P.A. loading.

11.4. Group Netting—Control Station.

For group netting "Control" will transmit on the ordered frequency after ensuring that its own Sender and Receiver are accurately netted.

(i) A short tuning call.

(ii) A "NETTING" call sufficiently long for the "Out" stations to complete the netting of their sets as detailed in Para. 11.5 (i) to (vii).

(iii) A group call asking for signal strength reports. The "NET" button is pressed as each station answers and so the netting of each station is checked. "Zero Beat" should be obtained although a low pitched hum is permissible. A note of higher pitch than this indicates that the station is badly netted and instructions will be given for that station to re-net.

Note.—For Netting on C.W. proceed as detailed in 11.4 (i), (ii) and (iii), except that in (iii) the "Function Switch" is switched to "R/T" before the "NET" button is pressed, and then returned to C.W. before answering.

Alternatively the "Function Switch" is left in the C.W. position for both sending and receivng; then, as each station answers the "Het Tone" is moved to the 455 Kc/s. "Lock" position, where "Zero Beat" should be obtained as in (iii).

11.5. Group Netting—"Out" Stations.

Prior to the time ordered for "Netting" all "Out" stations will prepare their sets for Netting (*see* Para. 11.2 (a) (i), (ii) and (iii)) and shall carry out the following operations whilst Netting :—

(i) With the "FREQ. Mc/s." dial search for the Control Station's signal.

(ii) Set the Function Switch to "C.W." and the "HET. TONE" dial to the 455 kc/s. "lock" position. Re-adjust the "FREQ. Mc/s." dial for Zero Beat with the Control Station's signal.

(iii) Return the Function Switch to "R/T.," depress the "NET" button, and adjust the "NETTING TRIMMER" until Zero Beat is obtained. Lock the "NETTING TRIMMER" and check that this operation does not disturb the Zero Beat. Log the reading of the "NETTING TRIMMER" on the calibration tablet.

(iv) Lock the "FREQ. Mc/s." dial screws of the correct colour.

(v) Turn the "FREQ. Mc/s." dial off the ordered frequency and then re-engage the "FLICK" checking that Zero Beat is still obtained. If it is not, repeat operations (i) to (v).

Note.—If re-netting is necessary the appropriate "FLICK" screws must be loosened with the Flick lock in the "FLICK" position and with the mechanism engaged.

(vi) Repeat operations (i) to (v) for the "Red" frequency if ordered by the Control Station.

(vii) Tune Aerial circuit as detailed in Para. 11.3.

(viii) Answer Group Call when ordered by Control Station, remembering that for C.W. reception, adjustment of the "Het Tone" will be necessary.

12. NETTING IN HARBOUR

12.1. Introduction.

This procedure is usually adopted with vehicle stations and involves the de-tuning of the aerial circuit of the Sender so that signals are too weak to be picked up far from the harbour. De-tuning of the aerial is carried out by setting the "AERIAL COUPLING" dial to "100" if the 4–8 Mc/s. band is used or to "0" if the 2–4 Mc/s. band is used.

12.2. Tuning the Control Station.

The Control Station set is adjusted by the same procedure as is used when netting at a distance (Para. 11.2) except that on "RECEIVE" it is necessary to make further adjustments to the "AERIAL TUNING."

12.3. Group Netting—Control Station.

For Group Netting "Control" will :—

(i) Set the "AERIAL TUNING" and Aer. Selector controls to the figure specified in Table 6 for the type of aerial and the frequency being used.

(ii) Detune the aerial circuit by setting the "AERIAL COUPLING" dial to "100" for operation on frequencies between 4 and 8 Mc/s. or to "0" for operation on frequencies between 2 and 4 Mc/s.

(iii) Send a short Tuning Call on the "Blue" frequency to enable identification by the "Out" stations.

(iv) Send a Netting Call sufficiently long for the "Out" stations to complete the netting of their sets according to the instructions set out in Para. 11.5 (i) to (vi).

(v) Send a Group Call asking for signal strength reports. The "NET" button will be pressed as each station answers so that the netting of the station is checked. Zero Beat should be obtained although a low pitched hum is permissible. A note of higher pitch than this indicates that the station is badly netted and instructions will be given for that station to re-net.

Note.—For C.W. refer to "Note" under Para. 11.4.

12.4. Control Station Adjustment—"RECEIVE."

Either during reception of replies to the Group Call or to a special Tuning Call to one of the "Out" stations, "Control" should, if necessary to improve receiver sensitivity, set the "AERIAL COUPLING" Control to figure specified in Table 6.

Note.—On changing back to "SEND" the "AERIAL COUPLING" dial MUST be de-tuned to "0" or "100" depending on whether the SENDER is being used on 2–4 Mc/s. or 4–8 Mc/s.—in order to limit radiation.

12.5. Group Netting—"Out" Stations.

"Out" stations shall follow the same procedure as when netting at a distance (Para. 11.5) except that before answering the Group Call from "Control" they shall :—

Detune the Aerial circuit by setting the "AERIAL COUPLING" dial to "0" when operating on the 2–4 Mc/s. range and "100" when operating on the 4–8 Mc/s. range.

On "Receive," adjustments are to be made as set out for Control Station (Para. 12.4).

12.6. Netting by Wavemeter.

In this procedure all sets, including the Control Station, are adjusted by the same wavemeter which is passed from set to set. No station of the group radiates any signal.

Each set is adjusted similarly in accordance with the following procedure :—

(i) Carry out instructions set out on Para. 11.2 (a), (i) to (viii). Do NOT carry out Aerial Tuning Procedure (Para. 11.3).

(ii) Adjust the "AERIAL TUNING" dial until maximum "dip" is indicated on the set meter.

(iii) Repeat operations (i) and (ii) for the "Red" frequency if in use.

(iv) Do NOT press key on Mic. Pressel Switch, as a strong signal will be radiated.

Note.—Before establishing communications, after moving out of harbor, carry out Aerial Tuning procedure (Para. 11.3).

13. MISCELLANEOUS

13.1: The Netting Trimmer.

This trimmer must always be clamped after "NETTING" and "FLICK" setting have been carried out. When two "NET" frequencies are used the trimmer setting for the "Red" frequency will usually differ from that for the "Blue" frequency. The two settings should be logged on the calibration tablet so that re-adjustments can be quickly made when "Flick" change is required.

13.2. Checking Netting ; Re-netting.

For various reasons, including the heat of the day or the state of the battery, the frequency of the set will vary slightly and put the set off "NET."

A good operator knows immediately (by a rise in the pitch of the voice of "Control," by slight distortion in the speech, by a change in the pitch of a C.W. signal, and by a rise in the pitch of the background hiss) when a set is tending to go off "NET."

Bad quality usually means bad netting. This can be corrected by waiting until "Control" is heard sending to another station and then pressing the "NET" button. No sound, or at most a "grunt" should be heard. If a high pitched whistle is heard the set is going off "NET" and must be re-netted.

This is done exactly as explained in Para. 11.2 (*b*) but "Control" MUST be sending all the time the operation is being performed.

13.3 Heterodyne Tone Control.

The correct use of this control during the "Netting" operation enables the exact centre of the carrier wave to be located. It is essential that the "Het. Tone" Control dial be set to the 455 Kc/s. "lock" position, otherwise Zero Beat will occur when the Receiver is tuned to one side of the carrier. When the "Netting" operation has been completed, the "Het. Tone Control" should be adjusted to give the desired pitch of beat note for C/W working. **On no account** must the "Freq. Mc/s." dial setting be altered to obtain this, as by doing so the whole Netting operation will be upset.

13.4. Using "TUNE" Position of "FLICK" Lever.

If the set goes off "NET" very frequently set the "FLICK" levers to "TUNE" whilst checking "NET." Both dials can now be adjusted without having to loosen the "FLICK" screws each time. Remember, though, that if the lever is turned to "FLICK" the dial will return to its old "FLICK" setting.

The first opportunity should be taken to re-set the "FLICK" device, but this should not be attempted unless the set is stationary and unless "Control" is making a long transmission which does not concern your station.

Having re-set the "FLICK" mechanism the levers should be left at "FLICK" until the set is again noticed to be going off frequency.

13.5. System Switching.

(i) As explained in Chapter I the Wireless Set No. 22 (Aust.) is designed to operate on M.C.W., C.W., or R/T.

The advantage of M.C.W. is that less interference is experienced from other stations sending C.W. on the same frequency as the M.C.W. transmission.

The advantage of C.W. is that it provides greater range than either M.C.W. or R/T. If interference is being experienced on your operating frequency from stations using M.C.W. or R/T. the changing over of your "SENDER" to C.W. on the same frequency will often lessen the interference.

(ii) Send/Receive Switching.
This is effected by relays which are operated on R/T. by the pressel switch in the microphone handle and on M.C.W. or C.W. by the Morse key.
This method of keying permits "Break-in" operation on C.W. and M.C.W. In this system the receiver is operative during the word spaces in sending so that if the receiving operator wishes to interrupt the sending operator he can do so by keying and his signals will be heard by the sending operator every time the latter allows his key to remain "up" for more than about half a second.

13.6. Poor Signals.

Whilst working, if the signals become progressively worse or fail altogether :—

(*a*) Check the Netting. If the set is going off "NET" re-net it on the Control Station.
(*b*) Check the batteries, headset, and aerial and their connections. Check the meter reading on "TEST." Check the Sidetone.
(*c*) Call a nearer station to prove your own set O.K.
(*d*) If there is still no answer and a rod aerial is being used, put up an additional aerial section, re-set the "AERIAL TUNING" and "AERIAL COUPLING" for maximum radiation, and call again.

13.7. Economy of Battery Drain.

If you have to listen for signals for a long period but need not be ready to send without having been warned, turn the Sender "ON–OFF" switch to the "OFF" position. This will enable the set to be worked for longer periods without battery replacement or recharging. *See* Table I.

13.8. Crash Limiter.

The principal purpose of this unit is to limit the effect of heavy static or of noise pulses caused by nearby electrical machinery.

The "CRASH LIMITER" is so designed as to be operative on high noise peaks and to have practically no effect on weak signals.

Chapter 3

SPECIAL CONDITIONS OF USE

14. AERIAL COUPLING EQUIPMENT

14.1. General.

Aerial Units, "J" (Aust.) has been designed to allow the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) to be operated up to 45 ft. from 12 ft. or 34 ft. vertical aerials on occasions when it would be impracticable or undesirable to have the set and aerial erected close together as under normal conditions of use.

The equipment allows the wireless set to be operated under cover whilst obtaining good radiating conditions for the aerial which stands in the open. Losses due to screening by local objects may thus be avoided.

Some loss of range is inevitable in the use of coupling units so they should be used only when absolutely necessary. Loss of range increases in proportion to the rise in the operating frequency and the increase in the length of the feeder lines.

14.2. Aerial Units "J," (Aust.).

This unit consists of an "AERIAL TUNING" inductance, L1A, a "VARIABLE AERIAL COUPLING" condenser, C1A, four "FIXED AERIAL COUPLING" condensers, C2A, C2B, C2C and C2D, a "TUNE SET" dummy aerial, R1A, an R.F. meter transformer, T1A, and its associated rectifier units, W1A and W2A and the meter M1A, which reads a direct current equivalent to 1.5A, R.F.

Aerial Units, "J," (Aust.) is provided with four terminals, two for connection of the Feeder Line from the Set, and two for connection of the Aerial and Earth, or Counterpoise if the latter is used.

The Chassis of Aerial Units, "J" (Aust.) fits into a dural case to which is rivetted Covers, Waterproof, No. 3 (Aust.). The front of the chassis is fastened to the case by means of four screws. A handle is provided for easy withdrawal of the unit from its case.

Aerial Units, "J" (Aust.) equipment comprises :

(i) Aerial Units, "J" (Aust.).
(ii) Three Connectors, Twin, No. 15.
(iii) Two Connectors, Twin No. 22 (Aust.).

Connectors, Twin No. 15 are used for the transmission line whilst Connectors, Twin No. 22 (Aust.) are used to connect the Sender/Receiver and the transmission line to the Aerial Units, "J" (Aust.)

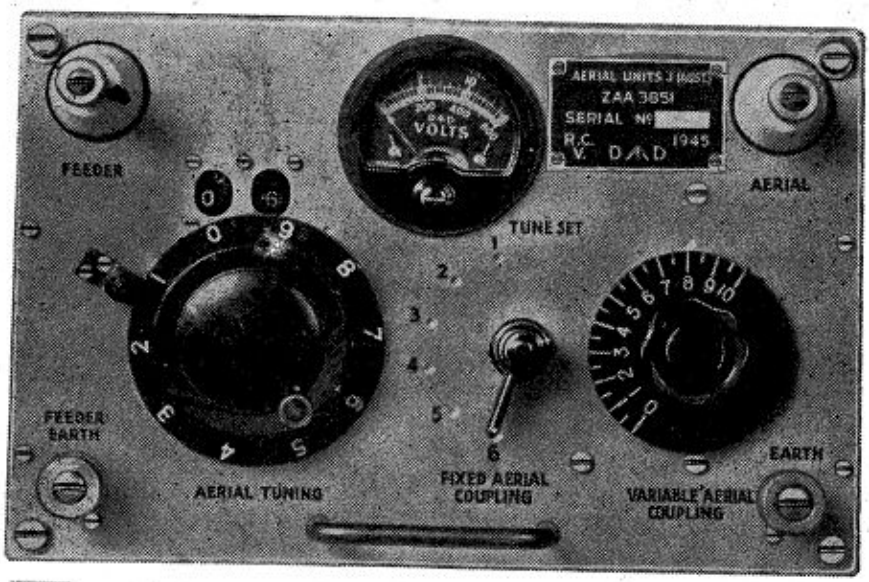

Plate 7. AERIAL COUPLING EQUIPMENT— Aerial Units, "J," (Aust.) — Front View

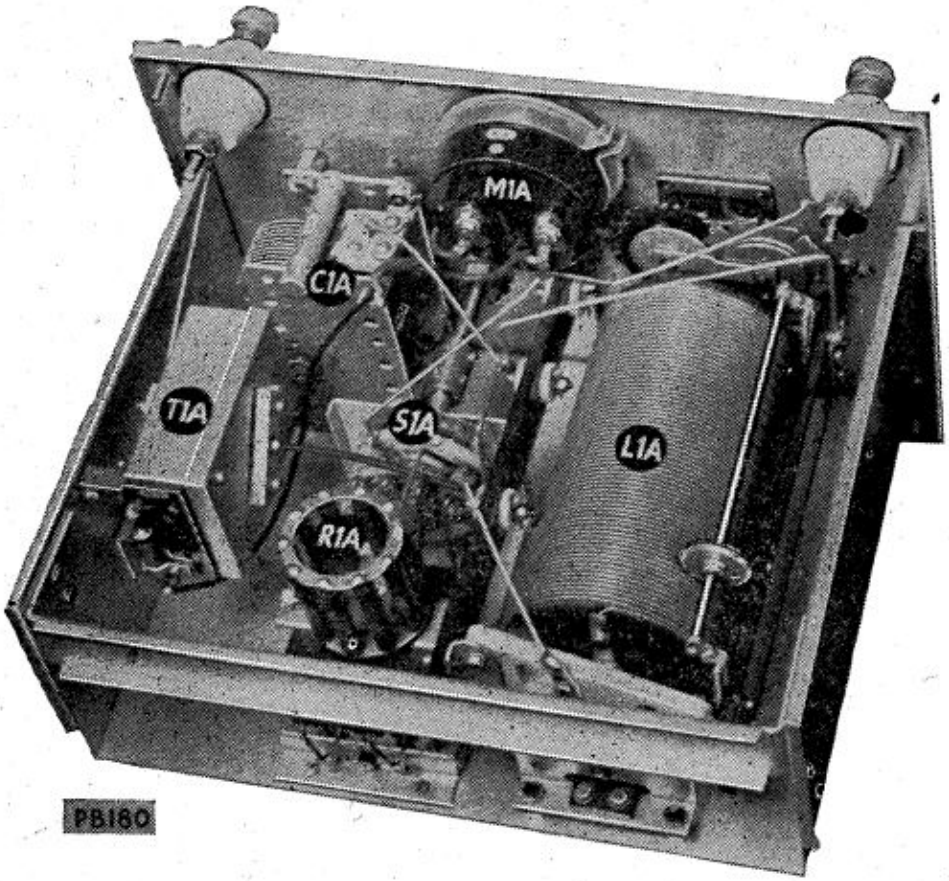

Plate 8. AERIAL COUPLING EQUIPMENT— Aerial Units, "J," (Aust.) — Top View

14.3. Weights and Dimensions. Aerial Coupling Equipment—Aerial Units, "J" (Aust.).

TABLE 12.—WEIGHTS AND DIMENSIONS.

Description	*Weight*	*Dimensions—Inches*		
		Length	*Width*	*Height*
Aerial Unit, "J" (Aust.)	9½ lbs.	10½	9½	7¼
Satchels, Signal, No. 1 Containing : 3 Connectors, Twin, No. 15 2 Connectors, Twin, No. 22 (Aust.)	9½ lbs.	11	2½	9

14.4. Tuning Instructions.

(i) Place the Aerial Units, "J" (Aust.) at the foot of the aerial and connect the aerial to the "AERIAL TERMINAL" on the unit. Connect the earth or the counterpoise to the "EARTH" terminal on the unit.

(ii) Connect together one, two or three lengths of Connectors, Twin, No. 15 as required to form the transmission line. Plug one Connector, No. 22 (Aust.) into the Aerial Unit end of the transmission line and attach the "AE" lug of this connector to the "FEEDER" terminal on Aerial Units, "J" (Aust.). Attach the "E" end of the connector to the "FEEDER EARTH" terminal on the Aerial Units, "J" (Aust.). Plug the other Connectors, Twin, No. 22 (Aust.) into the Set end of the transmission line and join the "AE" lug to the "AERIAL" terminal and "E" lug to the "EARTH" terminal on the Set.

(iii) Set the Aerial Units, "J" (Aust.) "FIXED AERIAL COUPLING" switch to "TUNE SET."

(iv) Adjust Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) to the desired frequency in accordance with the instructions set out in Paras. 9.3 and 9.4 and tune for correct P.A. plate current.

(v) Set the Aerial Units, "J" (Aust.) "FIXED AERIAL COUPLING" switch and the "VARIABLE AERIAL COUPLING" dial in accordance with the settings given for the frequency in use in TABLE 13.

(vi) Turn the Aerial Units, "J" (Aust.) "AERIAL TUNING" control until the maximum aerial current is indicated on the Aerial Unit meter.

(vii) Slightly vary the settings of the "FIXED AERIAL COUPLING" switch and the "VARIABLE AERIAL COUPLING" dial and, if necessary, finally adjust the "AERIAL TUNING" dial on the Aerial Unit until the maximum current is indicated on the Aerial Unit meter.

(viii) Check the tuning of the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) to ensure that the conditions of (iv) in this Para. are fulfilled. If the P.A. plate current is higher, or lower than the rated value—65 mA. for C.W. or 45 mA. for R/T—readjust the "AERIAL TUNING" and "AERIAL COUPLING" dials on the Set until this reading is reached. Slight readjustment to the Aerial Units, "J" controls may then be needed.

Note.—Normally, the P.A. reading for the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) should not vary but slight variation may be observed at certain frequencies.

(ix) The Set is now ready to "SEND" or "RECEIVE" on the frequency to which it is tuned.

14.5. Changing Frequency.

For each change of Sending or Receiving frequency the foregoing procedure must be repeated.

Reference should be made to Table 13 for details of the settings of the "FIXED AERIAL COUPLING" switch, the "VARIABLE AERIAL COUPLING" dial and the "AERIAL TUNING" dial.

TABLE 13.—AERIAL UNITS, "J" (AUST.)—TUNING SETTINGS.

Freq. Mc/s.	*12 ft. Vertical Aerial*			*34 ft. Vertical Aerial*		
	Fixed Aer. Coup.	*Var. Aer. Coup.*	*Aerial Tuning*	*Fixed Aer. Coup.*	*Var. Aer. Coup.*	*Aerial Tuning*
2	5	7·5	60·2	5	0	38·3
2·5	5	3·5	42·3	6	0	26·3
3·0	6	0	31·8	6	0	20·4
3·5	6	0	24·9	4	7·5	15·6
4·0	6	6	19·7	6	7·5	11·6
4·5	6	1	15·5	6	0	7·7
5·0	5	2	16·2	6	4	10·3
5·5	5	1·5	14·2	6	0	7·8
6·0	5	6	12·1	6	8	6·9
6·5	5	3	10·9	6	8	5·1
7·0	5	10	9·7	6	5	4·2
7·5	6	9	8·7	6	0	2·9
8·0	6	0	7·5	6	0	0

15. WIRELESS REMOTE CONTROL UNITS, "F", No. 1 (AUST.) AND No. 2 (AUST.).

15.1. General.

Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) can be used at a distance with the aid of Wireless Remote Control Units, "F," No. 1 (Aust.) and No. 2 (Aust.). The No. 1 Unit is used adjacent to the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) and the No. 2 Unit at a remote point which may be up to one mile distant from the No. 1 Unit.

Details of the No. 1 Unit are shown in Plates 9 and 10 and the circuit diagram Fig. 6, Plates 11 and 12 and circuit diagram Fig. 7 show details of the No. 2 Unit.

15.2. Facilities.

Wireless Remote Control Units, "F," No. 1 (Aust.) and No. 2 (Aust.) can provide the following facilities :

(A) **Unit No. 1.**

(i) Calling of Remote Unit.
(ii) Calling of Telephone Exchange No. 1.
(iii) R/T and W.T. control of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) by No. 1 Operator.
(iv) R/T operation of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) by Exchange No. 1 (In this operation the No. 1 Operator performs "Send/Receive" switching on the panel of the No. 1 Unit.
The No. 1 Operator may converse with Remote whilst Exchange uses set.)
(v) R/T and W.T. control of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) by Remote Unit (Operator No. 1 may converse with Exchange whilst Remote uses set.)
(vi) Re-broadcasting on a Separate Sender of :
(*a*) Signals received on Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).
(*b*) Signals received from either No. 1 or No. 2 Exchanges.
(*c*) Signals received from the Remote Unit.
(*d*) Signals from Near Receiver No. 2.
(vii) Re-broadcasting on the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) of signals from Near Receiver No. 1.
(viii) Exchange No. 1 may speak through to the No. 2 Operator and through to Exchange No. 2 which is connected to the Remote unit.

(B) **Unit No. 2.**

(i) Calling of No. 1 Operator.
(ii) R/T and W/T operation of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).
(iii) R/T operation of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) by Exchange No. 2 which is connected to Unit No. 2.
(iv) No. 2 Operator may call or be called by Exchange No. 2.
(v) Re-broadcasting on Separate Sender or on Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.), both of which are connected to No. 1 Unit, of signals received on Near Receiver No. 2 which is connected to the No. 2 Unit.
(vi) Exchange No. 2 may speak to Operator or Exchange No. 1.

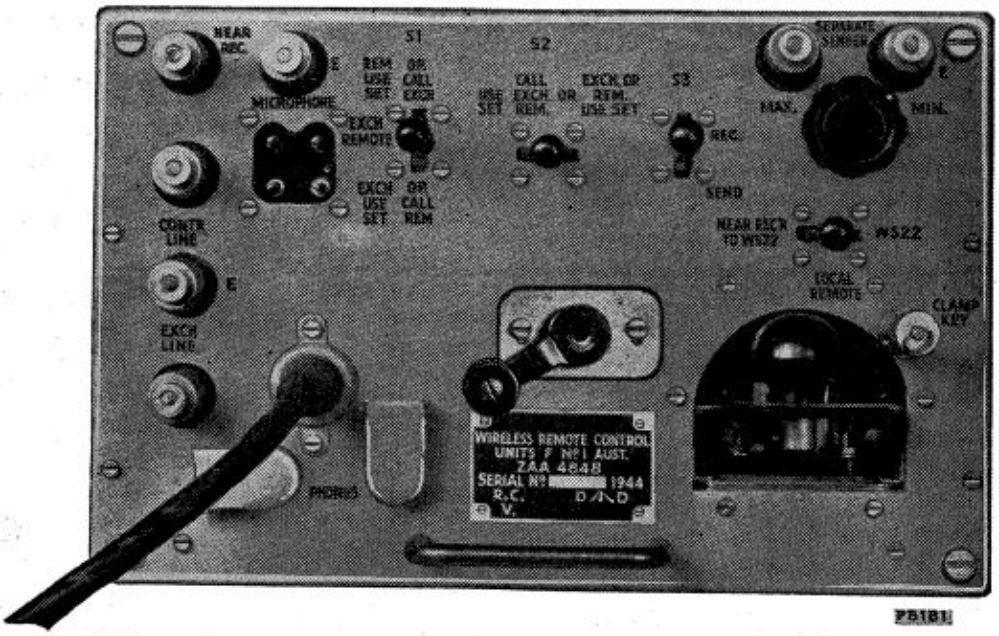

Plate 9. WIRELESS REMOTE CONTROL UNITS, "F," No. 1 (Aust.) Chassis — Front View

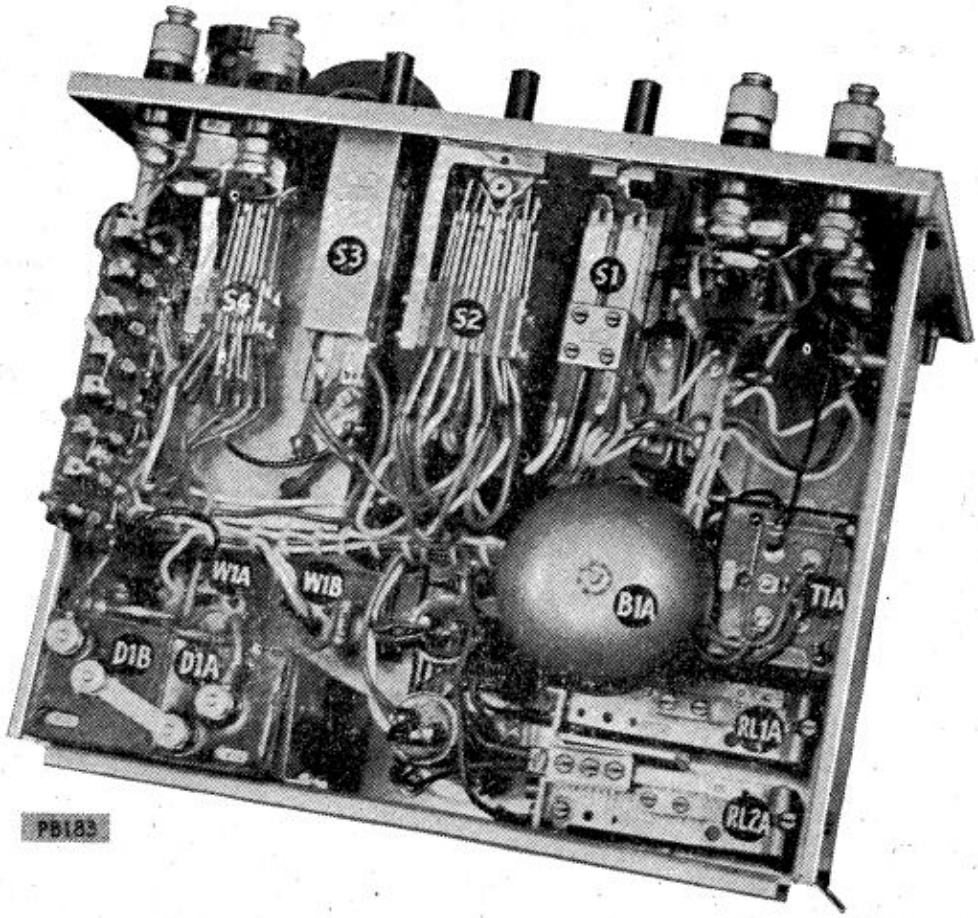

Plate 10. WIRELESS REMOTE CONTROL UNITS, "F," No. 1 (Aust.) Chassis — Top View

15.3. Description of Apparatus.

Wireless Remote Control Equipment for Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) comprises :

Wireless Remote Control Units, "F," No. 1 (Aust.)	1	
Wireless Remote Control Units, "F," No. 2 (Aust.)	1	
Receivers, Headgear, C.L.R., Double, Mk. III (Aust.)	2	
Microphones, Hand, No. 8	2	
Cable, D.3, Mk. VI, twisted	½	mile
Drums, Cable, No. 5, Mk. I	1	
Satchels, Signal	2	

Wireless Remote Control Units, "F," No. 1 (Aust.) and No. 2 (Aust.) are self-contained units fitted in a metal case provided with a hinged lid and a permanently attached water-proof cover which protects the unit when it is used in bad weather conditions.

The Units comprise a Morse key, a bell ringing magneto, dry batteries for operating the control relays, microphone socket, headphone jacks, the terminals necessary for connection of the various channels to the unit, and the switches needed for calling and speaking.

The microphone and headphones for each unit are carried in the Satchels, signal.

15.4. Weights and Dimensions of Wireless Remote Control Equipment for Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).

TABLE 14.—WEIGHTS AND DIMENSIONS.

Description	*Weight*	*Dimensions—Inches*		
		Length	*Width*	*Height*
Wireless Remote Control Units, "F," No. 1 (with batteries)	16 lbs.	10¾	7½	9½
Wireless Remote Control Units, "F," No. 2 (with batteries)	17½ lbs.	10¾	7½	9½
Satchels, Signal, No. 1 Containing : 2 Microphones, Hand, No. 8 2 Receivers, Headgear, C.L.R., Double, Mk. III (Aust.)	5½ lbs.	11	2½	9
Drums, Cable, No. 5, Mk. I, wound with ½ mile of Cable, D3, Mk. VI, twisted		16	10⅜	16

16. CONNECTIONS

16.1. Wireless Remote Control Unit, "F," No. 1 (Aust.).

To connect Wireless Remote Control Unit, "F," No. 1 (Aust.) to :

(i) Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) : Plug in :

(*a*) The drop lead on the Remote Control Unit to one of the drop leads on the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).

(*b*) Microphone, Hand, No. 8, into the "MICROPHONE" socket on the Remote Control Unit.

(*c*) Receivers, Headgear, C.L.R., Double, Mk. III (Aust.) into the "PHONES" jack on the Remote Control Unit.

(ii) Remote Control Unit, "F," No. 2 (Aust.) :
Connect lines between the two units to the terminals marked "CONTR. LINE."

Note.—Make sure that the "E" terminal on the No. 1 and No. 2 Units is connected to the same side of the line.

(iii) Exchange No. 1 :
Connect lines from exchange No. 1 to the terminals marked "EXCH. LINE" on Remote Control Unit.

(iv) Separate Sender :
Connect the input of the Separate Sender to the terminals marked "SEPARATE SENDER" on Remote Control Unit.

(v) Near Receiver No. 1 :
Connect Near Receiver No. 1 output to terminals marked "NEAR REC'R" on Remote Control Unit.

16.2. Wireless Remote Control Unit, "F," No. 2 (Aust.).

To connect Remote Control Unit, "F," No. 2 (Aust.) to :

(i) Remote Control Unit, "F," No. 1 (Aust.).

(*a*) Connect lines from Remote Control Unit No. 1 to terminals marked "CONTR. LINE" on Remote Control Unit No. 2.

Note.—Make sure that the "E" terminal on the No. 1 and No. 2 Units is connected to the same side of the line.

(*b*) Plug Microphone, Hand, No. 8, into the "MICROPHONE" socket on the Remote Control Unit.

(*c*) Plug Receivers, Headgear, C.L.R., Double, Mk. III (Aust.) into the "PHONES" jack on the Remote Control Unit.

(ii) Exchange No. 2 :
Connect lines from Exchange No. 2 to the terminals marked "EXCH. LINE" on Remote Control Unit.

(iii) Near Receiver No. 2 :

(*a*) Connect Near Receiver No. 2 output to terminals marked "RECEIVER OUTPUT" on Remote Control Unit.

(*b*) Connect Near Receiver No. 2 Aerial terminal (which also has the receiver's aerial connected to it) to the terminals marked "RECR. AER." on the Remote Control Unit.

17. OPERATING INSTRUCTIONS

17.1. Preliminary—No. 1 Operator.

To make use of all the facilities which are available from Wireless Remote Control Units, "F," No. 1 (Aust.) and No. 2 (Aust.), the No. 1 Operator first must :

(*a*) See that the "NORMAL/REMOTE" switch on the Wireless Set No. 22 (Aust.) is in the "REMOTE" position.

(*b*) See that the Function Switch—"M.C.W.–C.W.–R/T." switch—on the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) is set for the type of transmission required.

17.2. Switching Instructions—No. 1 Operator.

The following switching operations on Remote Control Unit, "F," No. 1 (Aust.) must be carried out :

(i) To call Operator No. 2 :
Place switch S1 in the "down" position and switches S2, S3 and S4 in the centre position. Ring Operator No. 2 by turning the magneto handle.

(ii) To call Exchange No. 1 :
Place switch S1 in the "up" position and switches S2, S3, and S4 in the centre position. Turn the magneto handle to ring Exchange No. 1.

(iii) To use Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

(*a*) Set the "M.C.W.–C.W.–R/T." switch on the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) to the type of transmission required.

(*b*) Place switches S1, S3 and S4 in the centre position and place S2 in the left hand position.

(*c*) For R/T. transmission press the pressel switch on Microphones, Hand, No. 8, whilst talking. For C.W. or M.C.W. use the key provided with Remote Control Unit, "F," No. 1 (Aust.).

(iv) For Exchange No. 1 to use Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

(*a*) Place Switch S1 in the "down" position, S2 in the right hand position, and S4 in the centre position. Whilst receiving, switch S3 must be in the centre position. For sending it must be in the "down" position.

(*b*) No. 1 Operator monitors the Exchange No. 1 line and operates switch S3 as required.

(v) For No. 2 Operator to use Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :
Place switch S1 in the "up" position, S2 in the right hand position and switches S3 and S4 in the centre position.

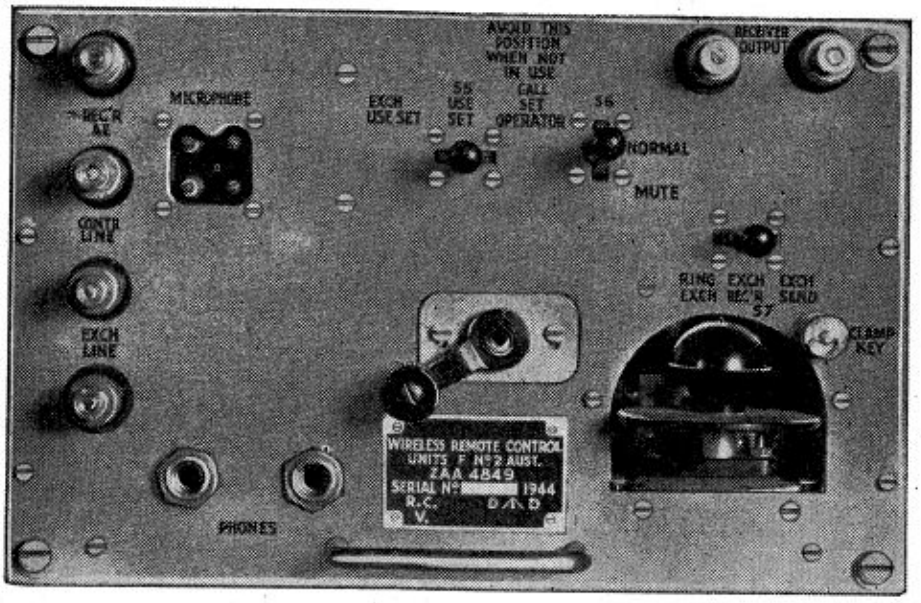

Plate 11. WIRELESS REMOTE CONTROL UNITS, "F," No. 2 (Aust.) Chassis — Front View

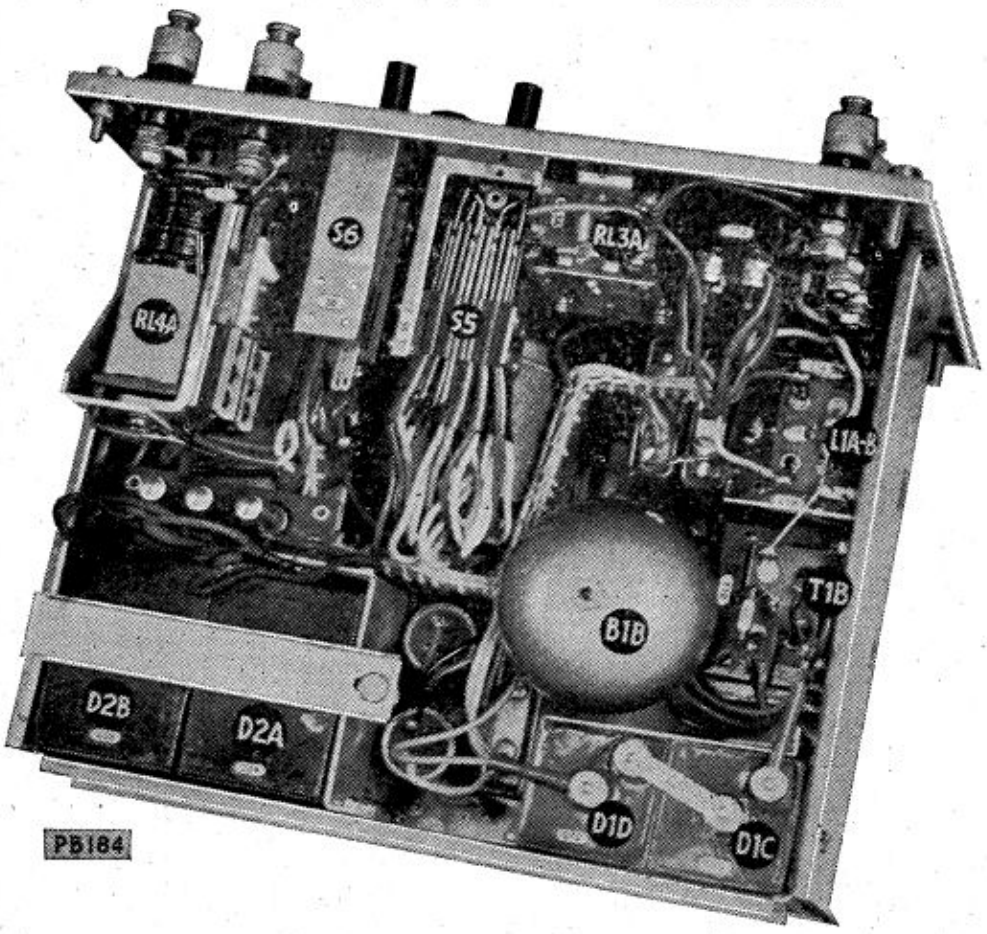

Plate 12. WIRELESS REMOTE CONTROL UNITS, "F," No. 2 (Aust.) Chassis — Top View

(vi) For Exchange No. 1 to speak to No. 2 Operator :

(*a*) Place switches S1, S2 and S3 and S4 in the centre position.

(*b*) The No. 1 operator may use the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) at the same time as Exchange No. 1 is in communication with the No. 2 Operator but switch S2 must then be placed in the left hand position.

(vii) To Re-broadcast on Separate Sender :

(*a*) Signals from No. 2 Operator, Exchanges No. 1 and 2, or Near Receiver No. 2, may be re-broadcast through the Separate Sender if switches S2, S3 and S4 are placed in the centre position and switch S1 is either "down" or "up." When S1 is in the "down" position Exchange No. 1 is being re-broadcast through the Separate Sender and when this switch is in the "up" position either No. 2 Operator, Exchange No. 2, or Near Receiver No. 2 can be re-broadcast.

Note.—Separate Sender must be switched on or off, as required, by No. 1 Operator.

(*b*) Signals from Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

Switch S1 may be set in any position. Place switches S2 and S3 in the centre position and S4 in the right hand position.

Whilst operations (vii) (*a*) and (*b*) are in progress No. 1 Operator can call Exchange No. 1 or No. 2 Operator.

Note.—During operation (vii) the "MOD. CONTROL" on Remote Control Unit No. 1 is advanced from the "Min" position sufficiently far to provide the required depth of modulation. During all other operations of Remote Control Unit, "F," No. 1 (Aust.) the "MOD. CONTROL" must be left in the "Min" position.

(viii) To re-broadcast on Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

Signals from Near Receiver No. 1 may be re-broadcast on Wireless Set No. 22 (Aust.). To do this set switch S1 in any position, switches S2 and S3 in the centre position, and S4 in the left hand position.

(ix) For Exchange No. 1 to speak to No. 2 Operator :

Place switches S1 and S3 in the centre position. With S2 in the centre position No. 1 Operator can ring or speak to Exchange No. 1 or to No. 2 Operator. With switch S2 in the central position and S4 in the left hand position No. 1 Operator can re-broadcast Near Receiver No. 1 over Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) or, with S2 in the left hand position, he can use Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) on speech or Morse. Both these operations can be carried out at the same time as Exchange No. 1 is talking to the No. 2 Operator.

17.3. Switching Instructions—No. 2 Operator.

The following procedure is to be adopted by the No. 2 Operator :

(i) To call No. 1 Operator :

Place switch S5 in the right hand position and switches, S6 and S7 in the centre position. Call No. 1 Operator by turning the magneto handle.

Note.—Observe the notice on the panel of Remote Control Unit, "F," No. 2 (Aust.). "Avoid this position when not in use"—otherwise the batteries may be discharged.

(ii) To call Exchange No. 2 :

With switch S5 in the left hand position and switch S6 in the centre position hold S7 to the left and call Exchange No. 2 by turning the magneto handle.

(iii) To operate Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

(*a*) When "Near Receiver" No. 2 is not in use place all switches in the centre position.

(*b*) When Near Receiver No. 2 is used place S5 and S7 in the centre position and S6 in the "down" position.

(*c*) For R/T. transmission press the pressel switch on Microphones, Hand, No. 8, whilst talking. For W/T. operation use the key supplied with Remote Control Unit, "F," No. 2.

(iv) For Exchange No. 2 to operate Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

(*a*) Place switch S5 in the left hand position and when Near Receiver No. 2 is not in use place S6 in the centre position. Place S7 in the centre position for receiving and in the right hand position for sending.

(*b*) No. 2 Operator monitors the Exchange No. 2 line and operates switch S7 as required.

(*c*) When Near Receiver No. 2 is in use follow the same procedure as in (*a*) (*b*), but place S6 in the "down" position.

(v) To re-broadcast Near Receiver No. 2 :

(*a*) Through Separate Sender :

Place S5, S6 and S7 in the centre position.

(*b*) Through Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) :

Place S5 and S6 in the centre position and S7 in the right hand position.

(vi) For Exchange No. 2 to speak to No. 1 Operator :

Place S5 in the left hand position and S6 and S7 in the centre position.

Chapter 4

FIELD MAINTENANCE

18. GENERAL MAINTENANCE

18.1. Introduction.

This chapter deals only with those items of maintenance and repair which can be handled by Signal Units in the field using a minimum of test equipment. Chapter 9 deals with maintenance and repair in greater detail. The occurrence of serious defects when the Set is in use will be minimised if the daily routine set out in Table 7 is carried out and if symptoms of trouble are reported to the "M" section immediately they are discovered.

For general consideration of Wireless Set maintenance and repair refer to Signal Training, Vol. III, Pamphlet No. 28—"Wireless Station Maintenance and Fault Finding and Associated Vehicle Suppression Systems."

18.2. Batteries.

The condition of the batteries should be checked daily and re-charging carried out if necessary. Refer to the label on the lid of the batteries for details of the correct specific gravity of the electrolyte and the charging rate.

19. DAILY MAINTENANCE

Note.—To be carried out by Unit Personnel, Div. Sigs. "C" or "M" Sections, Regt. or "M" Sections of Armd. or Motor Div. Sigs., or Tech. Main. of Corps, Army, or L.H.Q. Sigs.

19.1. Operators Maintenance.

The operator should see to the following points before putting the set away for the day :

(i) Before dismantling the station note the aerial current produced by the "SENDER." If this is low compared with what it was when work began, or if it falls off quickly, try a spare set of batteries in place of the set in use. If the change produces a large improvement in aerial current, say 25% increase, the original battery requires re-charging.

(ii) Change to "RECEIVE" and note whether the receiver is producing the normal background or is becoming "noisy." If intermittent crackling noises are heard disconnect the aerial. If the unusual noise ceases it is probably due to atmospherics or to interference caused by nearby electrical machinery in which case nothing further can be done.

TABLE 7.—DAILY TESTS.

Part tested	*Test No.*	*Test*	*What should happen*	*What should not happen*	*What is likely to be wrong*	*What to do about it*
Power Supply	1	Put Switch on Supply Unit to "ON."	Red lamp on Supply Unit should light. Slight hum should be heard or slight vibration felt from Vibrator Unit.	(*a*) No Red light. No hum or vibration.	(1) Power Unit not connected to battery. (2) Fuse blown in Power Unit. (3) Faulty Vibrator	Check connections. Replace fuse. Replace Vibrator.
				(*b*) Vibration or hum but no red light.	(1) Bulb burnt out. (2) Bulb removed for security reasons.	Replace with new bulb. Replace bulb if security permits.
L.T. Voltage Supply	2	Put Meter Switch to "L.T."	Meter reading normal—11 to 12 volts.	Meter reading less than 10.5 volts.	Battery needs charging.	Replace by spare battery and re-charge rundown one.
H.T. Voltage Supply	3	"Sender" Switch to "ON." Meter Switch to "H.T.S." Function Switch to "C.W." HP/LP Switch to "H.P." Key plugged in and depressed.	Meter reading about 360 volts.	Meter reads zero.	Internal fault.	Report.
		Meter Switch to H.T.R. Key. "UP."	Meter reading about 150 volts.			
"Sender." (NOT TO BE TESTED IF UNDER WIRELESS SILENCE.)	4	Meter Switch to "Test." Function Switch to "C.W." HP/LP Switch to "HP." Key plugged in and depressed. "Aerial Tuning" and "Aerial Coupling" adjusted for highest possible meter reading. Refer to Chap-	Meter should read values equivalent to those set out in Appendix VI.	Meter does not read, or reads very low.	1. Fault in Key or Key lead. 2. Internal fault.	Check Key, lead, and plug. Report.

		ter II, Para. 5.4. Table VI, and Appendix VI.				
	4a	Rotate "Aer. Tuning" Dial to check Cleaning.	Current should rise and fall smoothly			
	5	Switch to R/T plug in Microphone and Receiver Assembly. Pressel Switch closed. Key open. "Aerial Tuning" and "Aerial Coupling" settings as in Test 4. Speak into microphone.	Sidetone should be heard. Set Meter reading should increase on loud speech.	No sidetone.	Faulty Microphone and Receivers Assembly.	Replace.
				Set Meter reading unchanged.	Internal fault.	Report.
	6	Switch to M.C.W. Depress Key. Microphone pressel Switch "Open."	M.C.W. note heard in headset.	No M.C.W. note.	Internal fault.	Report.
"Receiver." TEST ON BOTH WAVE BANDS.	7	Turn Function Switch to "C.W." Turn R.F. Gain and A.F. Gain controls to max. (Clockwise) position. Tune in a C.W. carrier. Heterodyne it with the "HET" control.	Pitch of signal should change as "HET" control is rotated.	No change in pitch.	1. Signal too strong. 2. Internal fault.	Turn "R.F. Gain" control anti-clockwise. Report.
	8	Turn Function Switch to "R/T." Meter Switch to "A.V.C." R.F. and A.F. Gain controls to max. Tune in R/T signal.	Meter reading should decrease from approx. 10 (no signal) to 0 (depending on strength of received signal).	1. No reading. 2. No decrease. 3. Very small decrease.	Internal fault. Very weak signal. Weak signal.	Report. Search for stronger signal.
	9	Conditions as in Test 8. Press "NET" button and adjust the Netting Trimmer.	Whistle should be heard as Netting Trimmer is rotated.	No whistle.	Internal fault.	Report.
GENERAL.	10	Check all controls when necessary.	Controls should work and feel "smooth."	Controls jam, feel "rough" or fail to work.	Internal fault.	Report.

The unusual noise may be due to bad contacts in the aerial itself. Examine, and, if necessary, tighten all screwed joints and make sure no bared portion of the wire aerial is touching a metallic object.

If the noise persists with the aerial disconnected :

(*a*) Examine the Microphone and Receivers, headgear cord, and the connection between the snatch plug and the drop leads. See that the headphone terminals themselves are tight. If the noise is due to the cord it can probably be reproduced by shaking the cord, by lightly jerking the cord either at the snatch plug or at the headphones, or by flexing small sections of the cord progressively from the snatch plug to the headphones. Dirty, damp, or badly fitting contacts in the snatch plug or drop lead also can produce noise. If trouble persists report to Electrician, Signals.

(*b*) Examine the battery leads and the 12pt. connector from the set to the supply unit for signs of damage and make sure that the plugs fit tightly in their sockets. If no external signs of damage are apparent shake the battery leads and listen for corresponding clicks or crackling noises.

(*c*) Examine the valve shields to make certain that they are fitting tightly to the valves and that the securing rings are not displaced. The earthing clips should press firmly against the shields and the claws engaging the valve pin should make close contact with the pin.

(iii) When satisfied that everything is in good working order clean and dry each piece of equipment as it is put away. Remember ALWAYS that :

(*a*) Leads and plugs, the battery box, its connecting socket, the connecting sockets on the Supply Unit, and the drop leads on the Sender/Receiver Unit must be kept as dry as possible.

(*b*) Dirt interferes with all screw threads. Aerial gear which is left dirty will take longer to erect and may be very difficult to take apart later.

(*c*) Dust causes damage to all moving parts, such as variable condenser spindles and slow motion drives, and must be removed from the exterior of the set whenever it is noticed.

(*d*) For details of Daily Maintenance, see Table 7.

20. WEEKLY MAINTENANCE

20.1. General.

The routine to be followed in weekly maintenance includes the general check-over of the Sender/Receiver set out in Section 19 and Table 7. In addition it involves the checking of the auxiliary equipment which goes to make up the Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) Complete Stations, and the examination of the silica gel cartridge as per Paragraph 37.4.

20.2. Station Maintenance.

In addition to the Daily Maintenance Tests :

(i) Clean the outside of the Set and Supply Unit with a cloth to remove dust, dirt, and grease. Clean the outside of the aerial terminal insulator.

(ii) Test all the controls and see that they are neither jamming nor turning so freely that their setting would alter with vibration. See that each knob is tightly fitted to its spindle.

(iii) Check the Meter readings and enter them in Appendix 6.

(iv) Overhaul the Antennae Rods "F" and make sure that the sections fit into one another easily but firmly and that the engaging sections are free from dirt.

(v) Check kit. See that the Spare Parts and Spare Valves Cases are filled and that other Wireless Station equipment is complete, as per Appendix 1.

(vi) Vertical Aerial. Check that the contents of the aerial bag are complete and in good order. See Appendix 5.

(vii) Aerials Quarter-Wave and Half-Wave. Check that no insulators are broken and that the jumper leads are intact and provided with connecting lugs.

(viii) Report :

(*a*) Any faults which have been found and which you cannot put right.

(*b*) Any items which are missing.

20.3. Relays.

The relays in the Sender/Receiver Unit and the Supply Unit have been carefully adjusted during manufacture and normally will not need attention. Their contacts are not likely to "pit" or oxidize and normally will not need attention. However, Tools, contact cleaning (Aust.) No. 2 is provided for the removal of dust from the relay contacts. When using the cleaning tool care should be taken to avoid bending the relay spring-sets.

Note.—Should a fault develop in the Relays the Sender/Receiver or Supply Unit should be forwarded to "M" Section or to A.E.M.E. Workshops for repair and adjustment.

20.4. Removal of Units from Cases.

Inside the cases for the Sender/Receiver and the Supply Units is a water and dustproof rubber gasket. In order to preserve the seal which this gasket provides it is desirable only to withdraw the units from their cases when absolutely necessary.

With the exception of valve replacement required when any of the faults set out in Table 8 are present, or when a fuse must be replaced in the Supply Unit, there is no necessity for the operator to remove these units from their cases.

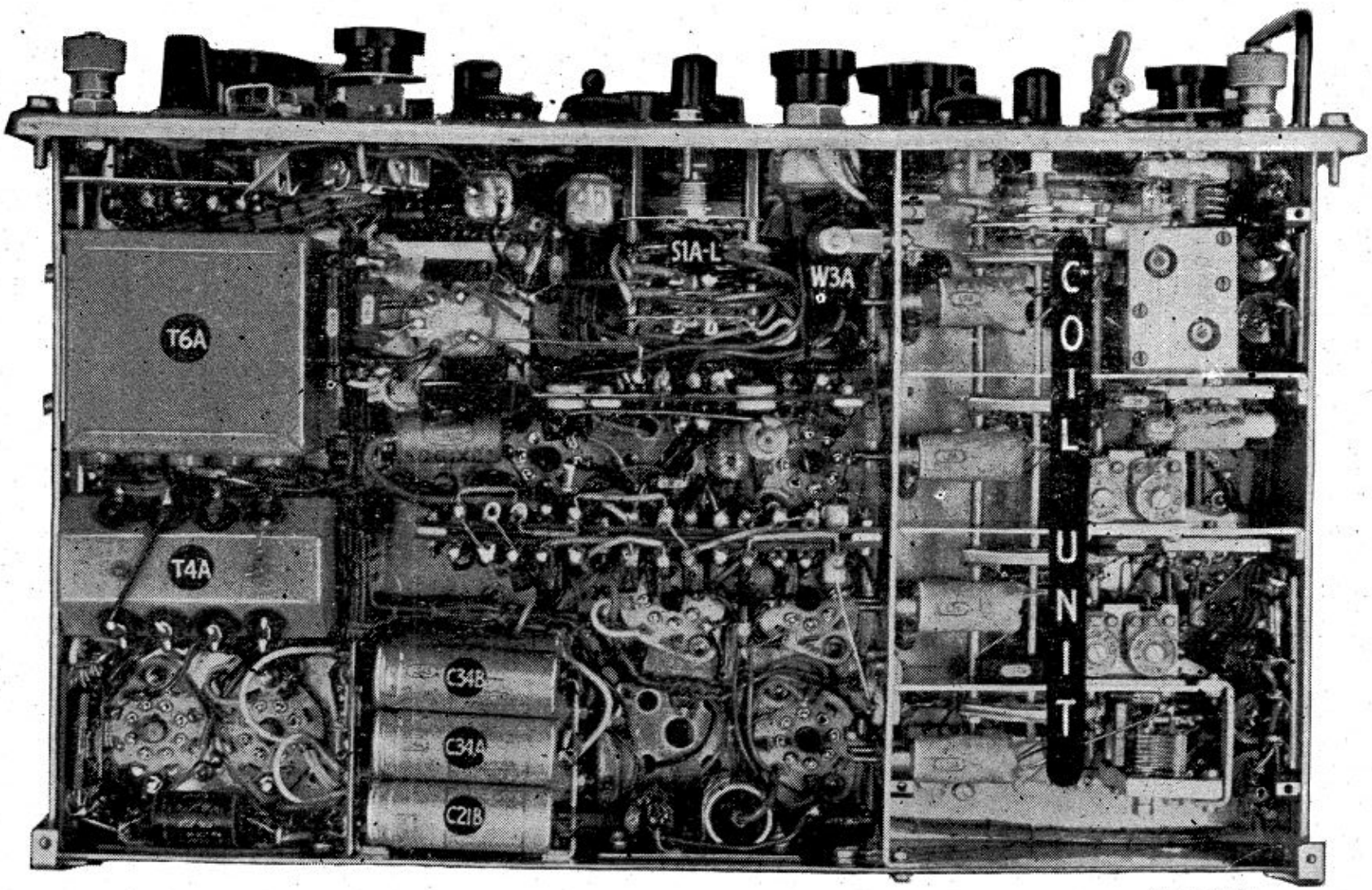

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Plate 2. WIRELESS SET No. 22 (Aust.) Chassis—Under View

NOTE—Electrolytic Condensers C34C, D, and E are not shown.

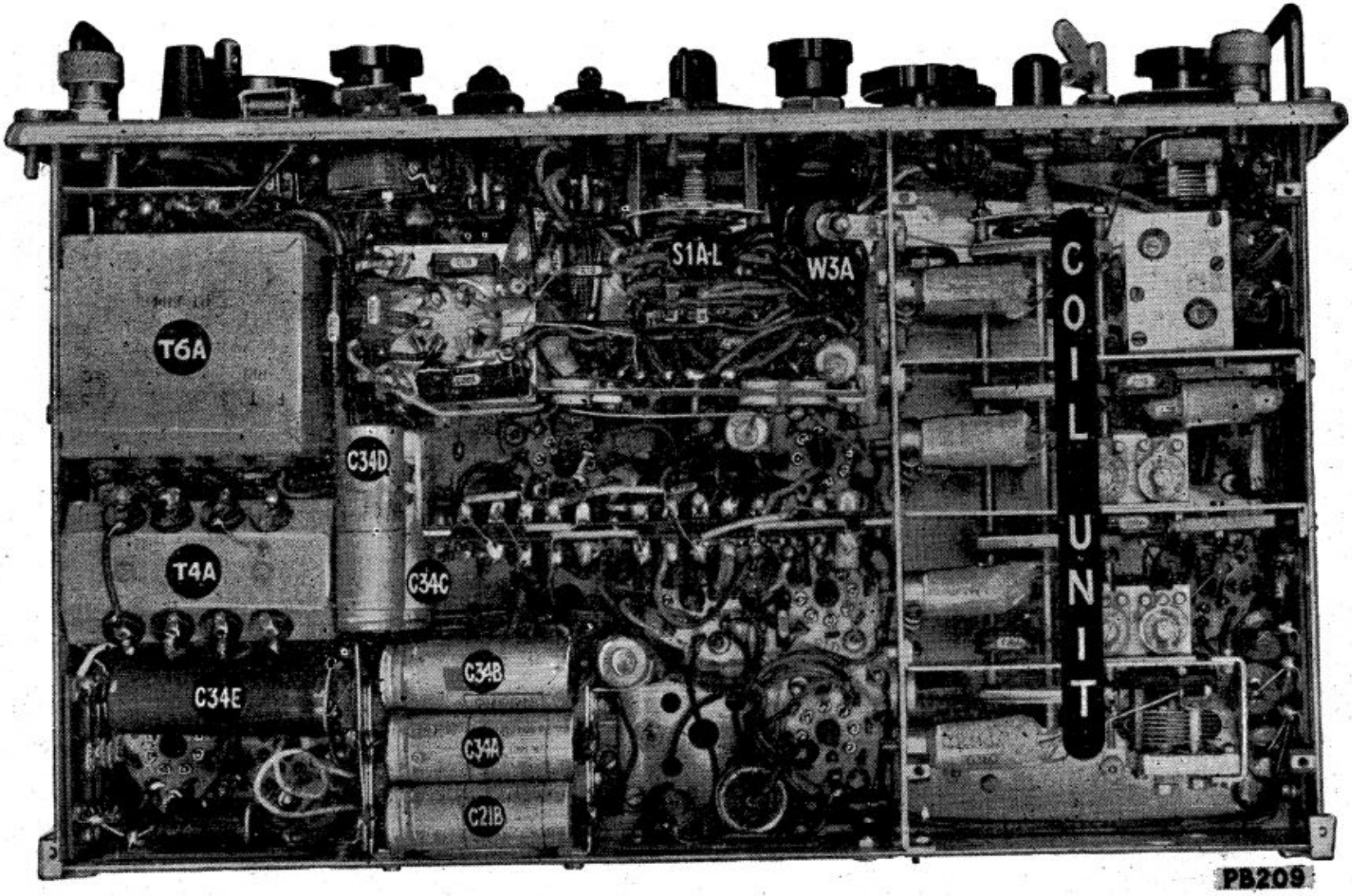


Plate 18. WIRELESS SETS No. 122 (Aust.) Chassis — Under View.

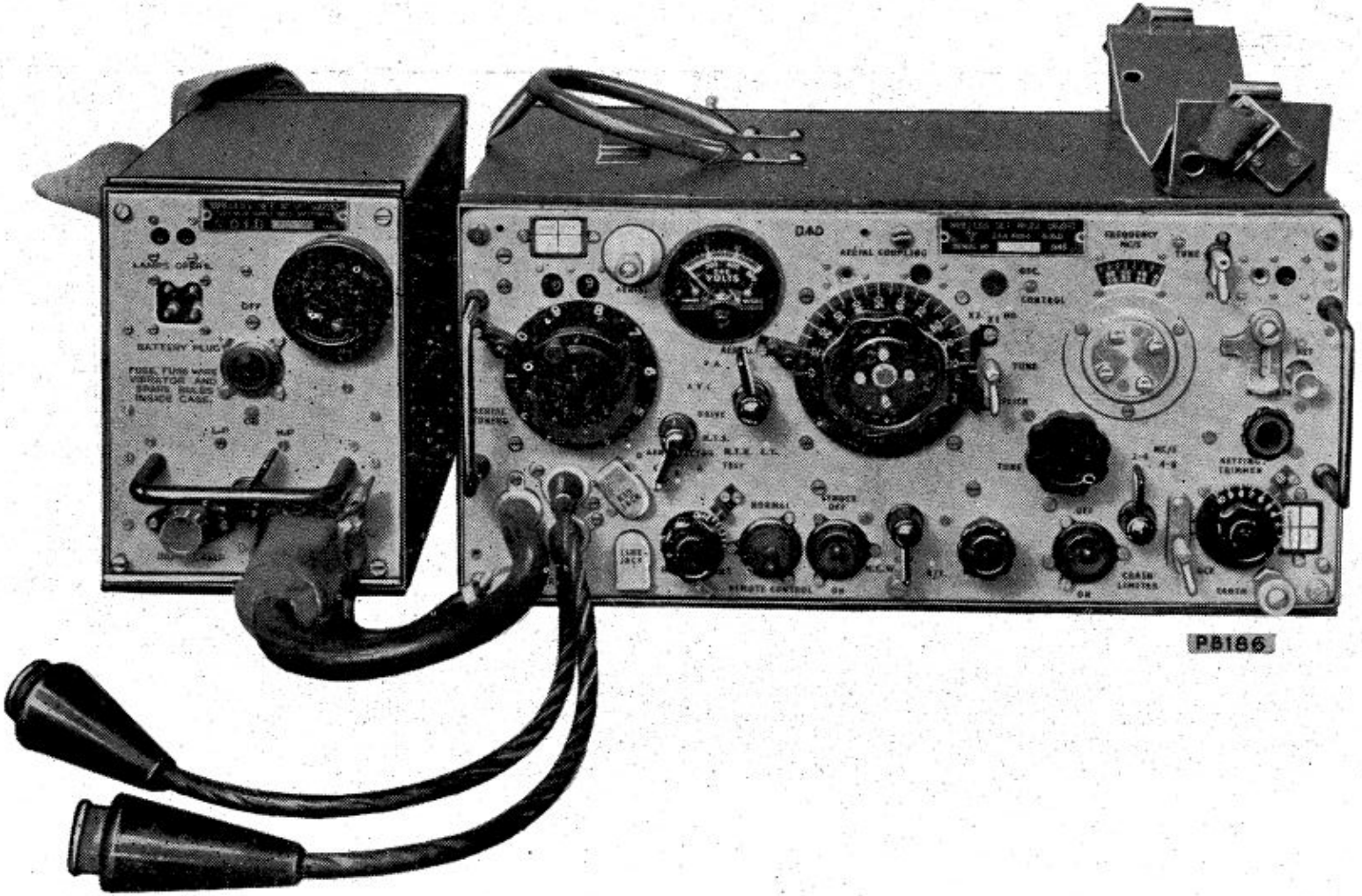


Plate 14. WIRELESS SET No. 22 (Aust.) — Sender/Receiver and Supply Units

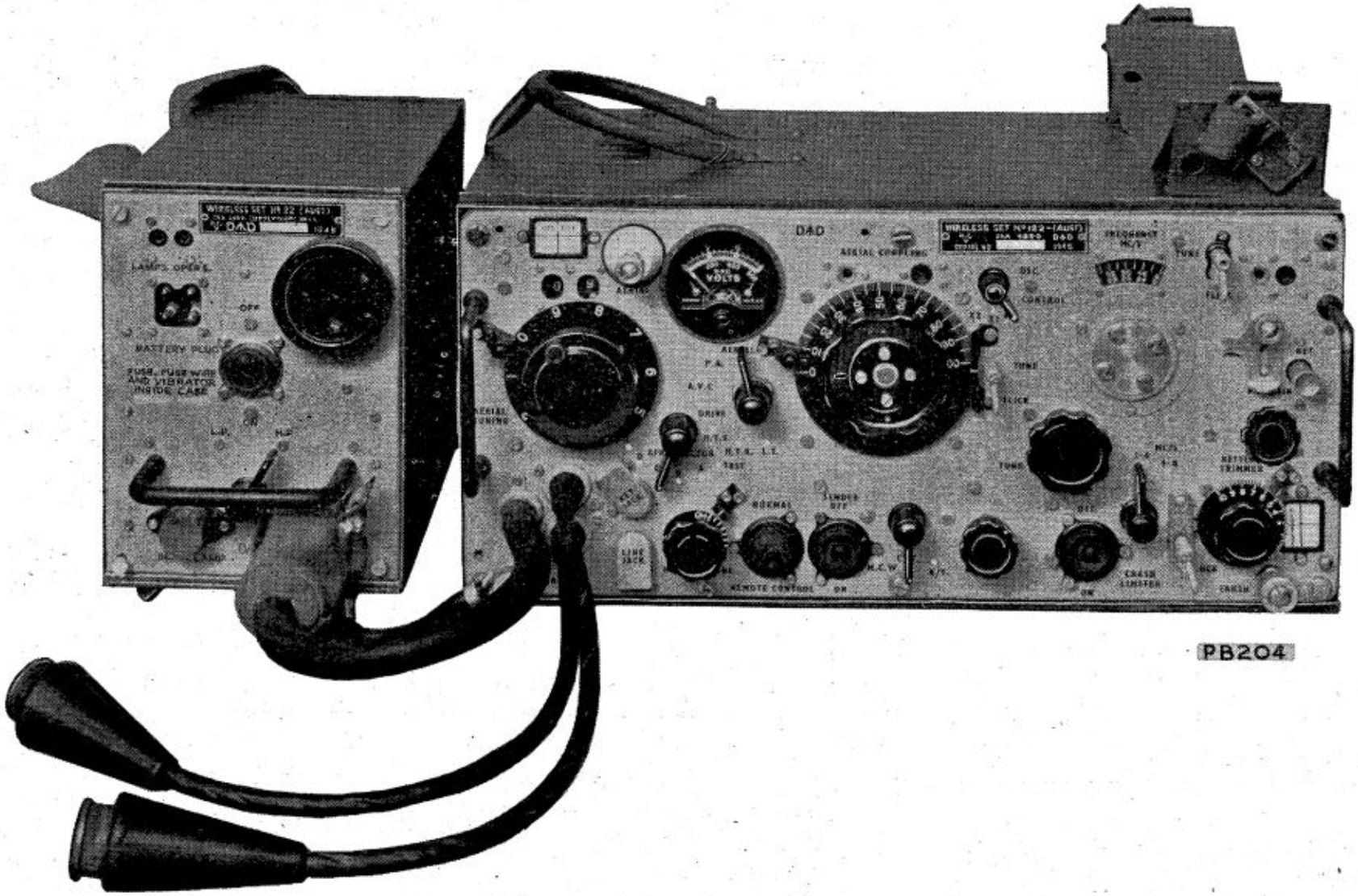


Plate 19. WIRELESS SETS No. 122 (Aust.) SENDER/RECEIVER and SUPPLY UNITS.

TABLE 8.—RUNNING REPAIRS.

No.	*Failure*	*Possible Cause*	*Possible Remedy*
1	Set completely dead.	Failure of power.	Perform Tests 1 to 3 of Table 7.
2	Power Unit working, but Sender and Receiver dead.	Aerial disconnected.	Examine and replace pigtail if necessary.
3	Receiver dead. Sender works, but no modulation or Sidetone.	V3A or V4A.	Replace either or both of these valves.
4	Receiver dead. Sender works and modulates.	V1A. V1B. V2A.	Replace any or all of these valves.
5	Receiver dead. Sender works, but no modulation sidetone heard.	V1A, V1B, V2A, or V6A.	Replace any or all of these valves.
6	Receiver very weak, Sender O.K.	V1A, V1B, V2A.	Replace any or all of these valves.
7	Receiver O.K. No Aerial Current on Send. No Netting Whistle.	V5A	Replace valve.
8	Receiver O.K. Sender Aerial Current and Drive very low. Netting whistle.	V5A, V7A.	Replace either or both of these valves.
9	Sender and Receiver O.K. on "R/T" but no beat tone on "Receive" "C.W."	V3B.	Replace valve.
10	Receiver and Sender O.K. on R/T but no Aerial Current on "C.W." or "M.C.W." when key is depressed. Aerial Current when pressel Switch is pressed.	Faulty key, lead or plug.	Examine, repair if possible, otherwise report.

Chapter 5

TECHNICAL DESCRIPTION OF RECEIVER

21. INTRODUCTION

This chapter describes the circuits used in the Receiver. The theory of operation of the individual stages and the function of the stages as related to the equipment as a whole also is briefly explained. Refer to Figs. 1 and 3 for circuit details.

21.1. General.

The receiver is of the super-heterodyne type operating at an intermediate frequency of 455 kc/s. Its tuning range—2 to 8 Mc/s. —is covered in two bands. These are 2 to 4 Mc/s. and 4 to 8 Mc/s. Facilities are provided for the reception of R/T., C.W. and M.C.W. transmissions by turning the function switch ("M.C.W.–C.W.–R/T" switch) to the appropriate position. With the "M.C.W.–C.W.–R/T." switch in the "R/T." position A.V.C. is applied to the R.F. and first I.F. stages and volume is adjusted by means of the "L.F. GAIN" control.

Normally, the "R.F. GAIN" control will be left in the maximum —fully clockwise—position but with extremely strong signals it may be found necessary to reduce this control to avoid overloading of the receiver.

With the "M.C.W.–C.W.–R/T." switch in the "C.W." position the heterodyne oscillator is switched on and the automatic volume control switched off. The pitch of the beat note is varied by adjusting the heterodyne tone control, "HET TONE." Volume is adjusted by means of the "R.F. GAIN" control. The "L.F. GAIN" control should be left at maximum.

The filaments of the receiver valves are connected in series across the 12 volt supply. The arrangement is such that the removal of one or more valves from the receiver cannot result in damage to the remaining valves from too high a filament voltage. The method of arranging the filament wiring permits correct bias for the various valves to be obtained without recourse to a separate source of bias voltage supply.

21.2. Aerial Stage.

The same method of tuning the aerial is used in both the Sender and the Receiver. However, as the Aerial Tuning is normally carried out on "SEND," this stage will be dealt with in the Technical Description of the Sender covered in Chapter 6.

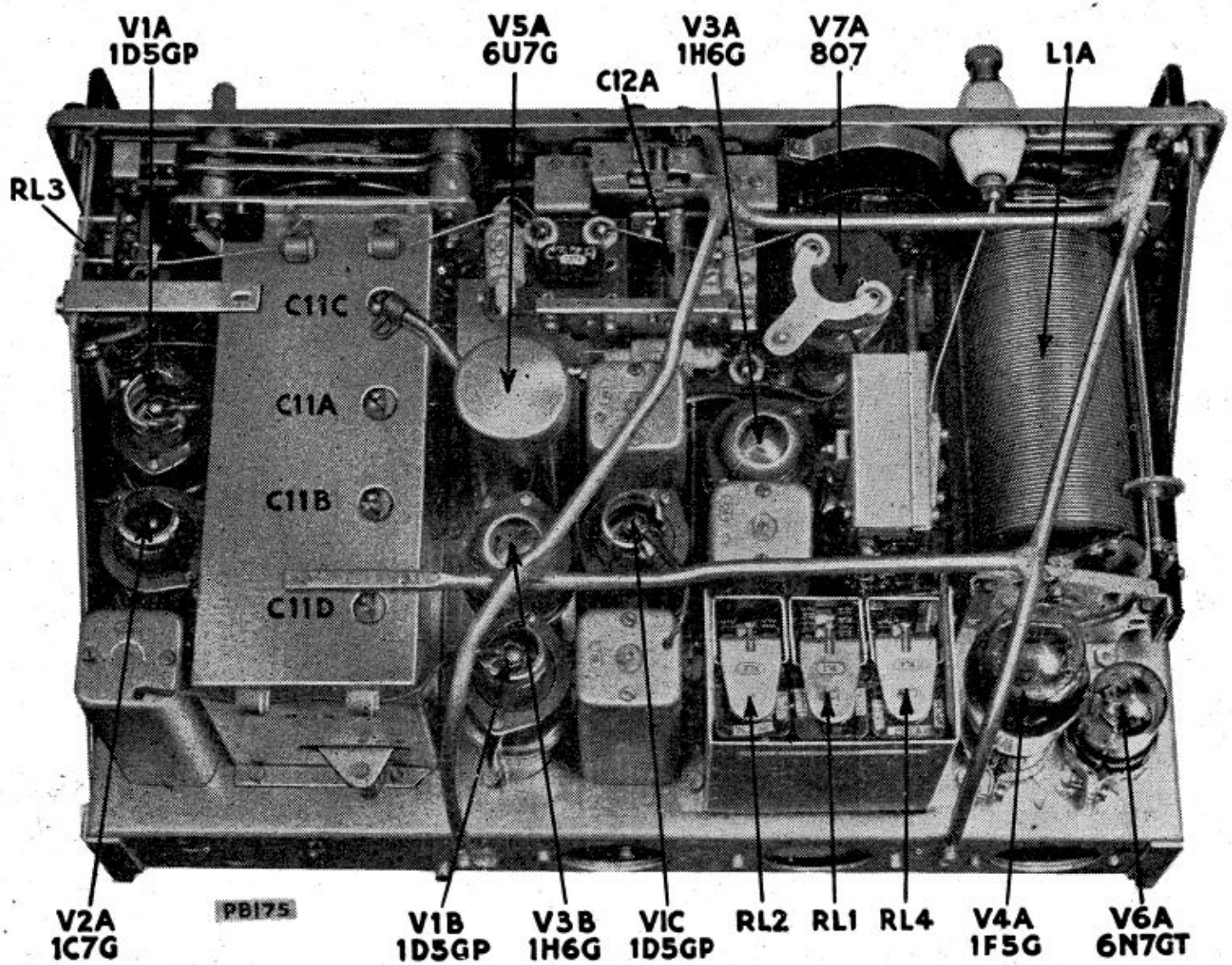


Plate I. WIRELESS SET No. 22 (Aust.) Chassis — Top View

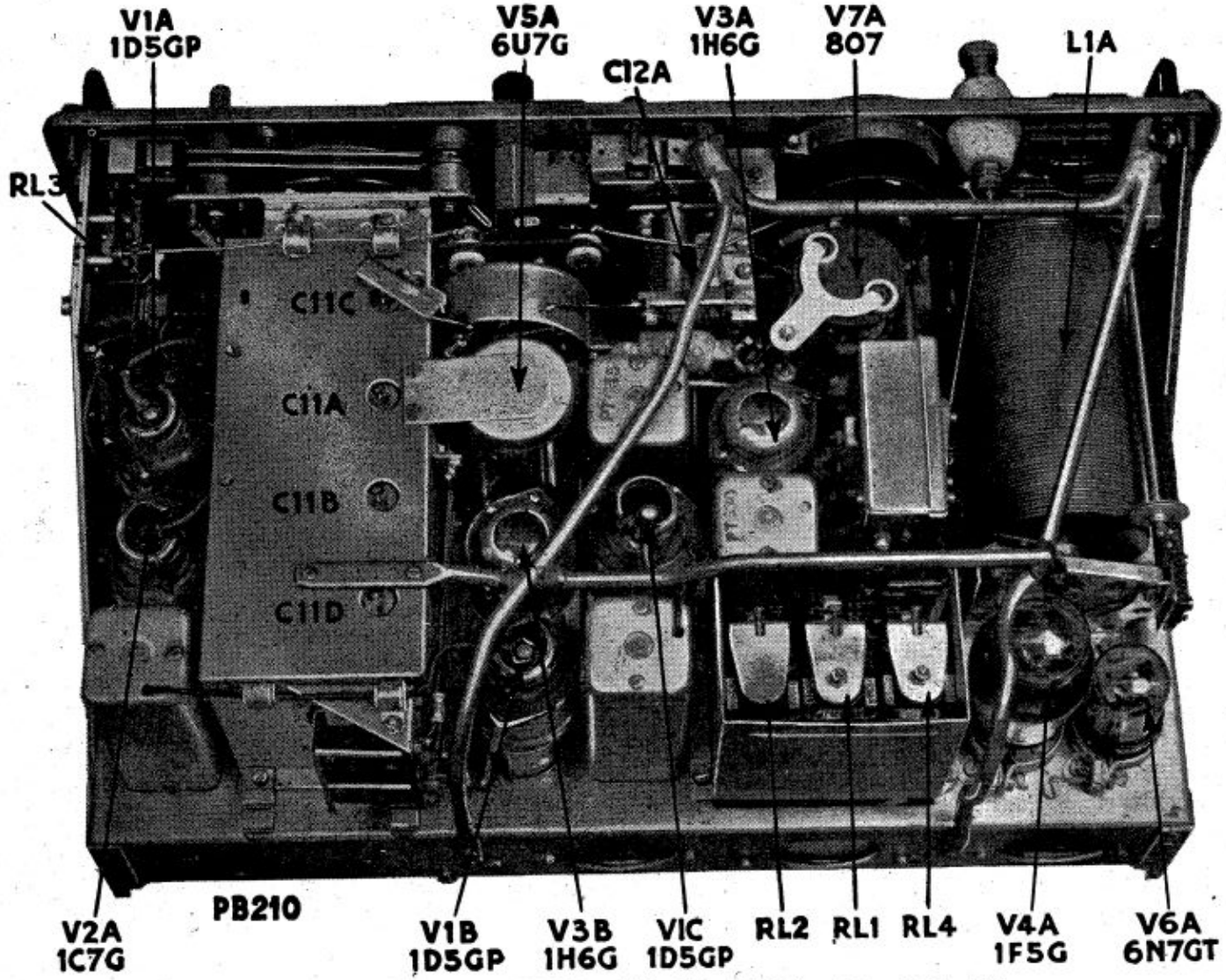


Plate 17. WIRELESS SETS No. 122 (Aust.) Chassis — Top View.

The aerial is tuned to resonance by means of the "AERIAL TUNING" inductor, L1A, in conjunction with the "AERIAL COUPLING" condenser, C12A, and, if necessary, with the switch-selected condensers, C8A, C8B and C8C and C8D. The high potential end of the tuned circuit is coupled, via the isolating condenser, C37A and the relay RL3, to the grid of the R.F. amplifier valve.

On "SEND" Relay RL3 shunts the grid of the R.F. valve to ground to prevent pulses from the transmitter from damaging the valve. The trimmer, C22E, compensates for the change in circuit capacity when the relay operates.

21.3. R.F. Amplifier Stage.

The signal is amplified by the R.F. valve, V1A (1D5GP). Bias is applied to the grid of this valve from the A.V.C. line via the choke, L3A. The amplified signal is shunt-fed from the choke, L3B, via condenser C2B, to the 2–4 Mc/s. tuned circuit consisting of L4A and C11A, or, on the 4–8 Mc/s. band, L6A and C11A. These circuits are trimmed by condensers C22A and C22B and the adjustable iron core in each coil.

21.4. Mixer Stage.

The signal appearing across the tuned circuit is applied to the mixer valve V2A (1C7G), where it combines with the local oscillator signal from the V2A triode section to produce the 455 kc/s. signal necessary for the I.F. amplifier.

The frequency controlling circuits of the V2A oscillator section consist of L5A and C11B, on the 2–4 Mc/s. range, and L7A and C11B on the 4–8 Mc/s. range.

As the gang condenser C11A, C11B, C11C and C11D is rotated throughout its capacity range the fixed padding condensers, C24A and C25A, the adjustable iron cores of the coils, L5A and L7A, and the trimming condensers, C22C and C22D, ensure that the local oscillator frequency generated in the triode section of V2A shall remain at a constant frequency difference of +455 kc/s. with respect to the signal frequency.

21.5. I.F. Amplifier.

The intermediate frequency signal appearing in the plate circuit of the mixer valve is transferred by means of the I.F. transformer, T2A, to the grid of the first I.F. amplifier, V1B (1D5GP).

Bias, provided by the A.V.C. system is applied to the grid of V1B via the I.F. transformer, T2A.

The amplified intermediate frequency signal appearing in the plate circuit of the first I.F. amplifier valve is transferred to the grid of the second I.F. valve, V1C (1D5GP) by means of the I.F. transformer, T2B.

No A.V.C. is applied to this valve which is fixed-biassed by the potential difference existing between its grid and filament.

21.6. 2nd Detector A.V.C. Stage.

The intermediate frequency signal appearing in the plate circuit of the second I.F. amplifier valve, V1C, is transferred to the signal rectifying diode of V3A (1H6G) by means of the I.F. transformer, T3A.

After rectification this signal appears across the diode load resistor, R9A, which is also the "L.F. GAIN" control. The radio frequency components of the signal are filtered out, by means of condensers C4A and C4B, and resistor R36A.

21.7. A.V.C.

The signal input to the A.V.C. diode of V3A is fed from the secondary circuit of T3A via condenser C5A. After rectification it appears across the load resistor, R19A, as a D.C. voltage varying according to the strength of the input signal from T3A. This voltage is fed via the decoupling resistor, R1C, to the controlled valves, V1A and V1B.

A.V.C. is only applied to these valves when the "M.C.W.–C.W.–R/T." switch is set to M.C.W. or R/T.

The A.V.C. diode of V3A is biassed to ensure that the amplification of weak signals will not be reduced by the A.V.C. action.

21.8. Output Stage.

The audio signal appearing across the "L.F. GAIN" control, R9A, is taken off through the isolating condenser, C16A, and the relay, RL1, to the grid of the pentode output valve, V4A (1F6G). The amplified signal appearing in the plate circuit is matched to the 100 ohm headphone line by means of the receiver output winding on the transformer, T4A, the centre tapped secondary winding of which is disconnected on "RECEIVE."

21.9. Beat Frequency Oscillator.

The triode section of V3B (1H6G) is used as the local oscillator for heterodyning C.W. signals to make them audible. The frequency of the oscillator is varied over a small range by altering the inductance of the tuned circuit by means of the variable resistance, R34A. The heterodyne oscillator is coupled to the low-potential end of the second I.F. transformer secondary by means of a winding on the B.F.O. transformer, L8A.

21.10. Crash Limiter.

A Crash Limiter—W3A—is connected across the headphone line when the panel switch is "ON." This consists of two half-wave metal rectifiers connected in parallel but with reversed polarity. The Crash Limiter operates in such a manner that weak signals are not appreciably reduced whilst strong signals suffer considerable attenuation. With correct adjustment of the volume control the signal-to-noise ratio may be greatly improved by means of the Crash Limiter.

Chapter 6

TECHNICAL DESCRIPTION OF SENDER

22. INTRODUCTION

The Sender is of the Master Oscillator–Power Amplifier type. Plate modulation is used for both R.T. and M.C.W. The sender consists of an electron-coupled oscillator which employs frequency doubling in its plate circuit, and a beam tetrode power amplifier. In the W.S.122 (Aust.) the Master Oscillator may be transformed to a Pierce Crystal Oscillator operating with either of two internally contained crystals by means of the "Osc. Control" switch on the front panel. A four stage amplifier which terminates in a Class "B" stage is used as a modulator on "SEND." See Figs. 1, 1a and 2 for circuit details.

22.1. Master Oscillator.

The Master Oscillator valve, V5A (6U7G) is a variable-mu R.F. pentode. The M.O. frequency is controlled by means of the tuned circuit, L9A, C31B, C26A, C29B, C23D, and C11C on the 4–8 Mc/s. band and L10A, C31A, C29A, C26A, C23D, and C11C on the 2–4 Mc/s. band.

Oscillation is obtained by returning the V5A cathode to a tap on the M.O. grid coil.

By means of the trimmers C31A and C31B the oscillator can be adjusted so that zero frequency shift occurs between the conditions of "NET" and "SEND." These trimmers are open-circuited when the "NET" button is depressed.

Condenser C26A is controlled by the "NETTING TRIMMER" dial on the front panel so that the M.O. can be set to zero-beat with the incoming signal.

The plate circuit of the M.O. is tuned to the second harmonic of the oscillator frequency. This becomes the transmitted frequency. A parallel-fed circuit is tuned by L11A, C30A and C11D on the 2–4 Mc/s. band and by L12A, C30B and C11D on the 4–8 Mc/s. band. Condensers C11C and C11D are ganged with the receiver tuning condensers, C11A and C11B, and are controlled by the "FREQ. Mc/s." dial.

22.2. Crystal Controlled Oscillator.

In the W.S.122 (Aust.) the M.O. valve, V5A (6U7G) becomes the Crystal Controlled Oscillator, when crystal control is used. The oscillator frequency is controlled by either of two crystals. The crystal is connected between the screen and control grid through the isolating condenser C16B by means of the "Osc. Control" switch S8A. This switch is used to connect either the tuned circuits or crystals to the appropriate valve elements. High tension is fed to the screen of V5A via the feed choke L3E. On M.O. operation, the isolating condenser C16B is earthed to act as a screen bypass condenser. The plate circuit of V5A may be tuned to either the fundamental or second harmonic frequency of the crystal.

22.3. Power Amplifier.

The R.F. voltage developed across the oscillator plate tuning circuit is applied to the grid of the beam tetrode power amplifier valve, V7A (807) through the blocking condenser, C10A.

Bias for the P.A. valve is developed across the grid leak R36C, by grid rectification. The current flowing in the grid leak can be checked by turning the meter switch to the "DRIVE" position.

The R.F. power developed by the P.A. valve is parallel-fed by means of the choke, L3D, and condenser C13A, to the aerial matching circuit, C12A, L1A, and the switch-selected condensers C8A, C8B, C8C and C8D. This circuit acts as an impedance matching transformer matching the output impedance of V7A to the impedance of the aerial being used.

Widely different types of aerials may be used in conjunction with this matching network.

The values of the component parts of the matching network are adjusted so that at resonance the aerial characteristics are reflected back to the plate of the Power Amplifier valve at its correct load impedance.

22.4. Modulator.

The modulator is a four stage amplifier utilizing the valves V1C, V3A, V4A and V6A. The output from the moving coil microphone is taken to the primary of the microphone transformer via the relay RL4. The amplified speech voltage appearing across the secondary is applied to the first audio amplifier, V1C (1D5GP) through the BFO injection coil on L8A and the secondary of T2B.

The resultant signal is developed across the load resistance, R36B, and transferred to the grid of the second audio amplifier, V3A (1H6G) through the de-coupling resistors, R13A and R39A. and the coupling condensers, C16C and C16D. The signal is further amplified by V3A and passes to the grid of the audio driver valve, V4A (1F5G) via the coupling condenser C16E, and relay contact

RL1. The power developed by this valve is applied to the grids of the Class "B" modulator valve, V6A (6N7GT) by means of transformer T4A.

Sidetone is taken off by means of the receiver output winding on T4A. This winding is also used to provide inverse feedback on V3A and V4A on "SEND." Control of the sidetone voltage is effected by means of the resistance, R29A.

The output of the modulator tube, V6A, is fed through the secondary winding of transformer T6A, to the plate and screen of the P.A. valve V7A, through the R.F. choke L3D, and the resistor, R8A. Resistors R21A and R23A in the plate of V7A are used for meter correction and oscillation suppression purposes respectively.

22.5. Relays.

Three multi-circuit and one single circuit relays are used in the Wireless Set No. 22 (Aust.) or W.S.122 (Aust.). The multi-circuit relays are RL1, RL2, and RL4. A brief description of the functioning of these relays is given in the following paragraphs. Reference should be made to the key-numbered relay positions set out in the circuit diagram for fuller appreciation of the circuit changes effected by each relay.

22.6. Relay RL1.

This is a relay arranged to have a delay of between $\frac{1}{4}$ and $\frac{1}{2}$ second between the time that the exciting current is removed, and the time that the relay contacts open. The purpose of this delay is to permit "break-in" operation.

Contacts 1 and 2 :

On "SEND" earth the centre-tap of the modulator driver transformer, T4A, for R/T or M.C.W. operation. For C.W. operation the centre-tap remains open circuited.

On "RECEIVE" the centre tap of T4A remains open at all settings of the "M.C.W.-C.W.-R/T" switch.

Contacts 3, 4, and 5 :

On "SEND" R/T apply inverse feedback to V3A and V4A. On "RECEIVE" earth resistor R5B connected to the grid of V3A.

Contacts 6, 7, and 8 :

On "SEND" connect the plate circuit of V3A to the grid circuit of V4A.

On "RECEIVE" connect the diode load potentiometer, R9A, to the grid circuit of V4A.

Contacts 21 and 22 :

On "SEND" earth Pin No. 9 on the Power Supply plug. This actuates the Power Supply relay.

On "RECEIVE" remove the energising current from the Power Supply relay.

Contacts 23, 24 and 25 :
On "SEND" C.W and M.C.W. connect the T5A secondary to V1C to use this valve as an audio oscillator.
On "RECEIVE" return the V1C grid to ground through R1A.

Contacts 26 and 27 :
On "SEND" place R29A in series with the sidetone output.
On "RECEIVE" short-circuit R29A.

Contacts 28 and 29 :
On "SEND" R/T and M.C.W. connect Pin No. 6 to Pin No. 3 on the Power Supply plug to raise the voltage from the Supply Unit.
On "RECEIVE" open the connection between Pins Nos. 3 and 6.

2.7. Relay RL2.

This is a standard high speed relay and is used for keying on C.W. and M.C.W. Two of its four sets of contacts are connected in such a manner as to control the functioning of the time delay relays, RL1 and RL4. Its four sets of contacts perform the following operations :

Contacts 1 and 2 :
On "SEND" are in series with the supply line and the actuating coils of the time delay relays RL1 and RL4 to supply keying pulses to them.

Contacts 3 and 4 :
On "SEND" are used to key the M.C.W. oscillator and C.W. sidetone valve, V1C.

Contacts 21 and 22 :
On "SEND" function as keying contacts in the "B" + line.

Contacts 23 and 24 :
On "SEND" are in parallel with Contacts 21 and 22 of RL1 and actuate the power supply relay immediately the key is pressed.
On "RECEIVE" all contacts of RL2 are open circuited.

22.8. Relay RL3.

This relay is used to shunt the grid of the R.F. valve to ground during transmission in order to prevent pulses from the transmitter from damaging V1A.

On "SEND" RL3 earths the grid of V1A and switches in the compensating condensers, C5B and C22E.

On "RECEIVE" it removes the earth from the V1A grid and short-circuits C22E and C5B.

22.9. Relay RL4.

This is a three circuit relay.

Contacts 1 and 2 :
On "SEND," operating in conjunction with contacts 6, 7, and 8 of RL1, these contacts of RL4, in switching in the plate load resistor for V3A, bring the modulator amplifier into operation.
On "RECEIVE" Contacts 1 and 2 open-circuit the V3A plate load resistor.

Contacts 3 and 4 :
On "SEND" connect the positive Microphone lead to the microphone transformer.
On "RECEIVE" open-circuit this connection.

Contacts 21 and 22 :
On "RECEIVE" are primarily used, in conjunction with S3A, for Remote Control operation. With S3A set in the Remote Control position, closure of Contacts 21 and 22 makes the Microphone lead a receiver audio output lead.
On "SEND" the opening of Contacts 21 and 22 enables the Sender to be modulated from the remote control unit.

Chapter 7

SWITCHING SYSTEMS

23. INTRODUCTION

To facilitate ready understanding of the functioning of the various multi-bank switches used in the Wireless Set No. 22 (Aust.) or W.S.122 (Aust.) a detailed description of the circuit changes effected by each switch is given in this Chapter. Refer to Fig. 1 for circuit details.

23.1. Function Switch.

The "M.C.W.-C.W.-R/T" or Function Switch is an 11 pole 3 way switch used, as its title implies, to change the transmitter over to any of the three types of transmission.

(i) C.W. Operation.

(*a*) "SEND"

When the Sender/Receiver Unit is on "SEND" the following functions are performed.

Switch S1A short-circuits the secondary of T6A and removes the plate voltage from the primary of this transformer.

S1B places the 100 ohm resistance, R11A, across the receiver output winding of T4A and so maintains a constant load on V4A.

S1C opens the grid return from the modulator driver transformer, T4A.

S1D places resistor R18A in series with the plate of the M.O. valve, V5A.

S1E connects the secondary of T5A to the plate circuit of V1C to provide feedback for the C.W. sidetone oscillator.

S1F, by grounding pin No. 5 on the Sender/Receiver power plug, enables relay RL1 on Supply Units No. 1A to be energised.

S1H switches in the C.W. sidetone oscillator grid leak, R4C.

(*b*) "RECEIVE"

On "RECEIVE" the following circuit changes take place :

S1G removes the A.V.C. from valves V1A and V1B and provides a grid return for these valves.

S1J applies plate voltage to the B.F.O. valve, V3B.

(ii) M.C.W. Operation.

(*a*) "SEND"

When the function switch is set to M.C.W. :—

S1A applies plate voltage to V6A and connects the secondary of T6A to the "B" supply line.

S1C earths the centre tap of the T4A secondary.

S1D short-circuits resistor R18A in series with the plate of the master oscillator valve, V5A.

S1E connects the secondary of T5A to the plate circuit of V1C to provide feedback and thus enables this valve to function as the M.C.W. oscillator.

S1H switches in the M.C.W. oscillator grid leak, R4C.

S1K short-circuits the modulator amplifier attenuator resistor, R13A.

S1L connects Pin No. 6 (the 150 volt line from the Supply Unit) on the Sender/Receiver power plug to the plate supply line to maintain a constant voltage for V1C, V3A, and V4A.

(*b*) "RECEIVE"

On "RECEIVE" :—

S1G applies A.V.C. to V1A and V1B.

(iii) R/T Operation.

(*a*) "SEND"

Under this condition of operation, Switches S1A, S1C, S1D, S1J, S1K, and S1L perform the same functions as they did under M.C.W. operation. The remaining switches operate as follows :

S1B grounds the primary of the microphone transformer, T5A.

S1E biasses the grid of V1C by returning it to the 2 volt POSITIVE position on the series filament circuit.

(*b*) "RECEIVE"

On "RECEIVE" :—

S1H removes the resistor R4C from the centre-tap of the T5A secondary.

23.2. Antenna Selector Switch S2A–S2B.

This is a two pole six-way switch.

In the first five positions the S2A section connects one side of the primary of the current transformer, T1A, to the AE terminal on the Sender/Receiver. In the sixth it connects the current transformer to the Dummy Aerial, R32A.

The first four settings of S2B connect the other side of the current transformer to from one to four of the condensers C8A, C8B, C8C, and C8D. In the fifth and sixth settings of S2B the current transformer is disconnected from the condensers.

23.3. "Osc. Control" Switch—S8A (W.S.122 (Aust.)).

(i) Master Oscillator operation.

The grid of V5A is connected via C36A to the oscillator tuning condenser C11C and grid coil L9A or L10A as selected by S5A. The screen bypass condenser C16B is earthed.

(ii) Crystal Operation.

The grid of V5A is connected directly to either of the crystals X1 or X2. The other side of the crystals is connected to the screen of V5A via blocking condenser C16B.

23.4. "SENDER—ON-OFF" Switch S3B.

On "SEND" this switch completes the filament circuit via Pin No. 10 and Pin No. 12 on the Sender/Receiver power plug. These pins are connected to filament positive in Supply Units No. 1A. At the same time S3B applies voltage to the one side of the coil of relay RL2. In the "OFF" position both these circuits are open-circuited.

23.5. "NORMAL-REMOTE" Switch S3A.

In the "NORMAL" setting contact 5 of the snatch socket is earthed. When the switch is turned to the "REMOTE" position on "RECEIVE" Pin 5 on the snatch socket is connected to the audio line whilst on "SEND" the audio line on No. 5 pin is disconnected to permit the sender to be modulated.

23.6. Meter Switch S4A-S4B.

One of the selector arms of this switch is connected to the positive side of the meter, M1A, and the other arm goes to the negative side. The seven settings of the switch read, respectively, Aerial Current, P.A. Plate Current, A.V.C., Drive, H.T. Send, H.T. Receive and L T.

23.7. Wave Change Switch S5A-M.

(i) "SEND"

On "SEND" closure of the Switch S5A connects 2-4 Mc/s. grid coil of the M.O. valve, V5A, and switch S5C completes the cathode circuit of this tube. S5K connects the plate of V5A to the 2-4 Mc/s. winding, L11A, and S5M places the gang condenser section, C11D, across this winding.

When S5A-M is moved to the 4-8 Mc/s. position S5A selects the appropriate grid coil, S5C switches the cathode of V5A to this coil, and S5B short-circuits the 2-4 Mc/s. coil, L10A. Switches S5M and S5K change over their respective circuits from L11A to the 4-8 Mc/s. coil, L12A, and S5L, short circuits L11A.

(ii) "RECEIVE"

On "RECEIVE" 2-4 Mc/s. S5D connects L4A to the grid of the Mixer Valve, V2A, and the tuning gang, C11A. On 4-8 Mc/s. this switch transfers the grid of V2A to the coil L6A and S5E short-circuits the low frequency coil, L4A. Switch S5H switches the 2-4 Mc/s. and the 4-8 Mc/s. coils to the oscillator grid of V2A and the C11B section of the tuning gang. Switch S5G connects the required plate coil to the oscillator plate of V2A and, in the 4-8 Mc/s. position, S5J short circuits the low frequency coil, L5A. Switch S5F transfers the R.F. output of V1A to the particular mixer grid coil being used.

23.8. "NET" Switch, S6A-F.

This switch is a jack type press-button switch. "Netting" is carried out with the function switch "M.C.W.-C.W.-R/T" set to R/T.

In the "NET" position the normal "B" supply line to V5A, V6A and V7A is open-circuited by means of switch section S6D. Closure of the S6E section of the switch places the 150 volt Receiver High Tension on the plate of V5A via the parallel resistors, R4G and R4H. This is done to reduce the output of the M.O. valve to a level which will not overload the receiver R.F. stages. No plate voltage is applied to V6A and V7A during "Netting."

To reduce the output still further the S6C section of the switch short-circuits the doubler stage tuning condenser, C11D. During this latter operation switch sections S6A and S6B open-circuit the "Netting Compensation" trimmers, C31A and C31B, connected across the cathode portion of the windings L9A and L10A.

Switch section S6F open-circuits the keying relay, R12. If this were not done the depression of the key whilst the sender was in the "NET" position would result in the closure of RL2, and the application of the 180 or 260 volt H.T. to the Receiver valves via R4G and R4H.

23.9. "CRASH LIMITER" Switch S7A.

This switch places the "Crash Limiter," W3A, in or out of circuit as required.

Chapter 8

THE POWER SUPPLY

24. INTRODUCTION

Power supply for the Sender/Receiver is drawn from Supply Units No. 1A. This is a twin vibrator unit employing two power transformers and vibrators energized from a 12 volt battery. The vibrators are of the full wave synchronous split-reed type. Incorporated in the power unit itself are two multi-circuit relays, a High Power/Low Power Switch, and an On-Off switch.

With the assistance of the relays and the function switch—the "M.C.W.-C.W.-R/T" switch—in the Sender/Receiver and the relays in Supply Units No. 1A, the power supply is changed over from "SEND" to "RECEIVE" or vice-versa and the correct "SEND" voltages for C.W., M.C.W., or R/T transmission are selected. See Fig. 4 for circuit details.

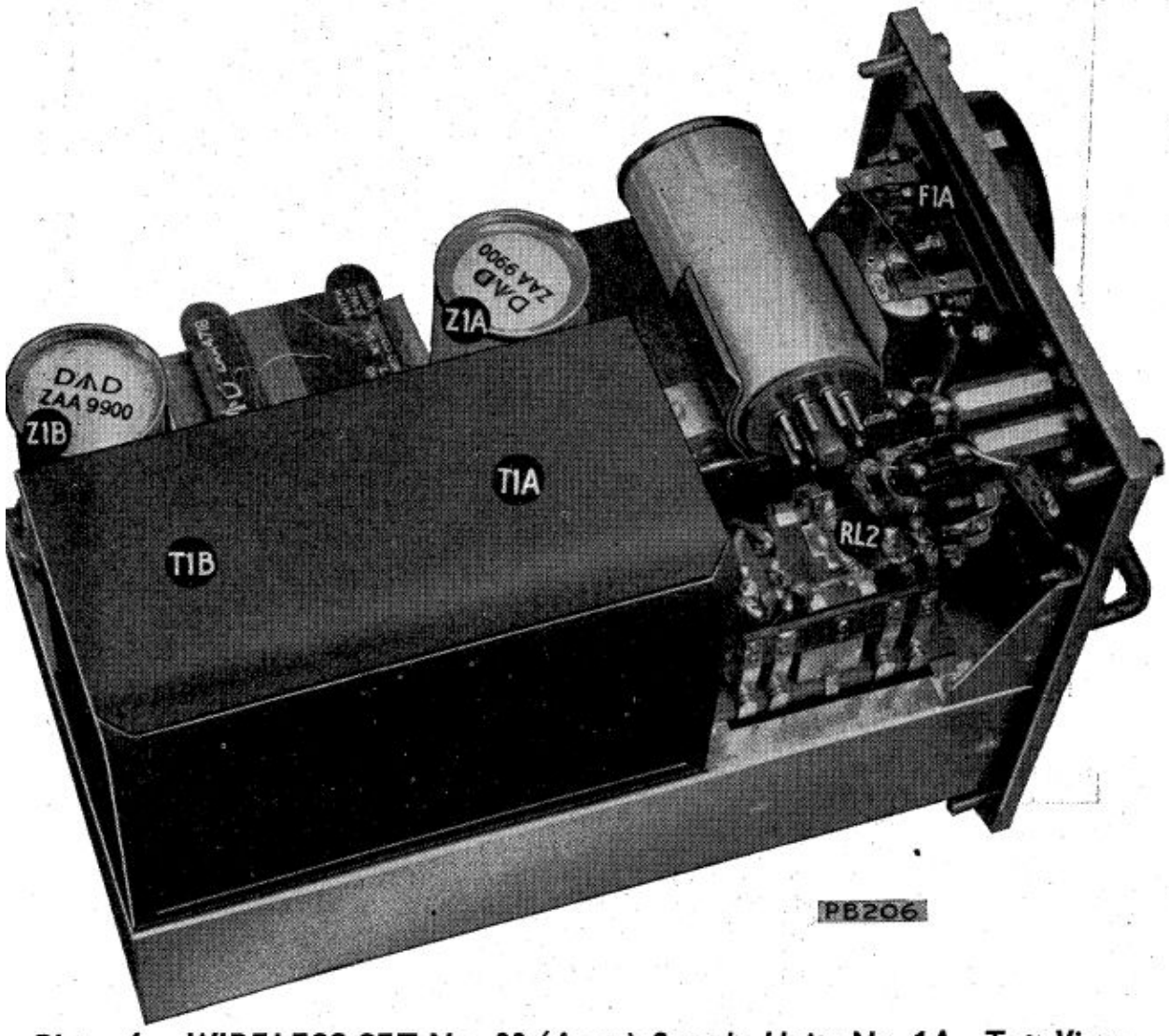


Plate 4. WIRELESS SET No. 22 (Aust.) Supply Units No. 1A—Top View

Plate 6. WIRELESS SET No. 22 (Aust.) Supply Units No. 1A — Front View

24.1. General.

On full output each vibrator unit delivers 180 volts D.C. but provision has been made, by means of primary tappings on each transformer, for a potential of 130 volts to be supplied by each unit under "H.P." M.C.W. and R/T conditions.

The relay and switching systems in Supply Units No 1A, and the Sender/Receiver unit are so arranged that the following voltages are made available when the battery voltage on load is 12 volts measured at the battery terminals.

"Receive"	150 volts
"Send"	
"L.P."	
C.W., M.C.W., R/T.	180 volts
"H.P."	
C.W.	360 volts
M.C.W.–R/T.	260 volts

Under all conditions of operation both "SEND" and "RECEIVE," care has been taken to ensure that the plate voltage on the modulator amplifier valves shall be maintained at a constant level.

Best understanding of the functioning of the various relays and switches in Supply Units No. 1A and the Sender/Receiver unit will be obtained by considering each condition of operation and tracing the switching changes on the schematic diagram Fig. 4.

24.2. "RECEIVE" Switching.

With Supply Units No. 1A connected to the Sender/Receiver unit by means of the 12 point connector, and the On-Off Switch, S2A closed, the following circuits are completed :

RL1 is in the unenergised position so that the full primary winding of transformer T1B is brought into circuit. Positive voltage is applied to the T1B primary via the choke coil, L1B, so that vibrator Z1B operates.

The D.C. output from Z1B passes through the choke coil, L2B, to contacts 4 and 5 of RL2, and thence through the filter choke, L3A, and contacts 6 and 8 of RL2, to the dropping resistor, R5A, which connects to pin No. 2 on the Sender/Receiver power socket. From this point is taken the plate supply line to the receiver valves, V1A, V2A, and V1B.

From the Sender/Receiver side of R5A another connection joins to contacts 9 and 11 on RL2. Contact 11 is wired to the No. 3 pin on the Sender/Receiver power socket and from this point is taken the plate and screen supply for the valves V1C, V3B, and V4A.

Under "RECEIVE" conditions neither RL1 nor RL2 are energised. The return for the energising coil of RL1 passes to Pin No. 5 on the Sender/Receiver power socket and the return for the coil of RL2 joins to Pin No. 9 on the same socket. Both connections are used only on "Send."

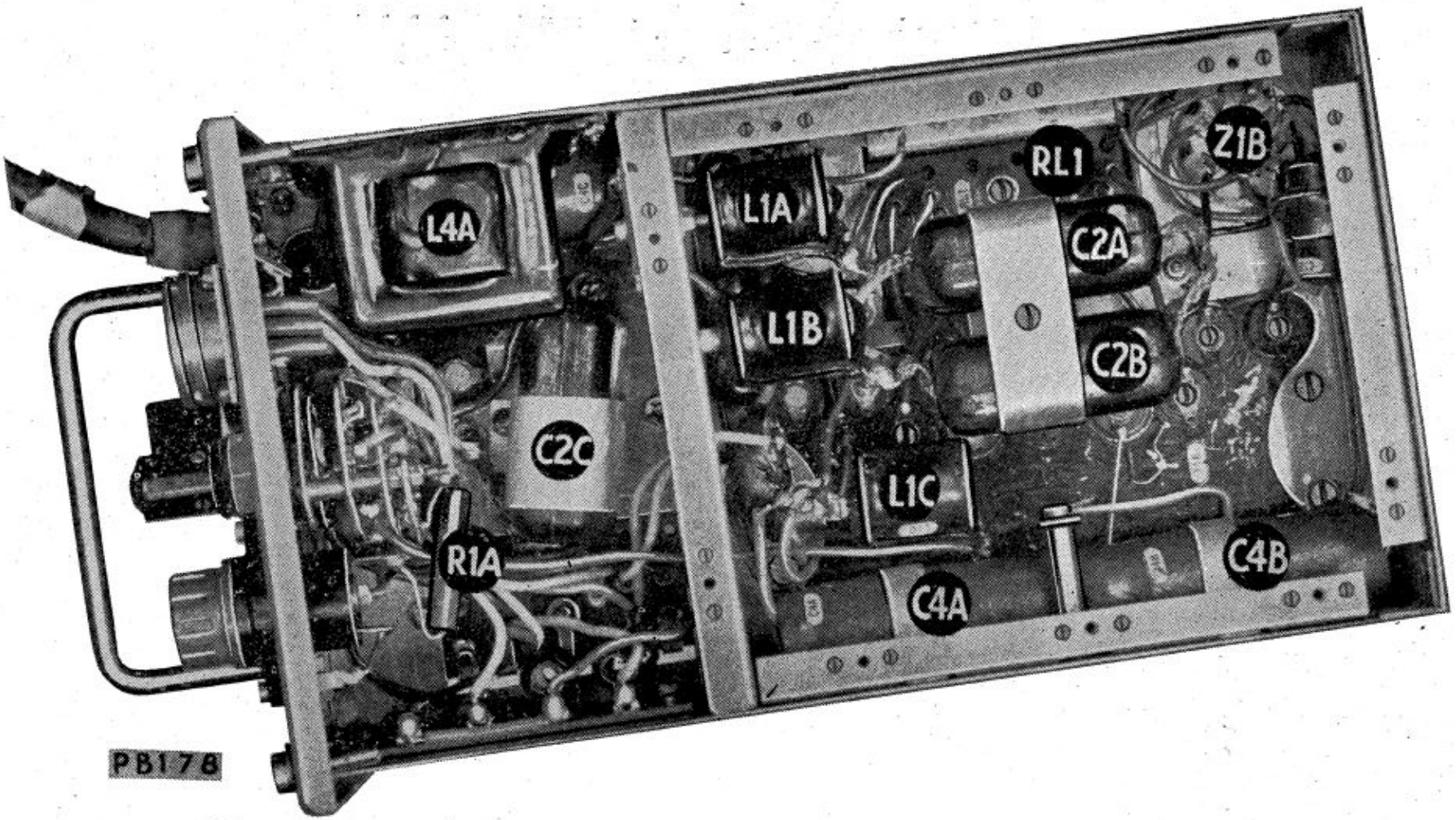


Plate 5. WIRELESS SET No. 22 (Aust.) Supply Units No. 1A — Under View

24.3. "SEND" L.P. Switching.

On "SEND" L.P. under all conditions of transmission switch S1A is open-circuited so that, though contacts 1 and 2 of RL2 are closed, no energising voltage can reach transformer T1A. S1B shunts contacts 3 and 4 of RL2. Switch S1C connects the energising coil of RL1 to Pin No. 9 on the Sender/Receiver power socket. The energising coil of RL2 is permanently connected to Pin No. 9. When the sending key or the microphone pressel switch is closed this pin is grounded thus completing the energising circuit for RL1 and RL2.

As RL1 is energised its four reeds transfer from contacts 1, 4, 7 and 10 to contacts 2, 5, 8, and 11. This places the transformer primary taps on the high output voltage position.

In the output circuit of the power supply system contact 8 of RL2 moves from contact 6 to contact 7. This removes voltage from the receiver R.F. valves and the output voltage passes to Pin No. 1 on the Sender/Receiver power socket and thence to the plates and screens of the oscillator valve V5A and the power amplifier valve V7A. When contacts 7 and 8 of RL2 are closed voltage is applied to the parallel resistors R2A, R2B By means of S1D these resistors are placed in parallel with R3A and joined to Pin No 6 on the Sender/Receiver power socket When S1D and S1E are in the L.P. position contacts 10 and 11 of RL2 join Pin No. 3 and Pin No. 6 on the Sender/Receiver power socket and thus voltage is applied to the plates and screens of the valves V1A and V4A and the plate of V3A.

24.4. "SEND" H.P. Switching.

(*a*) "SEND" C.W.

On C.W., when S1A–E is changed over for high power operation, of Supply Units No. 1A and the transmitting key is depressed in the Sender/Receiver unit, RL1 is energised. Its contacts place the primary taps of the two transformers on the high output voltage position.

Simultaneously contacts 1 and 2 of RL2 close and the primary of T1A is energised. Contact 5 of RL2 moves from contact 4 to contact 3 and places the output of the two vibrator units in series. Contact 8 of RL2 moves from contact 6 to contact 7 and feeds the output voltage to Pin No. 1 on the Sender/Receiver power socket whence it is distributed to the Master Oscillator and Power Amplifier valves in the Sender.

From Contact 7 of RL2 current flows through resistors R3A, R4A, and R4B and is taken through switch S1E to contact 10 on RL2. Contact 11 of RL2 joins contact 10 Pin No. 3 on the Sender/Receiver power plug. From this point it is fed to the plate and screen of V1C and V4A and to the plate of V3A.

(*b*) "SEND." M.C.W. and R/T.

When the "M.C.W.–C.W.–R/T." switch is changed from C.W. to M.C.W. or R/T. under H.P. conditions the earth return for RL1 is broken and the contacts on this relay return to the low voltage position on the power transformer primaries. The result is that a potential of 260 volts is applied to the supply line to V5A, V6A and V7A. To compensate for the decrease in H.T. voltage which takes place during the change from C.W. to M.C.W. or R/T., the R4A, R4B section of the voltage dropping resistor, R3A, R4A, R4B feeding V1C, V3A and V4A, is short-circuited by the S1L section of the Function Switch in the Sender/Receiver unit.

Full details of the functioning of the "M.C.W.–C.W.–R/T." switch will be found in Para. 23.1., Chapter 7.

24.5. Spares.

Inside the case of the Case of Supply Units No. 1A will be found the spare Vibrator unit and the Spare Fuse Wire. The former is held in place on the top of the filter choke can by clips, whilst the latter, wound on a bakelite strip, is mounted on top of the relay can.

24.6. Connectors.

Two sets of connectors are supplied to connect Supply Units No. 1A to the batteries.

For Vehicle or Ground Station operation Connectors, Battery, No. 8, or Connectors, 4 point, No. A4 are used. These terminate in two Niphan plugs for connection to the two 6 volt batteries used.

For Man-Pack operation, where a single 12 volt battery is used, Connectors 4 pt. No. A3 (Aust.) which terminate in hooked lugs, are employed. The Supply Unit end of either set of connectors is fitted with a 4 point socket which fits the 4 point plug on Supply Units No. 1A.

25. BATTERIES

Two types of battery are associated with Wireless Set No. 22 (Aust.). The first, Batteries, Secondary, Portable, 12V.20Ah. (Aust.) is used for Man-Pack operation. This is fitted with terminals to take the hooked lugs of Connectors, 4pt. No. A3 (Aust.). Only one of these batteries is required to operate the Sender/Receiver Unit. For Vehicle or Ground Station operation two Batteries, Secondary, Portable, 6V.75Ah are used. These are provided with Niphan sockets which engage with the Niphan plugs fitted to Connectors, Battery, No. 8, or Connectors, 4 point, No. A4. The wiring of the connector places the two batteries in series to provide the 12 volts necessary for operation of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).

Chapter 9

WORKSHOP MAINTENANCE

26. INTRODUCTION

The information provided in the following pages is intended for the guidance of radio personnel in A.E.M E. Workshops who are engaged in 2nd, 3rd and 4th Echelon repair of W.T. Equipment.

Note.—Repairs or maintenance adjustments to Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) will be carried out strictly to the requirements of G.R.O. O.190 of 10th July, 1942.

Bearing in mind that circumstances and the accessibility of test equipment have a large bearing on maintenance procedure, the following servicing instructions have been prepared with the object of providing the fullest practicable information to personnel engaged in the maintenance of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.).

26.1. Testing Instruments.

Recommended instruments for the testing of Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust.) are :

26.2. Frequency Standards :

(i) Standard Signal Generator.

This instrument is required for checks on Receiver alignment and for Sensitivity, Selectivity, Noise Level, A.V.C., and Fidelity measurements. It must be a precision instrument fitted with an accurately calibrated attenuator. Its frequency range should be from 2 to 8 Mc/s. and 400 to 500 kc/s. and its output range should be adjustable from 1 microvolt to .1 volt. Internal modulation—30% at 400 c/s.—should be incorporated and provision be made for the application of external modulation for audio response tests and B.F.O. calibration. Signal Generators, Type TA101B (Aust.) Signal Generators, Type TA101D (Aust.), or Signal Generators, Sub-Standard (Aust.) No. 1, Mk. I, fulfil these requirements.

(ii) Heterodyne Wavemeter.

This instrument, in conjunction with the Crystal Calibrator, is used to adjust the Master Oscillator tuning so that the Netting between the Sender and the Receiver is correct. The wavemeter must cover the frequency range from 2 to 8 Mc/s. with a calibration accuracy better than 1%. It should incorporate a sensitive detector and a headset or a loud speaker.

Wavemeters Class "C," No. 1 (Aust.) is an example of this type of equipment.

(iii) Crystal Controlled Oscillator or Multi-Vibrator.

This instrument is required for calibrating the "FREQ. Mc/s." dial and for checking the calibration of the Heterodyne Wavemeter. The oscillator should be capable of generating fundamental frequencies of 100 kc/s. and 1,000 kc/s. with an accuracy of not less than $\pm .05\%$ and should be capable of giving receivable harmonics up to 8 Mc/s.

Wavemeters, Class "C,' No. 1 (Aust.) Calibrators, Crystal will meet these requirements.

(iv) Beat Frequency Oscillator.

This instrument is required for measuring modulation depth and for checking audio response and the frequency range of the B.F.O. It should have a frequency range at least up to 12 kc/s. and an output of 150 milliwatts into an impedance of 600 ohms. The frequency response between 400 c/s. and 3,000 c/s. should not deviate more than 1 db.

26.3. Voltage Current and Resistance Measurements.

(i) A.C. Voltmeter.

This instrument should be of the rectifier type and have a range from 0-5 volts. It is required for monitoring the output of the beat frequency oscillator when making modulation depth measurements or when checking the receiver frequency response.

(ii) D.C. Voltmeter.

This should be a multi-range instrument having a top range of 0-500 volts. Its resistance should be at least 1,000 ohms per volt.

(iii) D.C. Milliammeter.

For point to point circuit tests. Ranges 0–12 mA, 0–120 mA, and 0–12 A.

(iv) Ohm-meter.

For point to point circuit tests. Ranges up to 1.5 megohms.

(v) 500 Volt Megger.

For various insulation tests. Note that electrolytic condensers must never be tested with a megger.

Note.—Items (i) to (iv) are usually incorporated in the Analyser supplied to Signals and A.E.M.E. Workshops. They will also be found in :

(*a*) Multi-Tester A.T.P. "B" (Aust.) (Super Tester T.S.T.)

(*b*) Multi-Tester (Aust.) No. 2.

26.4. Output Power and Modulation Measurements.

(i) Power Output Meter.

This instrument is required for those measurements conducted in association with the Standard Signal Generator.

It must have an impedance of 100 ohms and a range of at least 0.2mW. to 50 mW. It is also desirable that this instrument be provided with an auxiliary scale calibrated in db.

(ii) Dummy Aerials.

(*a*) Receiver Alignment :

A 50 uuF. condenser connected in series with a 16.6 ohms non-inductive resistor is used for Receiver sensitvity measurements. For alignment of the R.F. and I.F. stages the output of the signal generator is connected directly to the grids of the I.F. and mixer valves.

(*b*) Sender Alignment :

A 10 ohm dummy aerial is built into the sender for test and tuning purposes but an external dummy, consisting of a 50 uuF, air-dielectric condenser in series with a 16.6 ohm, 15 watt, non-inductive resistor is needed for the netting compensation adjustment, for the grid relay compensating condenser adjustment, and for Sender power output measurements. An 0–1A.R.F. meter is used in conjunction with the 16.6 ohm dummy aerial.

(iii) Cathode Ray Oscillograph or Direct Reading Modulation Meter.

This instrument is required for use in conjunction with the Beat Frequency Oscillator when measuring modulation depths. The Cathode Ray Oscillograph should be complete with Linear Time Base and amplifier.

27. SOCKET VOLTAGE MEASUREMENTS

27.1. Control Settings.

During voltage measurements on the Sender and Receiver the Controls shall be set as follows :

Wave Change Switch to 4–8 Mc/s.

"AER. SELECTOR" to "TEST."

Meter Switch to "A.V.C."

"NORMAL/REMOTE" switch to "NORMAL."

Sender "ON/OFF" switch to "ON."

"M.C.W.–C.W.–R/T." Switch to "R/T." or "C.W." as required.

"L.F. GAIN" control fully clockwise.

"R.F.GAIN" control fully clockwise.

"NETTING TRIMMER" dial to "5."

"HET TONE" control to 455 kc/s. lock position.

"FREQ.Mc/s." dial set to 6 Mc/s.

Power Amplifier valve loaded to 65 mA. as described in Chap. 2, Para. 9.4.

27.2. Voltage Measurement Conditions.

The conditions under which voltage measurements are to be made are as follows :

(i) The voltage at the input to the battery cable must be 12 volts on load.

(ii) The voltmeter must have a resistance of 1,000 ohms per volt.

(iii) All measurements except that of the P.A. plate voltage are made from the valve pin to chassis.

(iv) Measurements are made under both C.W. and R/T. conditions.

Note.—In the case of the P.A. plate voltage the measurements are made from the junction of resistor R21A and the R.F. choke, L3D, to chassis.

Tables 9 and 10 give details of the approximate voltage readings to be expected on "SEND" and "RECEIVE" under C.W. and R/T. conditions.

TABLE 9.—SOCKET VOLTAGES—"SEND."

1st Mod. Amplifier V1C (1D5GP)			*2nd Mod. Amplifier, V3A (1H6G)*			*3rd Mod. Amplifier, V4A (1F5G)*		
Pin No.	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*
1	—	—	1	—	—	1	—	—
2	6·0	6·0	2	10·0	10·0	2	8·0	8·0
3	83	80	3	44	44	3	145	140
4	52	50	4	—	—	4	150	145
5	—	—	5	—	—	5	—	—
6	—	—	6	—	—	6	—	—
7	4·0	4·0	7	8·0	8·0	7	6·0	6·0
8	—	—	8	12·0	12·0	8	—	—

Master Oscillator, V5A (6U7G)			*Modulator, V6A (6N7GT)*			*Power Amplifier, V7A (807)*		
Pin No.	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*
1	—	—	1	—	—	1	11·0	11·0
2	—	—	2	—	—	2	200	260
3	247	245	3	265	—	3	0·47–	0·38–
4	147	150	4	—	18–	4	—	—
5	—	—	5	—	18–	5	6·0	6·0
6	—	—	6	265	—			
7	—	—	7	6·0	6·0			
8	6·0	6·0	8	6·0	6·0			

NOTE : Plate voltage measured at junction of L3D and R21A :—
R/T. — 260
C.W. — 330

TABLE 10.—SOCKET VOLTAGES—"RECEIVE."

R.F. Amplifier, V1A (1D5GP)			*Converter, V2A (1C7G)*			*1st I.F. Amplifier, V1B (1D5GP)*		
Pin No.	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*
1	—	—	1	—	—	1	—	—
2	4·0	4·0	2	2·0	2·0	2	6·0	6·0
3	143	143	3	135	135	3	145	145
4	65	70	4	31	31	4	69	70
5	—	—	5	—	—	5	—	—
6	—	—	6	74	74	6	—	—
7	2·0	2·0	7	—	—	7	4·0	4·0
8	—	—	8	142	142	8	—	—

2nd I.F. Amplifier, V1C (1D5GP)			*2nd Detector—A.V.C., V3A (1H6G)*			*Beat Frequency Osc., V3B (1H6G)*		
Pin No.	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*	*Pin No.*	*R/T.*	*C.W.*
1	—	—	1	—	—	1	—	—
2	6·0	6·0	2	10·0	10·0	2	8·0	8·0
3	90	89	3	—	—	3	—	5·0
4	70	70	4	—	—	4	—	—
5	—	—	5	—	—	5	—	—
6	—	—	6	—	—	6	0·19	0·19
7	4·0	4·0	7	8·0	8·0	7	6·0	6·0
8	—	—	8	12·0	12·0	8	—	—

Audio Output, V4A (1F5G)

Pin No.	*R/T.*	*C.W.*
1	—	—
2	8·0	8·0
3	138	138
4	140	140
5	—	—
6	—	—
7	6·0	6·0
8	—	—

Note.—Voltage measurements taken with controls set as in Para. 27·1. Measurement conditions as specified in Para. 27·2.

Voltages under the M.C.W. condition will be approximately the same as those for R/T. It should be borne in mind, however, that due to component tolerances any of the voltages may vary ±10% from the figures given.

28. ALIGNMENT PROCEDURE

28.1. General.

When Wireless Set No. 22 (Aust.) or Wireless Set No. 122 (Aust). leaves the manufacturer the Sender/Receiver unit is fully aligned and all adjustments are sealed. Under normal circumstances no further adjustments are needed. However, in service, the occasion will arise when, due to valve replacement, or the repair or replacement of components in certain circuits, realignment may be necessary.

Such changes include :

(i) I.F. Alignment.
Replacement of valves V2A, V1B, V1C or V3A. Alteration to any of the tuned circuits associated with these valves.

(ii) R.F. Alignment—Receiver.
Replacement of valves V1A or V2A or alteration to any of the tuned circuits associated with these valves.

(iii) R.F. Alignment—Sender.
Replacement of V5A or V7A or alteration to the tuned circuits associated with these valves.

Note.—It is specially important that the tuned circuit adjustments shall not be interfered with unless suitable frequency standards with which to re-align the equipment are available.

28.2. Standard Alignment Conditions.

(i) Power Supply.
Variations of the battery supply shall not exceed the limits of 12 to 12.25 volts measured at the battery terminals under load conditions.

(ii) Receiver control settings.
Wave change switch in the required position.
"AER. SELECTOR" switch in the "A" position.
Meter switch in the "A.V.C." position.
"M.C.W.–C.W.–R/T." switch in the "R/T." position.
"NORMAL/REMOTE" switch in the "NORMAL" position.
Sender "ON/OFF" switch in the "OFF" position.
"L.F.GAIN" control fully clockwise.
"R.F.GAIN" control fully clockwise.
"NETTING TRIMMER" dial at "5."
"HET TONE" set to 455 kc/s. lock position.

29. I.F. ALIGNMENT.

29.1. 3rd I.F. Transformer.

(i) Connect the Output Meter across the 100 ohm headphone winding on transformer T4A.

(ii) Connect the Signal Generator to the grid of the 1D5GP 2nd I.F. valve, V1C. Leave the grid clip off this valve. No dummy aerial is used.

(iii) Turn the gang condenser plates fully out. Put the wave change switch to the "2–4 Mc/s." position.

(iv) Set the Signal Generator to 455 kc/s. and increase the output until a signal is heard in the headphones.

(v) Align the tuned circuits of the 3rd I.F. transformer in the following order whilst reducing the input as direct alignment is approached :

(*a*) 3rd I.F. Secondary.

(*b*) 3rd I.F. Primary.

Note.—The adjusting screws for the primary windings of all I.F. transformers are at the top of the cans. The secondary adjusting screws are underneath the chassis.

(vi) Repeat (v) until perfect alignment is obtained. Always finish with the Primary adjustment.

Note.—The alignment of this I.F. transformer is now complete and must not be altered during the subsequent alignment of the 2nd and 1st I.F. transformers.

(vii) Replace the grid clip on V1C.

29.2. 2nd I.F. Transformer.

(i) Connect the Signal generator to the grid of the 1D5GP 1st I.F. valve, V1B. Leave the grid clip off.

(ii) Align the tuned circuits of the 2nd I.F. transformer in the following order :

(*a*) 2nd I.F. Secondary.

(*b*) 2nd I.F. Primary.

Do not touch the adjusting screws on the 3rd I.F. transformer.

(iii) Repeat (ii) until perfect alignment is obtained. Always finish with the Primary adjustment.

Note.—The alignment of this transformer is now complete, and must not be altered during the alignment of the 1st I.F. transformer.

(iv) Replace the grid clip on V1B.

29.3. 1st I.F. Transformer.

(i) Connect the Signal Generator to the grid of the 1C7G converter valve, V2A. Leave the grid clip off.

(ii) Align the tuned circuits of the 1st I.F. transformer in the following order :

(*a*) 1st I.F. Secondary.

(*b*) 1st I.F. Primary.

Do not touch the adjusting screws on the 2nd or 3rd I.F. transformers.

(iii) Repeat (ii) until perfect alignment is obtained. Always finish with the Primary adjustment.

This completes the I.F. channel alignment.

Note.—The above procedure of stage by stage alignment must be adhered to strictly otherwise the band width and gain characteristics of the I.F. channel will be upset.

30. HETERODYNE TONE ADJUSTMENT

30.1. Preliminary.

Connect the Signal Generator to the grid of the 1C7G Converter valve, V2A. Leave the grid clip off this valve. Tune the Signal Generator to 455 kc/s. and increase its output to a level sufficient to provide a 50 mW. reading on the Output Meter. Plug in the headphones. Switch off the modulation from the Signal Generator.

30.2. B.F.O. Coil Adjustment.

(i) Switch the "M.C.W.–C.W.–R/T." switch to "C.W."
(ii) Engage the 455 kc/s. lock on the "HET TONE" dial.
(iii) Adjust the coil slug in the B.F.O. coil, L8A, for zero beat.

31. OVERALL ALIGNMENT—RECEIVER

31.1. Preliminary.

Operate the set under Standard Alignment Conditions. Turn the wave change switch to "2–4 Mc/s."

Note.—For R.F. alignment a screwdriver 10 inches in length and with a blade $\frac{1}{8}$ inch in width should be used.

31.2. Alignment procedure.

(i) Connect the Signal Generator to the grid of the 1D5GP R.F. valve, V1A. Leave the grid clip off.
(ii) Set the Signal Generator and "FREQ.Mc/s." dials to 2.0 Mc/s. and adjust the inductance of the L.F. receiver oscillator coil, L5A, for maximum output by means of the screw which is protruding from the side of the R.F. coil unit.
(iii) Turn the Signal Generator and "FREQ.Mc/s." dials to 4.0 Mc/s. and adjust the trimmer condenser, C22C, across L5A, for maximum output.
(iv) Repeat operations (ii) and (iii) and check the dial calibration accuracy against the Frequency Standard.
(v) Check the dial calibration accuracy at 2.5, 3.0 and 3.5 Mc/s. against the Frequency Standard.
(vi) Set the Signal Generator to 2.1 Mc/s. and tune the "FREQ. Mc/s." dial for maximum output. Next adjust the inductance trimming screw of the L.F. plate coil, L4A, for maximum output.
(vii) Set the Signal Generator to 3.85 Mc/s. and tune the "FREQ. Mc/s," dial for maximum output. Next adjust the L.F. plate coil trimmer, C22A, for maximum output. Rock the "FREQ.Mc/s." dial whilst making this adjustment.
(viii) Repeat operations (vi) and (vii).
(ix) Turn the wave change switch to "4–8 Mc/s." and repeat operations (i) to (vii) substituting the frequencies as follows :
Where : 2.0 Mc/s. is quoted read 4.0 Mc/s.
4.0 Mc/s. is quoted read 8.0 Mc/s.
2.1 Mc/s. is quoted read 4.2 Mc/s.
3.85 Mc/s. is quoted read 7.7 Mc/s.
For operation (v) substitute 5.0, 6.0, and 7.0 Mc/s.

32. ALIGNMENT OF SENDER

32.1. Control Settings.

Before the Sender Alignment can be commenced the Overall Alignment of the Receiver as set out in Para. 31 must have been completed.

The controls are to be set as follows :

"AER. SELECTOR" switch in the "TEST" position.
Meter Switch in the A.V.C. position.
"M.C.W.–C.W.–R/T." switch in the "R/T." position.
"NORMAL/REMOTE" switch in the "NORMAL" position.
Sender "ON/OFF" Switch in the "ON" position.
Supply Unit "H.P./L.P." switch in the "H.P." position.
Wave Change switch in the "2–4 Mc/s." position.
"NETTING TRIMMER" dial at "5."
"HET. TONE" set to 455 kc/s. lock position.

32.2. Alignment Procedure.

(*a*) L.F. Band

(i) Set the "FREQ. Mc/s." dial to 2.1 Mc/s. Depress and lock the "NET" switch and adjust the inductance of the L.F. transmitter oscillator coil, L10A, by means of the screw which is protruding from the side of the R.F. coil unit, for maximum "dip" as shown by the A.V.C. meter.

(ii) Turn the "FREQ. Mc/s." dial to 3.85 Mc/s. and adjust the trimmer, C29A, across L10A, for maximum "dip" on the A.V.C. meter.

(iii) Repeat operations (i) and (ii).

(iv) Release the "NETTING TRIMMER" lock and tune the "FREQ. Mc/s." dial to 2.0 Mc/s. Check the tracking between Sender and Receiver by rotating the "NETTING TRIMMER" dial. Maximum dip on the A.V.C. meter must occur over some part of the calibrated scale of the "NETTING TRIMMER" dial.

(v) Repeat (iv) at 3.0 and 4.0 Mc/s.

(vi) Release the "NET" switch. Re-set the "NETTING TRIMMER" to "5" and lock it. Change over to "SEND" by pressing the key.

(vii) Turn the "M.C.W.–C.W.–R/T." switch to C.W. and the meter switch to "DRIVE."

(viii) Set the "FREQ. Mc/s." dial to 2.1 Mc/s. and adjust the inductance of the L.F. transmitter doubler coil, L11A, by means of the screw which is protruding from the side of the R.F. coil unit, for maximum reading on "DRIVE."

(ix) Set the "FREQ. Mc/s." dial to 3.85 Mc/s. and adjust trimmer C30A, across L11A, for maximum reading on "DRIVE."

(x) Repeat operations (viii) and (ix.).

(xi) Change back to "RECEIVE" R/T, and turn the meter switch to "A.V.C."

(xii) Accurately tune in a 3.5 Mc/s. signal from the 500 kc/s. oscillator in Wavemeters, Class. "C," No. 1 (Aust.), Calibrators, Crystal, and adjust the coupling between this instrument and the receiver to produce an A.V.C. reading of about "6" on the Set meter.

(xiii) Release the "NETTING TRIMMER" lock. Press the "NET" switch and rotate the "NETTING TRIMMER" dial until zero beat is heard in the output of the Receiver. Release the "NET" switch.

(xiv) Change over to "SEND" R/T. by closing the transmitting key. On Wavemeters, Class "C," No. 1 (Aust.) tune in the beat between the Sender and the Crystal calibrator.

(xv) Adjust this beat to zero by means of the L.F. netting corrector trimmer, C31A.

(xvi) Repeat (xiii) to (xv) until zero beat is obtained under both "NET" and "SEND" conditions without further adjustment to C31A.

(*b*) H.F. Band.

(i) Set the "FREQ. Mc/s." dial to 4.2 Mc/s. Depress and lock the "NET" switch and adjust the inductance of the H.F. transmitter oscillator coil, L9A, by means of the screw which is protruding from the side of the R.F. unit, for maximum "dip" as shown by the A.V.C. meter.

(ii) Turn the "FREQ. Mc/s." dial to 7.7 Mc/s. and adjust the trimmer, C29B, across L9A, for maximum "dip" on the A.V.C. meter.

(iii) Repeat operations (i) and (ii).

(iv) Release the "NETTING TRIMMER" lock, and tune the "FREQ. Mc/s." dial to 4.0 Mc/s. Check the tracking between Sender and Receiver by rotating the "NETTING TRIMMER" dial. Maximum "dip" on the A.V.C. meter must occur over some part of the calibrated scale of the "NETTING TRIMMER" dial.

(v) Repeat (iv) at 6.0 and 8.0 Mc/s.

(vi) Release the "NET" switch. Re-set the "NETTING TRIMMER" to "5" and lock it. Change over to "SEND" by pressing the key.

(vii) Turn the "M.C.W.–C.W.–R/T." switch to C.W. and the meter switch to "DRIVE."

(viii) Set the "FREQ. Mc/s." dial to 4.2 Mc/s. and adjust the inductance of the H.F. transmitter doubler coil L12A, by means of the screw which is protruding from the side of the R.F. coil unit, for maximum reading on "DRIVE."

(ix) Set the "FREQ. Mc/s." dial to 7.7 Mc/s. and adjust trimmer C30B, across L12A, for maximum reading on "DRIVE."

(x) Repeat operations (viii) and (ix).

(xi) Change back to "RECEIVE" R/T. and turn the meter switch to "A.V.C."

(xii) Accurately tune in a 7.0 Mc/s. signal from the 500 kc/s. oscillator in Wavemeters, Class "C," No. 1 (Aust.), Calibrators, Crystal, and adjust the coupling between this instrument and the receiver to produce an A.V.C. reading of about "6" on the Set meter.

(xiii) Release the "NETTING TRIMMER" lock. Press the "NET" switch and rotate the "NETTING TRIMMER" dial until zero beat is heard in the output of the Receiver.

(xiv) Change over to "SEND" R/T. by closing the transmitting key. On Wavemeters, Class "C," No. 1 (Aust.) tune in the beat between the Sender and the Crystal Calibrator.

(xv) Adjust this beat to zero by means of the H.F. netting corrector trimmer, C31B.

(xvi) Repeat (xiii) to (xv) until zero beat is obtained under both "NET" and "SEND" conditions without further adjustments to C31B.

33. FINAL ALIGNMENT

33.1. Control Settings.

"H.P./L.P." switch to "H.P."
"M.C.W.–C.W.–R/T." switch to "C.W."
Wave change switch to "2–4 Mc/s."
"AER. SELECTOR" switch to "A."
Meter switch to "P.A."
Sender "ON/OFF" switch to "ON."

33.2. Preliminary.

Connect the Sender Dummy Aerial 50 uuF. capacity condenser and 16.6 ohms non-inductive resistor between the "AE" and "E" terminals. Set the "AER. COUPLING" dial at "O."

33.3. Procedure.

(i) Tune the "FREQ. Mc/s." dial to 4.0 Mc/s.

(ii) Rotate the "AERIAL TUNING" dial until resonance, as indicated by the greatest dip on the "P.A." meter, is reached. Under this condition the "P.A." meter reading should be approx. 30 mA.

(iii) Change over to "RECEIVE" C.W.

(iv) Tune the Signal Generator to 4.0 Mc/s. and switch off its modulation.

(v) Loosely couple the Signal Generator to the Receiver so that an output of from 20 to 30 mW. is obtained. Rotate the "AER TUNING" control until maximum sensitivity is obtained.

(vi) Change back to "SEND" and adjust trimmer C5B on the Aerial Relay assembly for maximum "dip" on the "P.A." meter.

(vii) Repeat operations (iii) to (vi).

IMPORTANT NOTE.—When the Sender/Receiver has been finally aligned all trimmers shall be sealed, with Glyptal or similar cement. The I.F. transformer core screws, which have a wax coating on them already, should be sealed with Halowax 2012.

34. PERFORMANCE TESTS

34.1. RECEIVER TESTS.

(a) **R.T. Sensitivity**—

The sensitivity may be checked in the following manner :—

(i) Connect the Signal Generator to the aerial terminal of the Wireless Set through a dummy aerial consisting of a 16.6 ohm non-inductive resistor in series with a 50 uufd condenser.

(ii) Set the Signal Generator to 2 Mc/s. with modulation adjusted to 30% at 400 c/s and tune Wireless Set to the same frequency with the M.C.W.–C.W.–R.T. switch in the R.T. position.

(iii) Adjust the output of the Signal Generator to give an output of 50 mW from the receiver into a load of 100 ohms with "LF Gain" and "RF gain" controls set at maximum and "crash limiter" switched "OFF."

(iv) Repeat at the frequencies set out in Table 15. The output from the Signal Generator at each frequency should not be greater than the figures shown in Table 15.

Table 15. Receiver Sensitivity.

Band	*Frequency Mc/s*	*R.T. Sensitivity UV*	*C.W. Sensitivity UV*	*Noise, mW*
1	2·0	4·0	3·0	1·0
	3·0	3·0	2·0	1·0
	4·0	3·0	2·0	1·0
2	4·0	4·0	3·0	1·0
	6·0	3·0	2·0	1·0
	8·0	3·0	2·0	1·0

(*b*) **C.W. Sensitivity.**

(i) The procedure for R.T. sensitivity is followed for C.W. sensitivity, but the modulation of the Signal Generator is switched "OFF" and the control on the Wireless Set is switched to "C.W."

(ii) The "het tone" control is then adjusted until a note of about 1000 c/s is obtained.

(iii) The output from the Signal Generator at each frequency shall not be greater than the figures shown in Table 15.

(*c*) **Noise.**

(i) To measure noise, switch the M.C.W.–C.W.–R.T. control to the "R.T." position, and with the modulation of the Signal Generator switched "ON," adjust the output to 5 uV, and adjust the "R.F. gain" control of the Wireless Set to give 50 mW output from the receiver.

(ii) Now switch the modulation "OFF," and the noise output at any frequency should not exceed 1 mW.

(*d*) **Image Ratio.**

(i) To measure image ratio proceed as in 34.1 (a) (i) and adjust the R.F. gain control to give 50 mW output with an input of 5uV from the Signal Generator.

(ii) Leave receiver controls set, and tune Signal Generator to image frequency (see Table 16) and increase input until 50 mW output is again obtained from receiver.

(iii) The increase in input at each image frequency should not be less than that shown in Table 16.

Table 16. Image Ratio.

Band	*Frequency*	*Image Frequency*	*Image Ratio*
1	2·0 Mc/s 3·0 ,, 4·0 ,,	2·91 Mc/s 3·91 ,, 4·91 ,,	4000/1 1000/1 400/1
2	4·0 ,, 6·0 ,, 8·0 ,,	4·91 ,, 6·91 ,, 8·91 ,,	400/1 200/1 100/1

(*e*) **I.F. Sensitivity and Selectivity.**

To measure the I.F. channel sensitivity and selectivity proceed as follows :—

(i) Connect the Signal Generator as for I.F. Alignment. *See* Para. 29.

(ii) Set the Signal Generator to 455 kc/s., modulated 30% at 400 c/s and with the receiver controls set at maximum, the Signal Generator output should not exceed 70–100 uV for 50 mW output from the receiver.

(iii) Increase the input by 6 db (twice input voltage) and detune the Signal Generator each side of resonance, recording the amount of detuning to restore the output to 50 mW.

(iv) Repeat for 60 db (1000 times input voltage) increase in input. The total bandwidth should be between the figures shown below and be approximately symmetrical.

6 db	.. ..	6–10 kc/s
60 db	.. ..	28–38 kc/s

(f) **A.V.C. Efficiency.**

To check the efficiency of the AVC system proceed as in (a), setting the Signal Generator to any convenient frequency from 2–8 Mc/s. Then proceed as follows :—

(i) Switch on the internal modulation of the Signal Generator and adjust the output to 20,000 uV.

(ii) Switch M.C.W.–C.W.–R.T. switch on Wireless Set to "R.T." and adjust "A.F. gain" control to give 50 mW output.

(iii) Reduce input to 5 uV, and output should not drop below 5 mW.

(g) **Audio Response.**

This test can only be carried out when the Signal Generator has provision for connecting an external source of modulation. To check the audio response proceed as follows :—

(i) Set Signal Generator to any frequency between 2 Mc/s. and 8 Mc/s. and with an output of 1000 uV modulated 30% at 400 c/s, tune receiver accurately to it.

(ii) Adjust "A.F. gain" control to give an output of 50 mW from the receiver.

(iii) Connect a Beat Frequency Oscillator to the external modulation terminals of the Signal Generator.

(iv) Adjust output of B.F.O. to give 30% modulation first at 150 c/s and then at 3000 c/s. The receiver output should not be less than —3 db and —15 db respectively of that obtained at 400 c/s.

34.2. SENDER TESTS.

(a) **Power Output.**

To check the Sender power output proceed as follows :—

(i) Connect a dummy aerial consisting of a 16.6 ohm non-inductive resistor in series with a 50 uufd air dielectric condenser to the Set "aerial" terminal, with the resistor on the "earth" side.

(ii) Connect a 0–1A thermo ammeter between the dummy Aerial resistor and the "earth" terminal of the set.

(iii) Tune the Wireless Set to each of the frequencies shown in Table 14, and in each case adjust the aerial loading to give a P.A. plate current of 65 mA for C.W., high power, or 45 mA for R.T. or M.C.W. high power.

The power output obtained in each case should not be less than the figures shown in Table 17.

(iv) When switching to "low power," the power output should be approximately 25% of that obtained on "high power."

Table 17. Sender Output.

Band	*Freq. Mc/s*	*Power Output (Watts) H.P.*	
		M.C.W. & R.T.	*C.W.*
1	2·0	3·5	6·0
	3·0	4·0	7·0
	4·0	4·0	7·0
2	4·0	4·0	7·0
	6·0	4·0	7·0
	8·0	4·0	7·0

(*b*) **Modulation.**

To test modulation, proceed as in 34.2 (a) (i) then as follows :—

(i) Connect the active terminal of Cathode Ray Oscillograph vertical plates through a 10–20 uufd condenser to the Wireless Set "Aerial" terminal.

(ii) Tune the Set for maximum output at 3.0 Mc/s. with a P.A. plate current of 45 mA.

(iii) Connect input from Beat Frequency Oscillator through a potentiometer to the microphone contacts on the drop lead.

The input required to give 100% modulation at 400 c/s shall not exceed 20 millivolts and at 300 or 3000 c/s shall not exceed 27 millivolts.

(*c*) **Sidetone.**

To test sidetone proceed as follows :—

(i) Connect input from Beat Frequency Oscillator to microphone contacts on drop lead.

(ii) Feed sufficient 400 c/s input for 100% modulation with (M.C.W., C.W., R.T.) switch in R.T. position.

(iii) Measure sidetone output on the output meter connected to the receiver contacts on the drop lead.

(iv) Measure sidetone output on C.W. and M.C.W.

The output in all cases should be not less than 1 mW or greater than 6 mW.

These figures are for guidance only and may vary with individual Wireless Sets or test equipment.

35. MECHANICAL ADJUSTMENTS

35.1. Flick Dial Mechanism.

(i) When a flick dial unit is removed from its associated condenser it is necessary to make sure upon replacement of the dial that its calibrations are in direct relation to the settings of the condenser plates. To do this first place the

dial on the condenser shaft and, with the condenser plates full in, partially tighten the screw clamping the dial assembly to the condenser shaft. The correct setting for the dial under these conditions is that the calibration mark in the clockwise position past the 2 Mc/s. mark shall correspond with the full-in position of the condenser.

(ii) When the dial and condenser assembly is placed in position on the chassis and screwed to the front panel, the calibration is accurately adjusted to agree with the hair-line indicator on the front panel. After this has been done the normal procedure of re-installation may be carried on and all securing screws firmly tightened.

(iii) Under normal operational circumstances it is extremely unlikely that any mechanical troubles will be experienced with either of the flick dials. The only faults likely to be met are :

(*a*) Failure of the Flick to re-engage satisfactorily due to a broken Flick selector spring or to a defective Flick selector pawl.

(*b*) Presence of bad backlash in the operation of the dial due to the failure of one or more springs in the drive plates.

(*c*) Binding of the drive mechanism due to "spreading" of the neoprene waterproof gasket fitted to cover the flick screws boss. If the neoprene gasket is being replaced the new gasket should be smeared lightly with a coating of anti-freeze grease.

36. REMOVAL OF MAJOR ASSEMBLIES

36.1. Gang Condenser Assembly.

Should it be necessary to remove the main gang condenser assembly and its associate tuning dial the following procedure should be adopted :

(i) Remove all leads from the gang condenser unit.

(ii) Remove screws holding V5A valve shield cover.

(iii) Remove the holding screws from C31A so that this unit can be moved aside to permit the condenser gang to be withdrawn.

(iv) Remove the two screws holding the microphone transformer, T5A, so that it can be moved out of the way.

(v) Remove the screws holding the condenser shield to the chassis.

(vi) Remove screw which holds rear mounting bracket to the rubber pillar.

(vii) Remove screws from chassis strengthening assembly.

(viii) Remove the tuning drive and flick knobs and their gaskets.

(ix) Remove the three screws from the cover plate protecting the boss on which the four flick screws are mounted. Remove this cover plate and its gasket.

(x) Remove one of the screws holding the name plate.
(xi) Remove the four screws securing the dial assembly to the front panel and withdraw the gang unit.
(xii) To replace the unit reverse the procedure.

36.2. Aerial Coupling Condenser Assembly.

To remove the Aerial Coupling Condenser Assembly :

(i) Remove chassis strengthening assembly.
(ii) Remove the assembly strip and mounting bracket carrying L3D C37A.
(iii) Unsolder the condenser earth connection and the remaining two leads connecting to the condenser and to C37A.
(iv) Unsolder and remove the B.F.O. coil, L8A.
(v) Remove the holding screws for the socket of V1C and the earthing screw holding the condenser assembly bracket to the chassis.
(vi) Remove the dial lock, the dial indicator, the flick knob, and the centre screw of the dial.
(vii) Remove the dial and expose the cover plate protecting the boss on which the four flick screws are mounted. Remove this cover plate and its gasket.
(viii) Remove the four screws securing the dial assembly to the front panel. Be careful not to lose the packing washers behind the panel.
(ix) Remove the Aerial Coupling Condenser assembly.
(x) To replace the assembly reverse the procedure.

36.3. Coil Unit.

To remove the Coil Unit from the chassis :

(i) Remove valves V1A and V2A from their sockets.
(ii) Disconnect the eight leads from the gang condenser to the coil unit and the two leads from the netting compensation condensers, C31A and C31B.
(iii) Turn the chassis upside down.
(iv) In the front section of the coil unit remove the two leads connected to C26A and the busbar leads near W3A which connect to switch S5. Remove the bracket holding W3A.
(v) In the second section of the unit disconnect the busbar lead to L3B and the two red leads which join to the other side of this component.
(vi) In the third section disconnect the busbar leads to C32A and C18A.
(vii) In the fourth (rear) section disconnect the busbar lead which joins to C16G.
(viii) Remove the switch knob and shaft bush.
(ix) Remove the seven screws holding the coil unit partitions. Two are on the front panel near the Crash Limiter switch, S7A. Four are on the side of the chassis. One is at the rear of the chassis.
(x) Reverse this procedure to replace the coil unit.

36.4. Meter Transformer and Aerial Selector.

To remove this assembly :

(i) Remove chassis strengthening assembly.

(ii) Disconnect the lead from the aerial terminal, the lead from the aerial inductor, L1A, and the lead from the bottom of R37A.

(iii) Remove the six screws holding the meter transformer brackets and the switch shafts brackets.

(iv) Remove the switch knob and bush and loosen the shaft collar behind the front panel.

(v) Reverse this procedure to instal the assembly.

36.5. Resistor-Condenser Mounting Assemblies.

All of these, except one, is accessibly mounted and can be removed without difficulty. The exception is the assembly at the rear of the Function Switch. To remove this it is necessary to take out the Microphone Transformer mounting screws to get at the countersunk head securing screw at the coil unit end of the resistor condenser assembly strip. It is not necessary to disconnect any of the leads from the Microphone transformer.

37. RELAY ADJUSTMENT

37.1. Adjustment Data.

Six relays are used in the Sender/Receiver Unit and the Supply Unit. Three are of the standard P.M.G. 3,000 type, two of the remaining three are of the heavy duty type and one is a light duty type grid relay.

Adjustment to any of these relays should be carried out only by skilled personnel who have access to the necessary gauges and tools. For the guidance of these the information in Table XI is provided :

TABLE 11.—RELAY ADJUSTMENT DATA.

3,000 *Type Relays*

Relay	*Residual*	*Armature Travel*	*Block Pressure*	*Contact Pressure*	
				Resist	*Lift*
RL1	4 mils	31 mils	11–15 Gms.	5 Gms.	8 Gms.
RL2	10 mils	31 mils	16–20 Gms.	5 Gms.	8 Gms.
RL4	10 mils	31 mils	16–20 Gms.	5 Gms.	8 Gms.

Note.—The D.C. resistance of the coil in each relay should be 100 ohms ± 5%.

Relay RL3—Grid Relay	*Relays RL1 and RL2—Supply Unit*
Gap Setting 31 mils Minimum Closing Volts, 9 Contact Tension : Energised .. 15 gms. Unenergised .. 20 gms. Coil resistance 100 ohms ± 5%	Gap Setting ·003″ Minimum Closing Volts, 9 Contact Tension : To resist 10 gms. Coil resistance 80 ohms ± 5% *Note.*—The setting of the moving contacts is such that when the contacts are just touching the armature still has approx. $\frac{1}{32}$″ downwards travel.

37.2. Adjusting Tools.

To adjust the relays to the figures set out in Table 11 the following tools are needed :

(i) Gramme Gauge 0–35 Grammes.

(ii) Set of plain and holed feeler gauges.

In addition, if adjustments are to be made to the Spring-sets of these relays, an Adjuster, spring, and Adjuster, spring, tongue, will be needed.

In general, however, it will be found that the relay Spring-sets will hold their adjustments for long periods and normally will not need attention.

37.3. Special Adjustments.

It is essential that the contacts of the time delay relays RL1 and RL4 used in the Sender/Receiver be adjusted to "OPEN" simultaneously. This usually will involve some departure from the Residual clearances specified in TABLE 11. Adjustments to the settings of the Residual screws in either RL1 and RL4, or both, are carried out when the relays are in the set and the latter is being operated.

Observation of the relay contacts as the set is changed over from "SEND" to "RECEIVE" will show whether the two relays are operating correctly. Reduction of the residual gap will lengthen in the interval between the removal of the exciting voltage and the opening of the relay contacts. In making this adjustment care should be taken to see that the residual gap is not made so great as to reduce the contact pressure to too low a value.

37.4. Silica Gel Cartridges.

Inside the Sender/Receiver unit case will be found the bakelite container which carries the Silica Gel cartridge used for moisture absorption purposes. It is important that this cartridge be examined weekly by Signals or A.E.M.E. Workshops personnel and changed if pink crystals are present. The crystals in the used cartridge should then be dried out by subjecting them to a temperature ranging from 140 to 160 degrees Centigrade (310 to 345 degrees Fahrenheit) for a period of 12 hours. Crystals passing through a 40 mesh screen should be discarded.

APPENDIX 1

APPENDIX 1.

WIRELESS SETS No. 22 (AUST.) AND WIRELESS SETS No. 122 (AUST.)—COMPLETE STATIONS.

V.A.O.S. No.	*Designation*		*Required for Operation*								
			As Ground Station			*As Vehicle Station*			*As Manpack Station*		
			X	*Y*	*Total*	*X*	*Y*	*Total*	*X*	*Y*	*Total*
	WIRELESS SETS, No. 22—										
†N.I.V.	Signal Equipment Card (Aust.) No. 45	(*a*)	1	—	1	1	—	1	1	—	1
	WIRELESS SETS, No. 122—										
* N.I.V.	Signal Equipment Card (Aust.) No. 48	(*a*)	1	—	1	1	—	1	1	—	1
	SECTION A1.										
	STRAPS, SHOULDER, haversack, W.E. pattern '37—										
AA1711	Left	(*b*)							1	—	1
AA1712	Right	(*b*)							1	—	1
	SECTION W2.										
WBA119	BULBS, 6-volt (Aust.) No. 4	(*c*)	2	4	6	2	4	6	2	—	2
WB1042	WIRE, electric, P.11., Mk. I yds.		—	12	12	—	12	12			
	SECTION Y1.										
†YAA728	STRAPS, carrying, "G" (Aust.) No. 2	(*e*)	1	—	1						
	SECTION Z1.										
	AERIAL BASES—										
ZA14172	No. 10, Mk. II					1	—	1			
ZAA4822	(Aust.) No. 1	(*a*)							1	—	1
ZAA4821	AERIAL FEEDERS, No. A1 (Aust.)		1	—	1	1	—	1			
	AERIAL COUPLING EQUIPMENT—										
†ZAA3851	Aerial Units, "J" (Aust.)—		1	—	1						
†ZAA3853	Tablets Calibration	(*d*)	1	—	1						

SECTION Z1.—*continued.*

	AERIALS—																		
	Half-wave (Aust.)—																		
ZAA0863	No. 1	..	..	..	..	..	..	..	..	(g)	1	—	1	1	—	1	1	—	1
ZAA0864	No. 2	..	..	..	..	..	..	..	..	(g)	1	—	1	1	—	1	1	—	1
ZAA0865	No. 3	..	..	..	..	..	..	..	..	(g)	1	—	1	1	—	1	1	—	1
ZAA0866	Quarter-wave (Aust.) No. 1	..	..	..	..	..	..			(g)	1	—	1	1	—	1	1	—	1
ZA11519	Vertical, 34-ft., steel. Complete Stations.					..	..	..		(f)	1	—	1	1	—	1			
	ANTENNA RODS, "F"—																		
	Sections—																		
ZA0894	No. 1	..	..	..	..	..	..	..	..	(h)							2	2	4
ZA0895	No. 2	..	..	..	..	..	..	..	..	(h)							1	1	2
ZA0896	No. 3	..	..	..	..	..	..	..	..	(h)							1	1	2
ZAA8871	Straps, carrying (Aust.)		..	..	..	..	..	..		(j)							1	—	1
ZAA4843	CARTRIDGES, silica gel. (Aust.) No. 1—				..	..	..	..		(k)	1	1	2	1	1	2	1	1	2
ZAA4844	Containers—	..	..	..	..	..	..	..	..	(k)	—	1	1	—	1	1	—	1	1
ZAA4846	Caps	..	..	..	..	..	..	..	..	(k)	1	3	4	1	3	4	1	3	4
ZAA4863	Washers	..	..	..	..	..	..	..	..	(k)	1	3	4	1	3	4	1	3	4
†ZAA4845	CONDENSERS, X.5, 5-kV., Mk. II (Aust.) No. 2					..	..							1	—	1			
*ZA2060	CONDENSERS, X.5, 5-kV., Mk. II				..	..	..	..						I	—	1			
	CONNECTORS—																		
ZA14086	Pigtail, No. 4	..	..	..	..	..	..	..	..	(l)				1	—	1			
	Single—																		
ZA2261	No. 10A	..	..	..	..	..	..	..	..	(m)	1	1	2	1	1	2			
ZA0933	No. 10C	..	..	..	..	..	..	..	..	(n)				1	1	2			
ZA10924	No. 10D	..	..	..	..	..	..	..	..	(o)	1	1	2	2	1	3	1	1	2
ZAA4818	No. 10E (Aust.)	..	..	..	..	..	..	..	..	(p)				1	—	1			
	Twin—																		
†ZA2347	No. 15	..	..	..	..	..	..	..	..	(q)	3	—	3						
†ZAA3852	No. 22 (Aust.)	..	..	..	..	..	..	..	..	(q)	2	—	2						
	4-point—																		
ZAA4836	No. A3 (Aust.)	..	..	..	..	..	..	..	..	(r)							1	—	1
*ZAA0821	No. A4 (Aust.)	..	..	..	..	..	..	..	..	(nn)	1	—	1	1	—	1			
ZAA4718	FUSE WIRE, copper, 33-S.W.G., 35-ft.			..	..	..	..			(b)	—	1	1	—	1	1	—	1	1
ZAA4259	HARDWARE SETS (Aust.) No. 14	..	..	..	..	..				(s)				1	—	1			

* Part of WS122 only. †Part of WS22 only.

APPENDIX 1—*continued*

V.A.O.S. No.	*Designation*		*Required for Operation*								
			As Ground Station			*As Vehicle Station*			*As Manpack Station*		
			X	*Y*	*Total*	*X*	*Y*	*Total*	*X*	*Y*	*Total*
	SECTION Z1.—*continued.*										
ZAA499	INSULATORS, W.T. (Aust.) No. 1D	(*g*)	1	1	2	1	1	2	1	1	2
ZA0937	KEY AND PLUG ASSEMBLIES, No. 9—	(*a*)	1	—	1	1	—	1	1	—	1
ZAA4864	Clamp, securing (Aust.)	(*t*)				1	—	1			
ZA12645	LAMPS, operators, No. 6A	(*a*)	1	—	1	1	—	1	1	—	1
†ZAA4842	LEADS, counterpoise, No. 2, Mk. II (Aust.)	(*a*)	1	—	1	1	—	1	1	—	1
*ZA2784	LEADS, counterpoise, No. 2, Mk. II	(*a*)	1	—	1	1	—	1			
ZAA4640	MASTS, 21-ft., wood (Aust.)—Complete Stations	(*u*)	1	—	1	1	—	1			
	MICROPHONE AND RECEIVERS HEADGEAR—										
ZA2904	Assemblies, No. 1	(*v*)	2	—	2	2	—	2	2	—	2
ZA1827	MOUNTINGS, aerial base, No. 3, Mk. I	(*x*)				1	—	1			
ZA10202	PADS, mounting, No. 1, Mk. I	(*w*)				2	—	2			
ZA10711	PLATES, connector, No. 2	(*y*)				1	—	1			
ZA6292	SATCHELS, signals, No. 1	(*z*)	4	—	4	4	—	4	2	—	2
ZAA3402	TOOLS, adjusting, flick dial	(*k*)	1	—	1	1	—	1	1	—	1
ZAA3401	TOOLS, contact cleaning (Aust.), No. 2	(*k*)	1	—	1	1	—	1	1	—	1
	VALVES, W.T., type—										
ZAA904	1C7G	(*aa*)	1	1	2	1	1	2	1	—	1
ZAA9215	1D5GP	(*aa*)	3	3	6	3	3	6	3	—	3
ZAA9213	1F5G	(*aa*)	1	1	2	1	1	2	1	—	1
ZAA9214	1H6G	(*aa*)	2	2	4	2	2	4	2	—	2
ZAA9209	6N7GT	(*aa*)	1	1	2	1	1	2	1	—	1
ZAA925	6U7G	(*aa*)	1	1	2	1	1	2	1	—	1
ZAA3400	VT100A (807)	(*aa*)	1	1	2	1	1	2	1	—	1
ZAA9900	VIBRATORS, 12-volt, PM957	(*bb*)	2	4	6	2	4	6	2	1	3

	SECTION Z1.—*continued.*																		
	WIRELESS SETS, No. 22—																		
ZA14042	Carriers, No. 1								(*cc*)				1	—	1				
	Harness, Manpack (Aust.)—																		
ZAA4855	Belts								(*dd*)							5	—	5	
ZAA4856	Pins								(*ee*)							10	—	10	
	Straps—																		
ZAA5916	Shoulder								(*ff*)							2	—	2	
ZAA4859	Carrier								(*gg*)							8	—	8	
ZAI5449	Straps, No. 1								(*hh*)				1	—	1	—	—	—	
	WIRELESS SETS, No. 22 (Aust.)—																		
ZAA4839	Carriers, battery, Mk. II								(*jj*)							4	—	4	
ZAA4838	Cases, spare valves, Mk. II									1	—	1	1	—	1				
	Covers, immersion—																		
ZAA4865	No. 1, Mk. II								(*kk*)	1	—	1	1	—	1	1	—	1	
ZAA4866	No. 2, Mk. II								(*kk*)	1	—	1	1	—	1	1	—	1	
	Covers, protecting—																		
ZAA4867	No. 1, Mk. II								(*k*)	1	—	1	1	—	1	1	—	1	
ZAA4868	No. 2, Mk. II								(*b*)	1	—	1	1	—	1	1	—	1	
	Covers, waterproof—																		
ZAA4869	No. 1, Mk. II								(*k*)	1	—	1	1	—	1	1	—	1	
ZAA4870	No. 2, Mk. II								(*b*)	1	—	1	1	—	1	1	—	1	
ZAA4840	Handbooks									1	1	2	1	1	2	1	1	2	
ZAA4854	Sender/Receiver Units									1	—	1	1	—	1	1	—	1	
ZAA4834	Supply Units, No. 1A									1	—	1	1	—	1	1	—	1	
ZAA4823	Tablets, calibration								(*b*)	1	—	1	1	—	1	1	—	1	
	WIRELESS SETS, No. 122 (Aust.)																		
ZAA4873	Handbooks									1	1	2	1	1	2	1	1	2	
ZAA4890	Sender/Receiver Units									1	—	1	1	—	1	1	—	1	
	SECTION Z2																		
	BATTERIES, secy., port.—																		
ZBA0800	6-volt 75-Ah. (Aust.)—								(*ll*)	2	2	4	2	2	4				
ZBA0816	Boxes, Mk. II									2	2	4	2	2	4				
ZBA0805	12-volt 20 Ah. (Aust.)								(*mm*)							1	3	4	
†ZBA0821	CONNECTORS, battery (Aust.), No. 8								(*nn*)	1	—	1	1	—	1				

* Part of WS122 only. † Part of WS22 only.

NOTES :—

(*a*) In Satchels, signals, No. 1A.
(*b*) In or on Supply Units No. 1A.
(*c*) One in Supply Units No. 1A. One in Lamps, operators, No. 6A. Four in Cases, spare valves, Mk. II.
(*d*) Fitted to Aerial Units, "J" (Aust.).
(*e*) Attached to Aerial Units, "J" (Aust.).
(*f*) See Appendix 5. for details.
(*g*) Carried in Satchels, signals, No. 1B.
(*h*) Part of Aerials, vertical, 34-ft. steel.
(*j*) For carrying Antenna Rods, "F."
(*k*) "X" Items in or on Sender/Receiver Unit. "Y" Items in Satchels, signals, No. 1A.
(*l*) Fitted to Plates, connection, No. 2.
(*m*) Lead from set to Aerial Base, No. 11 or Insulators, W.T., Ebonite, "B." Carried in Satchels, signals, No. 1A.
(*n*) Lead from Set to blocking condenser in vehicle station. One spare.
(*o*) One connects Supply Unit to Set. One connects Carriers, No. 1, to Set. One spare.
(*p*) Lead from blocking condenser to Aerial Base, No. 10, Mk. II.
(*q*) Used with Aerial units, "J." Carried in Satchels, signals, No. 1E.
(*r*) Battery lead for Manpack station. Carried in Satchels, signals, No. 1A.
(*s*) For mounting Aerial Base, No. 10, Mk. II, and Condensers X5, 5kV., to vehicle.
(*t*) For securing key to operating table in vehicle.
(*u*) See Appendix 4. for details.
(*v*) One in Satchels, signals, No. 1A and one in Satchels, signals, No. 1C.
(*w*) For mounting Set and Supply Unit to Carriers, No. 1.
(*x*) For mounting Aerial Base, No. 10, Mk. II.
(*y*) Mounted beneath Aerial Base, No. 10, Mk. II, in vehicle station.
(*z*) Nos. 1A and 1C for the Set. No. 1B for Wire aerials. 1E for Aerial Units, "J," accessories.
(*aa*) "X" Items in Sender/Receiver Unit. "Y" Items in Cases, spare valves.
(*bb*) Three in Supply Units No. 1A. Three in Satchels, signals, No. 1C.
(*cc*) For Vehicle station.
(*dd*) One for each Carriers, battery (Aust.), Mk. II. One for Set harness.
(*ee*) Two per belt.
(*ff*) Used with Set harness.
(*gg*) One set for each Carriers, battery (Aust.), Mk. II.
(*hh*) Secures Supply Units No. 1A, and Sender/Receiver Unit to Carriers, No. 1.
(*jj*) For Batteries, secy., port., 12-V. 20 Ah. Fitted with rubberised cover.
(*kk*) For use only when specially authorised.
(*ll*) For use with Vehicle or Ground Stations. Fitted in Boxes, Mk. II.
(*mm*) Used with Manpack Station.
(*nn*) Used with Vehicle or Ground Stations.

APPENDIX 2

APPENDIX 2.

ZAA4854, WIRELESS SETS No. 22 (AUST.) AND ZAA4890, WIRELESS SETS No. 122 (AUST.)—LIST OF MAIN COMPONENTS.

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			CONDENSERS.				
ZAA294	Cond. Fixed, X.1, Q (Aust.)	C1A	Injection Bypass, BFO	PC386	V1C	·0001 uf	Simplex Silver Mica Type SMX 5%
ZAA0601	Cond. Fixed, X.5, P (Aust.)	C2A	Plate Decoupler, 2nd IF.	PC618	V1C	·0005 uf	Simplex Silver Mica Type SMX 10%
ZAA0601	Cond. Fixed, X.5, P (Aust.)	C2B	Plate Coupling, RF.	PC618	V1A	·0005 uf	Simplex Silver Mica Type SMX 10%
ZAA255	Cond. Fixed, R.1, B (Aust.)	C3A	RFBypass,Ant.CurrentTrans.	PC108		·001 uf	Simplex Mica, Type P/T 10%
ZAA0602	Cond. Fixed, X.2, L (Aust.)	C4A	IF Filter. Det. Diode	PC563	V3A	·0002 uf	Simplex Mica, Type SM 10%
ZAA0602	Cond. Fixed, X.2, L (Aust.)	C4B	IF Filter. Det. Diode	PC563	V3A	·0002 uf	Simplex Mica, Type SM 10%
ZAA0602	Cond. Fixed, X.2, L (Aust.)	C4C	Plate Bypass, 2nd Mic. amp.	PC563	V3A	·0002 uf	Simplex Mica, Type SM 10%
ZAA0602	Cond. Fixed, X.2, L (Aust.)	C4D	Grid Bypass, 2nd Mic. amp.	PC563	V3A	·0002 uf	Simplex Mica, Type SM 10%
ZAA2919	Cond. Fixed, Y.35, B (Aust.)	C5A	Diode Coupling, Det. AVC	PC254	V3A	35 uuf	Ducon Ceramicon, Type N750. A35±2½
ZAA2919	Cond. Fixed, Y.35, B (Aust.)	C5B	SeriesCompensator,GridRelay	PC254	V1A	35 uuf	Ducon Ceramicon, Type N750. A35±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6A	Tuning 1st IF Trans. Prim.	PC456	V2A	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6B	Tuning 1st IF Trans. Secy.	PC456	V1B	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6C	Tuning 2nd IF Trans. Prim.	PC456	V1B	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6D	Tuning 2nd IF Trans. Secy.	PC456	V1C	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6E	Tuning 3rd IF Trans. Prim.	PC456	V1C	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6F	Tuning 3rd IF Trans. Secy.	PC456	V3A	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA2924	Cond. Fixed, X.1, P (Aust.)	C6G	Tuning BFO Coil, Secy.	PC456	V3B	100 uuf	Ducon Ceramicon, Type NPO. D100±2½
ZAA0603	Cond. Fixed, R.2, L (Aust.)	C7A	Plate Filter, Rec. Output	PC559	V4A	·002 uf	Simplex Mica, Type SM 10%
ZAA0603	Cond. Fixed, R.2, L (Aust.)	C7B	Screen Decoupling P.A.	PC559	V7A	·002 uf	Simplex Mica, Type SM 10%
ZAA0604	Cond. Fixed, X.6, A (Aust.)	C8	Aerial Loading Condenser				Ducon, Type M38 5%
		C8A	Aerial Loading Condenser				
		C8B	Aerial Loading Condenser	PC554	V7A	600 uuf tapped: 100 uuf, 100 uuf, 250 uuf, 150 uuf	
		C8C	Aerial Loading Condenser				
		C8D	Aerial Loading Condenser				
ZAA2415	Cond. Fixed Q.5, M (Aust.)	C9A	Screen bypass RF & 1st IF.	PC647	V1A-B	·05 uf	Ducon, 400V. Paper, Type MCT48 20%

ZAA2415	Cond. Fixed, Q.5, M (Aust.)	C9B	Screen Bypass	PC647	V2A	·05 uf	Ducon 400V. Paper, Type MCT. 48 20%
ZAA2415	Cond. Fixed, Q.5, M (Aust.)	C9C	B plus Bypass, RF Rec.	PC647	—	·05 uf	Ducon 400V. Paper, Type MCT. 48 20%
ZAA2415	Cond. Fixed, Q.5, M (Aust.)	C9D	Screen Bypass, 2nd IF.	PC647	V1B	·05 uf	Ducon 400V. Paper, Type MCT. 48 20%
ZAA2415	Cond. Fixed, Q.5, M (Aust.)	C9E	Decoupling, AVC	PC647	V1B	·05 uf	Ducon 400V. Paper, Type MCT 48 20%
ZAA295	Cond. Fixed, X.3, B (Aust.)	C10A	Grid Coupling, PA	PC399	V7A	·0003 uf	Simplex Silver Mica, Type SMX 5%
ZAA0605	Cond. Variable }	C11A	Gang, REC. RF Stage	}	V1A	10·5–248 uuf	}
ZAA0605	Cond. Variable } No. 94 (Aust.)	C11B	Gang, Rec. Osc.	}	V2A	10·5–248 uuf	}
ZAA0605	Cond. Variable }	C11C	Gang, MO Tuning	} PC621	V5A	10·5–248 uuf	} Radio Corp. 4-Gang PC621
ZAA0605	Cond. Variable }	C11D	Gang, Buffer Tuning	}	V5A	11 – 327 uuf	}
ZAA0413	Cond. Variable, No. 91 (Aust.)	C12A	Ant. Coupling	PC615	V7A	14 – 480 uuf	Radio Corp. Single-gang PC615
ZAA2788	Cond. Fixed, R.1, R (Aust.)	C13A	Plate Blocking, P.A.	PC398	V7A	·001 uf	Simplex Silver Mica, Type SMX 5%
ZAA2414	Cond. Fixed, Q.2, M (Aust.)	C14A	RF Filter, RF Stage	PC650	V1A	·02 uf	Ducon 400V. Paper, Type MCT. 47 20%
ZAA2414	Cond. Fixed, Q.2, M (Aust.)	C14B	Bypass, Mic. Trans.	PC650	V1C	·02 uf	Ducon 400V. Paper, Type MCT. 47 20%
ZAA0607	Cond. Fixed, R.2, M (Aust.)	C15A	Osc. Grid Cond. MCW.	PC560	V1C	·002 uf	Simplex Mica, Type SM 5%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16A	Audio Coupling, Rec.	PC145	V4A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16B	Screen Bypass, M.O.	PC145	V5A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16C	Feedback Coupling, MCW	PC145	V1C	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16D	Grid Coupling, Mic. Amp.	PC145	V3A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16E	Plate Decoupler, 2nd Mic. Amp.	PC145	V3A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16F	Plate Decoupling, M.O.	PC145	V5A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16G	RF Coupling, Buffer Coil	PC145	V5A	·01 uf	Simplex Mica, Type SM 10%
ZAA251	Cond. Fixed, Q.1, F (Aust.)	C16H	Bypass, Mod. Trans.	PC145	V6A	·01 uf	Simplex Mica, Type SM 10%
ZAA0608	Cond. Fixed, X.8, A (Aust.)	C17A	Stabiliser, 2nd Mic. Amp.	PC549	V3A	·0008 uf	Simplex Silver Mica, Type SMX 5%
ZAA2775	Cond. Fixed, Y.5, K (Aust.)	C18A	Conv. Osc. Grid Condenser	PC370	V2A	·00005 uf	Simplex Silver Mica, Type SMX 5%
ZAA2406	Cond. Fixed, P.1, W (Aust.)	C19A	Fil. Bypass RF Amp.	PC648	V1A	·1 uf	Ducon 200V. Paper, Type MCT. 43 20%
ZAA2406	Cond. Fixed, P.1, W (Aust.)	C19B	Fil. Bypass Conv. Stage	PC648	V2A	·1 uf	Ducon 200V. Paper, Type MCT. 43 20%
ZAA2406	Cond. Fixed, P.1, W (Aust.)	C19C	Fil. Bypass 2nd IF Stage	PC648	V1C	·1 uf	Ducon 200V. Paper, Type MCT. 43 20%
ZAA2059	Cond. Fixed, P.5, T (Aust.)	C20A	Fil. Bypass. BFO Osc.	PC548	V3B	·5 uf	Ducon 100V. Paper, Type PNT380/100 20% (Metal Clad)
ZAA2317	Cond. Fixed, 250, B (Aust.)	C21A	Fil. Bypass, BFO	PC204	V3B	250 uf	Ducon 15V., Type ET1090W 20%
ZAA2317	Cond. Fixed, 250, B (Aust.)	C21B	Fil. Bypass, 2nd Mic. Amp.	PC204	V3B	250 uf	Ducon 15V., Type ET1090W 20%
ZAA2317	Cond. Fixed, 250, B (Aust.)	C21C	Fil. Bypass, 2nd Mic. Amp.	PC204	V3B	250 uf	Ducon 15V., Type ET1090W 20%
ZAA2317	Cond. Fixed, 250, B (Aust.)	C21D	Fil. Bypass, Rec. Output	PC204	V4A	250 uf	Ducon 15V., Type ET1090W 20%
ZAA3045	Cond. Semi-fixed, No. 15 (Aust.)	C22A	Trimmer, LF. RF. Coil	PC207	V1A	4–30 uuf	Ducon, Ceramicon, Type N500TS2A
ZAA3045	Cond. Semi-fixed, No. 15 (Aust.)	C22B	Trimmer, HF. RF. Coil	PC207	V1A	4–30 uuf	Ducon, Ceramicon, Type N500TS2A
ZAA3045	Cond. Semi-fixed, No. 15 (Aust.)	C22C	Trimmer, LF. Osc. Coil	PC207	V2A	4–30 uuf	Ducon, Ceramicon, Type N500TS2A

APPENDIX 2.—ZAA4854, WIRELESS SETS No. 22 (AUST.) AND ZAA4890, WIRELESS SETS No. 122 (AUST.)
LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			CONDENSERS—*continued*				
ZAA3045	Cond. Semi-fixed, No. 15 (Aust.)	C22D	Trimmer, HF. Osc. Coil	PC207	V2A	4–30 uuf	Ducon, Ceramicon, Type N500TS2A
ZAA3045	Cond. Semi-fixed, No. 15 (Aust.)	C22E	Compensator, Grid Relay	PC207	V1A	4–30 uuf	Ducon, Ceramicon, Type N500TS2A
ZAA2122	Cond. Fixed, Y.2, D (Aust.)	C23A	Pad. LF. RF. Coil	PC517	V1A	20 uuf	Simplex Silver Mica, Type SMX 10%
ZAA2122	Cond. Fixed, Y.2, D (Aust.)	C23B	Pad, L.F. Osc. Coil	PC517	V2A	20 uuf	Simplex Silver Mica, Type SMX 10%
ZAA2122	Cond. Fixed, Y.2, D (Aust.)	C23C	Pad, H.F. Osc. Coil	PC517	V2A	20 uuf	Simplex Silver Mica, Type SMX 10%
ZAA2122	Cond. Fixed, Y.2, D (Aust.)	C23D	Pad, H.F.–L.F. MO Coils	PC517	V5A	20 uuf	Simplex Silver Mica, Type SMX 10%
ZAA0609	Cond. Fixed, R.12, A (Aust.)	C24A	Series Pad, L.F. Osc.	PC623	V2A	1200 uuf	Simplex Mica, Type SM 2½%
ZAA0610	Cond. Fixed, R206, A (Aust.)	C25A	Series Pad, H.F. Osc.	PC555	V2A	2060 uuf	Simplex Mica, Type SM 2½%
ZAA0614	Cond. Variable, No. 95	C26A	Trimmer, Netting	PC627	V5A	4–11 uuf	Radio Corp. PC627
ZAA0611	Cond. Fixed, P.3, A (Aust.)	C27A	Bias Decoupling, 2nd Mic. Amp.	PC607	V3A	·3 uf	Ducon 100V. Paper, Type PNT/380/100 (Metal Clad)
ZAA2134	Cond. Fixed, Q.2, J (Aust.)	C28A	Cath. Bypass, P.A.	PC310	V7A	·02 uf	Simplex Mica, Type M 10%
ZAA392	Cond. Variable, No. 72 (Aust.)	C29A	Trimmer, L.F. M.O. Coil	PC220	V5A	6–22 uuf.	Radio Corp. Double Trimmer PC220
		C29B	Trimmer, HF MO Coil		V5A	6–22 uuf.	
ZAA393	Cond. Variable, No. 73 (Aust.)	C30A	Trimmer, L.F. Buffer Coil	PC507	V5A	6–27 uuf.	Radio Corp. Double Trimmer PC507
		C30B	Trimmer H.F. Buffer Coil		V5A	6–27 uuf.	
ZAA394	Cond. Variable, No. 7 4(Aust.)	C31A	Netting Corrector, L.F. Osc.	PC208	V5A	4–11 uuf.	Radio Corp. Double Trimmer PC208
		C31B	Netting Corrector, H.F.			3–6 uuf.	
ZAA0612	Cond. Fixed, R.1, T (Aust.)	C32A	Plate Coupling, Rec. Osc.	PC570	V2A	·001 uf.	Simplex Mica, Type SM 10%
ZAA0622	Cond. Semi-fixed, No. 19 (Aust.)	C33A	Neutralising Cond. Conv.	PC616	V2A	·5–5 uuf.	Radio Corp. Type PC616
ZAA2316	Cond. Fixed, 300 (Aust.)	C34A	Relay Time Delay	PC205	—	300 uf.	Ducon 16V, Type ET1091W 20%
ZAA2316	Cond. Fixed, 300 (Aust.)	C34B	Relay Time Delay	PC205	—	300 uf.	Ducon 16V, Type ET1091W 20%
ZAA2316	Cond. Fixed, 300 (Aust.)	C34C	Relay Time Delay	PC205	—	300 uf.	Ducon 16V, Type ET1091W 20%
ZAA2316	Cond. Fixed, 300 (Aust.)	C34D	Relay Time Delay	PC205	—	300 uf.	Ducon 16V, Type ET1091W 20%
ZAA2316	Cond. Fixed, 300 (Aust.)	C34E	Relay Time Delay	PC205	—	300 uf.	Ducon 16V, Type ET1091W 20%
ZAA2423	Cond. Fixed, Q.1, AG (Aust.)	C35A	Plate Decoupling Conv.	PC649	V2A	·01 uf	Ducon 600V. Paper, Type MCT. 54 20%
ZAA2929	Cond. Fixed, X.1, R (Aust.)	C36A	Grid Cond. M.O.	PC479	V5A	100 uuf.	Ducon Ceramicon Type N750B100±5

ZAA294	Cond. Fixed, X.1, Q (Aust.)	C37A	Grid. Cond. R.F. Stage	PC386	V1A	·0001 uf.	Simplex Silver Mica, Type SMX 5%
ZAA2785	Cond. Fixed X.1, S (Aust.)	C38A	Grid Cond. BFO	PC513	V3B	·0001 uf.	Simplex Mica, Type P/T, 10%
ZAA2787	Cond. Fixed, R.1, S (Aust.)	C39A	Plate Coupling, BFO	PC512	V3B	·001 uf.	Simplex Mica, Type P/T. 10%
ZAA2917	Cond. Fixed Y.1, F (Aust.)	C40A	Pad, H.F.–L.F. Buffer Coils	PC331	V7A	10 uuf	Ducon Ceramicon, Type N750A10 10%
ZAA2927	Cond. Fixed, Y.2, H (Aust.)	C41A	Feedback Control Crystal Osc.	PC195	V3A	20 uuf	Ducon Ceramicon, Type N750 A20±5
*ZAA2916	Cond. Fixed, Y.15, C (Aust.)	C42A	Feedback Control Crystal Osc.	PC177	—	15 uuf	Ducon Ceramicon, Type N750 A15±10
*ZAA2916	Cond. Fixed, Y.15, C (Aust.)	C42B	Feedback Control Crystal Osc.	PC177	—	15 uuf	Ducon Ceramicon, Type N750 A15±10
*ZAA2916	Cond. Fixed, Y.15, C (Aust.)	C42C	Feedback Control Crystal Osc.	PC177	—	15 uuf	Ducon Ceramicon, Type N750 A15±10

RESISTORS

ZAA704	Res. ½W No. 3 or No. 4 1 megohm	R1A	Grid return, 2nd I.F. amp.	PR246	V3A	1 megohm	I.R.C. Carbon, Type BT½ 10%
ZAA704	Res. ½W No. 3 or No. 4 1 megohm	R1B	Grid return, 1st I.F. R.F. C.W. only	PR246	V3A	1 megohm	I.R.C. Carbon, Type BT½ 10%
ZAA704	Res. ½W No. 3 or No. 4 1 megohm	R1C	Decoupling AVC	PR246	V3A	1 megohm	I.R.C. Carbon, Type BT½ 10%
ZAA704	Res. ½W No. 3 or No. 4 1 megohm	R1D	Plate Feed BFO	PR246	V3B	1 megohm	I.R.C. Carbon, Type BT½ 10%
ZAA711	Res. ½W No. 3 or No. 4 750,000 ohm	R2A	Prim. Load, 3rd I.F.	PR267	V1C	750,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA711	Res. ½W No. 3 or No. 4 750,000 ohm	R2B	Prim. Load, 2nd I.F.	PR267	V1B	750,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA711	Res. ½W No. 3 or No. 4 750,000 ohm	R2C	Prim. Load, 1st I.F.	PR267	V2A	750,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA703	Res. ½W No. 3 or No. 4 500,000 ohm	R3A	Grid. Res, Rec. Audio amp.	PR245	V4A	500,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA703	Res. ½W No. 3 or No. 4 500,000 ohm	R3B	Sec. Load, 2nd I.F.	PR245	V1C	500,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA703	Res. ½W No. 3 or No. 4 500,000 ohm	R3C	Sec. Load, 1st I.F.	PR245	V1B	500,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA703	Res. ½W No. 3 or No. 4 500,000 ohm	R3D	Grid Res, 2nd Mic. Amp.	PR245	V3A	500,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4A	Grid Filter, Rec. Audio	PR103	V4A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4B	Screen Feed, 2nd I.F. Amp.	PR103	V1C	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4C	Grid Leak, M.C.W.	PR103	V1C	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4D	Grid Leak, B.F.O.	PR103	V3D	100,000 ohm	I.R.C. Carbon Type, BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4E	AVC Filter, R.F. amp.	PR103	V1A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4F	Grid Leak, M.O.	PR103	V5A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%

*Part of WS122 only.

APPENDIX 2.—ZAA4854, WIRELESS SETS No. 22 (AUST.) AND ZAA4890, WIRELESS SETS No. 122 (AUST.)
LIST OF MAIN COMPONENTS—*continued*.

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			RESISTORS—*continued*				
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4G	M.O. Plate and Screen	PR103	V5A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4H	Feed on "NET"	PR103	V5A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA700	Res. ½W No. 3 or No. 4 100,000 ohm	R4J	Bias Filter, 2nd Mic amp	PR103	V3A	100,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA702	Res. ½W No. 3 or No. 4 250,000 ohm	R5A	Plate Load 2nd Mic Amp.	PR249	V3A	250,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA702	Res. ½W No. 3 or No. 4 250,000 ohm	R5B	Inverse Feedback Mod.	PR249	V3A	250,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA698	Res. ½W No. 3 or No. 4 50,000 ohm	R6A	Grid Leak, Rec. Osc.	PR160	V2A	50,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6905	Res. ½W No. 3 or No. 4 50,000 ohm	R7A	Screen Regulator, R.F. & I.F.	PR150	V1A	50,000 ohm	I.R.C. Carbon, Type BT½ 5%
ZAA665	Res. 1W No. 3 or No. 4 10,000 ohm	R8A	Screen Feed 807	PR325	V7A	10,000 ohm	I.R.C. Carbon, Type BT1 10%
ZAA665	Res. 1W No. 3 or No. 4 10,000 ohm	R8B	Drive Regulator, L.F. Buffer	PR325	V5A	10,000 ohm	I.R.C. Carbon, Type BT1 10%
ZAA6067	Res. Variable, 1 megohm (Aust.) No. 4	R9A	Vol. Control L.F.	PR113	V3A-4A	1 megohm	Radio Corp. PR113
ZAA6067	Res. Variable, 1 megohm (Aust.) No. 4	R9B	Vol. Control R.F.	PR113	V1A-B	1 Megohm	Radio Corp. PR113
†ZAA6611	Res. ½W Wirewound. 500 ohm	R10A	Meter Shunt	PR565	—	500 ohm	I.R.C. W.W., Type BW½ 2½%
ZAA0624	Res. Wirewound, ½W 100 ohms	R11A	Limiter, C.W. Sidetone	PR217	V3A	100 ohm	I.R.C. W.W., Type BW½ 5%
ZAA687	Res. ½W No. 3 or No. 4 40,000 ohm	R12A	Screen Feed, M.O.	PR251	V5A	40,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6811	Res. ½W No. 3 or No. 4 200,000 ohm	R13A	Attenuator, MCW side-tone	PR213	V3A	200,000 ohm	I.R.C. Carbon, Type BT½ 5%
ZAA699	Res. ½W No. 3 or No. 4 70,000 ohm	R14A	Screen Feed Conv.	PR256	V2A	70,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6614	Res. Wirewound, 1W 33.3 ohm	R15A	Ballast Res. Fil.	PR506	V1A	33.3 ohm	I.R.C. W.W., Type BW1 5%
ZAA6614	Res. Wirewound 1W 33.3 ohm	R15B	Ballast Res. Fil.	PR506	V3A	33.3 ohm	I.R.C. W.W., Type BW1 5%
ZAA6614	Res. Wirewound 1W 33.3 ohm	R15C	Ballast Res. Fil.	PR506	V1C	33.3 ohm	I.R.C. W.W., Type BW1 5%
ZAA6613	Res. Wirewound, 1W 16.6 ohm	R16A	Ballast Res. Fil.	PR374	V3A	16.6 ohm	I.R.C. W.W., Type BW1 5%
ZAA6615	Res. Wirewound, 1W 66.6 ohm	R17A	Ballast Res. Fil.	PR149	V3B	66.6 ohm	I.R.C. W.W., Type BW1 5%

ZAA694	Res. ½W No. 3 or No. 4 5,000 ohm	R18A	Plate Feed, M.O.	PR250	V5A	5,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA694	Res. ½W No. 3 or No. 4 5,000 ohm	R18B	Decoupling, Conv. Plate	PR250	V2A	5,000 ohm	I.R.C. Carbon Type BT½ 10%
ZAA0619	Res. ½W No. 3 or No. 4 1.5 megohm	R19A	Diode Load, AVC	PR388	V3A	1.5 megohm	I.R.C. Carbon Type BT½ 10%
ZAA688	Res. ½W No. 3 or No. 4 2,000 ohm	R20A	Decoupler, R.F. amp. Grid	PR253	V1A	2,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6361	Res. 5W No. 2 1.67 ohm	R21A	Meter Shunt P.A. m/a	PR141	V7A	1.67 ohm	I.R.C. W.W. ,Type AB3 2½%
ZAA9420	Res. ½W Wirewound 5 ohm	R22A	Surge Limiter, Slugged Relay	PR568	—	5 ohm	I.R.C. W.W., Type BW½ 10%
ZAA6612	Res. 1W Wirewound 40 ohm	R23A	Plate Stopper 807	PR342	V7A	40 ohm	I.R.C. W.W. Type BW1 5%
ZAA705	Res. ½W No. 3 or No. 4 1.2 megohm	R24A	Meter Multiplier	PR139	—	1.2 megohm	I.R.C. Carbon, Type BT½ 5%
ZAA705	Res. ½W No. 3 or No. 4 1.2 megohm	R24B	Meter Multiplier	PR139	—	1.2 megohm	I.R.C. Carbon, Type BT½ 5%
ZAA712	Res. ½W No. 3 or No. 4 29.500 ohm	R25A	Meter Multiplier	PR134	—	29.500 ohm	I.R.C. Carbon, Type BT½ 2½%
ZAA6617	Res. ½W Wirewound 110 ohm	R26A	Meter Shunt	PR131	—	110 ohm	I.R.C. W.W., Type BW½ 2½%
ZAA6618	Res. ½W Wirewound 250 ohm	R27A	Meter Shunt	PR133	—	250 ohm	I.R.C. W.W., Type BW½ 2½%
*ZAA6618	Res. ½W Wirewound 250 ohm	R27B	Meter Shunt.	PR133	—	250 ohm	I.R.C. W.W., Type BW½ 2½%
ZAA9914	Res. 3W No. 2 25·27 ohm	R28A	Ballast Res. Fil.	PR555	V7A	25·27 ohm	I.R.C. W.W., Type AA2 5%
ZAA693	Res. ½W No. 3 or No. 4 1,000 ohm	R29A	Attenuator Sidetone	PR252	V4A	1,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6616	Res. ½W Wirewound 40 ohm	R30A	Trans. Load Aerial Current	PR183	—	40 ohm	I.R.C. W.W., Type BW½ 5%
ZAA6619	Res. 1W Wirewound 700 ohm	R31A	Ballast Res. Fil.	PR507	—	700 ohm	I.R.C. W.W., Type BW1 5%
ZAA6391	Res. 15W Wirewound 10 ohm	R32A	Dummy Antenna	PR561	—	10 ohm	Radio Corp. W.W., Type PR561
*ZAA701	Res. ½W No. 3 or No. 4 150,000 ohm	R33A	Grid Leak M/O	PR273	V5A	150,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6068	Res. Variable 6 ohms (Aust.) No. 1	R34A	Tone Control Heterodyne	PR510	V3B	6 ohm	Radio Corp. W.W., Type PR510
ZAA6655	Res. 1W Special 20,000 ohm	R35A	Screen Feed, R.F. amp.	PR533	V1A	20,000 ohm	I.R.C. Carbon, Type BT1 5%
ZAA697	Res. ½W No. 3 or No. 4 25,000 ohm	R36A	Filter Diode	PR155	V3A	25,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA697	Res. ½W No. 3 or No. 4 25,000 ohm	R36B	Plate Load, 1st Mic. amp.	PR155	V3A	25,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA697	Res. ½W No. 3 or No. 4 25,000 ohm	R36C	Grid Leak, P.A.	PR155	V7A	25,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA6294	Res. Adjustable, 1,000 ohm (Aust.) No. 1	R37A	Aer. Current Cal.	PR187	—	1,000 ohm	Radio Corp. W.W. Type PR187,
ZAA689	Res. ½W No. 3 or No. 4 30,000 ohm	R38A	Plate Feed, Rec. Osc.	PR151	V2A	30,000 ohm	I.R.C. Carbon, Type BT½ 10%
ZAA696	Res. ½W No. 3 or No. 4 20,000 ohm	R39A	MCW Feedback Regulator	PR166	V1C	20,000 ohm	I.R.C. Carbon, Type BT½ 10%
			INDUCTANCES				
ZAA0600	Inductance Unit (Aust.) No. 148	L1A	Var. Induct.	PT683	—	230 uH	Radio Corp.
ZAA1655	Choke, R.F. No. 75 (Aust.)	L2A	Choke, Ant. Trans.	PT652	—	470 uH 16.3 ohms	Radio Corp.

*Part of WS122 only.

APPENDIX 2.—ZAA4854, WIRELESS SETS No. 22 (AUST.) AND ZAA4890, WIRELESS SETS No. 122 (AUST.)
LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			INDUCTANCES—*continued*				
ZAA197	Choke, R.F. No. 13 (Aust.)	L3A	Choke, R.F. R.F. amp. grid	PT340	V1A	1.6 MH	Radio Corp.
ZAA197	Choke, R.F. No. 13 (Aust.)	L3B	Choke, R.F. R.F. amp. Plate	PT340	V1A	1.6 MH	Radio Corp.
ZAA197	Choke, R.F. No. 13 (Aust.)	L3C	Choke, R.F. M.O. Plate	PT340	V5A	1.6 MH	Radio Corp.
ZAA197	Choke, R.F. No. 13 (Aust.)	L3D	Choke, R.F. P.A. Plate	PT340	V7A	1.6 MH	Radio Corp.
*ZAA197	Choke, R.F., No. 13 (Aust.)	L3E	Choke, R.F. M.O. Screen	PT340	V5A	1.6 mH	Radio Corp.
ZAA4682	Inductance, No. 112 (Aust.)	L4A	Coil, R.F. Rec. L.F.	PT639	V1A	2–4 Mc/s.	Radio Corp.
ZAA4683	Inductance, No. 113 (Aust.)	L5A	Coil, Osc. Rec. L.F.	PT641	V2A	2–4 Mc/s.	Radio Corp.
ZAA4684	Inductance, No. 114 (Aust.)	L6A	Coil, R.F. Rec. H.F.	PT640	V1A	4–8 Mc/s	Radio Corp.
ZAA4685	Inductance, No. 115 (Aust.)	L7A	Coil, Osc. Rec. H.F.	PT642	V2A	4–8 Mc/s	Radio Corp.
ZAA4686	Inductance, No. 116 (Aust.)	L8A	Coil, BFO	PT645	V3B	455 Kc/s	Radio Corp.
ZAA4688	Inductance, No. 118 (Aust.)	L9A	Coil, M.O. H.F.	PT636	V5A	2–4 Mc/s	Radio Corp.
ZAA4687	Inductance, No. 117 (Aust.)	L10A	Coil, M.O. L.F.	PT635	V5A	1–2 Mc/s	Radio Corp.
ZAA4689	Inductance, No. 119 (Aust.)	L11A	Coil, Doubler, L.F.	PT637	V5A	2–4 Mc/s	Radio Corp.
ZAA4690	Inductance, No. 120 (Aust.)	L12A	Coil, Doubler, H.F.	PT638	V5A	4–8 Mc/s	Radio Corp.
ZAA1656	Choke, R.F., No. 76 (Aust.)	L13A	Choke, R.F. Filament	PT250	V1C–2A	16.6 ohm	Radio Corp.
			TRANSFORMERS				
ZAA8020	Transformer, R.F. Current, No. 6 (Aust.)	T1A	Trans. Ant. Current	PT653	—		Radio Corp.
ZAA8106	Transformer, IF, A.M. (Aust.)	T2A	Trans. 1st IF Conv. Stage	PT629	V2A–1B	455 Kc/s	Radio Corp.
ZAA8106	Transformer, IF, A.M. (Aust.)	T2B	Trans. 2nd IF	PT629	V1B–1C	455 Kc/s	Radio Corp.
ZAA8107	Transformer, IF, A.N. (Aust.)	T3A	Trans. 3rd IF	PT630	V1C–3A	455 Kc/s	Radio Corp.
ZAA0615	Transformer, Telephone, A.E. (Aust.)	T4A	Trans. Output and Drive	PT685	V4A–6A		Radio Corp.
ZAA0616	Transformer, Microphone, U. (Aust.)	T5A	Trans. Microphone	PT706	—		Radio Corp.
ZAA0617	Transformer, Modulation, H (Aust.)	T6A	Trans. Modulation	PT684	V6A		Radio Corp.

SWITCHES

*ZAA0534	Switch, 12-pole, 3-way, C (Aust.)	S1A–L	Function Switch	PM924			Radio Corp. 4D. 3P. 3W. PM924
*ZAA7539	Wafer, No. 1	S1		PM598			Radio Corp. 1D. 3P. 3W. PM598
*ZAA7539	Wafer, No. 2	S1		PM598			Radio Corp. 1D. 3P. 3W. PM598
*ZAA7539	Wafer, No. 3	S1		PM598			Radio Corp. 1D. 3P. 3W. PM598
*ZAA7539	Wafer, No. 4	S1		PM598			Radio Corp. 1D. 3P. 3W. PM598
†ZAA0533	Switch, 2-pole, 6-way, D. (Aust.)	S2A–B	Ant. Loading Selector Switch	PM926			Technico, 1D. 2P. 6W. PM926
ZAA0536	Switch, single-pole, 2-way, H (Aust.)	S3A	Normal/Remote Switch	PM928			Radio Corp. PM928
ZAA0536	Switch, single-pole, 2-way, H (Aust.)	S3B	Send/Stand-by Switch	PM928			Radio Corp. PM928
*ZAA7543	Switch, 2-pole, 7-way, A (Aust.)	S4A–B	Meter Switch	PM351			Radio Corp. 2D. 1P. 7W. PM351
*ZAA7544	Wafer, No. 1	S4A		PM599			Radio Corp. 1D. 1P. 7W. PM599
*ZAA7545	Wafer, No. 2	S4B		PM634			Radio Corp. 1D. 1P. 7W. PM634
	Switch, 12-pole, 2-way, B. (Aust.)	S5A–M	Wave Change Switch				
†ZAA7546	Wafers, No. 1	S5A, B, C	M.O. Change-over	PM315			Technico, 1D, 3P. 2W. PM315
†ZAA7546	Wafers, No. 2	S5D, E, F	RF. Change-over	PM315			Technico, 1D. 3P. 2W. PM351
†ZAA7546	Wafers, No. 3	S5G, H, J	Osc. Change-over	PM315			Technico, 1D. 3P. 2W. PM315
†ZAA7546	Wafers, No. 4	S5K, L, M	Doubler, Change-over	PM315			Technico, 1D. 3P. 2W. PM315
	Switch, 12-pole, 2-way, B. (Aust.)	S5A-M	Wave Change Switch				
*ZAA7585	Wafers, No. 1	S5A, B, C	M.O. Change-over	PM991			Radio Corp. 1D. 3P. 2W. PM991
*ZAA7585	Wafers, No. 2	S5D, E, F	R.F. Change-over	PM991			Radio Corp. 1D. 3P. 2W. PM991
*ZAA7585	Wafers, No. 3	S5G, H, J	Osc. Change-over	PM991			Radio Corp. 1D. 3P. 2W. PM991
*ZAA7585	Wafers, No. 4	S5K, L. M	Doubler, Change-over	PM991			Radio Corp. 1D. 3P. 2W. PM991
ZAA0537	Switch, push-button, No. 4 (Aust.)	S6A–F	Netting Switch	A284/576			Radio Corp. 2M. 4B. A284/576
ZAA0535	Switch, single-pole, 2-way, G. (Aust.)	S7A	Crash Limiter Switch	PM934			Radio Corp. PM934

VALVES.

ZAA9215	Valve, WT. Type 1D5GP	V1A	RF. Amplifier	PM588			Super Control RF Pentode
ZAA9215	Valve, WT. Type 1D5GP	V1B	IF. Amplifier	PM588			Super Control RF. Pentode
ZAA9215	Valve, WT. Type 1D5GP	V1C	IF. Amplifier	PM588			Super Control RF. Pentode
ZAA904	Valve, WT. Type 1C7G	V2A	Mixer	PM201			Pentagrid Converter
ZAA9214	Valve, WT. Type 1H6G	V3A	2nd Detector, AVC	PM317			Duo-diode Triode
ZAA9214	Valve, WT. Type 1H6G	V3B	BFO	PM317			Duo-diode Triode
ZAA9213	Valve, WT. Type 1F5G	V4A	Audio Output Amplifier	PM199			Power Amplifier Pentode
ZAA925	Valve, WT. Type 6U7G	V5A	M.O.	PM261			Super Control RF. Pentode
ZAA9209	Valve, WT. Type 6N7GT	V6A	Modulator	PM925			Class "B" Twin Triode
ZAA3400	Valve, WT. Type VT100A (807)	V7A	Power Amplifier	PM931			Beam Power Amplifier

*Bakelite Switch Wafer. †Ceramic Switch Wafer.

APPENDIX 2.—ZAA4854, WIRELESS SETS No. 22 (AUST.) AND ZAA4890, WIRELESS SETS No. 122 (AUST.) LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			MISCELLANEOUS				
ZAA598	Rect. Metal, MBS5. (Aust.)	W1A	Full-wave Meter Rect.	PM408		5 m/a	McKenzie & Holland, MBS5. Trop. Trtd.
ZAA599	Rect. Metal, SH. 1/1-1 (Aust.)	W2A	Half-wave, Meter Rect.	PM391		10 m/a	McKenzie&Holland,SH1/1-1.Trop.Trtd.
ZAA0618	Rect. Metal, BE/2-1 (Aust.)	W3A	Crash Limiter Rect.	PM981		100 m/a	McKenzie&Holland,BE2/1-1.Trop.Trtd.
ZAA4830	Socket, 12-point (Aust.) No. 2	Y1A	Power Socket	787/495-1			A.W.A. 12-pin
ZA2994	Socket, 5-point, No. 5	Y2A	Drop Cord Socket	A105/495			Radio Corp.
ZA2994	Socket, 5-point, No. 5	Y2B	Drop Cord Socket	A105/495			Radio Corp.
ZAA4825	Voltmeter, 15-600 volts No. 2 (Aust.)	M1A	All Metering	PM458		500 uA	Emmco. 15 & 600 volt scales
ZAA8858	Jacks, Microphone, Mk. II	J1A	Key Jack, 108 Mk. II	A102/266			Radio Corp. A102/266
ZAA8857	Jacks, Telephone, Mk. II	J2A	Line Jacks	A101/266			Radio Corp. A101/266
ZAA5824	Relay, 7-pole, No. 2 (Aust.)	RL1	Slugged Action Relay	PM314		coil 100 ohm 12 volt	S.T.C. Type 6000 : 1M.2CO-2M 1CO.1B
ZAA0620	Relay, 4-pole, No. 1 (Aust.)	RL2	Keying Relay	PM917		coil 100 ohm 12 volt	S.T.C. Type 3000 : 2M-2N
ZAA5823	Relay, SP. DT. No. 6 (Aust.)	RL3	Grid Change-over Relay	PM511	V1A	coil 100 ohm 9 volts	Radio Corp. PM511 1CO.
ZAA0621	Relay, 3-pole, No. 4 (Aust.)	RL4	Slugged Action Relay	PM918		coil 100 ohm 12 volt	S.T.C. Type 3000 : 2M-1B.

APPENDIX 2 (*continued*)—ZAA4834 SUPPLY UNITS (AUST.) No. 1A—LIST OF MAIN COMPONENTS

CONDENSERS.

ZAA2405	Cond. Fixed, Q.5,L. (Aust.)	C1A	Buffer, Primary	PC645		·05 uf	Ducon, 200V. Paper Type MCT42 20%
ZAA2405	Cond. Fixed, Q.5,L. (Aust.)	C1B	Buffer, Primary	PC645		·05 uf	Ducon, 200V. Paper Type MCT42 20%
ZAA2042	Cond. Fixed, I.M. (Aust.)	C2A	Filter, A Plus	PC553		1· uf	Ducon, 200V. Paper Type PTB345 20%
ZAA2042	Cond. Fixed, I.M. (Aust.)	C2B	Filter, A Plus	PC553		1· uf	Ducon, 200V. Paper Type PTB345 20%
ZAA2042	Cond. Fixed, I.M. (Aust.)	C2C	Filter, A Plus	PC553		1· uf	Ducon, 200V. Paper Type PTB345 20%
ZAA2134	Cond. Fixed, Q.2, J. (Aust.)	C3A	Buffer, Secondary	PC310		·02 uf	Simplex, Mica, Type M. 10%

ZAA2134	Cond. Fixed, Q.2, J .(Aust.)	C3B	Buffer, Secondary	PC310	·02 uf	Simplex, Mica, Type M 10%
ZAA2318	Cond. Fixed, 16,D. (Aust.)	C4A	Filter, B Plus	PC298	16 uf	Ducon, E'lytic 525PV Type ET1048 20%
ZAA2318	Cond. Fixed, 16,D. (Aust.)	C4B	Filter, B Plus	PC298	16 uf	Ducon, E'lytic 525PV Type ET1048 20%
ZAA2318	Cond. Fixed, 16,D. (Aust.)	C4C	Filter, B Plus	PC298	16 uf	Ducon, E'lytic 525PV Type ET1048 20%
ZAA2307	Cond. Fixed, 8,M. (Aust.)	C5A	Filter, B Plus	PC262	8 uf	Ducon, E'lytic 525PV Type ET1015 20%

RESISTORS

ZAA0422	Res. 1W. No. 2 200 ohm	R1A	Dropping Res. Indicator Lamp	PR207	200 ohm	I.R.C. W.W. Type BW1 10%
ZAA0422	Res. 1W. No. 2 200 ohm	R1B	Dropping Res. Inspec. Lamp	PR207	200 ohm	I.R.C. W.W. Type BW1 10%
ZAA664	Res. 1W. No. 3 or No. 4 7,500 ohm	R2A	Dropping Res. B Plus Mod.	PR339	7,500 ohm	I.R.C. Carbon Type BT1 10%
ZAA664	Res. 1W. No. 3 or No. 4 7,500 ohm	R2B	Dropping Res. B Plus Mod.	PR339	7,500 ohm	I.R.C. Carbon Type BT1 10%
ZAA0420	Res. 5W. No. 2 9,000 ohm	R3A	Dropping Res. B Plus Mod.	PR557	9,000 ohm	I.R.C. W.W. Type AB1 5%
ZAA667	Res. 1W. No. 3 or No. 4 20,000 ohm	R3A	Dropping Res. B Plus Mod.	PR171	20,000 ohm	I.R.C. Carbon Type BT1 10%
ZAA665	Res. 1W. No. 3 or No. 4 10,000 ohm	R4A	Dropping Res. B Plus Mod.	PR325	10,000 ohm	I.R.C. Carbon Type BT1 10%
ZAA665	Res. 1W. No. 3 or No. 4 10,000 ohm	R4B	Dropping Res. B Plus Mod.	PR325	10,000 ohm	I.R.C. Carbon Type BT1 10%
ZAA0421	Res. 3W. No. 2 500 ohm	R5A	Dropping Res. B Plus Mod.	PR417	500 ohm	I.R.C. W.W. Type AA1 5%

INDUCTANCES.

ZAA1658	Choke, RF. No. 78 (Aust.)	L1A	RF. Filtering LT.	PT625		Radio Corp. PT625
ZAA1658	Choke, RF. No. 78 (Aust.)	L1B	RF. Filtering LT.	PT625		Radio Corp. PT625
ZAA1658	Choke, RF. No. 78 (Aust.)	L1C	RF. Filtering LT.	PT625		Radio Corp. PT625
ZAA1656	Choke, RF. No. 76 (Aust.)	L2A	RF. Filtering HT.	PT250		Radio Corp. PT250
ZAA1656	Choke, RF. No. 76 (Aust.)	L2B	RF. Filtering HT.	PT250		Radio Corp. PT250
ZAA0428	Choke, AF. No. 70 (Aust.)	L3A	LF. Filtering HT.	PT695		Radio Corp. PT695
ZAA0439	Choke, AF. No. 71 (Aust.)	L4A	LT. Filtering LT.	PT694		Radio Corp. PT694

TRANSFORMERS.

ZAA0423	Transformer, Vibrator, P. (Aust.)	T1A T1B	Twin Power Transformer Ass.	PT697		Radio Corp. PT697

APPENDIX 2—ZAA4834 SUPPLY UNITS (AUST.) No. 1A—LIST OF MAIN COMPONENTS—*continued*

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			MISCELLANEOUS.				
ZAA0418	Relay, 4-pole, 2-way (Aust.) No.2	RL1	A Plus Change-over	PM958		Coil 80 ohm 12 Volts	Radio Corp. 2CO-2CO. PM958
ZAA0419	Relay, 4-pole, 2-way (Aust.) No.3	RL2	B Plus Change-over	PM959		Coil 80 ohm 12 Volts	Radio Corp. 2CO-2CO PM959
WBA119	Bulbs, 6-volt, (Aust.) No. 4	PL1A	Indicator Lamp	PM929		6V. 0·04A.	Radio Corp. G4½ Min. Screw Base.
ZAA4718	Fuse Wire, No. 33 S.W.G. 35-ft.	F1A	Fuse				Tinned Copper Wire, 33-S.W.G.
ZAA9900	Vibrator, 12-V. PM957	Z1A	Vibrator	PM957		12 volts	Radio Corp. Split Reed PM957
ZAA9900	Vibrator, 12-V. PM957	Z1B	Vibrator	PM957		12 volts	Radio Corp. Split Reed PM957
ZA5559	Plug, 4-point, No. 7	P1A	Battery Plug	A129/495			Radio Corp.
ZAA5915	Plug, 12-point, (Aust.), No. 1	P2A	Cable Plug	54/250			A.W.A. 12-pin
ZAA4832	Socket, 2-point, No. 10 (Aust.)	Y1A	Inspection Lamp Socket	A1033/495			Radio Corp.
*ZAA7554	Switch, 6-pole, 2-way L (Aust.)	S1A–F	HP/LP Switch	PM950			Radio Corp. 2D. 6P. 2W. PM950
*ZAA7551	Wafer, No. 1	S1A–B		PM955			Radio Corp. 1D. 2P. 2W. PM955
*ZAA7555	Wafer, No. 2	S1C–F		PM965			Radio Corp. 1D. 4P. 2W. PM965
ZAA7567	Switch, Single-pole, ON/OFF, H (Aust.)	S2A	A Plus ON/OFF Switch	PM743			Chivers, 12V. 15A. Type D140/1

APPENDIX 2 (*continued*)—AERIAL COUPLING EQUIPMENT—AERIAL UNITS "J" (AUST.) ZAA3851—LIST OF MAIN COMPONENTS

			CONDENSERS				
ZAA0413	Cond. Variable, No. 91 (Aust.)	C1A	Ant. Loading Cond.	PC615		14–480 uuf	Radio Corp. Single-gang PC615
ZAA0412	Cond. Fixed X.4.F (Aust.)	C2A	Ant. Loading Cond.	PC526		400 uuf	Ducon 1,500V/W Mica 10%
ZAA0412	Cond. Fixed X.4.F (Aust.)	C2B	Ant. Loading Cond.	PC526		400 uuf	Ducon 1,500V/W Mica 10%
ZAA0412	Cond. Fixed X.4.F (Aust.)	C2C	Ant. Loading Cond.	PC526		400 uuf	Ducon 1,500V/W Mica 10%
ZAA0412	Cond. Fixed X.4.F (Aust.)	C2D	Ant. Loading Cond.	PC526		400 uuf	Ducon 1,500V/W Mica 10%
ZAA255	Cond. Fixed, R.I.B. (Aust.)	C3A	RF Bypass Cond.	PC108		.001 uf	Simplex Mica, Type P/T 10%

RESISTORS

ZAA0417	Res. 1W Special 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm	R1A	Dummy Antenna (ten 1W.	PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm		Res. in parallel.)	PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA0417	Res. 1W „ 1,000 ohm			PR200	1,000 ohm	I.R.C. W.W., Type BW1 5%
ZAA6616	Res. ½W Wirewound 40 ohm	R30A	Secondary Loading	PR183	40 ohm	I.R.C. W.W., Type BW½ 5%
ZAA6294	Res. Adjustable 1,000 ohm (Aust.) No. 1	R37A	Meter Adjusting	PR187	1,000 ohm	Radio Corp. PR187

TRANSFORMERS

ZAA8020	Trans. RF Current No. 6 (Aust.)	T1A	Trans. Ant. Current	PT653		Radio Corp. PT653

SWITCHES

†ZAA0416	Switch, 2-Pole, 6-Way (Aust.)	S1A-B	Ant. Coupling Switch	PM692		Technico, Ceramic 2D, 2P, 6W
†ZAA0562	Wafer, No. 1	S1A	Dummy Ant. Section	PM983		Technico, Ceramic 1P, 6W
†ZAA0563	Wafer, No. 2	S1B	Loading Section	PM984		Technico, Ceramic 1P, 6W (Shorting)
*ZAA7588	Switch, 2-Pole, 6-Way, G (Aust.)	S1A–B	Ant. Coupling Switch	PM992		Radio Corp. 2D, 2P, 6W
*ZAA7586	Wafer, No. 1	S1A	Dummy Ant. Section	PM995		Radio Corp. 1P, 6W
*ZAA7587	Wafer, No. 2	S1B	Loading Section	PM996		Radio Corp. 1P, 6W (Shorting)

INDUCTANCES

ZAA0414	Inductance, No. 137 (Aust.)	L1A	Var. Induct. Ant. Coup.	PT674	230 uH	Radio Corp. PT674
ZAA1655	Choke, RF, No. 75 (Aust.)	L2A	Choke (Ant. Trans.)	PT652	470 uH 16.3 ohm	Radio Corp. PT652

MISCELLANEOUS

ZAA598	Rect. Metal, MBS5 (Aust.)	W1A	Fullwave Meter Rect.	PM408	5 m/a	McKenzie & Holland, Type MBS5 Trop. Trt.
ZAA599	Rect. Metal, SH1/1-1 (Aust.)	W2A	Halfwave Meter Rect.	PM391	10 m/a	McKenzie & Holland, Type SH1/1-1 Trop. Trt.
ZAA4825	Voltmeter, 15 & 600 Volts, No. 2 (Aust.)	M1	Ant. Current	PM458	500 uA	Emmco 15 & 600 Volt Scale

* Bakelite Switch Wafer. † Ceramic Switch Wafer

APPENDIX 2 (*continued*)—ZAA4848, WIRELESS REMOTE CONTROL UNIT "F" No. 1 (AUST.)—LIST OF MAIN COMPONENTS

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			CONDENSERS				
ZAA0361	Cond. Fixed, P.1.V. (Aust.)	C1A	Isolating Condenser	PC149		.1 uf	Ducon 600V, D.C.W., Type PZD1352 20%
ZAA0362	Cond. Fixed, 2, Q. (Aust.)	C2A	DC Blocking Condenser	PC606		2. uf	Ducon 200V, D.C.W., Type PSB126, 20%. Tropical Block Type with Mount Brackets & Ceramic Term. Insulators
ZAA2329	Cond. Fixed, P.25, J. (Aust.)	C3A	Isolating Condenser	PC122		.25 uf	Ducon. 400V, D.C.W., Type PZD1354, 20% Trop.
ZAA0363	Cond. Fixed, P.5, W. (Aust.)	C4A	DC Blocking Condenser	PC605		.5 uf	Ducon, 200V, D.C.W., Type PSB125, 20%. Tropical Block Type with Mount Bracket and Ceramic terminal Insulators.
			RESISTORS				
ZAA0354	Res. ½W Wirewound 600 ohms	R1A	Surge Limiting	PR338		600 ohm	I.R.C. W.W., Type BW½
ZAA0354	Res. ½W Wirewound 600 ohms	R1B	Line Matching	PR338		600 ohm	I.R.C. W.W., Type BW½
ZAA0354	Res. ½W Wirewound 600 ohms	R1C	Load Resistor	PR338		600 ohm	I.R.C. W.W., Type BW½
ZAA0355	Res. ½W Wirewound 200 ohms	R2A	Sidetone Limiter	PR176		200 ohm	I.R.C. W.W., Type BW½
ZAA0355	Res. ½W Wirewound 200 ohms	R2B	Line Matching	PR176		200 ohm	I.R.C. W.W., Type BW½
ZAA0356	Res. ½W Wirewound 50 ohms	R3A	Mic. Attenuator	PR280		50 ohm	I.R.C. W.W., Type BW½
ZAA0356	Res. ½W Wirewound 50 ohms	R3B	Input Load Resistor	PR280		50 ohm	I.R.C. W.W., Type BW½
ZAA6611	Res. ½W Wirewound 500 ohms	R4A	Modulation Limiter	PR274		500 ohm	I.R.C. W.W., Type BW½
ZAA0558	Res. Variable, 100 ohms (Aust.) No. 1	R5A	Modulation Control	PR435		100 ohm	Radio Corp., Type PR435
ZAA0357	Res. ½W Wirewound 10 ohms	R6A	Mic. Attenuator	PR553		10 ohm	I.R.C. W.W., Type BW½
ZAA688	Res. ½W No. 3 or No. 4 2,000 ohm	R7A	Sidetone to No. 2 Unit	PR253		2,000 ohm	I.R.C. Carbon, Type BT½
ZAA6810	Res. ½W No. 3 or No. 4 1,500 ohm	R8A	Output Level Equalizer	PR244		1,500 ohm	I.R.C. Carbon, Type BT½

ZAA695	Res. ½W No. 3 or No. 4 10,000 ohm	R9A	Monitoring Res.	PR164	10,000 ohm	I.R.C. Carbon, Type BT½
ZAA693	Res. ½W. No. 3 or No. 4 1,000 ohm	R10A	Output Level Equalizer	PR252	1,000 ohm	I.R.C. Carbon Type BT½
			TRANSFORMERS			
ZAA0358	Trans. Microphone V (Aust.)	T1A	Microphone Transformer	PT692	60–600 ohm imp.	Radio Corp. PT692
			SWITCHES			
YAA2000	Key (Aust.) No. 1	S1	Remote and Exchange	PM937		Whitford, Lever Up-lock, 1CO-1CO. Lever Down-lock 1CO-1CO. Frame No. 10. Mnt. Plate No. 5
YAA2001	Key (Aust.) No. 2	S2	Main Function	PM938		Whitford, Lever Up-lock 2CO-2CO. Lever Down-lock 2CO-2CO. Frame No. 11. No Mount Plate
YAA2002	Key (Aust.) No. 3	S3	Exchange, Send/Receiver	PM939		Whitford, Lever Centre-stop. Lever Up-lock, 1M-1M. Frame No. 10. Mnt. Plate No. 5
YAA2000	Key (Aust.) No. 1	S4	Re-broadcasting	PM937		Whitford, Lever Up-lock 1CO-1CO. Lever Down-lock 1CO-1CO. Frame No. 10. Mnt. Plate No. 5
			MISCELLANEOUS			
ZAA0360	Rectifier, Selenium, H.18.2	W1A	Relay Selecting	PM942		S.T.C. Type (H.18.2) 1TF Tropical
ZAA0360	Rectifier, Selenium, H.18.2	W1B	Relay Selecting	PM942		S.T.C., Type (H.18.2) 1TF Tropical
ZAA0364	Relay, WT, S.P.S.T., No. 10 (Aust.)	RL1A	Call Operator	PM944	2500 ohm, coil 24V	S.T.C., Type 3000, 1B
ZAA0559	Relay, WT, S.P.S.T., No. 11 (Aust.)	RL2A	Keying	PM943	100 ohm coil 12V	S.T.C., Type 3000 IM
ZAA8857	Jacks, Telephone, Mk. II	J1A	Phone Jack	A101/266		Radio Corp.
ZAA8857	Jacks, Telephone, Mk. II	J1B	Phone Jack	A101/266		Radio Corp.
YAA0285	Bell, Magneto (Aust.) No. 2	B1A	Bell, Magneto	PM869	Two coils, each 500 ohms	Eclipse Radio
ZAA0548	Key, W.T., 8 amps, No. 2B Assy. (Aust.)	K1A	C.W. Operator's Key	PM941		National Radio, PM941
YAA1201	Generator, Hand (Aust.) No. 1	G1A	Bell-ringing	PM868		S.T.C. Type "C" Handle No. 1 (Army Type)
ZA5559	Plug, 4-point, No. 7	Y1A	Microphone Plug	A129/495		Radio Corp.
ZA2994	Plug, 5-point, No. 5	Y2A	Snatch Plug	A104/495		Radio Corp.

APPENDIX 2 (*continued*)—ZAA4849, WIRELESS REMOTE CONTROL UNIT "F" No. 2(AUST.)—LIST OF MAIN COMPONENTS

Vocab. Cat. No.	*Designation*	*Symbol*	*Description*	*R.C. Part No.*	*Assoc. with Valve*	*Value*	*Remarks and Type*
			CONDENSERS				
ZAA0361	Cond. Fixed, P.1, V (Aust.)	C1B	DC Blocking	PC149		.1 uf	Ducon, 600V, D.C.W. 20%, Type PZDI352
ZAA0362	Cond. Fixed, 2, Q. (Aust.)	C2B	DC Blocking	PC606		2. uf	Ducon 200V, D.C.W. 20%, Type PSB126. Tropical Block, Type with Mount Brackets & Ceramic Term. Insulators
ZAA0362	Cond. Fixed, 2, Q. (Aust.)	C2C	DC Blocking	PC606		2. uf	Ducon, 200V, D.C.W. 20% Type PSB126. Tropical Block Type with Mount Brackets and Ceramic Term. Insulators
ZAA0362	Cond. Fixed, 2, Q (Aust.)	C2D	Key Click Filter	PC606		2. uf	Ducon, 200V D.C.W. 20% Type PSB126. Tropical Block Type with Mount Brackets & Ceramic Term. Insulators
ZAA2329	Cond. Fized, P. 25, J (Aust.)	C3B	Isolating Cond.	PC122		.25 uf	Ducon 400V, D.C.W. 20% Type PZD1354
			RESISTORS				
ZAA0354	Res. ½W Wirewound 600 ohm	R1D	Load Resistor	PR338		600 ohm	I.R.C. W.W., Type BW½ 10%
ZAA0355	Res. ½W Wirewound 200 ohm	R2C	Sidetone Limiter	PR176		200 ohm	I.R.C. W.W., Type BW½ 10%
			TRANSFORMERS				
ZAA0358	Trans. Microphone V. (Aust.)	T1B	Microphone Trans.	PT692		imp. 60–600 ohm	Radio Corp. PT692
			INDUCTANCES				
ZAA0359	Choke, A.F. (Aust.), No. 73	L1A	Battery isolating	PT693			Radio Corp. PT693
	Choke, A.F. (Aust.), No. 73	L1B	Key-click Filter				

SWITCHES

YAA2001	Key (Aust.), No. 2	S5	Main Function	PM938			Whitford, Lever Up-lock 2CO-2CO. Lever Down-lock 2CO-2CO. Frame No. 11. No Mnt. Plate
YAA2002	Key (Aust.), No. 3	S6	Normal/Mute	PM939			Whitford, Lever Up-lock 1M-1M. Lever Centre-stop. Frame No. 10. Mnt. Plate No. 5
YAA2003	Key (Aust.), No. 4	S7	Exchange	PM940			Whitford, Lever Up-non-lock 1CO-1CO. Lever Down-lock 1CO-1CO. Frame No. 10. Mnt. Plate No. 5

MISCELLANEOUS

ZAA0365	Relay, DP DT No. 5 (Aust.)	RL3A	Bell Change-over	PM946		720 ohm coil; 24V	Radio Corp. PM946, 1CO–1CO
ZAA0561	Relay, 2-Pole No. 1 (Aust.)	RL4A	Relay Muting	PM867		2,000 ohm coil; 24V	S.T.C. Type 3,000; 1M–1B. (Slugged 1 sec. delay on release)
YAA0285	Bell, Magneto (Aust.), No. 2	B1B	Bell, Magneto	PM869		Two coils, each 500 ohm	Eclipse Radio
ZAA0548	Key, WT, 8 amp. No. 2B Assy. (Aust.)	K1B	C.W. Operator's Key	PM941			National Radio Type PM941
YAA1201	Generator, Hand (Aust.), No. 1	G1B	Bell Ringing	PM868			STC Type "C" Handle No. 1 (Army Type)
ZAA8857	Jacks, Telephone, Mk. II	J1C	Phone Jack	A101/266			Radio Corp.
ZAA8857	Jacks, Telephone, Mk. II	J1D	Phone Jack	A101/266			Radio Corp.
ZA5559	Plug, 4-Point, No. 7	Y1B	Microphone Plug	A129/495			Radio Corp.

APPENDIX 3

WIRELESS REMOTE CONTROL UNITS, "F" (AUST.) COMPLETE STATIONS

V.A.O.S. No.	*Designation*	*Essential for Work*	*Essential Spares*	*Total*
	SECTION W2			
WB 0027	BATTERIES, dry, refills, 8-cell, No. 1, Mk. I .. (a)	2	2	4
WBA128	BOXES, spare cells (Aust.), No. 1		1	1
WB 0104	CABLE, electric, D3, Mk. VI, twisted miles .. .. (b)	½		½
WB 0200	CELLS, dry, X, Mk. II .. (c)	4	4	8
WB 0282	DRUMS, cable, No. 5, Mk. I	1		1
	SECTION Y1			
YAA 728	STRAPS, carrying, "G" (Aust.), No. 2 .. .. (d)	2		2
	SECTION Z1			
ZA 13859	MICROPHONES, hand, No. 8	2		2
	RECEIVERS, headgear, C.L.R., double—			
ZAA 569	Mk. III (Aust.)	2		2
ZA 6292	SATCHELS, signals, No. 1	1		1
ZAA4862	TOOLS, Contact cleaning (Aust.), No. 1 .. .. (e)	2		2
	WIRELESS REMOTE CONTROL UNITS, "F"—			
ZAA4848	No. 1 (Aust.)	1		1
ZAA4849	No. 2 (Aust.)	1		1

(*a*) Two in Remote Control Units, "F," No. 2 (Aust.).
Two in Boxes, Spare Cells (Aust.), No. 1.

(*b*) Carried on Drums, cable, No. 5, Mk. I.

(*c*) Two in each of Remote Control Units, "F."
Four in Boxes, spare cells (Aust.), No. 1.

(*d*) Carrying Straps on Remote Control Units, "F."

(*e*) Carried inside cases of Remote Control Units.

APPENDIX 4

MASTS, 21-FT. WOOD (AUST.) COMPLETE STATIONS

V.A.O.S. No.	*Designation*	*Essential for Work*	*Essential Spares*	*Total*
	SECTION W2			
WBA924	WIRE, Electric, R. No. 4 (Aust.) yds.	—	100	100
	SECTION Y			
YA 1149	PICKETS, Guy, Telegraph ..	6	2	8
YA 1205	POLES, Telegraph, Wood, 21-ft., Mk. I	2	—	2
	SECTION Z1			
	AERIALS, Horizontal, No. 1 (Aust.)—			
ZAA0857	Stayplates	2	—	2
ZAA 490	INSULATORS, W.T., No. 1 (Aust.)	—	4	4
	MASTS, 21-ft., Wood (Aust.)—			
ZAA4642	Bags, Carrying	1	—	1
ZAA4641	Installation Drawing	1	—	1

APPENDIX 5

AERIALS, VERTICAL, 34-FT. STEEL, COMPLETE STATIONS

V.A.O.S. No.	*Designation*	*Essential for Work*	*Essential Spares*	*Total*
	SECTION F			
FA 2137	HAMMERS, Engineers, ball pein, 8 oz.	1	—	1
	SECTION Y			
YA 4080	STRAPS, Carrying, H.	1	—	1
	SECTION Z1			
ZA 11009	AERIAL Bases, No. 11— ..	1	—	1
ZA 11010	Spikes	1	—	1
ZA 0374	ANTENNA RODS, A, pegs—	8	2	10
ZA 0378	Peg Bags	1	—	1
	ANTENNA RODS, D—			
ZA 5341	Reamers	1	—	1
ZA 5346	Sections 3-ft.	6	4	10
ZA 5325	Spikes	1	—	1
ZAA4860	Stayplate, No. 4 (Aust.) ..	2	—	2
	ANTENNA RODS, F—			
ZA 4135	Adaptors, No. 1	1	—	1
ZA 11011	Cases, Carrying, No. 1 ..	1	—	1
ZAA 009	Covers, Hammer (Aust.) ..	1	—	1
ZA 11462	Straps, Retaining	2	—	2
	Sections—			
ZA 0894	No. 1	2	2	4
ZA 0895	No. 2	1	1	2
ZA 0896	No. 3	1	1	2
ZA 0437	BAGS, Aerial Gear, No. 2, Mk. II	1	—	1
	INSULATORS, W.T.—			
ZA 4432	Ebonite B	1	—	1
ZAA 491	No. 2 (Aust.)	—	6	6
ZA 6579	STAYTIGHTENERS, Small ..	—	2	2

APPENDIX 6

METER READINGS*

1. FACTORY READINGS OF AERIAL CURRENT ON INTERNAL DUMMY

Freq. (Mc/s.)	2	3	4	4	6	8	*Date*	*Read by*
Rdg. of Meter:								

2. OPERATOR'S WEEKLY READINGS.

Date	*Drive*		*P.A. Crnt.*	*HTS*	*HTR*	*LT*	*AVC*
	3 *Mc/s.*	6 *Mc/s.*					

*All readings with Function Switch in "C.W." position.

APPENDIX 6—*continued*

METER READINGS*

FUNCTIONS OF METER FOR POSITIONS OF METER SWITCH

Position	*Function*	*Weekly Aerial Reading*			
		1st Freq.	*Rdg.*	*2nd Freq.*	*Rdg.*
AERIAL :	Indicates R.F. current flowing in internal dummy, or external aerials. Scale—approximately 1·5 amps. (Not linear at lower values.)				
A.V.C. :	This indicates screen current of R.F. and 1st IF tubes, which is reduced in proportion to the strength of the received signal.				
L.T. :	This indicates battery voltage. Scale—0–15 volts.				
H.T.R. :	Indicates receiver high tension. Scale—0–600 volts.				
H.T.S. :	Indicates Sender high tension. Scale—0–600 volts.				
DRIVE :	Indicates 807 grid current. Scale — 2 m/a.				
P/A :	Indicates 807 plate current. Scale—150 m/a.				

*All readings with Function Switch in the "C.W." position.

APPENDIX 7

SELECTION OF AERIALS

For ground waves a vertical or an inclined aerial must be used.

For sky waves either a vertical or a horizontal aerial, depending on the range required, can be used. A simple method for rapidly deciding upon the aerial to be used is as follows :—

(i) The power radiated from an aerial depends on :—

(*a*) The power fed into the aerial from the transmitter, this depending on the type of set in use ; and

(*b*) The radiation efficiency of an aerial ; this depends on various factors which need not be enumerated here. However, to enable these factors to be rapidly determined, the following graphs are included—

Fig. 11—The factor by which the RATED RF power output of a wireless set has to be multiplied to give the actual RADIATED power.

Fig. 12—The factor by which the RADIATED power of a vertical rod aerial has to be multiplied to give the actual power radiated at the correct vertical angle for the distance concerned.

Fig. 13—The factor by which the RADIATED power of a half or three-quarter wave length horizontal aerial, erected 10–30 ft. above earth, has to be multiplied to give the actual power radiated at the correct vertical angle for the distance concerned.

Note.—The left hand scale of Figs. 11, 12 and 13 gives the correction factor in decibels (db) (10 log 10 power ratio), while the right hand scale gives the same factor, only it is expressed as a power ratio. In Fig.11, for rod aerial lengths other than those shown, select points between the lengths shown by interpolating the graphs, i.e., the value for a 10 ft. rod would be approximately half way between the values shown for 8 ft. and 12 ft. rods. Similarly in Figs. 12 and 13, values for frequencies other than those shown should be obtained by interpolation of the graphs.

(ii) **The use of the Graphs.**

As the graphs are for use with sky waves only, let it be assumed that reference to Table 4 has indicated that the distance is beyond the ground wave range of the set.

From Figs. 11 and 12 determine the effective power radiated from a vertical rod aerial and then compare it with the value obtained from Figs. 11 and 13 for a horizontal aerial 10-30 ft. above earth. The use of the graphs is demonstrated in the following examples—

Example 1.

It is required to operate a wireless circuit over a distance of 30 miles, jungle country, using sky waves and a frequency of 2 mc/s.

16 ft. vertical rod aerial.

Radiation efficiency factor of a 16 ft. rod aerial for 2 mc/s.; from Fig. 11	= −15.4 db
Correction factor for 30 miles for sky wave radiation from a vertical rod aerial for 2 mc/s.; from Fig. 12	= −19 db
Total	−34.4 db

Half wave horizontal aerial—Average height 20 ft. above Earth.

Radiation efficiency factor of a $\frac{1}{2}$ wave horizontal aerial 20 ft. above earth for 2 mc/s.; from Fig. 11	= −4.6 db
Correction factor for 30 miles for sky wave radiation from a $\frac{1}{2}$ wave horizontal aerial 20 ft. above earth for 2 mc/s.; from Fig. 13	= −5 db
Total	−9.6 db

It is evident, therefore, that the correct aerial to use in this case would be a half wave horizontal aerial (for best results, at right angles to direction of distant station) erected 10–20 ft. above earth. As a matter of interest, the decibel (db) values obtained can be converted to a power ratio by reference to Fig. 11—

−34.4 db = Power ratio of approx. 0.0003
− 9.6 db = ,, ,, ,, ,, 0.115

The power output at the correct vertical angle, for 30 miles, from the horizontal aerial is therefore $\frac{0.115}{0.0003}$, equals 383 times the power output from the vertical rod aerial.

Example 2.

It is required to operate a wireless circuit over 500 miles using sky waves and a frequency of 8 mc/s.

16 ft. vertical rod aerial.

Correction factor from Fig. 11	=	−0.8 db
,, ,, ,, ,, 12	=	−3.5 db
Total		−4.3 db

Half wave horizontal aerial—Average height above earth of 20ft.

Correction factor from Fig. 11	=	0 db
,, ,, ,, ,, 13	=	−4.6 db
Total		−4.6 db

In this particular example, therefore, either a 16 ft. rod aerial or a $\frac{1}{2}$ wave horizontal aerial 20 ft. above earth could be used. However, before making a final decision, practical considerations in the siting of the aerials must be closely examined. In the above calculations it is assumed that both aerials are ideally sited but if, for instance, the vertical aerial in this example could only be sited so that it would be badly screened or have to be used in conjunction with a poor earth or counterpoise, while the horizontal aerial could be erected in the clear, it is evident that the horizontal aerial would be the most satisfactory to use.

(iii) The above examples illustrate the use of the graphs and also demonstrate the great advantage to be gained by the use of the correct aerial (Example 1).

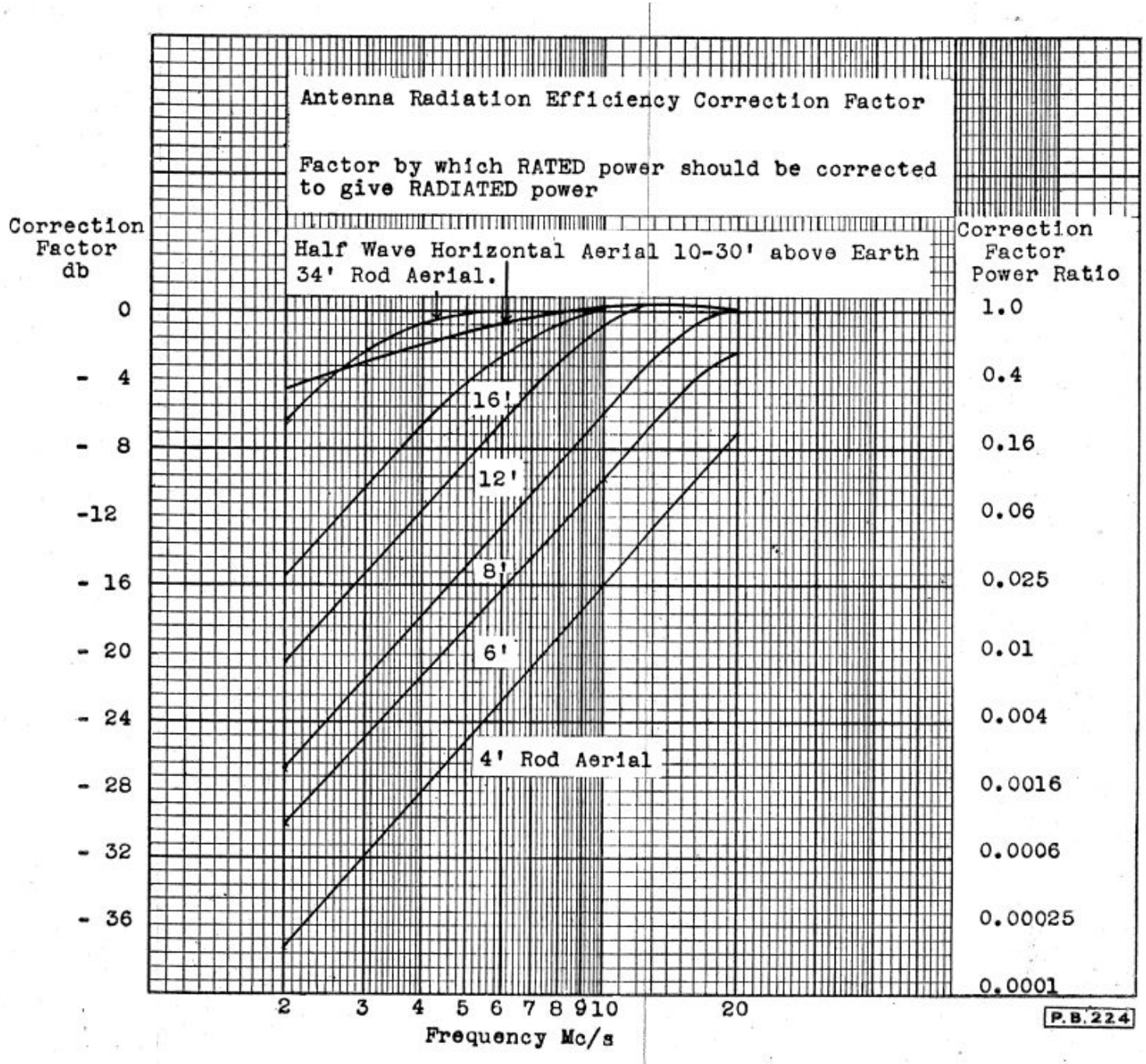

Antenna Radiation Efficiency Correction Factor
Factor by which RATED power should be corrected to give RADIATED power
Half Wave Horizontal Aerial 10-30' above Earth
34' Rod Aerial.
Correction Factor db
0
- 4
- 8
-12
- 16
- 20
- 24
- 28
- 32
- 36
16'
12'
8'
6'
4' Rod Aerial
Correction Factor Power Ratio
1.0
0.4
0.16
0.06
0.025
0.01
0.004
0.0016
0.0006
0.00025
0.0001
2 3 4 5 6 7 8 9 10 20
Frequency Mc/s
P.B.224

FIG. 11.

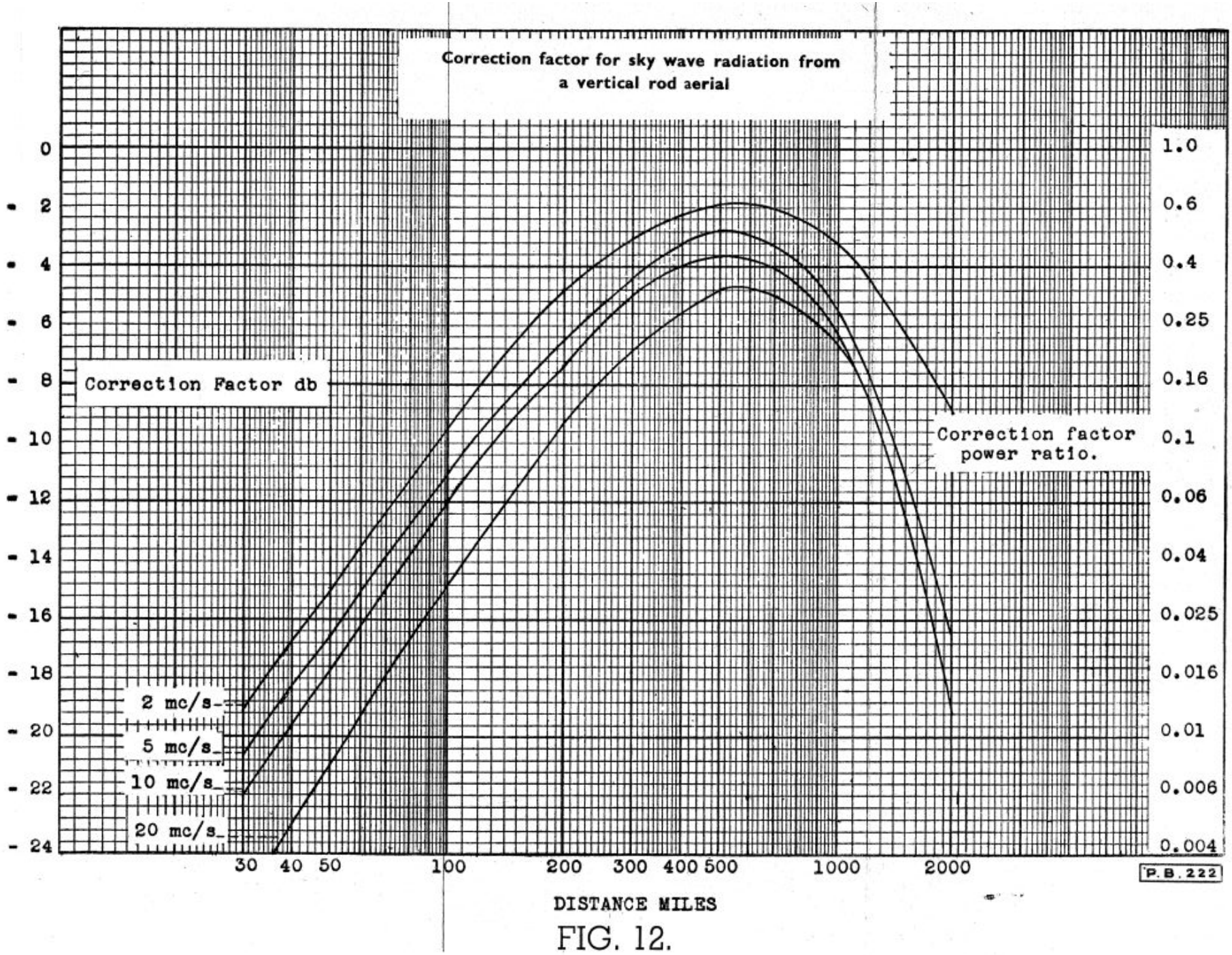

Correction factor for sky wave radiation from a vertical rod aerial
Correction Factor db
Correction factor power ratio.
0
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 18
- 20
- 22
- 24
1.0
0.6
0.4
0.25
0.16
0.1
0.06
0.04
0.025
0.016
0.01
0.006
0.004
2 mc/s
5 mc/s
10 mc/s
20 mc/s
30 40 50 100 200 300 400 500 1000 2000
P.B.222
DISTANCE MILES

FIG. 12.

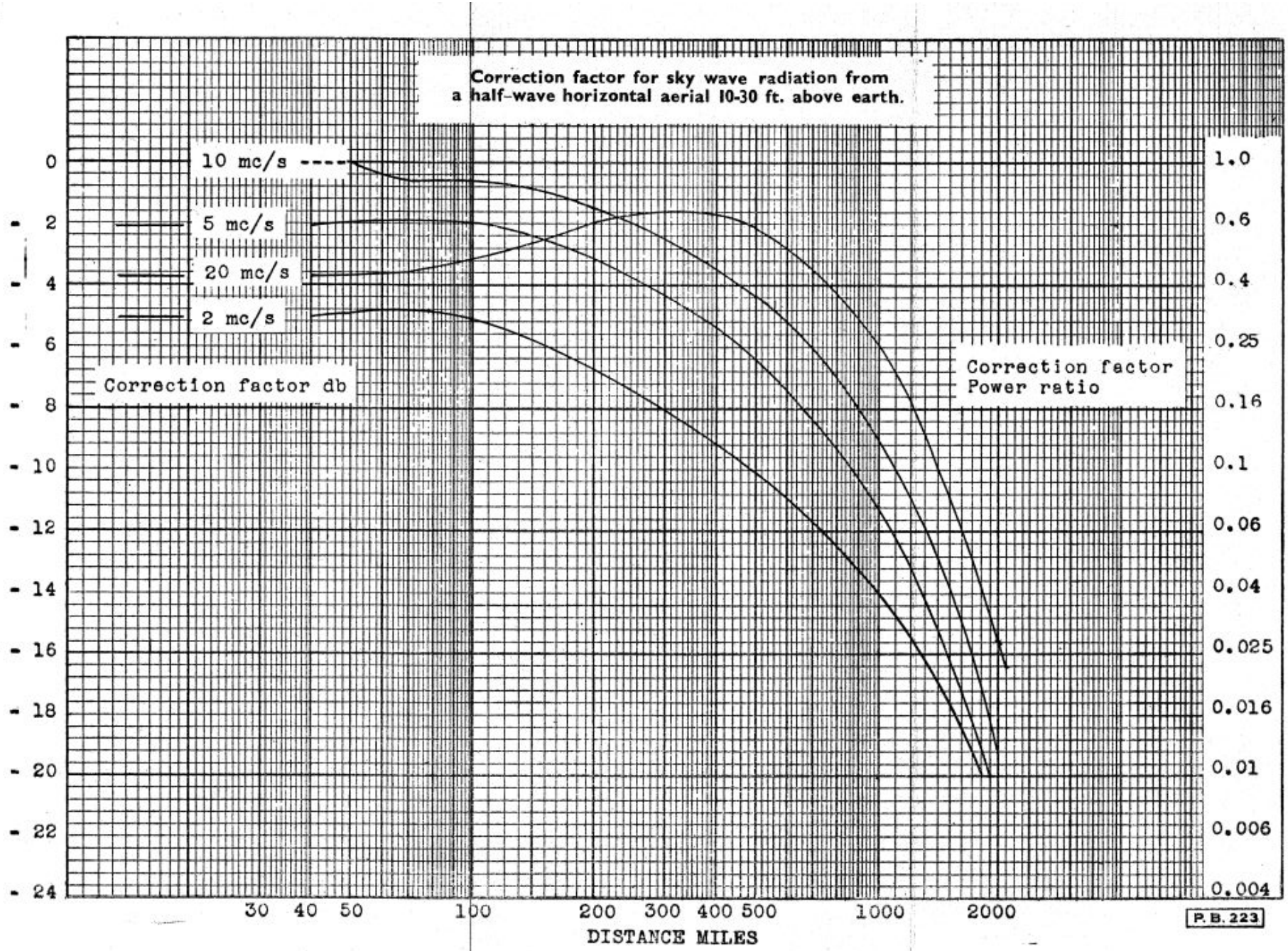
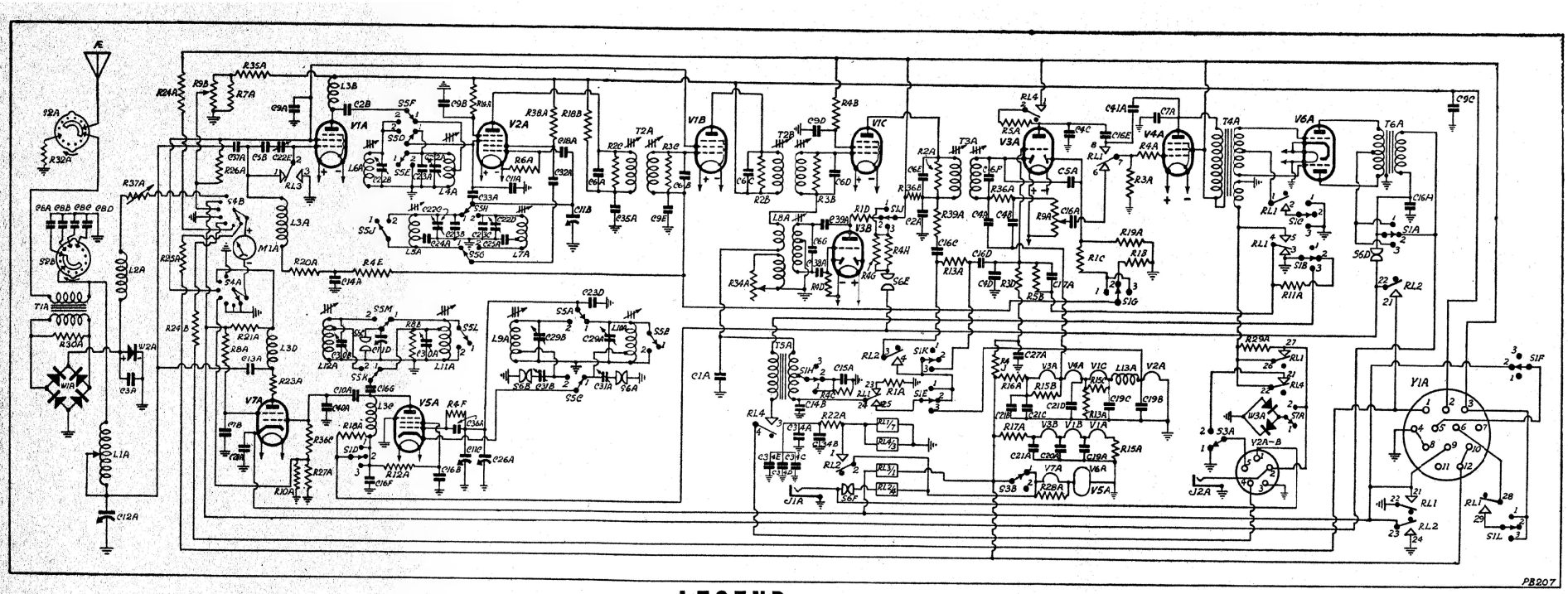

Correction factor for sky wave radiation from a half-wave horizontal aerial 10-30 ft. above earth.
10 mc/s
5 mc/s
20 mc/s
2 mc/s
Correction factor db
Correction factor Power ratio
0
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 18
- 20
- 22
- 24
1.0
0.6
0.4
0.25
0.16
0.1
0.06
0.04
0.025
0.016
0.01
0.006
0.004
30 40 50 100 200 300 400 500 1000 2000
DISTANCE MILES
P.B.223

FIG. 13.



LEGEND

C1A	.0001 ufd	
C2A-B	.0005 ufd	
C3A	.001 ufd	
C4A-D	.0002 ufd	
C5A-B	35 uufd	
C6A-G	100 uufd	
C7A-B	.002 ufd	
C8	600 uufd	
C8A	100 uufd	TAPPED
C8B	100 uufd	TAPPED
C8C	250 uufd	TAPPED
C8D	150 uufd	TAPPED
C9A-E	.05 ufd	
C10A	.0003 ufd	
C11A-D	VAR. COND., 4 GANG	
C12A	VAR. COND., 1 GANG	
C13A	.001 ufd	
C14A-B	.02 ufd	
C15A	.002 ufd	
C16A-H	.01 ufd	
C17A	.0008 ufd	
C18A	.00005 ufd	
C19A-C	.1 ufd	
C20A	.5 ufd	
C21A-D	250 uufd	
C21A-D	250 ufd	
C22A-E	4-30 uufd	
C23A-D	20 uufd	
C24A	1200 uufd	
C25A	2060 uufd	
C26A	4-11 uufd	
C27A	.3 ufd	
C28A	.02 ufd	
C29A-B	6-22 uufd	
C30A-B	6-27 uufd	
C31A	4-11 uufd	
C31B	3-6 uufd	
C32A	.001 ufd	
C33A	.5-5 uufd	
C34A-E	300 ufd	
C35A	.01 ufd	
C36A	100 uufd	
C37A	.0001 ufd	
C38A	.0001 ufd	
C39A	.001 ufd	
C40A	10 uufd	
C41A	20 uufd	

R1A-D	1 MEGOHM
R2A-C	750,000 OHM
R3A-D	500,000 OHM
R4A-J	100,000 OHM
R5A-B	250,000 OHM
R6A	50,000 OHM
R7A	50,000 OHM
R8A-B	10,000 OHM
R9A-B	1 MEGOHM
R10A	500 OHM
R11A	100 OHM
R12A	40,000 OHM
R13A	200,000 OHM
R14A	70,000 OHM
R15A-C	33.3 OHM
R16A	16.6 OHM
R17A	66.6 OHM
R18A-B	5,000 OHM
R19A	1.5 MEGOHM
R20A	2,000 OHM
R21A	1.67 OHM
R22A	5 OHM
R23A	40 OHM
R25A	29,500 OHM
R26A	110 OHM
R27A	250 OHM
R28A	25-27 OHM
R29A	1,000 OHM
R30A	40 OHM
R31A	700 OHM
R32A	10 OHM
R34A	6 OHM
R35A	20,000 OHM
R36A-C	25,000 OHM
R37A	1,000 OHM
R38A	30,000 OHM
R39A	20,000 OHM

L1A	VAR. INDUCT. ANT.
L2A	CHOKE, ANT. TRANS.
L3A-D	CHOKE, R.F.
L4A	COIL, R.F., REC. L.F.
L5A	COIL, OSC. REC. L.F.
L6A	COIL, R.F., REC. H.F.
L7A	COIL, OSC. REC. H.F.
L8A	COIL, B.F.O.
L9A	COIL, MO. H.F.
L10A	COIL, MO. L.F.
L11A	COIL, DOUBLER L.F.
L12A	COIL, DOUBLER H.F.
L13A	CHOKE, R.F. (FILAMENT)

V1A	TYPE 1D5GP. R.F. AMPLIFIER
V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
V2A	TYPE 1C7G. MIXER
V3A	TYPE 1H6G. 2nd DET. A.V.C.
V3B	TYPE 1H6G. B.F.O.
V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
V5A	TYPE 6U7G. M/O.
V6A	TYPE 6N7GT. MODULATOR
V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER

T1A	TRANS. ANT. CURRENT
T2A	TRANS. 1st I.F.
T2B	TRANS. 2nd I.F.
T3A	TRANS. 3rd I.F.
T4A	TRANS. OUTPUT & DRIVE
T5A	TRANS. MICROPHONE
T6A	TRANS. MODULATION

M1A	ALL METERING

S1A-L	FUNCTION SWITCH
S1D,H.J.	WAFER No. 1
S1C,E.G.	WAFER No. 2
S1A,F.L.	WAFER No. 3
S1B,K.	WAFER No. 4
S2A-B	ANT. LOADING SELECTOR SWITCH
S3A	NORMAL/REMOTE SWITCH
S3B	SEND/STAND-BY SWITCH
S4A-B	METER SWITCH
S4A	WAFER No. 1 (—)
S4B	WAFER No. 2 (+)
S5A-M	WAVE CHANGE SWITCH
S5A,B.C.	M/O. CHANGE-OVER
S5D,E.F.	R.F. CHANGE-OVER
S5G,H.J.	OSC. CHANGE-OVER
S5K,L.M.	DOUBLER CHANGE-OVER
S6A-F	NETTING SWITCH
S7A	CRASH LIMITER SWITCH

RL1	RELAY, SLUGGED ACTION
RL2	RELAY, KEYING
RL3	RELAY, GRID CHANGE-OVER
RL4	RELAY, SLUGGED ACTION

W1A	RECTIFIER, FULL-WAVE METER
W2A	RECTIFIER, HALF-WAVE METER
W3A	RECTIFIER, CRASH LIMITER
Y1A	POWER SOCKET
Y2A-B	DROP CORD SOCKET

J1A	KEY JACK
J2A	LINE JACK

CIRCUITS SHOWN

RELAYS IN "REC." POSITION.
FUNCTION SWITCH IN "C.W." POSITION.
WAVE-CHANGE SWITCH IN "L.F." POSITION.

SWITCHES

S1 FUNCTION SWITCH
POSITION 1—M.C.W.
" 2—C.W.
" 3—R.T.

S2 AERIAL SELECTOR SWITCH
POSITIONS: —TEST AERIAL
" A—VERTICAL AERIAL
" B-E—HORIZONTAL AND VERTICAL AERIALS

S3 NORMAL/REMOTE SWITCH
POSITION 1—NORMAL
" 2—REMOTE

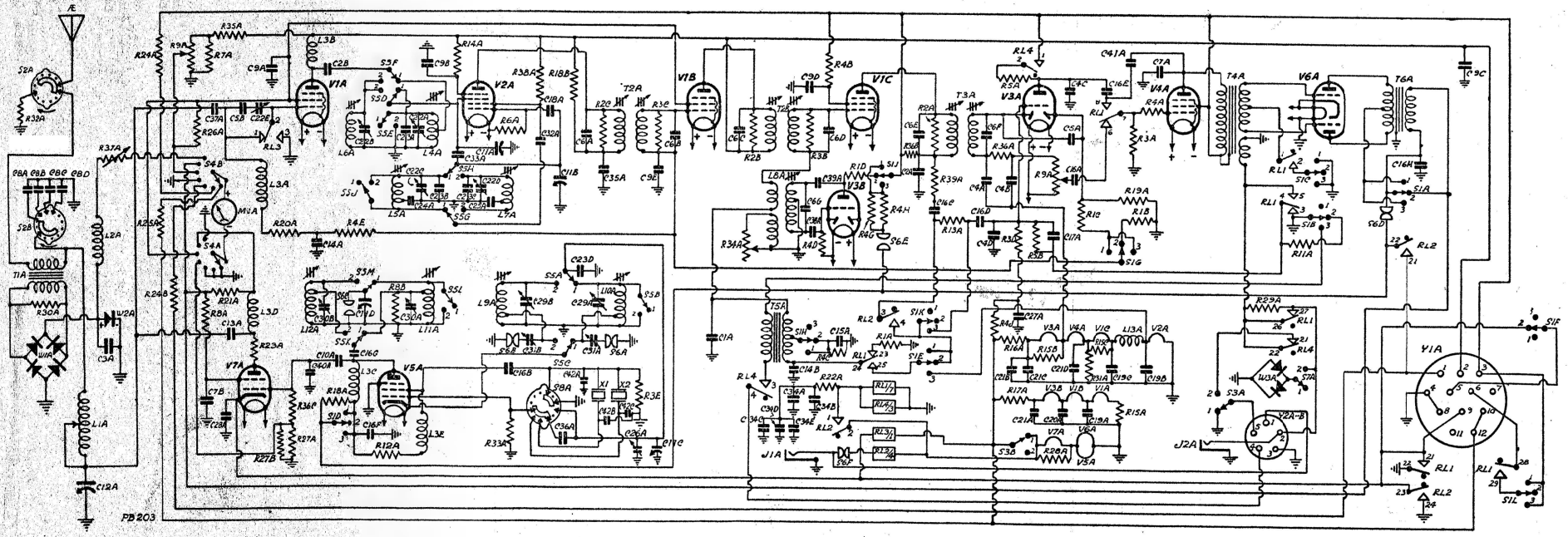
S3B SENDER ON/OFF SWITCH
POSITION 1—ON
" 2—OFF

S7A CRASH LIMITER SWITCH
POSITION 1—OFF
" 2—ON

S4 METER SWITCH
POSITION 1—AERIAL
" 2—P/A. M/A.
" 3—A.V.C.
" 4—DRIVE
" 5—H.T.S.
" 6—H.T.R.
" 7—L.T.

S5 WAVE-CHANGE SWITCH
POSITION 1—2-4 MC/S
" 2—4-8 MC/S

FIG. 1. WIRELESS SET No. 22 (AUST.) SCHEMATIC



C1A	.0001 ufd	C30A-B	6-27 uufd	R20A	2,000 OHM	V1A	TYPE 1D5GP. R.F. AMPLIFIER
C2A-B	.0005 ufd	C31A	4-11 uufd	R21A	1.67 OHM	V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
C3A	.001 ufd	C31B	3-6 uufd	R22A	5 OHM	V2A	TYPE 1C7G. MIXER
C4A-D	.0002 ufd	C32A	.001 ufd	R23A	40 OHM	V3A	TYPE1H6G.2nd DET.A.V.C.
C5A-B	35 uufd	C33A	.5-5 uufd	R25A	29,500 OHM	V3B	TYPE 1H6G. B.F.O.
C6A-G	100 uufd	C34A-E	300 ufd	R26A	110 OHM	V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
C7A-B	.002 ufd	C35A	.01 ufd	R27A-B	250 OHM	V5A	TYPE 6U7G. M/O.
C8	600 uufd	C36A	100 uufd	R28A	25-27 OHM	V6A	TYPE 6N7GT. MODULATOR
C8A	100 uufd }	C37A	.0001 ufd	R29A	1,000 OHM	V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER
C8B	100 uufd } TAPPED	C38A	.0001 ufd	R30A	40 OHM		
C8C	250 uufd }	C39A	.001 ufd	R31A	700 OHM		
C8D	150 uufd }	C40A	10 uufd	R32A	10 OHM	T1A	TRANS. ANT. CURRENT
C9A-E	.05 ufd	C41A	20 uufd	R33A	150,000 OHM	T2A	TRANS. 1st I.F.
C10A	.0003 ufd	C42A-C	15 uufd	R34A	6 OHM	T2B	TRANS. 2nd I.F.
C11A-D	VAR. COND., 4 GANG			R35A	20,000 OHM	T3A	TRANS. 3rd I.F.
C12A	VAR. COND., 1 GANG	R1A-D	1 MEGOHM	R36A-C	25,000 OHM	T4A	TRANS. OUTPUT & DRIVE
C13A	.001 ufd	R2A-C	750,000 OHM	R37A	1,000 OHM	T5A	TRANS. MICROPHONE
C14A-B	.02 ufd	R3A-E	500,000 OHM	R38A	30,000 OHM	T6A	TRANS. MODULATION
C15A	.002 ufd	R4A-J	100,000 OHM	R39A	20,000 OHM		
C16A-H	.01 ufd	R5A-B	250,000 OHM			M1A	ALL METERING
C17A	.0008 ufd	R6A	50,000 OHM	L1A	VAR. INDUCT. ANT.		
C18A	.00005 ufd	R7A	50,000 OHM	L2A	CHOKE, ANT. TRANS.	S1A-L	FUNCTION SWITCH
C19A-C	.1 ufd	R8A-B	10,000 OHM	L3A-E	CHOKE, R.F.	S1D,H.J.	WAFER No. 1
C20A	.5 ufd	R9A-B	1 MEGOHM	L4A	COIL, R.F., REC. L.F.	S1C,E.G.	WAFER No. 2
C21A-D	250 uufd	R11A	100 OHM	L5A	COIL, OSC. REC. L.F.	S1A,F.L.	WAFER No. 3
C21A-D	250 ufd	R12A	40,000 OHM	L6A	COIL, R.F., REC. H.F.	S1B,K.	WAFER No. 4
C22A-E	4-30 uufd	R13A	200,000 OHM	L7A	COIL, OSC. REC. H.F.	S2A-B	ANT. LOADING SELECTOR SWITCH
C23A-D	20 uufd	R14A	70,000 OHM	L8A	COIL, B.F.O.	S3A	NORMAL/REMOTE SWITCH
C24A	1200 uufd	R15A-C	33.3 OHM	L9A	COIL, MO. H.F.	S3B	SEND/STAND-BY SWITCH
C25A	2060 uufd	R16A	16.6 OHM	L10A	COIL, MO. L.F.	S4A-B	METER SWITCH
C26A	4-11 uufd	R17A	66.6 OHM	L11A	COIL, DOUBLER L.F.	S4A	WAFER No. 1 (—)
C27A	.3 ufd	R18A-B	5,000 OHM	L12A	COIL, DOUBLER H.F.	S4B	WAFER No. 2 (+)
C28A	.02 ufd	R19A	1.5 MEGOHM	L13A	CHOKE, R.F. (FILAMENT)	S5A-M	WAVE CHANGE SWITCH
C29A-B	6-22 uufd					S5A,B.C.	M/O. CHANGE-OVER
						S5D,E.F.	R.F. CHANGE-OVER
						S5G,H.J.	OSC. CHANGE-OVER
						S5K,L.M.	DOUBLER CHANGE-OVER
						S6A-F	NETTING SWITCH
						S7A	CRASH LIMITER SWITCH
						S8A	CRYSTAL OSCILLATOR CHANGE OVER SWITCH
						RL1	RELAY, SLUGGED ACTION
						RL2	RELAY, KEYING
						RL3	RELAY, GRID CHANGE-OVER
						RL4	RELAY, SLUGGED ACTION
						W1A	RECTIFIER, FULL-WAVE METER
						W2A	RECTIFIER, HALF-WAVE METER
						W3A	RECTIFIER, CRASH LIMITER
						Y1A	POWER SOCKET
						Y2A-B	DROP CORD SOCKET
						J1A	KEY JACK
						J2A	LINE JACK

LEGEND

CIRCUITS SHOWN

RELAYS IN "REC." POSITION.
FUNCTION SWITCH IN "C.W." POSITION.
WAVE-CHANGE SWITCH IN "L.F." POSITION.
CRYSTAL OSCILLATOR SWITCH IN "M/O" POSITION

SWITCHES

S1 FUNCTION SWITCH
POSITION 1—M.C.W.
„ 2—C.W.
„ 3—R.T.

S2 AERIAL SELECTOR SWITCH
POSITIONS: —TEST AERIAL
„ A—VERTICAL AERIAL
„ B-E—HORIZONTAL AND VERTICAL AERIALS

S3 NORMAL/REMOTE SWITCH
POSITION 1—NORMAL
„ 2—REMOTE

S3B SENDER ON/OFF SWITCH
POSITION 1—ON
„ 2—OFF

S7A CRASH LIMITER SWITCH
POSITION 1—OFF
„ 2—ON

S4 METER SWITCH
POSITION 1—AERIAL
„ 2—P/A. M/A.
„ 3—A.V.C.
„ 4—DRIVE
„ 5—H.T.S.
„ 6—H.T.R.
„ 7—L.T.

S5 WAVE-CHANGE SWITCH
POSITION 1—2-4 MC/S
„ 2—4-8 MC/S

S8A CRYSTAL OSCILLATOR SWITCH
POSITION 1—M/O.
„ 2—X1.
„ 3—X2.

WIRELESS SET No. 122 (AUST.) SCHEMATIC

FIG. 1A

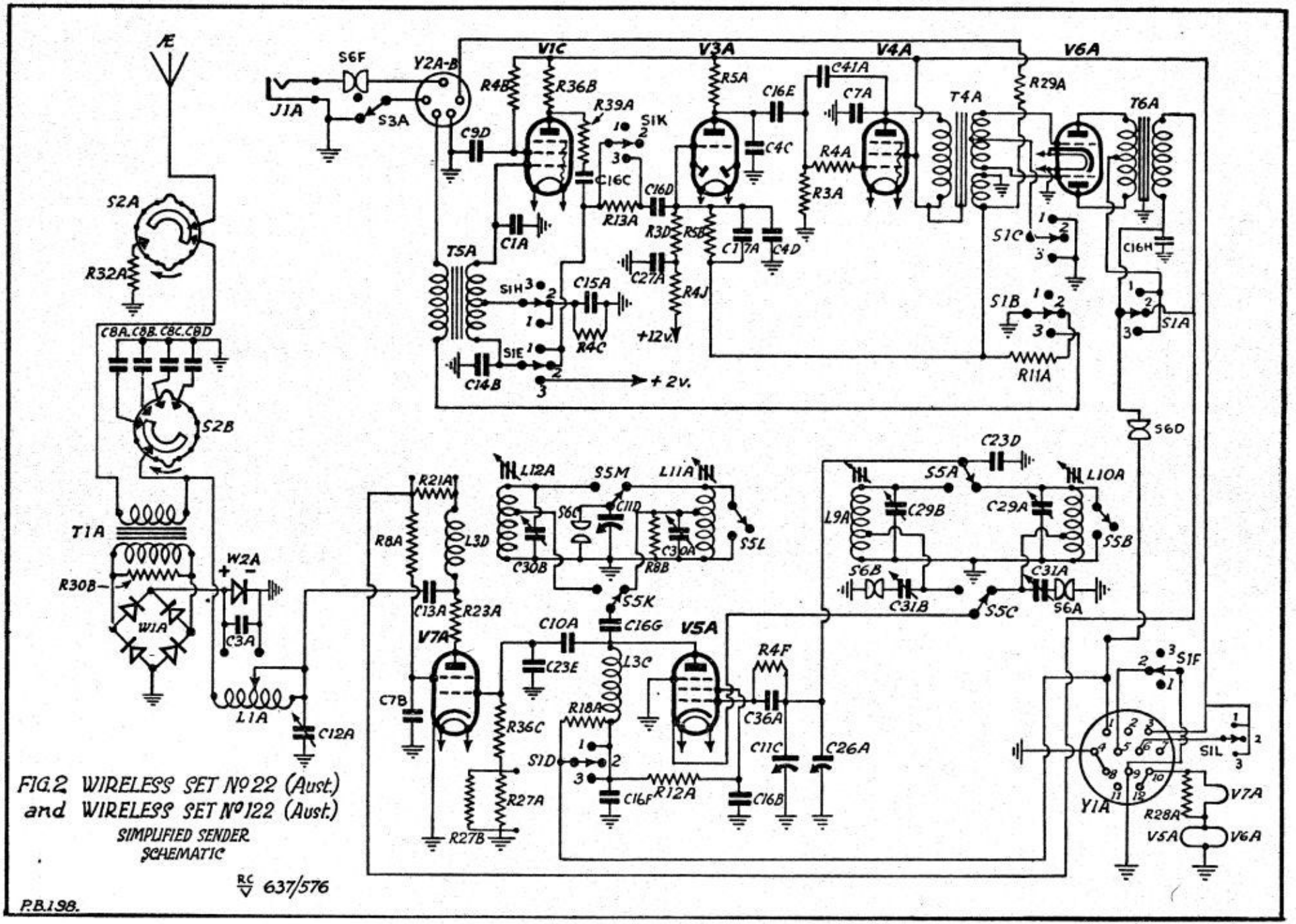


FIG.2 WIRELESS SET No 22 (Aust.) and WIRELESS SET No 122 (Aust.)

SIMPLIFIED SENDER SCHEMATIC

RC 637/576

P.B.198.

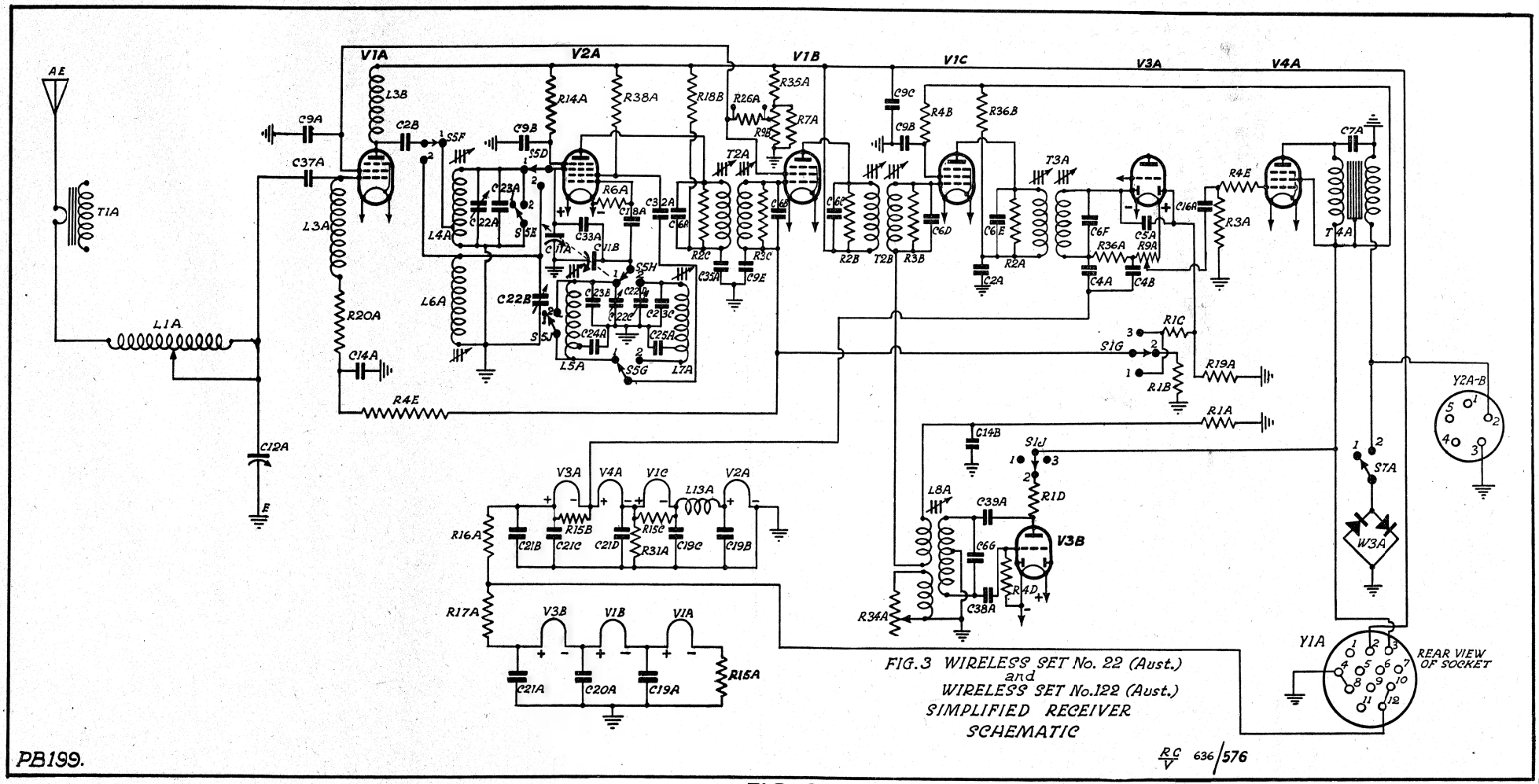


FIG.3 WIRELESS SET No. 22 (Aust.) and WIRELESS SET No.122 (Aust.) SIMPLIFIED RECEIVER SCHEMATIC

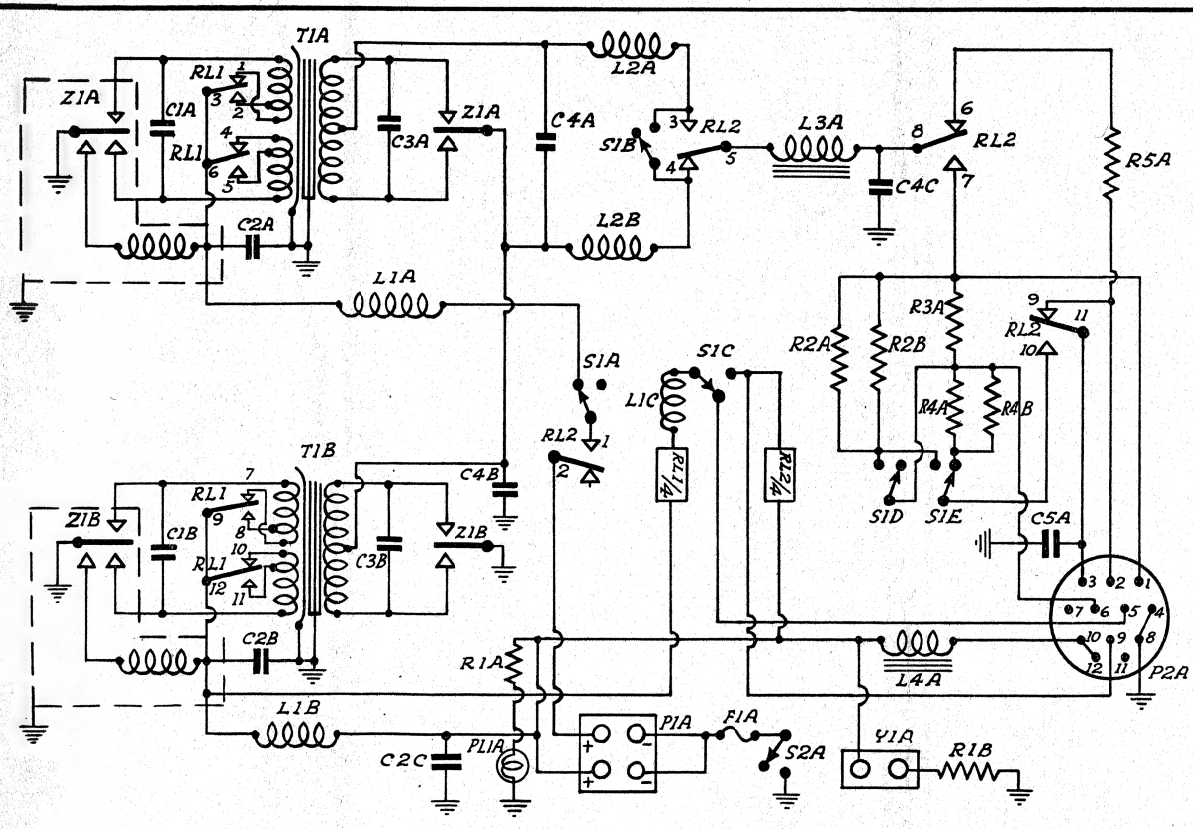
PB199.

RC V 636/576

FIG. 3.

LEGEND

C1A-B	·05 µfd.
C2A-C	1 µfd.
C3A-B	·02 µfd.
C4A-C	16 µfd.
C5A	8 µfd.
R1A-B	200 ohm
R2A-B	1,500 ohm
R3A-	6,200 ohm
R4A-B	10,000 ohm
R5A	500 ohm
L1A-C	R.F. Filtering L.T.
L2A-B	R.F. Filtering H.T.
L3A	L.F. Filtering H.T.
L4A	L.F. Filtering L.T.
T1A, T1B	Twin Power Trans. Assy.
RL1	Relay A+ change-over
RL2	Relay B+ change-over
PL1A	Lamp Indicator
F1A	Fuse
Z1A-B	Vibrators
P1A	Battery Plug
P2A	Cable Plug
S1A-F	Switch HP/LP.
S1A-B	Wafer No.1
S1C-F	Wafer No.2
S2A	Switch on/off A+
Y1A	Socket. Inspection Lamp



Rear view Shown of P1A, P2A and Y1A

Relays RL1 & RL2 Shown in "Rec!" position

HP/LP Switch S1 Shown in "HP" position

WIRELESS SET No. 22 (AUST.)

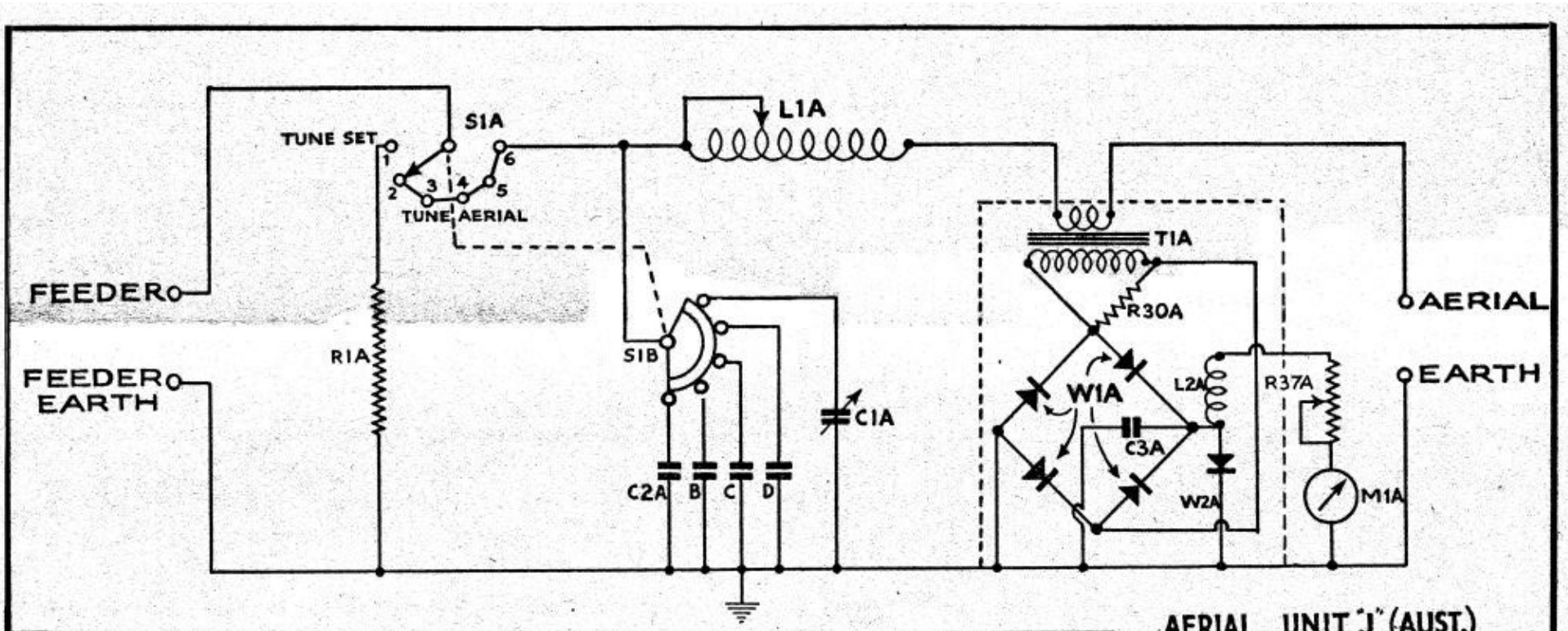
SUPPLY UNIT NO. 1A

SCHEMATIC

RC/V Drg. 635/576

PB201

FIG. 4.



LEGEND					
C1A	14-480 Var. Cond.	R30A	40 Ohms	L1A	Var. Inductor
C2A-D	400 uuf Cond.	R37A	1000 ohms.	L2A	R.F. Choke
C3A	.001 uf.	T1A	Meter Trans.	W1A	Rect F/Wave
R1A	100 Ohms (10x1000 Ohm)	S1A-B	Coup. Switch	W2A	Rect H/Wave
				M1	Meter 500 ua

AERIAL UNIT "J" (AUST.)
ZAA 3851—
SCHEMATIC
RC DRG. 39
V FILE 576

FIG. 5.

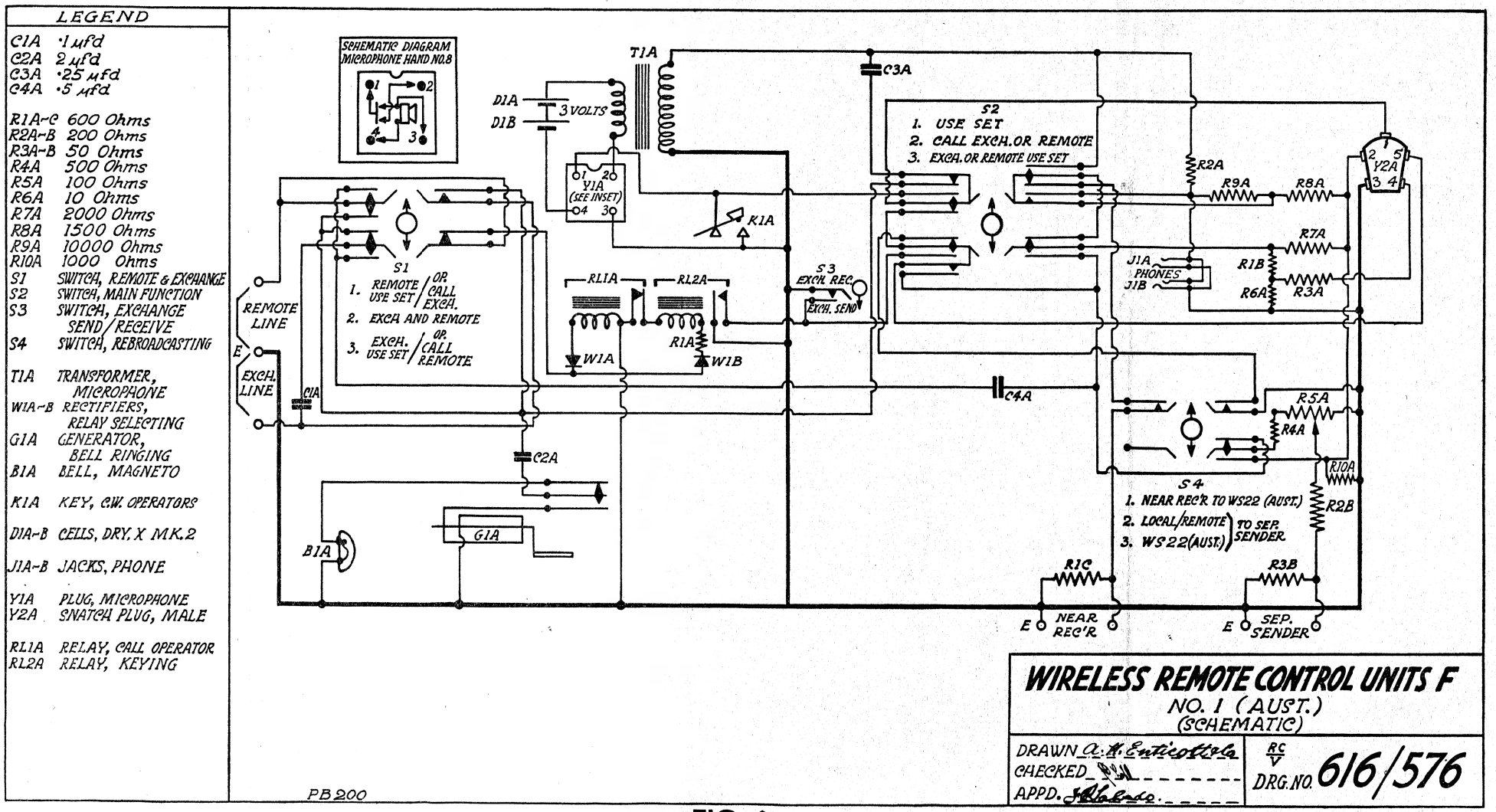

LEGEND
C1A ·1 μfd
C2A 2 μfd
C3A ·25 μfd
C4A ·5 μfd
R1A-C 600 Ohms
R2A-B 200 Ohms
R3A-B 50 Ohms
R4A 500 Ohms
R5A 100 Ohms
R6A 10 Ohms
R7A 2000 Ohms
R8A 1500 Ohms
R9A 10000 Ohms
R10A 1000 Ohms
S1 SWITCH, REMOTE & EXCHANGE
S2 SWITCH, MAIN FUNCTION
S3 SWITCH, EXCHANGE SEND/RECEIVE
S4 SWITCH, REBROADCASTING
T1A TRANSFORMER, MICROPHONE
W1A-B RECTIFIERS, RELAY SELECTING
G1A GENERATOR, BELL RINGING
B1A BELL, MAGNETO
K1A KEY, C.W. OPERATORS
D1A-B CELLS, DRY. X MK.2
J1A-B JACKS, PHONE
Y1A PLUG, MICROPHONE
Y2A SNATCH PLUG, MALE
RL1A RELAY, CALL OPERATOR
RL2A RELAY, KEYING
SCHEMATIC DIAGRAM MICROPHONE HAND NO.8
T1A
D1A
D1B
3 VOLTS
Y1A (SEE INSET)
K1A
S1
1. REMOTE USE SET / OR CALL EXCH.
2. EXCH AND REMOTE
3. EXCH. USE SET / OR CALL REMOTE
REMOTE LINE
E
EXCH. LINE
C1A
C2A
B1A
G1A
RL1A
RL2A
W1A
W1B
R1A
S3 EXCH. REC.
EXCH. SEND
C3A
S2
1. USE SET
2. CALL EXCH. OR REMOTE
3. EXCH. OR REMOTE USE SET
C4A
R2A
R9A
R8A
Y2A
R7A
J1A PHONES J1B
R1B
R6A
R3A
R5A
R4A
R10A
R2B
S4
1. NEAR REC'R TO WS22 (AUST.)
2. LOCAL/REMOTE TO SEP. SENDER
3. WS22 (AUST.)
R1C
R3B
E NEAR REC'R
E SEP. SENDER
PB200
WIRELESS REMOTE CONTROL UNITS F
NO. 1 (AUST.)
(SCHEMATIC)
DRAWN A. M. Enticottels
CHECKED
APPD. J. Blando
RC V
DRG. NO. 616/576

FIG. 6.

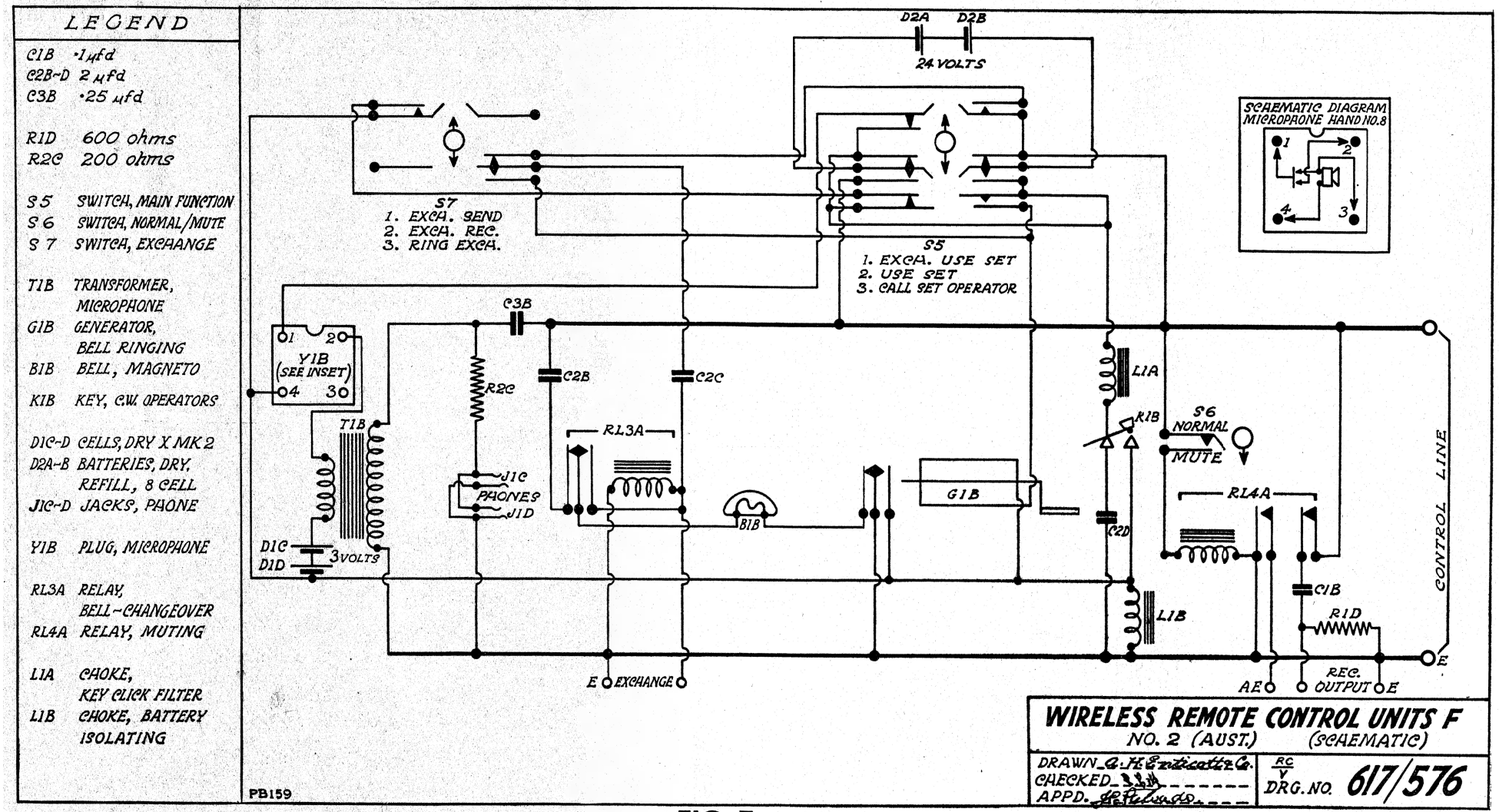
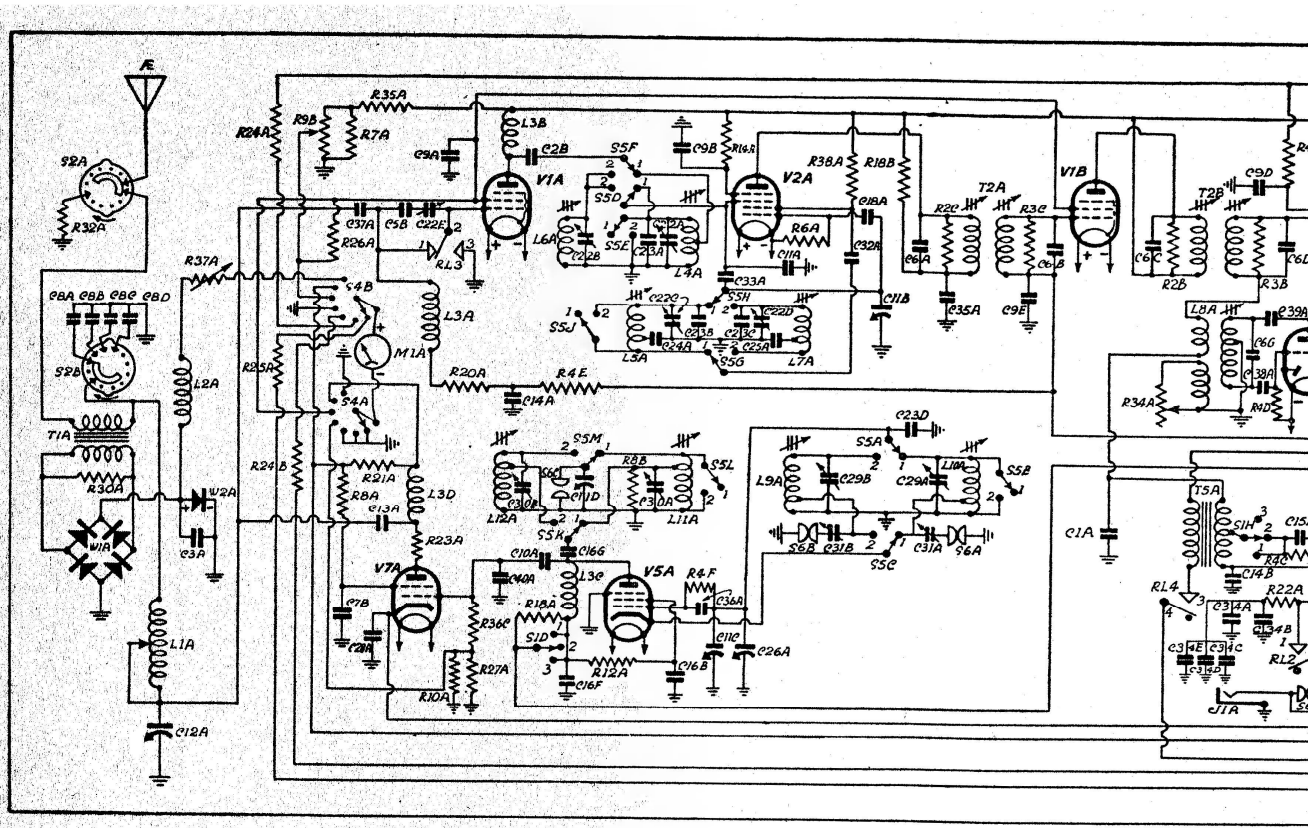

LEGEND
C1B ·1μfd
C2B-D 2μfd
C3B ·25 μfd
R1D 600 ohms
R2C 200 ohms
S5 SWITCH, MAIN FUNCTION
S6 SWITCH, NORMAL/MUTE
S7 SWITCH, EXCHANGE
T1B TRANSFORMER, MICROPHONE
G1B GENERATOR, BELL RINGING
B1B BELL, MAGNETO
K1B KEY, C.W. OPERATORS
D1C-D CELLS, DRY X MK 2
D2A-B BATTERIES, DRY, REFILL, 8 CELL
J1C-D JACKS, PHONE
Y1B PLUG, MICROPHONE
RL3A RELAY, BELL-CHANGEOVER
RL4A RELAY, MUTING
L1A CHOKE, KEY CLICK FILTER
L1B CHOKE, BATTERY ISOLATING
D2A
D2B
24 VOLTS
S7
1. EXCH. SEND
2. EXCH. REC.
3. RING EXCH.
S5
1. EXCH. USE SET
2. USE SET
3. CALL SET OPERATOR
SCHEMATIC DIAGRAM MICROPHONE HAND NO.8
C3B
Y1B (SEE INSET)
R2C
C2B
C2C
RL3A
T1B
J1C
PHONES
J1D
D1C
D1D
3 VOLTS
B1B
G1B
L1A
R1B
S6
NORMAL
MUTE
RL4A
C2D
L1B
C1B
R1D
CONTROL LINE
E
EXCHANGE
AE
REC. OUTPUT
E
WIRELESS REMOTE CONTROL UNITS F
NO. 2 (AUST.) (SCHEMATIC)
DRAWN G.H.E. Electric & Co.
CHECKED
APPD.
RC
V
DRG. NO. 617/576
PB159

FIG. 7.



LEGEND

C1A	.0001 ufd
C2A-B	.0005 ufd
C3A	.001 ufd
C4A-D	.0002 ufd
C5A-B	35 uufd
C6A-G	100 uufd
C7A-B	.002 ufd
C8	600 uufd
C8A	100 uufd
C8B	100 uufd
C8C	250 uufd
C8D	150 uufd
	TAPPED
C9A-E	.05 ufd
C10A	.0003 ufd
C11A-D	VAR. COND., 4 GANG
C12A	VAR. COND., 1 GANG
C13A	.001 ufd
C14A-B	.02 ufd
C15A	.002 ufd
C16A-H	.01 ufd
C17A	.0008 ufd
C18A	.00005 ufd
C19A-C	.1 ufd
C20A	.5 ufd
C21A-D	250 uufd
C21A-D	250 ufd
C22A-E	4-30 uufd
C23A-D	20 uufd
C24A	1200 uufd
C25A	2060 uufd
C26A	4-11 uufd
C27A	.3 ufd
C28A	.02 ufd
C29A-B	6-22 uufd
C30A-B	6-27 uufd
C31A	4-11 uufd
C31B	3-6 uufd
C32A	.001 ufd
C33A	.5-5 uufd
C34A-E	300 ufd
C35A	.01 ufd
C36A	100 uufd
C37A	.0001 ufd
C38A	.0001 ufd
C39A	.001 ufd
C40A	10 uufd
C41A	20 uufd

R1A-D	1 MEGOHM
R2A-C	750,000 OHM
R3A-D	500,000 OHM
R4A-J	100,000 OHM
R5A-B	250,000 OHM
R6A	50,000 OHM
R7A	50,000 OHM
R8A-B	10,000 OHM
R9A-B	1 MEGOHM
R10A	500 OHM
R11A	100 OHM
R12A	40,000 OHM
R13A	200,000 OHM
R14A	70,000 OHM
R15A-C	33.3 OHM
R16A	16.6 OHM
R17A	66.6 OHM
R18A-B	5,000 OHM
R19A	1.5 MEGOHM
R20A	2,000 OHM
R21A	1.67 OHM
R22A	5 OHM
R23A	40 OHM
R25A	29,500 OHM
R26A	110 OHM
R27A	250 OHM
R28A	25-27 OHM
R29A	1,000 OHM
R30A	40 OHM
R31A	700 OHM
R32A	10 OHM
R34A	6 OHM
R35A	20,000 OHM
R36A-C	25,000 OHM
R37A	1,000 OHM
R38A	30,000 OHM
R39A	20,000 OHM

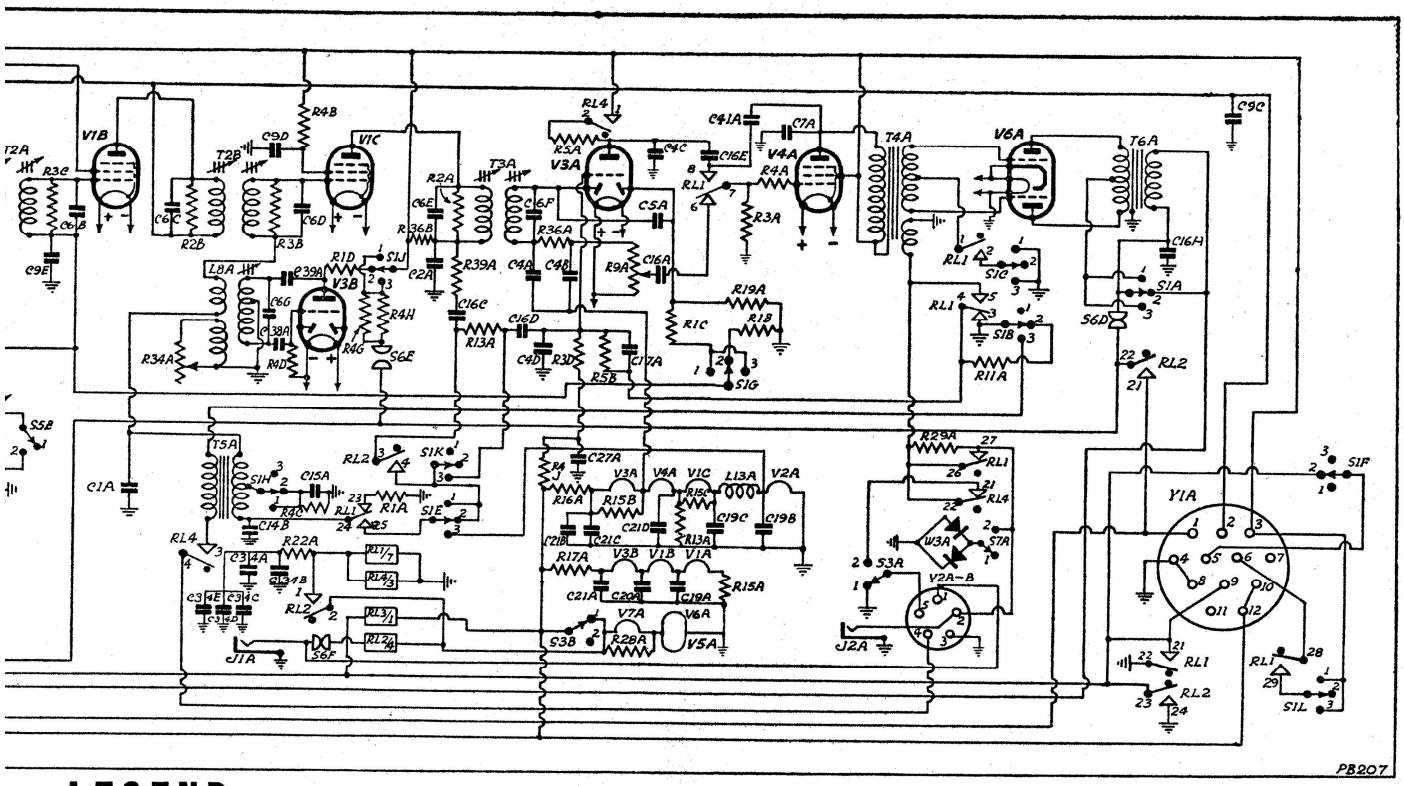
L1A	VAR. INDUCT. ANT.
L2A	CHOKE, ANT. TRANS.
L3A-D	CHOKE, R.F.
L4A	COIL, R.F., REC. L.F.
L5A	COIL, OSC. REC. L.F.
L6A	COIL, R.F., REC. H.F.
L7A	COIL, OSC. REC. H.F.
L8A	COIL, B.F.O.
L9A	COIL, MO. H.F.
L10A	COIL, MO. L.F.
L11A	COIL, DOUBLER L.F.
L12A	COIL, DOUBLER H.F.
L13A	CHOKE, R.F. (FILAMENT)

V1A	TYPE 1D5GP. R.F. AMPLIFIER
V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
V2A	TYPE 1C7G. MIXER
V3A	TYPE 1H6G. 2nd DET. A.V.C.
V3B	TYPE 1H6G. B.F.O.
V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
V5A	TYPE 6U7G. M/O.
V6A	TYPE 6N7GT. MODULATOR
V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER

T1A	TRANS. ANT. CURRENT
T2A	TRANS. 1st I.F.
T2B	TRANS. 2nd I.F.
T3A	TRANS. 3rd I.F.
T4A	TRANS. OUTPUT & DRIVE
T5A	TRANS. MICROPHONE
T6A	TRANS. MODULATION

M1A	ALL METERING

S1A-L	FUNCTION SWITCH
S1D,H.J.	WAFER No. 1
S1C,E.G.	WAFER No. 2
S1A,F.L.	WAFER No. 3
S1B,K.	WAFER No. 4
S2A-B	ANT. LOADING SELECTOR SWITCH
S3A	NORMAL/REMOTE SWITCH



LEGEND

V1A	TYPE 1D5GP. R.F. AMPLIFIER
V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
V2A	TYPE 1C7G. MIXER
V3A	TYPE 1H6G. 2nd DET. A.V.C.
V3B	TYPE 1H6G. B.F.O.
V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
V5A	TYPE 6U7G. M/O.
V6A	TYPE 6N7GT. MODULATOR
V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER
T1A	TRANS. ANT. CURRENT
T2A	TRANS. 1st I.F.
T2B	TRANS. 2nd I.F.
T3A	TRANS. 3rd I.F.
T4A	TRANS. OUTPUT & DRIVE
T5A	TRANS. MICROPHONE
T6A	TRANS. MODULATION
M1A	ALL METERING
S1A-L	FUNCTION SWITCH
S1D,H.J.	WAFER No. 1
S1C,E.G.	WAFER No. 2
S1A,F.L.	WAFER No. 3
S1B,K.	WAFER No. 4
S2A-B	ANT. LOADING SELECTOR SWITCH
S3A	NORMAL/REMOTE SWITCH
S3B	SEND/STAND-BY SWITCH
S4A-B	METER SWITCH
S4A	WAFER No. 1 (—)
S4B	WAFER No. 2 (+)
S5A-M	WAVE CHANGE SWITCH
S5A,B.C.	M/O. CHANGE-OVER
S5D,E.F.	R.F. CHANGE-OVER
S5G,H.J.	OSC. CHANGE-OVER
S5K,L.M.	DOUBLER CHANGE-OVER
S6A-F	NETTING SWITCH
S7A	CRASH LIMITER SWITCH
RL1	RELAY, SLUGGED ACTION
RL2	RELAY, KEYING
RL3	RELAY, GRID CHANGE-OVER
RL4	RELAY, SLUGGED ACTION
W1A	RECTIFIER, FULL-WAVE METER
W2A	RECTIFIER, HALF-WAVE METER
W3A	RECTIFIER, CRASH LIMITER
Y1A	POWER SOCKET
Y2A-B	DROP CORD SOCKET
J1A	KEY JACK
J2A	LINE JACK

CIRCUITS SHOWN

RELAYS IN "REC." POSITION.
FUNCTION SWITCH IN "C.W." POSITION.
WAVE-CHANGE SWITCH IN "L.F." POSITION.

SWITCHES

S1 FUNCTION SWITCH
POSITION 1—M.C.W.
" 2—C.W.
" 3—R.T.

S2 AERIAL SELECTOR SWITCH
POSITIONS: —TEST AERIAL
" A—VERTICAL AERIAL
" B-E—HORIZONTAL AND VERTICAL AERIALS

S3 NORMAL/REMOTE SWITCH
POSITION 1—NORMAL
" 2—REMOTE

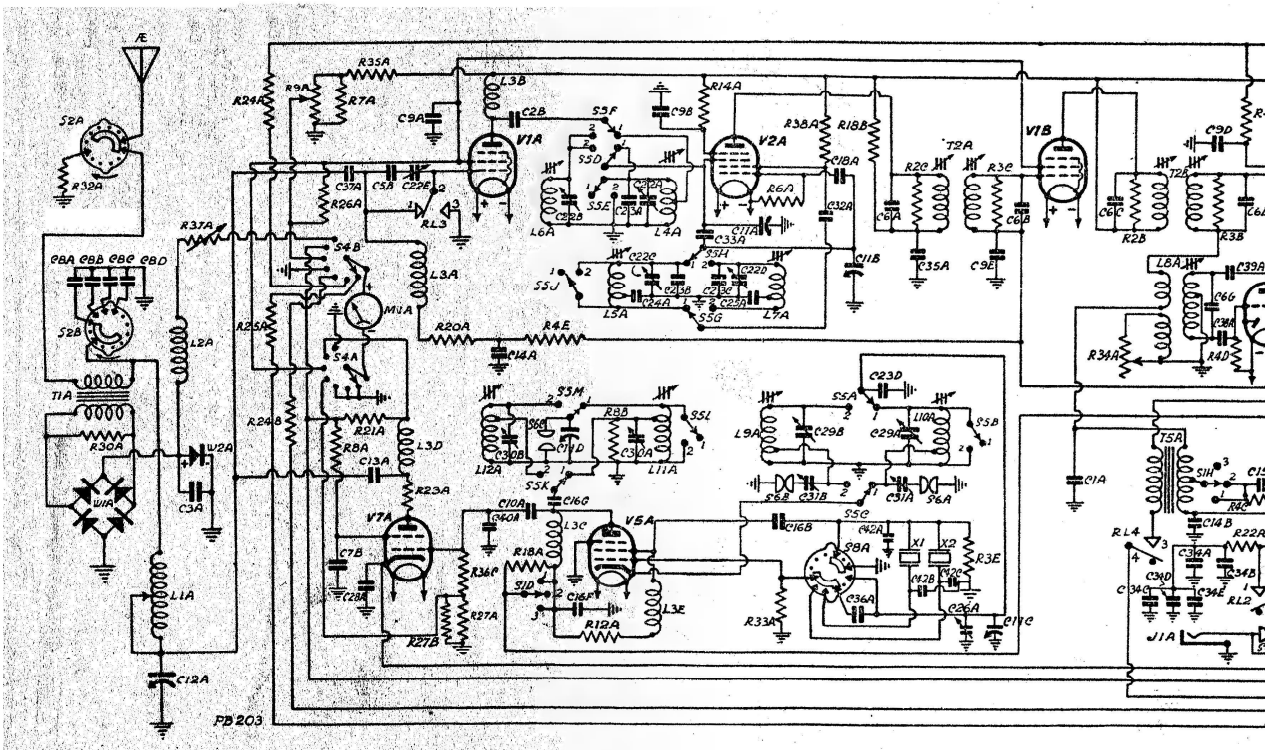
S3B SENDER ON/OFF SWITCH
POSITION 1—ON
" 2—OFF

S7A CRASH LIMITER SWITCH
POSITION 1—OFF
" 2—ON

S4 METER SWITCH
POSITION 1—AERIAL
" 2—P/A. M/A.
" 3—A.V.C.
" 4—DRIVE
" 5—H.T.S.
" 6—H.T.R.
" 7—L.T.

S5 WAVE-CHANGE SWITCH
POSITION 1—2-4 MC/S
" 2—4-8 MC/S

FIG. 1. WIRELESS SET No. 22 (AUST.) SCHEMATIC



LEGEND

C1A	.0001 ufd
C2A-B	.0005 ufd
C3A	.001 ufd
C4A-D	.0002 ufd
C5A-B	35 uufd
C6A-G	100 uufd
C7A-B	.002 ufd
C8	600 uufd
C8A	100 uufd
C8B	100 uufd
C8C	250 uufd
C8D	150 uufd
	TAPPED
C9A-E	.05 ufd
C10A	.0003 ufd
C11A-D	VAR. COND., 4 GANG
C12A	VAR. COND., 1 GANG
C13A	.001 ufd
C14A-B	.02 ufd
C15A	.002 ufd
C16A-H	.01 ufd
C17A	.0008 ufd
C18A	.00005 ufd
C19A-C	.1 ufd
C20A	.5 ufd
C21A-D	250 uufd
C21A-D	250 ufd
C22A-E	4-30 uufd
C23A-D	20 uufd
C24A	1200 uufd
C25A	2060 uufd
C26A	4-11 uufd
C27A	.3 ufd
C28A	.02 ufd
C29A-B	6-22 uufd
C30A-B	6-27 uufd
C31A	4-11 uufd
C31B	3-6 uufd
C32A	.001 ufd
C33A	.5-5 uufd
C34A-E	300 ufd
C35A	.01 ufd
C36A	100 uufd
C37A	.0001 ufd
C38A	.0001 ufd
C39A	.001 ufd
C40A	10 uufd
C41A	20 uufd
C42A-C	15 uufd

R1A-D	1 MEGOHM
R2A-C	750,000 OHM
R3A-E	500,000 OHM
R4A-J	100,000 OHM
R5A-B	250,000 OHM
R6A	50,000 OHM
R7A	50,000 OHM
R8A-B	10,000 OHM
R9A-B	1 MEGOHM
R11A	100 OHM
R12A	40,000 OHM
R13A	200,000 OHM
R14A	70,000 OHM
R15A-C	33.3 OHM
R16A	16.6 OHM
R17A	66.6 OHM
R18A-B	5,000 OHM
R19A	1.5 MEGOHM
R20A	2,000 OHM
R21A	1.67 OHM
R22A	5 OHM
R23A	40 OHM
R25A	29,500 OHM
R26A	110 OHM
R27A-B	250 OHM
R28A	25-27 OHM
R29A	1,000 OHM
R30A	40 OHM
R31A	700 OHM
R32A	10 OHM
R33A	150,000 OHM
R34A	6 OHM
R35A	20,000 OHM
R36A-C	25,000 OHM
R37A	1,000 OHM
R38A	30,000 OHM
R39A	20,000 OHM

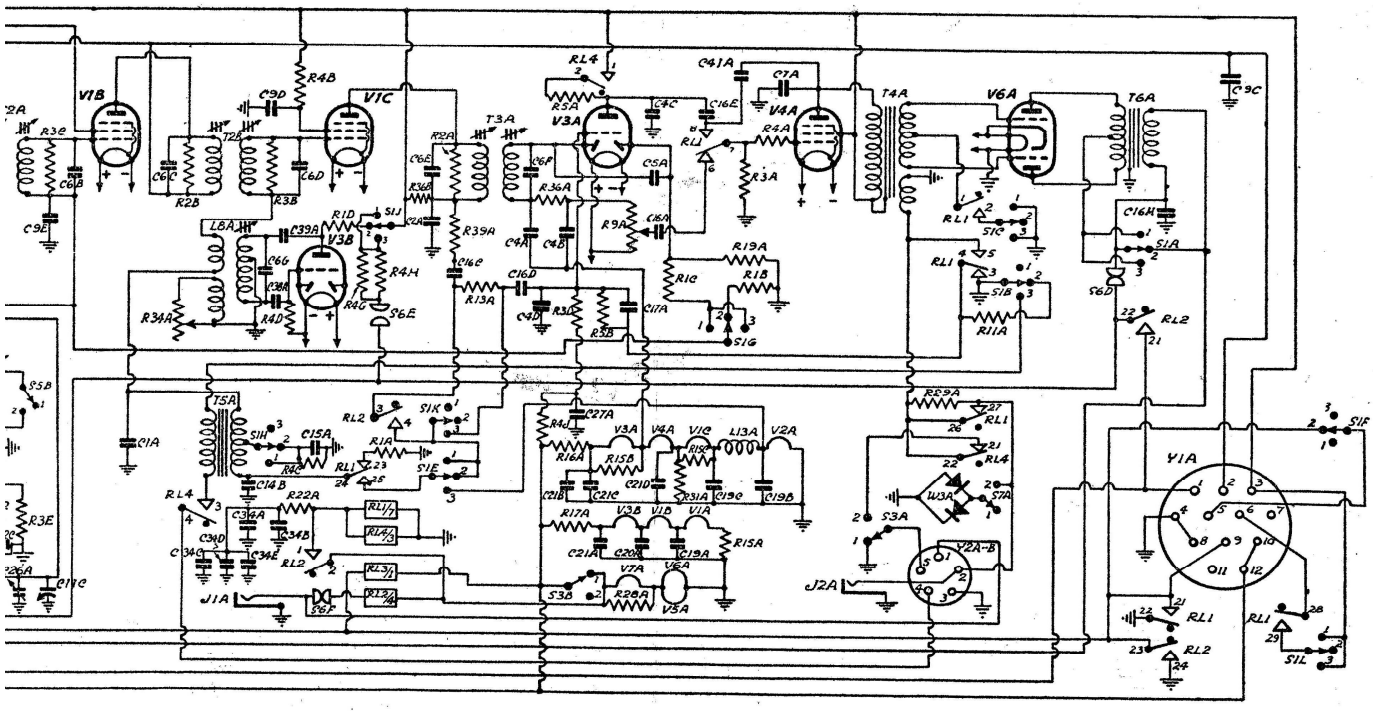
L1A	VAR. INDUCT. ANT.
L2A	CHOKE, ANT. TRANS.
L3A-E	CHOKE, R.F.
L4A	COIL, R.F., REC. L.F.
L5A	COIL, OSC. REC. L.F.
L6A	COIL, R.F., REC. H.F.
L7A	COIL, OSC. REC. H.F.
L8A	COIL, B.F.O.
L9A	COIL, MO. H.F.
L10A	COIL, MO. L.F.
L11A	COIL, DOUBLER L.F.
L12A	COIL, DOUBLER H.F.
L13A	CHOKE, R.F. (FILAMENT)

V1A	TYPE 1D5GP. R.F. AMPLIFIER
V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
V2A	TYPE 1C7G. MIXER
V3A	TYPE1H6G.2nd DET.A.V.C.
V3B	TYPE 1H6G. B.F.O.
V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
V5A	TYPE 6U7G. M/O.
V6A	TYPE 6N7GT. MODULATOR
V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER

T1A	TRANS. ANT. CURRENT
T2A	TRANS. 1st I.F.
T2B	TRANS. 2nd I.F.
T3A	TRANS. 3rd I.F.
T4A	TRANS. OUTPUT & DRIVE
T5A	TRANS. MICROPHONE
T6A	TRANS. MODULATION

M1A	ALL METERING

S1A-L	FUNCTION SWITCH
S1D,H,J.	WAFER No. 1
S1C,E,G.	WAFER No. 2
S1A,F,L.	WAFER No. 3
S1B,K.	WAFER No. 4
S2A-B	ANT. LOADING SELECTOR SWITCH
S3A	NORMAL/REMOTE SWITCH



LEGEND

V1A	TYPE 1D5GP. R.F. AMPLIFIER
V1B-C	TYPE 1D5GP. I.F. AMPLIFIERS
V2A	TYPE 1C7G. MIXER
V3A	TYPE 1H6G. 2nd DET. A.V.C.
V3B	TYPE 1H6G. B.F.O.
V4A	TYPE 1F5G. AUDIO OUTPUT AMP.
V5A	TYPE 6U7G. M/O.
V6A	TYPE 6N7GT. MODULATOR
V7A	TYPE 807 (VT-100-A) POWER AMPLIFIER

T1A	TRANS. ANT. CURRENT
T2A	TRANS. 1st I.F.
T2B	TRANS. 2nd I.F.
T3A	TRANS. 3rd I.F.
T4A	TRANS. OUTPUT & DRIVE
T5A	TRANS. MICROPHONE
T6A	TRANS. MODULATION

M1A	ALL METERING

S1A-L	FUNCTION SWITCH
S1D,H.J.	WAFER No. 1
S1C,E.G.	WAFER No. 2
S1A,F.L.	WAFER No. 3
S1B,K.	WAFER No. 4
S2A-B	ANT. LOADING SELECTOR SWITCH
S3A	NORMAL/REMOTE SWITCH
S3B	SEND/STAND-BY SWITCH
S4A-B	METER SWITCH
S4A	WAFER No. 1 (—)
S4B	WAFER No. 2 (+)
S5A-M	WAVE CHANGE SWITCH
S5A,B.C.	M/O. CHANGE-OVER
S5D,E.F.	R.F. CHANGE-OVER
S5G,H.J.	OSC. CHANGE-OVER
S5K,L.M.	DOUBLER CHANGE-OVER
S6A-F	NETTING SWITCH
S7A	CRASH LIMITER SWITCH
S8A	CRYSTAL OSCILLATOR CHANGE OVER SWITCH

RL1	RELAY, SLUGGED ACTION
RL2	RELAY, KEYING
RL3	RELAY, GRID CHANGE-OVER
RL4	RELAY, SLUGGED ACTION

W1A	RECTIFIER, FULL-WAVE METER
W2A	RECTIFIER, HALF-WAVE METER
W3A	RECTIFIER, CRASH LIMITER
Y1A	POWER SOCKET
Y2A-B	DROP CORD SOCKET

J1A	KEY JACK
J2A	LINE JACK

CIRCUITS SHOWN

RELAYS IN "REC." POSITION.
FUNCTION SWITCH IN "C.W." POSITION.
WAVE-CHANGE SWITCH IN "L.F." POSITION.
CRYSTAL OSCILLATOR SWITCH IN "M/O" POSITION

SWITCHES

S1 FUNCTION SWITCH
POSITION 1—M.C.W.
" 2—C.W.
" 3—R.T.

S2 AERIAL SELECTOR SWITCH
POSITIONS: —TEST AERIAL
" A—VERTICAL AERIAL
" B-E—HORIZONTAL AND VERTICAL AERIALS

S3 NORMAL/REMOTE SWITCH
POSITION 1—NORMAL
" 2—REMOTE

S3B SENDER ON/OFF SWITCH
POSITION 1—ON
" 2—OFF

S7A CRASH LIMITER SWITCH
POSITION 1—OFF
" 2—ON

S4 METER SWITCH
POSITION 1—AERIAL
" 2—P/A. M/A.
" 3—A.V.C.
" 4—DRIVE
" 5—H.T.S.
" 6—H.T.R.
" 7—L.T.

S5 WAVE-CHANGE SWITCH
POSITION 1—2-4 MC/S
" 2—4-8 MC/S

S8A CRYSTAL OSCILLATOR SWITCH
POSITION 1—M/O.
" 2—X1.
" 3—X2.

WIRELESS SET No. 122 (AUST.) SCHEMATIC

FIG. 1A