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AUSTRALIAN MILITARY FORCES

SIGNAL TRAINING VOL. 3

Australian Pamphlet No. 6

WIRELESS SET No. 11 (AUST.)

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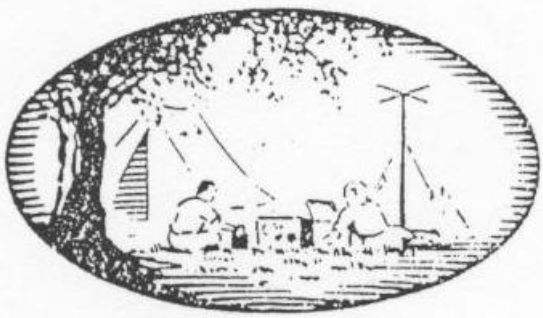

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WIRELESS SET No. 11 (AUST.)

Signal Training Volume III
Australian Pamphlet No. 6

CHAPTER I

GENERAL DESCRIPTION

1. GENERAL FEATURES.

NOTE.—Unless special mention is made, all references to Wireless Set No. 11, made in the following pages, apply equally to the English and Australian versions of this equipment.

Chapters or paragraphs carrying the word "AUST." in their headings or text, apply particularly to the Australian type Wireless Set No. 11.

Wireless Set No. 11 (AUST.)* has been designed to replace Wireless Set No. 101. It is a combined sender and receiver, its frequency range is 7.5 Mc/s (λ = 40 m.) to 4.2 Mc/s (λ = 71.4 m.), and it operates on C.W., M.C.W. and radio telephony.

The sender has been designed to operate from two different high tension supplies, i.e. High Power Rotary (H.P.) and Low Power Rotary (L.P.), the effective range of communication on high power being about twice that on low power under the same conditions.

The circuits of the sender and receiver are so associated that the main tuning control of the receiver is also the master tuning control for the sender. Accordingly, the sender is always automatically adjusted to transmit signals of the same frequency as those being received. Inter-communication between a "Net" of such sets is thereby greatly simplified.

The set is equipped with nine valves, three of which are common for sending and receiving.

* *Serial numbers* 1 *to* 105 *were produced with name plates* "*Wireless Set No.* 11 *AP*".

A superheterodyne circuit, with automatic volume control, is employed for the receiver. The sender is tuned by a master oscillator circuit common to both sender and receiver; no crystal oscillator is provided.

2. POWER SUPPLY AND SUPPLY UNITS.

2.1 Power Units.

Two different forms of power supply are available for use with Wireless Set No. 11 (AUST.).

(i) A 12 volt accumulator (Two — 6V. 75 Ah Units) operating a 210 volt low power supply unit.

(ii) Similar to (i) together with a 345 volt high power supply unit.

The high power supply unit supplies H.T. for the sender portion of the set only, but the low power unit supplies H.T. for both sending and receiving circuits. Consequently, the high power unit is never used alone, but always in association with the low power unit.

2.2 Current Consumption.

The approximate current consumption from the power supply, for the two above-mentioned conditions of use, is shown in Table I.

TABLE I.—CURRENT CONSUMPTION.

Arrangement	Power Supply	L.T. Current Consumption (Approx.)	
		Sending	Receiving
Low Power	12 V. 75-Ah Accumulator 210 V. L.P. Supply Unit	3.3 A	2.9 A
High Power	12 V. 75-Ah Accumulator 345 V. H.P. Supply Unit	6.5 A	2.9 A

NOTE.—With fully charged batteries, H.T. voltages up to 370 Volts and 220 Volts may be obtained from H.P. and L.P. Units, respectively.

3. WEIGHTS AND DIMENSIONS.

TABLE II.—WEIGHTS AND DIMENSIONS.

Arrangement of Set.	Weight lbs. (2)	Length ins. (3)	Width ins. (4)	Height ins. (5)
Set alone, with Lid	57½	19¾	12⅛	8⅝
Set alone, standing on Lid	57½	22	12	16¾
Set with Lid and L.P. Unit, in Carrier	96	26¾	12⅛	13
Set with Lid, L.P. Unit and H.P. Unit in Carrier	100	31¼	12⅛	13
Set with Lid, L.P. Unit in Carrier and H.P. Unit in tray	100	26¾	12⅛	15½
L.P. Unit alone	18¾	4½	11¼	8¼
H.P. Unit alone	12¼	4½	11¼	8¼

Connectors not included in weights.

4. CONNECTIONS.

Sender and receiver are assembled as one unit. Connections from power supply to wireless set for the two conditions of use are:

The supply unit (s) are assembled with the wireless set in a telescopic carrying frame. A flexible lead carrying a plug connects the Supply Unit L.P. to the L.T. battery, and plug connectors join the supply unit (s) to the wireless set (See Table VII.).

5. AERIALS AND COMMUNICATION DETAILS.

5.1 Aerials.

The aerials used with Wireless Set No. 11 are similar in form to those used with Wireless Set No. 101 and 109, but metal rods ⅞-in. diameter are employed. The set may be used with vertical rods up to a maximum of 21 ft., or 15 ft. with "top." The "top" employed is that already in use with Wireless Set No. 101 and 109 (four 3-ft. ⅜-in. diameter spokes), which is joined to the ⅞-in. rods by a special adapter provided for that purpose.

For working over longer ranges half-wave horizontal aerials may be used, viz. :—

(i) Horizontal, half-wave, single-feeder, matched impedance type (commonly known as the Wyndom aerial).
(ii) Horizontal half-wave end-fed type.

Table III. gives a representative list of aerials, with indications of the ranges which may be expected. Ranges obtainable with tuned aerials vary considerably according to position of station, frequency and time of year. Consequently, such work, under any new set of conditions, must be the subject of experiment, to determine the best working arrangements.

For further information concerning aerials, refer to "Signal Training, Vol. III., Pamphlet No. 24—Aerials."

TABLE III.—AERIALS AND RANGES.

Aerial			Range (miles)		
Type (1)	Length ft. (2)	Conditions of use (3)	C.W. (4)	M.C.W. (5)	R/T (6)
Rod, ⅞-in.	6	Vehicle station L.P.	6	5	3
		Vehicle station H.P.	16	13	8
Rod, with top	9	Ground station L.P.	10	8	5
		Ground station H.P.	20	16	10
Single wire	60 to 100 (top) *	Ground station H.P.	30 to 500 miles	up to 400 miles	up to 200 miles

* According to frequency.

5.2 **Factors affecting range.**

Certain general conditions tend adversely to affect the range of communication. Range may be expected to be curtailed if one, or both, sets are operated in any of the following positions :

(i) Against a bank or hill which lies on the line of communication.
(ii) In timber or scrub which is considerably taller than the aerial.
(iii) Under overhead power and telephone wires.
(iv) Near steel structures, or buildings having steel frameworks.
(v) On dry, sandy or dusty ground.

(vi) Installed in a vehicle su ıat interference as described in paragraph 5.3, below, is experienced from ignition and/or track static.

It is preferable for the site of a station to be set at least 50 yards from positions i to v., to minimise their effects on range. Condition vi. can only be overcome by correct interference suppression of the vehicle in question.

5.3 Interference.

Range is also affected adversely if the sets are situated where the receivers can pick up electrical interference. Interference of this nature may be expected from overhead and underground power and telephones lines, petrol engines, commutating motor and dynamos, hospital apparatus—such as diathermy, X-ray or ultra-violet ray equipment. The extent to which interference is radiated from such sources varies considerably and no prediction as to its effect is possible.

5.4 Effect of aerials.

With ordinary rod aerials, the limiting range of the set, when using high power C.W./M.C.W. is about 25 to 30 miles, beyond which distance fading may be expected. To communicate over greater distances tuned aerials may be used and, with such aerials, the ranges may be considerable, as indicated in Table III.

5.5 Selectivity.

Some restrictions are always placed upon the use of sets of this kind, when one is working in the vicinity of the other, due to interference from one sender with a nearby receiver. Table IV. gives the approximate limiting conditions that apply for Wireless Set No. 11 under most conditions of their use.

TABLE IV.—STATION PROXIMITY/FREQUENCY SEPARATION DATA (H.P. OPERATION).

Distance Separating Two Stations	Minimum Frequency Separation
100 Yards	50 kc/s
1 Mile	11 kc/s

5.6 Aerial coupling equipment.

An equipment known as Aerial Coupling Equipment "C" (AUST.) is available for use with Wireless Set No. 11.

It enables the normal service aerial to be erected at a distance up to 30 ft. from the set with but little loss of range efficiency. Such an arrangement may avoid screening of the aerial and allows the set to be worked under cover.

5.7 **Remote Control.**

Wireless Set No. 11 may be operated from a distance by employing Wireless Remote Control Unit "A." These Units are employed also with Wireless Sets No. 101 and 109, and when used with a Microphone, Hand, No. 3 and Receivers, Headgear, Double L.R. (AUST.) provide a means of communication between the Wireless Set and the Remote Control Unit. The arrangement is described in greater detail in Chapter IX.

Full remote control equipment comprises two units, one at the set and one at the distant point. In this case both R/T and W/T may be sent and received by the operator at either unit.

It is necessary for an operator to be in attendance at the wireless set at all times, since the remote controls cannot be employed for switching over the set from send to receive. The operator generally monitors the traffic through his own headphones, via the adjacent control unit.

When only one remote control unit is employed this is located at the set and may be connected to any telephone line. In this case R/T communication only is available from the distant telephone instrument.

Range of communication over a wireless link when joined to a telephone circuit through remote control apparatus, depends considerably upon the condition of the telephone circuit—and is thus largely a matter of experience and experiment.

NOTE.—See CHAPTER IX. for Operating Instructions for Aerial Coupling Equipment "C" (AUST.) and Wireless Remote Control Unit "A."

CHAPTER II

WORKING INSTRUCTIONS

6. VALVES.

Nine valves are required for Wireless Set No. 11 (AUST.). These valves are given in Table V.

TABLE V.—VALVES.

Type	Quantity	Type	Quantity
1M5G	2	1K7G	4
1C7G	2	807	1

6.1 Inserting the valves.

(i) Loosen and slide back the two locking bolts at each end of the set panel.

(ii) Withdraw set by pulling on the handles fixed below the "SEND/REC." switch.

(iii) Remove eight valve covers, by turning them slightly clockwise before lifting.

NOTE.—One valve (the 807 sender power amplifier) is not screened.

(iv) Plug the valves into their respective sockets, according to the disposition shown in Fig. 1.

(v) Replace the eight valve covers.

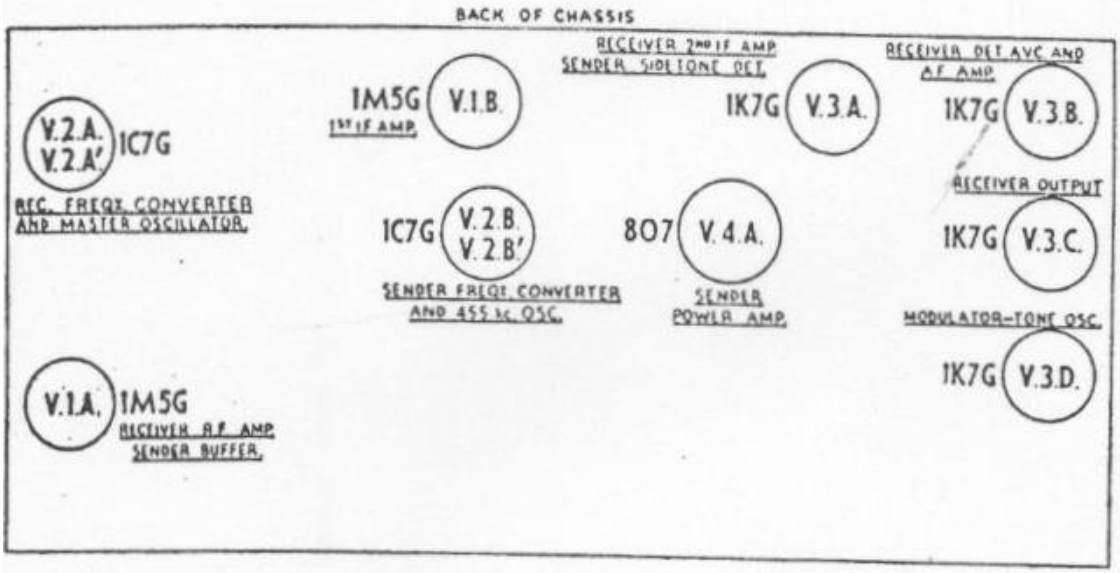


Fig. 1 Wireless Set No. 11 (Aust.)—Position of Valves

(vi) Remove the top caps from the eight valve covers, then firmly fit the grid connectors. Replace the top caps. The anode connector to the 807 is fitted as follows: Remove the thumb-nut from the sidetone pick-up rod, adjacent to the valve, and place the connector on the rod with the contact portion encircling the valve cap. Replace and tighten the thumb-nut. The connector is designed to put slight pressure on the valve to prevent it from lifting. The height of the connector may be altered, if necessary, by adjusting the lock-nut on the rod.

(vii) Replace set into case and secure by locking up the two fixing bolts by their set-screws.

FRONT PANEL CONTROLS

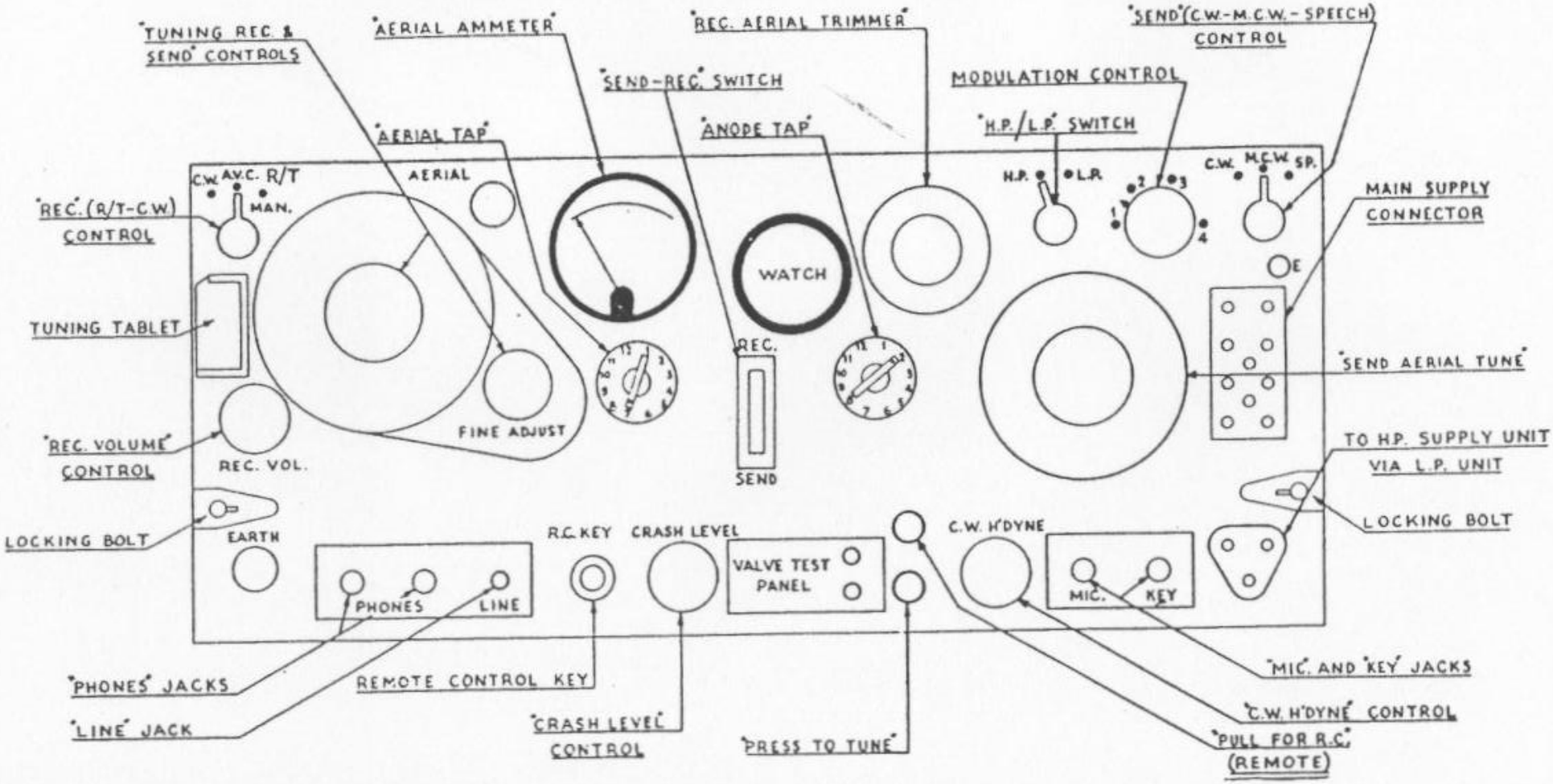


Fig. 2 Wireless Set No. 11 (Aust.)—Position of Controls on Front Panel

7. CONNECT UP.

7.1 Preliminary.

(i) Erect the appropriate aerial and connect it to the set "AERIAL" terminal.

(ii) Connect the leads, counterpoise to the set "EARTH" terminal.

NOTE.—When the set is in a vehicle, the aerial is joined to the set through an aerial blocking condenser, (Condenser X5-5 k.V. (AUST.) which is mounted on the set carrier, and the earth terminal is connected to the Vehicle chassis.

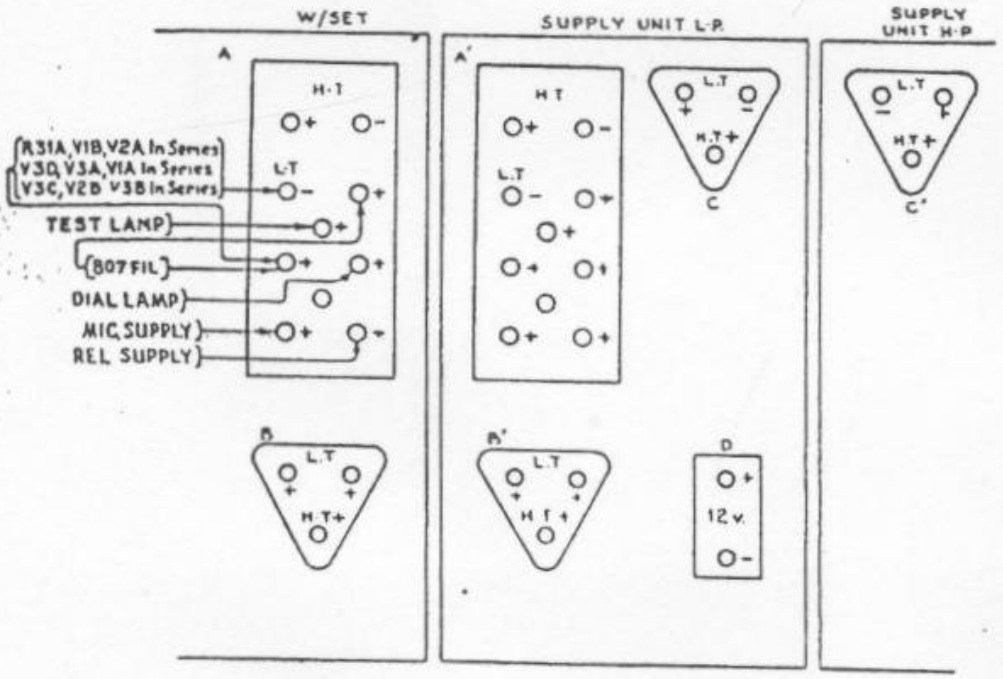
7.2 Preliminary Adjustments.

Make the following preliminary general adjustments using Fig. 2 as a guide in locating the position of the controls.

(i) See that the switch on the Supply Unit L.P. is in the off position—up.

(ii) Set the "H.P./L.P." switch to "L.P." or "H.P." as required.

POWER UNIT CONNECTIONS



ORDER OF CONNECTIONS:—

A TO A'

B TO B' } THESE CONNECTIONS ARE
C TO C' } INTERCHANGEABLE.

D TO 12 V. L.T. BATTERY (WITH 4 LEADS).

Fig. 3 Wireless Set No. 11 (Aust.)—Arrangement of Connections

NOTE.—Before setting switch to "H.P." see t
a 0-1A Aerial Ammeter is fitted.

(iii) Press in the remote control switch marked "PULL FOR RC."
(iv) Set the "REC. VOL." knob fully clockwise—i.e. in the maximum position.
(v) Set the "CRASH LEVEL" knob fully clockwise—i.e. in the position of minimum effectiveness.
(vi) Set the "C.W. H'DYNE" knob fully anti-clockwise.
(vii) Set the "MOD." control knob fully anti-clockwise.
(viii) Plug the headphones, microphone and key into their respective sockets.

7.3 **Power Supply.**

To join up the power supply to the set, proceed as follows:
(i) Connect up Supply Unit (s) to set by means of the appropriate inter-connecting plugs—Supply Unit L.P. stands next to, and at right-hand end of set, with the H.P. Unit, if required, to right of L.P. Unit or alternatively strapped in the tray on the top of the carrier. (See Table VII.).
(ii) Plug the L.T. battery plug into the L.P. Supply Unit.
(iii) Fit the braid earth connectors to small earth terminals between Set and Unit (s) and join earth lead to "EARTH." Fig. 3 shows the connection scheme, and Table VII., Chapter VI., the proper connectors and leads to be used.

8. OPERATING INSTRUCTIONS.

8.1 **Reception (R/T).**

To adjust the set for receiving R./T. signals:
(i) Turn the switch marked "REC." (R/T—C.W.) to "MAN." Turn knob marked "REC. VOL." fully clockwise.
(ii) Set the "SEND/REC." switch to "REC."
(iii) Switch on the power supply by: Setting the switch on the L.P. Supply Unit—down.

NOTE.—Changing over the "SEND/REC." switch from "REC." to "SEND" when operating on H.P. switches in the H.P. Unit.

(iv) Adjust the "REC. AERIAL TRIMMER" contro for maximum "rustling" noise at 7.5 Mc/s. Locl the knob in this position.

NOTE.—Once this knob is set a ocked, it will not require re-adjustment unless the aerial system to which the set is connected is changed.

(v) Set the "TUNING REC. & SEND" control to the frequency to be received.

(vi) Rotate this knob a little in both directions until the signal to be received is heard. Lock the knob in this position by the thumb-screw. Reduce signal volume (if necessary) by rotating the "REC. VOL." control in an anti-clockwise direction, and at the same time, re-adjust the tuning of the signal by the control marked "FINE ADJUST."

(vii) Press the "PRESS TO TUNE" button and a whistle will be heard. Adjust the "TUNING REC. & SEND" control to find the silent point (zero beat) of this whistle. At the correct point, a slight movement of the control in either direction will cause the whistle to be heard again, with the pitch of the whistle rising as the control is moved from the silent point. Accuracy of adjustment to the silent point is of fundamental importance, as it is this adjustment that determines that the transmitted frequency shall be identical with the received frequency. A low level of volume is essential to obtain accuracy in making this adjustment. The "PRESS TO TUNE" button should be released when the silent point has been found correctly.

(viii) The switch marked "REC." (R./T.-C.W.) may now be turned to "A.V.C." if desired.

8.2 **Reception (M.C.W.).**

(i) Turn the "REC." (R./T.-C.W.) switch to "C.W.," proceed as in paragraph 8.1, (i) to (vii), release the "PRESS TO TUNE" button and adjust the pitch of the beat note by means of the "C.W. H'DYNE" control

(ii) M.C.W. may also be received with the "REC." (R./T.-C.W.) switch at "MAN" or "A.V.C." and for certain conditions of operation these settings may be advantageous, as follows :

"MAN" Setting.—For telegraphy reception in vehicles travelling over rough terrain, this setting supplies a stable audio frequency note.

"A.V.C." Setting.—The above remarks apply and in addition the A.V.C. will help to maintain a signal at a constant level when change of position leads to intermittent screening of the other station.

8.3 **Reception (C.W.).**

Turn the " REC." (R./T.-C.W.) switch to " C.W.", proceed as in paragraph 8.1, (i) to (vii), and then adjust the pitch of the beat note by means of the " C.W. H'DYNE " control.

" CRASH LEVEL " Control.

If static or other interference is present which is liable to shock the operator's ears, the " CRASH LEVEL " control may be turned anti-clockwise from fully clockwise position until interference is tolerable. Under no circumstances should this control be used to limit the strength of R./T. as distortion will thereby be introduced.

The strength of received signals should be adjusted only by the " REC. VOL." control.

When not receiving, switch off power supply.

8.4 **Sending (C.W.).**

If not already on, switch on the power supply. The type 807 sender power amplifier valve will take some 30 seconds to reach operating temperature.

To adjust the set for sending C.W., proceed as follows :

(i) Set the " AERIAL TAP " and " ANODE TAP " switches to the numbers given on the Tuning Tablet for the frequency required, with the particular type of aerial in use.

(ii) Set the " TUNING REC. & SEND " dial to the required frequency.

(iii) Set the " SEND " (C.W.-M.C.W.—SPEECH) switch to " C.W."

(iv) Set the " H.P./L.P." switch to its required position.

NOTE.—High power sending is not possible without the Supply Unit H.P. The 0-1A. Aerial Ammeter must be used when sending on H.P.

(v) Set the " SEND/REC." switch to " SEND."

(vi) Press the key and rotate the " SEND AERIAL TUNE " dial until the current indicated by the Aerial Ammeter is a maximum. In order to assist keying under noisy conditions, an audio frequency sidetone signal will be heard in the headphones each time the key is depressed. To ensure that the best adjustments for the " AERIAL TAP " and " ANODE TAP " switches are found, it is desirable to set those in turn one " number " above and below that given in the

Tuning Tablet and re-a st the "SEND AERIAL TUNE" control in each case for maximum reading of the Aerial Ammeter. Lock the "SEND AERIAL TUNE" dial. The combination of these adjustments which gives the greatest reading of aerial current should always be used. The set is now in a condition to send on C.W.

NOTE.—Aerial Ammeters.- For low power (L.P.) use a 0-350 mA. Aerial Ammeter, but for high power (H.P.), a 0-1 A. meter must be employed.

8.5 **Sending (M.C.W.).**

Proceed as in 8.4, then set "SEND" (C.W.-M.C.W.-SPEECH) switch to "M.C.W." The sender Aerial Ammeter should indicate from one-half to two-thirds the current obtained on C.W.

Sidetone will be heard as in paragraph 8.4, (vi).

8.6 **Sending (R.T.).**

(i) Proceed as in paragraph 8.4, (i) to (vi), except that the "SEND" (C.W.-M.C.W.-SPEECH) switch referred to in paragraph 8.4, (iii) should be set to "SPEECH."

NOTE.—If the optimum adjustments of the "AERIAL TAP" and "ANODE TAP" switches, and the "SEND AERIAL TUNE" control have previously been made for C.W. transmission, these need not be altered for subsequent M.C.W. or SPEECH transmission, except under circumstances as indicated in (ii) below.

(ii) Speak clearly and distinctly into the microphone, and at the same time, turn the control marked "MOD." slowly clockwise from a fully anti-clockwise direction. As this control is turned, the effect of speech will be to increase the reading of the Aerial Ammeter. A point will be reached, however, when an increase no longer occurs, and a further advance of the "MOD." control may produce a decrease of aerial current. The best position of the "MOD." control is that which produces just less than the maximum increment of aerial current.

Speech distortion due to an incorrect setting of the "MOD." control may be detected by listening to the sidetone in the headphones. Sidetone volume may be adjusted by means of the "REC. VOL." control

only when the set is switched to " A.V.C." ame will be affected by the " CRASH LEVEL " control if it is set in any position other than maximum clockwise.

If insufficient indication of modulation is obtained on Aerial Ammeter, increase " SEND AERIAL TUNE " dial reading to give slightly less aerial current. Upward modulation should then be obtained.

(iii) In general, a Microphone Hand, No. 3, will be used. The " MOD." control should be adjusted as described in the paragraph entitled " Special Notes," paragraph 10 (iii). Loud speech, but not shouting, should be employed.

8.7 **To Switch Off.**

Set the switch on the L.P. Supply Unit Off—up.

9. PROCEDURE FOR NETTING.

9.1 **Directing Station.**

In the formation of a " Net," the Directing Station will set up its sender to the prescribed frequency either by Wavemeter or by reading of the " TUNING REC. & SEND " dial. Having done this, THE TUNING DIAL MUST NOT BE ALTERED until it is desired to alter the frequency of the whole " Net."

After setting up the sender, the Directing Station will call all other stations and will transmit for twenty or thirty seconds to allow them to tune in, requesting each station to answer back in turn at the end of that time. On receiving the answers from the other stations of the group, the Directing Station may adjust the volume of his receiver to suit the level of their replies, but must **NOT attempt to tune them in on his " TUNING REC. & SEND " dial.**

Owing to slight changes in the circuit constants, due to send-receive switching, the frequencies of the other stations in the group may vary by as much as ± 1000 cycles/sec. from the frequency of the Directing Station. No notice need be taken of this, as the width of the receiver band-pass allows for it and the effect is negligible. It must be understood that on pressing the " PRESS TO TUNE " button at the Directing Station, a beat note will probably be heard from each of the Out-stations and similarly the Out-Stations on pressing their " PRESS TO TUNE " buttons may hear beat notes from each other. The only occasion on which it is permissible for the " PRESS TO TUNE " button to be pressed and the tuning adjusted to silent point on

the whistle is when an Out-Station is listening to the Directing Station.

NOTE.—The Directing Station operator should NOT attempt to tune his receiver to any other station, otherwise he will alter the frequency of the Directing Station and spoil the " NET " of the whole group.

9.2 **Other Stations.**

Proceed as in Operating Instructions, paragraph 8.1 carefully observing the directions given in sub-paragraph (vii), regarding the " PRESS TO TUNE " adjustment. Once the silent point (zero beat) has been obtained on the signal from the Directing Station, no attempt should be made to re-tune to silent point when listening to other stations of the " Net," but a check on this silent point should be made, as often as convenient, when listening to the Directing Station, in order to ensure that correct " Net " frequency is maintained. Release the " PRESS TO TUNE " button and set the control marked " REC." (R./T.-C.W.) to " A.V.C." Adjust the " REC. VOL." control until the received signal is of suitable strength. Leave the " TUNING REC. & SEND " dial set at the frequency of the Directing Station's signals, set the " AERIAL TAP " and " ANODE TAP " switches to their numbers corresponding to this frequency as given on the Tuning Tablet for the particular aerial in use. This will save time when the order to SEND is given by the directing station.

Out-stations tune only to the Directing Station and to no one else. Orders from the Directing Station to make final adjustments for sending should always be awaited, otherwise serious interference may be caused to any other stations which may still be receiving in the " Net."

NETTING

NOTE.—When Sets which do not employ " common " tuning of the SEND-RECEIVE circuits (for example the 101, 108, or 109) are used in a " Net," it is essential that one of these Sets be used as the Directing Station, otherwise the automatic netting facilities will be upset.

10. SPECIAL NOTES.

(i) If the lead from the set to the aerial is allowed to drape over the set, it may be found that aerial current increases. This should be avoided, as the actual aerial radiation and, consequently the range, is thereby

reduced. When installed in a vehicle, the aerial lead should be so arranged that it is NOT free to swing about unduly, as any movement in proximity to the set or metal parts of the vehicle will cause fluctuations in aerial current and radiation. Care should be taken not to stand near the aerial or aerial lead when sending.

(ii) The sensitivity of the Wireless Set No. 11 receiver is such that loose metal articles or metal parts of a vehicle vibrating together, may cause crackling, which might be attributed to a fault in the set.

(iii) Modulation control. The following information on the use of the "MOD." control should be noted. Four spot positions appear on the panel. These positions correspond approximately with the conditions of use as shown in Table VI.

TABLE VI.—MODULATION CONTROL SETTINGS.

Position	Conditions of set operation.
1.	Low power ; with Microphone Hand No. 3
2.	High Power ; " " " "
3.	Low Power ; Line—R.C. Unit.
4.	High Power ; " — " "

The settings in the above table may require to be varied with different microphones or types of line input.

11. MAINTENANCE.

11.1 Valves.

All valves—except the 807 sender power amplifier—may be tested whilst in their working positions in the set. For this purpose, a valve testing panel is incorporated at the bottom of the set panel. By means of a Voltmeter, pocket, 250 V, No. 2 (AUST.) specially supplied for the duty, the valves are tested whilst in operation according to Fig. 17.

After ascertaining that H.T. and L.T. voltages are correct, the method of test is :

(i) Switch on the set for normal operation of sender and receiver in turn.

(ii) Press the fixed prong of the testing voltmeter into the + (red) terminal of the valve testing panel.

(iii) Press the flexible terminal of the voltmeter into the terminal of the testing panel, corresponding to the valve (s) it is desired to test.

The lay-out of the terminals of the valve testing panel, the valves corresponding to the engraved lettering on this panel and the approximate voltage readings to be expected when

valves are in good condition are shown in Fig. 17. The voltmeter readings obtained in this test are the voltages dropped across the valve anode feed resistances. All valves should be tested weekly when the set is in regular use. It is also advisable—when time allows—to check through the spare valves after any long rough journey.

NOTE.—No means are provided on the test panel for testing the 807 valve.

11.2 Tuning controls, etc., on sender and receiver.

The operator should report as soon as possible any faults which he may notice while using the set, such as :

(i) Tuning knobs, etc., becoming hard to turn.

(ii) Locking screws becoming stiff so that the tuning knobs move when the screws are operated.

(iii) Backlash in, or occasional failure of, slow motion controls. The tuning knob must be firmly held when locked. A slight movement ending with a " Click " indicates that the worm and worm wheel are not engaging fully.

(iv) Meter needle " sticking."

11.3 Supply Units.

The operator should report at once :

(i) Sluggishness in starting.

(ii) Excessive or unusual noise when running.

(iii) Noise interference.

(iv) Any other unusual symptom.

11.4 Leads and Plugs.

The leads and plugs of a set which is permanently installed in a vehicle should not be liable to damage, provided that they are not free to swing about unduly, but leads, etc., used for ground stations which are put into or removed from their vehicles at frequent intervals, should be examined regularly for signs of damage, and in any case, should be cleaned and examined before the sets are returned to store at the end of each period of use.

11.5 Aerial Gear.

Aerials mounted on vehicles should be examined every day for damage which is particularly likely to occur if much travelling in wooded country has been done. Aerial and earth connections should be checked for tightness and good contact.

Ground station aerial gear must always be clean when it is packed up if it is to be easily and quickly erected when next required.

The threaded portions of the mast sections should be wiped clean with an oily rag at least once a week and lightly greased.

CHAPTER III

GENERAL TECHNICAL DESCRIPTION

12. GENERAL CONSIDERATIONS.

12.1 Introduction.

The Wireless Set No. 11 can be used for the reception and transmission of C.W./M.C.W. and radio telephony. The frequency range is 4.2 to 7.5 Mc/s. and the circuits are so designed that when the set has been tuned to an incoming signal, precisely the same frequency is used for sending.

A block diagram showing the layout of the set is given in Fig. 4. Fig. 19 is a schematic circuit diagram of the set, while Plate V. is a top view of the chassis, and Plate VI. is an under view of the chassis.

12.2 Principle employed.

In order to explain the principle employed to ensure that the transmitted frequency is identical with the received frequency, the method of operation of the superheterodyne receiver will first of all be recapitulated.

The amplified signal at signal frequency from the R.F. amplifier is passed to a frequency converter stage. This stage consists of local oscillator and a mixer or first detector valve. The local oscillator is adjusted by the same tuning control (" TUNING REC. & SEND ") as the signal frequency circuits, but the circuit arrangements are such that the frequency of the oscillator is always off-set from the signal frequency by a fixed frequency difference at any setting of the " TUNING REC. & SEND " control. The signal frequency and the oscillator frequency are applied to the frequency converter and the difference frequency is obtained in the output from the frequency converter. This corresponds to the frequency by which the oscillator is off-set from the signal frequency, and is termed the Intermediate Frequency (I.F.). The I.F. is lower in frequency than the signal frequency. The tuning circuits are so arranged that the signal and oscillator frequencies over the tuning range of the receiver maintain a constant frequency difference, which is the I.F. This I.F., containing the modulation of the original signal, is amplified by the I.F. amplifier and then demodulated by the 2nd or signal detector.

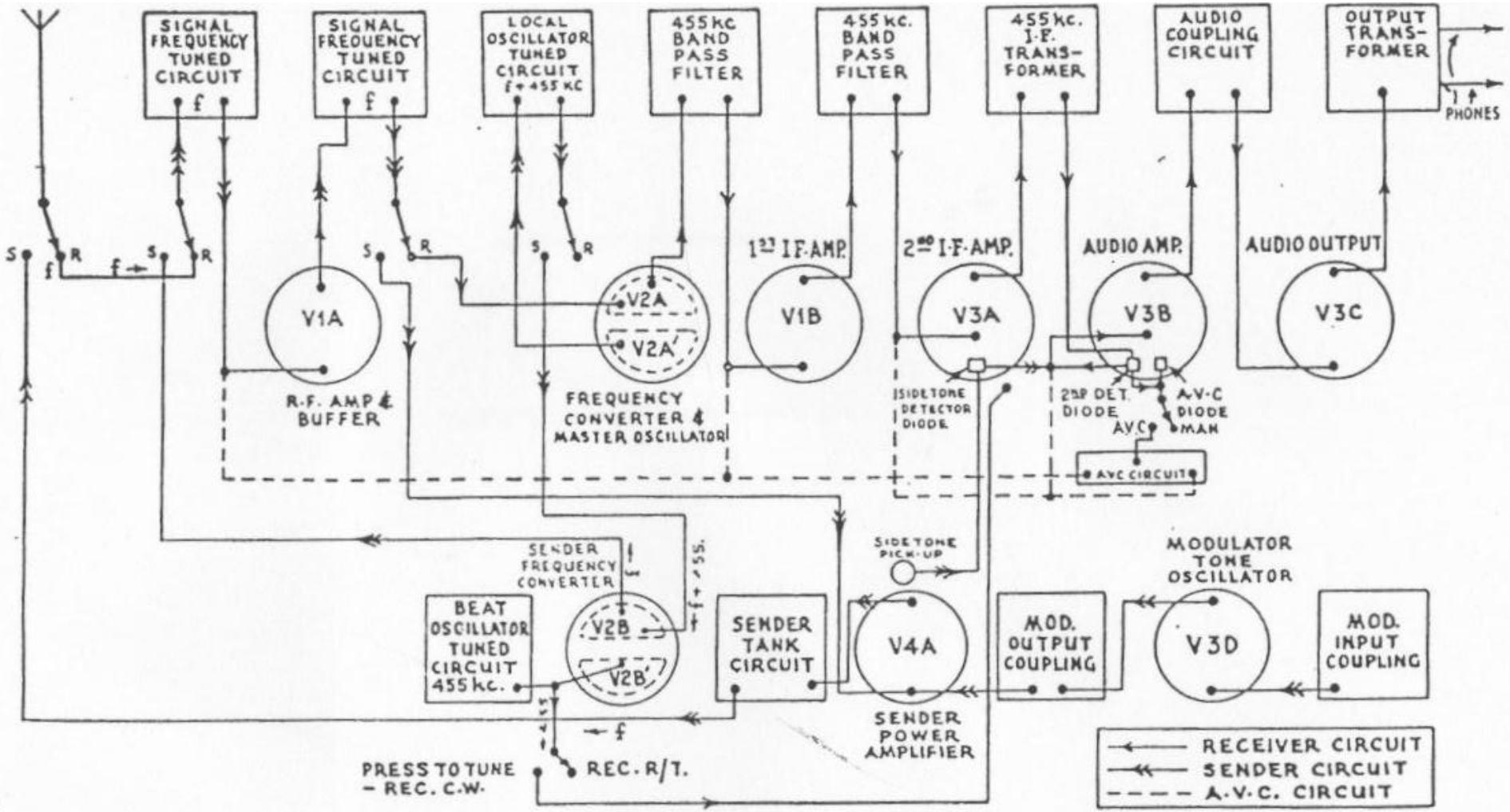


Fig. 4 Wireless Set No. 11 (Aust.)—Block Diagram of Circuit Arrangement

CIRCUIT ARRANGEMENT

In the No. 11 Set, an oscillator (B.F.O.) tuned t ıe correct I.F. may be brought into operation by a push button. If the I.F. of the signal in the I.F. amplifiers is not correct, a beat note will be heard when the button is pressed, and tuning to zero beat by the " TUNING REC. & SEND " control will make certain that the I.F. is the same as the frequency of the beat frequency oscillator, which remains constant.

It should be noted that adjustment of the " C.W. H'DYNE " control has no effect on the frequency of the beat frequency oscillator when the latter is brought into operation by the " PRESS TO TUNE " button.

There are thus available in the receiver a first oscillator of frequency,—" signal frequency, plus I.F." and a second oscillator of frequency, " I.F." On switching to " SEND," the outputs of these two oscillators are applied to a frequency converter valve, corresponding in function to the frequency converter valve used to receive.

The difference frequency is selected by a tuned circuit from the frequency converter output, and in this case, it must be identical with the original received frequency. The output of this frequency converter valve is then used in the same way as the master oscillator output in a conventional sender.

12.3 **Application of Principle.** (See Fig. 4).

The application of this principle involves the use of certain parts of the apparatus for both reception and transmission. These are briefly described below, but their functions during reception and transmission are distinct, and they are therefore discussed separately and in greater detail in Chapters IV. and V.

The parts common to the receiver and sender are a local radio frequency oscillator, a local intermediate frequency oscillator, and a radio frequency amplifier.

The R.F. oscillator, which is of the feed-back type, employs the oscillator section V-2-A' (see note), and the circuit has been so designed that the oscillator frequency is practically independent of changes in the H.T. supply voltage. In the receiver, the output of this valve is mixed with the received signal in the converter section V-2-A, and in the sender it is mixed with the output of the I.F. oscillator in the converter section V-2-B.

The I.F. oscillator, which is of the series—fed Hartley type employs the oscillator section V-2-B'. In the receiver it supplies a fixed I.F. for tuning and a variable I.F. for the beat frequency reception of C.W./M.C.W. telegraphy ; in the sender it supplies a fixed I.F. which is mixed as stated in the previous paragraph.

The R.F. amplifier employs a pentode V-1-A with its associated tuned grid and tuned anode circuits. In the receiver it comprises a highly selective first stage, and in the sender it acts as a selector and buffer between the mixing stage and the sender power amplifier valve.

Other valves which are used during both reception and transmission are V-3-A, V-3-B and V-3-C. Functions of these valves during transmission are :—V-3-A, sidetone detector ; V-3-B, sidetone amplifier ; and V-3-C, sidetone output, enabling the operator to hear his own R./T., C.W. or M.C.W. signals in the headphones.

NOTE.—In this Chapter and in Chapters IV. and V., the converter section of the pentagrid converter valve V-2-A will be referred to as the " converter section V-2-A' " and the oscillator section as the " oscillator section V-2-A." Similar references will apply to the pentagrid converter V-2-B.

CHAPTER IV

TECHNICAL DESCRIPTION of RECEIVER

13. RECEIVER CIRCUITS, WIRELESS SET No. 11 (AUST.).

13.1 Introduction.

The receiver is of the superheterodyne type using an intermediate frequency of 455 kc/s, the frequency of the local oscillator being higher than the signal frequency. One R.F. stage and two I.F. stages of amplification are employed ; these are followed by a detector, audio amplifier and output stages. A second local oscillator is provided. This performs two functions : it enables the set to be tuned so that precisely the same frequency as that of the incoming signal will be used when sending ; and it is used as a heterodyne for the reception of C.W. and M.C.W. signals.

NOTE.—The intermediate frequency of the English model Wireless Set No. 11 is 475 kc/s.

Fig. 19 is a schematic circuit diagram of the set, whilst Fig. 20 is a simplified Receiver diagram. Plate V. is a top view of the chassis, and Plate VI, is an under view of the chassis.

13.2 **R.F. Amplifier.**

One of the disadvantages of superheterodyne receivers is that a signal whose frequency is higher instead of lower than that of the local oscillator, if allowed to reach the grid of the frequency converter, will produce the same difference frequency as the wanted frequency, and will cause interference. In order to reject these images, two preselector circuits are employed in conjunction with a pentode, V-1-A. This arrangement gives an image rejection ratio of about 1000 : 1, and it also assists in increasing the signal/noise ratio.

The input circuit comprises two coils, L-1-A and L-1-A'. L-1-A is a high impedance aerial coil inductively coupled and top coupled by means of a 4 uuF condenser, C-18-A, to the grid coil L-1-A'. The grid coil L-1-A' is tuned by means of the tuning condenser C-8-A (11-255uuF), which forms part of the 3 gang assembly operated by the " TUNING REC. AND SEND " control. This circuit is trimmed by the " REC.

R.F. AMPLIFIER

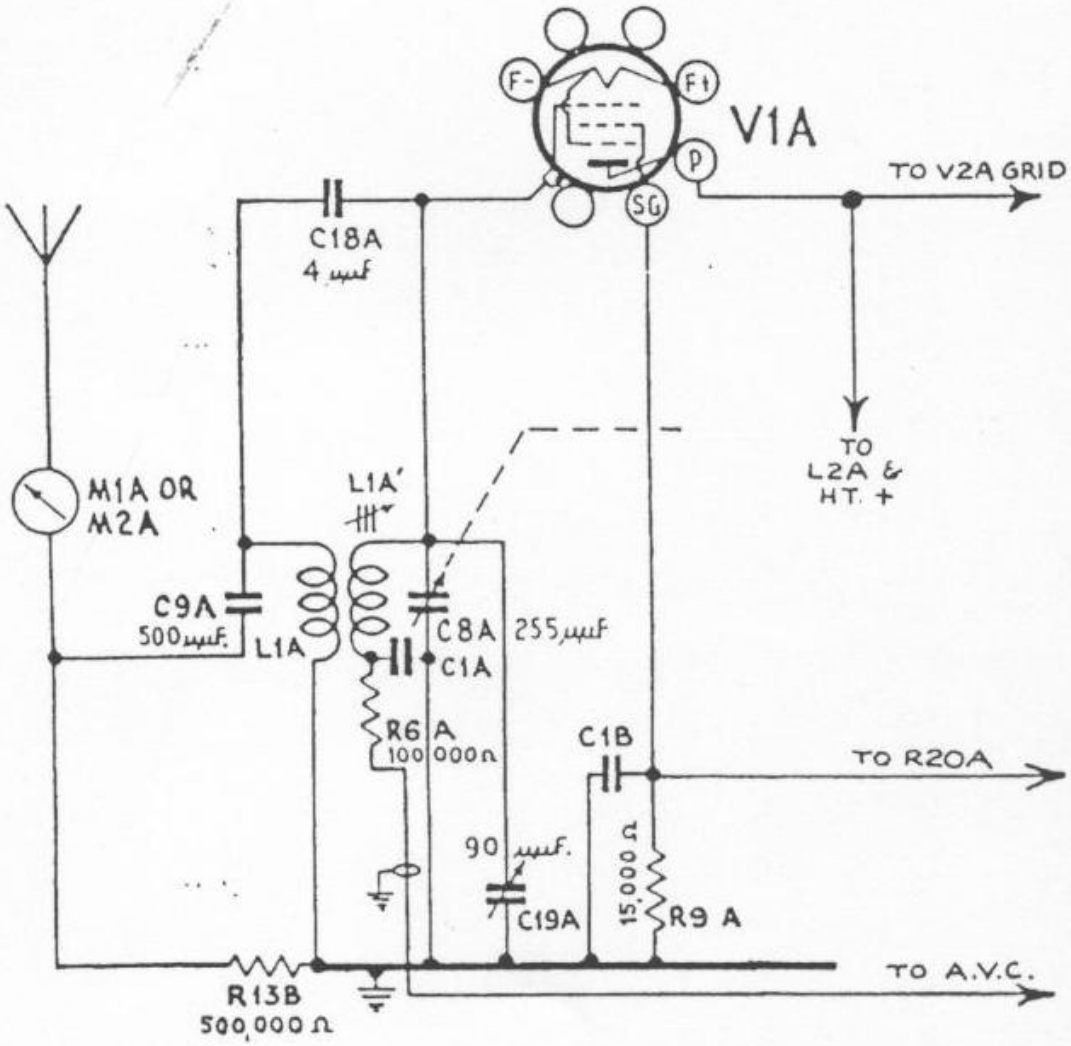


Fig. 5 Wireless Set No. 11 (Aust.)—R.F. Amplifier Schematic

AERIAL TRIMMER" conden. C-19-A (5-90 uuF) to enable various types of aerial to be used with the set.

The tuned anode circuit comprises the inductance L-2-A and condenser C-8-B (11-255 uuF), which forms part of the 3 gang assembly. This circuit is trimmed by fixed condenser C-20-A (14 uuF) and adjustable condenser C-7-C (7-25 uuF). The signal is fed via the condenser C-6-A (500 uuF) to the control grid of the frequency converter valve. The grid bias connected to the low potential end of the tuned input circuit is switched by means of the "REC." (R./T.-C.W.) switch S-4-A. When this switch is in the "A.V.C." position the amount of bias to V-1-A depends upon the strength of the received signal. With the switch in the "MAN." or "C.W." position, the amount of bias depends upon the setting of the "REC. VOL." control R-23-A. Decoupling is provided by the resistance R-6-A (100,000 ohms) and condenser C-1-A (.05 uF). See Fig. 5.

13.3 Frequency Converter.

The output of the R.F. amplifier is applied to the control grid of the pentagrid converter V-2-A via the coupling condenser C-6-A, and the local oscillations are provided by the oscillator section V-2-A'.

The oscillator operates in a tuned grid feed-back circuit. The tuned circuit comprises coil L-3-A' and condenser C-21-A (12-360 uuF—part of 3 gang assembly) and condenser C-23-A (3000uuF), the padder condenser. The tuned circuit is trimmed by the fixed condenser C-22-A (65 uuF) and adjustable condenser C-7-A (7-25 uuF).

A space charge neutralising condenser (NEUT. COND.) is connected between the control grid and oscillator grid.

The load impedance of the converter section of this valve is formed by the primary circuit of the first I.F. filter L-4-A, C-3-A (115 uuF), which is tuned to the intermediate frequency.

A negative bias of 1.5 volts is supplied to the control grid by returning the grid leak R-2-A, to the junction of R-14-A and R-32-A on the fixed bias potentiometer. The oscillator section is biased by means of the grid resistor R-5-A and grid condenser C-11-A (250 uuF) See Fig. 6.

13.4 I.F. Amplifier.

The function of the I.F. amplifier is to give sufficient amplification to meet all requirements, and at the same time, to provide the necessary selectivity.

To accomplish this, two stages of amplification are used, the first stage consisting of an R.F. pentode V-1-B and an I.F. band-pass filter, and the second a duo-diode pentode and

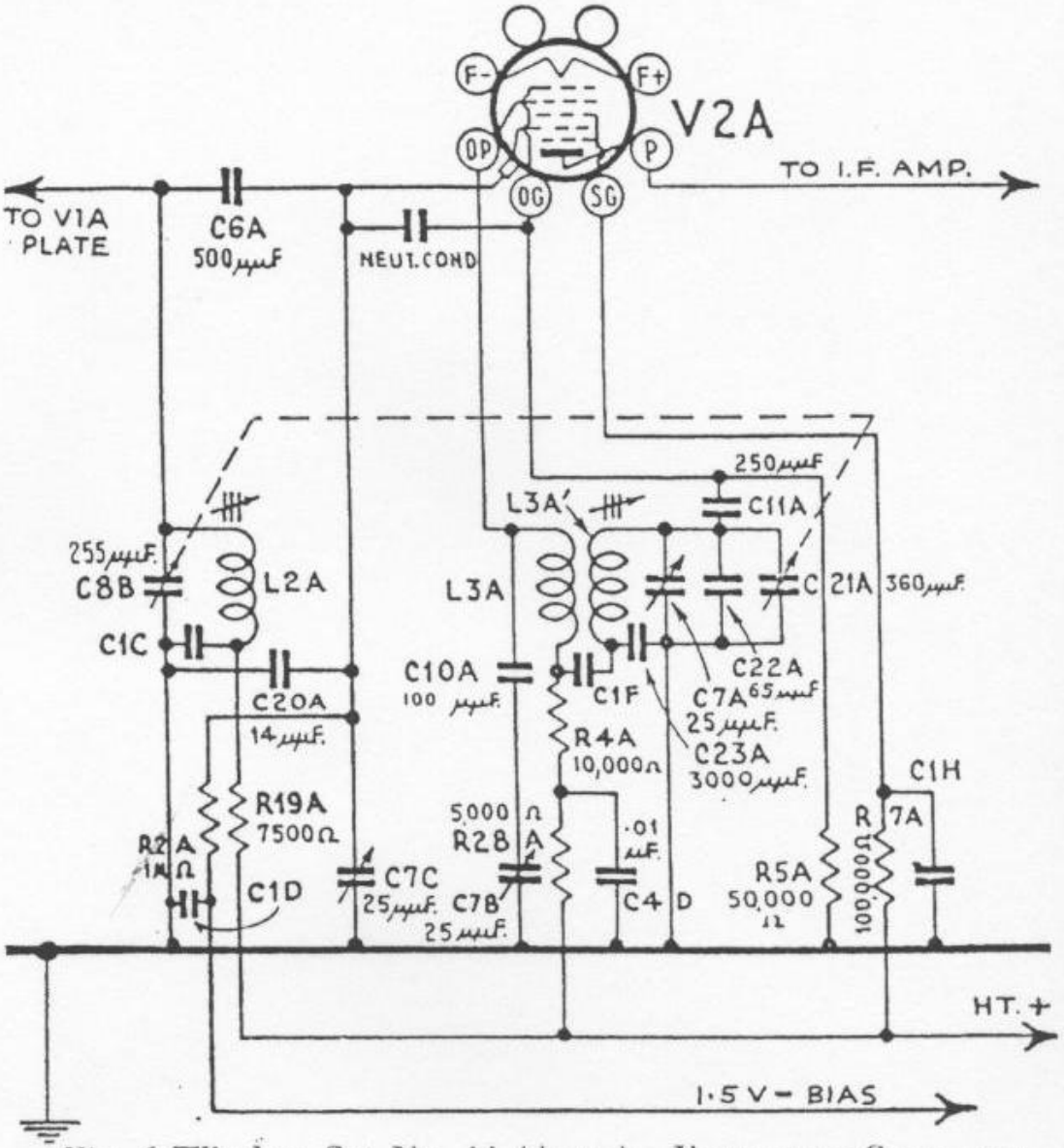


Fig. 6 Wireless Set No. 11 (Aust.)—Frequency Converter Schematic

an I.F. band-pass filter. The first filter consists of four coil —L-4-A, L-4-A', L-4-B and L-4-B'—all of which are tuned The second filter consists of L-4-C, L-4-C', L-4-D and L-4-D' The two link circuits L-4-A'—L-4-B and L-4-C'—L-4-D ar inductively coupled to the anode and grid coils of V-2-A an V-1-B, and V-1-B and V-3-A respectively. They are capacity coupled by the .01 uF condensers C-5-A for the first filte and C-5-B for the second filter. In addition, an I.F. trans former is used for coupling the output of the second I.F amplifier V-3-A to the diode detector V-3-B. This transforme comprises two coils, L-4-E and L-4-E', which are tuned an inductively coupled.

The intermediate frequency response curve produced b this channel is approximately 9 kc/s wide. It has a slight di at mid-frequency, and drops by 6 db when the band-pass i

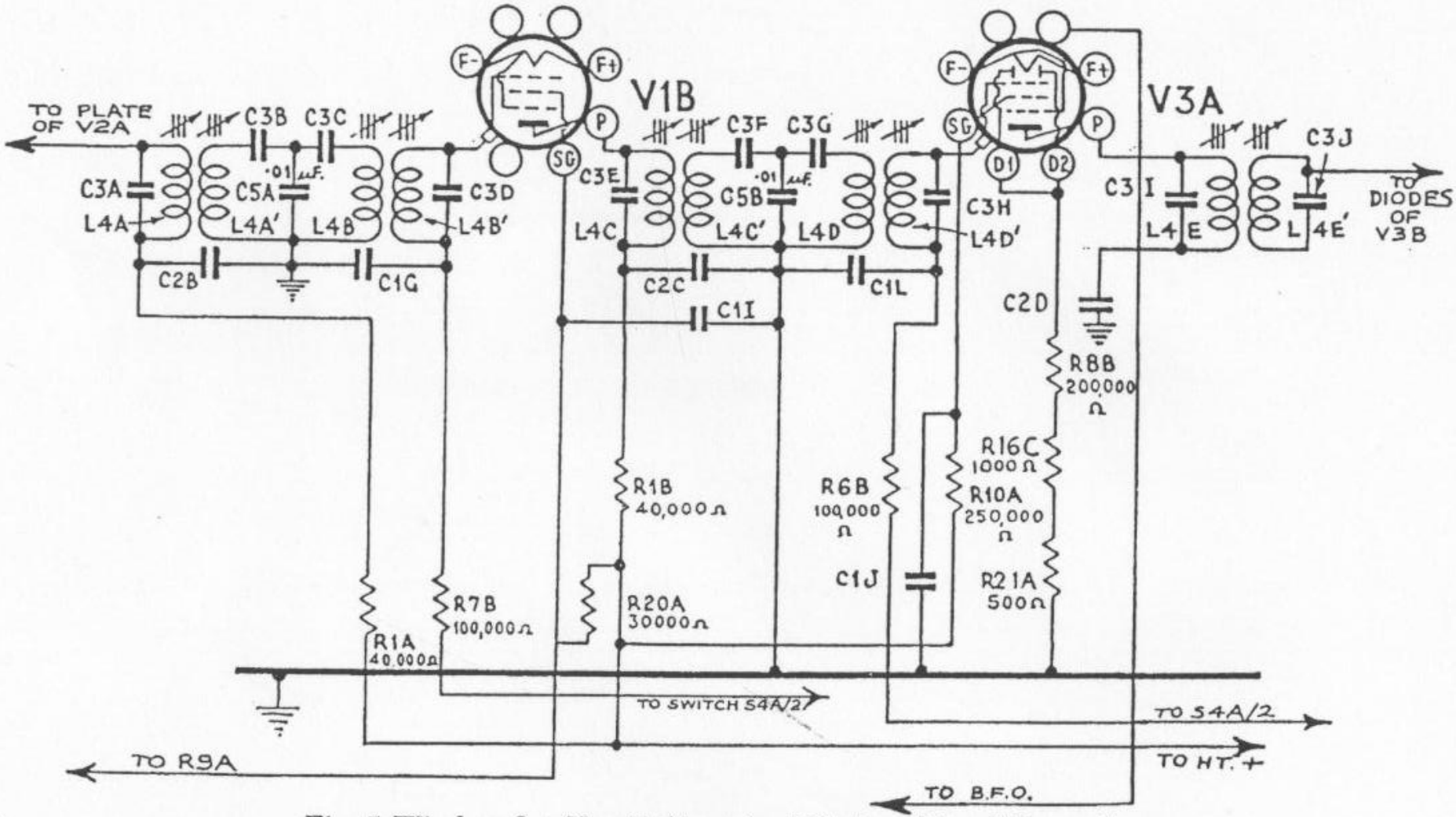


Fig. 7 Wireless Set No. 11 (Aust.)—I.F. Amplifier Schematic

I.F. AMPLIFIER

10 kc/s wide and by 60 db when the band-p. is 20 kc/s wide, giving a slope of approximately 10 db per kc.

The anode decoupling components for both these stages are similar, but the screen grid and bias arrangements are different.

The screen grid of the first I.F. valve (V-1-B) is returned to the junction of R-20-A and R-9-A screen feed potentiometer, and is common with the screen grid of the R.F. valve (V-1-A). Voltage for the screen grid of the second I.F. amplifier (V-3-A) is obtained through a screen feed resistance, R-10-A, direct from H.T. +. The grid return of the first I.F. stage is common with that of the R.F. valve, through decoupling resistance R-7-B.

The grid return of the second I.F. stage is switched, by means of S-4-A, to earth (zero bias) in " C.W." or " MAN." position, and to the junction of R-12-A and R-12-B (which form the

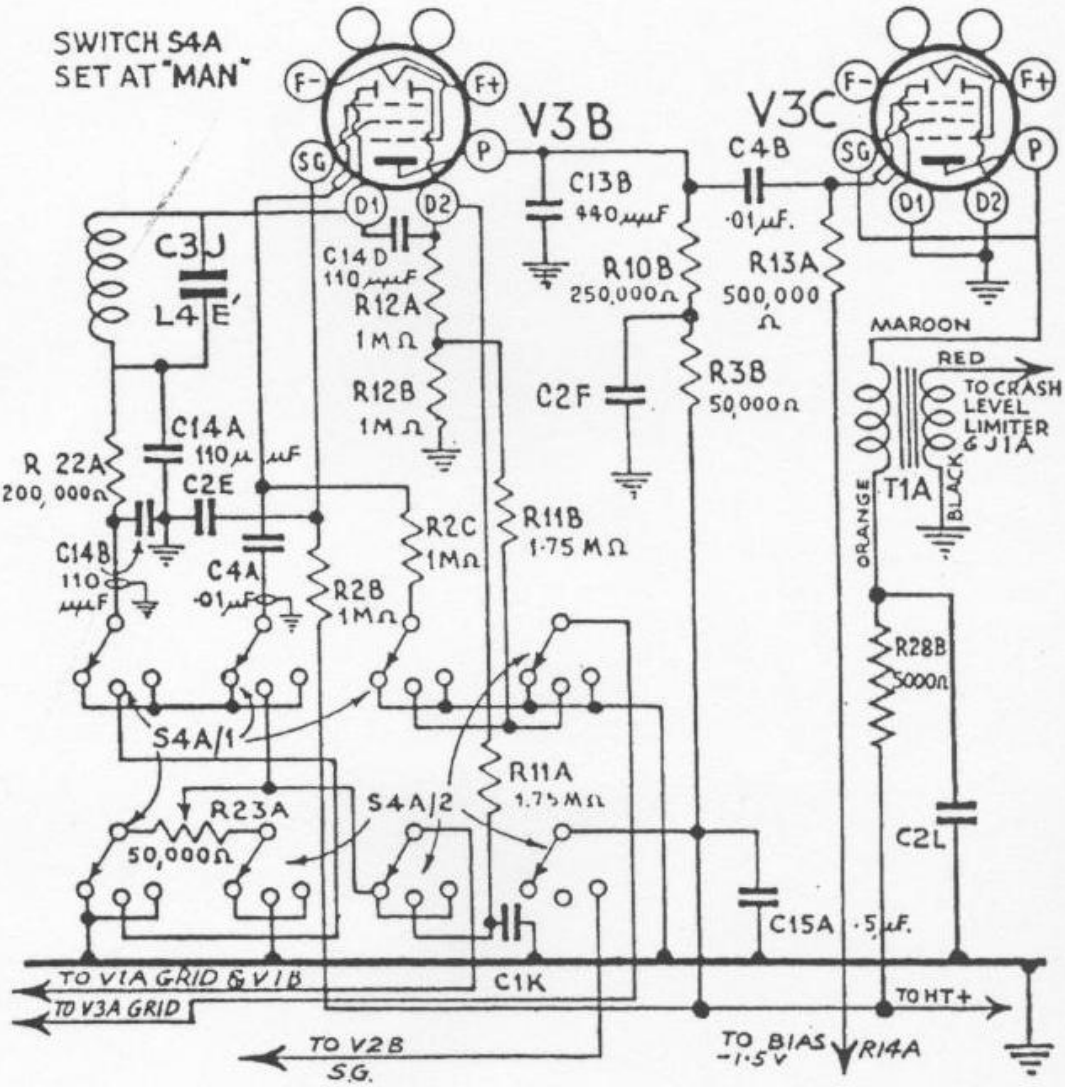


Fig. 8 Wireless Set No. 11 (Aust.)—Detector & A.F. Amplifier Schematic

A.V.C. bias potentiometer) in ..V.C." position. Thus in the " A.V.C." position, the bias for this stage will depend upon the strength of the received signal. Decoupling is accomplished by means of the resistance R-6-B and condenser C-1-L. See Fig. 7.

13.5 **Detector.**

The detector is a diode rectifier type using diode D1 in valve V-3-B, to which is applied R.F. voltage developed across the secondary of the last I.F. transformer L-4-E'. R-22-A, as well as forming a part of the diode load, acts as a filter, in conjunction with condenser C-14-A (110 uuF) and C-14-B (110 uuF), to separate the R.F. from the A.F. component. The remainder of the diode load is provided by R-3-A when the " REC." (R./T.-C.W.) switch is in the " C.W." or " MAN." position, and by the " REC. VOL." control R-23-A when in the " A.V.C." position. The portion of the A.F. component of the detector developed across this diode load is applied through condenser C-4-A (.01 uF) to the grid of the audio amplifier, pentode section of V-3-B. See Fig. 8.

13.6 **Audio amplifier stage.**

The audio amplifier stage is the pentode section of the duo-diode pentode V-3-B. When the " REC." (R./T.-C.W.) switch is in the " C.W." or " MAN." position, a fixed amount of the A.F. component of the detector output is applied to the grid, via C-4-A, but in the " A.V.C." position the amount supplied is dependent on the setting of the " REC. VOL." control.

The resistance R-10-B forms the output impedence across which the A.F. voltage is developed and applied through condenser C-4-B (.01 uF) to the grid of the output stage. Decoupling of the anode circuit is accomplished by means of resistance R-3-B and condenser C-2-F (.1 uF).

The screen voltage is supplied through a screen feed resistance, R-2-B, direct from H.T. +.

The grid return is switched by means of S-4-A to earth (zero bias) when in the " C.W." or " MAN." position, and to the junction of resistances R-12-A and R-12-B (which form the A.V.C. bias potentiometer) when in the " A.V.C." position, thus in this position the bias is dependent on the strength of the received signal. See Fig. 8.

13.7 **Output stage.**

Further audio frequency amplification is carried out in the duo-diode pentode V-3-C, whose load comprises the receivers headgear referred to the primary of the matching transformer T-1-A.

Negative bias is obtained by returning the grid ‹ R-13-A to the junction of R-14-A and R-32-A on the fixed bias potentiometer, plus a fixed amount derived from the filament circuit. See Fig. 8.

13.8 **I.F. or beat frequency oscillator.**

The second local oscillator or beat frequency oscillator comprises the oscillator section V-2-B′ of the pentagrid converter V-2-B operating in a series Hartley circuit. The circuit is tuned by the coil L-5-A and condenser C-24-A (750 uuF). The oscillator is biased by the grid resistance R-5-B and condenser C-11-B. A small capacitive coupling to the I.F. amplifier is provided by connecting the plate to the oscillator, through condenser C-6-B (500 uuF), to the vacant pin of V-3-A.

This very small coupling is necessary to prevent operation of the A.V.C. system by the beat oscillator, and, consequently desensitizing the receiver.

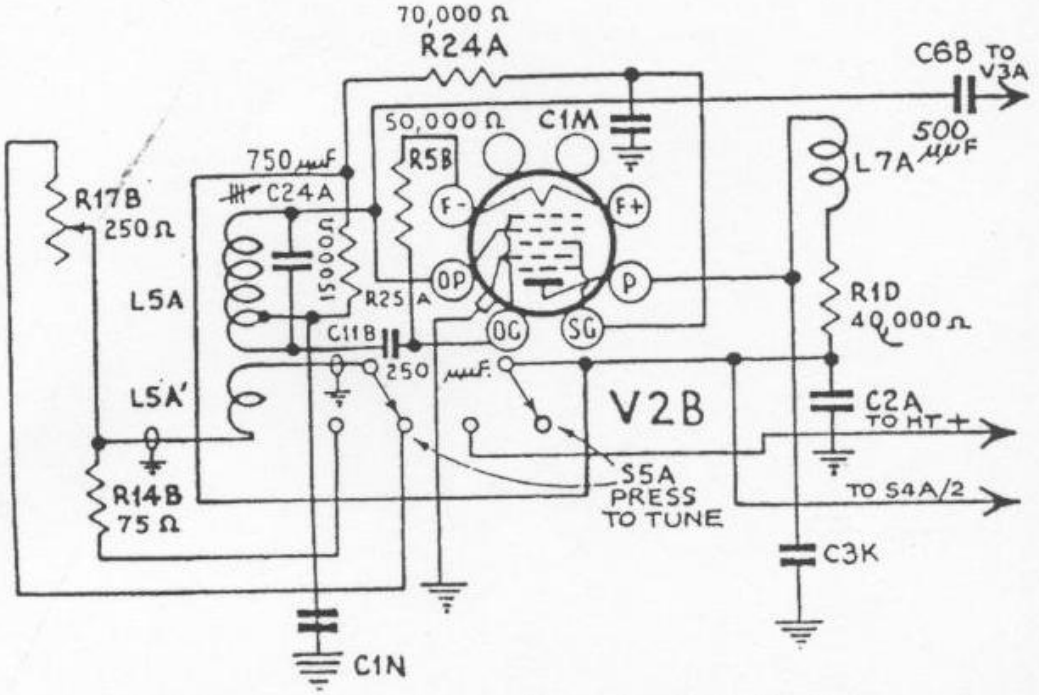


Fig. 9 Wireless Set No. 11 (Aust.)—B.F.O. Schematic

When the oscillator is brought into operation by the "PRESS TO TUNE" button or by switching to "C.W.", a beat note is produced with the signal being received by the signal detector.

When tuning the set, to ensure that the same frequency as that of the incoming signal will be used in sending, the oscillator is operated by pressing the "PRESS TO TUNE" switch, S-5-A, which connects the H.T. + to the oscillator plate, screen and anode of the valve V-2-B, through their individual decoupling circuits, and zero beat is obtained by turning the "FINE ADJUST" control of the 3 gang assembly.

For C.W. reception, the " REC. (R./T.-C.W.) switch S-4-A, is switched to the " C.W. " position and the oscillator operates continuously, the heterodyne note being varied by means of the " C.W. H'DYNE " control R-17-B, which provides a maximum variation of about ± 2 kc/s; this variation is produced by a rheostat, R-17-B, which is connected in parallel with a coupling coil L-5-A' coupled to the tuned circuit. The effective resistance, and hence the resonant frequency of the tuned circuit thus depends on the setting of this control.

When the oscillator is used for tuning by operation of the " PRESS TO TUNE " button, R-17-B is replaced by a fixed resistance R-14-B. This gives a load to the oscillator tuned circuit equivalent to R-17-B in the mid-position. See Fig. 9.

13.9 **Automatic and manual volume control.**

The A.V.C. rectifier is of the diode type using diode D2 in valve V-3-B, operating in a circuit similar to the signal diode. The R.F. voltage developed across the secondary of the last I.F. transformer L-4-E' is applied to this diode through condenser C-14-D. The rectified voltage is developed across the diode load potentiometer R-12-A and R-12-B. This voltage is proportionate to the strength of the carrier and when switch S-4-A is in the " A.V.C." position it is used to provide bias for the A.V.C. system. A strong signal produces a large bias and considerably reduces the gain, while a weak signal produces a small bias and more gain is available. This tends to keep all signals at the same strength.

The whole H.T. current for the receiver flows through the potentiometer arrangement of resistances R-18A (400 ohms), R-30-B (250 ohms), R-32-A (650 ohms) and R-14-A (75 ohms) connected between H.T. negative and earth. The resultant voltage drop enables points of fixed bias to be obtained.

For the reception of R./T. the " REC." (R./T.-C.W.) switch S-4-A is first set in the " MAN." position. With the switch S-4-A set in this position, the " REC. VOL." control R-23-A is connected from H.T. negative to earth across the fixed bias potentiometer with its movable arm connected to the grid circuits of the two controlled stages V-1-A and V-1-B through their decoupling resistances. Thus a proportionate bias, determined by the setting of the volume control is applied to the grids of these two valves and gives manual control in the R.F. and first I.F. stages. After tuning in R./T. with switch S-4-A set to " MAN." it should then be turned to " A.V.C." which will place the full R.F. and I.F. gain under the control of the AV.C. system and the " REC. VOL." control will function as an A.F. volume control. It then forms

part of the detector diode load and a proportionate A.F. voltage developed across it, determined by its setting, is applied to the grid of the audio amplifier V-3-B and by this means, the signal can be adjusted to the desired strength in the headphones.

Also, in this position, the grid returns of valves V-1-A and V-1-B are connected to the A.V.C. diode through decoupling resistance R-11-A. Thus the full voltage developed across the diode load potentiometer R-12-A and R-12-B is applied to the grids of these valves. The grid returns of V-3-A and V-3-B are connected to the junction of R-12-A and R-12-B on the A.V.C. diode load potentiometer, through decoupling resistance R-11-B. By this means, half the voltage developed across the diode load is applied to the grids of these valves.

When switched to "C.W." the A.V.C. is inoperative and R-23-A acts as an R.F. and I.F. manual gain control in the same circuit arrangement as when switched to "MAN." See Fig. 8.

13.10 **Crash level limiter.**

This comprises the metal rectifier unit W-1-A (Type BNF4-1-1M3) which consists of two metal rectifiers connected in parallel, but in opposite polarity across the secondary of the valve-to-phones transformer T-1-A. When an A.C. voltage from the transformer is applied, this arrangement of rectifiers conducts equally in both directions but acts as a resistance to low values of A.C. Owing to the curvature of the normal characteristic of the westinghouse rectifier at low voltages. the apparent resistance of this device decreases rapidly as the applied voltage is increased. The resistance is high to ordinary signal voltages, but for atmospheric and other interference voltages of a transient nature which rise above the signal voltage, the resistance becomes low, and shunts the secondary of the transformer. This has the effect of reducing such noise to the level of the signal. The shunting effect is adjusted by means of the "CRASH LEVEL" control which opreates the rheostat R-17-A connected in series with W-1-A. The effect of heavy transients is considerably reduced by decreasing the

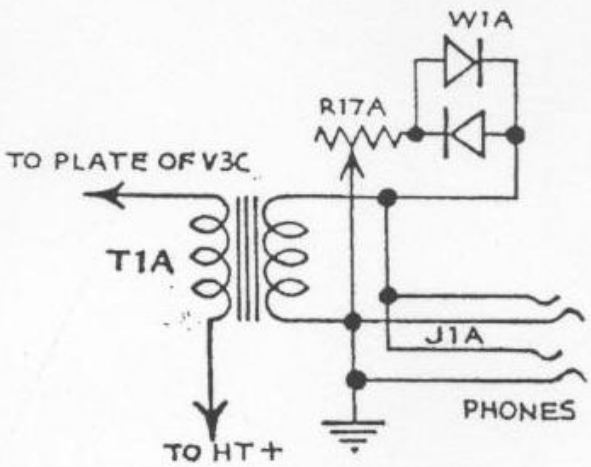


Fig. 10 Wireless Set No. 11 (Aust.) —Crash Level Limiter Schematic

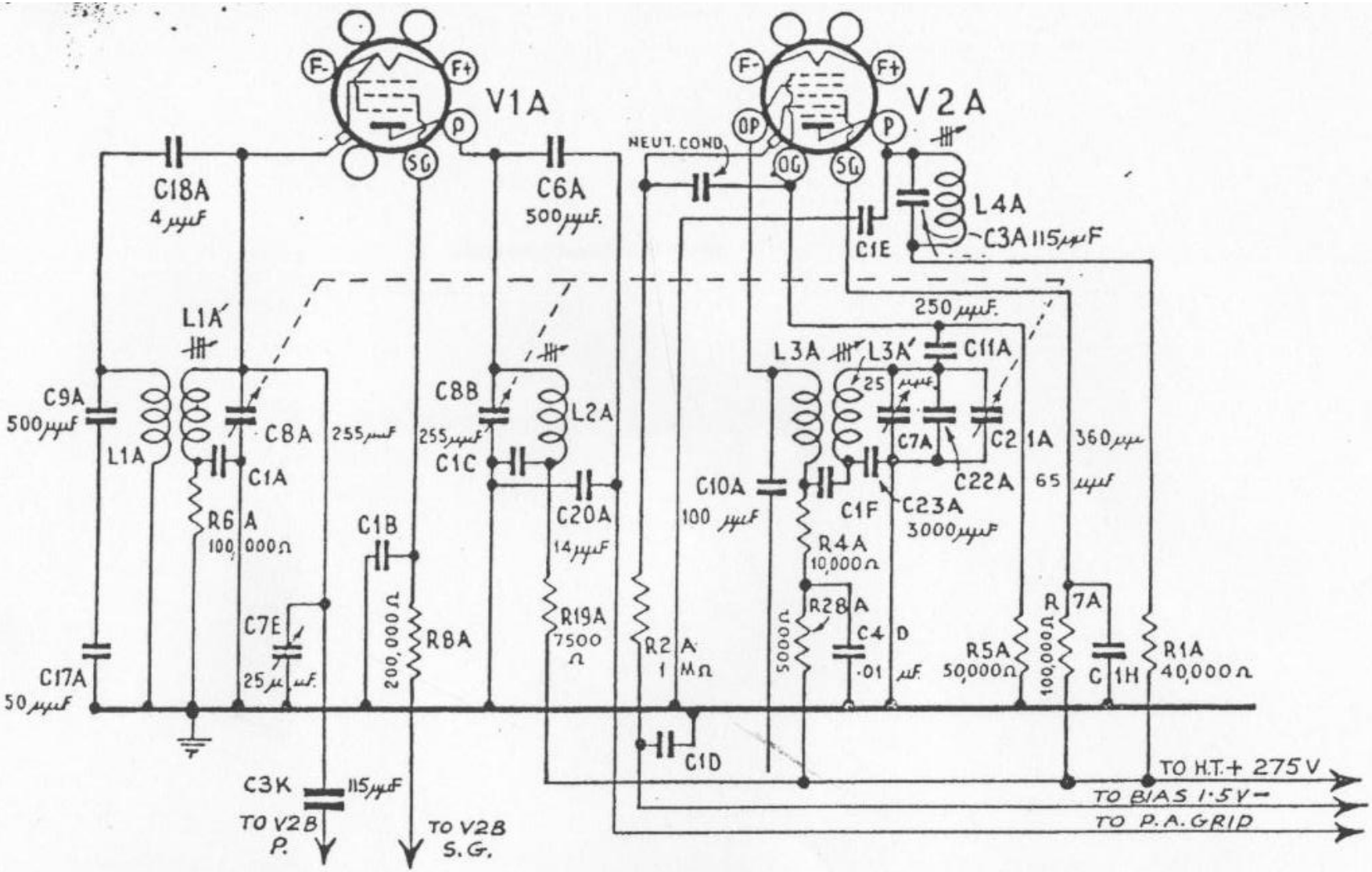


Fig. 11 Wireless Set No. 11 (Aust.)—R.F. Oscillator and Buffer Amplifier Schematic

R.F. OSCILLATOR

setting of R-17-A, but the higher speech frequencies are thereby attenuated, and, if background noise is at all tolerable, maximum intelligibility will be obtained when the "CRASH LEVEL" control is in the maximum position, at which point R-17-A is open circuited. See Fig. 10.

13.11 **"SEND/REC." switch.**

A detailed account of the functions of the "Send/Rec." switch S-1-A, S-2-A and S-3-A is given in Chapter V., Sec. 14.10.

13.12 **Valve testing.**

A valve test panel is provided, at which all the valves in the receiver can be tested by measuring the voltage drops across the anode feed resistances.

CHAPTER V

TECHNICAL DESCRIPTION OF SENDER

14. SENDER CIRCUITS, WIRELESS SET No. 11 (AUST.).

14.1 **Introduction.**

When the set is switched to "SEND," the output of the receiver first oscillator of frequency equal to "Signal frequency plus 455 kc/s," and the output of the I.F. or beat frequency oscillator, of frequency,—"455 kc/s," are combined in the sender frequency converter valve V-2-B. The difference frequency, i.e. "Signal frequency," is selected from the sender frequency converter output by a tuned circuit, amplified in a buffer stage, and applied to the sender power amplifier stage.

Fig. 19 is a schematic circuit diagram of the set whilst Fig. 21 is a simplified diagram of the Sender circuit. Plate V. is a top view of the chassis and Plate VI. is an under view of the chassis.

14.2 **R.F. Oscillator.**

The R.F. oscillations are provided by the oscillator section V-2-A' in conjunction with the tuned circuit comprising the inductance L-3-A', the padder condenser C-23-A (3000 uuF) and the tuning condenser C-21-A (12-360 uuF), which forms part of the 3-gang assembly operated by the "TUNING REC. & SEND" control.

This circuit is trimmed by a[illegible]stable condenser C-7-A (7-25 uuF), and fixed condenser C-22-A (65 uuF). C-22-A comprises temperature compensating condensers used to minimize frequency drift due to temperature variations. Feed-back is supplied by inductance L-3-A in conjunction with condenser C-1-F (.05 uF).

The output of this valve is applied via the feed condenser C-10-A (100 uuF) to the control grid of the converter section V-2-B in the sender frequency converter stage.

14.3 I.F. or beat frequency oscillator.

This oscillator, whose functions have been explained in Chapters III. and IV., comprises the oscillator section V-2-B′ of the sender frequency converter stage, and oscillatory circuit, L-5-A, C-24-A (750 uuF), which is tuned to 455 kc/s and coupled to the oscillator grid via the condenser C-11-B (250 uuF). Coupling coil L-5-A′ is terminated into a fixed resistance R-14-B on "SEND," thus maintaining the I.F. oscillator at a fixed frequency, nominally 455 kc/s. The output of this oscillator is mixed in the converter section V-2-B, with the output of the R.F. oscillator V-2-A′.

14.4 Frequency converter.

The output of the R.F. Oscillator is applied to the control grid of the sender frequency converter section V-2-B, and is mixed with the output of the I.F. oscillator V-2-B′ which is in the same envelope. The output of V-2-B is choke capacity coupled to the tuned input circuit of the separator or buffer valve V-1-A, by means of the radio frequency choke L-7-A and the condenser C-3-K (115 uuF).

For C.W. and M.C.W. transmission, the screen supply to valve V-2-B is keyed by relay S-11-A.

14.5 Buffer stage.

The input and output circuits of the stage are tuned to the desired transmitting frequency, so that unwanted components in the output of the sender frequency converter are eliminated.

The input circuit comprises the inductance L-1-A′ and the tuning condenser C-8-A (11-255 uuF), which forms part of the 3-gang assembly. This circuit is trimmed by the condenser C-7-E (7-25 uuF). Inductance L-1-A is shunted by condenser C-17-A (50 uuF) to preserve the tracking between the ganged tuned circuits.

The low potential end of the tuned input circuit of this stage is returned to earth (filament negative) via resistance R-6-A. No additional bias is supplied when the stage is operating as a buffer.

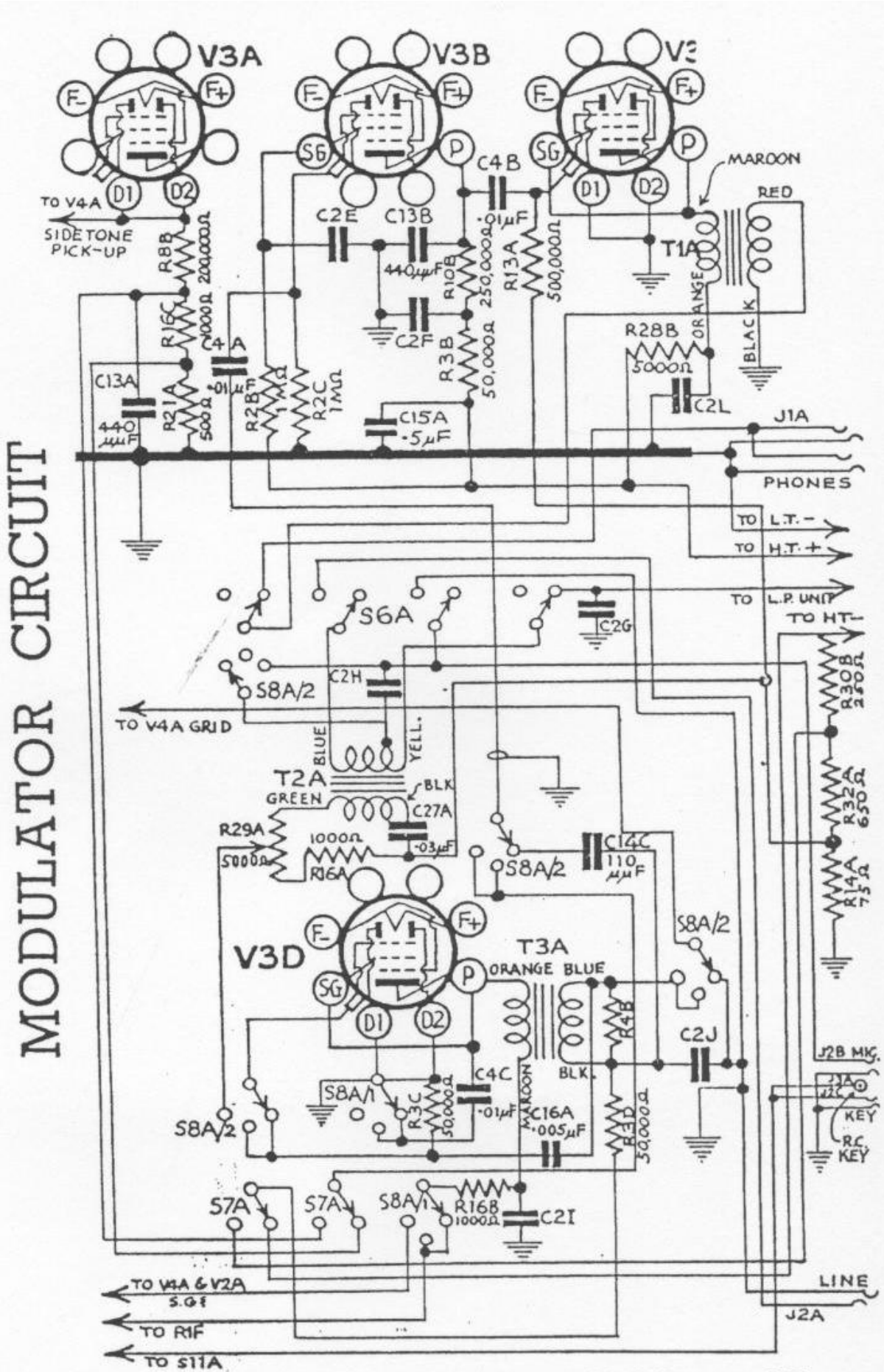


Fig. 12 Wireless Set No. 11 (Aust.)—Modulator and Tone Oscillator Schematic

The tuned anode circuit comprise e inductance L-2-A and condenser C-8-B (11-255 uuF), which forms part of the 3-gang assembly. The output is fed via the condenser C-6-A (500 uuF) to the control grid of the sender power amplifier V-4-A, and the circuit is trimmed by the adjustable condenser C-7-D (7-25 uuF) and fixed condenser C-20-A (14 uuF). See Fig. 11.

14.6 **Modulator/Tone oscillator.**

For M.C.W. and R./T., grid molulation of the power amplifier is employed, and audio frequency voltages supplied by the triode connected modulator/tone oscillator stage V-3-D are superimposed on the R.F. and bias voltages applied to the power amplifier control grid, thus modulating the sender power output.

On C.W. and M.C.W., V-3-D is connected as a feed-back type audio frequency oscillator, a tuned circuit being formed by the primary winding of the modulator output transformer T-3-A, and condenser C-4-C (.01 uF). A portion of the voltage appearing across the secondary is fed back via condenser C-16-A (.005 uF) to the control grid of V-3-D. H.T. supply to the tone oscillator is controlled by the keying relay S-11-A on C.W. and M.C.W., and the oscillator output is adjusted by the " H.P./L.P." switch S-7-A which selects the appropriate anode dropping resistance, i.e. R-1-F (40,000 ohms) on H.P., and R-1-F in series with R-1-E (40,000 ohms) on L.P.

For R/T., V-3-D is used as an amplifier/modulator, and speech voltages from " MIC." or " LINE " are applied to the primary of the modulator input transformer T-2-A, appearing in the secondary across the resistive load formed by the variable " MOD." control potentiometer R-29A and resistance R-16-A. The input to the modulator grid is thus controlled by means of R-29-A, and the depth of modulation may be adjusted for various types of speech input or for H.P./L.P. The output circuit of the modulator-tone oscillator consists of the transformer T-3-A, the secondary of which is terminated by resistance R-4-B, which forms the modulator load. On M.C.W. and R/T., tone or speech voltages appearing across R-4-B are fed via R-9-B, L-7-B, and R-15-A to the control grid of the power amplifier, thus modulating the sender output.

On C.W., the tone output is used for sidetone only and does not modulate the sender output, the connection to the power amplifier grid being broken by " SEND " (C.W.-M.C.W.-SPEECH) switch S-8-A/2.

Grid bias for V-3-D is obtained by self bias from grid leak R-3-C for C.W. and M.C.W., and from the junction of R-32-A —R-14-A on the bias potentiometer for R./T. See Fig. 12.

POWER AMPLIFIER

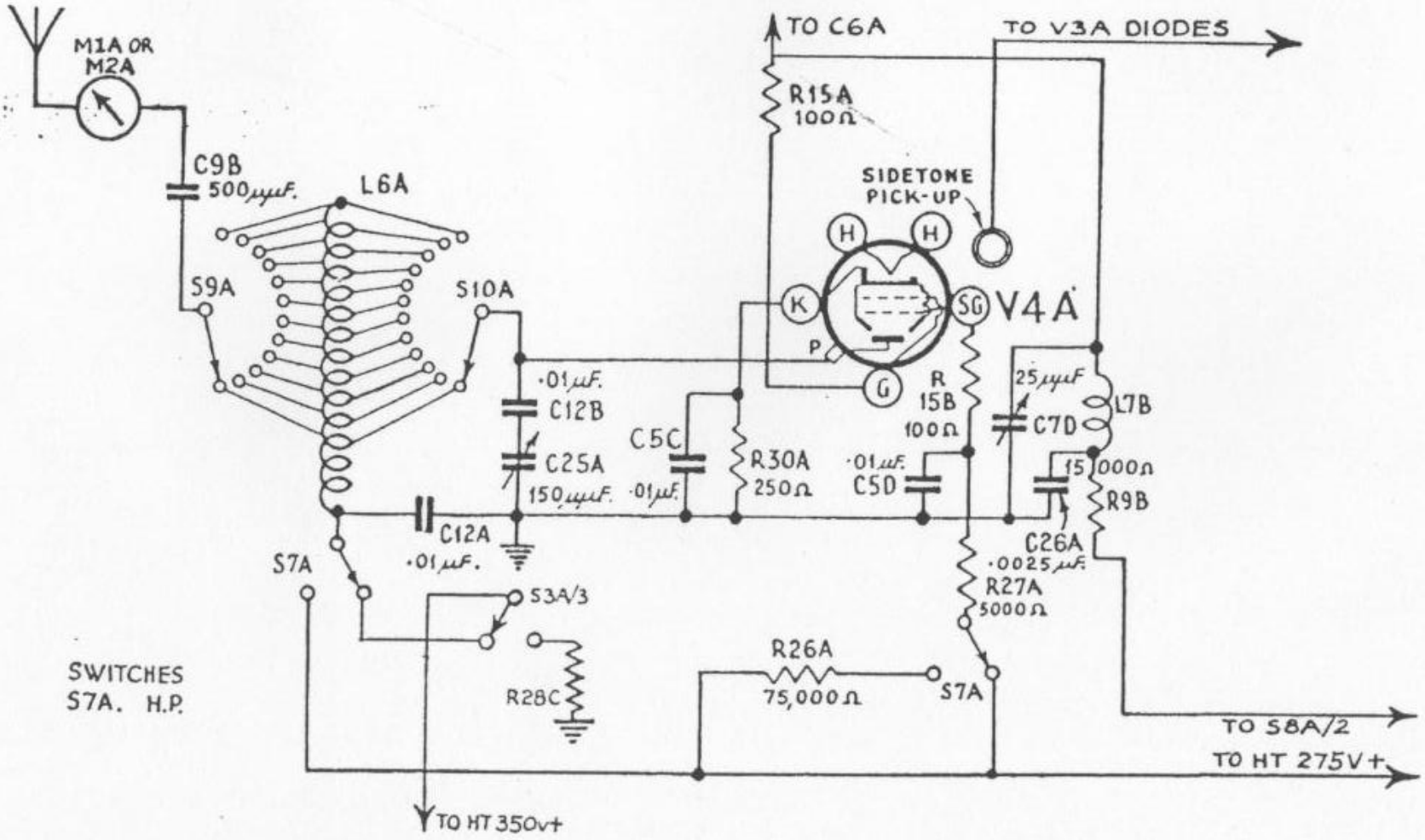


Fig. 13 Wireless Set No. 11 (Aust.)—Power Amplifier Schematic

14.7 **Power amplifier stage.**

The output of this stage (V-4-A) is fed via the aerial coupling circuit and aerial series fixed condenser C-9-B (500 uuF) to the Aerial Ammeter M-1-A or M-2-A, and thence to the aerial. The power amplifier/aerial coupling consists of the tapped inductance L-6-A and the "SEND AERIAL TUNE" condenser C-25-A (5-150 uuF). C-25-A is isolated from the power amplifier anode by the blocking condenser C-12-B (.01 uF). The circuit is tuned by the adjustment of C-25-A and the "ANODE TAP" switch S-10-A. See Fig. 13.

The H.T. supply to the anode is decoupled by means of the condenser C-12-A (.01 uF). V-4-A is an indirectly heated valve, and some 30 seconds elapse from the time of switching on the L.T. supply until the cathode reaches operating temperature.

Grid bias for this stage is obtained as follows :—

(i) On C.W.

The grid is returned to earth via the radio frequency choke L-7-B and grid leak R-9-B. Rectification of the drive supplied by the buffer stage results in grid current flowing and the potential thus developed across R-9-B provides grid leak bias to which is added the drop across the cathode resistor R-30-A. The cathode bias ensures that the power amplifier anode and screen dissipation is limited to a safe value when the relay S-11-A is opened by the key, and the drive removed.

(ii) ON M.C.W. and SPEECH.

The grid leak R-9-B is returned via the secondary of the modulator output transformer T-3-A and the resistance R-3-D, to the correct negative bias point on the bias potentiometer R-30-B—R-32-A—R-14-A. (NOTE : R-18-A which is a part of this potentiometer, is not used on "SEND" and is short-circuited by the "SEND/REC." switch S-3-A/2). The correct voltage is selected by the "H.P./L.P." switch S-7-A, i.e., on H.P. connection is made to negative H.T., and on L.P. to the junction of R-30-B and R-32-A. Cathode bias from R-30-A is added to the potential selected by S-7-A.

In order that the operator may have an aural indication in the headphones of his C.W. and M.C.W. keying, and of the depth of modulation on speech, sidetone is provided via the sidetone amplifier (audio amplifier stage) V-3-B, and the sidetone output (receiver output) stage V-3-C. On C.W. a small portion of the output of the tone oscillator valve V-3-D is fed via coupling

condenser C-14-C (110 uuF) to the control grid of V-3-B, is amplified and passed to the receiver headgear via V-3-C, so that an audio frequency note is heard each time the key is pressed.

On M.C.W. and SPEECH, a small fraction of the R.F. output voltage is collected by the sidetone pick-up rod adjacent to valve V-4-A. The R.F. voltage is applied to the sidetone diode detector in valve V-3-A, across the load resistance R-8-B. Rectification occurs and the audio frequency (sidetone) component appears across the load R-8-B, R-16-C and R-21-A. The voltage required to provide a suitable sidetone level is selected with the " H.P./L.P. " switch S-7-A, which makes connection to the junctions of R-8-B and R-16-C or R-16-C and R-21-A, on L.P. or H.P. respectively. The selected audio frequency voltage is then fed to the control grid of V-3-B, amplified, and fed to the receivers via V-3-C. Keyed audio frequency tone is heard on M.C.W., and radiated speech is monitored on R./T.

Sidetone volume can be adjusted by means of the " REC. VOL." control only when the " REC." (R./T.-C.W.) switch is set at " A.V.C."

"H.P./L.P." SWITCH

14.8 **" H.P./L.P." switch S-7-A.**

(i) When the switch is in the " L.P." position, the anode of the power amplifier valve V-4-A is fed from the L.P. Supply Unit. (approx. 210 volts). Screen potential for V-4-A is fed through resistances R-26-A, R-27-A and R-15-B. On M.C.W. and R./T. correct grid bias for V-4-A is selected as described in 14.7, and the sidetone voltage developed across R-16-C—R-21-A is fed to V-3-B. On C.W. and M.C.W., H.T. is supplied to the tone oscillator valve V-3-D via the keying relay S-11-A, and resistances R-1-E, R-1-F and R-16-B.

(ii) When the switch is in the " H.P. " position, the anode of V-4-A is fed from the H.P. Supply Unit (approx. 345 volts). Screen potential for V-4-A is increased by feeding the supply through R-27-A and R-15-B only On M.C.W. and R./T., the full grid bias available is applied as described in 14.7, and to compensate for the increased signal strength the sidetone voltage across R-21-A only is applied to V-3-B. On C.W. and M.C.W H.T. supply to the tone oscillator V-3-D is fed through resistances R-1-F and R-16-B only, thus increasing the oscillator output in order to modulate the higher power

14.9 "SEND" (C.W.-M.C.W.-SPEECH) switch S-8-A.

(i) When the switch is in the "C.W." position the grid leak R-9-B of the power amplifier V-4-A is earthed. Screen supply for valves V-1-A and V-2-B, and anode supply for V-3-D is obtained via the keying relay S-11-A. V-3-D is connected as a tone oscillator and sidetone is fed directly from T-3-A via C-14-C to V-3-B. Condenser C-2-H is placed in series with the "LINE" winding of T-2-A to prevent D.C. from remote control unit "A" key circuits flowing in the transformer.

(ii) When the switch is in the "M.C.W." position, the grid leak R-9-B of V-4-A is connected to the high potential end of the tone oscillator load R-4-B, and through this path and R-3-D to the correct negative bias point as selected by "H.P./L.P." switch S-7-A. Screen supply for V-1-A and V-2-B, and anode supply for V-3-D is obtained as for C.W., i.e., via the keying relay S-11-A. V-3-D again functions as a tone oscillator, but due to the connection through R-9-B also modulates the sender output. The sidetone connection to V-3-B is therefore transferred to the correct point on the sidetone potentiometer, as selected by S-7-A. Condenser C-2-H is in series with the "LINE" winding as for C.W.

(iii) When the switch is in the "SPEECH" position, the grid leak R-9-B of V-4-A is connected as in 14.9 (ii). "M.C.W." H.T. voltage from L.P. Supply Unit is applied continuously to the screens of V-1-A and V-2-B, and via R-16-B only, to the anode of V-3-D. V-3-D functions as an amplifier modulator stage, whose output modulates the sender power amplifier through the connection via R-9-B. The V-3-B sidetone connection is made to the appropriate sidetone potentiometer point as selected by the "H.P./L.P." switch S-7-A. Condenser C-2-H in the "LINE" winding of T-2-A is short-circuited to facilitate the passage of speech currents

14.10 "SEND/REC." Switch S-1-A, S-2-A, S-3-A.

One of the functions of the "SEND/REC." switch is to compensate for various differences in stray circuit capacity resulting from the use of certain components for both reception and transmission. Thus the grid and anode circuits of the valve V-1-A are respectively compensated by means of the adjustable trimming condensers C-19-A and C-7-C during reception, and by

"SEND/REC." SWITCH

C-7-E and C-7-D during transmissio C-17-A is switched across L-1-A during transmission to compensate for the disconnection of the aerial from this inductance. The anode circuit of the R.F. oscillator V-2-A' is compensated during reception by means of the adjustable trimming condenser C-7-B for the removal of the capacity involved in the connection to the control grid of V-2-B, which is made on "SEND." The coupling coil L-5-A' is connected on "SEND" to the fixed resistance R-14-B, which presents a load to the I.F. oscillator equivalent to the C.W. H'DYNE" control R-17-B at mid-position.

Other functions of the SEND/REC." switch are as follows :—It switches the aerial to the appropriate circuit, and on "SEND" earths the unused receiver aerial connections to prevent feed-back. It changes the screen supply for valves V-1-A and V-2-B, and it changes the bias connection of valve V-1-A. When the switch is in the "REC." position, it earths the input and output circuits of the converter section V-2-B to prevent excessive B.F.O. injection and makes the connection from the receiver output transformer T-1-A to the headphone jack J-1-A, which is open on "SEND" when the "PULL FOR R.C." switch is at "REMOTE."

It also earths the H.P. H.T. supply through resistor R-28-C to prevent commutator interference should the H.P. machine still be rotating on switching to "REC." R-28-C also ensures dissipation of the energy of the rotary transformer by loading the output of this Uni with the result that the Rotary transformer rapidly comes to a stop when the "SEND/REC." switch i moved from "SEND" to the "REC." position.

When the switch is at "SEND" it earths the output circui of the converter section V-2-A through condenser C-1-E. I connects the H.T. supply to the anodes of V-2-B and V-2-E and, via the keying relay S-11-A, to the anode of V-3-D. A "SEND" the H.T. supply is also fed, via the "H.P./L.P. switch S-7-A to the anode and screen of V-4-A and to th "SEND" (C.W.-M.C.W.-SPEECH) switch S-8-A.

The "SEND-RECEIVE" switch S-1-A, S-2-A, S-3-A als provides L.T. supply for the "MIC" and for the keying rela S-11-A. It short-circuits section R-18-A of the bias potentiometer, switches on the H.P. Supply Unit, and—for side-to purposes—connects the control grid circuit of V-3-B to th "SEND" (C.W.-M.C.W.-SPEECH) switch S-8-A/2. It al

open-circuits the H.T. supplies t ıe I.F. valves V-1-B and V-3-A.

14.11 Keying relay S-11-A.

For telegraph transmission (C.W. or M.C.W.), the relay S-11-A is used both for remote control keying and when keying at the set.

With the key up, the screens of the buffer V-1-A and the frequency converter V-2-B are earthed by the relay contacts, thus cutting off the R.F. drive to the grid of the power amplifier V-4-A and rendering this stage inoperative. The anode of the tone oscillator V-3-D is earthed so that side-tone, and in the case of M.C.W., tone modulation is also cut off.

When the key is pressed, the correct screen potential is applied to V-1-A and V-2-B, and the R.F. drive appears at the grid of V-4-A, thus energizing this stage. At the same time, the appropriate anode voltage is provided for V-3-D, which supplies tone oscillations for sidetone on C.W., or tone modulation and sidetone on M.C.W.

14.12 Remote control switch ("PULL FOR R.C.") S-6-A.

This switch provides facilities for changing over from the local microphone to a speech or buzzer input transmitted from a remote point over a wire line.

It changes over the primary winding of the modulator input transformer T-2-A from "MIC." to "LINE," at the same time switching off the "MIC." supply. On "R.C.", it also opens a closed circuit from a pole of the "SEND/REC." switch (S-3-A/2), thus permitting the disconnection of the receiver output transformer T-1-A from the headphones and "LINE" on "SEND," in order that the "LINE" inputs may not be unnecessarily attenuated.

14.13 Valve Testing.

A valve test panel is provided at which all the valves in the Sender, with the exception of the power amplifier (V-4-A), can be tested by measuring the voltage drops across the anode feed resistances.

CHAPTER VI

ASSOCIATED APPARATUS

15. SUPPLY UNITS AND CONNECTORS.

SUPPLY UNITS

15.1 **General.**

Two types of supply units are used in various arrangements of the Wireless Set No. 11 (AUST.) viz. :—

Supply Unit L.P.
Supply Unit H.P.

Both operate from 12 volt supply.

The Supply Unit L.P. supplies H.T. for both sending and receiving circuits, but the Supply Unit H.P. supplies H.T. for the sender portion of the set only. Consequently, the Supply Unit H.P. is never used alone, but always in association with the Supply Unit L.P.

The Units supply H.T. for the wireless set by means of rotary transformers, which step up the battery voltage to 210 Volts (L.P.) or 345 Volts (H.P.). Each incorporates essential smoothing circuits.

15.2 **Description of apparatus.**

(i) Supply Unit L.P.

This unit comprises a rotary transformer (11 V./210 V. -50 mA) smoothing filters for the H.T. supply and filters on the L.T. side for avoiding commutator interference together with dropping resistances to decrease the 12 volts L.T. supply to correct operating voltage. Interconnection of the unit with the set and with the Supply Unit H.P. is effected by means of plug-socket connectors. Fig. 14 is a circuit diagram and Plate VII. a general view of this unit.

(ii) Supply Unit H.P.

This Unit has the same overall dimensions as the Supply Unit L.P. It consists of a rotary transformer (11 V./345 V.—40 mA), an R.F. choke and a smoothing condenser. This unit derives its power supply via Supply Unit L.P., through a flexible plug-socket connector and supplies the power amplifier valve only. With this arrangement the power output and consequently the range of the sender is considerably increased in comparison with that when working under the low power condition. Fig. 15 is a circuit diagram and Plate VIII. is a general view of this unit.

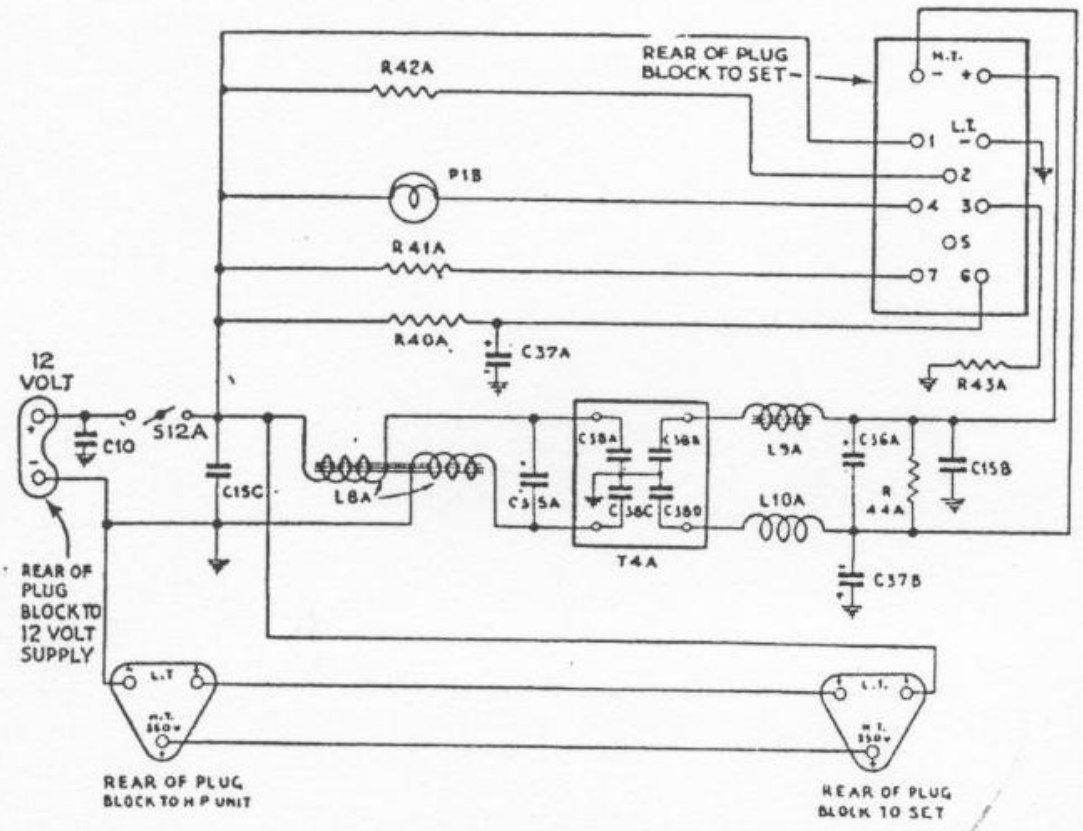


Fig. 14 Wireless Set No. 11 (Aust.)—Supply Unit L.P. Schematic

(iii) Connectors.

The various components of the No. 11 Set station are joined up by means of connectors appropriately named and numbered for identification. Each connector has several variations to meet the alternative arrangements of the station. Each variation of a connector is identified by a separate number. The scheme of connections adopted is shown in Table VII.

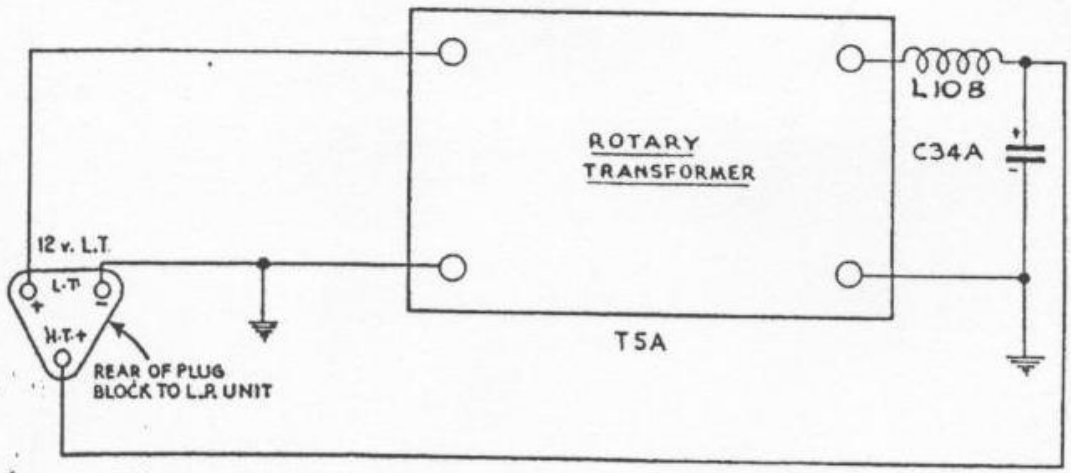


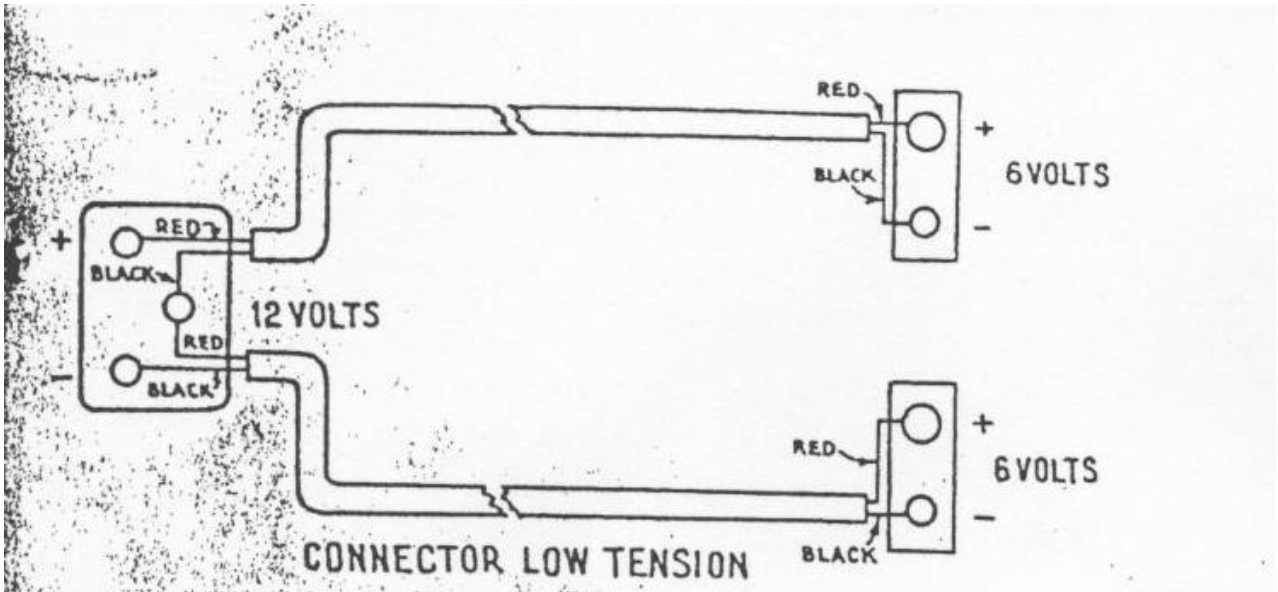
Fig. 15 Wireless Set No. 11 (Aust.)—Supply Unit H.P. Schematic

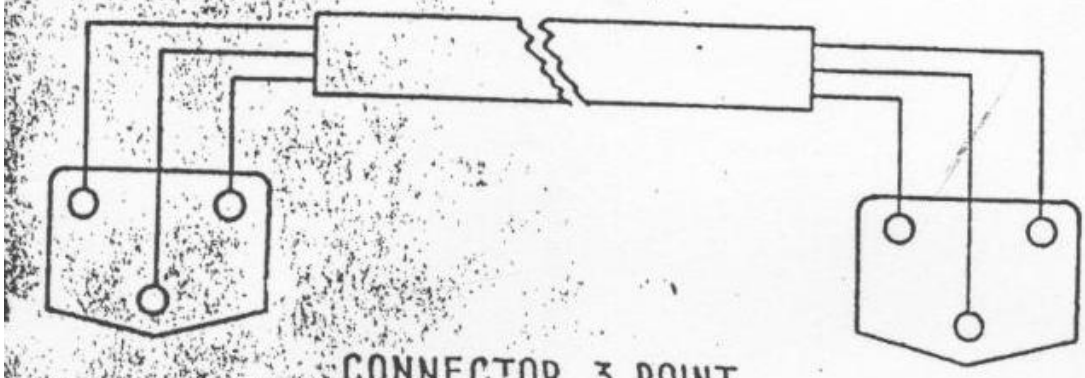
CONNECTION TABLE

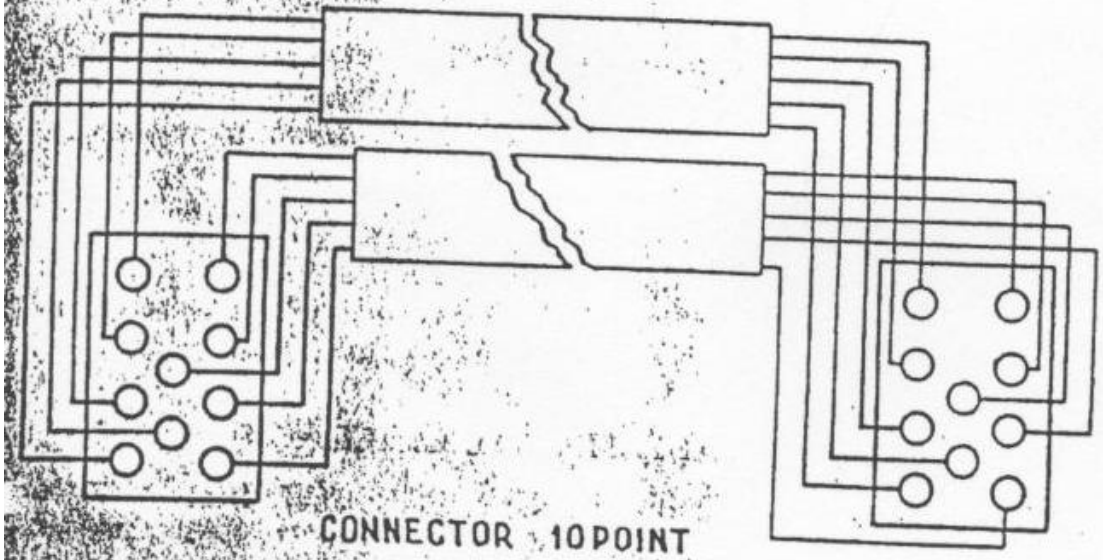
TABLE VII :—SCHEME OF CONNE( )NS.

Connector	Function	Number Used		
		L.P. Operation	H.P. Unit in Tray	H.P. Un in Carri
Connector, 4 Point No. 2 (AUST.)	Joins battery to Supply Unit L.P.	1	1	1
Connector, 10 Point No. 1	Interconnects set with Supply Unit L.P.	1	1	1
Connector, 3 Point No. 2	Interconnects set with Supply Unit L.P. Joins Supply Unit L.P. to Supply Unit H.P. when latter is used in carrier.	1	1	2
Connector, 3 Point No. 3	Joins Supply Unit L.P. to Supply Unit H.P. when latter is used in tray on top of carrier.	—	1	—
Lead, Aerial or Earth No. 1 (AUST.)	Connects set aerial terminal to aerial blocking condenser, and set earth terminal to carrier.	2	2	2
Lead, Earth No. 2	Earths Supply Unit L.P. to set. Earths Supply Unit L.P. to Supply Unit H.P. when latter is used in carrier.	1	1	2
Lead, Earth No. 4	Earths Supply Unit L.P. to Supply Unit H.P. when latter is used in tray.	—	1	—
Lead, Earth No. 5	Earths Supply Unit L.P. to carrier when Supply Unit H.P. is either not used or used in tray.	1	1	—
Lead, Earth No. 6	Earths Supply Unit H.P. to carrier when unit is used in carrier.	—	—	1

NOTE.—The wiring of these connectors is shown in Fig. 16.







CONNECTOR DETAILS

Fig 16 Wireless Set No. 11 (Aust.)—Connectors

16. BATTERIES.

One type of battery is associated with Wireless Set No. 11 (AUST.) viz. :—

Batteries, Secondary Portable, 6 V. 75 Ah.

Two batteries are employed. They are 6 Volt units, each fitted in a wooden box provided with a carrying strap. The batteries are connected in series and are provided with two sockets, a Niphan for use with Wireless Set No. 11 and a DP6 two pin type for use with wireless sets of other types.

The Niphan type socket is provided with a screwed retaining ring to ensure that the plug does not become detached while operating.

CHAPTER VII

FIELD MAINTENANCE

17. GENERAL MAINTENANCE.

17.1 **Introduction.**

This chapter deals only with items of maintenance and repair that can be handled by Signal Units in the field using a minimum of test equipment. CHAPTER VIII. of this pamphlet deals with maintenance and repair in greater detail.

The occurrence of serious defects when the set is in use will be minimized if the daily and weekly routines given below are 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."

17.2 **Batteries.**

The condition of the batteries should be checked daily and recharging carried out if necessary. Refer to the label in the lid of the batteries for correct specific gravity of electrolyte.

18. 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.

The operator should see 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 was begun, or, if it falls off quickly, try first a spare battery in place of that in use. If the change produces a large improvement in aerial current, say 25% increase, the original battery requires recharging.

(ii) Put the "SEND/REC." switch to "REC." and note whether the receiver is producing normal background noises or is becoming "noisy." If intermittent crackling noises are heard, disconnect the aerial. If the unusual noises cease they are probably due to atmospherics or some external electrical disturbance, in which case nothing further can be done. They may, however, be due to bad contacts in the aerial itself. Examine, and if necessary, tighten up all aerial screwed joints.

If the noises persist with the aerial disconnected—

(*a*) Examine the headphone cord for signs of damage, and see that the terminals on the headphones themselves are tight. If the noise is due to the cord, it can probably be reproduced by shaking the cord or lightly jerking on the cord either at the plug or at the headphones.

(*b*) Examine the battery leads for signs of damage, and the plugs to see that they all fit tightly. If no external signs of damage are present, shake the leads in turn and listen for corresponding clicks or crackling noises.

(iii) When satisfied that everything is in good working order, clean and dry everything as it is put away.

Remember ALWAYS that—

(*a*) Leads and plugs, the battery box, its connecting socket, and the connecting socket on the set must always 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, slow-motion controls, etc., and it must be removed from the exterior of the set whenever it is noticed.

19. L.P. AND H.P. UNITS—WEEKLY INSPECTION.

19.1 **References to Figs. and Plates.**

L.P. Supply Unit		
	Schematic	Fig. 14
	Rear View	Plate VII.
H.P. Supply Unit		
	Schematic	Fig. 15
	Rear View	Plate VIII.

19.2 **Power unit maintenance.**

(i) Remove the four countersunk head screws from the sides of the case, and withdraw the complete assembly by pulling the handle.

(ii) See that all compgnents are mechanically tight and examine all electrical connections.

(iii) Examine the switch on the L.P. Unit. The pilot lamp in the L.P. Unit will not light when the unit is disconnected from the wireless set, since this lamp is connected in series with the wireless set dial lamp.

(iv) See that the machine is riding correctly on the rubber grommets; on pressing the base plate firmly, a small clearance should appear under the retaining washers.

(v) Remove the brushes by unscrewing the moulded caps and carefully withdrawing the springs carrying the brushes Carefully note the position of the brushes.

(vi) Wipe the brushes and commutators with a clean soft cloth.

(vii) See that the brush springs have not lost their temper.

(viii) See that the brushes are free to move in their holders and that they are of reasonable length.

(ix) Brushes should be renewed when reduced in length to about $\frac{3}{8}$ inch. To bed in a new brush, interpose a strip of No. 00 glass paper between the brush and the commutator with the rough surface facing the brush, and move the glass paper backwards and forwards.

NOTE.—Spare Brushes are carried in Case Spare Parts included in the Complete Station for Wireless Set No. 11.

(x) Examine the commutators for wear and proud micas and if in good condition replace the brushes. Be sure to replace the brush contact discs and when replaced.

each brush must occupy t holder from which it was withdrawn and must be the same way round as before.

(xi) Start the machine. If sparking occurs, stop the machine and clean the commutator with a paraffined rag.

NOTE.—The commutators of these machines will eventually become dark and glossy, and if clean and free from sparking, they are best left alone.

The bearings require a few drops of "Amberex" or M.80 oil monthly. In no circumstances may engine oil be used.

If the weekly inspection reveals that the equipment is faulty it should be forwarded to the appropriate Echelon Repair Section for attention.

All commutator repairs are to be handled ONLY by 3rd or 4th Echelon Workshops.

20. WIRELESS SET No. 11 (AUST.)—WEEKLY INSPECTION.

20.1 References to Figs. and Plates.

Wireless Set No. 11 (AUST.) Schematic	Fig. 19
Wireless Set No. 11 (AUST.) Chassis, Top View	Plate V.
Wireless Set No. 11 (AUST.) Chassis, Under View	Plate VI.

20.2 Removal of the set from the case.

To remove the set from the case, release the small bolts each side of the front panel, and pull the handles, located below the "SEND/REC." switch.

20.3 R.F. Compartment.

The wiring and components on the under side of the chassis (Plate VI.) are exposed by removing the bottom cover plate. The R.F. compartment is situated behind the "PHONE" and "LINE" jacks.

ON NO ACCOUNT MUST THE WIRING OF THE R.F. COMPARTMENT BE DISTURBED.

If the wiring of the R.F. compartment is disturbed in any way, the calibration and sensitivity of the set will be seriously affected and the set should be returned to "M" Section for checking its calibration against Wavemeter Class C No. 1. If calibration is out by more than 20 kc/s the set should be returned to Ordnance Workshops.

20.4 **Miscellaneous.**

(i) Clean the aerial terminal insulators on the front and back of the panel, to prevent leakage.

(ii) See that the Aerial Ammeter is firmly housed and making good contact, slightly spreading the split contact pins on the meter, if necessary.

(iii) See that all components are mechanically tight and examine all electrical connections and switches, **but do not disturb the wiring in the R.F. compartment.**

(iv) See that all valve covers are secure, and that the valve anode and grid connectors are making good contact.

20.5 **Connectors and plugs.**

Examine all connectors, plugs and contacts for electrical continuity and mechanical damage. See that the spring contacts of the Banana plugs are properly tensioned, and clean all plugs and sockets.

The wiring of the connectors is shown in Fig. 16.

20.6 **Relay.**

If the relay is suspected of being faulty, replace with spare. See Chapter VIII., para. 27.12 for further details.

20.7 **Tuning drive.**

Test the tuning drive for binding and backlash, proceeding as follows :—

If there is any tendency to bind, apply a few drops of " AMBEREX " or M.80 oil to the bearings. **Engine oil must not be used.**

Examine the two half-cogs on the main spindle. If the anti-backlash spring is properly tensioned, one of the half-cogs will be slightly in advance of the other, which one is immaterial.

Examine the coupling between the gang and the main drive spindles. The screws connecting the flanges and the grub screws securing the coupling to the spindles should be tight. Do **not attempt** to loosen these screws.

See that the worm pressure spring is effective. A weak spring causes the drive to " jump " on fine tuning.

If the backlash is excessive or if the drive jumps on fine tuning, the set should be returned to " M " section.

See that the locking screw rotates freely in the spindle and that it is not bent or twisted. Clean the locking screw, and lubricate with a few drops of " Amberex " or M.80 oil. **Engine oil must not be used.**

21. WIRELESS SET No. 11 TESTING ELECTRICAL PERFORMANCE.

21.1 Valve test panel.

The valve test panel, situated in the middle of the main panel near the lower edge, is provided so that all the valves in the receiver and sender, with the exception of the sender power amplifier valve, may be tested by measuring the voltage drops across the anode feed resistances. These voltage drops, which are proportional to the anode currents are measured by connecting the Voltmeter, pocket, 250 V., No. 2 (AUST.) across each of the points marked " 1A," etc., in turn and the point marked " + ".

The designations on the valve test panel, the valves to which they refer, and typical readings are tabulated in Fig. 17. An abnormal reading, taken under the conditions stipulated indicates that either the valve or its associated circuit is at fault.

The points on the valve test panel marked " LAMP " are connected from the L.T. supply terminals of the set so that an inspection lamp (Lamp, Operators, No. 2) can be plugged in.

The point on the valve test panel marked " + " is connected from the H.T. + terminal of the set, and, when the pocket voltmeter is connected across this point and the upper " LAMP " socket or any other terminal at earth potential, it will give an indication of the total voltage between H.T. + and earth.

21.2 Procedure.

The following routine should be carried out weekly or at any time when the presence of electrical faults is suspected :

Connect up the set, switch on, and take readings under conditions given under the table in Fig. 17.

If a slightly abnormal reading is obtained, although the set appears to be functioning satisfactorily, no action need be taken, but the reading should be reported.

If unsatisfactory operation is accompanied by an abnormal reading, try changing the valve, and if this does not affect a cure, proceed to locate the fault in accordance with the suggestions given in the next section.

22. WIRELESS SET No. 11—LOCATION OF FAULTS.

22.1 Readings at valve test panel abnormal.

An abnormal reading obtained at the valve test panel (see Section 21) will probably be due to one of the following faults :

TABLE VIII.—FAULTS.

Symptom (1)	Fault (2)	Action (3)
(i) No reading at any test point	No L.T. or no H.T. supply or O/C filament in V-4-A.	Check L.T. at "LAMP" sockets. Check H.T. at "+" test point and "EARTH" terminal on set. Examine leads and plugs. Substitute spare valve for V-4-A.
(ii) No reading at one test point.	Anode or screen supply O/C	Examine circuit. (A valve seldom loses its emission entirely).
(iii) No reading at (*a*) 1-A, 3-A and 3-D or (*b*) 2-A, 2-A, and 1-B, or (*c*) 3-B, 2-B, 2B′ and 3-C.	One or more valves in the group has O/C filament or filament circuit.	Substitute spare valve for each in turn. If set does not operate, return to Ordnance Workshops.
(iv) Low reading at all test points.	Battery voltage low, or fault in L.P. Supply Unit.	Replace with fully charged battery and check again.
(v) Low reading at one test point.	Low emission valve or low screen volts.	Substitute spare valve.
(vi) Slightly high reading at one test point.	Fault in bias or grid circuit.	Return to "M" Section.
(vii) Very high reading at one test point.	Complete S/C (full H.T. volts) or partial S/C to earth on anode side of feed resistance.	Return to "M" Section.

These voltages will be dependent on the position of the "SEND/REC." switch. Valve V-3-D can only be tested with this switch in the "SEND" position, while valves V-1-B and V-3-A can only be tested on "RECEIVE." The testing of all other valves is independent of the "SEND/REC." switch, but when testing V-2-B on "RECEIVE," the "REC." (R./T.-C.W.) switch must be in the "C.W." position.

NOTE.—The switch contacts may be cleaned by using a small camel hair brush dipped in clean carbon-tetrachloride. Care should be taken not to damage the contacts and to use a small quantity of fluid on the brush.

On no account should an abrasive be used.

If the above tests do not indicate the cause of the trouble, the set should be returned to "M" Section for examination.

22.2 **Locating faults on recei\ -Readings normal.**

If all test point readings are normal, it can be assumed that all the anode, screen, filament and bias supplies are correct. The following tests should then be conducted.

(a) **Set inoperative.**

(i) Touching the grid of the audio amplifier V-3-B with the finger should produce a low frequency hum in the headphones (the REC. VOL." control must be in max. position if the " REC." (R./T.-C.W.) switch is in " A.V.C." position). If no hum is heard the fault lies in this or the output stage and test (ii), should be conducted.

(ii) Examine the headphone equipment for good connection at the jack, and check for continuity across the phone plug, by connecting the plug across a single dry cell. A loud " click " should be heard in the phones.

(iii) Examine the " REC." (R./T.-C.W.) switch S-4-A for faulty or dirty contacts.

(iv) Examine section S-1-A of the " SEND/REC." switch for faulty or dirty contacts.

(v) The Aerial Ammeter M-1-A or M-2-A should also be examined to see that it is making good contact in the meter housing sockets.

If the above tests do not indicate the cause of the trouble, the set should be returned to " M " Section for examination.

(b) **Crackling.**

If crackling occurs, the following tests should be conducted :

(i) Disconnect the aerial. This will ascertain whether or not the fault is from an external source or due to a fault in the equipment.

(ii) Connect the voltmeter between the " + " point on the valve test panel and the " EARTH " terminal. If violent deflections of the voltmeter are observed, the fault lies in the H.T. power supply.

(iii) Inspect all valve sockets for loose or dirty contacts.

(iv) Lightly tap each valve in turn with a finger.

(v) Operate all switches to see if the crackling varies with their movement.

(vi) Bump the set. If crackling increases considerably, the cause may be a loose or bad connection. If it persists at the same level, it will probably be due to a faulty resistance or condenser.

If the above tests do not indicate a means of remedying the trouble, the set should be returned to " M " Section for examination.

22.3 **Locating Faults on sender.**

(i) General.

The valves in circuit on "SEND" are:—V-1-A, V-2-A', V-2-B, V-2-B', V-3-B, V-3-C, V-3-D and V-4-A, all of which can be tested at the valve test panel with the exception of the sender power amplifier V-4-A. Valves V-3-B and V-3-C are in use as sidetone amplifier only. Valve V-3-A functions as a sidetone detector but has no H.T. applied to the anode and screen and therefore cannot be tested at the test panel on "SEND."

Normal readings for those valves which can be checked at the test panel will indicate that the L.T., H.T. and bias supplies are in order. An abnormal reading for any valve will indicate the stage in which a fault is present. Zero readings on C.W. or M.C.W. for all four valves V-1-A, V-2-B, V-2-B' and V-3-D will probably be due to relay S-11-A not making proper contact, Relay should be replaced with a spare and tests repeated.

(ii) No modulation.

Absence of modulation will be readily indicated by the lack of sidetone, and by the Aerial Ammeter. The aerial current normally rises when speaking loudly into the microphone.

First readjust the "AERIAL TAP" and "ANODE TAP" switches and the "SEND AERIAL TUNE" dial, and then if no indication of modulation is present either the microphone equipment should be examined for continuity of leads and good connections at the jack and Pressel switch, or another microphone equipment substituted.

If the microphone equipment is in order, the contacts of the "H.P./L.P." switch S-7-A, and of the "SEND (C.W.-M.C.W.-SPEECH) switch S-8-A should be examined and cleaned if necessary.

NOTE.—The switch "Pull for R.C." must be in the local operating position when using a microphone in the "MIC." jack.

(iii) No sidetone.

If modulation is indicated on Aerial Ammeter, but no sidetone is heard in the headphones, the sidetone circuit should be examined.

If the valve test readings of V-3-B, V-3-C and V-3-D are normal, the failure may be due to a dirty contact on the "H.P./L.P." switch S-7-A, the "PULL FOR

R.C." switch S-6-A, or t. "SEND" (C.W.-M.C.W.-SPEECH) switch S-8-A. The headphones and headphone plug should also be examined for an open circuit.

(iv) No output when all valve readings are normal.

Both oscillators may be checked by reverting to "RECEIVE" but lack of oscillation will in any case affect the valve test readings, so that, if normal readings have been obtained for all valves, the fault will probably lie in one of the tuned circuits or sender power amplifier stage.

The contacts S-9-A and S-10-A ("AERIAL TAP" AND "ANODE TAP") switches) and of the S-1-A section of the "SEND/REC." switch should be examined and cleaned, if necessary.

The Aerial Ammeter M-1-A or M-2-A should also be examined to see that it is making good contact in the meter housing sockets, and should be given a continuity check to ensure that it is not burnt out. The Ammeter should never be checked for continuity by connecting it directly across a battery, as this will burn it out.

CHAPTER VIII

WORKSHOP MAINTENANCE

23. INTRODUCTION.

The information provided in the following pages is intended for the guidance of radio personnel in Signals and Ordnance Workshops who are engaged in 2nd, 3rd, and 4th Echelon repair of W/T equipment.

NOTE.—Repairs or maintenance adjustments to Wireless Set No. 11 will be carried out strictly to the requirements of G.R.O. 0.190 of 10th July 1942.

Bearing in mind that circumstances and accessibility of test apparatus have a large bearing on maintenance procedure the following servicing instructions have been prepared with the object of giving the fullest practical information to personnel engaged in the maintenance of Wireless Set No. 11.

23.1 **Testing Instruments.**

Recommended instruments for the testing of Wireless Set No. 11 are :—

23.2 **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 output attenuator. Its frequency range should cover 4.2 to 8.5 Mc/s and 400 to 500 kc/s., and its output range be adjustable from 1 microvolt to 1 volt. Internal modulation—400 c/s 30%—which can be switched off as desired, should be incorporated. Provision should also be made for the application of external modulation for audio response tests.

(ii) HETERODYNE WAVEMETER.

This instrument is required for checking the compensation of the R.F. oscillator on switching from "SEND" to "REC." It must cover a frequency range from 4.2 to 8 Mc/s with a calibration accuracy of better than 1%. It should incorporate a sensitive detector and either a listening post or loudspeaker. Wavemeter Class "C" No. 1 (AUST.) is an example of this type of equipment.

(iii) CRYSTAL CONTROLLED OSCILLATOR OR MULTIVIBRATOR.

This instrument is required for calibrating the "TUNING REC. & SEND" dial and for checking the calibration of the HETERODYNE WAVEMETER. The oscillator should be capable of generating fundamental frequencies of 100 kc/s and 750 or 1,000 kc/s with an accuracy of not less than ± .05%. It should be capable of giving receivable harmonics up to 7.5 Mc/s.

(iv) BEAT FREQUENCY OSCILLATOR.

This instrument is required for measuring modulation depth, audio response, and receiver A.F. gain. It should have a frequency range up to at least 12 kc/s and an output of 0.5 W. with an output impedance of 600 ohms. The response characteristic between 400 c/s and 3 kc/s should not deviate more than 1 db.

23.3 Voltage, Current, and Resista. 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.

(ii) D.C. VOLTMETER.

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

(iii) D.C. MILLIAMETER.

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

(iv) PORTABLE RESISTANCE MEASURING INSTRUMENT.

For point to point circuit tests. Ranges: Up to 1 megohm.

(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 Ordnance Workshops.

23.4 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 125 ohms and a range of at least 0.2 mW to 50 mW. It is also desirable that this instrument be provided with an auxiliary scale calibrated in db.

(ii) DUMMY AERIALS.

Receiver Alignment.—A 50 uuF condenser connected in series with the 10 ohms impedance of the STANDARD SIGNAL GENERATOR is used for R.F. alignment, whilst a .005 uF condenser is used in the same manner for I.F. alignment.

Sender Alignment.—The Sender DUMMY AERIAL consists of a 16.6 ohm 6-10 watt, non-inductive resistance in series with a 50 uuF air dielectric condenser. These are connected between the set "AERIAL" and "EARTH" terminals with the resistance at the "EARTH" end.

(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 and frequency errors. The CATHODE RAY OSCILLOGRAPH should be complete with linear time base and amplifier.

24. SOCKET VOLTAGE, CURRENT AND RESISTANCE MEASUREMENTS.

24.1 Control Settings.

In taking measurements as set out in the following tables of Voltage, current and resistance, it is to be observed that unless otherwise stated, the under-mentioned conditions must be adhered to :—

	Controls.	Position of Control
(*a*) 1.	"Rec. Volume" and "Crash Level"	Maximum clockwise
2.	"Rec." Switch	In R/T manual
3.	"C.W.-M.C.W." Switch.	In C.W.

(*b*) All measurements on transmitter taken at 6 Mc/s with standard dummy antenna.

(*c*) Voltage readings to be taken with 20,000 ohms per volt meter.

NOTE.—In using 1000 ohm per voltmeter the only readings which will vary outside the normal practical limits are V3A—Screen grid, and V3B—plate and Screen grid, and since these readings vary widely according to the voltage range used, no specific values are given. This applies to V2A and V2B Screen grids to a lesser degree.

N.C. in the tables refers to "no connection."
O.G. " " " " " "Oscillator grid."
O.P. " " " " " "Oscillator plate."
D.1. / D.2. " " " " "Diode 1" or "Diode 2."
S.G. " " " " " "Screen grid."

24.2 Resistance Measurements :—

All resistance measurements are taken with power units connected, but inoperative.

TABLE IX.—SOCKET VOLTAGES, CURRENTS, AND RESISTANCE MEASUREMENTS —"RECEIVE."

	V1A 1M5G R.F. Amplifier				V2A 1C7G Converter				V1B 1M5G I.F. Amplifier				V3A 1K7G I.F. Amplifier			
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—
2	F+1.9	—	—	—	F+1.9	—	—	—	F+3.8	—	—	—	F+3.8	—	—	—
3	P 170	1.5	7,500	—	P 125	1.0	40,000	—	P 160	0.5	40,000	—	P 135	1.0	40,000	—
4	SG 50	0.5	11,000	10,000	SG 40	1.4	100,000	—	SG 45	0.2	11,000	10,000	D —	—	—	200,000
5	NC —	—	—	—	OG —	—	—	50,000	NC —	—	—	—	D —	—	—	200,000
6	NC —	—	—	—	OP 140	2.5	15,000	—	NC —	—	—	—	SG 80	0.4	250,000	—
7	F— 0	—	—	0	F— 0	—	—	0	F—1.9	—	—	—	F—1.9	—	—	—
8	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—

	V3B 1K7G Det. A.V.C. Audio				V3C 1K7G Power Output				V2B 1C7G Het. Oscillator							
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—				
2	F+1.9	—	—	—	F+5.7	—	—	—	F+3.8	—	—	—				
3	P 70	0.4	300,000	—	P 165	1.3	6,000	—	P 130	1.0	40,000	—				
4	D —	—	—	2 meg.	D —	—	—	0	SG 50	2.0	70,000	—				
5	D —	—	—	250,000	D —	—	—	0	OG —	—	—	50,000				
6	SG 35	0.13	1 meg.	—	SG 165	1.0	6,000	—	OP 140	3.5	15,000	—				
7	F— 0	—	—	0	F—3.8	—	—	—	F—1.9	—	—	—				
8	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—				

NOTE: "Rec. Vol." and "Crash Level" control clockwise "Rec" Switch on RT except for V2B when "Rec." switch is on CW.

SOCKET VOLTAGES—"RECEIVE"

SOCKET VOLTAGES—"L.P. SEND"

TABLE X.—SOCKET VOLTAGES, CURRENTS, AND RESISTANCE MEASUREMENTS. —"L.P. SEND."

	V1A 1M5G Buffer				V2A 1C7G Oscillator				V2B 1C7G Freq. Changer				V4A 807 Power Amp.			
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—	F + 11.5	—	—	—
2	F + 1.9	—	—	—	F + 1.9	—	—	—	F + 3.8	—	—	—			80,000	
3	P 150	1.5	7,500	—	P 130	0.5	40,000	—	P 130	1.0	40,000	—		—	—	—
4	SG 65	0.6	200,000	—	SG 40	1.4	100,000	—	SG 45	2.0	70,000	—			—	250
5	NC —	—	—	—	OG —	—	—	50,000	OG —	—	—	50,000	F— 5.7	—	—	—
6	NC —	—	—	—	OP 130	2.0	15,000	—	OP 130	3.0	15,000	—				
7	F— 0	—	—	0	F— 0	—	—	0	F— 1.9	—	—	—				
8	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—				

	V3A 1K7G Sidetone Diode				V3B 1K7G Audio Driver				V3C 1K7G Audio Output				V3D 1K7G Modulator			
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	F + 3.8	—	—	—	1.9	—	—	—	5.7	—	—	—	5.7	—	—	—
3	P—	—	—	—	65	0.35	300,000	—	155	0.7	6,000	—			—	—
4	D1—	—	—	200,000	—	—	—	—	—	—	—	—	—	—	—	0—
5	D2 —	—	—	200,000	—	—	—	—	—	—	—	—	—	—	—	0
6	SG—	—	—	—	30	0.13	1 meg.	—	155	0.5	6,000	—	—			—
7	F 1.9	—	—	—	0	—	—	—	3.8	—	—	—	3.8	—	—	—
8	NC—	—	—	—	NC—	—	—	—	NC —	—	—	—	NC—	—	—	—

TABLE XI.—SOCKET VOLTAGES, CURRENTS, AND RESISTANCE MEASUREMENTS. —"H.P. SEND."

	V1A 1M5G Buffer				V2A 1C7G Oscillator				V2B 1C7G Freq. Changer				V4A 807 Power Amp			
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—	F+11.4	—	—	—
2	F+1.8	—	—	—	F—1.8	—	—	—	F+3.6	—	—	—			5,100	—
3	P 160	1.5	7,500	—	P 130	1.0	40,000	—	P 135	1.0	40,000	—		—	—	
4	SG 65	0.6	200,000	—	SG 40	1.4	100,000	—	SG 50	2.5	70,000	—			—	250
5	NC —	—	—	—	OG —	—	—	50,000	OG —	—	—	50,000	F— 5.4	—	—	—
6	NC —	—	—	—	OP 140	2.0	15,000	—	OP 135	3.5	15,000	—				
7	F— 0	—	—	0	F— 0	—	—	0	F— 1.8	—	—	—				
8	NC —	—	—	—	NC —	—	—	—	NC —	—	—	—	NC —			

	V3A 1K7G Sidetone Diode				V3B 1K7G Audio Driver				V3C 1K7G Audio Output				V3D 1K7G Modulator			
Pin	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis	Volts to Chassis	Current	Res. to B +	Res. to Chassis
1	NC —	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	F+3.6	—	—	—	1.8	—	—	—	5.4	—	—	—	5.4	—	—	—
3	P —	—	—	—	70	0.3	300,000	—	160	1.3	6,000	—				
4	D1 —	—	—	200,000	—	—	—	—	—	—	—	0	—	—	—	0
5	D2 —	—	—	200,000	—	—	—	—	—	—	—	0	—	—	—	0
6	SG —	—	—	—	35	0.13	1 meg.	—	160	1.0	6,000	—				—
7	F— 1.8	—	—	—	0	—	—	0	3.6	—	—	—	3.6	—	—	—
8	NC —	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

SOCKET VOLTAGES—"H.P. SEND"

POWER UNIT VOLTAGES

TABLE XII.—POWER SUPPLY UNITS VOLTAGES AND CURRENTS.

Operation	H.P. Send		L.P. Send H.P. Mach. Idling	L.P. Send H.P. Mach. Disconnected.	Receive	No Load	
	L.P. Machine	H.P. Machine				H.P.	L.P.
B + to Chassis Volts ..	180	345	165	168	195	—	—
H.T. Across Brushes Volts ..	200	345	195	200	218	410	230
Output current m.A.	20	43	35	35	17	—	—
Input Current Amps. ..	6.0 Total input		4.6	3.1	2.7	1.8	1.4

25. PERFORMANCE TESTS.

25.1 Receiver Tests.

(*a*) R/T Sensitivity and Noise.

The sensitivity may be checked in the following manner :—

(i) Set the STANDARD SIGNAL GENERATOR at 7.5 Mc/s modulated 30% at 400 c.p.s.

(ii) Roughly tune-in the signal and then switch off the internal modulation of the STANDARD SIGNAL GENERATOR.

(iii) Press the "PRESS TO TUNE" button and with the "FINE ADJUST" control accurately tune the signal for zero beat. Release the "PRESS TO TUNE" button.

(iv) Switch on the internal modulation of the STANDARD SIGNAL GENERATOR and adjust the input until an output meter reading of 5mW. is obtained with "REC. VOL." control at maximum.

(v) Repeat the above procedure at 7.0, 6.0, 5.0 and 4.2 Mc/s. The figures obtained should be not greater than those given in the middle column of Table XIII.

(vi) After each of the above measurements, increase the input to 10 uV, and adjust "REC. VOL." control until an output of 30mW. is obtained.

Switch off the internal modulation of the STANDARD SIGNAL GENERATOR and take output meter reading.

The figures obtained in this test should be not greater than those given in the right hand column of Table XIII.

TABLE XIII.—R/T SENSITIVITY AND NOISE.

Frequency Mc/s	Input to Aerial uV	Noise Output mW
4.2	3.5	0.45
5.0	3.0	0.45
6.0	2.5	0.45
7.0	2.5	0.45
7.5	2.5	0.45

(*b*) C.W. Sensitivity.

After each test in the above section, adjust input to aerial to values shown in following tables, switch "REC." (R./T.-C.W.) switch to "C.W." adjust "C.W. H'DYNE" control until a beat note of about 1,000 c.p.s. is obtained and take the

OUTPUT METER reading. The figures obtain should n be below those given in TABLE XIV.

TABLE XIV.—C.W. SENSITIVITY.

Frequency Mc/s	Input to Aerial uV	C.W. Output mV
4.2	3.5	10
5.0	3.0	10
6.0	2.5	10
7.0	2.5	10
7.5	2.5	10

(*c*) Image Ratio.

To measure the image ratio, proceed as in (*a*), (i) to (iv adjust input until an output of 5mW. is obtained, then pro ceed as follows :—

(i) Lock the receiver tuning controls and leave them locked

(ii) Tune STANDARD SIGNAL GENERATOR to imag frequency (see table) and increase the input until th output of 5mW. is restored.

(iii) Repeat the above procedure at 6.0 and 4.2 Mc/s.

The increase in input should not be less than that shown i Table XV.

TABLE XV.—IMAGE RATIO.

Frequency Mc/s	Image Frequency Mc/s	Image Ratio db
4.2	5.11	60
6.0	6.91	45
7.5	8.41	40

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

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

(i) Connect the STANDARD SIGNAL GENERATOR as for I.F. alignment.

(ii) Set the STANDARD SIGNAL GENERATOR to 455 kc/s modulated 30% at 400 c.p.s. and with an output to give 5mW. output, the input should not exceed 90 uV.

(iii) Increase the input 6 db and detune the STANDARD SIGNAL GENERATOR each side of resonance record ing the kc/s off tune to restore the output to 5mW.

(iv) Repeat (iii) for 60 db increase in input.

The total band-width should be between the figures shown below and be approximately symmetrical.

6 db	8-11 kc/s.
60 db	21 kc/s max.

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

To check the efficiency of the A.V.C. system, proceed as in (*a*) (i) to (iii), but setting the STANDARD SIGNAL GENERATOR at 6 Mc/s. Then continue as follows :—

(i) Switch on the internal modulation of the STANDARD SIGNAL GENERATOR and adjust the input to 50,000 uV.

(ii) Switch the " REC." (R./T.-C.W.) switch to " A.V.C.".

(iii) Adjust the " REC. VOL." control to give 50mW. output.

(iv) Reduce input to 5 uV and output should not drop more than 15 db (that is, shall not fall below 1.5mW.).

(*f*) Audio Response.

This test can only be carries out when the STANDARD SIGNAL GENERATOR has provision for connecting an external source of modulation. To check the audio response proceed as follows :—

(i) Set STANDARD SIGNAL GENERATOR to 6 Mc/s modulated 30%.

(ii) Roughly tune-in the signal and then switch off the internal modulation of the STANDARD SIGNAL GENERATOR.

(iii) Press the " PRESS TO TUNE " button and with the " FINE ADJUST " control accurately tune the signal for zero beat. Release the " PRESS TO TUNE " button.

(iv) Connect the BEAT FREQUENCY OSCILLATOR to the external modulation terminals of the STANDARD SIGNAL GENERATOR and adjust input at 1,000 c.p.s. to give 30% modulation.

(v) Vary the frequency of the BEAT FREQUENCY OSCILLATOR between 400 and 2,500 c.p.s., checking at each frequency to ensure that the modulation remains at 30%. The OUTPUT METER READING should not vary more than 3 db about a mean value.

(*g*) **Current Consumption.**

The L.T. current consumption should not exceed 3.0 amps.

25.2 Sender Tests.

(*a*) Output.

To check the Sender output, proceed as follows :—

(i) Connect a DUMMY AERIAL comprising a 16.6 ohm 6-10 watt, non-inductive resistance in series with a 5(uuF. air dielectric condenser between the Set " AERIAL' and " EARTH " terminals with the resistance at the " EARTH " end.

(ii) Set the " TUNING R.C. & SEND " dial and " AERIAL TAP " " ANODE TAP " and H.P./L.P. switches as indicated in Table XVI.

(iii) Adjust the " SEND AERIAL TUNE " dial for max. peak output as indicated on the aerial ammeter. Be sure to insert the correct ammeter—0.350 mA. for L.P. and 0-1 A. for H.P.

The figures obtained in the above test should be better than in Table XVI.

TABLE XVI.—SENDER OUTPUT.

Frequency Mc/s	" Aerial Tap "	" Anode Tap "	Low Power (L.P.) Aerial mA			High Power (H.P.) Aerial mA		
			Speech	M.C.W.	C.W.	Speech	M.C.W.	C.W.
4.2	12	7	120	135	220	260	270	500
5.0	10	7	130	140	225	260	270	500
6.0	8	6 or 5	130	140	230	280	310	530
7.0	6	5	120	140	225	250	280	480
7.5	6 or 5	5 or 4	120	135	215	240	260	460

(*b*) Modulation.

To test modulation proceed as in 25.2 (*a*), then as follows :—

(i) Connect the active terminal of CATHODE-RAY OSCILLOGRAPH vertical plates through a 10-15 uuF. air dielectric condenser to Set " AERIAL " terminal.

(ii) Tune Set for max. peak output at 6 Mc/s.

(iii) Connect input from BEAT FREQUENCY OSCILLATOR to " MIC." or " LINE " jacks as indicated in first column of Table XVII.

With control settings as in Table XVII, and input voltages not greater than those shown, 100% modulation should be obtained for all frequencies between 400 and 2,500 c.p.s.

TABLE XVII.—MODULATION TESTS.

" MOD " Control	" H.P./L.P." Switch	R.M.S. Input Volts	" PULL FOR R.C." Switch
1 " MIC "	" L.P."	1.8	In
2 " MIC "	" H.P."	1.8	In
4 " LINE "	" L.P."	9	Out
Max. " LINE "	" H.P."	1.2	Out

(*c*) Sidetone.

To test sidetone, proceed as follows :—

Low Power (L.P.).

(i) Connect input from BEAT FREQUENCY OSCILLATOR to " MIC." Jack.

(ii) Feed sufficient 1000 c/s input for 100% modulation with " SEND " (C.W.-M.C.W.-SPEECH) switch in switch in " SPEECH " position.

(iii) Measure sidetone output on the OUTPUT METER at the " PHONES " jack.

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

High Power (H.P.).

Repeat the above procedure for high power operation.

In all the above tests the output should not be less than 1.5 milliwatts.

(*d*) Compensation.

That the emitted and received frequencies are identical may readily be checked with a HETERODYNE WAVEMETER. The procedure is as follows :—

(i) Connect a DUMMY AERIAL to the set as in 25.2 (*a*).

(ii) Set the wavemeter to 7.5 Mc/s and loosely couple its input lead to the DUMMY AERIAL.

(iii) Switch " SEND/REC." switch to " SEND," adjust the " AERIAL TAP " and " ANODE TAP " switches for maximum output, and tune the set until zero beat note is obtained at the listening post of the HETERODYNE WAVEMETER.

(iv) Switch the Set to " REC." and, leaving the tuning control untouched, press the " PRESS TO TUNE " button and listen at the Set for the beat frequency. Repeat for 7.0, 6.0, 5.0 and 4.2 Mc/s. and the beat note should not be more than 500 c/s at any point.

Adjustment for compensation is only carried out on " RECEIVE." See 26.7 for adjustment of compensators.

26. ALIGNMENT PROCEDURE.

26.1 General.

(i) Unless Receiver and/or Sender performance is considerably below that indicated in the various performance tables set out in the earlier sections of this handbook re-alignment of the Wireless Set No. 11 will not be necessary.

(ii) The replacement or repair of components in certain circuits of the set may affect its performance and necessitate its re-alignment.

Changes are :—

I.F. Alignment.

Change of valves V-2-A, V-1-B, V-3-A or V-3-E Alteration to any of the tuned circuit components c wiring associated with these valves.

R.F. Alignment—Receiver.

Change of valves V-1-A or V-2-A or alteration to an of the tuned circuit components or wiring associate with these valves.

R.F. Alignment—Sender.

Same as receiver with the addition of valve V-4-A and associated circuits. Wireless Set No. 11 (AUST. is tested with precision instruments at the factory anc all adjustments are sealed.

NOTE.—Re-alignment should only be carried out when necessary. It should not be assumed that re-alignment is required because a component is replaced ; check the equipment by following the tests given in Section 25, Performance Tests, and if poor performance is indicated, re-alignment will be necessary.

IT IS SPECIALLY IMPORTANT THAT THE ADJUSTMENT SHOULD NOT BE INTERFERED WITH IN ANY WAY UNLESS IN ASSOCIATION WITH THE CORRECT TESTING INSTRUMENT.

ALIGNMENT

26.2 **Preliminary adjustments.**

In all operations in this section, the wireless set controls should be in the following positions unless otherwise stated :

" REC." (R./T.-C.W.) switch	" MAN."
" REC. VOL." Control	Max. clockwise
" CRASH LEVEL "	Max. clockwise
" SEND " (C.W.-M.C.W.-SPEECH) switch	C.W.
" PULL FOR R.C." Button	In
" H.P./L.P." Switch	L.P.

Before proceeding with the alignment, screw either one or two chassis support brackets, if available, to the rear of the chassis base. The bracket is specially constructed for the purpose of supporting the rear of the chassis when it is upturned, thus protecting the above chassis components from damage through contact with the bench.

26.3 **I.F. Alignment.**

(i) With the grid clip connected to the control grid of converter valve V-2-A, connect the active output lead of

the STANDARD SIGNAL GENERATOR through a .005 uF. condenser to this point and the earth lead to the set chassis.

(ii) Set the STANDARD SIGNAL GENERATOR at 455 kc/s modulated 30% at 400 c.p.s. and adjust the input to give an OUTPUT METER reading of approximately 5mW. (For English model Wireless Set No. 11 set to 475 kc/s).

(iii) Using a non-metallic screwdriver, adjust core L-4-E' for max. peak output. Reverse the chassis and adjust core L-4-E in the same manner.

(iv) Tune the STANDARD SIGNAL GENERATOR to 451 kc/s. (471 kc/s for English Model Wireless Set No. 11).

(v) Adjust cores L-4-D, L-4-C, L-4-B and L-4-A for maximum peak output.

(vi) Tune the STANDARD SIGNAL GENERATOR to 458.5 kc/s. (478.5 kc/s for English Model Wireless Set No. 11).

(vii) Reverse the chassis and adjust cores L-4-D', L-4-C', L-4-B' and L-4-A' for maximum peak output.

Repeat adjustments (ii) to (vii) until further adjustment produces no increase in output.

(viii) Detune the STANDARD SIGNAL GENERATOR on each side of 455 kc/s (or 475 kc/s for English Model Wireless Set No. 11) and note the OUTPUT METER readings on each peak. These should be approximately symmetrical and if not adjust core L-4-E until symmetry is obtained. This adjustment is critical and it should not be necessary to turn the adjusting screw more than a quarter of a turn.

26.4 B.F.O. Adjustment.

Proceed as in 26.3, (i) and (ii). Switch off the internal modulation of the STANDARD SIGNAL GENERATOR, then whilst pressing the "PRESS TO TUNE" button, adjust core L-5-A for zero beat.

26.5 Preliminary R.F. Alignment—Send.

Set "TUNING REC. & SEND" dial at 6 Mc/s and using the "AERIAL TAP" and "ANODE TAP" switches together with the "SEND AERIAL TUNE" dial, adjust for maximum output on the Aerial Ammeter.

This preliminary adjustment at 6 Mc/s is made to ensure that the circuits are tuned to the correct mixer frequency and not to the local oscillator frequency and that sufficient output will be obtained to carry out the R.F. Alignment on Send.

26.6 **R.F. Alignment—Send.**

Calibration :

(i) Remove the gang condenser cover which is held by fou screws.

(ii) Adjust dial scale by means of the eccentric adjustin screw until the stop mark, located at the L.F. end o the scale, is opposite the centre line on the cursor The adjusting screw is located at the rear of the dia mechanism adjacent to the gang condenser flexibl coupling and is secured with a lock nut.

(iii) With the dial scale set thus, the gang condenser shoul be 5° from the maximum capacity position. To chec this, a special gauge should be inserted between th strap on the moving plates and the fixed plates. If th gauge is not available, the distance between the tips o the fixed and moving plates should measure $\frac{1}{8}$ inch. If the gang condenser is not set correctly, it may be shifted by loosening the two rear screws in the flexible coupling and rotating the moving plates to their correct position whilst holding the dial against the L.F. stop mark.

(iv) Tighten the screws in the flexible coupling and replace the gang condenser cover.

(v) Connect the Sender DUMMY AERIAL, switch on the equipment and set " SEND/REC." switch to " SEND."

(vi) Connect a lead from the active terminal of the CRYSTAL CALIBRATOR to the HETERODYNE WAVEMETER aerial. Switch the calibrator to 100 kc/s points and tune the wavemeter to zero beat with calibrator at 7.5 Mc/s.

(vii) Remove lead mentioned in (vi) from calibrator.

(viii) Set the " TUNING REC. & SEND " dial accurately at 7.5 Mc/s and adjust oscillator trimmer C-7-A until zero beat is obtained at the wavemeter listening post.

(ix) Again connect lead to the active terminal of the calibraor.

(x) Switch calibrator to 100 kc/s points and tune wavemeter to zero beat at 4.2 Mc/s, then repeat (vii).

(xi) Set the " TUNING REC. & SEND " dial accurately at 4.2 Mc/s and adjust oscillator coil core L-3-A′ until zero beat is obtained at the wavemeter listening post.

Repeat (vi) to (xi) until the calibration is correct at both points.

Check the calibration at 7.0, 6.0 and 5.0 Mc/s by adjusting the wavemeter on correct frequency as in (vi). Then set the " TUNING REC. & SEND " dial at the corresponding frequency and measure the frequency of the beat note at the wavemeter listing post by means of a BEAT FREQUENCY OSCILLATOR and CATHODE-RAY OSCILLOGRAPH.

If it is found after calibrating the set by this method that the error at the middle portion of the frequency range is outside the tolerance, i.e. 0.2% and, for example, positive, the error may be reduced by introducing a tolerable negative error at 7.5. and 4.2 Mc/s.

26.7 **Compensation.**

(i) Set the HETERODYNE WAVEMETER at 7.0 Mc/s and loosely couple its input lead to the Sender Dummy Aerial.

(ii) Switch the set to "SEND" and adjust "AERIAL TAP" and "ANODE TAP" switches together with the "SEND AERIAL TUNE" dial for maximum output and turn the "TUNING REC. & SEND" dial until zero beat is obtained at the wavemeter listening post.

(iii) Switch the "SEND-REC." switch to "REC." leaving the tuning controls untouched. Press the "PRESS TO TUNE" button and listen at the set for the beat frequency. If zero beat is not obtained, adjust trimmer C-7-B to zero beat.

(iv) Without altering C-7-B, repeat the procedure (i) to (iii) at 7.5, 6.0, 5.0 and 4.2 Mc/s, checking the frequency of the beat note on H.P. and L.P.

26.8 **R.F. Alignment—Receive.**

To align the R.F. on Receive, proceed as follows :—

(i) Connect the active output lead of the STANDARD SIGNAL GENERATOR through a 50 uuF. condenser to the set "AERIAL" terminal and the earth to the set chassis.

(ii) Set the STANDARD SIGNAL GENERATOR at 4.2 Mc/s modulated 30% at 400 c.p.s.

(iii) Roughly tune in the signal end then switch off the internal modulation of the STANDARD SIGNAL GENERATOR.

(iv) Press the "PRESS TO TUNE" button and with the "FINE ADJUST" control accurately tune the signal for zero beat. Release the "PRESS TO TUNE" button.

(v) Switch on the internal modulation of the STANDARD SIGNAL GENERATOR and adjust the input until approximately 3mW. output is obtained.

(vi) Adjust Cores L-1-A' and L-2-A for peak output.

(vii) Turn the STANDARD SIGNAL GENERATOR to 7.5 Mc/s, repeat adjustments (iii) to (v), and adjust trimmer C-7-C and "REC. AERIAL TRIMMER" for max. peak output.

Repeat adjustments (ii) to (vii) until further adjustment produces no increase in output.

26.9 **Final Alignment—Send.**

Turn "TUNING REC. & SEND" dial to 7.5 Mc/s an tune for maximum output using "AERIAL TAP" an "ANODE TAP" with "SEND AERIAL TUNE" dial an adjust C-7-E and C-7-D for maximum output as indicated o the Aerial Ammeter.

IMPORTANT NOTE.

All trimmers should peak twice. Either of these peaks is correct.

The maximum and minimum capacity positions are indicated when the adjusting slot is in line with the fixing screw heads.

The locking collar of the trimmers must be loosened before adjustments are made, and locked again when adjustments are completed.

27. MECHANICAL ADJUSTMENTS.

TO BE CARRIED OUT ONLY BY ADVANCED ORDNANCE WORKSHOPS, BASE ORDNANCE WORKSHOPS OR L. OF C. AREA WORKSHOPS.

27.1 **Slow Motion Tuning Drive..**

The Slow Motion Tuning Drive is removed from the set in the following manner :—

(i) Loosen the grub screws from the rear section of the flexible coupling between the gang and the main drive spindle.

(ii) Remove the locking screw from the centre of the main tuning knob.

(iii) Loosen the grub screw and remove the main tuning knob.

(iv) Withdraw the screws from circumference of the front cover plate and remove the front cover plate complete with the cursor. Care should be taken that the cursor is not allowed to fall as it is only a sliding fit between the window of the cover plate.

(v) Remove the four mounting screws holding the main assembly and withdraw the assembly.

27.2 **Dismantling Tuning Drive Assembly.**

It will only be necessary to dismantle this assembly for one or more of the following reasons :—

(i) If the drive has developed backlash.

(ii) If the drive has seized.

iii) If the assembly has become so dirty that cleaning is essential to prevent rapid wear of the movable parts after removing the Slow Motion Tuning Drive, the procedure to be followed is as set out below :—

(*a*) Remove the flexible coupling from the main drive spindle.

(*b*) Remove the three countersunk head screws securing the back plate to the three spacing pillars.

(*c*) Ease the back plate forward and slide it over the main drive spindle taking care that the worm engaging spring is not damaged.

(*d*) Remove the main spindle together with the spring loaded gear wheel (the loading spring is so designed that additional tension may be applied if necessary to the extent of 1 or 2 teeth).

(*e*) The front spindle may now be removed together with the concave gear wheel by pushing back on the front of the spindle.

(*f*) The slow motion drive may now be examined and cleaned. Should it be necessary to replace the gear wheel forming the slow motion drive the fixing pins will have to be removed and the shafts knocked out. These gear wheels should always be replaced in pairs so that a smooth drive can be obtained.

(*g*) All parts should now be thoroughly cleaned before reassembly.

27.3 Tuning Drive Re-assembly.

The drive should be re-assembled by reversing the order given but two points must be checked :—

(i) The meshing marks on the pinion gearing and the spring loaded gear wheel must coincide and adjustment of the loading spring be such that back-lash does not occur and an even movement is obtained.

(ii) Ensure that the concave gear wheel and associated worm are in mesh before the spring load is applied.

Failure to adjust correctly as in (i) will alter the relationship between the tuning dial and the three gang condenser spindle and thus curtail the amount of rotation.

27.4 Alignment of drive and condenser.

The drive rotates through approximately 180 degrees, and is regulated by two stops on the spring loaded gear wheel and

one stop on the back plate. Care should taken on r assembly to ensure that the amount of rotation is limited a both ends of the dial by means of the stops on the drive, an that it never reaches the maximum or minimum of the condense

If it is found that the condenser has reached the end of it travel before the drive, and the drive is correctly assemble and aligned, the couplings should be loosened, by undoing th grub screws on the rear end, and the condenser shaft move to suit.

It should be noted that the stop fitted to the back plate i in the form of an eccentric and should be adjusted, if neces sary, to take up minor irregularities of the drive.

27.5 **Removing the Gang Condenser.**

Should it be necessary to remove this component the follow ing procedure should be used :—

(i) Remove the Slow Motion Tuning Drive as detailed above
(ii) Unsolder the tinned copper leads fixed to the lugs pro jecting through the chassis into the R.F. compartment
(iii) Remove the three screws holding the base of the gang condenser assembly to the chassis. Care should b taken not to distort the screens fitted to the R.F. com partment.
(iv) Lift out the condenser assembly.
(v) To re-assemble, the above procedure should be reversed

NOTE.—If the condenser or any other of the components of the R.F. compartment are disturbed, removed, replaced, or otherwise interfered with it is necessary for the set to be re-calibrated.

27.6 **Switch and Potentiometer Assembly Removal.**

This assembly is mounted on the top right hand cover of the front panel and contains the following controls :—

(*a*) " H.P.—L.P." switch.
(*b*) Modulation Depth Control (" MOD ").
(*c*) " SEND " (CW-MCW-SPEECH) switch.

This assembly may be removed from the front panel in the following manner :—

(i) Remove the knobs from the controls.
(ii) Remove the nameplates from the " H.P.-L.P. " and " SEND " switches.
(iii) Remove the three screws securing the assembly to the front panel.
(iv) Remove the screw securing the resistor strip to the sub-panel.

(v) Remove the two screws from the securing bracket on the bottom of the resistor panel assembly.

(vi) The whole assembly may now be tilted back, and any of these controls removed by unsoldering the leads and undoing the securing nuts on the sub-panel.

27.7 **Removing the "SEND AERIAL TUNE" Condenser.**

To remove the "SEND AE TUNE" from the set proceed as follows :—

(i) Remove the switch and potentiometer assembly as in 27.6.

(ii) Remove V3D and the keying relay from the set.

(iii) Unsolder the Yellow lead joined to the "H.P./L.P." switch from C-12-A.

(iv) The resistor panel and the switch and potentiometer assembly should then be swung out of the way.

(v) Remove the retaining clip from the locking nut of the "REC. AERIAL TRIMMER" and remove the locking nut.

(vi) Remove the knob from the "REC. AERIAL TRIMMER" condenser together with the graduated dial plate This will expose the mounting screws securing the condenser to the front panel, which should be removed and the condenser then moved to one side.

(vii) Unsolder the leads to the "SEND AERIAL TUNE" condenser.

(viii) Remove the retaining clip from the locking nut of the "SEND AERIAL TUNE" control, and remove the locking nut.

(ix) Remove the knob from the "SEND AERIAL TUNE" condenser together with the graduated dial plate. This will expose the mounting screws securing the condenser to the front panel, which should be removed. This will allow the condenser to be removed from the set.

27.8 **Condenser-Resistor Panel—Components Removal.**

Components may be removed from, or replaced on, any of the condenser resistor panels without removing the panels from the set. It is only necessary to unsolder the leads of the component to be removed.

27.9 **Removing the Potentiometers.**

The four potentiometers fitted in the set are as follows :—

Receiver Volume Control ("REC. VOL.").
Crash Level Control ("CRASH LEVEL").
C.W. Heterodyne Control ("C.W. HETERODYNE").
Modulation Depth Control ("MOD.").

The detail necessary to remove the "Mod." control h been given in paragraph 27.6 dealing with the switch and poten tiometer assembly above.

The procedure to remove any of the remaining controls i as follows :—

(i) Remove the knob from the potentiometer.
(ii) Undo the two screws holding the potentiometer mountin bracket to the front panel.
(iii) Unsolder the connecting leads at the terminals of th potentiometer.
(iv) The potentiometer may now be removed.

When replacing the potentiometers care should be taken t ensure that the knobs and pointers are replaced in the correc relationship to the potentiometer movement.

27.10 **Aerial Tuning Inductance Assembly—Removal.**

The procedure for the removal of the Aerial Tuning Induc tance assembly is as follows :—

(i) Remove the white moulded knob from the "SEND-REC." switch, by undoing the two 5BA screws.
(ii) Remove the watch case, and the two nameplates mounted immediately above the handles on the front panel.
(iii) Remove the four 2BA countersunk head screws holding the assembly to the front panel.
(iv) Disconnect the main shaft of the "SEND-REC." switch from the actuating arm. This is done underneath the chassis.
(v) Remove the four 2BA screws securing the main shaft of the "SEND-REC." switch to the chassis. These screws are removed from the top of the chassis.
(vi) Remove the "AERIAL TAP" and "ANODE TAP" knobs, noting carefully the position of the switches and relationship of the knobs.
(vii) Remove the two 2BA screws fixing the Aerial Tuning Inductance assembly to the chassis.
(viii) Unsolder the 6 leads from the assembly to the adjacent components and remove the assembly.

27.11 **Dismantling the Aerial Tuning Inductance.**

After removal of the Aerial Tuning Inductance Assembly from the chassis—27.10—the Aerial Tuning Inductance may be dismantled in the following manner :—

(i) Undo the nuts holding the switches to the assembly bracket and remove the switches.
(ii) Remove the two 2BA screws holding the aerial coil and remove the coil.

(iii) If it is necessary to replace either of the switches the tinned copper leads from the coil should be unsoldered at the switches.

27.12 **Keying Relay Adjustments.**

Relay (S-11-A) should respond properly to impulses of the transmitting key. If not, clean the silver-gold contacts with a soft cloth moistened in petrol. Great care must be exercised during cleaning or adjustment to avoid distortion of the assembly.

Adjustment of contact spacing should be as follows :—

(i) With transmitting key depressed, the air gap between armature and pole piece should be adjusted to 1 to 2 mil. by means of the contact screw on the side of the reed adjacent to the coil. This adjustment is important and should be carried out by use of a feeler gauge (See plate XI.).

(ii) With key up, the contact screw on the side of the reed remote from the coil should be adjusted until there is a gap of 4 to 5 mil. between the opposite contact and reed contact. (See plate XII.).

(iii) With the key up, the knurled screw should be adjusted until the reed exerts a pressure of 15 gms. on the contact screw remote from the coil. (See plate XI.).

If contact pressure gauges are unavailable the knurled screw may be adjusted so that on the application of 4 volts to the coil, any increase in tension will prevent the armature from closing.

NOTE.—All contact spacing and pressures have been accurately adjusted in manufacture, and unless absolutely necessary they should not be altered without access to the necessary equipment.

CHAPTER IX

SPECIAL CONDITIONS OF USE

AERIAL COUPLING EQUIPMENT

28. AERIAL COUPLING EQUIPMENT " C " (AUST.).

28.1 **General.**

Aerial Coupling Equipment " C " (AUST.) has been designe to allow the Wireless Set No. 11 to be operated up to 30 f from its aerial, on occasions when it would be undesirable c impracticable to have the set and aerial erected close to eac other as under normal conditions of use.

Accordingly, the equipment allows the wireless set to b worked under cover, whilst obtaining good operating condition with the aerial alone standing in the open. Losses due t screening by local objects may be thereby avoided.

A loss of range is inevitable in the use of coupling units s they should only be used when absolutely necessary. Loss o range occurs in proportion both to increases of feeder line lengtl and frequency of transmission.

Aerial Coupling Equipment " C " (AUST.) comprises :—

(i) Aerial Unit " C " (AUST.).
(ii) Connectors, Twin No. 15 (feeder).
(iii) Set Connector.

28.2 **Aerial Unit " C " (AUST.).**

This unit consists of a variometer inductance and an R.F. Ammeter (350mA.) for aerial tuning purposes. The meter is fitted with a shunt which is normally connected for high power working. When operating the set on low power, it is necessary to disconnect this shunt by pressing the push button (located below the R.F. ammeter) whilst tuning the aerial.

The unit has been designed so that aerials of heights from six to fifteen feet with and without a capacity top, may be resonated at from 4.2 to 7.5 Mc/s and so that under all conditions a correct aerial to line impedance match is obtained.

28.3 **Sending.**

(i) Place the Aerial Coupling Unit at foot of aerial and connect it to the Aerial and counterpoise by means of the leads provided. Connect the Unit to the Wireless Set No. 11 by means of the twin connectors provided (See Fig. 22).

(ii) Set the Aerial Coupling Equipment "C" switch to "Tune Set."

(iii) Adjust the set for sending the desired frequency in accordance with the Working Instructions given in Chapter II., and tune it for maximum reading as indicated by the Set Aerial Ammeter.

NO FURTHER ADJUSTMENT TO THE SENDER TUNING IS NECESSARY.

Approximate adjustments for the Wireless Set No. 11 when used with Aerial Coupling Unit "C" (AUST.) and a 9 ft. Aerial with "top" are given in Table XVIII. Fig. 23 is the Schematic diagram of the Aerial Coupling Unit "C" (AUST.).

TABLE XVIII.—SENDER TUNING.

F Mc/s	AE Tap	Anode Tap	Send AE Tune
4.2	3	12	70
5.0	2	11	60
6.0	2	11	30
7.0	1	9	20
7.5	1	8	30

(iv) Set the Aerial Coupling Equipment "C" Switch to "Tune Aerial" and by means of the variometer and condenser controls adjust this unit for maximum reading on the R.F. Ammeter in the Aerial Coupling Equipment "C" (AUST.) Unit. Adjust the variometer first according to the frequency setting given in the Calibration Table XIX. Then adjust the condenser setting to that listed. The final adjustment calls for slight variation of both "VARIO" and "COND." dials until peak reading is obtained on the Coupling Unit R.F. Ammeter.

NOTE.—On low power it will be necessary to press the "PRESS FOR L.P. ONLY" switch, in order to obtain a suitable reading.

DO NOT PRESS THIS SWITCH ON H.P. FOR THE METER IS LIABLE TO BE BURNED OUT.

(v) The set is now ready for sending or receiving on the frequency to which it is tuned.

(vi) **Calibration Table.**—With the Aerial Coupling Unit "C" set at "Tune Aerial," a tabulation of appropriate control readings is given for various aerials in Table XIX.

TABLE XIX.—COUPLING UNIT "C" (A[illegible]) TUNING

Aerial	1		2		3		4	
F. Mc/s	Vario.	Cond.	Vario.	Cond.	Vario.	Cond.	Vario.	Cond
4.2	105	9.0	70	8.5	65	8.0	60	8.0
4.5	90	8.0	65	8.0	60	8.0	50	8.0
5.0	65	8.0	50	8.0	45	8.0	40	8.0
5.5	60	8.0	40	7.5	40	7.5	30	7.5
6.0	55	7.5	30	7.0	30	7.0	25	7.0
6.5	45	7.5	25	7.0	20	7.0	15	6.5
7.0	40	7.5	20	6.5	15	6.5	10	6.0
7.5	30	6.5	15	6.0	10	4.5	6	4.0

Aerial 1— 6 feet (2 Sections) without capacity top
2— 9 " (3 ") with " "
3—12 " (4 ") " " "
4—15 " (5 ") " " "

28.4 **Changing Frequency.**

When changing from one sending frequency to anothe repeat the foregoing procedure.

28.5 **Receiving.**

(i) Adjust the No. 11 Set in accordance with Workin Instructions given in Chapter II.

(ii) Set the Coupling Unit according to instructions given i Calibration Table XIX.

(iii) Tune in signals on the wireless set in the ordinary way

28.6 **Sender and Aerial Currents.**

Table XX. gives details of average Sender and Aerial cur rents to be expected on various frequencies when the Wireles Set No. 11 is used in conjunction with Aerial Coupling Equip ment "C" (AUST.).

NOTE.—It should be understood that under High Power (H.P.) conditions the meter used in the Aerial Coupling Equipment "C" (AUST.) provides merely a RELATIVE indication of aerial current.

The meter is not provided with dual scales so that when the "Press for Low Power" Switch is in the "Up" position—and the meter is actually reading 0-1 A full scale—the H.P. readings set out in Table XX. are actually the mA readings shown on the 0-350 mA scale.

TABLE XX.—SENDER AN AERIAL CURRENTS (REMOTE CONTROL).

Frequency Mc/s	Sender Output	Feeder Length	Sender R.F. Ammeter		Aerial R.F. Ammeter	
			C.W.	R.T.	C.W.	R.T.
6 Ft. Aerial.						
7.5	H.P.	15 Ft.	160	80	170	90
	L.P.	15 Ft.	90	50	180	100
	H.P.	30 Ft.	140	70	130	80
	L.P.	30 Ft.	80	40	130	80
7	H.P.	15 Ft.	205	110	190	120
	L.P.	15 Ft.	110	65	190	120
	H.P.	30 Ft.	185	90	170	100
	L.P.	30 Ft.	90	60	180	110
6	H.P.	15 Ft.	235	125	180	110
	L.P.	15 Ft.	120	65	190	110
	H.P.	30 Ft.	200	100	180	120
	L.P.	30 Ft.	90	50	170	120
5	H.P.	15 Ft.	240	140	180	160
	L.P.	15 Ft.	110	80	170	100
	H.P.	30 Ft.	250	130	170	80
	L.P.	30 Ft.	110	70	180	100
4.2	H.P.	15 Ft.	230	140	185	70
	L.P.	15 Ft.	100	70	160	90
	H.P.	30 Ft.	260	140	185	90
	L.P.	30 Ft.	120	80	150	100
15 Ft. Aerial with Top.						
7.5	H.P.	15 Ft.	170	70	150	85
	L.P.	15 Ft.	90	50	180	105
	H.P.	30 Ft.	145	70	120	60
	L.P.	30 Ft.	80	40	130	80
7	H.P.	15 Ft.	220	110	170	110
	L.P.	15 Ft.	100	60	190	120
	H.P.	30 Ft.	190	100	165	90
	L.P.	30 Ft.	90	60	190	120
6	H.P.	15 Ft.	240	120	180	110
	L.P.	15 Ft.	120	70	200	120
	H.P.	30 Ft.	215	100	150	90
	L.P.	30 Ft.	100	60	195	120
5	H.P.	15 Ft.	180	110	150	90
	L.P.	15 Ft.	80	60	180	120
	H.P.	30 Ft.	255	125	160	95
	L.P.	30 Ft.	115	75	180	120
4.2	H.P.	15 Ft.	230	140	125	70
	L.P.	15 Ft.	100	70	170	95
	H.P.	30 Ft.	255	135	135	80
	L.P.	30 Ft.	115	70	170	115

REMOTE CONTROL AERIAL CURRENTS

29. WIRELESS REMOTE CONTROL UNIT A."

29.1 **General.**

Wireless Remote Control Unit " A " is already in use with Wireless Sets Nos. 101 and 109. This unit provides the following facilities :—

(i) Provides communication from a remote point by speech or morse via the wireless set over a radio link.

(ii) Permits communication by speech or buzzer morse through a buzzer or universal call switchboard via either unit and the wireless set, over a radio link.

(iii) Two persons may converse together through the units as over an ordinary telephone line.

(iv) An operator at the wireless set may communicate by the buzzer or universal call switchboard without interfering with traffic passing from the remote point to the wireless set. When joined in circuit, the two control units are—in effect—in parallel across an " open " telephone line circuit, which connects to three separate circuits in the wireless set, viz. :—

Microphone circuit.
Headphone output circuit.
Sender keying circuit.

29.2 **Description of Apparatus.**

Wireless Remote Control Equipment for Wireless Set No. 11 (AUST.) comprises :—

Wireless Remote Control Unit " A " ..	2
Connectors, Twin, No. 13	4
Receivers, Headgear, Double, C.L.R. or L.R. (AUST.)	2
Microphone, Hand, No. 3	2

(i) Remote Control Unit " A."

Wireless Remote Control Unit " A " is self-contained in a metal case with a hinged lid. This hinged lid, when open, gives partial protection to the unit when operated in bad weather conditions.

The Unit comprises a Morse Key, Buzzer, two dry cells, Line and Exchange terminals, headphones and microphone jacks and the necessary switches for calling and speaking. The buzzer itself " plugs in " for easy replacement purposes—whilst its adjusting screws are readily accessible when the unit is in the working position

The case is fitted with a web sling by which the unit is carried. This sling is also fitted with a small pouch

in which is carried Connecto Plug, No. 1 Mk. II., for connecting the unit to the wireless set.

This connector has a four-pin flat plug at one end, for plugging into the unit, whilst Plugs, Single, No. 9, No. 10 and No. 11 are fitted at the opposite end for connection to the wireless set.

(ii) Connectors, Twin, No. 13.

This connector consists of 100 yards of Wire, Electric Q.22—wound on Reel, Cable, No. 2—which is terminated at each end by a two-pin, two-socket coupler (Coupler No. 1). The engaging couplers of this unit are provided together with clamping rings for holding them securely together. The Reel, Cable No. 1, is fitted with brackets on the side to hold the couplers when not in use.

(iii) Microphones and Headphones.

The Microphones and headphones for the unit are carried in a separate satchel.

29.3 Weights and dimensions of Wireless Remote Control Equipment for Wireless Set No. 11.

TABLE XXI.—WEIGHTS AND DIMENSIONS.

Description. (1)	Weight lb. (2)	Dimension—inches		
		Length (3)	Height (4)	Depth (5)
Wireless Remote Control Unit "A"	7¾	9½	5¾	5⅛
Connectors, Twin, No. 13 ..	7¼	—	dia. 8½	4
Receivers, Headgear and Microphone Hand No. 3 in satchel	4	11	9	2½

30. WORKING INSTRUCTIONS FOR WIRELESS REMOTE CONTROL UNIT "A."

30.1 General.

The instructions which follow cover the following conditions of use :—

Unit to Unit communication and remote control of Wireless Set No. 11.

Unit to Switchboard communication and remote control of No. 11 Set.

Unit to Unit communication combined with switchboard communication, and remote control of the No. 11 set.

Plate IX. is a general view of the Unit. Fig. 18 is a schematic diagram of the Unit, and Plate X. shows the Unit,

joined up to its associated connectors, for linking with wireless set and telephone lines.

NOTE.—When employing remote control units, an operator must always be on duty at the set for the purpose of changing over from "SEND" to "RECEIVE," when remote traffic is passing through the set, and for general telephonic communication with the remote points.

The sequence of operations is dealt with in the working instructions below, and, although it may be assumed that the operator at the set is normally on watch and may be communicated with at any time from the remote points, it must be remembered that he has to attend to the tuning of the set, adjusting of the various controls, changing over from "SEND" to "RECEIVE," etc., in addition to dealing with "remote" traffic.

30.2 **Connecting Up.**

(i) Insert the 4-pin plug carrying leads into the sockets on the front of the Unit.

(ii) Insert the "LINE" and "PHONES" plugs into the "LINE" and "PHONES" sockets of the No. 11 Set respectively.

(iii) Insert the "KEY" plug into the socket "R.C. KEY" adjacent to the "LINE" socket in the No. 11 Set.

(iv) Plug in phones (Receivers, Headgear, Double C.L.R. or L.R. (AUST.) and the microphone (Microphone, Hand, No. 3) into the appropriate sockets on the Control Unit.

(v) See that the two cells are correctly connected in series in their compartment in the Control Unit.

(vi) Pull out switch marked "PULL FOR R.C." and set "MOD." control to appropriate position if R./T. is to be used.

(vii) Connect the end of the "line" to the terminals engraved "CONTROL" on the front of the unit by means of the Connectors, Twin, No. 16.

NOTE.—The distant unit should be connected up as described in sub-paragraphs (iv), (v) and (vii) above.

30.3 **Unit to unit working and remote control of No. 11 Set.**

(i) See that the left-hand key switch on the panel engraved "NORMAL" and "CONNECT EXCHANGE" is in the "NORMAL" position.

(ii) Press the switch in the microphone handle. On speaking into the microphone loud side tone in the speaker's phones will indicate that the local circuit is in working order.

(iii) Either operator may now call the other by speech or by the buzzer by pressing the right-hand key switch to "CALL R/C. UNIT."

ALWAYS CALL FIRST BY SPEECH AS THE BUZZER IS VERY LOUD TO AN OPERATOR WEARING PHONES.

Two-way speech communication will now be possible.

(iv) If the No. 11 Set be now tuned and adjusted for speech transmission, speech for either the local or distant unit may be radiated.

Thus one operator either at the local or distant unit may transmit a message through the No. 11 Set while the other "listens in" or "monitors" the message.

The operator at the set takes charge of the switching of the set from "SEND" to "RECEIVE," at the appropriate moment and since speech from both units is radiated, it is essential that only one operator speaks during a message. The operator at the set should adjust the "MOD." control as appropriate for satisfactory modulation (see Chapter II., Section 10 (iii) and Table VI.)

NOTE.—It is essential that, when the local and distant operators are communicating solely with each other, the No. 11 Set should not be set to transmit Speech.

C.W./M.C.W. transmission can be effected by either operator if the "SEND" (C.W.-M.C.W.-SPEECH) switch on the No. 11 Set is set to the appropriate position.

Since keying from both units is radiated, it is essential that only one operator should use his key at a time.

30.4 **Unit to switchboard communication and remote control of the No. 11 Set.**

(i) One Wireless Remote Control Unit "A" at least, is required for connecting a No. 11 Set to a buzzer or universal call switchboard.

(ii) The unit is placed near the No. 11 Set and connected to it as in "Connecting Up," 30.2.

(iii) Connect the "EXCHANGE" terminals to the switchboard by means of a twin field cable.

(iv) Put the key switch on the left-hand side of the panel of the Remote Control Unit to the "CONNECT EXCHANGE" position.

(v) Call the switchboard operator by pressing the key switch on the right of the panel to the "CALL EXCHANGE" position.

(vi) When communication between the local operator and the exchange operator is established, speech over the line from the exchange or from a subscriber to the exchange, may be radiated through the No. 11 Set, the tuning and switching of the latter being controlled in the normal manner by the "local" operator at the set.

(vii) Set the "MOD." control to the appropriate position (see Table VI.), advancing it clockwise beyond this point, if necessary, to give satisfactory modulation with the speech from the exchange or subscriber. Speech from a D Mk.V telephone will necessitate setting the "MOD." control almost fully clockwise for both L.P. and H.P. operation (see Chapter II., paragraph 8.6 (ii)). Set the "CRASH LEVEL" control fully clockwise.

NOTE.—When the "local" operator at the set is "standing by," a call from the exchange will produce a loud "buzz" in his phones.

ALWAYS CALL FIRST BY SPEECH AS THE BUZZER IS VERY LOUD INDEED TO AN OPERATOR WEARING PHONES.

30.5 **Unit to Unit communication combined with switchboard communication and remote control of the No. 11 Set.**

(i) The units are connected to the No. 11 and to each other as described in "Connecting Up" 30.2.

(ii) With the left-hand key switches on the Units at "NORMAL," communication between the Units, and local or remote control of the No. 11 Set is possible, as previously described.

(iii) A call coming in from the switchboard, will now be heard as a "buzz" in the local operator's phones whether :—

(*a*) He is standing by.

(*b*) He is communicating with the "remote" operator.

(*c*) He is radiating C.W., M.C.W. or R./T. through the No. 11 Set.

(*d*) The remote operator is r ating C.W., M.C.W. or R./T. through the No. 11 Set.

(iv) To reply to a call from a switchboard operator the "local" operator should proceed as follows for each of the cases (*a*), (*b*), (*c*), (*d*), above.

Case (*a*)—Put the left-hand key switch to "CONNECT EXCHANGE" and reply to the switchboard operator. The remote operator will hear this conversation and will thus be warned against breaking in until any message is cleared.

Case (*b*)—Instruct the remote operator to stand-by, put the left-hand key switch to "CONNECT EXCHANGE" and reply to the switchboard operator.

Case (*c*)—Instruct the wireless station which is being communicated with to stand-by, then press the centre switch, marked "PRESS TO SPEAK EXCHANGE" and reply to the switchboard operator. The No. 11 Set controls may be left at "SEND" as the "PRESS TO SPEAK EXCHANGE" conversation is not radiated.

Case (*d*)—Press "PRESS TO SPEAK EXCHANGE" switch and reply to the switchboard operator. This will not interfere with the remote operator's transmission. The switchboard operator should be instructed to withhold his message until he receives a further call. The "PRESS TO SPEAK EXCHANGE" switch is then released and the traffic from the remote operator dealt with by the normal operation of the No. 11 Set.

When this traffic is completed, return the "SEND/REC." switch to "REC." press the left-hand key switch to "CONNECT EXCHANGE" and accept the message from the switchboard operator (or subscriber) and, if necessary, transmit his speech over the No. 11 Set by operating the controls in the normal manner.

The question of priority will, of course, decide the action taken by the local operator.

NOTE.—The distinction between the "CONNECT EXCHANGE" and the "PRESS TO SPEAK EXCHANGE" switches, is, the latter isolates the local operator—switchboard operator circuit from both the set and the remote operator, while the former brings in an "omnibus" connection to all operators and to the set if this is switched to "SEND"-"SPEECH."

BUZZER ADJUSTMENT

30.6 **Adjustment of the buzzer.**

(i) Loosen the two " lock " discs ; half a turn will suffice.

(ii) Unscrew both contact knobs a few turns.

(iii) Set the key switch on the right of the panel to " CALL R/C UNIT " and screw in the left-hand contact knob untill a buzz is heard. Adjust this knob until the loudest note is obtained irrespective of quality or pitch.

(iv) Screw in the other contact knob slowly until a clear and moderately high-pitched note is obtained. The buzzer will not give its best output at a very high note and may not start up again after being switched off.

(v) Press over the right-hand key to " CALL R/C UNIT " and " CALL EXCHANGE " to make sure that the buzzer starts up with certainty.

(vi) Tighten the " lock " discs, making sure that the pitch of the note is not changed by so doing.

APPENDIX I.

WIRELESS SETS No. 11 (AUST.)—COMPLETE STATIONS.

Cat. No	Designation	ZAA3997—No. 1—Ground Station			ZAA3998—No. 2—Truck Station			ZAA3999—No. 3—Carrier Station			ZAA4000—No. 4—Composite Station		
		Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total
	SECTION F												
F A 2137	Hammers, engineers, ball-pein, 8-oz. (b)	1	—	1	1	—	1	—	—	—	1	—	1
	SECTION W2												
WB 0071	Bulbs, 6-volt, J. (d)	1	4 (a)	5	1	4 (a)	5	1	4 (a)	5	1	4 (a)	5
WB 0200	Cells, dry, X, Mk. II	4 (e)	2	6	4 (e)	2	6	—	—	—	4 (e)	2	6
WB 1043	Wire, electric, P.13, Mk. 1 yds	—	4 (f)	4	—	4 (f)	4	—	—	—	—	4 (f)	4
	SECTION Z1.												
ZA 0078	Aerial bases, No. 2 —	—	—	—	1	—	1	1	—	1	1	—	1
ZA 0031	Aerial coupling equipment C (Aust.) (h)	1	—	1	1	—	1	—	—	—	1	—	1
ZA 0061	Aerial leads, 3 ft., No. 2	1	—	1	1	—	1	1	—	1	1	—	1
ZAA 023	Aerials, horizontal, No. 1 (Aust.) equipment A (q)	1	—	1	1	—	1	—	—	—	1	—	
	Ammeters, R.F.—												
ZAA0701	350-mA. (Aust.) (c)	1	1	2	1	1	2	—	—	—	1	1	2
ZAA0702	1-amp. No. 2 (Aust.)	1	1	2	1	1	2	1	1	2	1	1	2
	Antennae Rods, D.— (f) (q)												
ZA 5330	10-ft.	—	—	—	—	—	—	1	—	1	1	—	1
ZA 5333	18-ft., No. 1	1	—	1	1 (g)	—	1	—	—	—	1	—	1
ZA 5335	18-ft., No. 2	—	—	—	1	—	1	—	—	—	1	—	1
ZA 0437	Bags, aerial gear, No. 2, Mk. II	1	—	1	2	—	2	—	—	—	2	—	2
	Brushes, dynamo or motor— (a)												
ZAA4020	No 1 (Aust.)	—	2	2	—	2	2	—	2	2	—	2	2
ZAA4021	No. 2 (Aust.)	—	2	2	—	2	2	—	2	2	—	2	2
ZAA4012	Cases, Spare Parts No. 1A (Aust.)	1	—	1	1	—	1	1	—	1	1	—	1
ZAA4005	Condensers, X.5, 5-kV., (Aust)	—	—	—	1	—	1	1	—	1	1	—	1
	Connectors—												
ZA 2262	Plug, No 1, Mk. II (k)	2	—	2	2	—	2	—	—	—	2	—	2

COMPLETE STATION LIST

COMPLETE STATION LIST

APPENDIX I.—*continued.*

WIRELESS SETS No. 11 (AUST.)—COMPLETE STATIONS—*continued.*

Cat. No.	Designation	ZAA3997—No. 1—Ground Station			ZAA3998—No. 2—Truck Station			ZAA3999—No. 3—Carrier Station			ZAA4000—No. 4—Composite Station		
		Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total
	SECTION Z1—(*Contd.*)												
	Connectors—(*contd.*)												
	Twin—												
ZA 2343	No. 13 (l)	2 (m)	—	2	2 (m)	—	2	—	—	—	2 (m)	—	2
ZA 2345	No. 16 (k)	2	—	2	2	—	2	—	—	—	2	—	2
	3-point—												
ZA 2375	No. 2	2	—	2	2	—	2	1	—	1	2	—	2
ZA 2379	No. 3	—	—	—	—	—	—	1	—	1	1	—	1
	4-point—												
ZAA4009	No. 2 (Aust.)	1	—	1	1	—	1	1	—	1	1	—	1
ZA 2329	10-point, No. 1	1	—	1	1	—	1	1	—	1	1	—	1
	Key and plug assemblies												
ZA 4500	No. 2B	1	—	1	1	—	1	1	—	1	1	—	1
ZA 4381	Slides, No. 1	—	—	—	1	—	1	—	—	—	1	—	1
ZA 4523	Lamps, operators, No. 2	1	—	1	1	—	1	1	—	1	1	—	1
ZA 2784	Leads, counterpoise, No. 2, Mk. II (f)	1	—	1	1	—	1	—	—	—	1	—	1
ZA 5371	Microphones, hand, No. 3 (l)	3 (n)	—	3	4 (n)	—	4	1	—	1	4 (n)	—	4
ZA 5624	Plugs, single, No 9 (l)	4	—	4	4	—	4	1	—	1	4	—	4
ZAA 586	Relays, W.T., S.P.D.T. (Aust.) —	—	1	1	—	1	1	—	1	1	—	1	1
	Receivers, headgear—												
ZA 5785	C.L.R., double, Mk. III (or) (	4 (n)	—	4	4 (n)	—	4	1	—	1	4 (n)	—	4
ZAA 561	Double, L.R. (Aust.) (	4 (n)	—	4	4 (n)	—	4	1	—	1	4 (n)	—	
ZA 5787	C.L.R., double, Mk. V	—	—	—	—	—	—	1	—	1	1	—	
ZA 6202	Satchels, signals	5 (o)	—	5	5 (o)	—	5	1	—	1	5 (o)	—	
ZA 0073	Springs, 7-in.	—	—	—	1	—	1	—	—	—	1	—	1
	Valves, W.T., Type—												
ZAA 904	1C7G	2	2 (p)	4	2	2 (p)	4	2	2 (p)	4	2	2 (p)	4
ZAA 907	1K7G	4	4 (p)	8	4	4 (p)	8	4	4 (p)	8	4	4 (p)	8
ZAA9260	1M5G	2	2 (p)	4	2	2 (p)	4	2	2 (p)	4	2	2 (p)	4
ZAA 929	807	1	1 (p)	2	1	1 (p)	2	1	1 (p)	2	1	1 (p)	2

APPENDIX I.—*continued.*

WIRELESS SETS No. 11 (AUST.)—COMPLETE STATIONS—*continued.*

Cat. No.	Designation	ZAA3907—No. 1—Ground Station			ZAA3908—No. 2—Truck Station			ZAA3909—No. 3—Carrier Station			ZAA4000—No. 4—Composite Station		
		Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total
	SECTION Z1—(*Contd.*)												
	Voltmeters, pocket, 250-volt.—												
ZAA 737	No. 2 (Aust.)	1	—	1	1	—	1	1	—	1	1 (a)	—	1
ZAA7371	Cases	1	—	1	1	—	1	1	—	1	1 (a)	—	1
ZA 7400	Watches, non-magnetic (r)	1	—	1	1	—	1	1	—	1	1	—	1
ZAA 433	Wireless remote control units A	2	—	2	2	—	2	—	—	—	2	—	2
ZAA 400	Wireless sets, No. 11 (Aust.)	1	—	1	1	—	1	1	—	1	1	—	1
ZAA4001	Cases, Spare Valves	1	—	1	1	—	1	1	—	1	1	—	1
ZAA4002	Leads, aerial and earth	2	—	2	2	—	2	2	—	2	2	—	2
ZAA4003	Nuts, screws and washers, sets	—	—	—	1	—	1	1	—	1	1	—	1
	Supply Units—												
ZAA4010	High Power	1	—	1	1	—	1	1	—	1	1	—	1
ZAA4011	Low Power	1	—	1	1	—	1	1	—	1	1	—	1
	Tablets, calibration—												
ZAA4006	No. 1	1	—	1	1	—	1	—	—	1	—	—	1
ZAA4007	No. 2	—	—	—	1	—	1	—	—	—	—	—	1
ZAA4008	No. 3	—	—	—	—	—	—	1	—	1	1	—	1
	Wireless Set No. 11—												
ZA 9297	Carriers, No. 1	1	—	1	1	—	1	1	—	1	1	—	1
ZA 8401	Channels, packing	—	—	—	4	—	4	—	—	—	4	—	4
ZA 8389	Pads, felt	—	—	—	—	—	—	1	—	1	1	—	1
ZA 9281	Straps, No. 1	—	—	—	—	—	—	1	—	1	1	—	1
	Leads, earth—												
ZA 8403	No. 2	2	—	2	2	—	2	1	—	1	2	—	2
ZA 8395	No. 4	—	—	—	—	—	—	1	—	1	1	—	1
ZA 8396	No. 5	1	—	1	1	—	1	1	—	1	1	—	1
ZA 9203	No. 6	1	—	1	1	—	1	—	—	—	1	—	1
ZA 8402	Straps, carrying	2	—	2	2	—	2	2	—	2	2	—	2

COMPLETE STATION LIST

COMPLETE STATION LIST

APPENDIX I.—*continued.*

WIRELESS SETS No. 11 (AUST.)—COMPLETE STATIONS—*continued.*

Cat. No.	Designation	ZAA3997—No 1—Ground Station			ZAA3998—No. 2—Truck Station			ZAA3999—No. 3—Carrier Station			ZAA4000—No 4—Composite Station		
		Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total	Minimum for Work	Essential Spares	Total
	SECTION Z2.												
ZBA0800	Batteries, secy, port, 6-volt, 75-Ah.	2	2	4	2	2	4	2	2	4	2	2	4
ZBA0801	Boxes	2	2	4	2	2	4	2	2	4	2	2	4

(a) Normally carried in cases, spare parts.
(b) Normally carried in Antennae Rod A, peg bags.
(c) Used for L.P.. and dry battery operation only.
(d) For use in Lamps, Operators, No. 2.
(e) Normally carried in Wireless remote control units, "A" (2 per unit).
(f) Normally carried in Bags, aerial gear, No. 2. Mk. II
(g) For use when set erected as a ground station.
(h) Comprises 1 aerial unit, "C" (Aust.), 2 Connectors, twin, No. 15 and 1 Connector, twin, No. 22.
(i) If Receivers, headgear, double, L.R. (Aust.) are issued.
(k) Normally carried in Wireless remote control units, "A" (1 per unit).
(l) Normally carried in Satchels, signals.
(m) Four required when used in R.A.A units—Under this condition, 2 extra Satchels, signals will be required (See note (o) below)
(n) Two used with Wireless remote control units, "A" (1 per unit)
(o) Increased by two for R A A. units. (See Note (m) above).
(p) Normally carried in cases, spare valves.
(q) See separate detail below.
(r) Or watches, G.S., Mk. II (Sect. V2) in lieu.

AERIALS, HORIZONTAL, No. 1 (AUST.) EQUIPMENT "A".

Vocab. Cat No.	Designation	Minimum for Work	Essential Spares	Total
	SECTION W2.			
WBA925	Wire Electric R, No. 5 (AUST.).....ft.		100	100
	or			
WBA926	Wire Electric R, No. 6 (AUST.).....ft.		100	100
	SECTION Z1.			
ZAA0851	Aerials 20 ft. No. 1 (AUST.)	1		1
ZAA0852	Aerials 30 ft. No. 1 (AUST.)	1		1
ZAA0853	Aerials 40 ft. No. 1 (AUST.)	1		1
ZAA0854	Aerials 70 ft. No. 1 (AUST.)	1		1
ZAA0855	Aerials 90 ft. No. 1 (AUST.)	1		1
	Aerials, Horizontal No. 1 (AUST.)			
ZAA0859	Halyard Assembly	1		1
ZAA0860	Plates Connection No. 1		2	2
ZAA0861	Plates Connection No. 2		2	2
ZAA0857	Stayplates	2		2
ZAA0862	Installation Drawing	1		1
ZAA 487	Insulators W.T. No. 2B (AUST.)		6	6
ZAA 497	Lugs Hooked No. 2 (AUST)		2	2
ZA 6018	Reels Aerial No. 3		2	2
	SECTION Y.			
YA 1149	Pickets, Guy Telegraph	6	2	8
YA 1205	Poles Telegraph Wood 21 ft. Mk. I.	2		2

ANTENNAE RODS "D"

ANTENNAE RODS D.

Vocab. Cat. No.	Item	10 ft.	18 ft. No. 1	18 ft. No. 2
	SECTION Z1.			
	Antennae Rod, A			
ZA 0374	Pegs	—	5	5
ZA 0378	Pegbags	—	1	1
	Antennae Rods, D			
	Clamps			
ZA 5339	Section	1	—	1
ZA 5328	Spoke	—	1	1
ZA 5341	Reamers	1	1	1
	Sections			
ZA 5346	3 ft.	—	8	8
ZA 5342	4 ft.	2	—	—
ZA 5343	6 ft.	1	—	—
ZA 5325	Spikes	—	1	—
ZA 5324	Stayplates No. 3	—	1	1
ZA 7638	Antennae Rods, E. spokes	—	5	5
	Insulators, W.T.			
ZAA 491	(Aust.) No. 2	—	2	2
ZA 4432	Ebonite, B.	—	1	—
ZA 6579	Stay tighteners, small	—	1	1

APPENDIX II.

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS.

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks.
	SECTION Z1.				
	CONDENSERS—				
ZAA 231	Fixed, Q.5,B (Aust.)	C1A	Grid decoupling.	V1A	.05 uF., paper, 350 V. wkg.
,,	,, ,,	C1B	Screen ,,	,,	,, ,, ,,
,,	,, ,,	C1C	Anode ,,	,,	,, ,, ,,
,,	,, ,,	C1D	Grid ,,	V2A	,, ,, ,,
,,	,, ,,	C1E	Anode bypass (S)	,,	,, ,, ,,
,,	,, ,,	C1F	Osc. anode decoupling	V2A'	,, ,, ,,
,,	,, ,,	C1G	Grid decoupling	V1B	,, ,, ,,
,,	,, ,,	C1H	Screen ,,	V2A	,, ,, ,,
,,	,, ,,	C1I	,, ,,	V1B	,, ,, ,,
,,	,, ,,	C1J	,, ,,	V3A	,, ,, ,,
,,	,, ,,	C1K	A.V.C. ,,	V1B	,, ,, ,,
,,	,, ,,	C1L	Grid ,,	V3A	,, ,, ,,
,,	,, ,,	C1M	Screen ,,	V2B	,, ,, ,,
,,	,, ,,	C1N	Anode ,,	V2B'	,, ,, ,,
ZAA 223	,, P.1,C (Aust.)	C2A	B.F.O., H.T. bypass	V2B	0.1 uF ,, ,,
,,	,, ,,	C2B	Anode decoupling	V2A	,, ,, ,,
,,	,, ,,	C2C	,, ,,	V1B	,, ,, ,,
,,	,, ,,	C2D	,, ,,	V3A	,, ,, ,,
,,	,, ,,	C2E	Screen ,,	V3B	,, ,, ,,
,,	,, ,,	C2F	Anode ,,	,,	,, ,, ,,
,,	,, ,,	C2G	Microphone Supply bypass	—	,, ,, ,,
,,	,, ,,	C2H	Line Series	—	,, ,, ,,
,,	,, ,,	C2I	Anode decoupling	V3D	,, ,, ,,
,,	,, ,,	C2J	Grid ,,	V3D	,, ,, ,,
,,	,, ,,	C2K	Filament ,,	V3B	,, ,, ,,
,,	,, ,,	C2L	Anode ,,	V3C	,, ,, ,,

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks
	CONDENSERS—*Contd.*				
ZAA2703	Fixed, X.115 (Aust.)	C3A	1st I.F. filter, Input primary tuning.	V2A	115 uuF. silvered mica, ceramic case.
"	" "	C3B	" " Input secy. tuning	"	" "
"	" "	C3C	" " output pri. "	V1B	" "
"	" "	C3D	" " " secy. "	"	" "
"	" "	C3E	2nd " Input pri. "	"	" "
"	" "	C3F	" " " secy. "	"	" "
"	" "	C3G	" " output pri. "	V3A	" "
"	" "	C3H	" " " secy. "	"	" "
"	" "	C3I	3rd " primary "	V3B	" "
"	" "	C3J	" " secondary "	"	" "
"	" "	C3K	Output coupling (S)	V2B	" "
ZAA.243	" Q.1,H (Aust.)	C4A	Signal diode coupling	V3B	.01 uF., paper, 700 V. wkg.
"	" "	C4B	Output coupling	"	" "
"	" "	C4C	Anode tuning	V3D	" "
"	" "	C4D	" decoupling	V2A	" "
ZAA 230	" Q.1,E (Aust.)	C5A	1st I.F. filter coupling	—	.01 uF., mica, 1000 V.
"	" "	C5B	2nd " "	—	" "
"	" "	C5C	Cathode bypass	V4A	" "
"	" "	C5D	Screen decoupling	"	" "
ZAA2306	" X.5,B (Aust.)	C6A	Output coupling	V1A	500 uuF., mica, metal cased
"	" "	C6B	B.F.O. "	—	" "

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks
	CONDENSERS—*Contd.*				
ZAA3151	Variable, No. 21 (Aust.)	C7A	Oscillator trimmer	V2A'	7-25 uuF., air variable.
"	" "	C7B	" compensating	"	" 15 plate.
"	" "	C7C	Output trimmer (R)	V1A	" "
"	" "	C7D	" " (S)	"	" "
"	"	C7E	Input " (S)	"	" "
ZAA3150	" No. 20 (Aust.)	C8A	TUNING REC. & SEND. Input tuning	"	11-255 uuF.,3 gang.
		C8B	" output "	"	
ZAA2807	Fixed, X.5,C (Aust.)	C9A	Aerial series (R)	—	500 uuF., mica metal cased
"	" "	C9B	Aerial series (S)	—	
ZAA2702	" X.1,C (Aust.)	C10A	Output coupling (S)	V2A'	100 uuF., S.M., ceramic
ZAA2704	" X.25,B (Aust.)	C11A	Oscillator grid	"	250 uuF., "
		C11B	" "	V2B'	
ZAA 228	" Q.1,C (Aust.)	C12A	Anode decoupling	V4A	.01 uF., mica, 3U2956
		C12B	" blocking	"	
ZAA2805	" X,44 (Aust.)	C13A	Side-tone det. filter	—	440 uuF. mica, metal cased "J"
		C13B	Anode bypass	V3B	
ZAA2803	" X,11 (Aust.)	C14A	Signal diode filter	"	110 uuF., " " "L"
"	" "	C14B	" "	V3D	" " "
"	" "	C14C	Side-tone coupling	"	" "
		C14D	A.V.C. diode coupling	V3B	
ZAA 242	" P.5,F (Aust)	C15A	H.T. bypass	—	0.5 uF., paper, 350-V. kwg.

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks.
	CONDENSERS—*Contd.*				
ZAA 236	Fixed, R.5,B (Aust.)	C16A	Grid condenser	V3D	.005 uF., paper, 700 V. wkg.
ZAA2802	,, Y.5,C (Aust.)	C17A	Input tuning (S)	V1A	50 uuF., mica, metal cased.
ZAA2800	,, Z.4 (Aust.)	C18A	Aerial coupling (R)		4 uuF ,,
ZAA3152	Variable, No. 22 (Aust.)	C19A	REC. AERIAL TRIMMER (R)	V1A	5-90 uuF., air variable.
ZAA2801	Fixed Y.14 (Aust.)	C20A	Output trimmer	,,	14 uuF., mica, metal case "C"
ZAA3150	Variable, No. 20 (Aust.)	C21A	Oscillator tuning	V2A'	12-360 uuF., 3 gang.
ZAA2700	Fixed, Y.35 (Aust.)	C22A	Oscillator trimmer (3 condensers in parallel)	V2A'	35 uuF., S.M., ceramic
ZAA2903	,, Y.24 (Aust.)				24 uuF., Erie ceramicon
ZAA2900	,, Z.6 (Aust.)				6 uuF., ,,
ZAA2706	,, X.75 (Aust.)	C23A	Osc. series padder (4 condensers in parallel = 3000 uuF	V2A'	750 uuF., S.M. ceramic.
,,	,, ,,	C23A			,, ,,
,,	,, ,,	C23A			,, ,,
,,	,, ,,	C23A			,, ,,
,,	,, ,,	C24A	Oscillator tuning	V2B'	,, ,,
ZAA3153	Variable, No. 23 (Aust.)	C25A	SEND AERIAL TUNE (S)	—	5-150 uuF., air variable
ZAA 237	Fixed, R.25 (Aust.)	C26A	Grid decoupling	V4A	.0025 uF., paper, 700V. wkg.
ZAA 238	,, Q.3 (Aust.)	C27A	Grid Condenser	V3D	.03 uF., ,,
ZAA 245	,, 400 (Aust.)	C28A	Filament decoupling	—	400 uF., electrolytic tubular. Ducon ET1045,12 V. peak
ZAA 306	Semi-fixed, No. 7 (Aust.)	C29A	Neutralising Condenser	V2A-V2A'	2 Z plates on ceramic base.

APPENDIX II.—*continued.*

WIRELESS SETS No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks
	INDUCTANCES—				
ZAA 469	No. 26 (Aust.)	L1A L1A'	Aerial Coupling Input tuning	V1A "	Permeability tuned.
ZAA 473	No. 27 (Aust.)	L2A	Anode tuning	"	
ZAA 479	No. 28 (Aust.)	L3A L3A'	Oscillator anode coupling " tuning	V2A' "	Permeability tuned.
	TRANSFORMERS—				
ZAA8091	I.F., I (Aust.)	L4A L4A'	1st I.F. filter, input pri. " " secy.		Permeability tuned. " "
ZAA8092	" J (Aust.)	L4B L4B'	" output pri " " secy.		
ZAA8093	" K (Aust.)	L4C L4C'	2nd I.F. filter, input pri. " " secy.		
ZAA8094	" L (Aust.)	L4D L4D'	" output pri. " " secy.		
ZAA8095	" M (Aust.)	L4E L4E'	3rd I.F. primary " secondary		
	INDUCTANCES—				
ZAA 458	No. 29 (Aust.)	L5A L5A'	Oscillator tuning C.W. H'DYNE control coupling	V2B' "	
ZAA 464	No. 30 (Aust.)	L6A	Aerial tuning (S)	V4A	24 tappings, 12 anode 12 aerial.

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type Rating & Remarks
	CHOKES, R.F.—				
ZAA1851	No. 17 (Aust.)	L7A	Anode R.F. Choke	V2B	4 pies, wax-dipped.
"	"	L7B	Grid R.F. Choke	V4A	
	WIRELESS SET, No. 11 (AUST.)				
ZAA4050	Jacks, telephone	J1A	PHONES jack		For 2 Plugs, single, No. 9
ZAA4051	" microphone	J2A	LINE jack		For 1 Plug, single, No. 10
	" "	J2B	MIC. jack		"
	" "	J2C	KEY jack		"
ZAA4052	" remote control	J3A	R.C. KEY		For 1 Plug, single, No. 11
	SECTION W2.				
WBA111	BULBS, 6 volt (Aust.) No. 2	P1A	Dial lamp		6 volt, 1.5 watt
	SECTION Z1.				
	RECTIFIERS, METAL—				
ZAA 595	4/1/1 (Aust.)	W1A	CRASH LEVEL		4 elements, pairs in opposite polarity, BNF 4/1/1M3
	AMMETERS, R.F.				
ZAA0702	1 amp. (Aust.) No. 2	M1A	Aerial current meter		For High Power operatio
ZAA0701	350 mA. (Aust.)	M2A	" "		For L.P. (and bty.) operation

APPENDIX II.—*continued.*

WIRELESS SETS No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks.
	RELAYS, W.T.—				
ZAA 586	S.P.D.T. (Aust)	S11A	C.W. and M.C.W. (S)		Keying relay.
	RESISTORS—				
	1 watt No. 3, or No. 4—				I.R.C, BT1; or Chanex.
ZAA 670	40,000 ohms	R1A	Anode feed	V2A	
"	"	R1B	"	V1B	
"	"	R1C	"	V3A	
"	"	R1D	"	V2B	
"	"	R1E	" (L.P., M.C.W.)	V3D	
"	"	R1F	" (M.C.W.)	"	
ZAA 680	1 megohm	R2A	Grid leak	V2A	
"	"	R2B	Screen feed	V3B	
"	"	R2C	Grid leak	"	
"	"	R2D	"	V2B	
ZAA 671	50,000 ohms	R3A	Signal diode load (MAN., C.W.)	V3B	
"	"	R3B	Anode decoupling	"	
"	"	R3C	Grid leak (C.W., M.C.W.)	V3D	
"	"	R3D	Grid decoupling	V3D	
ZAA 665	10,000 ohms	R4A	Anode feed	V2A	
"	"	R4B	Modulator load	V3D	
	½ Watt No. 3, or No. 4—				I.R.C., BT½; or Chanex
ZAA 608	50,000 ohms	R5A	Oscillator grid leak	V2A	
"	"	R5B	" "	V2B	
ZAA 700	100,000 ohms	R6A	Grid decoupling	V1A	
"	"	R6B	"	V3A	
	1 watt, No. 3 or No. 4—				I.R.C., BT1; or Chanex
ZAA 675	100,000 ohms	R7A	Screen feed	V2B	
"	"	R7B	Grid decoupling	V1B	

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks
	RESISTORS—*Contd.*				
ZAA 676	1 watt No. 3, or No. 4— 200,000 ohms	R8A	Screen feed (S)	V1A	
"	"	R8B	Side-tone diode filter	V3A	
ZAA 653	2 watt No. 3— 15,000 ohms	R9A	Screen potentiometer (R)	V1A, V3A	I.R.C., BT2.
"	"	R9B	Grid leak	V4A	
ZAA 677	1 watt No. 3, or No. 4— 250,000 ohms	R10A	Screen feed	V3A	I.R.C., BT1 : or Chanex
"	"	R10B	Anode "	V3B	
ZAA 681	1.75 megohms	R11A	A.V.C. decoupling	—	
"	"	R11B	"	—	
ZAA 704	½ watt No. 3, or No. 4— 1 megohm	R12A } R12B }	A.V.C. diode load potentiometer	{ V3B "	I.R.C., BT½ : or Chanex
"	"				
ZAA 679	1 watt No. 3, or No. 4— 500,000 ohms	R13A	Grid leak	V3C	I.R.C., BT1 : or Chanex
"	"	R13B	Static leak	—	
ZAA6401	3 watt No. 2— 75 ohms	R14A	Fixed bias potentiometer	—	I.R.C., AA, coat C
"	"	R14B	C.W H'DYNE control compensator		
ZAA6701	1 watt, No. 3 or No. 4— 100 ohms	R15A	Grid suppressor	V4A	I.R.C., BT1; or Chanex
"	"	R15B	Screen suppressor	"	

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc. with Valve	Type, Rating & Remarks
	RESISTORS—*Contd.*				
	1 watt No. 3, or No. 4—				I.R.C., BT1; or Chanex
ZAA6706	1,000 ohms	R16A	MOD. potentiometer	V3D	
"	"	R16B	Anode decoupling		
"		R16C	Side-tone diode load potentiometer	V3A	
	RESISTANCES, variable—				
ZAA6001	250 ohms (Aust.)	R17A	CRASH LEVEL control	—	Wirewound
"	"	R17B	C.W. H'DYNE "	—	"
	RESISTORS—				
	3 watt No. 2—				I.R.C., AA, coat C
ZAA6402	400 ohms	R18A	Fixed bias potentiometer	—	
	1 watt No. 3, or No. 4—				I.R.C., BT1; or Chanex
ZAA 664	7,500 ohms	R19A	Anode feed	V1A	
	2 watt No. 3—				I.R.C., BT2.
ZAA6505	30,000 ohms	R20A	Screen potentiometer (R)	V1A	
	1 watt No. 3, or No. 4—				I.R.C., BT1; or Chanex
ZAA6704	500 ohms	R21A	Side-tone diode load pot	V3A	
	½ watt No. 3, or No. 4—				I.R.C., BT½; or Chanex
ZAA6811	200,000 ohms	R22A	Signal diode filter	V3B	
	RESISTANCE, variable—				
ZAA6005	50,000 ohms No. 1 (Aust.)	R23A	REC. VOL. control		Carbon
	RESISTORS—				
	1 watt No. 3, or No. 4—				I.R.C., BT1; or Chanex
ZAA 673	70,000 ohms	R24A	Screed feed	V2B	
ZAA 666	15,000 ohms	R25A	Oscillator anode feed	V2B'	

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender		Assoc. with Valve	Type, Rating & Remarks.
	RESISTORS—*Contd.*					
	2 watt No. 2—					I R.C., BT2.
ZAA 657	75,000 ohms	R26A	Screen feed (L.P.)		V4A	
ZAA6503	5,000 ohms	R27A	Screen feed		,,	I.R.C , BT1 : or Chanex
	1 watt No. 3, or No. 4—					
ZAA 663	5,000 ohms	R28A	Osc. anode decoupling		V2A'	
,,	,,	R28B	Anode decoupling		V3C	
,,	,,	R28C	H.P. Rotary X fmr. load		—	
	RESISTANCE, variable—					
ZAA6003	5,000 ohms No. 1 (Aust.)	R29A	MOD. control		V3D	Wirewound
	RESISTORS, 3 watt No. 2—					I.R.C., AA, coat C
ZAA 646	250 ohms	R30A	Cathode bias		V4A	
,,		R30B	Fixed bias potentiometer		—	
ZAA 641	16.6 ohms	R31A	Filament series		—	
ZAA6403	650 ohms	R32A	Fixed bias potentiometer		—	
	SWITCHES—					
ZAA 756	2 pole 2 way B (Aust.)	S1A	Aerial			Oak
ZAA7561	Wafer					,, wafer only.
ZAA 775	9 pole, 2 way (Aust.)					,,
ZAA7751	Wafer 1	S2A/1	R.F. input	ganged	V1A	,, 5 poles
ZAA7752	Wafer 2	S2A/2	,, output	ganged	,,	,, 4 poles, 1 wkg.
ZAA7753	Wafer 3	S2A/3	Oscillator	ganged	V2A'	,, 4 poles, 3 ,,
ZAA 767	11 pole, 2 way (Aust.)					,,
ZAA7671	Wafer 1	S3A/1	H.P. power			,, single pole, On-off.
ZAA7672	Wafer 2	S3A/2	Bias and L.T. Switching			,, 6 poles.
ZAA7673	Wafer 3	S3A/3	H.T. Switching			

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.)—LIST OF MAIN COMPONENTS—*continued.*

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Assoc with Valve	Type, Rating & Remarks
	SWITCHES——*Contd.*				
ZAA 780	8 pole, 3 way (Aust.)				Oak
ZAA7801	Wafer 1	S4A/1	REC.—C.W.—A.V.C.—MAN.		„ 4 poles
ZAA7802	Wafer 2	S4A/2			„ „
ZAA 757	2 pole, 2 way,C (Aust.)	S5A	PRESS TO TUNE (R)		
ZAA 760	4 pole, 2 way,B (Aust.)	S6A	PULL FOR R.C. (S)		
ZAA 761	5 pole, 2 way (Aust.)	S7A	L.P.—H.P		Oak
ZAA 769	7 pole, 3 way,B (Aust.)				„
ZAA7691	Wafer 1	S8A/1	SEND—C.W.—M.C.W.—SPEECH		„ 4 poles, 3 wkg.
ZAA7692	Wafer 2	S8A/2			„ 4 poles
ZAA 747	1 pole, 12 way,B (Aust.)	S9A	AERIAL TAP (S)		„
ZAA „	„	S10A	ANODE TAP (S)		
		S11A	See RELAYS, W.T.		
	TRANSFORMERS—				
ZAA 823	Telephone, J. (Aust.)	T1A	Receiver Output to Phones	V3C	
ZAA 825	Microphone,F. (Aust.)	T2A	Modulation Input	V3D	
ZAA 826	„ G. (Aust.)	T3A	„ Output	„	
	VALVES, W.T.—				
	Type—				
ZAA9260	1M5G	V1A	R.F. ampl. (R); Buffer (S)		Variable mu R.F. pentode.
ZAA „	„	V1B	1st I.F. amplifier (R)		„
ZAA 904	1C7G	V2A	Converter (R); M.O. (S)		Pentagrid Converter.
ZAA „	„	V2B	„ (S). 455 kc. Osc. (S)		„
ZAA 907	1K7G	V3A	2nd I.F. ampl. (R) Side-tone det. (S)		Duo-diode pentode.
ZAA „	1K7G	V3B	Det., A.V.C., A.F. amplifier (R)		„
ZAA „	„	V3C	Output (R)		„
ZAA „	„	V3D	Modulator, Tone Oscillator (S)		„
ZAA 929	807	V4A	Power amplifier (S)		Beam pentode

MAIN COMPONENTS LIST

MAIN COMPONENTS LIST

APPENDIX II.—*continued.*

WIRELESS SETS, No. 11 (AUST.) SUPPLY UNITS, L.P.—LIST OF MAIN COMPONENTS.

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Location	Type, Rating & Remarks
	SECTION Z1.				
	CONDENSERS—				
ZAA 231	Fixed, Q.5.B Aust.)	C10	L.T. filter		.05 uF., paper, 350 v wkg.
ZAA 242	„ P.5.F („)	C15B	H.T. filter		0.5 uF., „
	„	C15C	L.T. filter		„ „
ZAA2001	„ 400,B" („)	C35A	L.T. „		400 uF., electrolytic tubular.
					Ducon EEO 822, 25 V, peak.
ZAA2007	„ 16 (Aust.)	C36A	H.T. „		16 uF., electrolytic tubular.
					(Ducon EEO 887, 525 V, peak.
ZAA2006	„ 20 (Aust.)	C37A	Mic. Supply filter		(20 uF., Electrolytic, tubular.
					(Ducon EEO 839, 200 V peak.
		C37B	Bias filter		
ZAA2810	„ R 5.C (Aust.)	C38A	L.T. brushes filter		.005 uF., mica, metal cased.
„	„ „	C38B	„ „ „		„
„	„ „	C38C	H.T. „ „		„
„	„ „	C38D	„ „ „		„
	CHOKES, A.F.—				
ZAA 175	No. 7 (Aust.)	L8A	L.T. filter		20 mH., twin windings
ZAA 176	No. 8 „	L9A	H.T. „		1.5 H., in positive lead
	CHOKES, R.F.—				
ZAA1853	No. 10 Aust	L10A	H.T. filter		38 mH., in negative lead.
	SECTION W2.				
WBA 111	BULBS, 6 volt (Aust.) No. 2	P1B	Pilot lamp		6 volts, 1.5 watt.

WIRELESS SETS, No. 11 (AUST.) SUPPLY UNITS, L.P.—LIST OF MAIN COMPONENTS.

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Type, Rating & Remarks.
	SECTION Z1.			
	RESISTORS—			
	5 watt No. 5—			
ZAA6210	250 ohms	R40A	Voltage dropping, Microphone	I.R.C., DG, wirewound.
ZAA6205	130 ohms	R41A	" Relay	" "
ZAA6202	25 ohms	R42A	" Lamps, operators	" "
ZAA6201	11 ohms	R43A	" Filament	" "
	2 watt No. 3—			
ZAA 656	50,000 ohms	R44A	H.T. Filter	I.R.C., B.T2.
	SWITCHES—			
ZAA 746	Single pole, On-Off (Aust.)	S12A	L.T. Supply	Flush toggle.
	TRANSFORMERS—			
ZAA 836	Rotary A (Aust.) No. 1	T4A	11/210V., D.C.	

WIRELESS SETS, No. 11 (AUST.) SUPPLY UNITS, H.P.—LIST OF MAIN COMPONENTS.

Vocab. Cat. No.	Vocabulary Nomenclature	Symbol	Description (R) Receiver (S) Sender	Type, Rating & Remarks
	SECTION Z1.			
	CONDENSERS—			
ZAA 209	Fixed, 8, B (Aust.)	C34A	H.T. smoothing	8 uF., electrolytic, metal cased, Ducon EE 10774, 525V. peak.
	CHOKES, R.F.—			
ZAA1853	No. 19 (Aust.)	L10B	H.T. Filter	30 M.H. in positive lead.
	TRANSFORMERS—			
ZAA 837	Rotary A (Aust.) No. 2	T5A	11-345 V., D.C.	

MAIN COMPONENTS LIST

VALVE TEST PANEL READINGS

VALVE TEST PANEL READINGS.

Valve	Panel Engraving	Function		Approx. Volts.	
		Receiver	Sender	Rec.	Send.
1M5G	1A	R.F Amp.	Buffer	12	13
1C7G	2A	Converter	——	40	28
	2A′	Master Oscillator	Master Oscillator	13	13
1M5G	1B	1st I.F.	——	20	—
1K7G	3A	2nd I.F.	Sidetone Detector	40	—
1K7G	3B	Det., A.V.C., & A.F. Amp.	Sidetone Amplifier	15	15
1K7G	3C	Output	Sidetone Output	16	12
1C7G	2B	——	Converter	—	36
	2B′	I.F. Oscillator	I.F. Oscillator	—	36
1K7G	3D	——	Modulator Tone Oscillator	—	2-5

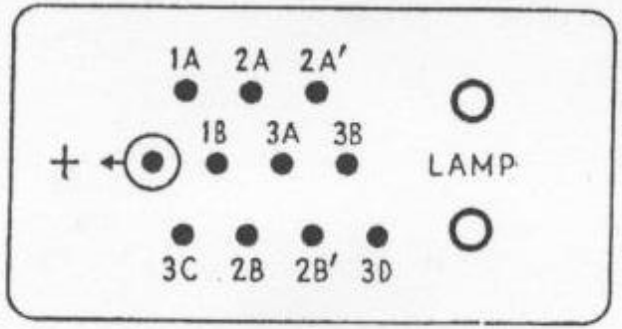


Fig. 17 Wireless Set No. 11 (Aust.) —Valve Test Data.

NOTES.

1. Normal readings on a Voltmeter, Pocket, 250V., No. 2 (Aust.) are given in the REC. and SEND. columns. All readings except that at point 3D are made on the 250 volt scale of the meter.

2. For "REC." reading the "SEND./REC." switch must be in the "REC." position, the "REC. VOL." control must be set fully-clockwise, and the "RE[illegible] (R/T-C.W.) switch must be in the "MAN." position.

3. For "SEND." reading the "SEND./REC." switch must be in the "SEND." position, the "H.P./L.P." switch must be in the "L.P." position and the "SEND." (C.W.-M.C.W.-SPEECH) switch in the "SPEECH" position.

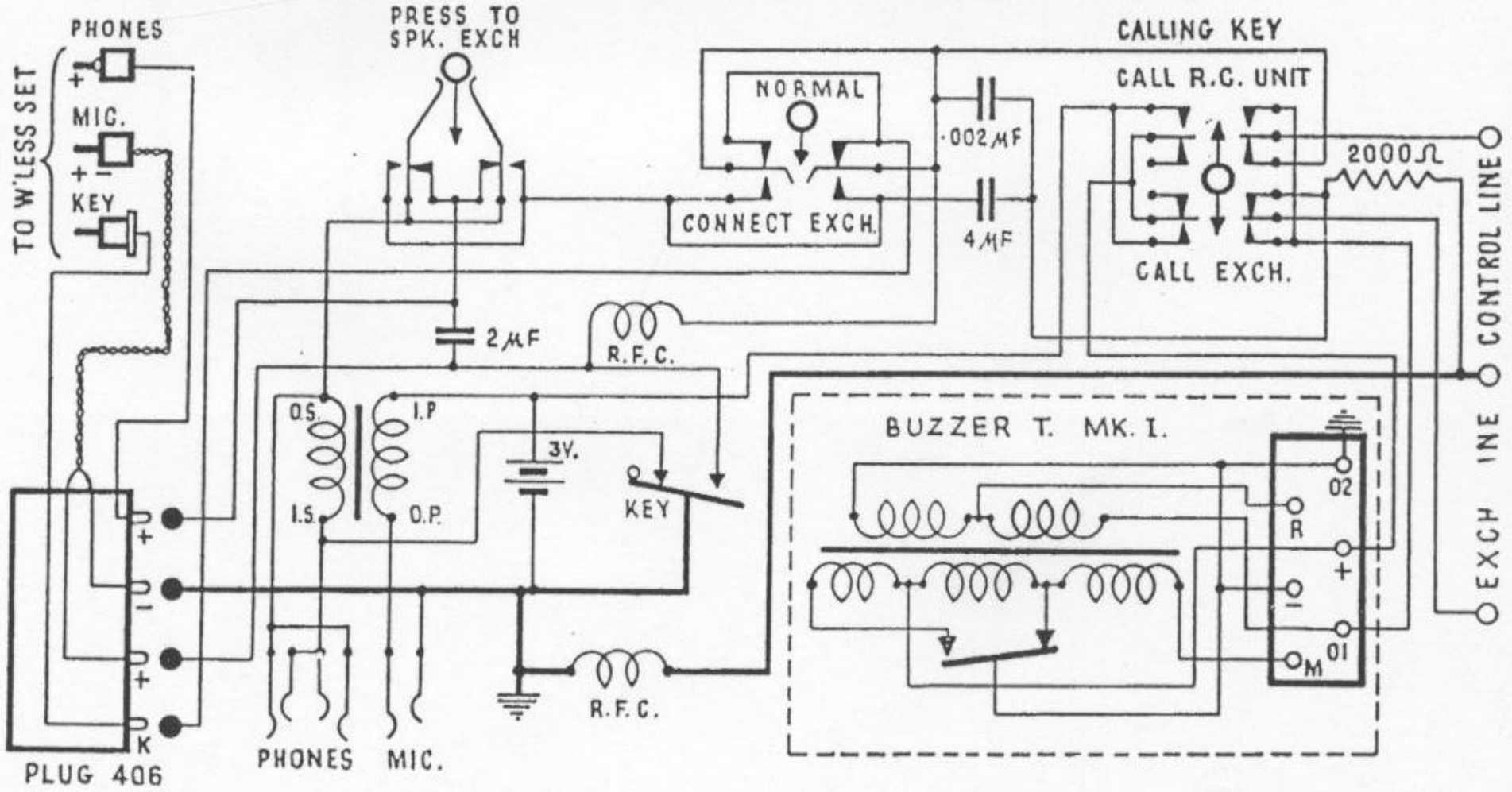


Fig. 18 Wireless Remote Control Unit " A " Schematic

SCHEMATIC DIAGRAMS

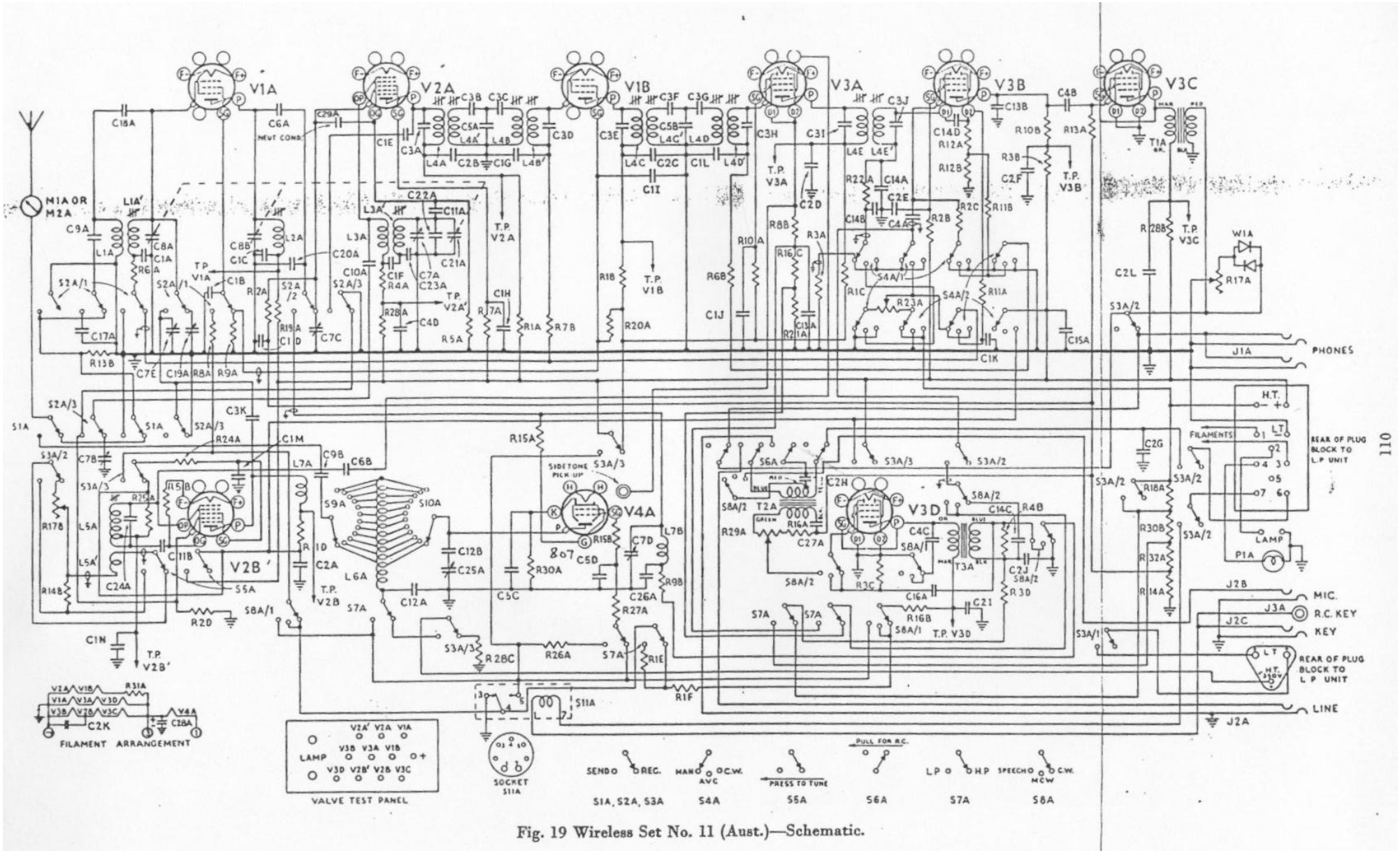


Fig. 19 Wireless Set No. 11 (Aust.)—Schematic.

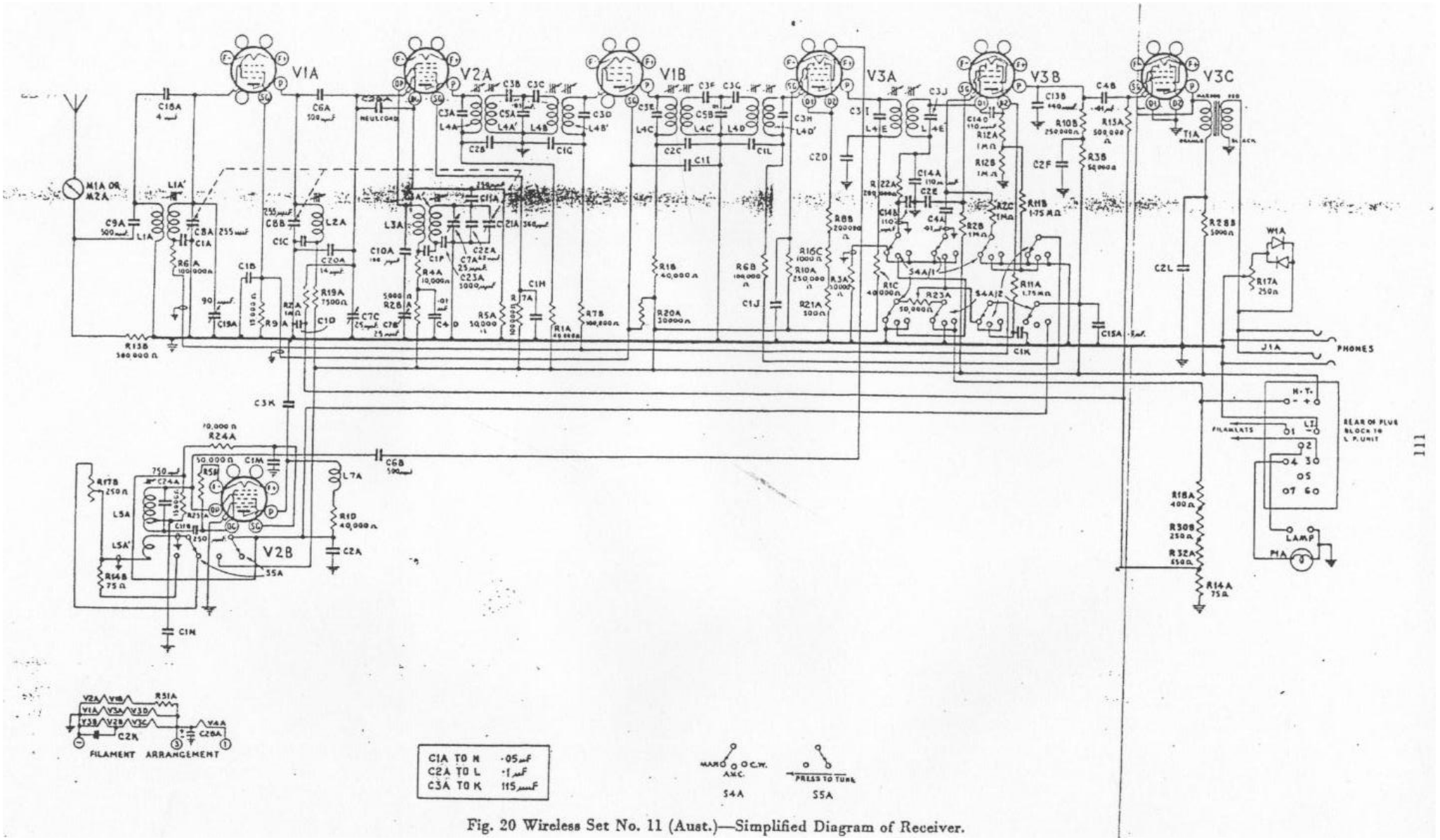


Fig. 20 Wireless Set No. 11 (Aust.)—Simplified Diagram of Receiver.

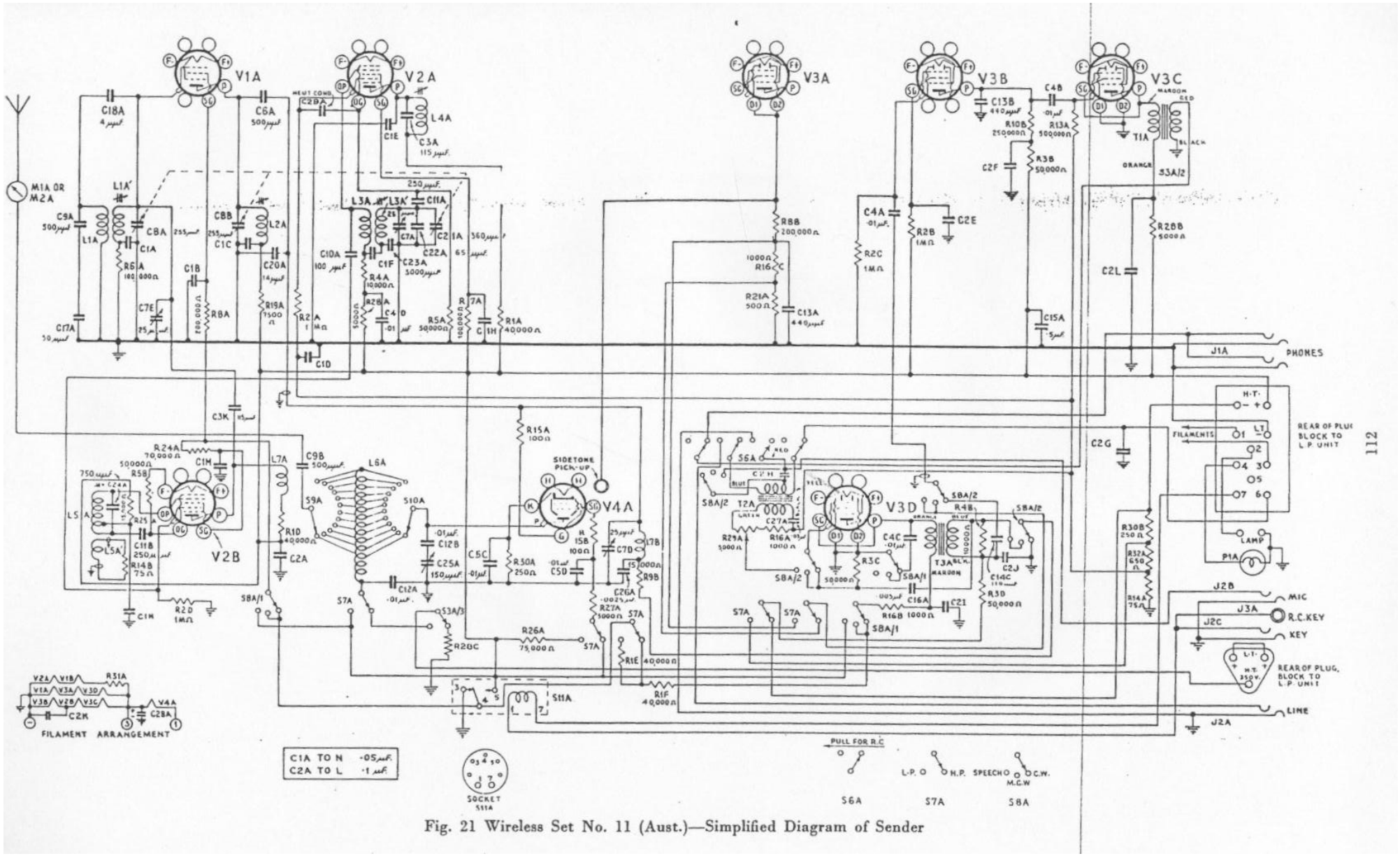


Fig. 21 Wireless Set No. 11 (Aust.)—Simplified Diagram of Sender

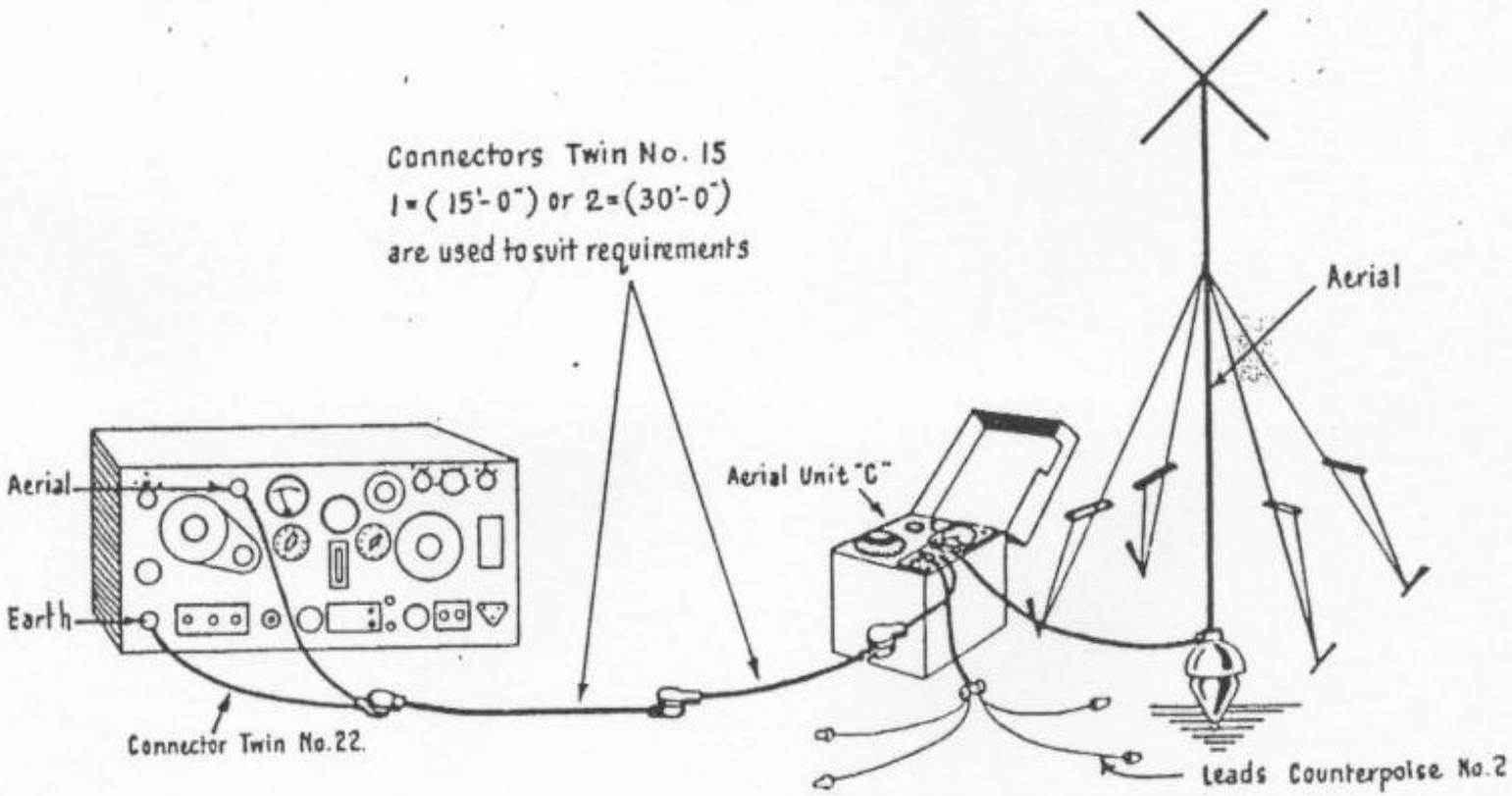


Fig. 22 Wireless Set No. 11 (Aust.)—Aerial Coupling Unit " C " Layout.

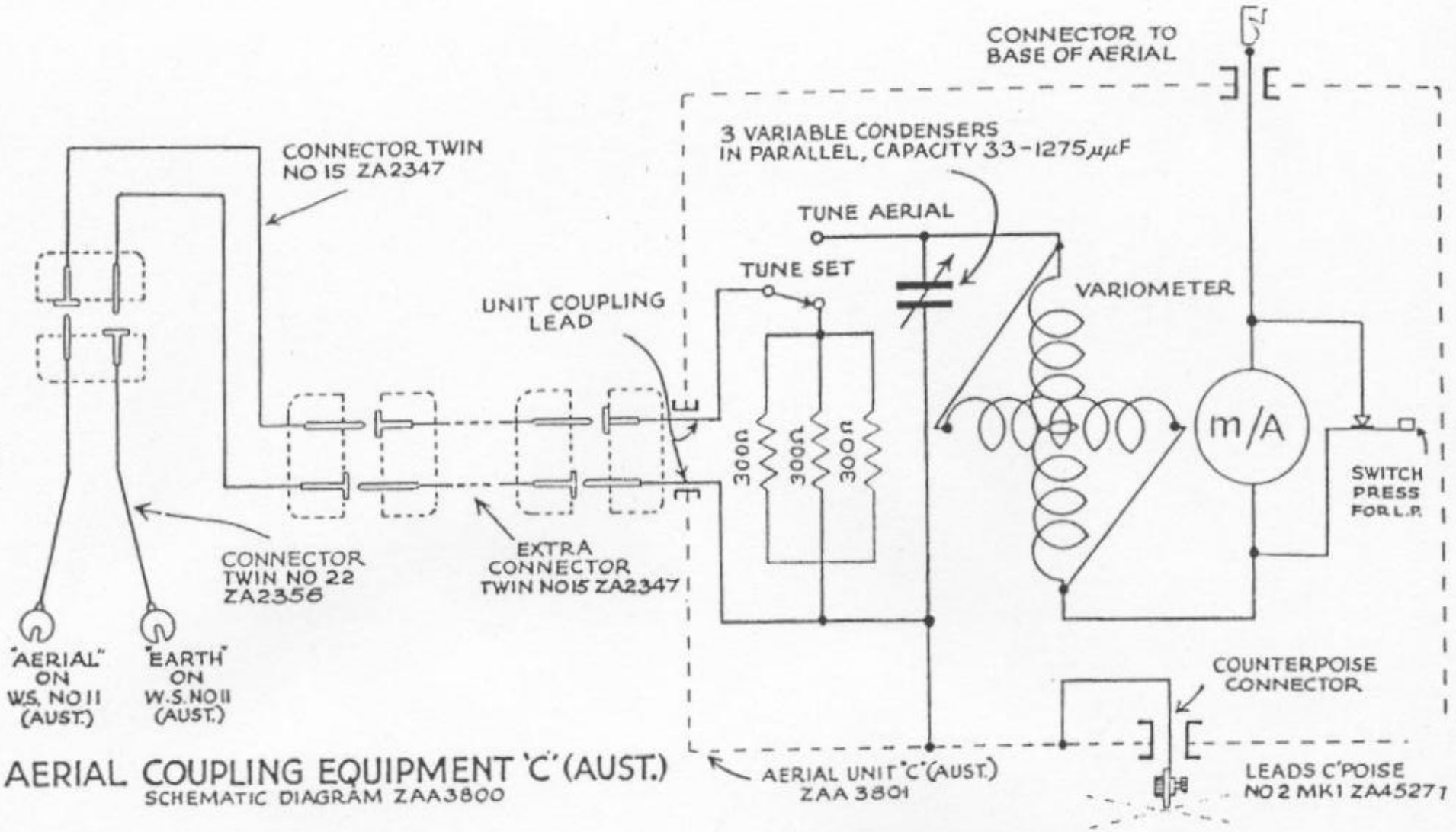


Fig. 23 Wireless Set No. 11 (Aust.)—Aerial Coupling Unit " C " Schematic

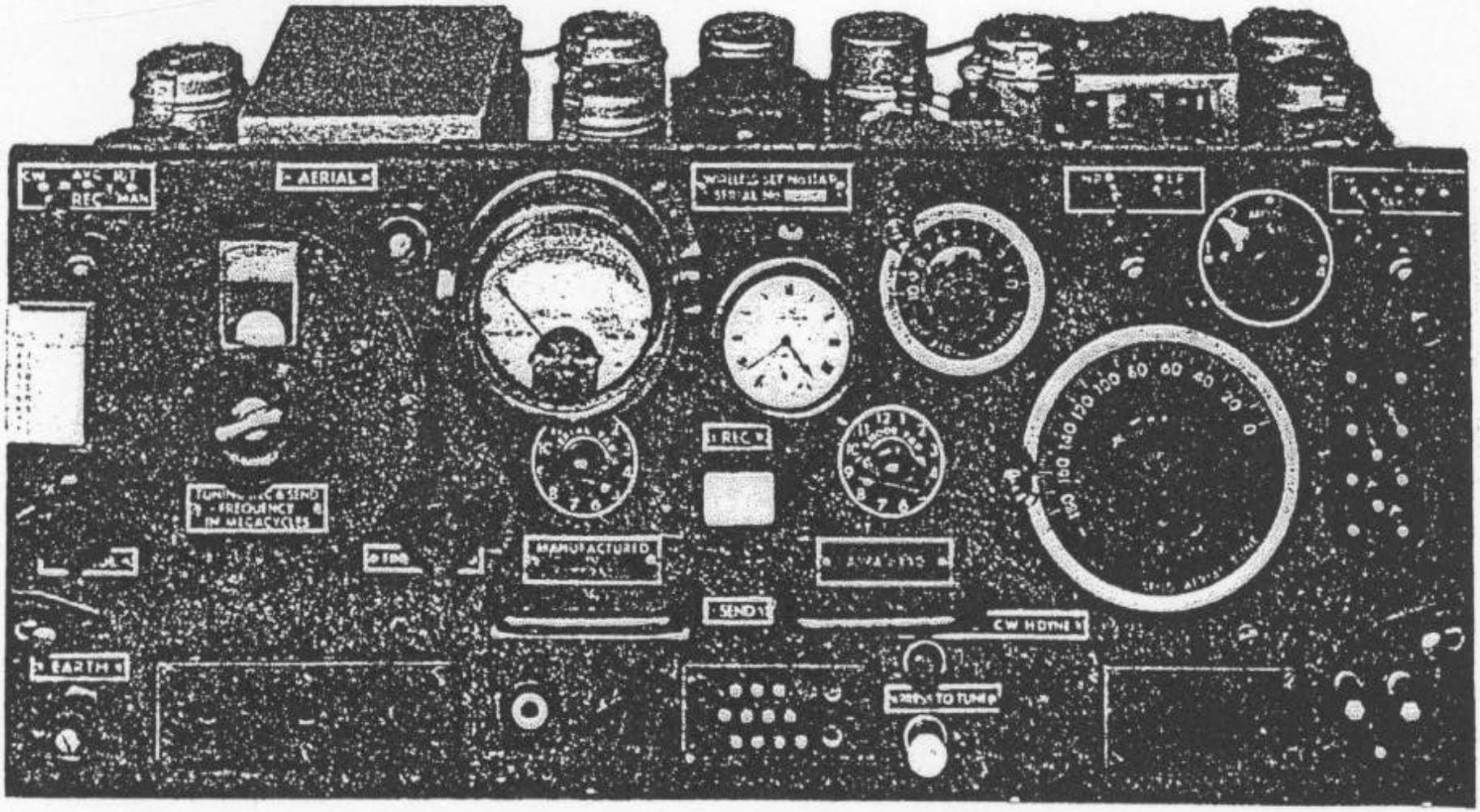


Plate I. Wireless Set No. 11 (Aust.)—Front View.

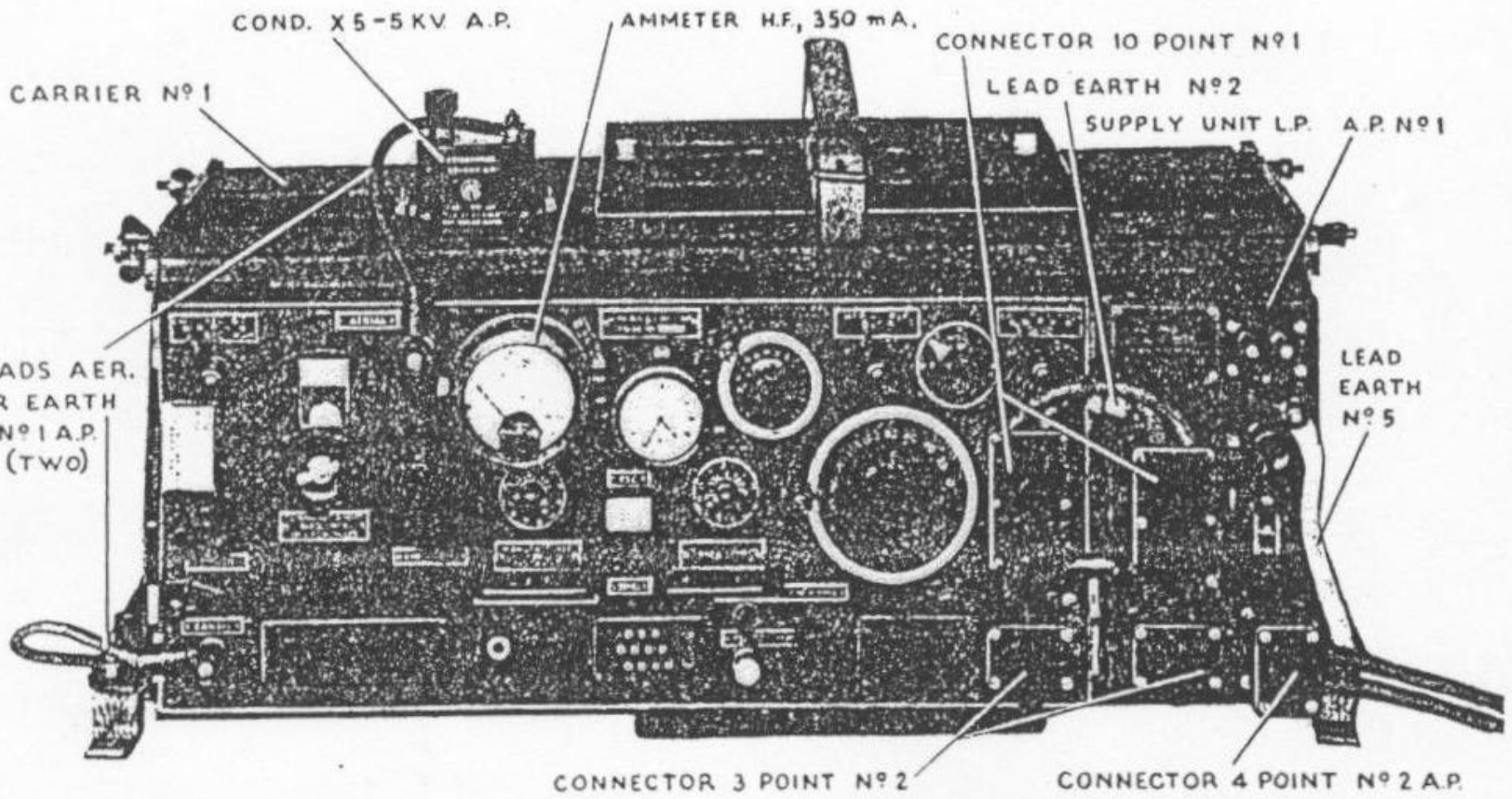


Plate II. Wireless Set No. 11 (Aust.)—With Supply Unit L.P. in Carrying Frame

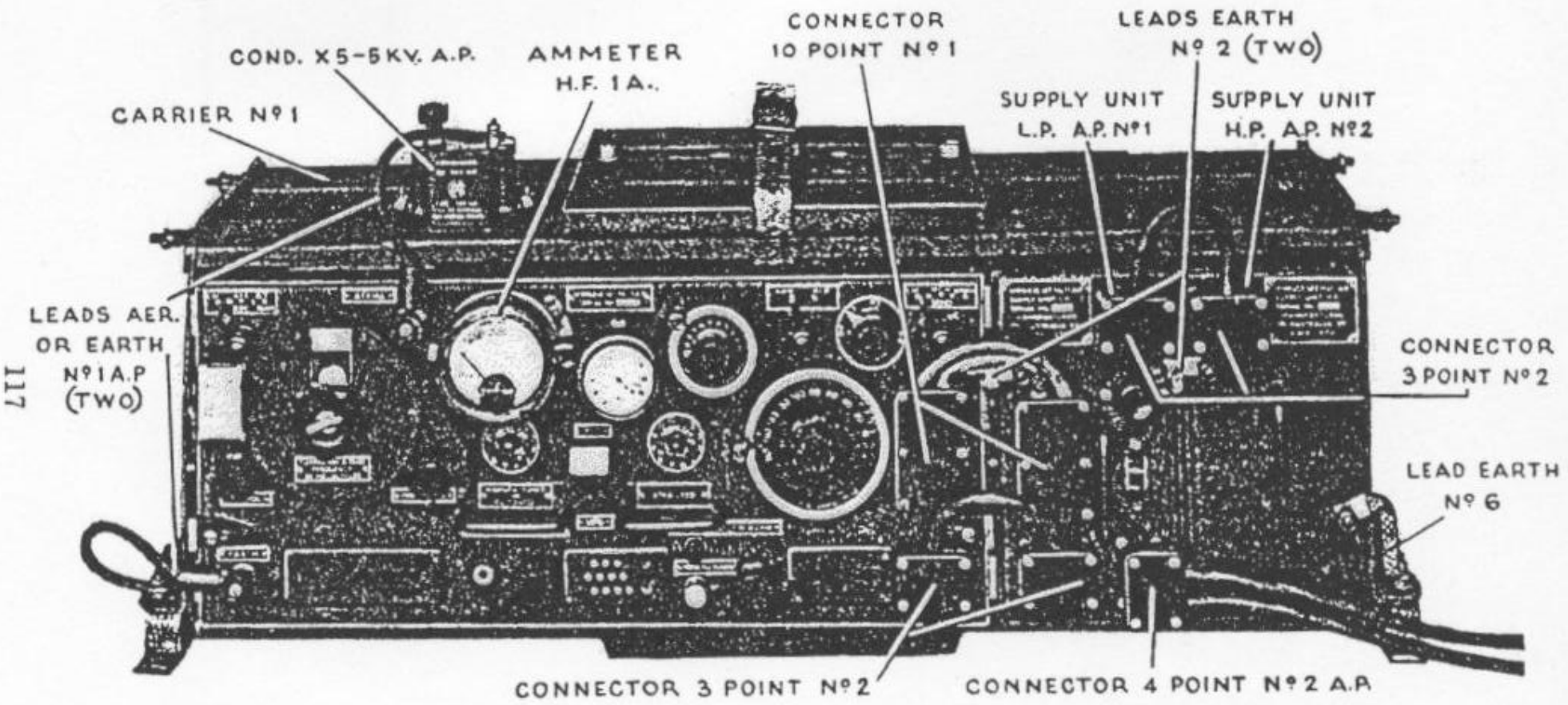


Plate III. Wireless Set No. 11 (Aust.)—With Supply Units L.P. and H.P. in Carrying Frame

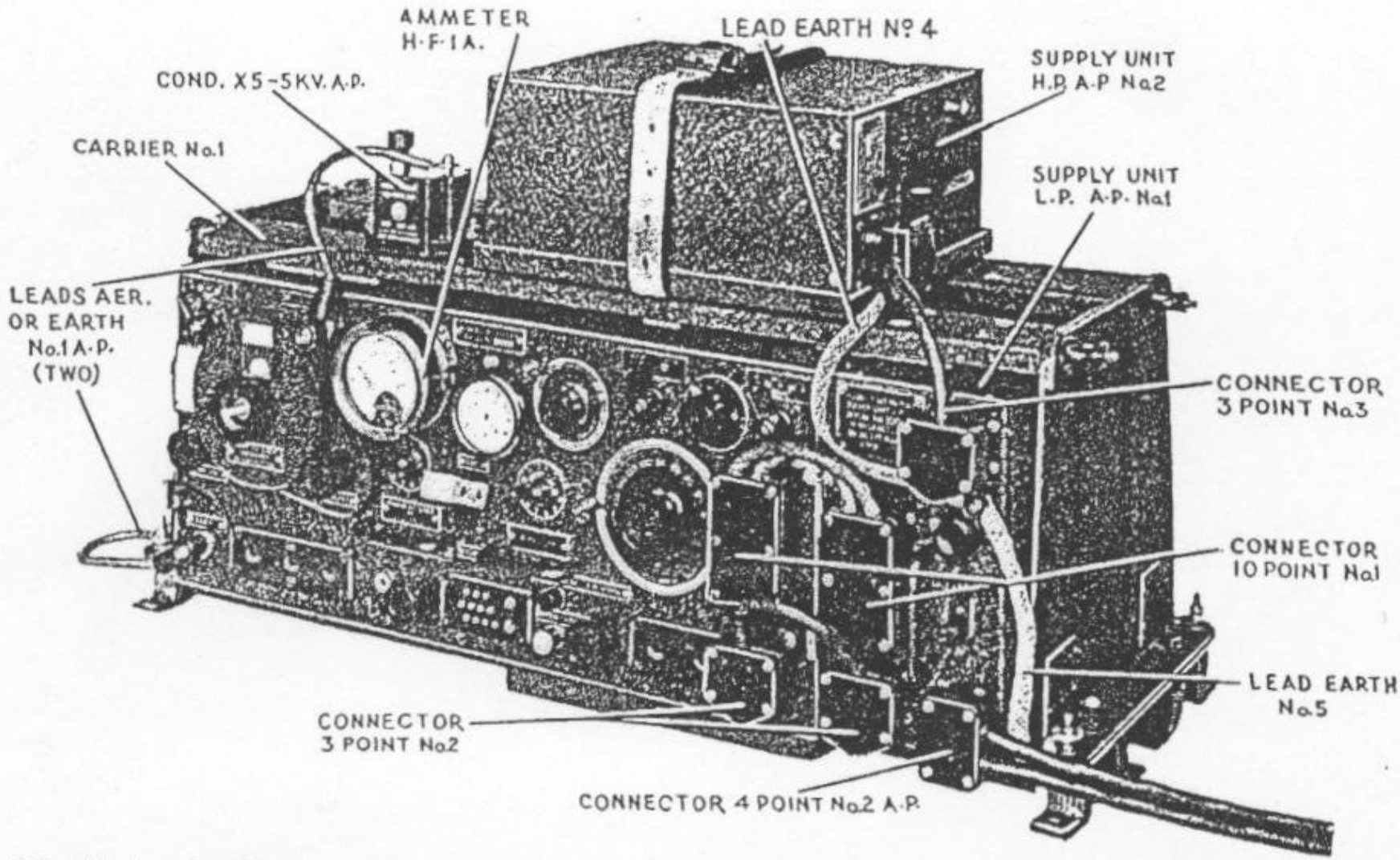


Plate IV. Wireless Set No. 11 (Aust.)—With Supply Unit L.P. in Carrying Frame and Supply Unit H.P. in Tray

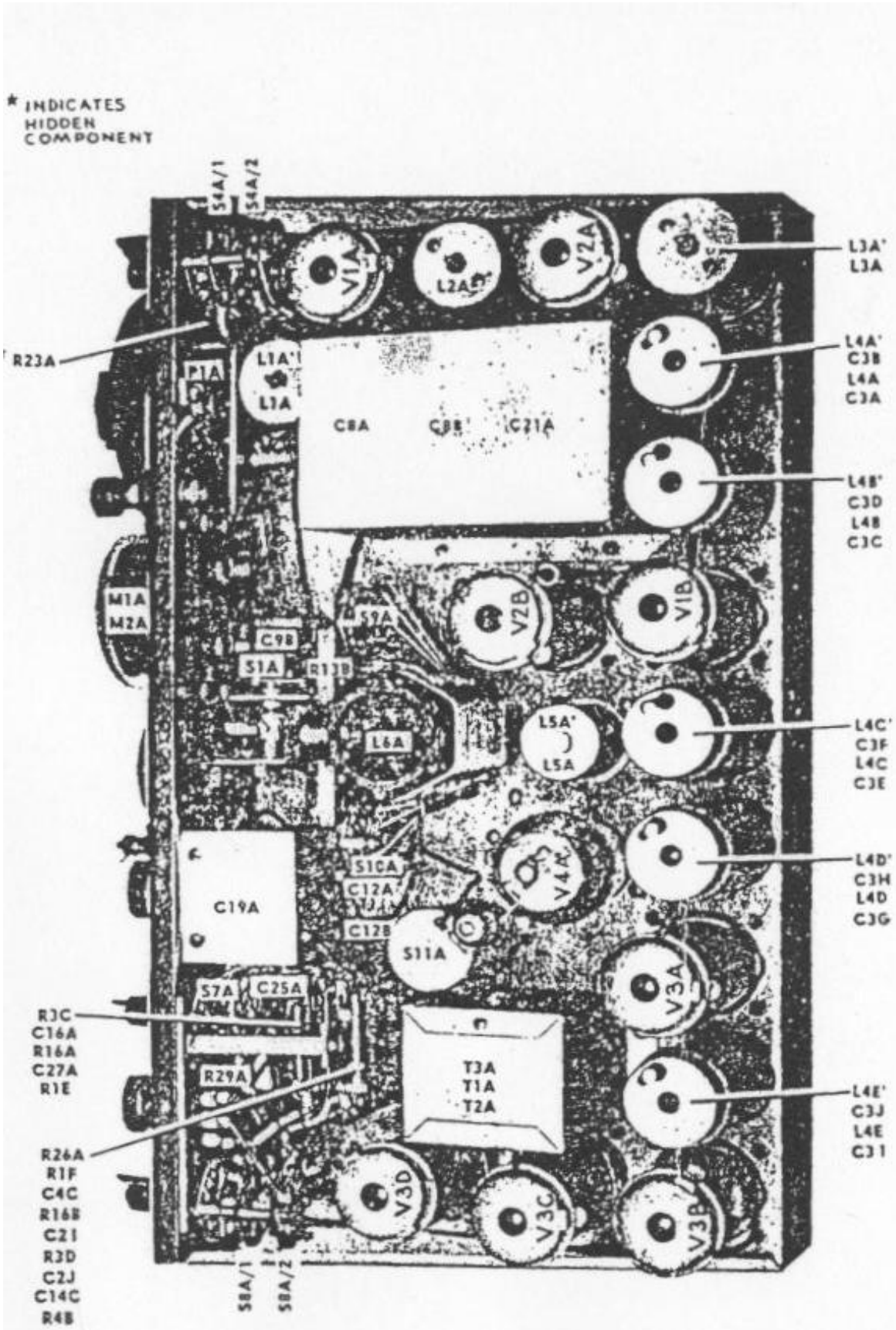


Plate V. Wireless Set No. 11 (Aust.) Chassis—Top View.

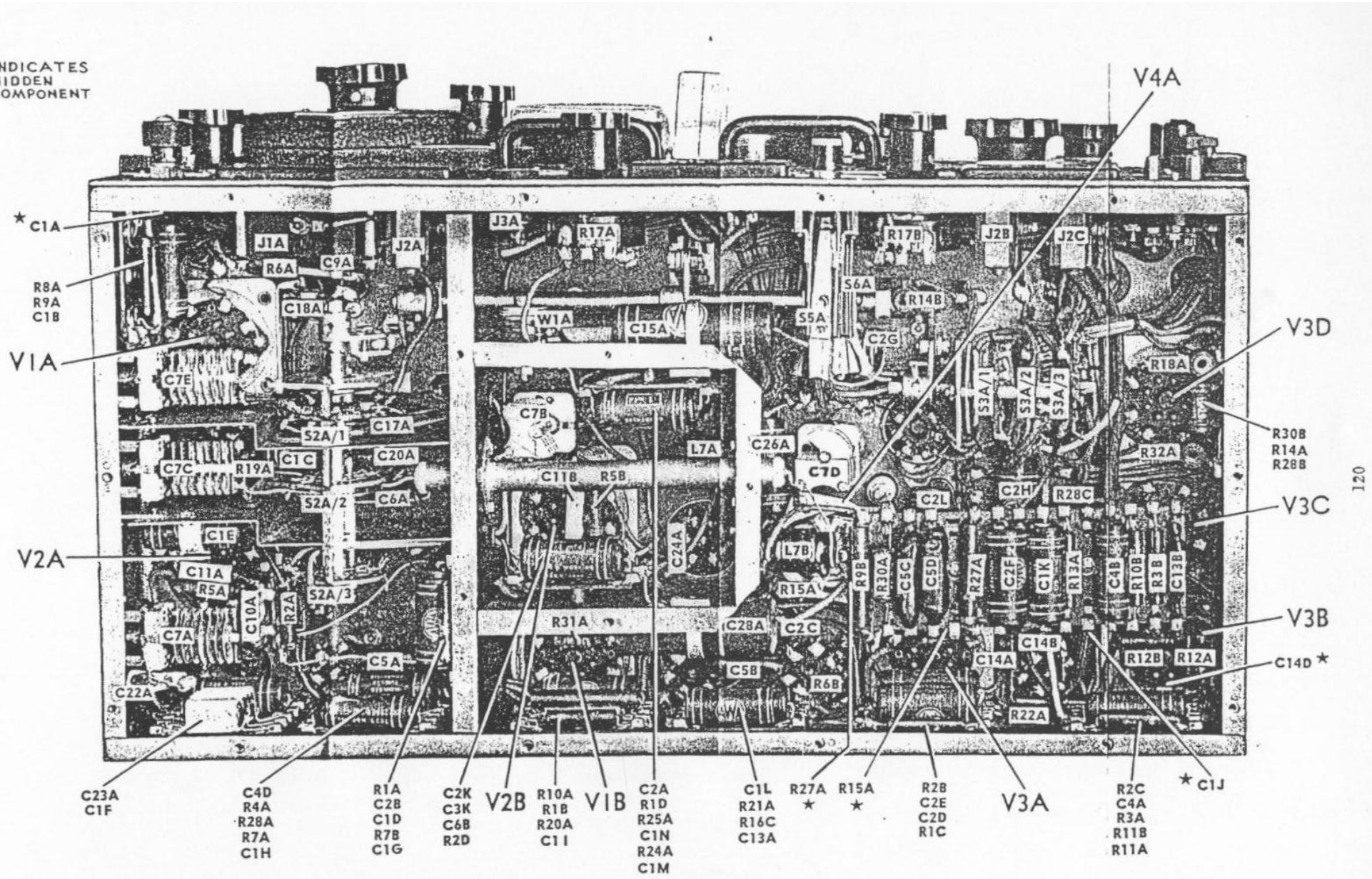


Plate VI. Wireless Set No. 11 (Aust.)—Chassis—Under View.

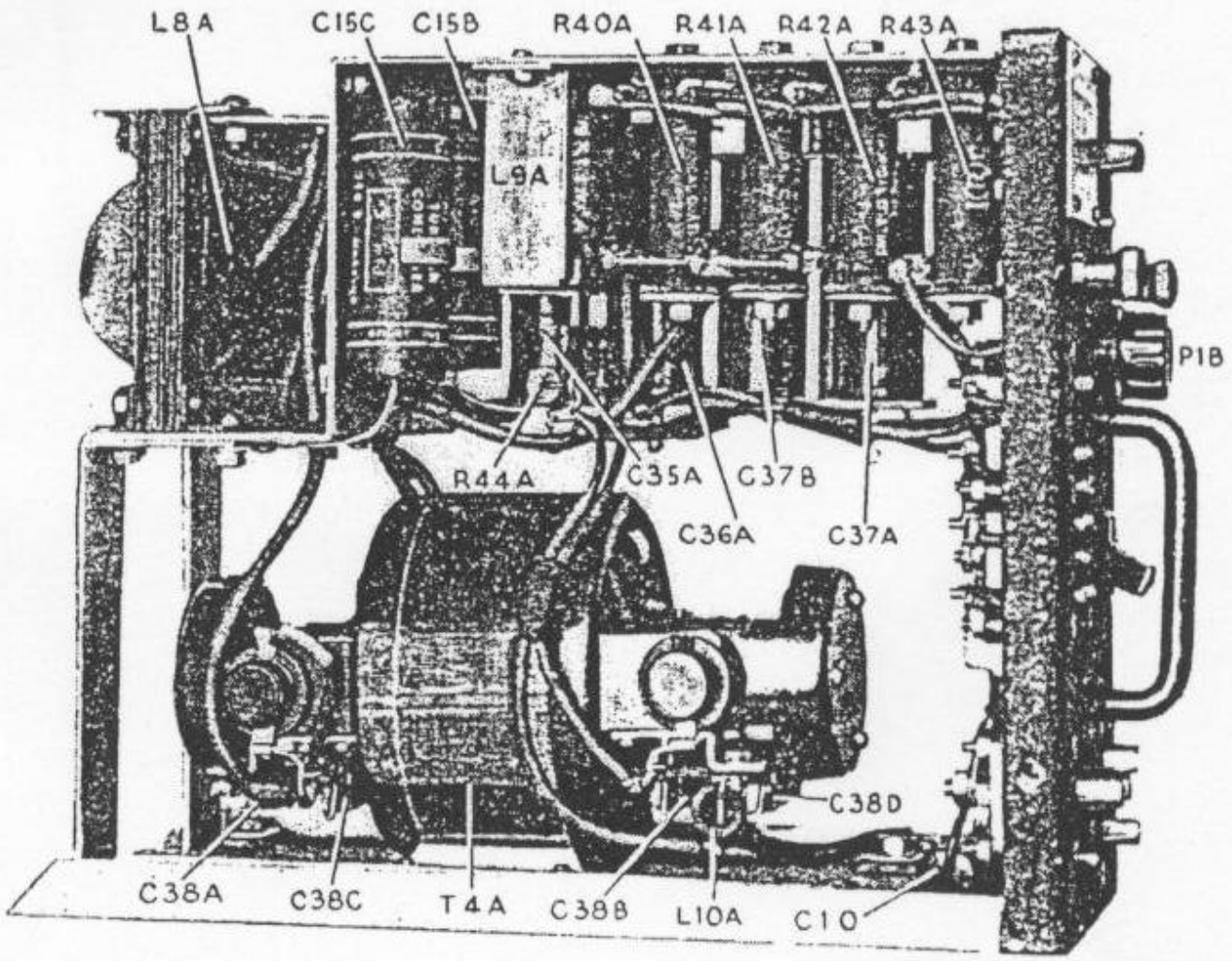


Plate VII. Wireless Set No. 11 (Aust.)—Supply Unit L.P.—Rear View.

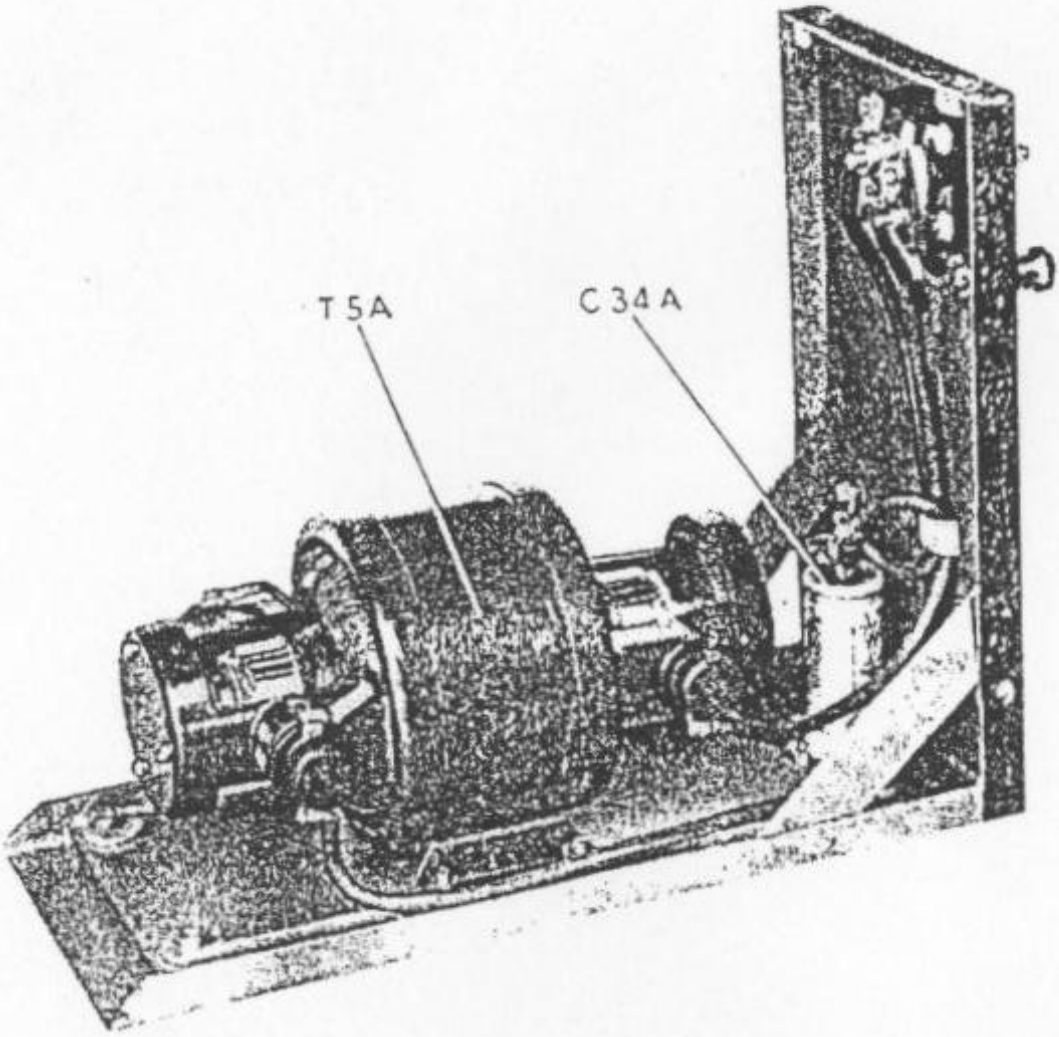


Plate VIII. Wireless Set No. 11 (Aust.)—Supply Unit H.P.—Rear View. Note.—L-10-B is located beneath H.T. Brush Assembly.

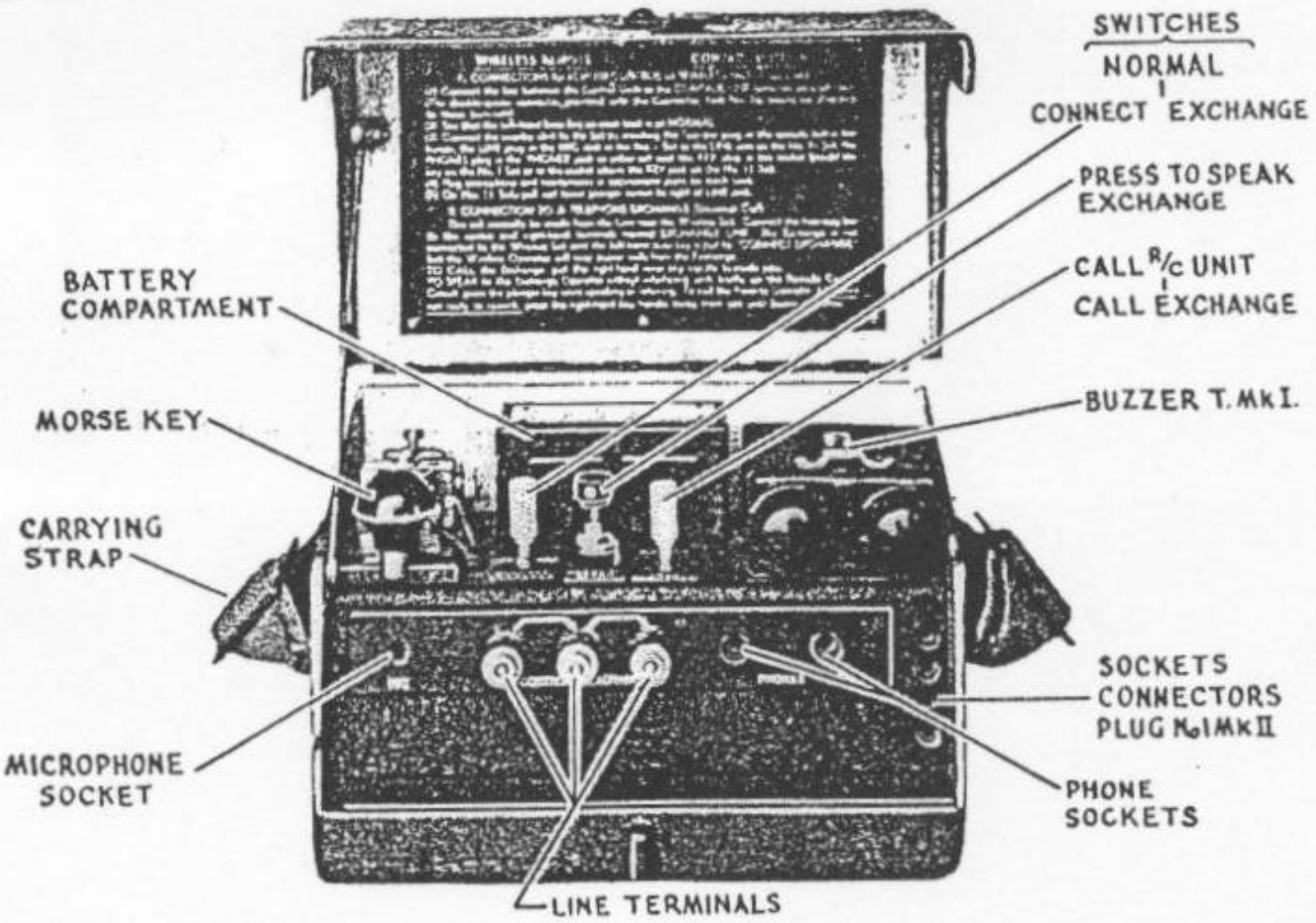


Plate IX. Wireless Remote Control Unit " A "—General View

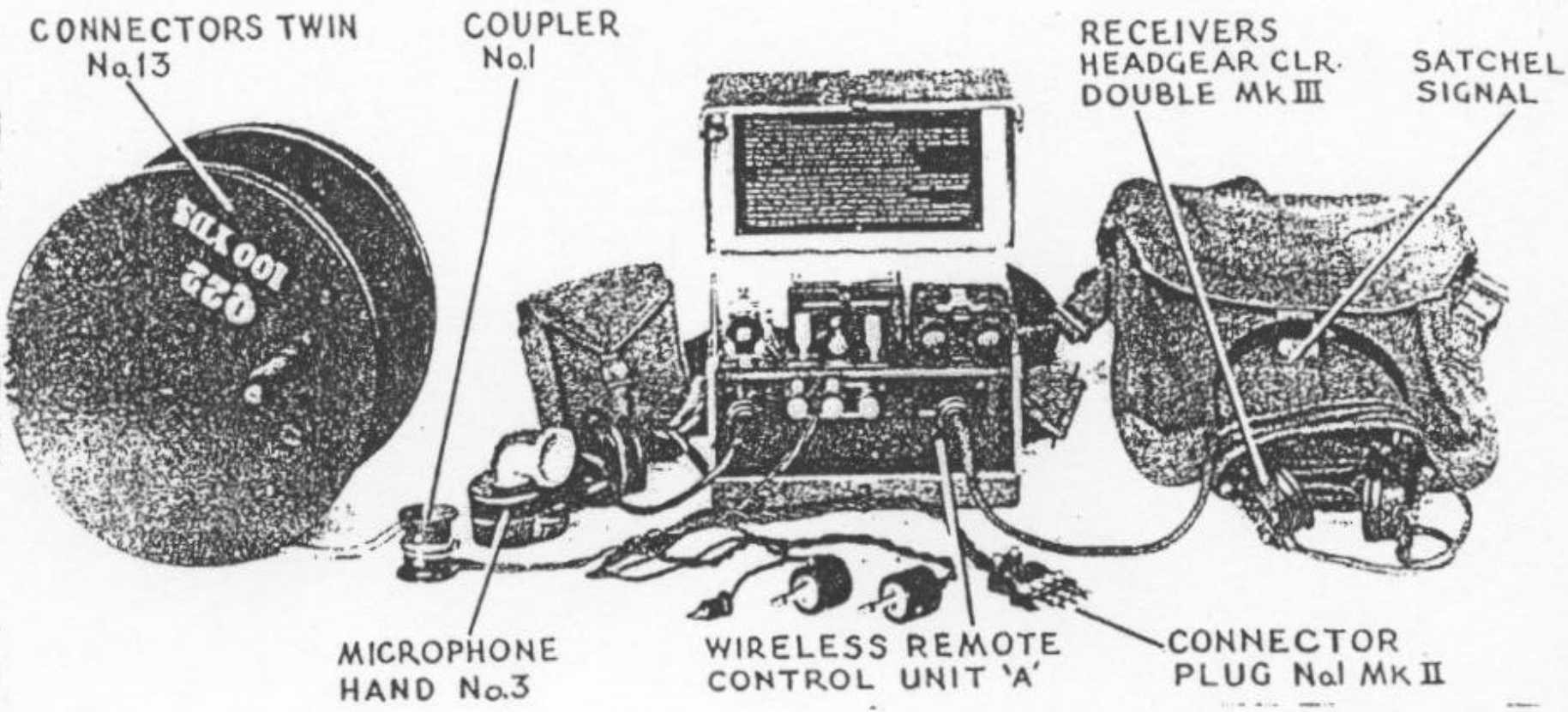


Plate X. Wireless Remote Control Equipment

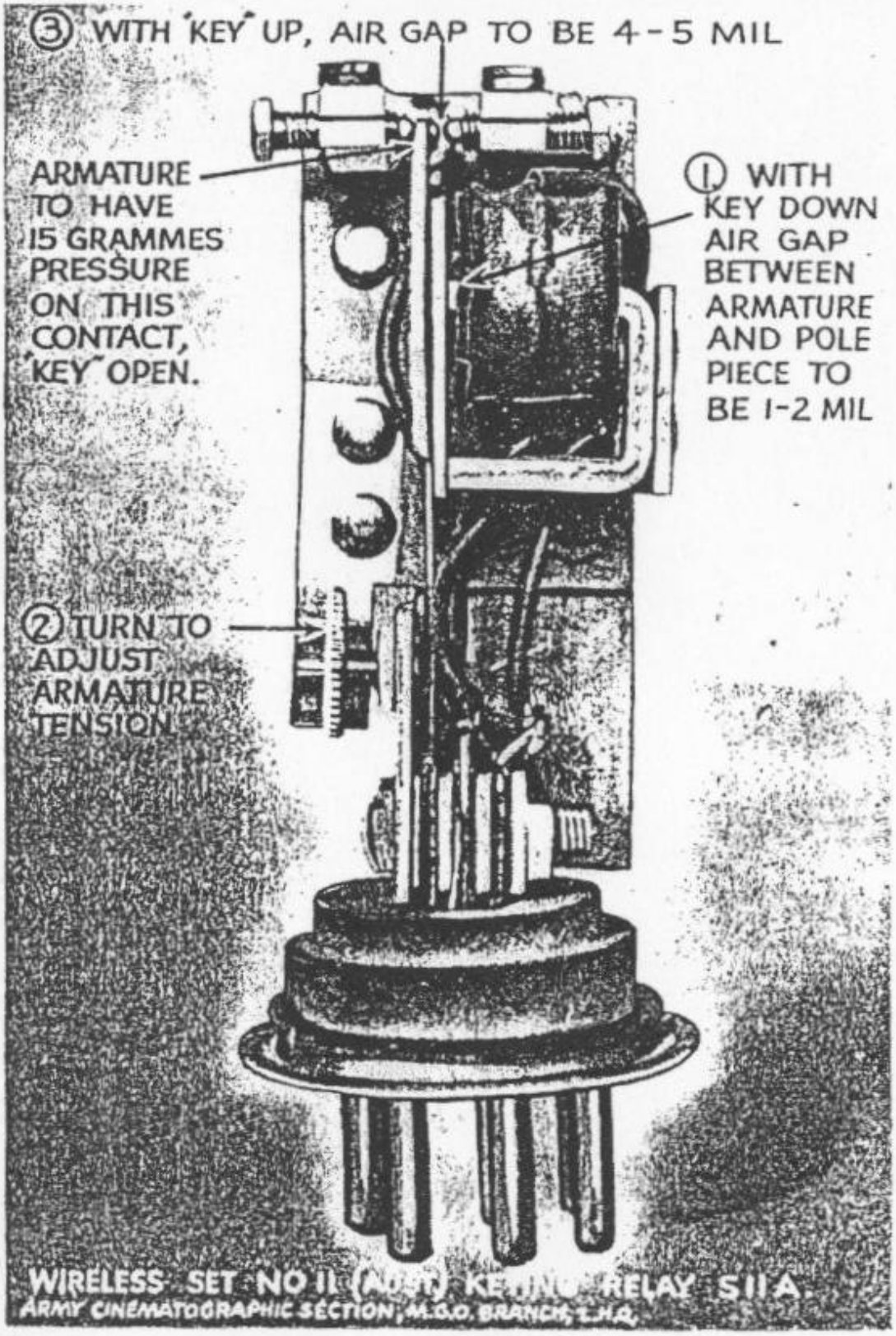


Plate XI. Wireless Set No. 11 (Aust.)—Keying Relay S-11-A showing adjustments to be made with key "Down"

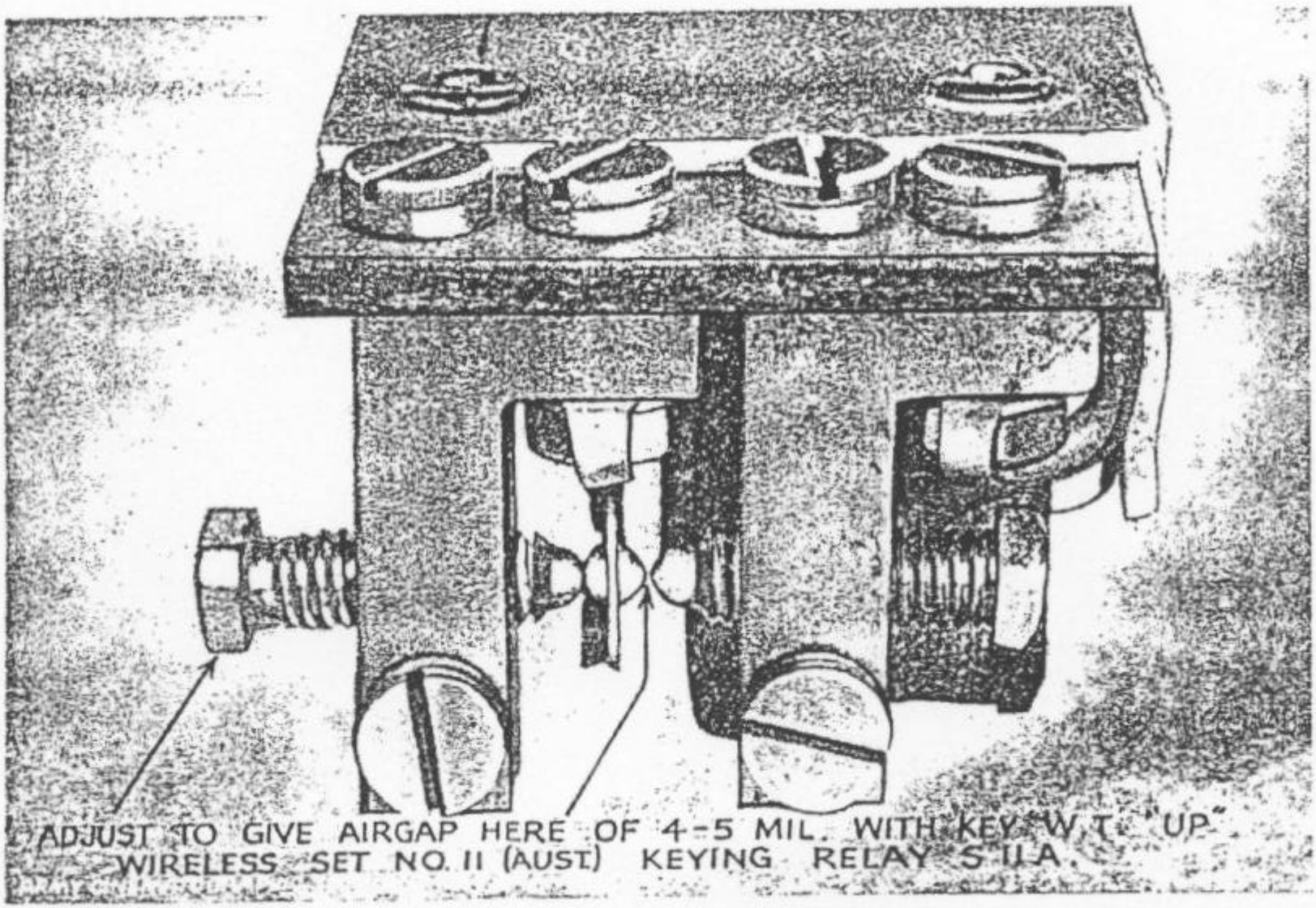


Plate XII. Wireless Set No. 11 (Aust.)—Keying Relay S-11-A showing key "Up" adjustment

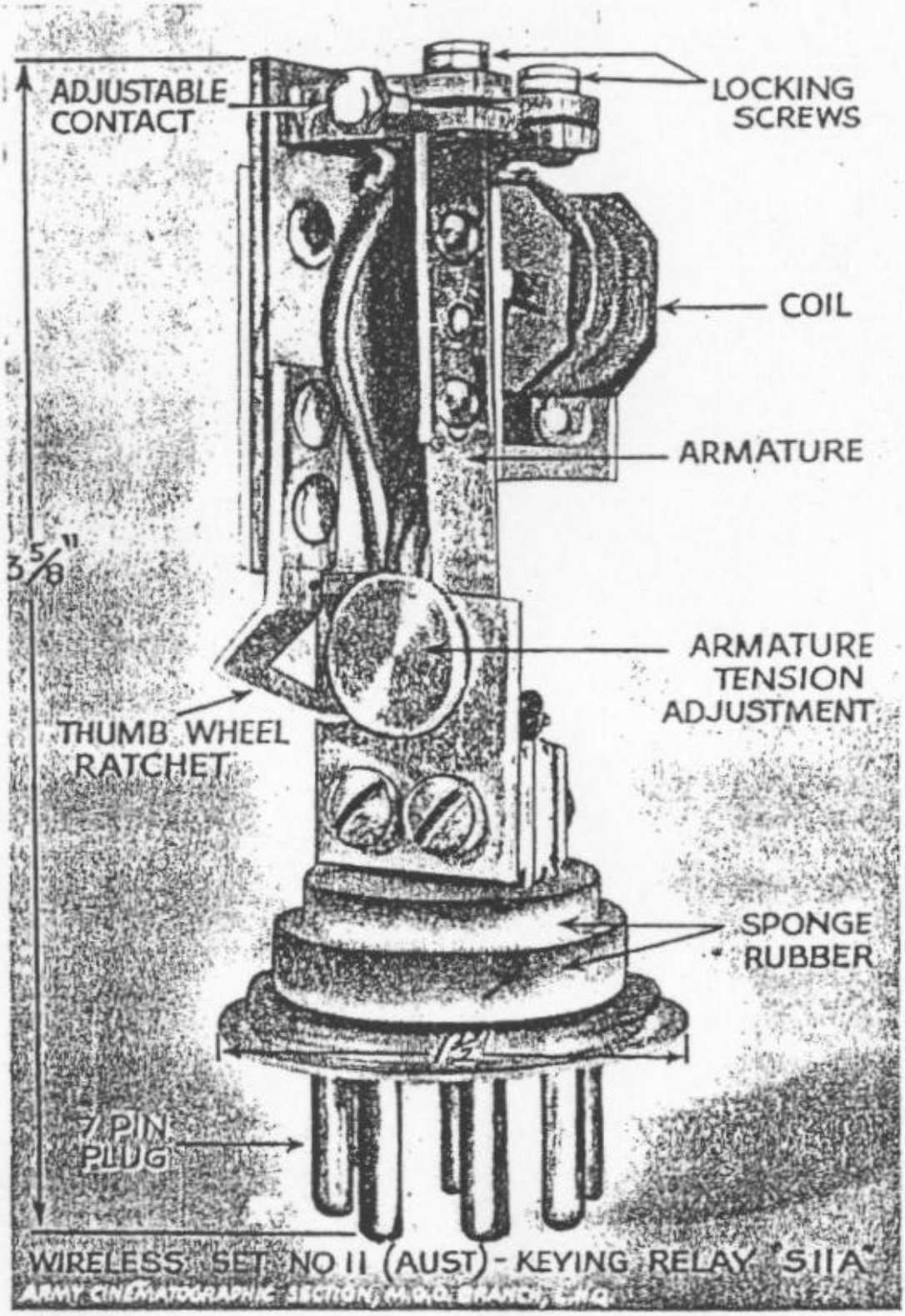
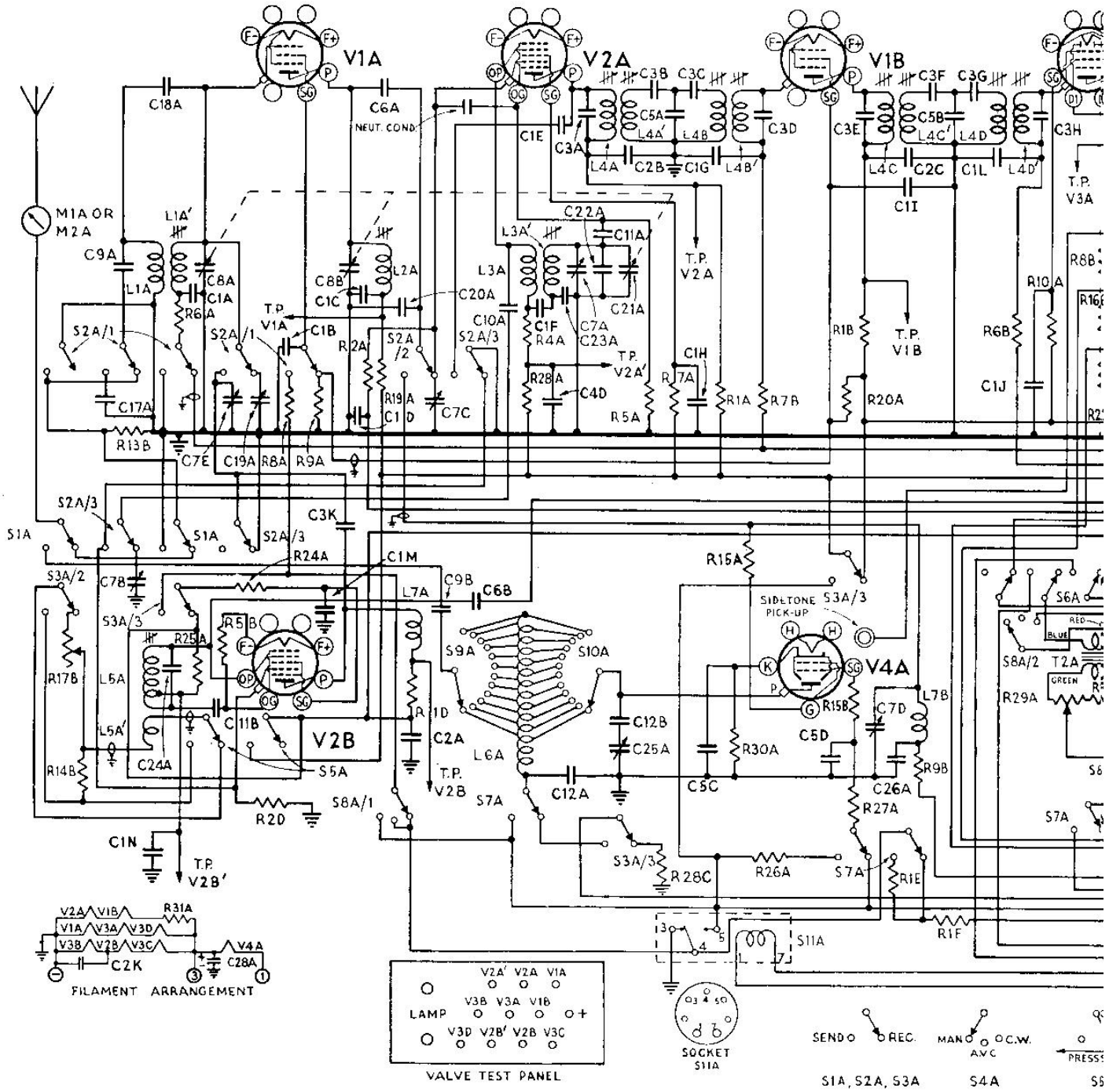
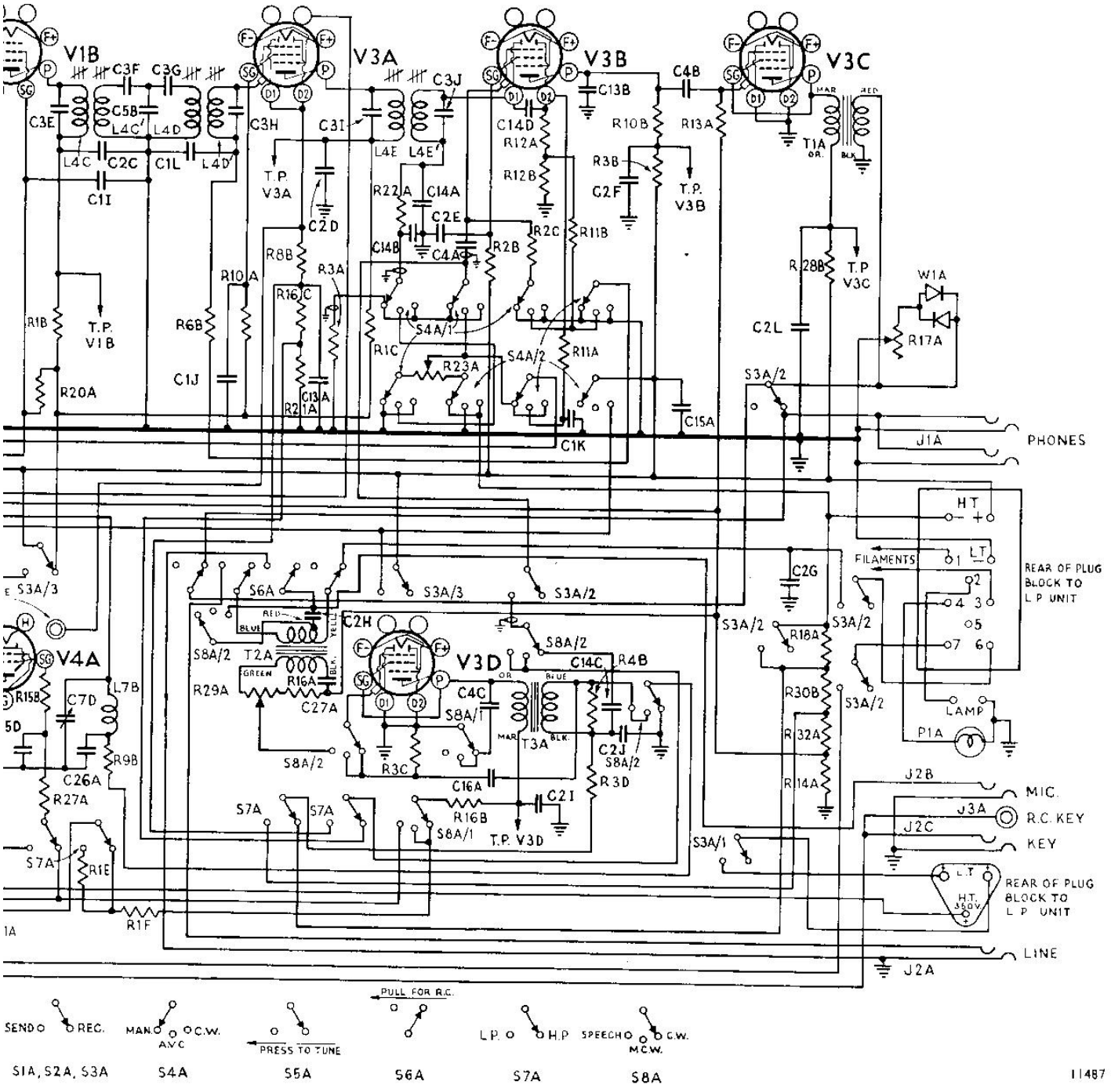


Plate XIII. Wireless Set No. 11 (Aust.)—Keying Relay. General View with case removed.

WIRELESS SET No. 11 (A



ELESS SET No. 11 (AUST.)



LIST OF MAIN COMPONENTS USED IN WIRELESS SET No. 11 (AUST.)

CONDENSERS.

C-1-A—N	.05 uF
C-2-A—L	.1 uF
C-3-A—K	115uuF
C-4-A—D	.01 uF
C-5-A—D	.01 uF
C-6-A—B	500 uuF
C-7-A—E	7-25 uuF
C-8-A—B	11-25 uuF
C-9-A—B	500 uuF
C-10-A	100 uuF
C-11-A—B	250 uuF
C-12-A—B	.01 uF
C-13-A—B	440 uuF
C-14-A—D	110 uuF
C-15-A	.5 uF
C-16-A	.005 uF
C-17-A	50 uuF
C-18-A	4 uuF
C-19-A	5-90 uuF
C-20-A	14 uuF
C-21-A	12-360 uuF
C-22-A	65 uuF
C-23-A	3000 uuF
C-24-A	75 uuF
C-25-A	5-150 uuF
C-26-A	.0025 uF
C-27-A	.03 uF
C-28-A	400 uuF

RESISTANCES.

R-1-A—F	40,000Ω
R-2-A—D	1 MΩ
R-3-A—D	50,000 Ω
R-4-A—B	10,000 Ω
R-5-A—B	50,000 Ω
R-6-A—B	100,000 Ω
R-7-A—B	100,000 Ω
R-8-A—B	200,000 Ω
R-9-A—B	15,000 Ω
R-10-A—B	250,000 Ω
R-11-A—B	1.75 MΩ
R-12-A—B	1 MΩ
R-13-A—B	500,000 Ω
R-14-A—B	75 Ω
R-15-A—B	100 Ω
R-16-A—C	1,000 Ω
R-17-A—B	250 Ω
R-18-A	400 Ω
R-19-A	7,500 Ω
R-20-A	30,000 Ω
R-21-A	500 Ω
R-22-A	200,000 Ω
R-23-A	50,000 Ω
R-24-A	70,000 Ω
R-25-A	15,000 Ω
R-26-A	75,000 Ω
R-27-A	5,000 Ω
R-28-A—C	5,000 Ω
R-29-A	5,000 Ω
R-30-A—B	250 Ω
R-31-A	16.6 Ω
R-32-A	650 Ω

INDUCTANCES.

L-1-A	Aer. Coupling
L-1-A'	Input Tuning
L-2-A	Anode Tuning
L-3-A	Osc. Anode Tuning
L-3-A'	Osc. Tuning
L-4-A—A'	1st I.F. Filter Input
L-4-B—B'	" " " Output
L-4-C—C'	2nd " " Input
L-4-D—D'	" " " Output
L-4-E—E'	3rd I.F. Trans.
L-5-A	Osc. Tuning
L-5-A'	Het. Contr. Coupling
L-6-A	Aer. Tuning (S)
L-7-A—B	Choke

SWITCHES.

S-1-A	Aerial
S-2-A/1	R.F. Input
S-2-A/2	" Output
S-2-A/3	Oscillator
S-3-A/1	H.P. Power
S-3-A/2	Bias & L.T.
S-3-A/3	H.T.
S-4-A	"REC." (R./T.-C.W.)
S-5-A	"PRESS TO TUNE"
S-6-A	"PULL FOR R.C."
S-7-A	"H.P./L.P."
S-8-A	"SEND" (C.W.-M.C.W.-SP.)
S-9-A	"AERIAL TAP"
S-10-A	"ANODE TAP"
S-11-A	Relay

JACKS.

J-1-A	Phone
J-2-A	Line
J-2-B	Microphone
J-2-C	Key
J-3-A	R.C. Key

LAMPS.

P-1-A	6 V., .25 A.

RECTIFIERS.

W-1-A	"CRASH LEVEL"

AMMETERS.

M-1-A	H.F. 1 A.
M-2-A	H.F. 350 mA.

TRANSFORMERS.

T-1-A	Receiver Output
T-2-A	Mod. Input
T-3-A	Mod. Output

11488

CONNECTING UP THE SET IN THE FIELD.

1. GROUND STATION L.P. OPERATION.

(a) ERECT AERIAL, OF 3 SECTIONS (9 FT.), WITH 4 HORIZONTAL SPOKES FITTED INTO THE TOP ADAPTOR. FIT MAST ON TO AERIAL BASE AND PUSH THE IRON MOUNTING SPIKE INTO THE GROUND. AERIAL HEIGHT MAY BE RAISED TO 12 OR 15 FT. WITH TOPS, OR TO 21 FT. WITHOUT TOPS. STAYPLATES SHOULD BE USED IN WINDY WEATHER.

(b) STAND LID OF SET ON GROUND, WITH LEGS OPENED OUT, AND STAND SET ON IT AS CLOSE TO AERIAL AS POSSIBLE.

(c) CONNECT L.P. SUPPLY UNIT TO SET WITH CONNECTORS 10 POINT, 3 POINT AND LEAD EARTH BRAID.

(d) CONNECT SET AERIAL TERMINAL TO TERMINAL AT BASE OF AERIAL.

(e) CONNECT COUNTERPOISE WIRES TO SET EARTH TERMINAL.

(f) PLUG MICROPHONE, KEY, AND HEADPHONES INTO APPROPRIATE JACKS.

(g) CONNECT THE BATTERIES, SECONDARY PORTABLE, 6V. 75 A.H. WITH CONNECTOR 4 POINT No. 2.

2. GROUND STATION H.P. OPERATION.

(a) PROCEED AS IN 1.

(b) CONNECT H.P. SUPPLY UNIT TO L.P. SUPPLY UNIT WITH A SECOND CONNECTOR 3 POINT AND LEAD EARTH BRAID.

3. VEHICLE STATION L.P. OPERATION.

(a) FIT AERIAL, CONSISTING OF 1-6 FT. SECTION, TO AERIAL BASE ON VEHICLE AND CONNECT AERIAL TO CONDENSER X5-5K.V. (AUST) MOUNTED ON SET CARRIER USING LEAD AERIAL 3 FT. No. 2. AERIAL MAY BE INCREASED TO 10 FT. FOR USE ON THE MOVE WHERE CIRCUMSTANCES PERMIT AND TO 21 FT. (STAYED) FOR STATIONARY USE.

(b) CONNECT OTHER TERMINAL OF CONDENSER TO SET AERIAL TERMINAL USING LEAD AERIAL OR EARTH No. 1.

(c) CONNECT SET EARTH TERMINAL TO CARRIER USING A SECOND LEAD AERIAL OR EARTH No. 1.

(d) CONNECT L.P. SUPPLY UNIT TO SET AS IN 1(c), AND PROCEED AS IN 1 (f) AND (g).

4. VEHICLE STATION H.P. OPERATION.

(a) PROCEED AS IN 3, AND 2 (b).

PRELIMINARY ADJUSTMENTS.

5. (a) SET "H.P./L.P." SWITCH TO APPROPRIATE POSITION FOR HIGH OR LOW POWER.

(b) PRESS IN KNOB MARKED "PULL FOR R.C."

(c) TURN "REC. VOL." KNOB FULLY CLOCKWISE (MAXIMUM).

(d) SET "CRASH LEVEL" KNOB FULLY CLOCKWISE. NOTE: FOR H.P. USE 0-1 AMP. AERIAL METER AND FOR L.P. USE 0-350 M.A. METER.

OPERATING INSTRUCTIONS.

6. TO RECEIVE R/T.

(a) SET THE "SEND/REC." SWITCH TO "REC." AND TURN SWITCH MARKED "REC." (R/T-C.W.) TO "MAN."

(b) SWITCH ON THE SET BY SETTING SWITCH ON L.P. SUPPLY UNIT—DOWN.

(c) ADJUST "REC. AERIAL TRIMMER" FOR MAX. RUSTLING NOISE AT HIGHEST FREQUENCY AND LOCK. THERE IS NO NEED TO RE-ADJUST THIS CONTROL UNLESS AERIAL IS ALTERED.

(d) ROTATE "TUNING REC. & SEND" CONTROL UNTIL DESIRED SIGNAL IS HEARD, THEN LOCK. REDUCE SIGNAL STRENGTH IF NECESSARY BY ROTATING "REC. VOL." CONTROL ANTI-CLOCKWISE. RE-ADJUST TUNING WITH "FINE ADJUST" CONTROL.

(e) PRESS BUTTON MARKED "PRESS TO TUNE" AND AT THE SAME TIME RE-TUNE "FINE ADJUST" CONTROL UNTIL ZERO BEAT IS OBTAINED.

(f) TO REDUCE INTERFERENCE, TURN "CRASH LEVEL" CONTROL ANTI-CLOCKWISE UNTIL INTERFERENCE IS TOLERABLE.

(g) SWITCH "REC." (R/T-C.W.) CONTROL TO "A.V.C."

7. TO RECEIVE M.C.W.

(a) SET THE "SEND/REC." SWITCH TO "REC." AND SET SWITCH MARKED "REC." (R/T-C.W.) TO "C.W." AND PROCEED AS IN 6 (b), (c), (d), (e) AND (f) AND FINALLY ADJUST PITCH OF NOTE WITH "C.W. H'DYNE" CONTROL.

(b) M.C.W. MAY ALSO BE RECEIVED WITH THE "REC." (R/T-C.W.) SWITCH SET AT "MAN." OR "A.V.C.," AND FOR SOME CONDITIONS OF OPERATION THIS MAY BE FOUND ADVANTAGEOUS.

8. TO RECEIVE C.W.

PROCEED AS IN 7 (a).

9. TO SEND C.W.

(a) SET "AERIAL TAP" AND "ANODE TAP" SWITCHES TO NUMBERS INDICATED ON TABLET FOR FREQUENCY WITH PARTICULAR AERIAL.

(b) SET "TUNING REC. & SEND" DIAL TO REQUIRED FREQUENCY.

(c) SET "SEND" (C.W.-M.C.W.-SPEECH) SWITCH TO "C.W." AND "H.P./L.P." SWITCH TO REQUIRED POSITION (SEE PRELIMINARY ADJUSTMENTS).

(d) SET "SEND/REC." SWITCH TO "SEND" AND SWITCH ON AS IN 6 (b). WHEN THE SET IS BEING OPERATED INITIALLY ON "SEND" THE 807 VALVE WILL TAKE SOME 30 SECONDS TO REACH OPERATING TEMPERATURE. IF THE SET HAS PREVIOUSLY BEEN OPERATING ON "RECEIVE" THE FOREGOING DOES NOT APPLY.

(e) PRESS KEY, ROTATE "SEND AERIAL TUNE" DIAL UNTIL MAX. CURRENT IS INDICATED ON AERIAL AMMETER. IN ORDER TO ASSIST KEYING UNDER NOISY CONDITIONS, AN AUDIO FREQUENCY SIDETONE SIGNAL WILL BE HEARD IN THE HEADPHONES EACH TIME KEY IS DEPRESSED. SIDETONE VOLUME MAY BE ADJUSTED BY MEANS OF THE "REC. VOL." CONTROL ONLY WHEN THE "REC." (R/T-C.W.) SWITCH IS SET AT "A.V.C.". VOLUME WILL BE AFFECTED BY THE "CRASH LEVEL" CONTROL IF IT IS SET IN ANY POSITION OTHER THAN MAX. CLOCKWISE.

(f) SET "AERIAL TAP" AND "ANODE TAP" SWITCHES ONE POSITION ABOVE AND BELOW THOSE INDICATED AND RE-TUNE "SEND AERIAL TUNE" DIAL FOR EACH SETTING. USE COMBINATION WHICH GIVES MAX. AERIAL CURRENT.

WARNING.—THE POWER UNITS DESIGNED FOR USE WITH THE WIRELESS SET No. 11 (AUST) ARE NOT SUITABLE FOR USE WITH THE ENGLISH No.

10. TO SEND M.C.W.

(a) PROCEED AS IN 9, THEN SET "SEND" (C.W.-M.C.W.-SPEECH) SWITCH TO "M.C.W." THE SENDER AERIAL AMMETER SHOULD INDICATE FROM ONE-HALF TO TWO-THIRDS THE CURRENT OBTAINED ON C.W.
SIDETONE WILL BE HEARD AS IN 9 (e).

11. TO SEND R/T

(a) PROCEED AS IN 9, THEN SET "SEND" (C.W.-M.C.W.-SPEECH) SWITCH TO "SPEECH." THE SENDER AERIAL AMMETER SHOULD INDICATE FROM ONE-HALF TO TWO-THIRDS THE CURRENT OBTAINED ON C.W. AND SHOULD RISE SLIGHTLY WITH MODULATION.

(b) SET "MOD." CONTROL AS IN TABLE BELOW. THESE SETTINGS ARE APPROXIMATE AND SOME VARIATION MAY BE EXPECTED WITH DIFFERENT MICROPHONES AND/OR LINES.

H.P./L.P. SWITCH	TYPE OF INPUT	POSITION OF MOD. CONTROL
L.P.	MIC. No. 3	1
H.P.	MIC. No. 3	2
L.P.	LINE	3
H.P.	LINE	4

(c) IF INSUFFICIENT INDICATION OF MODULATION IS OBTAINED ON AERIAL AMMETER, INCREASE "SEND AERIAL TUNE" DIAL READING TO GIVE SLIGHTLY LESS AERIAL CURRENT. UPWARD MODULATION SHOULD THEN BE OBTAINED.

(d) SPEECH SIDETONE WILL BE HEARD IN THE HEADPHONES. IF DISTORTION IS NOTICEABLE, REDUCE "MOD." CONTROL UNTIL SPEECH IS CLEAR AND DISTINCT.

12. PROCEDURE FOR NETTING.

(a) DIRECTING STATION WILL SET UP ITS SENDER TO PRESCRIBED FREQUENCY AND WILL THEN CALL OTHER STATIONS.

(b) OTHER STATIONS WILL TUNE IN DIRECTING STATION AS IN OPERATING INSTRUCTIONS 6 (d), (e) 8 (f), (g), 7 OR 8, AS APPROPRIATE.

(c) DIRECTING STATION WILL INSTRUCT EACH STATION TO REPLY IN TURN, AND WILL ADJUST VOLUME OF HIS RECEIVER. ON NO ACCOUNT MUST THE SETTING ON HIS "TUNING REC. & SEND" DIAL BE ALTERED.

(d) WHEN ANY OTHER STATION IS INSTRUCTED TO CALL DIRECTING STATION, HE WILL THROW HIS "SEND-REC." SWITCH TO "SEND" AND WITHOUT ALTERING HIS "TUNING REC. & SEND" DIAL WILL TUNE FOR MAX. AERIAL CURRENT, AS INDICATED IN OPERATING INSTRUCTIONS 9 (a), (e) AND (f), WITH "SEND" (C.W.-M.C.W.-SPEECH) SWITCH SET TO APPROPRIATE POSITION.

NOTE: DIRECTING STATION MUST NOT ATTEMPT TO TUNE HIS RECEIVER TO ANY OTHER STATION, OTHERWISE FREQUENCY OF WHOLE GROUP WILL BE ALTERED. OTHER STATIONS SHOULD RE-ADJUST THEIR RECEIVER TUNING WITH DIRECTING STATION ONLY AS OFTEN AS CONVENIENT. THE "PRESS TO TUNE" BUTTON MUST ALWAYS BE PRESSED WHEN RE-ADJUSTING THE "TUNING REC. & SEND".