Amalgamated Wireless (Australasia) Ltd

INSTRUCTION BOOK NO. 6-6800R

INSTRUCTIONS FOR INSTALLING, OPERATING & MAINTAINING

A.W.A. TELERADIO 3B INSTALLATION

TYPE 8J6800

47 York Street, Sydney

IMPORTANT

HOW TO ORDER REPLACEMENT PARTS.

The following systems of ordering spare or replacement parts should be adhered to in order to avoid unnecessary correspondence and expedite delivery:—

1. To order a MAJOR part which carries its OWN type number, quote this type number; quote ALSO serial number, resistance value or capacity value where shown.

   Examples:—Transformer ITK5510 (Serial No. 117).

   Resistance A.W.A. 1S4282 500 Ω

2. To order a small electrical part which carries NO type number, quote:—

   (i) Type number AND serial number of SECTION (not whole equipment) where part is used.

   (ii) Circuit reference number.

   (iii) Circuit drawing number and sub-number, the latter being found in the right-hand section of the LAST entry in the "changes" column.

   Example:—Type P8368, Serial No. 18, C50A Dwg. No. 8368C1, sub-number 2.

3. To order a part which carries NO type number and has NO circuit reference number, quote:—

   (i) Type number AND serial number of SECTION (not whole equipment) where part is used.

   (ii) Circuit reference number and circuit drawing number of component associated with the wanted part.

   (iii) Brief description of part.

   Example:—Type J8279, Serial No. 41. Insulated Coupling C23B, Dwg. No. 8279D1.

INSTRUCTION BOOK NO. 6-6800R

INSTRUCTIONS FOR INSTALLING, OPERATING & MAINTAINING

A.W.A. TELERADIO 3B INSTALLATION

TYPE 8J6800

Using Australian Valves.

INSTRUCTION BOOK NO. 6-6800R
A.W.A. TELERADIO 3B INSTALLATION
TYPE 8J6800

SCHEDULE OF INSTRUCTIONS AND DRAWINGS.

DRAWINGS.

NOTE: Refer respective instruction books appended for diagrams connected with Transmitter and Receiver.

SECTION A.

SCHEDULE OF EQUIPMENT.

Item 1. One A.W.A. Teleradio 3B Transmitter Type 8J6798

Item 2. Valves, Vibrator and Crystals required for the operation of Item 1 as follows:

4 Radiotrons Type 6V6G
1 Radiotron Type 807

1 A.W.A. Vibrator Type 1H7220

2 Crystals Type R583B (frequency as required)

Item 3. Cables required for the operation of Item 1 as follows:

1 Battery Cable	Dwg. No. 4021B1/10
1 Charging Cable	Dwg. No. 4021B1/22
1 Key Cable	Dwg. No. 4021B2/27
1 Battery Link Cable	Dwg. No. 4021B2/31

Item 4. Accessories for Item 1 as follows:

1 Hand Microphone	Type R1484
1 Transmitting Key	Type R688A
3-15A Auto Fuses	(Spares)
3-Pilot Lamps S3854-1	(Spares)

Item 5. One A.W.A. Superheterodyne Receiver Type C, 3C6770 complete with Vibrator Power Supply Unit Type H6499.

Item 6. Valves, Vibrator and Crystal required for the operation of Item 5:

1 Radiotron Type 5U7G
2 Radiotrons Type 6J8G
1 Radiotron Type 6G8G
1 Radiotron Type 6V6G

1 Oak Vibrator Type V5809

1 A.W.A. Crystal Type R5587 (3C6770) frequency as required.

Item 7. Cables required for the operation of Item 5 as follows:

One 12 volt 3 core Battery Cable

OR

One 6 volt 2 core Battery Cable.

Item 8. Accessories for Item 5 as follows:

One pair Ericsson Headphones.
One 3A Australux Fuse (spare)

Item 9. One A.W.A. Loudspeaker Unit Type D6799

Item 10. One Loudspeaker Cable (Drawing No. 6799A1/31)

Item 11. Two 6 volt 120 A.H. Accumulators.

Item 12. One 12 volt Engine Charger.

Item 13. 200 feet 7/20 Aerial Wire.

Item 14. Six Bull-nose Insulators.

Item 15. One lead-in Insulator.

Item 16. Instruction Book No. 6-6800R.

NOTE: This list is a guide to the items which comprise a normal equipment, but may be varied to suit the requirements of each installation.

INSTRUCTION BOOK NO. 6-6800R
A.W.A. TELERADIO 3B INSTALLATION
TYPE 8J6800

SECTION B.

GENERAL DESCRIPTION.

The A.W.A. Teleradio 3B Transmitter and Receiver Installation Type 8J6800 consists of a low power dual wave transmitter unit capable of giving reliable communication over short distances on both C.W. and Telegraphy, a super-heterodyne receiver, loudspeaker unit and associated cables.

A detailed description of these units is given in the respective Instruction Books appended.

SECTION C.

INSTALLATION.

1. GENERAL.

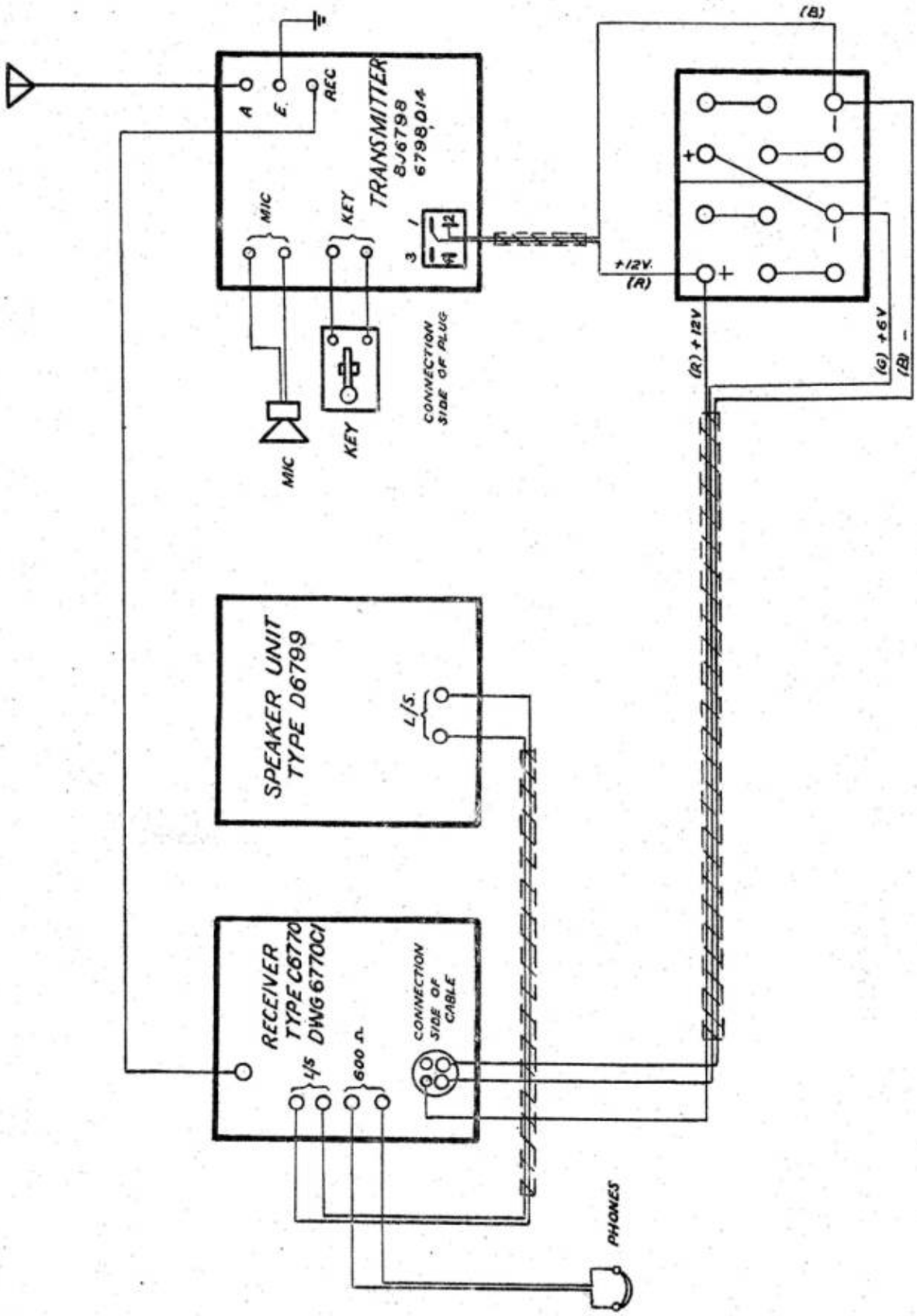
Full installing and operating details are given in the respective unit Instruction Books appended; it is, therefore, considered unnecessary to give further details in this section.

2. LOUDSPEAKER UNIT.

The Loudspeaker Unit Type D6799 consists of a 7.1/2" permanent magnet loudspeaker mounted in a standard case of identical dimensions and finish to the transmitter and receiver cases.

The loudspeaker is fitted with two terminals mounted on the left-hand side of the case and these are connected directly to the 1.3/4 Ω voice coil. The speaker is of the dust-proof type and the rear of the cone is also protected by means of metal gauze, thus enabling the case to be used for the storage of accessories, spare valves, etc. either on location or in transport.

Detachable hooks are mounted at the ends of the case to carry the microphone and headphones. For convenience in transport, these may be carried inside the case and this is accomplished by removing the clamping nut on the hook and mounting it inside the case.



AMALGAMATED WIRELESS
(AUSTRALASIA) LTD. SYDNEY

INTERWIRING DIAGRAM
TELERADIO 3B

REF.		1ST SHEET REF.
ARGT.		
DRN.		TYPE 8J6800
TRCD.	B. Pettigrew 15-4-41	
CKD		DWG. 6800D6
APP.		

INSTRUCTION BOOK NO. 6-6798R

INSTRUCTIONS FOR INSTALLING, OPERATING & MAINTAINING

A.W.A. TELERADIO 3B TRANSMITTER

TYPE 8J6798

Amalgamated Wireless (A'sia.) Limited,
47 York Street,
SYDNEY.

SCHEDULE OF INSTRUCTIONS AND DRAWINGS. Page Nos.

DRAWINGS. Drawing Nos.

INSTRUCTION BOOK NO. 6-6798R
A.W.A. TELERADIO 3B TRANSMITTER
TYPE 8J6798

SECTION A.

SCHEDULE OF EQUIPMENT.

Item 1. One A.W.A. Teleradio 3B Transmitter Type 8J6798.

Item 2. Valves, Vibrator and Crystal required for the operation of Item 1 as follows:

4 Radiotrons Type 6V6G
1 Radiotron Type 807

1 A.W.A. Vibrator Type 1H7220

2 Crystals Type R583B (frequency as required)

Item 3. Cables required for the operation of Item 1 as follows:

1 Battery Cable	Drawing No. 4021B1/10
1 Charging Cable	Drawing No. 4021B1/22
1 Key Cable	Drawing No. 4021B2/27
1 Battery Link Cable	Drawing No. 4021B2/31

Item 4. Accessories for Item 1 as follows:

1 Hand Microphone Type R1484
1 Transmitting Key Type R688A
3 - 15A Auto Fuses (Spares)
3 Pilot Lamps S3854-1 (Spares)

Item 5. Two 6 volt 120 A.H. Accumulators.

Item 6. One 12 volt Engine Charger

Item 7. 200 feet 7/20 Aerial Wire.

Item 8. Six Bull-nose Insulators.

Item 9. One Lead-in Insulator.

Item 10. Instruction Book No. 6-6798R

SECTION B.

DESCRIPTION.

1. GENERAL.

The A.W.A. Type 8J6798 Transmitter comprises a low power unit capable of giving reliable communication over short distances on both telephony and C.W. Telegraphy.

2. THE CASE.

The Transmitter and Power Supply Units are built on a common chassis and mounted in a metal case and finished in grey wrinkled enamel. The dimensions and weights are as follows:

(a) Dimensions.

Length (including cover clips)	16.3/4"
Height (including feet)	10.1/2"
Depth (including cover and clips at rear)	11.3/4"

(b) Weight.

Less valves and vibrator 43 lbs.

The case is provided with a removable top and bottom which completely encloses and protects the apparatus against insects, etc., and a front cover to protect the controls whilst being transported. Connection to the battery is made via a multipin plug and socket at the rear left-hand side and three holes in the right side of the case take the transmitting aerial, the lead to the receiving aerial terminal and the earth. Thus, the apparatus may be left permanently set up and the front cover on when the installation is not being used. When the unit is being transported, the slot in the back of the case can be covered by a plate provided for the purposes.

3. TRANSMITTER UNIT.

The transmitter employs five valves, one Radiotron 6V6G as a crystal-controlled oscillator driving one Radiotron 807 as a modulated radio frequency amplifier. The audio system consists of one Radiotron 6V6G as a microphone amplifier, driving two Radiotron 6V6G's in push-pull Class AB.1 as modulators.

Communication may be carried out by telephony or C.W. telegraphy. For telegraphy, keying is carried out in the cathode circuit of the 6V6G oscillator valve, while for telephony, the 807 radio frequency power amplifier valve is modulated in its anode circuit. A choice of two wavelengths is provided and provision is made for changing from one to the other by means of two wave-change switches and two tuning condensers. The total power input to the transmitter from the battery for telephony operation is approximately 110 watts, and the carrier power output power is 10 watts on both Telephony and Telegraphy.

The vibrator section of the transmitter is on the left-hand side of the chassis and contains the vibrator transformer and filter units, supplying H.T. at approximately 300V 150mA to the transmitter.

The transmitter is provided with eight controls. These are arranged from left to right as follows:

(i) L.T. switch.
(ii) Key-Speech Control.
(iii) H.T. switch.
(iv) Oscillator plate tuning condenser.
(v) Oscillator Wavechange switch.
(vi) Meter Selector switch.
(vii) Power Amplifier plate tuning condenser.
(viii) Power Amplifier wavechange and aerial switch.

The L.T. switch controls the filament heating power and a small pilot light immediately above indicates that the filaments are on.

The Key-Speech switch controls the transfer from telegraph to telephone operation.

The H.T. power to the transmitter is controlled by means of the switch marked H.T. The pilot light immediately above it indicates that the vibrator unit is supplying H.T. power to the transmitter.

The meter selector switch enables the meter, which is mounted on the left-hand side of the front panel, to be switched into the cathode circuit of any of the valves. Terminals are provided for connection of aerial and earth and for a lead to the aerial terminal of the receiver if the same aerial is used for both transmitter and receiving.

One fuse is used in the L.T. input lead and two fuses are supplied as spares. The fuses are easily reached by removing the lid of the case, and are located behind the general purpose meter.

4. POWER SUPPLY.

The power supply system consists of a 12V accumulator and petrol-driven battery charger.

This unit is supplied ready for operation and is an entirely self-contained unit complete with charging meter, reverse current cut-out, starting button, etc. For details of installation and operation, refer the "Delco" Instruction Book supplied.

The battery charger is not to be run when operating the transmitter, but merely for charging the battery and keeping it fully charged when the transmitter is idle.

5. AERIAL.

The transmitter is designed to work in conjunction with a single-wire feeder Hertz Antenna cut specially for the working frequency. Theoretically, the length of the aerial should equal half the working wavelength, but owing to the aerial's proximity to the earth, and the coupling of the feeder wire, the actual length required is a little less than

half the working wavelength; the fraction being 0.45.

Assuming operation on 7,150 kc., which is approximately 42 metres, the length of the horizontal radiator should be 42 x 0.45 metres, i.e., 18.9 metres or approximately 62 feet.

In order to prevent energy from being radiated from the feeder and to confine it to the horizontal portion of the aerial, the feeder wire must be attached to the aerial at a point which is at a critical distance from the centre of the aerial. This point of attachment should be 13.0% of the total length off centre. In the case above, this becomes approximately 8'7" off centre or 22'5" from one end. For working wavelengths between 30 and 100 metres, the dimensions of the aerial and the point of attachment of the feeder may be read off the nomogram appended.

If a band of wavelengths within 10% coverage is to be employed, one aerial may be used if it is designed to suit the shortest wavelength (highest frequency) of the limited band.

The feeder wire can be of any length. It should have no sharp bends, and should run at right angles to the horizontal radiator for at least a quarter wavelength from the point of attachment.

For maximum efficiency the aerial should be supported on poles to a height of 70 feet, although good results may be obtained with poles of 40 feet or less.

In the event of two working wavelengths being required and the higher wavelength being more than 10% above the other, one aerial cannot successfully be used for both; it becomes necessary to erect two aerials, one for each wavelength. Dimensions and feeder attachment point for each can be read off the nomogram supplied with this book if both are between 30 and 100 metres.

If it is required to use two working wavelengths which are approximately in harmonic relationship, i.e., if one is twice the other, it becomes possible to use one aerial for both wavelengths if certain modifications are made in the design of the aerial. In such a case, where one wavelength is twice the other, the aerial is designed to suit the shorter wavelength (higher frequency) of the two. The length of the horizontal portion of the aerial can be determined from the formula $L = \frac{959}{F}$ where "L" is the length in feet of the horizontal portion of the aerial, and "F" is the frequency in megacycles of the higher frequency to be used. The tapping point for the feeder line, which can be any length as before, is 1/3rd of the length "L" from one end.

As an example, if operation is desired on 42.3 metres (7,100 kc.) and 75 metres (4,000 kc.) one aerial can be used To find its length from the formula above $L = \frac{959}{7.1}$ feet (7,100 kc. being equal to 7.1 megacycles) i.e., $L = 135$ feet. The tapping point for the feeder is then $\frac{135}{3}$ feet, i.e., 45 feet from one end.

INSTRUCTION BOOK NO. 6-6798R
A.W.A. TELERADIO 3B TRANSMITTER
TYPE 8J6798

SECTION C.

INSTALLING INSTRUCTIONS.

1. THE TRANSMITTER

(a) Remove the top from the transmitter case, and also the front cover, by releasing the spring catches.

(b) Place the five valves (4 - 6V6G's and 1 - 807) in their respective sockets in the transmitter and see that they are firmly located.

(c) Replace the vibrator in its socket in the Power Section.

(d) Replace the lid on the transmitter.

(e) Plug the battery cable into the socket at the rear of the unit and connect the other end to the battery (Red to 12V positive, black to negative).

NOTE: The battery must not be removed further than 6' from the power unit as with greater lengths of connecting cable than this, the voltage drop in the cable becomes excessive.

The transmitter unit is now ready for operation, except for connection of aerial and earth, etc.

2. BATTERY CHARGER.

The petrol-driven battery charger is supplied ready for operation. The maker's instruction book should be consulted for all details. All that is necessary is to install the unit in a suitable position, fill with petrol and oil, and fit connecting cable to terminals provided on the charger. The other end of this cable clips on to the battery terminals (Red to 12V positive, black to 12V negative.)

CAUTION:

AS THE EXHAUST GASES ARE VERY POISONOUS, THE UNIT SHOULD ONLY BE INSTALLED IN A WELL-VENTILATED PLACE, OR ELSE THE EXHAUST PIPE SHOULD BE EXTENDED TO DISCHARGE THE GASES OUTSIDE THE BUILDING.

3. AERIAL SYSTEM.

The aerial equipment supplied should be erected in accordance with the instructions set out in Section B, 5, and with the aid of the nomogram.

OPERATING INSTRUCTIONS.

1. GENERAL.

After installing the Transmitter, Battery, Battery Charger and Aerial, as set out in Section C, the procedure for operation is as follows:

2. TRANSMITTING.

(a) See that the battery cable is correctly plugged in. The battery charger cable need not be connected.

(b) Connect aerial, earth, microphone and key to their respective terminals.

(c) Place "Key-Speech" switch in "SPEECH" position.

(d) Switch on L.T. switch, located on left-hand side of the front panel, and wait for valve heaters to warm up, about 30 seconds should be sufficient. The L.T. pilot light should light up when this switch is closed to indicate that the valve heaters are being supplied with power.

(e) Place "Oscillator" wavechange switch and the "Aerial" switch at wavelength required.

(f) Switch on the H.T. switch on the front panel; the H.T. Pilot light should light up and the meter should show a reading of approximately 20 milliamperes, when meter selector switch is in Osc. position.

(h) If the oscillator tuning dial is rotated over its complete range, it will be noticed that at one point the meter reading will dip to a minimum and then rise again. The dial should be set in position where this minimum current is observed.

(j) The meter switch should then be moved to the next position, marked "P.A.", and the P.A. tuning control rotated as above. It will be noticed that, as before, in one position of the tuning dial the current as indicated by the meter will dip to a minimum and then rise again. The dial should be set in the position which gives this minimum current indication, which should be approximately 60 milliamperes.

It is necessary to retune as under Section D, 2, (f), (h) and (j), should the wavechange switches be changed to transmit on the other available frequency.

The transmitter is now radiating on the selected wavelength and is ready for operation on telephony. Speaking loudly into the microphone should cause the "P.A." plate current to drop slightly, indicating that the transmitter is operating satisfactorily. For best operation, speak in a normal voice into the microphone.

For operation on Telegraphy, turn the "Key Speech"

switch to "KEY" position, this breaks the oscillator cathode circuit and switches off the microphone. Signalling is then carried out with the key in the usual manner.

It will be noticed that the P.A. cathode current does not fall to zero with the key in the "up" position, but stays at approximately the same value. This is quite in order and no power is being radiated as the oscillator is not supplying driving power to the P.A. The best way to monitor the keying is to switch the meter to the oscillator valve, where it will be seen to drop to zero when the key is up, and jump to approximately 20 milliamperes when the key is pressed.

To change back to speech again, it is merely necessary to switch over the "Key-Speech" switch to "SPEECH" position.

NOTES:

(1) As an indication that the aerial is taking power from the transmitter, after tuning adjustments have been made as above, note the reading of the milliammeter when connected to the "P.A.", then disconnect the aerial and, if necessary, retune the P.A. to obtain the lowest reading in the dip of current as indicated by the meter. Note this reading which should be about 1/3 to 1/2 of the normal reading, i.e., between 20-30 milliamperes.

(2) In switching off to receive, it is necessary only to switch off the H.T. switch on the front panel. This keeps the transmitter in a standing-by condition with its valve heaters on and it is ready for instant operation by merely closing the H.T. Switch. In the case where the same aerial is to be used on the receiver, it is necessary to switch the aerial over also, i.e., switch the "Aerial" switch on Transmitter panel to "REC." position. Care should be taken when changing back to transmit that this switch is turned to its correct position again.

Read Section B, 2, regarding permanent set-up of equipment.

3. BATTERY CHARGING.

The battery may be put on charge when the transmitter is not being operated. If run while operating, the transmission will be noisy.

The specific gravity of the battery should be regularly tested with a hydrometer. A full charge is indicated by a specific gravity of 1,250. If the battery is below this figure at the end of a period of operation of the equipment, it should be put on charge until this figure is reached. The specific gravity should never be allowed to fall below 1,150 or the battery may be permanently damaged. See Charger Instruction Book for general directions regarding battery care.

To put the battery on charge, it is merely necessary to see that the cable is attached to the correct terminals on the charger and that the other end is clipped to the battery terminals (Red to 12V positive, Black to negative) and that both L.T. and H.T. switches are in the "OFF" position. Then

start the charger in accordance with the directions given in the maker's instruction book. When the generator voltage builds up, the cut-out incorporated in the generator will connect it to the battery. The charge-discharge ammeter on the charger will indicate the charging rate. When the charger is not running, the cut-out automatically disconnects it from the battery.

SECTION E.

SIMPLIFIED MAINTENANCE INSTRUCTIONS.

1. AERIALS.

It may be found advantageous, in some circumstances, to have a separate horizontal aerial for the receiver and to use the main aerial for transmitting only. Such an aerial may be constructed as indicated in the diagram showing the aerial layout, from the 7/20 aerial wire left over after the main aerial has been cut.

This system has the advantage of eliminating the necessity of operating the aerial changeover switch on the transmitter when changing from send to receive and vice versa, but, on the other hand, when transmitting, it will probably be found necessary to reduce the receiver gain.

2. BATTERIES.

To ensure maximum efficiency and long service, care must be taken of the accumulators. The following are suggestions which, if carried out, will greatly assist in keeping the batteries in good condition.

(a) By means of a hydrometer, frequently check the Specific Gravity of the battery acid. This should never be higher than 1,300 or lower than 1,215.

(b) Never allow the level of the acid to fall below the tops of the plates. Replenish with distilled water only.

(c) Do not discharge the batteries excessively, and similarly do not overcharge.
Always keep the battery terminals clean and keep them covered by a coating of vaseline.

(d) Always wipe off the moisture that collects on the top of the batteries during charging.

(e) Periodically remove the battery clips of the transmitter and receiver, and clean. If ever these become loose, the tension can be regained by slightly bending the lug. Always keep these connections tight.

3. TRANSMITTER.

The following are suggestions to assist the location of faults in the transmitter.

Assuming that the transmitter is inoperative, the procedure is as follows:

Close the L.T. switch; check that the filaments of all valves heat up, as indicated by the red glow in the centre of the tube. See that the valves are well seated in the sockets. Check to see that there are no obvious faults, e.g., wires unsoldered, plate caps off or crystal connections loose, loose battery lead, etc. The fault may now be in either of two sections, the transmitter or the aerial system.

Remove the aerial lead and switch on the H.T. If the meter readings are quite steady, about their normal value and the correct tuning dips, as mentioned in the instructions for tuning, are obtained for both crystal and power amplifier sections, then the fault is definitely in the aerial circuit. A thorough check of the aerial and aerial changeover switch should locate this trouble.

If, however, the meter readings are not approximate as in the meter reading schedule, but are quite steady, the trouble may be located by changing the valves.

Bad contact between the fuse and fuse clips may result in the transmitter not operating when the switches are closed. Cleaning the contact or renewing the fuse should fix this.

If the fuse blows every time the H.T. is switched on, and the meter readings obtained during the brief interval that H.T. is applied are normal, it is probable that the vibrator is at fault.

SECTION F.

SCHEDULE OF COMPONENTS.

Resistors

R1	0.1 M ohms 1 watt.
R2	250 ohms 1 watt.
R3	.2 megohm 1 watt.
R4	5,000 ohms 2 watt.
R5	25,000 ohms 1 watt (2 x 50,000 ohms in parallel)
R6	100 ohms 1 watt.
R7	250 ohms 5 watt wire wound ±5%.
R8	10 ohms W.W. on Bobbin S3656.
R9	5,000 ohms 3 watt wire wound.
R10	10 ohms W.W. on Bobbin S3656.
R11	500 ohms 2 watt.
R12	10 ohms W.W. on Bobbin S3656.
R13	75,000 ohms 1 watt.
R14	250 ohms 3 watt wire wound ±5%.
R17	10 ohms wire wound on Bobbin S3656.
R19	50 ohms 1/3 watt.
R20	5,000 ohms 2 watt.
R21	5,000 ohms 2 watt.
R22	17,500 ohms 2 watt.
R23	17,500 ohms 2 watt.
R24	150 ohms 2W wire wound ±5%.
R25	100 ohms 3W wire wound
R26	100 ohms 3W wire wound.

Condensers

C1	6uuF 750V W. (Condenser S6771 - black waxed).
C2	0.01uF (Condenser 1-1)
C3	0.01uF (Condenser 1-1)
C4	1,000uuF 750V W. (Condenser S6772 - black waxed).
C5	8-88uuF (Condenser U1472 Mod. Drawing No. 6798A1/32).

Condensers

C6	0.01uF (Condenser 1-1).
C7	0.01uF (Condenser 1-1).
C8	0.01uF (Condenser 1-1).
C9	1,000uuF 750V W. (Condenser S6772, black waxed)
C10	8-88uuF (Condenser U1472 Mod. Drawing No. 6798A1/32.
C11	0.01uF (Condenser 1-1).
C12	2,000uuF (Condenser S6772 - 2 x 1,000uuF).
C13	2uF 350V D.C.W. (Condenser 1U3551).
C14	0.002uF (Condenser 1-1).
C15	8uF 600V Electrolytic.
C16	8uF 600V Electrolytic.
C17	0.05uF (2 x 0.1uF 2,000 V.T. Wax moulded S7080).
C18	0.05uF (2 x 0.1uF 2,000 V.T. Wax moulded S7080).
C21	0.1uF 350V W. (Condenser S7080).
C22	0.1uF 350V W. (Condenser S7080).

Transformers and Chokes.

L1	Oscillator Coil (Drawing No. 3908A2/24-5).
L2	P.A. Coil (Drawing No. 3908A2/18-19).
L3	Choke Type 5TG1163AY.
L4	Choke Type 4TS3871.
T1	Transformer Type 2TG3271AY.
T2	Transformer Type TG3270AY.
T3	Transformer Type TG3802AY.
T4	Transformer Type 1TK8107.

Switches

S1	Single bank, Oak Switch	Drawing No. 3908E12
S2	Two bank Oak Switch	Drawing No. 3908E14
S3	Single Bank Oak Switch	Drawing No. 3908E13
S4	Switch S3507 (Arrow 6445, 240V 10A D.P. S.T.)	
S5	Switch S3507 (Arrow 6445, 240V 10A D.P. S.T.)	
S6	Switch S3509 (Alpha Toggle Type D, D.P. S.T.)	

Valves, Vibrator and Crystals

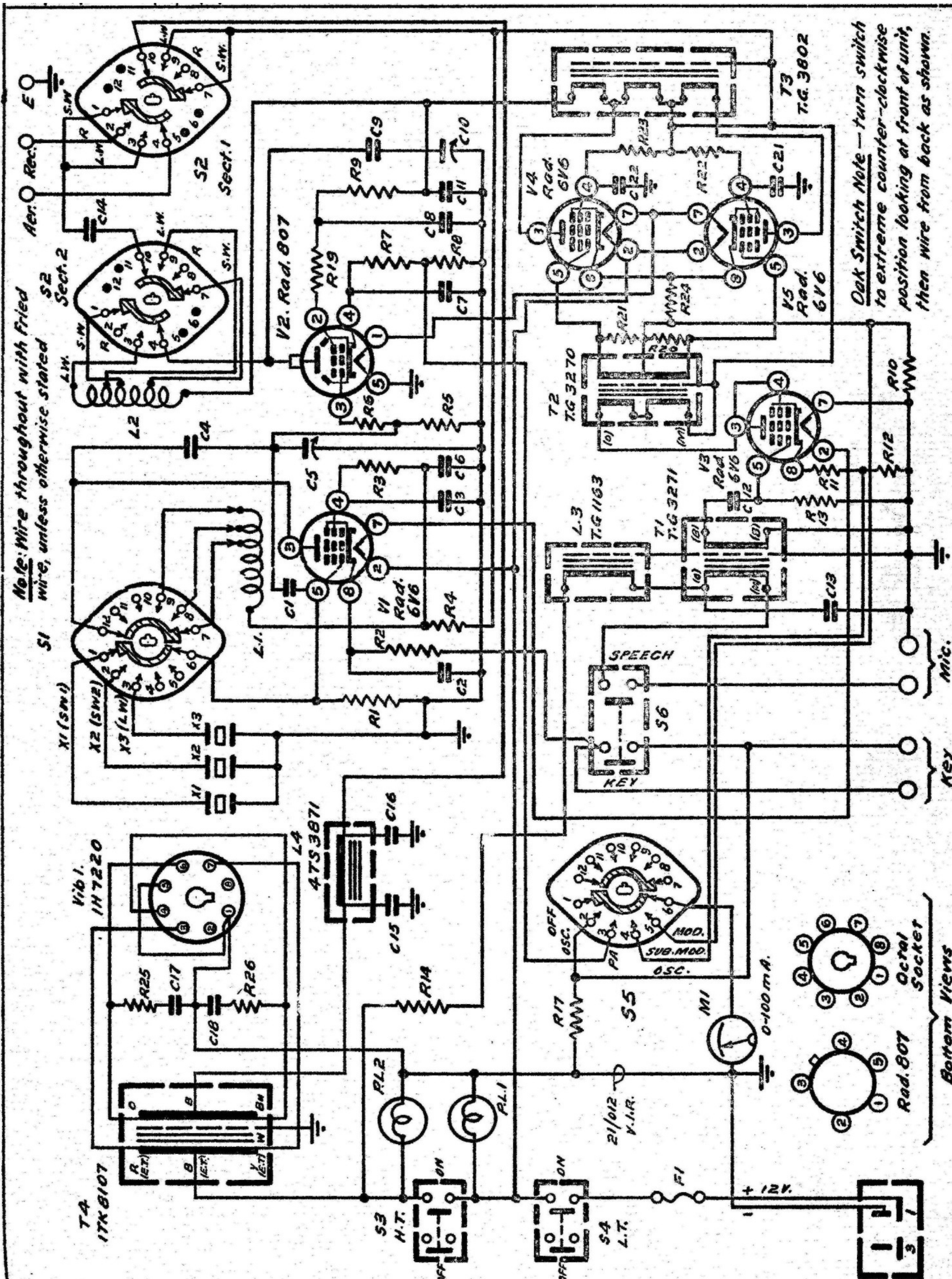
V1	Radiotron Type 6V6G valve

Valves, Vibrator and Crystals

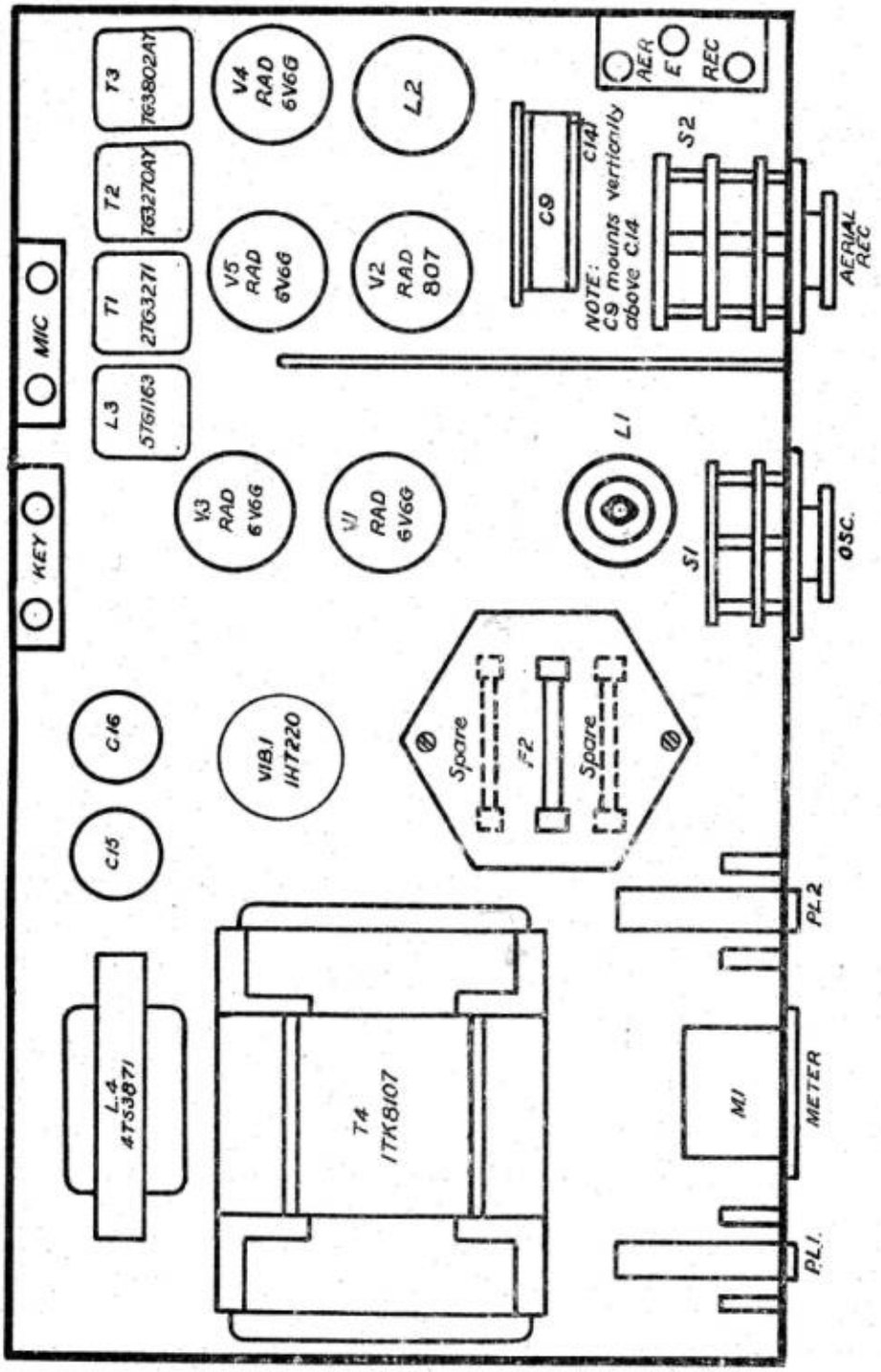
V2	Radiotron Type 807 valve	
V3	Radiotron Type 6V6G valve	
V4	Radiotron Type 6V6G valve	
V5	Radiotron Type 6V6G valve	
V1B1	Vibrator A.W.A. Type 1H7220	
X1	Crystal Type R583B, frequency as required	
X2	Crystal Type R583B, frequency as required	

Miscellaneous

M1	Meter, 0-100 mA D.C.	
PL1,2	Pilot Lights, comprising:	Jack S3518
		Bezel S3849-1 (Red)
		Lamp S3854-1 (12V G.E.C. No. 2)
F1,2	Fuse, 15A Auto Cartridge Type (Australux) with Fuse Remover S5413.	



AMALGAMATED WIRELESS (AUSTRALASIA) LTD. - SYDNEY	REF.		1ST SHEET REF.
	ARGT.	[signature] 21.9.41	
SCHEMATIC DIAGRAM TELERADIO 3B	DRN.	H.R. Searle 31-7-41	TYPE 8J.11J6798
	TRCD.	V. Lacey 31-7-41	
	CKD.	P. Gillespie 1-8-41	DWG. 6798D14
	APP.	R.R.D.	



AMALGAMATED WIRELESS
(AUSTRALASIA) LTD. - SYDNEY

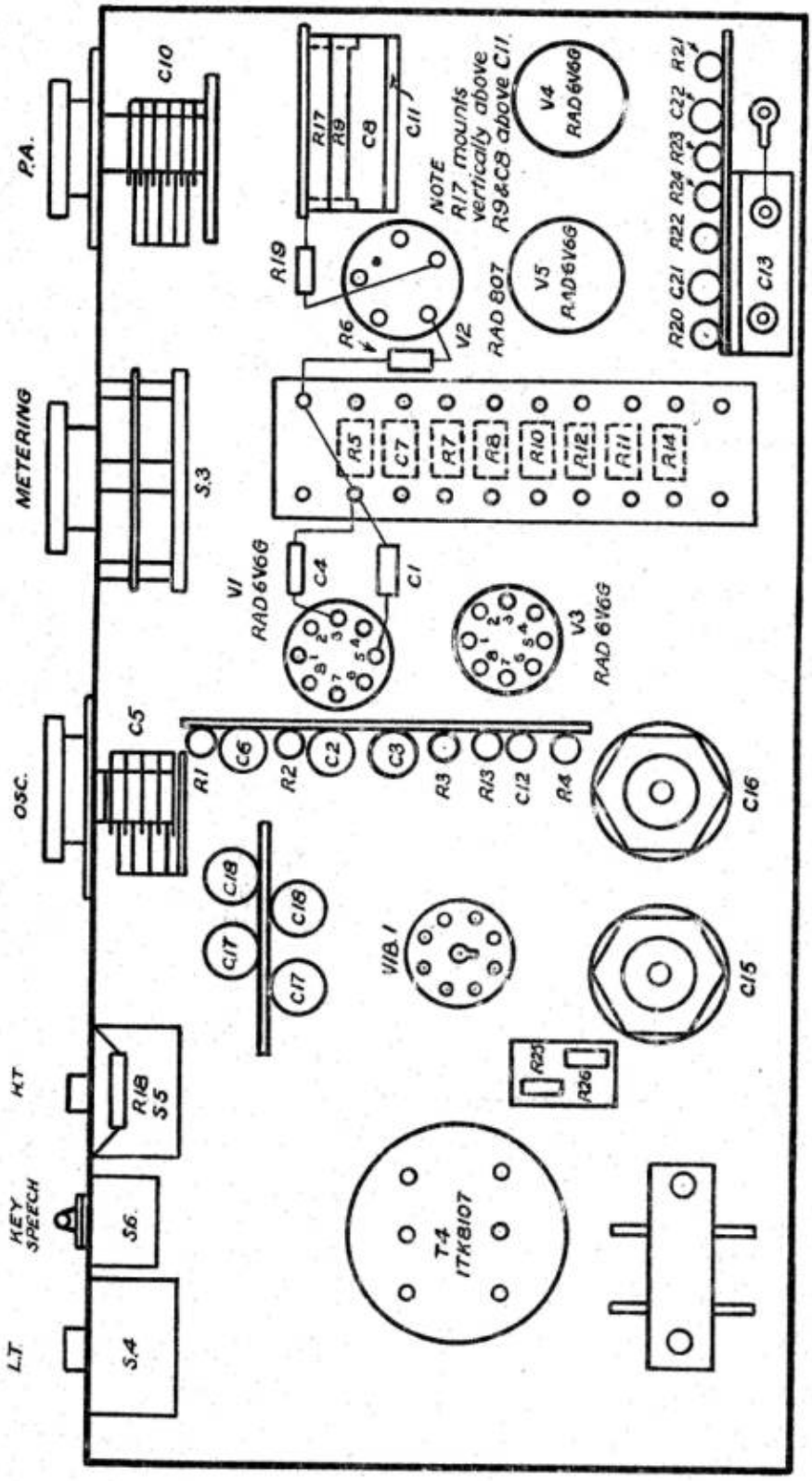
LAYOUT OF COMPONENTS
TELERADIO 3B
PLAN VIEW.

REF.		
ARGT	[illegible]	7.9.43
DRN.	[illegible]	7.9.43
TRCD.	B. Pattrick	15.9.43
CKD.	[illegible]	7.9.43
APP.		

1ST SHEET REF.

TYPE 8J6798

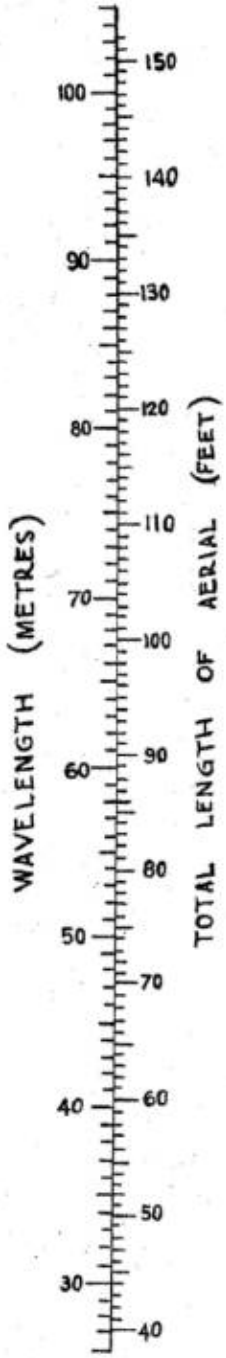
DWG. 6798D16



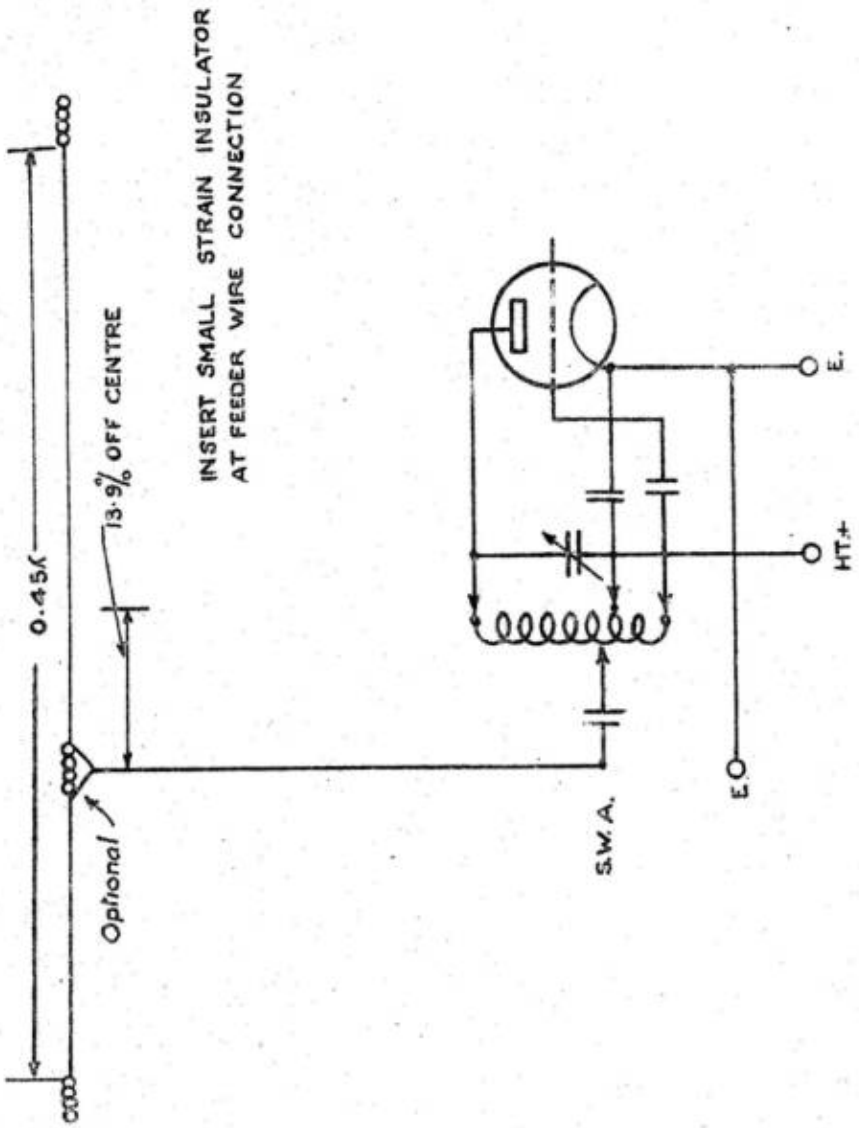
AMALGAMATED WIRELESS
(AUSTRALASIA) LTD. - SYDNEY

LAYOUT OF COMPONENTS
TELERADIO 3B.
UNDERSIDE VIEW.

REF.			1st SHEET REF.
ARGT.			
DRN.			TYPE 8J6798
TRCD.	D Patterson	16-9-48	
CKD.			DWG. 6798D17
APP.			



AMALGAMATED WIRELESS (AUSTRALASIA) LTD., SYDNEY	SK No.		SPEC. R.S.
	DRAWN		TYPE
NOMOGRAM FOR AERIAL LENGTHS AT VARIOUS WAVELENGTHS	TRACED	R.B.C.	
	CHECK	A.J.A.	DRG. No. O.D.479
	DATE	6·1·36	



AMALGAMATED WIRELESS (AUSTRALASIA) LTD., SYDNEY	SK No.		SPEC.	R.S.
	DRAWN	R.L.T.	TYPE	
DETAILS. TRANSMITTING AERIAL	TRACED	H.S.		
	CHECK		DRG. No.	OD476
	DATE	16-12-35		

Covering
Aerial Coupling Unit, type J8992

1.1 General Description

The standard Teleradio 3B transmitter is designed to work with an ungrounded or "Hertz" horizontal aerial to which a single-wire feeder is attached at such a point that the aerial represents a load of 600 Ω to the output circuit of the transmitter. This type of aerial is used because it provides radiation at such an angle to the vertical that it is reflected from the ionosphere and provides good signal at distances between 80 and 500 miles. At lesser distances little or no signal is usually received due to "skip" effect. When communication over distances less than 100 miles is required, a different form of aerial must be used, known as a "grounded Marconi" type. This may take the form of a simple vertical wire, a "T" aerial or an "L" aerial. In any case, this aerial has an impedance less than 50 Ω at its base, and so, for efficient operation, cannot be directly coupled to the Teleradio 3B. Such an aerial may also be required in mobile or semi-mobile installations where restricted space prevents the erection of the standard type aerial. Finally, in other installations it may be advantageous to erect the aerial at a distance from the transmitter and here again the grounded type would be used.

Whenever the grounded type of aerial has to be used, an aerial coupling unit is required to tune the aerial, and match its low impedance to the 600 Ω output circuit of the Teleradio 3B transmitter. This coupling unit is known as a type J8992, and its installation and tuning are described in this addendum. It is not supplied as standard equipment with the transmitter, but may be ordered when circumstances necessitate the employment of a Marconi type aerial.

The type of grounded aerial to be employed will be determined by the space and facilities available, but in any case it should be erected as clear as possible of surrounding objects. For maximum efficiency, the aerial should be as long as possible, but not greater than three-eights of the shortest wavelength in use, where the transmitter operates on more than one wavelength. In general, the aerial should be cut to an overall length equal to one-quarter of the operating wavelength, the length being calculated from the formula given below.

Length (feet) = .78 x wavelength in metres

Note that this length includes the length of the earth lead, which must therefore be subtracted in order to find the actual length of the aerial wire itself.

For maximum efficiency, an earth system constructed as follows should be laid down beneath the aerial in permanent land stations installations. For mobile or semi-mobile land installations, a portable ground mat constructed along the same lines will be satisfactory. The earth system should consist of a minimum of 10 wires of 7/22 bare copper, cut to a length of one-quarter of the longest wavelength in use. These wires are buried in the ground, radiating at equal intervals from a point immediately at the foot of a vertical aerial, or from immediately beneath the down-lead in the case of an "L" or "T" shaped aerial. In restricted areas, the size of this earth system may have to be reduced, but improved results will still be obtained.

1.2 Installation

When ordered, the aerial coupling unit, type J8992 is supplied

as a separate unit, suitable for bolting directly to the transmitter case, or for installing at the base or down-lead of an aerial which is erected at a distance from the transmitter.

In the first case, when the transmitter and coupling unit form one assembly, the lead from the centre of the earth system must be connected to the earth terminal on both the transmitter and the coupling unit. The aerial wire or down-lead is connected to the "Aerial" terminal of the coupling unit, and the "trans." terminal of this unit is joined by an insulated lead to the "A" terminal on the transmitter.

In the second case, when the transmitter is remote from the aerial and coupling unit, the two must be connected by a two-wire feeder line constructed to have an impedance of 600 Ω. Suitable dimensions for this line are two conductors of No.12 S.W.G. bare copper spaced 6" apart, centre to centre. One of these wires is connected at one end to the "A" terminal of the transmitter and at the other end to the "trans." terminal of the coupling unit. The other wire is connected at one end to the earth terminal of the transmitter and at the other end to the earth terminal of the coupling unit. The earth terminal of the transmitter must also be joined to an adjacent earthing point such as a buried earth plate or rod, whilst the earth terminal of the coupling unit must be connected to the lead from the centre of the earth system. The aerial or down-lead is, as before, connected to the "aerial" terminal of the coupling unit.

1.3 Tuning

First disconnect the lead from the "A" terminal of the transmitter and tune for a dip in the anode current of the power amplifier (P.A.) valve, as explained in the accompanying instruction book. Note the P.A. tuning dial reading at which the dip is obtained, and then switch off the H.T. Set the aerial tuning condenser in the aerial coupling unit to approximately half-scale; connect an 0-1 amp. thermoammeter in series with the aerial lead; re-connect the feeder wire to the "A" terminal of the transmitter, and switch on the H.T.

Rotate the aerial tapping switch in the coupling unit until a position is found where the aerial current shown by the thermoammeter is a maximum. Re-tune the P.A., and if the dip occurs at a different dial setting, adjust the aerial tuning condenser and aerial tapping switch until the dip occurs at the same setting as it did with the feeder line disconnected. The P.A. anode meter should now be reading 60-70 mA, and the aerial current should be 0.4 to 0.8 ampere.

NEVER leave the aerial or P.A. tuning controls in such positions that the P.A. anode current is greater than 70 mA.

Date: 31.12.42

Covering Details of Crystal Selection and Wiring

In the standard teleradio 3B, type 8J6798, accommodation is provided for three plug-in crystals. These will normally have frequencies from 3.5 Mc. to 5 Mc. so that the overall frequency coverage of the transmitter from 3.5 Mc. to 9 Mc. is obtained by fundamental operation from 3.5 Mc. to 5 Mc., and by doubling in the power amplifier from 5 Mc. to 9 Mc. The crystals are selected by the panel-mounted "CRYSTAL SELECTOR" switch, whose positions "X1", "X2", and "X3" correspond to crystals 1, 2 and 3 respectively. However, it must be clearly understood that this switch also selects tappings on the crystal oscillator coil, so that there is some degree of restriction between the frequencies of the crystals and the positions in which they can be used.

If the operating frequencies of the crystals are specified, then the equipment leaves the factory with the selector switch correctly wired so that the right coil tap is provided for each position. If, however, the crystal frequencies are secret, or not specified, this facility cannot be provided and it is necessary for the user to arrange the leads from the switch to the coil taps to suit the crystals. The following information will enable it to be done.

The crystal oscillator coil has three taps, counting the end of the coil as a tap. These cover the following frequency ranges:-

Tap 1 (Band 1)	Tap 2 (Band 2)	Tap 3 (end of coil) (Band 3)
5.45 Mc. - 7.9 Mc.	4 Mc. - 5.95 Mc.	2.9 Mc. - 4.35 Mc.

If the crystal frequencies are such that one falls in each of the three bands, then position "X3" of the switch is wired to the end of the coil (tap 3), position "X2" to the second tap, and position "X1" to the first tap. The three crystals can then be selected with their correct tuning circuit.

Now, if additional crystal frequencies are required, the new crystals may be substituted for the originals in the correct sockets according to their frequencies. However, not more than three crystals can be available for selection at any one time.

Two other combinations of operating frequencies may arise, and each may be dealt with in two ways.

Firstly, the frequencies of all three crystals may fall in the one band, say band 1. The first solution is to leave the coil and switch wired as before, and merely substitute the crystals for one another as required, using only sockets "1". This may not be convenient if rapid change of frequency is required.

The second alternative is to re-wire the switch so that the crystals may be used in sockets "1", "2" and "3", as before, and they can then be selected instantaneously by the "CRYSTAL SELECTOR". It is merely necessary to bridge all three switch contacts which connect to the coil, and wire only one lead from them to whichever tap on the coil gives a frequency range suitable for the crystals. The unused taps on the coil are left disconnected.

Secondly, the frequencies of two of the crystals may fall in, say band 1, and that of the remaining one in one of the other two bands, say band 3. The first alternative is still available, and will be somewhat more convenient than for the first case. Thus, one crystal may be left plugged into sockets "3", whilst the other two are interchanged as required in sockets "1". The "CRYSTAL SELECTOR" will then

allow a choice between X3 and X1 or X3 and X2.

To make the switch available for instantaneous selection of all three crystals, it must again be re-wired. The coil-tapping contacts corresponding to the crystals X1 and X2, which fall in the same band, must be bridged together, and wired to the correct tap on the coil according to the table given. The contact corresponding to X3 is wired to a coil tap which suits this crystal.

As an example of the first case quoted, the crystal frequencies may be 4.4 Mc., 4.8 Mc. and 5.2 Mc. These all fall in band 2, so that the three coil-tapping contacts will be connected together and to tap 2. As an example of the second case, one crystal may be 3.5 Mc. and the others 6.0 Mc. and 6.5 Mc. respectively. (This is purely an illustrative example as 6.0 Mc. and 6.5 Mc. crystals will not normally be used). The former crystal would be used in sockets "3", and its coil contact on the switch wired to tap 3, i.e., the end of the coil. The two latter crystals would be plugged into sockets "1" and "2", and their coil-tapping contacts bridged and wired to tap 1.

It is not advisable to operate any crystal close to the limits of a band. For instance, a crystal of 4250 kc. should be used in band 2 and not in band 3. Furthermore, the crystals should be allotted to the sockets in such a way that the crystal frequency <u>decreases</u> from position X1 (sockets "1") to position X3 (sockets "3").

As <u>normally</u> supplied when no frequencies are specified, position "X3" of the switch is wired to the end of the coil (tap 3) and position X1 to tap 2. Tap 1 is not wired as this band has no normal application if crystals higher than 5 Mc. are not used. The coil taps can therefore be recognised by this fact, or by inspection of the coil.

In the power amplifier, the "S.W." position of the selector switch is suitable for carrier frequencies from 3.35 Mc. to 6.2 Mc., and the "L.W." position for 5.5 Mc. to 9.7 Mc.