

INSTRUCTIONU BOOK NO. BODGER

INSTALLATION, OPERATION AND MAINTENANCE

A.W.A. TRANSMITTER

TYPE J50062

TELERADIO 3BZ

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:—

 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 1TK5510 (Serial No. 117).
Resistance A.W.A. 1S4282 500 Ω

- 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.

- 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. 50062R

# INSTALLATION, OPERATION AND MAINTENANCE

A.W.A. TRANSMITTER

TYPE J50062

TELERADIO 3BZ

# Amalgamated Wireless (A'sia) Limited

47 York Street

SYDNEY

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#### GENERAL DESCRIPTION

## 1.1 Application

The A.W.A. Teleradic 3BZ Transmitter, type J50062 is a low power unit designed to be conveniently portable and simple to operate so that it may be handled by relatively inexperienced persons. The transmitter, in conjunction with a receiver of the A.W.A. type C6770 series, provides facilities for a two-way communication installation.

# 1.2 Facilities, Frequency Coverage and Power Output

The transmitter provides C.W. and speech transmission and a standby condition to allow transmission and reception from the one aerial.

The transmitter is crystal-controlled with a frequency coverage of 2.5 Mc. to 10 Mc. Up to six crystals may be used and these must have frequencies between 2.5 Mc. and 5.0 Mc., the emitted frequency being that of the crystal used or double that frequency, depending on the setting of the "CRYSTAL SELECTOR" switch.

The power output of the transmitter on C.W. and speech fed into a 600  $\Omega$  impedance aerial at four emitted frequencies is given in table I.

Carrier	Outpu	ut (Watts)
Frequency (Mc.)	c.W.	Speech x
3.0	12.5	16.5
4.5	13.5	17.5
6.0	10	13
9.0	10	13

TABLE I - POWER OUTPUT

# Modulated 80%

#### 1.3 Power Supply

The transmitter is operated from a 12 volt battery, H.T. supply being derived from a synchronous or self-rectifying vibrator.

A petrol-driven battery-charger can be supplied with the transmitter and is an entirely self-contained unit complete with charging meter, reverse current cut-out, starting button etc. For details of installation, operation and maintenance, refer to the Instruction Book supplied with the charger.

The battery-charger should not be run while operating the transmitter. The battery should be kept fully-charged by charging when the transmitter is idle.

The low tension current consumption for the three conditions of operation is given in Table II.

Condition of Operation	L.T. Current Consumption (Amps.)
C.W.	7.5
Speech	7.5
Stand By	1.5

## 1.4 Aerial Output Circuits

The transmitter is designed for use with both low impodance and high impedance aerial arrays with separate terminals for each on the front panel. See Plate I.

The high impedance aerial should be of the horizontal halfwave or doublet type which provides good signals at distances between 80 and 500 miles approximately but is not particularly suited for communication over shorter distances. In the latter case a low impedance aerial of the "grounded marconi" type should be used which has an effective range up to 100 miles approximately.

## 1.5 Mechanical Construction

The transmitter and its associated vibrator power supply unit are assembled on a single chassis housed in a pressed steel case with detachable top and bottom. Controls are mounted on and project through the front panel and are protected in transit by a removable front cover. The case is fitted with gauze ventilation panels and rubber feet and is finished externally in grey wrinkle enamel.

Weight and dimensions of the transmitter are given in Table III.

TABLE III - WEIGHT AND DIMENSIONS

Arrangement	Weight lbs.	Length ins.	Width ins.	Height ins.
Complete with valves, vibrator, crystals, covers and battery connector.	44	16	10	12

The vibrator is a plug-in type fitted with an octal base and is mounted in a floating socket to prevent vibration being transmitted to the valves etc. See Plate II.

A cartridge type 15 amp. fuse protects the L.T. input circuit and is held in clips on top of the chassis. Two spare fuses are provided in adjacent clips - see Plate II.

The crystals plug into sockets on a panel at the rear of the chassis. The six sockets are lettered to correspond with the "CRYSTAL SELECTOR" switch designations on the front panel.

The controls shown in Plate I are designated by black printing on a front panel finished in grey enamel. A calibration log plate is attached to the top left-hand corner of the panel on which can

be noted dial readings, carrier frequency, crystal frequency etc.

The battery connector is fitted with a non-reversible three pin plug.

## 1.6 Circuit Arrangement

Reference to the circuit diagram - Fig. I will show that the transmitter has five valves: four type 6V6G and one type 807, employed as follows:-

VI is a type 6V6G valve which operates as a crystal-controlled oscillator. This valve always operates at the frequency of the crystal in circuit and is coupled to a type 807 valve, V2, which functions as a power amplifier. This stage operates as a fundamental-frequency amplifier for carriers between 2.5 Mc. and 5.0 Mc., and as a doubler for carriers between 5.0 Mc. and 10 Mc.

The speech channel comprises a microphone amplifier or sub-modulator, employing a type 6V6G valve, V3, driving a class "A" modulator having two type 6V6G valves, V4 and V5, arranged to give plate modulation of the power amplifier.

The valve functions in the circuit arrangement are shown in Table IV. Refer to Fig. II for a block circuit diagram which clearly shows the path of the signal from its source in the crystal oscillator to the aerial.

TABLE IV - VALVE FUNCTIONS

Symbol	Туре	Function
. Vl	6V6G	Crystal Oscillator
V2	807	Power Amplifier
V3	6V6G	Sub-Modulator
V4	6V6G	) No. 3, 3, 4,
V5	6V6G	)Modulator

#### INSTALLATION

#### 2.1 The Aerial

The transmitter is designed for operation with either a horizontal half-wave aerial with a single wire feeder so that it presents a load of  $600~\Omega$  to the transmitter, or a vertical or "grounded Marconi" type of aerial representing a quarter wavelength or less at the operating frequency. The former is most suitable for communication over distances from 80 to 500 miles while the latter should be used for communication up to 100 miles.

Fig. III shows constructional details of a half-wave aerial and Fig. (iv) a typical vertical quarter-wave aerial.

#### 2.2 Half-Wave Aerials

For a half-wave aerial the theoretical length is one-half of the working wavelength, so that a different aerial is required for every frequency. However, if two or more of the carrier frequencies are within 10% of each other, the one aerial may be used satisfactorily. Also, if one of the working frequencies is twice one of the others, then for these two the same aerial can be used. In this case it would be designed to be half-wave for the longer of the two wavelengths, i.e., the lower the two frequencies, whence it would become full wave for the higher frequency.

In practice, due to the proximity of the aerial to earth, the physical length of a half-wave aerial is only 0.45 times the working wavelength. Therefore, if operation is required on, for example, 6,000 kc., which corresponds to a wavelength of 50 metres, the length of a half-wave aerial will be 50 x 0.45 metres, or 50 x 0.45 x 3.28 feet, equalling 74 feet approximately.

## 2.2.1 Half-Wave Centre Fed Aerial

To prevent energy being radiated from the feeder line and to match the aerial impedance to the output impedance of the transmitter (600  $\Omega$ ), the feeder wire must be attached to the aerial at a point near the centre and distant from it 13% of the total length. For the case under consideration (6,000 kc.) this will amount to 74 x 0.13 feet or 9.6 feet approximately measured from the centre. The feeder wire itself may be of any length required but should have no sharp bends, which produce changes in the impedance of the line. It should also leave the aerial at right angles and continue so for a distance of at least a quarter wavelength.

It is essential that the relationship between frequency of transmission, and aerial length and feeder connection be maintained in accordance with the foregoing, in order that the aerial may properly load the transmitter, in which the high impedance output circuit is designed to work into a fixed load of  $600\ \Omega$ .

For maximum efficiency the aerial should be supported on poles about 75 feet high but good results will be obtained down to about 40 feet.

## 2.2.2 Factors Affecting Range

The increased range obtained by horizontal aerials depends upon the reflection of the waves from the ionized layers of the upper atmosphere. Results therefore depend upon ionospheric conditions, and differ according to the time of day or night, the season of the year, and from year to year.

The following factors have been found to affect range in the manner stated.

- (i) For optimum results between any two stations, the radiator should be placed at right angles to a line joining one station to the other.
- (ii) The most unfavourable placing of the radiator is at an angle 60°/70° from the line joining the two stations. Signal reduction from that obtained when the radiator is placed as in (i) above, is one or two "R" strengths.
- (iii) Whenever possible, an open site should be chosen since the proximity of energy absorbing structures adversely affects range.

## 2.3 Quarter-Wave Aerial

Theoretically, a quarter-wave aerial should be 0.25 times the wavelength on which it is to work, but in practice this factor must be considerably reduced. This is due to the fact that the complete aerial circuit comprises the aerial wire itself, the inductance which couples it to the anode circuit of the power amplifier and, finally, the earth wire. Consequently, if the aerial wire proper is cut to only 0.22 approximately of the working wavelength, the aerial circuit can be resonated by the coupling coil. For the case under consideration (6,000 kc.) the aerial wire should, therefore, be cut to 0.22 x 50 x 3.28 feet or 36 feet approximately. Some reduction to this must also be made if the length of the earth wire is in excess of a few feet.

Since a quarter-wave aerial presents a low impedance load (approximately 37  $\Omega$ ) to the transmitter, it must be matched to the power amplifier anode circuit by means of the built-in aerial coupling unit.

This unit is designed to match any aerial, up to a quarter-wavelength long, to correctly load the transmitter at any frequency within the range 2.5 Mc. to 10 Mc.

Hence, if an aerial is made quarter-wave at 10 Mc., then this aerial may be used for transmission on any of the other frequencies, simply by re-adjusting the aerial coupling and aerial tuning controls for each change of carrier frequency, thus avoiding the necessity to adjust the aerial length.

## 2.3.1 Factors Affecting Range

Since radiation from a vertical aerial is mainly by virtue of the direct or "ground wave", range may be expected to be reduced if one, or both transmitters are operated in any of the following positions.

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

## 2.4 The Earth

## Permanent Land Installations

For maximum efficiency an earth system as follows should be laid down beneath the aerial in permanent land station installations.

The system should consist of 10 or more wires of 7/22 bare copper cut to a length of one-quarter of the <u>langest</u> wavelength in use. These wires are buried in the ground radially at equal intervals from a point immediately beneath a vertical aerial or the down lead in the case of a horizontal aerial. In restricted areas, the size of this earth system may have to be reduced, nevertheless, results from this type will be superior to most others.

## Semi-Mobile Station

If the station is not a permanent installation the most convenient earthing system is a counterpoise arranged as follows:Cut four rubber-covered leads approximately 12 feet long, connect one end of each lead to the earth terminal of the transmitter and spread the leads radially at equal intervals from the connecting point. Such an earth system has low efficiency and so reduces the overall efficiency of the transmitter.

## Mobile Station

In vehicle installations the chassis of the vehicle is generally used as the earth. In marine installations some metallic portion of the hull or super-structure could be used as a counterpoise but in such cases, particular care should be taken to keep the earth lead as short as possible. Care should be taken in making contact with the chassis to see that the connection is clean and firm.

## 2.5 Inserting Valves, Vibrator and Crystals

The positions of the valves, vibrator and crystals are shown in an illustration in the lid of the transmitter and in Plate II of this book.

Insert the valves and vibrator in their respective sockets. The type 807 valve, V2, has a plate connector which is designed to apply slight downward pressure on the valve to ensure good contact. The height of the connector may be altered, if necessary, by adjusting the nuts on the mounting pillar beneath the insulator. The lock-nut must be tightened after adjustment.

The crystals should be plugged into their sockets on the crystal panel in such an order that the crystal frequency increases from position "A" to "F". The crystal positions and carrier frequencies should then be logged on the plate at the top left-hand corner of the front panel, the surface of which is suitable for pencilling and erasing, if necessary.

## 2.6 Connections to Transmitter

- (i) Connect the hand key to the terminals marked "KEY" and the microphone to those marked "MIC."
- (ii) Connect the aerial. If a low impedance type aerial (e.g., quarter-wave) is used connect it to the terminal designated "AERIAL LOW IMP." A high impedance aerial (e.g., half-wave) should be connected to the terminal marked "AERIAL 600  $\Omega$ ". Refer to sections 1.4, 21, 2.2 and 2.3 for details of suitable aerials for use with the transmitter.

- (iii) Connect the earthing system to the terminal marked "EARTH". See section 2.4 for details of recommended earthing systems.
- (iv) Connect the terminal marked "AERIAL TO RECEIVER" to the aerial terminal on the receiver.
- (v) Fit the socket on the battery connector to the plug at the rear of the transmitter and connect the battery (12 volts) red lead to positive (+) terminal, black lead to negative (-)

#### OPERATING INSTRUCTIONS

## 3.1 Tuning the Transmitter

To tune the transmitter proceed as follows:-

#### 3.1.1 General

- (i) Turn the "SIGNAL CONTROL" switch to "STAND BY" when the green indicator will show that filament power is on. Wait approximately 30 seconds for the valve heaters to reach operating temperature, then turn the switch to "C.W." when the red indicator shows that H.T. power is on.
- (ii) Set the "CRYSTAL SELECTOR" switch at the position corresponding to the crystal it is proposed to use; for example at "XA" if the crystal to be used is fitted in position "A" on the crystal panel and at "XA-1" if the required carrier frequency is that of the crystal or at "XA-2" if the required carrier frequency is double that of the crystal.
- (iii) Set the "METER SELECTOR" switch at "OSC. CATH." and press the key while adjusting the "CRYSTAL OSCILLATOR TUNING" dial until the oscillator cathode current dips to about 10-12 mA. Tune to the minimum of the dip and release the key.
- (iv) Turn "METER SELECTOR" switch to "P.A. CATH." and set "AERIAL COUPLING" dial at zero on indicator.

## 3.1.2 For Operation with a High Impedance Aerial

After carrying out instructions 3.1.1 above, in full, press key and adjust "P.A. ANODE TUNING" dial until the P.A. cathode current dips to a minimum which should be approximately 60 mA.

<u>CAUTION</u>: It will be noticed in tuning the transmitter that the "CRYSTAL OSC. TUNING" and "P.A. ANODE TUNING" dial readings increase with increase in frequency. Also for any frequency the readings on the two dials are approximately the same. This fact should be remembered to avoid undesired frequency multiplication in the P.A.

#### 3.1.3 For Operation with a Low Impedance Aerial

After carrying out instructions 3.1.1 above, in full -

- (i) Press the key and adjust the "P.A. ANODE TUNING" dial until the P.A. anode current dips to a minimum which should be approximately 20-30 mA.
- (ii) Increase the "AERIAL COUPLING" dial reading until the P.A. cathode current rises about 10 mA. Then adjust the "AERIAL TUNING" dial until a maximum peak reading is obtained.
- (iii) Increase the "AERIAL COUPLING" dial reading until the P.A. cathode current rises 10-20 mA.
- (iv) Re-adjust the "P.A. ANODE TUNING" dial for minimum reading of P.A. cathode current.

Repeat (iii) and (iv) alternately until minimum P.A. cathode current is about 65 mA.

CAUTION: At the conclusion of the tuning procedure the "CRYSTAL OSC. TUNING" and "P.A. ANODE TUNING" dial readings should be approximately the same. If not, it is probable that frequency multiplication is occurring in the P.A. For instance, the P.A. may be doubling instead of operating at fundamental frequency or trebling instead of doubling. It will also be noticed that these dial readings will increase with increase in frequency.

## 3.2 Operating the Transmitter

At the conclusion of the tuning procedure described above, the transmitter should be ready for normal operation on C.W. Keying may be monitored by setting the "METER SELECTOR" switch at "OSC. CATH." or "P.A. CATH." When the key is up the oscillator cathode current falls to zero and P.A. cathode current rises.

To transmit speech, it is only necessary to turn the "SIGNAL CONTROL" switch to "SP.", passing smartly through the "OFF" position, and to speak into the microphone.

When receiving, turn "SIGNAL CONTROL" switch to the adjacent "STAND BY" position. This silences the transmitter, thus economising in battery current and also switches the aerial to the receiver when one aerial is used for both transmission and reception.

When operating the transmitter the dial settings should not be altered unless it is desired to change the transmitting frequency when it will be necessary to repeat the procedure shown in section 3.1 above.

#### MAINTENANCE

#### 4.1 General

The occurrence of serious defects in the equipment will be minimised if it is inspected periodically. This section deals with maintenance which can be handled by persons who are relatively inexperienced.

## 4.2 Batteries and Battery Cable, Battery Charging

## 4.2.1 Batteries

The batteries should be charged regularly depending on the amount of service required from the equipment. Low battery voltage will cause a reduction in power output. The cells should be "topped" only with distilled water or, failing that, clean rain water. The top of the battery should be wiped clean after charging and the terminals coated with vaseline. The specific gravity of the electrolyte should be 1,280 when fully charged and should not be allowed to fall below 1,225. Readings of the specific gravity taken with a hydrometer give a much more reliable indication of battery condition than terminal voltage readings. Electrolyte should never be added to batteries unless it is known that some has been spilt and then only by a person skilled in battery service.

# 4.2.2 Battery Cable

The battery cable should be supported clear of the battery so that acid will not attack the covering and leads. The clamps for attaching to the battery terminals should be cleaned periodically and all corrosion removed. They should then be liberally coated with vaseline.

## 4.2.3 Battery Charging

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 instal 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 12 volts positive, black to 12 volts negative).

<u>CAUTION</u>: 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.

## 4.3 Fuse

If on switching on the transmitter the pilot lamps and valve heaters fail to light, check the battery connections both at the battery and at the plug and socket. If these prove to be in order it may be that the fuse has "blown". Before replacing the fuse, investigate the fault which caused it to "blow". Two replacement fuses are provided and it is advisable to always have two spare fuses of the correct current rating - 15 amps., as fitting a substitute may cause damage to the equipment. The fuse will "blow" if the battery is wrongly connected.

#### 4.4 Valves

In the event of faulty operation the valves should be checked in a reliable valve-tester or, if this equipment is not available, they may be replaced one at a time by spare valves of similar type and of known condition until the original performance is restored. The voltage and current figures provided in Table V are a valuable guide in determining the condition of valves.

## 4.5 Vibrator

The vibrator is a sealed unit and, if faulty, should be replaced. It may fail completely due to an open circuit lead or internal short-circuit or the output voltage may drop and "hash" appear on the carrier due to deterioration of the contacts after long usage, or overload caused by a defect elsewhere in the equipment. In the case of the vibrator, the simplest and surest method of testing is to fit a replacement and note whether the fault disappears.

#### 4.6 Pilot Lamps

The pilot lamps should be replaced as they burn out since they prove a useful indication of whether the transmitter is in the "STAND BY" or "TRANSMIT" condition.

## 4.7 Crystals

The crystals should give no trouble unless they are carelessly handled and sustain mechanical damage such as that resulting from a fall. If a crystal is accidentally dropped, the operation of the transmitter should be carefully checked to ensure that signals are being emitted at the correct frequency.

#### 4.8 Switches

All switches are correctly lubricated prior to assembly, and do not require further lubrication during their life. Switches are also self-cleaning, and should not be treated with any cleaning solution as this would remove the lubricating film and result in rapid deterioration of the contacting surfaces.

#### 4.9 Aerial and Earth Systems

The aerial system should be inspected periodically for faulty connections, dirty or cracked insulators, etc. It must be remembered that as this is a low power transmitter the effect of leakage from this cause is serious.

Connections in the earthing system should also be inspected periodically.

### 4.10 Chassis Inspection

The top and bottom of the case should be removed periodically and all components closely inspected. Check that the components are mechanically tight and examine all electrical connections and switches. See that the vibrater and all the valves and crystals

are tight in their sockets and that the type 807 valve V2 plate connector is making good contact.

# 4.11 Socket Voltages and Currents

TABLE V - SOCKET VOLTAGES AND CURRENTS

	6V6G Osc.	6V6G Sub≃ Mod.	6V6G Mod.	807 P.A.
Plate Volts	300	130	350	360
Screen Volts	130	40	330	280
Cathode Volts	3	8	22	14
Plate mA		0.6		
Screen mA	70.5		xx6.0	xx8.0
Cathode mA	13		70	60
Grid mA	0.6			70.5

H.T. mA D.C.: -150 Battery Volts: 12.0 Battery Current: 7.5A

7 0-1 mA meter at test meter terminals

xx 0-10 mA meter at test meter terminals

The figures in the above table were taken with the transmitter operating at an output of 15 watts, modulated 50% at 400 C.P.S.

# APPENDIX I

Type, Rating and Remarks		0.1 µF, paper, 350V, working	0.1 µF, paper, 350V, working	0.1 µF, paper, 350V, vorking	0.1 µF, paper, 350V, working	24 µF, 600P.V., Electro EE10594	24 µF, 600P.V., Electro EE10594	0.01 µF, mica, 3U7684	0.01 µF, mica, 307684	9 pirF, mica, metal cased (B)	5,000 µµF, rica, metal cased				
Plate Location		1.8	1.8	IO	1.9	1.1	1.2	L2	1.3	P9	PS	1.6	L6	ET.	L7
Circuit		B2	B2	B3	B3	B7	85	1/0	D7	104	Tá.	H4	H3	32	J.
Associated With Valve	18	,	r	í	1	V3	ТЗ	V3	V4,V5	I	1	ΓΛ	LV.	ŢĀ	V2
Description	Condensers	Buffer	Buffer	Buffer	Buffer	Misrophone soupling	Cathode by-pass	Feedback filter	Grid coupling	H,T. filter	H.T. filter	Cathode by-pass	Screen by-pass	Foodback	Grid coupling
Symbol	.5	C1	0.2	03	C4	C5	90	40	08	50	OTO	נוס	012	013	614

	Type, Rating and Remarks	0.01 µF, mica, 3U7684	0.1 µF, paper, 350V, working	7-225 µmF, air variable, 1608315	0.01 µF, mica, 307684	0.01 µF, mica, 3U7684	5,000 purF, mica, metal cased	7-225 µuF, air variable, 16U8315	0.01 µF, mica, 307684	5,000 µuF, mica, metal cased	100 µF, 40P.V., Electro EC10720	100 µF, 40P.V., Electro EC10720 0.1 µF, paper, 350V working	50 Ω, 1 watt	50 Q, 1 watt	50 Q, 1 watt	50 Ω, 1 watt	
13	Plate Location	174	14	38	1.5	1.5	B8	13	B8	B5	K4	K4 K5	L8	L9	1.9	1.9	
in.	Circuit	34	9Н	K4	17	174	M3	114	144	P2	К8	L6 K4	G2	GZ	03	80	
	Associated With Valve	V1	V4,V5	ſΛ	V2	V2	V2	V2	V2	ı	E	V4,V5 V2	ı	ı	•		
	Description	Anode decoupling	Screen by-pass	Crystal oscillator tuning	Cathode by-pass	Screen by-pass	H.T. blocking	P.A. anode tuning	Anode decoupling	Aerial series	Microphone filter	Cathode by-pass Cathode by-pass Resistances	Buffer	Buffer	Buffer	Buffer	
	Symbol	015	910	017	018	613	020	021	022	023	. 024	G25 G26	R	R2	R3	R4	

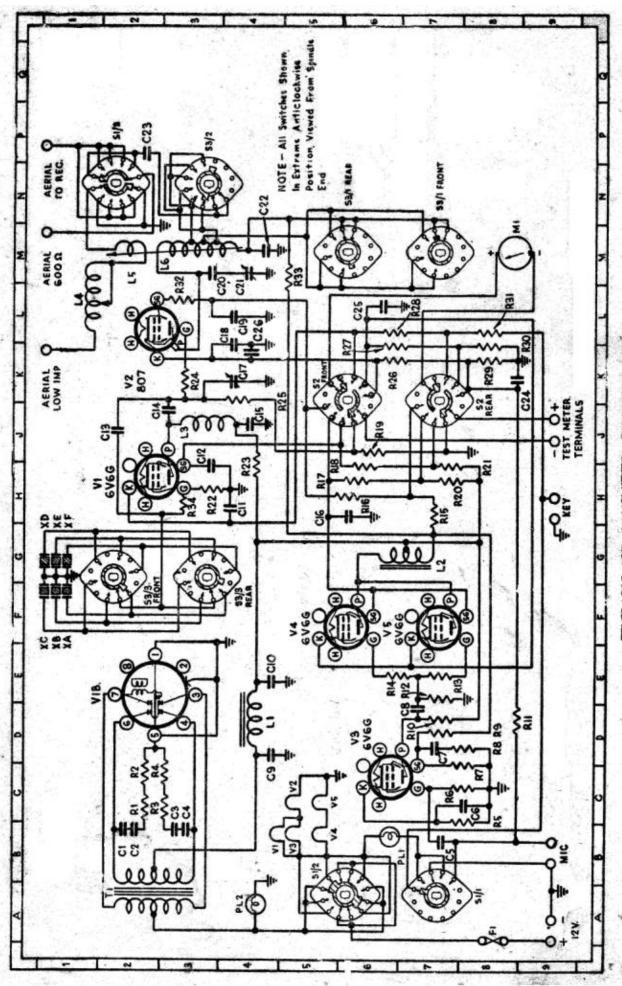
Symbol	Description	Associated With Valve	Circuit	Plate Location	Type, Rating and Remarks
R5	Cathode bias	V3	0.8	L2	16,000 Q, 1 watt
R6	Grid leak	V3	0.8	TW	250,000 Q, 1/2 watt
R7	Screen bleed	V3	108	M2	250,000 A, 1/2 watt
RB	Feedback filter	V3	D8	L2	20,000 Q, 1/2 watt
R9	Screen feed	V3	7.0	M4	1 M. 1 vatt
RLO	Anode load	V3	D7	M3	250,000 \O, 1 watt
RII	Microphone load	,	00	1.1	1,600 Q, 1/2 watt
R12	Grid leak	V4,V5	E7	N3	250,000 A, 1/2 watt
R13	Grid suppressor	V5	五7	M2	100 Q, 1/2 watt
R14	Grid suppressor	74	E7	M3	100 Q, 1/2 watt
RL5	Screen feed	V2	H7	1.4	10,000 Ω, 2 vatts (2 x 20,000 Ω, 1 vatt in parallel)
R16	Screen metering	V2	H6	L5	100 Q, 1/3 vatt
R1.7	Screen metering	V4,V5	H6	1.4	100 Q, 1/3 watt
R18	Screen metering	ርለ	H6	M6	100 Q, 1/3 watt
R19	Grid metering	V2	36	Te	100 A, 1/3 watt
R20	Screen feed	V4,V5	H7	L3	5,000 A, 1 watt

Type, Rating and Remarks	200,000 Ω, 1 watt	250,000 A, 1 watt	5,000 Q, 1 watt	250 Q, 1/2 watt	100,000 Q, 1 watt	10 Ω, 3 watt, W.W., I.R.C. AA, ctg. c	10 \O, 3 watt, W.W., I.R.C. AA, Ctg. C	10 A, 3 watt, W.W., I.R.C. AA, ctg. c	250 $\Omega$ , 2 watt (2 x 500 $\Omega$ , 1 watt in parallel)	315 $\Omega$ , 2 vatt (2 x 630 $\Omega$ , 1 vatt in parallol)	250 Q, 1 watt	100 A, 1/3 watt	50 Q, 1 watt	100 Q, 1/3 watt
Plate Location	TM	1.7	1.8	Ж6	1.7	K5	Г.3	M6	1.5	Г.3	35	Ге 97	. B8	MS
Circuit	Н7	Н3	H4	K3	K4	K6	Te	1.6	K8	K8	1.8	Т3	MS	Н3
Associated With Valvo	Λ	נא	ΤΛ	. 72	V2	V2	V4,V5	r <sub>V</sub>	V2	V4,V5	VJ	V2	V2	TA.
Description	Surcen feed	Grid leak	Anode feed	Grid suppressor	Grid Leak	Cathode metering	Cathode metering	Cathode metering	Cathode bias	Cathode bias	Cathode bias	Scroen suppressor	Anode decoupling	Grid suppressor
Symbol	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34

Symbol	Description	Associated With Valve	Circuit	Plato Location	Type, Rating and Remarks
	Inductonces				
11	Filter choke		4	B2	٨
L2	Audio choke	V4,V5	67	N4	
L3	Crystal oscillator	Ŋ	J3	N6	
L4	Aerial tuning	1	17	60	W.
1.5	Aerial coupling		M2	. 80	
Te	P.A. tank	V2	M3	38	
	Transformers				
TI	Vibrator	,	A2	D2	
	Vibrator				
VIB	Vibrator, synchronous	,	23	E4	A.W.A. type 1H7220
	Switches				
21	Four pole, five way, "SIGNAL CONTROL"	8		57/4	Oak
22	Four pole, four way, "METER SELECTOR"			35	0ak
	Five pole, 12 way, "CRYSTAL SELECTOR			A-E7	Oak

	ă)														
Type, Rating and Remarks		Radiotron	Radiotron	Radiotron	Radiotron	Radiotron		Palec 216	Cartridge					Frequency as required between 2.5 Mc. and 5.0 Mc.	Frequency as required between 2.5 Mc. and 5.0 Mc.
Plate Location	*	E5	65	F9	E8	6日		A5	F4		A4	A7		F6	F6
Circuit		H2	L2	90	F6	FT		M8	AB		B6	A&		F1	FI
Description With Valve	Valves	6V6G Crystal Oscillator	807 power amplifier	6V6G sub-modulator	Worked of one	Modulator	Meters	Test meter, 0-100 mA D.C.	Fuses Low Tension 15 amps.	Lamps	"STAND BY" 14 volts, 3W,	"TRANSMIT" 14 volt, 3W, M.E.S.	Crystals	A.W.A. type R7847 V1	A.W.A. type R7847 V1
Symbol		Ŋ	72	V3	74)	(2)		Q.	FI		PLJ.	PL2		XA	XB

Type, Rating and Remarks	Frequency as required between 2.5 Mc. and 5.0 Mc.	Frequency as required between 2.5 Mc. and 5.0 Mc.	Frequency as required between 2.5 Mc. and 5.0 Mc.	Frequency as required between 2.5 Mc. and 5.0 Mc.			
Plate Location	F6	F-7	84	F8		31 10	
Circuit	E	5	15	ij			
Associated With Valve	VI	VI	۲۸	τν.			
Description	. A.W.A. type R7847	A.W.A. type R7847	A.W.A. type R7847	A.W.A. type R7847			
Symbol	XC	Ø	受	ÆX.			



TELERADIO 38Z TRANSMITTER—CIRCUIT D. VGRAM.

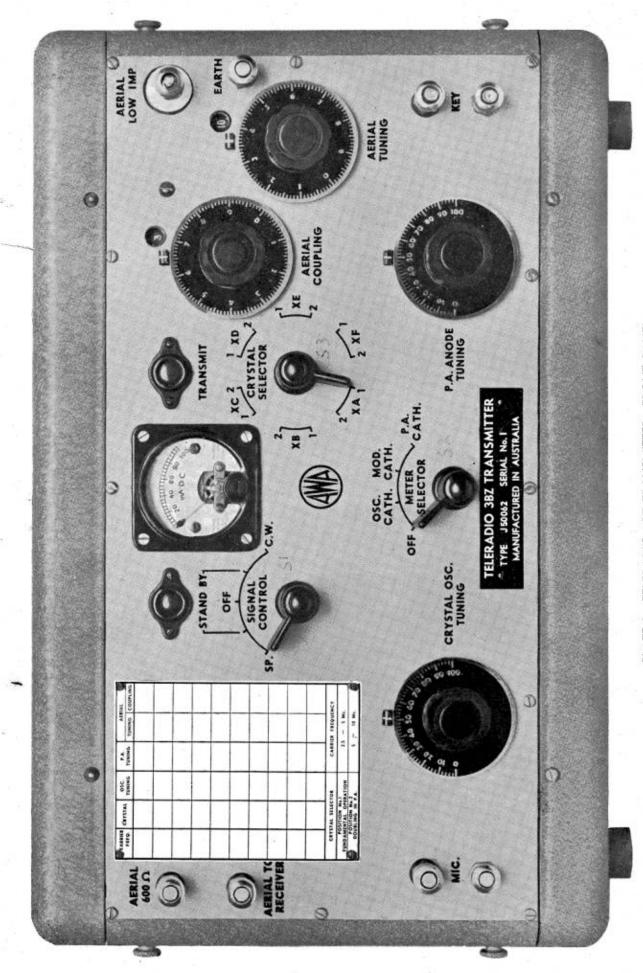


PLATE I. TELERADIO 38Z TRANSMITTER—FRONT PANEL.

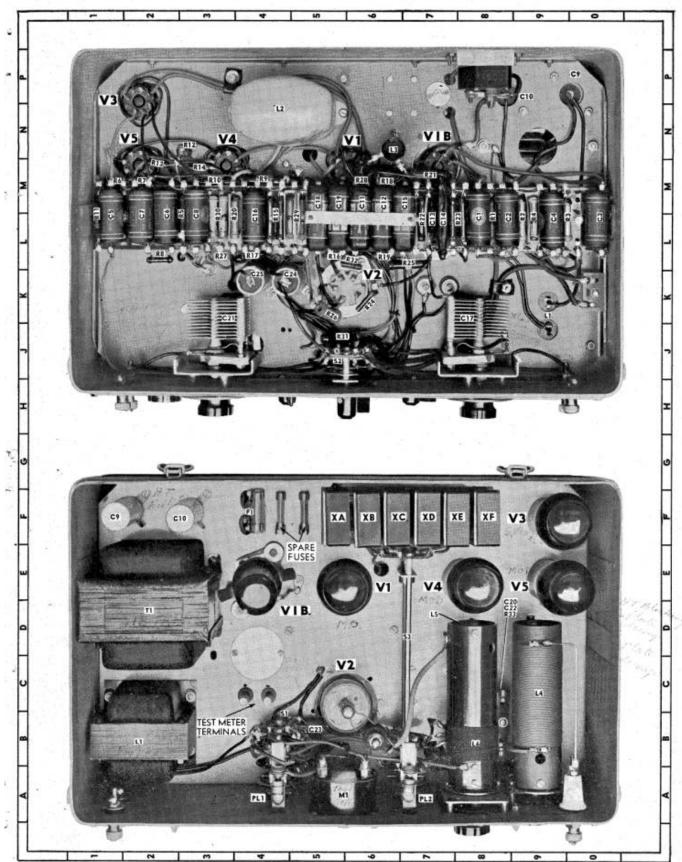


PLATE II.—TELERADIO 3BZ TRANSMITTER—TOP AND BOTTOM VIEWS.

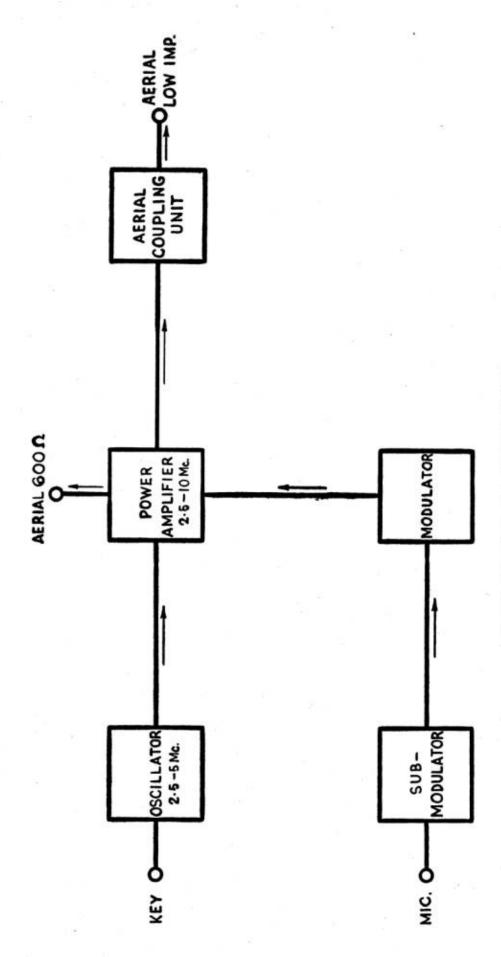


FIG. II. TELERADIO 38Z—BLOCK DIAGRAM.

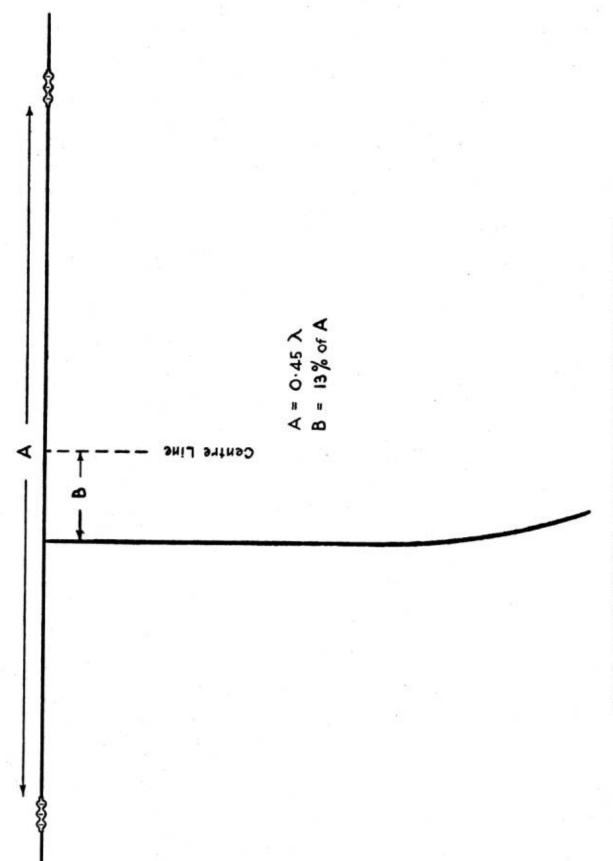
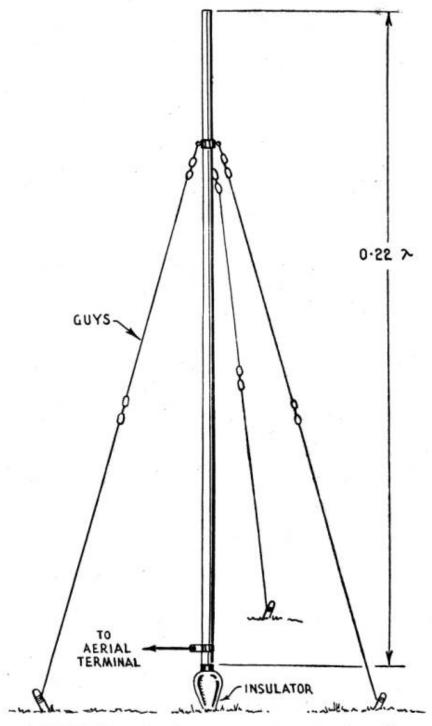


FIG. III. CONSTRUCTIONAL DETAILS OF A HALF-WAVE CENTRE-FED AERIAL.



A VERTICAL OR "GROUNDED MARCONI" AERIAL (QUARTER WAVE)

FIG. IV. A TYPICAL VERTICAL QUARTER-WAVE AERIAL.

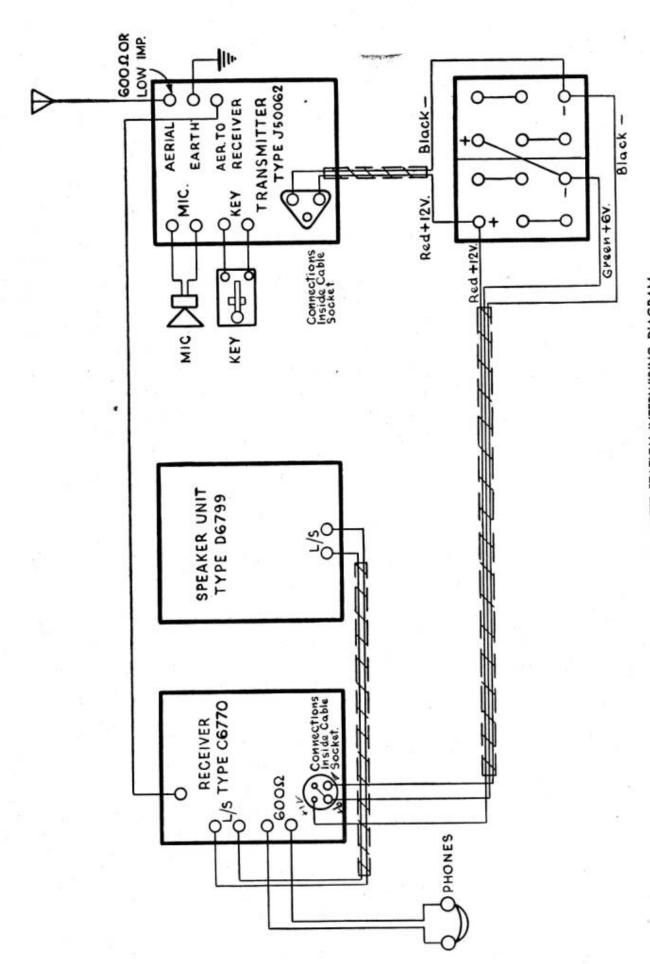


FIG. V. TELERADIO 3BZ COMPLETE STATION INTERWIRING DIAGRAM.