INSTRUCTION BOOK No. 17020R

Installation, Operation and Maintenance

Australian Army
Amenities Service Receiver

A.W.A. TYPE C17020

Compiled by VK2DYM
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INSTRUCTION BOOK No. 17020R

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FOREWORD

The A.W.A. Type C17020 is a dual wave receiver which has been designed by Amalgamated Wireless (Australasia) Ltd. especially for the Australian Army Amenities Service. The construction of the receiver and the performance required are within very strict limits established by the Directorate of Radio and Signals Supplies.

From time to time many reports, both technical and non-technical, have been received from Amenities Officers serving in all Areas where Australian troops have been in action, and it is the result of these many reports that the receiver has been constructed to the rigid specification laid down.

The main causes for complaint in the majority of receiving sets have been lack of resistance to weather conditions, insufficiently sturdy construction of the receiver, too light and insecure packing, and the use of components which have been unavailable as spare parts.

It is confidently expected that the type C17020 receiver will meet all that is asked of it, and, concurrently with the manufacture of these receivers, a large batch of spare parts has been manufactured which will be circulated to Amenities Depots with Formations.

When a radio receiver becomes inoperative from one cause or another, it is suggested that only qualified radio technicians effect repairs. Although this manual gives full information regarding circuits, voltages and currents, alignment, etc., if you are inexperienced, do not attempt to rectify a fault which may occur, but report the fault to your Amenities Officer, who can arrange for replacement of the faulty parts and for sound technical attention.

Australian Army

Amenities Service Receiver

A.W.A. TYPE C17020

CHAPTER I.

GENERAL DESCRIPTION

1.1. Introduction

The C17020 Amenities Receiver is a five-valve, 6 volt battery-operated superheterodyne, with a frequency coverage of 550 to 1650 kc and 6 to 18 Mc. in two bands. Designed for service conditions, and especially for tropical use, the Receiver is impregnated throughout and is housed in a waterproof metal case. Two silica-gel desiccators are fitted to the chassis as a further protection against the ingress of moisture. Instructions for re-activation or replenishment of silica-gel are given in Chapter 3, para. 3.3.

The Receiver is supplied ready for use in an impregnated carrying case from which it should not be removed except for purposes of repair and maintenance. Some early-production Receivers were supplied in a 2 compartment carrying case, the compartment on the left housing the 6 volt battery.

1.2. Electrical Specifications

Frequency Ranges—Medium Wave, 550 — 1650 kc.
Short Wave, 6 — 18 Mc.
Intermediate Frequency—455 kc.
R-F Alignment Frequencies—Medium Wave, 1500 kc. and 600 kc.
Short Wave, 17 Mc.
Battery—6 volts, 130 Ah capacity.
Battery Consumption—1.4 amp.
Valves—V1-1M5G R-F Amplifier.
V2-1C7G Converter.
V3-1M5G I-F Amplifier.
V4-1K7G Detector, A.V.C. and A-F Amplifier.
V5-1L5G Output.
Vibrator—6 volt Synchronous, Split-reed, Oak type, V5211.
NOTE: The locations of the valves and vibrator are shown in plate 2.
Loudspeaker—7 in. Permanent Magnet. Input Impedance—15,000 ohms. Voice Coil Impedance—3 ohms.
Fuse—5 amp.
The fuse is located in a three-way panel near the front of the chassis adjacent to the tuning capacitor. (See plate 2.) The fuse in circuit occupies the two centre clips, the remaining fuses supplied are spares.

CHAPTER II

INSTALLATION AND OPERATION

2.1. Installation

2.1.1. THE AERIAL

The importance of an efficient outside aerial, especially for short wave reception, cannot be over emphasised. A single wire between 50 and 100 feet long, including lead-in, is recommended.

The aerial should be erected as high as possible above and clear of surrounding objects such as trees, buildings, etc., and, preferably, should be erected over open ground. Insulators should be used between the wire and any object from which it is suspended, and it is desirable that no electrical joints be made. If it is necessary to make a joint it should be well soldered and, if steel wire is used, such as Army line telegraph cable, the joint should be protected with a piece of insulation tape. Among the types of wire most suitable for an aerial are 7/22 bare copper, 3/20 bare copper and D3 or D5 Army Cable.

2.1.2. THE EARTH

In most installations an earth wire will be found unnecessary, although, under certain conditions its use may improve reception. A short, direct lead of not less than 7/22 insulated cable firmly connected to a water pipe which travels under the ground or, alternatively, to a metal stake driven several feet into the ground will be found satisfactory. Particular care should be taken to see that the portion of the pipe or stake to which connection is made is perfectly clean to the base metal. A file or emery cloth may be used for this purpose. If available, an earth clip should be used for connecting the wire, but, failing this, the wire should be bound tightly around the pipe or stake for at least 1 inch.

If the earth stake is used the soil surrounding it should be kept damp.

2.1.3. THE BATTERY

The battery is supplied without acid and is not suitable for operation until filled and charged in the correct manner. This procedure must be carefully carried out, otherwise irreparable damage to the battery may result.

The instructions for initially charging an unfilled battery are as follows:—

1. Remove the cell-caps and fill the cells with pure sulphuric acid of 1340 specific gravity, having first tested the acid with a hydrometer. Allow to stand for 12 hours and then add sufficient 1340 acid to bring to original level.
2. Charge at 1.1/4 amps for at least 96 hours or 2 amps for at least 72 hours. In any case, continue the charge until the voltage and specific gravity of all cells show no further rise over a period of 5 hours.

   Distilled water should be added as required during the charge to maintain the acid level. Temperature during charge should not exceed 100° F. If this occurs the current should be reduced to allow the cells to cool.

3. Adjust the specific gravity of the cells to 1280 at 70° F. by adding water or 1340 acid while on charge.

Adjust the level of the electrolyte to 1/8 in. above tops of separators in all cells. Replace cell-caps and screw down firmly. Wipe the top of the battery clean and smear the terminals with vaseline.

WARNING: ONCE THE BATTERY HAS BEEN FILLED WITH ACID IT IS ESSENTIAL THAT IT BE KEPT UPRIGHT AT *ALL TIMES*.

See Chapter 3, sub-para. 3.1.2. for battery maintenance.

2.1.4. ROUTINE CHECK OF EQUIPMENT

The front of the equipment case is fastened by 14 screws; remove these and hinge the front of the case back. Keep the screws, for these will be needed when it is next desired to transport the equipment.

The Receiver should be checked for damage in transit and the following procedure must be carried out in the shortest possible time to prevent saturation of the silica-gel within the Receiver—see Chapter 3, para. 3.3:—

i. Four screws hold the chassis in the waterproof metal case, one in each corner of the front panel. The screws are provided with screwdriver slots and holes for the use of a tommy-bar. To remove the chassis, loosen the screws until they are free, then withdraw the chassis by grasping the handles provided.

ii. Having removed the chassis, check that all valves are in their correct sockets and correctly seated, that valve grid caps are firmly connected to the correct valves and that the valve screens and caps are properly fitted. Refer to plate 2 as a guide to the above.

iii. The vibrator cartridge is situated within the vibrator power unit—see plate 2. In order to reach the vibrator, the cover of the unit must be removed. To do this, remove a screw at the rear edge of the cover. The front edge clips into place in a slot. With the cover removed, check that the vibrator is firmly seated in the socket, then replace the cover.

iv. The fitting of the 5 amp. fuse on the panel near the centre front of the chassis base should be checked. Three fuses are supplied, one in circuit, two as spares. The fuse occupying the two centre clips is in circuit and in the event of the receiver failing to operate should be replaced with one of the spares as the first step in tracing the fault. Should the replacement fuse "blow" a further fuse should not be fitted until the cause of the trouble is located.

v. See that the silica-gel desiccators are filled and check the condition of the chemical—see Chapter 3, para. 3.3.

vi. Replace the chassis in the metal case and fully tighten the four holding screws.

2.2. Connecting Up

2.2.1. AERIAL AND EARTH

The aerial and earth terminals are located at the right hand side of the front panel and are marked "A" and "E", respectively—see plate 1. Connect the aerial and earth wires to the respective terminals.

2.2.2. BATTERY CONNECTIONS

The battery connector is fitted with two leads each with a clip attached. The positive (+) lead is RED, the negative (—) lead BLACK. Connect the leads to the positive (+) and negative (—) terminals of the battery, which are also marked with the positive and negative symbols.

2.3. Operation

2.3.1. LOUDSPEAKER COVER

The loudspeaker is protected by a cover which is fastened at the top and hinged at the bottom of the perforated grille. The cover should be fastened over the grille at all times when the Receiver is not in use.

2.3.2. CONTROLS

There are five controls as follows:—

1. **Tuning Control.**
The large knob in the centre of the dial. This is a dual control, which enables the operator to rotate the dial quickly to any region of the scale using the fast movement which is controlled by the inner portion of the knob.
The outer portion of the knob is the vernier movement, which has a ratio of 23 to 1.

2. **Volume Control.**
Volume is increased as the knob is turned in a clockwise direction.

3. **ON/OFF Switch.**
The switch has two positions—ON clockwise and OFF anti-clockwise.

4. **Range Switch.**
The switch has two positions—S.W. (Short Wave) clockwise, and M.W. (Medium Wave) anti-clockwise.

5. **Tone Control.**
Turning this knob in an anti-clockwise direction attenuates the high frequency response.

CHAPTER III

MAINTENANCE

NOTE: The wooden equipment case is supplied as a non-expendable item and is employed to keep the equipment self-contained, to render it more readily transportable, and to afford it protection. Therefore, the Receiver must not be removed from the equipment case unless for purposes of maintenance and repair. The waterproof metal case which houses the Receiver chassis should never be removed, as the chassis may be withdrawn as described in Chapter 2, sub-para. 2.1.4, item ii.

3.1. The Battery

3.1.1. REMOVING THE BATTERY WHEN INSTALLED IN CARRYING CASE

The battery is held in the equipment case by a metal "gate" which is tightened against the battery by a winged nut at the left-hand side. To remove the battery, loosen this nut, slide the "GATE" to the right and pull it forward by grasping it at the left-hand end. Withdraw the battery towards the front of the case.

3.1.2. BATTERY MAINTENANCE

Following the initial charge given to a new battery as described in Chapter 2, sub-para. 2.1.3, the battery should be charged regularly, depending upon the amount of service required from the equipment. The charging rate for the battery supplied with the equipment should not exceed 6 amps. The cells should be topped with distilled water or, failing that, clean rain-water. The top of the battery should be wiped clean after charging and the terminals smeared with vaseline. The specific gravity of the electrolyte should be 1280 when fully charged, and should not be allowed to fall below 1225. Readings of specific gravity taken with a hydrometer give a more reliable indication of battery condition than terminal voltage readings. Electrolyte should NEVER be added to a battery unless it is known that some has been spilt and then only by a person skilled in battery service.

3.2. Removal of Chassis from Metal Case

Instructions for removing the Receiver chassis from the waterproof metal case are given in Chapter 2, sub-para. 2.1.4, item ii.

3.3. Re-Activation or Replenishment of Silica-gel Desiccators

Two silica-gel desiccators are mounted on the chassis and within the equipment case to absorb any moisture which may enter.

Silica-gel possesses the power of absorbing 40-60% of its own weight of water and, at the same time, will reduce the relative humidity of the air on contact with it to approximately 45%. However, the capacity of silica-gel for water absorption is limited and when saturated is obviously incapable of further acton. The chemical may be re-activated by holding it at a temperature exceeding 240° F., but *not exceeding* 300° F., for at least half an hour. The latter temperature should not be exceeded, otherwise the power of absorption may be lost.

The silica-gel is contained in a fabric bag, which is removed by unscrewing the bakelite cap on the desiccator and withdrawing it by means of drawing strings attached to the bag.

Some silica-gel is coloured with cobalt chloride, which is pink when wet and blue when dry, providing a means of ascertaining when the chemical requires re-activating.

It is suggested that the process of re-activation or replenishment with fresh chemical be carried out monthly or on every occasion that the chassis is removed from the case, even for a short period. In tropical climates it may be necessary to re-activate or replenish the chemical more frequently. Care should be taken when refilling a desiccator to see that the fabric bag is serviceable, for spilled chemical may cause mechanical damage to the equipment.

3.4. Removal of Loudspeaker

Remove the four dome nuts which mount the grille and lift it from the mounting studs. These studs also mount the loudspeaker, which is removed by unscrewing four nuts. Connection is made to the loudspeaker by means of a plug and socket mounted on the cone housing.

Removal of the loudspeaker does not allow moisture to enter the equipment, as this is prevented by a rubber bag which is fitted to the front panel behind the unit.

3.5. Inspection and Removal of Tuning Knob Assembly

To inspect the tuning mechanism, unscrew the knurled button in the centre and remove the vernier or outer portion of the knob.

To remove the tuning assembly, proceed as above, then turn the knob to the extreme anti-clockwise position. Remove the anchor screw which is situated 7/8 inch to the right of the knob centre. Loosen the set screw which fastens the assembly to the drive spindle, entry to which is through a hole in the outer edge, and remove the knob and pointer.

When refitting the tuning knob, set the pointer to the end of travel mark on the dial, which is on the left between the characters "KC" and "MC", with the tuning capacitor plates in full mesh.

The calibration should be checked, using a signal generator or modulated oscillator before finally setting the pointer.

3.6. Alignment Procedure

3.6.1. MANUFACTURER'S SETTING OF ADJUSTMENTS

The Receiver is tested by the manufacturer with precision instruments and all adjustments locked or sealed. Re-alignment should be necessary only when components *in certain circuits have required replacement or repair.* However, it should not be assumed that re-alignment is required because a component, except in a tuned circuit, has been replaced. First, check the performance of the Receiver and if it is below normal, re-alignment will be necessary.

It is specially important that the adjustments should not be interfered with in any way unless in association with the correct testing instruments listed below.

If adjustments are necessary, the seal covering the adjusting screws must be broken or the locking nuts loosened.

Under no circumstances should the plates of the variable tuning capacitor, C3, C12, C18, be interfered with. This capacitor is aligned by the manufacturer and cannot be re-adjusted without the use of specialised precision instruments.

3.6.2. SETTING OF CONTROLS

In all operations in this Chapter the Receiver's controls should be in the following positions, unless otherwise stated:—

Volume Control	—	Maximum Clockwise.
Tone Control	—	Maximum Clockwise.
Range Switch	—	Medium Wave (M.W.).

3.6.3. TESTING INSTRUMENTS

(i) *Standard Signal Generator*

Frequency Range—450 Kc. to 18 Mc.
Output Range—1 microvolt to 1 volt.
Internal Modulation—30 per cent. at 400 c/s.

(ii) *Dummy Aerial*

I.R.E. standard in series with the output termination of the standard signal generator.

(iii) *Output Meter*

This instrument should have an output impedance of 15000 ohms and a range of 5-3000 milliwatts.

3.6.4. I.F. ALIGNMENT

(i) Connect the output meter across the primary of the output transformer, inserting a capacitor of approx. 1 μF in series, with the lead connected to the anode of the output valve.

(ii) Disconnect the grid connector from V2 and connect the active side of the standard signal generator in its place and the earth side to chassis.

(iii) Set the standard signal generator to 455 kc.

(iv) Align the I.F. transformers, beginning with the core within L16, which is the secondary of the 2nd I.F. transformer, and continuing with the primary, then the secondary and primary of the 1st I.F. transformer, for maximum output, as indicated on the output meter.

(v) Repeat iv until maximum output is obtained.

(vi) Disconnect the standard signal generator from the converter grid and replace the grid connector.

3.6.5. R.F. ALIGNMENT—MEDIUM WAVE

(i) Connect the active lead from the standard dummy aerial to the aerial terminal on the Receiver. Connect the other side of the dummy aerial to the Receiver chassis.

(ii) Set the standard signal generator to 1500 kc. and tune the Receiver to the signal. If the calibration of the Receiver is incorrect, adjust the M.W. oscillator trimmer C17 until calibration is correct.

(iii) Adjust the M.W. R.F. trimmer C11 and the M.W. aerial trimmer C2, in turn, for maximum output.

(iv) Set the standard signal generator to 600 kc. and tune the Receiver to the signal. If the calibration is incorrect, adjustment may be made by means of the magnetite core in the M.W. oscillator inductor L10.

(v) Repeat ii to iv.

3.6.6. R.F. ALIGNMENT—SHORT WAVE

(i) Set range switch to S.W.

(ii) Set the standard signal generator to 17.0 Mc. and tune the Receiver to the signal (if the Receiver is far out of alignment two signals may be heard—the one at the higher frequency is correct). If the calibration is incorrect, adjust the S.W. oscillator trimmer C21 until calibration is correct.

(iii) Adjust the short wave R.F and aerial trimmers (C10 and C1), in turn until maximum output is obtained. Two peaks may be found when adjusting the R.F trimmer, the correct one being that using the lower capacity.

(iv) Lock all trimmers and re-seal all screw adjustments.

CHAPTER IV

TECHNICAL DESCRIPTION

4.1. Introduction

The Receiver is of the superheterodyne type employing an intermediate frequency of 455 kc., the frequency of the local oscillator being higher than the signal frequency. One stage of R-F and one stage of I-F amplification are employed, these being followed by detector, audio amplifier and output stages.

The frequency ranges are:—

S.W. 6.0 — 18.0 Mc.

M.W. 550 — 1650 kc.

4.2. R-F Amplifier

A 1M5G super control R-F amplifier pentode V1 is employed as an R-F amplifier.

The input circuit comprises two inductors for each band, which are L1 and L2 on the M.W. band, and L3 and L4 on the S.W. band. L1 and L3 are high impedance aerial inductors inductively coupled to the grid inductors L2 and L4, respectively. The grid inductors are tuned, depending on the setting of the range switch, by means of the tuning capacitor C3, which forms part of the 3-gang tuning capacitor assembly. This circuit is trimmed by the variable trimmer capacitor C2 on the M.W. band and C1 on the S.W. band. C4 is a coupling capacitor between the tuned circuit and the grid of valve V1. V1 operates on zero bias, with no signal input, and obtains A.V.C. bias via de-coupling resistor R1. The screen grid voltage is obtained through the series resistor R11 from HT.

The output from V1 is applied to the grid of the converter valve V2 via inductors L5 and L6 on the M.W. band, L7 and L8 on the S.W. band, and coupling capacitor C13. L5 and L7 are high impedance inductors resonant outside the low frequency end of each band, respectively, and inductively coupled to the grid inductors L6 and L8. Top-capacity coupling is employed on the S.W. band by means of capacitor C9. The grid inductors are tuned, depending on the setting of the range switch, by means of the variable tuning capacitor C12, which forms part of the three gang tuning capacitor assembly. This circuit is trimmed by the variable trimmer capacitor C11 on the M.W. band and C10 on the S.W. band.

4.3. Frequency Converter

The 1C7G pentagrid converter V2 is employed as a frequency converter.

The output of the R-F amplifier is applied to the control grid of this valve as described in para. 4.2, and the local oscillations are provided by the oscillator section.

The oscillator operates in a tuned grid feed-back circuit. The tuned circuits comprise inductor L10 and padding capacitor C19 on the M.W. band and inductor L12 and padding capacitor C22 on the S.W. band, both circuits being tuned, depending on the position of the range switch, by tuning capacitor C18, which forms part of the 3-gang tuning capacitor assembly. These circuits are trimmed by trimmer shunt C17A and variable air trimmer C17 on the M.W. band and variable air trimmer C21 on the S.W. band. A magnetite core is also provided in the M.W. inductor L10 for alignment at the L.F. end of the band.

A space-charge neutralizing capacitor C16 is connected between the control grid and the oscillator grid.

The output of the converter section is coupled to the control grid of the I-F amplifier valve V3 via the I-F transformer L13-L14, both primary and secondary of which are tuned to the intermediate frequency by means of capacitors C29 and C30, adjustment being effected by means of magnetite cores.

Negative bias is obtained for V2 by means of the filament arrangement, the negative filament being 2 volts above chassis potential, thus giving the grid a bias of 2 volts in respect to the filament. A.V.C. bias is also provided on the M.W. band only.

Decoupling of the oscillator anode circuit is accomplished by means of the resistor—capacitor network comprising resistors R8, R7 and R5, and capacitors C25, C24 and C20 on the M.W. band, and resistors R8, R7 and R6, and capacitors C25, C24 and C23 on the S.W. band. The screen grid voltage is also obtained from this network, being connected to the junction of resistors R6 and R7, through resistor R4, and is by-passed by capacitor C14.

4.4. I-F Amplifier

V3 is a 1M5G super control R.F. amplifier pentode employed as an I-F amplifier, the input circuit of which has been described in para. 4.3.

This valve operates on zero bias with no signal input, but receives A.V.C. bias. Decoupling of the grid circuit is obtained by means of the resistor R10 and capacitor C32. The screen grid is connected to the screen grid of valve V1, and is by-passed by capacitor C33.

Capacitors C31 and C32 function as a neutralizing circuit for the grid-plate capacitance of the valve.

The output of this valve is applied to the diodes of valve V4 and the I-F transformer L15-L16, both primary and secondary of which are tuned by fixed capacitors C36 and C37, adjustments being effected by means of magnetite cores as in the 1st I-F transformer.

4.5. Detector, A.V.C. and A-F Stage

V4 is a 1K7G duo-diode pentode valve employed as a detector, A.V.C. and audio amplifier.

One diode acts as the signal detector, the other as the A.V.C. detector, and the pentode section as the A-F amplifier.

4.5.1. SIGNAL DETECTOR

The voltage developed across the secondary of the second I-F transformer L16 is applied to the diode D1 of valve V4. The diode load is provided by resistor R13 and volume control R14. R13, as well as forming part of the diode load, acts as an I-F filter in conjunction with capacitor C38. The A F component developed across the volume control R14 is applied to the control grid of the pentode section, which is connected to the moving arm of the control through coupling capacitor C39. The voltage applied to the grid of this valve depends on the setting of the control.

4.5.2. A.V.C. DETECTOR

The A.V.C. diode D2 is connected to the signal detector diode D1 through capacitor C43. The rectified voltage is developed across the diode load resistor R17. This voltage is proportional to the strength of the received carrier, and is used to provide negative bias to the A.V.C. controlled valves. The valves thus controlled are V1, via decoupling resistors R1 and R12. V3, via decoupling resistors R10 and R12, and V2, on M.W. band only, via decoupling resistors R2 and R12, and by-passed by capacitor C35.

4.5.3. A-F AMPLIFIER STAGE

The pentode section of V4 operates as an A-F amplifier. Resistor R18 forms the output impedance across which the A-F component is developed and applied to the control grid of the output valve V5 via coupling capacitor C46. Decoupling of the anode circuit is accomplished by means of resistor R19 and capacitor C45.

Screen grid voltage is obtained from HT through the series resistor R15, which is by-passed by capacitor C42.

Negative bias of 2 volts is obtained by means of the series filament arrangement of the valves, the negative filament of V4 being 2 volts positive in respect to the grid.

4.6. Output Stage

V5 is a 1L5G power amplifier pentode output valve, the anode of which is coupled to the loudspeaker via transformer T2. The screen grid is connected directly to high tension positive.

Negative bias is obtained by a combination of two methods:—

(i) By the series filament arrangement, which places the negative filament 4 volts positive in respect to the grid.

(ii) By back-bias resistor R27, which is in the negative H-T circuit, and across which is developed — 3.5 volts approx. This is applied to the grid via decoupling resistor R22 and grid resistor R21. A compensated feed-back circuit is incorporated by means of coupling capacitors C48 and C60, tone control R23, and by-pass capacitor C47.

4.7. Vibrator Power Supply Unit

The Vibrator Power Supply Unit type 6H6499 is a self-contained unit which is "earthed" to the Receiver chassis at one point only. The vibrator socket and the whole unit are cushion-mounted on rubber to reduce mechanical vibration.

The negative pole of the 6 volt battery is connected to the Receiver chassis. The supply voltage, after passing through the ON-OFF switch S2 and the L T fuse F1, is filtered by a network comprising choke L22 and capacitors C50, C54 and C55. The filtered supply is fed to the driving coil of the vibrator and also to the centre tap of the vibrator transformer primary. The vibrator primary contacts 1 and 6 are connected to the primary, across which a suppressor resistor R26 is connected.

The secondary of T1 is connected to contacts 2 and 5 of the vibrator, capacitors C52 and C56 and resistors R24 and R25 form the buffer circuits.

HT is taken from the centre tap of the secondary of T1 and is filtered by the network comprising chokes L20 and L21 and capacitors C53, C57 and C51.

Back bias for the output valve is developed by connecting HT negative, which is contact 3 on the vibrator, to chassis through resistor R27. This circuit is filtered by choke L19 and capacitors C26, C27, C28, C58 and C59.

TABLE I — WEIGHTS AND DIMENSIONS

Arrangement	Weight Lbs.	Length Ins.	Height Ins.	Depth Ins.
C17020 equipment in carrying case.	95	21	14.1/4	17
C17020 equipment in carrying case and complete with battery (when installed in carrying case).	145	29	14.1/4	17
C17020 Receiver only complete with valves, vibrator, etc.	51	16	11	12.1/4

TABLE II — SOCKET VOLTAGES AND CURRENTS

Valve Code	Valve Type	Function	Anode to Chassis (V)		Screen to Chassis (V)		Anode (mA)		Screen (mA)	
			M.W.	S.W.	M.W.	S.W.	M.W.	S.W.	M.W.	S.W.
V1	1M5G	R.F Amplifier	180	180	70	70	2.6	2.6	0.85	0.85
V2	1C7G	Converter	170	160	50	55	0.5	1.45	2.15	1.6
		Oscillator	65	110	—	—	1.8	3.4	—	—
V3	1M5G	I.F Amplifier	180	180	70	70	2.6	2.6	0.85	0.85
V4	1K7G	Det., A.V.C. and A.F Amp.	70	70	35	35	0.35	0.35	0.12	0.12
V5	1L5G	Output	178	178	180	180	9.5	9.5	2.3	2.3

Total H.T Current
23 mA.

Oscillator Grid Current
M.W. 220 — 260 μA.
S.W. 60 — 220 μA.

Measurements taken with 6.2 volts L.T input, no signal, and Volume Control at maximum.

Voltages measured with 1,000 ohms/volt meter.

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
		CAPACITORS—					
C1	ZAA303	Variable, No. 4 (Aust.)	2-20 $\mu\mu$F, air trimmer (piston type)	Aerial Trimmer (S.W.)	3-C2	A.W.A.	3661
C2	ZAA2853	Variable, No. 80 (Aust.)	2-10 $\mu\mu$F, air trimmer (piston type)	Aerial Trimmer (M.W.)	3-A2	A.W.A.	3658
C3	ZAA2854	Variable, No. 81 (Aust.)	Aer. section, 3 gang tuning	Aerial Tuning	2-H4	A.W.A.	16816
C4	ZAA257	Fixed, X2 (Aust.)	200 $\mu\mu$F, mica	Grid Coupling	2-H4	A.W.A.	224267
C5	ZAA2001	Fixed, 400, B (Aust.)	400 μF, 12PV, electrolytic	Filament By-pass	3-F6	Ducon	EE10782 (RC)
C6	ZAA223	Fixed, P1, C (Aust.)	0.1 μF, paper, 350V working	Filament By-pass	3-D4	A.W.A.	228121
C7	ZAA2001	Fixed, 400, B (Aust.)	400 μF, 12PV, electrolytic	Filament By-pass	3-L2	Ducon	EE10782
C8	ZAA280	Fixed, R1, C (Aust.)	1,000 $\mu\mu$F, mica	L.T. By-pass	3-E7	A.W.A.	224281
C9	ZAA2800	Fixed, Z4 (Aust.)	4 $\mu\mu$F, mica	Coupling	3-C5	A.W.A.	224233
C10	ZAA2853	Variable, No. 80 (Aust.)	2-10 $\mu\mu$F, air trimmer (piston type)	R-F Trimmer (S.W.)	3-C4	A.W.A.	3658
C11	ZAA2853	Variable, No. 80 (Aust.)	2-10 $\mu\mu$F, air trimmer (piston type)	R-F Trimmer (M.W.)	3-A4	A.W.A.	3658
C12	ZAA2854	Variable, No. 81 (Aust.)	R.F. section, 3 gang tuning	R.F. Tuning	2-H5	A.W.A.	16816
C13	ZAA257	Fixed, X2 (Aust.)	200 $\mu\mu$F, mica	Grid Coupling	2-H5	A.W.A.	224267

APPENDIX 1—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
C14	ZAA223	Fixed, P1, C (Aust.)	0.1 μF, paper, 350V, working	Screen Grid By-pass	3-D5	A.W.A.	228121
C15	ZAA2834	Fixed, Y7 (Aust.)	70 $\mu\mu$F, mica	Grid Coupling	3-D6	A.W.A.	13211*
C16		Fixed		Neutralising	2-J6	A.W.A.	
C17	ZAA2853	Variable, No. 80 (Aust.)	2-10 $\mu\mu$F, air trimmer (piston type)	Oscillator Trimmer (M.W.)	3-B6	A.W.A.	3658
C17A	ZAA8508	Fixed, Y14, A (Aust.)	14 $\mu\mu$F, mica	Osc. Trimmer Shunt (M.W.)	3-B6	A.W.A.	13211*
C18	ZAA2854	Variable No. 81 (Aust.)	Osc. section, 3 gang tuning	Oscillator Tuning	2-H6	A.W.A.	16816
C19	ZAA2805	Fixed, X44 (Aust.)	440 $\mu\mu$F, mica, $\pm$ 2.1/2%	Padding (M.W.)	3-B7	A.W.A.	13212*
C20	ZAA231	Fixed, Q5, B (Aust.)	0.05 μF, paper, 350V, working	Anode Decoupling	3-A6	A.W.A.	228115
C21	ZAA2853	Variable, No. 80 (Aust.)	2-10 $\mu\mu$F, air trimmer (piston type)	Oscillator Trimmer (S.W.)	3-C5	A.W.A.	3658
C22	ZAA2855	Fixed, R32 (Aust.)	3200 $\mu\mu$F, mica, $\pm$ 2.1/2%	Padding (S.W.)	3-B7	A.W.A.	13213*
C23	ZAA231	Fixed, Q5, B (Aust.)	0.05 μF, paper, 350V, working	Anode Decoupling	3-B7	A.W.A.	228115
C24	ZAA209	Fixed 8, B (Aust.)	8 μF, 525PV, electrolytic	Filter	3-E2	Ducon	EE10774
C25	ZAA209	Fixed 8, B (Aust.)	8 μF, 525PV, electrolytic	Filter	3-F2	Ducon	EE10774

* Capacitance and tolerance to be specified.

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.D.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
C26	ZAA242	Fixed, P5, F (Aust.)	0.5 μF, paper, 350V, working	R-F By-pass	3-J4	A.W.A.	228135
C27	ZAA208	Fixed, 25, C (Aust.)	25 μF, 40 PV, electrolytic	Filter	3-G3	Ducon	ET10769
C28	ZAA2040	Fixed, Q2, C (Aust.)	0.02 μF, mica	R-F By-pass	3-G3	A.W.A.	224807
C29	ZAA2834	Fixed, Y7 (Aust.)	70 $\mu\mu$F, silvered mica	1st I-F Transformer, Primary Tuning	2-F7	Simplex	
C30	ZAA2834	Fixed, Y7 (Aust.)	70 $\mu\mu$F, silvered mica	1st I-F Transformer, Secondary Tuning	2-F7	Simplex	
C31	ZAA2800	Fixed, Z4 (Aust.)	4 $\mu\mu$F, mica	Neutralising	3-J6	A.W.A.	224233
*C32	ZAA243	Fixed, Q1, H (Aust.)	0.01 μF, paper, 700V, working	A.V.C. Decoupling	3-H6	A.W.A.	228301
†C32	ZAA238	Fixed, Q3 (Aust.)	0.03μF, paper, 700V, working	A.V.C. Decoupling	3-H6	A.W.A.	228311
C33	ZAA223	Fixed, P1, C (Aust.)	0.1 μF, paper, 350V, working	Screen Grid By-pass	3-K7	A.W.A.	228121
C34	ZAA231	Fixed, Q5, B (Aust.)	0.05 μF, paper, 350V, working	Anode Decoupling	3-H7	A.W.A.	228115
C35	ZAA231	Fixed, Q5, B (Aust.)	0.05 μF, paper, 350V, working	A.V.C. Decoupling	3-J5	A.W.A.	228115
C36	ZAA2834	Fixed, Y7 (Aust.)	70 $\mu\mu$F, silvered mica	2nd I-F Transformer, Primary Tuning	2-J6	Simplex	
C37	ZAA2834	Fixed, Y7 (Aust.)	70 $\mu\mu$F, silvered mica	2nd I-F Transformer, Secondary Tuning	2-J6	Simplex	

* Serial numbers 1 to 250.

† Serial numbers above 250.

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
C38	ZAA2804	Fixed, X1, D (Aust.)	100$\mu\mu$F, mica	Signal Diode Filter	3-K6	A.W.A.	224261
C39	ZAA243	Fixed, Q1, H (Aust.)	0.01 μF, paper, 700V, working	Grid Coupling	3-J5	A.W.A.	228301
C40	ZAA223	Fixed, P1, C (Aust.)	0.1 μF, paper, 350V, working	H.T. By-pass	3-G3	A.W.A.	228121
C41	ZAA246	Fixed, 8C (Aust.)	8 μF, 525V, electrolytic	Filter	3-J1	Ducon	EG10810
C42	ZAA223	Fixed, P1, C (Aust.)	0.1 μF, paper, 350V, working	Screen Grid By-pass	3-K5	A.W.A.	228121
C43	ZAA2802	Fixed, Y5, C (Aust.)	50 $\mu\mu$F, mica	A.V.C. Diode Coupling	3-M5	A.W.A.	224255
C44	ZAA257	Fixed, X2, B (Aust.)	200 $\mu\mu$F, mica	Anode By-pass	3-L4	A.W.A.	224267
C45	ZAA242	Fixed, P5, F (Aust.)	0.5 μF, paper, 350V, working	Anode Decoupling	3-J3	A.W.A.	228135
C46	ZAA243	Fixed, Q1, H (Aust.)	0.01 μF, paper, 700V, working	Grid Coupling	3-K4	A.W.A.	228301
C47	ZAA236	Fixed, R5, B (Aust.)	0.005 μF, paper, 700V, working	Tone Control By-pass	3-J2	A.W.A.	228295
C48	ZAA231	Fixed, Q5, B (Aust.)	0.05 μF, paper, 350V, working	Feed-back Coupling	3-J2	A.W.A.	228115

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
C49	ZAA237	Fixed, R25 (Aust.)	0.0025 μF, paper, 700 V, working	Anode By-pass	3-L3	A.W.A.	228289
C50	ZAA208	Fixed. 25, C (Aust.)	25 μF, 40PV, electrolytic	Filter	3-F5	Ducon	ET10769
C51	ZAA243	Fixed. Q1. H (Aust.)	0.01 μF, paper, 700V, working	Filter	4	A.W.A.	228301
C52	ZAA218	Fixed. Q2, B (Aust.)	0.02 μF, paper, 700V, working	Buffer	4	A.W.A.	228307
C53	ZAA218	Fixed, Q2, B (Aust.)	0.02 μF, paper, 700V, working	Filter	4	A.W.A.	228307
C54	ZAA242	Fixed, P5, F (Aust)	0.5 μF, paper, 350V, working	L-T Supply R-F By-pass	4	A.W.A.	228135
C55	ZAA2837	Fixed. X32 (Aust.)	320 μμF, mica	L-T Supply R-F By-pass	4	A.W.A.	224271
C56	ZAA218	Fixed, Q2, B (Aust.)	0.02 μF, paper, 700V, working	Buffer	4	A.W.A.	228307
C57	ZAA2017	Fixed. 8H (Aust.)	8 μF, 525PV, electrolytic	Filter	4	Ducon	EE0849
C58	ZAA257	Fixed, X2, (Aust.)	200 μμF, mica	R-F By-pass	4	A.W.A.	224267
C59	ZAA253	Fixed, R2 (Aust.)	2,000 μμF, mica	R-F By-pass	4	A.W.A.	224287
C60	ZAA2828	Fixed, R15, C (Aust.)	1,500 μμF, mica	Feed-back Coupling	3-J3	A.W.A.	13213*
C61	ZAA245	Fixed, 400 (Aust.)	400 μF, 12PV, electrolytic	Filter	3-K7	Ducon	EG10853

* Capacitance and tolerance to be specified.

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Car. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
		RESISTORS (Note: In the	list below Ω = ohms, and MΩ	= megohms.)			
R1	ZAA704	1/2 watt, No. 4, 1 MΩ (Aust.)	1 MΩ, 1/2 watt	Grid Decoupling	2-J4	I.R.C.	
R2	ZAA704	1/2 watt, No. 4, 1 MΩ (Aust.)	1 MΩ, 1/2 watt	Grid Decoupling	2-J5	I.R.C.	
R3	ZAA698	1/2 watt, No. 4, 50,000 Ω (Aust.)	50,000 Ω, 1/2 watt	Osc. Grid Leak	3-D6	I.R.C.	
R4	ZAA670	1 watt, No. 3 or 4, 40,000 Ω (Aust.)	40,000 Ω, 1 watt	Screen Grid Feed	3-E2	I.R.C. or Chanex	600713 or 600513
R5	ZAA6679	1 watt, No. 3 or 4, 32,000 Ω (Aust.)	32,000 Ω, 1 watt	Osc. Anode Decoupling (M.W.)	3-F3	I.R.C. or Chanex	600711 or 600511
R6	ZAA6704	1 watt, No. 3 or 4, 500 Ω (Aust.)	500 Ω, 1 watt	Osc. Anode Decoupling (S.W.)	3-F3	I.R.C. or Chanex	600675 or 600475
R7	ZAA6704	1 watt, No. 3 or 4, 500 Ω (Aust.)	500 Ω, 1 watt	Osc. Anode and Screen Grid Decoupling	3-E2	I.R.C. or Chanex	600675 or 600475
R8	ZAA2856	1 watt, No. 3 or 4, 12,000 Ω (Aust.)	12,000 Ω, 1 watt	Osc. Anode and Screen Grid Decoupling	3-F2	I.R.C. or Chanex	600703 or 600503
R9	ZAA2856	1 watt, No. 3 or 4, 12,000 Ω (Aust.)	12,000 Ω, 1 watt	Anode Decoupling	3-G7	I.R.C. or Chanex	600703 or 600503
R10	ZAA700	1/2 watt, No. 3 or 4, 100,000 Ω (Aust.)	0.1 MΩ, 1/2 watt	Grid Decoupling	3-H6	I.R.C. or Chanex	600321

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
R11	ZAA6675	1 watt, No. 3 or 4, 63,000 Ω (Aust.)	63,000 Ω, 1 watt	Screen Grid Feed	3-G7	I.R.C. or Chanex	600717 or 600517
R12	ZAA0619	1/2 watt, No. 3 or 4, 1.6 MΩ (Aust.)	1.6 MΩ, 1/2 watt	A.V.C. Diode Decoupling	3-L5	I.R.C. or Chanex	600345
R13	ZAA698	1/2 watt, No. 3 or 4, 50,000 Ω (Aust.)	50,000 Ω, 1/2 watt	Signal Diode Filter	3-L6	I.R.C. or Chanex	600315
R14	ZAA603	Variable, 500,000 Ω (Aust.) No. 1	0.5 MΩ, carbon, variable	Volume Control	3-F8	Aerostat	5622
R15	ZAA680	1 watt, No. 3 or 4, 1 MΩ (Aust.)	1 MΩ, 1 watt	Screen Grid Feed	3-L6	I.R.C. or Chanex	600741 or 600541
R16	ZAA0619	1/2 watt, No. 4, 1.6 MΩ (Aust.)	1.6 MΩ, 1/2 watt	Grid Leak	3-J5	I.R.C.	
R17	ZAA2857	1/2 watt, No. 4, 2.5 MΩ (Aust.)	2.5 MΩ, 1/2 watt	A.V.C. Diode Load	3-L5	I.R.C.	
R18	ZAA676	1 watt, No. 3 or 4, 200,000 Ω (Aust.)	0.2 MΩ, 1 watt	Anode Load	3-K4	I.R.C. or Chanex	600727 or 600527
R19	ZAA671	1 watt, No. 3 or 4, 50,000 Ω (Aust.)	50,000 Ω, 1 watt	Anode Decoupling	3-K2	I.R.C. or Chanex	600715 or 600515
R20	ZAA698	1/2 watt, No. 4, 50,000 Ω (Aust.)	50,000 Ω, 1/2 watt	Grid Suppressor	3-L3	I.R.C.	
R21	ZAA2858	1/2 watt, No. 4, 400,000 Ω (Aust.)	0.4 MΩ, 1/2 watt	Grid Leak	3-L3	I.R.C.	

APPENDIX I—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
R22	ZAA700	1/2 watt, No. 4, 0.1 MΩ (Aust.)	0.1 MΩ, 1/2 watt	Grid Decoupling	3-L4	I.R.C.	
R23	ZAA7937	Variable, 100,000 Ω, (Aust.) No. 5	0.1 MΩ, carbon variable	Tone Control	3-B8	Aerostat	4540
R24	ZAA644	3 watt, No. 2, 100 Ω (Aust.)	100 Ω, 3 watt	Buffer	4	I.R.C.	AA Ctg. C. 602361
R25	ZAA644	3 watt, No. 2, 100 Ω (Aust.)	100 Ω, 3 watt	Buffer	4	I.R.C.	AA Ctg. C. 602361
R26	ZAA685	1/2 watt, No. 3 or 4, 400 Ω (Aust.)	400 Ω, 1/2 watt	Suppresor	4	I.R.C. or Chanex	
R27	ZAA2859	1 watt, No. 4, 160 Ω (Aust.)	160 Ω, 1 watt	Bias	3-C4	I.R.C. BW1	600273
		INDUCTORS—					
L1	ZAA2860	(Aust.) No. 171		Aerial Coupling (M.W.)	2-L3	A.W.A.	16800
L2	ZAA2860	(Aust.) No. 171		Input Tuning (M.W.)	2-L3	A.W.A.	16800
L3	ZAA2860	(Aust.) No. 171		Aerial Coupling (S.W.)	2-L3	A.W.A.	16800
L4	ZAA2860	(Aust.) No. 171		Input Tuning (S.W.)	2-L3	A.W.A.	16800
L5	ZAA2861	(Aust.) No. 172		Anode Coupling (M.W.)	2-L5	A.W.A.	16804

APPENDIX I—CIRCUIT CODE

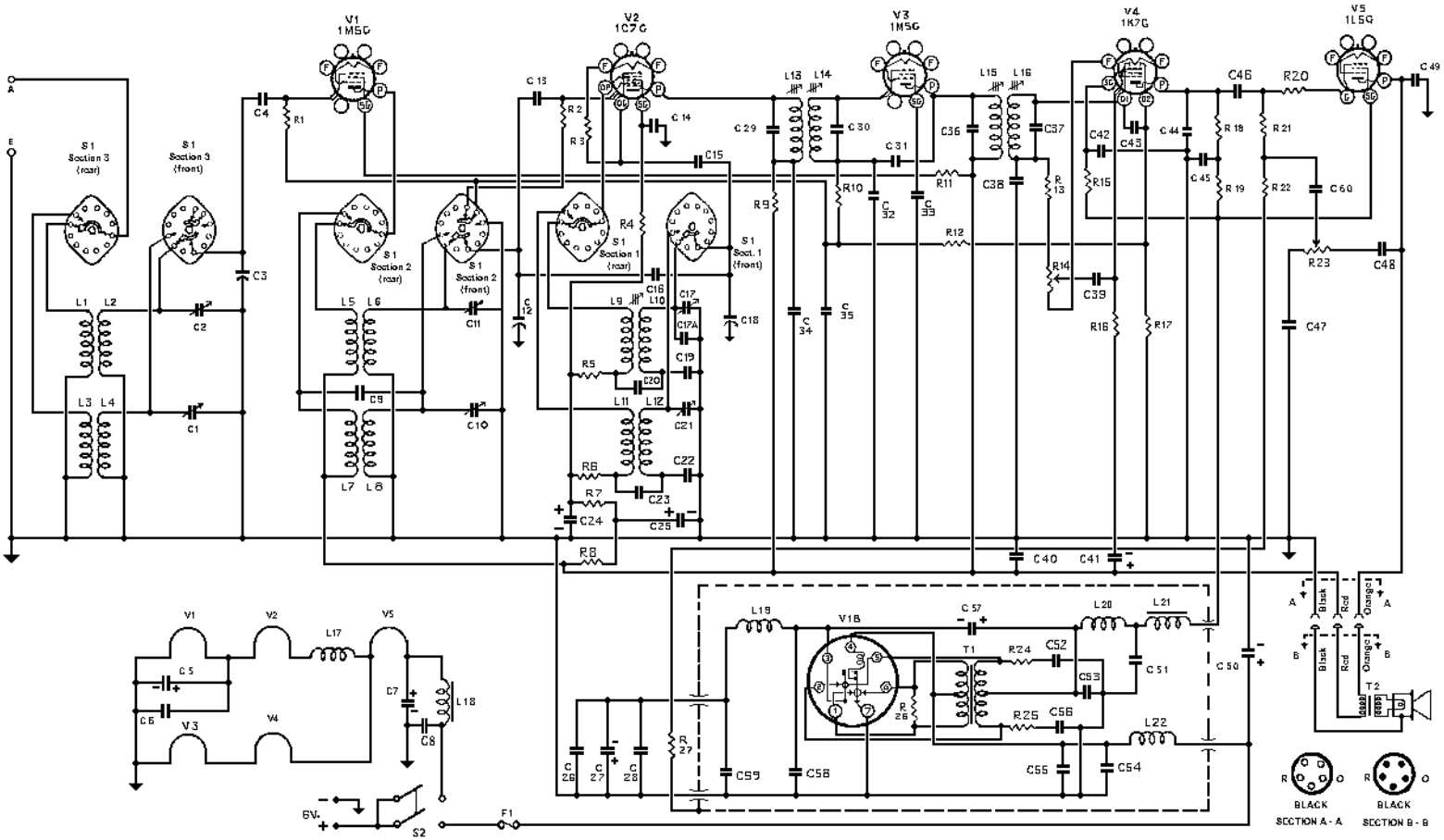
Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
L6	ZAA2861	(Aust.) No. 172		Input Tuning (M.W.)	2-L5	A.W.A.	16804
L7	ZAA2861	(Aust.) No. 172		Anode Coupling (S.W.)	2-L5	A.W.A.	16804
L8	ZAA2861	(Aust.) No. 172		Input Tuning (S.W.)	2-L5	A.W.A.	16804
L9	ZAA2862	(Aust.) No. 173		Osc. Anode Coupling (M.W.)	2-L7	A.W.A.	16802
L10	ZAA2862	(Aust.) No. 173		Osc. Grid Tuning (M.W.)	2-L7	A.W.A.	16802
L11	ZAA2862	(Aust.) No. 173		Osc. Anode Coupling (S.W.)	2-L7	A.W.A.	16802
L12	ZAA2862	(Aust.) No. 173		Osc. Grid Tuning (S.W.)	2-L7	A.W.A.	16802
L13	ZAA2863	Transformers, I.F. (Aust.) No. AR		1st I.F. Trans., Primary	2-F7	A.W.A.	8286Z
L14	ZAA2863	Transformers, I.F. (Aust.) No. AR		1st I.F. Trans., Secondary	2-F7	A.W.A.	8286Z
L15	ZAA2864	Transformers, I.F. (Aust.) No. AS		2nd I.F. Trans., Primary	2-C7	A.W.A.	8287Z
L16	ZAA2864	Transformers, I.F. (Aust.) No. AS		2nd I.F. Trans., Secondary	2-C7	A.W.A.	8287Z

APPENDIX I — CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
L17	ZAA8527	Chokes, R.F. (Aust.) 96		L-T R-F Choke	3-P6	A.W.A.	3149
L18	ZAA2865	Chokes, R.F. (Aust.) 104		L-T R-F Choke	3-F2	A.W.A.	1TU14805
L19	ZAA8530	Chokes, R.F. (Aust.) 97		R-F Choke	4	A.W.A.	13809
L20	ZAA2866	Chokes, R.F. (Aust.) 105		H-T R-F Choke	4	A.W.A.	3036
L21	ZAA2867	Chokes, R.F. (Aust.) 106		H-T R-F Choke	4	A.W.A.	1XA8430
L22	ZAA8527	Chokes, R.F. (Aust.) 96		L-T R-F Choke	4	A.W.A.	3149
		TRANSFORMERS—					
T1	ZAA2868	Vibrator R (Aust.)		Vibrator	4	A.W.A.	2TS6817
T2	ZAA2869	Telephone A.L. (Aust.)		Output	2-E9	A.W.A.	1XA3
		SWITCHES—					
S1	ZAA2870	8 pole, 2 way, A (Aust.)	8 pole, 2 way, rotary (oak type)	Range	3-C2 to C8	A.W.A.	16328
		Wafer 1					16328/1
		Wafer 2					16328/2
		Wafer 3					16328/3

APPENDIX 1—CIRCUIT CODE

Circ. Ref. No.	V.A.O.S. Cat. No.	V.A.O.S. Nomenclature	Description	Circuit Function	Plate and Location	Manufacturer	
						Name	Type
S2	ZAA7473	2-Pole, ON-OFF (Aust.)	2 pole, 2 way, toggle	ON-OFF	3-E8	Scanlan	
		FUSES					
F1	ZAA4766	Cartridge, No. 1, 5 amp. (Aust.)		L.T	2-F7		370D12
		VALVES					
V1	ZAA9620	W.T. Type 1M5G	Super control R-F amp. pentode	R-F Amplifier	2-K5	A.W.V.	1M5G
V2	ZAA904	W.T. Type 1C7G	Pentagrid converter	Converter	2-K7	A.W.V.	1C7G
V3	ZAA9620	W.T. Type 1M5G	Super control R-F amp. pentode	I.F Amplifier	2-D7	A.W.V.	1M5G
V4	ZAA907	W.T. Type 1K7G	Duo-diode pentode	2nd Det. A.V.C. and A-F Amplifier	2-C5	A.W.V.	1K7G
V5	ZAA9240	W.T. Type 1L5G	Power amplifier pentode	Output	2-C4	A.W.V.	1L5G
		VIBRATORS—					
	ZAA950		6V synchronous (oak type)	Vibrator	4	A.W.A.	V5211
		LOUDSPEAKERS—					
			7 inch permanent magnet. Voice coil imp. 3 Ω	Loudspeaker	2	A.W.A.	AY19



note : switch S1 viewed from knob end in extreme anti-clockwise position (M W)

FIG. 1. CIRCUIT DIAGRAM.

NOTE. Capacitor C61, which is not shown, is connected across the filament of valve V4.

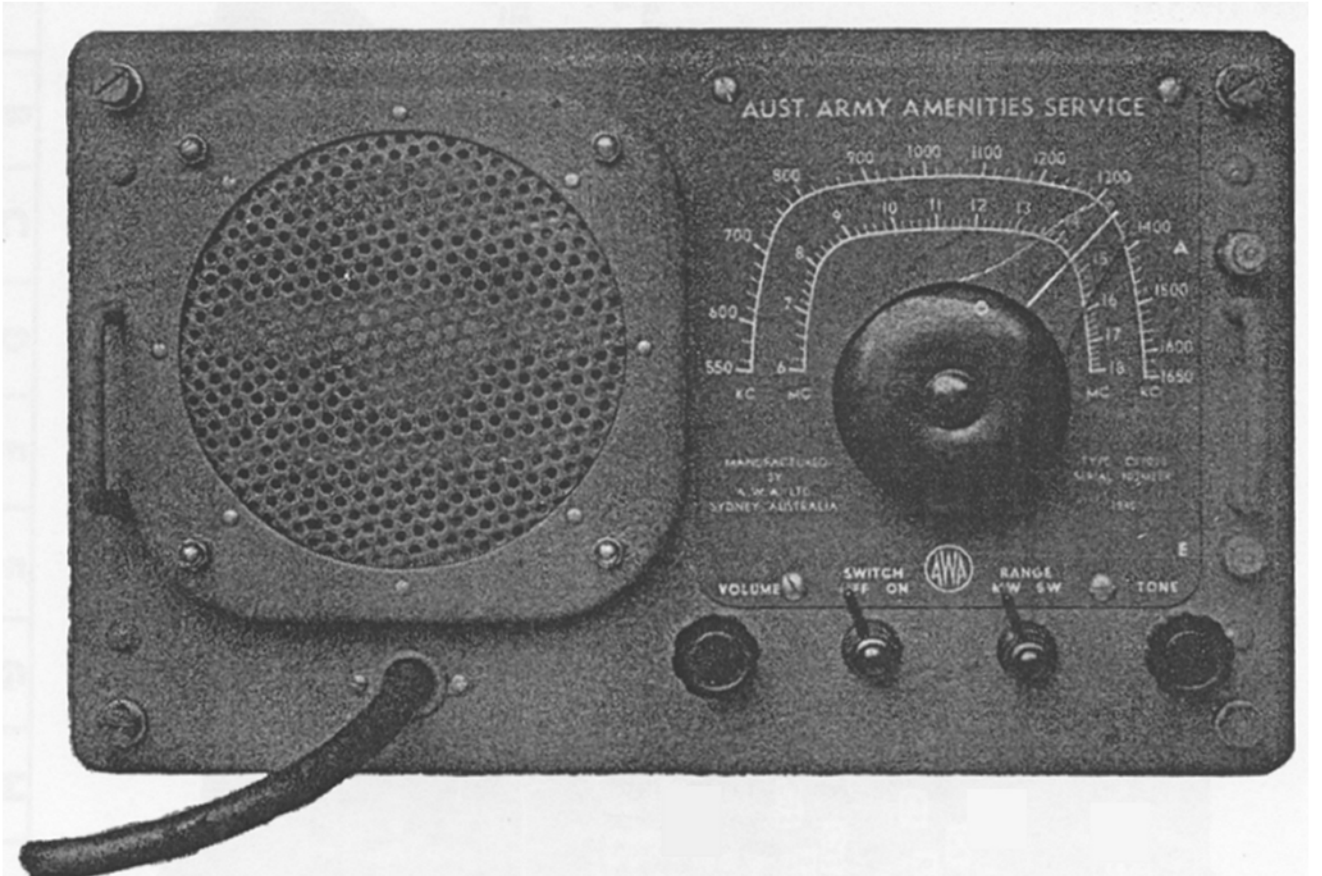


PLATE I. RECEIVER FRONT PANEL.

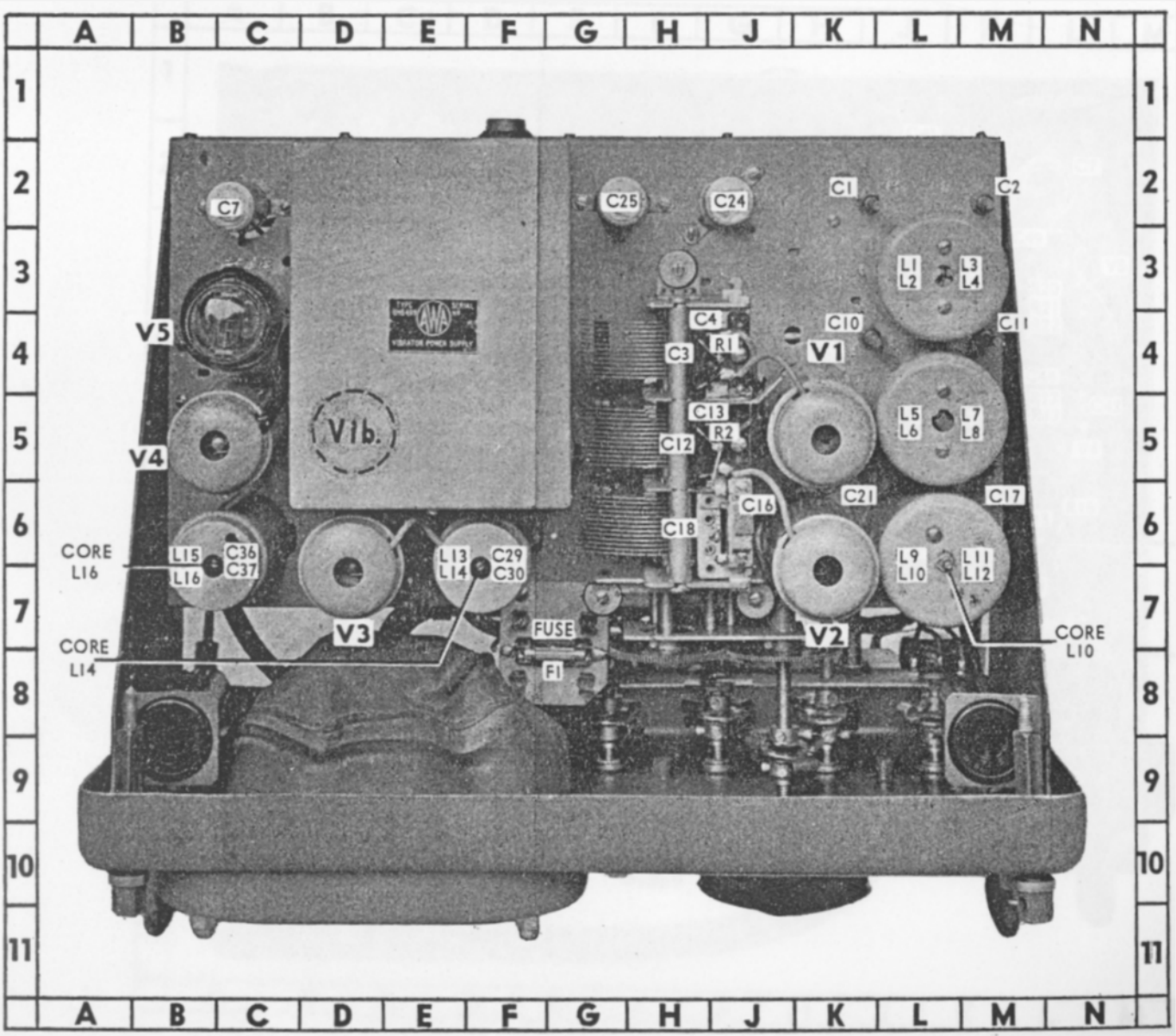


PLATE 2. RECEIVER CHASSIS — TOP VIEW.

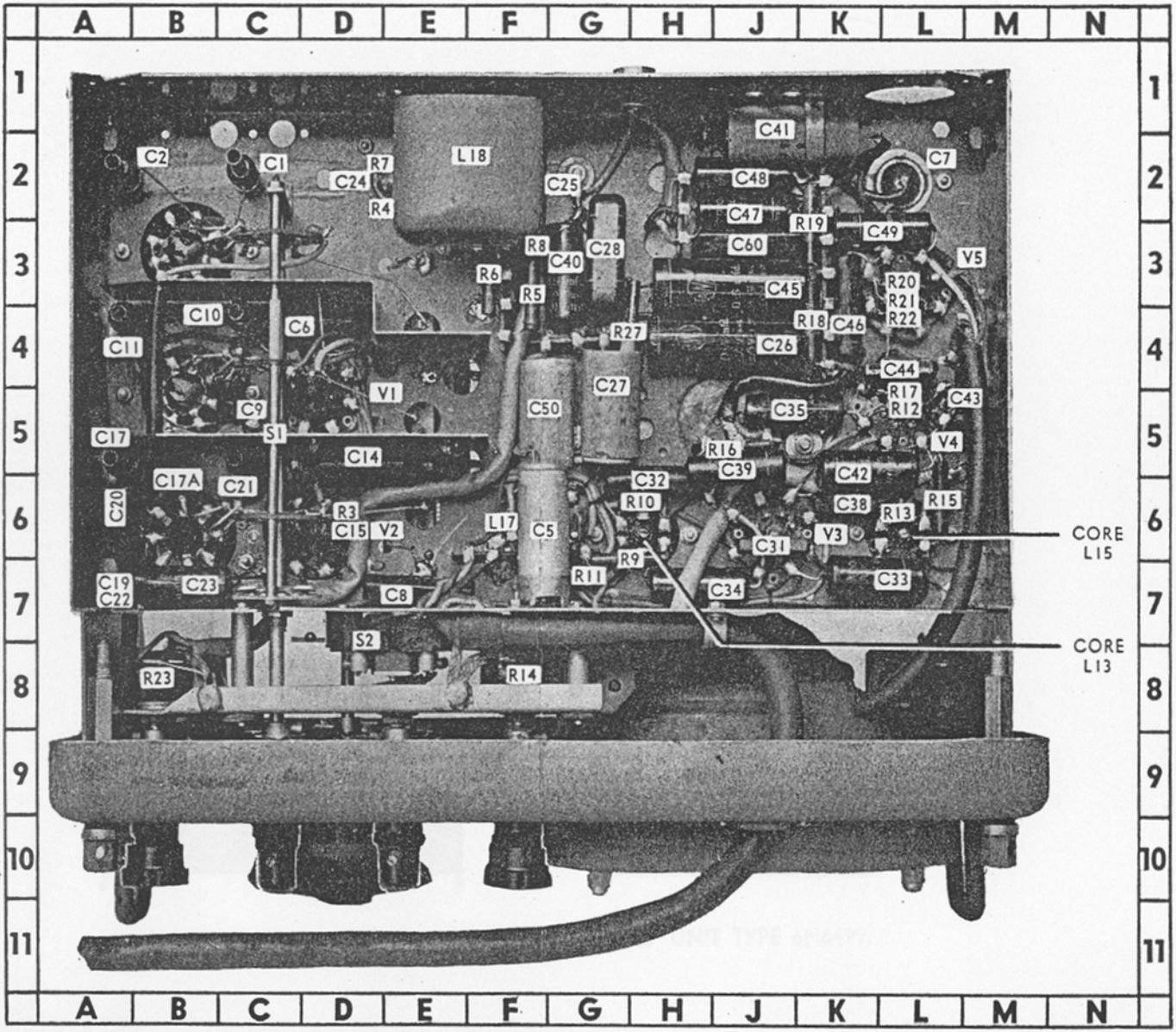


PLATE 3. RECEIVER CHASSIS — UNDERNEATH VIEW.

NOTE. Capacitor C61, which is not shown, is mounted on the front of the chassis base adjacent to valve V3.

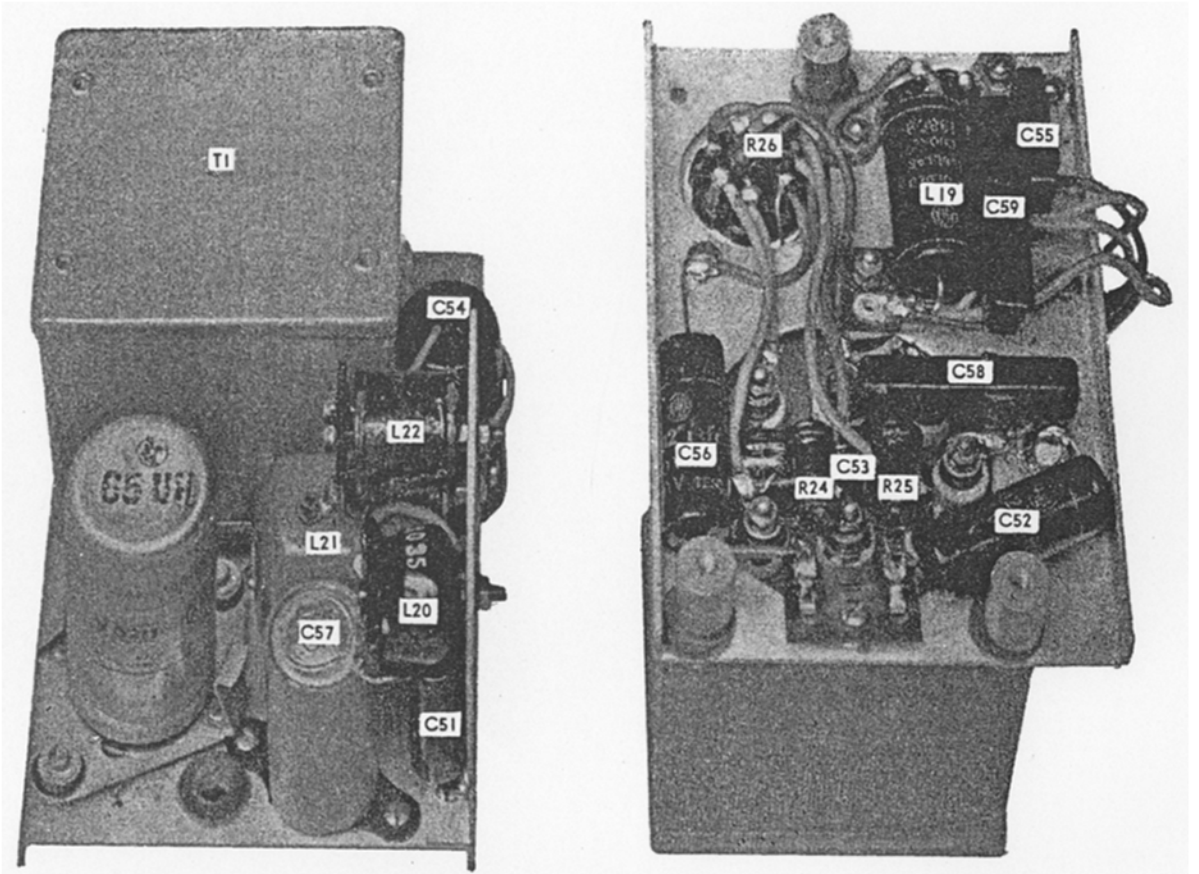


PLATE 4. VIBRATOR POWER SUPPLY UNIT TYPE 6H6499.