Wireless Set No 62

Service Manual

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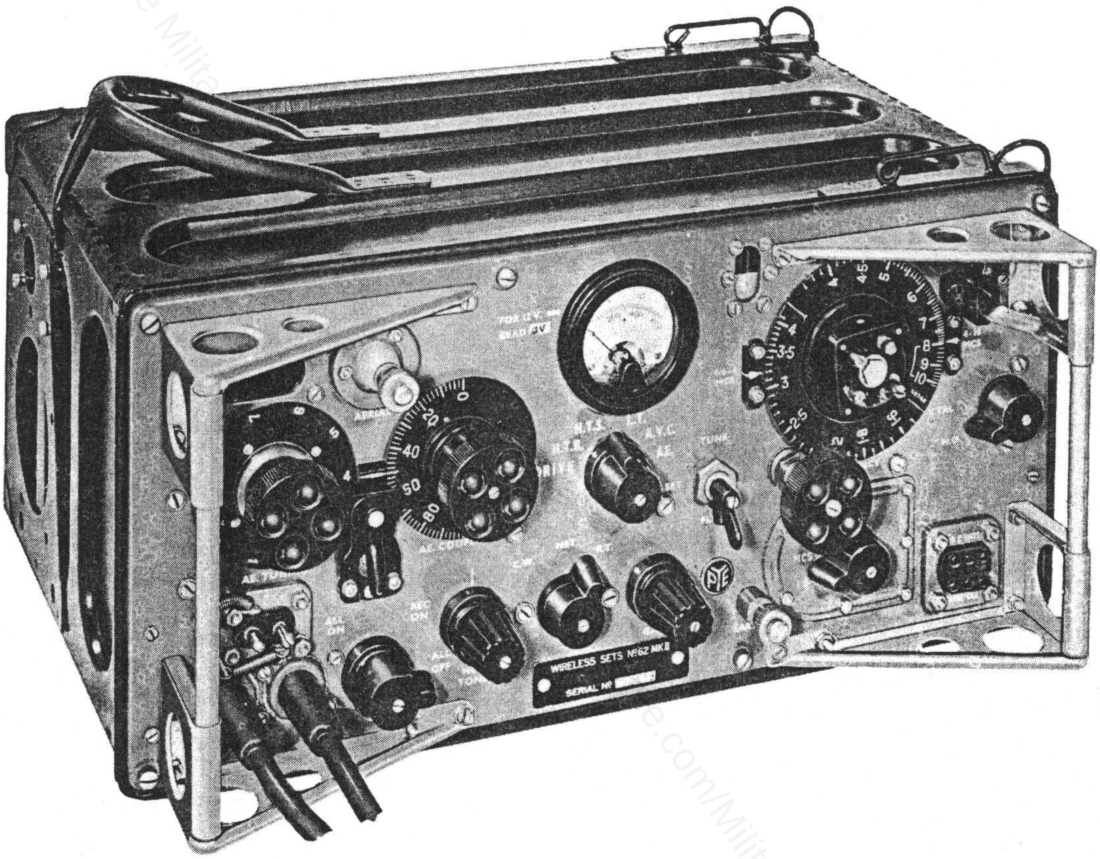


PYE WIRELESS SET 62

CHAPTER I

GENERAL DESCRIPTION

INTRODUCTION

The Pye Wireless Set 62 is a low power high frequency transceiver designed to operate from a 12 volt d.c. supply. It is intended for both military and civil purposes and may be used as a mobile or fixed station.

As a military equipment it has been adopted by the British Army for use in the following roles:-

Unarmoured vehicle station
Man-pack/animal-pack station
Fixed station

As a civil equipment it can be used as a general purpose, high frequency fixed or mobile station by police, oil companies, postal administrations and similar authorities. Operation of the equipment has been simplified to such an extent that operators need a minimum of instruction.

Facilities provided by the Wireless Set 62 are R/T and C.W. with provision for netting the operating frequency to a base station. Power for a crystal calibrator and an operator's lamp or remote control equipment can also be drawn from the equipment if required. A remote control unit is available providing inter-communication between the transceiver and control point, as well as remote operation of the Wireless Set 62 over a line or cable. Essential controls are luminised and a lamp can be supplied with a special ultra violet adaptor to enable the set to be used without illumination.

Two drop leads may be plugged into the equipment enabling two headsets and a morse key to be used at the same time.

The Wireless Set 62 is designed to work into rod aerials or into an end-fed horizontal wire aerial.

The equipment has a frequency coverage of 1.6 to 10.0 Mc/s divided into two bands 1.6 to 4.0 Mc/s and 4.0 to 10.0 Mc/s. In addition to normal tuning, a flick mechanism is incorporated for setting up on any two spot frequencies in the range 1.6 to 10.0 Mc/s. Both transmitter and receiver are tuned by the same controls and are automatically on the same frequency. The equipment is continuously tunable over the complete frequency range or can be crystal controlled on a spot frequency.

CONSTRUCTION

The Wireless Set 62 is housed in a steel case complete with carrying harness and front cover. It is both splash and rain-proof and will float supporting an additional weight of up to 20 lb. This fact renders it most dangerous for a man to attempt to swim with the equipment strapped to his back. All controls and connections are mounted on the front panel. The chassis is so designed that when removed from its case adequate mechanical protection is afforded to all vulnerable components.

FINISH

The external metal work is finished in Drab Olive and Dark Admiralty Grey. The equipment is tropicalised and the components have been chosen to ensure efficient operation in the extreme climatic conditions encountered in tropical and arctic regions.

BRIEF SPECIFICATION

Range of working

This varies with the length of aerial used. Using a 14 ft aerial, the approximate ranges under good conditions are:-

Stationary	C.W. 25 miles	R/T 15 miles
Mobile	C.W. 20 miles	R/T 11 miles

Power output

C.W. 0.78 to 1.1 watts depending on frequency
R/T 0.44 to 0.84 watts depending on frequency

Frequency range

The overall frequency range of 1.6 to 10.0 Mc/s is covered in two bands, 1.6 to 4.0 Mc/s and 4.0 to 10.0 Mc/s. The tuning range is dependent, however, on the length of aerial used. It should be noted that above 8.0 Mc/s there is a slightly reduced transmitter output on both M.O. and XTAL whilst at the same time the frequency accuracy is marginally below that from 1.6 to 8.0 Mc/s.

Power supply

The Wireless Set 62 operates from a 12 volt d.c. battery supply. The battery provides power for the valve heater circuits and the H.T. generator. The generator is a small rotary transformer which is housed with its associated components in a screened box and is mounted under the main chassis. A fan in the rotary transformer circulates air within the equipment generally.

Current consumption

The following table gives approximate figures of current consumption and working hours which may be obtained from each of the types of battery listed below when fully charged. These figures are given as a rough guide only and in practice there may be quite large differences depending upon the condition of the battery.

	Average Current	Approx. no. of working hrs for 12 volt battery		
		14Ah	22Ah	75Ah
Transmit R/T	4.6A	2.5	4.7	16.3
Transmit C.W.	5.0A	2.2	4.4	15
1:5 Transmit/Receive ratio	4.0A	3.2	5.5	18.7
Receive (ALL ON)	3.7A	3.6	5.9	20.3
Listening watch (REC. ON)	3.0A	4.5	7.6	25

Dimensions

$20\frac{1}{4}$" long x $10\frac{1}{4}$" high x $12\frac{3}{4}$" deep (51.5 x 27 x 32 cm)

Weight

30 lb (13.5 kg)

ALIGNMENT INSTRUCTIONS

Re-alignment is only necessary when the equipment fails to meet the performance figures quoted in the Electrical Specification (see pages 3 & 4). Normally this is after the equipment has been in use for a considerable period or when components which affect tuning are replaced. This chapter has been divided into sections and when re-aligning it is only necessary to carry out the instructions listed in the sections below.

Reason for Adjustment	Sections
IF stage re-alignment	1, 2
BFO stage re-alignment	3
RF stage re-alignment	5
Receiver oscillator re-alignment	4, 5
Sender-mixer and buffer amplifier re-alignment	6, 4, 2
Microphone amplifier (modulation) stage re-alignment	7
Meter replacement	8
Performance tests	9, 10, 11, 12

INSTRUMENTS REQUIRED

1. Dummy Aerials
   - (a) Receiver — 60pF ±2% condenser in series with the 10Ω output impedance of the signal generator.
   - (b) Transmitter — 60pF ±2% condenser in series with a non-reactive 10Ω ±5% 10W resistor.
2. Output Meter — having an impedance of 150Ω and capable or measuring up to at least 1W.
3. Thermal Ammeter — 0 - 500mA full scale deflection.
4. Signal Generator — having an output impedance of 10Ω and covering up to 15.0 Mc/s.
5. Crystal Calibrator — Pye Crystal Calibrator No. 10.
6. Beat Frequency Oscillator — having an output impedance of 600Ω. The following pad should be fitted between the output of the BFO and the equipment under test.

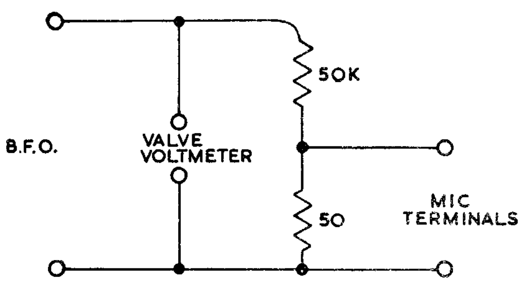


Fig. 9 Attenuator Pad

7. Valve Voltmeter

8. Universal Test Meter — having a sensitivity of 500Ω/volt (Avometer Model 7 suitable).

9. Trimming Tool

10. Damping Device — consisting of a 0.1μF capacitor and 20kΩ resistor connected in series.

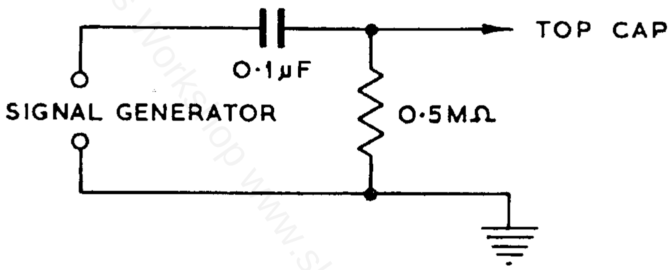
NOTES:-
1. For all oscillator tests a dummy base coverplate should be used to simulate the effect on the coils of the actual base plate.
2. The signal generator should be checked periodically against a crystal calibrator at the frequencies used for oscillator alignment.

1. I.F. ALIGNMENT & SENSITIVITY

(a) Set system switch SD to R/T and switch SC to 'ALL ON'.

(b) Connect output meter to harness socket pins SKTAb and SKTAc (see Fig. 16).

(c) Connect the signal generator to the control grid (top cap) of VIE, as shown in diagram.



(d) Set signal generator to give a 400 c/s 30% modulated output at a carrier frequency of 460 kc/s.

(e) Trim secondary of T3 for maximum output. (Tuning slug on top of can).

(f) Trim primary of T3 for maximum output. (Tuning slug on underside of can).

(g) Repeat (c) to (f) connecting the signal generator, as in diagram above, to VID and trim T2 for maximum output.

(h) Connect the signal generator as shown in the diagram above, to VIB.

(j) Connect the damping device (0.1μF capacitor and 20kΩ resistor in series) across the primary of T1 (anode of V1B and junction of R8 and C16) and trim the secondary of T1 for maximum audio output. (Tuning slug on top of can).

(k) Transfer the damping device to the secondary of T1 (between grid of V1D and chassis) and tune the primary of T1 for maximum audio output. (Tuning slug on underside of can).

(l) Check that the sensitivity is better than 120μV for a 50mW output.

2. I.F. BANDWIDTH

(a) Connect signal generator to V1B and output meter as in Section 1 (b).

(b) Set the signal generator output to 100μV and tune to the centre of the I.F. response.

(c) Adjust GAIN control RV2 to give an output of 10mW.

(d) Increase a signal generator output to 200µV.

(e) Detune the signal generator on either side of resonance in turn to give an audio output of 10mW. The total bandwidth between these two points should be between 5 and 8 kc/s.

(f) Without disturbing the setting of GAIN control RV2, adjust the signal generator output to 100mV.

(g) Detune the signal generator on either side of resonance in turn to give an audio output of 10mW. The total bandwidth between these two points should not be greater than 28 kc/s.

3. <u>BFO ADJUSTMENT</u>

(a) Connect signal generator, as in Section 1.

(b) Tune the signal generator accurately to 460 kc/s, switch off modulation and adjust output to 100µV.

(c) Set system switch SD to NET and adjust L11 for zero beat in headphones. (L11 located on top of can).

(d) Set system switch to C. W. and check that zero beat occurs roughly in the central position of HET. TONE control. The range of audio tone produced by RV1 on either side of the centre line should be approximately 3 kc/s.

(e) Set system switch to R/T and adjust modulated input to give 20mW output.

(f) Switch modulation off and set system switch to C. W.

(g) Adjust HET. TONE control RV1 for maximum audio output.

(h) Adjust twisted wire condenser C59 for maximum audio output, (approximately 100mW).

(j) Re-seal C59.

(k) Repeat (b) and (c).

(l) Re-seal the core of L11.

4. <u>OSCILLATOR (V1C) ADJUSTMENTS</u>

<u>'H.F' Band</u> (4.0 - 10.0 Mc/s)

(a) Tune signal generator to 9.0 Mc/s, unmodulated, and feed a signal of 100 - 150µV between top cap of V1B and chassis.

(b) Set system switch SD to NET and receiver frequency dial to 9 0 Mc/s. Adjust C12B for zero beat in headphones. (C12B located on underside of chassis).

(c) Set signal generator and receiver frequency dial to 4 Mc/s. Adjust L6A for zero beat in headphones. (L6A located on top of chassis).

(d) Repeat (a) to (c) until calibration holds at both 9.0 and 4.0 Mc/s.

(e) Check calibration at 1 Mc/s intervals with the aid of a crystal calibrator. The error at each point should not exceed the following:-

Between 8 Mc/s and 10 Mc/s ±1%
Between 4 Mc/s and 8 Mc/s ±0.5%

(f) Re-seal C12B and the core stem of L6A.

'L.F' Band (1.6 - 4.0 Mc/s)

(a) Set signal generator to 4.0 Mc/s, unmodulated, and feed a signal of 100 - 150µV between top cap of V1B and chassis.

(b) Set system switch SD to NET and receiver frequency dial to 4.0 Mc/s 'L.F'. Adjust C12A for zero beat in headphones. (C12A located on underside of chassis).

(c) Set signal generator and receiver frequency dial to 1.7 Mc/s and adjust core of L5A for zero beat in headphones. (L5A located on top of chassis).

(d) Repeat (b) and (c) until calibration holds at both points.

(e) Check calibration at 1 Mc/s intervals with the aid of a crystal calibrator. The error at each point should not exceed ±0.5%.

(f) Re-seal C12A and the core stem of L5A.

5. RECEIVER RF ANODE CIRCUIT ADJUSTMENTS & OVERALL SENSITIVITY

'H.F' Band (4.0 - 10.0 Mc/s)

(a) Set signal generator to 9.0 Mc/s, modulated 30% at 400 c/s and connect it to the aerial terminal via the dummy aerial.

(b) Set system switch SD to R/T.

(c) Connect output meter across harness socket pins SKTAb and SKTAc.

(d) Tune receiver controls to signal generator. Adjust C10A (at the same time adjusting the main tuning condenser for maximum audio output. (C10A located on underside of chassis).

(e) Set the signal generator to 4.0 Mc/s and tune the receiver controls to the signal generator. Adjust L2A for maximum audio output. (L2A located on top of chassis).

(f) Repeat (d) and (e) until no further improvement in audio output is obtained.

(g) Check the overall sensitivity for 50mW receiver output at the following frequencies:- 4.0, 6.0 and 9.0 Mc/s. Aerial coupling control to be adjusted to the figure given in Table C in Operating Instructions'.

(h) The overall sensitivity should be better than 4µV at 9.0 and 6.0 Mc/s and 6µV at 4.0 Mc/s.

(j) Re-seal C10A and the core stem of L2A.

'L.F' Band (1.6 - 4.0 Mc/s)

(a) Set the signal generator to 4.0 Mc/s and tune the receiver controls to the signal generator.

(b) Adjust C11A for maximum audio output. (C11A located on underside of chassis).

(c) Set the signal generator to 1.7 Mc/s and tune the receiver controls to the signal generator.

(d) Adjust L3A for maximum audio output. (L3A located on top of chassis.)

(e) Repeat (a) to (d) until no further improvement in output is obtained.

(f) Check overall sensitivity for 50mW receiver output at the following frequencies:- 4.0, 2.5 and 1.7 Mc/s. Aerial coupling control to be adjusted to the figure given in Table C in 'Operating Instructions'.

(g) The overall sensitivity should be better than 3µV.

(h) Re-seal C11A and the core stem of L3A.

6. SENDER-MIXER & BUFFER AMPLIFIER CIRCUIT ADJUSTMENTS

'L.F' Band (1.6 - 4.0 Mc/s)

(a) Set range switch to 1.6 - 4.0 Mc/s and the frequency control to 4.0 Mc/s

(b) Set ON/OFF switch to ALL ON, meter switch to DRIVE and M.O./XTAL switch to XTAL, but do not plug in the crystal.

(c) A reading on the built-in meter (cathode current of V6A) of approximately 26 - 28mA should be obtained.

(d) Set M.O./XTAL switch to M.O. and the frequency control to 3.5 Mc/s.

(e) Set C28A one turn from maximum. (C28A located on underside of chassis.)

(f) Adjust C11B and C11C for maximum drive, as indicated on meter. (C11B and C11C located on underside of chassis.)

(g) Set frequency control to 1.7 Mc/s.

(h) Adjust L3C for maximum drive, as indicated on meter (L3C located on top of chassis).

(j) Adjust L3B to minimum (anticlockwise). Rotate the core of L3B clockwise until the second peak is obtained on the meter. (L3B located on top of chassis).

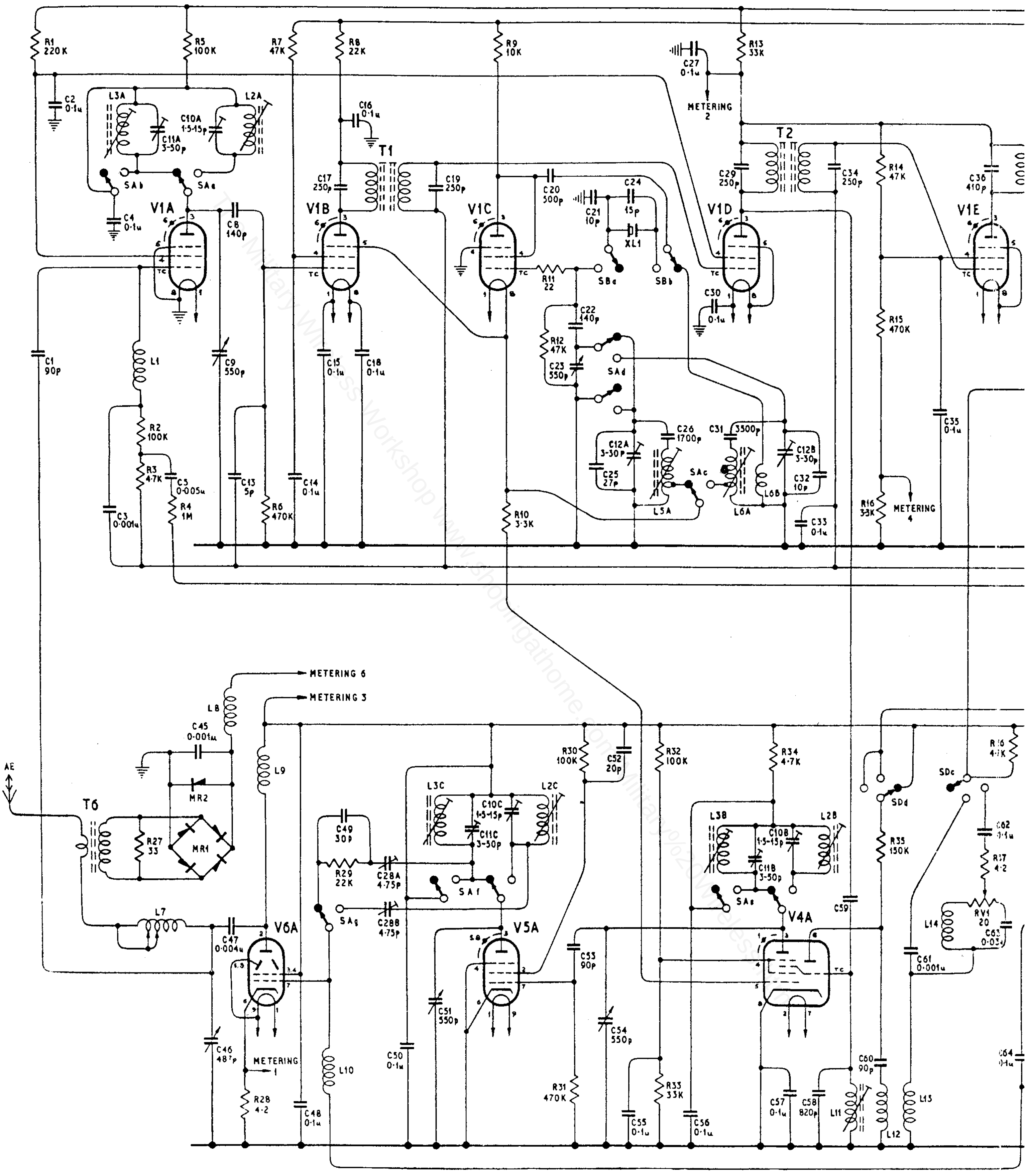
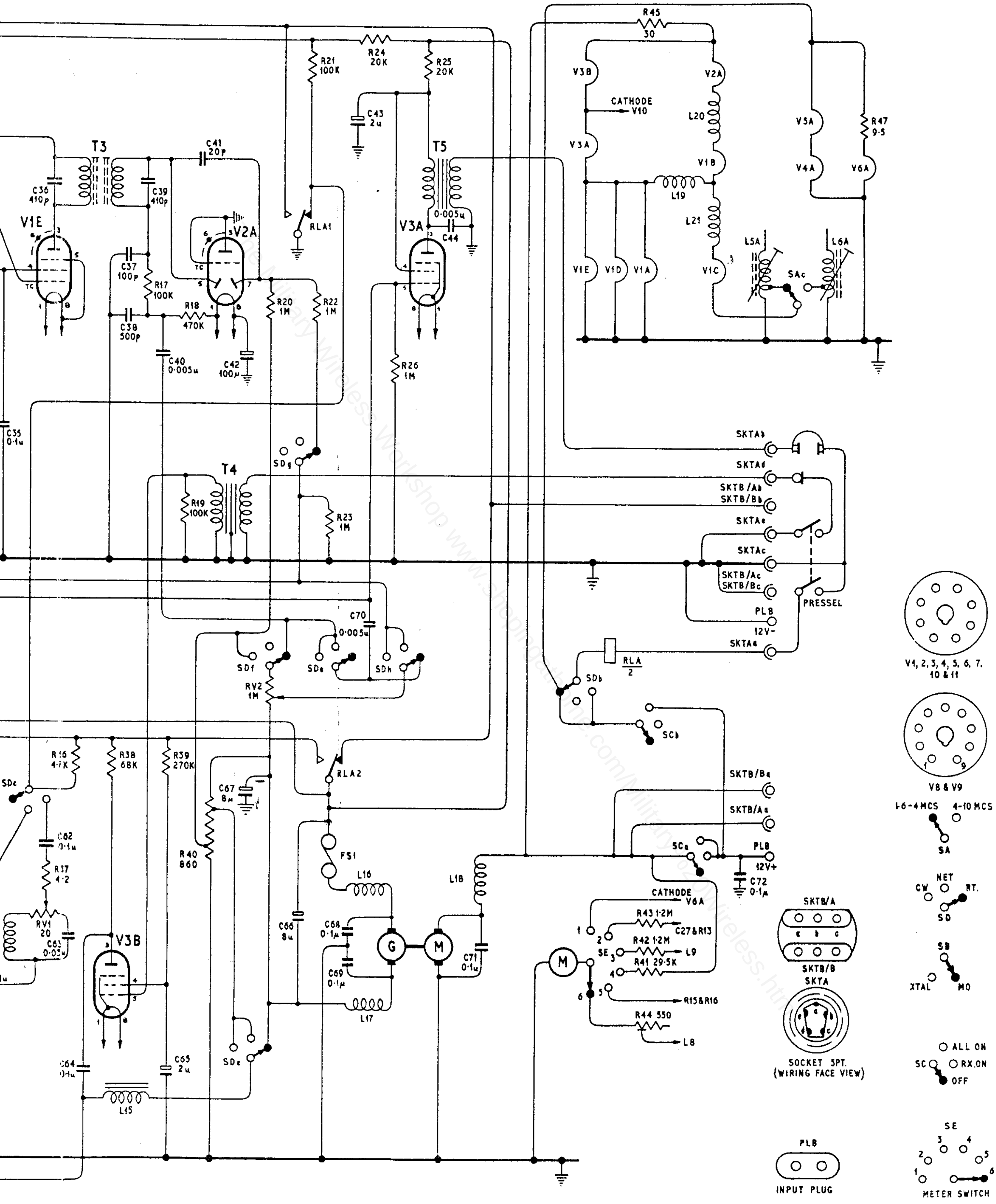


Fig. 16 TRANSCEIVER C



CR CIRCUIT DIAGRAM

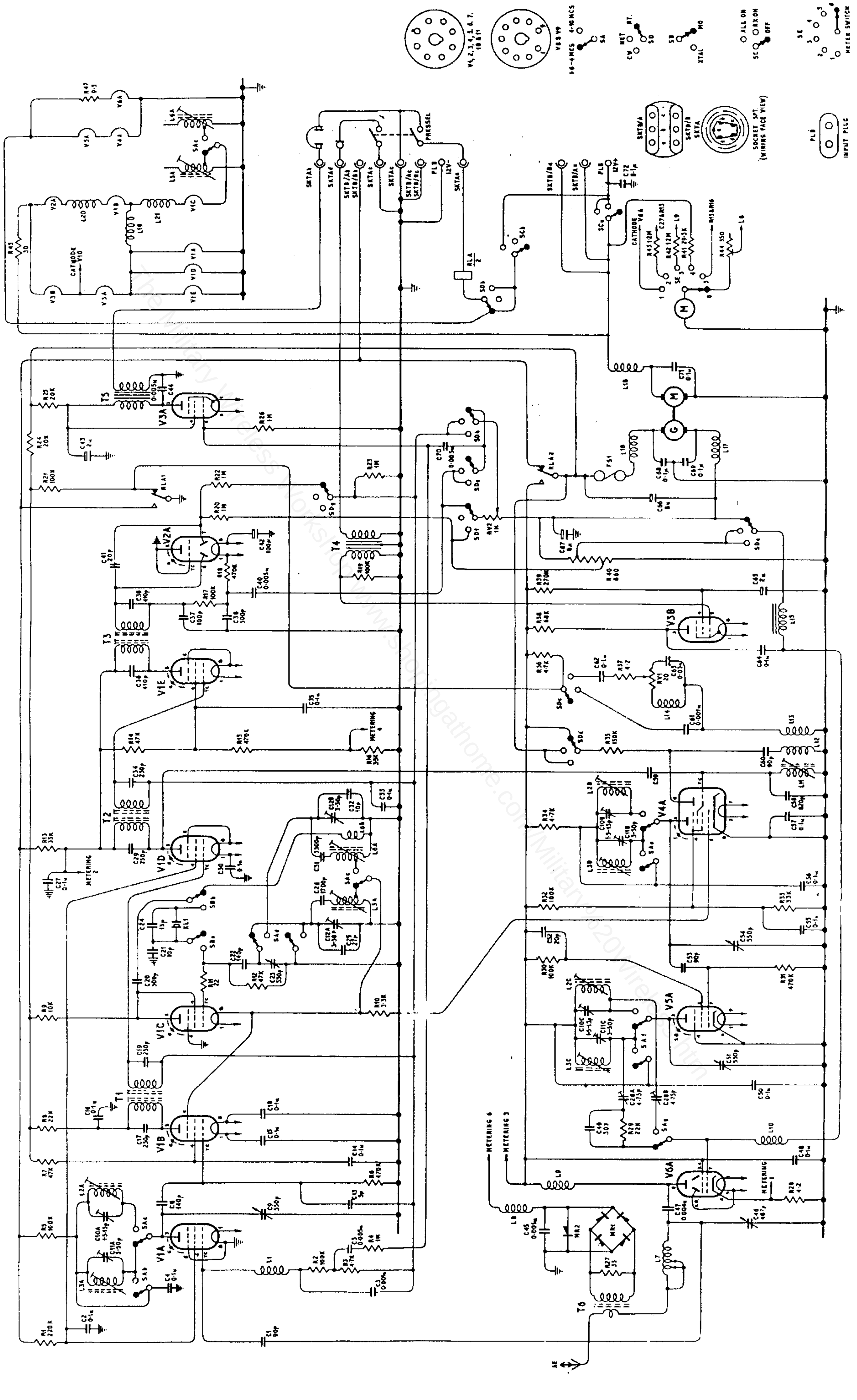


Fig. 16 TRANSCEIVER CIRCUIT DIAGRAM

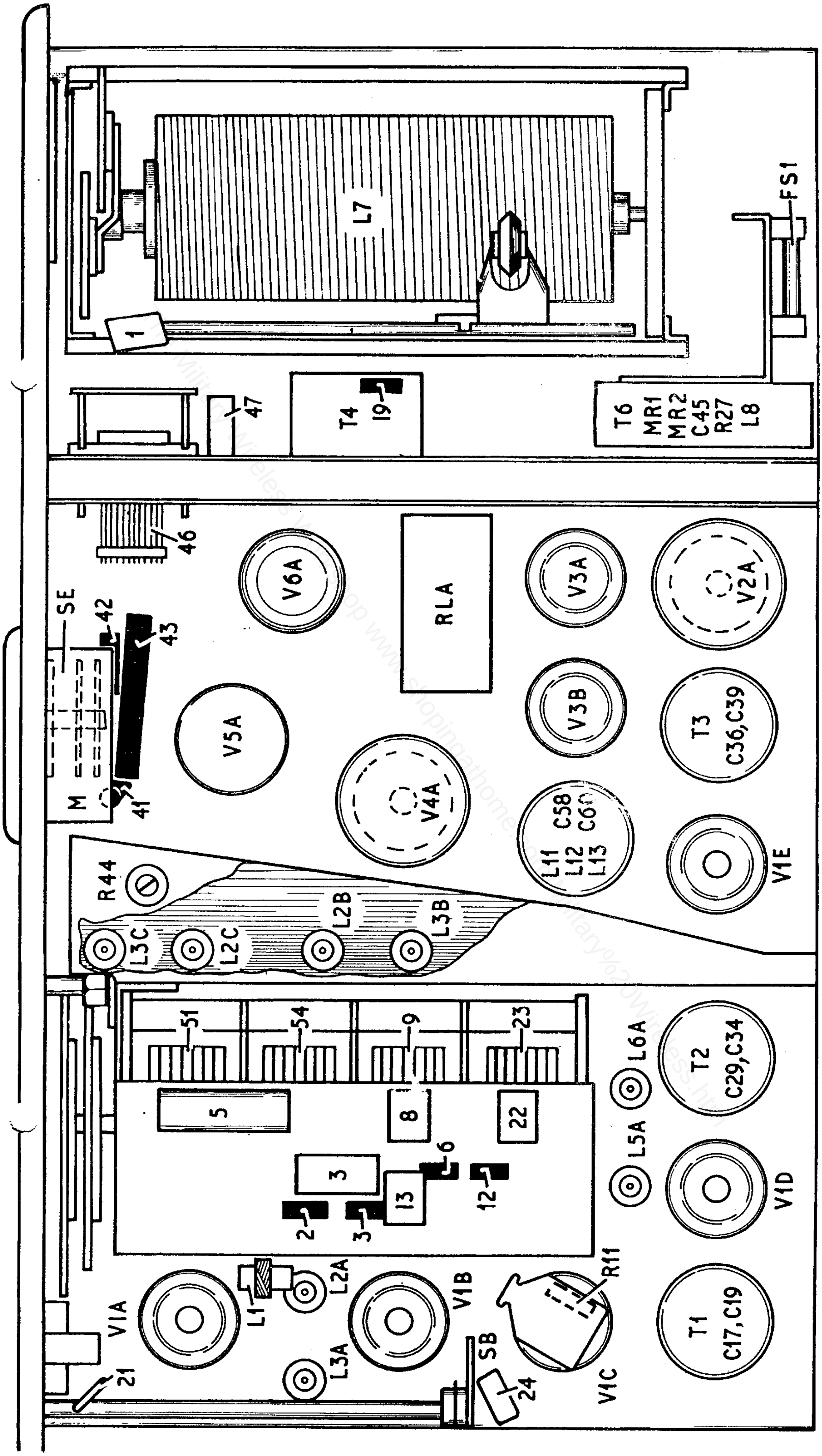


Fig.14 TRANSCEIVER TOP CHASSIS LAYOUT

NOTE: RESISTORS SHOWN BLACK

* ENCLOSED IN SLEEVING

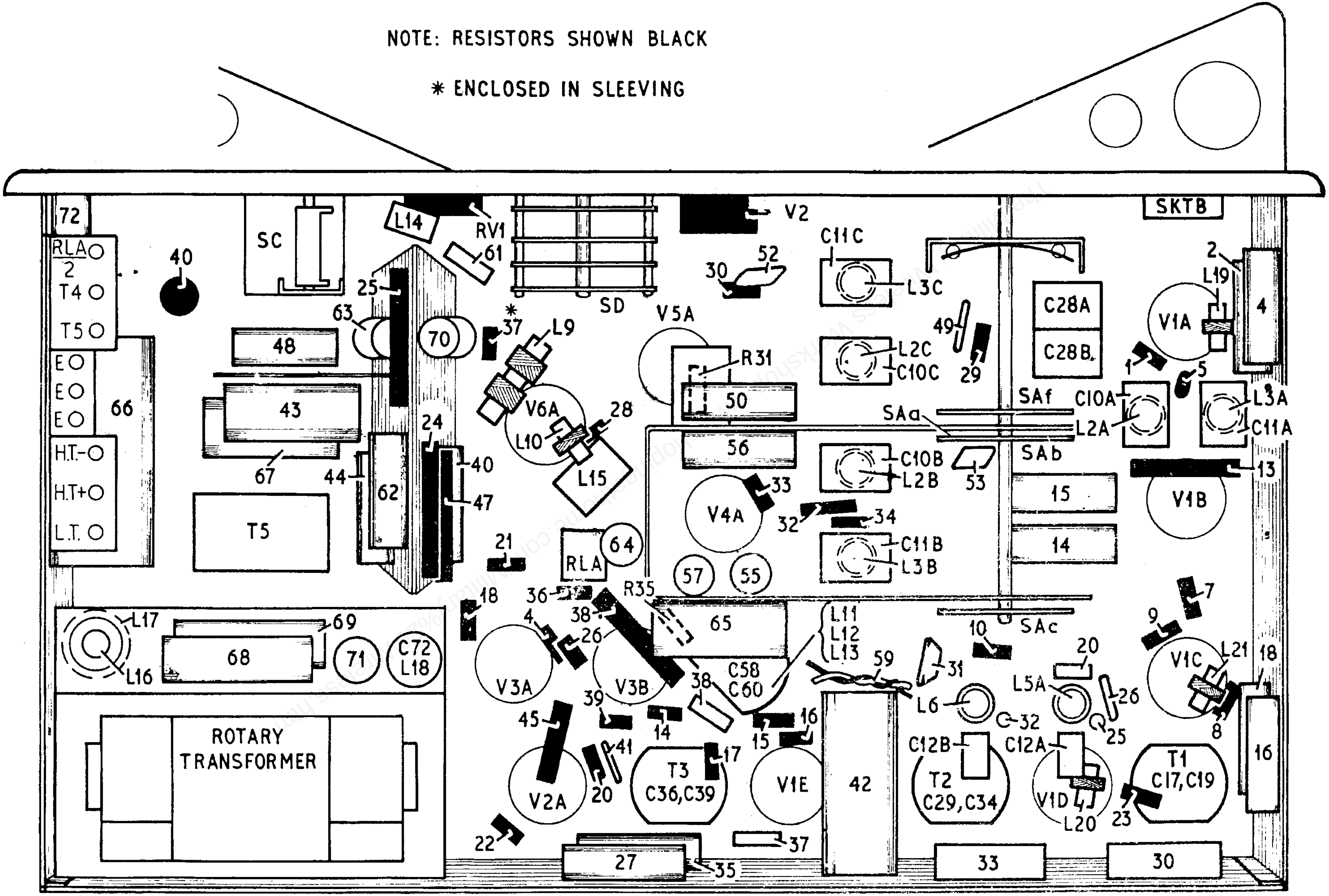


Fig. 15 TRANSCEIVER UNDER CHASSIS LAYOUT

PARTS LISTS

AND

DIAGRAMS

TRANSCEIVER

Code	CONDENSERS				Ref. No.
C1	90pF	Mica	350V	±10%	66715
C2	0.1μF	Tubular	350V	±20%	266353
C3	0.001μF	Mica	350V	±20%	66758
C4	0.1μF	Tubular	350V	±20%	266353
C5	0.005μF	Tubular	1kV	±20%	68390
C8	140pF	Mica	350V	± 5%	66301
C9	550pFmax.	Trimmer			80250
C10A	1.5-15pF	Trimmer			80139
C10B	1.5-15pF	Trimmer			80139
C10C	1.5-15pF	Trimmer			80139
C11A	3-50pF	Trimmer			80136
C11B	3-50pF	Trimmer			80136
C11C	3-50pF	Trimmer			80136
C12A	3-30pF	Trimmer			80234
C12B	3-30pF	Trimmer			80234
C13	5pF	Mica	350V	±20%	66240
C14	0.1μF	Tubular	350V	±20%	266353
C15	0.1μF	Tubular	350V	±20%	266353
C16	0.1μF	Tubular	350V	±20%	266353
C17	250pF	Mica	350V	± 2%	66297
C18	0.1μF	Tubular	350V	±20%	266353
C19	250pF	Mica	350V	± 2%	66297
C20	500pF	Mica	350V	±20%	66095
C21	10pF	Mica	350V	±20%	66005
C22	140pF	Mica	350V	± 5%	66301
C23	550pFmax.	Trimmer			80250
C24	15pF	Mica	350V	±20%	66247
C25	27pF	Tub. Ceramic	350V	±10%	66964
C26	1700pF	Mica	350V	±20%	66295
C27	0.1μF	Tubular	350V	±20%	266353
C28A	4.75pF	Trimmer			80127/A
C28B	4.75pF	Trimmer			80127/A
C29	250pF	Mica	350V	± 2%	66297
C30	0.1μF	Tubular	350V	±20%	266353
C31	3500pF	Mica	350V	± 2%	66296
C32	10pF	Tub. Ceramic	350V	±10%	66963
C33	0.1μF	Tubular	350V	±20%	266353
C34	250pF	Mica	350V	± 2%	66297
C35	0.1μF	Tubular	350V	±20%	266353
C36	410pF	Mica	350V	± 2%	66298
C37	100pF	Moulded Mica	350V	±20%	66096
C38	500pF	Moulded Mica	350V	±20%	66095
C39	410pF	Mica	350V	± 2%	
C40	0.005μF	Tubular	1kV	±20%	68390
C41	20pF	Mica	350V	±20%	66006
C42	100μF	Electrol.	6V	+50%) -20%)	67240
C43	2μF	Electrol.	350V	±20%	67230
C44	0.005μF	Tubular	1kV	±20%	68390
C45	0.001μF	Moulded Mica	350V	±20%	66758
C46	487pFmax.	Trimmer			80244
C47	0.004μF	Moulded Mica	750V	±15%	66109
C48	0.1μF	Tubular	350V	±20%	266353
C49	30pF	Mica		±10%	66717
C50	0.1μF	Tubular	350V	±20%	266353
C51	550pFmax.	Trimmer			80250
C52	20pF	Mica	350V	±20%	66006
C53	90pF	Mica	350V	±10%	66715
C54	550pFmax.	Trimmer			80250
C55	0.1μF	Tubular	350V	±20%	266353
C56	0.1μF	Tubular	350V	±20%	266353
C57	0.1μF	Tubular	350V	±20%	266353
C58	820pF	Mica	350V	± 2%	66300
C59		Twisted wire			
C60	90pF	Mica	350V	± 5%	66299
C61	0.001μF	Moulded Mica	350V	±20%	66758
C62	0.1μF	Tubular	350V	±20%	266353
C63	0.0 μF	Tubular	500V	±10%	68391
C64	0.1μF	Tubular	350V	±20%	266353

Code	CONDENSERS (Cont)				Ref. No.
C65	2μF	Electrol.	350V	±20%	67230
C66	8μF	Electrol.	550V	+50%) -20%)	67248
C67	8μF	Electrol.	75V	+50%) -20%)	67233
C68	0.1μF	Tubular	350V	±20%	68392
C69	0.1μF	Tubular	350V	±20%	68392
C70	0.005μF	Tubular	1kV	±20%	68390
C71	0.1μF	Tubular	350V	±20%	68392
C72	0.1μF	Tubular	350V	±20%	266353

RESISTORS

Code					Ref. No.
R1	220kΩ	Ceramic	½W	±20%	57068
R2	100kΩ	Ceramic	¼W	±20%	70743
R3	4.7kΩ	Ceramic	¼W	±20%	57062
R4	1MΩ	Ceramic	¼W	±20%	70723
R5	100kΩ	Ceramic	½W	±20%	70066
R6	470kΩ	Ceramic	½W	±20%	59209
R7	47kΩ	Ceramic	¼W	±20%	57044
R8	22kΩ	Ceramic	¼W	±20%	57060
R9	10kΩ	Ceramic	¼W	±20%	57052
R10	3.3kΩ	Ceramic	¼W	±20%	57005
R11	22Ω	Ceramic	¼W	±20%	57063
R12	47kΩ	Ceramic	¼W	±20%	57044
R13	33kΩ	Ceramic	¼W	±10%	57070
R14	47kΩ	Ceramic	¼W	±20%	57044
R15	470kΩ	Ceramic	¼W	±20%	59209
R16	3.3kΩ	Ceramic	¼W	±20%	57005
R17	100kΩ	Ceramic	¼W	±20%	70743
R18	470kΩ	Ceramic	¼W	±20%	59209
R19	100kΩ	Ceramic	¼W	±20%	70743
R20	1MΩ	Ceramic	¼W	±20%	70723
R21	100kΩ	Ceramic	¼W	±20%	70743
R22	1MΩ	Ceramic	¼W	±20%	70723
R23	1MΩ	Ceramic	¼W	±20%	70723
R24	20kΩ	Wirewound	12W	±10%	72499
R25	20kΩ	Wirewound	12W	±10%	72499
R26	1MΩ	Ceramic	¼W	±20%	70723
R27	33Ω	Ceramic	¼W	±10%	59012
R28	4.2Ω	Wirewound	1/10W	± 3%	59123
R29	22kΩ	Ceramic	¼W	±20%	57060
R30	100kΩ	Ceramic	¼W	±20%	70743
R31	470kΩ	Ceramic	¼W	±20%	59209
R32	100kΩ	Ceramic	½W	±20%	70066
R33	33kΩ	Ceramic	¼W	±20%	57066
R34	4.7kΩ	Ceramic	¼W	±20%	57062
R35	150kΩ	Ceramic	¼W	±10%	70749
R36	4.7kΩ	Ceramic	¼W	±20%	57062
R37	4.2Ω	Wirewound	1/10W	± 3%	59123
R38	68kΩ	Ceramic	1W	±20%	57069
R39	270kΩ	Ceramic	¼W	±10%	70096
R40	860Ω	Wirewound	10W	±20%	59037
R41	30kΩ	Meter Res.	½W	± 2%	64136
R42	1.2MΩ	Meter Res.	1W	± 5%	64120
R43	1.2MΩ	Meter Res.	½W	± 5%	64119
R44	550Ω	Wirewound			91347
R45	30Ω	Wirewound	6W	± 2%	59124
R46		NOT USED			
R47	9.5Ω		4W	± 5%	[illegible]
RV1	20Ω	Potentiometer			91470
RV2	1MΩ	Potentiometer			91469

TRANSCEIVER (Cont)

Code	COILS & CHOKES	Ref. No.
L1	RF choke	79237
L2A	HF anode coil	78636
L2B	HF anode coil	78636
L2C	HF anode coil	78636
L3A	LF anode coil	78637
L3B	LF anode coil	78637
L3C	LF anode coil	78637
L5A	LF local oscillator coil	78635
L6A	HF local oscillator coil	78634
L6B	HF local oscillator coil	78634
L7	Aerial tuning coil	85483
L8	Meter choke	79237
L9	P.A. anode coil	79236
L10	RF choke	79237
L11	BFO coil (tuned winding)	78639
L12	BFO coil (coupling winding)	
L13	BFO coil (control winding)	
L14	Het. tone control coil	78638
L15	Modulation choke	79233
L16	RF choke	79237
L17	RF choke	79237
L18	L.T. RF choke	79245
L19	Filament coil	79235
L20	Filament coil	79235
L21	Filament coil	79235

TRANSFORMERS

Code	TRANSFORMERS	Ref. No.
T1	1st IF Transformer	77583
T2	2nd IF Transformer	77584
T3	3rd IF Transformer	77585
T4	Microphone Transformer	77590
T5	Output Transformer	77586
T6	Meter Transformer	77588

Code	VALVES		Ref. No.
V1A	VP23	CV1331	86166
V1B	VP23	CV1331	86166
V1C	VP23	CV1331	86166
V1D	VP23	CV1331	86166
V1E	VP23	CV1331	86166
V2A	HL23DD	CV1306	86167
V3A	Pen 25	CV65	86209
V3B	QV04-7	CV1510	86209
V4A	EF50	CV1091	86191
V5A	ECH35	CV1347	86097
V6A	Pen 25	CV65	86264

SWITCHES

Code	SWITCHES	Ref. No.
SA	Range switch	83345
SB	Crystal/M.O switch	83346
SC	On/Off switch	83347
SD	System switch	85553
SE	Meter switch	83360

MISCELLANEOUS

Code	MISCELLANEOUS	Ref. No.
MR1	Bridge Rectifier	64688
MR2	Selenium Rectifier	64689
RLA	Transmit/Receive Relay	57920
FS1	Fuse 250mA	90267
M	Meter	58149
SKTA	Handset Socket	
SKTB/A	Remote Control Unit Socket	88122
SKTB/B	Crystal Calibrator Socket	88122
PLB	Battery Input Plug	88123
MG	Rotary Transformer 11 watt	77595

CHAPTER II

ELECTRICAL SPECIFICATION & TECHNICAL DESCRIPTION

SPECIFICATION

RECEIVER

Audio output	Not less than 200mW at 1 kc/s.
Het. tone range	Between 2 and 5 kc/s.
IF sensitivity	The input required for an output of 50mW does not exceed 120µV.
Adjacent channel selectivity	Between 5 and 8 kc/s wide at -6dB. Average slope between -6 and -60dB not less than 5.8dB/kc.
Frequency calibration	The calibration error of the tuning dial does not exceed 0.5% between 1.6 and 8.0 Mc/s and 1% between 8.0 and 10.0 Mc/s.
Frequency coverage	1.6 to 4.0 and 4.0 to 10.0 Mc/s with an overlap of not less than 2% between the two bands.
Signal/noise ratio	At least 20dB for 3µV input modulated 30% at 400 cycles.

Second channel selectivity

Signal Freq. Mc/s	Second channel Freq. Mc/s	Second channel ratio dB
1.6	2.52	70
2.5	3.42	60
4.0	4.92	50
4.0	4.92	55
6.0	6.92	45
9.0	9.92	28

I.F. breakthrough	80dB down from 1.6 to 10.0 Mc/s.
L.F. Hum	With no signal input, the l.f.hum does not exceed 1.0µW.
Overall sensitivity	'L.F.' band: not worse than 3µV for 50mW output.
	'H.F.' band: not worse than 6µV for 50mW output.
A.V.C. characteristic	Less than 14dB change in output from 50µV to 100mV.
Overall audio response	Within ± 2dB at 400 cycles and -13dB to -17dB at 3000 cycles - relative to 1000 cycles.

Valve complement

Circuit No.	Function	British	CV Type
V1A	R.F. amplifier	Mazda VP23	CV1331
V1B	Mixer	Mazda VP23	CV1331
V1C	Local oscillator	Mazda VP23	CV1331
V1D	1st I.F. amplifier	Mazda VP23	CV1331
V1E	2nd I.F. amplifier	Mazda VP23	CV1331
V2A	Detector & A.V.C.	Mazda HL23DD	CV1306
V3A	Output stage & sidetone amplifier	Mazda Pen 25	CV65

TRANSMITTER

R.F. Power output — C.W. 0.78 to 1.1 watts depending on frequency
R/T 0.44 to 0.84 watts depending on frequency

Modulator frequency response — Within +6dB and -3dB of the response at 1000 cycles for the frequency range 400 - 3000 cycles.

Frequency accuracy — Within 1 kc/s of the incoming signal when adjusted to zero beat on receive.

Valve complement

Circuit No.	Function	British	CV Type
V6A	Power amplifier	Mullard QV04-7	CV309
V5A	Buffer amplifier	Mullard EF50	CV1091
V4A	Sender mixer & BFO	Mullard ECH35	CV1347
V3B	Microphone amplifier	Mazda Pen 25	CV65

CIRCUIT DESCRIPTION

AERIAL CIRCUIT

Fig. 16

This circuit is common to both transmitter and receiver and consists of the variable capacitor C46 and the aerial tuning inductor L7. The inductor L7 has two contact wheels which short out part of the coil, thus preventing absorption at certain frequencies. The circuit forms a series tuned circuit for matching the aerial to the transceiver.

RECEIVER

Fig. 16

The receiver is a conventional superheterodyne covering the frequency range 1.6 - 10.0 Mc/s in two bands, 1.6 - 4.0 Mc/s and 4.0 - 10.0 Mc/s. An I.F. frequency of 460 kc/s is produced by tuning the local oscillator to a frequency 460 kc/s higher than that of the incoming signal. The equipment is tunable over the complete frequency range or can be crystal controlled on spot frequency.

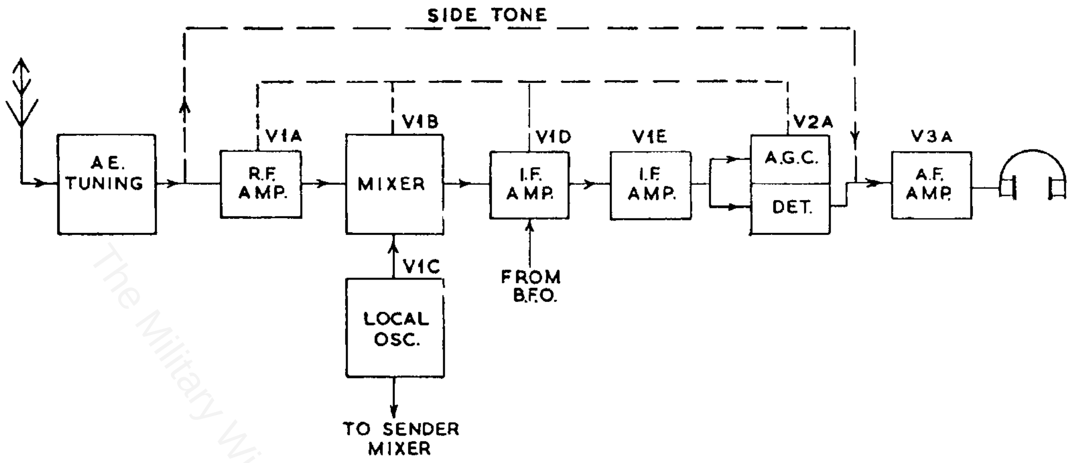


Fig. 1 Receiver Block Diagram

RF Amplifier (V1A)

This is a conventional pentode tuned anode amplifier with A.V.C V1A has a series tuned input circuit comprising L7 (aerial tuning control) and C46 (aerial coupling control). The RF input is coupled by C1 to the grid of V1A, from which the output is fed via the tuned circuit (selected by SAa) and C8 to the grid of V1B. The tuned circuits selected by SAa are as follows:-

'H.F' band	L2A, C10A and C9
'L.F' band	L3A, C11A and C9

On 'receive', C3 decouples the earthy end of L1 so that the received signals are developed across L1 and not across R2 and R3. The series tuned input circuit is not disconnected on 'transmit' as it forms the output circuit of the P.A. stage V6A.

Local Oscillator (V1C)

The local oscillator (V1C) employs a pentode as a cathode coupled Hartley oscillator. It functions as a tuned grid oscillator, the tuned circuit being selected by SA and SAd as follows:-

'H.F' band	L6A, C12B, C31, C32 and C23
'L.F' band	L5A, C12A, C26, C25 and C23

On the 'H.F' range (4.0 - 10.0 Mc/s) it has an additional feedback path via C20, SBb and L6B. This additional feedback path is switched out of circuit when crystal operation is used.

When SB is switched to 'XTAL' the oscillator functions as a Pierce Crystal oscillator, using the same tuned circuits as before.

The output of the oscillator is tapped off the filament and fed to the suppressor grid of the mixer V1B.

Mixer (V1B)

This stage employs a pentode. The outputs from the local oscillator and the RF amplifier are mixed in this stage to produce an intermediate frequency of 460 kc/s. The output from the mixer V1B is transformer coupled by T1, tuned to 460 kc/s, to the grid of the 1st IF stage V1D.

IF Amplifiers (V1D and V1E)

There are two stages of IF amplification employing pentodes. The signal appearing at the anode of V1D is transformer coupled by T2 to the second IF amplifier V1E for further amplification. The IF output from V1E is coupled by T3 to the detector section of V2A. The degree of amplification provided by these amplifiers is controlled by the A.V.C. voltage.

The output from the BFO is injected into the anode circuit of V1D for use on C.W. reception and netting.

Detector and A.V.C. (V2A)

These two functions are performed by the double-diode-triode V2A. The triode section is not used and is strapped to earth. One diode is used to provide an A.V.C. voltage via SDg to the IF and RF stages of the receiver. A small delay voltage developed across the filament and also across a portion of R40 is applied to this diode to prevent the A.V.C. action from reducing the gain when very weak signals are received. A.V.C. is used only when the set is switched to R/T.

The second diode is used as a detector, the output from which, subject to the setting of the GAIN control RV2, is fed to the grid of the output stage V3A.

When switched to C.W. or NET the above arrangements are modified. The A.V.C. diode is disconnected. The GAIN control RV2 is switched by SDf across the bias resistor R40 and the A.V.C. line to the slider of RV2 by SDh. RV2 then acts as an RF gain control, to the RF and IF stages.

AF Output (V3A)

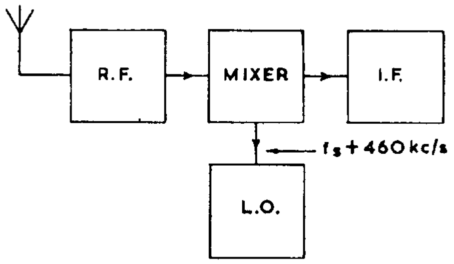
This stage is a conventional pentode AF amplifier. The input is fed via the GAIN control RV2 to the grid of V3A. After amplification the signal is transformer coupled by T5 to the headphone circuit via SKTAb. C44 is connected from the anode of V3A to earth for tone correction.

TRANSMITTER

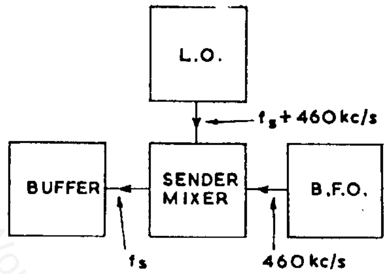
Fig. 16

The reconstitution principle used in the W.S. 62 provides that, in addition to using some common circuits, both the transmitter and receiver operate on the same frequency once the receiver has been netted to the incoming signal. The principle is briefly as follows:-

In a conventional superhet receiver the incoming signal is fed, together with the output of the local oscillator into a mixer valve. The resultant frequency is known as the intermediate frequency.



The carrier frequency for a transmitter working on the reconstitution principle is obtained by simply reversing the above procedure i.e. the IF (provided in this case by the BFO) is mixed with the local oscillator frequency in the sender-mixer stage V4A and produces a resultant frequency (carrier frequency) equal to the signal frequency.



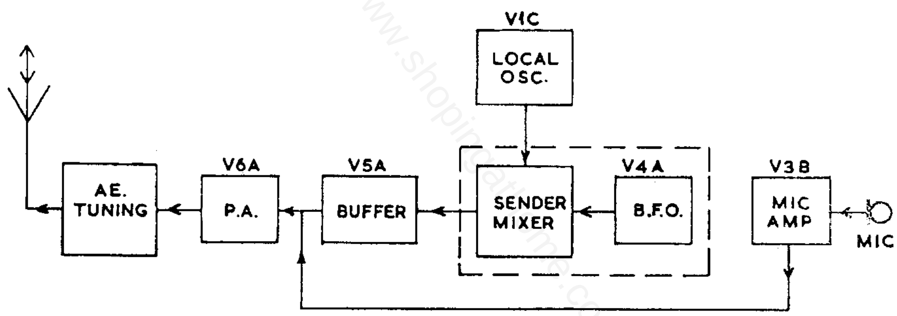


Fig. 2 Transmitter Block Diagram

Sender-Mixer & BFO (V4A)

A triode heptode is employed, the triode section as a BFO and the heptode section as a sender-mixer. The BFO is a tuned grid shunt-fed oscillator. The HET. TONE control RV1 is disconnected when switched to transmit, therefore the BFO operates continuously at 460 kc/s. The output from the BFO is internally fed to the third grid of the sender-mixer, whilst the output from the receiver local oscillator V1C is fed to the first grid of the sender-mixer, where it beats with the BFO output. The signal appearing at the anode of the sender-mixer is fed via the tuned circuit, which acts as the sender-mixer anode load, to the grid of the buffer amplifier V5A. The tuned circuits are selected by SAe as follows:-

'H.F' band	L2B, C10B and C54
'L.F' band	L3B, C11B and C54

Buffer Amplifier (V5A)

This stage employs a pentode, from which the output is taken via the anode tuned circuit (selected by SAf) to the grid of the power amplifier (V6A). The anode tuned circuits selected by SAf are:-

'H.F' range L2C, C10C and C51
'L.F' range L3C, C11C and C51

The buffer stage is designed to provide a more constant drive over the complete frequency range. This is achieved on the 4.0 to 10.0 Mc/s band by the use of a frequency-sensitive screen circuit together with the use of limiting in the grid circuit. There is no screen decoupling but C52 is shunted across the screen resistor R30 and this gives degeneration at the lower frequencies relative to the gain of the stage at the higher frequency end of the band. A similar effect is obtained on the 1.6 - 4.0 Mc/s band by switching C49 and R29 into the grid feed to the P.A stage (V6A) by means of SAg. Here the drive circuit is made frequency sensitive with a gain characteristic rising towards the high end of the band.

The above measures tend to level the drive over the frequency range of the equipment and ensures that the modulation is reasonably undistorted.

Power Amplifier (V6A)

This stage employs a beam tetrode. The power amplifier is grid modulated by the output from the microphone amplifier V3B. No independent tuned circuit is provided for the P.A. stage and the aerial circuit comprising L7 and C46 constitutes the anode load. The output from V6A is capacity coupled by C47 to the aerial circuit providing the RF power output. Bias for this stage is obtained by the voltage drop across the bias resistor R40.

Microphone Amplifier (V3B)

The input from the microphone is fed via SKTAd, SKTAe and the microphone transformer T4 to the grid of the pentode amplifier V3B. The output is taken via C64 and the voltage appearing across the AF choke L15 is fed into the power amplifier grid circuit.

Side-Tone

On transmit, a fraction of the power amplifier output is fed to the grid of the RF amplifier V1A. Under transmit conditions the H.T. supply to V1A is disconnected and the stage acts as a diode between grid and filament. This diode serves as a de-modulator, a fraction of the resulting voltage developed across R3 is fed via C5 and R4 to the grid of the AF output stage V3A. It is then amplified and fed to the headphones as sidetone.

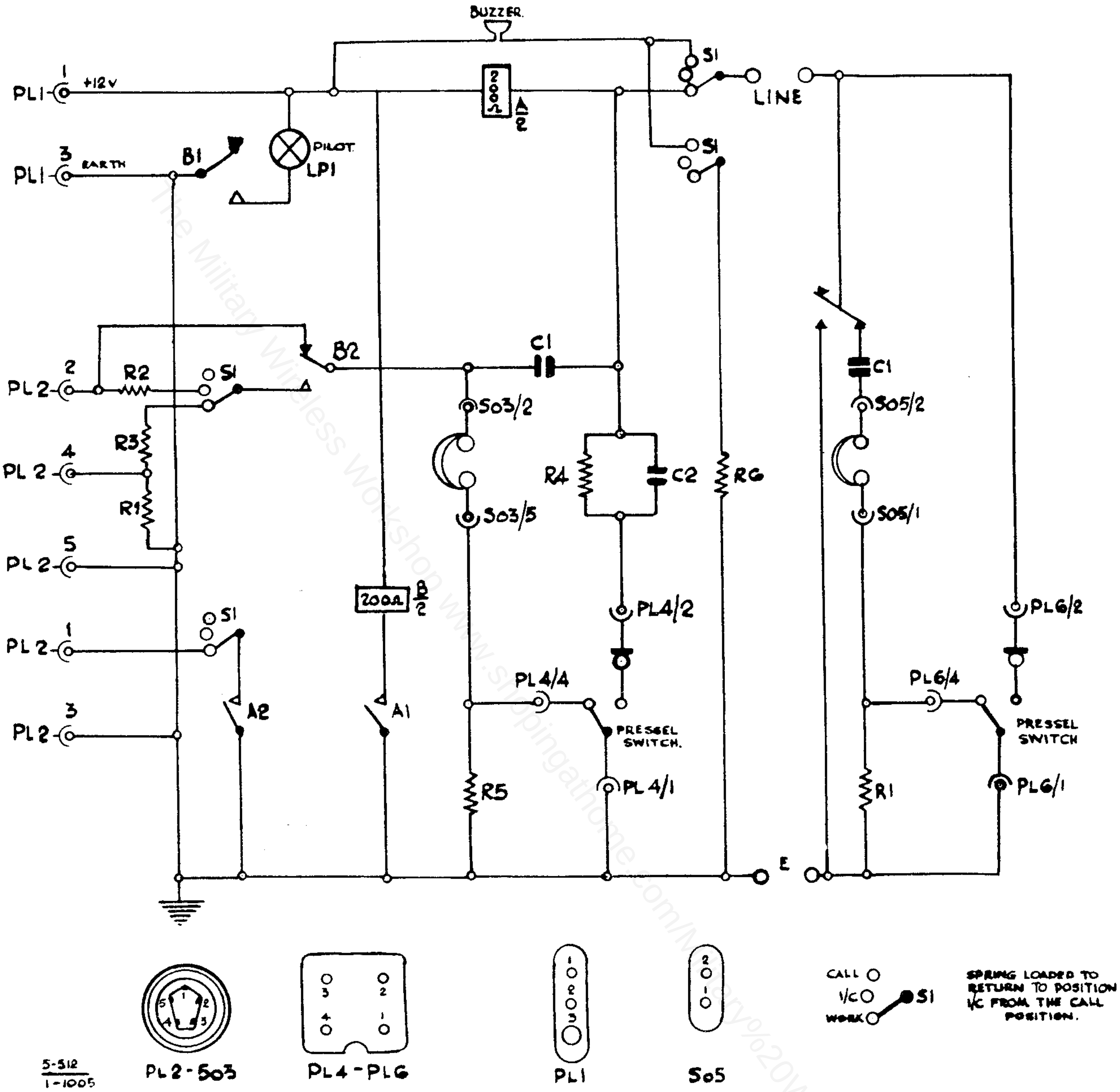
C.W. OPERATION

When switched to C.W. the morse key replaces the microphone pressel switch and operates the transmit/receive relay RLA in the normal manner. Therefore, when operating on C.W. it is possible to "listen through" during intervals in transmissions.

A portion of the output from the BFO is permanently coupled to the first IF stage via C59 for C.W reception. The HET. TONE control RV1 varies the BFO frequency thus altering the pitch of received C.W signals.

The remote operators headset is connected normally across the line via C1 with the resistance R1 shorted out when listening.

When speaking into his microphone sidetone is reduced by bringing resistance R1 into circuit. The action of pressing the pressel switch also operates the relays in Unit No. 1.



SOCKETS VIEWED FROM WIRING FACE. PLUGS VIEWED FROM PINS.

REMOTE CONTROL UNIT L No 1 & 2

FIGURE 74.

5. MAINTENANCE TASKS

A. Operator's Maintenance

A system of daily tasks has been evolved which will be done by the operator. These will not be explained here as they do not effect, directly the radio mechanic. They cover, however, the following items:-

(i) Mechanical cleanliness.

(ii) Mechanical maintenance.

(iii) A check of meter readings.

(iv) Correct operation under all conditions.

B. Monthly Maintenance Tasks to be carried out by Radio Mechanics

(i) Inspect Maintenance Log. Have all tasks been carried out regularly? If not, report to the Section Officer.

(ii) Is there any irregularity or steady decline in any of the meter readings logged by the operator? If so, test immediately for a fault, or change the valve concerned. Do not remove a valve when the set is working. Slacken holding screw before removing Buffer or P.A. Readings should be as follows:-

L.T. 12 to 13
H.T.R. 120 t0 160. Rises when switched to "Net" or "C.W." Disappears on "Send".
A.V.C. No signal and switch to R.T. - 180 to 190.
" " " " " Net or C.W. 240.
(with R.F. gain fully clockwise).
With switch to R.T. reading should rise when a strong signal is tuned in.
H.T.S. 280 to 290.
Drive on 2 Mc/s.
R.T. - 340 - 360.
Net - zero.
C.W. - 460 - 480.
" On 6 Mc/s.
R.T. - 300 - 310.
Net - zero.
C.W. - 400 - 460.

(iii) Check mechanical action of all controls, working from left to right. in particular check that clutch on "Aerial Tuning" slips at end of travel and that Counter operates correctly. Ensure that all grub screws are tight.

(iv) See that valves are firmly held in sockets and top cap clips are tight. See that screening cans are in position and that lids fit securely. If grid leads are worn, repair or replace.

(v) Clean slow motion drive, rim of dial and flick discs with a soft cloth. Apply Oildag (grease, special, H.P.M., HA 6302) to slow motion drive, rim of dial and discs. Apply thin oil to moving parts of flick mechanism. All lubricants must be of high-temperature type.

(vi) (a) Clean interior of Set and inspect for loose or dirty connections. Do not disturb positions of wires. If Set is damp, dry out.

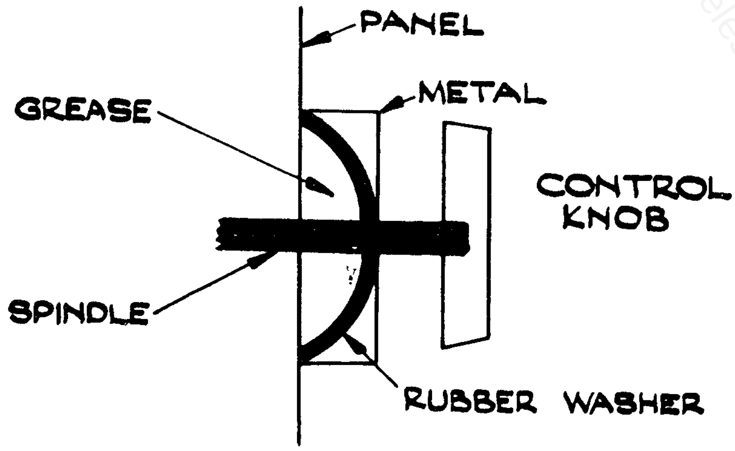
(b) Carefully clean aerial tuning inductor with a dry soft cloth. See that wheel makes good contact. See that indicator reads 0-0-0 when one wheel is $\frac{1}{2}$ turn from back end of inductor.

(vii) See that contacts and pole-piece of relay are clean. See that contacts make and break correctly and do not foul the cam. Check that relay operates instantaneously on closing or opening the pressel switch.

(viii) After every 500 hours of use repack the bearings of the rotary transformer with grease.

<u>Important Note.</u> Do <u>not</u> clean commutator as it has been specially treated.

(ix) If it is ever necessary to remove a control knob from the front panel, before replacing it make sure that the concavity in the rubber washer is filled with Grease, Kingsworth, 1026, to make a watertight and dustproof joint. See Figure 75.



WATERTIGHT JOINT

FIGURE 75

Sequence	Adjustment	Set Controls	Frequency	Modulation	Inject from	Inject to	Adjust	For	Remarks
1.	I.F. alignment	Rec. on R.T. full gain	460 Kc/s	400 c/s 30%	Signal generator	Control grid of V1B	(a) T3A (b) T2A (c) T1A	Max o/put or max. A.V.C. reading	If difficult to adjust tune primary of T2A to 463 Kc/s, and secondary of T2A to 457 Kc/s.
2.	B.F.O.	All on, net	460 Kc/s	None	Signal generator	Control grid of V1B	L10A	Zero beat	
3.	Calibration	(a) All on, net 4-10 Mc/s (b) All on, net 1.6-4 Mc/s	9 Mc/s 4 Mc/s 4 Mc/s 1.6 Mc/s		Wave Meter Class D	Aerial	C12B L6A C12A L5A	Zero beat	Check on spot frequencies. Between 8-10 Mc/s it should be within 1%, and between 1.6-8 Mc/s within 5%.
4.	Receiver Alignment	(a) Rec. on RT 4-10 Mc/s (b) Rec on RT 1.6-4 Mc/s	9 Mc/s 4 Mc/s 4 Mc/s 1.6 Mc/s	400 c/s 30%	Signal generator	Aerial	C10A L2A C11A L3A	Max. o/p.	
5.	Transmitter Alignment	(a) All on press pressel R.T. 4-10 Mc/s (b) All on press pressel R.T. 1.6-4 Mc/s	9 Mc/s 4 Mc/s 4 Mc/s 1.6 Mc/s				L2C L2B L3C L3B	Maximum drive	Have C28A and B about $\frac{1}{2}$ a turn from Maximum
6.	P.A. Drive	(a) All on press pressel R.T. 4-10 Mc/s (b) All on press pressel R.T. 1.6-4 Mc/s	9 Mc/s 4 Mc/s 4 Mc/s 1.6 Mc/s				1a(i) Ae Tuning a(ii) C28B b(i) Ae. Tuning b(ii) C28A	Maximum aerial current reading	There should be no violent variation when modulating. Check sidetone by whistling into microphone.

(x) See that aerial rods are straight and clean and greased with a little vaseline at the ends. Clean insulator and check spring contact. If set is part of vehicle installation, remove aerial base and inspect pigtail.

C. FAULT FINDING

The usual procedure should be employed but it may be helpful to notice the following characteristics of the Set.

(1) Power Supply

Switch to "Rec. on". Rotary Transformer should start. After about two seconds pitch of hum should fall slightly, indicating that receiver valves are taking current. If it does not, inspect fuse.

(2) Receiver

See that "M.O. - Xtal" switch is to M.O. unless a crystal is in use. L.T., H.T.R. and A.V.C. readings should be as shown in the previous sub-section. With System Switch to R.T. the A.V.C. reading should rise when a strong signal is tuned in. If it does, but the set is "dead", the fault must be after the last I.F. stage. On R.T. the gain control should have no effect on the A.V.C. reading (it being an A.F. gain) but on "Net" or "C.W." it should have a great effect, as it is then an R.F. gain. Remember that the B.F.O. will not work unless the Power Switch is in the "All on " position, and that it is an indirectly heated valve and it takes a little while for its cathode to heat. If the "Drive" reading is correct, the L.O. and B.F.O. are working. If the set does not work on one range try it on the other. If satisfactory sidetone is obtained on Send, Receiver output stage is in order.

(3) Sender

Drive and H.T.S. readings should be as shown above. The drive reading is taken across a small resistance in the cathode lead of the P.A., hence absolutely no reading would indicate a fault in the P.A. circuit whereas a low reading would point to faulty drive (perhaps the L.O. or B.F.O. not oscillating). If the B.F.O. is badly off tune it may not be possible to receive C.W. or to send. As to adjusting it see the subsection on Adjustments. To test whether B.F.O. is oscillating, earth grid and anode voltage should rise. To test L.O. switch to Xtal with no crystal in position and Drive should fall.

If satisfactory side-tone is obtained, it is a good indication that the transmitter is in order, as it is taken from the P.A. output. If there is good sidetone but no aerial current reading, the fault is probably in the meter circuit or the lead to the aerial. If there is aerial current but no indication of modulation, the fault is probably in the modulation amplifiers or microphone circuit.

APPENDIX

Colour Coding of Drop Leads

Red	contact	5 in socket
Yellow	"	3 in socket
Green	"	2 in socket
Blue	"	1 in socket
White	"	4 in socket

The contact num bers and connections on headset are shown on the complete circuit diagram.

Table of valve voltages taken with respect to chassis with a Model 7 Avo Meter on 1000 Volt range, with valves in position, System Switch to R.T. and no signal.

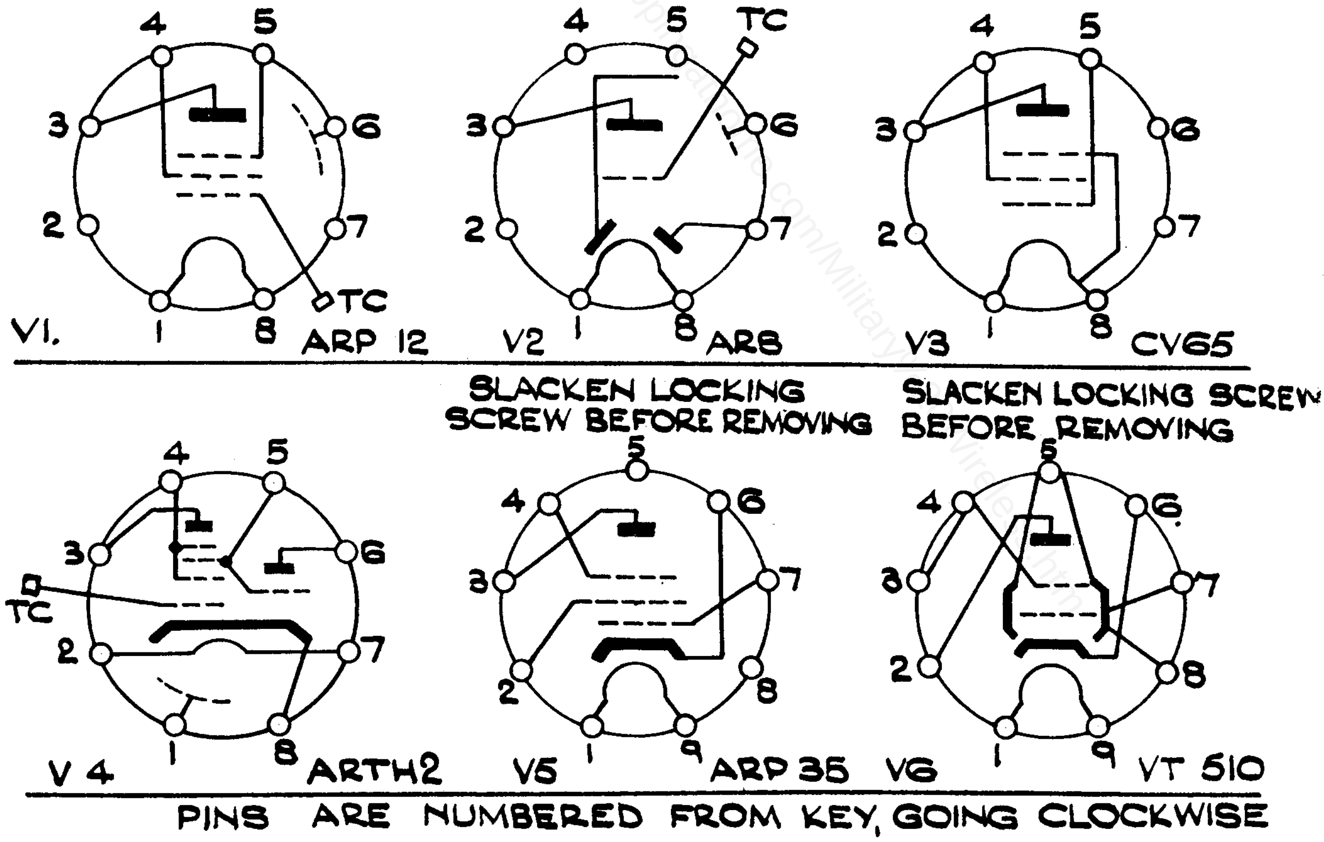
VALVE TYPE AND FUNCTION		ANODE VOLTS		SCREEN VOLTS	
		RECEIVE	SEND	RECEIVE	SEND
V1A	ARP 12 R.F.A and Sidetone Detector	140		60	
V1B	ARP 12 Receiver Mixer	100	100	90	90
V1C	ARP 12 L.O. and part of M.O.	90	90	90	90
V1D	ARP 12 1st I.F.A.	130		60	
V1E	ARP 12 2nd I.F.A.	160		80	
V2A	AR 8 Sig. Det. A.V.C. Det. and 1st Mod. Amp.		Triode 110		
V3A	CV 65 Receiver output and Sidetone emplifier	105	100	110	105
V3B	CV 65 2nd Mod. Amp.		90		120
V4A	ARTH 2 B.F.O., part of M.O. and Sender Mixer		Hexode 270 Triode 100		45
V5A	ARP 35 Buffer		290		170
V6A	VT 610 P.A.		270		270

TABLE 8

CONNECTIONS TO SPARE PINS ON VALVE HOLDERS

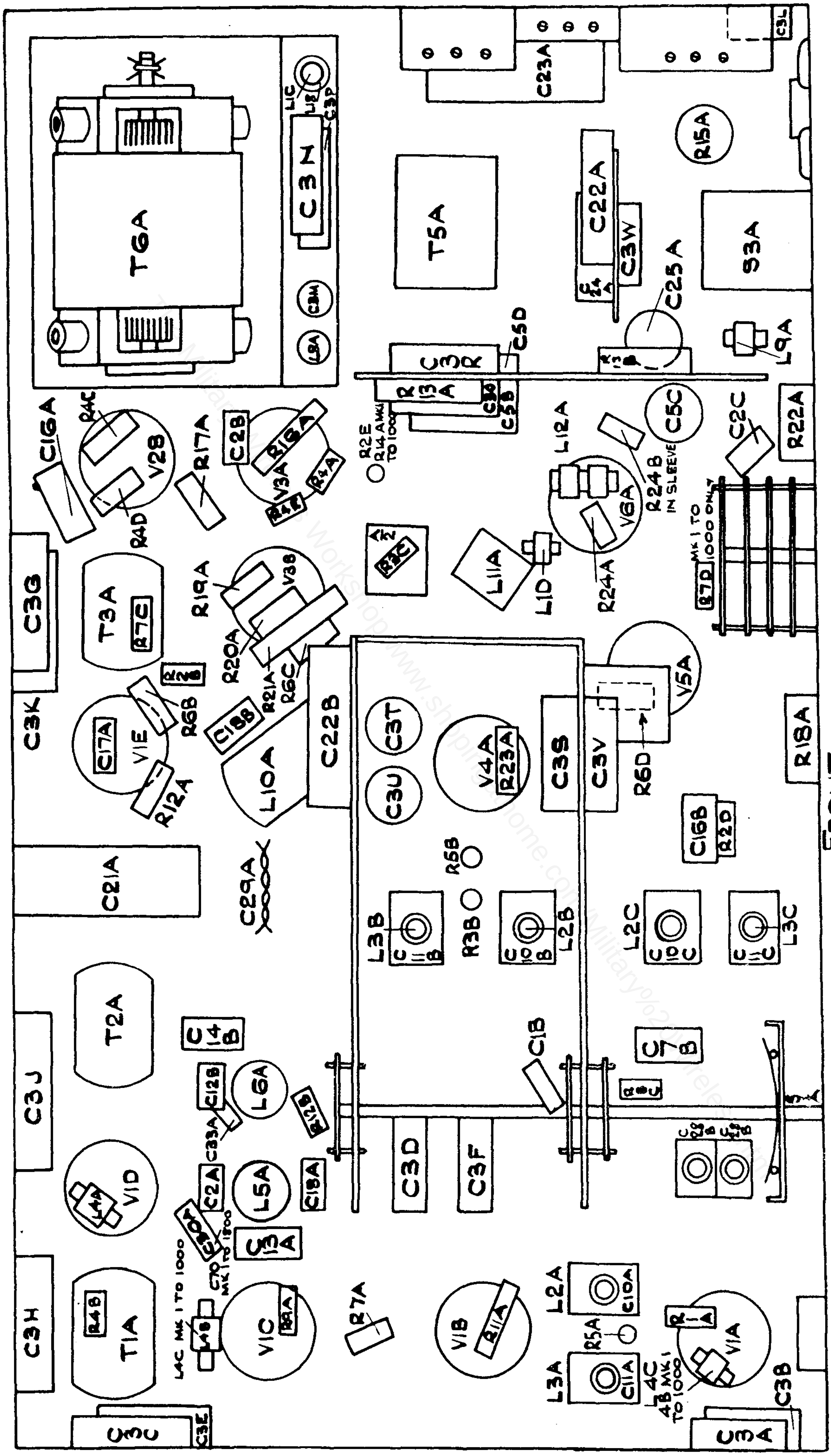
V1A	2	H.T. R5A, R1A.
	7	R4B and L.T. Lead to V1C.
V1B	2	R11A and H.T. Lead to I.F. valves.
	7	Nil.
Vic	2	LAC and Lead to fil. of V1B.
	7	R7A, R9A, RSA and lead to junction of R13A and R14A.
V10	2	L4A and lead to fil. of V2A, C3J, C7A,
	7	R4B and chassis via pins 5 and 6.
VIE	2	Nil.
	7	R6B, R12A, meter (A.V.C. reading).
V2A	2	R4D and lead to S4A/6 and R15A.
	4	R4C and lead to S4A/7.
V3A	2	R16A and lead to fils. of V3B and V2A.
	6	R4A and lead to C5A.
	7	R16A, leads to Power Switch and R27A (meter L.T. resistance).
V3B	2	C18B, R2B and R6C.
	6	R20A and H.T. (via relay).
	7	R30A and S4A/4.

V4A NO SPARE PINS.
V5A 8 Chassis, screening can and C3V.
V6A NO SPARE PINS. But pin 4 is used as an anchor point for H.T. leads.



VALVE BASES (VIEW ON PINS)

FIGURE 76



UNDERSIDE OF CHASSIS

FIGURE 78

DN 6334/1

Table 1001—List of components, Wireless set No. 62

Circuit reference	*Value*	*Tolerance*	*Rating*	*Type*	*Remarks*	*Location reference (Figs. 1001 and 1002)*
RESISTORS						
R1A	220kΩ	±20%	½W	Ceramic	—	B1
R2A	100kΩ	±20%	¼W	Ceramic	—	D2
R2B	100kΩ	±20%	¼W	Ceramic	—	C10
R2C	100kΩ	±20%	¼W	Ceramic	—	D10
R2D	100kΩ	±20%	¼W	Ceramic	—	F6
R2E	100kΩ	±20%	¼W	Ceramic	Mk. 1 over 1000 and Mk. 2	B12
R3A	4.7kΩ	±20%	½W	Ceramic	—	D2
R3B	4.7kΩ	±20%	¼W	Ceramic	—	F7
R3C	4.7kΩ	±20%	¼W	Ceramic	Mk. 1 over 1000 and Mk. 2	F12
R4A	1MΩ	±20%	¼W	Ceramic	—	E2
R4B	1MΩ	±20%	¼W	Ceramic	—	D12
R4C	1MΩ	±20%	¼W	Ceramic	—	C12
R4D	1MΩ	±20%	¼W	Ceramic	—	C11
R4E	1MΩ	±20%	¼W	Ceramic	—	D13
R5A	100kΩ	±20%	½W	Ceramic	—	B2
R5B	100kΩ	±20%	½W	Ceramic	—	F6
R6A	470kΩ	±20%	¼W	Ceramic	—	D3
R6B	470kΩ	±20%	¼W	Ceramic	—	C8
R6C	470kΩ	±20%	¼W	Ceramic	—	C10
R6D	470kΩ	±20%	¼W	Ceramic	—	H6
R7A	47kΩ	±20%	¼W	Ceramic	—	B3
R7B	47kΩ	±20%	¼W	Ceramic	—	D5
R7C	47kΩ	±20%	¼W	Ceramic	—	B8
R8A	22kΩ	±20%	¼W	Ceramic	—	B3
R8B	22kΩ	±20%	¼W	Ceramic	—	C11
R8C	22kΩ	±20%	¼W	Ceramic	—	G4
R9A	10kΩ	±20%	¼W	Ceramic	—	B5
R10A	22Ω	±20%	¼W	Ceramic	—	C5
R11A	33kΩ	±10%	1W	Ceramic	—	B7
R12A	3.3kΩ	±20%	¼W	Ceramic	—	D8
R12B	3.3kΩ	±20%	¼W	Ceramic	—	G6
R13A	20kΩ	±10%	12W	Wire-wound	—	B12
R13B	20kΩ	±10%	12W	Wire-wound	—	B13
R14A	47kΩ	±20%	½W	Ceramic	Mk. 1 up to 1000	B12
R15A	860Ω	—	10W	Wire-wound, tapped	—	E14
R16A	30Ω	±20%	6W	Wire-wound	—	H16
R17A	15kΩ	±20%	¼W	Ceramic	—	G12
R18A	1MΩ	±20%	¼W	Variable	—	F13
R19A	220kΩ	±20%	¼W	Ceramic	—	H11
R20A	270kΩ	±10%	¼W	Ceramic	—	F12
R21A	68kΩ	±20%	1W	Ceramic	—	F11
R22A	20Ω	—	—	Variable; wire-wound, centre-tapped	—	H9
R23A	39kΩ	±20%	¼W	Ceramic	—	H6
R24A	4.2Ω	± 2%	1/10W	Wire-wound	—	H3
R24B	4.2Ω	± 3%	1/10W	Wire-wound	Mk. 1 over 1000 and Mk. 2	G9
R25A	33Ω	±10%	¼W	Ceramic	—	G2
R26A	550Ω			Variable, wire-wound	—	F2
R27A	29.5kΩ	± 2%	½W	Meter resistor (high stability)	—	F3
R28A	1.2MΩ	± 5%	½W	Meter resistor	—	E3
R29A	1.2MΩ	± 5%	1W	Meter resistor	—	F3
R30A	150kΩ	±10%	¼W	Ceramic	—	G8
CONDENSERS						
C1A	90pF	±10%	350V	Protected silvered mica	—	D1
C1B	90pF	±10%	350V	Protected silvered mica		G6

Table 1001—List of components, Wireless set No. 62 (*continued*)

Circuit reference	*Value*	*Tolerance*	*Rating*	*Type*	*Remarks*	*Location reference (Figs. 1001 and 1002)*
CONDENSERS						
C2A	0.001μF	±25%	350V	Moulded mica	—	D1
C2B	0.001μF	±25%	350V	Moulded mica	—	G12
C2C	0.001μF	±25%	350V	Moulded mica	—	H9
C2D	0.001μF	±25%	350V	Moulded mica	—	F2
C3A	0.1μF	±20%	350V	Metal-cased tubular paper	—	C2
C3B	0.1μF	±20%	350V	Metal-cased tubular paper	—	B1
C3C	0.1μF	±20%	350V	Metal-cased tubular paper	—	B3
C3D	0.1μF	±20%	350V	Metal-cased tubular paper	—	D3
C3E	0.1μF	±20%	350V	Metal-cased tubular paper	—	D3 Fig. 1001, D4 Fig. 1002
C3F	0.1μF	±20%	350V	Metal-cased tubular paper	—	D4
C3G	0.1μF	±20%	350V	Metal-cased tubular paper	—	B7
C3H	0.1μF	±20%	350V	Metal-cased tubular paper	—	D7
C3J	0.1μF	±20%	350V	Metal-cased tubular paper	—	D8
C3K	0.1μF	±20%	350V	Metal-cased tubular paper	—	D5
C3L	0.1μF	±20%	350V	Metal-cased tubular paper	—	EI6
C3M	0.1μF	±20%	350V	Metal-cased tubular paper	—	F16
C3N	0.1μF	±20%	350V	Metal-cased tubular paper	—	F15
C3P	0.1μF	±20%	350V	Metal-cased tubular paper	—	F15
C3Q	0.1μF	±20%	350V	Metal-cased tubular paper	—	H11
C3R	0.1μF	±20%	350V	Metal-cased tubular paper	—	G9
C3S	0.1μF	±20%	350V	Metal-cased tubular paper	—	H7
C3T	0.1μF	±20%	350V	Metal-cased tubular paper	—	H6
C3U	0.1μF	±20%	350V	Metal-cased tubular paper	—	H7
C3V	0.1μF	±20%	350V	Metal-cased tubular paper	—	H4
C3W	0.1μF	±20%	350V	Metal-cased tubular paper	—	H4
C4A	140pF	± 5%	350V	Protected silvered mica	—	C3
C4B	140pF	± 5%	350V	Protected silvered mica	—	D5
C5A	0.005μF	±20%	1kV	Metal-cased tubular paper	—	D2
C5B	0.005μF	±20%	1kV	Metal-cased tubular paper	—	C10
C5C	0.005μF	±20%	1kV	Metal-cased tubular paper	—	E12

Table 1001—List of components, Wireless set No. 62 (*continued*)

Circuit reference	*Value*	*Tolerance*	*Rating*	*Type*	*Remarks*	*Location reference (Figs. 1001 and 1002)*
CONDENSERS						
C5D	0.005μF	±20%	1kV	Metal-cased tubular paper	—	C13
C6A	250pF	± 2%	350V	Protected silvered mica	—	B3
C6B	250pF	± 2%	350V	Protected silvered mica	—	B4
C6C	250pF	± 2%	350V	Protected silvered mica	—	B7
C6D	250pF	± 2%	350V	Protected silvered mica	—	B8
C7A	30pF	±10%	350V	Protected silvered mica	Mk. 1 up to 1800	D6
C7B	30pF	±10%	350V	Protected silvered mica	—	G4
C8A	5pF	±20%	350V	Protected silvered mica	Mk. 1 up to 1800	C6
C8B	5pF	±20%	350V	Protected silvered mica	—	D3
C9	550pF max.			Variable, 4-gang	—	C9A D3 O9B D5 C9C H6 C9D H5
C10A	1.5—15pF			Trimmer, flat type	—	B2
C10B	1.5—15pF			Trimmer, flat type	—	G7
C10C	1.5—15pF			Trimmer, flat type	—	G5
C11A	3—50pF			Trimmer, flat type	—	B2
C11B	3—50pF			Trimmer, flat type	—	G7
C11C	3—50pF			Trimmer, flat type	—	G5
C12A	3—30pF			Trimmer, concentric type	—	D5
C12B	3—30pF			Trimmer, concentric type	—	D6
C13A	1,700pF	±20%	350V	Protected silvered mica	—	D6
C14A	3,500pF	± 2%	350V	Protected silvered mica	—	D6
C15A	410pF	± 2%	350V	Protected silvered mica	—	B9
C15B	410pF	± 2%	350V	Protected silvered mica	—	B10
C16A	20pF	±20%	350V	Protected silvered mica	—	B11
C16B	20pF	±20%	350V	Protected silvered mica	—	F6
C17A	100pF	±20%	350V	Moulded mica	—	C10
C18A	500pF	±20%	350V	Moulded mica	—	B5
C18B	500pF	±20%	350V	Moulded mica	—	C10
C19A	820pF	± 2+	350V	Protected silvered mica	—	H8
C20A	90pF	± 5%	350V	Protected silvered mica	—	H8
C21A	100μF	+50% −20%	6V	Electrolytic	—	D3
C22A	2μF	±20%	350V	Electrolytic	—	B12
C22B	2μF	±20%	350V	Electrolytic	—	H12
C23A	8μF	+50% −20%	500V	Electrolytic	—	F15

Table 1001—List of components, Wireless set No. 62 (*continued*)

Circuit reference	*Value*	*Tolerance*	*Rating*	*Type*	*Remarks*	*Location reference (Figs. 1001 and 1002)*
CONDENSERS						
C24A	8μF	+50% −20%	75V	Electrolytic	—	E14
C25A	0.03μF	±10%	500V	Metal-cased tubular paper	—	H9
C26A	0.004μF	±15%	750V	Moulded mica	—	G3
C27A	487pF max.			Variable, air-spaced	—	H3
C28A	4.75pF			Trimmer, flat type	—	G4
C28B	4.75pF			Trimmer, flat type	—	G4
C29A	4 turns twisted wire				—	G8
C30A	27pF	±10%	350V	Ceramic: Special Temp. Coeff.	Mk. 1 over 1800, Mk. 2	D6
C31A	10pF	±20%	350V	Protected silvered mica	Mk. 1 over 1800, Mk. 2	C5
C32A	15pF	±20%	350V	Protected silvered mica	Mk. 1 over 1800, Mk. 2	C6
C33A	10pF	±10%	350V	Ceramic: Special Temp. Coeff.	Mk. 1 over 1800, Mk. 2	D7

Circuit reference	*Description*	*Location reference (Figs. 1001 and 1002)*
INDUCTORS		
L1A	R.F. choke	D2
L1B	R.F. choke	F15
L1C	R.F. choke	C15
L1D	R.F. choke	H4
L1E	R.F. choke	F2
L2A	H.F. range anode coil	B3
L2B	H.F. range anode coil	F7
L2C	H.F. range anode coil	G5
L3A	L.F. range anode coil	B2
L3B	L.F. range anode coil	F7
L3C	L.F. range anode coil	G4
L4A	Filament choke	D3
L4B	Filament choke	D4
L4C	Filament choke	C4 Fig. 1001 D3 Fig. 1002
L5A	L.F. range LO coil	D6
L6A/1	H.F. range LO coil (tuned winding)	D6
L6A/2	H.F. range LO coil (coupling winding)	D7
L8A	L.T. R.F. choke	G16
L9A	HET. TONE control coil	H9
L10A/1	Beat oscillator coil (tuned winding)	H8
L10A/2	Beat oscillator coil (coupling winding)	H8
L10A/3	Beat oscillator coil (control winding)	H9
L11A	Modulation choke	H4
L12A	PA anode choke	G3
L13A	Aerial tuning inductor	G3
TRANSFORMERS		
T1A	1st I.F. transformer	B3
T2A	2nd I.F. transformer	B8
T3A	3rd I.F. transformer	B9
T4A	Microphone transformer	D11
T5A	Output transformer	B13
T6A	Rotary transformer, 11W	F15 and F16
T7A	Aerial current transformer	G2

Table 1001—List of components, Wireless set No. 62 (continued)

Circuit reference	*Type*	*Description*	*Location reference (Figs. 1001 and 1002)*
VALVES			
V1A	CV1331 (ARP12)	Receiver R.F. amplifier	C2
V1B	CV1331 (ARP12)	Receiver mixer	C3
V1C	CV1331 (ARP12)	Local oscillator	C5
V1D	CV1331 (ARP12)	1st I.F. amplifier	C7
V1E	CV1331 (ARP12)	2nd I.F. amplifier	C9
V2A	CV1306 (AR8)	Detector, A.V.C. and modulation amplifier	C11
V3A	CV65	Receiver output and sidetone amplifier	C13
V3B	CV65	Modulator	G11
V4A	CV1347 (ARTH2)	Beat oscillator and sender mixer	G7
V5A	CV1091. (ARP35)	Buffer amplifier	G5
V6A	CV1510 (VT510)	Power amplifier	G3
RECTIFIERS			
W1A			F2
W2A		Selenium	F2
SWITCHES			
S1A	Rotary multi-wafer	RANGE switch	C2, C2, D5, C5, G7, G5 and G4
S2A	Rotary wafer, 1-bank 2-pole, 2-position	XTAL/MO switch	C5 and C6
S3A	Double-toggle (rotary-operated)	ON/OFF switch	G16 and H15
S4A	Rotary wafer, 3-bank, 3×3-pole, 3-position	CW/NET/RT switch	F14, G14, F9, F8, E13, G13, D12 and E12
S5A	Rotary wafer, 1-bank, 2-pole, 6-position	Meter switch	F3
RELAY			
A/2	600 type 100Ω coil 2C	SEND/RECEIVE relay	Operating coil G14 Contacts A1 D12 A2 F14
FUSE			
F1A	250mA cartridge	Main H.T.	F14

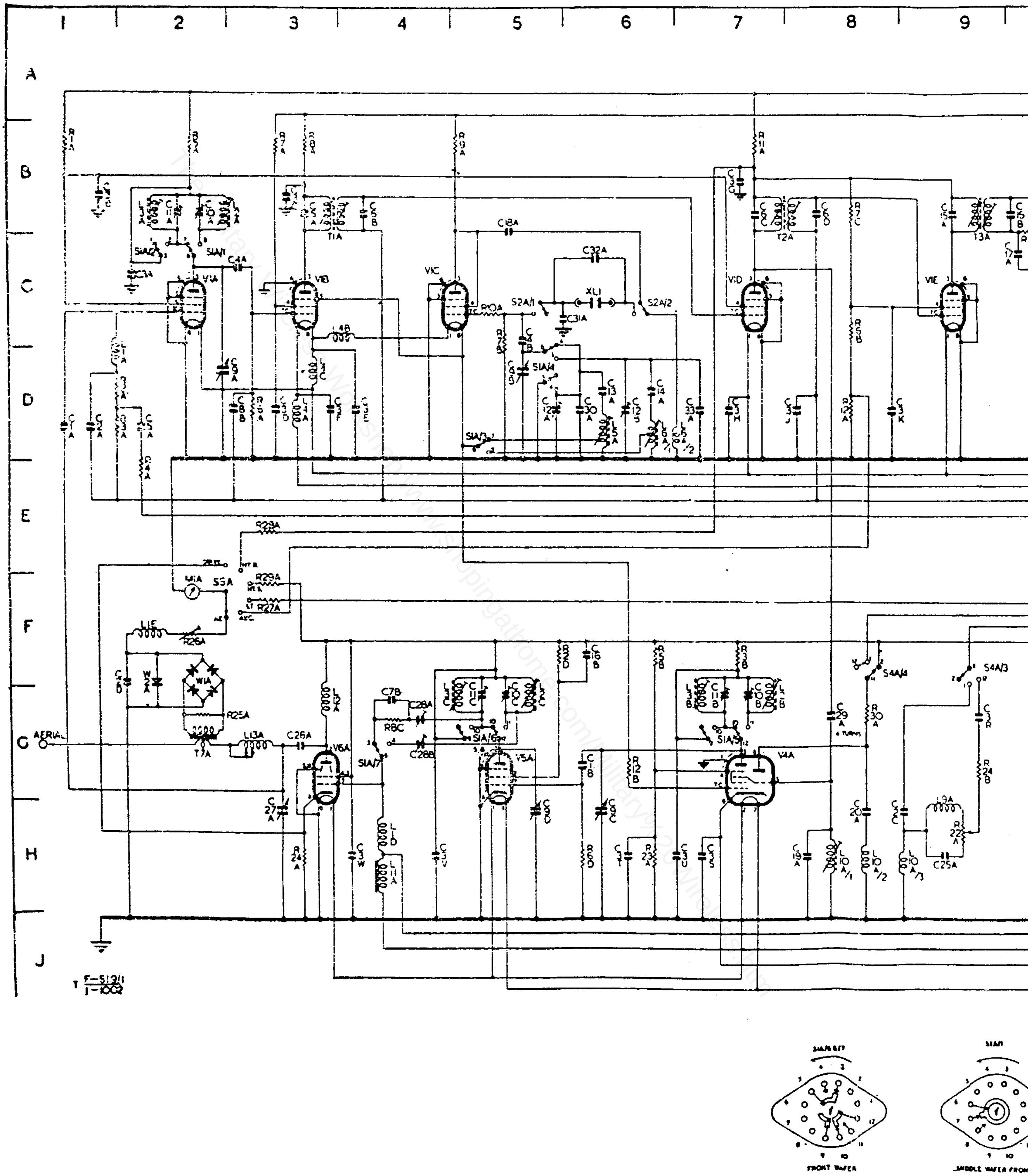
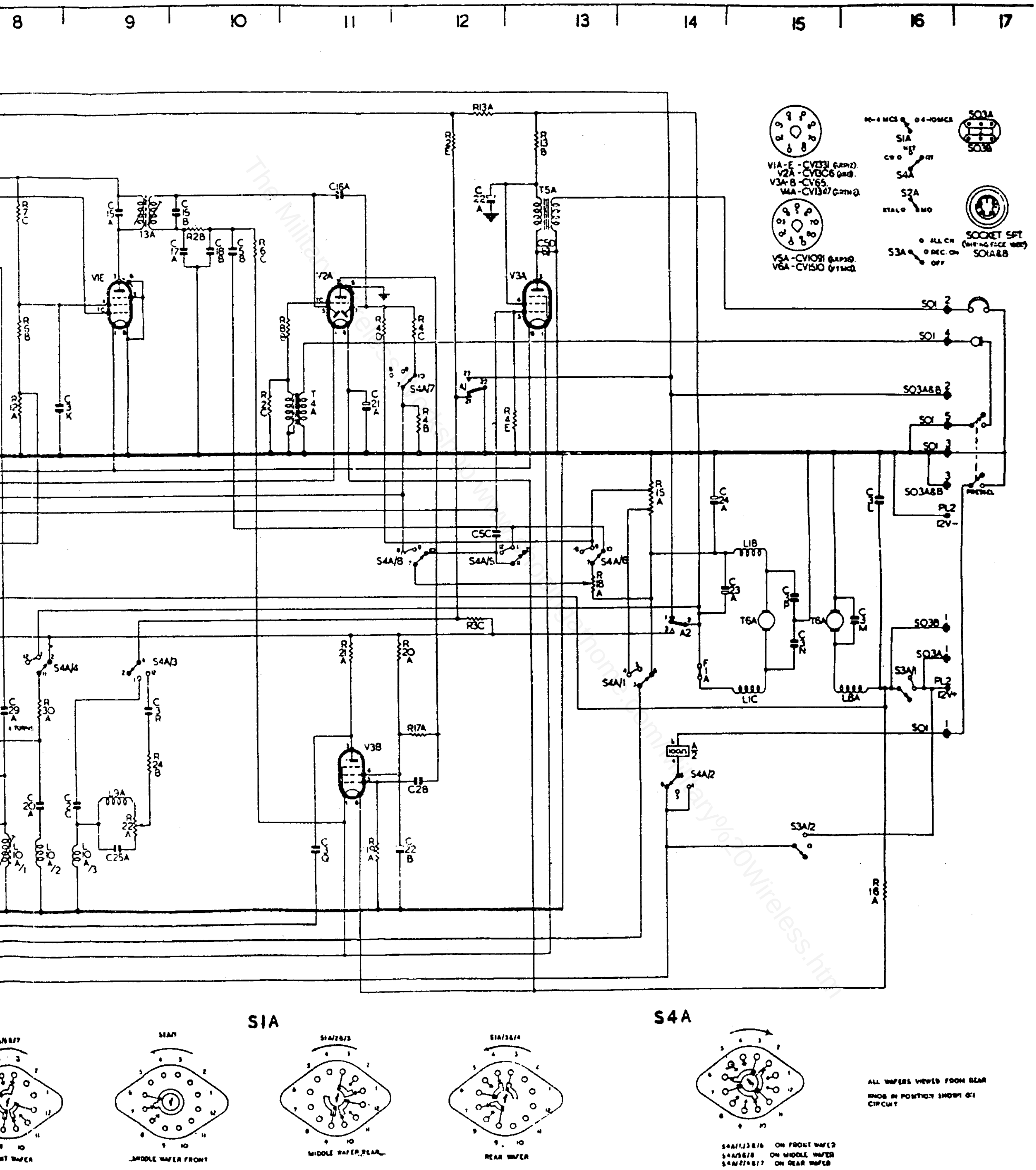


Fig. 1002—Circuit diagram, Mk. 1 to 1



it diagram, Mk. 1 to 1800 onwards, and Mk. 2

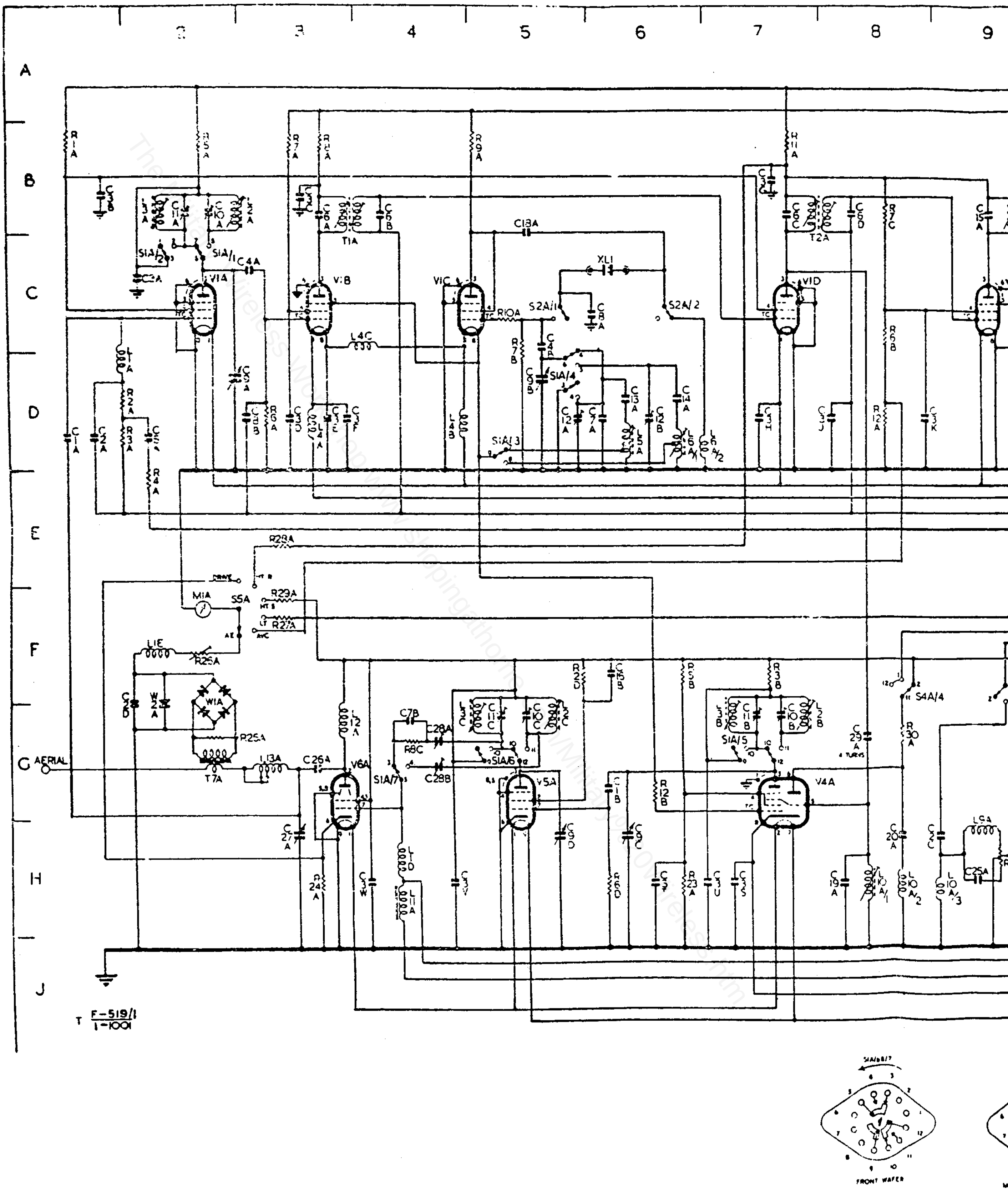
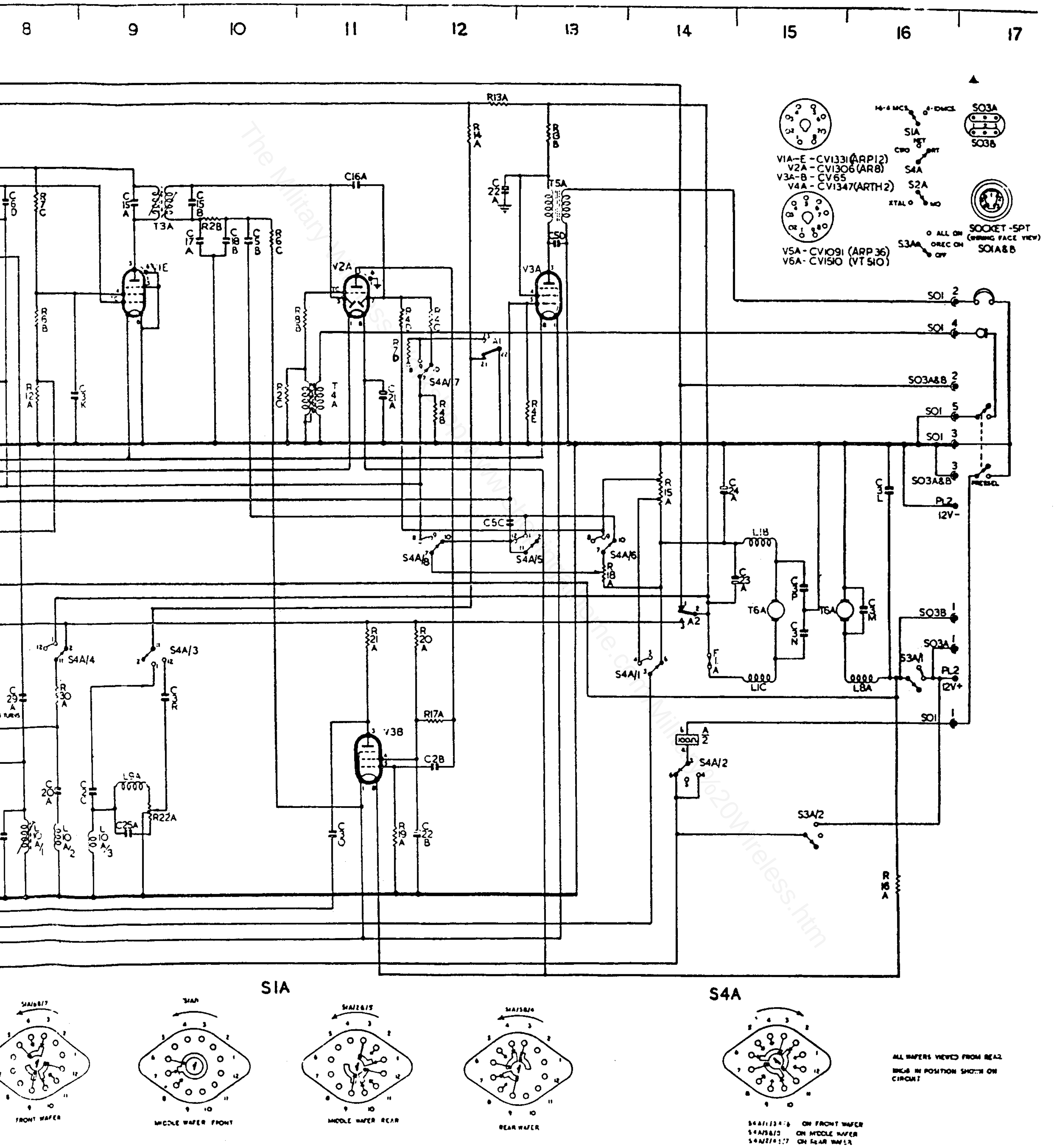


Fig. 1001—Circuit diagram, M



ALL WAFERS VIEWED FROM REAR
S4A/1/3/4/6 ON FRONT WAFER
S4A/5/8/5 ON MIDDLE WAFER
S4A/2/4/7 ON REAR WAFER

-Circuit diagram, Mk. 1 to 1000

WIRELESS SET NO. 62, MARKS 1 AND 2

SERVICE DATA—FIRST ECHELON WORK

Note: For double distribution see Tels. A 600

Circuit changes during production

1. Owing to the components not being available in time, certain of these modifications may not be incorporated until a later serial number than that indicated. This applies particularly to paras. 2(d) and 3.

2. Changes incorporated after Mk. 1, serial number 1,000, and included in Mk. 2 sets:—
   - (*a*) Filament circuit changed from Fig. 1 to Fig. 2.
   - (*b*) XTAL/MO switch rewired (Figs. 3 and 4).
   - (*c*) R14A (47kΩ) replaced by R2E (100kΩ). Sender H.T. now earthed through R3C (4.7kΩ) on receive.
     Relay contact A1 rewired and R7D removed. Receiver H.T. now earthed on send (Figs. 5 and 6).
   - (*d*) Earth connection to midpoint of R22A removed. R24B added.

3. Changes incorporated after Mk. 1, serial number 1800, and included in Mk. 2 sets:—
   - (*a*) C32A (15pF) added across crystal. C8A (5pF) replaced by C31A (10pF) (Fig. 4).
   - (*b*) C7A (30pF) replaced by C30A (with spec. temp. coeff.). C33A (10pF spec. temp. coeff.) added.

Relay adjustments

4. For method of adjustment, see Tels. A 424/5 (Type K. 600).

5. Spring tensions: 1 and 3, 21 and 23: 16—20 grams.
2 and 22 8—12 grams.
Armature travel: 31 mils.
Armature residual stud: 4 mils.
Current: Saturate, 100 mA
Operate, 70 mA

Send-receive alignment check

6. Set wavemeter to 4 Mc/s and tune in receiver (switch to NET and tune for zero beat). Press pressel switch and tune in wavemeter to SEND frequency. If more than 1.5 kc/s from 4 Mc/s, return to workshops for realignment. Carry out at 4 Mc/s on both frequency ranges.

Calibration check

7. Check at 2.1, 2.5, 3.0, 3.5, 4.0 (both ranges) 5.0, 6.0, 7.0, 8.0, 9.0 and 9.9 Mc/s by setting crystal calibrator to frequency, tuning in receiver, using A.V.C. meter, and noting receiver frequency dial reading. If error is greater than 1%, return to workshops for realignment.

Mechanical replacements

8. Note that when components are replaced in this set, the replacement must be of tropical pattern and in accordance with the identification list. If the case is removed for any purpose, the fixing screws must be re-sealed, after replacing with either shellac or bakelite varnish.

Rotary transformer

9. To reach the rotary transformer for changing brushes, etc., remove the baseplate and disconnect the wires connecting the transformer to the set at the terminal blocks fitted in the side of the chassis (Fig. 8). Place the set right way up on a bench and remove the two rubber-mounted screws at the rear of the chassis at the back of the A.T.I. The rotary transformer and associated smoothing components can now be removed as one unit. The transformer is mounted on the bottom half of the case when it is placed right way up (as in the set). The remainder of the case can be removed by undoing the screws around the edge. Check that the rubber grommets used for suspension are not perished.

AERIAL TUNING inductance L13A

10. Remove the AERIAL TUNING knob and drive by removing the knob and unscrewing the clutch screw, taking care not to lose the clutch spring. Remove the dial by unscrewing the two grubscrews. Unsolder the connections to the A.T.I. and the fuse panel and remove the tape holding the aerial lead to the frame. Remove the three screws holding the A.T.I. frame to the chassis and lift out the A.T.I. To do this it will be necessary to move the fuse panel.

11. The A.T.I. should be replaced in the reverse order. When reassembling the drive, reference should be made to Fig. 9. Adjust the clutch screw so that the drive operates correctly but slips at the ends of the coil.

OFF/REC ON/ALL ON switch S3A (Fig. 10).

12. Remove the knob and remove the nut holding the gland to the panel. Remove the nut holding the switch mounting to the chassis, disconnect the switch and remove. To do this it may first be necessary to remove C3W. The separate switches can now be removed by undoing the fixing screws.

Flick mechanism

13. If the flick mechanism requires attention, the set should be returned to workshops, since recalibration will be needed.

Issue 1, 5 Mar. 1947

Distribution—Class 870. Code No. 4 (double)

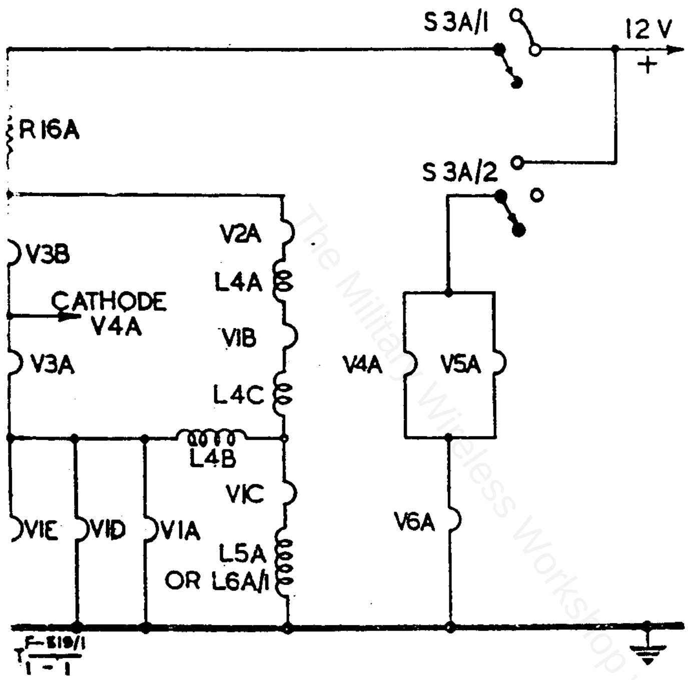


Fig. 1—Filament circuits, Mk. 1, Ser. Nos. 1-1000

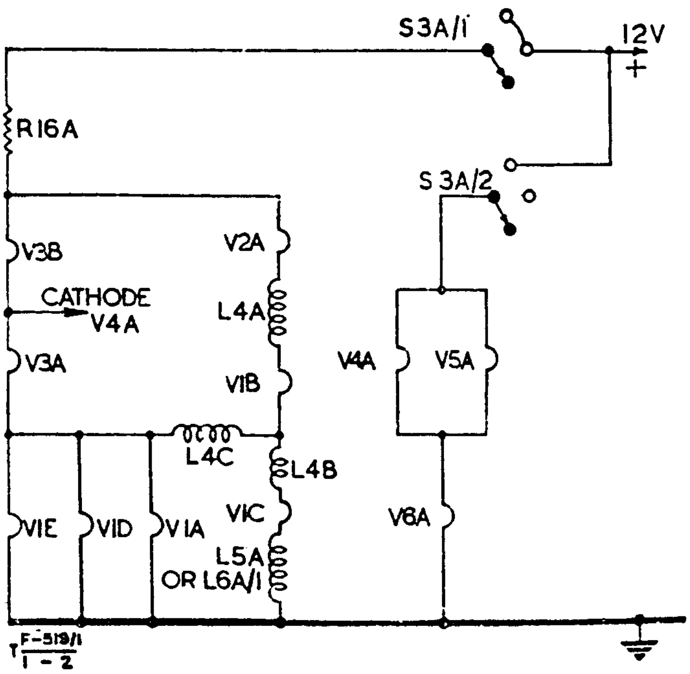


Fig. 2—Filament circuits, Mk. 1, Ser. Nos. 1001 onwards and Mk. 2

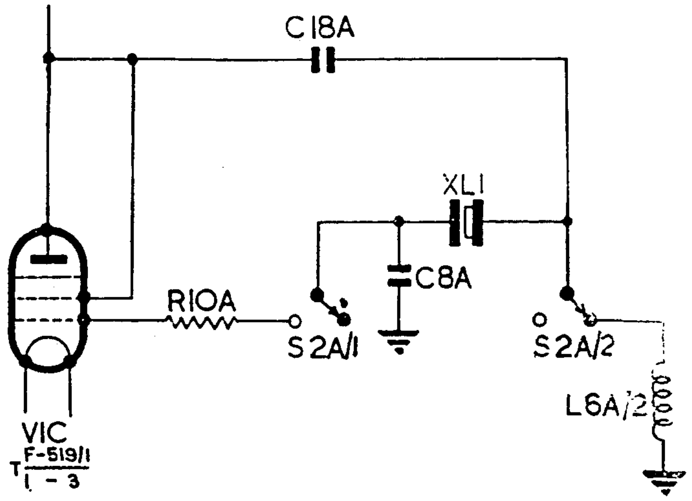


Fig. 3—Crystal Osc. circuits, Mk. 1, Ser. Nos. 1-1000

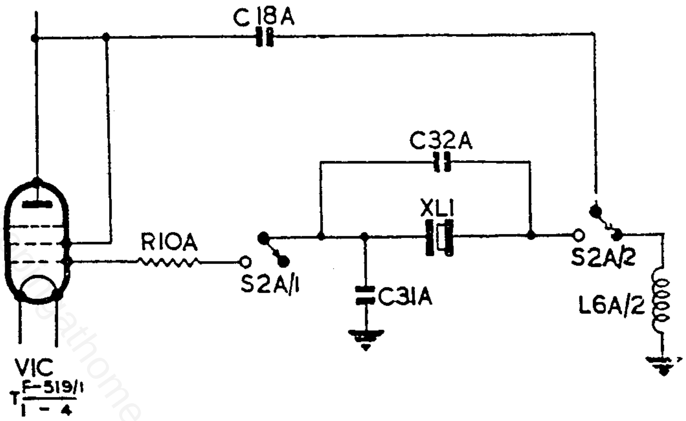


Fig. 4—Crystal Osc. circuits, Mk. 1, Ser. Nos. 1801 onwards and Mk. 2

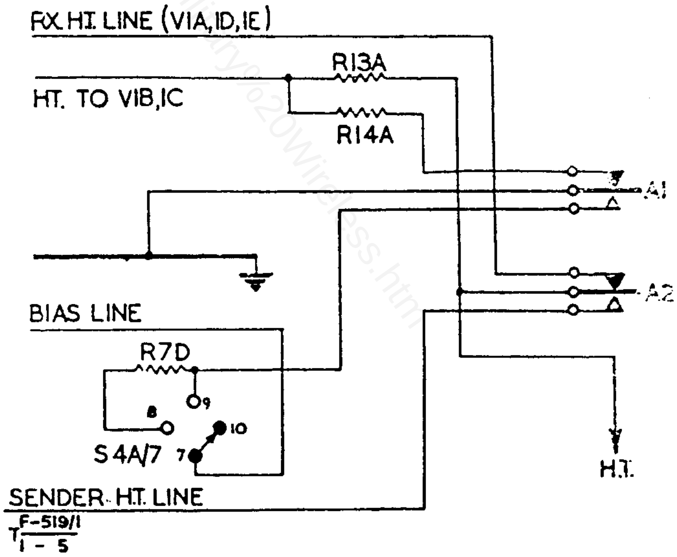


Fig. 5—Send-receive switching, Mk. 1, Ser. Nos. 1-1000

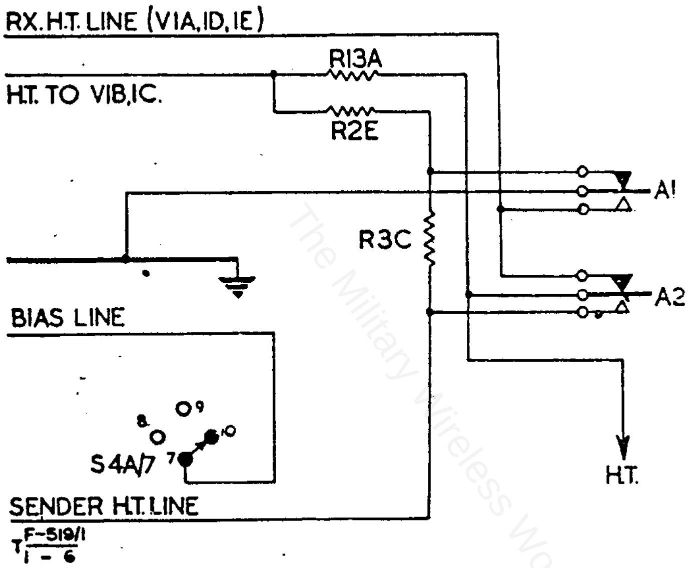
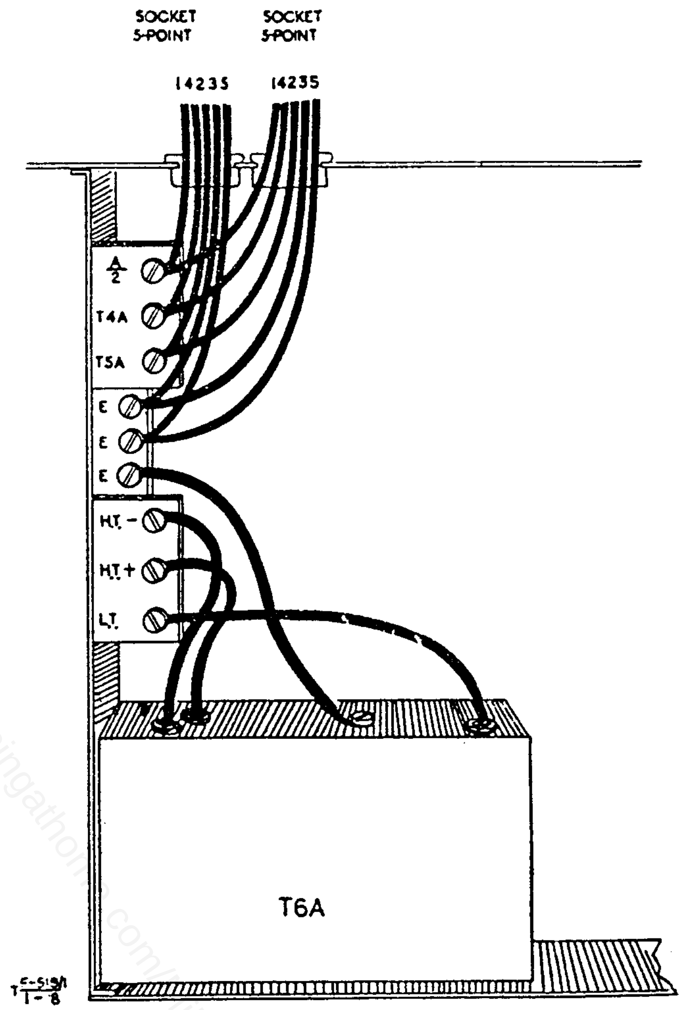


Fig. 6—Send-receive switching, Mk. 1, Ser. Nos. 1001 onwards and Mk. 2



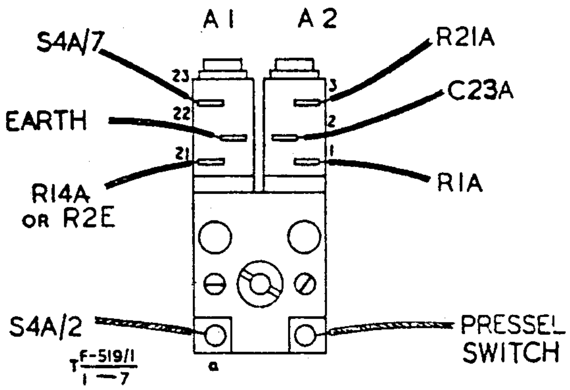


Fig. 7—Relay connections

Fig. 8—Connections to rotary transformer

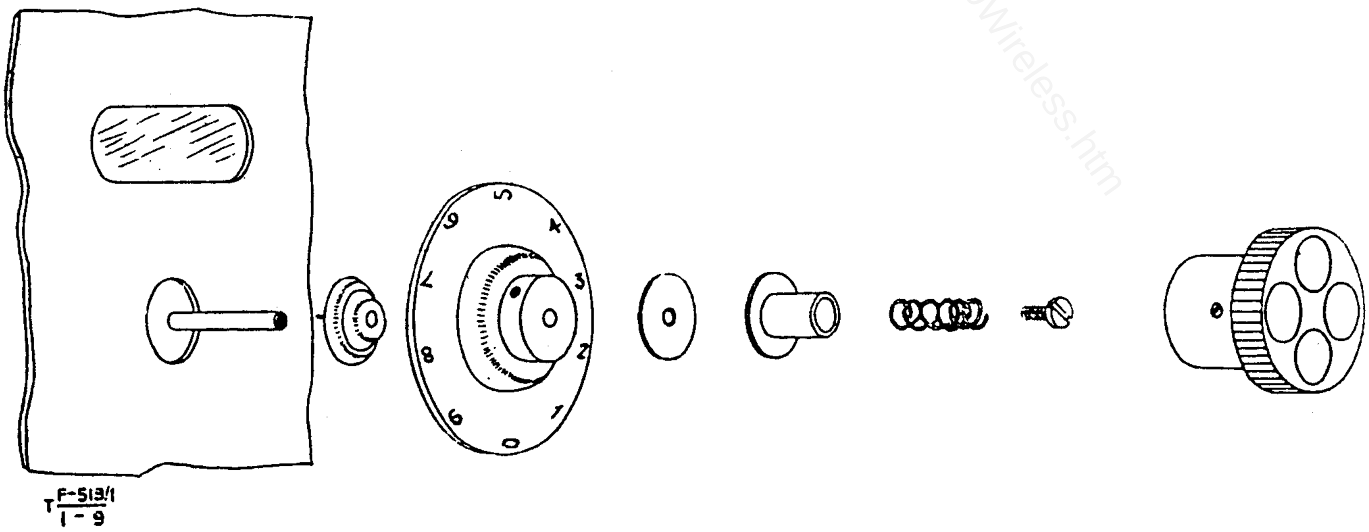


Fig. 9—Exploded view of A.T.I. drive

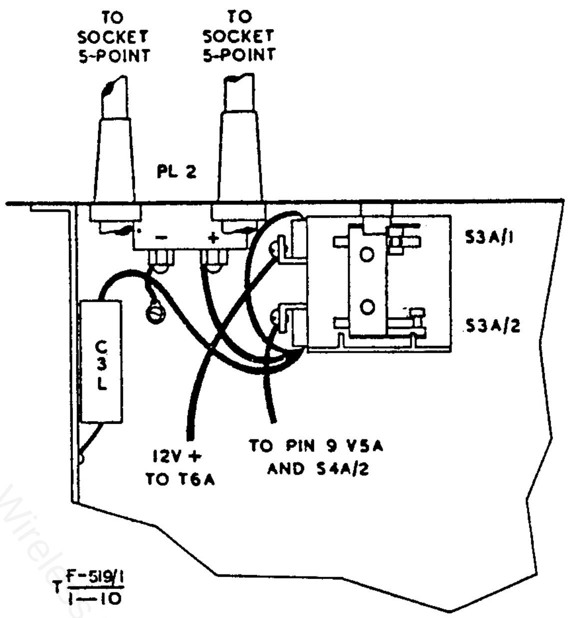


Fig. 10—S3A connections

Table 1—Voltage, current and resistance checks

CONDITIONS OF MEASUREMENT

For all measurements use Avometer, model 7
Voltages above 50V—400V range, between 10 and 50V—100V range
Gain control at maximum
X'TAL/MO switch at MO
H.F. band, 6 Mc/s
ON/OFF switch at ALL/ON
Meter switch at DRIVE
12 V input at plug

Pin connections		*Voltage (V)*					*Current (mA)*					*Resistance (Ω)*					
		Receive			*Send*		*Receive*			*Send*		*To*	*Receive*			*Send*	
		R/T	*Net*	*C.W.*	*R/T*	*C.W.*	*R/T*	*Net*	*C.W.*	*R/T*	*C.W.*		*R/T*	*Net*	*C.W.*	*R/T*	*C.W.*
V1A	**(CV 1331)**																
1	Fil. + ..	2	2	2	2	2	50	50	50	50	50	CH.	1.9	1.9	1.9	1.9	1.9
2	— ..	315	320	320	—	—	—	—	—	—	—	H.T.	S.C.	S.C.	S.C.	1.2k	1.2k
3	Anode ..	100	112	112	—	—	1.5	1.4	11.4	—	—	H.T.	100k	100k	100k	100k	100k
4	Screen ..	60	75	75	—	—	0.6	0.5	0.5	—	—	H.T.	220k	220k	220k	220k	220k
5	Sup.	—	—	—	—	—	—	—	—	—	—	CH.	S.C.	S.C.	S.C.	S.C.	S.C.
6	Met.	—	—	—	—	—	—	—	—	—	—	CH.	S.C.	S.C.	S.C.	S.C.	S.C.
7	— ..	2	2	2	2	2	—	—	—	—	—	CH.	2.9	2.9	2.9	2.9	2.9
8	Fil.	—	—	—	—	—	50	50	50	50	50	CH.	S.C.	S.C.	S.C.	S.C.	S.C.
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	CH.	700k	105k	105k	700k	105k
V1B	**(CV 1331)**																
1	Fil. + ..	4	4	4	4	4	50	50	50	50	50	Chassis	7.7	7.7	7.7	7.7	7.7
2	— ..	115	135	135	—	—	—	—	—	—	—	H.T.	33k	33k	33k	33k	33k
3	Anode ..	80	80	80	85	85	2	2	2	2	2	H.T.	40k	40k	40k	42k	42k
4	Screen ..	80	80	80	85	85	0.85	0.85	0.85	0.85	0.85	H.T.	63k	63k	63k	67k	67k
5	Sup.	—	—	—	—	—	—	—	—	—	—	Chassis	0.05	0.05	0.05	0.05	0.05
6	Met.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
7	— ..	—	—	—	—	—	—	—	—	—	—	,,	—	—	—	—	—
8	Fil. — ..	2	2	2	2	2	50	50	50	50	50	Chassis	5	5	5	5	5
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	,,	470k	470k	470k	470k	470k

Table 1—Voltage, current and resistance checks (*continued*)

Pin connections		Voltage (V)					Current (mA)					Resistance (Ω)					
		Receive			Send		Receive			Send		To	Receive			Send	
		R/T	Net	C.W.	R/T	C.W.	R/T	Net	C.W.	R/T	C.W.		R/T	Net	C.W.	R/T	C.W.
V1C	**(CV 1331)**																
1	Fil. +	2	2	2	2	2	50	50	50	50	50	Chassis	2.9	2.9	2.9	2.9	2.9
2	—	2	2	2	2	2	—	—	—	—	—	,,	5.1	5.1	5.1	5.1	5.1
3	Anode	95	95	95	100	100 }	4	4	4	4	4	H.T.	28k	28k	28k	30k	30k
4	Screen	95	95	95	100	100 }						H.T.	28k	28k	28k	30k	30k
5	Sup.	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
6	Met.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
7	—	132	132	132	142	136	—	—	—	—	—	H.T.	18k	18k	18k	18k	18k
8	Fil. −	—	—	—	—	—	50	50	50	50	50	Chassis	0.05	0.05	0.05	0.05	0.05
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	,,	47k	47k	47k	47k	47k
V1D	**(CV 1331)**																
1	Fil. +	2	2	2	2	2	50	50	50	50	50	Chassis	1.9	1.9	1.9	1.9	1.9
2	—	4	4	4	4	4	—	—	—	—	—	,,	7.8	7.8	7.8	7.8	7.8
3	Anode	115	115	135	—	—	1.7	1.6	1.6	—	—	H.T.	33k	33k	33k	33k	33k
4	Screen	60	75	75	—	—	0.6	0.5	0.5	—	—	H.T.	220k	220k	220k	220k	220k
5	Supt.	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
6	Met.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
7	—	4	4	4	4	4	—	—	—	—	—	,,	7.9	7.9	7.9	7.9	7.9
8	Fil. −	—	—	—	—	—	50	50	50	50	50	,,	S.C.	S.C.	S.C.	S.C.	S.C.
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	,,	600k	100	100	600k	100
V1E	**(CV 1331)**																
1	Fil. +	2	2	2	2	2	50	50	50	50	50	Chassis	1.9	1.9	1.9	1.9	1.9
2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	Anode	115	135	135	—	—	1.7	1.6	1.6	—	—	H.T.	33k	33k	33k	33k	33k
4	Screen	62	85	85	—	—	0.9	0.8	0.8	—	—	H.T.	80k	80k	80k	80k	80k
5	Sup.	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
6	Met.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
7	—	0.3	0.4	0.4	—	—	—	—	—	—	—	,,	*3.3k	*3.3k	*3.3k	*3.3k	*3.3k
8	Fil.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	,,	600k	100	100	600k	100
V2A	**(CV 306)**																
1	Fil. +	4	4	4	4	4	50	50	50	50	50	Chassis	7.9	7.9	7.9	7.9	7.9
2	—	−3	−3	−3	−5.5	−6.3	—	—	—	—	—	,,	100	100	100	100	100
3	Anode	—	—	—	97	95	—	—	—	0.35	0.35	H.T.	290k	290k	290k	280k	280k
4	—	—	—	—	−3	0	—	—	—	—	—	Chassis	600k	1M	1M	600k	1M
5	Sig. diode	—	—	—	—	—	—	—	—	—	—	,,	570k	570k	570k	570k	570k
6	Met.	—	—	—	—	—	—	—	—	—	—	,,	S.C.	S.C.	S.C.	S.C.	S.C.
7	A.V.C. Diode	—	—	—	—	—	—	—	—	—	—	,,	600k	1M	1M	600k	1M
8	Fil. +	6	6	6	6	6	50	50	50	50	50	Chassis	4.8	4.8	4.8	4.8	4.8
T.C.	Grid	—	—	—	—	—	—	—	—	—	—	,,	28k	28k	28k	28k	28k
V3A	**(CV 65)**																
1	Fil. +	4	4	4	4	4	150	150	150	150	150	Chassis	3.9	3.9	3.9	3.9	3.9
2	—	6	6	6	6	6	—	—	—	—	—	,,	5.2	5.2	5.2	5.2	5.2
3	Anode	108	108	108	98	98	7.5	7.5	7.5	7	7	H.T.	20.5k	20.5k	20.5k	20.5k	20.5k
4	Screen	112	112	112	103	103	2.5	2.5	2.5	2.3	2.3	H.T.	20k	20k	20k	20k	20k
5	Grid	—	—	—	—	—	—	—	—	—	—	Chassis	1M	1M	1M	1M	1M
6	—	—	—	—	—	—	—	—	—	—	—	,,	2M	2M	2M	2M	2M
7	—	12	12	12	12	12	—	—	—	—	—	,,	0.5	0.5	0.5	0.5	0.5
8	Fil. −	2	2	2	2	2	150	150	150	150	150	,,	1.8	1.8	1.8	1.8	1.8

* NOTE.—Meter in all positions except A.V.C. When in A.V.C., resistance 480Ω.

Table 1—Voltage, current and resistance checks (*continued*)

Pin connections		Voltage (V) Receive R/T	Voltage Receive Net	Voltage Receive C.W.	Voltage Send R/T	Voltage Send C.W.	Current (mA) Receive R/T	Current Receive Net	Current Receive C.W.	Current Send R/T	Current Send C.W.	To	Resistance (Ω) Receive R/T	Resistance Receive Net	Resistance Receive C.W.	Resistance Send R/T	Resistance Send C.W.
V3B	**(CV 65)** ..																
1	Fil. + ..	6	6	6	6	6	150	150	150	150	150	Chassis	5	5	5	5	5
2	— ..	—	—	—	—	—	—	—	—	—	—	„	470k	470k	470k	470k	470k
3	Anode ..	—	—	—	80	80	—	—	—	2.8	2.8	H.T.	75k	75k	75k	68k	68k
4	Screen ..	—	—	—	95	95	—	—	—	0.3	0.3	H.T.	270k	270k	270k	270k	270k
5	Grid	—	—	—	—	—	—	—	—	—	—	Chassis	220k	220k	220k	220k	220k
6	— ..	—	—	—	265	250	—	—	—	—	—	H.T.	5k	5k	5k	S.C.	S.C.
7	— ..	—	315	315	270	250	—	—	—	—	—	H.T.	5k	S.C.	S.C.	S.C.	S.C.
8	Fil. — ..	4	4	4	4	4	150	150	150	150	150	Chassis	3.9	3.9	3.9	3.9	3.9
V4A	**(CV 1347)**																
1	Met.	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
2	Heater ..	12	12	12	12	12	300	300	300	300	300	„	0.5	0.5	0.5	0.5	0.5
3	Hex. anode ..	—	—	—	270	280	—	—	—	2.8	2.6	H.T.	10k	10k	10k	4.7k	4.7k
4	Hex. screen ..	—	—	—	50	50	—	—	—	1	1	H.T.	105k	105k	105k	100k	100k
5	Osc. grid ..	—	—	—	—	—	—	—	—	—	—	Chassis	3	3	3	3	3
6	Osc. anode ..	—	90	90	90	90	—	1.5	1.5	1.5	1.5	H.T.	155k	150k	150k	150k	150k
7	Heater ..	6	6	6	6	6	300	300	300	300	300	Chassis	2	2	2	2	2
8	Cath.	4	4	4	4	4	—	1.5	1.5	5.3	5.1	„	3.9	3.9	3.9	3.9	3.9
T.C.	Hex. grid ..	—	—	—	—	—	—	—	—	—	—	„	3.3k	3.3k	3.3k	3.3k	3.3k
V5A	**(CV 1051)** ..																
1	Heater ..	6	6	6	6	6	300	300	300	300	300	Chassis	2	2	2	2	2
2	Screen ..	—	—	—	150	135	—	—	—	0.65	0.63	H.T.	105k	105k	105k	100k	100k
3	Anode ..	—	—	—	280	265	—	—	—	5	5	H.T.	5k	5k	5k	S.C.	S.C.
4	Sup.	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
5	— ..	—	—	—	—	—	—	—	—	—	—	„	S.C.	S.C.	S.C.	S.C.	S.C.
6	Cath.	—	—	—	—	—	—	—	—	—	—	„	S.C.	S.C.	S.C.	S.C.	S.C.
7	Grid	—	—	—	—	—	—	—	—	—	—	„	470k	470k	470k	470k	470k
8	— ..	—	—	—	—	—	—	—	—	—	—	„	S.C.	S.C.	S.C.	S.C.	S.C.
9	Heater ..	12	12	12	12	12	300	300	300	300	300	„	0.5	0.5	0.5	0.5	0.5
V6A	**(CV 1510)**																
1	Heater ..	6	6	6	6	6	600	600	600	600	600	Chassis	2	2	2	2	2
2	Anode ..	—	—	—	265	250	—	—	—	24	40	H.T.	5k	5k	5k	1.5k	1.5k
3	Screen ..	—	—	—	265	250	—	—	—	—	—	H.T.	5k	5k	5k	S.C.	S.C.
4	Screen ..	—	—	—	265	250	—	—	—	3.5	5	H.T.	5k	5k	5k	S.C.	S.C.
5	Earth screen ..	—	—	—	—	—	—	—	—	—	—	Chassis	S.C.	S.C.	S.C.	S.C.	S.C.
6	Cathode ..	—	—	—	0.2	0.25	—	—	—	27.5	45	„	4.2	4.2	4.2	4.2	4.2
7	Grid	—	—	—	−38	−31	—	—	—	—	—	„	2.3k	2k	2k	2.3k	2k
8	Earth screen ..	—	—	—	—	—	—	—	—	—	—	„	S.C.	S.C.	S.C.	S.C.	S.C.
9	Heater ..	—	—	—	—	—	600	600	600	600	600	„	S.C.	S.C.	S.C.	S.C.	S.C.

Note:

SUPPLEMENT
to
PYE WIRELESS SET 62
TECHNICAL HANDBOOK (ISSUE 1).
TRANSISTOR POWER SUPPLY UNIT

INTRODUCTION

This supplement should be read in conjunction with the Technical Handbook for the Pye Wireless Set 62.

The transistor power supply unit for the Pye Wireless Set 62 is designed to operate from a 12 volt d.c. supply. It is a direct replacement for the rotary transformer power unit with which the standard equipment is issued, and results in a considerable reduction in battery consumption.

CONSTRUCTION

The complete unit is housed in a well ventilated metal case with the same overall dimensions as those of the rotary transformer power unit. When installed it is bolted directly to the chassis of the Wireless Set 62, the two securing screws being provided with adaptor washers to replace the rubber grommets on which the rotary transformer power unit is mounted.

TECHNICAL DESCRIPTION

The unit operates from a 12 volt d.c. battery supply and utilises two transistors, VT1 and VT2, in a push-pull d.c. converter circuit with saturable transformer core switching.

The operation of the converter is briefly as follows:-

At the beginning of the first cycle both transistors are equally biased by resistors R1 and R2 but one begins to conduct before the other. If VT1 commences to conduct first, current flows through the emitter to the collector until VT1 is in the bottomed condition i.e. the voltage appearing across terminals 1 and 2 of the transformer T1 is equal to the d.c. input voltage. At the same time the bias applied to the base of VT1 by terminals 5 and 6 of the feedback winding is increasing, tending to increase current flow still further until T1 is saturated. During this half-cycle terminal 4 is negative with respect to terminal 5, biasing VT2 well into the cut-off region. The frequency of operation is mainly determined by the primary inductance of T1 and the time taken to reach saturation is almost equal to half the period of the cycle.

When saturation is reached the transformer action of T1 ceases, with the result that the feedback voltage applied to VT1 is no longer capable of supplying the increasing bias required to maintain the emitter current. This causes a cumulative switch off of VT1. As the feedback voltage applied to the base of VT1 decreases, that applied to the base of VT2 increases, so that when VT1 is finally cut off, VT2 starts to conduct and commences the succeeding half cycle.
The frequency of operation of the converter is approximately 1.5kc/s.

The d.c. input is fed to the primary winding of T1 via a low pass filter L1, C3, which is designed to prevent hum generated by the convertor from entering the transceiver. The fixed bias resistors R1 and R2 are bypassed by capacitors C1 and C2 to reduce a.c. losses.

The secondary winding of T1 (terminals 7 and 8) is connected in a conventional full-wave bridge rectifier circuit employing silicon rectifiers MR1, MR2, MR3 and MR4. The h.t. output from the rectifier circuit is fed to the transceiver via a filter network comprising C4, L2, L3 and L4, of which L2 and L3 are r.f. chokes and L4 an a.f. choke.

T1 is a pot core type transformer, completely shielded to prevent undesirable coupling effects with the transceiver.

Current Consumption. (This paragraph replaces the corresponding paragraph on page 2 of the Handbook).

The following table gives approximate figures of current consumption and working hours which may be obtained from each of the types of battery listed below when fully charged. These figures are given as a rough guide only and in practice there may be quite large differences, depending upon the condition of the battery.

	Average Current	Approx. no. of working hrs for 12 volt battery		
		14Ah	22Ah	75Ah
Transmit R/T	2.7	5.1	8.1	27.7
Transmit C.W.	2.9	4.8	7.5	25.8
1:5 Transmit/Receive ratio	2.5	5.6	8.8	30
Receive (ALL ON)	2.12	6.6	10.3	35.3
Listening watch (REC. ON)	1.2	11.6	18.3	62.5

FITTING INSTRUCTIONS

1. Remove the base plate, which is secured by five screws underneath the chassis, four at the rear and two at the front.
2. Disconnect the rotary transformer connecting leads from the terminal block fitted to the side of the main chassis (see Fig. 11 - Page 36).
3. Unscrew the two 2 B.A. mounting screws on top of the chassis, at the back of the aerial tuning inductance.
4. The complete power unit, mounted in its screened case, may now be removed together with its shock absorbing pads.
5. Remove the rubber grommets, upon which the power unit was mounted, from the Wireless Set 62 chassis and ensure that when the transistor power unit is mounted the whole of its upper side will be in contact with the chassis.
6. Remove the two mounting screws and adaptor washers from the transistor power unit and place it on the Wireless Set 62 chassis so that the four lead-out wires are nearest to the terminal board in the Wireless Set 62.
7. Place the adaptor washers in the mounting holes on the upper side of the Wireless Set 62 chassis and bolt down the power unit. Seal the washers and bolt heads with bakelite varnish.
8. Connect the lead-out wires to the appropriate terminals on the terminal board. The connections use the same colour coding as for the rotary transformer power unit, i.e.

Red lead to H. T. +
Brown lead to H. T. -
White lead to L. T.
Black lead to E.

9. Replace the base plate.

TRANSISTOR SERVICING

1. Do not apply a soldering iron to the connecting leads for any length of time and use a heat shunt on the lead, e.g. grip the wire between the transistor and the joint with a pair of pliers.

2. Always observe the correct polarity when connecting up transistor circuits.

3. Transistors have a very low resistance and may be destroyed by the inadvertent application of quite low potentials. It should be noted that such potentials may exist between the terminals of a meter or other piece of test equipment, or between a soldering iron and earth.

Transistors are extremely robust when operated under the correct conditions. However, if transistor damage is suspected, continuity checks should be carried out as shown below. The ohmmeter should have an internal or external resistance of approximately 1kΩ in circuit.

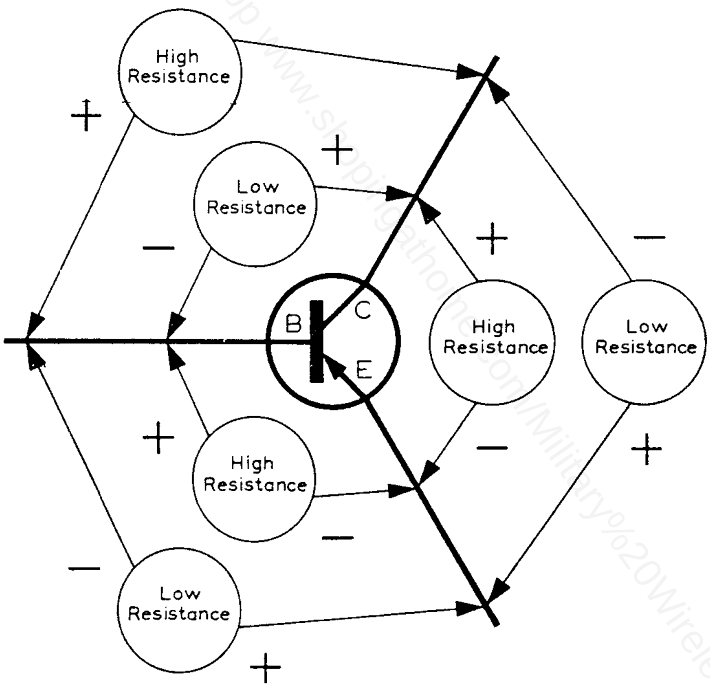


Fig. 1 Transistor Continuity Checks

If these results are not obtained, a replacement transistor should be fitted after investigation and rectification of the fault.

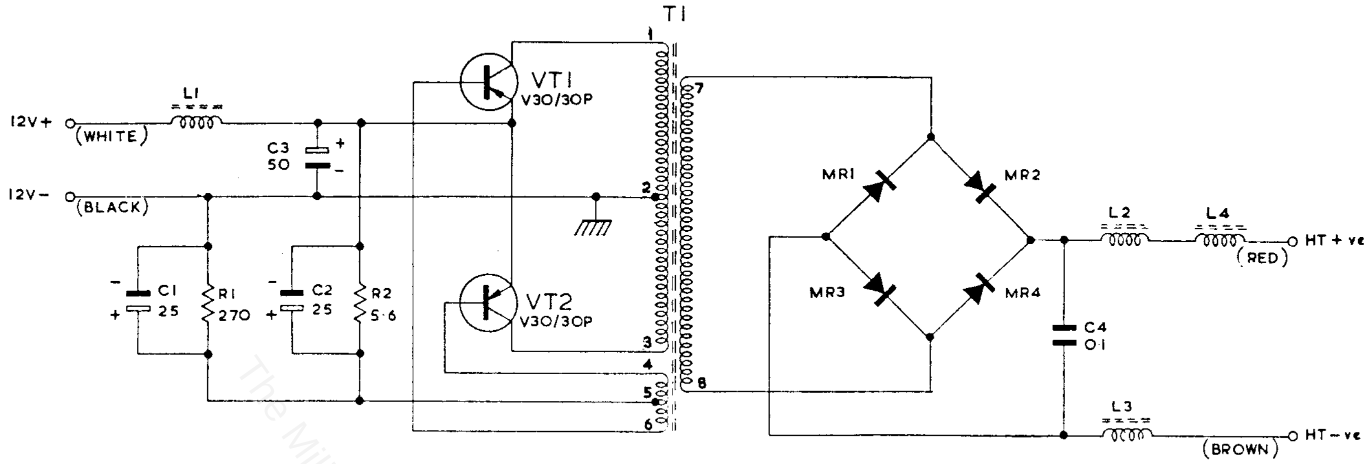


Fig. 2 Power Supply Unit Circuit Diagram

PARTS LIST

Code		CONDENSERS		Part No.
C1	25μF	Electrolytic	25V	266405
C2	25μF	Electrolytic	25V	266405
C3	50μF	Electrolytic	15V	266406
C4	0.1μF	Tubular	500V	669487
		RESISTORS		
R1	270Ω	Dubilier	B.T.A. ± 5%	671423
R2	5.6Ω	Dubilier	B.W.A. ± 5%	676700
		CHOKES		
L1	1mH			279748
L2	500μH			279747
L3	500μH			279747
L4	155mH			279760

Code	TRANSFORMER	Part No.
T1	Converter Transformer	277770
	RECTIFIERS	
MR1		709071
MR2		709071
MR3		709071
MR4		709071
	TRANSISTORS	
VT1	V30/30P	865112
VT2	V30/30P	865112

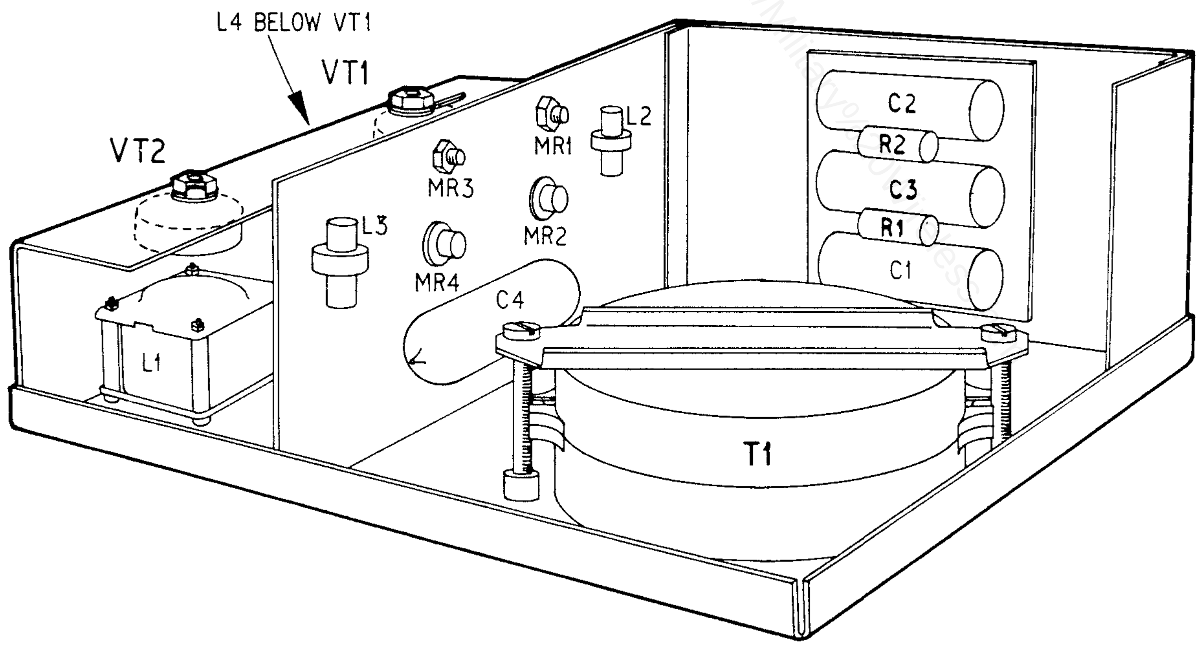


Fig. 3 Power Supply Unit Layout Diagram

APPROXIMATE SETTINGS OF AE. TUNING AND COUPLING CONTROLS

Length of Aerial	Frequency Mc/s	1.6	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	
12"	Coupling	-	40	35	30	25	15	8	5	0	0	0	0	0	0	0	0	0	0	G
		-	34	26	22	20	18	14	12	12	8	5	0	0	0	0	0	0	0	T
	Tuning		770	576	447	373	324	290	259	235	200	180	173	159	145	134	125	117	107	G
			877	639	496	406	334	292	256	227	206	180	179	163	140	138	128	110	100	T
16"	Coupling		35	30	20	17	10	5	0	0	0	0	0	0	0	0	0	0	0	G
		80	70	60	52	44	38	32	28	20	18	16	15	11	8	6	4	2	0	T
	Tuning	-	740	549	446	368	318	284	250	224	193	170	164	149	137	126	117	103	101	G
		735	534	388	305	253	217	187	166	152	135	121	107	099	091	084	076	066	036	T
22"	Coupling	55	20	18	14	10	8	3	0	0	0	0	0	0	0	0	0	0	-	G
	Tuning	879	747	549	421	357	306	269	236	209	186	164	149	133	123	112	098	089	-	G
28'	Coupling	50	35	26	8	5	4	0	0	0	0	0	0	0	0	0	0			
	Tuning	805	619	461	402	338	280	242	209	180	159	139	122	109	092	081	073			G
34'	Coupling	50	40	26	24	20	10	6	4	0	0	0	0	0	0					G
	Tuning	748	566	430	330	275	248	219	190	168	143	123	103	087	005					G
110'	Coupling	38	22	0	15	0	0	0	0	0	0	20	12	16	10	0	30	10	30	G
		20	18	6	20	0	18	18	0	0	4	18	12	20	20	12	12	12	8	T
	Tuning	563	454	516	304	378	291	230	192	172	144	098	098	085	085	108	048	062	038	G
		797	502	392	293	373	197	167	248	180	131	107	104	081	072	075	069	062	062	G
	Condenser	100	100	400	400	100	100	100	100	100	400	400	440	400	400	100	400	400	400	G
	Shunt	100	100	100	400	100	400	400	100	100	400	400	400	400	400	400	400	400	400	T

TABLE 9

G - Ground

T - Truck

VEHICLE STATION

E. 4 FT AERIAL

Mobile

Freq. Mc/s	2	3	4 L.F	4 H.F	5	6	8	10
AE Coupling	51	36	19	20	15	9	0	0
AE Tuning	950	537	385	380	287	234	169	129

F. 8 FT AERIAL

Mobile

Freq. Mc/s	1.8	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	9.0	10.0
AE Coupling	70	55	50	45	40	30	22	18	15	12	10	7	5	3	0	0
AE Tuning	960	850	640	480	390	340	290	250	230	200	180	160	150	140	125	115

G. 14 FT AERIAL

Mobile

Freq. Mc/s	1.7	2.0	2.5	3.0	3.5	4.0 L.F	4.0 H.F	4.5	5.0	5.5	6.0	6.5	7.0	8.0	9.0	10.0
AE Coupling	70	60	55	50	40	30	25	23	20	17	14	11	8	5	0	0
AE Tuning	920	720	530	420	330	290	300	250	225	200	180	160	150	130	110	100

H. 32 FT AERIAL (set retained in vehicle:-stationary)

Freq. Mc/s	1.6	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
AE Coupling	73	70	60	50	43	30	23	18	13	8	4	0	0	0
AE Tuning	670	485	360	290	245	215	195	175	155	140	120	110	100	90

J. 100 FT AERIAL (set retained in vehicle:- stationary)

Freq. Mc/s	1.6	2.0	2.5	3.0	3.0	3.5	4.0 L.F	4.0 H.F	4.5	5.0	5.0	5.5	6.0
Aerial length(ft)	100	100	100	100	75	75	75	45	45	45	100	100	100
Straps open	-	-	-	-	A	A	A	AB	AB	AB	-	-	
Straps closed	ABC	ABC	ABC	ABC	BC	BC	BC	C	C	C	ABC	ABC	ABC
AE Coupling	60	50	40	20	35	20	8	20	12	6	0	0	0
AE Tuning	575	395	280	205	245	195	160	225	195	180	310	240	190

Cont.

Freq. Mc/s	6.5	7.0	7.0	7.5	8.0	8.5	9.0	9.0	9.5	10.0
Aerial length(ft)	100	100	75	75	75	75	75	25	25	25
Straps open	-	-	A	A	A	A	A	ABC	ABC	ABC
Straps closed	ABC	ABC	BC	BC	BC	BC	BC	-	-	-
AE Coupling	0	0	0	0	0	0	0	0	0	0
AE Tuning	155	120	190	160	140	125	105	90	65	50

(h) Adjust AERIAL COUPLING control (14) and AERIAL TUNING control (11) alternately as described in Section 4 to obtain maximum aerial current. Lock controls.

(j) Set system switch (4) to the required position.

7. The ON/OFF switch (6) in the REC. ON position switches off the transmitter valve heaters and is intended for use during long periods of receive when adequate notice is given before transmissions are required. The transmitter valve heaters take approximately two minutes to warm up. Before attempting to transmit the ON/OFF switch (6) must be switched to the ALL ON position. When standing by for C.W. signals the ALL ON position must be used.

8. The following tables give approximate settings for the AERIAL COUPLING control (14) and AERIAL TUNING control (11) on any aerial and frequency.

MAN-PACK STATION

A. 4 FT AERIAL

	Mobile								On Ground							
Freq. Mc/s	2	3	4 L.F	4 H.F	5	6	8	10	2	3	4 L.F	4 H.F	5	6	8	10
AE Coupling	90	34	18	17	12	6	0	0	62	33	18	18	11	7	0	0
AE Tuning	980	595	421	420	317	256	180	140	980	571	404	401	305	246	176	136

B. 8 FT AERIAL

	Mobile								On Ground							
Freq. Mc/s	2	3	4 L.F.	4 H.F	5	6	8	10	2	3	4 L.F.	4 H.F.	5	6	8	10
AE Coupling	45	28	18	17	11	3	0	0	49	35	19	19	13	7	0	0
AE Tuning	946	533	382	382	290	236	165	127	898	517	366	367	278	228	164	126

C. 14 FT AERIAL (These also apply to the Vehicle/Animal Station when on the ground)

On Ground

Freq. Mc/s	2	3	4 L.F	4 H.F	5	6	8	10
AE Coupling	51	34	17	17	10	5	0	0
AE Tuning	750	439	324	323	251	214	145	108

D. 100 FT AERIAL (These also apply to the Vehicle/Animal Station when on the ground)

On Ground

Freq. Mc/s	1.6	2.0	2.5	3.0	3.0	3.5	4.0	4.0	4.5	5.0	5.5
Aerial length(ft)	100	100	100	100	75	75	75	45	45	45	45
Straps open	-	-	-	-	A	A	A	AB	AB	AB	AB
Straps closed	ABC	ABC	ABC	ABC	BC	BC	BC	C	C	C	C
AE Coupling	45	30	20	10	25	10	0	11	6	0	0
AE Tuning	650	450	350	250	270	250	190	255	220	195	160

Freq. Mc/s	5.5	6.0	6.5	7.0	7.5	7.5	8.0	8.5	9.0	9.0	9.5	10.0
Aerial length(ft)	100	100	100	100	100	75	75	75	75	25	25	25
Straps open	-	-	-	-	-	A	A	A	A	ABC	ABC	ABC
Straps closed	ABC	ABC	ABC	ABC	ABC	BC	BC	BC	BC	-	-	-
AE Coupling	0	0	0	0	0	0	0	0	0	0	0	0
AE Tuning	250	205	165	135	100	180	155	135	105	100	90	80