TRANSISTORISED BROADCAST CONSOLETTE

Type 1P63870

Handbook 63870R

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED
47 YORK STREET, SYDNEY

TRANSISTORISED BROADCAST CONSOLETTE

Type 1P63870

141065

Handbook 63870R

Amalgamated Wireless (Australasia) Limited,

47 York Street,

SYDNEY.

GENERAL INFORMATION

1. INTRODUCTION

The A.W.A. Transistorised Broadcast Consolette Type 1P63870 is designed for the control of up to nine simultaneous audio inputs.

2. SUMMARY OF FACILITIES Drg 63870A1

Inputs:	Six low-level channels including:
	Two microphone channels (with selection at each input of either of two microphone inputs).
	Three pickup channels.
	One cartridge tape channel (with three parallel inputs).
	Three high-level channels.
Input Channel Mixing:	The pick-up, cartridge and high-level channels can be switched to either programme or cue channels as required.
Output Switching:	In the emergency position of the output selector switch the normal functions of the two output amplifiers are interchanged.
Talkback:	The microphone channel outputs are wired to the talkback system via relay protection circuitry.
Reverberation:	Reverberation outputs are available from the two microphone channels.

3. PERFORMANCE DATA

Input Impedances:

Low Level:	50 or 150Ω (balanced).
High Level:	600Ω (balanced bridging).

Maximum Input Levels:

Low Level Channels:	-30 dbm
High Level Channels:	+20 dbm.

Output Impedance: 600Ω balanced.

Output Levels:

Normal:	+8 dbm to line.
Maximum:	+24 dbm.
Frequency Response:	Flat ±1 db with reference to 1 kc/s within the range 30 c/s to 15 kc/s.
Distortion:	Less than 1% at +16 dbm within the range 30 c/s to 15 kc/s.
Noise:	-120 dbm referred to the input between 30 c/s and 15 kc/s.

4. CONSTRUCTION

The console is constructed on a desk-mounting cabinet frame 30 inches wide, 10 inches deep and 9 inches high.

The case has a removable cover and hinged front panel to provide access to all wiring. Amplifier components are mounted on plug-in modules. All electrical connections to the unit are made via 3 x 25 way APO type terminal blocks at the rear.

5. COMPOSITION

The major items in the console are listed below:

6 Pre-amplifiers each containing two 30 db amplifiers Type 1G60793

5 Output amplifiers each containing one 50 db amplifier Type 1G60793

1 10 Watt Monitor Amplifier Type 1G60800

2 VU Meters

1 CVA Meter

6. COMPONENT SCHEDULE

6.1 Printed Circuit Boards

30 db Amplifier: Refer to Drg 60793G1

50 db Amplifier: Refer to Drg 60794G2

10 watt Monitor Amplifier: Refer to Drg 60800G1

6.2 Components Mounted on Frame

C1	2000 µF -50+100%, 50 VDCW, tubular electrolytic	Ducon EMG 2050
C2	2000 µF -50+100%, 65 VDCW, tubular electrolytic, insulated	UCC EJC 651S

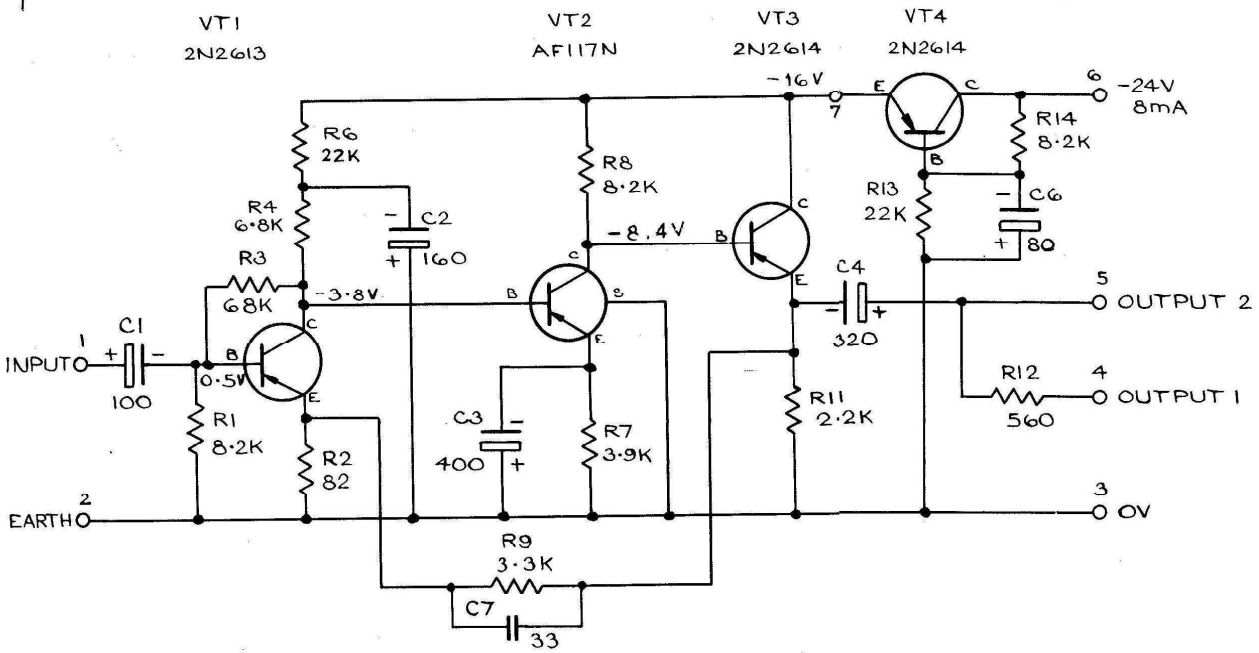
C3	160 µF -50+100%, 23 VDCW, tubular electrolytic	Ducon EU0907
C4	100 pF ±5%, 500 VDCW, ceramic disc	Ducon N750
C5	100 µF -50+100%, 25 VDCW, tubular electrolytic	Ducon EU0907
C6	4700 pF ±5%, 400 VDCW, polyester tubular	Philips C296AC
C7	4700 pF ±5%, 400 VDCW, polyester tubular	Philips C296AC
FS1 to FS4	Fuse unit, single way, protected, panel mtg	Amp. Co. of Aust. Z590100
	Fuse-link, glass cartridge, 1A	Belling Lee L1055
KA, KB, KK, KL	Switch, key, telephone, 4C-L	APO No. 73
KC, KD, KE, KG, KH, KJ, KP	Switch, key, telephone, 4C-L/4C-L	APO No. 198
M1, M2	Meter, VU, scale B, illuminated	Master S34
M3	Meter, 1 mA FSD, illuminated	Master S34
MR1 to MR24	Silicon diode rectifier	AWV 1N3193
PB1, LP1 to PB6, LP6	Indicating pushbutton T/B	AWA 6387CY54
PB10, LP10 PB11, LP11	Indicating pushbutton TAPE	AWA 63870V55
PB15, LP15	Indicating pushbutton TURN STUDIO ON	AWA 63870V56
PB12, LP12 PB16, LP20 PB17, LP21	Indicating pushbutton CART	AWA 63870V57
PB14, LP16	Indicating push-turn button PROG. SWITCHER	AWA 63870V58
PB7, LP7 to PB9, LP9	Indicating ~~self-locking~~ button T.T.	AWA 63870V59
R1	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R2	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B

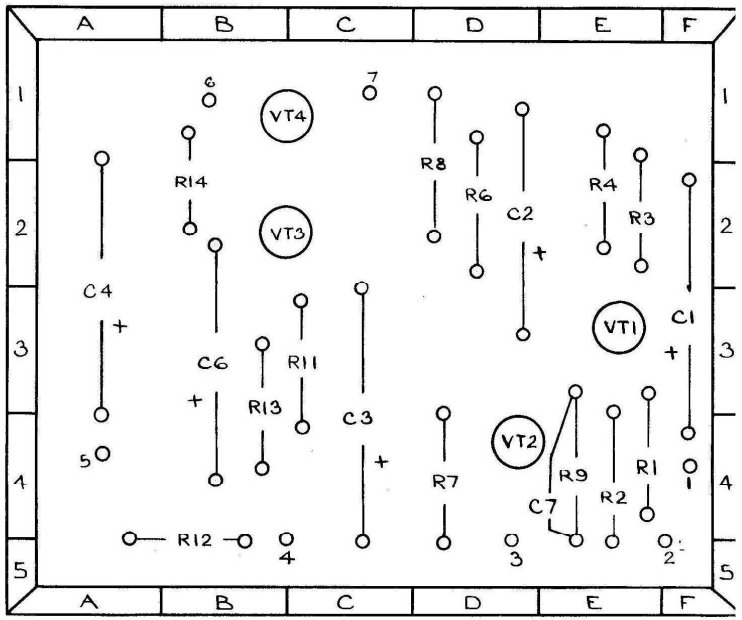
R3	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R4	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R5	Not used	
R6	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R7	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R8	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R9	Not used	
R10	Not used	
R11	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R12	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R13	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R14	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R15	Not used	
R16	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R17	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R18	1.2 kΩ 1/4W, carbon film	Philips B8-305-05B
R19	27Ω 1/4W, carbon film	Philips B8-305-05B
R20	Not used	
R21	47Ω 1/4W, carbon film	Philips B8-305-05B
R22	47Ω 1/4W, carbon film	Philips B8-305-05B
R23	1.2 kΩ 1/4W, carbon film	Philips B8-305-05B
R24	27Ω 1/4W, carbon film	Philips B8-305-05B
R25	Not used	
R26	Not used	
R27	Not used	
R28	10 kΩ 1/4W, carbon film	Philips B8-305-05B
R29	10 kΩ 1/4W, carbon film	Philips B8-305-05B
R30	Not used	
R31	15 kΩ 1/4W, carbon film	Philips B8-305-05B
R32	15 kΩ 1/4W, carbon film	Philips B8-305-05B
R33	15 kΩ 1/4W, carbon film	Philips B8-305-05B
R34	1.5 kΩ 1/4W, carbon film	Philips B8-305-05B
R35	Not used	
R36	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R37	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R38	1 kΩ 1/4W, carbon film	Philips B8-305-05B
R39	100Ω 1/4W, carbon film	Philips B8-305-05B
R40	Not used	
R41	Not used	
R42	Not used	
R43	Not used	
R44	2.2 kΩ 1/4W, carbon film	Philips B8-305-05B
R45	Not used	

R46	68Ω 1/4W, carbon film	Philips B8-305-05B
R47	470Ω 1/4W, carbon film	Philips B8-305-05B
R48	470Ω 1/4W, carbon film	Philips B8-305-05B
R49	470Ω 1/4W, carbon film	Philips B8-305-05B
R50	Not used	
R51	470Ω 1/4W, carbon film	Philips B8-305-05B
R52	1 kΩ 1/4W, carbon film	Philips B8-305-05B
R53	1 kΩ 1/4W, carbon film	Philips B8-305-05B
R54	33Ω 1/4W, carbon film	Philips B8-305-05B
R55	Not used	
R56	3.9 kΩ 1/4W, carbon film	Philips B8-305-05B
R57	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R58	3.9 kΩ 1/4W, carbon film	Philips B8-305-05B
R59	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R60	Not used	
R61	560Ω 1/4W, carbon film	Philips B8-305-05B
R62	560Ω 1/4W, carbon film	Philips B8-305-05B
R63	560Ω 1/4W, carbon film	Philips B8-305-05B
R64	560Ω 1/4W, carbon film	Philips B8-305-05B
R65	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R66	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R67	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R68	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R69	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
R70	4.7 kΩ 1/4W, carbon film	Philips B8-305-05B
RV1 to RV9	1 kΩ ±20%, 1W, variable, composition log law, 7/8-inch shaft	Plessey E
RV10 RV11	5 kΩ ±20%, 1W, variable, composition log law, 7/8-inch shaft	Plessey E
RV12 to RV17	1 kΩ ±20%, 1W, variable, composition log law, screwdriver slot	Plessey E
RLA B, C, E, F, G, H, T, K, L	Relay, 2 C/O, twin contacts (gold)	Siemens Halske Tris 154c
RLD M, N,	Relay, 4 C/O, twin contacts (gold)	Siemens Halske Tris 154d
SWA	Switch, "Oak F"	AWA 63870V48
SWB	Switch, "Oak F"	AWA 63870V49
SWC	Switch, "Oak F"	AWA 63870V50

TR1 to TR6	Transformer	AWA 1XC60169
TR7 to TR9, TR12	Transformer	AWA 1XC61609
TR10	Transformer	AWA 3XD53442
TR11	Transformer	AWA 1XC63284
TR13	Transformer	AWA 1XC63287
TR14	Transformer	AWA 1LB63270
TSA to TSD	Terminal block, 3 x 25 way	APO No. 43
TSE	Terminal block, flexible,3-way	AWA 254830

- End of Part -



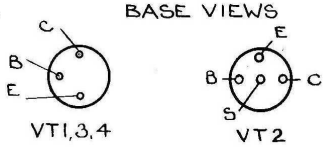


VIEWED FROM COMPONENT SIDE

COMP.	GRID	DESCRIPTION	CODE Nº
R1	E4	8·2KΩ	611853
R2	F4	82Ω	601000
R3	E2	68KΩ	615505
R4	E2	6·8KΩ	611533
R5			
R6	D2	22KΩ	613667
R7	D4	3·9KΩ	610564
R8	D1	8·2KΩ	611853
R9	E4	3·3KΩ	610313
R10			
R11	C3	2·2KΩ	609452
R12	B5	560Ω	606851
R13	B3	22KΩ	613667
R14	B2	8·2KΩ	611853
		ALL ± 5% 1/10 WATT PHILIPS, B8·305·00B	
C1	F3	100μF ELECTRO 6V DUCON EU0502	
C2	D2	160μF ELECTRO 10V DUCON EU0603	
C3	C4	400μF ELECTRO 10V DUCON EU0903	
C4	A2	320μF ELECTRO 12V DUCON EU0904	
C5			
C6	B3	80μF ELECTRO 25V DUCON EU0707	
C7	E4	33pF ± 5% 100V DUCON DFB0133	
VT1	E3	2N2613	
VT2	D4	AF117N	
VT3	C2	2N2614	
VT4	B1	2N2614	

PRINTED CIRCUIT BOARD AWA 60793W2/1

BASE VIEWS



AUDIO PERFORMANCE

MAX. OUTPUT: (OUTPUT 1) 0dbm IN 600Ω LOAD

GAIN: (INPUT FROM 600Ω UNTERMINATED SOURCE OUTPUT TAKEN FROM OUTPUT 1 LOAD WITH 600Ω)

INPUT IMPEDANCE: 7KΩ

SOURCE IMPEDANCE: AT OUTPUT 1 560Ω

FREQUENCY RESPONSE: AT OUTPUT 1 LOADED IN 600Ω + 0db TO -0·1db FROM 20c/s TO 20Kc/s

HARMONIC DISTORTION: AT MAX. OUTPUT. NOT GREATER THAN 0·2% WITH IN THE RANGE 30c/s TO 20Kc/s

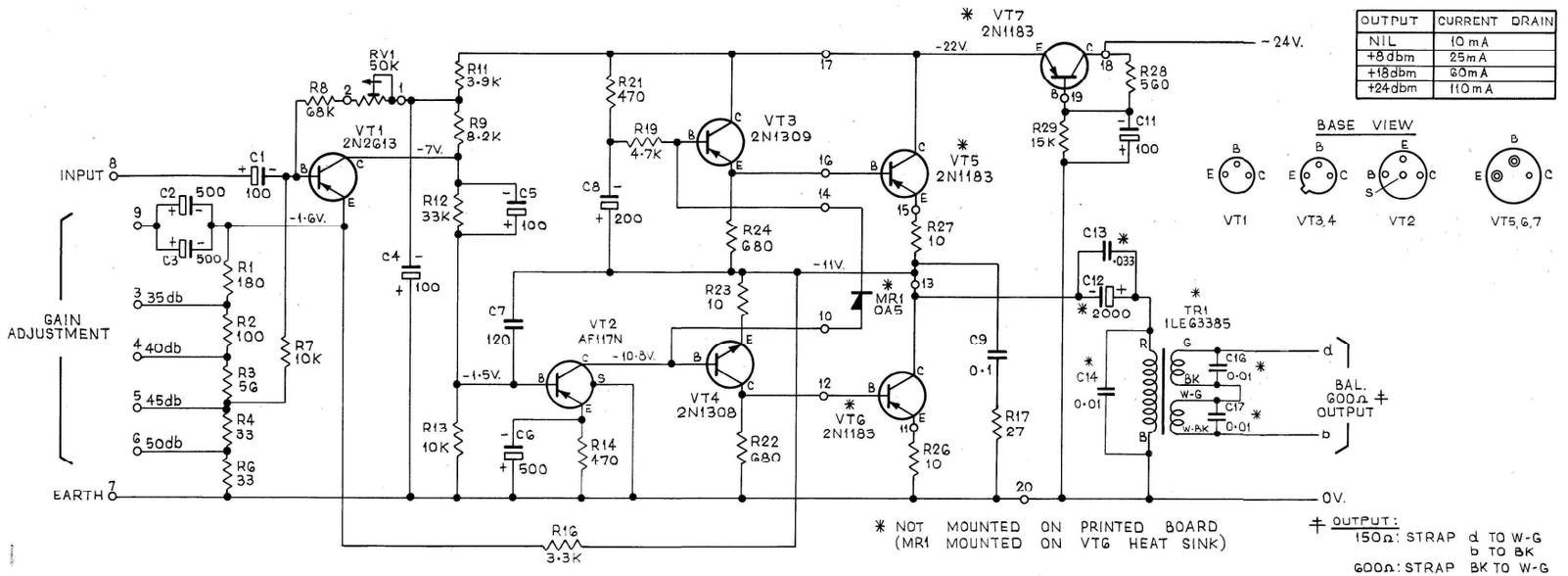
NOISE: -120 dbm REFERRED TO INPUT WITHIN THE RANGE 30c/s TO 15Kc/s INPUT TERMINATED IN 600Ω

AWA

30db AMPLIFIER

TYPE IG60793

DRG 60793C2

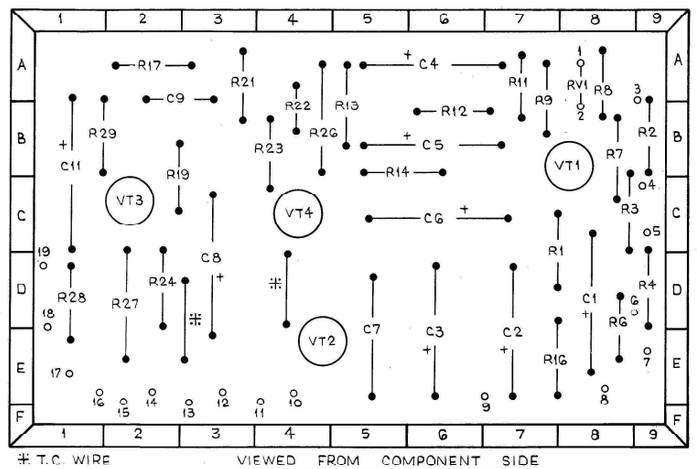


OUTPUT	CURRENT DRAIN
NIL	10 mA
+8 dbm	25 mA
+18 dbm	60 mA
+24 dbm	110 mA

BASE VIEW

* NOT MOUNTED ON PRINTED BOARD
(MR1 MOUNTED ON VT6 HEAT SINK)

± OUTPUT:
150Ω: STRAP d TO W-G
b TO BK
600Ω: STRAP BK TO W-G



* T.C. WIRE VIEWED FROM COMPONENT SIDE

COMP.	GRID	DESCRIPTION	CODE No.
R1	C8	180 Ω	G04922
R2	B9	100 Ω	G04047
R3	C8	56 Ω	G03369
R4	D9	33 Ω ALL RESISTORS	G02762
R5		ARE ± 5% 1/10 WATT	
R6	E8	33 Ω PHILIPS, BB·305·008	G02762
R7	B8	10K Ω UNLESS OTHERWISE	G12045
R8	A7	68K Ω STATED.	G03578
R9	B7	8·2KΩ	G11853
R10			
R11	A7	3·9K Ω	G10564
R12	B6	33K Ω	G14469
R13	B5	10K Ω	G12045
R14	B5	470 Ω	G06596
R15			

COMP.	GRID	DESCRIPTION	CODE No.
R17	A2	27Ω	G02599
R18			
R19	C2	4·7KΩ	G10971
R20			
R21	A3	470Ω	G06596
R22	B4	680Ω	G07288
R23	B4	10Ω	G01105
R24	D2	680Ω	G07288
R25			
R26	B4	10Ω ± 5% 1/4 W. PHILIPS BB·305·058	G01101
R27	D2	10Ω ± 5% 1/4 W. PHILIPS BB·305·058	G01101
R28	D1	560 Ω	G06851
R29	B1	15KΩ	G12959
R30			

COMP.	GRID	DESCRIPTION	CODE No.
C1	D8	100μF 6V. ELECTRO. DUCON	
C2	E7	500μF 3V. ELECTRO. DUCON	
C3	E6	500μF 3V. ELECTRO. DUCON	
C4	A6	100μF 25 V. ELECTRO. DUCON	
C5	B6	100μF 6 ELECTRO. DUCON	
C6	C6	500μF 3V. ELECTRO DUCON	
C7	E5	120pF 125V. STYROSEAL DUCON	
C8	D3	200μF 18 V. ELECTRO. DUCON	
C9	A2	0·1μF 30V. POLY. PHILIPS C280AA	227084
C10			
C11	B1	100μF 25V. ELECTRO. DUCON	
C12	*	·033μF 125V. POLY. PHILIPS C29GAA	226740
C13	*	·01μF 125V. POLY. PHILIPS C29GAA	226370
C16	*	·01μF 125V. POLY. PHILIPS C29GAA	226370

COMP.	GRID	DESCRIPTION	CODE No.
MR1	*	OA5	
	A8	50KΩ ± 20% DUCON PDM	
	*	A.W.A. TYPE 1LE63385	
	B8	2N2613	
	E4	AF117N	
	C2	2N1309	
	C4	2N1308	
	*	2N1183	
	*	2N1183	
	*	2N1183	

AUDIO PERFORMANCE : OUTPUT TERMINATED IN 600Ω LOAD

MAX. OUTPUT : + 24 dbm

GAIN : INPUT FED FROM A 600Ω TERMINATED SOURCE

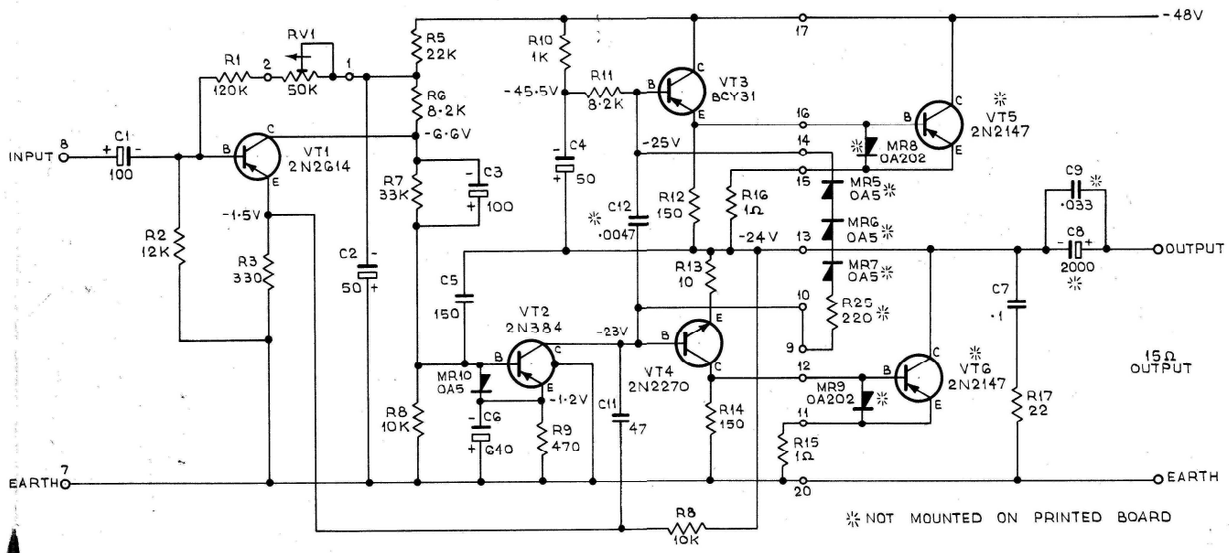
GAIN	TERMINAL STRAPPING
30 db	NO CONNECTION
35 db	9 TO 3
40 db	9 TO 4
45 db	9 TO 5
50 db	9 TO 6

INPUT IMPEDANCE : NOT LESS THAN 10K
SOURCE IMPEDANCE AT OUTPUT: 600Ω
RETURN LOSS AT OUTPUT: 20db WITHIN THE RANGE 30c/s TO 15 Kc/s.
FREQUENCY RESPONSE : +0 db TO -0·3 db FROM 30c/s TO 15 Kc/s.
HARMONIC DISTORTION: : AT MAX. OUTPUT NOT GREATER THAN 0·5% WITHIN THE RANGE 30c/s TO 15 Kc/s.
NOISE : -120 dbm REFERRED TO INPUT, WITHIN THE RANGE 30c/s TO 15 Kc/s. INPUT TERMINATED IN 600Ω

PRINTED CIRCUIT BOARD A.W.A. DRG. No. G0794W3

BOARD G0794W3

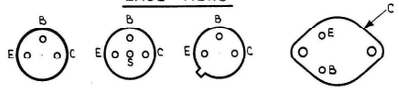
50 db AMPLIFIER
TYPE 1GG0794
DRG. G0794G2

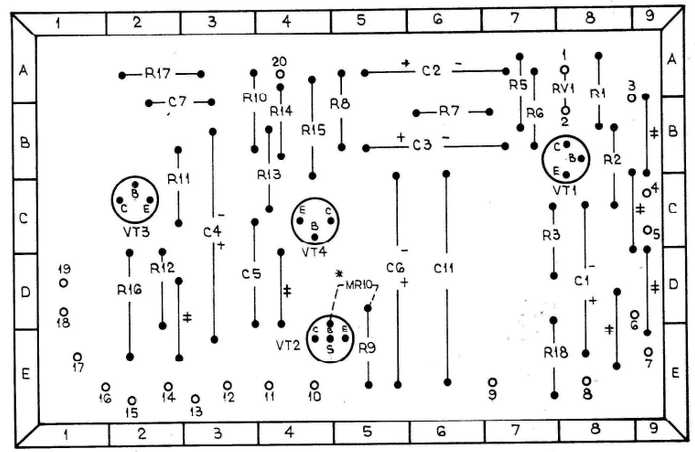


※ NOT MOUNTED ON PRINTED BOARD

OUTPUT	CURRENT DRAIN
NIL	25 mA
10 WATTS	400 mA

BASE VIEWS





PRINTED CIRCUIT BOARD A.W.A. DRG. No. G0794W2
‡ T.C. WIRE * MOUNTED ON WIRING SIDE

VIEWED FROM COMPONENT SIDE

COMP.	GRID	DESCRIPTION	CODE No.
R1	A8	120 KΩ	G16207
R2	B8	12KΩ	G12520
R3	C8	330Ω	G05968
		ALL RESISTORS	
R5	A7	22KΩ ARE ±5% 1/10 W.	G13607
R6	B7	8·2KΩ PHILIPS 88-305-	G11853
R7	B6	33KΩ 00B UNLESS	G14469
R8	B5	10KΩ OTHERWISE	G12045
R9	D5	470Ω STATED.	G06596
R10	A4	1KΩ	G08040
R11	B2	8·2KΩ	G11853
R12	D2	150Ω	G04687
R13	B4	10Ω	P
R14	B4	150Ω	G04687
R15	B4	1Ω ± 10% WELWYN UJ	G00402
R16	D2	1Ω ± 10% WELWYN UJ	G00402

COMP.	GRID	DESCRIPTION	CODE No.
R17	A2	22Ω	P
R18	E7	10KΩ	G12045
R25		220Ω	G05262
RV1	A8	50KΩ ±20% DUCON PDM	P
C1	D8	100μF ELECTRO 6VW DUCON EU0502	
C2	A6	50μF ELECTRO 25VW DUCON EU0607	
C3	B6	100μF ELECTRO 12VW DUCON EU0604	
C4	C3	50μF ELECTRO 50VW DUCON EU0808	
C5	D4	150pF ±5% 125VW DUCON STYROSEAL	P
C6	D6	500μF ELECTRO 3VW DUCON EU0801	
C7	B3	0·1μF ±20% 30V POLY PHILIPS C280AA	227084
C8		2000μF ELECTRO INSUL. 35VW U.C.C. EJBG50S	P

COMP.	GRID	DESCRIPTION	CODE No.
C9		0·033μF ±10% 125VW POLY PHILIPS C296	
C11	D6	47pF ±5% CER. TUB. NPO 500V.	221548
C12		0·0047μF ±20% 25VW CER. 'RECAP' CDR	
VT1	B8	2N2614 AWV	
VT2	D5	2N384 AWV	
VT3	C2	BCY31 MULLARD	
VT4	C4	2N2270 RCA	
VT5		2N2147 AWV	
VT6		2N2147 AWV	
MR5		OA5 MINIWATT	
MR6		OA5 MINIWATT	

COMP.	GRID	DESCRIPTION	CODE No.
MR7		OA5 MINIWATT	
MR8		OA202 MINIWATT	
MR9		OA202 MINIWATT	
MR10		OA5	597208
		SPACER, TRANS. MTG. (FOR VT1 & VT2)	795909
		SPACER, TRANS. MTG. (FOR VT3 & VT4)	795915

PERFORMANCE SUMMARY

POWER OUTPUT: 10 WATTS INTO 15 OHMS

INPUT GAIN: 0·4 V FOR 10 WATTS OUTPUT

IMPEDANCE: 10KΩ

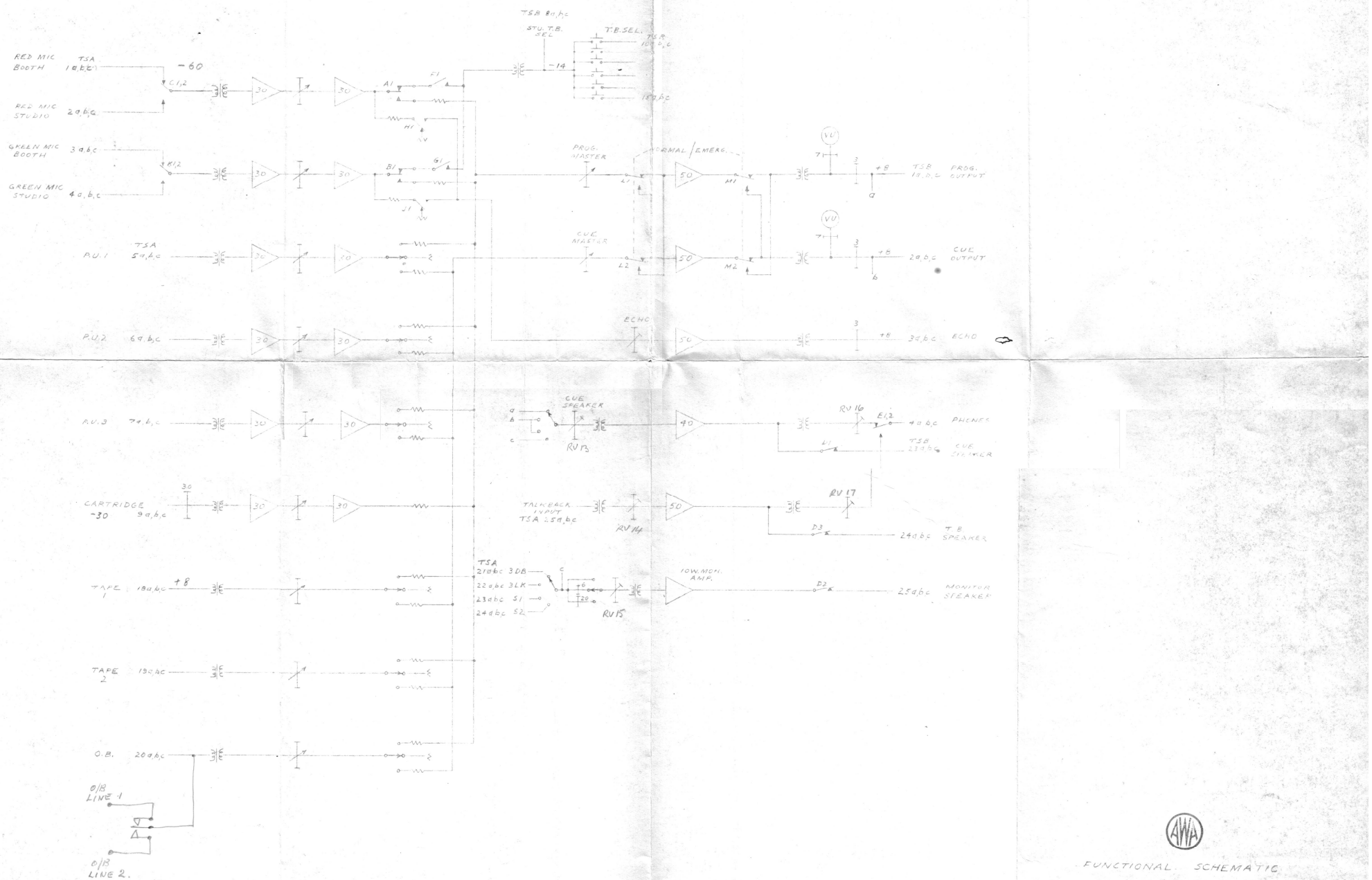
FREQUENCY RESPONSE: ±1db FROM 30 c/s TO 15 Kc/s

HARMONIC DISTORTION: 0·5% FROM 30 c/s TO 15 Kc/s AT 10 WATTS OUTPUT.

NOISE: BETTER THAN 80 db BELOW 10 WATTS OUTPUT

POWER SUPPLY: 44 V D.C. AT 500 mA.

MONITOR AMPLIFIER
TYPE 1660800
DRG. 60800G1

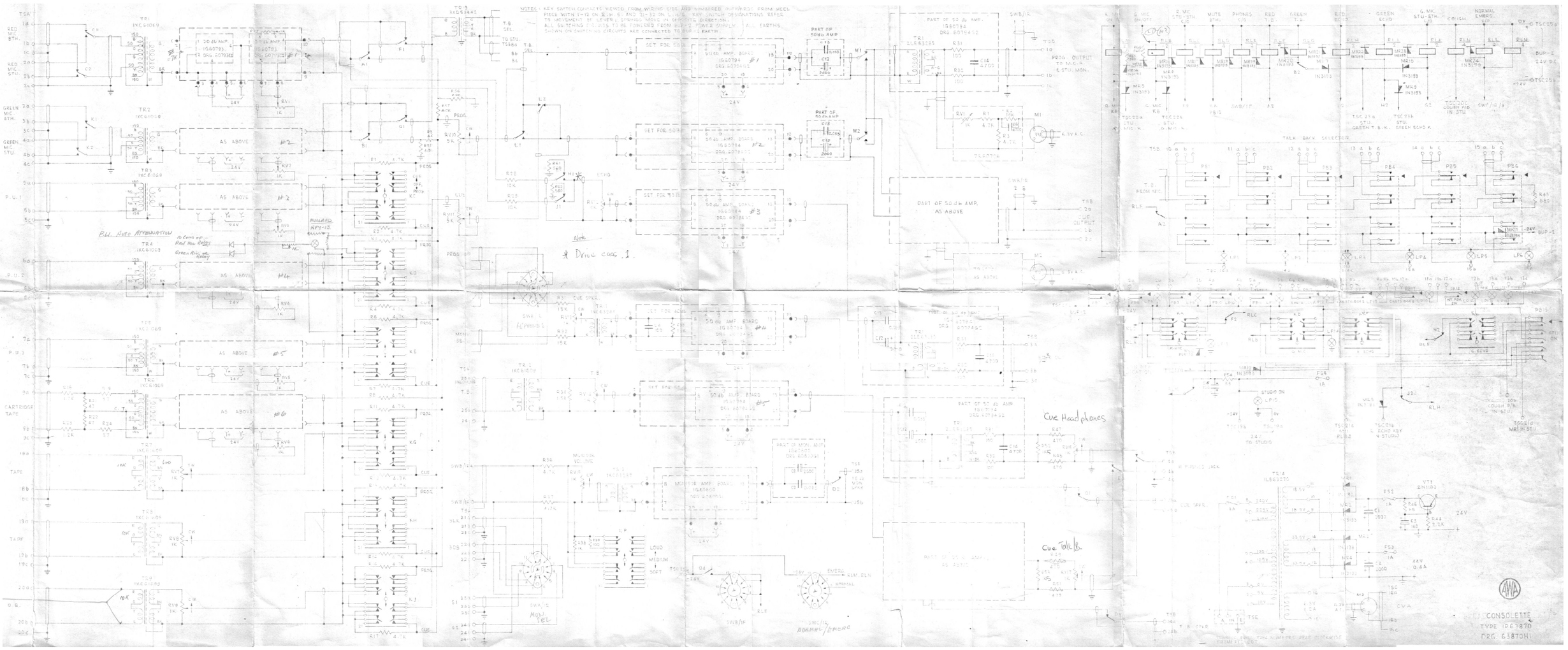


FUNCTIONAL SCHEMATIC

CONSOLETTE

TYPE 1R63870

DRG 63870A1


NOTES: KEY SWITCH CONTACTS VIEWED FROM WIRING SIDE AND NUMBERED OUTWARDS FROM HEEL PIECE WITH 1-12 ON R.H. & 21-32 ON L.H.S. KEY UNIT & SP DESIGNATIONS REFER TO MOVEMENT OF LEVER. L. OPENING MOVE IN OPPOSITE DIRECTION.
ALL 50 VOLTAGES FOR UNITS TO BE POWERED FROM BUFFER POWER SUPPLY. ALL EARTHS SHOWN ON SWITCHING CIRCUITS ARE CONNECTED TO BUFFER EARTH.
Note
* Drive coils 1.
R.H. Mute Attenuation
To Coils of — Red Mic Relay
Green Mic. " Relay
CONSOLETTE
TYPE IP63870
DRG. 63870H1

FORM 6000-A697
(Revised Feb. 61)

SERVICING INSTRUCTIONS
FOR
PRINTED WIRING BOARDS

1. Construction of Printed Wiring Boards

Printed wiring boards are made from a laminated insulating material with a thin sheet of copper bonded to one side. The conductor pattern is formed by an etching process. Component leads are inserted in holes punched in the boards and the ends of the leads are normally bent over against the terminal areas of copper conductors. The completed assembly is then soldered and a protective coating may be applied.

2. Tools and Materials Required for Servicing

A small soldering iron with a bit diameter of approximately 3/16 inch and a working temperature rather above 250°C.

Resin cored solder, 60/40, 22SWG. (Additional flux must not be used).

A pair of small diagonal cutters.

A pair of extra long nose pliers.

Methylated spirits.

An epoxy resin repair kit, e.g. Araldite Two-tube Pack. (Required only when the board has a protective coating.)

3. Repair Procedure

It is strongly recommended that the board be removed from the equipment BEFORE servicing in order to facilitate inspection of the underside.

IMPORTANT: At no time, either while locating a faulty component or testing following a repair, should any lead be attached to the copper side of the board.

Care should be taken to avoid mechanical damage to the board. Where a protective coating has been applied to both the component and the copper side of the board, it will be necessary, after freeing the leads, to apply a sideways force to the component in order to release it from the coating material.

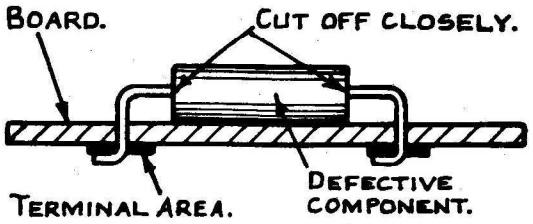
Avoid excessive heating of any joints, as this can reduce the strength of the bonding adhesive between the copper and laminate, and may also damage the protective coating.

Mechanical damage to the copper foil is most likely to be caused by pushing force being exerted on the component leads from the component side of the board.

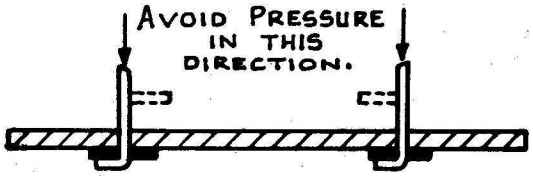
4. Preferred Method of Repair

The only recommended method for the replacement of the components is detailed below. The directions should be carefully studied before attempting replace any component.

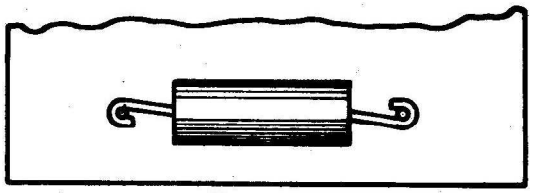
1. Clip off the leads close to the component. Remove the component.



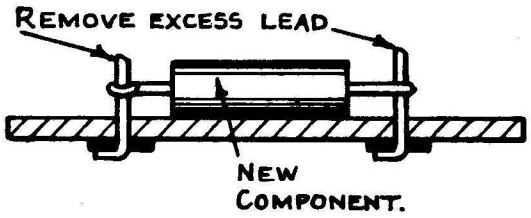
2. Straighten the wires left on the board, by bending away from the board, until the wires are perpendicular. Do not exert any downward force on the leads during this operation.



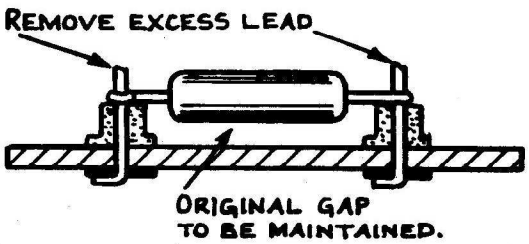
3. Bend semicircular hooks on the replacement component leads to correspond with spacing of the perpendicular wires and slide the replacement component into position.



4. Solder the replacement component into position, ensuring that the component lies flat on the board. Remove excess perpendicular wires.



Where insulating spacers have been used to keep a component, such as a wirewound resistor, raised from the board, they should be retained to maintain adequate air space.



5. Specialised Method of Repair

The following method is not recommended but is included in these instructions to cover the case when the preservation of the original appearance of the board is of such importance that it overrides the danger associated with the application of heat to the copper terminal areas.

When the soldering iron is applied to the terminal areas, the following points should be noted:

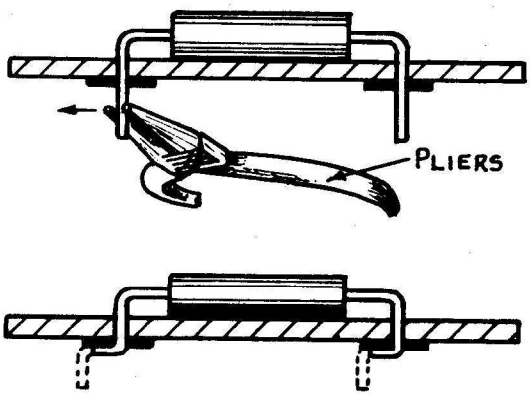
(i) It is not necessary to remove the protective coating beforehand.

(ii) The iron should be applied to the copper only for the absolute minimum of time necessary to melt the solder.

(iii) Local repair of the damaged protective coating must be effected immediately after the final soldering and cleaning operations to prevent the ingress of moisture.

The procedure for the specialized repair method follows:

1. Proceed as in the previous method until the old component leads are perpendicular to the board.
2. Clip off the leads close to the component side of the board.
3. Melt the soldered connection by the brief application of the soldering iron and tap the board so that the lead stub is ejected together with the solder in the hole. Check that no solder remains in the hole.
4. Form the leads of the replacement component to the required shape.
5. Fit the component, and after ensuring that it is lying flat on the board, clench the lead ends by gripping with the long nose pliers, 1/8 inch from the board, and pressing sideways. Ensure that the sides of both jaws remain parallel to the board throughout the movement.



6. Cut off the leads at the edge of the terminal area between the two right-angle bends.

4.

7. Solder the joints using a hot iron and resin cored solder. The iron should be applied for the least possible time consistent with a good soldered joint. The amount and shape of the solder should be similar to the original connections on the board, and it should be possible to see the outline of the component leads.

8. Remove the excess resin and any contaminant from around the joints by wiping with methylated spirits.

9. If the board has been previously coated with a protective material, mix the constituents of the epoxy resin according to the maker's instructions and apply to the areas from which the coating has been removed during servicing. Take care to overlap the existing coating. The new resin will cure at room temperature but, if it is desired to achieve a "tack free" state rapidly, the cure may be accelerated by raising the temperature of the board to 50°C maximum.

6. Transistors

Transistors can be permanently damaged by reverse current. Care must be exercised to avoid reverse current through transistor circuits when using a multimeter (ohms) during servicing. A buzzer must not be used for continuity testing under any circumstances.

The use of carbon element soldering irons is not recommended for the servicing of transistorized circuits as any a.c. leakage may cause permanent damage to the transistors.