AIR PUBLICATION
116T-1201-1

TRANSCDUCTOR POWER SUPPLY TYPES 5355C & D

GENERAL, AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

(Ministry of Defence)

FOR USE IN THE
ROYAL AIR FORCE

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◀ The reference number of this publication was altered from A.P. 101S-0202-1, Cover 5 to A.P. 116T-1301-1 by A.L. action in Feb. 69.▶

DANGER–HIGH VOLTAGE

LEARN THESE SAFETY RULES

1. ELECTRICAL SYSTEM. Voltages in excess of 100 volts, a.c. or d.c. can be extremely dangerous in certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential for tests or adjustments to be made with the electrical power switched on, the greatest care must be exercised.

2. SHOCK. Learn how to deal with cases of electric shock.

APPARATUS IS SAFE – *ONLY IF YOUR APPROACH IS CORRECT*

Marconi

Technical Manual

T3961A

TRANSDUCTOR POWER SUPPLY

Types 5355C & D

(W.74723 Editions C & D)

THE MARCONI COMPANY LIMITED · Chelmsford · Essex · England

Telephone: Chelmsford 53221 Telex 99201 · Telegrams: Expanse Chelmsford Telex

FIRST AID IN CASE OF ELECTRIC SHOCK

DO NOT TOUCH THE VICTIM WITH YOUR BARE HANDS until the circuit is broken.

SWITCH OFF. If this is not possible, PROTECT YOURSELF with dry insulating material and pull the victim clear of the conductor.

THE EXPIRED AIR METHOD OF ARTIFICIAL RESPIRATION

(Approved by the Royal Life Saving Society)

1. Lay the patient on his back with his arms to his sides. If on a slope have the stomach slightly lower than the chest. Make a brief inspection of the mouth and throat to ensure that they are clear of obvious obstruction.

2. Kneel on one side of the patient level with his head, place one hand under his neck and the other on top of his head. (Fig.1).
   LIFT THE NECK AND TILT THE HEAD BACK AS FAR AS POSSIBLE.

FIG 1

3. Move the hand from under the neck and place it on the chin of the patient, the thumb between the chin and mouth, the index finger along the line of the jaw, the remaining fingers curled. (Fig.2). Whilst positioning the patient, open your mouth and take deep breaths.

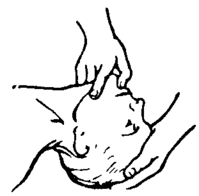


FIG 2

4. Using the thumb of the hand on the chin to keep the lips sealed, open your mouth wide and make a seal round the patient's nose and blow into it. (Fig.3).

FIG 3

5. After blowing, turn your head to observe the rise of the chest. (Fig.4). If no air enters the patient's lungs, the nose may be blocked and the mouth should be opened using the nand on the chin; open your mouth wide and making a seal round his mouth blow into it. Turn the head to observe the chest rise. This may be used as an alternative to blowing into the nose even when the nose is not blocked but the nose must be sealed either with the cheek or by moving the hand from the top of the head and pinching the nostrils. THE HEAD MUST BE KEPT AT FULL BACKWARDS TILT.

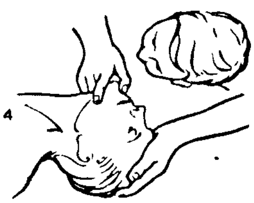


FIG 4

6. Start with ten quick deep breaths and then continue at the rate of twelve to fifteen breaths per minute. This should be continued until the patient revives or a doctor certifies death.

7. In the case of facial injuries it may be necessary to do a manual method of artificial respiration. (Holger Nielsen).

8. It is ESSENTIAL to commence artificial respiration without delay and to send for medical assistance immediately.

TREATMENT FOR BURNS

If the patient is also suffering from burns, then, without hindrance to artificial respiration, observe the following:-

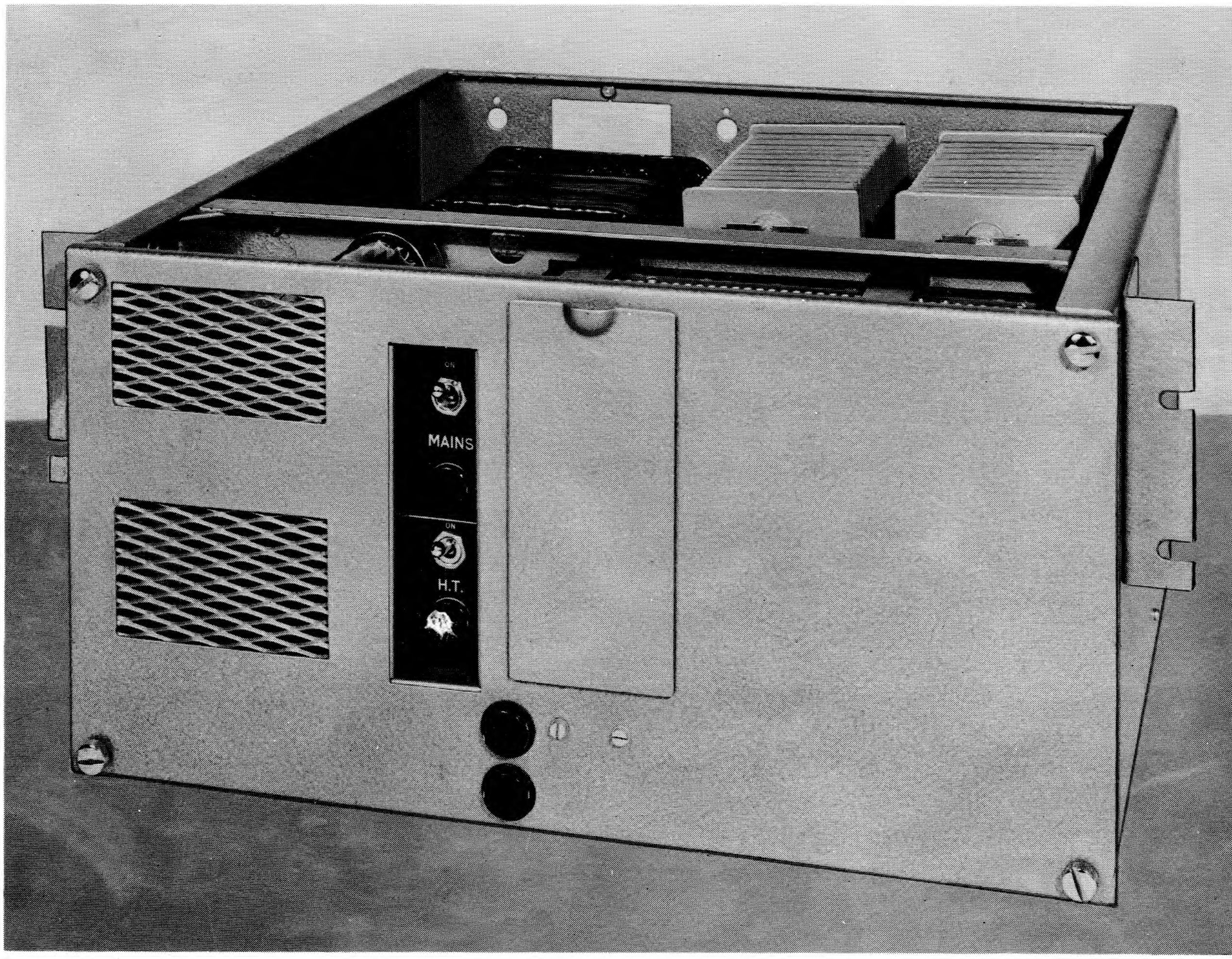
(a) DO NOT ATTEMPT TO REMOVE CLOTHING ADHERING TO THE BURN.

(b) If help is available or as soon as artificial respiration is no longer required the wound should be covered with a DRY dressing.

(c) Oil or grease in any form should **NOT** be applied.

Further details of charts and books on artificial respiration may be obtained from:-

The Royal Life Saving Society, 14 Devonshire Street, Portland Place, London, W.1.



GENERAL VIEW
TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355C

CONTENTS

61A

CONTENTS (Contd.)

COMPONENTS LIST

Component schedules in this Manual are presented in the form of a Master Components List, which includes all components used in this equipment. Each component is identified by means of a spares reference number, column 1, in addition to the normal part identity in column 6.

Components shown on individual circuit diagrams may be identified in the master list by means of the Cross Reference Lists associated with each circuit diagram, the numbers given against the circuit references on these lists being the spares reference numbers.

The Master Components List will be found immediately after the text commencing at Page A, and the Cross Reference Lists will be found adjacent to the circuit diagrams with which they are associated.

ILLUSTRATIONS

A

TRANSDUCTOR POWER SUPPLY
TYPES 5355C & D

1 INTRODUCTION

The transductor power supply unit Type 5355 is a general purpose unit intended for use with T.V. studio equipment. It is available in two versions differing as indicated below.

The maximum h.t. outputs are as follows:-

Ed.C: 1.5A at 70°C, which may be increased to 2A at 50°C.
Ed.D: 0.9A at 70°C, 1.15A at 50°C.

The temperatures quoted are the ambient temperatures around the components.

Both editions include facilities for remote switching of a.c. mains and h.t. to studio equipment, in particular to camera channels.

The mains selector panel, visible through a window at the rear of the case, allows the unit to be adjusted to operate from a.c. mains of 100-125V or 200-250V at nominal frequencies of 50 to 60 c/s.

Regulation of the h.t. output against relatively slow (less than a few cycles per second) variations is accomplished by a full wave magnetic amplifier in the form of a simple transductor element. More rapid variations, such as supply frequency ripple and switching transients are controlled and reduced by a shunt regulator valve a.c. coupled to the load by a two stage amplifier. This valve is operated under class AB conditions.

Two reference voltages (+85V and -85V) are available at the output sockets. A +260V unregulated supply is also available at the output sockets.

Provision is made for a centring supply (up to 6V at the h.t. supply current) to be taken from the unit.

Voltages and currents at various points in the circuit can be monitored by plugging the Marconi Test Meter Type BD642B into the test meter jack and operating the built-in selector switch.

Apart from the larger components (mains transformer, transductor, filter choke and regulator valves) the greater part of the circuit is constructed on a printed wiring board. This is mounted on hinges and retained by two captive screws to allow easy access for servicing.

A separately fused a.c. mains supply is also available at the output sockets.

2 TECHNICAL SUMMARY

NOTE: *This is not a rigid specification, the performance figures given being typical only.*

2.1 ELECTRICAL

2.1.1 Input

Mains	100-125V or 200-250V at 50-60 c/s, with transformer tap selection. Total Input Power, excluding equipment connected to mains outlets; Ed.C 600 VA Ed.D 375 VA

2.1.2 Outputs

Regulated H.T. 250V Unregulated H.T. 260V	Total current Ed.C 1.5A (maximum) at 70°C (may be increased to 2A (maximum) at 50°C). Ed.D 0.9A (maximum) at 70°C (may be increased to 1.5A (maximum) at 50°C. Temperatures quoted are ambient around components.
Reference Voltages:	+85V -85V
Mains:	Controlled by power supply switch (separate fuse) 400 VA maximum for Ed.C and 250 VA maximum for Ed.D.
Centring Supply:	6V (requires shunt resistor).

2.1.3 Performance

Regulation $\dfrac{\text{output voltage change}}{\text{output current change}}$ Less than 0.5Ω

2.2 DIMENSIONS AND WEIGHTS

Height	Width	Depth
$8\frac{3}{4}$ in. (22 cm)	$17\frac{1}{2}$ in. (44.5 cm)	$16\frac{3}{4}$ in. (42.5 cm)

Weights	Ed. C	80 lb. (36 kg)	Ed. D	66 lb. (30 kg)

2.3 STANDARD FINISH

Oyster Grey Hammer

2.4 VALVE COMPLEMENT

Ed. C	Ed. D
2 - 85A2	2 - 85A2
3 - E88CC	2 - E88C
1 - ECC83	1 - ECC83
2 - 6080	1 - 6080

3 EQUIPMENT LIST

Transductor Power Supply Type 5355 W.74723

includes:-

Fuses		Ed. C	Ed. D
FS1 Mains (230V)	7.5A	(WIS.2947 Sh.1 Ref.17)	*5A (WIS.6501/C Sh.1 Ref.6)
FS1 Mains (117V)	15A	(WIS.2947 Sh.1 Ref.13)	10A (WIS.2947 Sh.1 Ref.12)
FS2 H.T.	5A	(WIS.2947 Sh.1 Ref.11)	3A (WIS.2947 Sh.1 Ref.10)
FS3 Mains Outlets (230V)	2A	(WIS.2947 Sh.1 Ref.9)	1A (WIS.2947 Sh.1 Ref.7)
FS3 Mains Outlets (117V)	4A	(WIS.2947 Sh.1 Ref.15)	2A (WIS.2947 Sh.1 Ref.9)

* *FS1 on Ed.D (5A) is an anti-surge fuse.*

4 DESCRIPTION

4.1 GENERAL

Both editions will be described together, any major differences being noted as they arise.

4.1.1 Mechanical

The Transductor Power Supply is built into a U-shaped case. The chassis, mounted to the front of the case, carries most of the components; only the mains transformer, the transductor and the rectifiers being mounted on the case itself.

The chassis is placed vertically, the right hand side being taken up by the printed wiring board. The MAINS ON-OFF and H.T. ON-OFF switches and fuses are raised on a central bracket. This brings them alongside the other controls which are located on the printed wiring board. This board is semi-hinged at the top, but may be easily removed from the main chassis. The panel carrying the controls (preset controls, Meter Switch, and TEST METER jack) is hinged to the lower edge of the printed wiring board to allow access to the rear of the controls. The filter choke and regulator valves occupy the left hand side of the chassis.

A removable panel is fitted to the front of the case; a slot in it allows access to the switches and fuses. The remaining controls may be reached through a door in the panel.

The input plug and the three output sockets are mounted on 45° brackets at the rear centre of the case. These brackets are drilled to allow the plug and sockets to be fitted facing either side of the unit.

Two guides are provided to seat the sides of the case in a standard 19 inch rack. Two adjustable brackets are fitted at the sides of the case to secure it in position in the rack.

4.1.2 Electrical

Reference should be made to the Block Diagram Fig.1.

4.1.2.1 Action of the Transductor

The rectified output of the full wave rectifier bridge is applied to the reservoir capacitor via the transductor which controls the flow of current.

The mean output voltage is determined by the amount of charging current which flows into the reservoir capacitor during each half-cycle of the mains supply. This is controlled by suitably setting the transductor core flux (and hence its impedance) at a time before the rectifiers conduct. This setting is obtained by making the control regulator valve V1b draw current from the reservoir capacitor, the amount of current drawn depending on the grid voltage of this valve. Thus the reservoir voltage depends on the voltage at the grid of V1b.

In order to maintain the output voltage constant a small part is tapped off by the SET Eo control RV3 and applied to one grid of a differential amplifier V4, the other grid being held at a reference potential by the reference valve V3. Any change in the output voltage results in a difference signal being produced by V4 and d.c. coupled to V2 where it is amplified and applied to the grid of the control regulator valve V1b. This results in a suitable 'reset' current flowing through the valve and the transductor to correct the change in output voltage.

4.1.2.2 Shunt Regulator

The speed at which the transductor can regulate is limited to slow changes, since the remagnetization of its core can only occur during half-cycles of the mains supply. It is therefore necessary to have a means of suppressing transient changes such as mains supply ripple and load fluctuations. This is achieved by the regulator valves V6 and V7 which are driven by the amplifier stage V2. The two halves of V2 are coupled to V4 which converts transient variations of the output voltage into a difference signal. V6 and V7 conduct so as to supply additional current to the output on a negative transient and to draw current from the output on a positive transient.

4.1.2.3 Bias Supply

The negative bias supply is obtained by voltage doubling from one arm of the rectifier bridge, and is stabilized by the voltage reference valve V5.

4.1.2.4 Reference Voltages

The positive and negative reference voltages (85V) are taken from V3 and V5 respectively.

4.1.2.5 Centring Supply

A wire link across C57 may be replaced by a suitable resistor to give a centring supply of up to 6V. The current at this point is approximately equal to the total h.t. load.

4.1.2.6 Metering Facilities

A test jack is provided, into which a standard Test Meter Type BD642 may be plugged and switched into various parts of the circuit by means of the meter selector switch to measure:-

(a) Regulated h.t. output voltage
(b) Total load current
(c) Quiescent current through the fast regulator valves
(d) Current through the control regulator valve.

4.1.2.7 Unregulated H.T.

The unregulated h.t. supply is obtained from the reservoir capacitors C51, C52.

5 CIRCUIT DETAILS

Reference should be made to the Circuit Diagram, Fig.7, or 8, as appropriate.

5.1 MAINS SELECTION, TRANSFORMER AND RECTIFIER

The mains input is brought into the connector PLD at the rear of the case. The live lead to pin 1, the neutral to pin 4, and earth to pin 2. The input is taken via the two-pole mains on-off switch SWB and the fuse FS1 to the mains transformer TR1. Mains outlets are included in the three output sockets SKD-F inclusive, which are used in parallel. Both editions have the neutral connected to pin 11 and have a connection from TR1 to pin 9. A small adjustment of mains output can be obtained by altering the tap on TR1. This output is labelled AUTO OUT LIVE on editions C & D. A connection to pin 10 is taken from FS1, and labelled MAINS OUT LIVE. This is intended to make possible a reduction in the load on TR1 primary. An output can be taken through unit without loading primary for auto-purposes.

The two primary windings of TR1 are brought out to terminals visible through the lower window at the rear of the case. Wire links must be used to connect the windings in series for operation at supply voltages of 200-250V, or in parallel for 100-125V operation. Selection of the local mains voltage is by taps which are provided at 120, 110 and 100 volts and also at 5 volts on each winding.

To compensate for ageing of the rectifiers the output from TR1 may be adjusted by means of taps at 5, 255, 265 and 275 volts on the secondary winding. These terminals are visible from the rear of the case through the upper window. TR1 also provides the 6.3V supply for the valve heaters in the voltage control circuits.

The metal rectifier bridge, MR1 and MR2 is connected directly to the secondary winding of TR1. C56 is connected across one arm of the bridge to compensate for the ripple caused by the unbalance imposed by the connection of the bias rectifier circuit to the opposite arm of the bridge. FS2 is provided to protect the rectifiers and TR1; some protection is also afforded by the regulator circuits and RLB/1 (see Section 5.3).

Three spare fuses are provided in carriers located on the front panel.

5.2 TRANSDUCTOR REGULATOR

The transductor TRD1 is in series with the main h.t. supply from the rectifier bridge to the reservoir capacitors C51, C52. The impedance of the transductor is controlled by the magnetization of its core, the material of which has a high permeability (flux density/magnetizating force), a high saturation flux density and a substantially rectangular B-H loop. In the unsaturated condition the transductor presents a high impedance to the flow of current into the reservoir capacitor, but when saturated it presents an impedance of little more than the d.c. resistance of its winding, allowing the full current to flow. The change is extremely abrupt due to the shape of the B-H curve of the core material.

5.2.1 Transductor Control

In the absence of the transductor, and with a constant applied a.c. input, the charge acquired by the reservoir capacitor C51, C52 in each half-cycle, and hence the mean output voltage, is determined by the time for which full conduction of the rectifiers MR1, MR2 can occur. This conduction time is limited to that period during which the instantaneous a.c. input exceeds the reservoir voltage. With the unsaturated transductor in circuit, only a small current can flow at the time at which the rectifiers would otherwise be fully conducting, contributing a negligible charge to the reservoir. This current causes the core flux to move towards positive saturation. When saturation is reached current can flow freely from the rectifier into the reservoir until the instantaneous a.c. input voltage falls below the reservoir voltage.

As a result of the delay to the start of rectifier conduction caused by the time taken for the core flux to become saturated, the charge acquired by the reservoir is smaller, and hence the mean output voltage is less than it would be in the absence of the transductor.

It will be seen that the transductor will saturate at some time in each half-cycle of rectifier conduction, and as the rectifier current falls to zero, the transductor, by virtue of its high retentivity will remain at saturation flux density. Since the permeability is high very little current is required to carry the core away from positive saturation to a lower level of flux density.

If the core is allowed to remain at saturation there will be no delay to the start of rectifier conduction in the next half cycle of a.c. input. Maximum charge is then acquired by the reservoir capacitor and maximum output voltage results. If, however, the core has been 'reset' to the negative saturation point the maximum delay to the start of conduction occurs and thus the minimum output voltage results.

5.2.2 Resetting the Core

As stated in Section 5.2.1 the rectifier conducting time is limited to the period for which the instantaneous value of the a.c. input voltage exceeds the reservoir voltage and is a function of the reservoir capacitance and load resistance. There is a time therefore, between the end of one conduction period and the beginning of the next during which the core may be reset from positive saturation to the required flux density. This reset action is achieved by drawing current from the reservoir capacitor through the transductor winding in a direction opposite to the normal charging current. The reset current is taken by V1b via R7 and is therefore proportional to the voltage on the grid of V1b. Although this current flows continuously, it is effective in resetting the core only during the period when the rectifiers are not conducting.

When the power is first switched on V1b is bypassed by RLA/2 and the transductor is fully reset by the current flowing through R7 alone. This holds the charge on the reservoir capacitor C51, C52 to a low value until V1b has warmed up sufficiently to provide a regulated control. RLA/2 is opened by V1a operating RLA when the resistor R5 in its cathode is bypassed by operation of the H.T. ON-OFF switch SWC. RLB/2 which is connected in parallel with RLA/2 is opened by RLA/1 operating RLB; RLB/1 then connects h.t. to the control circuits and the load.

5.2.3 Output Voltage Regulation

The output voltage is a function of the grid voltage of the control valve V1b (assuming a constant a.c. input). Conversely the output voltage can be held constant for variations of a.c. input or load current by applying a correcting voltage to the grid of V1b.

The output voltage is sampled by applying a voltage from the slider of the SET Eo (output volts) control RV3 to the grid of V4b via R40 and R39. V4b is cathode coupled to V4a by the large cathode resistor R37. The grid of V4a is held at a reference potential of +85V by the discharge valve V3. The two valves form a differential amplifier comparing the sampled output voltage with the reference voltage.

With RV3 correctly adjusted to give 250V at the output, the two grids of V4 will be held at the same potential and there will be no output from the amplifier. Any variation in the output voltage will result in a change in voltage on the grid of V4b, producing opposite changes of voltage at the anodes of V4. The anode of V4b is d.c. coupled via R30 and R21 to the grid of V2a, so the change of voltage is fed to the grid of V2a for amplification. The output of V2a is d.c. coupled to the grid of the Control Regulator Valve V1b via R19, RV2 and R8.

This variation occurs in such a way as to correct the change in output voltage or load current producing it, and tends to bring the grid potential of V4b back to the reference potential. The SET Eo control RV3 varies the tapping point on the resistor chain R41, RV3, R42, the feedback loop then altering the h.t. voltage so as to bring the grid potential of V4b back to the reference potential. This control therefore provides a means of setting the h.t. voltage to the correct level when circuit components - particularly the reference valve V3 or the amplifier valve V4 - are replaced.

R9 and C2, in the grid circuit of the control valve provide attenuation of the signal at those frequencies where the phase shift around the feedback loop approaches 180° and instability would occur.

Decoupling at ripple frequencies is provided by L2 and C58.

The finite back resistance of the rectifiers allows a certain amount of current to flow back through the transductor winding, resetting the core independently of the control current flowing in the control valve. In the case of rectifiers having a poor back resistance this current will limit the regulation range of the circuit. To offset the effect of this current, an additional magnetizing force is applied to the core by passing the load current through a bias winding consisting of a few turns wound over the main winding.

5.3 FAST REGULATOR SYSTEM

A limitation of the transductor regulation system is that the response is relatively slow, being further restricted by the smoothing circuit. To control any transients appearing on the output which are of too short duration for the transductor to operate, a fast regulator system is used.

The fast regulator system comprises a high gain a.c. amplifier driving the class AB shunt regulator valves V6, V7. As in the transductor control system, the transient change of output voltage is sampled by the grid of V4b and compared with the reference voltage at the grid of V4a. The two valves operate as a differential amplifier since the cathodes are directly coupled by R37. The anode circuits produce amplified versions of the 'error' signal (gain of stage approximately 30) which are balanced and of opposite phase. These are a.c. coupled, via C8 and C9, to the two grids of the second amplifier V2 which is biassed by returning the grid leaks R28 and R29 to the 85V negative bias supply.

The symmetrical output given at the anodes of these valves is applied to the grids of the regulator valves V6 and V7. The two valves are connected in series for d.c. across the output of the smoothing filter L1, C53, C54. To minimise the power consumed the two valves are biased to class AB, the grid of V7 being returned to the negative bias line via RV1 (ADJUST Iq). This control adjusts the quiescent current through the two valves to approximately 60 mA in Ed.C (30 mA in Ed.D), values chosen to ensure that the valves have sufficient gain to regulate against the ripple voltage.

In operation, if the output voltage increases at a rate in excess of that at which the transductor regulator can control, the resultant amplified 'error' signal produces an increase of current through V7 and a corresponding reduction of current through V6. The current for V7 is then withdrawn from the output via the filter capacitors C53, C54 to correct the transient.

On a negative transient the signals driving the regulator valves are reversed and result in an increase of current through V6 and a reduction of current through V7. The additional current flowing in V6 is then supplied to the output.

In order to achieve sufficient gain on the A.C./D.C. amplifier V2-V4 to give a low ripple content on the output combined with a low output impedance, the interstage coupling resistors R30 and R33 are shunted by the capacitors C8 and C9 to provide an increased a.c. gain. In addition, positive feedback is applied over the first two stages by R22 and C11.

In the event of a sudden overload causing the h.t. voltage to drop (e.g. an accidental short of h.t. to earth) the relay RLA provides some means of protection before the fuse FS2 blows.

As a result of the overload the grid of V1a is taken beyond cut off by the transient applied to it through R11 and C1. The anode current of the valve is reduced allowing the relay coil to become de-energized. The contact RLA/1 releases RLB, causing RLB/1 to disconnect the load. In the event of the fuse not having blown h.t. is reconnected to the load when V1a again commences to conduct, a delay of approximately 10 seconds occurring due to the time constant of R11, C1, R3 in its grid circuit. Should the fault still be present the foregoing sequence will be repeated until the h.t. fuse FS2 blows. Care should therefore be exercised when working on a unit in this condition to establish whether the fuse has blown before attempting to carry out any maintenance on the unit.

5.4 NEGATIVE BIAS SUPPLY

The negative bias supply is obtained from the a.c. voltage across one arm of the bridge rectifier MR1, MR2. This voltage is doubled by the rectifier MR3 and C55. The rectified output is filtered by C13, R44 and C14 to reduce the ripple content. The filtered d.c. is taken via the load network R45, R46, R47 to the voltage reference valve V5, from the cathode of which the stabilized bias is taken. A reference voltage of -85V is connected via R48 to the output sockets, pin 5.

5.5 METERING CIRCUIT

The TEST METER jack JKA and the four-position meter selector switch SWA enable a standard Marconi Test Meter Type BD642 to be connected to various points in the circuit.

The test meter should be used on the 150 mA range. In this condition it represents a 1.5 mA movement having an internal resistance of 940Ω. An additional series resistor R49 of 50Ω in the power supply circuit makes the total effective resistance 990Ω.

On positions 2, 3 and 4 of the switch - Io, Ic and Iq - the actual currents are twice the indicated reading on Ed.C and are the indicated reading on Ed.D.

Position 1 of the selector switch connects the meter between the h.t. output rail and earth via the 200k series resistor R43. The full scale deflection in this position is 300V.

Position 2 of the switch measures the output current, placing the meter across the shunt resistors R51, R52 on Ed.C (R51 in Ed.D). Full scale deflection in this position is 3A for Ed.C (1.5A for Ed.D).

Position 3 connects the meter across the shunt resistors R13 and R61 in the cathode circuit of the regulator valve V7 to measure the quiescent current Iq. It is normally set to 60 mA in Ed.C and 30 mA in Ed.D.

Position 4 connects the meter across R6 and R63 in the cathodes of the control regulator valves V1b and V8 (R6 and V1b only in Ed.D) to measure the reset current Ic flowing in the transductor winding. The meter button should be depressed to read a normal value of approximately 16 mA in Ed.C or 8 mA in Ed.D.

5.6 CENTRING SUPPLY

The earth return of the rectifier bridge MR1, MR2 and the reservoir capacitor C51, C52 may be broken to make available a centring supply at pin 2 of the output sockets SKD, SKE and SKF. A capacitor C57 is provided to decouple the centring supply which should not be allowed to exceed 6V. A suitable resistor must be connected in place of the wire link across the stand-off insulators located by C57 (on the back of the chassis). The current at this point is approximately equal to the sum of the load current Io and the quiescent current Iq of the regulator valves.

5.7 REMOTE SWITCHING

This is achieved by RLC operated from the 100V tap on TR1 via R68 and MR4. The remote power switch is connected between pins 11 and 12 on the outlet sockets. When RLC is energized by closing the remote power switch contacts RLC/1 and RLC/2 will supply a.c. to pins 9 and 10 respectively. RLC/3 will supply heater volts to V1 and RLC/4 will close the h.t. switch circuit through SWC to pin 4.

6 INSTALLATION

6.1 GENERAL

The Transductor Power Supply is supplied as a working unit ready for operation when unpacked and fitted into a standard 19 inch rack. Before connecting any power to the unit it should be carefully examined for any signs of mechanical damage which may have been suffered in transit. The valves should also be checked for any signs of damage and to ensure that they are correctly fitted in their holders.

The printed wiring board is held in position by means of two captive screws at its lower edge. Check that these are tightly locked and that the connectors SKA, SKB (and PLC in Ed.C only) are securely in place.

When mounted in a 19 inch rack the unit should be positioned so that a cool air flow is received into the case. The temperature of the incoming air should be such that the ambient temperature surrounding the components does not exceed 70°C for the lower ratings and 50°C for the upper ratings.

6.2 MAINS INPUT

Once the points detailed in the previous Section have been checked the mains fuse rating and the transformer primary connections should be checked.

For a mains input of 200-250V the mains fuse should be rated at 5A (7.5A Ed.C) and for 100-125V it should be rated at 10A (15A Ed.C).

The taps on the transformer primary should be set to correspond with the local mains voltage. Wire links are required to connect the two primary windings in series for 200-250V operation or in parallel for 100-125V operation. The wire links should be connected to the same terminals as the mains leads in the latter case.

Connections to the mains input Plug PLD are as follows:-

LIVE	pin 1	(pin 3 unused)
NEUTRAL	pin 4	
EARTH	pin 2	

The mains input plug PLD and the output sockets SKD, SKE and SKF should be adjusted to face in the required direction before the mains supply is connected to the unit.

6.3 CONNECTORS AND CABLING

6.3.1 External Connectors

The only external connections are to the plug and three sockets at the rear of the case. The connections to the mains input plug PLD are given in Section 6.2 above. The mating connector for this plug is Type EP-CG-4-11.

The output sockets SKD, SKE and SKF are connected in parallel and are identical. The mating connectors are Type EP-CG-12-12.

The output connections are as follows:-

Pin No.	Function
1	EARTH
2	CENTRING UP TO -6V
3	NOT USED
4	H.T. SWITCH
5	-85V REFERENCE
6	+260V UNREGULATED H.T.
7	+250V H.T.
8	+85V REFERENCE
9	AUTO OUT LIVE
10	MAINS OUT LINE
11	MAINS OUT NEUTRAL
12	POWER SWITCH

6.3.2 Internal Connectors - Printed Wiring Board

The pin connections for the two connectors PLA-SKA and PLB-SKB are clearly shown on the circuit diagram Fig.7 or 8 on the border line enclosing those components mounted on the board itself. In Ed.C only a further (single pin) connector PLC-SKC is used to connect the anode of V8 in parallel with the anode of V1b.

7 OPERATION

7.1 GENERAL

The Transductor Power Supply is designed for rack mounting. It provides stabilized h.t. and switched mains supplies. Reference voltages of +85V and -85V and a centring supply are available at the output sockets.

7.2 CONTROLS

The only operational controls on the unit are the MAINS ON-OFF switch SWB and the H.T. ON-OFF switch SWC. SWB is a double pole switch mounted on a bracket so as to be accessible with the front panel in place. It connects the mains supply from the input plug PLD to the primary of the transformer TR1. SWC, a single pole switch is similarly mounted just below the MAINS ON-OFF switch; by causing V1a to operate relays RLA and RLB, it connects the h.t. supply to the load. H.T. is not available until both the remote power switch and the remote h.t. switch have been operated.

The remaining controls are preset and should require only occasional adjustment. They may be reached through the door in the front panel. The preset controls are:-

ADJUST Iq (RV1)	Controls the quiescent d.c. through the regulator valves V6 and V7. Normally set to give a value of 60 mA in Ed.C. 30 mA in Ed.D.
BAL V2 (RV2)	Adjusts the anode potential of V2a to match that of V2b by changing the d.c. amplifier output for balance in the control loop.
SET Eo (RV3)	Adjusts the h.t. potential at the output of the supply. Normally set to give 250V, may require resetting if V3 or V4 are replaced.

7.3 FUSES

Three fuses are mounted on the same bracket as the MAINS ON-OFF switch SWB. Spare fuses are provided.

The fuses are:-

MAINS (FS1)	Connected in the LIVE LEAD from the MAINS ON-OFF switch SWB to the mains transformer TR1.

MAINS (FS1) (Contd.)	**The rating is 5A (7.5A Ed.C) for 200-250V or 10A (15A Ed.C) for 100-125V supplies. The 5A fuse should be of the surgeproof type.**
H.T. (FS2)	Connected in the positive side of the output from the rectifier bridge MR1, MR2. The rating is 5A for Ed.C and 3A for Ed.D. This fuse is a standard type.
MAINS OUT (FS3)	Connected between the mains outlet at the output sockets SKD, SKE, SKF and the live tap on the transformer. Rating is 2A Ed.C (230V) 4A (117V) 1A Ed.D (230V) 2A (117V)

7.4 SWITCHING ON

Before switching on the power supply it should be connected to a suitable load, using a cable coupled into the output socket SKE at the rear of the case.

The tappings on the mains transformer panel, visible through the lower window at the rear of the case, should be checked and, if necessary, set to the position nearest to the measured local mains supply.

7.5 NORMAL ADJUSTMENTS

Using a standard Test Meter Type BD642B connected to the TEST METER jack JKA, monitor the four positions of the meter selector switch SWA.

Position 1 measures the h.t. output voltage Eo, the meter reading giving Eo/2. If the reading is not 250V an adjustment should be made to the SET Eo control RV3.

Position 2 measures the h.t. load current Io, the meter reading giving Io/10. The total load current must not exceed 1.5A (Ed.C) or 0.9A (Ed.D) unless the ambient temperature around the components within the unit is below 50°C when the maximum load current may be increased to 2A (Ed.C) or 1.15A (Ed.D).

Position 3 measures the quiescent current Iq in the regulator valves V6, V7. This should be set to 60 mA (Ed.C) or 30 mA (Ed.D) by means of the ADJ Iq control RV1.

Position 4 monitors the control current Ic flowing in the transductor; this should be around 16 mA in Ed.C or 8 mA in Ed.D but may vary from half to twice the value given depending on mains supply voltage and load conditions.

8 MAINTENANCE

8.1 WARNING

The Transductor Power Supply is not fitted with interlocks. Care should therefore be taken when working on a live unit to avoid contact with h.t. potential. In the event of any emergency arising the drawing backing onto the Title Page gives the recommended methods of carrying out treatment on any person suffering from electric shock.

8.2 ROUTINE CHECKS AND MAINTENANCE

8.2.1 General

The following checks should be carried out fairly frequently to ensure that the equipment is maintained in an optimum working condition.

Check that all cables to the connector panel at the rear of the unit are firmly attached. Loose cable connectors can lead to broken conductors within the cableform.

Check that the printed wiring board is firmly attached to the main chassis and that the connectors are properly fitted. Recommended methods of servicing Printed Wiring Boards is shown in Information Leaflet No.2 immediately following the text.

It is essential that the unit be kept as clean as possible to avoid dust or grease layers accumulating upon the printed wiring board and forming undesirable conducting layers, resulting in poor performance and damage to components.

8.2.2 Valve Checks

The valve circuits employed in the unit have been designed with a conservative rating in order to ensure a maximum life from the valves. It is advisable, however, that the condition of the valves be checked from time to time and any that fall outside the manufacturer's specified tolerances be replaced. In carrying out measurements the valves should be taken out singly and replaced in their original positions.

It is possible to avoid a breakdown of the equipment due to valve failure by keeping a log of the readings obtained. A developing fault will then be clearly indicated.

8.2.3 Typical D.C. Meter Readings

The d.c. voltages given in Tables 1-4 were taken with a valve voltmeter Type BD699A having a normal input impedance of 17 MΩ. They are typical of what may be expected in a unit that is operating satisfactorily.

Table 1

Edition C - Valves

Valve	Type	Pin No.								
		1	2	3	4	5	6	7	8	9
V1	E88CC	59	-0.34	-	H	H	165	-4.3	0.7	-
V2	E88CC	168	75	79	H	H	156	75	80	-
V3	85A2	-	-	-	E	84	-	-	-	-
V4	ECC83	160	84	85	H	H	160	80	84.5	-
V5	85A2	-	-	-	84	E	-	-	-	-
V6	6080	58.5	260	127	58.5	260	127	H	H	-
V7	6080	-62	124	.35	-62	124	.35	H	H	-
V8	E88CC	-	-	-	H	H	165	-4.3	0.7	-

H - Heater E - Earth

Table 2

Edition C - Control Ranges

Control	Position	Voltage Range
SET Iq	V1 pin 1 or 4	30 - 74V
BAL V2	V2 pin 1	120 - 160V
SET Eo	V4 pin 2	73 - 78V

A

Table 3

Edition D - Valves

Valve	Type	Pin No.								
		1	2	3	4	5	6	7	8	9
V1	E88CC	59	-0.34	-	H	H	165	-4.3	0.7	-
V2	E88CC	168	75	79	H	H	156	75	80	-
V3	85A2	-	-	-	E	84	-	-	-	-
V4	ECC83	160	84	85	H	H	160	80	84.5	-
V5	85A2	-	-	-	84	E	-	-	-	-
V6	6080	-62	124	0.35	58.5	260	127	H	H	-

H - Heaters E - Earth

Table 4

Edition D - Control Ranges

Control	Position	Voltage Range
SET Iq	V6 pin 1	30 - 74V
BAL V2	V2 pin 1	120 - 160V
SET Eo	V4 pin 2	73 - 78V

8.3 PERIODIC CHECKS AND OVERHAULS

8.3.1 Controls

The position of a control is a good indication of the associated circuit. Normal operation should give a control operating in approximately the centre of its range. Where a control is operating at one end of its range it is advisable to check the components in that circuit and also the d.c. voltages on any valve electrode against Table 1 or 3. The BAL V2 control (RV2) adjusts the anode voltage of V2a (pin 1) to make it equal to that of V2b (pin 6). This is achieved by changing the d.c. amplifier output for balance in the control loop.

First check that the mains input is at the correct voltage and if necessary alter the position of the mains input taps. The normal h.t. load should be connected.

Using a d.c. valve voltmeter, monitor the voltages appearing on the anodes of V2. Two tags A and B are provided on the printed wiring board for this purpose. When correctly adjusted the two voltages should be within ±2V.

8.3.2 Regulation for Mains Variation of 7½%

Connect the mains supply into the unit through a suitable Variac control and adjust the input to the unit to 230V. Check that the taps on the mains transformer primary are set for 230V.

Connect an oscilloscope to the h.t. output, which should have been reset to 250V if necessary; set the oscilloscope controls to allow small variations in output voltage to be measured.

Now vary the input voltage to the unit, by means of the Variac, from approximately 213V to 247V and check that the output voltage does not vary by more than ±150 mV.

8.3.3 Ripple

The amount of ripple appearing on the output is a good indication of how efficiently the unit is regulating.

With the power supply loaded to 1.5A (0.9A in the case of Ed.D) monitor the output with an oscilloscope. Care should be taken to avoid stray pick-up, preferably by the use of a screened lead.

With the unit loaded and the mains input varied ±7½% about the selected input tap, the ripple should not exceed 5 mV. If the ripple level is higher than this figure the electrolytics in the smoothing circuit should be checked.

8.3.4 Rectifiers

Additional taps are provided on the secondary winding of the mains transformer TR1 to counteract the drop in output voltage from the rectifier bridge due to ageing of the rectifiers. The adjustment may be made in steps of 5V up to 280V.

A good indication of when a tap adjustment is necessary is given by monitoring the control current with a Type BD642 meter in the jack JKA and the selector switch in the Ic position. A record of the readings obtained will indicate any fall off in current in which case an adjustment should be made. This may be necessary when the control current reading falls below about 9 mA (4.5 mA in Ed.D) with the correct mains input applied and with normal load connected. It is recommended that the rectifiers be replaced before the maximum tap adjustment is reached. Access to the transformer taps is obtained through the upper window in the rear of the case.

8.3.5 Relay Adjustment

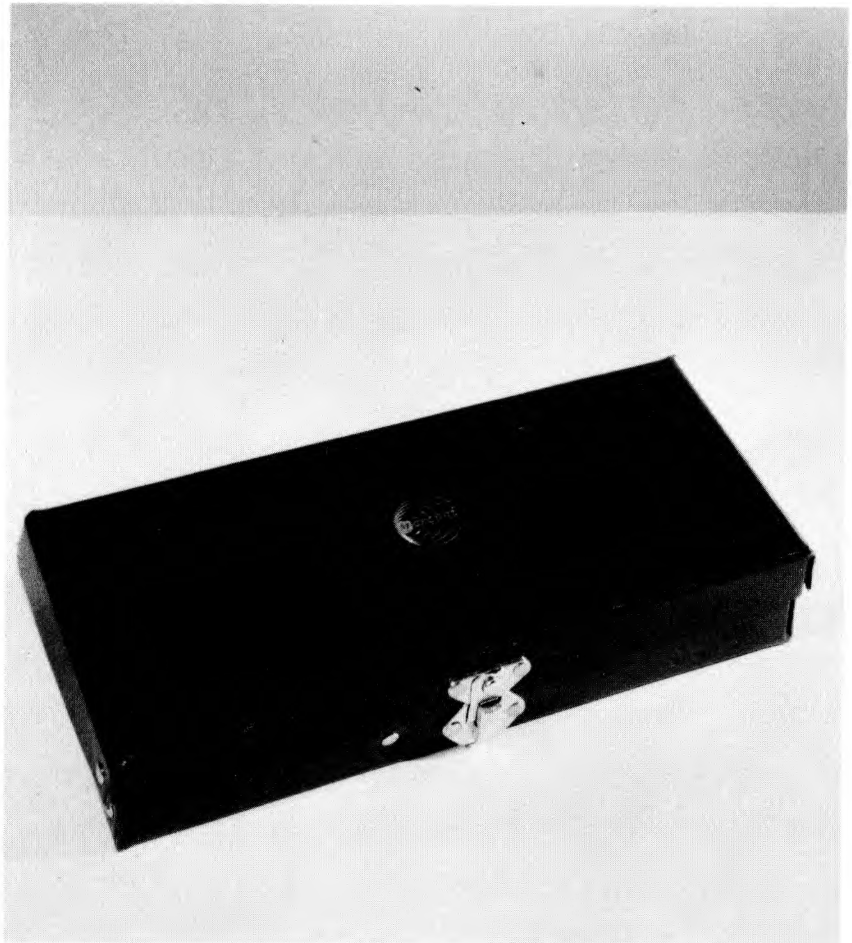
RLA is a sealed type and will not normally require either adjustment or maintenance.

RLB, located at the rear of the chassis, should have its contacts cleaned from time to time with a suitable contact-cleaning fluid to prevent the surfaces becoming pitted.

RLC is a post office type 3000 and should have its contacts cleaned occasionally.

RECOMMENDED METHODS OF SERVICING PRINTED WIRING BOARDS

Information Leaflet No.2



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Marconi Printed Wiring Service kit

CONTENTS

RECOMMENDED METHODS OF SERVICING
PRINTED WIRING BOARDS

1 INTRODUCTION

Printed wiring boards are made of a laminated material with a thin sheet of copper bonded to one side. The conductor pattern is formed by an etching process. Component leads are threaded through holes punched in the boards and the ends of the leads are normally bent over against 'pads' on the copper conductors. The completed assembly is then soldered and a protective coating applied.

2 TOOLS AND MATERIALS REQUIRED FOR SERVICING

1. A small soldering iron with a bit diameter of approximately 3/16" and a working temperature rather above the normal 250°C. A suitable tool is the Precision Iron, Model C240, 230-240 volts, 15 watts with the No.4 standard bit, made by A.N.T.E.X.Ltd., 3 Tower Hill, London EC3.
2. 22 SWG resin cored 60/40 solder, such as Multicore Type PC35. Additional flux must not be used.
3. A pair of small side-cutters, such as the 5½ inch Pointed Nose Diagonal Cutting Nipper, Cat.No.21123, made by Wilkinsons Tools Ltd., Kerfoot Street, Warrington, England.
4. A pair of small snipe-nosed instrument pliers, such as the 5½ inch or 6 inch Long Snipe Nosed Pliers, Cat.No.23107, made by Wilkinsons Tools Ltd.
5. A small stiff-bristled brush such as the Post Office Type Brush, fitch, Paint, No.7, round.
6. A small-bladed knife, e.g. a penknife.
7. An epoxy resin repair kit, e.g. the Araldite Two-tube Pack.

The tools and materials listed above are contained in the Marconi Printed Wiring Board Service Kit (Drawing No.LT.8420 Sh.1) which is illustrated in the Frontispiece of this leaflet.

3 REPAIR PROCEDURE

It is recommended that the board be removed from the equipment before servicing. in order to facilitate inspection of the underside after repair.

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

eaf.
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the coating lacquer.

Avoid excessive heating of the joint, as this will reduce the strength of the bonding adhesive and damage more than the necessary minimum area of protective varnish.

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

In those methods where the soldering iron is applied to the copper 'pad', the following points should be noted:-

(a) It is not necessary to remove the protective varnish beforehand.

(b) The iron should only be applied to the pad for the absolute minimum of time necessary to melt the solder, particularly where transistors are involved.

(c) Local repair of the damaged protective coating must be carried out immediately after the final soldering and cleaning operations, to prevent the ingress of moisture.

There are three recommended methods for the replacement of defective components, the suitability of each being determined by the circumstances.

3.1 METHOD 1

This is the recommended method for axial lead components, and certain others (excluding transistors), when it is possible to leave a sufficient length of wire attached to the board.

(a) Clip off the leads close to the component (Fig.1.1). In the case of certain non-axial lead components it may be necessary to break the component in the middle (Figs.1.2 and 1.3). Remove the component.

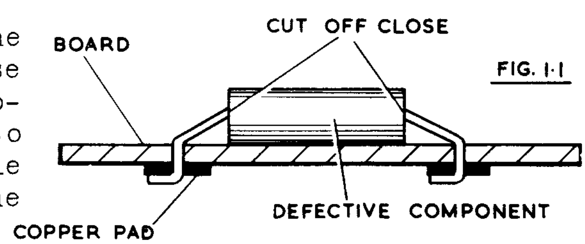


FIG. 1·1

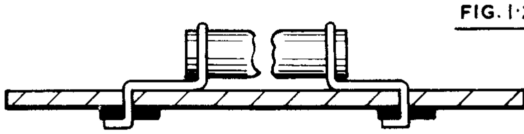


FIG. 1·2

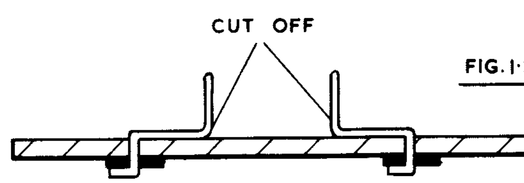


FIG. 1·3

(b) Straighten the wires left on the board, by bending away from the board, until they are perpendicular to it (Fig.1.4).

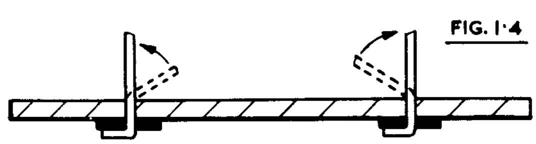


FIG. 1·4

(c) Bend semicircular hooks on the leads of the replacement component, to correspond with the spacing of the old component wires, slide on to the old leads and solder into position, ensuring that the component lies flat on the board (Figs. 1.5 and 1.6). For radial lead components, form the leads as Fig. 1.7 and attach as shown in Fig. 1.8.

FIG. 1·5

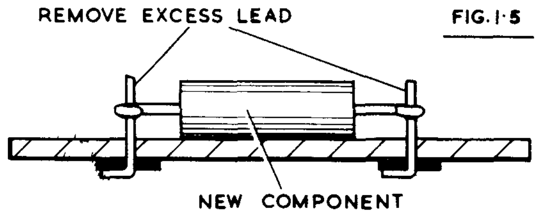
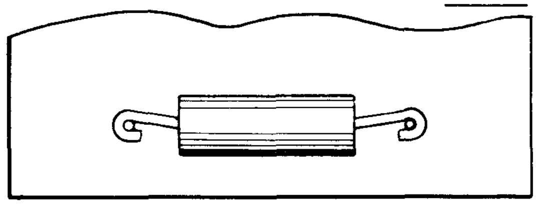


FIG. 1·6



PLAN VIEW

FIG. 1·8

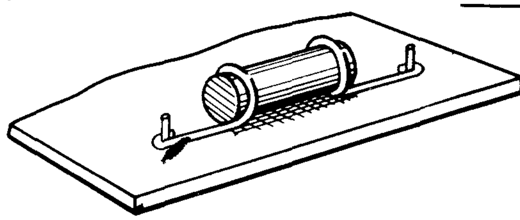
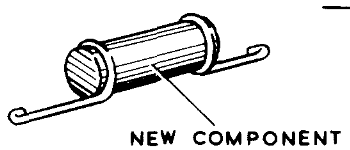
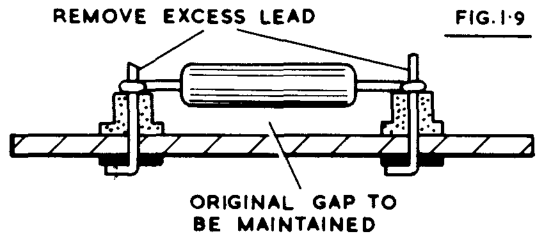


FIG. 1·7



NOTE: *Where insulating spacers have been used to keep a component, such as a wirewound resistor, raised from the board, they should be retained as shown in Fig. 1.9 to maintain adequate ventilation.*

FIG. 1·9



3.2 METHOD 2

This is the recommended procedure when it is desired to retain, as far as possible, the original appearance of the board. It is preferable, however, that it should not be used unless the importance of appearance overrides the obvious advantage of avoiding application of heat direct to the copper pads.

(a) Proceed as in Method 1 (a) and (b) until the old component leads are perpendicular to the board.

(b) Clip off the leads close to the component side of the board.

(c) Melt the soldered connection by the brief application of a hot iron and flick the board rapidly so that the lead stub is ejected, together with the solder in the hole. Check that no solder remains in the hole. Care should be taken to avoid physical damage to the board when flicking.

(d) Form the leads of the replacement component to the required shape (Fig.2.1).

(e) Fit the component and, after ensuring that it is lying flat on the board, clench the lead ends by gripping with the pliers, $\frac{1}{8}$" from the board, and pressing sideways, not allowing the pliers to twist, so that the sides of both jaws remain parallel to the board throughout the movement (Fig.2.2).

(f) Cut off **leads at the edge of the** pad between the two right-angle bends (Fig.2.3).

(g) Resolder the joint using only resin-cored solder and a hot iron. The iron should be applied for the least possible time consistent with obtaining a good soldered joint.

(h) Remove the excess resin and any contaminant from around the joints by wiping with a degreasing solvent, e.g. trichlorethylene. Allow excess solvent to evaporate.

(i) Mix the components of the epoxy resin, according to the makers instructions and apply to the areas from which varnish has been

FIG.2·1

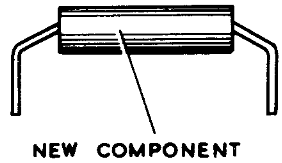


FIG.2·2

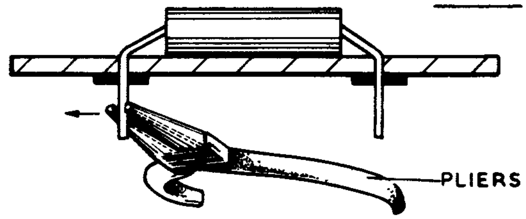
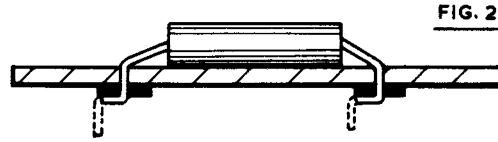


FIG.2·3



NOTE:

Operations (h) and (i) should follow (g) as rapidly as possible. If resealing is appreciably delayed, it is strongly recommended that the board be heated to 50°C and maintained at this temperature for one hour before resealing.

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removed during soldering, taking care to overlap the old varnish. 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.

3.3 METHOD 3

This method is recommended where access to the leads on the component side of the board is denied and where destruction of the component to gain access is impracticable.

(a) Apply a hot iron to the soldered connections, one at a time, and as soon as the solder has melted, remove as much excess as possible with the stiff brush.

(b) With the excess solder removed, apply the soldering iron to the clenched end of the component lead and, as the solder melts, introduce the blade of a small penknife under the clenched end, removing the soldering iron immediately this is achieved. Straighten the clenched end by twisting the knife in such a manner that the thin edge remains both on the board and touching the lead where it leaves the hole (Fig.3.1).

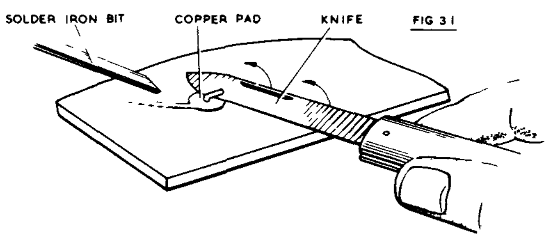


FIG 3.1

(c) After repeating operation (b) on all the leads of the component, carefully examine the leads where they enter the board, to ensure that they are not still attached to the pads. In those cases where they are attached they must be freed by re-applying the iron to the wire and, after the solder has melted, moving the wire to and fro in the hole until the solder has set.

(d) When all the leads are freed the component may be withdrawn and a new one inserted, pre-forming the leads where necessary.

(e) After insertion the ends are clenched, trimmed and soldered and the board resealed as in Method 2 (h) and (i).

NOTE 1. *Certain components, such as valve bases, may be fitted with tags which it is impracticable to clench over because of risk of damage to the board. Where these components have to be replaced, operation (b) is omitted during the removal and, correspondingly, the re-clenching operation is not carried out when fitting the new component.*

NOTE 2. *In operation (b) the knife must not be inserted without first melting the solder, or damage to the copper pad may result. Similarly in (d) the component must not be withdrawn until all the leads are freed as in (c).*

4 TEST AND INSPECTION

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

Repairs should be inspected for dry joints. When Method 2 or 3 has been used the amount and shape of solder should be similar to the original connections on the board, and it should be possible to see the outline of the component leads.

Repairs should be inspected to ensure that all varnish displaced during the servicing operations has been made good and that a sufficient overlap of varnish has been allowed to effect a complete seal.

MCL:- T3961A
Issue:- Provisional
Date:- 24.1.63

MASTER COMPONENTS LIST

FOR

TRANSDUCTOR POWER SUPPLY UNITS TYPES 5355C&D

(W.74723 Eds.C&D)

NOTES:

1. Component schedules are presented in the form of a master components list, which includes all components used in this equipment. Each component is identified by means of a spares reference number, column 1. in addition to the normal part identity.
2. Components shown on individual circuit diagrams may be identified in the master list by means of the cross-reference tables associated with each circuit diagram. The numbers given are the spares reference numbers.
3. For spares ordering purposes it is only necessary to quote the exact reference at the top of this page together with the spares reference number. Individual part identities can be given as a cross check if desired, but not necessary.
4. Prices are subject to change without notice.
5. All items reference PC are standardised items and comply with Government specifications where these exist.
6. All items reference WIS are manufactured by component or other suppliers to a Marconi specification which, where appropriate, complies with a Government specification.
7. All items reference W are manufactured by MWT and while materials and practices are in accordance with appropriate Government specifications, these items cannot be regarded as 'Standard Items'.

P.T.O.

8. The following abbreviations are used throughout this Master List:

cap.	capacitor	uH	microhenry
carb.	carbon	pF	micromicrofarad
c.r.t.	cathode-ray tube	mH	millihenry
cer.	ceramic	mA	milliapere
c.o.	changeover	min	minute
coax.	coaxial	min.	minimum
coeff.	coefficient	m.c.	moving coil
CV	Common Valve	mld.	moulded
comp.	composition	neg.	negative
c/s	cycles per second	No.	number
dB	decibel	osc.	oscillator
dia.	diameter	pap.	paper
d.c.	direct current	%	per cent
d.p.	double pole	pos.	positive
d.t.	double throw	potr.	potentiometer
elyc.	electrolytic	prim.	primary (winding)
enam.	enamelled	r.f.	radio frequency
e.h.t.	extra high tension	rect.	rectifier
fig.	figure	ref.	reference
fil.	filament	res.	resistor
ft	foot (feet)	res.var.	resistor variable (potentiometer)
freq.	frequency		
f.s.d.	full scale deflection	rev/min	revolutions per minute
gal	gallon		
H	henry	sect.	section
h.s.	high stability	sil.mica	silver mica
h.p.	horse power	s.p.	single pole
h	hour	s.t.	single throw
in	inch	sp.gr.	specific gravity
indr.	inductance, self inductor	s.w.g.	standard wire guage
		temp.	temperature
insul.	insulated	F	fahrenheit
insulr.	insulator	terml.	terminal
kc/s	kilocycles per second	transf.	transformer
kΩ	kilohm	tub.	tubular
kW	kilowatt	var.	variable
kV	kilovolt	vit.	vitreous
kVA	kilovolt-amp	V	volt
lin.	linear	VA	volt-ampere
lg.	long	W	watt
max.	maximum	w.w.	wirewound
Mc/s	megacycles per second	yd	yard
mΩ	megohms		
metd.	metallised		
u	micro		
uF	microfarad		

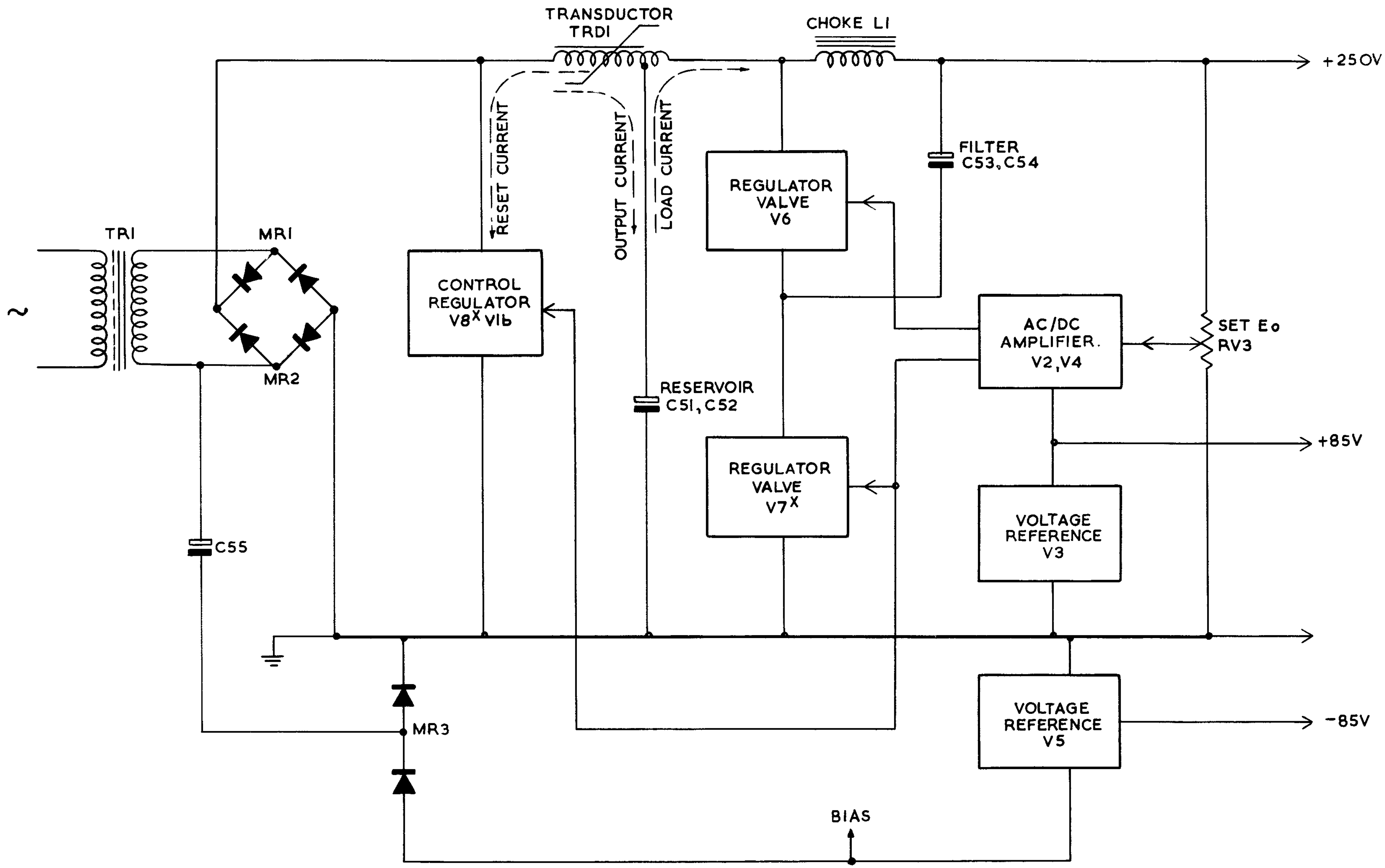
No.	Description and Identity	Qty.	Price Each † £. s. d.	Sc
1	Can screening PC.17504-2	3* 4+		
2	Can screening PC.17503-2	2		
3	Cap. elyc. 500uF 330V WIS.5082-B-2-78	2* 1+		
4	Cap. elyc. 500uF 150V WIS.5082-B-2-77	2* 1+		
5	Cap. elyc. 8uF 450V PC.18406-2	1		
6	Cap. mica metal 0.0065uF ±5% 350V PC.18801-7	1		
7	Cap. elyc. 5000uF +50% -20% 12V WIS.5082-B-2-91	1		
8	Cap. pap. 0.15uF ±15% 150V WIS.7588-B-1-11	1		
9	Cap. elyc. 16uF 350V PC.18406-6	1*		
10	Cap. elyc. 16uF 150V PC.18406-9	1*		
11	Cap. metal film 1uF 250V WIS.7190-C-1-1	4* 2+		
12	Cap. elyc. 2uF 150V PC.18404-2	1		
13	Cap. elyc. 8uF +50% -20% 450V WIS.7122-B-1-16	2		
14	Cap. superlytic 2uF ±20% 250V WIS.6333-C-1-37	1		
15	Cap. metal film 1uF ±20% 350V WIS.7190-C-1-2	2		
16	Cap. mica metal 220pF ±5% 750V PC.18802-17	1		
17	Cap. metal film 0.25uF ±20% 250V WIS.7190-C-1-8	3		
18	Cap. elyc. 16+16+16uF +50% -20% 275V WIS.7122-B-1-1	1		
19	Cap. elyc. 8uF +50% -20% 350V PC.18406-5	1		
20	Cap. pap. foil 0.05uF ±20% 350V PC.19202-13	1		
21	Cover spindle end PH.71103-1	3		
22	Crystal rect. OA211	1		
23	Fuse 7.5A WIS.2947-1-17	2ϕ		
24	Fuse 15A WIS.2947-1-13	2⌿		
25	Fuse h.t. 5A WIS.2947-1-11	2		
26	Fuse 2A WIS.2947-1-9	2		
27	Fuse 4A WIS.2947-1-15	2⌿		
28	Fuse 5A WIS.6501-C-1-6	2ϕ		
29	Fuse 10A WIS.2947-1-12	2⌿		
30	Fuse h.t. 3A WIS.2947-1-10	2		
31	Fuse 1A WIS.2947-1-7	2ϕ		
32	Fuseholder WIS.4154-C-1-1	3		
33	Fuseholder WIS.8672-C-1-1	3		
34	Indr. choke 0.5H WIS.5698-B-118	1*		
35	Indr. W.84706-B-1-A	1		

* Edition C　　ϕ 230V
\+ Edition D　　⌿ 117V

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scal
36	Indr. choke WIS.5698-B-119	1+		
37	Insulr. PC.43305-1	14		
38	Knob PH.46525-1	1		
39	Metal rect. WIS.6896-B-1-6	2*		
40	Metal rect. WIS.6897-B-1-8	1		
41	Metal rect. WIS.6897-B-1-9	2+		
42	Nut spindle gripping PH.71101-1	3		
43	Plug WIS.7491-C-1-2	1*		
44	Plug WIS.5781-B-1-13	1		
45	Plug 10 pole PC.57001-1	2		
46	Printed wiring board F.105	1		
47	Relay WIS.8805-C-1-1	1*		
48	Relay WIS.1829-44-603	1		
49	Relay PC.65406-10	1		
50	Res. w.w. 1 ohm ±1% 2W WIS.7452-B-1-2	2* 1+		
51	Res. w.w. 47 ohms ±5% 3W PC.67008-5	2* 1+		
52	Res. comp. 100 ohms ±10% 0.25W PC.66609-7	11* 8+		
53	Res. w.w. 150 ohms ±5% 3W PC.67008-8	2* 1+		
54	Res. w.w. 10 ohms ±1% 2W WIS.7452-B-1-1	4* 2+		
55	Res. w.w. 15k ohms ±5% 4.5W PC.67009-20	2* 1+		
56	Res. w.w. 6.8 ohms ±5% 3W PC.67008-23	1*		
57	Res. carb. film 68k ohms ±5% 0.125W PC.66601-35	1*		
58	Res. comp. 100k ohms ±10% 1W PC.66621-49	1		
59	Res. w.w. 1.5k ohms ±5% 3W PC.67008-14	1		
60	Res. w.w. 10k ohms ±5% 4.5W PC.67009-19	1		
61	Res. w.w. 33k ohms ±5% 6W PC.67010-22	1		
62	Res. comp. 220k ohms ±5% 0.25W PC.66604-53	2		
63	Res. comp. 6.8k ohms ±10% 0.5W PC.66611-35	1		
64	Res. comp. 100k ohms ±5% 0.25W PC.66604-49	4		
65	Res. comp. 220k ohms ±10% 0.5W PC.66611-53	1		
66	Res. comp. 2.2M ohms ±10% 0.25W PC.66610-65	1		
67	Res. comp. 220 ohms ±10% 0.25W PC.66610-17	1		
68	Res. comp. 150k ohms ±5% 0.25W PC.66604-51	1		
69	Res. comp. 33k ohms ±5% 0.25W WIS.7461-B-1-60	2		
70	Res. comp. 330k ohms ±5% 0.25W PC.66604-55	4		
71	Res. comp. 1M ohm ±5% 0.25W PC.66604-61	3		

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
72	Res. comp. 470k ohms ±5% 0.25W PC.66604-57	4		
73	Res. comp. 68 ohms ±5% 0.25W WIS.7461-B-1-61	1		
74	Res. comp. 47k ohms ±5% 0.25W WIS.7461-B-1-59	2		
75	Res. comp. 22k ohms ±5% 0.5W WIS.7462-B-1-58	1		
76	Res. comp. 1.8M ohms ±5% 0.5W PC.66605-64	2		
77	Res. comp. 68k ohms ±5% 0.75W PC.66606-47	1		
78	Res. comp. 390k ohms ±5% 0.25W PC.66602-51	1		
79	Res. comp. 180k ohms ±5% 0.125W PC.66601-40	1		
80	Res. comp. 200k ohms ±1% 1W WIS.7311-B-1-12	1		
81	Res. w.w. 15k ohms ±5% 3W PC.67008-20	3		
82	Res. w.w. 50 ohms ±1% 2W WIS.7452-B-1-4	1		
83	Res. var. comp. 50k ohms 0.25W PC.67202-21	2		
84	Res. comp. 100k ohms 0.25W PC.67202-25	1		
85	Socket 10-way WIS.7090-B-1-3	2		
86	Socket 12-way WIS.4183-C-1-11	3		
87	Socket WIS.7491-C-1-1	1		
88	Switch d.p. 250V 10A PC.71304-1	2		
89	Switch s.p. 250V 3A PC.71301-1	1		
90	Switch 2 pole 4-way WIS.5808-C-160	1		
91	Test jack WIS.9676-C-1-1	1		
92	Transductor W.63151-3-D	1*		
93	Transductor W.63151-1-A	1+		
94	Transf. WIS.5697-B-251	1*		
95	Transf. WIS.5697-B-252	1+		
96	Valve 6080	2* 1+		
97	Valve E88CC	3* 2+		
98	Valve 85A2	2		
99	Valve ECC83	1		
100	Valveholder PC.81814-1	2* 1+		
101	Valveholder PC.81824-1	1*		
102	Valveholder PC.81826-1	2		
103	Valveholder PC.81827-1	3		

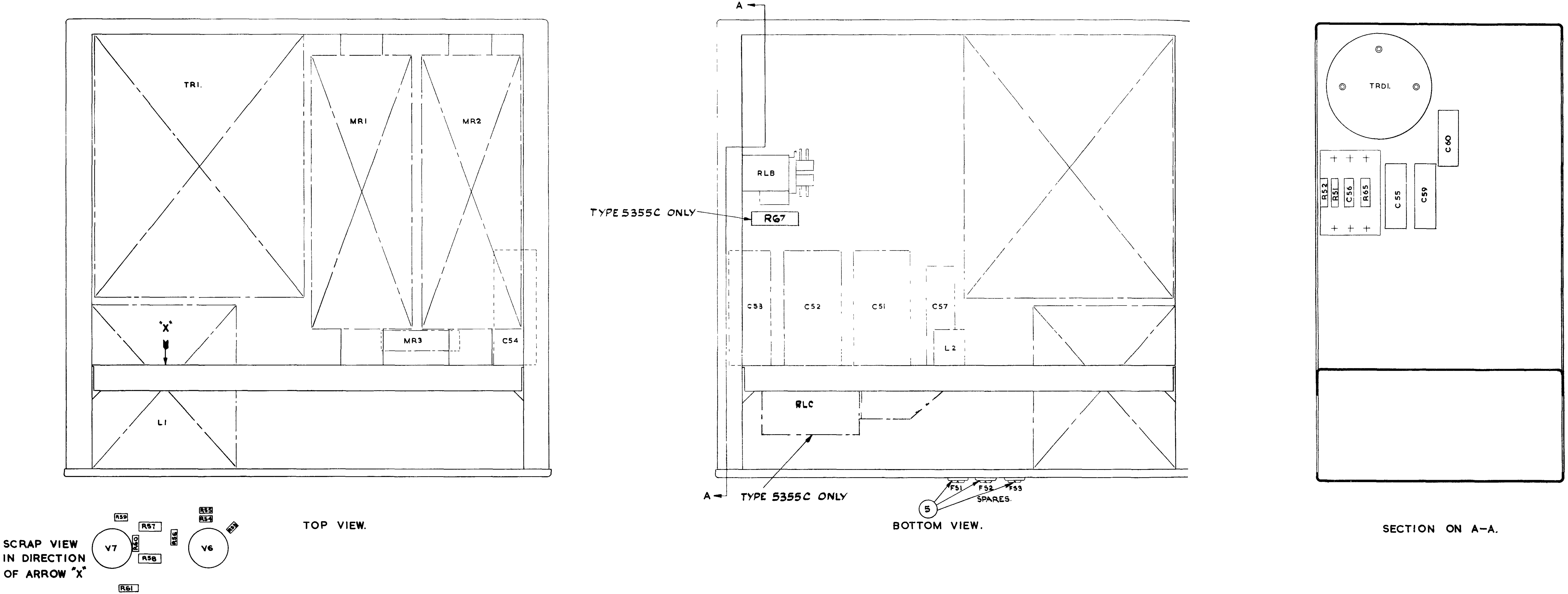
* Edition C + Edition D



NOTE. ITEMS MARKED X ARE OMITTED FROM EDITION B & D IN WHICH V6 & V7 ARE REPLACED BY THE TWO HALVES OF V6.

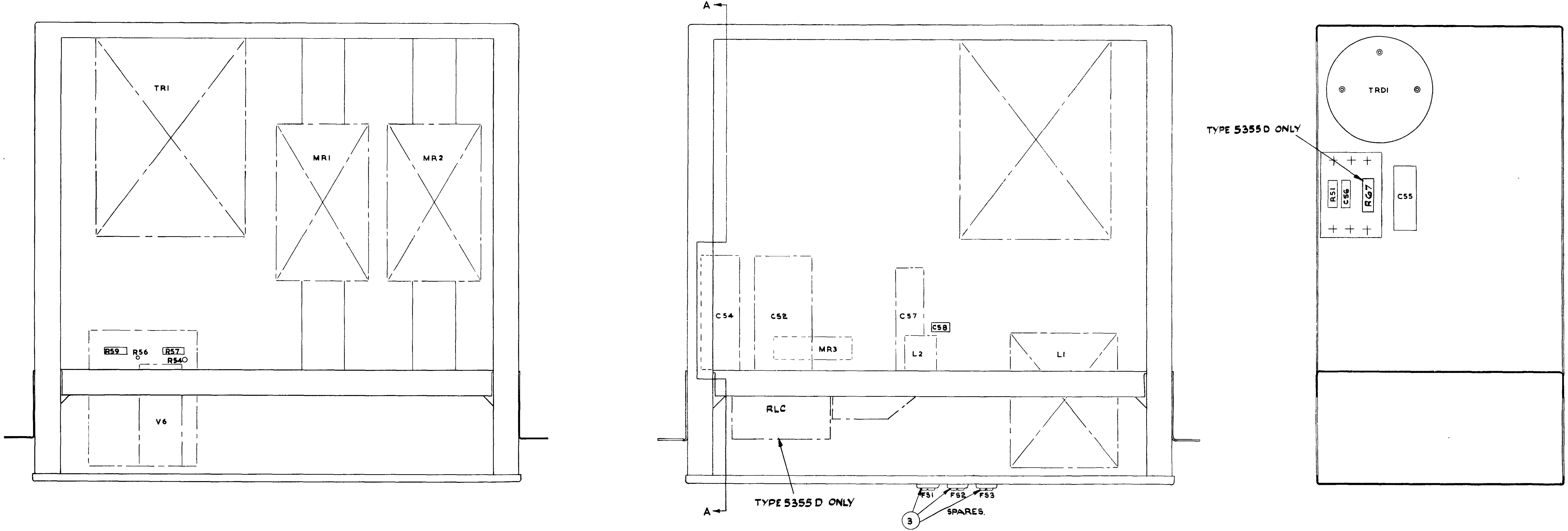
BLOCK DIAGRAM
TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355
WZ.23578/B Sh.1 Iss.1

FIG.1



COMPONENT LAYOUT TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355C
TOP, BOTTOM AND SIDE VIEW
WZ.20387/D Sh.1 Iss.2

FIG.2



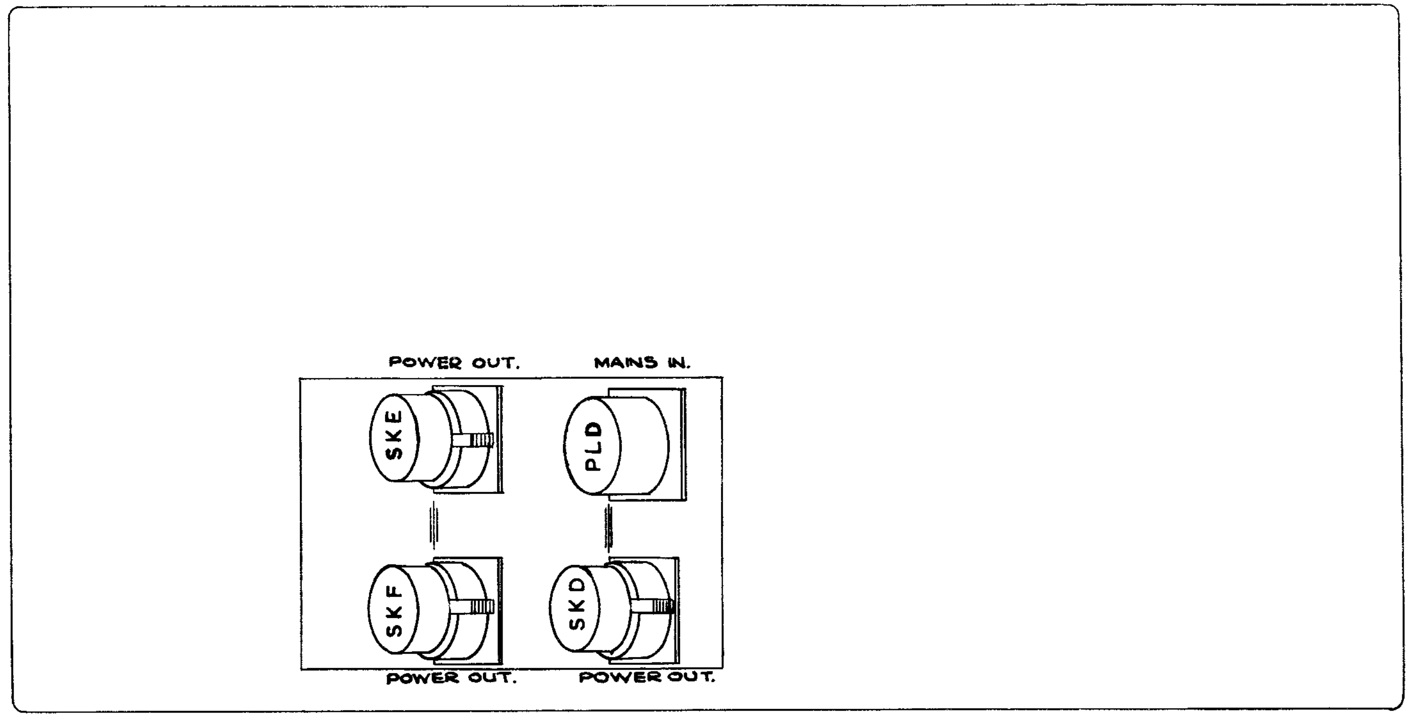
TOP VIEW.

BOTTOM VIEW.

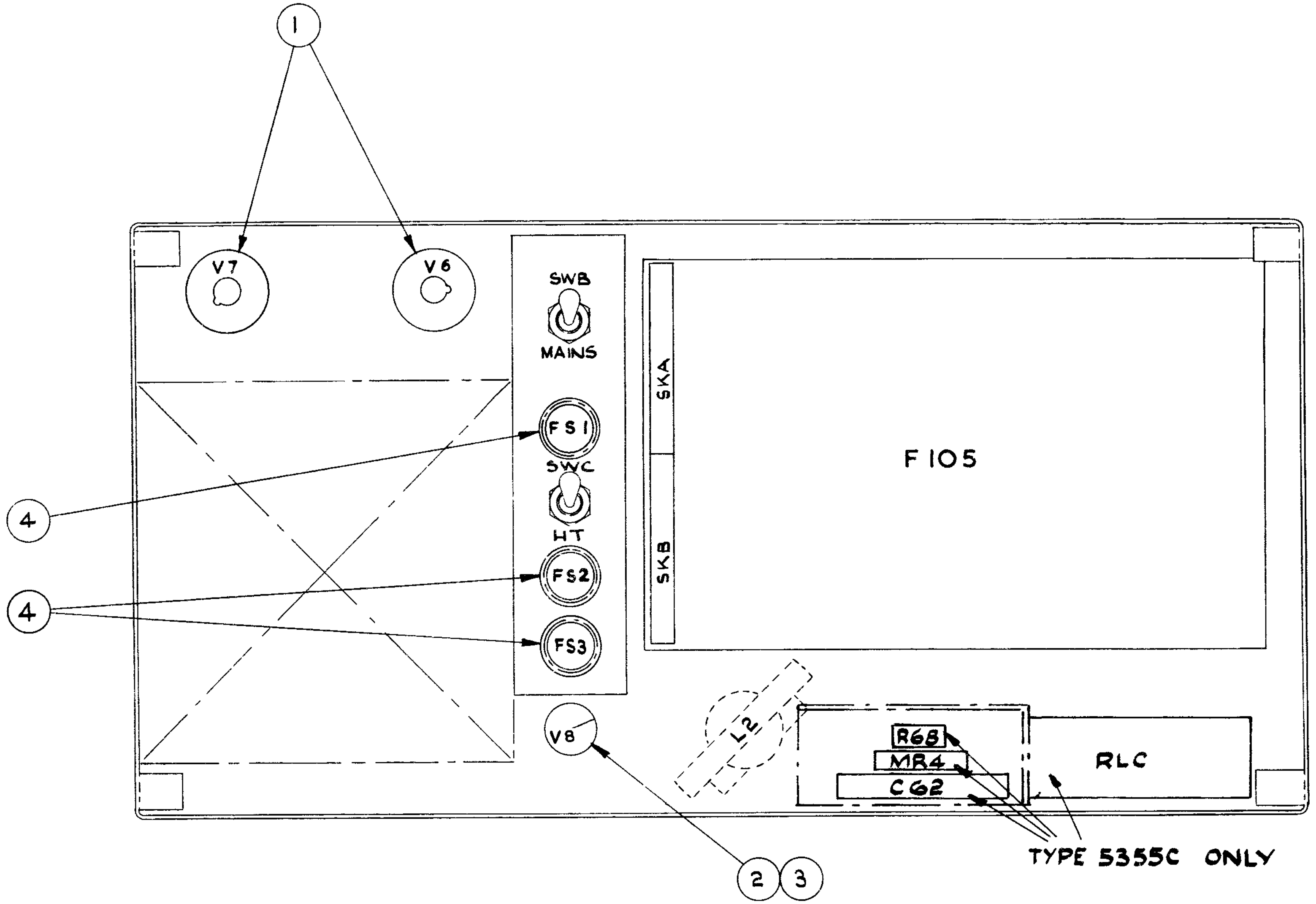
SECTION ON A-A

COMPONENT LAYOUT TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355D
TOP, BOTTOM AND SIDE VIEW
WZ.20389/D Sh.1 Iss.2

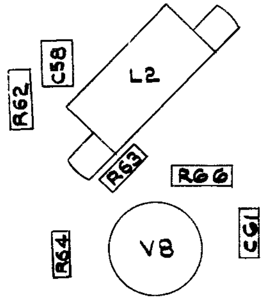
FIG.3



REAR VIEW.



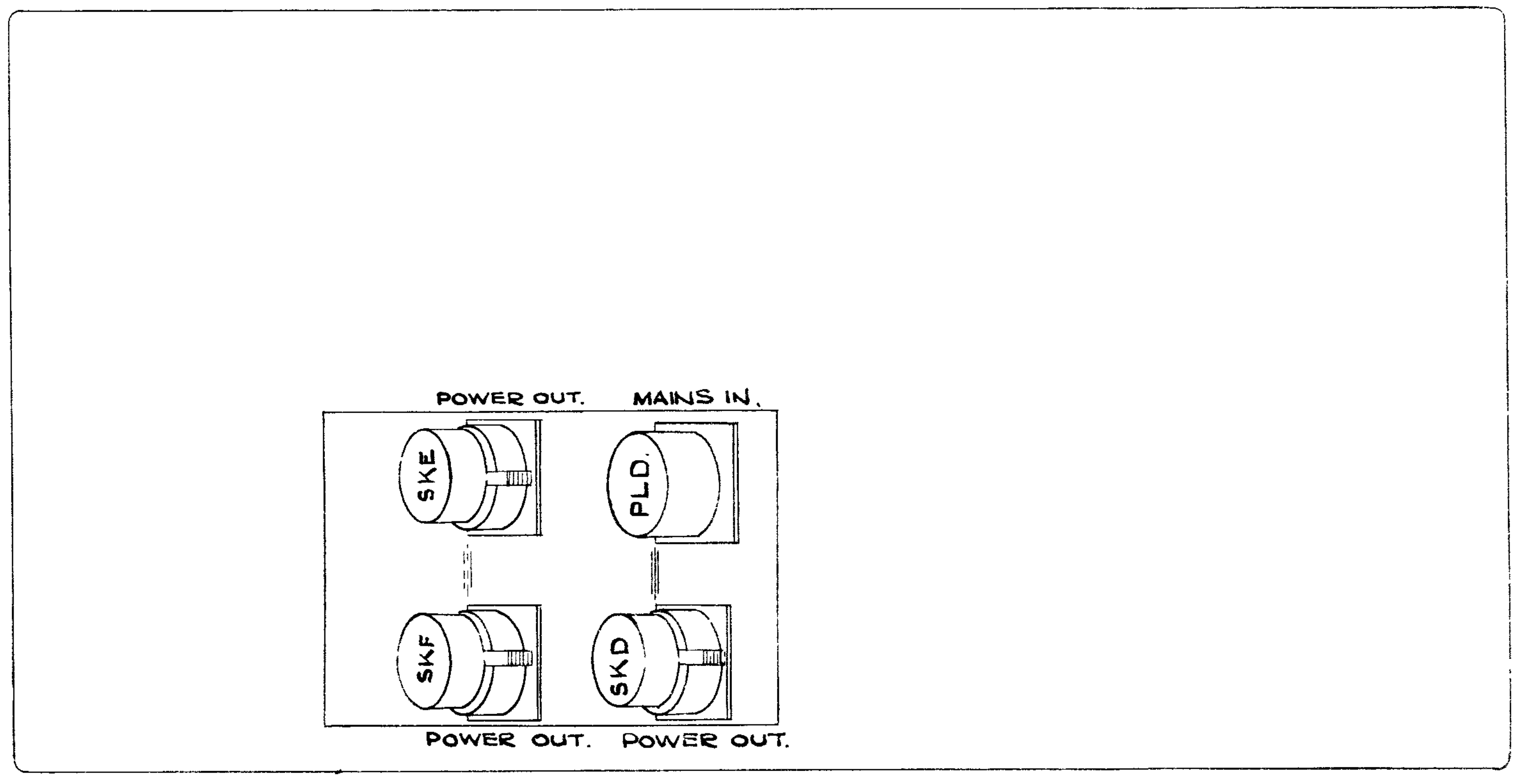
FRONT VIEW WITH FRONT PANEL REMOVED.



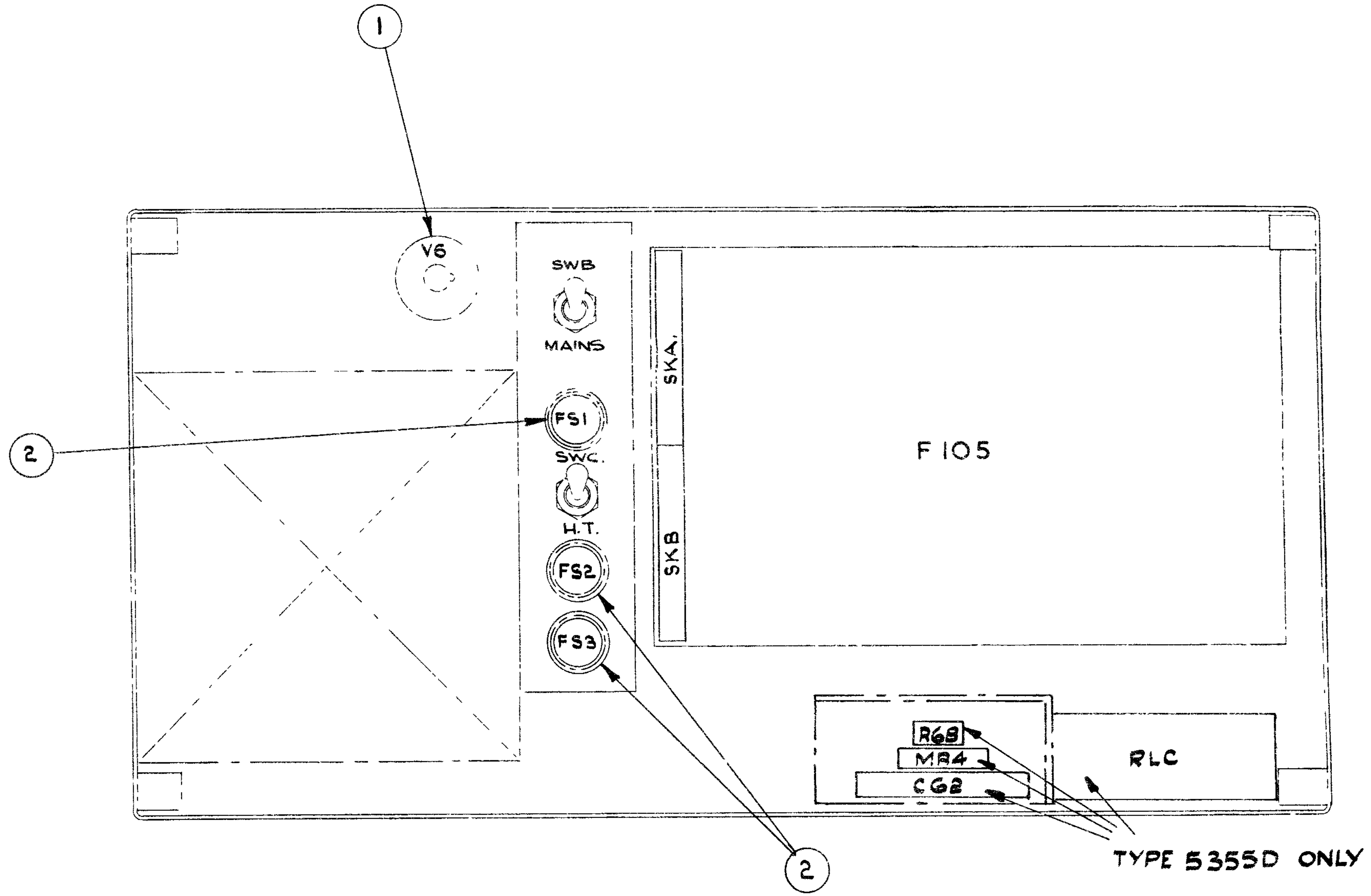
SCRAP VIEW SHOWING COMPONENTS FIXED TO UNDERSIDE OF L2 & V8.

COMPONENT LAYOUT TRANSUDCTOR POWER SUPPLY UNIT TYPE 5355C
FRONT AND REAR VIEWS
WZ.20387/D Sh.2 Iss.2

FIG.4



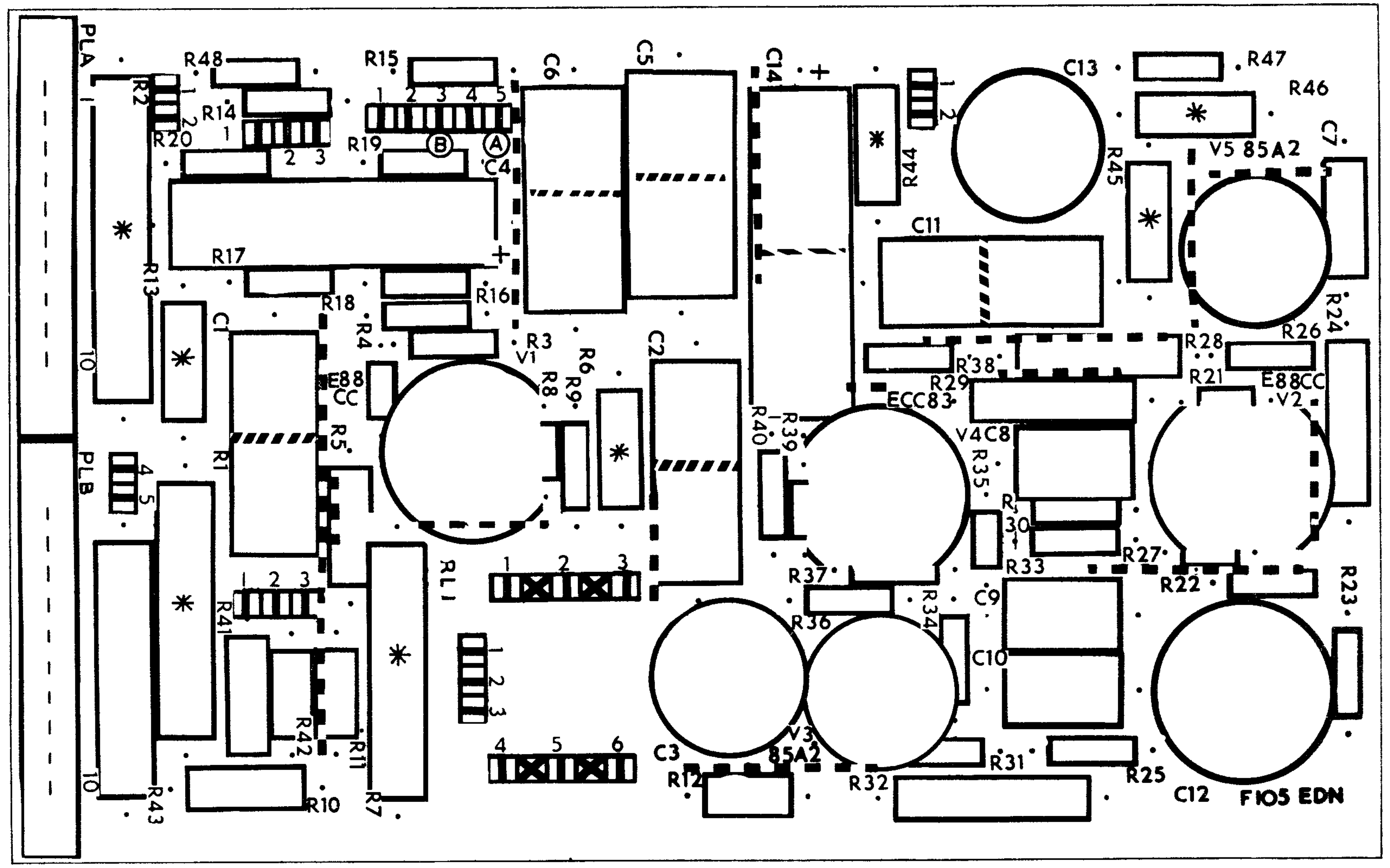
REAR VIEW.

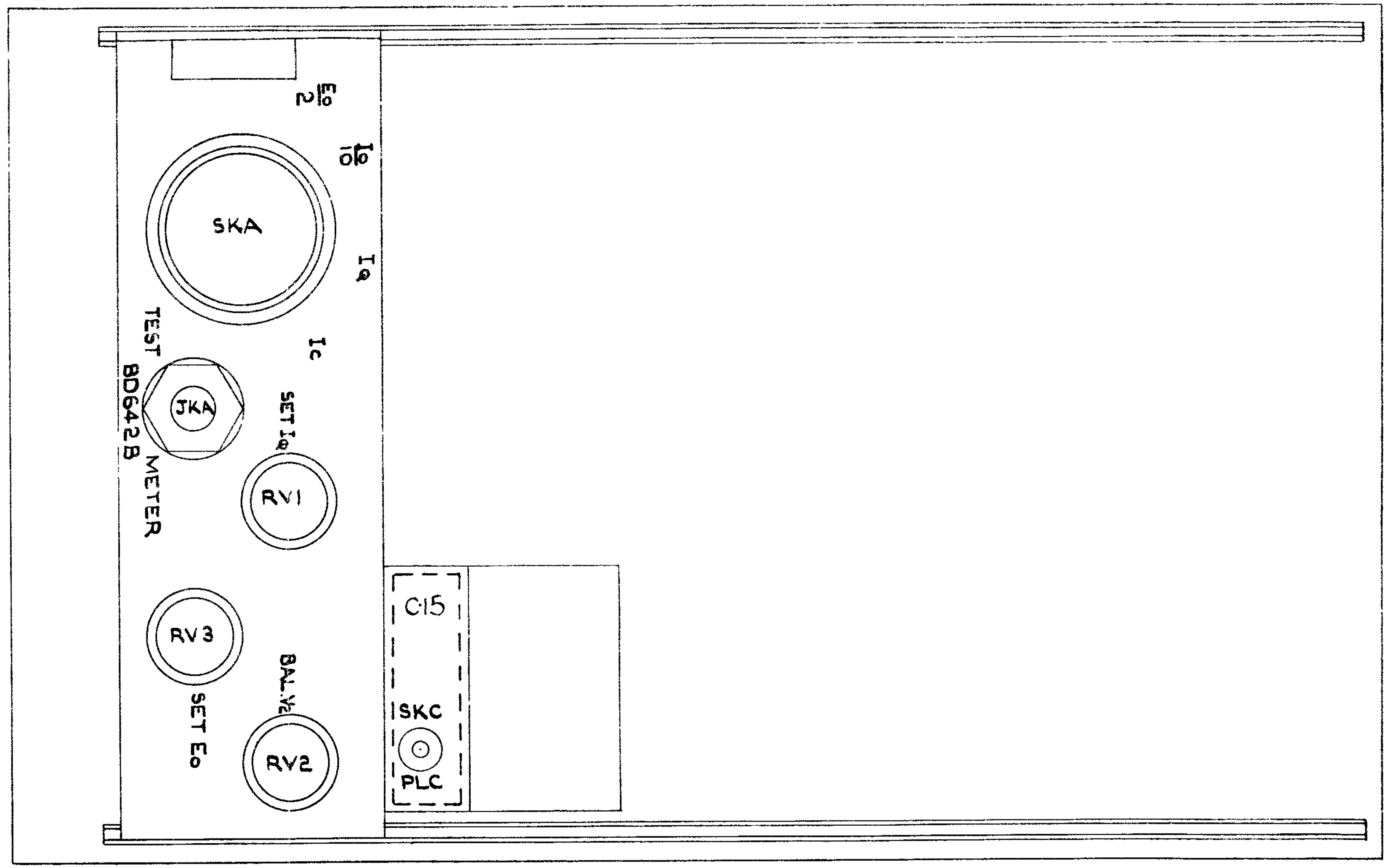


FRONT VIEW WITH FRONT PANEL REMOVED.

COMPONENT LAYOUT TRANSUDCTOR POWER SUPPLY UNIT TYPE 5355D
FRONT AND REAR VIEWS
WZ.20389/D Sh.2 Iss.2

FIG.5





DETAILS OF PRINTED WIRING BOARD F105.

COMPONENT LAYOUT TRANSUDCTOR POWER SUPPLY UNIT TYPE 5355
PRINTED WIRING BOARD TYPE F105
WZ.20387/D Sh.3 Iss.4

FIG.6

TRANSDUCTOR POWER SUPPLY TYPE 5355C

Cross Reference List for WZ.27611-D Sh.1

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C1	11	C52	3	L2	35	R11	66	R32	77	R51	50	RLA	49	TR1	94
C2	11	C53	4			R12	67	R33	71	R52	50	RLB	47		
C3	13	C54	4	MR1	39	R13	54	R34	72	R53	51	RLC	48		
C4	14	C55	5	MR2	39	R14	68	R35	52	R54	51				
C5	15	C56	6	MR3	40	R15	69	R36	70	R55	52	RV1	83	TRD1	92
C6	15	C57	7	MR4	22	R16	70	R37	62	R56	52	RV2	84		
C7	16	C58	8			R17	64	R38	70	R57	53	RV3	83		
C8	17	C59	9	PLA	45	R18	64	R39	52	R58	53			V1	97
C9	17	C60	10	PLB	45	R19	71	R40	72	R59	52			V2	97
C10	17	C61	11	PLC	43	R20	72	R41	73	R60	52			V3	98
C11	11	C62	12	PLD	44	R21	52	R42	79	R61	54	SKA	85	V4	99
C12	18					R22	73	R43	80	R62	52	SKB	85	V5	98
C13	13	FS1*	23	R1	60	R23	74	R44	81	R63	54	SKC	87	V6	96
C14	19	FS1+	24	R2	61	R24	75	R45	81	R64	55	SKD	86	V7	96
C15	20	FS2	25	R3	62	R25	74	R46	81	R65	56	SKE	86	V8	97
		FS3*	26	R4	52	R26	69	R47	70	R66	57	SKF	86		
		FS3+	27	R5	63	R27	52	R48	64	R67	58				
				R6	54	R28	76	R49	82	R68	59				
				R7	55	R29	76								
		JKA	91	R8	52	R30	71					SWA	90		
				R9	64	R31	72					SWB	88		
C51	3	L1	34	R10	65							SWC	89		

MISCELLANEOUS MECHANICAL ITEMS

Board Printed Wire F.105	No. 46
Can Screening B7G for V3,V5	No. 2
Can Screening B9A for V1,V2,V4,V8	No. 1
Fuseholder for FS1,FS2,FS3	No. 32
Fuseholder for FS1,FS2,FS3 (spares)	No. 33
Insulator	No. 37
Knob	No. 38
Locking Device : Nut	No. 42
Cover	No. 21
Valveholder for V3,V5	No.102
Valveholder for V1,V2,V4	No.103
Valveholder for V6,V7	No.100
Valveholder for V8	No.101

* 230V + 117V

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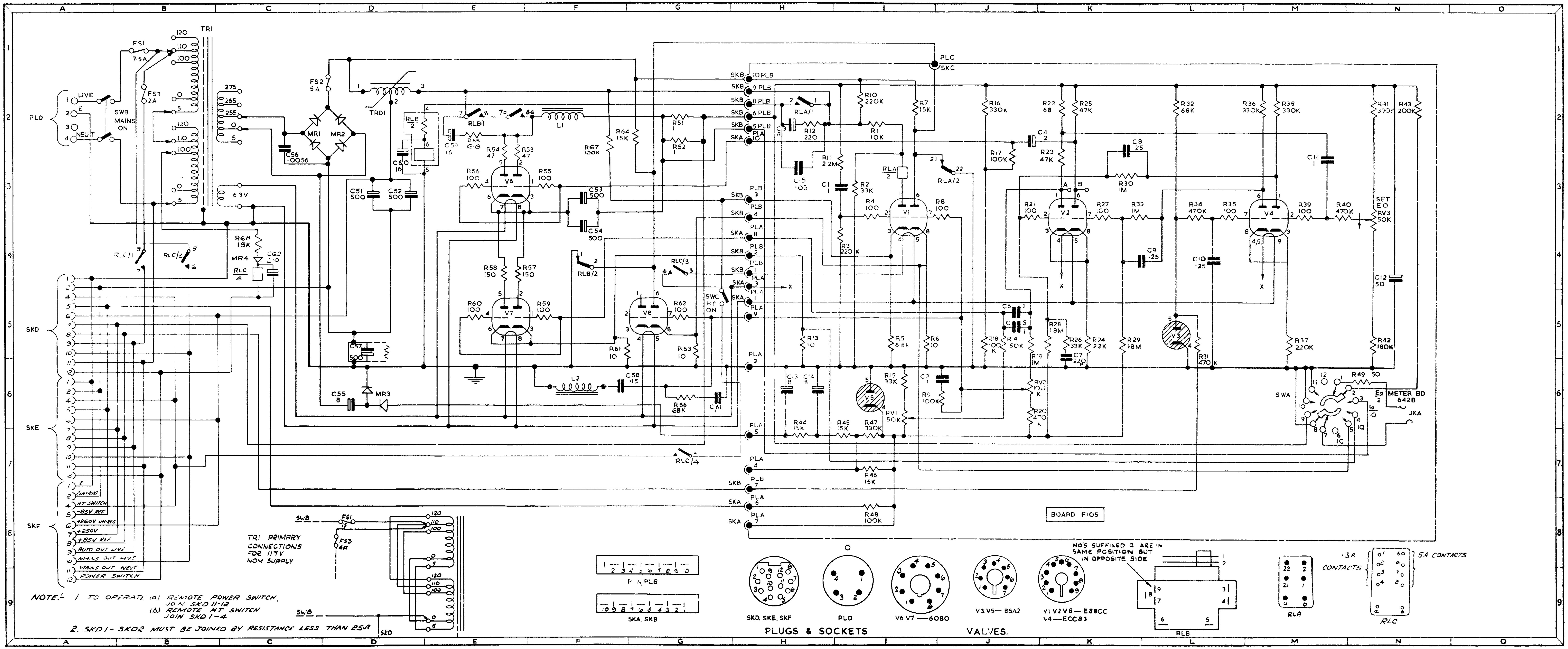
CP



CIRCUIT DIAGRAM
TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355C
WZ.27611/D Sh.1 Iss.1

FIG.7

TRANSDUCTOR POWER SUPPLY TYPE 5355D

Cross Reference List
for WZ.27613-D Sh.1

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C1	11	C52	3	L2	35	R11	66	R32	77	R51	50	RLA		TR1	95
C2	11	C53				R12	67	R33	71	R52		RLB			
C3	13	C54	4	MR1	41	R13	54	R34	72	R53		RLC	48		
C4	14	C55	5	MR2	41	R14	68	R35	52	R54	51			TRD1	93
C5	15	C56	6	MR3	40	R15	69	R36	70	R55		RV1	83		
C6	15	C57	7	MR4	22	R16	70	R37	62	R56	52	RV2	84		
C7	16	C58	8			R17	64	R38	70	R57	53	RV3	83	V1	97
C8	17	C59		PLA	45	R18	64	R39	52	R58				V2	97
C9	17	C60		PLB	45	R19	71	R40	72	R59	52	SKA	85	V3	98
C10	17	C61		PLC	43	R20	72	R41	78	R60		SKB	85	V4	99
C11	11	C62	12	PLD	44	R21	52	R42	79	R61		SKC	86	V5	98
C12	18					R22	73	R43	80	R62		SKD	86	V6	96
C13	13	FS1*	28	R1	60	R23	74	R44	81	R63		SKE	86		
C14	19	FS1+	29	R2	61	R24	75	R45	81	R64		SKF	86		
C15	20	FS2	30	R3	62	R25	74	R46	81	R65					
		FS3+	26	R4	52	R26	69	R47	70	R66					
		FS3*	31	R5	63	R27	52	R48	64	R67	58				
				R6	54	R28	76	R49	82	R68	59				
		JKA	91	R7	55	R29	76								
				R8	52	R30	71					SWA	90		
				R9	64	R31	72					SWB	88		
		L1	36	R10	65							SWC	89		

MISCELLANEOUS MECHANICAL ITEMS

Board Printed Wire [illegible].105	No. 46
Can Screening B7G [illegible] V3,V5	No. 2
Can Screening B9A for V1,V2,V4	No. 1
Fuseholder for FS1-FS3	No. 32
Fuseholder for FS1-FS3 (spares)	No. 33
Insulator	No. 37
Knob	No. 38
Locking Device: Nut	No. 42
Cover	No. 21
Valveholder for V3,V5	No.102
Valveholder for V1,V2,V4	No.103
Valveholder for V6,V7	No.100

* 230V + 117V

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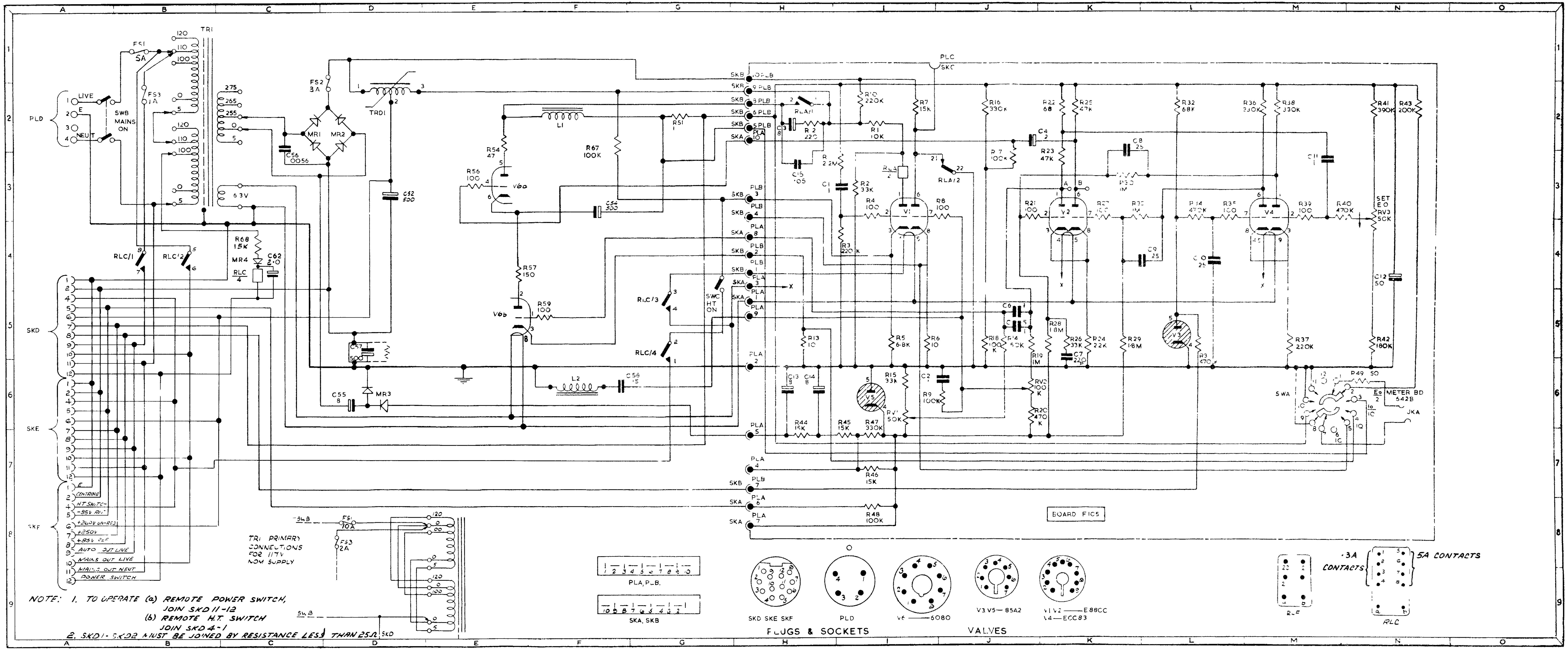

CIRCUIT DIAGRAM
TRANSDUCTOR POWER SUPPLY UNIT TYPE 5355D
WZ.27613/D Sh.1 Iss.1

FIG.8