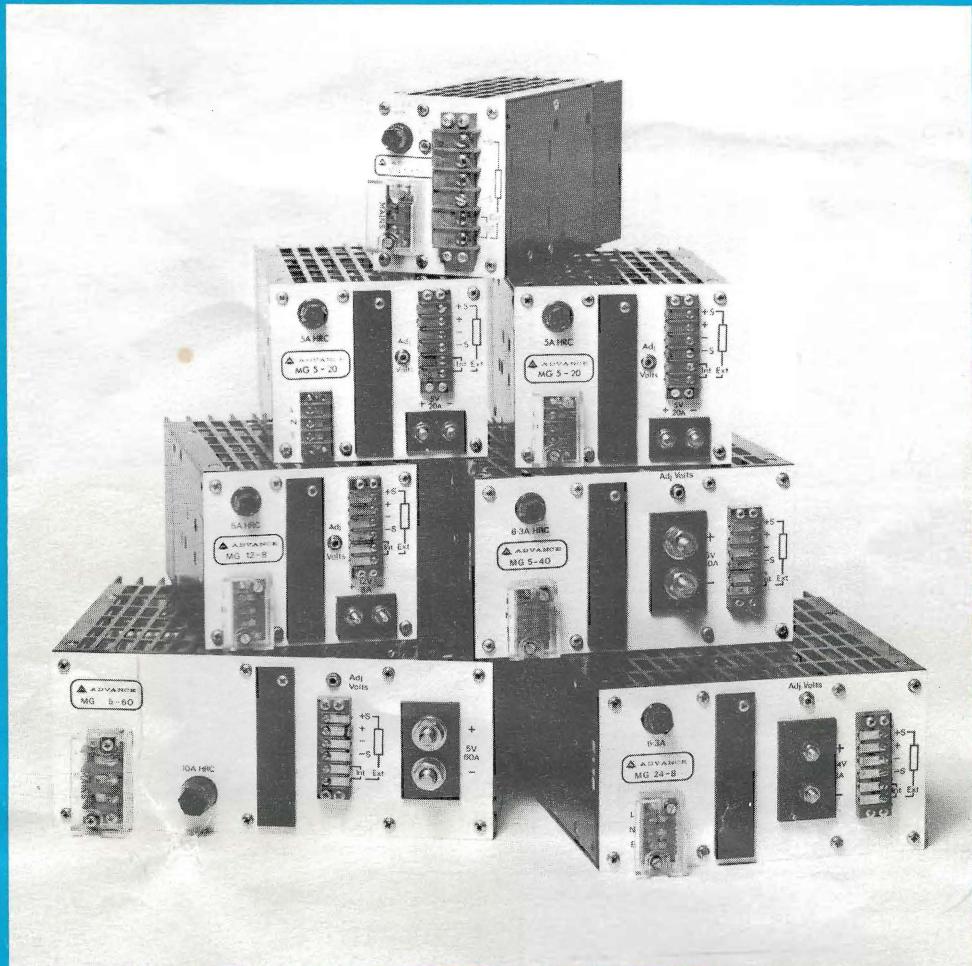


The Advance MG Power Supply Handbook



 GOULD

Introduction

The Advance MG family of power supplies is a range of very compact units employing direct-off-line switching techniques in order to reduce physical dimensions to a minimum.

The range is produced in four different power levels, i.e., 50 watts, 100 watts, 200 watts and 300 watts. At each of these power levels, units are available with various combinations of output voltage and current.

The output voltage is adjustable by $\pm 5\%$ on all units by means of a screwdriver adjustment on the front panel. Facilities are provided for local or

remote sensing and for voltage programming by means of an externally connected resistor.

Constant current protection is provided against overloads or short circuits.

Oversupply protection by means of automatic control circuit shut-down is provided on all units.

Particular attention has been paid during the design stage to the problems of interference caused by the switching action of the power supply circuits. In this respect sample units have met the requirements of VDE 0875, curve 'N', and BS800, part 3.

Specification

Type No.	MG 5-10	MG 5-20	MG 5-40	MG 5-60	MG 5-60A	MG 12-8	MG 15-7	MG 15-14	MG 24-4	MG 24-8	MG 24-12	MG 24-12A
Input Voltage +10% -20% 45-440Hz	115V to 120V or 220V to 240V *	220V or 240V by tap change	115V or 120V by tap change *									115V to 120V *
Output Voltage	5	5	5	5	5	12	15	15	24	24	24	24
Output Current	10	20	40	60	60	8	7	14	4	8	12	12
Case Style	A	B	C	D	D	B	B	C	B	C	D	D
Oversupply Protection			Set between 120-130 %			Set be- tween 115- 125 %			Set between 110-120 %			
Efficiency	> 65 %					> 70 %						
Power Densities	0.9W/ Cu.In.											

* Units MG5-10, MG5-60A and MG24-12A can also be used at input voltages in the range 100V to 115V within the limitations of the output characteristic curve Fig. 1.

Note: Output voltages are adjustable $\pm 5\%$ by front panel potentiometer.

Output Voltage Regulation

0.1% maximum for a worst case combination of 0-100% load change and $\pm 10\%$ line change.

Ripple

10mV r.m.s.
50mV pk-pk.
(30MHz bandwidth)

Temperature Co-efficient

$\pm 0.01\%/\text{ }^{\circ}\text{C}$.

Output Impedance

100m Ω at 100KHz.

Overload Protection

Constant current, set at 110% $\pm 5\%$ full load.

Temperature Range

-10°C to +70°C derating from 50°C at $2\frac{1}{2}\%/\text{ }^{\circ}\text{C}$.

Series and Parallel Operation

No limit on parallel operation.
Series operation to a maximum total voltage of 250V.

Remote Sensing

Available from front panel, total voltage drop in the output leads should not exceed 5V max. in each lead. See output characteristic curves, Figs. 1 and 2, for limitations.

Remote Programming

Output voltage may be programmed from 1V upwards by insertion of a programming resistor on front panel. Programming resistance $1000\Omega /V \pm 0.5\%$.

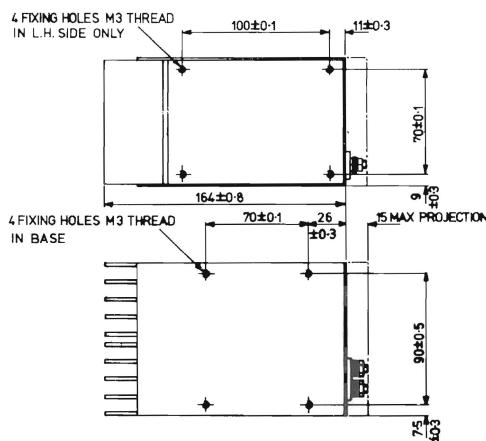
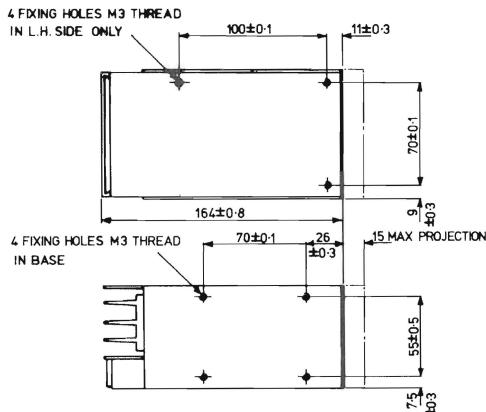
Output Hold-Up

Output maintained for the duration of a missing mains cycle at maximum output current and -10% mains input when the unit is operating at up to 105% output voltage rating.

Remote switch off

Output may be reduced to zero by connecting short-circuit between 1 and 6 of programme terminal block.

Dimensions



Insulation

Between AC input and output terminals and case connected together tested to 2.1KV peak for one minute.

Between DC output and case $\pm 250V$ DC continuous, tested to 500V DC for one minute.

Switch-on Time

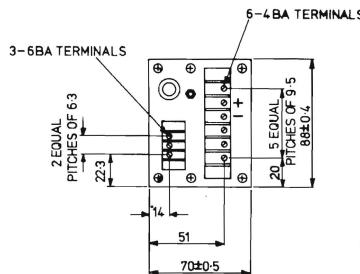
Output will reach specification within 4 cycles of 50 or 60 Hz mains.

Transient Response

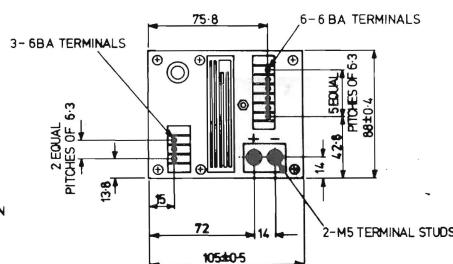
For step load changes of 10–100% or 100–10%, voltage deviations are typically 350mV and output voltage returns to within the regulation band in approximately 4mS.

Mechanical Standard

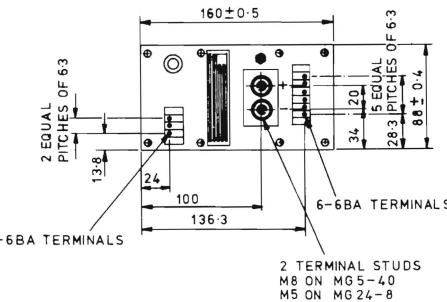
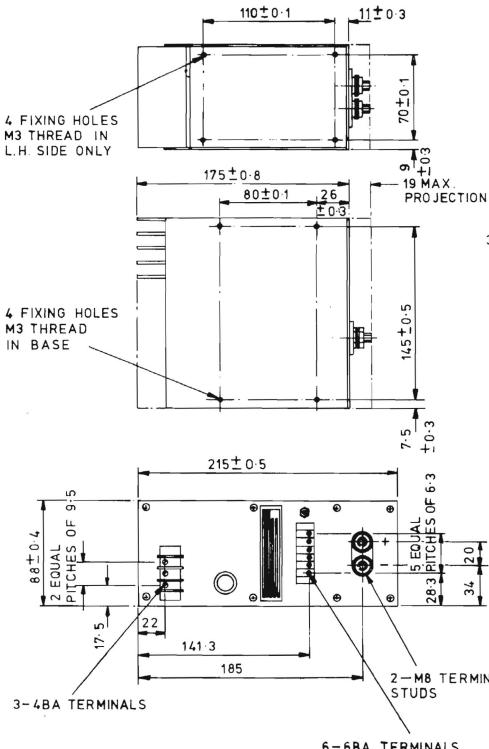
B.S.4318 preferred metric dimensions and Isometric screws are used.



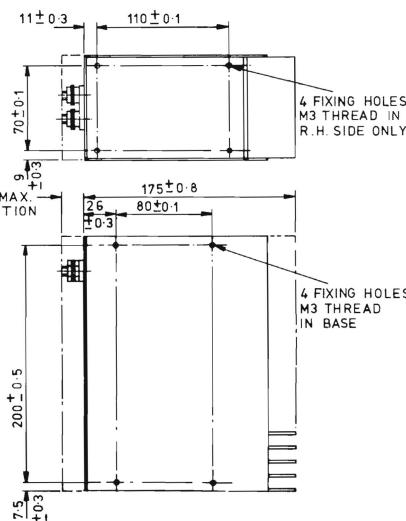
CASE STYLE A
Weight 1.2Kg



CASE STYLE B
Weight 2.0 Kg



CASE STYLE C
Weight 3.4 Kg



CASE STYLE D
Weight 4.5 Kg

Guarantee and service facilities

This instrument is guaranteed for a period of five years from its delivery to the purchaser covering the replacement of defective parts other than fuses.

We maintain comprehensive after sales facilities and the instrument can, if necessary, be returned to our factory for servicing. The Type and Serial Number of the instrument should always be quoted, together with full details of any fault and the service required. The Service Department can also provide maintenance and repair information by telephone or letter. Equipment returned to us for servicing must

be adequately packed preferably in the special box supplied, and shipped with the transportation charges prepaid. We can accept no responsibility for instruments arriving damaged. Should the cause of failure during the guarantee period be due to misuse or abuse of the instrument, or if the guarantee has expired, the repair will be put in hand without delay and charged unless other instructions are received.

OUR SALES, SERVICE AND ENGINEERING DEPARTMENTS ARE READY TO ASSIST YOU AT ALL TIMES.

Operation

Mains Connections

The AC supply input to the unit is connected to the terminal block on the left of the front panel. The terminals are marked L (line), N (neutral), E (earth). A transparent mains cover is provided.

Mains tap-changing. (5V Units only)

Table 1 shows the mains input options available for the various units in the range and the required connections to the inverter transformer. In order to change the input voltage connections, the top or bottom covers must be removed to gain access to the appropriate components. In addition to changing the output transformer connections, the value of the fine-adjustment current limit resistor R112 must be changed. The values of the resistor appropriate to 220V and 240V operation are related by the equations,

$$R_x = \frac{14.8R_y}{16.3 + 3R_y} \text{ for MG5-20}$$

$$R_x = \frac{5.8R_y}{6.4 + 3R_y} \text{ for MG5-40, MG5-60 and MG5-60A}$$

where Rx and Ry are the values in k Ω appropriate to all units operating at 115/220V and 120/240V respectively.

The location of R112 is as follows:—

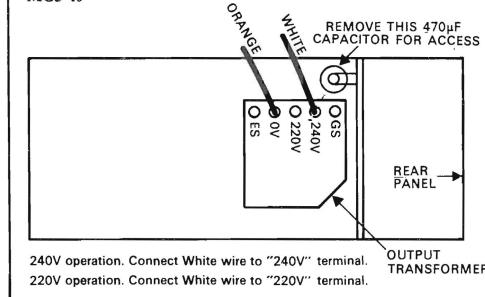
MG5-20 – Mounted on PTFE feed-throughs on the longitudinal centre panel at the bottom of the unit.

MG5-40 – Mounted on the auxiliary printed circuit card which runs longitudinally along the top of the unit, approximately at the centre-line.

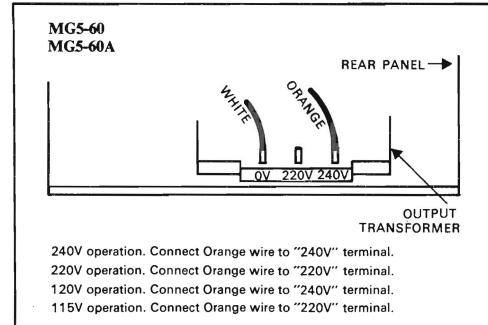
MG5-60 and MG5-60A – On the auxiliary printed circuit board which mounts on the R.H. intermediate longitudinal panel at the top of the unit.

N.B. On the MG5-10 unit in addition to changing the input voltage connections, the input rectifier has to be changed from a bridge circuit to a doubler circuit by changing wire links. See the Circuit Diagram for the required information.

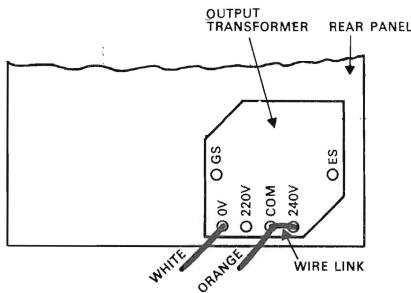
MG5-40



MG5-60
MG5-60A



MG5-20



Output Characteristics

An inherent advantage in the design concept of switching power supplies is that it is possible to trade off three fundamental aspects of the specification against each other.

These three aspects are:

- 1 Mains failure hold-up time.
 - 2 Negative mains margin.
 - 3 Output voltage (including lead voltage drop).
- The MG series has been designed for a 28ms hold-up time at an output voltage of 105% of specification at -10% mains.

Example

Referring to the graphs: An MG5-20 operating on 220V nominal mains is required to provide 5V into a load with a 0.5V total lead drop, i.e. 110% voltage at the power supply terminals. Under these conditions the unit may be operated down to -8% mains with 28ms hold-up (whole cycle missing) or down to -16.5% mains with 18ms hold-up (half cycle missing).

Output Connections

The output is available at the large studs on the front panel, the positive and negative terminals being identified + and - respectively. On the MG5-10 only the output is taken from the 6-way terminal block on the front panel. The wiring to the load should be such as to ensure that the lead voltage drop does not exceed the level determined from Fig. 1 or Fig. 2. Refer to Fig. 3 for the required size of cable.

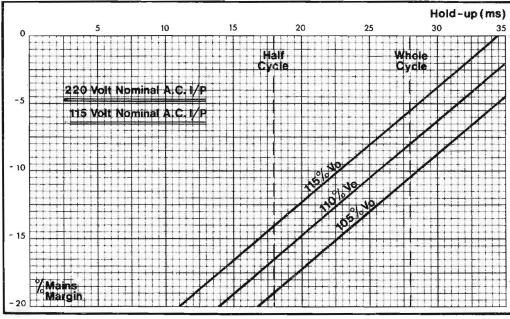


Fig. 1

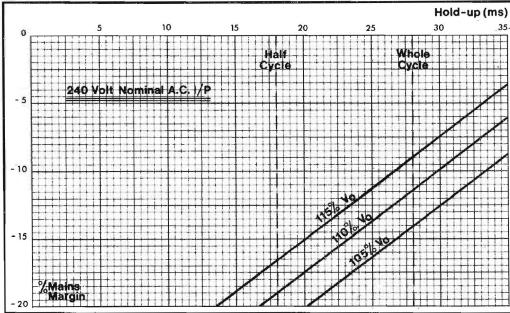


Fig. 2

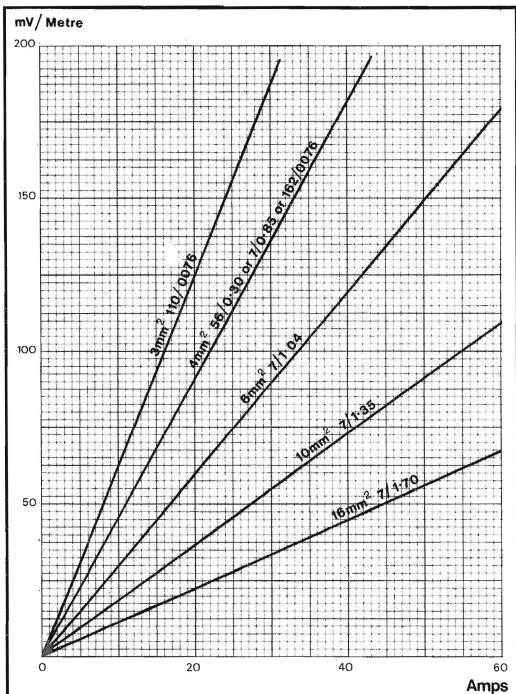


Fig. 3

Remote Sensing

The remote sensing terminals are situated on the 6-way terminal block on the front panel. To operate the unit under remote sense conditions remove the links connecting +S to + and -S to -, and connect +S and -S to the points at which the regulated voltage is required.

External Voltage Programming

The output voltage may be programmed remotely by removing the link marked "Int" on the 6-way terminal block and inserting a programming resistor between the lower terminal and +S.

Programming ratio $1000\Omega / \text{Volt} \pm 0.5\%$.

N.B. Do not remove the link between +S and + unless remote sensing is being used.

Mounting

Four M3 fixing holes are provided in the base of the unit and in one of the side panels. If it is necessary to mount the unit from the other side or from above the unit may be operated in the inverted position without limitation of any area of the specification.

Cooling

The power supply is convection cooled and under normal operating conditions does not require forced air cooling. The unit should be mounted to allow the free passage of air to pass through the unit in a vertical direction. This is particularly important in the area of the heatsink. Units may be mounted adjacently without limitation.

Circuit description

General

The following is a generalised description of the operation of the MG circuit with reference to the block diagram of Fig. 4. Although the basic circuit is common to all units in the MG range, slight differences exist between individual units, and for this reason a complete detailed description of all units is not given here.

Basically, the circuit consists of a mains filter MF1 and full-wave rectifier D101-D104, followed by a reservoir capacitor C103. (For 115V units the rectifier is connected as a voltage doubler followed by a pair of series connected reservoir capacitors.) The resulting unstabilised D.C. voltage of approximately 350V is used as the power rail for a regulated D.C.-D.C. converter, operating at a frequency of 35KHz. The converter (TR101, TR102, C101, C102, T5) is of the half-bridge, pulse-width-modulated type. The output from the converter is rectified by the push-pull rectifier stage D109, D110, and smoothed by the low-pass filter L1, C106, to produce the output voltage.

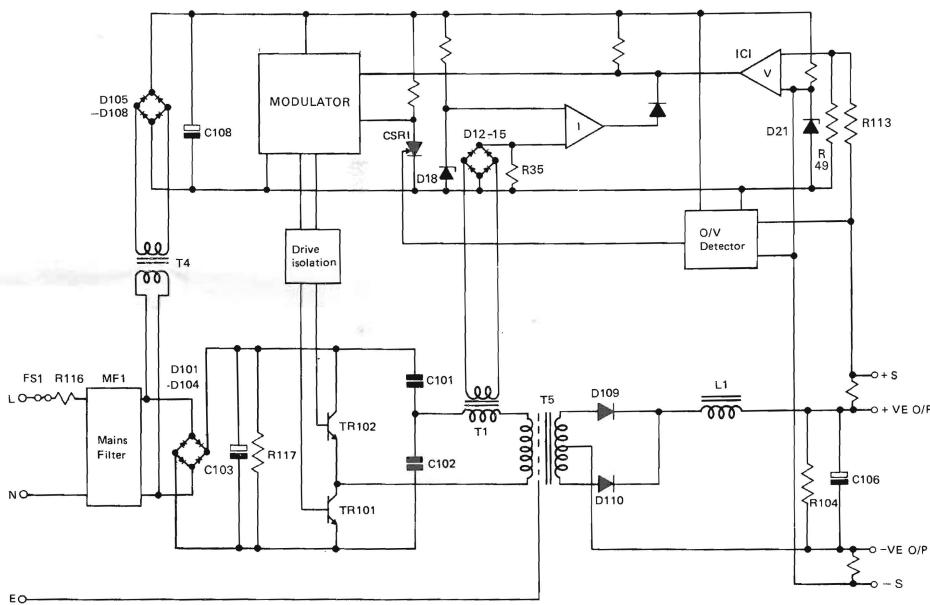


Fig. 4

Voltage control circuit

The output voltage, as sensed at the terminals $+S$ and $-S$, is fed via the potential divider R_{113} , R_{49} to the input of the operational amplifier IC_1 . Here it is compared with the internally generated reference voltage appearing across D_{21} . The amplified error signal at the output of the amplifier is then fed to the modulator. The function of this circuit is to produce two trains of antiphase current pulses of controlled and equal durations, these durations being controlled by the level of the input to the modulator from the error amplifier.

The current pulses are fed to the bases of the inverter transistors TR_{101} , TR_{102} , in such a manner as to cause the transistors to conduct alternately with a period of non conduction, or dwell, in the intervening periods. The voltage waveform thereby impressed on the primary of transformer T_5 is stepped down and rectified by D_{109} , D_{110} to produce a voltage whose D.C. content is a function of the width of the current pulses produced by the modulator and hence of the output of the voltage error amplifier.

The rectified secondary voltage waveform is then filtered by L_1 , C_{106} , to remove the A.C. content.

Current control circuit

Overcurrent protection is provided by sensing the A.C. current pulses flowing in the primary of the inverter transformer. (The amplitude of this current is proportional to the magnitude of

the D.C. output current.) The A.C. current is transformed by T_1 and rectified by the small signal rectifier D_{12-15} . The resulting train of unidirectional current pulses is fed into resistor R_{35} to produce a voltage waveform. The amplitude of this waveform is compared with the internally generated reference voltage appearing across D_{18} , by the peak-detecting amplifier I . When the amplitude of these pulses reaches a predetermined level, the overcurrent amplifier operates so as to feed a signal into the modulator which overrides the voltage control signal and causes the modulator pulse widths to reduce, thus reducing the output voltage and keeping the output current controlled to the maximum safe level.

Overvoltage circuit

The output voltage of the unit is monitored at the sense terminals $+S$ and $-S$ and fed to the input of the O/V detector by means of a potential divider. If a fault occurs in either the power supply or its external voltage-sense wiring such that an output overvoltage appears, the O/V detector operates and fires the small signal thyristor CSR_1 . This has the effect of disabling the modulator so that no drive current pulses are available and the output voltage decays to zero. The power supply will remain at zero until the mains supply is switched off and re-applied.

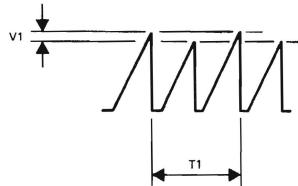
Maintenance

The plug-in control boards used in the MG units are available as spare parts together with an extension board for use as a servicing aid.

1. Control Board Advance Part No. 63397
(50, 100 and 300 watt units)
2. Control Board Advance Part No. 63761
(200 watt units)
3. Extension Board Advance Part No. 64268

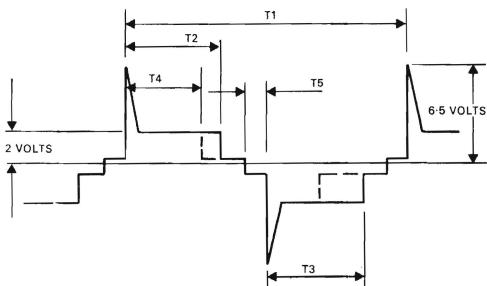
Setting up procedure for board assembly 63397 & 63761.

- 1 Measuring between Pins 3 and 9, the following waveform should be observed.



Adjust R47 to give a time T_1 of $36\mu\text{s}$.

- 2 Adjust R46 so as to equalize the amplitude of alternate peaks of the waveform, i.e., to minimise the difference voltage V_1 . When this test has been carried out, time T_1 should have reduced to $30\mu\text{s} - 0\mu\text{s} + 1\mu\text{s}$.
- 3 Now monitoring between pins 1 and 2, the following waveform should be observed.
(Display set to $Y_1 + Y_2$, Y_1 inverted.)



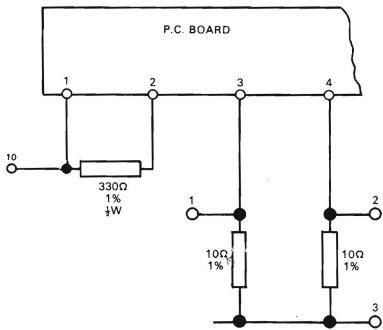
- 4 Adjust R37 so that T_2 and T_3 are reduced to T_4 which is $7.5\mu\text{s}$.
- 5 Adjust R34 so that T_2 and T_3 just begin to reduce. At this point the waveform will look as below for Part No. 63397. (For Part No. 63761 waveform will be similar to that in test 3.)



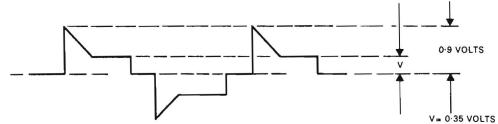
- 6 Adjust R45 so that the waveform is clamped to zero under an overvoltage signal.
- 7 Switch the auxiliary voltage from 10.0 volts to 17.5 volts and check that only T_2 and T_3 reduce in time.

- 8 Check that T_5 does not exceed $1\mu\text{s}$ during any of the above tests.

- 9 Extra test for P.C. Assy. 63761

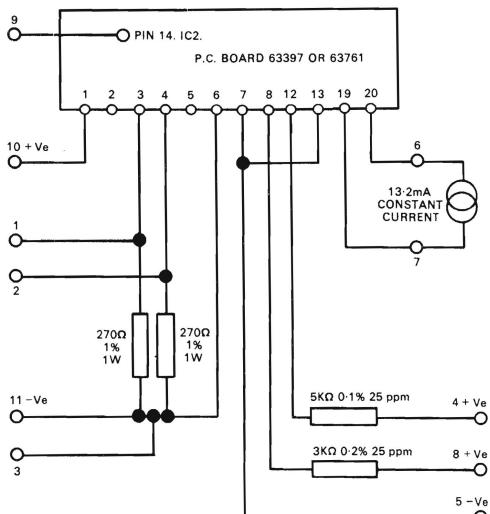


The following waveform should be observed.



Adjust R36 until $V = 0.35$ Volts.
Fit the nearest E24 range resistor above the measured value of R36.

Board test circuit (Board No.63397 & 63761)



Note:

Pins 9 + 11 supplied during test 2 (4 to 8 volts, variable)

Pins 4 + 5 supplied during test 4 (5 volts $\pm 2\text{mV}$ at 10mA)

Pins 6 + 7 supplied during test 5 (13.2mA $+0-0.1\text{mA}$ Constant I)

Pins 8 + 5 supplied during test 6 (6.75 volts ± 0.10 volt at 30mA)

MG 5 - 10				MG 5 - 20				MG 5 - 40			
Cat. Ref.	Description	Qty.	Part No.	Description	Qty.	Part No.	Description	Qty.	Part No.		
R101	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747		
R102	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747		
R103	RESISTOR M.O. 470R 2% 1W	1	26739	RESISTOR W.W. 100R 5% 6W	1	1240	RESISTOR W.W. 100R 5% 6W	1	1240		
R104	NOT USED			RESISTOR W.W. 10R 5% 6W	1	19803	RESISTOR W.W. 8R2 5% 6W	1	19795		
R105	NOT USED			NOT USED			RESISTOR M.O. 100R 2% 1W	1	26747		
R106	RESISTOR M.O. 220K 2% 1W	1	28830	NOT USED			RESISTOR M.O. 27R 2% 1W	1	28774		
R107	RESISTOR M.O. 220K 2% 1W	1	28830	NOT USED			RESISTOR M.O. 33R 2% 1W	1	28749		
R108	RESISTOR M.O. 2K7 2% 1W	1	26728	RESISTOR M.O. 2K7 2% 1W	1	26728	RESISTOR M.O. 2K7 2% 1W	1	26728		
R109	POTENTIOMETER 200R 20% 1W	1	53915	NOT USED			NOT USED				
R110	RESISTOR WIRE 30m 000% 000W	1	63859	NOT USED			RESISTOR M.O. 5K6 2% 1W	1	22483		
R111	RESISTOR C.C. 47R 5% 1W	1	4038	NOT USED			RESISTOR M.O. 430R 2% 1W	1	26752		
R112	RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.		
R113	RESISTOR M.F. 4K5 1% 1W	1	52949	RESISTOR M.F. 4K5 1% 1W	1	52949	RESISTOR M.F. 4K5 1% 1W	1	52949		
R114	CONTROL POT. 1K0 10% 1W	1	52925	CONTROL POT. 1K0 10% 1W	1	52925	CONTROL POT. 1K0 10% 1W	1	52925		
R115	NOT USED			NOT USED			RESISTOR C.C. 10R 5% 1W	2	21793		
R116	RESISTOR W.W. 2R7 5% 2W	1	54015	RESISTOR W.W. 1R0 10% 3W	1	53613	RESISTOR W.W. 3R8 10% 2W OR RESISTOR W.W. 3R9 10% 2W OR RESISTOR W.W. 1R8 5% 4W	4	35397		
R117	RESISTOR W.W. 2R7 5% 2W	1	54015	RESISTOR M.O. 470K 2% 1W	1	27574	RESISTOR C.C. 560K 10% 1W	1	4409		
R118				NOT USED			NOT USED				
C101	CAP. POLYESTER 220n 250v	1	53758	CAP. POLYESTER 470n 250v	1	52886	CAP. POLYESTER 1μ0 250v	1	51121		
C102	CAP. POLYESTER 220n 250v	1	53758	CAP. POLYESTER 470n 250v	1	52886	CAP. POLYESTER 1μ0 250v	1	51121		
C103	CAP. EL. 250μ 200v	1	53756	CAP. EL. 200μ 400v	1	52881	CAP. EL. 470μ 400v	1	52914		
C104	CAP. POLYESTER 10n 400v	1	781	CAP. CERAMIC 10n 250v	1	22395	CAP. CERAMIC 10n 250v	1	22395		
C105	CAP. POLYESTER 470p 400v	1	53757	CAP. POLYESTER 1n0 400v	1	769	CAP. POLYESTER 2n2 400v	1	53090		
C106	CAP. EL. 470μ 6-3v	10	32164	CAP. EL. 2 x 16n5 6-3v. OR CAP. EL. 33m 6-3v OR 10v	1	52882	CAP. EL. 2 x 16n5 6-3v. OR CAP. EL. 33m 6-3v OR 10v	2	53882		
C107	CAP. TANT. 10μ 25v	1	52937	NOT USED			CAP. CERAMIC 10n 30v	1	19647		
C108	CAP. EL. 470μ 25v	1	32185	CAP. EL. 470μ 25v	1	32185	CAP. EL. 470μ 25v	2	32185		
C109	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394		
C110	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394		
C111	CAP. POLYESTER 100n 160v	1	804	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377		
C112	CAP. CERAMIC 100n 30v	1	19647	CAP. CERAMIC 100n 30v	1	19647	CAP. CERAMIC 100n 30v	1	19647		
C113	NOT USED			CAP. CERAMIC 5n0 3Kv	1	1514	CAP. CERAMIC 5n0 3Kv	1	1514		
C114	CAP. POLYESTER 4n7 250v	1	53099	CAP. POLYESTER 4n7 250v	1	53046	CAP. POLYESTER 10n 250v	1	53102		
C115	CAP. POLYESTER 47n 250v	1	53100	NOT USED			NOT USED				
C116	CAP. POLYESTER 4n7 250v	1	53099	NOT USED			NOT USED				
C117	CAP. POLYESTER 4n7 250v	1	53099	NOT USED			NOT USED				
C118	CAP. POLYESTER 33n 250v	1	53101	NOT USED			NOT USED				
C119	CAP. POLYESTER 100n 160v	1	804	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377		
C120	NOT USED			NOT USED			NOT USED				
C121	CAP. EL. 250μ 200v	1	53756	NOT USED			NOT USED				
C122	NOT USED			NOT USED			CAP. CERAMIC 1n0 500v	1	22387		
C123	NOT USED			NOT USED			NOT USED				
D101	NOT USED										
D102	NOT USED										
D103	DIODE IN4148	1	23802	RECTIFIER BRIDGE S8MB9	1	53229	RECTIFIER BRIDGE S8MB9	1	53229		
D104	DIODE IN4148	1	23802								
D105	DIODE IN4007	1	52337	DIODE IN4003	1	23462	DIODE IN4003	1	23462		
D106	DIODE IN4007	1	52337	DIODE IN4003	1	23462	DIODE IN4003	1	23462		
D107	DIODE IN4007	1	52337	DIODE IN4003	1	23462	DIODE IN4003	1	23462		
D108	DIODE IN4007	1	52337	DIODE IN4003	1	23462	DIODE IN4003	1	23462		
D109	DIODE EF150N6. OR DIODE BYX61-200	1	52946 53810	DIODE MBR4020 P/F	1	52885	DIODE SELECTED MBR4020 P/F	1	63545		
D110	DIODE EF150N6. OR DIODE BYX61-200	1	52946 53810	DIODE MBR4020 P/F	1	52885	DIODE SELECTED MBR4020 P/F	1	63545		
MR101	RECTIFIER BRIDGE W02	1	19725								
TR101	TRANSISTOR MATCHED PAIR	1	63828	MATCHED PAIR BDY93 OR BDY 28 AD	1	62165	MATCHED PAIR MST1092 OR BDY28AD	1	62119		
L1	CHOKE OUTPUT	1	63831	CHOKE OUTPUT	1	61176	CHOKE OUTPUT	1	61327		
L2	CHOKE SYMMETRIC	1	63836	NOT USED			NOT USED				
L3	CHOKE SYMMETRIC	1	63836	NOT USED			NOT USED				
L4	CHOKE ASSYMETRIC	1	63837	NOT USED			NOT USED				
L5	NOT USED			NOT USED			NOT USED				
L6	NOT USED			NOT USED			NOT USED				
	P.C. BOARD ASSY.		63397	P.C. BOARD ASSY.	1	63397	P.C. BOARD ASSY.	1	63761		
MF1	NOT USED			MAINS FILTER	1	52935	MAINS FILTER	1	52974		
T1	TRANSFORMER - CURRENT SENSE	1	63841	TRANSFORMER - CURRENT SENSE	1	61545	TRANSFORMER - CURRENT SENSE	1	61591		
T2	TRANSFORMER - DRIVE	1	63840	TRANSFORMER - DRIVE	1	61545	TRANSFORMER - DRIVE	1	61591		
T4	TRANSFORMER - AUXILIARY	1	64267	TRANSFORMER - AUXILIARY	1	64275	TRANSFORMER - AUXILIARY	1	64276		
T5	TRANSFORMER - OUTPUT	1	63830	TRANSFORMER - OUTPUT	1	61177	TRANSFORMER - OUTPUT	1	61324		
GS1	GUARD SHIELD - TRANSISTOR	1	63843	GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172		
GS2	NOT USED			GUARD SHIELD - DIODE	1	61171	GUARD SHIELD - DIODE	1	61171		
FS1	FUSE 2-5A CERAMIC 5 x 20mm	1	53788	FUSE 5amp CERAMIC 5 x 20 mm	1	52877	FUSE 6-3amp CERAMIC 5 x 20mm	1	52990		

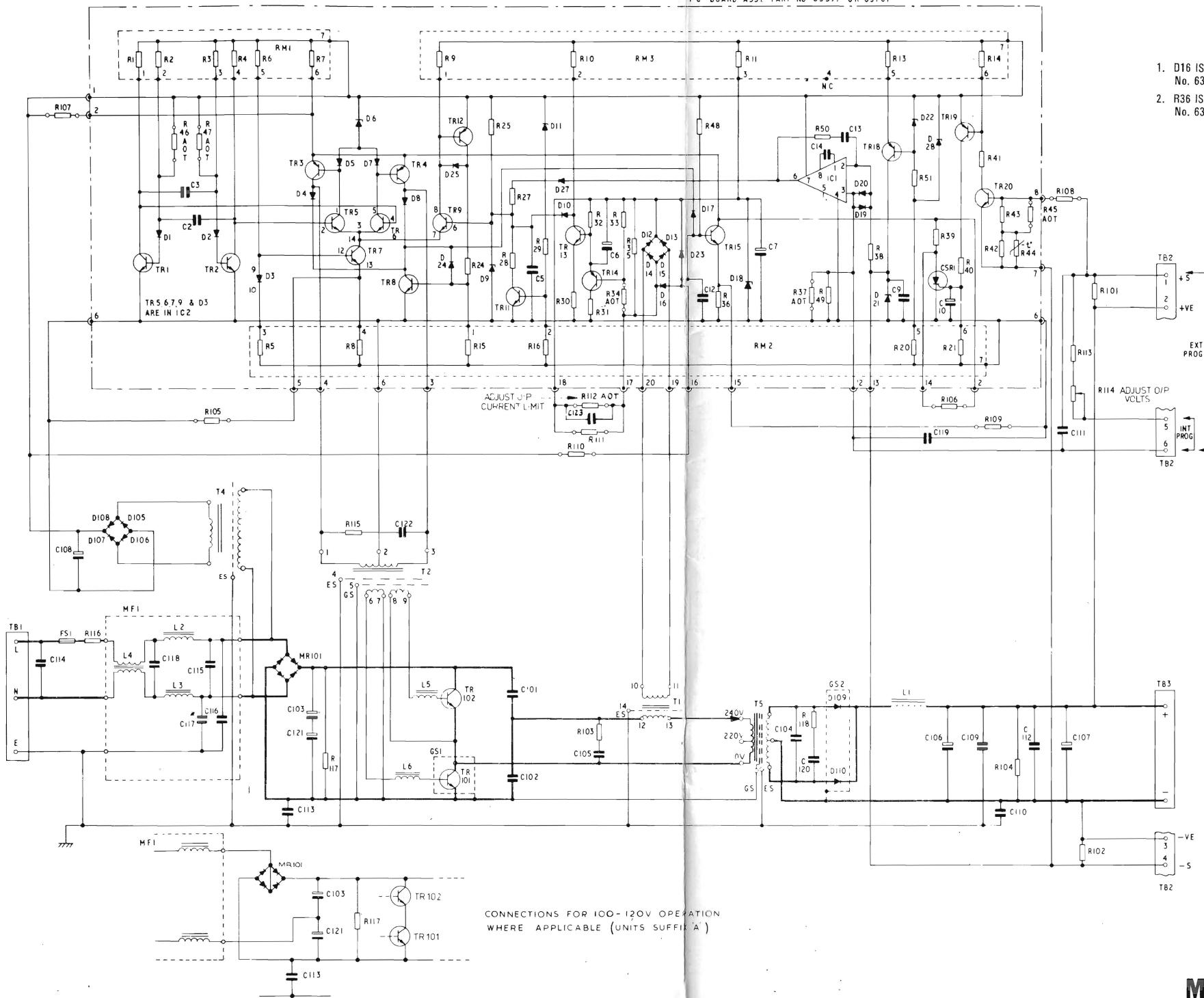
	MG 5 - 60			MG 5 - 60A			MG 12 - 8		
Description	Qty.	Part No.	Description	Qty.	Part No.	Description	Qty.	Part No.	
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	
RESISTOR W.W. 33R 5% 6W	1	2277	RESISTOR W.W. 33R 5% 6W	1	2277	RESISTOR W.W. 100R 5% 6W	1	1240	
RESISTOR W.W. 4R7 5% 6W	1	19792	RESISTOR W.W. 4R7 5% 6W	1	19792	RESISTOR W.W. 120R 5% 6W	1	3264	
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	NOT USED			
RESISTOR M.O. 39R 2% 1W	1	28775	RESISTOR M.O. 39R 2% 1W	1	28775	NOT USED			
RESISTOR M.O. 33R 2% 1W	1	26748	RESISTOR M.O. 33R 2% 1W	1	26748	NOT USED			
RESISTOR M.O. 2K7 2% 1W	1	26728	RESISTOR M.O. 2K7 2% 1W	1	26728	RESISTOR M.O. 6K8 2% 1W	1	28796	
RESISTOR M.O. 82R 2% 1W	1	28781	RESISTOR M.O. 82R 2% 1W	1	28781	NOT USED			
RESISTOR M.O. 1K2 2% 1W	1	26734	RESISTOR M.O. 1K2 2% 1W	1	26734	NOT USED			
RESISTOR M.O. 560R 2% 1W	1	26737	RESISTOR M.O. 560R 2% 1W	1	26737	NOT USED			
RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.	
RESISTOR M.F. 4K5 1% 1W	1	52949	RESISTOR M.F. 4K5 1% 1W	1	52949	RESISTOR M.F. 1K1 1% 1W	1	53413	
CONTROL POT. 1KD 10% 1W	1	52925	CONTROL POT. 1KD 10% 1W	1	52925	CONTROL POT. 2KD 10% 1W	1	52944	
NOT USED			NOT USED			NOT USED			
NOT USED			NOT USED			RESISTOR W.W. 1R0 10% 3W	1	53613	
RESISTOR C.C. 68K 5% 5W	2	18572	RESISTOR C.C. 68K 5% 5W	2	18572	RESISTOR M.O. 470K 2% 1W	1	27574	
RESISTOR C.C. 10R 5% 5W	2	21793	RESISTOR C.C. 10R 5% 5W	2	21793	NOT USED			
CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 470n 250v	1	52886	
CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 470n 250v	1	52886	
CAP. EL. 1m4 200v	1	53097	CAP. EL. 1m4 200v	1	53097	CAP. EL. 200μ 400v	1	52881	
CAP. POLYESTER 10n 400v	1	781	CAP. POLYESTER 10n 400v	1	781	CAP. POLYESTER 4n7 400v	1	776	
CAP. POLYESTER 3n3 400v	1	774	CAP. POLYESTER 3n3 400v	1	774	CAP. POLYESTER 1n0 400v	1	769	
CAP. EL. 2 x 23m5 6-3v	2	52961	CAP. EL. 2 x 23m5 6-3v	1	52961	CAP. EL. 2 x 7m5 16v	1	52784	
CAP. TANT. 33μ 10v	1	52936	CAP. TANT. 33μ 10v	1	52936	CAP. TANT. 10μ 35v	1	53106	
CAP. EL. 1m0 25v	1	32186	CAP. EL. 1m0 25v	1	32186	CAP. EL. 470μ 25v	1	32185	
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	
CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 47n 250v	1	31375	
CAP. CERAMIC 100n 30v	2	19647	CAP. CERAMIC 100n 30v	2	19647	CAP. CERAMIC 100n 30v	1	19647	
CAP. CERAMIC 5n0 3kv	1	1514	CAP. CERAMIC 5n0 3kv	1	1514	CAP. CERAMIC 5n0 3kv	1	1514	
CAP. POLYESTER 10n 250v	1	53102	CAP. POLYESTER 10n 250v	1	53102	CAP. POLYESTER 4n7 250v	1	53046	
CAP. POLYESTER 47n 250v	1	53100	CAP. POLYESTER 47n 250v	1	53100	NOT USED			
CAP. POLYESTER 4n7 250v	1	53099	CAP. POLYESTER 10n 250v	1	53102	NOT USED			
CAP. POLYESTER 4n7 250v	1	53099	CAP. POLYESTER 10n 250v	1	53102	NOT USED			
CAP. POLYESTER 33n 250v	1	53101	CAP. POLYESTER 33n 250v	1	53101	NOT USED			
CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377	
CAP. CERAMIC 10n 250v	2	22395	CAP. CERAMIC 10n 250v	2	22395	NOT USED			
CAP. EL. 1m4 200v	1	53097	CAP. EL. 1m4 200v	1	53097	NOT USED			
NOT USED			NOT USED			NOT USED			
NOT USED			NOT USED			NOT USED			
DIODE M756	1	53098	DIODE MR756	1	53098	RECTIFIER BRIDGE S8MB9	1	53229	
DIODE M756	1	53098	DIODE MR756	1	53098				
DIODE M756	1	53098	DIODE MR756	1	53098				
DIODE M756	1	53098	DIODE MR756	1	53098				
RECTIFIER BRIDGE W02	1	19725	RECTIFIER BRIDGE W02	1	19725	DIODE IN4003	1	23462	
DIODE SELECTED MBR4020 P/F	2	63545	DIODE SELECTED MBR4020 P/F	2	63545	DIODE IN4003	1	23462	
DIODE SELECTED MBR4020 P/F	2	63545	DIODE SELECTED MBR4020 P/F	2	63545	DIODE IN4003	1	23462	
MATCHED PAIR SVT350-5	1	62094	MATCHED PAIR SVT 350-5	1	62094	DIODE EF150N6 'OR'	1	52846	
CHOKE OUTPUT	1	61595	CHOKE OUTPUT	1	61595	DIODE BYX61-200	1	53810	
CHOKE SYMMETRIC	1	62074	CHOKE SYMMETRIC	1	62187	DIODE EF150N6 'OR'	1	52846	
CHOKE SYMMETRIC	1	62074	CHOKE SYMMETRIC	1	62187	DIODE BYX61-200	1	53810	
CHOKE ASYMMETRIC	1	62075	CHOKE ASYMMETRIC	1	62188	DIODE EF150N6 'OR'	1	52846	
FERRITE RING	1	53315	FERRITE RING	1	53315	DIODE BYX61-200	1	53810	
FERRITE RING	1	53315	FERRITE RING	1	53315	NOT USED			
P.C. BOARD ASSY.	1	63397	P.C. BOARD ASSY.	1	63397	MATCHED PAIR BDY93	1	62165	
NOT USED			NOT USED			NOT USED			
TRANSFORMER - CURRENT SENSE	1	61591	TRANSFORMER - CURRENT SENSE	1	61591	TRANSFORMER - CURRENT SENSE	1	61545	
TRANSFORMER - DRIVE	1	61591	TRANSFORMER - DRIVE	1	61591	TRANSFORMER - DRIVE	1	61545	
TRANSFORMER - AUXILIARY	1	64276	TRANSFORMER - AUXILIARY	1	64276	TRANSFORMER - AUXILIARY	1	64275	
TRANSFORMER - OUTPUT	1	61590	TRANSFORMER - OUTPUT	1	61590	TRANSFORMER - OUTPUT	1	61544	
GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172	
GUARD SHIELD - DIODE	1	61171	GUARD SHIELD - DIODE	1	61171	GUARD SHIELD - DIODE	1	52966	
FUSE 10amp CERAMIC SIZE 'O'	1	4227	FUSE 10amp CERAMIC SIZE 'O'	1	4227	FUSE 5amp CERAMIC 5 x 20mm	1	52877	

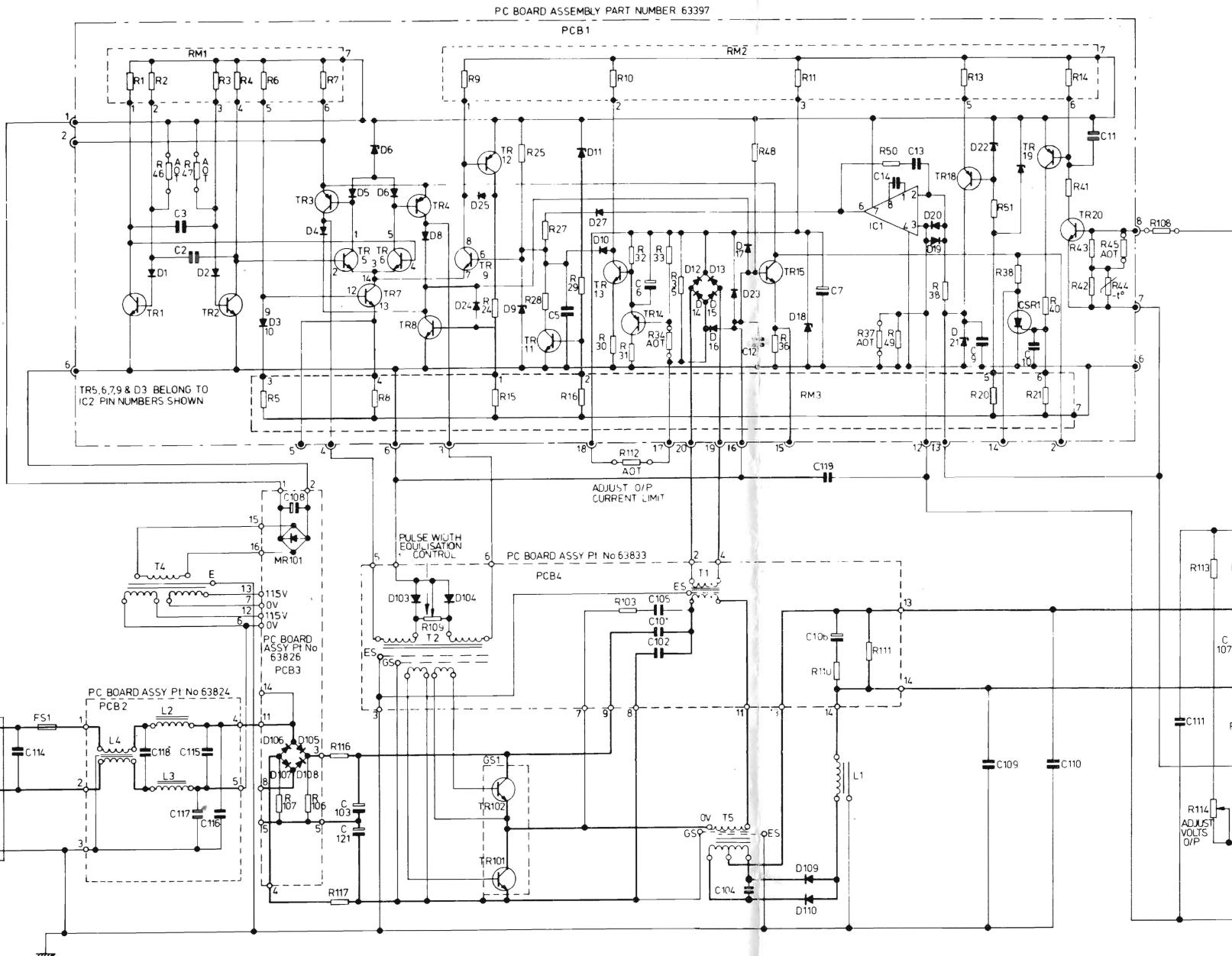
MG 15 - 7			MG 15 - 14			MG 24 - 4		
Description	Qty.	Part No.	Description	Qty.	Part No.	Description	Qty.	Part No.
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747
RESISTOR W.W. 100R 5% 6W	1	1240	RESISTOR W.W. 100R 5% 6W	1	1240	RESISTOR W.W. 100R 5% 6W	1	1240
RESISTOR W.W. 150R 5% 6W	1	19085	RESISTOR W.W. 120R 5% 6W	1	3264	RESISTOR W.W. 470R 5% 6W	1	231
NOT USED			RESISTOR M.O. 100R 2% 1W	1	26747	NOT USED		
NOT USED			RESISTOR M.O. 27R 2% 1W	1	28774	NOT USED		
NOT USED			RESISTOR M.O. 33R 2% 1W	1	26749	NOT USED		
RESISTOR M.O. 8K2 2% 1W	1	28798	RESISTOR M.O. 8K2 2% 1W	1	28798	RESISTOR M.F. 13K3 2% 4W	1	52994
NOT USED			NOT USED			NOT USED		
NOT USED			RESISTOR M.O. 5K6 2% 1W	1	22483	NOT USED		
NOT USED			RESISTOR M.O. 430R 2% 1W	1	26752	NOT USED		
RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.
RESISTOR M.F. 14K 1% 1W	1	5341c	RESISTOR M.F. 14K 1% 1W	1	53416	RESISTOR M.F. 21K5 1% 1W	1	53424
CONTROL POT. 2K0 10% 1W	1	52944	CONTROL POT. 2K0 10% 1W	1	52944	CONTROL POT. 5K0 10% 1W	1	52945
NOT USED			RESISTOR C.C. 10R 5% 1W	2	21793	NOT USED		
RESISTOR W.W. 1R0 10% 3W	1	53613	RESISTOR W.W. 3R9 10% 2W OR	4	53597	RESISTOR W.W. 1R0 10% 3W	1	53613
			RESISTOR W.W. 3R9 10% 2W OR	4	53598			
			RESISTOR W.W. 1R8 5% 4W	2	53599			
RESISTOR M.O. 470K 2% 1W	1	27574	RESISTOR C.C. 560K 10% 1W	1	4409	RESISTOR M.O. 470K 2% 1W	1	27574
NOT USED			NOT USED			NOT USED		
CAP. POLYESTER 470n 250v	1	52886	CAP. POLYESTER 1n0 250v	1	51121	CAP. POLYESTER 470n 250v	1	52886
CAP. POLYESTER 470n 250v	1	52886	CAP. POLYESTER 1n0 250v	1	51121	CAP. POLYESTER 470n 250v	1	52886
CAP. EL. 200n 400v	1	52881	CAP. EL. 470n 400v	1	52914	CAP. EL. 200n 400v	1	52881
CAP. CERAMIC 1n0 500v	1	22387	CAP. CERAMIC 1n0 400v	1	769	CAP. CERAMIC 1n0 500v	1	22387
CAP. POLYESTER 1n0 400v	1	769	CAP. POLYESTER 2n2 400v	1	53090	CAP. POLYESTER 1n0 400v	1	769
CAP. EL. 2 x 5n0 25v	1	52867	CAP. EL. 2 x 5n0 25v	2	52687	CAP. EL. 2 x 3n4 40v	1	52870
CAP. TANT. 10μ 35v	1	53106	CAP. TANT. 10μ 35v	1	53106	CAP. TANT. 10μ 35v	1	53106
CAP. EL. 470n 25v	1	32185	CAP. EL. 470n 25v	2	32185	CAP. EL. 470n 25v	1	32185
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394
CAP. POLYESTER 47n 250v	1	31375	CAP. POLYESTER 22n 160v	1	31373	CAP. POLYESTER 22n	1	31373
CAP. CERAMIC 100n 30v	1	19647	CAP. CERAMIC 100n 30v	1	19647	CAP. CERAMIC 100n 30v	1	19647
CAP. CERAMIC 5n0 3kV	1	1514	CAP. CERAMIC 5n0 3kV	1	1514	CAP. CERAMIC 5n0 3kV	1	1514
CAP. POLYESTER 4n7 250v	1	53046	CAP. POLYESTER 4n7 250v	1	53046	CAP. POLYESTER 4n7 250v	1	53046
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			CAP. CERAMIC 1n0 500v	1	22387	NOT USED		
NOT USED			NOT USED			NOT USED		
RECTIFIER BRIDGE S8MB9	1	53229	RECTIFIER BRIDGE S8MB9	1	53229	RECTIFIER BRIDGE S8MB9	1	53229
DIODE IN4003	1	23462	DIODE IN4003	1	23462	DIODE IN4003	1	23462
DIODE IN4003	1	23462	DIODE IN4003	1	23462	DIODE IN4003	1	23462
DIODE IN4003	1	23462	DIODE IN4003	1	23462	DIODE IN4003	1	23462
DIODE IN4003	1	23462	DIODE IN4003	1	23462	DIODE IN4003	1	23462
DIODE EF150N6 OR	1	52946	DIOD. EF150N12 OR	1	53184	DIODE EF150N6 OR	1	52946
DIODE BYX61-200	1	53810	DIOD. BYX61-200	1	53810	DIODE BYX61-200	1	53810
DIODE EF150N6 OR	1	52946	DIODE EF150N12 OR	1	53184	DIODE EF150N6 OR	1	52946
DIODE BYX61-200	1	53810	DIOD. BYX61-200	1	53810	DIODE BYX61-200	1	53810
MATCHED PAIR BOY 93 OR BOY 28 AD	1	62165	MATCHED PAIR MST 1092 OR BOY 28AD	1	62119	MATCHED PAIR BOY93 OR BOY 28AD	1	62165
CHOKE OUTPUT	1	61542	CHOKE OUTPUT	1	63484	CHOKE OUTPUT	1	61553
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
NOT USED			NOT USED			NOT USED		
P.C. BOARD ASSY.	1	63397	P.C. BOARD ASSY.	1	63761	P.C. BOARD ASSY.	1	63397
MAINS FILTER	1	52935	MAINS FILTER	1	52974	MAINS FILTER	1	52935
TRANSFORMER - CURRENT SENSE			TRANSFORMER - CURRENT SENSE			TRANSFORMER - CURRENT SENSE		
TRANSFORMER - DRIVE	1	61545	TRANSFORMER - DRIVE	1	61591	TRANSFORMER - DRIVE	1	61545
TRANSFORMER - AUXILIARY	1	64275	TRANSFORMER - AUXILIARY	1	64276	TRANSFORMER - AUXILIARY	1	64275
TRANSFORMER - OUTPUT	1	62327	TRANSFORMER - OUTPUT	1	63483	TRANSFORMER - OUTPUT	1	61555
GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172
GUARD SHIELD - DIODE	1	52986	GUARD SHIELD - DIODE	1	52966	GUARD SHIELD - DIODE	1	52986
FUSE 5amp CERAMIC 5 x 20mm	1	52877	FUSE 6.3amp CERAMIC 5 x 20mm	1	52980	FUSE 5amp CERAMIC 5 x 20mm	1	52877

MG 24 - 8			MG 24 - 12			MG 24 - 12A		
Description	Oty.	Part No.	Description	Oty.	Part No.	Description	Oty.	Part No.
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747
RESISTOR W.W. 100R 5% 6W	1	1240	RESISTOR W.W. 33R 5% 6W	1	2277	RESISTOR W.W. 33R 5% 6W	1	2277
RESISTOR W.W. 270R 5% 6W	1	19841	RESISTOR W.W. 180R 5% 6W	1	2210	RESISTOR W.W. 100R 5% 6W	1	2210
RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747	RESISTOR M.O. 100R 2% 1W	1	26747
RESISTOR M.O. 27R 2% 1W	1	28774	RESISTOR M.O. 39R 2% 1W	1	28775	RESISTOR M.O. 39R 2% 1W	1	28775
RESISTOR M.O. 33R 2% 1W	1	26749	RESISTOR M.O. 33R 2% 1W	1	26749	RESISTOR M.O. 33R 2% 1W	1	26749
RESISTOR M.O. 13K5 2% 1W	1	52994	RESISTOR M.F. 13K5 2% 1W	1	52994	RESISTOR M.F. 13K5 2% 1W	1	52994
NOT USED			RESISTOR M.O. 82R 2% 1W	1	28781	RESISTOR M.O. 82R 2% 1W	1	28781
RESISTOR M.O. 5K6 2% 1W	1	22483	RESISTOR M.O. 1K2 2% 1W	1	26734	RESISTOR M.O. 1K2 2% 1W	1	26734
RESISTOR M.O. 430R 2% 1W	1	26752	RESISTOR M.O. 560R 2% 1W	1	26737	RESISTOR M.O. 560R 2% 1W	1	26737
RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.	RESISTOR M.O. 2% 1W	1	A.O.T.
RESISTOR M.F. 21K5 1% 1W	1	53424	RESISTOR M.F. 21K5 1% 1W	1	53424	RESISTOR M.F. 21K5 1% 1W	1	53424
CONTROL POT. 5K0 10% 1W	1	52945	CONTROL POT. 5K0 10% 1W	1	52945	CONTROL POT. 5K0 10% 1W	1	52945
RESISTOR C.C. 10R 5% 1W	2	21793	NOT USED			NOT USED		
RESISTOR W.W. 3R8 10% 2W OR	4	53597	NOT USED			NOT USED		
RESISTOR W.W. 3R9 10% 2W OR	4	53598						
RESISTOR W.W. 1R8 5% 4W	2	53599						
RESISTOR C.C. 560K 10% 1W	1	4409	RESISTOR C.C. 68K 5% 1W	2	18572	RESISTOR C.C. 68K 5% 1W	2	18572
NOT USED			RESISTOR C.C. 10R 5% 1W	2	21793	RESISTOR C.C. 10R 5% 1W	2	21793
CAP. POLYESTER 1μF 250v	1	51121	CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 1μF 250v	1	53278
CAP. POLYESTER 1μF 250v	1	51121	CAP. POLYESTER 1μF 250v	1	53278	CAP. POLYESTER 1μF 250v	1	53278
CAP. EL. 470μ 400v	1	52914	CAP. EL. 1m4 200v	1	53097	CAP. EL. 1m4 200v	1	53097
CAP. POLYESTER 1n0 400v	1	769	CAP. POLYESTER 1n0 400v	1	769	CAP. POLYESTER 1n0 250v	1	769
CAP. POLYESTER 2n2 400v	1	53090	CAP. POLYESTER 3n3 400v	1	774	CAP. POLYESTER 3n3 400v	1	774
CAP. EL. 2 x 3m4 40v	2	52870	CAP. EL. 2 x 5m0 40v	1	52871	CAP. EL. 2 x 5m0 40v	1	52871
CAP. TANT. 10μ 35v	1	53106	CAP. TANT. 10μ 35v	1	53106	CAP. TANT. 10μ 35v	1	53106
CAP. EL. 470μ 25v	2	32185	CAP. EL. 1m0 25v	1	32186	CAP. EL. 1m0 25v	1	32186
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394
CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394	CAP. CERAMIC 5n6 500v	1	22394
CAP. CERAMIC 22n 250v	1	31373	CAP. POLYESTER 22n 160v	1	788	CAP. POLYESTER 22n 160v	1	788
CAP. CERAMIC 100n 30v	1	19647	CAP. CERAMIC 100n 30v	2	19647	CAP. CERAMIC 100n 30v	2	19647
CAP. CERAMIC 5n0 3Kv	1	1514	CAP. CERAMIC 5n0 3Kv	1	1514	CAP. CERAMIC 5n0 3Kv	1	1514
CAP. POLYESTER 10n 250v	1	53102	CAP. POLYESTER 10n 250v	1	53102	CAP. POLYESTER 10n 250v	1	53102
NOT USED			CAP. POLYESTER 47n 250v	1	53100	CAP. POLYESTER 47n 250v	1	53100
NOT USED			CAP. POLYESTER 4n7 250v	1	53099	CAP. POLYESTER 10n 250v	1	53102
NOT USED			CAP. POLYESTER 4n7 250v	1	53099	CAP. POLYESTER 10n 250v	1	53102
NOT USED			CAP. POLYESTER 33n 250v	1	53101	CAP. POLYESTER 33n 250v	1	53101
CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377	CAP. POLYESTER 100n 160v	1	31377
NOT USED			CAP. POLYESTER 1n0 400v	1	769	CAP. POLYESTER 1n0 400v	1	769
NOT USED			CAP. EL. 1m4 200v	1	53097	CAP. EL. 1m4 200v	1	53097
CAP. CERAMIC 1n0 500v	1	22387	NOT USED			NOT USED		
NOT USED			CAP. CERAMIC 1n5 500v	1	22388	CAP. CERAMIC 1n5 500v	1	22388
RECTIFIER BRIDGE S8M09	1	53229						
DIODE IN4003	1	23462	RECTIFIER BRIDGE W02	1	19725	RECTIFIER BRIDGE W02	1	19725
DIODI IN4003	1	23462						
DIODO IN4003	1	23462						
DIODE EF150N6 OR	1	52946	DIODE EF150N12 OR	1	53184	DIODE EF150N12 OR	1	53184
DIODE BYX61 200	1	53810	DIODE BYX61-200	1	53810	DIODE BYX61-200	1	53810
DIODE EF150N6 OR	1	52946	DIODE EF150N12 OR	1	53184	DIODE EF150N12 OR	1	53184
DIOD BYX61-200	1	53810	DIODE BYX61-200	1	53810	DIODE BYX61-200	1	53810
MATCHED PAIR MST1092 OR BDY28AD	1	62119	MATCHED PAIR SVT350-5	1	62094	MATCHED PAIR SVT350-5	1	62094
CHOKE OUTPUT	1	61694	CHOKE OUTPUT	1	62635	CHOKE OUTPUT	1	62635
NOT USED			CHOKE SYMMETRIC	1	62074	CHOKE SYMMETRIC	1	62187
NOT USED			CHOKE SYMMETRIC	1	62074	CHOKE SYMMETRIC	1	62187
NOT USED			CHOKE ASYMMETRIC	1	62075	CHOKE ASYMMETRIC	1	62188
NOT USED			FERRITE RING	1	53315	FERRITE RING	1	53315
NOT USED			FERRITE RING	1	53315	FERRITE RING	1	53315
P.C. BOARD ASSY.	1	63761	P.C. BOARD ASSY.	1	63397	P.C. BOARD ASSY.	1	63397
MAINS FILTER	1	52974	NOT USED			NOT USED		
TRANSFORMER - CURRENT SENSE	1	61591	TRANSFORMER - CURRENT SENSE	1	61591	TRANSFORMER - CURRENT SENSE	1	61591
TRANSFORMER - DRIVE	1	64276	TRANSFORMER - DRIVE	1	64276	TRANSFORMER - DRIVE	1	64276
TRANSFORMER - AUXILIARY	1	64276	TRANSFORMER - AUXILIARY	1	64276	TRANSFORMER - AUXILIARY	1	64276
TRANSFORMER - OUTPUT	1	61693	TRANSFORMER - OUTPUT	1	61590	TRANSFORMER - OUTPUT	1	61590
GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172	GUARD SHIELD - TRANSISTOR	1	61172
GUARD SHIELD - DIODE	1	52966	GUARD SHIELD - DIODE	1	61171	GUARD SHIELD - DIODE	1	61171
FUSE 6.3amp CERAMIC 5 x 20mm	1	52990	FUSE 10amp CERAMIC SIZE 'O'	1	4227	FUSE 10amp CERAMIC SIZE 'O'	1	4227

P.C. BOARD ASSY. 63397 AND 63761.							
Ct. Ref.	Description	Qty.	Part No.	Ct. Ref.	Description	Qty.	Part No.
R1	RESISTOR 3K9 5%	1	63478	D5	DIODE IN4148	1	23802
R2	RESISTOR 6K8 5%			D6	ZENER DIODE 3V3	1	33923
R3	RESISTOR 6K8 5% RESISTOR			D7	DIODE IN4148	1	23802
R4	RESISTOR 3K9 5% MODULE			D8	DIODE IN4148	1	23802
R6	RESISTOR 12K 5% RM1			D9	ZENER DIODE 8V2	1	33933
R7	RESISTOR 100R 5%			D10	DIODE IN4148	1	23802
R9	RESISTOR 1K0 5%			D11	ZENER DIODE 6V8	1	33931
R10	RESISTOR 2K7 5% RESISTOR	1	63400	D12	DIODE IN4148	1	23802
R11	RESISTOR 2K2 5% MODULE			D13	DIODE IN4148	1	23802
R13	RESISTOR 330R 5% RM3			D14	DIODE IN4148	1	23802
R14	RESISTOR 1K0 5%			D15	DIODE IN4148	1	23802
R5	RESISTOR 330R 5%			D17	DIODE IN4148	1	23802
R8	RESISTOR 100R 5% RESISTOR	1	63399	D18	ZENER DIODE 5V6	1	33929
R15	RESISTOR 220R 5% MODULE			D19	DIODE IN4148	1	23802
R16	RESISTOR 1K0 5% RM2			D20	DIODE IN4148	1	23802
R20	RESISTOR 820R 5%			D21	ZENER DIODE IN3497	1	29601
R21	RESISTOR 220R 5%			D22	ZENER DIODE 3V9	1	33925
R24	RESISTOR M.O. 680R 2% 1/2W	1	22484	D23	DIODE IN4148	1	23802
R25	RESISTOR M.O. 47K 5% 1/2W	1	53624	D24	DIODE AA143	1	52900
R27	RESISTOR M.O. 1K0 5% 1/2W	1	28593	D25	DIODE AA143	1	52900
R28	RESISTOR M.O. 4K7 5% 1/2W	1	52122	D27	DIODE IN4148	1	23802
R29	RESISTOR M.O. 2K7 5% 1/2W	1	52121	D28	ZENER DIODE 6V8	1	33931
R30	RESISTOR M.O. 150R 5% 1/2W	1	28605	TR1	TRANSISTOR 2N2369	1	23307
R31	RESISTOR M.O. 10R 5% 1/2W	1	28588	TR2	TRANSISTOR 2N2369	1	23307
R32	RESISTOR M.O. 22K 5% 1/2W	1	53623	TR3	TRANSISTOR BFS96 OR TRANSISTOR BS498 OR TRANSISTOR ZTX551	1	53626
R33	RESISTOR M.O. 5K6 5% 1/2W	1	28603	R34	RESISTOR M.O. 5% 1/2W	1	A.O.T.
R35	RESISTOR M.O. 510R 5% 1/2W	1	53621	TR4	TRANSISTOR BFS96 OR TRANSISTOR BS498 OR TRANSISTOR ZTX551	1	53626
R37	RESISTOR M.O. 5% 1/2W	1	A.O.T.	TR5	TRANSISTOR 2N2369	1	23307
R38	RESISTOR M.O. 1K5 5% 1/2W	1	25903	TR11	TRANSISTOR BC108	1	26110
R39	RESISTOR M.O. 120R 2% 1/2W	1	26746	TR12	TRANSISTOR BCY70	1	23354
R40	RESISTOR M.O. 2K2 5% 1/2W	1	28607	TR13	TRANSISTOR BC108	1	26110
R41	RESISTOR M.O. 3K3 5% 1/2W	1	53622	TR14	TRANSISTOR BCY70	1	23354
R42	RESISTOR M.O. 220R 5% 1/2W	1	28600	TR15	TRANSISTOR BY150	1	26112
R43	RESISTOR M.O. 300R 5% 1/2W	1	28611	TR18	TRANSISTOR BCY70	1	23354
R44	THERMISTOR 220R 10%	1	50786	TR19	TRANSISTOR BCY70	1	23354
R45	RESISTOR M.O. 5% 1/2W	1	A.O.T.	TR20	TRANSISTOR BC108	1	26110
R46	RESISTOR M.O. 5% 1/2W	1	A.O.T.	(TR5)	TRANSISTOR ARRAY CA 3086	1	52940
R47	RESISTOR M.O. 5% 1/2W	1	A.O.T.	(TR6)			
R48	RESISTOR M.O. 5K6 5% 1/2W	1	28603	(TR7)			
R49	RESISTOR M.F. 6K8 1% 1/2W	1	52950	(TR8)			
R50	RESISTOR M.O. 180K 5% 1/2W	1	53625	(D3)			
R51	RESISTOR M.O. 2K7 5% 1/2W	1	52121	IC2			
C2	CAP. POLYSTY. 6n8 30v	1	52939	IC1	I.C., O.P.A. TYPE 748 C	1	53549
C3	CAP. POLYSTY. 6n8 30v	1	52939	CSR1	THYRISTOR 2N4146	1	52941
C5	CAP. POLYESTER 22n 250v OR CAP. POLYESTER 22n 400v	1	53620				
C6	CAP. TANT. 10μ 10v	1	52938	FOR P.C. BOARD ASSY. No. 63397 ADD:			
C7	CAP. TANT. 33μ 10v	1	52936				
C9	CAP. CERAMIC 100n 10v OR CAP. CERAMIC 47n 12v	1	51093				
C10	CAP. TANT. 220n 35v	1	53784	R36	RESISTOR M.O. 220R 5% 1/2W	1	28600
C12	CAP. CERAMIC 1n5 500v	1	22388	D16	DIODE IN4148	1	23802
C13	CAP. CERAMIC 100n 10v OR CAP. CERAMIC 47n 12v	1	51093	FOR P.C. BOARD ASSY. No. 63761 ADD:			
C14	CAP. CERAMIC 27p 500v	1	19657				
D1	DIODE IN4148	1	23802				
D2	DIODE IN4148	1	23802	R36	RESISTOR M.O. 5% 1/2W	1	A.O.T.
D4	DIODE IN4148	1	23802				

Component Schedule





INPUT VOLTAGE CONNECTION TABLE

115/120 VOLTS AC			220/240 VOLTS AC		
PCB2	PCB3	PCB4	PCB2	PCB3	PCB4
11-8	11-12		5-8-6	11-12	
5-5-6-7			7-12		
14-12-13			14-13		

Adjustment procedure for R109.

With the unit working in an overload condition (i.e. with the output voltage having dropped by about 10% from nominal) adjust R109 to give maximum output current.