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In the village of Blunham, Bedfordshire, UK.

AP 116U-0504-1

2nd. Edition Apr. 77

(Superseding previous edition)

POWER SUPPLY COUTANT TYPES ASA/ATA, ASB/ATB AND ASC/ATC

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

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Issued Apr. 77

Prelim

POWER SUPPLY COUTANT

TYPE ASA/ATA, ASB/ATB, AND ASC/ATC

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APPENDICES

App.A Coutant overvoltage protection units.

LEADING PARTICULARS

Specifications

1. The specifications for the power unit are as follows:-

(1)	Output voltage:	ASA/ATA 1V - 7.5V dc ASB/ATB 6V - -15V dc ASC/ATC 6V - 30V dc
(2)	Output voltage control:	A front panel potentiometer control gives a ± 1V adjustment over the preset level.
(3)	Output current:	0.5 to 30A in logical steps (50A ASA)
(4)	Stabilisation ratio:	10,000 : 1 for ± 10% mains change
(5)	Line regulation:	0.001% for a ± 10% mains change
(6)	Output resistance:	Less than 1 mohm for 7A units and below. Less than 2 mohm for 10A units and above. Twin output units of 0.5A and 1A output do not have remote sensing facilities and the output resistance of these units is 6 mohms (load regulation 6mV or 0.06% whichever is greater).
(7)	Load regulation:	1mV or 0.02% whichever is greater, no load to full load.

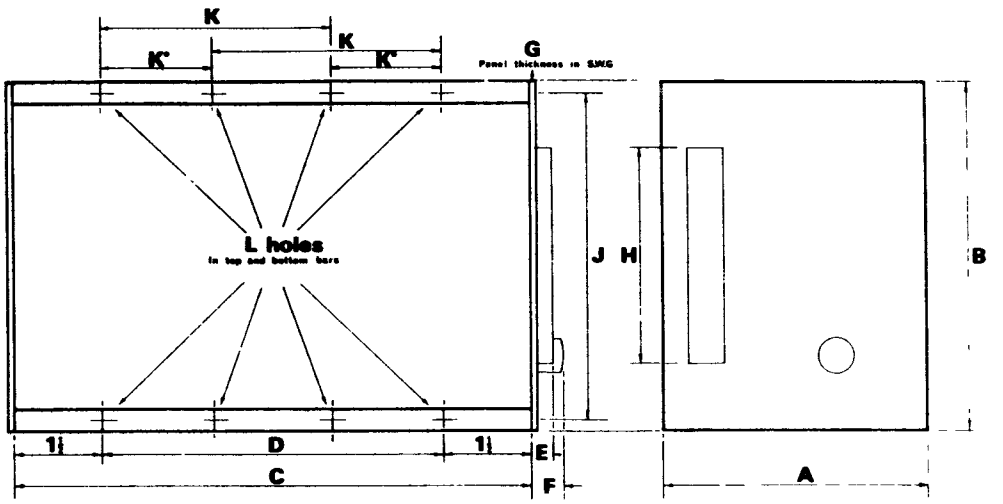
(8)	Output impedance:	Less than 0.1 ohm at 100 kHz. Less than 0.25 ohm at 500 kHz. Impedance increases linearly (approx) with increasing frequency.
(9)	Low frequency ripple and noise:	Less than 200μV peak to peak (500μV for units of 15A and above).
(10)	Transient response:	Approximately 10μs for recovery to within 10mV of nominal voltage after maximum load changes.
(11)	Temperature range:	$-10^{o}C$ to $+65^{o}C$.
(12)	Temperature coefficient:	$0.02\%^{o}C$ ($0.005\%^{o}C$ optional).
(13)	Overload protection	The overload protection circuit operates at between 115 - 160% of the maximum current rating on 0.5A - 7A units and between 115 - 140% on 10A - 50A units. On units with an output of 4.5V and below the overload characteristic approximates to constant current operation. Higher voltage units have a re-entrant characteristic with an initial period of 200ms of approximately constant current operation to ensure reliable "switch on" into non-linear loads.
(14)	Overvoltage protection:	Overvoltage protection circuits are fitted to some ASA units as standard. External overvoltage units to connect directly to the output terminals are available. Appendix A contains details of external overvoltage units.
(15)	Input power:	100V to 125V ac and 200V - 250V ac 45 to 400Hz single phase. Split primary windings are connected in parallel for 100V to 125V and in series for 200V to 250V.
(16)	Remote sensing:	Amplifier terminals are provided on all units (with the exception of 0.5A to 1A twin output units).
(17)	Output voltage polarity:	Both output terminals are isolated from earth and either can be grounded.
(18)	Insulation resistance:	Withstands 500V dc across output terminals and earth. Withstands 2.1kV dc across line, neutral and earth.

(19) Series and parallel connection: Any number of units of a similar type may be connected in series. Units of a similar type fitted with 'P' terminals may be connected in parallel with the 'P' terminals interconnected. Fig 4 gives details of method of connection.

(20) Dimensions and weights: The dimensions and weights of the power supply units are listed in table 1.

TABLE 1

Power supply units : dimensions and weights



SIZE REF.	A ins	A mm	B ins	B mm	C ins	C mm	D ins	D mm	E ins	E mm	F ins	F mm	G SWG	G mm	H ins	H mm	J ins	J mm	K ins	K mm	L UNIFIED TAP	APPROX WEIGHT LBS	APPROX WEIGHT Kgs
10	3½	83	3¼	83	7	178	4	10	5/16	8	3/8	9·5	12	2·63	2½	64	2 7/8	73	–	–	6-32U.N.C.	4	1·8
11A	5	127	3¼	83	7	178	4	102	5/16	8	3/8	9·5	12	2·63	2½	64	2 7/8	73	–	–	6-32U.N.C.	5	2·3
11B	5	127	3¼	83	7½	190	4½	114	5/16	8	3/8	9·5	12	2·63	2½	64	2 7/8	73	–	–	6-32U.N.C.	6	2·7
11C	5	127	3¼	83	9	229	6	152	5/16	8	3/8	9·5	12	2·63	2½	64	2 7/8	73	–	–	6-32U.N.C.	7	3·2
11D	5	127	3¼	83	11¼	286	8¼	210	5/16	8	3/8	9·5	12	2·63	2½	64	2 7/8	73	6	152	6-32U.N.C.	8	3·6
12	5	127	4⅛	105	11¾	298	8¾	222	13/32	10	11/16	17·5	10	3·28	3⅜	92	3⅝	95	6	152	10-32U.N.F.	11	4·9
13	5	127	6½	165	11¼	286	8¼	210	13/32	10	11/16	17·5	10	3·28	3⅜	92	6⅛	56	6	152	6-32U.N.C.	20	9·1
14A	6½	171	8⅜	213	11¾	298	8¾	222	13/32	10	11/16	17·5	10	3·28	3*	76	8	203	6	152	10-32U.N.F.	32	14·5
14B	6½	171	8⅜	213	15⅝	397	12⅝	321	13/32	10	11/16	17·5	10	3·28	3	76	8	203	6*	152	10-32U.N.F.	37	16·7
15	8⅛	206	17½	438	16½	419	13½	317	⅜	16	11/16	17·5	10	3·28	3	76	16½	419	6*	152	10-32U.N.F.	75	34

15Amp units & above have O/P terminals which protrude 1in (25.4mm.) from the front panel

* For twin units read 5⅛" (130mm.)

Size Ref	Power supply type
10	ASA50, ASA100, ASB50, ASC50
11A	ASB100
11B	ASA200, ASC100
11C	ASB200
11D	ASA300, ASB300, ASC200, ATA50, ATA100, ATA200, ATB50, ATB100, ATC50, ATC100
12	ASA500, ASB500, ASC300, ATB200
13	ASA700, ASA1000, ASB700, ASB1000, ASC500, ATA300, ATB300 ATC200
14A	ASA1500, ASC700, ASC1000, ATA500, ATB500, ATC300, ATC500
14B	ASA2000, ASB1500,
15	ASA3000, ASA5000, ASB2000, ASB3000, ASC1500, ASC2000, ASC3000

INTRODUCTION

2. The Coutant series of stabilized supplies are used to provide sources of dc power for logic circuits over a voltage range of 1V to 30V with current rating of 0.5A to 50A. The voltage range is covered by three groups of power supply, each group having eleven units to cater for the wide current range. The voltage output of each unit is set during manufacture to a specified level but can subsequently be altered by adjustment of transformer tappings and resistor change. Twin output units are provided in the lower current ranges (up to 5A) of each group. The three groups are as follows:-

Group	Voltage output range	Current output range
ASA/ATA	1V - 7.5V dc	0.5 - 50A ASA 0.5 - 5A ATA
ASB/ATB	6V - 15V dc	0.5 - 30A ASB 0.5 - 5A ATB
ASC/ATC	6V - 30V dc	0.5 - 30A ASC 0.5 - 5A ATC

General description

3. The power supply consists of a rectangular frame closed by a panel at each end. One end panel is used as the input/output panel and is fitted with a terminal block for ac, dc and SENSE connections. Mounted above the terminal block is the ac fuse and a potentiometer for fine adjustment of the output voltage. A solid baseplate supports the supply transformer, electrolytic reservoir capacitors and an inductor which is fitted on high current output units only.

4. The voltage control components are mounted on a printed circuit board (PCB) which is secured to the side rails of the frame on some lower current units and behind the input/output panel on all high current units (3A and above). Two types of PCB are in use. Early versions of the power supply use a PCB 293 single output and PCB 294 twin output, while on later production a PCB 397 single output and PCB 398 twin output is used. The twin output PCB's each contain two identical control circuits. To facilitate re-adjustment of the output voltage those resistors on the PCB subject to change are mounted on stand-off tags clear of the board surface.

5. Series current transistors used in the circuit are mounted with their associated resistor on panels secured to the frame side rails. The number of transistors used depends on the output current rating of the unit. For example a unit with a rated current output of 3A would have two transistors in parallel while a 30A output unit would require 13 in parallel.

Circuit description (figs 5 and 6)

6. Input power is supplied to the primaries of the transformer via anti-surge fuse FS 1. The split winding is connected in series for voltages of 200-250 and in parallel for voltages 100-125. Full wave bridge MR7-10 rectifies the output of the 22 volt secondary winding and the resulting dc passes to transistors VT1 and VT6 which provide a constant current output feed into three zener diodes. The most negative zener (MR2) forms the stabilised negative line of the subsidiary rail. The two most positive zeners (MR3 and 4) form the positive subsidiary line and the junction of zeners MR2 and MR3 is taken to the common reference rail which is also the positive sensing line.

7. The output of the main secondary winding is full wave rectified by MR11-12 diode network and the resulting dc output passes to the output terminals via series transistors VT50 (VT50 may consist of two or more transistors in parallel). R50 compensates for any base emitter voltage variation in VT50

and also forms part of the overload protection circuit.

8. Zener diode MR6 is connected via R17 to the positive subsidiary rail to provide a reference voltage from which a reference current is derived by R19. This current is compared by comparator VT5a and b with a current obtained from the output voltage by R20. Since the current obtained is proportional to the output voltage the value of this resistor determines the output voltage of the unit. RV1 provides a degree of output voltage adjustment.

9. The single ended output from the comparator is taken to common emitter amplifier VT3, the emitter of which is taken to the junction of MR3 and 4. MR4 together with VT3 provides an approximate constant voltage across R16 which defines the current in VT5b. The output of VT3 provides the drive to emitter follower chain VT2 and VT51 which in turn controls the current to the base of series transistor VT50. (VT51 is not fitted on units of 2 amps and below).

10. Lag network R8 and C2 ensures high frequency stability of the closed loop. C4 and R18 provide a degree of ripple attenuation by by-passing R20 at ripple frequency thereby increasing the low frequency a.c. loop gain. R12 may be incorporated to improve the output resistance by providing feed forward into comparator VT5a and b of a current proportional to the output current.

11. Re-entrant overload protection is provided by VT4 and related circuitry. VT4 compares the voltage across R50 with a reference voltage derived from the output by potential divider R6 and R7. (R10 is incorporated in the potential divider circuit on units with an output of 5 volts and above). When the voltage across R50 increases sufficiently, VT4 conducts and diverts the drive current from the emitter follower chain and causes the output voltage and current to fall to a low level. When the trip operates VT3 is turned on but as the drive voltage is now developed across R9, this prevents VT3 interfering with the operation of VT4.

12. As the output voltage falls, the reference voltage at VT4 is reduced, hence the voltage drop required in R50 for conduction in VT4 is also reduced and the available current falls. Because C3 is connected to the negative subsidiary rail, an approximate constant current characteristic prevails when the unit is first switch on, until C3 is charged.

13. When C3 is at the same potential as the base of VT4 the normal re-entrant characteristic is established. MR5 prevents C3 causing a voltage over-shoot when the unit is switched off. MR50 protects the unit from reverse voltages applied across the output terminals.

Installation and adjustments

15. Examine the unit for visible damage.

Note...

Some high current power supplies are to be fitted with fast acting fuses when operated on 115V ac nominal input. Table 2 contains details of those power supplies to which this applies.

16. Ensure that the fuse fitted is of the correct rating (table 2) and is an anti-surge device.

TABLE 2

List of fuse ratings

Power supply type	Maximum dc current	ac fuse rating 200 - 250V	ac fuse rating 100 - 125V	Fuse type
ASA50, ASB50, ASC50	0.5A	1A	1A	TDC 123
ASA100, ASB100, ASC100	1A	1A	1A	TDC 123
ASA200, ASB200, ASC200	2A	1A	1A	TDC 123
ASA300, ASB300, ASC300	3A	2A	3A	TDC 11
ASA500, ASB500, ASC500	5A	3A	5A	TDC 11
ASA700, ASB700, ASC700	7A	5A	5A	TDC 11
ASA1000, ASB1000, ASC1000	10A	5A	7A	TDC 11
ASA1500, ASB1500, ASC1500	15A	10A	10A	TDC 11
ASA2000, ASB2000	20A	10A	10A	TDC 11
ASC2000	20A	10A	20A*	TDC 11 10A
ASA3000	30A	10A	10A	
ASB3000, ASC3000	30A	10A	20A*	TDC 10 20A
ASA5000	50A	10A	20A*	
ATA50, ATB50, ATC50	2 x 0.5A	1A	1A	TDC 123
ATA100, ATB100, ATC100	2 x 1A	1A	2A	TDC 123
ATA200, ATB200, ATC200	2 x 2A	2A	3A	TDC 123
ATA300, ATB300, ATC300	2 x 3A	3A	5A	TDC 11
ATA500, ATB500, ATC500	2 x 5A	7A	7A	TDC 11

Note...
Except for fuses indicated * all fuses are of the anti-surge type.

Fuses: TDC 10, TDC 11, TDC 123, Manufacturer K Beswick Ltd.,

Fuseholders: For TDC 123 - Belling Lee Type E6011
For TDC 10, TDC 11 - Belling Lee Type L1744

Some power supplies may be fitted with fuses in the dc output negative line. These are of the fast acting type and the following ratings apply:-

Unit current output	Fuse rating
1A	2A
2A	3A
3A	5A
5A	7A
7A	10A
10A	15A
15A	20A
20A	30A
30A	40A
50A	60A

17. The mains transformer has a split primary winding with tappings. The windings must be connected in series for the input voltage range 200V - 250V and in parallel for 100V to 125V. The appropriate tappings must be selected for within ±10% of the nominal input voltage.

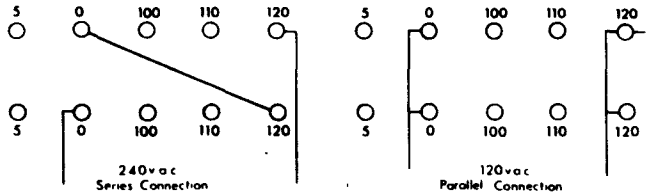


Fig 1 Transformer primary connections

18. The power supplies are convection cooled and should be mounted with the heatsinks vertical and positioned to ensure an uninterrupted flow of air through the unit. The air temperature in the immediate vicinity of the heatsinks should not exceed 65°C with the unit working at full power. If the temperature is likely to exceed this maximum the unit must be derated or force ventilated to avoid overheating.

Input and output connections (fig.2)

19. Connect the mains input to the 'AC' terminals line to 'L' and neutral to 'N'. The unit is earthed at the 'E' terminal.

20. The output terminals comprise a positive and negative line with positive and negative amplifier sensing terminals (AMP). Normally the amplifier sensing terminals are directly linked to the output by a fanning strip supplied with the unit. When difficulty is experienced with voltage drop at the load end, the unit may have to be operated with remote sensing as detailed in the paragraphs which follow.

Remote sensing connections

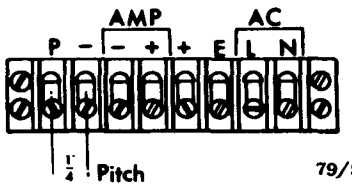
21. When the voltage drop across the output leads causes difficulty, the connection between the sensing terminals (AMP) and the output terminals can be removed and the sensing terminals connected directly to the load with separate leads; the correct output voltage will then be regulated at the load. An electrolytic capacitor of approx. 100μF per ampere must be connected across the load to balance the inductance of the leads. The following must also be observed when operating the unit under remote sensing:-

(1) When using long runs route the sensing leads carefully to avoid mains pick up and subsequently possible oscillation of the sense amplifier. It may be necessary to use screened leads.

(2) Ensure that the resistance of the sensing leads is as low as possible.

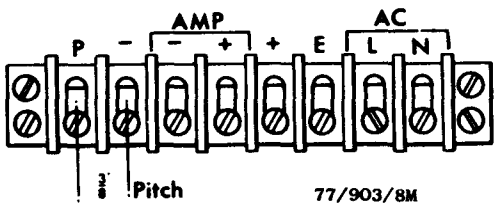
SINGLE OUTPUT MODELS

ASA 50 100 200 300
ASB 50 100 200 300
ASC 50 100 200



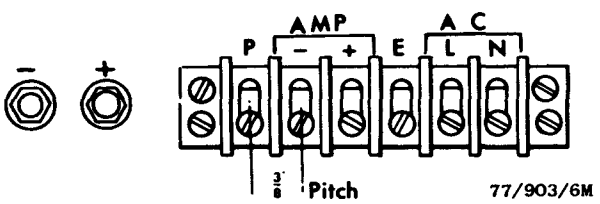
79/593/8M

ASA 500 700 1000
ASB 500 700 1000
ASC 300 500 700 1000



77/903/8M

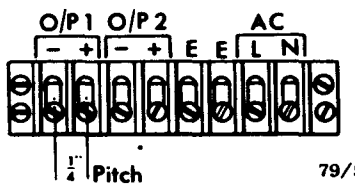
ASA 1500 2000 3000 5000
ASB 1500 2000 3000
ASC 1500 2000 3000



77/903/6M

TWIN OUTPUT MODELS

ATA 50 100 200
ATB 50 100
ATC 50 100

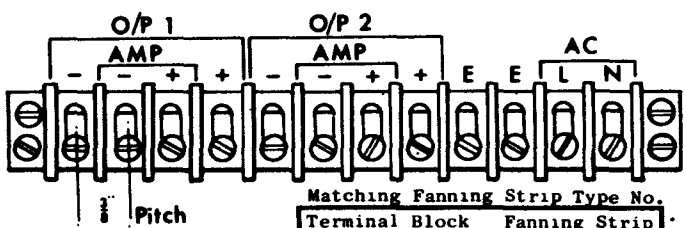


79/593/8M

ATA 300 500
ATB 300 500
ATC 200 300 500

77/903/12M

ATB 200 Terminal Block (Type No. 79/593/12M) has the same connection layout but with a pitch of ¼".



Matching Fanning Strip Type No.

Terminal Block	Fanning Strip
79/593.....	81/200
77/903.....	77/534/20

Manuf. Carr Fastener Co. Ltd.

Fig 2 Terminal block connections

(3) When very long sensing leads are used it may be necessary to remove the output capacitor (C51) from the unit to improve the high frequency stability of the amplifier.

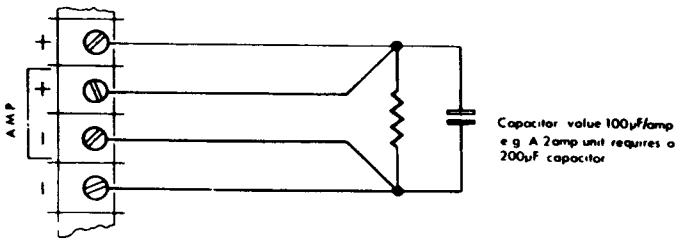


Fig 3 Remote sensing connections

Output voltage adjustment

22. The front panel potentiometer RV1 provides a fine adjustment of the output voltage of approx. ±1V. On some of the higher voltage units it may be possible to achieve a wider voltage variation. Such large adjustments by means of RV1 may cause over dissipation of the series transistors at full load, with consequent damage to the unit, particularly if the voltage is reduced excessively.

Caution...

Before commencing any work on the power supply involving component changes, the reservoir capacitors must be discharged through a low value wirewound resistor. Failure to do this may result in an accidental short circuit damaging components.

23. To alter the pre-set output voltage it is necessary to change the values of resistors R7, R10, R20 and in some cases R8 and R12. In addition the transformer output tappings will require re-selection. The values of the resistors and the transformer tappings for the various units is contained in Table 3. For ease in removal the resistors requiring change are mounted on stand-off tags on the PCB and are clearly identified.

24. The values given in Table 3 for resistors R10 and R7 are approximate and are dependent upon the charactersistics of the series transistors VT50. (2N3055). Resistor R10 determines the trip current level. To increase the trip current, the value of R10 must be decreased and its value increased to lower the trip current. Resistor R7 determines the short circuit current level. A decrease in the value of R7 increases the short circuit current level and its value must be increased to lower the short circuit current.

Parallel operation (fig. 4)

Caution...

Care should be taken to ensure that the 'P' terminal is not short circuited to the negative output terminal. A short circuit between these two terminals will result in circuit failure.

25. When operating a maximum of five similar power supplies in parallel is only necessary to interconnect the 'P' terminals of each unit and parallel the dc outputs. The unit set to the highest voltage will act as the master unit and will have overriding control of the other units. The output voltage of each unit should be set within the limits required.

26. When more than five units are operated in parallel the units should be connected using 47 ohm ½W resistors as shown in fig 4.

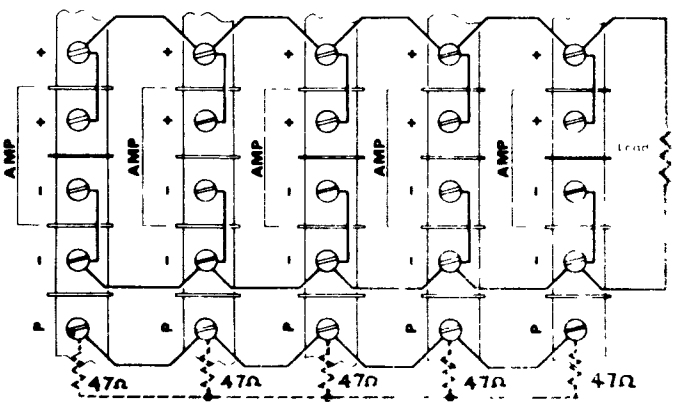


Fig 4 Parallel operating connections

TABLE 3

Output voltage - resistor values

ASA/ATA 50 - 5000 power supply units

Output voltage range	Resistor	50	100	200	300	500	700	1000	1500	2000	3000	5000	Transformer tappings
PCB 293&294													
1V to 4.5V	R7	3.3k	1.8k	1.8k	1.5k	910	1.5k	1k	1k	910	910		ASA 50 - 2000
	R10	-	-	-	-	-	-	-	-	-	-		9V - 0 - 9V
	R12	470k	470k	470k	-	-	-	-	-	-	-		ASA 3000
	R20	100	100	100	100	100	100	100	100	100	100		14V - 0 - 14V
4.5V to 7.5V	R7	2.2k	6.8k	6.8k	2.7k	2.2k	3.3k	2.2k	2.2k	2.2k	5.6k		ASA 50 - 2000
	R10	3.9k	2.2k	2k	3k	1.5k	2.2k	1.8k	1.8k	1.8k	1k		12V - 0 - 12V
	R12	470k	470k	470k	-	-	-	-	-	-	-		ASA 3000
	R20	270	270	270	270	270	270	270	270	270	270		17V - 0 - 17V
PCB 397&398													
1V to 4V	R7	3.3k	1.8k	1.8k	1.5k	910	1.5k	1k	1k	910	910		ASA 50 - 3000
	R8	560	560	560	560	560	560	560	560	1k	1k		9V - 0 - 9V
	R10	-	-	-	-	-	-	-	-	-	-		
	R12	470k	470k	470k	-	-	-	-	-	-	-		
	R20	100	100	100	100	100	100	100	100	100	100		
5V to 7.5V	R7	2.2k	6.8k	6.8k	2.7k	2.2k	3.3k	2.2k	2.2k	2.2k	5.6k		ASA 50 - 3000
	R8	560	560	560	560	560	560	560	560	1k	1k		12V - 0 - 12V
	R10	2.7k	2.2k	2k	3k	1.5k	2.2k	1.8k	1.8k	1.5k	1k		
	R12	470k	470k	470k	-	-	-	-	-	-	-		
	R20	270	270	270	270	270	270	270	270	270	270		

TABLE 3 (Cont.)

ASB/ATB 50 - 2000 power supply units

Output voltage range	Resistor	50	100	200	300	500	700	1000	1500	2000	Transformer tappings
PCB 293&294 PCB 397&398											
6V to 8V	R7	27k	6.8k	6.8k	4.7k	3.3k	4.7k	3.3k	4.7k	4.7k	ASB 50 - 2000
	R10	5.6k	2.2k	2.2k	2.4k	1.5k	2.7k	3.9k	1.8k	1.5k	0V - 13 (13V)
	R12	470k	470k	470k	-	-	-	-	-	-	
	R20	470	470	470	470	470	470	470	470	470	
9V to 11V	R7	2.7k	6.8k	6.8k	4.7k	3.3k	4.7k	3.3k	4.7k	4.7k	ASB 50 - 2000
	R10	6.8k	3.3k	3.3k	3.3k	1.8k	3.9k	4.3k	2.7k	2k	2V - 0 - 13V (15V)
	R12	470k	470k	470k	-	-	-	-	-	-	
	R20	750	750	750	750	750	750	750	750	750	
12V to 13V	R7	27k	6.8k	6.8k	4.7k	3.3k	4.7k	3.3k	4.7k	4.7k	ASB 50 - 2000
	R10	8.2k	4.7k	4.7k	4.7k	2.7k	4.7k	4.7k	3.3k	2.7k	0V - 18V (18V)
	R12	470k	470k	470k	-	-	-	-	-	-	
	R20	1k	1k	1k	1k	1k	1k	1k	1k	1k	
14V to 15V	R7	27k	6.8k	6.8k	4.7k	3.3k	4.7k	3.3k	4.7k	4.7k	ASB 50 - 2000
	R10	8.2k	4.7k	4.7k	4.7k	2.7k	4.7k	5.1k	3.9k	3.3k	2V - 0 - 18V (20V)
	R12	470k	470k	470k	-	-	-	-	-	-	
	R20	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	

TABLE 3 (Cont.)

ASC/ATC 50 - 1500 power supply units

Output voltage range	Resistor	50	100	200	300	500	700	1000	1500	Transformer tappings
PCB 397&398										
6V to 8V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	3.3k	2.4k	2.2k	2.7k	1.8k	1.5k	2.4k	2.2k	0V - 13V (13V)
	R12	470k	470k	470k	-	-	-	-	-	
	R20	270	270	270	270	270	270	270	270	
9V to 11V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	4.7k	3.3k	2.7k	3.9k	3.9k	1.8k	3.3k	2.7k	3V - 0 - 13V (16V)
	R12	470k	470k	470k	-	-	-	-	-	
	R20	560	560	560	560	560	560	560	560	
12V to 14V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	8.2k	4.7k	3.9k	47k	5.6k	2.2k	3.9k	3.3k	6V - 0 - 13V (19V)
	R12	470k	470k	470k	-	-	-	-	-	
	R20	820	820	820	820	820	820	820	820	
15V to 17V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	12k	5.1k	4.7k	5.6k	5.6k	2.7k	4.7k	3.9k	0V - 23V (23V)
	R12	1M	2.2M	470k	-	-	-	-	-	
	R20	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	1.2k	
	R7	-	-	-	5.6k	5.6k	5.8k	5.6k	5.6k	ASC 50 - 1500
	R10	15k	6.8k	5.6k	7.5k	5.8k	6.8k	5.6k	4.7k	3V - 0 - 23V (26V)

TABLE 3 (Cont.)

ASC/ATC 50 - 1500 power supply units

Output voltage range	Resistor	50	100	200	300	500	700	1000	1500	Transformer tappings
PCB 397&398										
18V to 20V	R12	470k	2.2M	470k	-	-	-	-	-	ASC 50 - 1500
	R20	1.5k	1.5k	1.5k	1.5k	1.5k	1.5k	1.5k	1.5k	3V - 0 - 23V (26V)
21V to 24V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	18k	7.5k	6.8k	8.2k	9.1k	7.5k	6.8k	4.7k	6V - 0 - 23V (29V)
	R12	470k	2.2M	470k	-	-	-	-	-	
	R20	1.8k	1.8k	1.8k	1.8k	1.8k	1.8k	1.8k	1.8k	
25V to 27V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	15k	9.1k	7.5k	10k	10k	8.2k	7.5k	5.6k	3V - 0 - 28V (31V)
	R12	470k	2.2M	470k	-	-	-	-	-	
	R20	2k	2k	2k	2k	2k	2k	2k	2k	
28V to 30V	R7	-	-	-	5.6k	5.6k	6.8k	5.6k	5.6k	ASC 50 - 1500
	R10	20k	10k	9.1k	10k	12k	10k	9.1k	6.2k	6V - 0 - 28V (34V)
	R12	2.2M	2.2M	470k	-	-	-	-	-	
	R20	2.4k	2.4k	2.4k	2.4k	2.4k	2.4k	2.4k	2.4k	

TABLE 3 (Cont.)

ASC 2000 and ASC 3000 power supply units

Output voltage	Resistor	2000	3000	Transformer output voltage. Obtained by output tapping selection
6V to 8V	R7	5.6k	5.6k	20V
	R10	1.5k	1.5k	
	R12	-	-	
	R20	270	270	
9V to 11V	R7	5.6k	5.6k	24V
	R10	1.8k	1.8k	
	R12	-	-	
	R20	560	560	
12V to 14V	R7	5.6k	5.6k	28V
	R10	2k	2k	
	R12	-	-	
	R20	820	820	
15V to 17V	R7	5.6k	5.6k	34V
	R10	2.7k	3.3k	
	R12	-	-	
	R20	1.2k	1.2k	
18V to 20V	R7	5.6k	5.6k	38V
	R10	3.9k	3.9k	
	R12	-	-	
	R20	1.5k	1.5k	
21V to 24V	R7	5.6k	5.6k	40V
	R10	4.7k	4.7k	
	R12	-	-	
	R20	1.8k	1.8k	

TABLE 3 (Cont.)

ASC 2000 and ASC 3000 power supply unit

Output voltage range	Resistor	2000	3000	Transformer output voltage. Obtained by output tapping selection
25V to 27V	R7	5.6k	5.6k	44V
	R10	5.1k	5.6k	
	R12	-	-	
	R20	2k	2k	
28V to 30V	R7	5.6k	5.6k	48V
	R10	5.6k	5.8k	
	R12	-	-	
	R20	2.4k	2.4k	

TABLE 4

Parts list: power supply framework

These lists contains those components that are fitted to the power supply framework. Diodes MR11-12 given in those lists may on some twin output units (ATB) be fitted to the printed circuit board. Parts list for printed circuit boards PCB293/294 and PCB397/398 (later versions) are contained in table 5 . PCB 293 and PCB 397 are used on single output.units (AS) PCB 294 and PCB 398 are used on twin output units (AT).

Component Ref	Description	Manufacturers part/type
ASA50, ASA100 ATA50, ATA100		
C50	Capacitor elect. 2500µF 25V	Sprague 36D 272G 025 AA 2A (or AA 6B)
C51	Capacitor elect. 200µF 35V	Wima Printilyt
C52	Capacitor 0.1µF 160V	Wima Tropyfol M
MR11-12	Diode	Motorola 1N4003 (2)
MR50-51	Diode	Motorola 1N4003 (2)
R50	Resistor 1 ohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 wirewound or Colvern CLR1106/9S
T1 (ASA50)	Transformer	Albion T147/8
(ATA50)	Transformer	Albion T78/16
(ASA100)	Transformer	Albion T147/9
(ATA100)	Transformer	Albion T78/17
VT50	Transistor	RCA 2N3055
ASA200, ATA200		
C50	Capacitor elect. 5100µF 25V	Sprague 32D 512G 025 AC 2A (or AC 6B)
C51	Capacitor elect. 200µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	Westinghouse 1N5402 (2)
MR50-51	Diode	Motorola 1N4003 (2)
R50	Resistor 0.5 ohm 5W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 wirewound or Colvern CLR1106/9S
T1 (ASA200)	Transformer	Albion T78/11
(ATA200)	Transformer	Albion T152/8
VT50	Transistor	RCA 2N3055

Component Ref	Description	Manufacturers part/type
ASA300, ATA300		
C50	Capacitor elect. 5100µF 25V	Sprague 32D 512G 025 AC 2A (or AC 6B)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard 121/17399 (or Mullard C415)
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	Westinghouse 1N5402 (2)
MR50	Diode	Int. Rectifiers 3F10
MR51-52	Diode	Motorola 1N4003 (2)
R50 a, b	Resistor 0.5 ohm 5W 5%	Wirewound (2)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 wirewound or Colvern CLR1106/9S
T1 (ASA300)	Transformer	Albion T78/7
(ATA300)	Transformer	Albion T120/23
VT50 a & b	Transistor	RCA 2N3055 (2)
VT51	Transistor	RCA 2N3055
ASA500, ATA500		
C50	Capacitor elect. 11000µF 25V	Sprague 32D 113G 025 BC 2A (or BC 6B)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard 121/17399 (or Mullard C415)
C52	Capacitor 0.22µF 160V	Wima Tropyfol
MR11-12 (ASA500)	Diode	RCA 40210
MR11-12 (ATA500)	Diode, bridge	Motorola MDA 962-2 (2)
MR50	Diode	Int. Rectifiers 3F10
MR51	Diode	Motorola 1N4003
MR52	Diode	Motorola 1N4003
R50 a & b	Resistor 0.5 ohm 5% 5W	Wirewound (2)
R51	Resistor 1 kohm 5% 3W	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 wirewound (or Colvern CLR1106/9S)
T1 (ASA500)	Transformer	Albion T78/13
(ATA500)	Transformer	Albion T120/24
VT50 a & b	Transistor	RCA 2N3055 (2)
VT51	Transistor	RCA 2N3055
ASA 700		
C50 a	Capacitor elect. 5100µF 25V	Sprague 32D 512G 025 AC 2A (or AC 6B)
C50 b	Capacitor elect. 11000µF 25V	Sprague 32D-113 025 BC 2A (or BC 6B)

Component Ref	Description	Manufacturers part/type
ASA 700 (Cont'd)		
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C121 (or Mullard C415)
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	RCA 40210 (2)
MR50	Diode	RCA 40209
MR51	Diode	Westinghouse 1N5402
R50 a-e	Resistor 0.5 ohm 5% 5W	Wirewound (5)
R51	Resistor 1 kohm 5% 5W	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 (or Colvern CLR1106/9S
T1	Transformer	Albion T120/16
VT50 a-e	Transistor	RCA 2N3055 (5)
VT51	Transistor	RCA 2N3055
ASA 1000		
C50 a & b	Capacitor elect. 11000µF 25V	Sprague 32D 113G 025 BC 2A (or BC 6B) (2)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C121
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	RCA 40210 (2)
MR50	Diode	RCA 40209
MR51	Diode	Westinghouse 1N5402
R50 a-e	Resistor 0.5 ohm 5W 5%	Wirewound (5)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable too ohm 5%	Reliance CC115 (or Colvern CLR1106/9S
T1	Transformer	Albion T120/17
VT50 a-e	Transistor	Motorola 1N5402 (5)
VT51	Transistor	Solidev 2N3055
ASA 1500		
C50 a-c	Capacitor elect. 11000µF 25V	Sprague 36D 113 025 AE 2A (or AE 6E) (3)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432
C51 b	Capacitor elect. 39µF 40V	Mullard C121 (or Mullard C415)
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor 0.22µF	Wima Tropyfol M
C54	Capacitor 2µF 40V	Mullard C415

Component Ref	Description	Manufacturers part/type
ASA 1500 (Cont'd)		
MR11-12	Diode	RCA 40210 (2)
MR50	Diode	RCA 40209R
MR51	Diode	Westinghouse 1N5402
R50 a-f	Resistor 0.5 ohm 5W 5%	Wirewound (6)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance CC115 (or Colvern CLR1106/9S
T1	Transformer	Albion T248/2
VT50 a-f	Transistor	RCA 2N3055 (6)
VT51	Transistor	Solidev 2N3055
ASA 2000		
C50 a-d	Capacitor elect. 1100µF 25V	Sprague 32D 113G 025 CD 2A (or CD 6B) (4)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432
C51 b	Capacitor elect. 39µF 40V	Mullard C121 (or Mullard C415)
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor 0.22 F	Wima Tropyfol M
C54	Capacitor 2µF 40V	Mullard C415
MR11-12	Diode	RCA 40210 (2)
MR50	Diode	RCA 40209
MR51	Diode	Westinghouse 1N5402
R50 a-h	Resistor 0.5 ohm 5W 5%	Wirewound (8)
R51	Resistor 1 kohm 3W 5%	Wirewound
T1	Transformer	Albion T248/3
VT50 a-h	Transistor	RCA 2N3055 (8)
VT51	Transistor	Solidev 2N3055
ASA 3000		
C50 a & b	Capacitor elect. 1600µF 30V	Sprague 36D 163G 030 BD (or BD 6B)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432 FR/B1400
C51 b	Capacitor elect. 39µF 40V	Mullard C121 (or Mullard C415)
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
L1	Inductor	Albion L78/4
MR11-12	Diode	RCA 40210 (2)
MR50 a & b	Diode	RCA 40209 (2)
MR51	Diode	Westinghouse 1N5402

Component Ref	Description	Manufacturers part/type
ASA 3000 (Cont'd)		
R50 a-m	Resistor 0.5 ohm 5W 5%	Wirewound (13)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 5%	Reliance CC115 (or Colvern CLR1106/9S)
T1	Transformer	Albion T638C/2
VT50 a-m	Transistor	RCA 2N3055
VT51	Transistor	Solidev 2N3055
ASA 5000		
C50 a-c	Capacitor elect. 1600 µF 30V	Sprague 36D 163G 030 BD 2A (or BD 6B) (3)
C51 a	Capacitor elect. 1400 µF 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39 µF 40V	Mullard C121 (or Mullard C415)
C51 c	Capacitor elect. 500 F 35V	Wima Printlyt
C52	Capacitor 0.22 µF 160V	Wima Tropyfol M
C54	Capacitor 2 µF 40V	Mullard C415AP/G2
L1	Inductor	Albion L78/5
MR11-12	Diode	Motorola MR1202FL (2)
MR50 a-b	Diode	RCA 1N40209 (2)
MR51	Diode	Westinghouse 1N5402
R50 a-z	Resistor 0.5 ohm 5W 5%	Wirewound (26)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohms 5%	Reliance CC115 (or Colvern CLR1106/9S)
VT50 a-z	Transistor	RCA 2N3055(26)
VT51	Transistor	Solidev 2N3055
T1	Transformer	Albion T638C/3
ASB50, ATB50		
C50	Capacitor elect. 1000µF 40V	Sprague 32D 102G 025 AA 2A (or AA 6B)
C51	Capacitor elect. 200 µF 35V	Wima Printilyt
C52	Capacitor 0.1 µF 160V	Wima Tropyfol M
MR11-12	Diode	Motorola 1N4003 (4)
MR50-52	Diode	Motorola 1N4003 (3)
R50	Resistor 1 ohm 3W 5%	Wirewound
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1 (ASB)	Resistor variable 500 ohm 5%	Reliance WL18 wirewound (or Colvern CLR1106/9S)
RV1 ATB	Resistor variable 500 ohm 5%	M.E.C. MP31 (or Reliance CW-90)
T1 (ASB)	Transformer	Albion T147/10
(ATB)	Transformer	Albion T78/18
VT50	Transistor	RCA 2N3055

Component Ref	Description	Manufacturers part/type
ASB100, ATB100		
C50	Capacitor elect. 2100µF 40V	Sprague 32D 212G 040 AB 2A (or AA 6B)
C51	Capacitor elect. 200µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	Motorola 1N4003 (4)
MR50-52	Diode	Motorola 1N4003 (3)
R50	Resistor 1 ohm 3W 5%	Wirewound
RV1 (ASB)	Resistor variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
RV1 (ATB)	Resistor Variable 500 ohm 5%	M.E.C. MP31 (or Reliance CW-90)
T1 (ASB)	Transformer	Albion T29/7
(ATB)	Transformer	Albion T78/19
VT50	Transistor	Motorola 2N3055
ASB 200, ATB 200		
C50 a & b	Capacitor elect. 2100 F 40V	Sprague 32D 212G 040 AB 2A (or AB 6A)
C51	Capacitor elect. 200 F 35V	Wima Printilyt
C52	Capacitor 0.22 F 160V	Wima Tropyfol
MR11-12	Diode bridge	Motorola MDA 952-2
MR50-52	Diode	Motorola 1N4003 (3)
R50	Resistor 0.5 ohm 5W 5%	Wirewound
RV1 (ASB)	Resistor Variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
RV1 (ATB)	Resistor variable 500 ohm 5%	M.E.C. MP31 (or Reliance WL18)
T1 (ASB)	Transformer	Albion T78/8
T1 (ATB)	Transformer	Albion T78/21
VT50	Transistor	Motorola 2N3055
ASB 300, ATB 300		
C50 a & b	Capacitor elect. 3600µF 40V	Sprague 36D 362G 040 AB 2A (or AC 6B) (2)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA 952-2
MR50	Diode	Int. Rectifiers 3F10
MR51-52	Diode	Motorola 1N4003

Component Ref	Description	Manufacturers part/type
ASB 300, ATB 300		
R50 a & b	Resistor 0.5 ohm 5W 5%	Wirewound (2)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1 (ASB)	Resistor variable 500 ohm	Reliance WL18 (or Colvern CLR1106/9S
RV1 (ATB)	Resistor variable	M.E.C. MP31 (or Reliance WL-18)
T1 (ASB)	Transformer	Albion T152/4
T1 (ATB)	Transformer	Albion T120/26
VT50 a & b	Transistor	Motorola 2N3055
VT51	Transistor	Solidev 2N3055
ASB 500, ATB 500		
C50 a & b (ASB)	Capacitor elect. 5500µF 40V	Sprague 36D 552G 040 AC 2A (or AC 6B) (2)
C50 (ATB)	Capacitor elect. 12000µF 40V	Sprague 32D 123G 040 AC 2A (or CC 6B)
C51 a	Capacitor elect. 500µF 35V	Wima Tropyfol M
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA-962-2
MR50-52	Diode	Motorola 1N4003
R50 a & b (ASB)	Resistor 0.5 ohm 5W 5%	Wirewound (2)
R50 a-c (ATB)	Resistor 0.5 ohm 5W 5%	Wirewound (3)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1 (ASB)	Resistor variable 5%	Reliance WL18 (or Colvern CLR1106/9S
RV1 (ATB)	Resistor variable 5%	M.E.C. MP31 (or Reliance WL18)
T1 (ASB)	Transformer	Albion T78/14
T1 (ATB)	Transformer	Albion T120/27
VT50 a & b (ASB)	Transistor	Motorola 2N3055 (2)
VT50 a-c (ATB)	Transistor	Solidev 2N3055 (3)
VT51	Transistor	Solidev 2N3055
ASB 700		
C50 a & b	Capacitor elect. 7300µF 40V	Sprague 32D 732G 040 BC 2A (or BC 6B) (2)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA-962-2
MR50	Diode	RCA 40209
MR51 a & b	Diode	Westinghouse 1N5402 (2)
MR52	Diode	Motorola 1N4003

Component Ref	Description	Manufacturers part/type
ASB 700 (Cont'd)		
R50 a-c	Resistor 0.5 ohm 5W 5%	Wirewound (5)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
T1	Transformer	Albion T120/18
VT50 a-e	Transistor	Motorola 2N3055
VT51	Transistor	Solidev 2N3055
ASB 1000		
C50 a & b	Capacitor elect. 12000µF 40V	Sprague 32D 123G 040 CC 2A (or CC 6A) (2)
C51a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA-962-2
MR50	Diode	RCA 40209
MR51 a & b	Diode	Westinghouse 1N4721 (2)
MR52	Diode	Motorola 1N4003
R50 a-b	Resistor 0.5 ohm 5W 5%	Wirewound (6)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
T1	Transformer	Albion T120/19
VT50 a-f	Transistor	Motorola 2N3055 (6)
VT51	Transistor	Soidev 2N3055
ASB 1500		
C50 a-b	Capacitor elect. 7300µF 40V	Sprague 32D 732 040 BC 2A (or BC 6B)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA-972-2
MR50	Diode	RCA 40209
MR51 a & b	Diode	Westinghouse 1N4721 (2)
MR52	Diode	Motorola 1N4003
R50 a-h	Resistor 0.5 ohm 5W 5%	Wirewound (8)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
T1	Transformer	Albion T284/4

Component Ref	Description	Manufacturers part/type
ASB 1500		
VT50 a-h	Transistor	Motorola 2N3055 (8)
VT51	Transistor	Solidev 2N3055
ASB 2000		
C50 a & b	Capacitor elect. 7300 F 40V	Sprague 32D 732G 040 BC 2A (or BC 6B) (2)
C50 c & d	Capacitor elect. 12000 F 40V	Sprague 32D 123G 040 CC 2A (or CC 6B) (2)
C51 a	Capacitor elect. 1400 F 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39 F 40V	Mullard C415
C51 c	Capacitor elect. 500 F 35V	Wima Printilyt
C52	Capacitor 0.22 F 160V	Wima Tropyfol M
MR11 a-12a	Diode	RCA 1N40210R (or 1N40209R) (2)
MR11 b-12b	Diode	RCA 1N40210 (or 1N40209) (2)
MR51	Diode	Westinghouse 1N5402
MR52	Diode	Motorola 1N4003
R50 a-g	Resistor 0.5 5W 5%	Wirewound (7)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance WL18 (or Colvern CLR1106/9S)
T1	Transformer	Albion T248/5
VT50 a-g	Transistor	Motorola 2N3055 (7)
VT51	Transistor	Solider 2N3055
ASB 3000		
C50 a-c	Capacitor elect. 10,000 F 50V	Sprague 32D 103G 050 CC 2A (or CC 6B)
C51 a	Capacitor elect. 1400 F 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39 F 40V	Mullard C415
C51 c	Capacitor elect. 500 F 35V	Wima Printilyt
C52	Capacitor 0.22 F 160V	Wima Tropyfol
L1	Inductor	Albion L120/3
MR11 a-12 a	Diode	RCA 40210R (2)
MR11 b-12 b	Diode	RCA 40210 (2)
MR50 a & b	Diode	RCA 40209 (2)
MR51	Diode	Westinghouse 1N5402
MR52	Diode	Motorola 1N4003
R50 a-m	Resistor 0.5 ohm 5W 5%	Wirewound (13)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Reliance WL18 (for Colvern CLR1106/9S)

Components Ref	Description	Manufacturers part/type
ASB 3000 (Cont'd)		
T1	Transformer	Albion T638C/4
VT50 a-m	Transistor	RCA 2N3055 (13)
VT51	Transistor	Solidev 2N3055
ASC 50 - ATC 50		
C50	Capacitor elect. 1300µF 50V	Strague 36D 132G 050 AA 2A
C51	Capacitor elect. 200µF 35V	Wima Tropyfol M
C52	Capacitor 0.µF 160V	Wima Printilyt
MR11-12	Diode	Motorola 1N4003 (4)
MR50-51	Diode	Motorola 1N4003 (2)
R50	Resistor 1 ohm 5W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/9S (or M.E.C. MP31)
T1 (ASC)	Transformer	Albion T147/11
T1 (ATC)	Transformer	Albion T78/20
VT50	Transistor	Motorola 2N3055
ASC 100 - ATC 100		
C50	Capacitor elect. 2600µF 50V	Sprague 36D 262G 050 AB 2A
C51	Capacitor elect. 200µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode	Motorola 1N4003 (4)
MR50-51	Diode	Motorola 1N4003 (2)
R50	Resistor 1 ohm 5W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/95 (or M.E.C. MP31)
T1 (ASC)	Transformer	Albion T78/9
T1 (ATC)	Transformer	Albion T152/5
VT50	Transistor	Motorola 2N3055
ASC 200 - ATC 200		
C50 a & b	Capacitor elect. 2600µF 50V	Sprague 36D 262G 050 AB 2A
C51	Capacitor elect. 200µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-MR12	Diode bridge	Motorola MDA-952-2
MR50-51	Diode	Motorola 1N4003
R50 a & b	Resistor 1 ohm 5W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/9S (or M.E.C. MP31)

Component Ref.	Description	Manufacturers part/type
T1 (ASC)	Transformer	Albion T152/3
T1 (ATC)	Transformer	Albion T120/25
VT50 a & b	Transistor	Motorola 2N3055 (2)
ASC 300 - ATC 300		
C50	Capacitor elect. 5800µF 50V	Sprague 32D 582G 050 BC 2A
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-MR12	Diode bridge	Motorola MDA-952-2
MR50	Diode	Int. Rectifiers 3F10
MR51	Diode	Motorola 1N4003
R50 a & b	Resistor 0.5 ohm 5W 5%	Wirewound (2)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 500 ohm 5%	Colvern 1106/9S (Or M.E.C. MP31)
T1 (ASC)	Transformer	Albion T78/15
T1 (ATC)	Transformer	Albion T248/8
VT50 a & b	Transistor	Motorola 2N3055 (2)
VT51	Transistor	Solidev 2N3055
ASC 500 - ATC 500		
C50	Capacitor elect. 10000µF 50V	Sprague 32D 103G 050 CC 2A
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-MR12	Diode bridge	Motorola MDA-962-2
MR50	Diode	Int. Rectifiers 3F10
MR51	Diode	Motorola 1N4003
R50 a-d (ASC)	Resistor 0.5 ohm 5W 5%	Wirewound (4)
R50 a-c (ATC)	Resistor 0.5 ohm 5W 5%	Wirewound (3)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor 1 kohm 5%	Colvern CLR1106/9S (or M.E.C. MP31)
T1 (ASC)	Transformer	Albion T120/0
T1 (ATC)	Transformer	Albion T248/0
VT50 a-d (ASC)	Transistor	Motorola 2N3055 (4)
VT50 a-c (ATC)	Transistor	Solidev 2N3055 (3)
ASC 700		
C50 a	Capacitor elect. 8500µF 50V	Sprague 32D 582G 050 BC 2A
C50 b	Capacitor elect. 10000µF 50V	Sprague 32D 103G 050 CC 2A
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol
MR11-12	Diode bridge	Motorola MDA-972-2
MR50	Diode	RCA 40209
MR51	Diode	Motorola 1N4721

Component Ref.	Description	Manufacturers part/type
ASC 700 (Cont'd)		
R50 a-e	Resistor 0.5 ohm 5W 5%	Wirewound
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/9S
T1	Transformer	Albion T248/6
VT50 a-e	Transistor	Motorola 2N3055
VT51	Transistor	Solidev 2N3055
ASC 1000		
C50 a & b	Capacitor elect. 1000µF 50V	Sprague 32D 103G 050 CC 2A (2)
C51 a	Capacitor elect. 500µF 35V	Wima Printilyt
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
MR11-12	Diode bridge	Motorola MDA-972-2
MR50	Diode	RCA 40209R
MR51	Diode	Motorola 1N5402
R50 a-f	Resistor 0.5 ohm 5W 5%	Wirewound (6)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/9S
T1	Transformer	Albion T248/7
VT50 a-f	Transistor	Motorola 2N3055 (6)
VT51	Transistor	Solidev 2N3055
ASC 1500		
C50 a-c	Capacitor elect. 1000µF 50V	Sprague 32D 103G 050 CC 2A (3)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
MR11 a-12 a	Diode	RCA 1N40210R (2)
MR11 b-12 b	Diode	RCA 1N40210 (2)
MR50	Diode	RCA 1N40209
MR51	Diode	Motorola 1N4721
R50 a-g	Resistor 0.5 ohm 5W 5%	Wirewound
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor 1 kohm 5%	Colvern CLR1106/9S
T1	Transformer	Albion T638C/5
VT50 a-g	Transistor	Motorola 2N3055 (7)
VT51	Transistor	Solidev 2N3055

Component Ref.	Description	Manufacturers part/type
ASC 2000		
C50 a & b	Capacitor elect. 15000µF 75V	Sprague 36D 153F 075 CF 2A (2)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor 0.22µF 160V	Wima Tropyfol M
L1	Inductor	Albion L120/4
MR11 a-12 a	Diode	RCA 1N40210R (2)
MR11 b-12 b	Diode	RCA 1N40210 (2)
MR50 a & b	Diode	RCA 1N40209 (2)
MR51	Diode	Motorola 1N4721
R50 a-i	Resistor 0.5 ohm 5W 5%	Wirewound (9)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1105/9S
T1	Transformer	Albion T638C/6
VT50 a-i	Transistor	Motorola 2N3055 (9)
VT51	Transistor	Solidev 2N3055
ASC 3000		
C50 a & b	Capacitor elect. 15000µF 75V	Sprague 36D 153F 075 CF 2A (2)
C51 a	Capacitor elect. 1400µF 64V	Mullard C432 FR/H1400
C51 b	Capacitor elect. 39µF 40V	Mullard C415
C51 c	Capacitor elect. 500µF 35V	Wima Printilyt
C52	Capacitor elect. 0.22µF 160V	Wima Tropyfol M
L1	Inductor	Albion L120/5
MR11 a-12 a	Diode	RCA 1N40210R (2)
MR11 b-12 b	Diode	RCA 1N40210 (2)
MR50 a & b	Diode	RCA 40209 (2)
MR51	Diode	Motorola 1N4721
R50 a-m	Resistor 0.5 ohm 5W 5%	Wirewound (13)
R51	Resistor 1 kohm 3W 5%	Wirewound
RV1	Resistor variable 1 kohm 5%	Colvern CLR1106/9S
T1	Transformer	Albion T638/7
VT50 a-m	Transistor	RCA 2N3055 (13)
VT51	Transistor	Solidev 2N3055

TABLE 5

Parts list: PCB 293/294 and PCB 397/398

PCB 293/294

Component ref.	Description	Manufacturers part/type
C1	Capacitor 200µF elect. 35V	Wima Printilyt
C2	Capacitor 1000pF 400V	Wima Tropyfol M
C3	Capacitor 200µF elect. 35V	Wima Printilyt
C4	Capacitor 5µF elect. 64V	Mullard C428 AR/H5
MR1	Diode, zener 4.3V	Mullard BZY 88C4V3
MR2	Diode, zener 5.1V	Mullard BZY 88C5V1
MR3	Diode, zener 5.6V	Mullard BZY 88C5V6
MR4	Diode, zener 4.3V	Mullard BZY 88C4V3
MR5	Diode	Motorola 1N4001
MR6	Diode, zener 5.1V	Mullard BZY 88C5V1
MR7-10		Mullard 1N4001
MR11-12		
	Note... MR11-12 may be fitted to the PCB 294 on some power supply units instead of on the main chassis. Details of these components are contained in the parts list for each power supply.	
MR13-14	Diode	Mullard 1N4001
R1	Resistor 2 2 kohm carbon	All resistors are 5% ½W carbon
R2	Resistor 7.5 kohm carbon	
R3	Resistor 100 ohm, carbon	
R4	Resistor 1 kohm, carbon	
R5	Resistor 10 kohm, carbon	
R6	Resistor 390 ohm carbon	
R7	Resistor, * selected component	
R8	Resistor 1 kohm, carbon	
R9	Resistor 180 ohm, carbon	
R10	Resistor * selected component	
R11	Resistor 1 kohm, carbon	
R12	Resistor * selected component	
R13	Resistor 470 ohm, carbon	
R14	Resistor 2.2 kohm, carbon	
R15-16	Resistor 4.7 kohm, carbon	
R17	Resistor 240 ohm, carbon	
R18	Resistor 470 ohm, carbon	
R19	Resistor 510 ohm, carbon	
R20	Resistor * selected component	
R21-R22	Resistor 100 ohms, carbon	
	Note... R22 is removed when Coutant Overvoltage Protection Units are fitted to the power supply.	
	Note... Details of the values for * selected components can be found in Table 3.	
VT1-VT2	Transistor	Mullard BFY51
VT3	Transistor	Mullard BCY72
VT4	Transistor	Mullard BC108
VT5a-VT5b	Transistor	Mullard BC108

PCB 397/398

Component ref.	Description	Manufacturers part/type
C1	Capacitor 200µF elect. 35V	Wima Printilyt
C2	Capacitor 2200pF 400V	Wima Tropyfol M
C3	Capacitor 200µF elect. 6.4V	Mullard C426 AR/C200
C4	Capacitor 5µF elect. 64V	Mullard C428 AR/H5
C5	This component annotation is not used	
C6	Capacitor 4700pF 160V	Wima Tropyfol M
C7	Capacitor 0.01µF 400V	Wima Tropyfol M
Note... C7 is only fitted to units with outputs of 15A and above		
MR1	Diode, zener 4.3V	Mullard BZY 88C4V3
MR2	Diode, zener 5.1V	Mullard BZY 88C5V1
MR3	Diode, zener 5.6V	Mullard BZY 88C5V6
MR4	Diode, zener 4.3V	Mullard BZY 88C4V3
MR5	Diode	Motorola 1N4003
MR6	Diode, zener 5.1V	Mullard BZY 88C5V1
Note... MR6 on some boards may be 1N823. This is a manufacturers change. Resistor R19 is associated with this change.		
MR7-10	Diode	Mullard 1N4003
MR11-12		
Note... MR11-12 may be fitted to the PCB 398 on some power supply units instead of on the main chassis. Details of these components are contained in the parts list for each power supply.		
MR13-14	Diode	Mullard 1N4003
R1	Resistor 390 ohm, high stability	
R2	Resistor 82 kohm, carbon film	Electrosil TR5
R3	Resistor 100 ohm, carbon film	Metal oxide, high stability
R4	Resistor 1 kohm, carbon film	resistors 2% or 5%
R5	Resistor 10 kohm, carbon film	Waycom Piher WP051
R6	Resistor 390 ohm, high stability	carbon film resistors
R7	Resistor, * selected component, high stability	½W 5%
R8	Resistor 560 ohm, carbon film	
R9	Resistor 180 ohm, carbon film	
R10	Resistor * selected component, high stability	
R11	Resistor 1 kohm, high stability	
R12	Resistor * selected component, high stability	
R13	Resistor 470 ohm, carbon film	
R14	Resistor 2.2 kohm, carbon film	
R15-16	Resistor 4.7 kohm, carbon film	
R17	Resistor 240 ohm, high stability	
R18	Resistor 470 ohm, carbon film	
R19	Resistor 510 ohm, high stability	

(Table 5 Cont.)

PCB 397/398

Component ref.	Description	Manufacturers part/type
	Note... R19 on some boards may have a value of 620 ohms. This is a manufacturers change. Rectifier MR6 is associated with this change.	
R20	Resistor * selected component, high stability	
R21-R22	Resistor 100 ohms, carbon film	
	Note... R22 is removed when Coutant Overvoltage Protection Units are fitted to the power supply.	
R23	Resistor 39 kohm, carbon film.	
	Note... Details of the values for * selected components can be found in Table 3.	
VT1-VT2	Transistor	Mullard BFY51 (alternative 2N3053)
VT3	Transistor	Mullard BCY72 (alternative SM 4975)
VT4	Transistor	Mullard BC108 (alternative 2N3053)
VT5a-VT5b	Transistor	Fairchild U415 (alternative 2 x BC108 or 2 x SM 6576 if VT3 is BCY72)
VT6	Transistor	Mullard BCY72 (alternative SM4975)

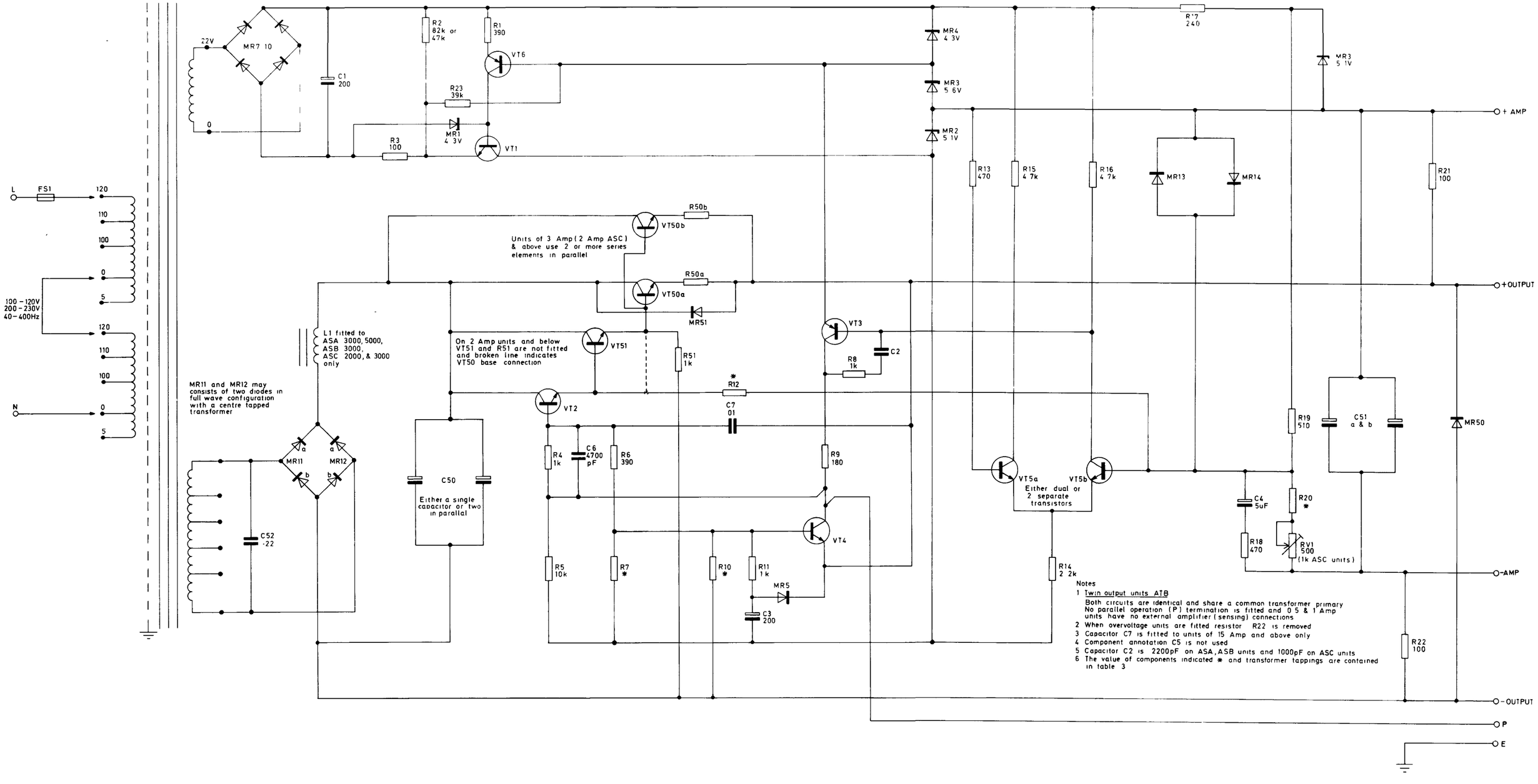


Fig 5

Coutant A series power supply: circuit diagram

Fig.5

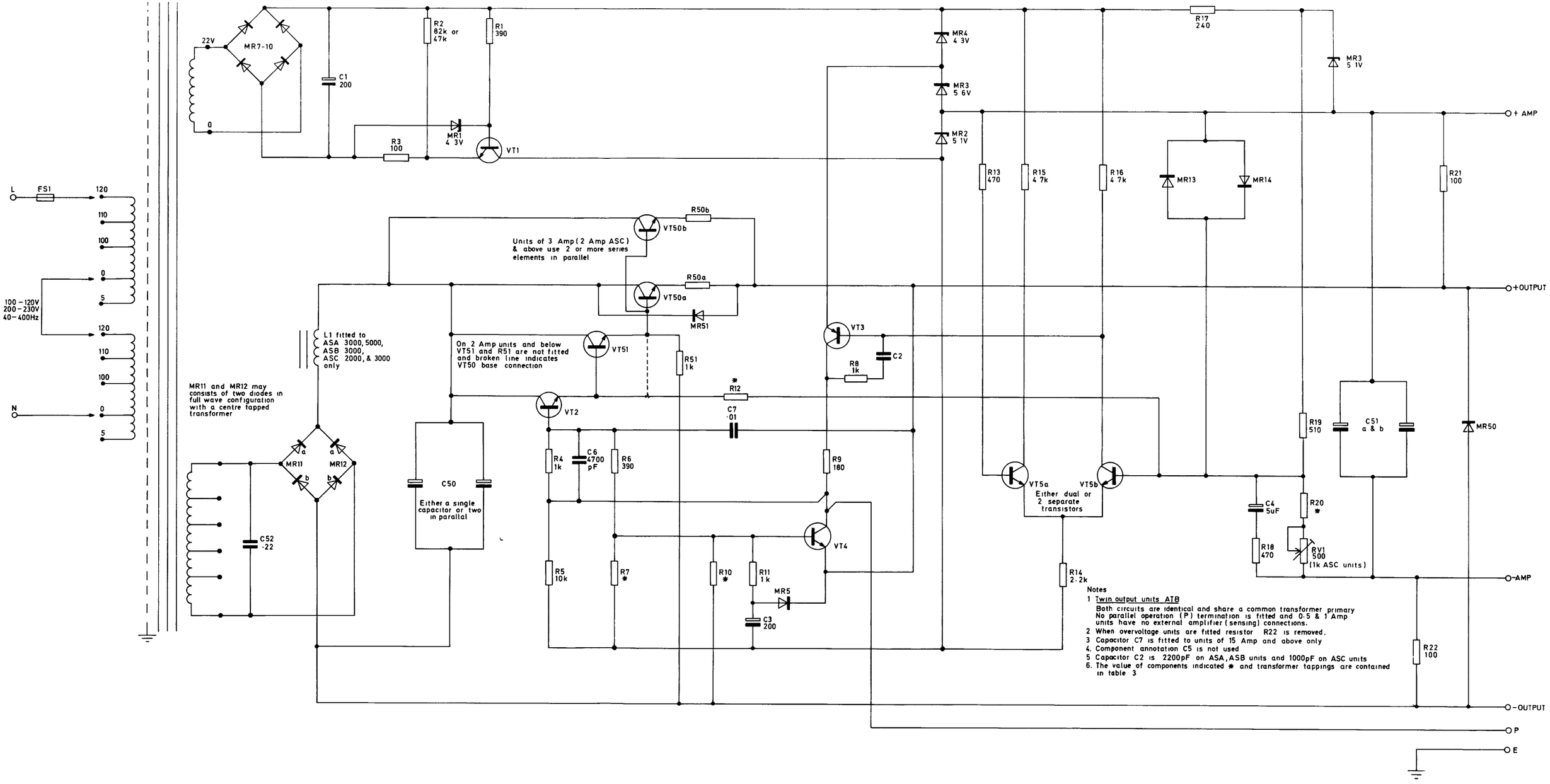


Fig. 6

Coutant A series power supply: circuit diagram
(early version)

Fig.6

APPENDIX A

Coutant overvoltage protection units

1. OV series
2. KRO 30

Appendix A

COUTANT OVERVOLTAGE PROTECTION UNIT

OV SERIES

1. Coutant OV protection units are designed to protect voltage sensitive components connected to the output terminals of standard Coutant A Series power supply units. Voltage rise beyond a pre-adjusted limit results in the firing of a Crowbar SCR which clamps the output of the supply unit at zero.

2. The overvoltage unit connects directly to the tagboard of the power supply or alternatively can be connected into the output cableform remote from the supply. A dc fuse which forms part of the protection circuit is mounted on the OV printed circuit board. The OV protection unit derives its power from its associated power supply. The following specifications apply to the unit:-

Dimensions:	2.25 in (57 mm) x 2.375 in (61 mm) x 4.2 in (107 mm)
Weight:	4½ oz (127.5 gm)
Overvoltage limits:	Range 1 8.5 to 35V Range 2 4.5 to 13V
Temperature range:	-10 deg. C. to +65 deg. C.
Setting resolution:	Range 1 100 mV Range 2 60 mV
Minimum threshold setting: for protection over the full temperature range	Range 1 output volts +5% nom. Range 2 output volts +10% nom.
Delay time:	Normal 20 µS (set by manufacturer) Minimum 3 µS (by removal of link LKA)

Circuit description (fig.1)

3. A voltage derived from the output of the power supply by potential divider R4 and RV1 is compared by VT2 with a fixed reference voltage across Zener diode MR4 (high range) and MR3 (low range). VT3 and VT4 provide a constant current source to drive the Zener diode over a wide voltage range.

4. When the voltage from the potential divider R4/RV1 rises sufficient to cause VT1 to conduct, the resultant signal amplified by VT1 fires SCR2. This fires SCR1 clamping the +ve output rail and the P terminal via MR1 to the -ve output rail. Link LKB is inserted for low voltage operation (4.5 to 13V).

5. If the overvoltage condition has been caused by other than a series element failure the unit goes into the overcurrent protection condition and only a few milliamps will be drawn from the power supply. Series element failure results in a large current surge through SCR1 blowing fuse FS1 in the OV protection unit; isolating the -ve output rail from the load.

6. A delay is introduced between the occurrence of the overvoltage condition and the firing of the SCR by the insertion of link LKA. The link made gives a delay of 20µS. Removal of the link reduces this delay to 3µS so that the unit then responds to transient voltage changes. To adjust the OV unit proceed as follows:-

(1) Unclip the cover from the printed circuit board on the OV protection unit

(2) Turn the OV potentiometer (RV1) fully counterclockwise

(3) Monitor the output voltage with a suitable voltmeter and adjust the output voltage control on the power supply for an indication of 10% above the normal output

(4) Turn the OV potentiometer clockwise until the unit trips indicated by the output falling to zero

(5) Switch off the power supply and turn the output voltage control fully counterclockwise. Switch on the power supply

(6) Check that the OV protection unit trips at 10% above normal by increasing the output voltage. If necessary repeat paras. (2) to (5)

(7) After satisfactory adjustment reset the power supply for the normal output and refit the cover on the OV protection unit.

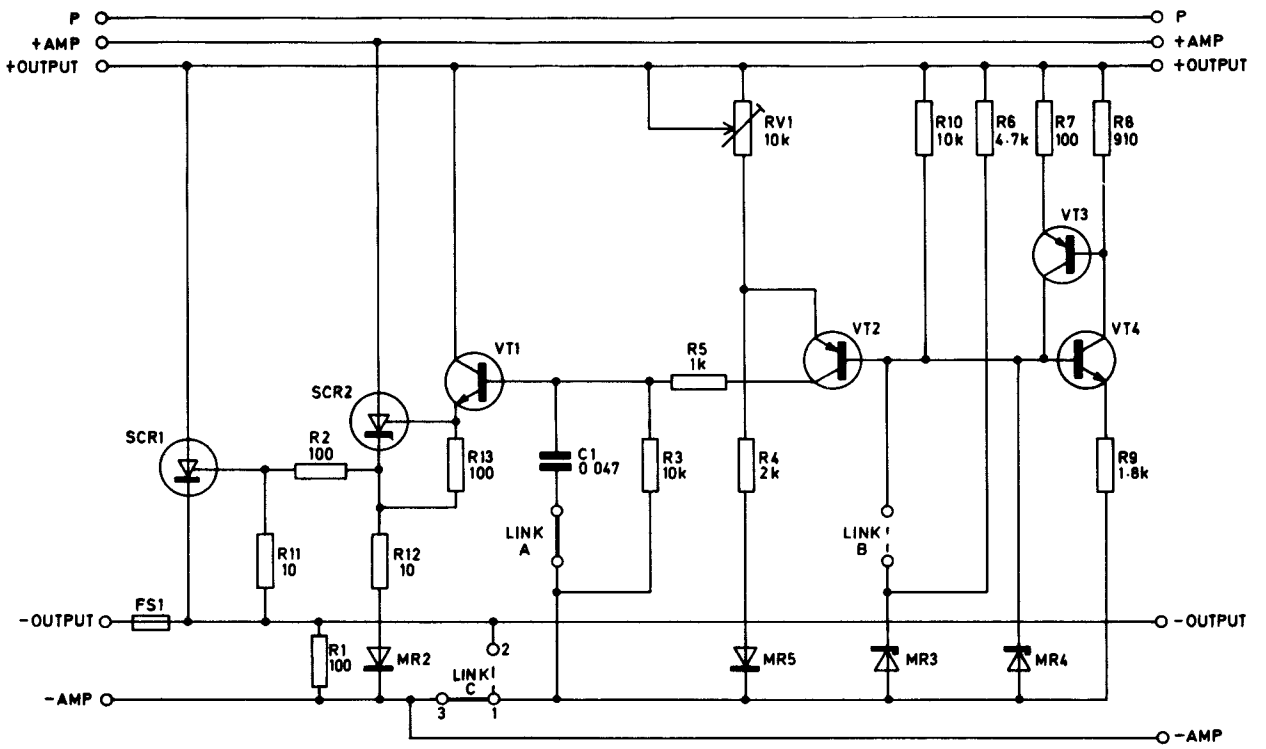


Fig 1 Circuit diagram : OV series 2, 3 and 4

7. Coutant overvoltage protection units OV series are fitted to the following power supplies:-

(1) Coutant power supply type ASB 700/6; part of FGRI 26062/1. Embodied under modification No. A3888 - AP 116S-0206-2

(2) Coutant power supply type ASB 700/12; part of FGRI 26062/1. Embodied under modification No. A3889 - AP 116S-0206-2

Parts List

Components ref	Description	Manufacturers part/type
C1	0.047 160V	Wima Tropyfol M
MR1	Diode	Texas Instruments 1N914
MR2	Diode	Motorola 1N4003
MR3	Diode Zener 3.3V	Mullard BYZ 88 C3V3
MR4	Diode Zener 6.2V	Mullard BZY 88 C6V2
MR5	Diode	Motorola 1N4003
R1-R2	Resistor 10 ohm ½W 5%	Carbon
R3	Resistor 10 kohm ½W 5%	Carbon
R4	Resistor 2 kohm ½W 2% high stab	Carbon
R5	Resistor 1 kohm ½W 5%	Carbon
R6	Resistor 4.7 kohm ½W 5%	Carbon
R7	Resistor 100 ohm ½W 5%	Carbon
R8	Resistor 910 ohm ½W 5%	Carbon
R9	Resistor 1.8 kohm ½W 5%	Carbon
R10	Resistor 10 kohm ½W 5%	Carbon
R11	Resistor 10 ohm ½W 5%	Carbon
R12	Resistor 10 ohm ½W 5%	Carbon
R13	Resistor 100 ohm ½W 5%	Carbon
RV1	Resistor variable 10 kohm	Reliance WL18 or M.E.C. MP31
SCR1	Silicon controlled rectifier	RCA 2N3896 (0V2 & 0V3)
SCR1	Silicon controlled rectifier	Westinghouse 29T1 (0V4)
SCR2	Silicon controlled rectifier	Motorola 2N5061
VT1	Transistor	Mullard BC107
VT2	Transistor	Mullard BCY72
VT3	Transistor	Mullard BCY70
VT4	Transistor	Mullard BC107

COUTANT OVERVOLTAGE PROTECTION UNIT KRO 30

(5920-99-626-8109)

General description

1. Type KRO overvoltage protection units are fully encapsulated complete units and capable of providing protection of voltage sensitive loads in any power system up to a rating of 3 amps.

2. The unit is connected across the supply lines to the load. In the event of the supply line voltage rising above the preset protection level a fast acting circuit operates to turn on a SCR connected across the supply lines thus effectively short circuiting the supply and protecting the load. The following are the specifications for the unit.

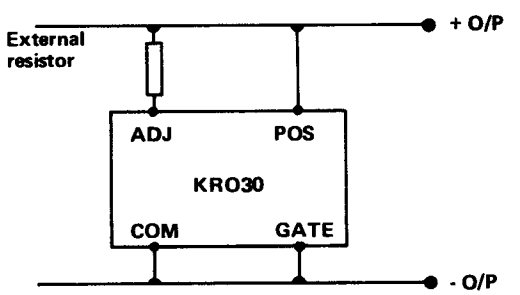
Preset limit voltage	30V ± 2%
Adjustable range	10-35V
Operating temprature range	-15C to +100°C
Delay time	Supplied set at 20µS
Case style	A
	Pin 1 POS
	Pin 2 ADJ
	Pin 3 GATE
	Pin 4 COM

Voltage setting

3. Units are internally preset before encapsulation but any voltage within the range 10-35V can be set by the addition of one external resistor. For voltage above the preset level the resistor is connected between the positive supply line and the ADJ pin. For voltages below the preset level the resistor is connected between the negative supply line and the ADJ pin.

4. A range of resistor values with corresponding voltage settings is given in the following table:

Voltage	Resistor value
10	4.3kΩ
12	6.0kΩ
15	9.5kΩ
18	14.7kΩ
20	20.0kΩ
22	27.6kΩ
25	56.0kΩ
27	100.0kΩ
35	7.5kΩ



Units to which fitted

5 Overvoltage protection unit type KRO30 is fitted to Countant power supply type ATB 100 12/2; part of FGRI 26062/1. Embodied under modification No. A3887 - AP 116S-0206-2.

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