INSTRUMENT HANDBOOK

ISSUE 5

Applicable from Serial No. 40,000

MODEL 216A

DC POWER SUPPLY

CONTENTS

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INSTRUMENT HANDBOOK

MODEL bwd 216A

DUAL HIGH VOLTAGE STABILISED D.C. POWER SUPPLY

1. GENERAL.

Model bwd 216A provides two stabilised independent D.C. Power Supplies and 6.3V A.C. heater supplies. Both D.C. supplies are fully protected by constant current overload, with the main 0-400V supply having variable overload from 20 to 200mA. High stability solid state control circuitry, together with a valve pre-regulator provide the minimum of warmup time (approximately 15 sec. to within 10mV of set output), together with a complete absence of 'switch on' surges, should a load be connected when the unit is switched on.

All the supplies are completely independent and are isolated from ground, and each other, providing operation at ±500V from ground.

2. PERFORMANCE.

2.1 D.C. Power Supplies.

	0-400V	0-250V
Voltage Output - continuously variable	0-400V	0-250V
Current Range	0-200mA	0-50mA
Line and Load Regulation for a 10% Line	0.002%	0.002%
And 100% Load Change	+3mV	+3mV
Ripple and Noise at Full Load	<20mV p-p, 1mVrms	<10mV p-p, 1mV rms
Response Time 0-100% Load to within 100mV	<50µSec	<50µSec
Temperature Stability 0 to 50°C	(0.01%+2mV)/°C	(0.01%+2mV)°C
Long Term Stability 1000 hours Constant Load and Temperature	0.1%	0.1%

2.2

Constant Current Output - continuously variable	20-200mA	>60mA Fixed
Output Impedance D.C. - 1kHz	>10KΩ	>10KΩ
Current Ripple p-p maximum	<4mA	<4mA
Upper Voltage Limit - continuously variable	0-400V	0-250V
Current Stabilisation for 10% Line Change	>200:1	

2.3 A.C. Supplies.

Phased by 'Dot' notation on front panel 2 x 6.3V at 3 Amp.RMS for series/parallel connection.

2.4 Input Supply Range.

85 to 137V, 185 to 260V, 50-60Hz.

2.5 Output Polarity.

Supplies completely isolated, may be taken to ±500V from ground, either side, earthed, or may be connected in series.

2.6 Environmental Conditions.

Temperature Range: 0 to 50°C
Humidity: 0 to 90% RH

2.7 Output Terminations.

Heavy current insulated screw terminals at 3/4" centres. Terminals accommodate 4mm plugs, spade terminals or wire.

2. PERFORMANCE. (Cont'd.)

2.8 Finish.

Light grey front and rear panels, blue grey vinyl covered aluminium covers and natural anodised surrounds on front and rear panels. Light grey to Federal Standard 595 Colour No.26492.

2.9 Dimensions.

Bench Mounting 8" (20cm) high, 8.1/4" (21cm) wide and 12.1/4" (32cm) deep.

2.10 Weight

21 lbs. (8½kg) Domestic Pack 25 lbs. (10½kg)
Export Pack 35 lbs. (16kg)

2.11 Options.

02 10 turn vernier voltage control complete with digit dial indicator.
05 as for 02, less digit dial indicator.

3. FUNCTION OF CONTROLS.

Power - ON-OFF:	DPST Toggle switch fitted in A.C. line before A.C. Fuse.
A.C. Fuse:	3 Amp. delay fuse fitted between power switch and transformer.
Power Indicator:	Low voltage lamp connected to one of the power transformer secondaries.
Voltage Controls:	Continuously variable controls set the required output voltages on both the 0-400 and 0-250V supplies.
Current Control:	Continuously variable control sets the required current overload on the 0-400V supply only. (See figure 2).
Current Pull to Set:	Switch on rear of Current Control places the supply into constant current (with greater than 20V output) enabling the current overload to be set via the panel meter.
Meter Range:	Selects either voltage or current of either the 0-400V or the 0-250V supply for presentation on the single front panel meter.
Standby-Use Switches:	In 'standby' open circuit their appropriate output terminals and in 'Use' apply the output voltage to the output terminals.

4. FIRST TIME OPERATION.

Switch both Standby-Use Switches to Standby.

Make sure that the Current Control is pushed in. Plug in and switch on. After approximately 15 seconds, the required output voltages can be set via their respective Voltage Controls, using either the front panel meter, switched to the appropriate range, or an external meter. The maximum current required for the 0-400V supply can now be set by setting the Meter Range to the mA scale of the 0-400V range, and pulling the Pull-to-Set Current Knob. Rotation of the knob will vary the current overload point as shown on the meter. Having set all voltages and currents, be sure to push the Current Control back in. Connect the required load to the front panel terminals, heaters included if required. Switch the Standby - Use Switches to 'Use'. If the supply voltage drops, the supply is in overload, i.e. the load is drawing too much current. Check the load circuit for possible shorts etc.

4. FIRST TIME OPERATION. (Cont'd.)

NOTE: The Constant Voltage/Constant Current characteristics of both D.C. supplies employ automatic crossover techniques so that the supply will not allow a greater current to flow than that set by the Current Control. (See figure 2).

5. CIRCUIT DESCRIPTION.

5.1 The A.C. input is taken via S1A and B and F1 to the primary of T1. The 0-400V supply will be described since the 0-250V supply is virtually identical in operation, except for
a) only one valve is used in the pre-regulator and
b) no variable constant current control is used.
The 0-440V secondary is rectified by the bridge D1,2,3 and 4 and filtered by C1 and C2. Valves V1,2,3 and 4 have their cathode/grid circuits connected across Q7 and Q8, paralleled regulator transistors, in such a way that the potential across Q7 and Q8 is maintained at the bias value required by the valves to supply the particular output requirements. R4,5,6 and 7 function as balancing resistors to ensure that the current in each valve is approximately equal and D9 prevents the grids from attaining a positive bias and also Q7 and Q8 from damage due to reverse polarity. The heater winding is rectified by D5, regulated by Q10,11 and 12 and is used as the supply for the control circuit.

5.2 The +ve output is taken via R23 to pin 6 of IC1B. Referring to the Integrated Circuit schematic, the +ve output is taken to Q5 base. Q6 base (pin 9) is taken via R24 to RV1, the Output Voltage Control, the other end being connected to the -ve output line. A constant current source provided by Q13, Q14, R26, R27 and RV2 is taken to RV1, setting the base voltage of Q6. Balance in the differential pair (Q5, Q6) will occur when the +ve output voltage is equal to the voltage across RV1. The output of IC1B is taken from the collector of Q5 via D12 to emitter follower Q9. An increase in the value of RV1 will cause the base of Q6 to rise in a positive direction. Q6 emitter and hence Q5 emitter will also rise tending to reduce conduction in Q5. Q5 collector will also rise and via D12, Q9 and the series regulator circuit the output voltage will also rise until the bases of Q5 and Q6 are at an equal potential. Any changes in the output voltage not caused by RV1 will appear on the base of Q5 which will invert and amplify the change and via D12, Q9 and the regulator circuit correct the output.

5.3 The current sensing resistor R15 develops a voltage across itself proportional to the output current. The base of Q1 (IC1A) is connected to the input of R15 via R13 so that the base of Q1 will increase its potential in a positive direction as the output current increases. The base of Q2 is taken via R14 to the positive end of RV2, the Output Current Control. Voltage divide R19 and RV4 feeds into RV2 producing a voltage at Q2 base which is proportional to the value of RV2.

When the output current rises such that the base of Q1 rises above the base potential of Q2, Q1 increases its conduction and via D10 and Q9 reduces the output of the supply. A quiescent level of output is reached when the bases of Q1 and Q2 are at an equal potential.

5.4 The output impedance compensation network introduces positive feedback into the constant voltage amplifier to achieve an easily adjustable output characteristic. RV5 connected across the current sensing resistor R15 produces a voltage at its wiper which is proportional to the output current and increases in a positive direction as the current increases. This voltage is fed via R16 into pin 12 of IC1B (emitter Q4). As the emitter of Q4 rises, so does its collector and the emitters of Q5 and Q6. Q5 collector will rise and increase the output via D12 and the series regulator. Adjustment of RV5 will compensate for the inherent output impedance of the supply.

5. CIRCUIT DESCRIPTION. (Cont'd.)

5.5 Various protection diodes are incorporated in the circuit; their operation is as follows:-

D13 and D14 limit any excursion of Q5 base with respect to the +ve output to ±0.6V.
D15 protects the control circuit should an external reverse voltage be applied across the output terminals.
D9 protects both the valve grids and the transistors Q7 and Q8 in the event of an external voltage of greater potential being applied to the output terminals.

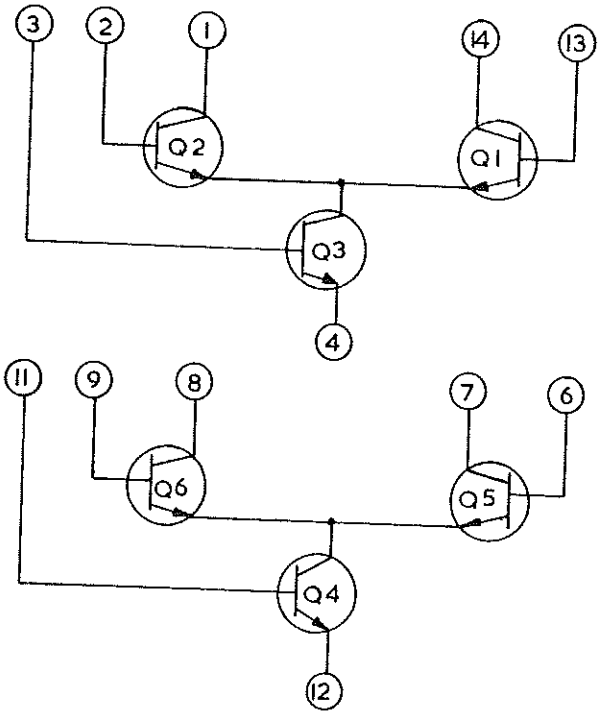


Figure 1. Integrated Circuit Schematic

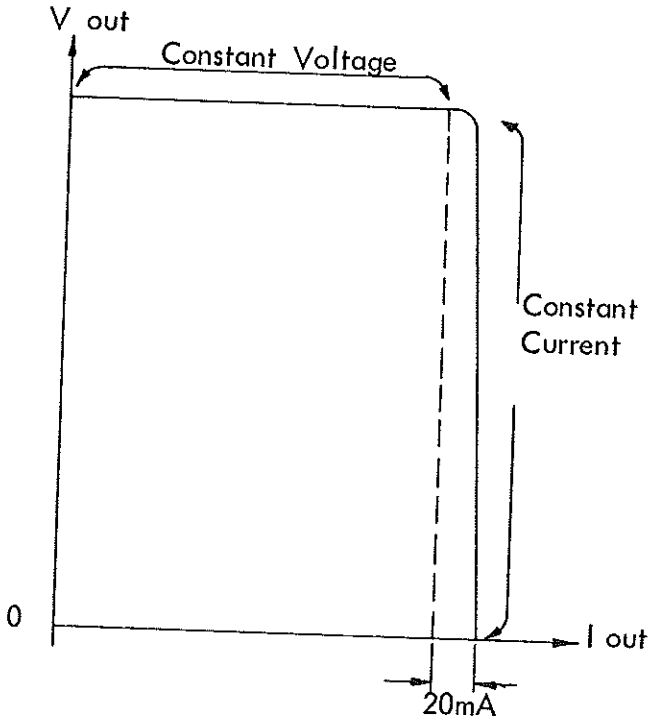


Figure 2. Constant Voltage/Current Crossover Characteristics

6. MAINTENANCE AND ADJUSTMENTS.

6.1 RV2 Maximum Output Voltage Preset (0-400V)

RV2 is adjusted to give an output voltage range of 0-410V.

6.2 RV4 Maximum Output Current Preset (0-400V)

With an external ammeter across the output terminals and the current output control turned max. clockwise RV4 is adjusted to give approximately 240mA.

6.3 RV5 Output Impedance Preset (0-400V)

Connect a DVM (capable of resolving at least 200μV at 10V and with input protection to at least ±400V) and a stable power supply as shown on page 5. Adjust RV5 so that the change in DVM reading is less than 1mV when a 2000Ω resistor is connected across the terminals.

6.4 RV6 Ammeter Calibrate (200mA 0-400V)

Connect an ammeter across the output terminals and adjust the Current Control until the external ammeter reads 200mA. Adjust RV10 to make the front panel meter read F. S. D.

6. MAINTENANCE AND ADJUSTMENTS. (Cont'd.)

6.5 RV7 Voltmeter Calibrate (0-400V)

Connect a voltmeter or DVM across the supply and adjust the Output Voltage Control to give exactly 400V output. RV7 is adjusted, with the meter range in the appropriate position, for a F.S.D. indication on the panel meter.
NOTE: Check, both before and after adjustment, that the mechanical zero of the meter is set correctly.

6.6 RV9 Maximum Output Voltage Preset (0-250V)

RV9 is adjusted to give an output voltage range of 0-255V.

6.7 RV10 Output Impedance Preset (0-250V)

Adjust as for RV5 using a load resistor of 5000Ω.

6.8 RV11 Ammeter Calibrate (50mA 250V)

Connect an ammeter in series with a 2000Ω resistor across the supply and adjust the output voltage until exactly 50mA output current flows through the ammeter. RV11 is adjusted so that the front panel meter indicates 50mA.
NOTE: Check mechanical zero before and after adjustment.

6.9 RV12 Voltmeter Calibrate (0-250V)

Connect a voltmeter or DVM across the supply and adjust the Output Voltage Control to give exactly 250V output. RV12 is adjusted, with the meter range in the appropriate position for the panel meter to indicate 250V exactly.
NOTE: Check mechanical zero before and after adjustment.

7. REPLACEMENT PARTS.

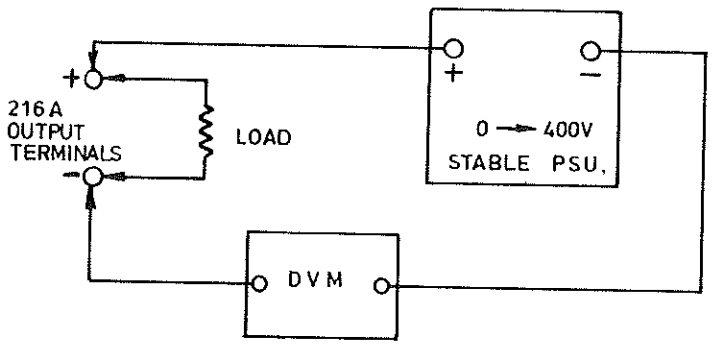
Spares are normally available from the manufacturer, B.W.D. Electronics Pty.Ltd. When ordering, it is necessary to indicate the serial number of the instrument. If exact replacements are not to hand, locally available alternatives may be used, provided they possess a specification not less than or physical size not greater than the original components.

As the policy of B.W.D. Electronics Pty.Ltd., is one of continuing research and development, the Company reserves the right to supply the latest equipment and make amendments to circuit and parts without notice.

8. GUARANTEE.

The equipment is guaranteed for a period of twelve (12) months from the date of purchase, against faulty materials and workmanship.

Please refer to Guarantee Registration and No.....which accompanied instrument for full details of conditions and warranty.



Adjust the PSU to the same voltage as the 216A output. The DVM will show the change in output as the load is taken on or off.

PARTS LIST - MODEL bwd 216A

CCT REF.	DESCRIPTION				Mfr. or Supply	PART NO.	
	RESISTORS						
R1	100KΩ	1Watt	5%	cc	PI		
R2	100KΩ	1Watt	5%	cc	PI		
R3	10KΩ	½Watt	5%	cc	PI		
R4	10Ω	1Watt	5%	cc	PI		
R5	10Ω	1Watt	5%	cc	PI		
R6	10Ω	1Watt	5%	cc	PI		
R7	10Ω	1Watt	5%	cc	PI		
R8	1KΩ	½Watt	5%	cc	PI		
R9	10Ω	1Watt	5%	cc	PI		
R10	10Ω	1Watt	5%	cc	PI		
R11	47KΩ	½Watt	5%	cc	PI		
R12	820Ω	½Watt	5%	cc	PI		
R13	2.2KΩ	½Watt	5%	cc	PI		
R14	2.2KΩ	½Watt	5%	cc	PI		
R15	4.7Ω	½Watt	5%	WW	IRC	BW½	
R16	5.6KΩ	½Watt	5%	cc	PI		
R17	10KΩ	½Watt	5%	cc	PI		
R18	6.8KΩ	½Watt	5%	cc	PI		
R19	8.2KΩ	½Watt	5%	cc	PI		
R20	470KΩ	½Watt	5%	cc	PI		
R21	6.8KΩ	½Watt	5%	cc	PI		
R22	47KΩ	½Watt	5%	cc	PI		
R23	2.2KΩ	½Watt	5%	cc	PI		
R24	2.2KΩ	½Watt	5%	cc	PI		
R25	22KΩ	½Watt	5%	cc	PI		
R26	100Ω		2%	MO	T	TR5	
R27	22KΩ	½Watt	5%	cc	PI		
R28	560Ω		2%	MO	T	TR5	
R29	1KΩ	½Watt	5%	cc	PI		
R30	6.8KΩ	½Watt	5%	cc	PI		
R31	100KΩ	1Watt	5%	cc	PI		
R32	10KΩ	½Watt	5%	cc	PI		
R33	10KΩ	½Watt	5%	cc	PI		
R34	220Ω	½Watt	5%	cc	PI		
R35	10Ω	½Watt	5%	cc	PI		
R36	220Ω	½Watt	5%	cc	PI		
R37	330KΩ	1Watt	5%	cc	PI		
R38	1KΩ	½Watt	5%	cc	PI		
R39	270Ω	½Watt	5%	cc	PI		
R40	10KΩ	½Watt	5%	cc	PI		
R41	47KΩ	½Watt	5%	cc	PI		
R42	820Ω	½Watt	5%	cc	PI		
R43	2.2KΩ	½Watt	5%	cc	PI		
R44	2.2KΩ	½Watt	5%	cc	PI		
R45	4.7Ω	½Watt	5%	WW	IRC	BW½	
R46	5.6KΩ	½Watt	5%	cc	PI		
R47	10KΩ	½Watt	5%	cc	PI		
R48	6.8KΩ	½Watt	5%	cc	PI		

CCT Ref.	DESCRIPTION				Mfr. or Supply	PART NO.	
R49	8.2K	½Watt	5%	cc	PI		
R50	470KΩ	½Watt	5%	cc	PI		
R51	6.8KΩ	½Watt	5%	cc	PI		
R52	47KΩ	½Watt	5%	cc	PI		
R53	2.2KΩ	½Watt	5%	cc	PI		
R54	2.2KΩ	½Watt	5%	cc	PI		
R55	22KΩ	½Watt	5%	cc	PI		
R56	100Ω		2%	MO	T	TR5	
R57	1KΩ	½Watt	5%	cc	PI		
R58	1KΩ	½Watt	5%	cc	PI		
R59	1KΩ	½Watt	5%	cc	PI		
R60	6.8KΩ	½Watt	5%	cc	PI		
R61	330KΩ	1Watt	5%	cc	PI		
R62	1KΩ	½Watt	5%	cc	PI		
R63	1KΩ	½Watt	5%	cc	PI		
R64	100Ω	4Watt	5%	MO	CAN	F32	
R65	2K7	½Watt	5%	cc	PI		
R66	1.5KΩ	½Watt	5%	cc	PI		
	CAPACITORS						
C1	200µF	350V		Elec	ELN	Type RG	
C2	200µF	350V		Elec	ELN	Type RG	
C3	125µF	16V		Elec	PH	C426AR/E125	
C4	125µF	16V		Elec	PH	C426AR/E125	
C5	125µF	16V		Elec	PH	C426AR/E125	
C6	68µF	63V		Elec	PH	2222-017-18689	
C7	220pf	630V	10%	PYS	AC	TCS604	
C8	150pf	630V	10%	PYS	AC	TCS602	
C9	10µF	16V	10%	TA	ELN		
C10	150µF	16V		Elec	PH	2222-016-15151	
C11	150µF	16V		Elec	PH	2222-016-15151	
C12	470pf	630V	10%	PYS	AC	TCS608	
C13	0.1µF	630V	10%			Metalised film	
C14	6.4µF	400V		Elec	PH	C426AR/Q6.4	
C21	32µF	500V		Elec	D	E05F	
C22	6.4µF	400V		Elec	PH	C426AR/Q6.4	
C23	Deleted						
C24	Deleted						
C25	Deleted						
C26	68µF	63V		Elec	PH	2222-017-18689	
C27	220pf	630V	10%	PYS	AC	TCS604	
C28	150pf	630V	10%	PYS	AC	TCS602	
C29	10µF	16V	10%	TA	ELN		
C30	150µF	16V		Elec	PH	2222-016-15151	
C31	150µF	16V		Elec	PH	2222-016-15151	
C32	470pf	630V	10%	PYS	AC	TCS608	
C33	0.1µF	630V	10%	PYE	Metalised film		
C34	0.01µF	630V	10%	PYE	PH		
C35	0.01µF	630V	10%	PYE	PH		

CCT Ref.	DESCRIPTION	Mfr. or Supply	PART NO.	
	TRANSISTORS			
Q1				
Q2				
Q3	Incorporated in I.C.1 and I.C.2	RCA	CA3054	
Q4				
Q5				
Q6				
Q7	300V VCE 1A NPN SI	CAN	MJE340	
Q8	300V VCE 1A NPN SI	CAN	MJE340	
Q9	300V VCE 1A NPN SI	CAN	MJE340	
Q10	SELECTED CHARACTERISTICS SI	BWD	2N3819-0	
Q11	300V VCE 1A NPN SI	CAN	MJE340	
Q12	40V VCE hfe100 NPN SI	PH	BC147	
Q13	SELECTED CHARACTERISTICS SI	BWD	2N3819-B	
Q14	SELECTED CHARACTERISTICS SI	BWD	2N3819-B	
Q15	300V VCE 1A NPN SI	CAN	MJE340	
Q16	300V VCE 1A NPN SI	CAN	MJE340	
Q17	SELECTED CHARACTERISTICS SI	BWD	2N3819-0	
Q18	300V VCE 1A NPN SI	CAN	MJE340	
Q19	40V VCE hje100 NPN SI	PH	BC147	
Q20	SELECTED CHARACTERISTICS SI	BWD	2N3819-B	
IC1	DUAL DIFFERENTIAL AMP SI	AWA	CA3054	
IC2	DUAL DIFFERENTIAL AMP SI	AWA	CA3054	
	DIODES			
D1	1000V PIV 500mA DIODE SI	S	EM410	
D2	1000V PIV 500mA DIODE SI	S	EM410	
D3	1000V PIV 500mA DIODE SI	S	EM410	
D4	1000V PIV 500mA DIODE SI	S	EM410	
D5	400V PIV 500mA DIODE SI	S	EM404	
D6	400V PIV 500mA DIODE SI	S	EM404	
D7	400V PIV 500mA DIODE SI	S	EM404	
D8	400V PIV 500mA DIODE SI	S	EM404	
D9	1000V PIV 500mA DIODE SI	S	EM410	
D10	60V PIV 100mA DIODE SI	PH	IN4148/IN914A	
D11	6.2V ZENER DIODE SI	PH	BZY88/C6V2	
D12	60V PIV 100mA DIODE SI	PH	IN4148	
D13	400V PIV 500mA DIODE SI	S	EM404	
D14	400V PIV 500mA DIODE SI	S	EM404	
D15	1000V PIV 500mA DIODE SI	S	EM410	
D16				
D17				
D18				
D19				
D20				
D21	1000V PIV 500mA DIODE SI	S	EM410	
D22	1000V PIV 500mA DIODE SI	S	EM410	
D23	1000V PIV 500mA DIODE SI	S	EM410	
D24	1000V PIV 500mA DIODE SI	S	EM410	

PARTS LIST - MODEL bwd 216A

CCT REF	DESCRIPTION	Mfr or Supply	PART NO.	
	DIODES (Cont'd.)			
D25	400V PIV 500mA DIODE SI	S	EM404	
D26	400V PIV 500mA DIODE SI	S	EM404	
D27	400V PIV 500mA DIODE SI	S	EM404	
D28	400V PIV 500mA DIODE SI	S	EM404	
D29	1000V PIV 500mA DIODE SI	S	EM410	
D30	60V PIV 100mA DIODE SI	PH	IN4148	
D31	6.2V ZENER DIODE SI	PH	BZY88/C6V2	
D32	60V PIV 100mA DIODE SI	PH	IN4148	
D33	400V PIV 500mA DIODE SI	S	EM404	
D34	400V PIV 500mA DIODE SI	S	EM404	
D35	1000V PIV 500mA DIODE SI	S	EM410	
	POTENTIOMETERS			
RV1	100KΩ 10 TURN WW	BOURN	3507S-K	
RV2	1KΩ PRESET WW	DAR	P121	
RV3	1KΩ VAR DPST PP SW CD	D	PSP	
RV4	4K7Ω PRESET CD	PH	EO97AC/4K7	
RV5	1KΩ PRESET CD	PH	EO97AC/1K	
RV6	1KΩ PRESET CD	PH	EO97AC/1K	
RV7	100KΩ PRESET CD	PH	EO97AC/100K	
RV8	100KΩ 2 Watt VAR WW	NAH		
RV9	1KΩ PRESET WW	DAR	P121	
RV10	1KΩ PRESET CD	PH	EO97AC/1K	
RV11	1KΩ PRESET CD	PH	EO97AC/1K	
RV12	100KΩ PRESET CD	PH	EO97AC/100K	
	SWITCHES			
S1	2 Position 2 pole Toggle Switch	AWA	8370K8	
S2	4 Position 2 pole 1 Deck Rotary S.	PA		
S3	2 Position 2 Pole Toggle Switch	AWA	8370K8	
S4	2 Position 2 Pole Toggle Switch	AWA	8370K8	
S5A	Rear RV3			
	MISCELLANEOUS			
F1	3Amp. Delay Fuse	Y	3AG	
V1	Power Pentode	PH	6CA7	
V2	Power Pentode	PH	6CA7	
V3	Power Pentode	PH	6CA7	
V4	Power Pentode	PH	6CA7	
V5	Power Pentode	PH	6CW5	
T1	Power Transformer	BWD	T109	
M1	Panel Meter	BWD	216-A/V	
B1	6.3V Pilot Indicator	S	3280	
F2,3	5A Fuse	Y		
IC1	Transistor Array	RCA	CA3054	
IC2	Transistor Array	RCA	CA3054	

CCT REF	DESCRIPTION	Mfr. or Supply	PART NO.	
	ITEMS NOT LISTED ON CIRCUIT DIAGRAM.			
	Main Printed Circuit Board	BWD	160/134	
	Rectifier Printed Circuit Board	BWD	160/135	
	Circuit Diagram	BWD	No.910	
	ALL OTHER ITEMS ORDER BY DESCRIPTION QUOTING MODEL NO. AND SERIAL NO.			

R 65
C 34
D 35
Q 20

MODIFICATIONS

ISSUE 1 10/74
REDRAWN FROM
DRG. NO. 910

ISSUE 2 1-6-76
APPLICABLE FROM
S/No. 34370
R19 8K2 → 6K8
RV4 2K2 → 5K

ISSUE 3 1-12-77
APPLICABLE FROM
S/No. 34370
R35 & B1 ADDED
SEE DRG.No. 1205

ISSUE 4 21-4-78
APPLICABLE FROM
S/No. 37740
RV4 5K → 4K7

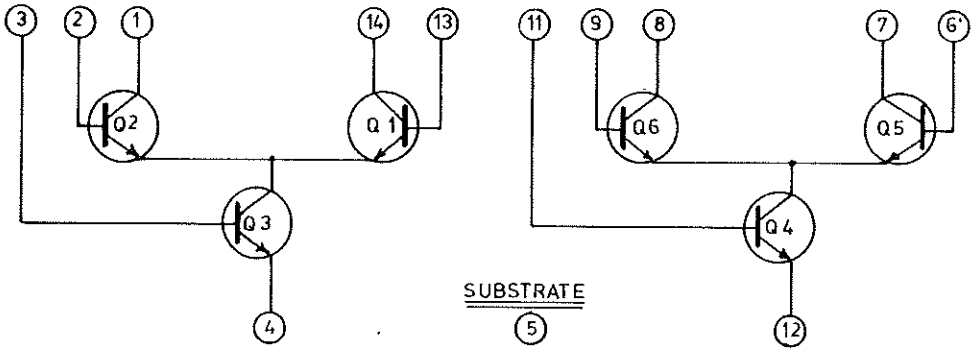
ISSUE 5 12-9-78
IC1A&B DESIGNATED
CA 3054
SEE ALSO DRG.No. 1205

CONTROLS

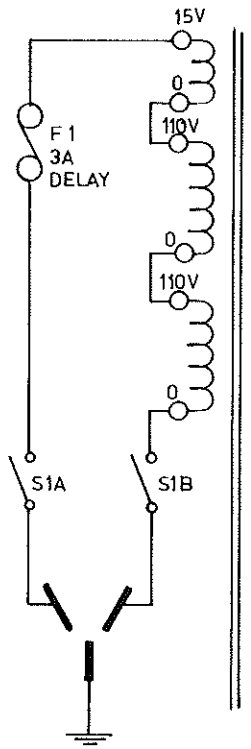
RV1	OUTPUT VOLTAGE CONTROL	400 V
RV2	MAXIMUM VOLTAGE PRESET	400 V
RV3	OUTPUT CURRENT CONTROL	400V
RV4	MAXIMUM CURRENT PRESET	400V
RV5	CONSTANT VOLTAGE OUTPUT IMPEDANCE	400V

SWITCHES

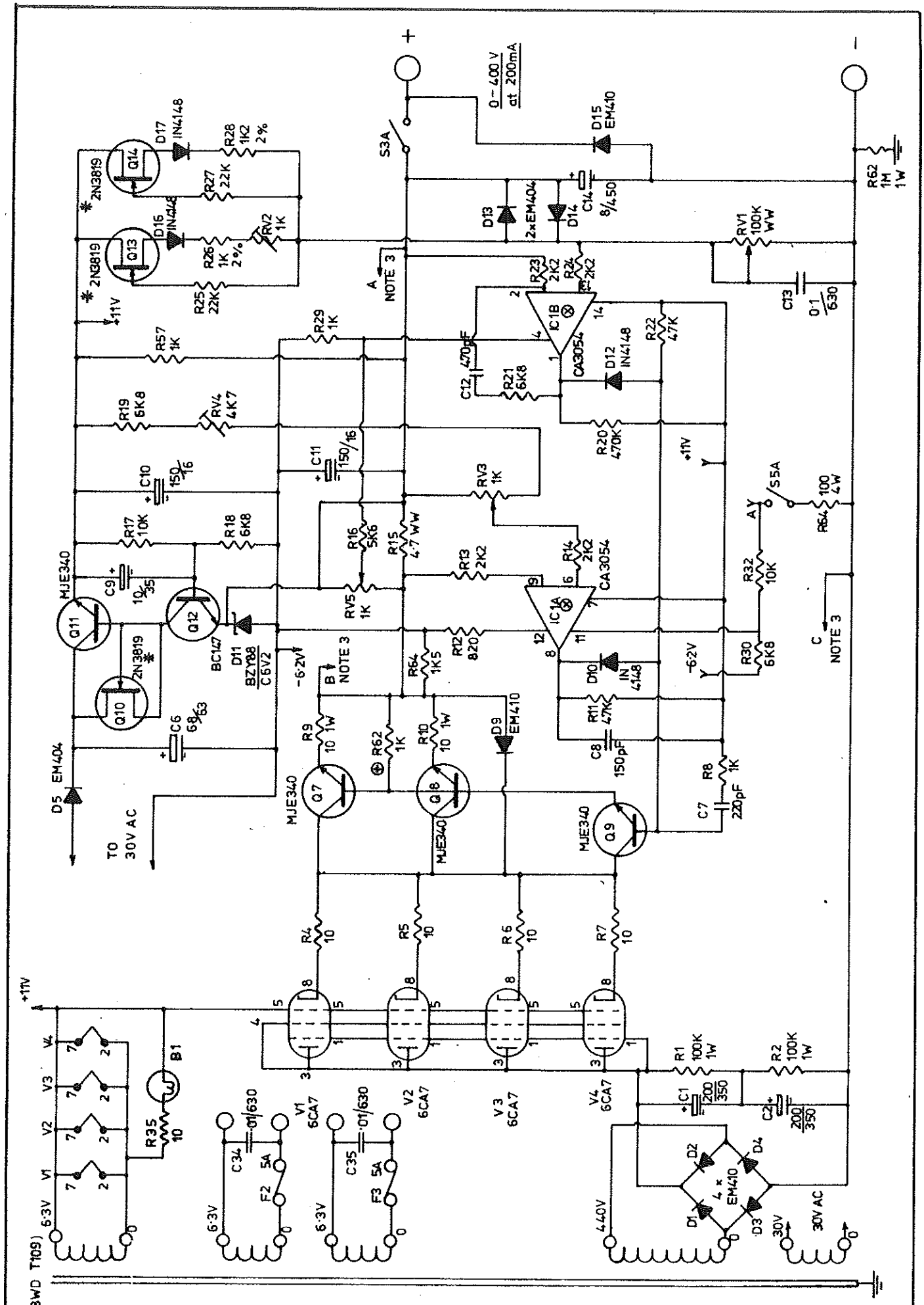
		POS. SHOWN
S1A-B	POWER ON/OFF	OFF
S3A	STANDBY/USE (400V)	STANDBY
S5A	PULL TO SET CURRENT (400V) (REAR RV3)	OFF



NOTE 1 I.C. CONNECTIONS



NOTE 2 PRIMARY TRANSFORMER WINDING



* SELECTED COMPONENT

⊕ MAY BE OMITTED

⊗ FOR IC CONNECTIONS SEE NOTE 1 # 1204

FOR METERING CIRCUIT SEE NOTE 3 # 1205

5 / 9-78	DRAWN	MODEL 216A POWER SUPPLY 0-400V 200mA
	TRACED	
	CHECKED B.R.T.	
	DATE 29·10·74	

DRG. NO 1204

R 65
C 34
D 35
Q 20

MODIFICATIONS

ISSUE 1 10/74
REDRAWN FROM DRG. NO. 910

ISSUE 2 1-6-76
SEE DRG. No. 1204

ISSUE 3 1-12-77
APPLICABLE FROM S/No. 34730
R35 & B1 DELETED
SEE DRG. No. 1204

ISSUE 4 21-4-78
SEE DRG. No. 1204

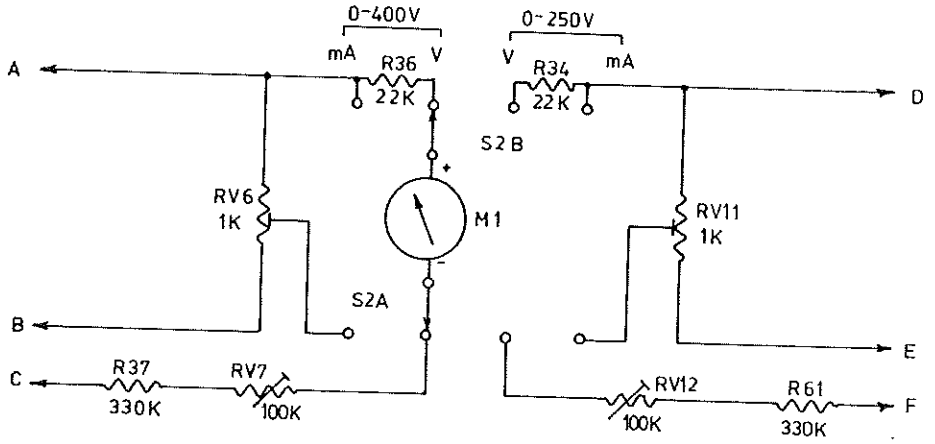
ISSUE 5 12-9-78
IC 2A&B DESIGNATED CA3054
SEE ALSO DRG No. 1204

CONTROLS

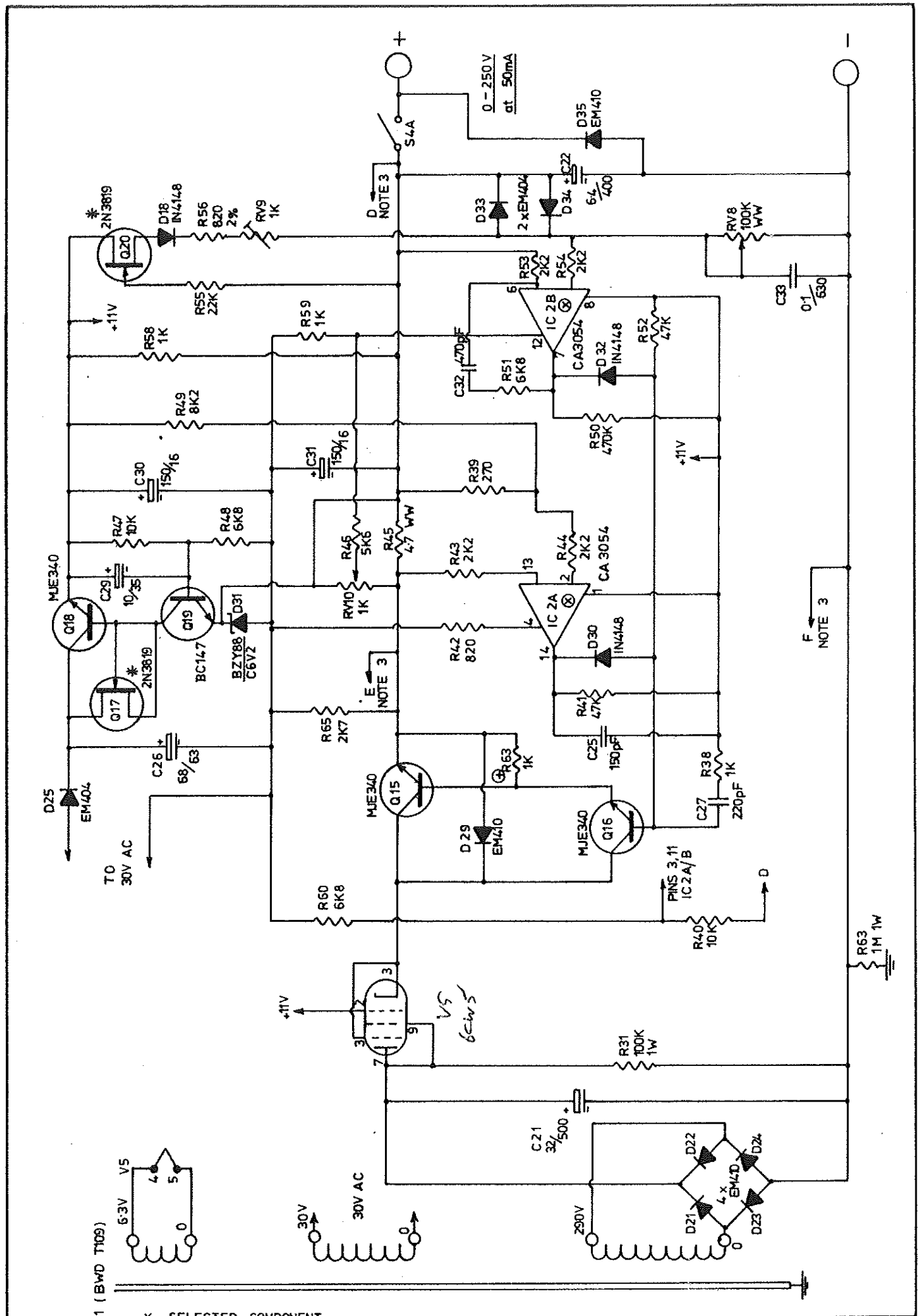
RV6	AMMETER CALIBRATE	400 V
RV7	VOLTMETER CALIBRATE	400V
RV8	OUTPUT VOLTAGE CONTROL	250V
RV9	MAXIMUM VOLTAGE PRESET	250V
RV10	CONSTANT VOLTAGE OUTPUT IMPEDANCE	250V
RV11	AMMETER CALIBRATE	250V
RV12	VOLTMETER CALIBRATE	250V

SWITCHES

		POS. SHOWN
S2 A - B	METER RANGE	0-400V
S4A	STANDBY USE (250V)	STANDBY



NOTE 3 METERING CIRCUIT

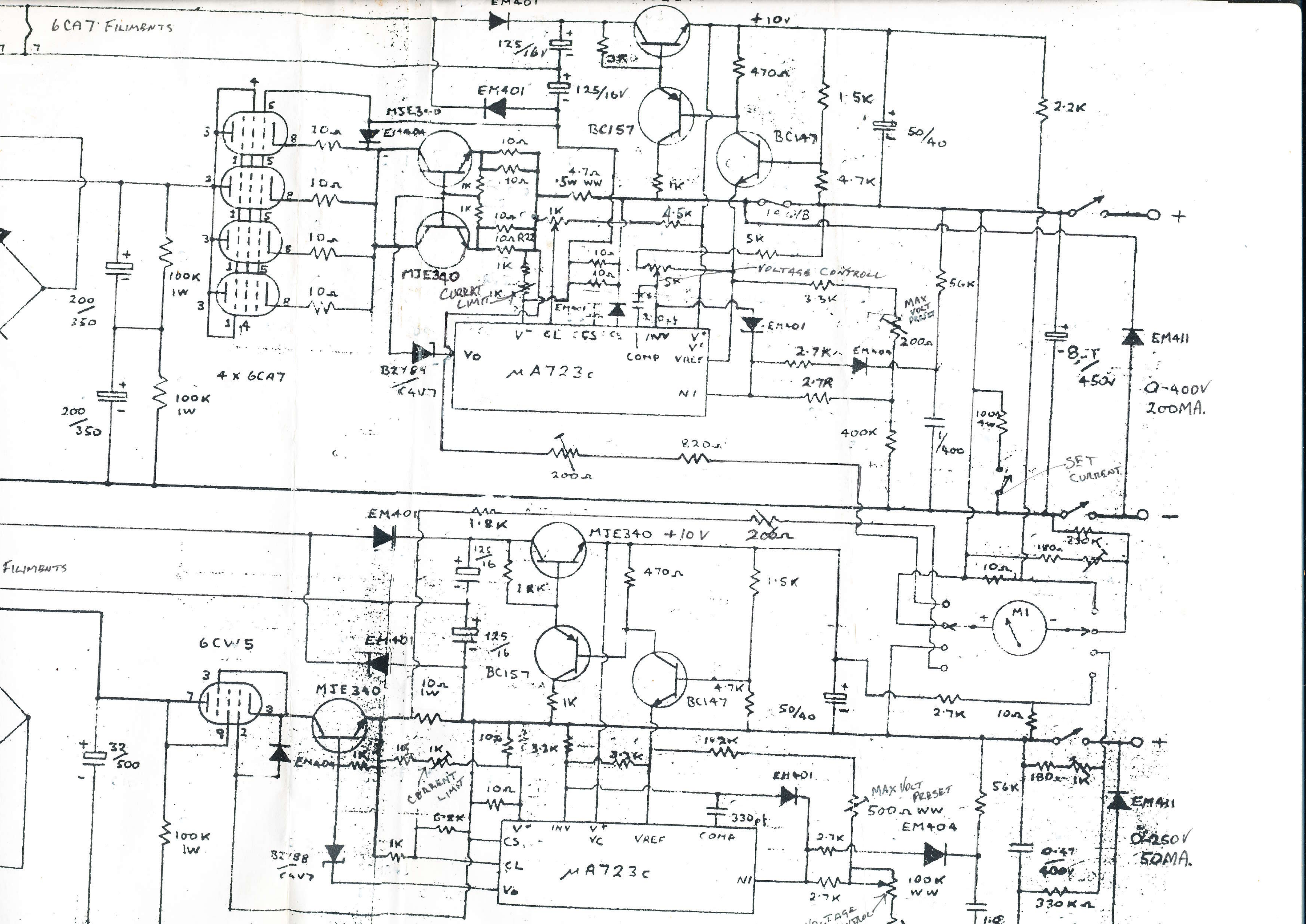


X SELECTED COMPONENT
⊕ MAY BE OMITTED
⊗ FOR I.C. CONNECTIONS SEE NOTE 1 # 1204

FOR METERING CIRCUIT SEE NOTE 3 # 1205

5 / 9-78	DRAWN	MODEL 216A POWER SUPPLY 0 – 400V 200mA
	TRACED	
	CHECKED BKT	
	DATE 29·10·74	

DRG. NO. 1205



6CA7 FILIMENTS
EM401
+10V
125/16V
EM401
MJE340
BC157
BC147
470Ω
1.5K
2.2K
50/40
4.7K
4x6CA7
100K 1W
200/350
MJE340
CURRENT LIMIT
BZY88 C4V7
MA723c
VOLTAGE CONTROLL
MAX VOLT PRESET
EM411
-8µF 450V
0-400V 200MA.
400K
820Ω
200Ω
SET CURRENT
MJE340 +10V
FILIMENTS
6CW5
33/500
M1
EM404
MAX VOLT PRESET
500Ω WW
0-250V 50MA.
330pf
100K WW
330KΩ