DELTA ELEKTRONIKA BV

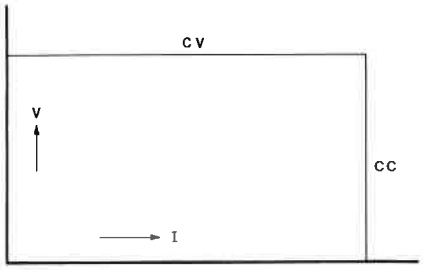
P.O. BOX 27
4300 AA ZIERIKZEE
NETHERLANDS
TEL. (01110) 3656 TLX 55349

REGULATED POWER SUPPLIES

E 015–2	0– 15 V	0–2 A
E 030–1	0– 30 V	0–1 A
E 030–3	0– 30 V	0–3 A
E 060–0.6	0– 60 V	0–0.6 A
E 0300–0.1	0–300 V	0–0.1 A
E 018–0.6 D	±0– 18 V	0.6 A

DESCRIPTION

E 015-2, E 030-1 and E 060-0.6



These power supplies are of the linear transistor series regulator type. They can be used as a constant voltage source with a sharply limited current, or as a constant current source with a sharply limited open voltage. Both limits are continuously variable from zero to full range. The change of mode occurs at the crossing of the voltage and current settings.
A ten-turn potentiometer is used to provide a high resolution voltage control. For current control a single turn potentiometer (resolution 0,1 %) is used to enable an approximate indication of the current setting.

E 030-3 and E 0300-0.1

These models also have a linear transistor series regulator which however is preceeded by an SCR pre-regulator for better efficiency.
This pre-regulator keeps the rectified voltage in accordance with the output voltage to keep dissipation in the power transistors low.

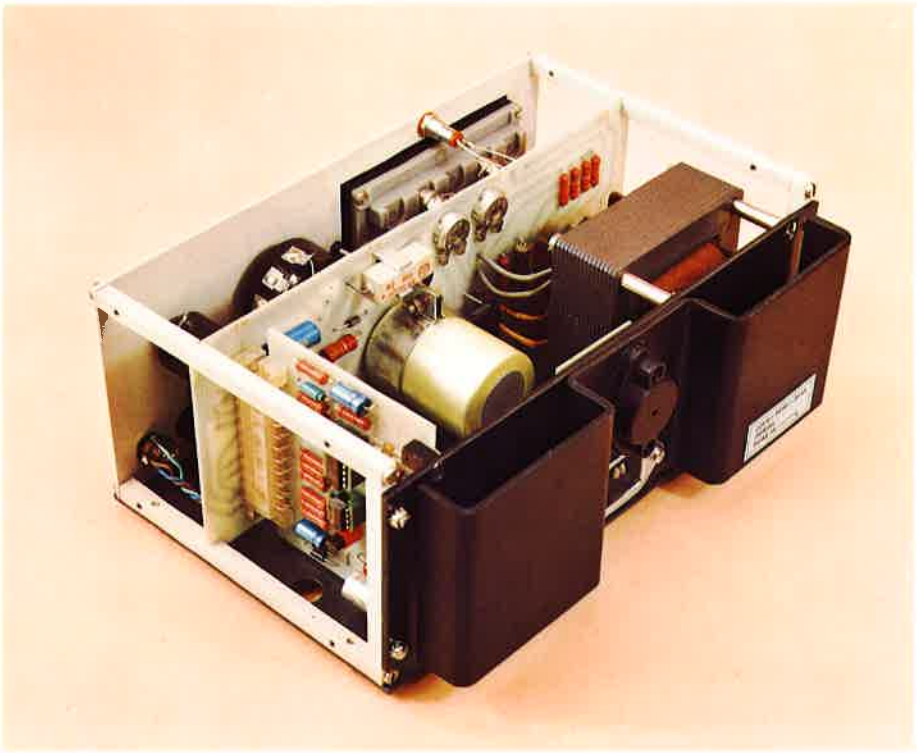
E 018-0.6 D

This model was designed to supply plus and minus 15 volts for design work with operational amplifiers. It provides a plus 0—18 V and a minus 0—18 V which are tracking and can be varied with one ten-turn potentiometer. With the second potentiometer the ratio of the positive and negative voltage can be varied between 1/2 and 2. The positive and negative outputs have coupled overload protection circuits. This means that both output voltages will decrease proportionally if one is overloaded. Also if one output is short circuited, both outputs will drop to zero. The E 018-0.6 D has a fixed constant current overload characteristic. Indepedent of the ratio setting, the positive and negative output can ever exeed a limit of about 18,5 V.

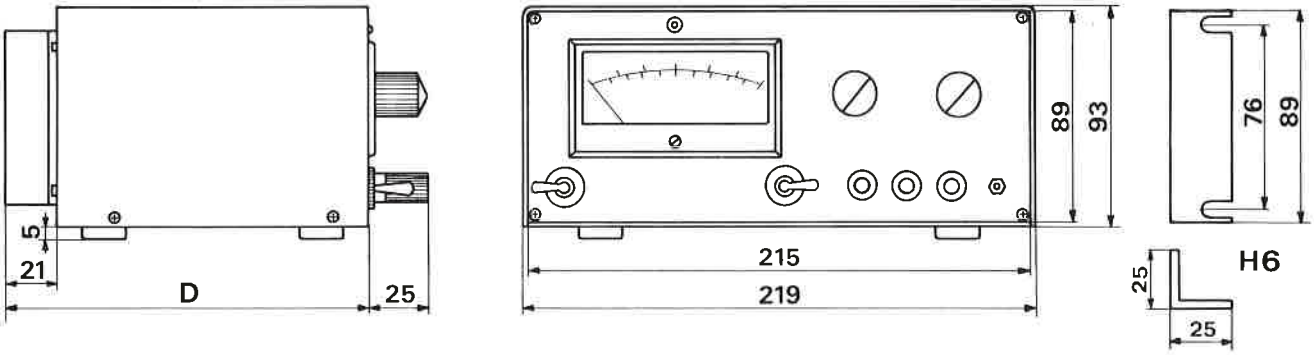
SPECIFICATIONS

Input voltage	220 V 50 Hz standard. Other input voltages at special order.
Input-output isolation	1500 V AC rms 1 minute (VDE 0550).
Max. voltage between output and case	500 V DC.
Max. ambient temperature	45°C.
Meter	Accuracy 1.5 % of fsd, selector switch for voltage and current measurement.
Parallel and series connection	Units can be connected parallel and in series. Series connection up to 300 V.
Weight and size	2.8 kg 219 x 93 x 154 mm 30 Watts type. 5.7 kg 219 x 93 x 222 mm E 030-3

SPECIFICATIONS	E 015-2	E 030-1	E 030-3	E 060-0.6	E 0300-0.1	E 018-0.6 D
CONSTANT VOLTAGE MODE						
Line regulation for 198–242 V variation	1 mV	2 mV	2 mV	4 mV	10 mV	5 mV
Load regulation for 0–100 % variation.	2 mV	4 mV	4 mV	8 mV	20 mV	5 mV
Temp. coefficient per °C (% of V max)	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Drift per 8 hours under constant conditions after 15 minutes warm up	0.1 %	0.1 %	0.1 %	0.1 %	0.1 %	0.1 %
Riple voltage, rms	0.1 mV	0.1 mV	0.1 mV	0.1 mV	0.5 mV	0.1 mV
Output impedance at 100 kHz load frequency	100 mΩ	100 mΩ	100 mΩ	100 mΩ	10 Ω	100 mΩ
Recovery time to within 30 mV after a step load change from 10 to 100 %	15 µS	15 µS	15 µS	15 µS	30 µS	15 µS
Remote programming of output voltage by resistance	0–5 kΩ	0–5 kΩ	0–5 kΩ	0–10 kΩ	–	–
CONSTANT CURRENT MODE						
Line regulation for 198–242 V variation	0.3 mA	0.3 mA	0.4 mA	0.3 mA	0.03 mA	–
Load regulation for zero to max. load	2 mA	2 mA	4 mA	2 mA	0.5 mA	–
Temp. coefficient per °C (% of I max.)	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	–
Ripple current rms	0.1 mA	0.1 mA	0.1 mA	0.1 mA	0.1 mA	–



Simple construction and use of high quality components forms unique reliable unit.



For E 030-3 D = 222 mm, for all other models D = 154 mm.

Two uncased units can be mounted side by side and with the addition of two H6 brackets can be inserted in a 19'' rack.

R = Ohm

1 =	390	2,5W
2 =	180	
3 =	470	
4 =	CR	
5 =	3,9 k	
6 =	6,8 k	
7 =	1,8 k	
8 =	1,2	
9 =	18 k	
10 =	4,7 k	
11 =	47	
12 =	470	
13 =	470	
14 =	150 k	
15 =	2,7 k	
16 =	CR	
17 =	1,8 k	
18 =	2,2 k	
19 =	CR	
20 =	470	
21 =	CR	
22 =	1 k	
23 =	470	
24 =	3,3 k	
25 =	-	
26 =	0	
27 =	10	
28 =	3,3	7W WW
29 =	1,5 k	
30 =	1 k	var.
31 =	CR	
32 =	18 k	
33 =	2 k	var.
34 =	5 k	10 trn.potm.
35 =	3,9 k	
36 =	1 k	var.
37 =	4,7 k	
38 =	4,7 k	
39 =	1 k	
40 =	3,9 k	
41 =	1 k	
42 =	1 k	
43 =	8,2 k	
44 =	470	
45 =	1 k	
46 =	1 k	
47 =	47	
48 =	4,7 k	
49 =	1 k	
50 =	10 k	
51 =	10	
52 =	1,5 k	
53 =	1 k	var.
54 =	3,3	7W WW
55 =	2 k	var.
56 =	18 k	
57 =	CR	
58 =	1 k	
59 =	5 k	var.
60 =	1 k	var.
61 =	3,9 k	
62 =	560	1W
63 =	560	1W

C = microfarad

1 =	100	63 V
2 =	22	25 V
3 =	2,2	35 V tt
4 =	0,047	250 V
5 =	10	35 V tt
6 =	CC	
7 =	22	25 V
8 =	0,01	1000 V
9 =	0,1	250 V
10 =	2200	40 V
11 =	10	100 V
12 =	-	
13 =	10	40 V
14 =	0,01	250 V
15 =	0,047	250 V
16 =	2200	40 V
17 =	10	100 V
18 =	-	
19 =	220	40V EKR
20 =	-	
21 =	220	40V EKR
22 =	-	
23 =	0,0001	250 V
24 =	0,0001	250 V
25 =	0,022	250 V

C12, 18, 19, 20, 21, 22	4-'86	Vr	Title: Part list	
R1 = 2,5W PR52	7-'85	Vr	E 018 - 0.6 D	
(Led) R24, D18, D19	3-'81	V.	Date: 1-'78	
Modifications	Date	App.	delta elektronika bv	

D

1 =	1N4004G	Philips
2 =	ZY 6,2	ITT
3 =	1N825 A	Thom.
4 =	1N4148	TI
5 =	1N4148	TI
6 =	1N4148	TI
7 =	VH 148	Varo
8 =	1N4004G	Philips
9 =	1N4004G	Philips
10 =	ZPD 6,2	ITT
11 =	ZPD 6,2	ITT
12 =	1N4148	TI
13 =	1N4148	TI
14 =	ZPY 18	ITT
15 =	1N4148	TI
16 =	1N4004G	Philips
17 =	1N4004G	Philips
18 =	1N4148	TI
19 =	133 HR	Sloan

T

1 =	BC 556A	Siemens
2 =	BC 556A	Siemens
3 =	BC 546A	Siemens
4 =	BC 546A	Siemens
5 =	BC 556A	Siemens
6 =	BD 239 A	TI
7 =	2N3055	RCA
8 =	BC 556A	Siemens
9 =	BC 546A	Siemens
10 =	BC 556A	Siemens
11 =	BC 546A	Siemens
12 =	BC 556A	Siemens
13 =	BC 546A	Siemens
14 =	BD 239 A	TI
15 =	2N3055	RCA

IC

1 =	TL 082 IP	TI

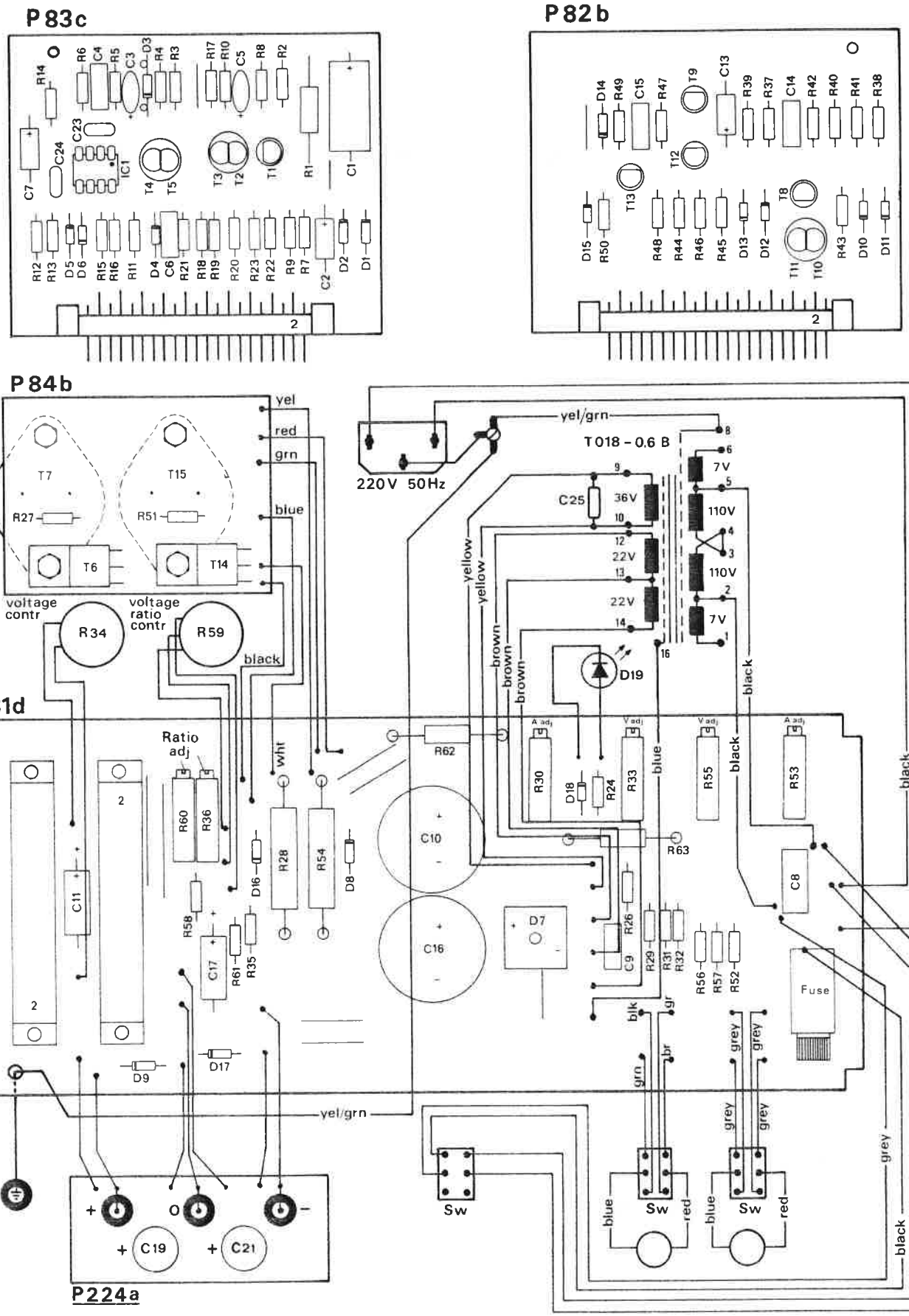
Fuse = Fuse 1 A 5 x 20 mm

All resistors 0,4W 2% metal-film.
WW = Wire wound resistor.

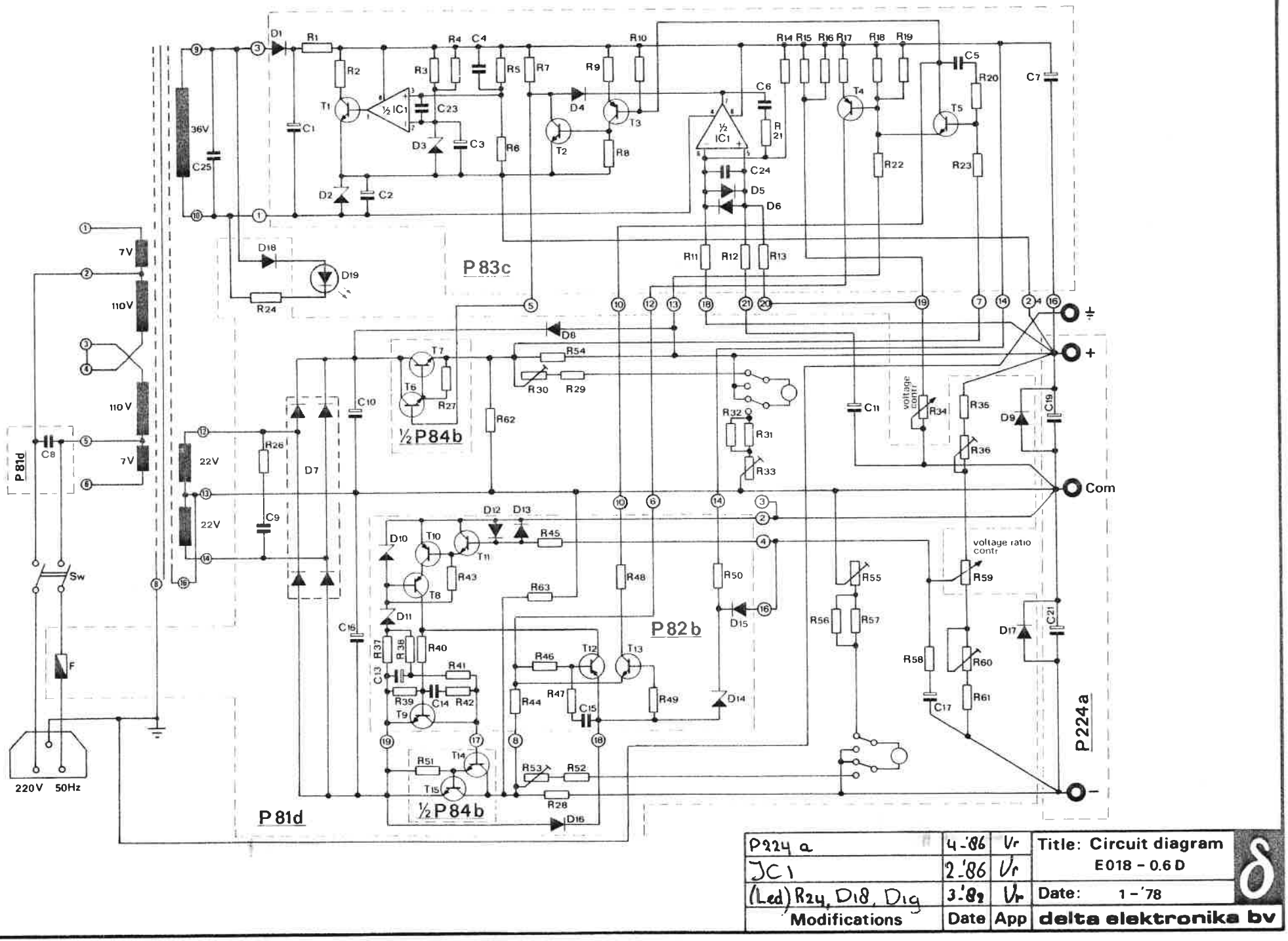
tt = tantalum

CR = Calibration resistor.
CC = Calibration capacitor.

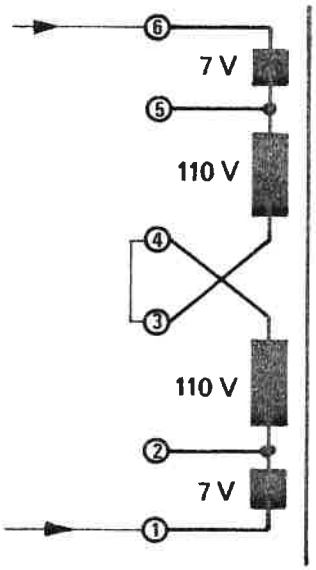
			Title: Part list E 018-0,6 D
JC1	2-'86	Vr	
(Led) R24, D18, D19	3-'82	Vr	Date: 1-'78
Modifications	Date	App.	delta elektronika bv



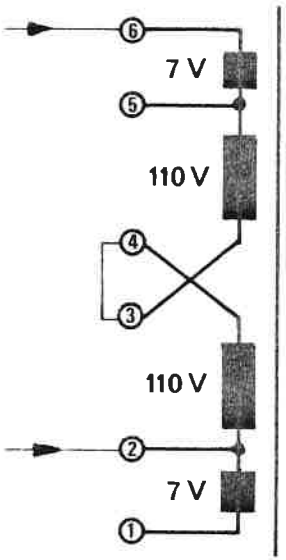
P224a	4-'86	Vr	Title: Wiring diagram E018-0.6D
JC1	2-'86	Vr.	
(Led) R24, D18, D19	3-'87	Vr	Date: 1-'78
Modifications	Date	App.	delta elektronika bv



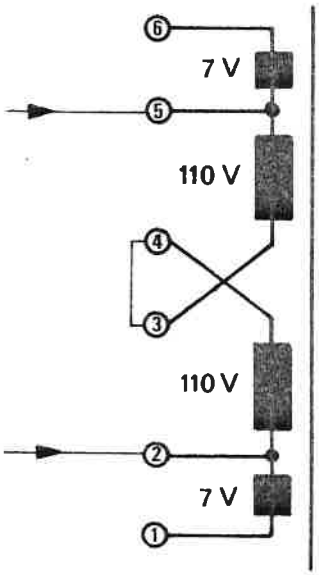
P224 a	4-'86	Vr	Title: Circuit diagram E018 - 0.6 D
JC1	2-'86	Vr	
(Led) R24, D18, D19	3-'82	Vr	Date: 1-'78
Modifications	Date	App	delta elektronika bv



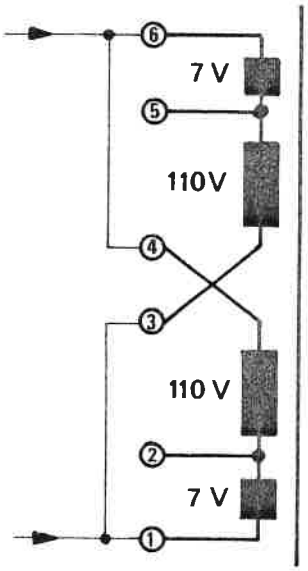
234 V~



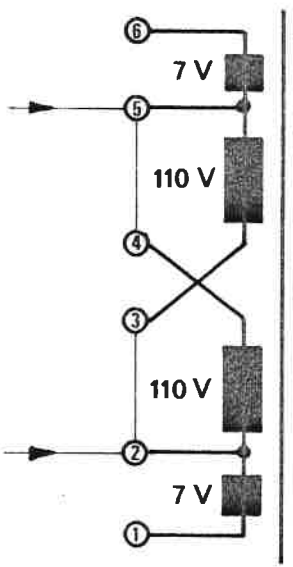
227 V~



220 V~



117 V ~



110 V ~

			Title: Transformer connections
			Date: Apr '78
Modifications	Date	App	delta elektronika bv

NV DELTA ELEKTRONIKA

P.O. BOX 27
ZIERIKZEE
NETHERLANDS
TELEPHONE (01110) 2734

DUAL POWER SUPPLY E 018-0.6 D

± 0 - 18 V, 0.6 A

DESCRIPTION

The regulated power supply E 018-0.6 D is specially designed for the development work with operational amplifiers. It provides a positive and a negative output, both of 0-18 V DC 0.6 A, which are tracking and can be varied with one ten turn potentiometer.
With the left-hand knob the ratio of the two voltages can be varied between 1/2 and 2.
The positive and negative output have coupled overload protection circuits.
This means that both voltages will decrease proportionally if one output is overloaded.
Also when one output is short circuited both voltages will fall down to zero.
The E 018-0.6 D can also be used as a 0-36 V 0.6 A supply.

TECHNICAL DATA (Equal for positive and negative output)

Voltage control	10-turn potentiometer, range 0-18 V.
Voltage ratio control	1-turn potentiometer, range 1/2 to 2.
Voltage regulation	5 mV for a + or − 10 % AC input variation. 10 mV for a 0-100 % load change.
Temp. coefficient	2.10^{-4} per °C.
Ripple voltage	0.1 mV r.m.s.
Output impedance	Maximum 0.1 Ohm up to 100 kHz load frequency.

For uncased unit
add B to type number

Recovery time — 15 micro seconds for recovery to within 30 mV of steady state voltage after a step load change from 10 % to 100 %.

Voltage limit — The positive and negative output voltage can never exceed a limit of about 18.5 V, independent of the voltage and ratio setting.

Current limit — Fixed constant current limit of about 125 % of nominal maximum current. The limiting circuits of the plus and minus output are coupled.

Ambient temp. — − 20 to + 45 °C.

Output terminals — Isolated from the case.
Maximum allowed voltage between output and case 500 V.

Rack mounting — Two uncased units side by side can be rack mounted with the help of two brackets H 6.

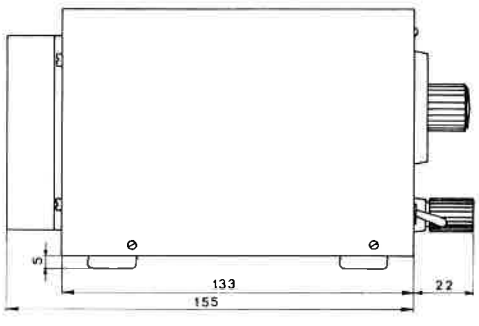
Cooling — By natural convection cooling. The air must flow freely through the vertically heat sink for effective cooling.

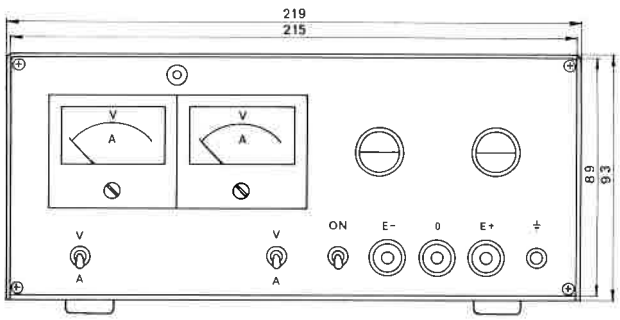
Meters — Two 1.5 % meters with selector switches for monitoring voltage and current of both positive and negative output.

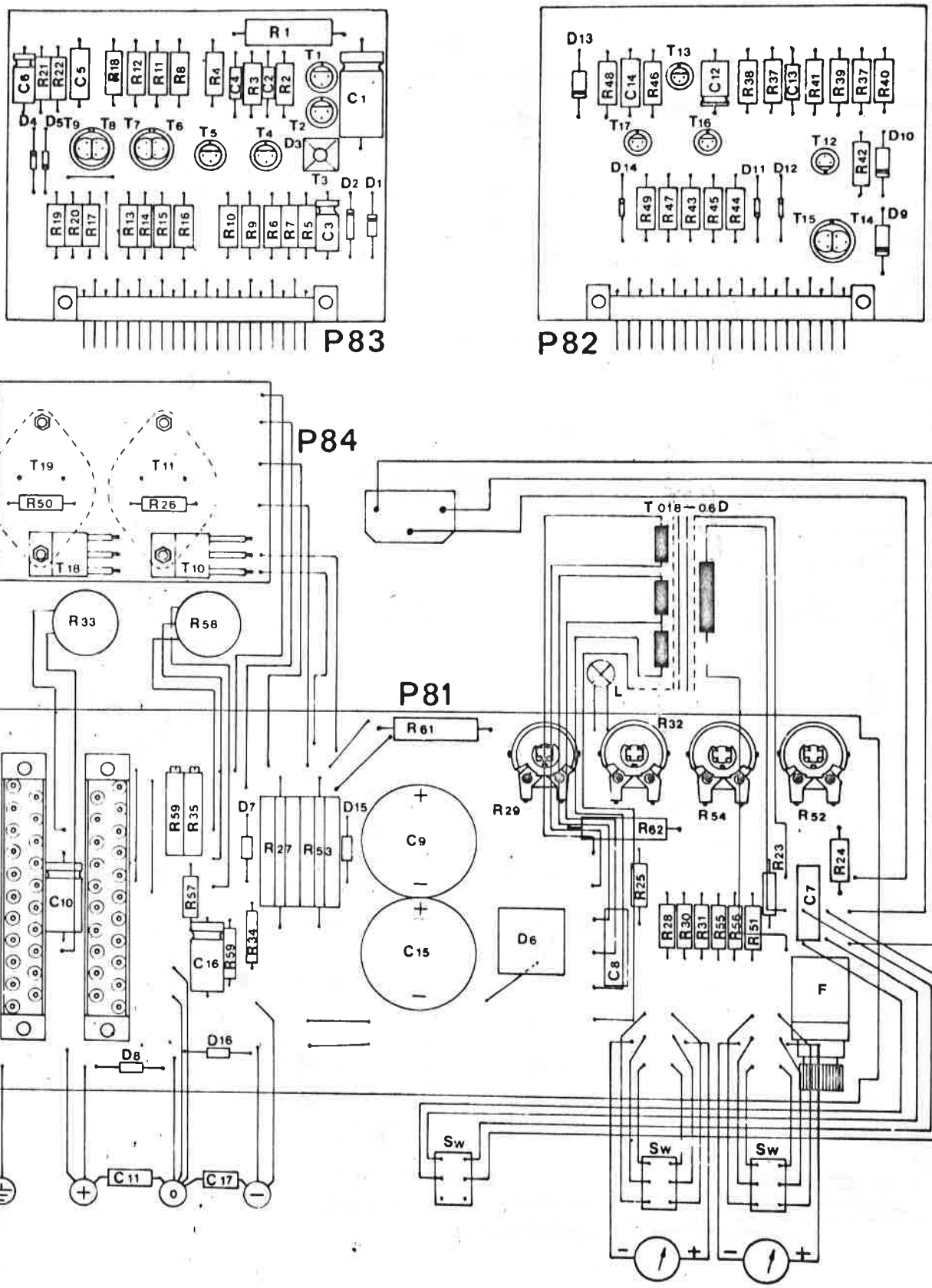
Input voltage — 110-117-220-234 V, 50-400 Hz.

Finish — Light gray front panel with dark gray case.

Weight and size — 2,75 kg, 219 x 93 x 154 mm.






P83
P82
P84
P81
R1
C1
C2
C3
C4
C5
C6
C9
C10
C11
C15
C16
C17
C7
C8
C12
C13
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
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R57
R58
R59
R61
R62
T1
T2
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T7
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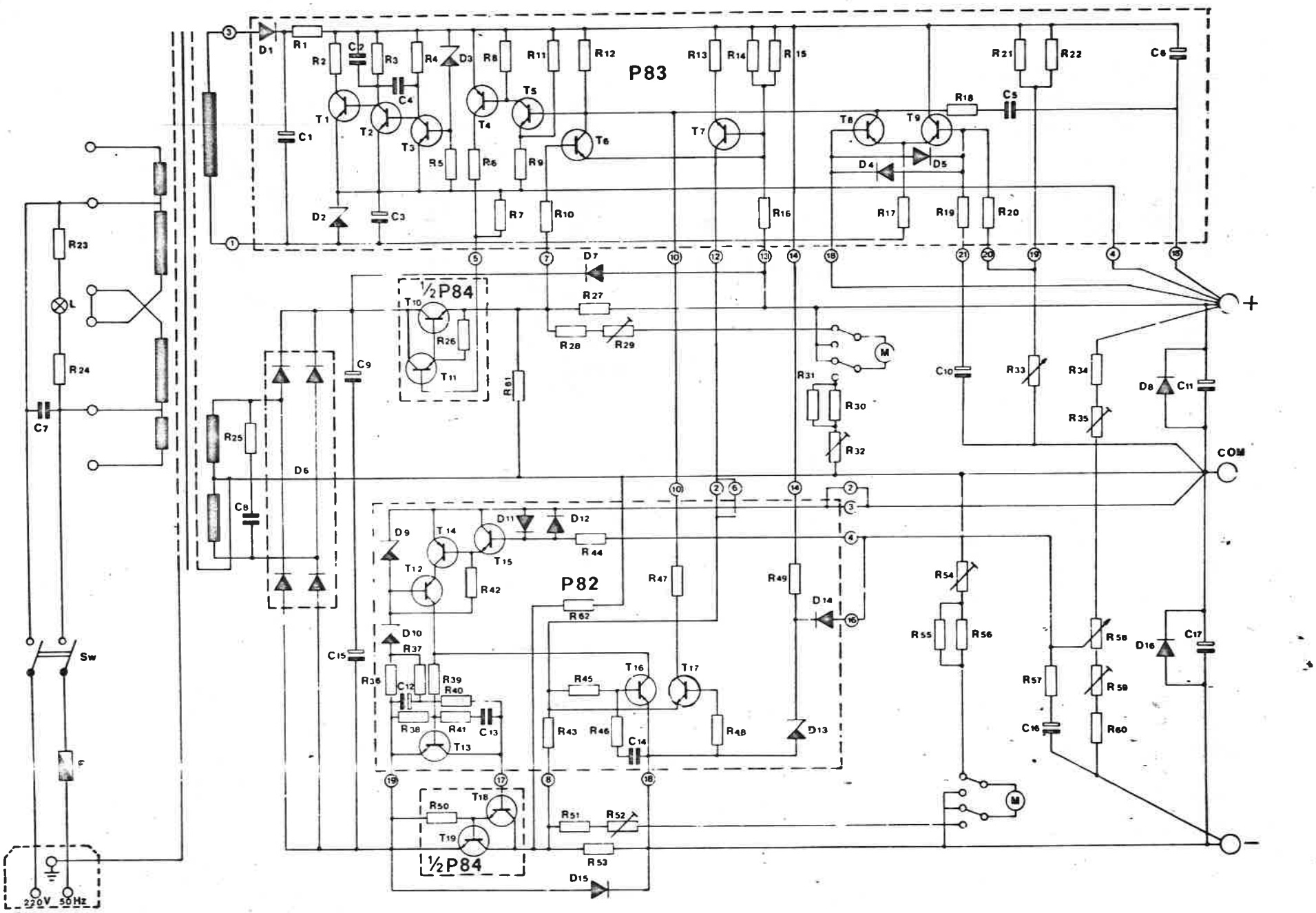
T12
T13
T14
T15
T16
T17
T18
T19
T01B–06D
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
D16
L
F
Sw
Sw
Sw


P83
P82
½P84
½P84
D1
R1
R2
C2
R3
R4
D3
R8
R11
R12
R13
R14
R15
R21
R22
C6
C4
T1
T2
T3
T4
T5
T6
T7
T8
T9
R18
C5
C1
R5
R6
R9
D4
D5
D2
C3
R7
R10
R16
R17
R19
R20
D7
R27
R28
R29
R31
R30
R32
C10
R33
R34
R35
D8
C11
R23
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R24
C7
R25
D6
C8
C9
R61
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D12
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T15
R44
R42
R47
R49
D14
R54
R55
R56
R58
D16
C17
R57
R59
C16
R60
D10
R37
C15
R36
C12
R39
R40
R38
R41
C13
T13
R45
T16
T17
R43
R46
C14
R48
D13
R50
T18
T19
R51
R52
R53
D15
Sw
F
220V 50Hz

PART LIST

R (Ohm)

1 =	820	1 W
2 =	150	
3 =	10 k	
4 =	10 k	
5 =	150	
6 =	33	
7 =	6,8 k	
8 =	2,2 k	
9 =	2,2 k	
10 =	470	
11 =	2,7 k	
12 =	22 k	
13 =	1,2 k	
14 =	12 k	
15 =	1,5 k	
16 =	470	
17 =	6,8 k	
18 =	270	
19 =	470	
20 =	470	
21 =	10 k	
22 =	2,2 k	
23 =	270 k	
24 =	270 k	
25 =	82	
26 =	10	
27 =	3,3	7 W WW
28 =	1,5 k	
29 =	1 k	var.
30 =	220 k	
31 =	18 k	
32 =	1 k	var.
33 =	5 k	10-t. potm.
34 =	3,9 k	
35 =	1 k	20-t. potm.
36 =	4,7 k	
37 =	4,7 k	
38 =	1 k	
39 =	3,9 k	
40 =	1 k	
41 =	1 k	
42 =	12 k	
43 =	470	
44 =	1 k	
45 =	1 k	
46 =	47	
47 =	4,7 k	
48 =	1 k	
49 =	10 k	
50 =	10	
51 =	1,5 k	
52 =	1 k	var.
53 =	3,3	7 W WW
54 =	1 k	var.
55 =	18 k	
56 =	220 k	
57 =	1 k	
58 =	5 k	var. WW
59 =	1 k	20-t. potm.
60 =	3,9 k	
61 =	560	1 W
62 =	560	1 W

C (microfarad)

1 =	47	63 V
2 =	0,01	250 V
3 =	22	25 V
4 =	0,01	250 V
5 =	0,047	250 V
6 =	22	25 V
7 =	0,01	1000 V
8 =	0,1	250 V
9 =	2200	35 V
10 =	10	100 V
11 =	47	63 V
12 =	10	35 V
13 =	0,01	250 V
14 =	0,047	250 V
15 =	2200	35 V
16 =	10	100 V
17 =	47	63 V

D

1 =	1N4003	TI
2 =	ZP 6,2	ITT
3 =	ZP 6,2	ITT
4 =	1N4148	TI
5 =	1N4148	TI
6 =	VH 148	VARO
7 =	1N4003	TI
8 =	1N4003	TI
9 =	ZP 6,2	ITT
10 =	ZP 6,2	ITT
11 =	1N4148	TI
12 =	1N4148	TI
13 =	ZY 18	ITT
14 =	1N4148	TI
15 =	1N4003	TI
16 =	1N4003	TI

T

1 =	BC 182	TI
2 =	BC 182	TI
3 =	BC 182	TI
4 =	BC 212	TI
5 =	BC 182	TI
6 =	BC 182	TI
7 =	BC 212	TI
8 =	BC 182	TI
9 =	BC 182	TI
10 =	TIP 29A	TI
11 =	2N3055	RCA
12 =	BC 212	TI
13 =	BC 182	TI
14 =	BC 212	TI
15 =	BC 182	TI
16 =	BC 212	TI
17 =	BC 182	TI
18 =	TIP 29A	TI
19 =	2N3055	RCA

F = Fuse 1 A - 5 x 20 mm

WW = Wire wound resistor

All other resistors metalfilm $\frac{1}{2}$ W 2%