

*Vertretung für die Schweiz:
Représentation pour la Suisse:*

 **A&D Products AG**

2500 Biel-Bienne 1
Tel. 032 23 63 12

EK 030-10

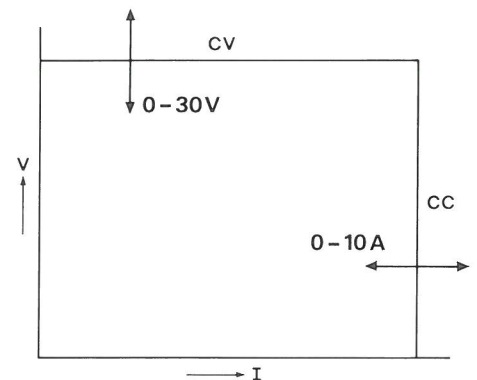


EK 030 – 10

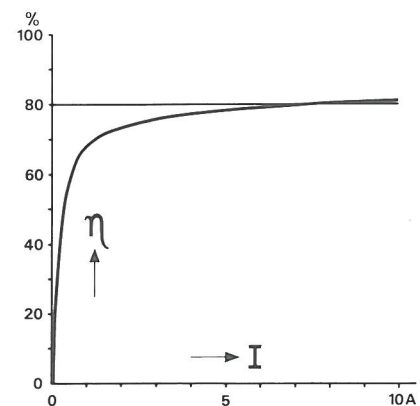
HIGH EFFICIENCY LINEAR POWER SUPPLY

0 – 30 V 0 – 10 A

- * A new improvement in preregulation makes this linear power supply as small and efficient as a high frequency switcher, but with better specifications and at a more economical price.
- * **Efficiency 80%**
- * **Small dimensions**
- * **Fast response, low ripple**
- * Natural convection cooling, no blower
- * No inrush current
- * Ready for programming by computer (via PSC 625 programmer)
- * All programming and monitor levels standardized at 0-5 V
- * Protected against all overload and short circuit conditions
- * Equal current sharing when connected in parallel and equal voltage sharing when used in series



Constant voltage/constant current



Efficiency versus load current at 30 V output

Efficiency

The efficiency is very high (80%) and constant over a large output range.
At no load the input power is less than 15 Watts.

Input voltage

198-265V 50Hz +/-1Hz (for use at 220 and 240V 50Hz line voltage)

Up to 25V 10A the input voltage range is 185-265VAC.

This power supply can only be used at 50Hz because the pre-regulation is frequency dependent.

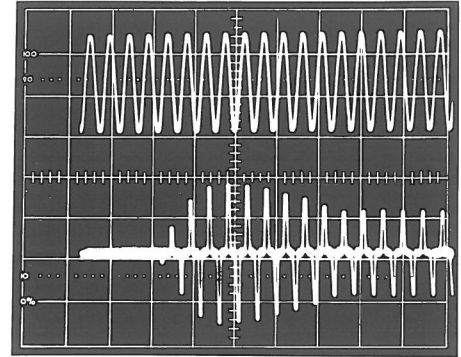
Inrush current

During switch-on the inrush current is kept very low to avoid stress on the input fuse and switch.

Photo: AC input voltage and current during switch on.

Upper diagram : Input voltage, 200V/div.

Lower diagram : Input current, 5A/div.



Input current

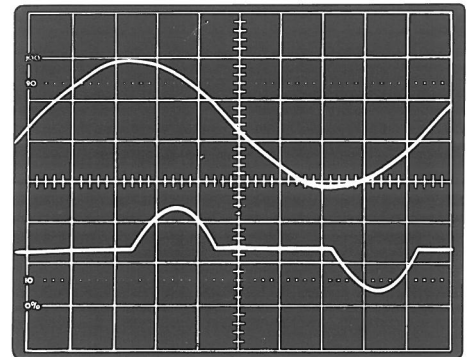
The input current is 2,6 A rms at 220VAC input and 300 Watts output.

Input current shows no sharp peaks that can cause distortion at the line voltage.

Photo: Input voltage and current at 300W output

Upper diagram : Input voltage, 200V/div.

Lower diagram : Input current, 5A/div.



Insulation voltage

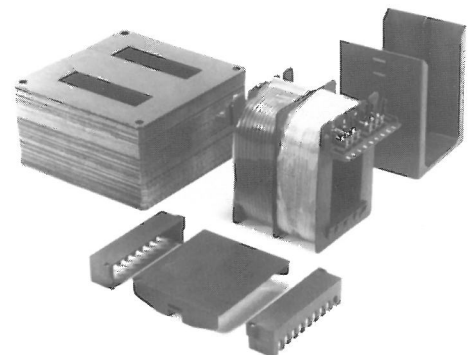
Input-output 2500 Vrms

Input-case 2500 Vrms

Output-case 500 VDC

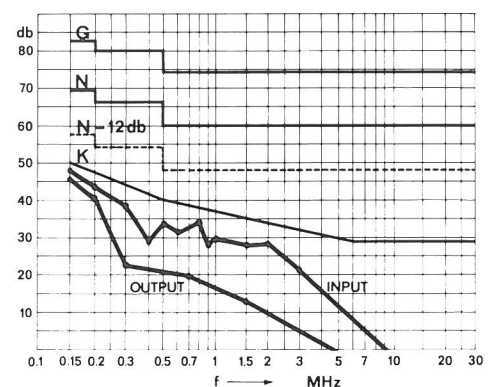
Safety is in accordance with IEC 348

For extra safety the input transformer has a split bobbin with an insulation voltage of 3750Vrms



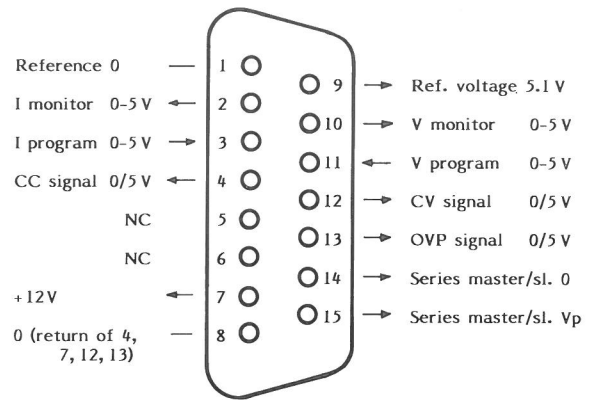
RFI suppression

No radio frequency interference on input and output.
RFI suppression is in accordance with VDE 0875 below level K, both on input and output.



Master and slave connection

The rear panel 15-pole D-connector has special connections to make a master and slave connection of two or more units EK 030-10 possible. Parallel as well as in series, with automatic equal current sharing respectively equal voltage sharing. Series connection is allowed up to 500 V total output.

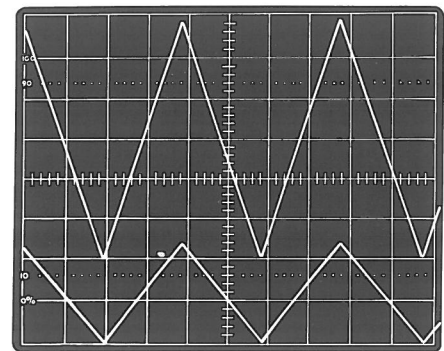


Remote programming

Output voltage and current can be programmed by voltage. A programming voltage of 0-5 V corresponds with 0 to full range of output voltage or current. The max programming speed is 30V/sec.. Output voltage and current can also be set by external potentiometers of 5 kOhm.

Voltage and current monitoring

At the rear plug two monitor voltages 0-5 V are available, corresponding with 0 to full range of output voltage and current. These can be used to talk back to a computer or to connect external meters.



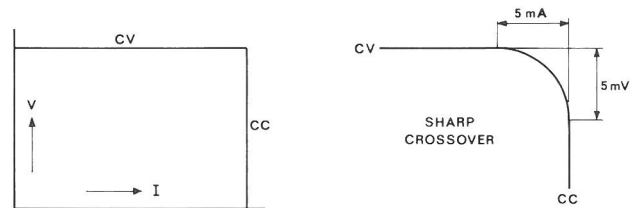
Upper diag. : Output voltage 5V/division
 Lower diag. : Programming voltage 2V/div.
 Time scale : 0.5 sec./division
 Load : 3 Ohm

CC signal and OVP signal

These are logic signals indicating the status of CV/CC and OVP

CV/CC regulation

The EK 030-10 can be used as a constant voltage source with current limiting or as a constant current source with voltage limiting. The change of mode occurs sharply at the crossing of the voltage and current settings.



Line regulation

Input 198-265 V AC

Load regulation

Load 0-100%

Ripple p-p

Temperature coefficient per °C

Stability

During 8 hours after one hour warm up, under constant load and ambient conditions

Output impedance

Up to 100 kHz, less than

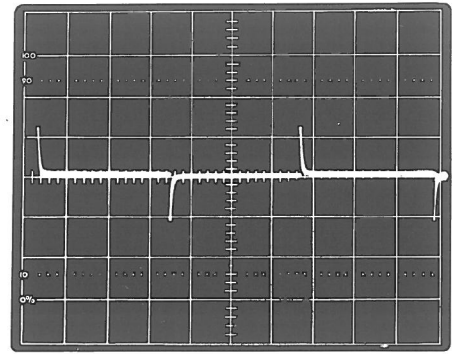
	CV	CC
Line regulation	1 mV	3 mA
Load regulation	10 mV	10 mA
Ripple p-p	1 mV	5 mA
Temperature coefficient per °C	$5 \cdot 10^{-5}$	$5 \cdot 10^{-4}$
Stability	$3 \cdot 10^{-4}$	$1 \cdot 10^{-3}$
Output impedance	0.1 Ohm	-

Recovery time

In the constant voltage mode the recovery time to within 30mV after a load step of 10-100% is less than 20 uS

Photo:

Vertical : Output voltage 50mV/div.
Horizontal: Time 200 micro-sec./div.



Ambient temperature

- 0 - 35 °C at a continuous load of 10 A
- 0 - 50 °C at a continuous load of 8 A
- 0 - 70 °C at a continuous load of 5 A

Thermal protection

In case of insufficient cooling the output will be shut down by a thermoswitch.

Overvoltage protection

Built-in over voltage protection is adjustable 7-35V with a screwdriver through a hole in the front panel. When the output reaches the set trip level of the OVP the power supply shuts down. To reset the output it is necessary to switch off the power supply and switch it on again.

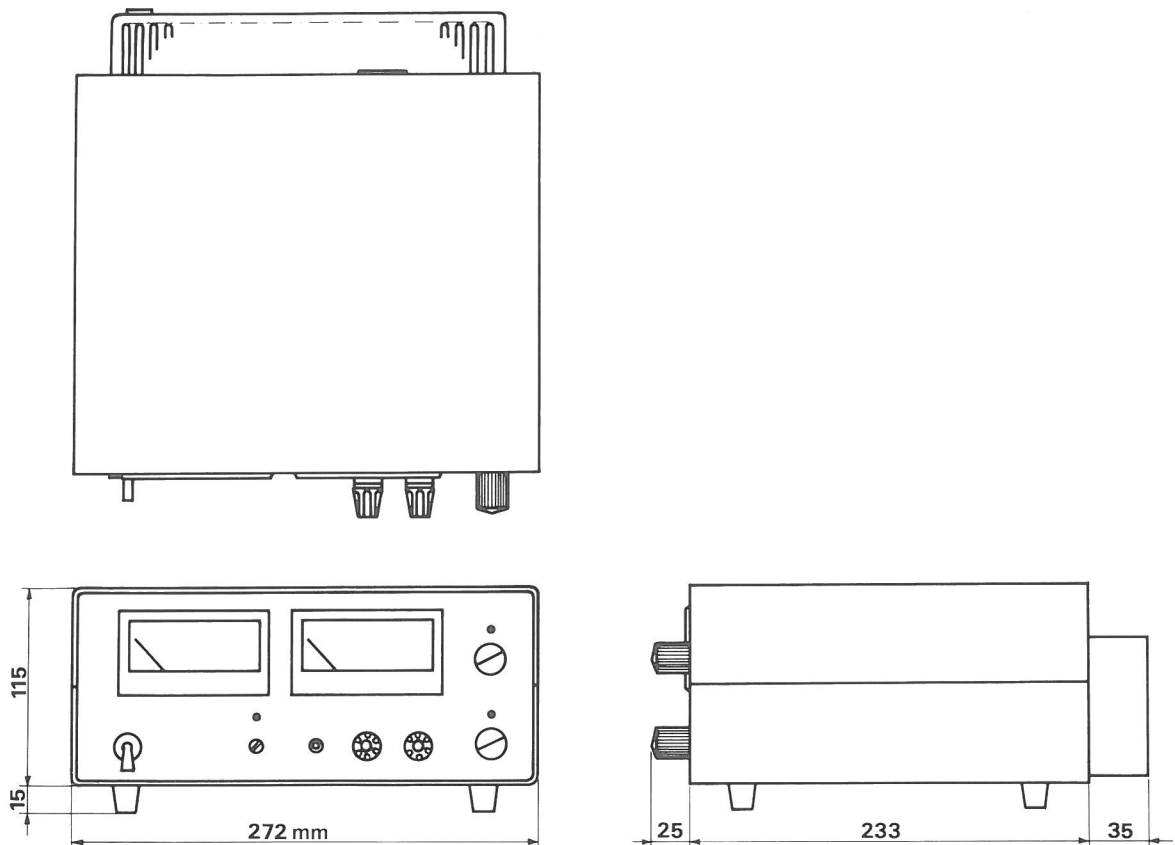
The OVP is not of the crowbar type and therefore cannot absorb power from external sources.

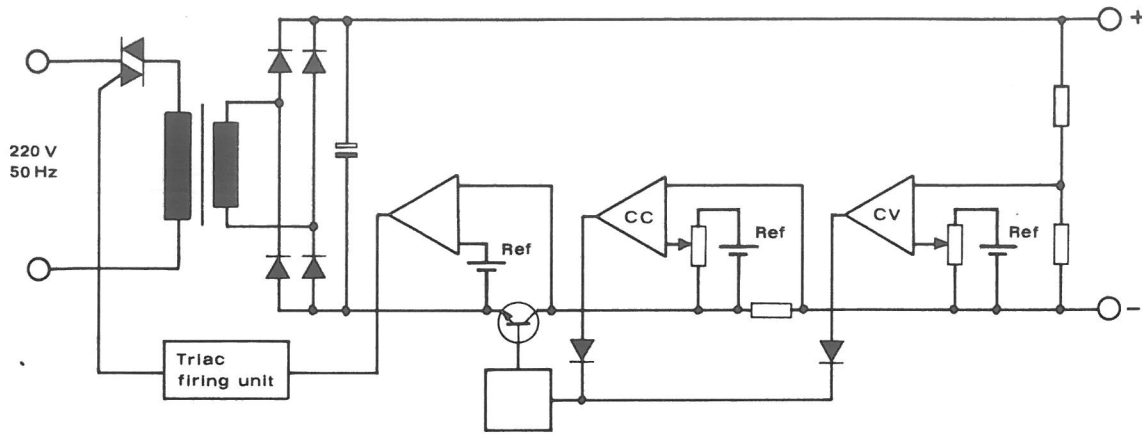
Voltage and current controls

Voltage and current controls are by 10-turn potentiometers for high resolution.

Dimensions and weight

272 x 115 x 268mm, 10.5kgs





Simplified diagram of the EK 030-10

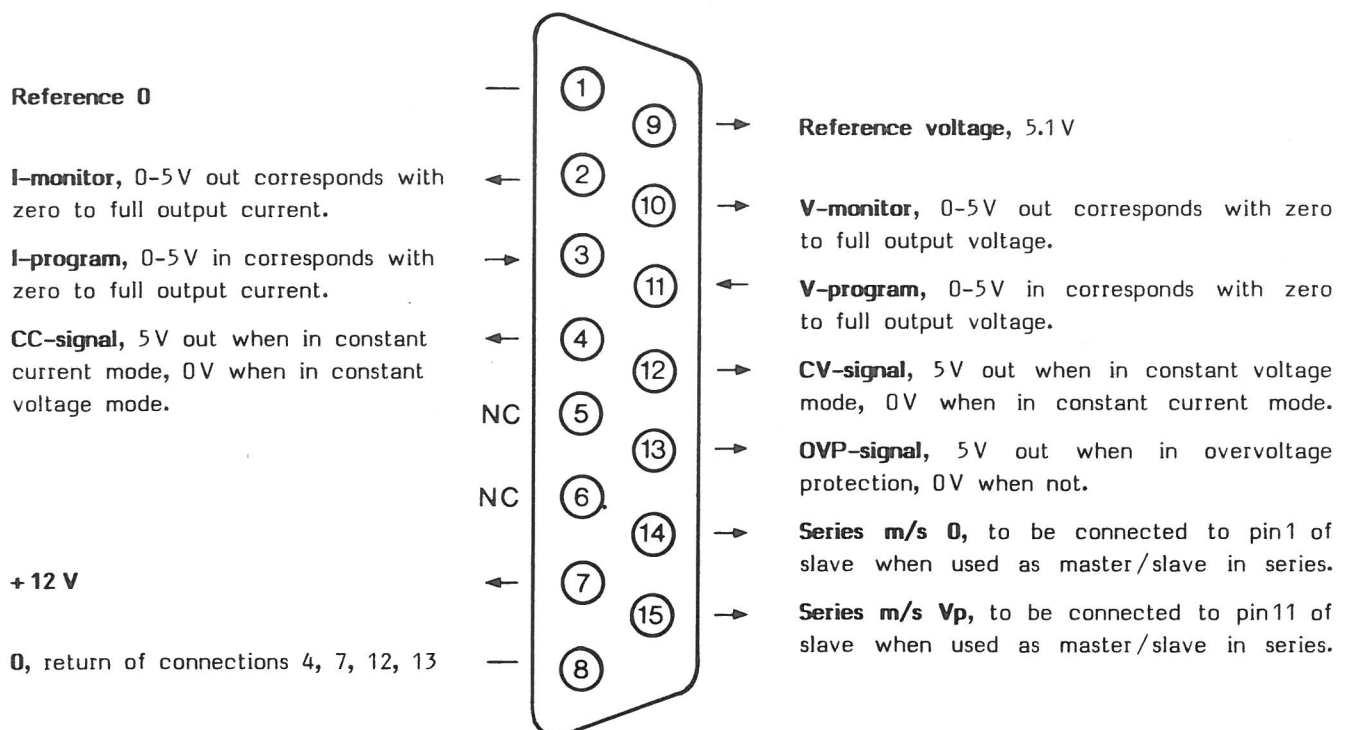
The EK 030-10 is a linear series regulated DC power supply with triac pre-regulation. The voltage drop across the power transistor of the series regulation is kept at a low constant value by comparing it with a reference voltage and using the error voltage to influence the firing angle of the triac. This pre-regulation is slow because it operates at the 50Hz line frequency. It is used to keep the heat dissipation in the transistors low. The series pass transistors take care of the fast regulation with a recovery time of 25 microseconds.

The pre-regulation technique has been used already 25 years in previous Delta Elektronika power supplies but now the size and weight have been reduced and the efficiency increased to 80% by improved circuitry and the use of modern components.

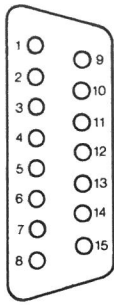
The 15-pole D-connector at the rear panel is a new standardisation on Delta power supplies which offers many features like voltage and current programming by 0-5V, monitoring voltages of 0-5V proportional to the output voltage and current and the possibility of interconnecting the regulation circuits of two or more power supplies to enable parallel master and slave operation with equal current sharing or master and slave series operation with equal voltage sharing.

All input and output levels at this plug are standardized at 0-5V.

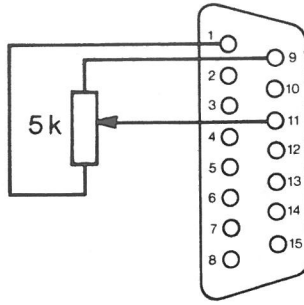
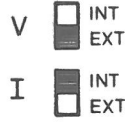
In future this plug with standardized connections will be fitted on most new designs. With the help of the interface unit PSC625 (Power Supply Controller) these power supplies can easily be programmed by computer with IEC625 or IEEE448.



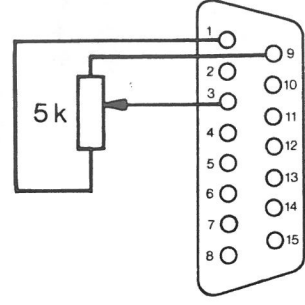
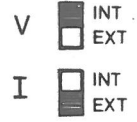
Connections to 15-pole D-connector



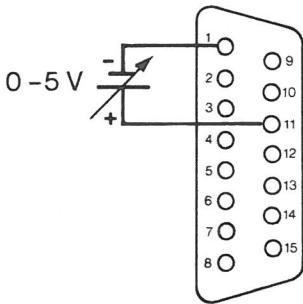
Voltage and Current control by front panel potentiometers



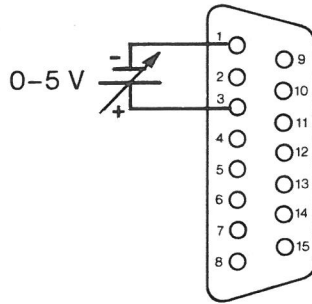
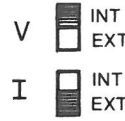
Voltage control by external potentiometer



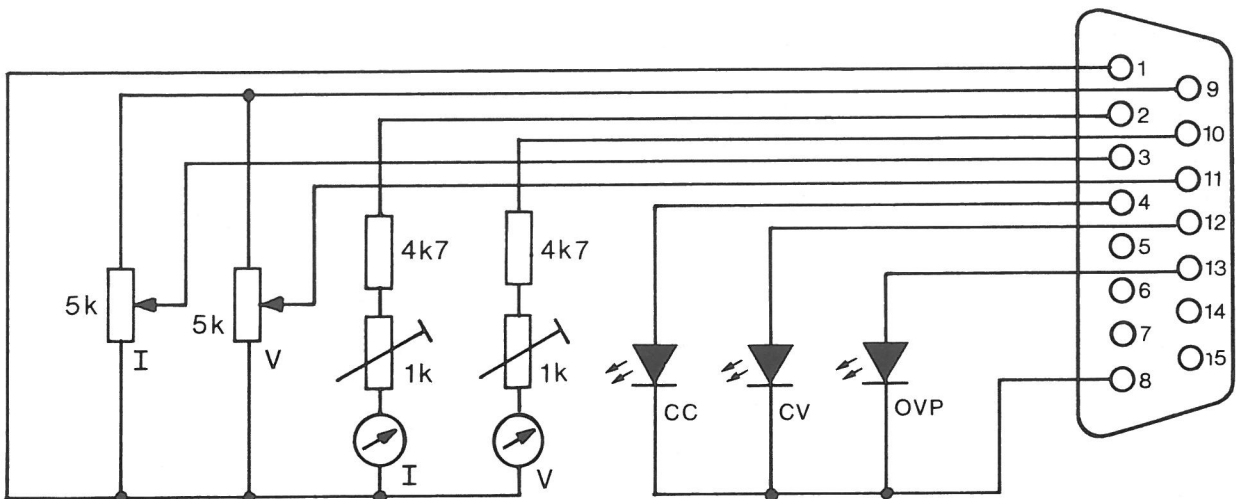
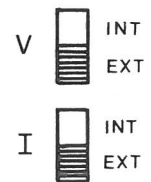
Current control by external potentiometer



Remote programming : Voltage by Voltage



Remote programming : Current by Voltage



Remote control

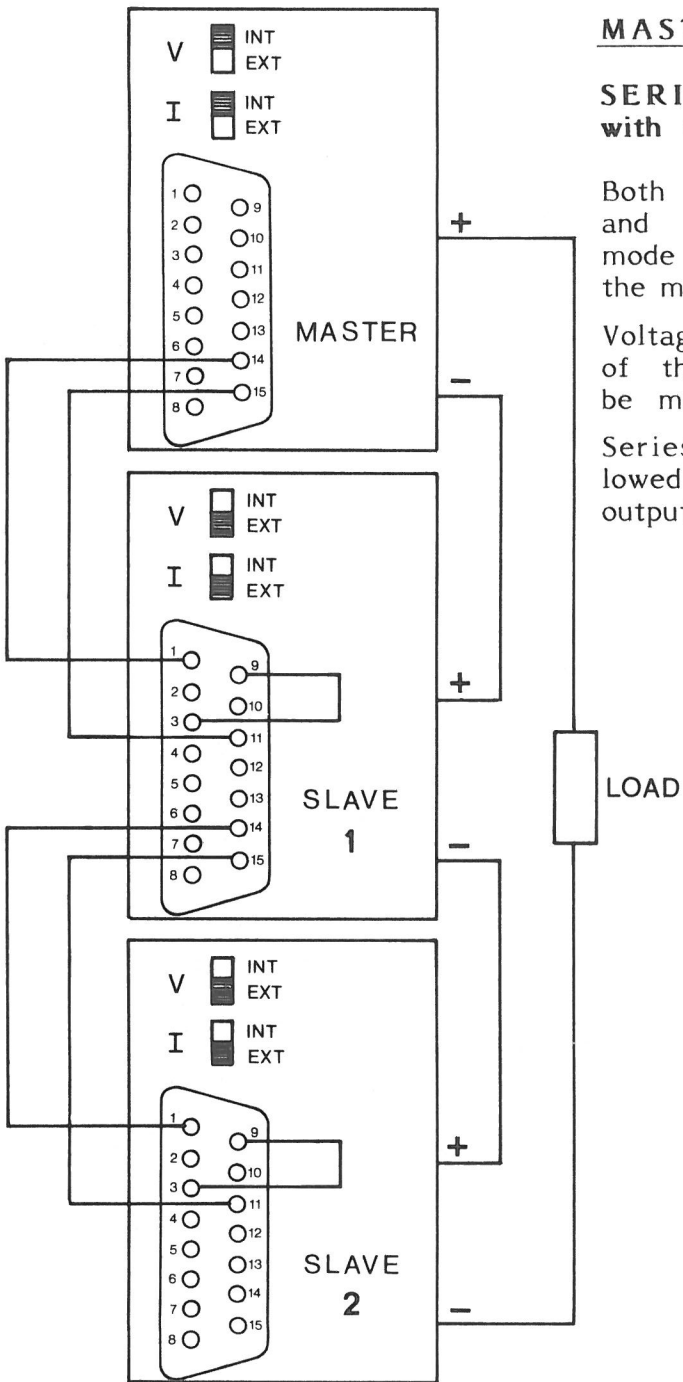
MASTER AND SLAVE

SERIES CONNECTION with equal voltage sharing

Both in constant voltage and in constant current mode the slaves will follow the master.

Voltage and current control of the master can either be manual or programmed.

Series connection is allowed up to 500V total output.



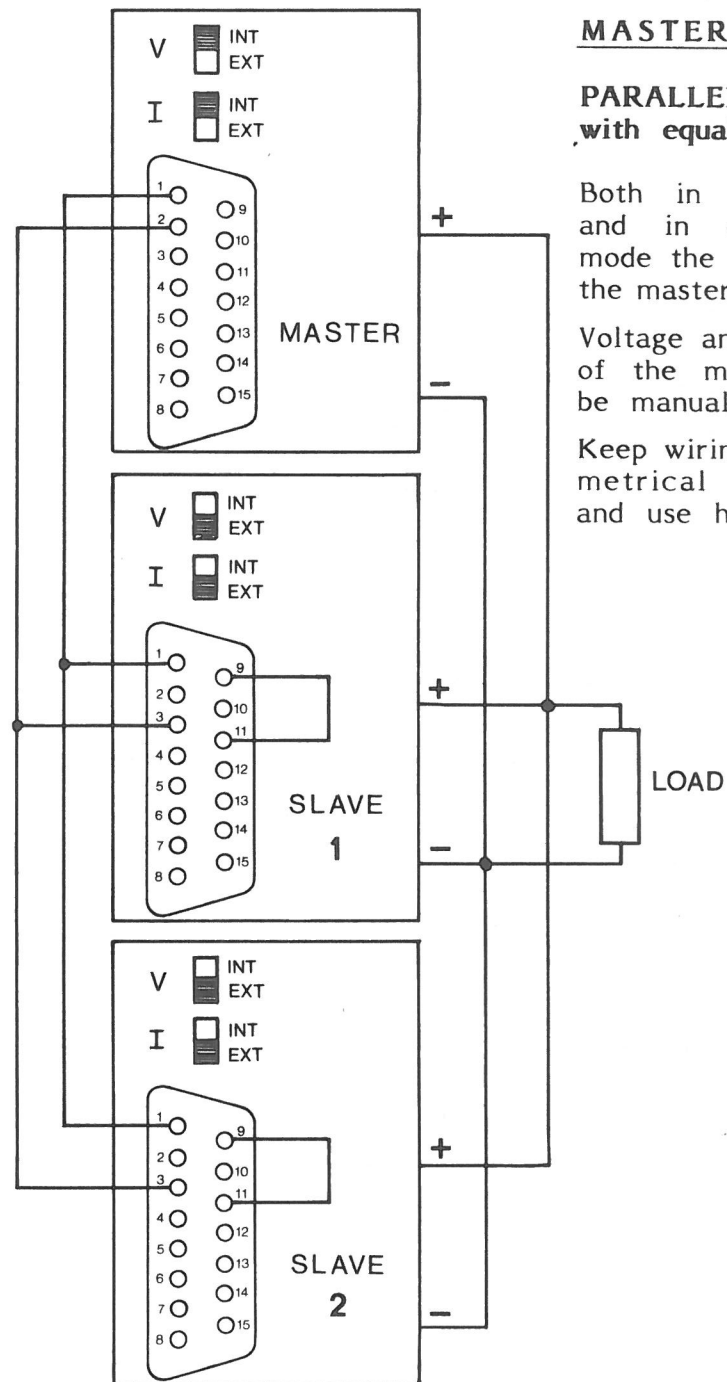
MASTER AND SLAVE

PARALLEL CONNECTION with equal current sharing

Both in constant voltage and in constant current mode the slaves will follow the master.

Voltage and current control of the master can either be manual or programmed.

Keep wiring short and symmetrical (equal lengths) and use heavy gauge wire.



MASTER AND SLAVE

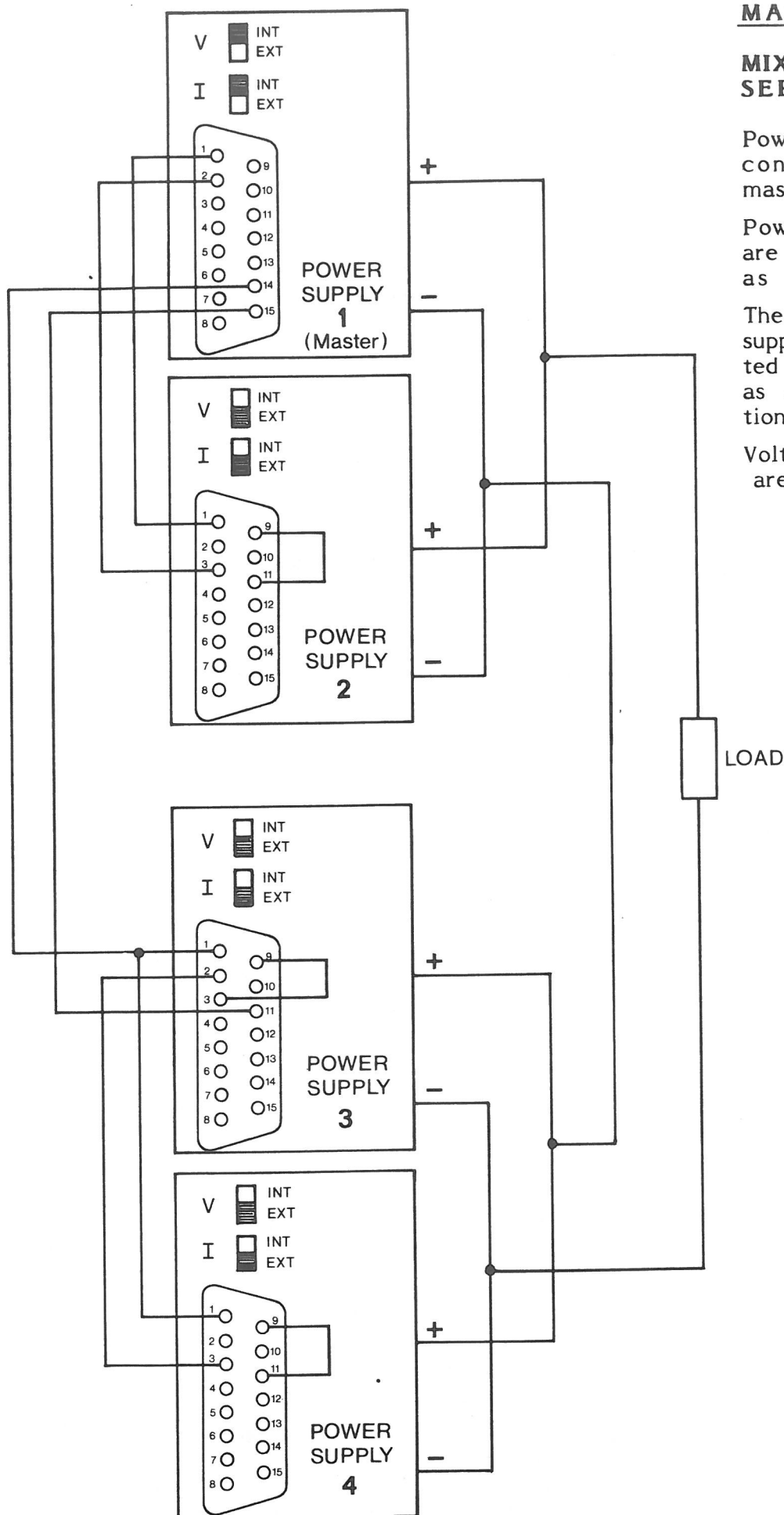
MIXED PARALLEL AND SERIES CONNECTION

Power supply 1 and 2 are connected parallel as master and slave.

Power supply 3 and 4 are also connected parallel as master and slave.

The combination of power supply 3 and 4 is connected in series with and as slave of the combination 1 and 2.

Voltage and current control are now by power supply 1.



R = Ohm

1 = 3,3 k
2 = 100 k
3 = 12 k
4 = 68 k
5 = 10 k potm.
6 = 27 k
7 = 3,9 k
8 = 1 k
9 = 10 k
10 = 18 k
11 = 4,7 k
12 = 4,7 k
13 = 10 k potm.
14 = 120 k
15 = 100
16 = 18 k
17 = 18 k
18 = 3,9 k
19 = 3,9 k
20 = 18 k
21 = 1
22 = 1
23 = 10 k
24 = 10 k potm.
25 = 15 k
26 = 6,8 k
27 = 4,7 k
28 = 100
29 = 18 k
30 = 18 k
31 = 1,2 k
32 = 1 M
33 = 1,2 k
34 = 1,2 k
35 = 1,2 k
36 = 18 k
37 = 18 k
38 = 6,8 k
39 = 6,8 k
40 = 1 M
41 = 6,8 k
42 = 6,8 k
43 = 8,2 k
44 = 8,2 k
45 = 3,3 k
46 = 560 k
47 = 560
48 = 560
49 = 560
50 = 27 k
51 = 39 k
52 = 5 k 20 trns trim
53 = 5 k 20 trns trim
54 = 5 k 20 trns trim
55 = 680
56 = 1 k
57 = 470
58 = 680
59 = 150
60 = 470

61 = 470
62 = 12 k
63 = 2,2 k
64 = 22 k
65 = 4,7 k
66 = CR
67 = 470
68 = 470
69 = 1 k
70 = 22
71 = 470
72 = 1 k
73 = 22
74 = 22
75 = 4,7 k
76 = 4,7 k
77 = 1 k


CR = calibration resistor

WW = wire wound

all non specified resistors are
of MRS 25

MRS 25 = metal film 0,4W 1%

PR 37 = metal film 1,6W 5%

			Title: P 342	
			Date: 1-'85	
Modifications	Date	App.	delta elektronika bv	

R = Ohm

78 = 470
 79 = 330
 80 = 100
 81 = 15
 82 = 3,9 k PR 37
 83 = 3,9 k PR 37
 84 = 470
 85 = 3,3 k
 86 = 10
 87 = 470
 88 = 680 9W WW
 89 = 680 9W WW
 90 = 1 k
 91 = 1 k
 92 = 1 k 20 trns trim
 93 = 1 k 20 trns trim
 94 = 5 k 10 trns potm
 95 = 5 k 10 trns potm
 96 = 0,01 (shunt) 50W
 97 = 10
 98 = 5 k potm
 99 = 100
 100 = 100
 101 = 1,8
 102 = 1 k 20 trns trim

CR = calibration resistor
 WW = wire wound
 all non specified resistors are
 of MRS25

MRS 25 = metal film 0,4W 1%
 PR 37 = metal film 1,6W 5%

C

26 = 2,2 nF 4 kV
 27 = 0,22 μ F 250V X 2
 28 = 2,2 nF 4 kV
 29 = 2200 pF 250V Y
 30 = 5 nF 250V RY
 31 = 0,15 μ F 250V
 32 = -
 33 = 4700 μ F 16V
 34 = 4700 μ F 16V
 35 = 220 μ F 40V
 36 = 220 μ F 40V
 37 = 220 μ F 40V
 38 = 220 μ F 40V
 39 = 36000 μ F 40V
 40 = 36000 μ F 40V
 41 = 0,1 μ F 100V

D

18 = 558-0101 Dialight
 19 = 558-0101 Dialight
 20 = 558-0101 Dialight
 21 = 1 N 4148
 22 = 1 N 4148
 23 = 1 N 4003 Philips
 24 = MR 751 Motorola
 25 = BYW 77/200 Sescosem
 26 = 1 N 4003 Philips
 27 = 1 N 4003 Philips
 28 = SD 41 IR
 29 = SD 41 IR
 30 = SD 41 IR
 31 = SD 41 IR

Q

11 = TAG 725 TAG
 12 = BD 240 RCA
 13 = BD 239 RCA
 14 = 2 N 3055 RCA
 15 = 2 N 3055 RCA
 16 = 2 N 3055 RCA
 17 = 2 N 3055 RCA

TS = Thermoswitch Uchiya
 OP 62 85 °C +/- 5%

T


1 = T 225 Delta
 2 = T 223 Delta
 3 = T 224 Delta

L

1 = L 226 Delta
 2 = L 227 Delta

F

2 = 4A slow blow

			Title: EK 030 - 10	
R 99, 100, 101, 102	2-'86	Ur.	Date: 1 - '85	
C 32	2-'86	Ur.		
Modifications	Date	App.	delta elektronika bv	

<u>C</u>			
1 =	220	μF	25V
2 =	220	μF	25V
3 =	220	μF	25V
4 =	15	μF	16V
5 =	15	μF	16V
6 =	4700	pF	63V
7 =	4700	pF	63V
8 =	4700	pF	63V
9 =	4700	pF	63V
10 =	0,022	μF	250V
11 =	100	pF	500V
12 =	100	pF	500V
13 =	100	pF	500V
14 =	100	pF	500V
15 =	100	pF	500V
16 =	0,1	μF	100V
17 =	100	pF	500V
18 =	100	pF	500V
19 =	100	pF	500V
20 =	2,2	μF	25V
21 =	15	pF	500V
22 =	0,047	μF	250V
23 =	0,022	μF	250V
24 =	2,2	μF	25V
25 =	2,2	μF	25V

<u>D</u>		
1 =	B 80 C1000	Siemens
2 =	ZPD 12	ITT
3 =	1 N 4148	
4 =	1 N 4148	
5 =	1 N 4148	
6 =	1 N 4148	
7 =	1 N 4148	
8 =	1 N 4148	
9 =	1 N 4148	
10 =	1 N 4148	
11 =	ZPD 5,1	ITT
12 =	ZPD 8,2	ITT
13 =	ZPY 12	ITT
14 =	ZPD 8,2	ITT
15 =	ZPY 12	ITT
16 =	ZPY 12	ITT
17 =	TL 431	TI

<u>IC</u>		
1 =	L 7812	SGS
2 =	L 7912	SGS
3 =	REF 02	PMI
4 =	TDB 084	Thomson
5 =	TDB 084	Thomson

<u>Q</u>		
1 =	2 N 2907A	Sescosem
2 =	2 N 2222A	Sescosem
3 =	2 N 2222A	Sescosem
4 =	2 N 2222A	Sescosem
5 =	2 N 2222A	Sescosem
6 =	2 N 2222A	Sescosem
7 =	VN 10 KM	Siliconix
8 =	VN 10 KM	Siliconix
9 =	TAG 93A	TAG
10 =	ESM 693	Thomson

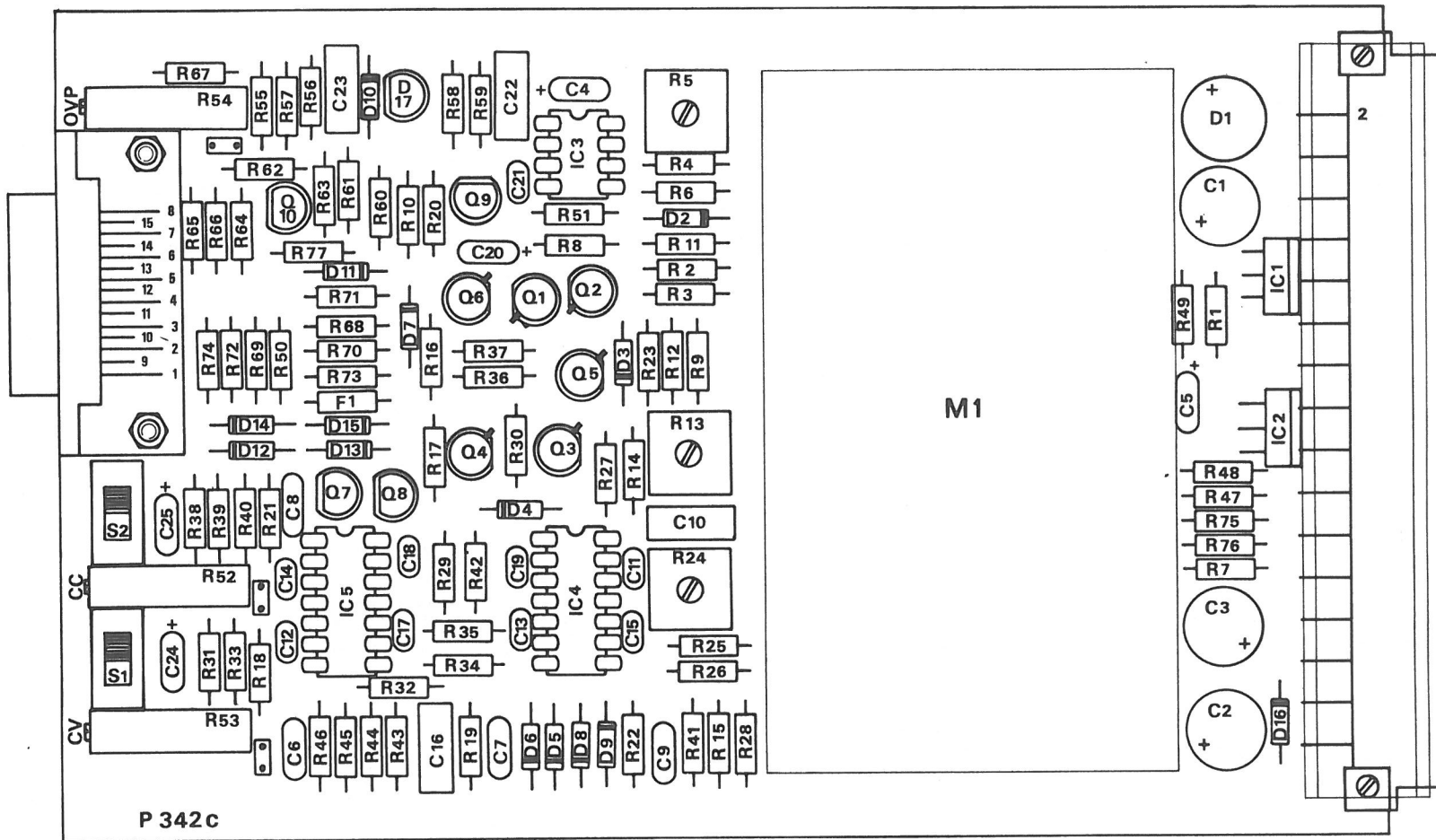
<u>F</u>	
1 =	250 mA

<u>M</u>	
1 =	PE 343

<u>S</u>	
1 =	C & K
2 =	C & K

			Title: P 342
			(EK030 - 10)
			Date: 1-'85
Modifications	Date	App.	delta elektronika bv



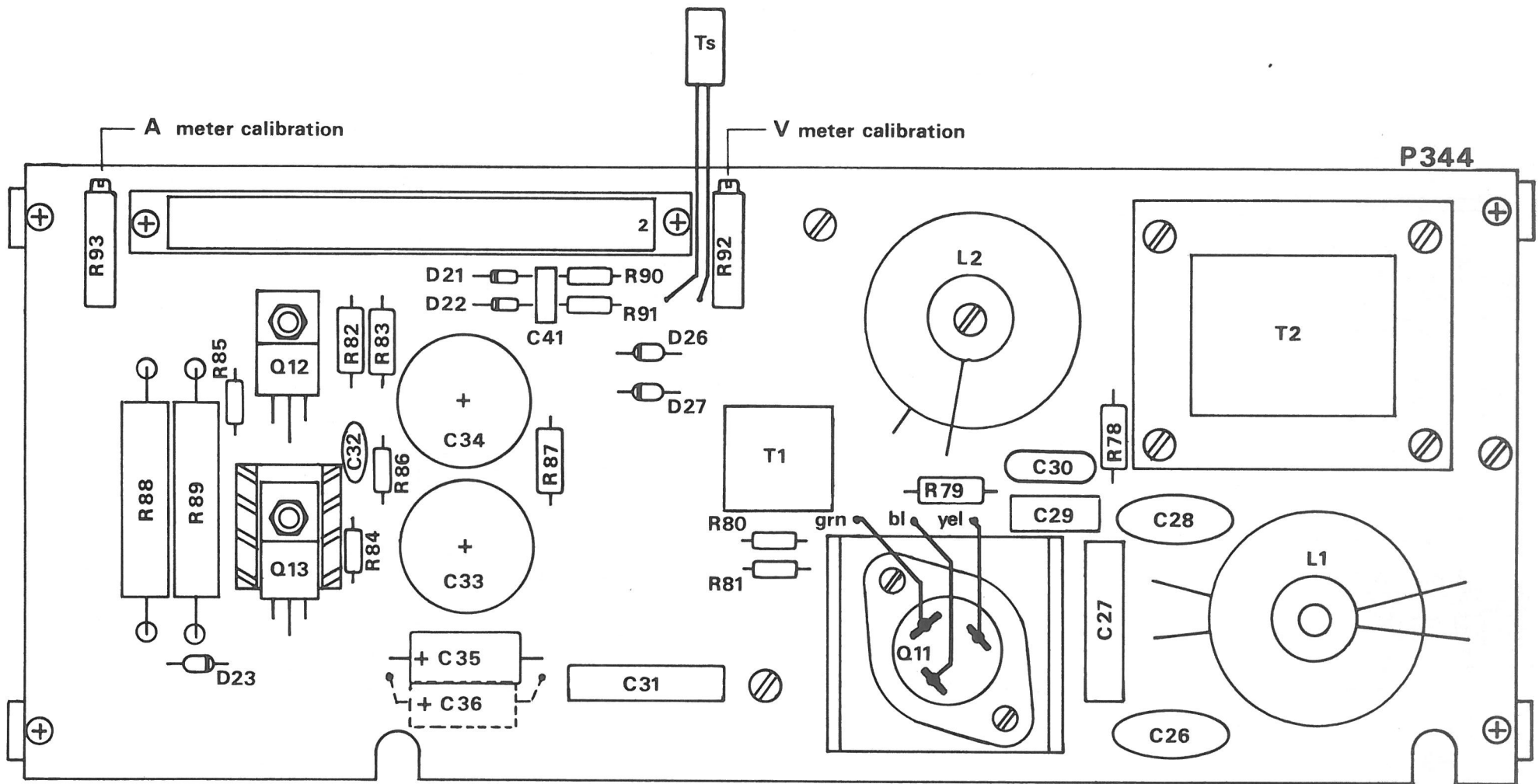


M1

P 342c

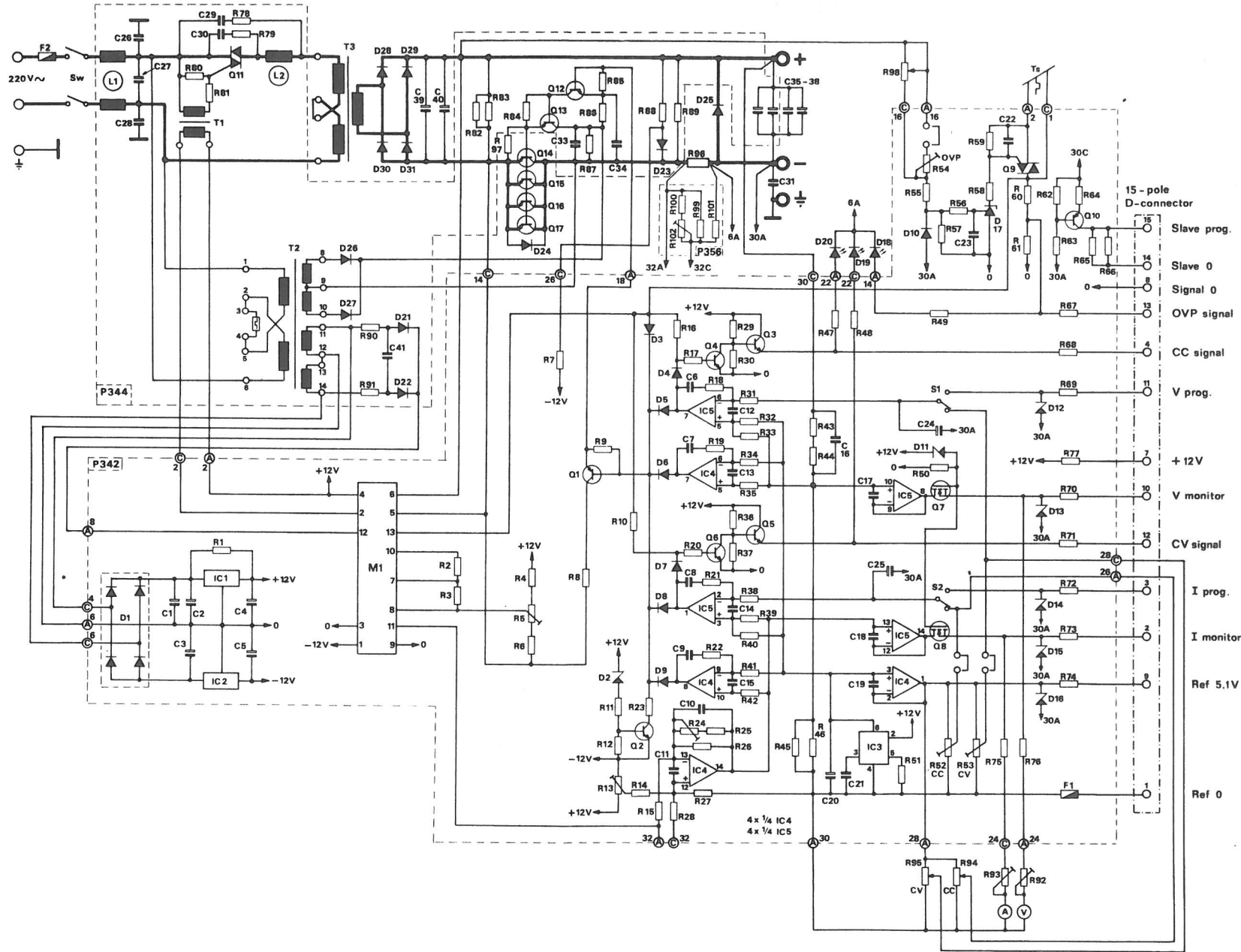
			Title: P 342 (EK 030-10)
			Date: 1-'85
Modifications	Date	App	delta elektronika bv





			Title: P344 (EK 030-10)
			Date: 1-'85
Modifications	Date	App	delta elektronika bv





			Title: Circuit diagram EK 030 - 10	
P356	2-'86	Vr	Date: 1 - '85	
Modifications	Date	App	delta elektronika bv	