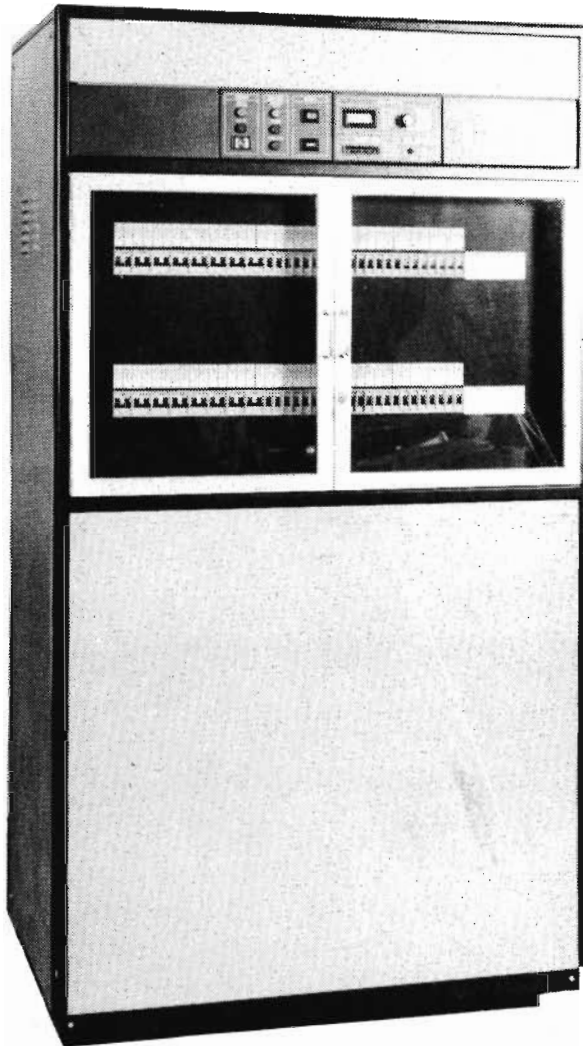


POWER DISTRIBUTION



60 KVA

CONTENTS

General information	sid 1
Operator panel/output monitor	sid 2
Technical specification	sid 4
Installation	sid 5
Error check list	sid 10
Drawings operator and instrument panel	sid 12
Illustrated parts break down	sid 30
Functional drawings	sid 36

GENERAL INFORMATION

P.D. 10/20/40/60 is a new way of supplying computers with the clean electric current they require. It is a complete unit which is wheeled into position in the plant just like other units.

P.D. consists of equipment for transient suppression, powerup sequence, earth fault monitoring, phase error monitoring, power monitoring, voltage, current and frequency measurement, alarm for high room temperature and a power distribution panel with circuit breakers under a lockable glass cover.

OPERATOR PANEL

Power to computers is switched on and off from this panel by using the key-operated switch.

The control panel is designed for automatic restart after outage and has indicators for power-up sequence, power on, room temperature above 26°C, room temperature above 28°C and phase error.

Acoustic alarm for both room temperature 26°/28°C and phase error.

Automatic power-off is generated by room temperature above 28°C or phase error.



INSTRUMENT PANEL

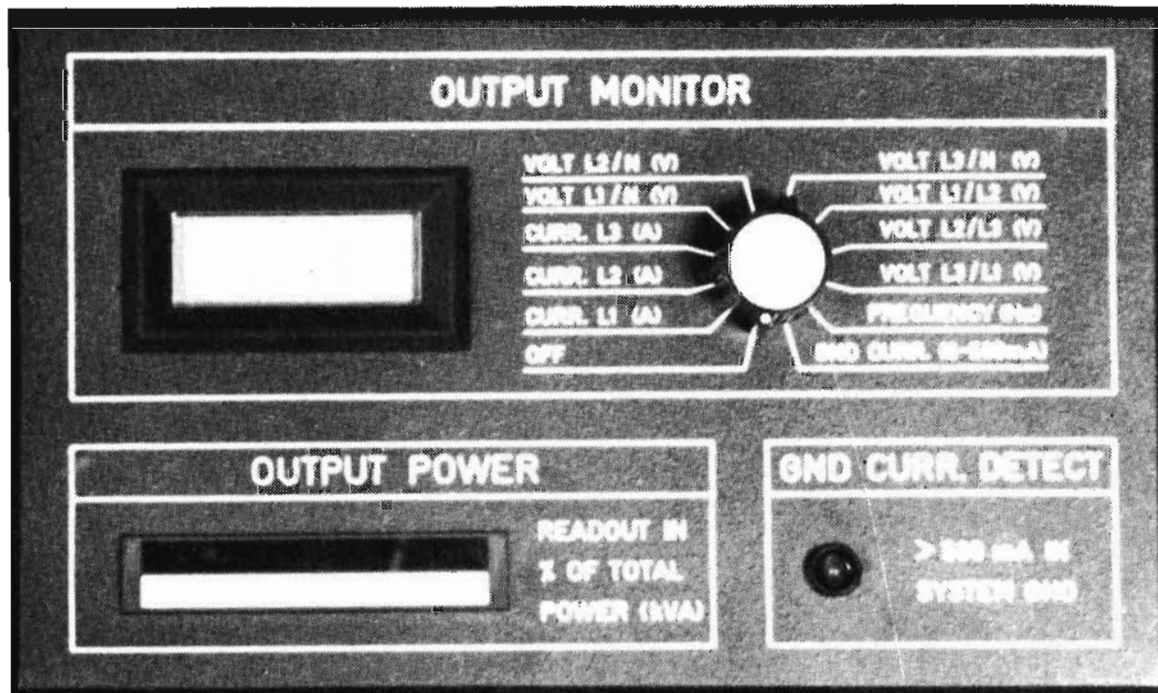
All readouts are made from secondary side of power distribution unit.

The instrument is operated by a rotary switch, and has the following functions (LCD-display).

- Total current for each phase
- Voltage between phase and neutral
- Voltage between phases
- Frequency
- Current in safety ground (0–500 mA)

The instrument panel also includes:

- kVA-meter scaled in percent of total power available.
- Indicator, activated when current in safety ground exceeds 500 mA.



TECHNICAL SPECIFICATION

P.D. 60

Input: Three phase 220/230V or 380/400V with neutral and earth. Other voltages can be supplied on request.

Output: Three phase 380/400V and one phase 220/230V with neutral

Noise suppression: Common mode, min. 80 dB from 1 kHz to 1 MHz.
Transfer mode, min. 60 dB from 100 kHz to 1 MHz.

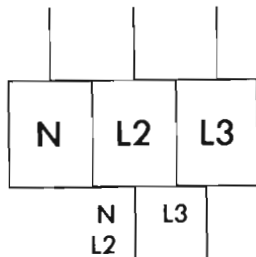
Terminal connections for: Emergency breakers, room thermostat 26°C and 28°C, and external alarm.

H × W × D in cm	195 × 102 × 63
Service space front and side	100/60
Weight in kg	485
Operating temp in degrees Celsius	0 to 40
Main fuse 230/380V	160/100
Input outlet types: 220/230V 380/400V	
kVA	65,8
Heat loss in kcal	1300
Number of sequences	9
Number of fuses 25 Amp	15
Number of fuses 16 Amp	25
Number of fuses 32 Amp	6

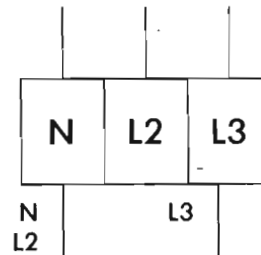
INSTALLATION P.D. 60

Before rolling the P.D. into its proper position, remove rear and left side cover and check the transformer connection (below). Also check the floor cutting (page 6)

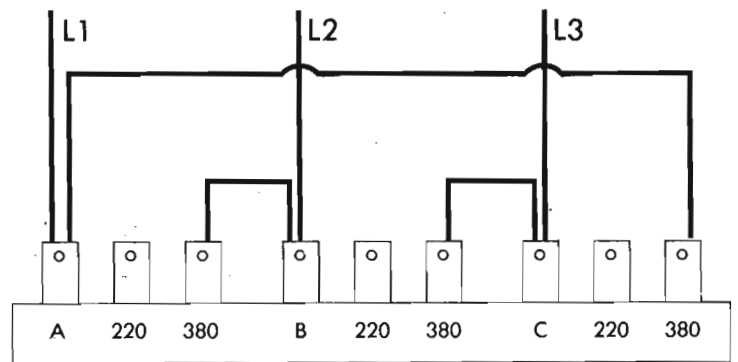
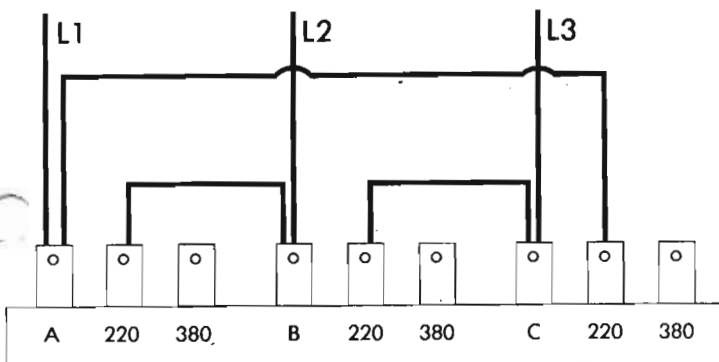
Mains 3x220/230 V



Mains 3x380/400 V

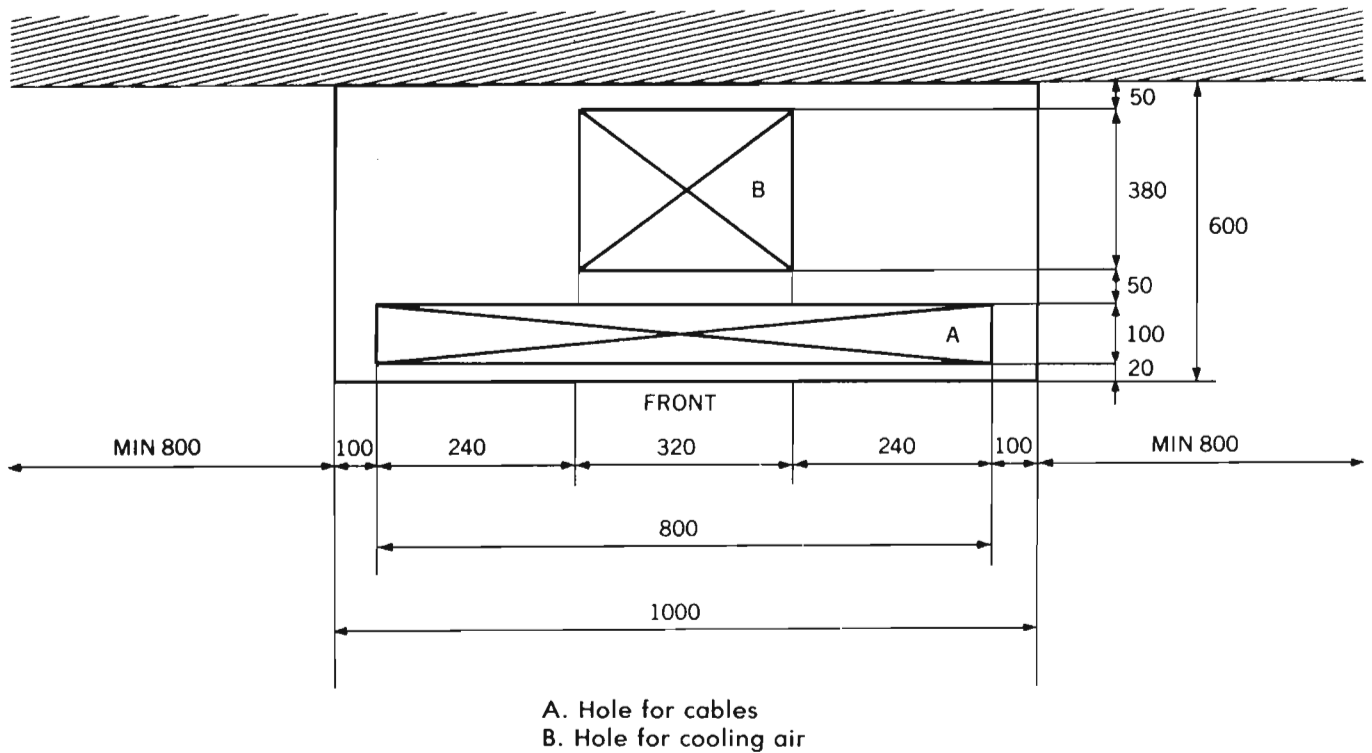


Control Voltage Terminal
(Located on rear side of chassis, marked "220/380")



Transformer Primary Terminal

OUTLINE DRAWING FOR P.D. 60



Note: The distance between wall and rear cover should be about 8 cm.

Connect mains, separate earth line, emergency breaker and room-thermostat to terminals on left side (fig. 3).

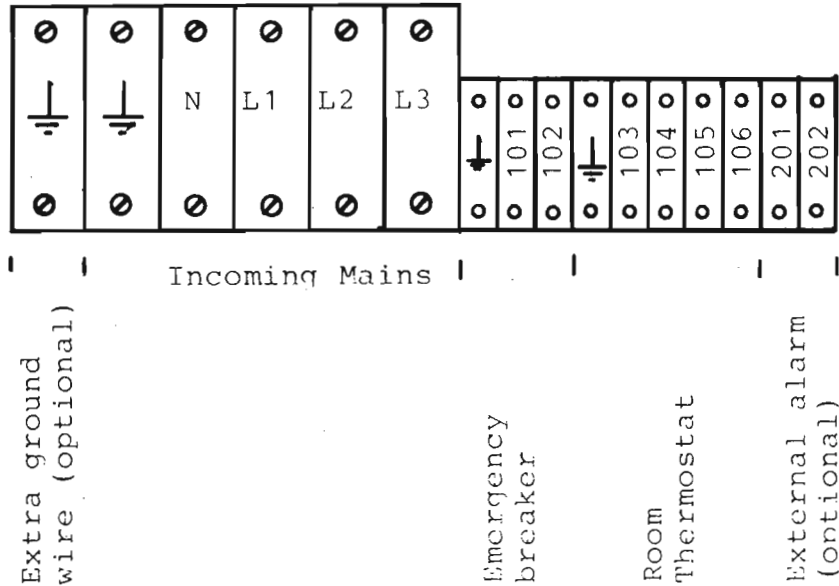


Fig. 3.

If running P.D. without emergency breaker and room thermostat connect jumper-wire between: 101-102 and 103-104-105.

Connect all output cables to terminals behind front cover.

Before power-on, switch all outgoing circuit breakers in off position.

Turn on the key switch, and the power-up sequence is complete when the green power-on indicator lights up.

If the operator panel indicates "phase error", check with internal meter that all three phases are present. If so change places between incoming L1 and L2.

Check outgoing voltage with internal instrument before switching on the output circuit breakers.

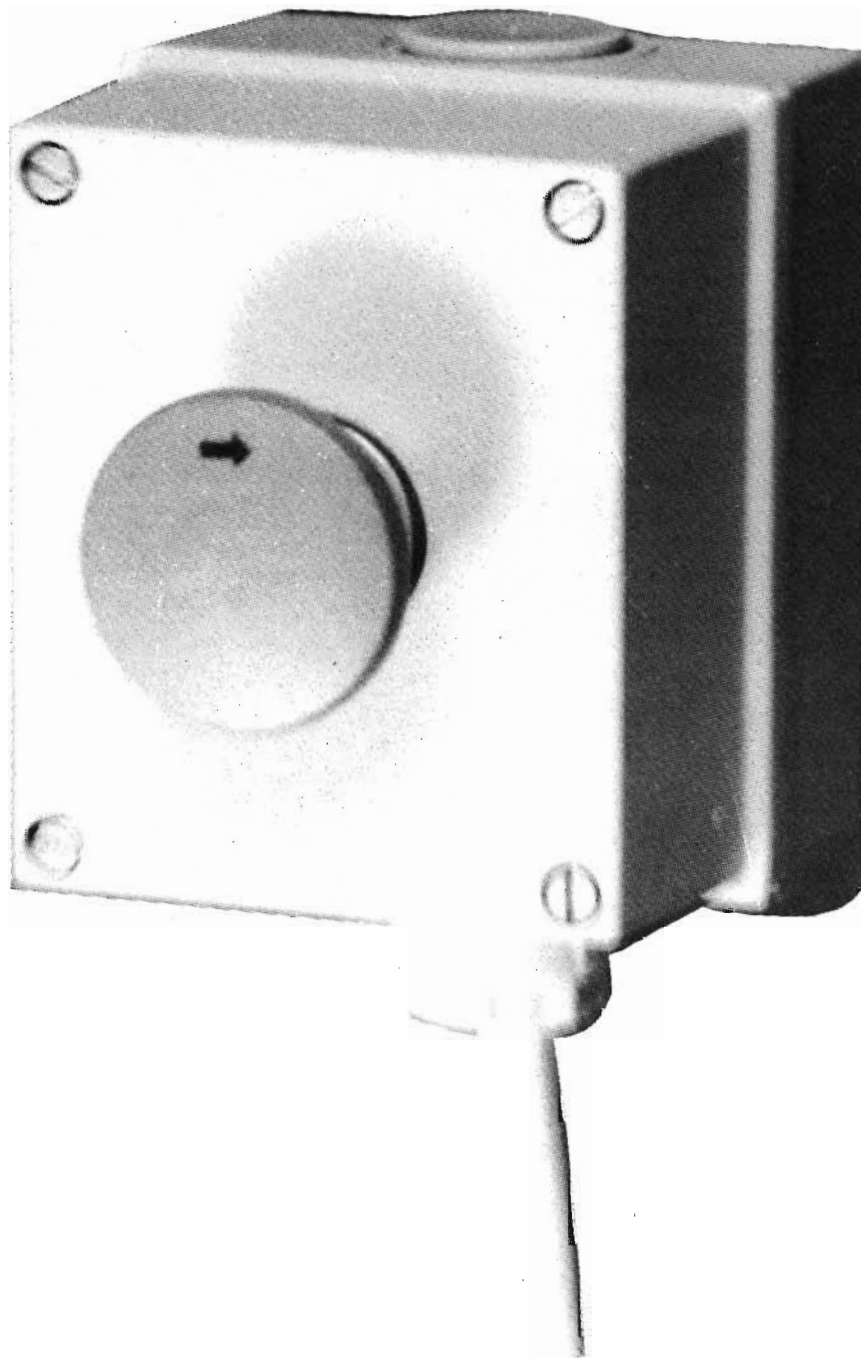
Connect load one by one, and check the ground current meter. (Correct installation should be about 0—100 mAmps. See error check list for details.)

EMERGENCY BREAKERS

When the emergency breaker is activated the control voltage will be switched off and all outgoing power is shut down.

The emergency breaker should be connected on terminals no: 101 and 102, located beside incoming mains terminal. See fig. 3.

The emergency breaker is activated when the button is depressed.



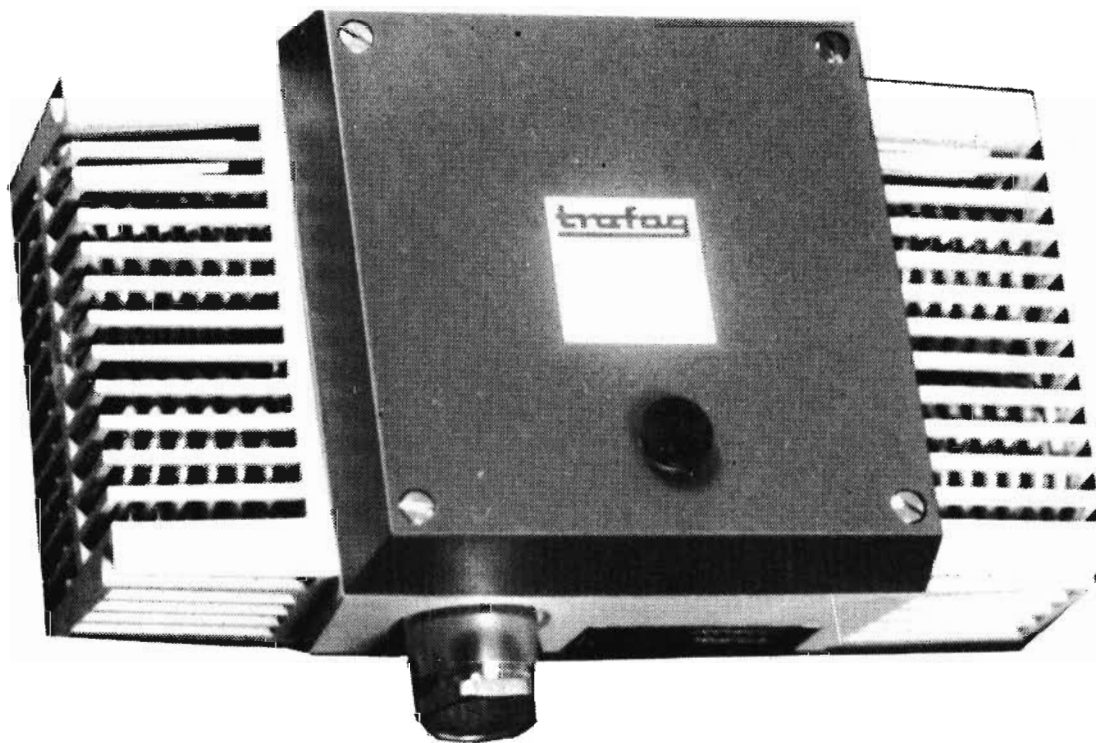
ROOM-THERMOSTAT

(DOUBLE FUNCTIONS)

The thermostat is divided in two parts, system I and system II.

System I activates when room temperature exceeds 26°C. This engages the indicator "≥26°" and the acoustic alarm. System 1 deactivates automatically when the temperature drops below 26°C.

System II activates when room temperature exceeds 28°C, the unit is then automatically shut down. To be able to start the system again, you have to wait until room temp has fallen to 25–26° and then make a manual reset by pressing the red button on the thermostat. The thermostat shall be connected on terminals 103, 104, 105 and 106 located beside incoming mains terminal. See fig. 3.



ERROR CHECK LIST

NO RESPONSE WHEN STARTING SYSTEM

1.

Emergency breaker (off position)

2.

No incoming power (check main fuses)

3.

Wrong connection according to fig. 3

ROOM-TEMP -26°

1.

Temperature in the room probably over 26°C
(more cooling capacity needed)

2.

If temp. is lower than 26°C, check thermostat on wall and relay R.1 on control board/operator panel

ROOM-TEMP -28°

1.

Temperature in the room probably over 28° (more cooling capacity needed). To be able to get power-on again after "roomtemp. -28°C", the temperature must be lower than 26–27°, and a manual reset must be done on the thermostat. (Push red button)

2.

If temp is lower than 28°C, check the thermostat, and relay R.2 on control board/operator panel. If thermostat is damaged, it's possible to start the unit by replacing the thermostat cable on terminals 103, 104, 105 and 106 with a jumper-wire between 103, 104 and 105, no jumper-wire on 106. Terminals are located behind left side cover on P.D.-unit. See fig. 3.

PHASE ERROR

1.

With internal meter check the three voltages L1/N, L2/N, and L3/N. The extreme lowest readout has probably a blown incoming main fuse. Also check the main circuit breaker located behind cover. See page 30.

2.

If all three readouts are more or less the same, the phase rotation might be wrong. Change place between 2 incoming phases (if during installation).

3.

Phase error relay is damaged. (As an emergency action, a jumper wire can be connected between terminals 1 and 3 on the phase error relay socket, until a new relay is inserted.)

4.

Relay R.3 on control board/operator panel is damaged.

GROUND CURRENT DETECT (red lamp on instr. panel)

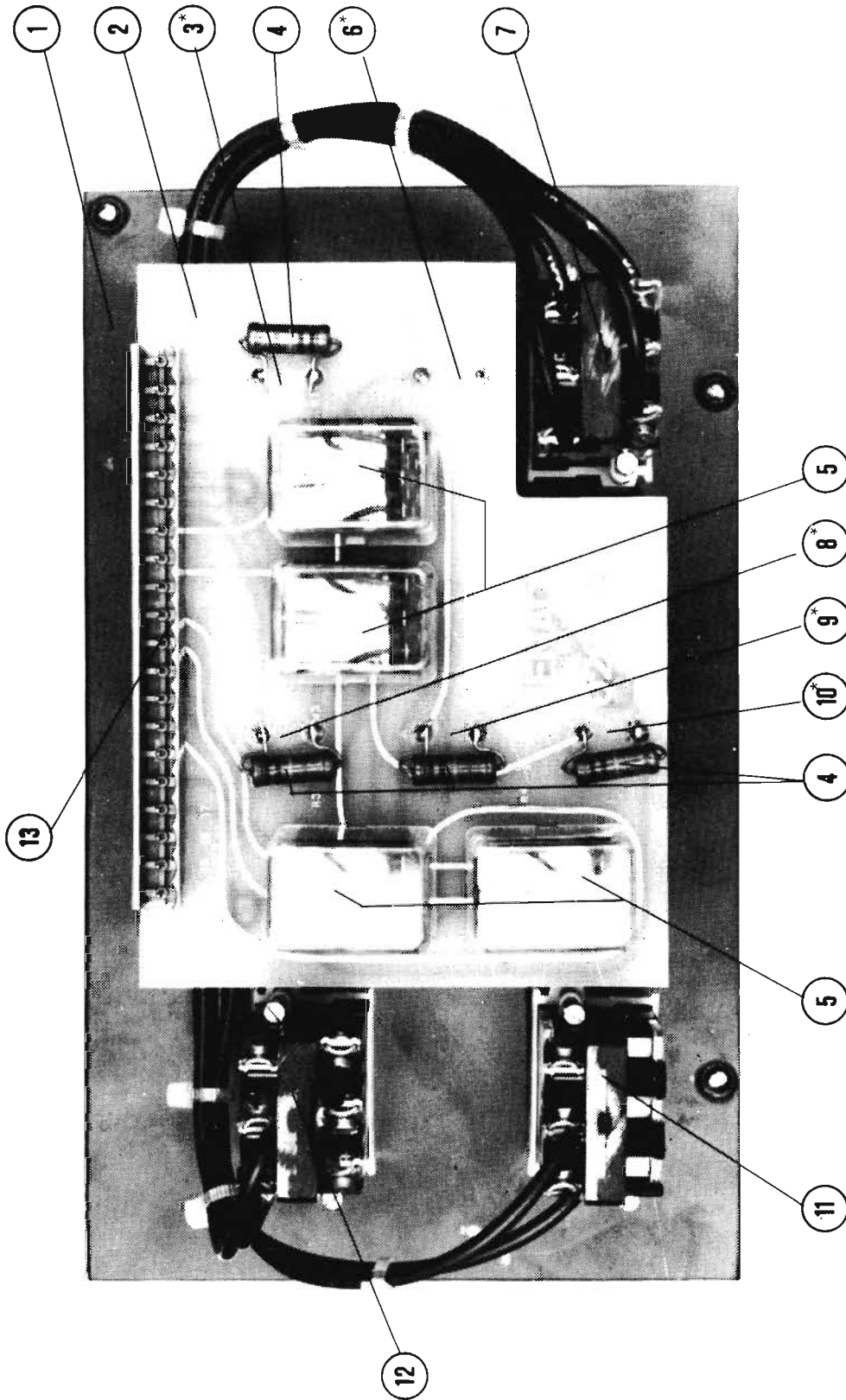
If red indicator "GND Curr. detect", is activated there is far too much current in the safety ground. To find out which unit or units generating this current proceed as follows:

Turn the rotary switch to position GND Curr (0-500 mA) and power down the entire system by using the circuit breakers located under the glass cover. Switch on each unit separately and observe on LCD-display which unit fails.

If ground-current is measured even when all outgoing circuit breakers are in off-position, there is a fault in the ground-wire system. Check the grounding installation (probably a ground-loop).

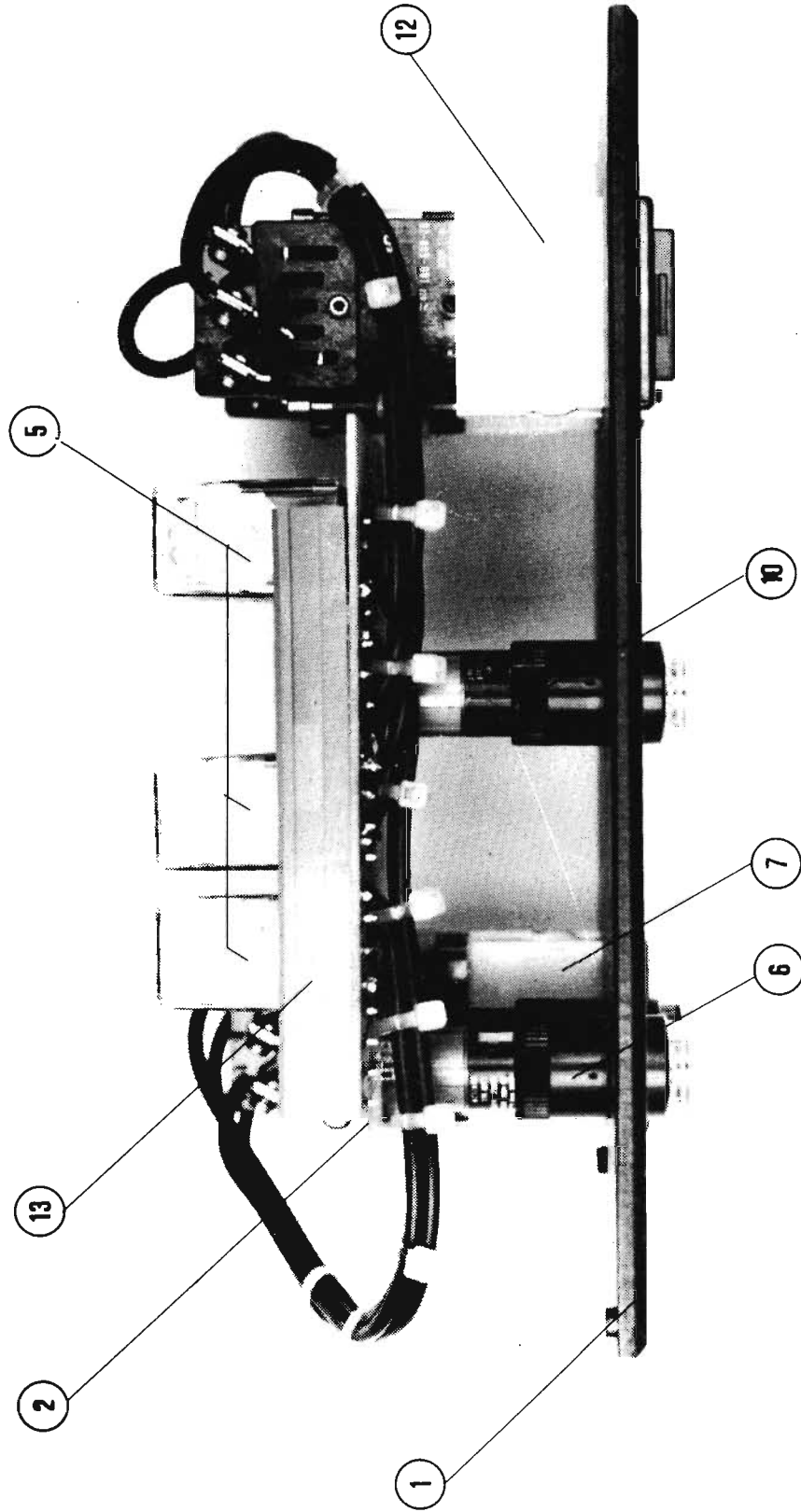
OPERATOR PANEL (rear view)

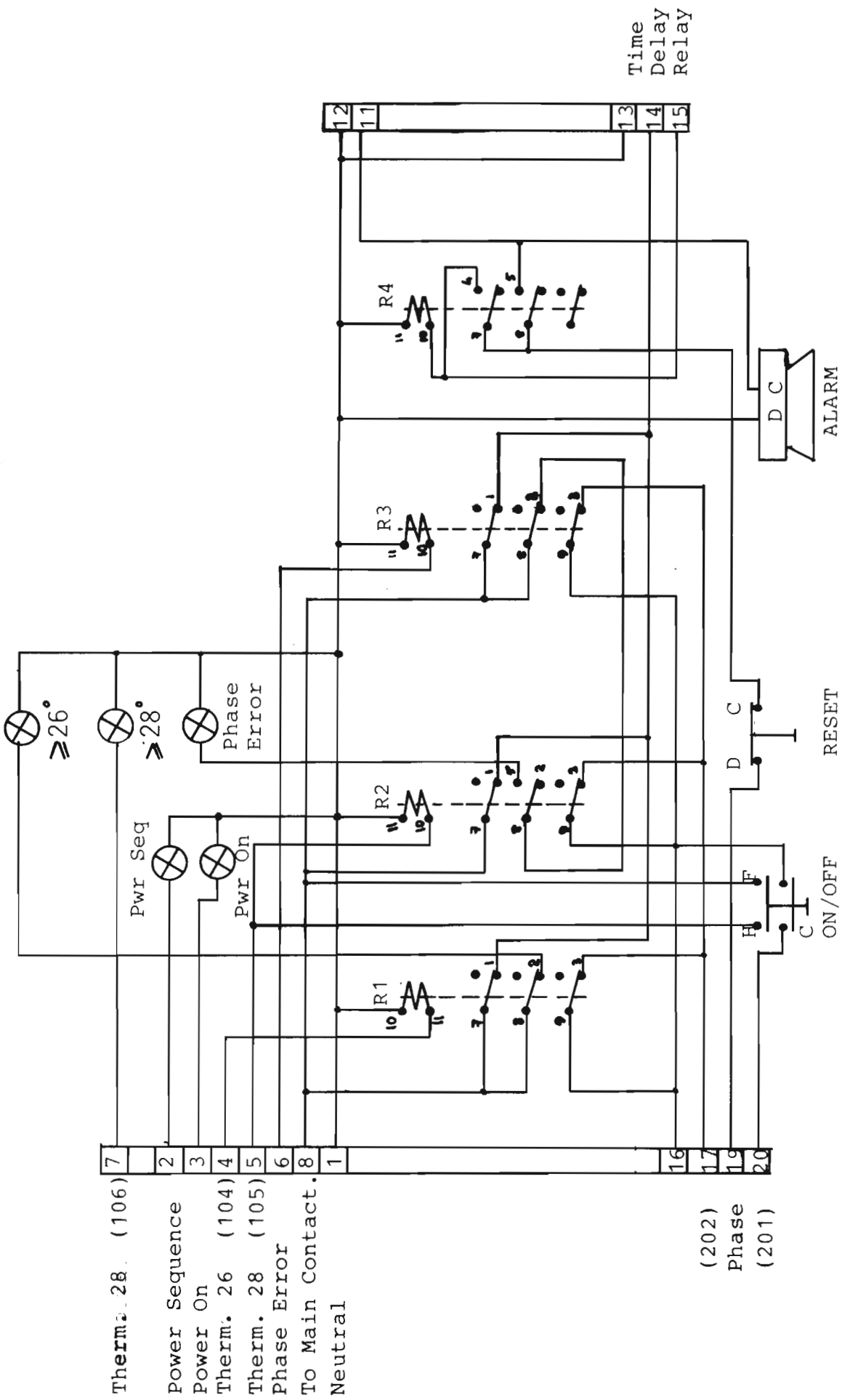
Illustrated part break down



* Mounted on opposite side of card. Not shown on photo.

OPERATOR PANEL (top view)





Therm. 28 (106)
 Power Sequence
 Power On
 Therm. 26 (104)
 Therm. 28 (105)
 Phase Error
 To Main Contact.
 Neutral

(202)
 Phase
 (201)

Time
 Delay
 Relay

D C
 ALARM

D C
 RESET

H F
 C
 ON/OFF

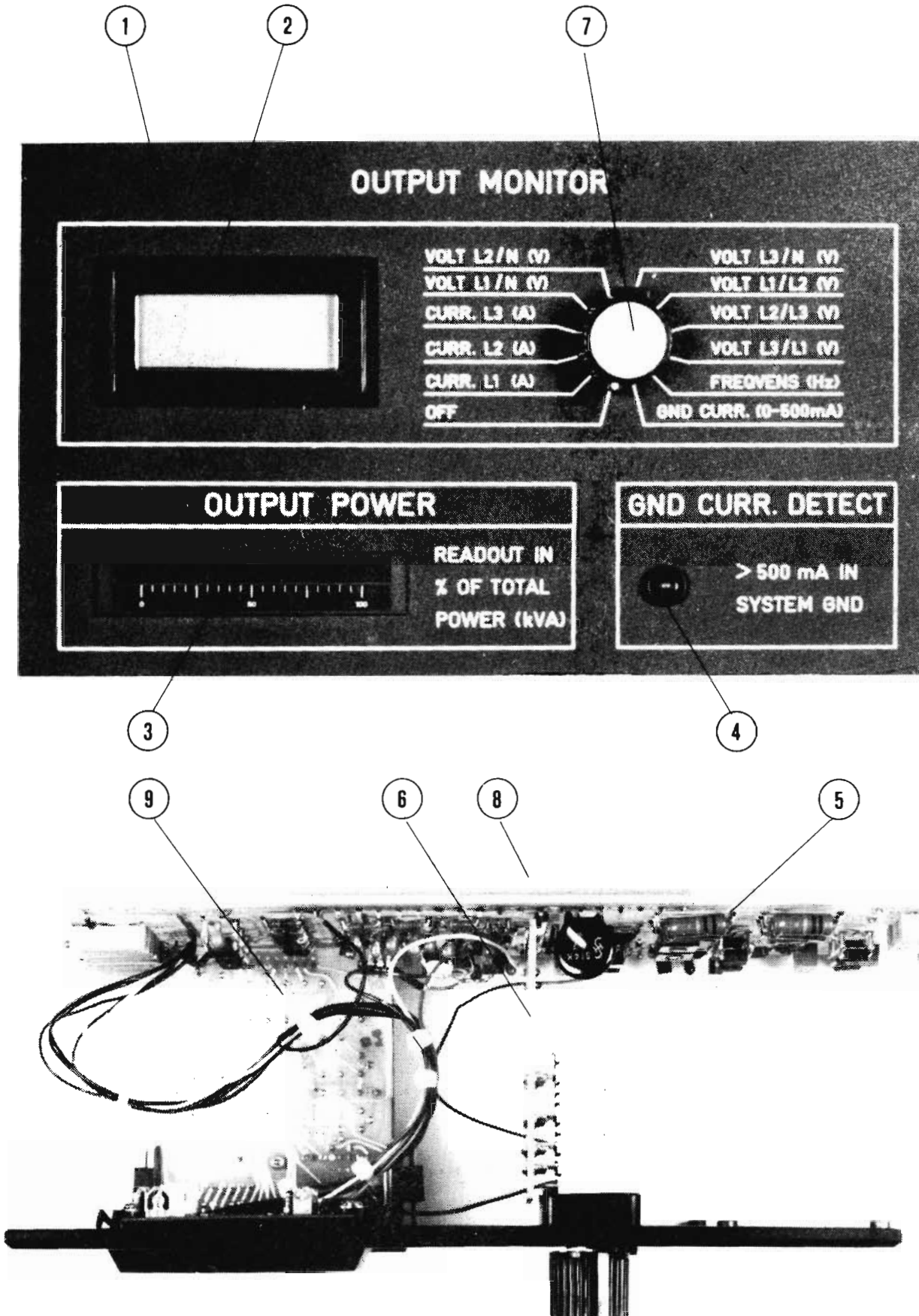
CONTROL PANEL DIAGRAM
 POWER DISTRIBUTION

PARTS LIST

No	Name	Enaco Part no:	Manufacturer/ type no.
1.	Front-panel	200-036	Enaco
2.	PC-board	020-102	Enaco
3.	"Power-up sequence" lampholder Yellow lens Lamp 220V neon, red	011-001	EAO. No: 701 031 006 EAO No: 701 973 4 Telephone lamp T.5.5.
4.	Resistor 100k Ohm, 1W	011-009	
5.	Relay 220V AC	011-008	Elesta FR 11P 220V AC
6.	Power on lampholder Green lens Lamp 220V neon, green	011-003	EAO No: 701 031 006 EAO No: 701 973 5 Telephone lamp T.5.5
7.	Key-switch On/Off	011-004	EAO No: 702 192 011/ 702 980 01
8.	"Room Temp -26°" lampholder Yellow lens Lamp 220V neon, red	011-001	EAO No: 701 031 006 EAO No: 701 973 4 Telephone lamp T.5.5
9.	"Room Temp -28°" lampholder Red lens Lamp 220V neon, red	011-002	EAO No: 701 031 006 EAO No: 701 993 2 Telephone lamp T.5.5
10.	"Phase-error" lampholder Red lens Lamp 220V neon, red	011-002	EAO No: 701 031 006 EAO No: 701 973 2 Telephone lamp T.5.5
11.	Alarm reset switch	011-005	EAO No: 702 111 01
12.	Buzzer 220V AC	011-006	EAO No: 702 809 001
13.	Terminal, 20 pole	011-007	Phoenix MSTBU 1.5/20

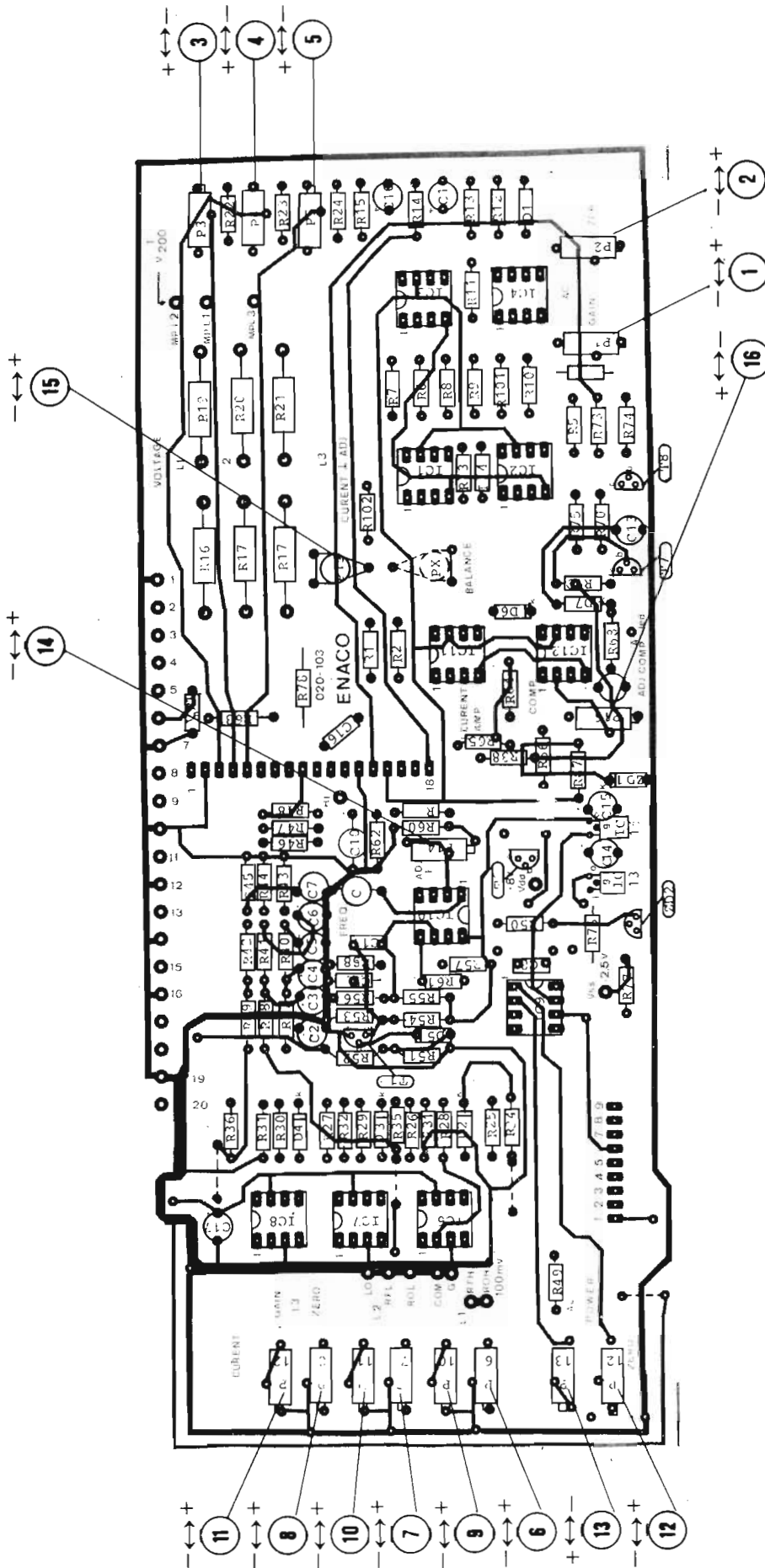
INSTRUMENT PANEL

Illustrated parts breakdown



PARTS LIST

No	Name	Enaco Part no:	Manufacturer/ type no.
1.	Front-panel		Enaco
2.	LCD Voltmeter		Various/PCIM 176
3.	LED Display		Contraves/LB2B 01003B
4.	LED Indicator		Various
5.	PC-Board	020-104	Enaco
6.	PC-Board	020-103	Enaco
7.	Rotary Switch 1 × Shaft 1 × Contact Whaffer 1 × Cover 1 × Knob		Wasp/6 Layers Wasp/N 112 Wasp/6 Layers Stockli/333, 40
8.	Terminal, 20 pole	011-007	Phoneix/MSTBV 1,5/20
9.	PC-Board/LED Display		See Part No 3

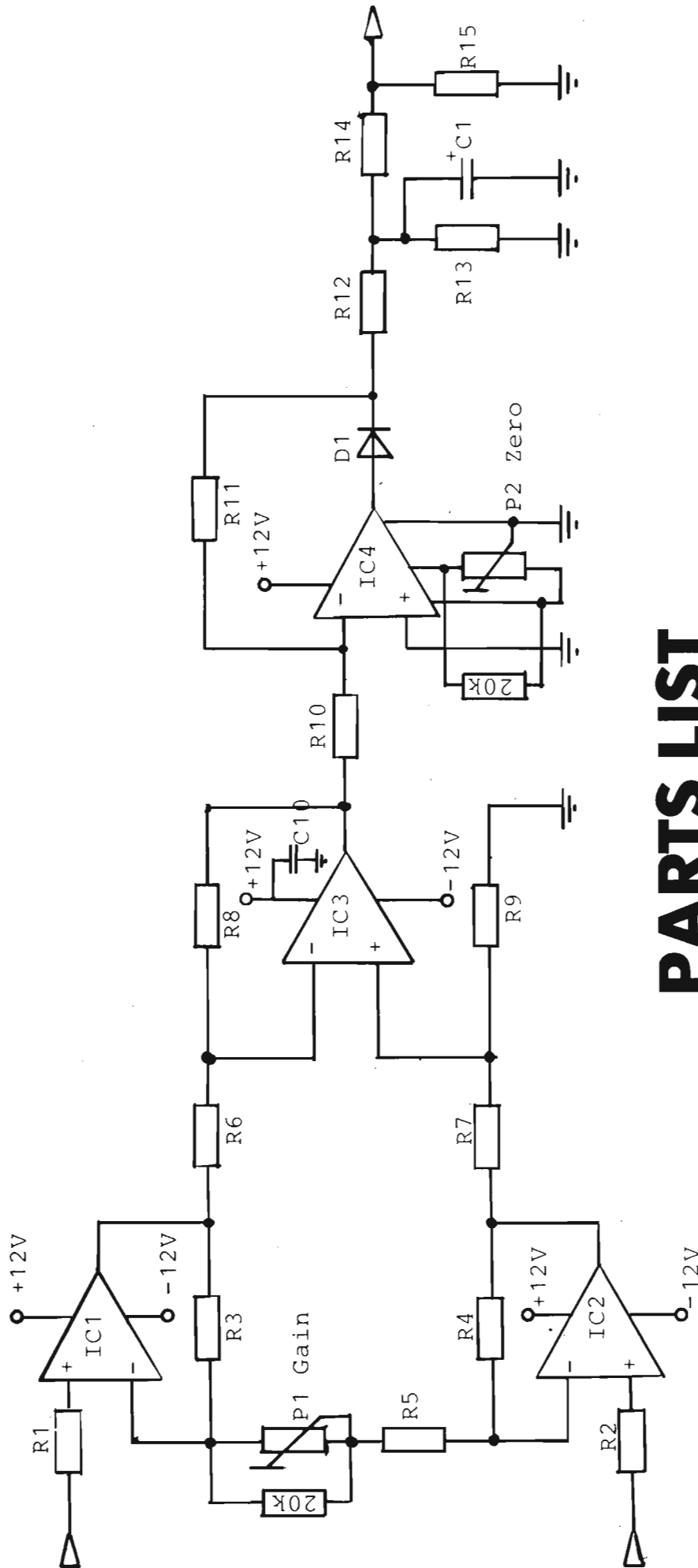


Adjustments on instrument card

- | | | | |
|-----|--------------------------------|------|-----------------------------------|
| P1. | Gain voltage, all three phases | P9. | Gain current adj. L1 |
| P2. | Zero | P10. | Gain current adj. L2 |
| P3. | Voltage L1 | P11. | Gain current adj. L3 |
| P4. | Voltage L2 | P12. | Zero output power |
| P5. | Voltage L3 | P13. | Gain |
| P6. | Zero current adj. L1 | P14. | Grequence adj. |
| P7. | Zero current adj. L2 | P15. | Ground current adj. Gain 0—500 mA |
| P8. | Zero current adj. L3 | P16. | Indicator illumination point |

AC/DC CONVERTER

0,5 VAC = 10mVDC

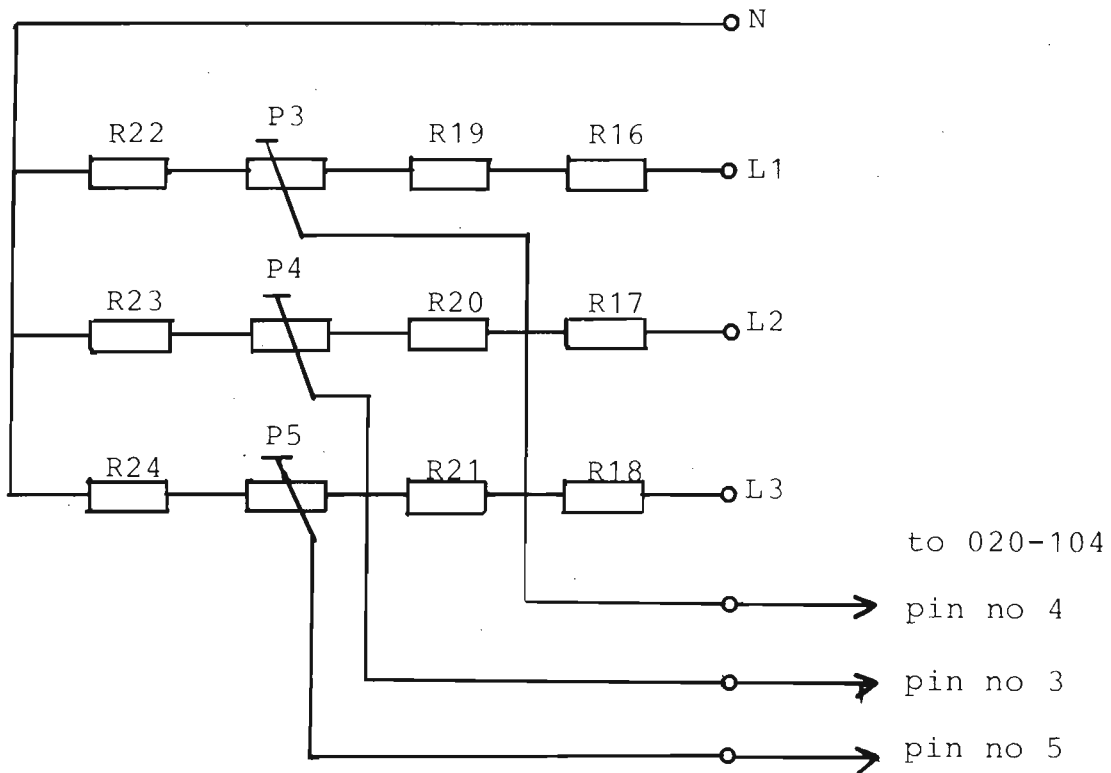


PARTS LIST

AC/DC converter

P1	100K—5K	R4	10K	R9	10K	R14	30K
P2	100K	R5	3K9	R10	8K9	R15	3K16
R1	1M	R6	15K	R11	4K3—4K12	D1	1N 4148
R2	1M	R7	15K	R12	10K	C1	1uF tantal
R3	10K	R8	10K	R13	5K1	IC1, 2, 3, 4	CA 3140 E

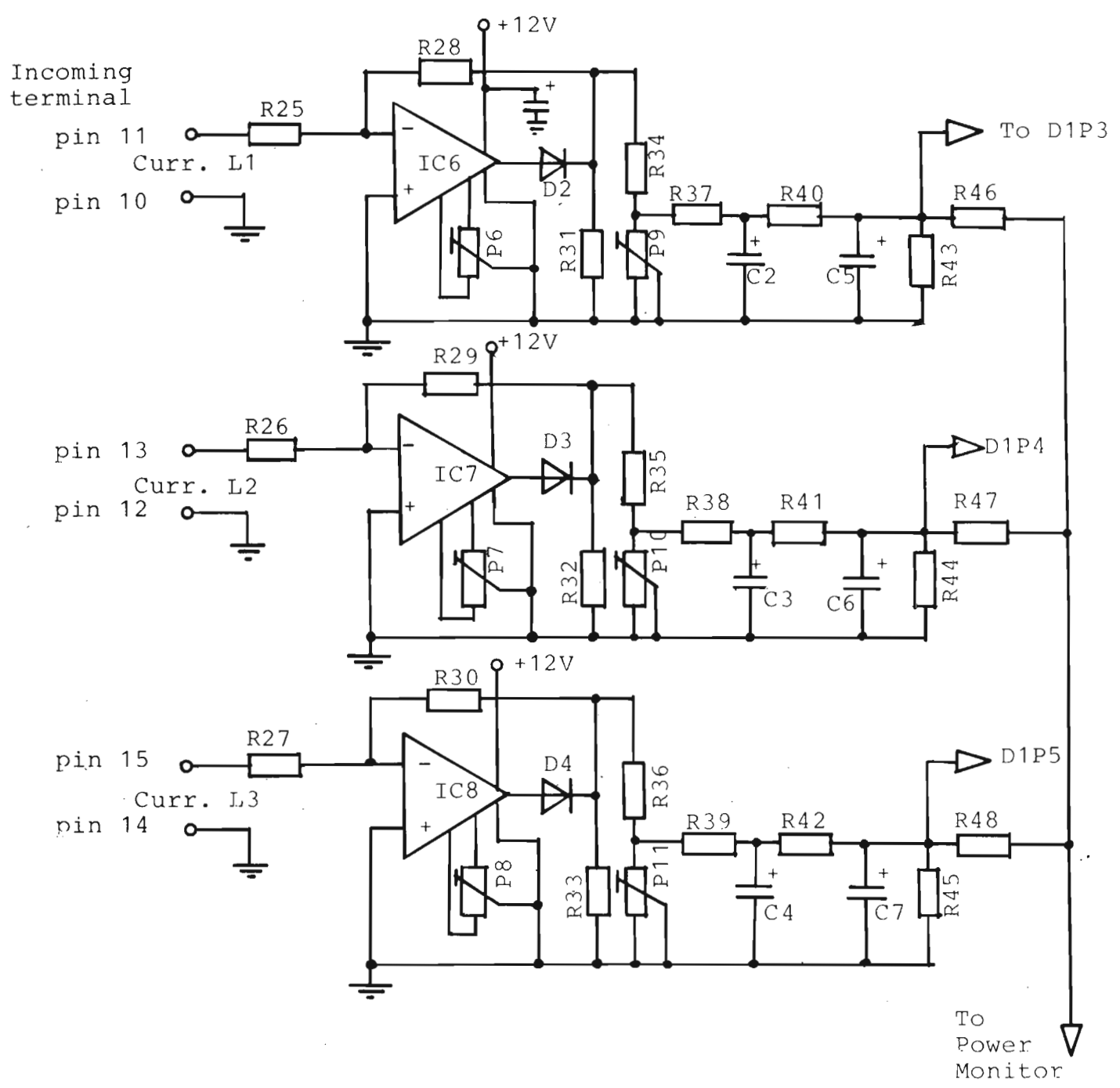
VOLTAGE MEASURING



PARTS LIST

R 19—R 21	100 K 1 W MK 5
R 22—R 24	750 R 1/4 W
P 3—P 5	1 K trimmer 10 turns

AC — CURRENT MEASURING

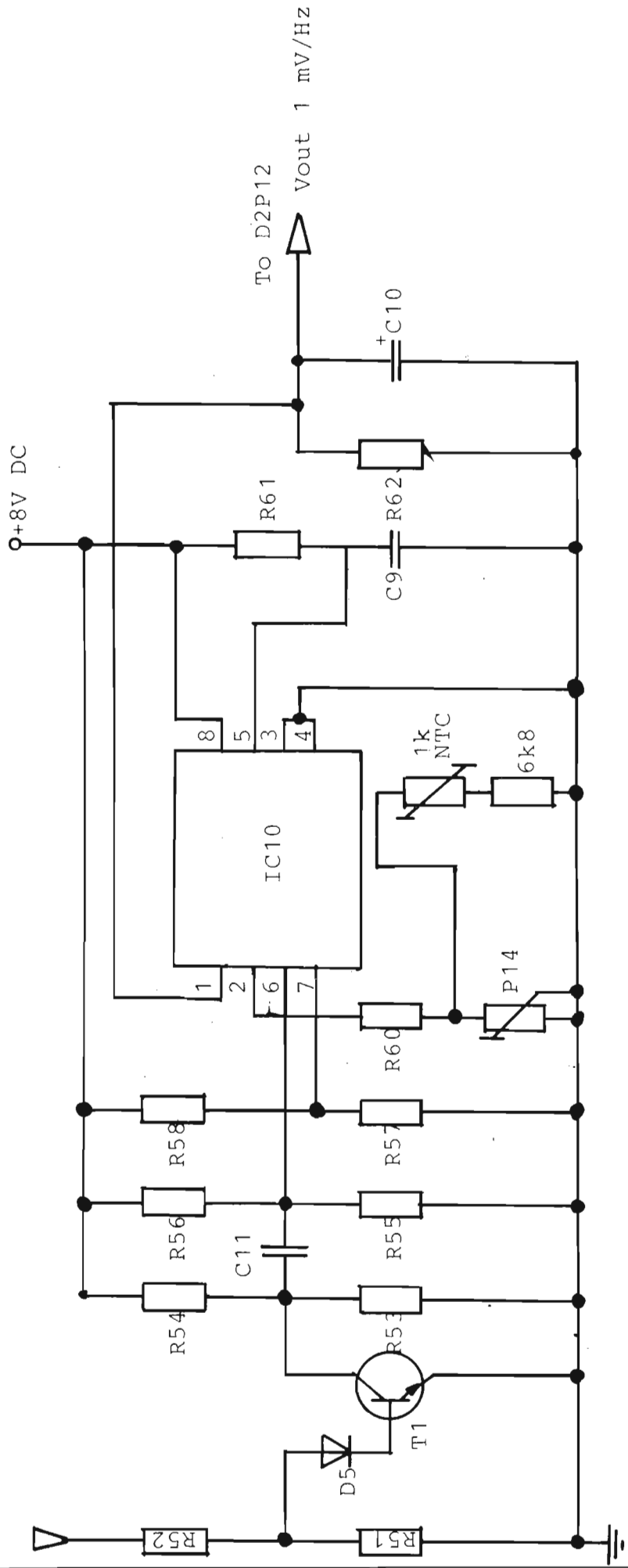


PARTS LIST

(AC — Current Measuring)

R25, R26, R27	10 K 1/4 W
R28, R29, R30	4K02 1/4 W
R31, R32, R33	10 K 1/4 W
R34, R35, R35	100 K 1/4 W
R37, R38, R39 R40, R41, R42	10 K 1/4 W
R43, R44, R45	42k2 1/4 W
R46, R47, R48	1 M 1/4 W
P6, P7, P8	100 K Trimmer
P9, P10, P11	5 K Trimmer
C2, C3, C4 C5, C6, C7	4,7 uF Tantal Condensator
IC6, IC7, IC8	CA 3140 E OP

FREQUENCY TO VOLTAGE CONVERTER

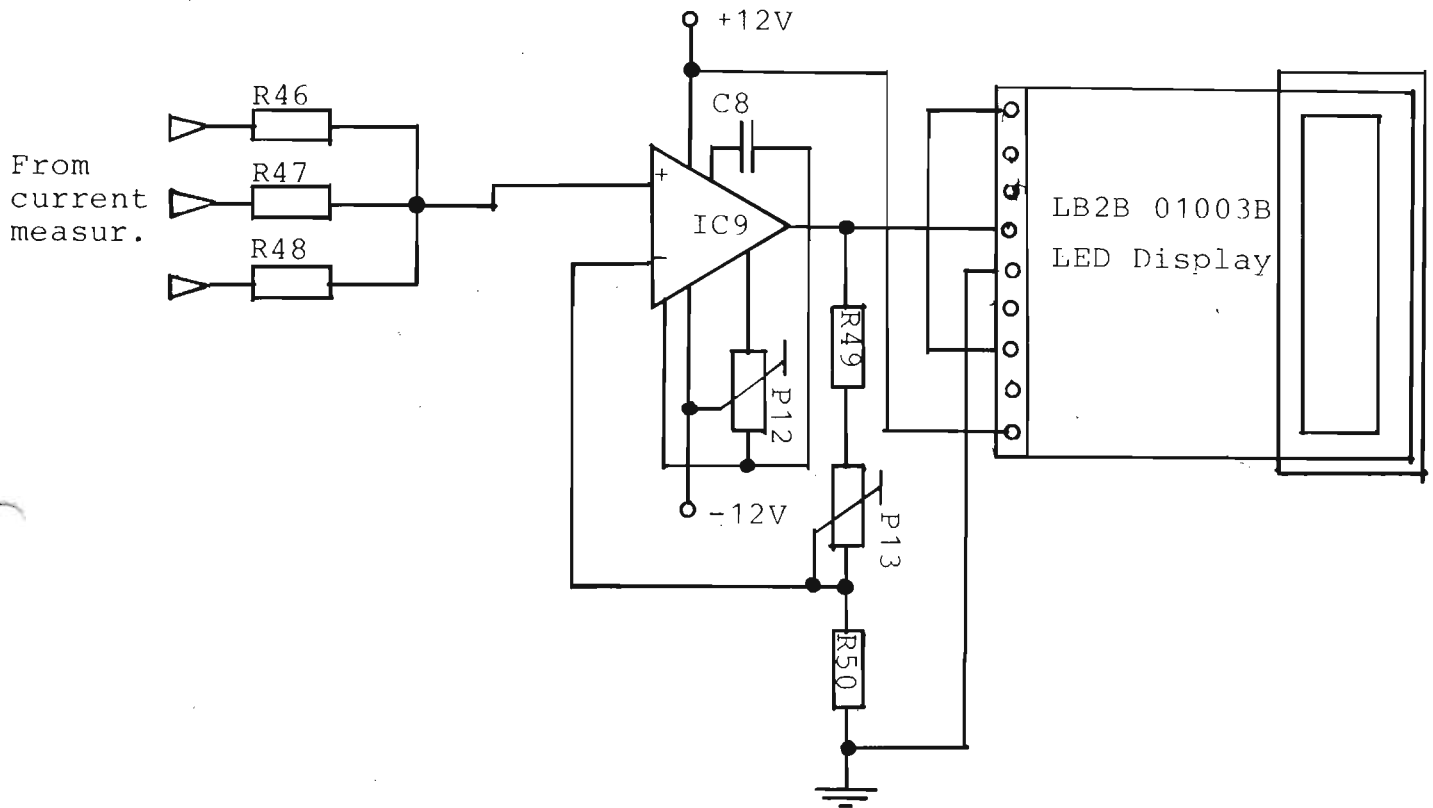


PARTS LIST

(Frequency to voltage converter)

R51	5K6 1/4 W 50 ppm 1 %
R52	39K 1/4 W
R53, R55, R57, R58	10K 1/4 W
R54, R56	5K1 1/4 W
R60	11K 1/4 W 25 ppm 1 %
*R61	6K8 1/4 W 25 ppm 1 %
R62	9K1 1/4 W
P14	5K Trimmer
C9, C11	0,1uF polycarbonat
C10	10 uF Tantal
D5	1N 4148
T5	BC 238
IC10	RC 4151 eller RC 4152
Temp	1 st 6K8 MK ²
Compensation	1 st NTC IK Elfa

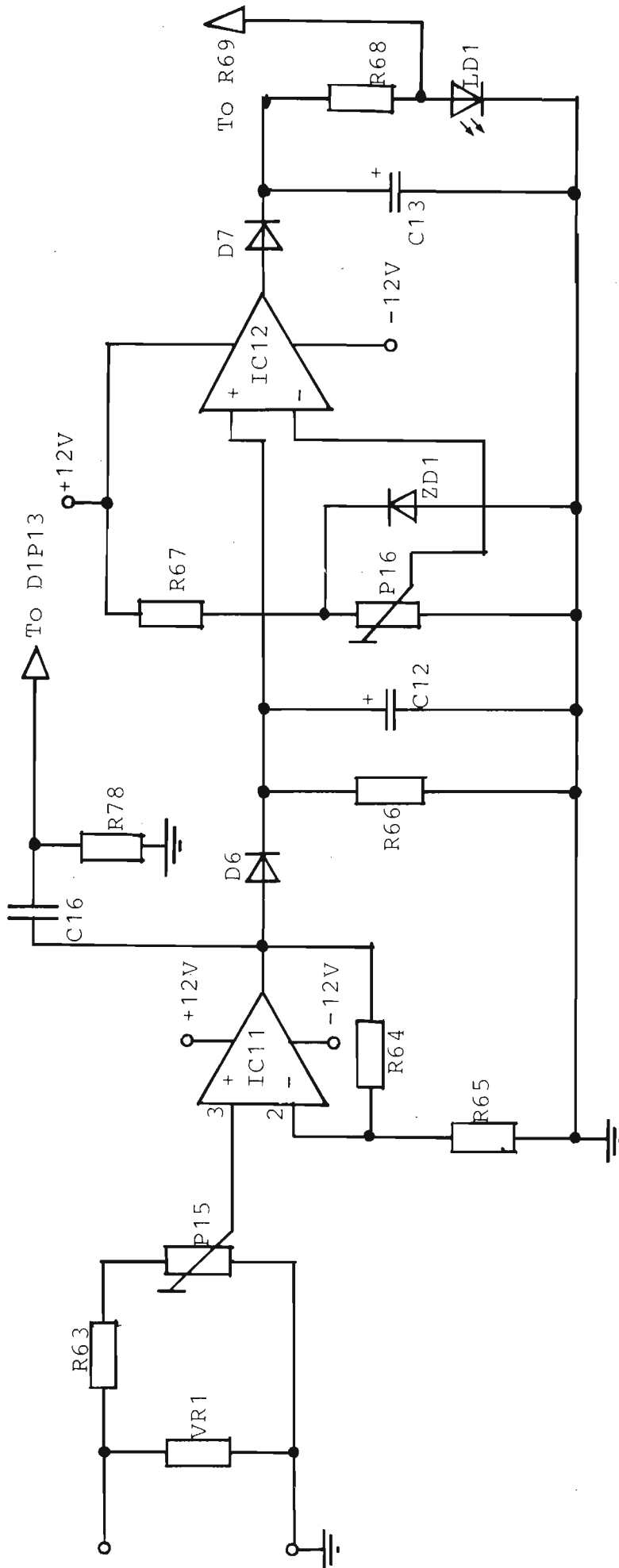
POWER — MONITOR



PARTS LIST

R49	Value varies for different P.D. types
R50	1K 1/4 W
R46, R47, R48	1 M 1/4 W
P12	10 K Trimmer
P13	100 K Trimmer
C8	0,1 uF ker. condensator
IC 9	CA 3140 E OP
MI	LB 2B 0100 3B

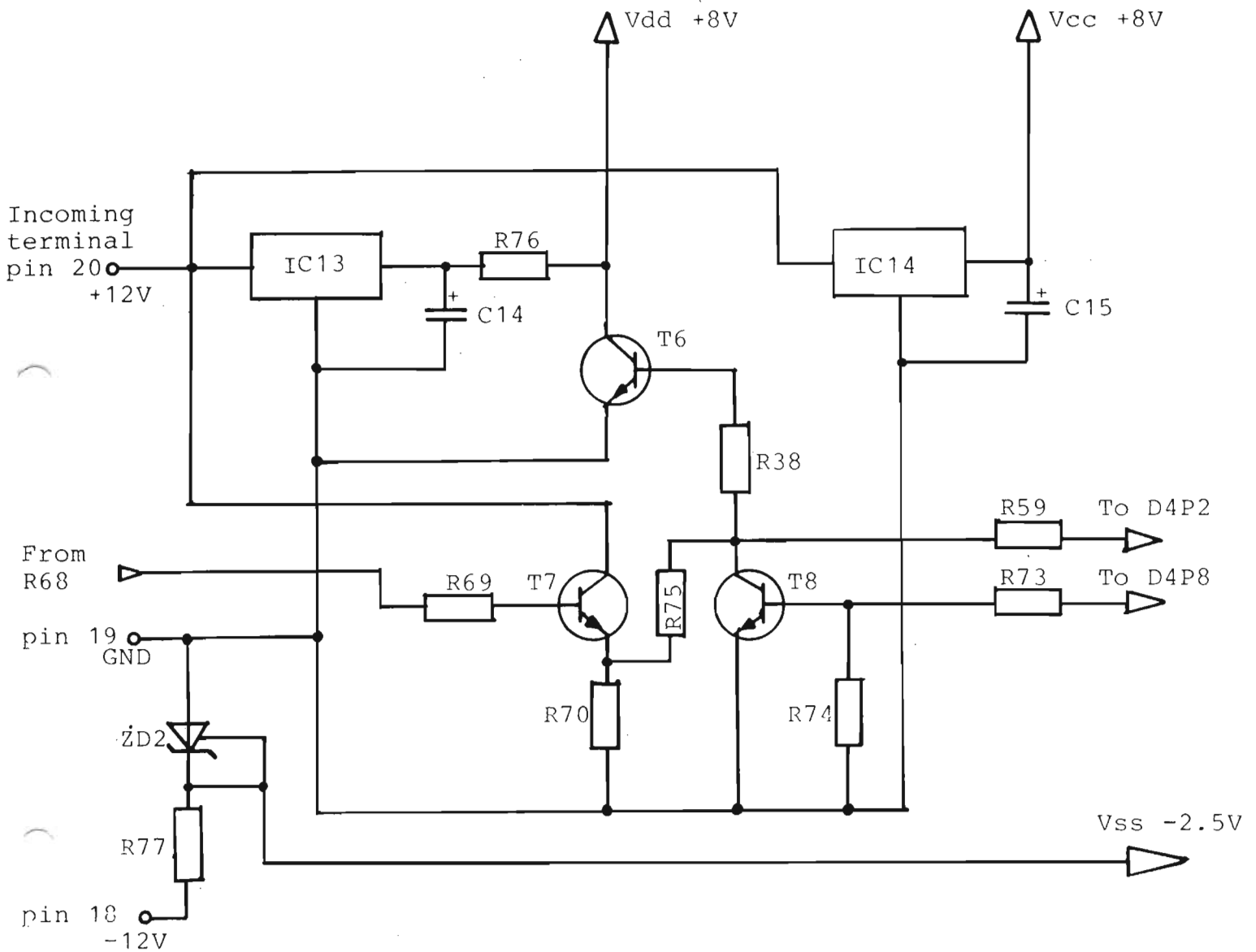
GND CURRENT DETECT



PARTS LIST

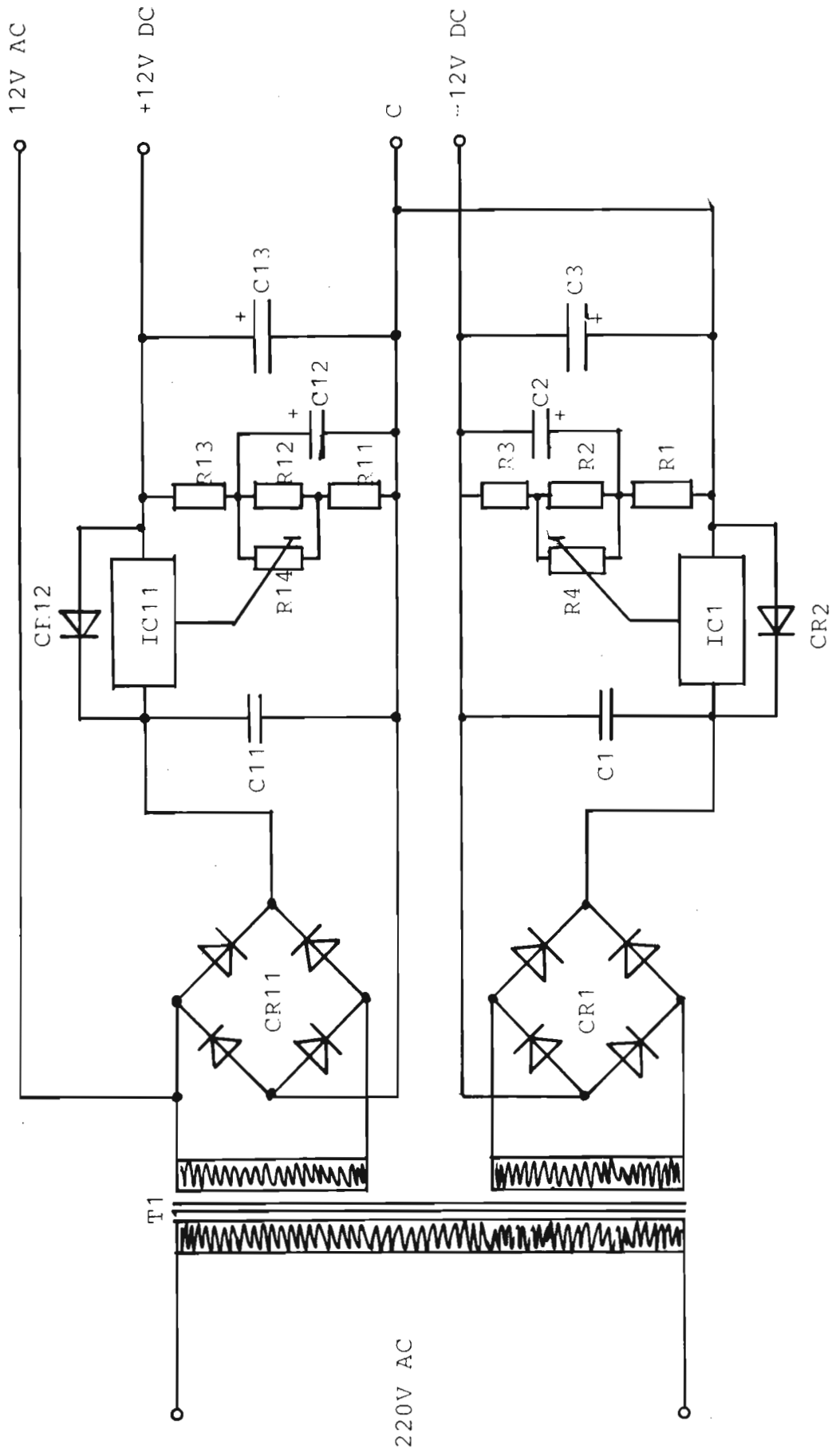
R63	10K 1/4 W 1 %
R64	20K 1/4 W 1 %
R65	1K0 1/4 W 1 %
R66	5M6
R67	1K0
R68	220R 1/4 W
VR1	Varitor 17 V
D6, D7	1N 4148 Diod
ZD1	BZX 85C11 OKAB
P15	10K Trimmer
P16	5K Trimmer
C12, C13	1uF Tantalcondensator
IC11	CA 741E OKAB
IC12	CA 741 E
LD1	LED 2 V 50mA Red ELFA N2: 33—7000-4
R78	1M
C16	0.1 uF polycarbonat

POWER SUPPLY



R38, R59, R69, R75, R76, R77	1K 1/4 W 1 %
R70, R73	10K 1/4 W 1 %
R74	3K3 1/4 W 1 %
C14, C15	1uF Tantal 35 V
T6, T7, T8	BC 238/547 eller motsv.
DZ2	uA 431 WC referens diode ELFA
IC13, IC14	78L08 8V Regulator

POWER SUPPLY UNIT

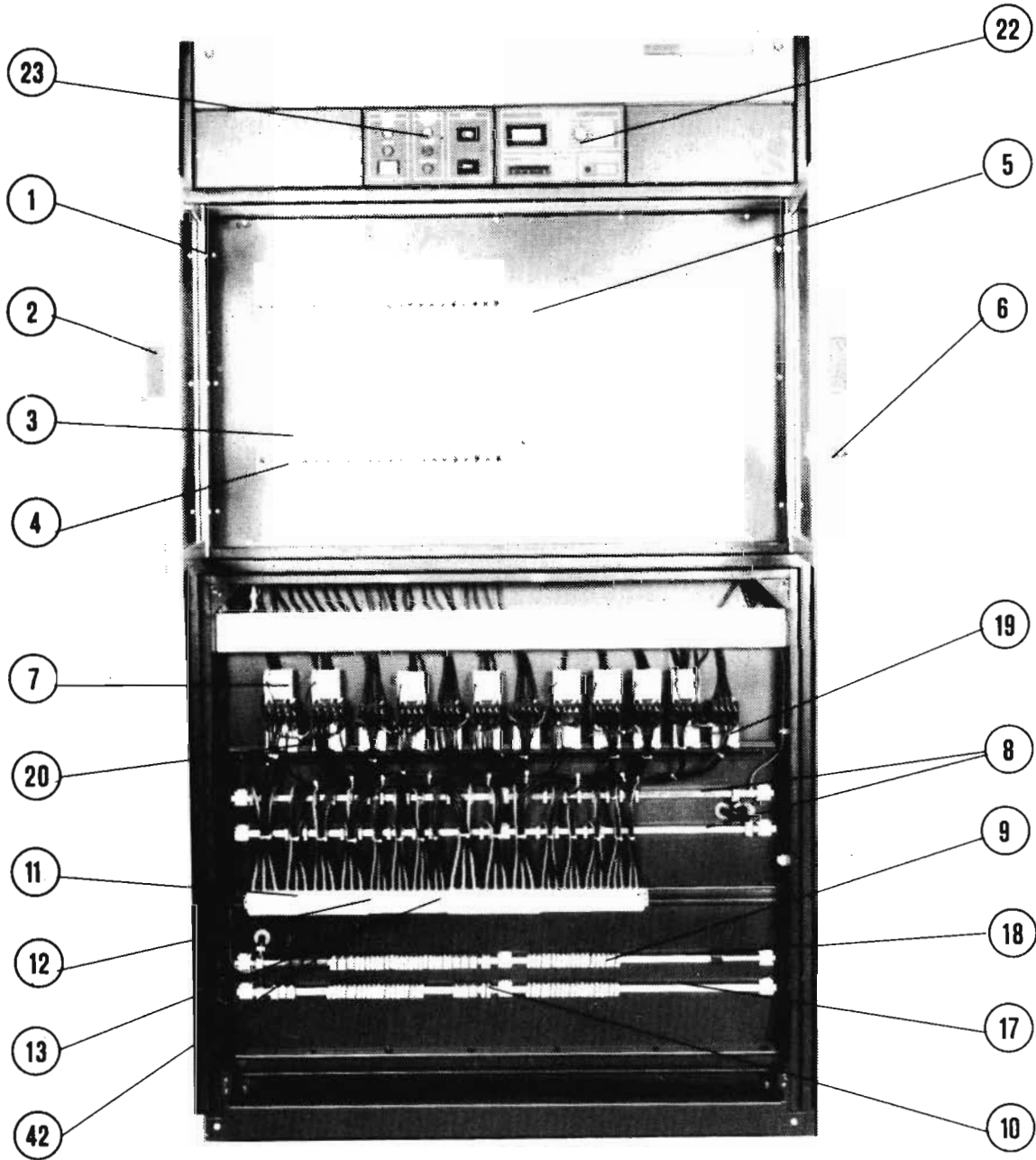


PARTS LIST

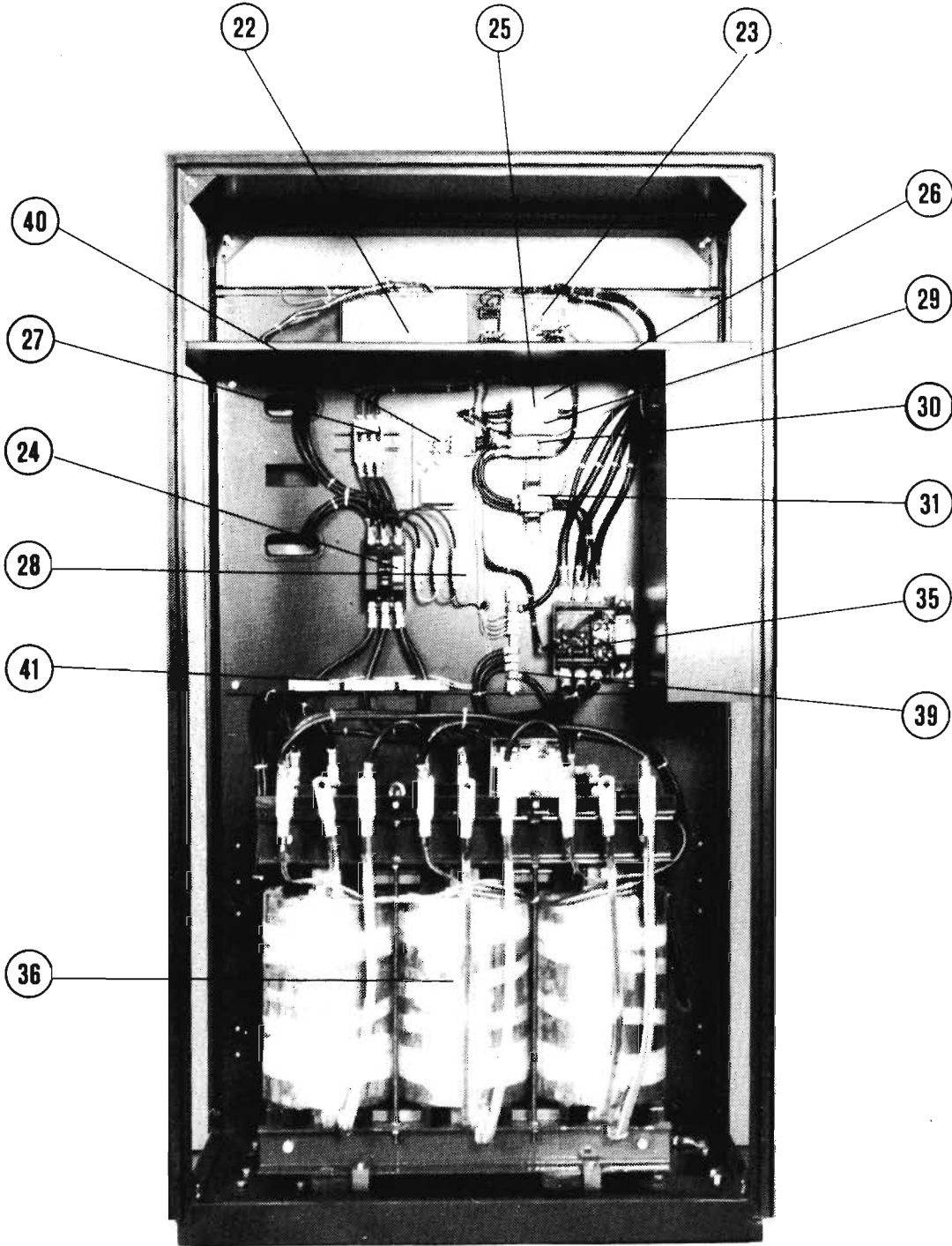
POWER SUPPLY

T1	TD 3714	Transformer
CR1, CR11	BY 164	DC-Converter
C1, C11		1000 uF 40 V Condensator
Cr2, CR12	IN 4007	Diod
IC1, IC11	LM 317 TO 220	
IC1, IC11	K 35.1 L	Cooling Element
R1, R11		100 Resistor
R2, R12		27 Resistor
R3, R13		1K Resistor
R4, R14	3386F	1K Trimmer
		8-pole Terminal

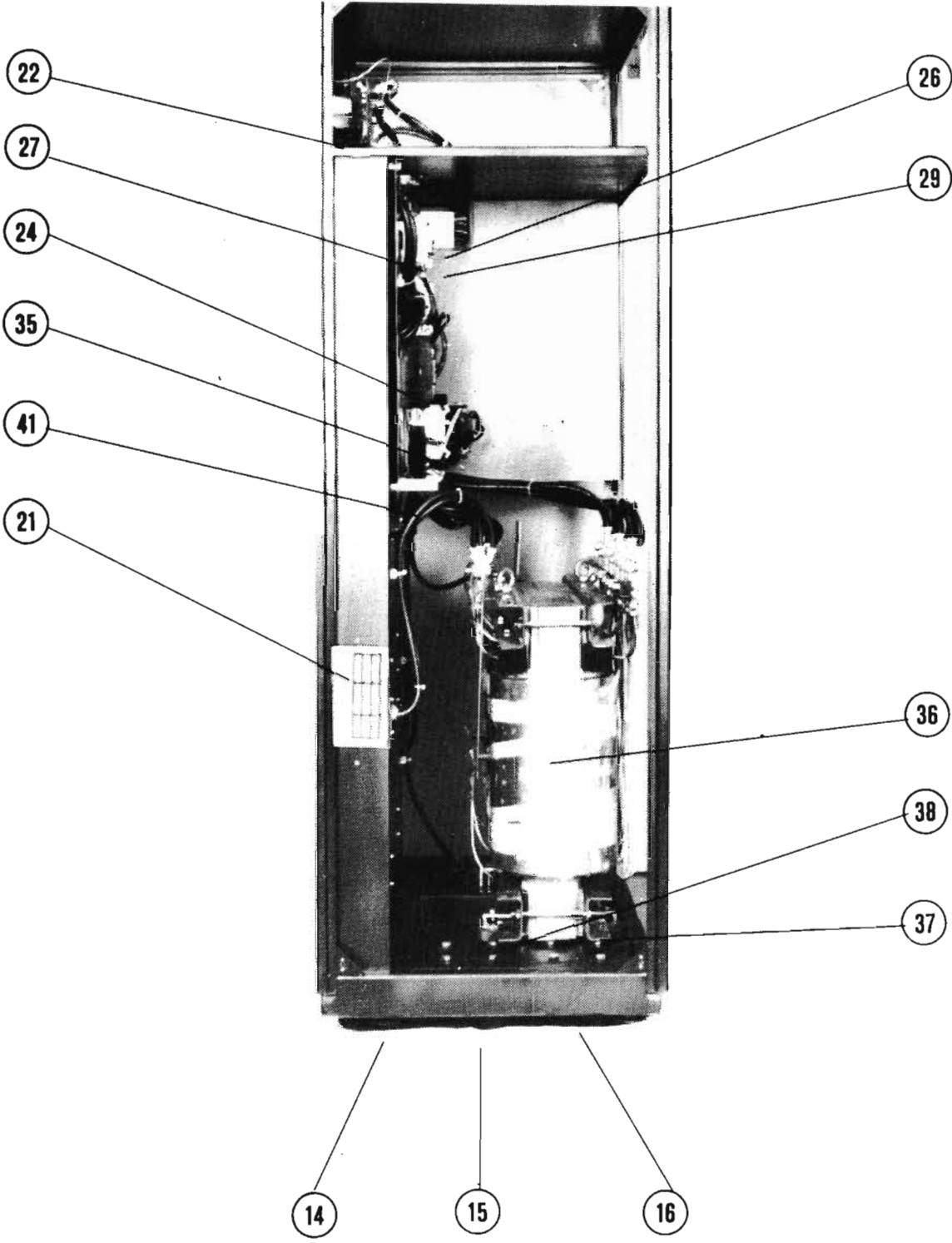
P.D. 60



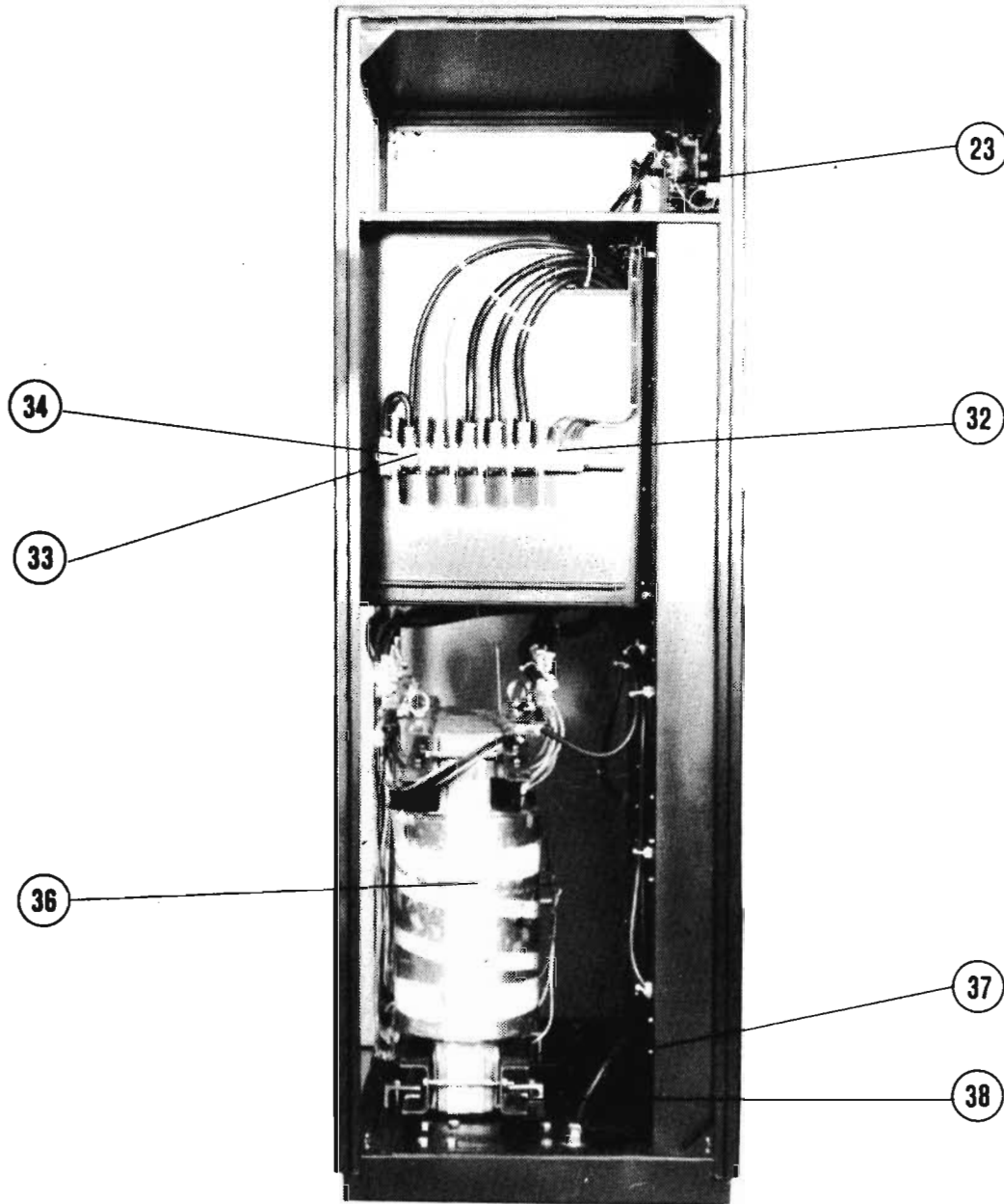
P.D. 60



P.D. 60



P.D. 60



PARTS LIST PD 60

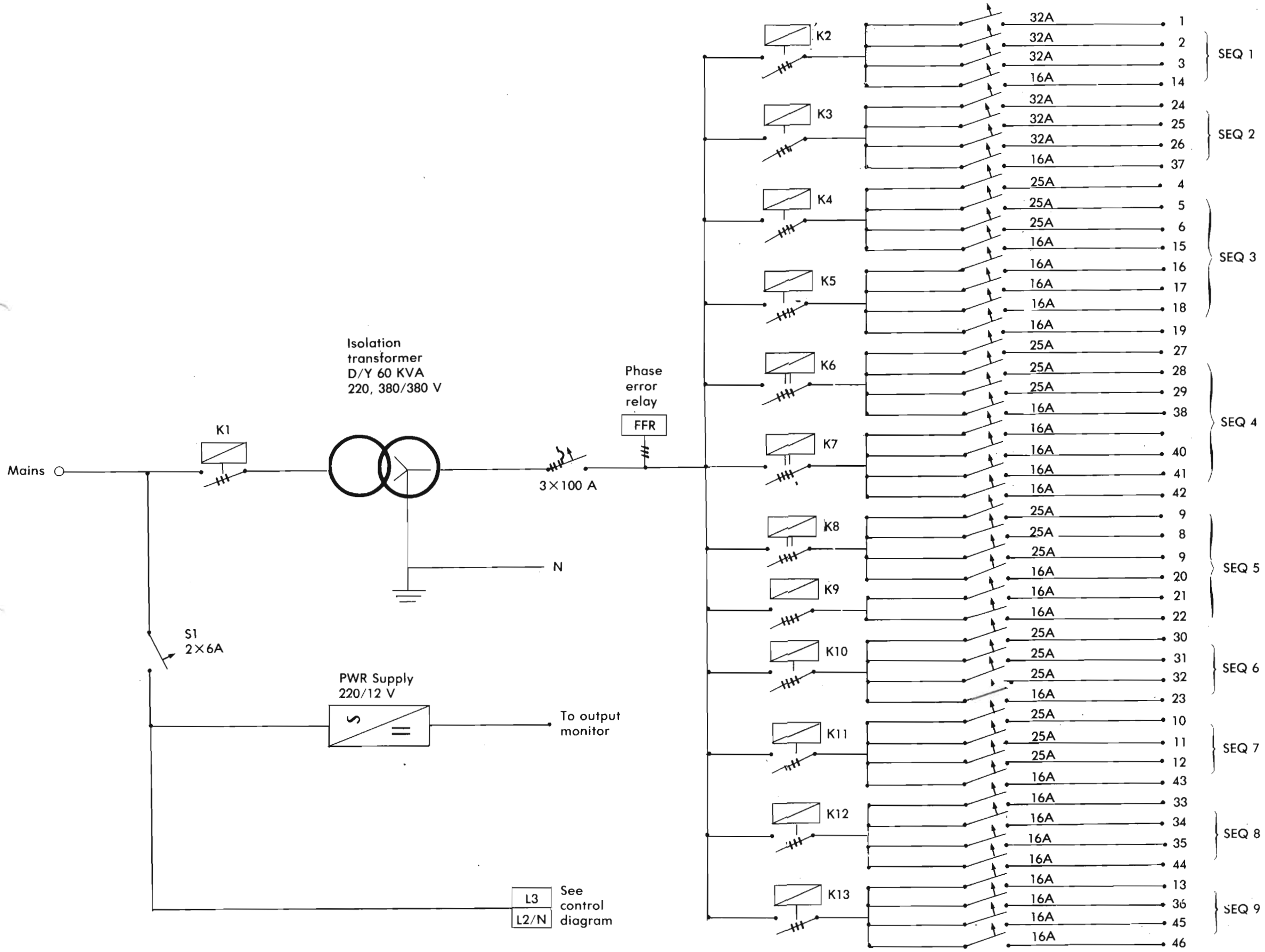
Fig	Qty	Article	Part no:	Manufacturer/type no.
1	2	Glass Cover	210-003	Enaco
2	2	Handle	210-007	Enaco
3	2	Label, circ. breakers	300-005	Enaco
4	6	Circuit breaker, 1×32A	100-050	Siemens 5 SN1 332-6A 632
4	15	Circuit breaker, 1×25A	100-049	Siemens 5 SN1 325-6A 625
4	25	Circuit breaker, 1×16A	100-047	Siemens 5 SN1 316-6A 616
5	2	Cover, spare space	100-059	Siemens 8 GB4 671
6	1	Lock	210-008	Enaco
7	8	Time Delay, Contactor	100-086	Sprecher-Schuc CZE 3-11
8	2	Neutral Bar	100-027	Weidmüller Ssch
9	92	Bar Connector, 6 mm ²	100-033	Weidmüller ZBE 6
10	12	Bar Connector, 35 mm ²	100-034	Weidmüller ZB 35
11	12	Terminal, 10 mm ²	100-036	Weidmüller SAK 10
12	30	Terminal, 4 mm ²	100-035	Weidmüller SAK 4
13	50	Terminal, 2.5 mm ²	100-006	Wiedmüller SAK 2.5
14	4	Foot	200-019	Enaco
15	2	Wheel, front	200-024	Enaco
16	2	Wheel, rear	200-023	Enaco
17	1	Shield Bar	100-027	Weidmüller Ssch
18	1	Protective Ground Bar	100-027	Weidmüller Ssch
19	10	Contacto, Power-Up Sequence	100-085	Sprecher-Schuh CA 3-12
20	2	Contacto, Power-Up Sequence	100-001	Sprecher-Schuh CA 3-23
21	1	Type Label	300-004	Enaco
22	1	Instrument Panel Assy	029-103C	Enaco
23	1	Control Panel Assy	029-102	Enaco
24	1	Main Circuit Breaker	100-097	Terasaki TO100CC 3PFC 100A

PARTS LIST PD 60

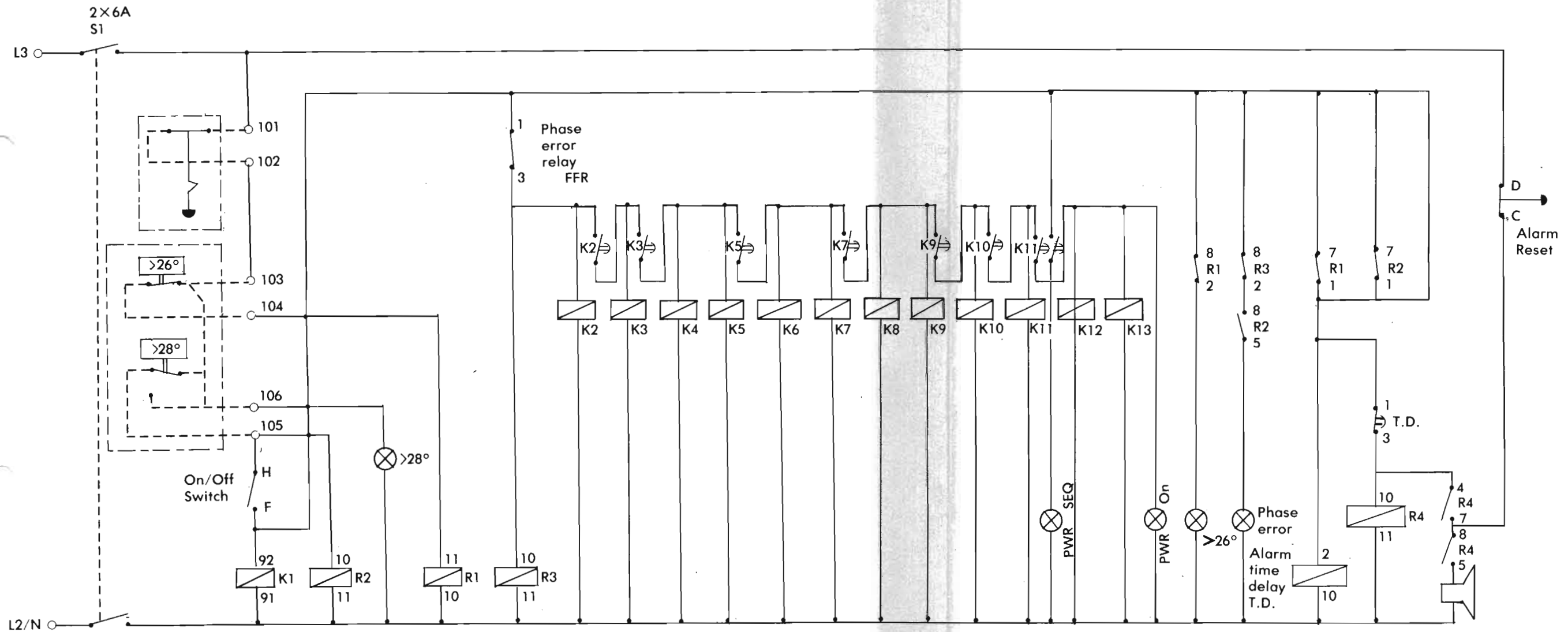
Fig	Qty	Article	Part no:	Manufacturer/type no.
25*	2	Relay Socket	100-087	Eldon S 411
26	1	Phase Error Relay	100-004	Eldon SM 170 415
27	1	Circuit Breaker, S2	100-052	Siemens SN3 306-6A G6
28	3	Varistor	100-088	Siemens SIOV B32K 250 V
29	1	Time Delay Relay	100-089	Eldon SB 105 220
30	1	Circuit Breaker, S1	100-090	Siemens 5SNR 306-6A G6
31	3	Terminal 220/380V	100-038	Weidmüller SAK 35
32	10	Terminal, emergency breaker and thermostat	100-035	Weidmüller SAK 4
33	6	Terminal, Mains	100-039	Sprecher-Schuh VRB 1-185
34	5	Terinal stop	100-013	Sprecher-Schuh VR 1-185
35	1	Main Contactor	100-003	Specher-Schuh CA 1-100 140 A
36	1	Main Transformer		Enaco
37	4	Fastener	200-021	Enaco
38	4	Rubber Damper	200-020	Enaco
39	1	Ground Bar	100-043	Weidmüller Ssch
40	1	Power Supply	100-097	Enaco
41	3	Current Transformer	100-017	Eldon MI 100
42	1	Protective Ground Coil	100-098	Enaco

* Not shown on photo.

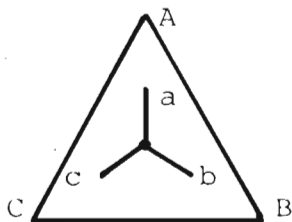
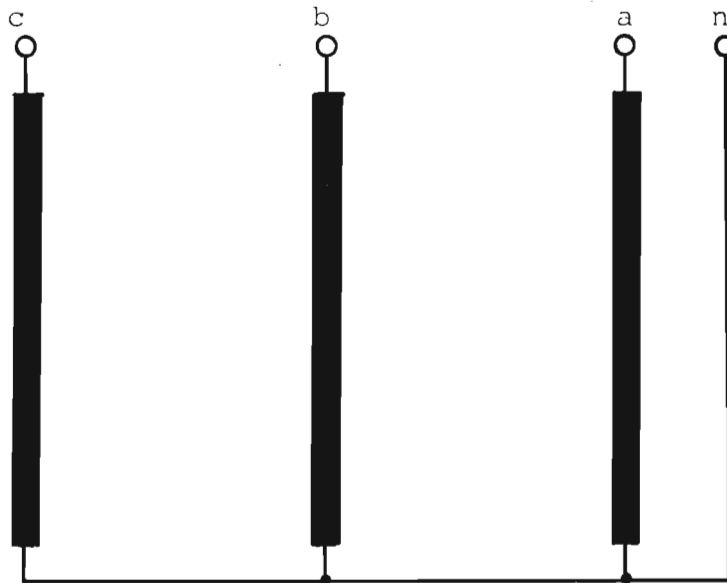
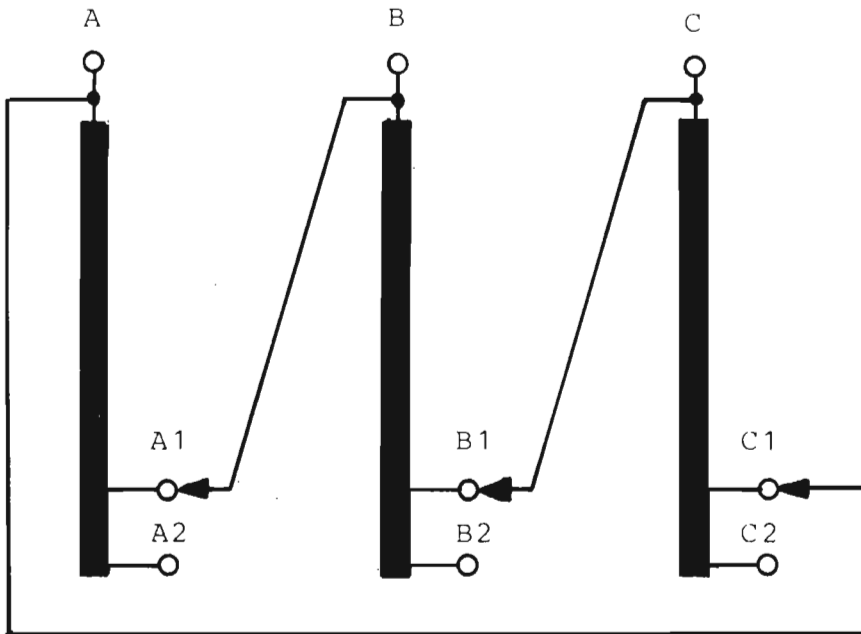
P.D. 60 POWER DIAGRAM



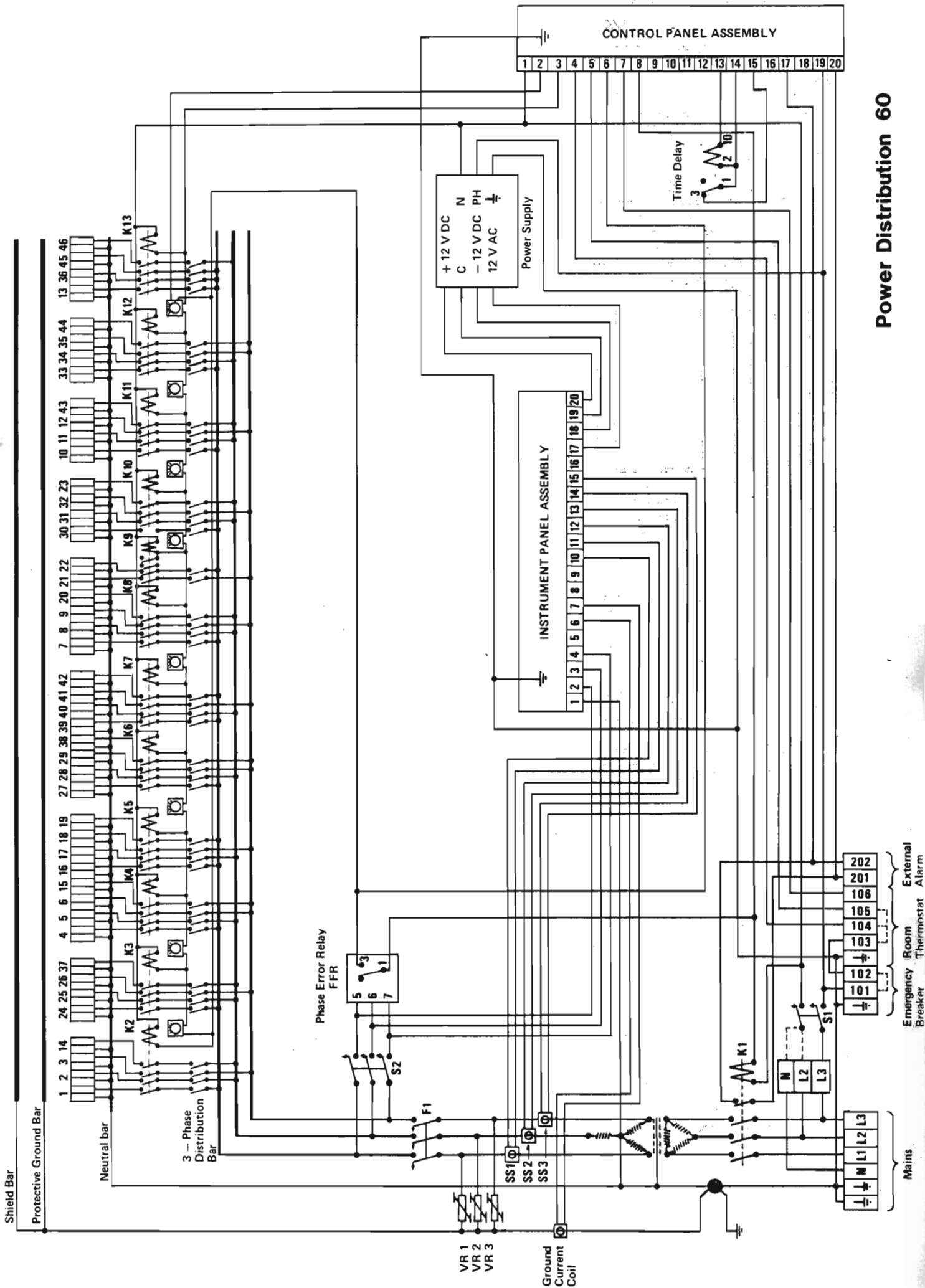
P.D. 60 CONTROL DIAGRAM



MAIN TRANSFORMER DIAGRAM



Connect	Mode	Strappings	Voltage
ABC	△	A-C1 B-A1 C-B1	220
		A-C2 B-A2 C-B2	380
abcn	v-n		380



Power Distribution 60