

---

**RC900**

---

**POW451 Power Supply**

---

**Hardware reference manual**

---

---

**PN: 99110965**

---

**Keywords:**

POW451, Power supply RC900

**Abstract:**

This paper contains a hardware description of the POW451 power supply for the RC900 series.

**Date:**

September 1987

**Author:**

Lars Haugaard

**Copyright © 1988, Regnecentralen a.s./RC Computer a.s**  
**Printed by Regnecentralen a.s, Copenhagen**

---

Users of this manual are cautioned that the specifications contained herein are subject to change by RC at any time without prior notice. RC is not responsible for typographical or arithmetic errors which may appear in this manual and shall not be responsible for any damages caused by reliance on any of the materials presented.

| TABLE OF CONTENTS                                    | PAGE |
|------------------------------------------------------|------|
| 1. GENERAL DESCRIPTION .....                         | 1    |
| 2. ON/OFF - LOGIC .....                              | 10   |
| 3. ADJUSTMENT PROCEDURE .....                        | 11   |
| 3.1 Step by step test and adjustment procedure ..... | 12   |
| 4. POWER SPECIFICATIONS .....                        | 15   |
| 5. WHERE TO FIND .....                               | 16   |
| 6. SAFETY COMPONENTS .....                           | 21   |

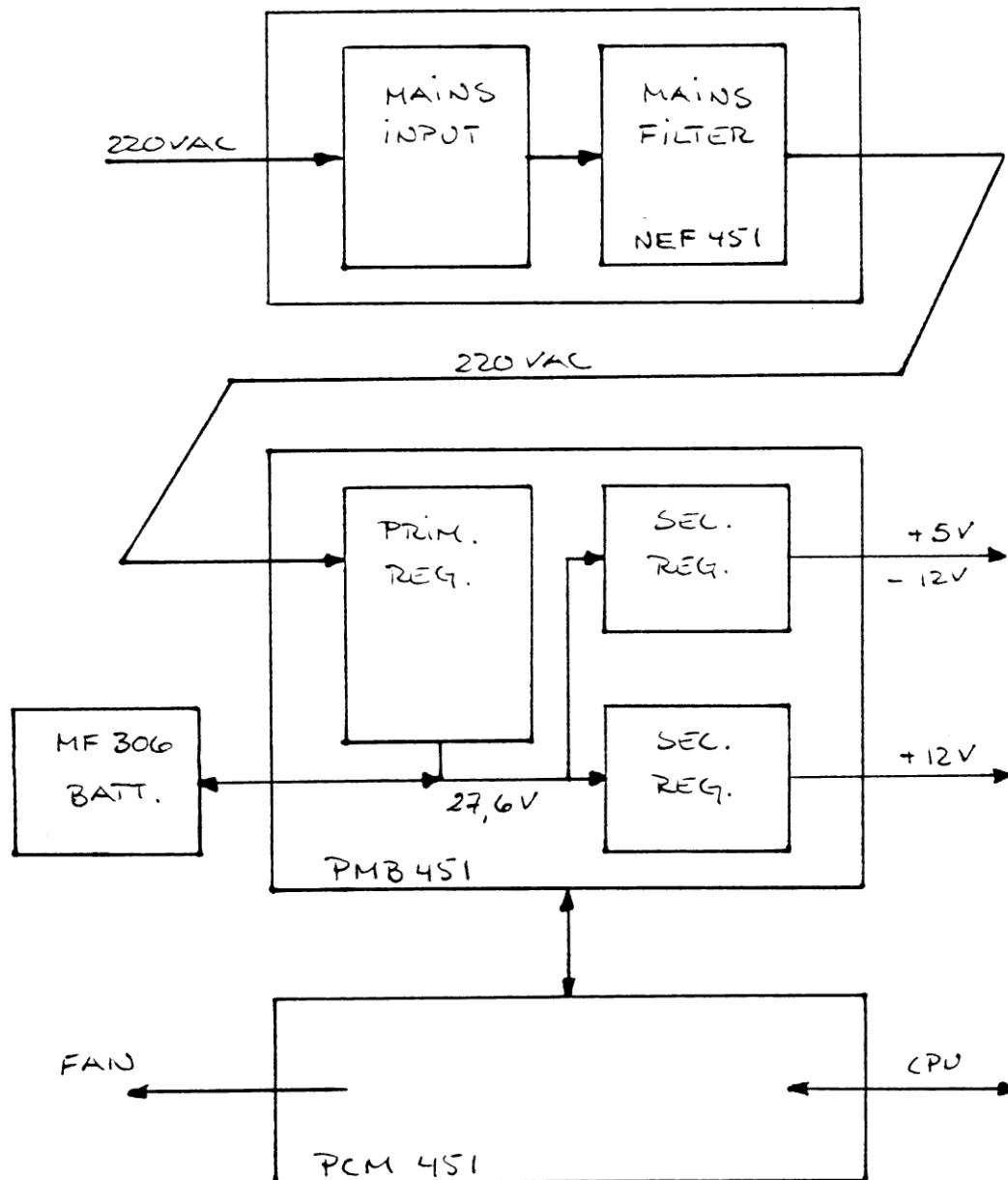


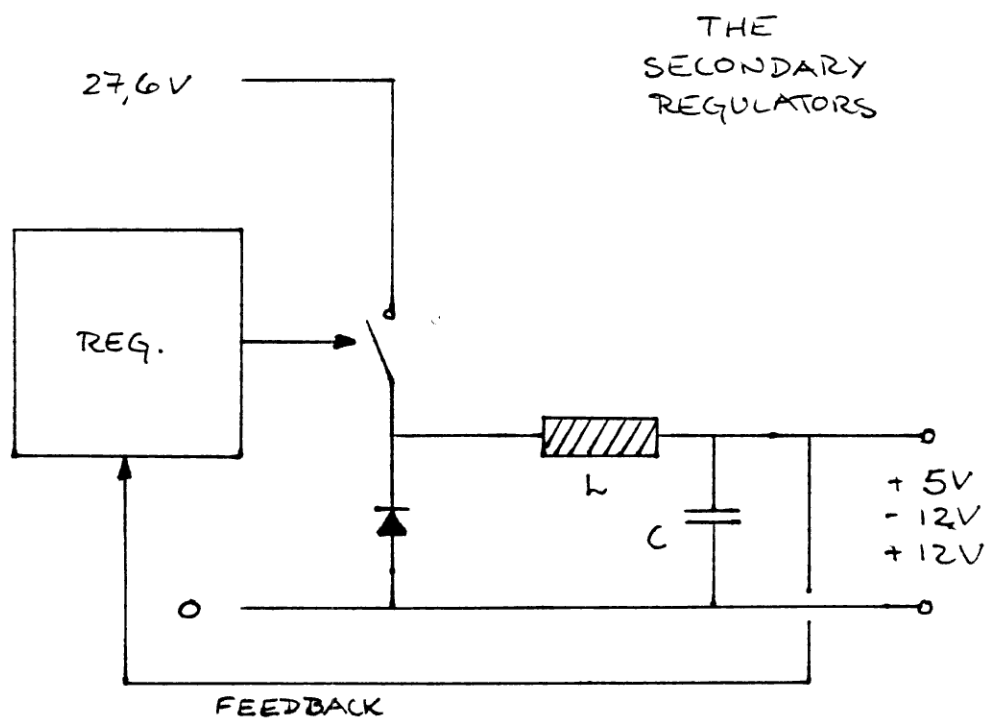
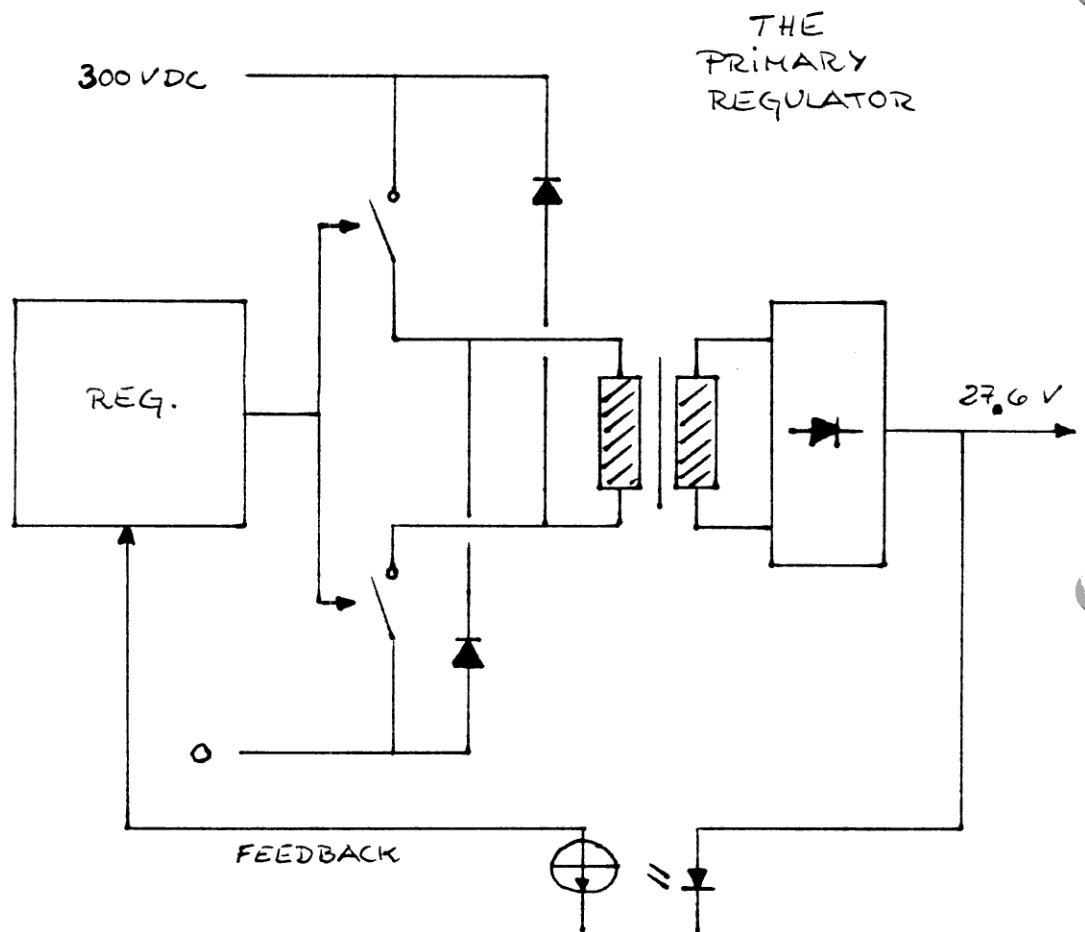
## 1. GENERAL DESCRIPTION

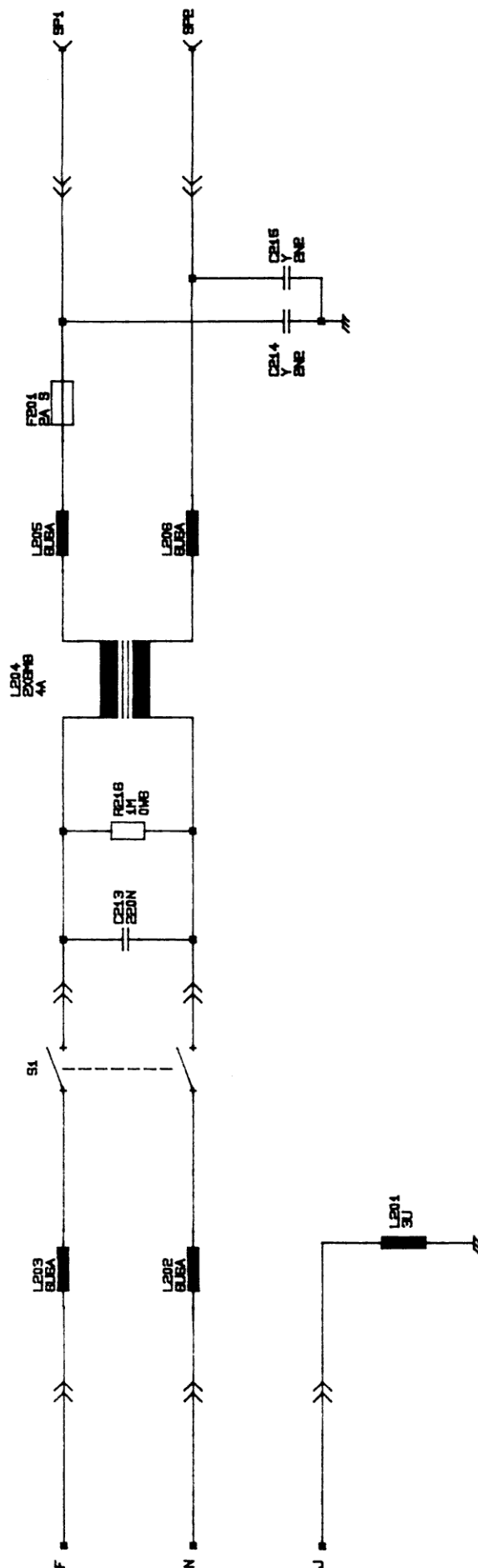
POW451 consists of a forward switch mode power supply (220VAC  $\rightarrow$  27.6VDC) and two step down converters (27.6VDC  $\rightarrow$  5VDC). Batterybackup on the 27.6V-rail is optional (MF306).

POW451 can supply 200W continuously and 250W during startup of motors and fans.

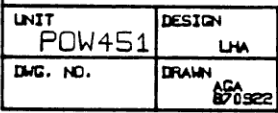
Fan-cooling and mains filtering are integral parts of POW451.





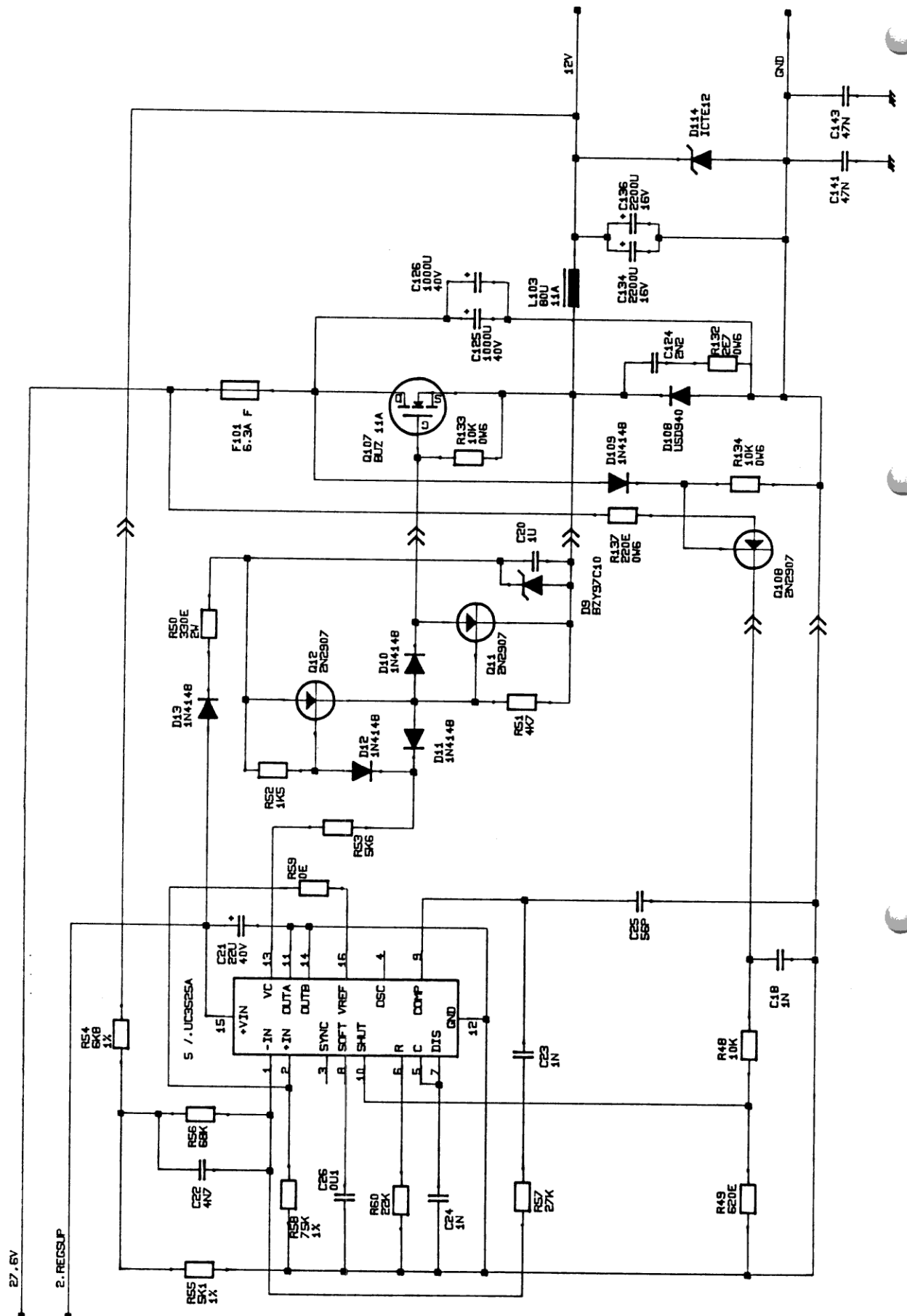


|                |                        |               |   |
|----------------|------------------------|---------------|---|
| UNIT<br>POW451 | DESIGN<br>LHA          | 220V - FILTER | 1 |
| DWG. NO.       | DRAWN<br>LIJ<br>880414 |               |   |



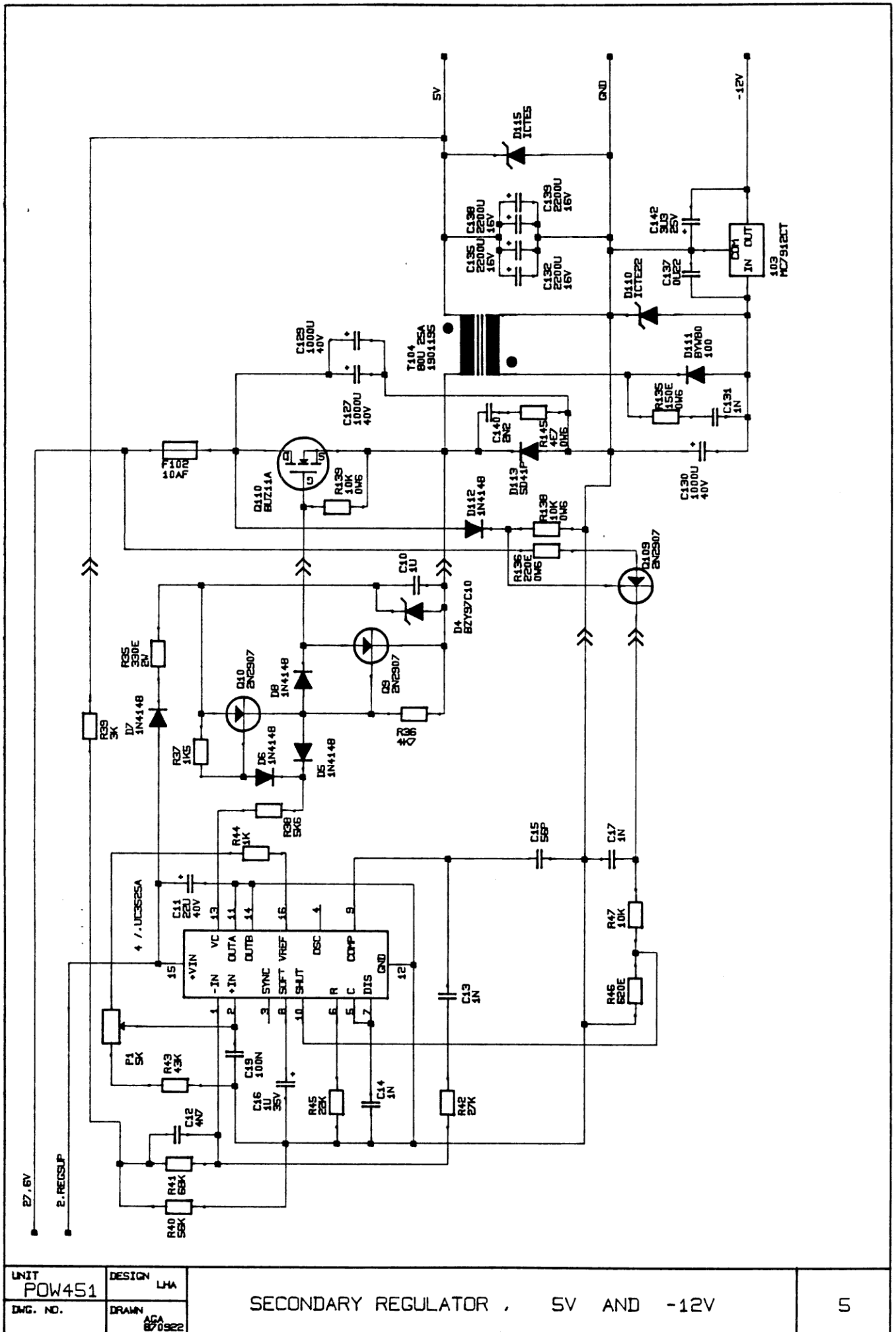
## 2

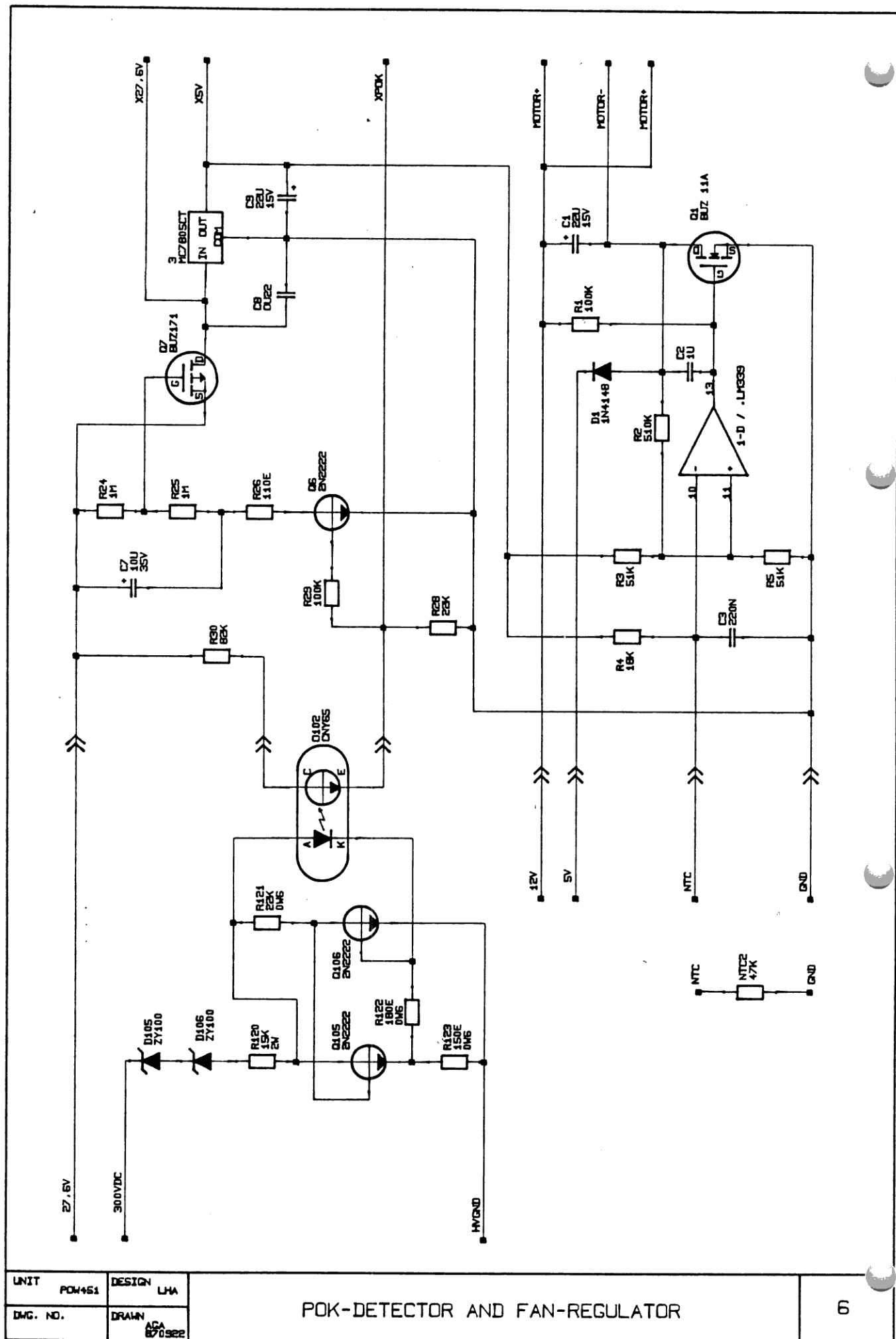
|                |                        |                           |   |
|----------------|------------------------|---------------------------|---|
| UNIT<br>POW451 | DESIGN<br>LHA          | PRIMARY REGULATOR , 27.6V | 3 |
| DWG. NO.       | DRAWN<br>ACA<br>870322 |                           |   |



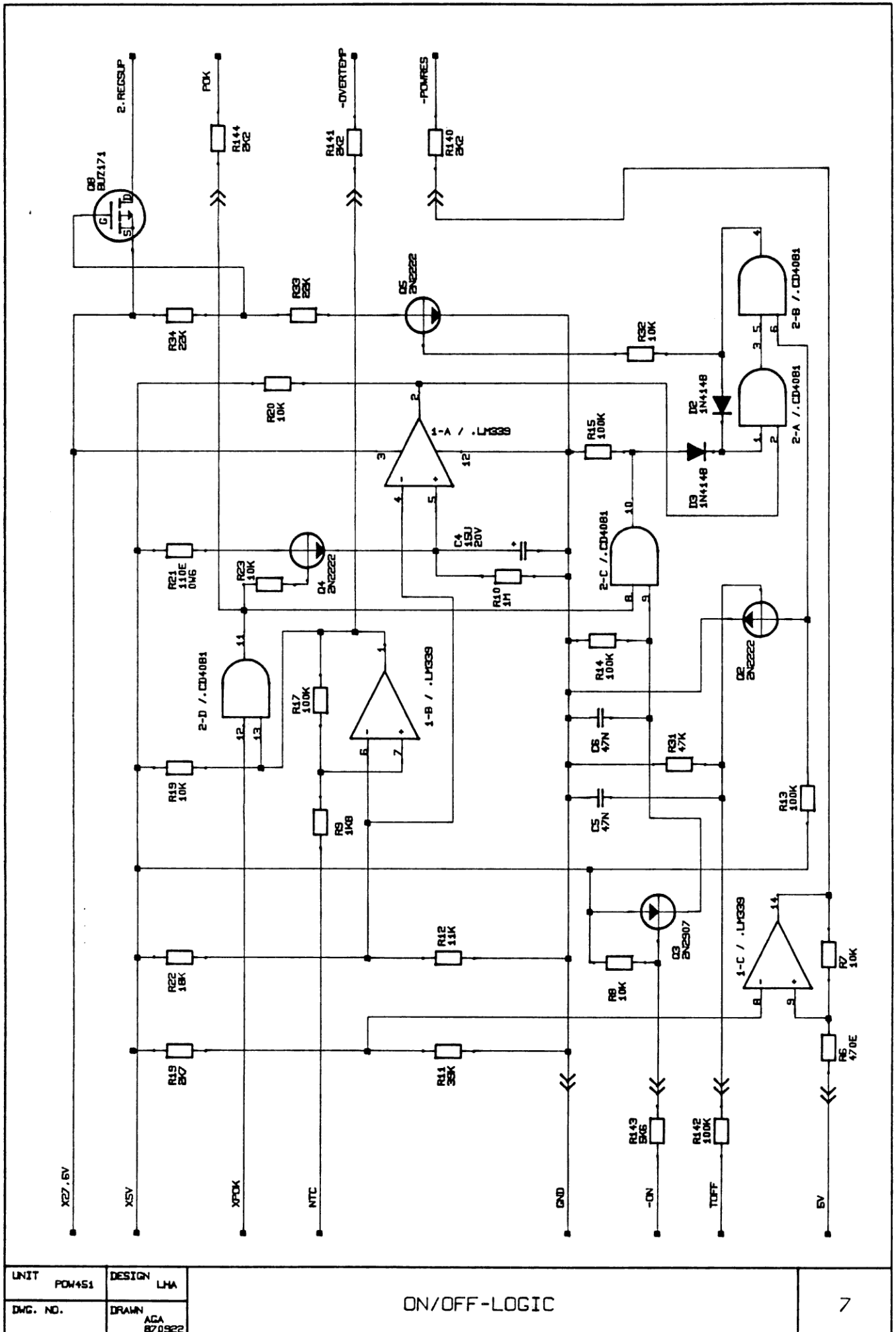
|                |                        |
|----------------|------------------------|
| UNIT<br>POW451 | DESIGN<br>LHA          |
| DWG. NO.       | DRAWN<br>ACA<br>870522 |

SECONDARY REGULATOR , 12V





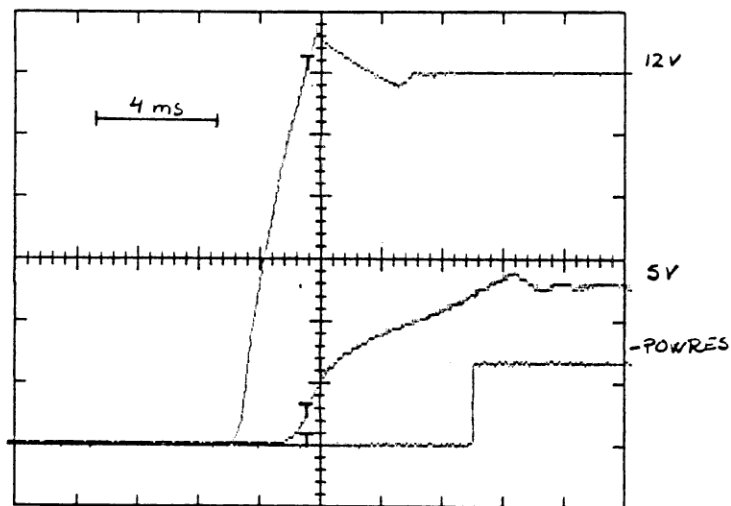
|                                |        |        |        |
|--------------------------------|--------|--------|--------|
| UNIT                           | POW451 | DESIGN | LJA    |
| DWG. NO.                       | 870522 | DRAWN  | 870522 |
| POK-DETECTOR AND FAN-REGULATOR |        |        |        |



## 2. ON/OFF - LOGIC

- ON : Goes low when the key is turned away from the off position. If POK is high this will make POW451 change from "stand by" to "on" state. POW451 will remain on until TOFF goes high or POK goes low for more than 13 seconds.
- TOFF : Generated by the CPU. TOFF going high causes POW451 to enter "stand by"-mode immediately.
- POK : Generated by POW451. POK goes low when the line voltage drops below 185VAC during brown or black out. If POK is still low after app. 13 seconds POW451 will enter "stand by"-mode.
- OVERTEMP : Generated by POW451. -OVERTEMP goes low when the temperature inside POW451 exceeds maximum operating temperature. -OVERTEMP going low will result in POK going low as well, hence causing POW451 to enter "stand by"-mode after app. 13 seconds.
- POWRESS : Generated by POW451. -POWRES is high when the supply voltages 5V, 12V and -12V are within specified limits.

## TURN ON

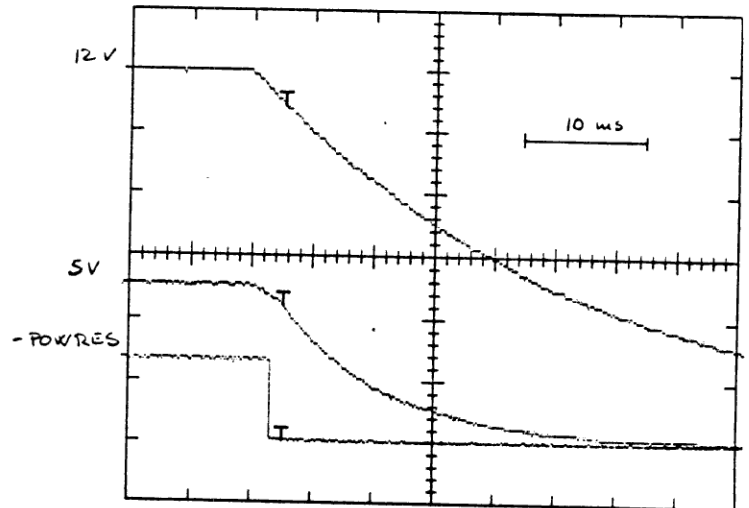


LOAD:

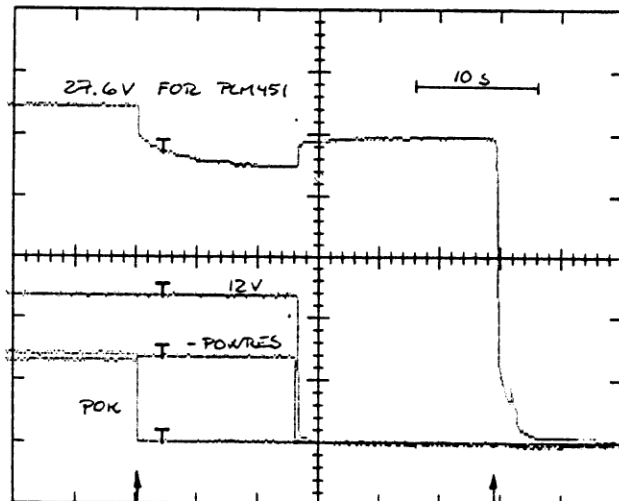
5V - 7A

12V - 2A

## TURN OFF



## WITH BB451 (HF306) INSTALLED:



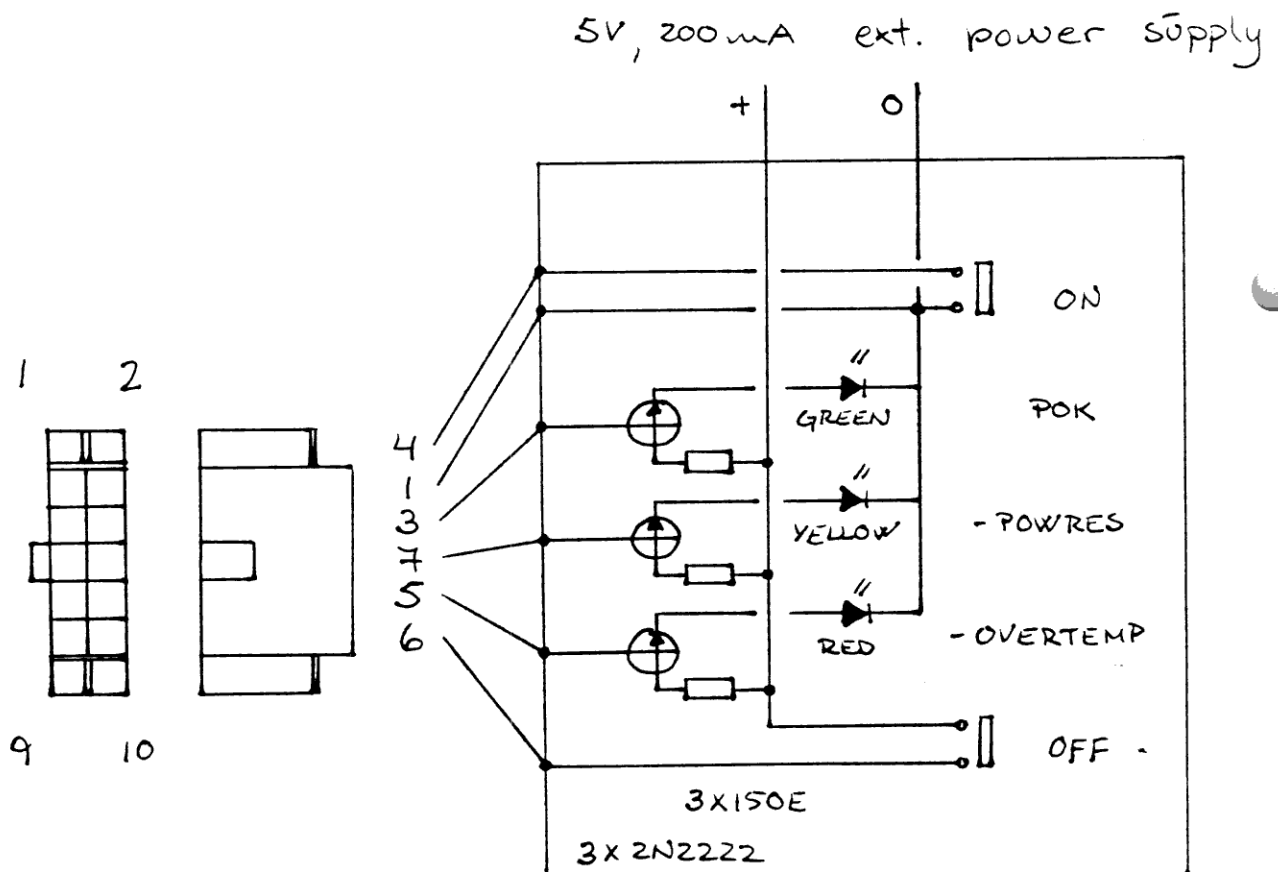
MAINS BLACK OUT

SUPPLY VOLTAGE FOR  
PCM451 SHUT OFF

### 3. ADJUSTMENT PROCEDURE

#### Necessary equipment

- Isolation transformer
- Variable mains transformer
- Variable DC power supply 0-15V, 200 mA
- Oscilloscope
- Hotair blower
- Digital voltmeter ( $R_{IN} = 10 \text{ Mohm min}$ )
- MF306 Battery backup Unit
- Dummy loads for
  - +5V 5A and 24A (2 steps)
  - +12V 2A and 6,5A (2 steps)
  - 12V 0,5A 25 Ohm/30W
  - +27,6V 1,1A
- "Logical test board" as shown below



### 3.1 Step by step test and adjustment procedure

#### 1) Checking the primary switcher

Connect the auxillary DC-power supply to HVGND (0V) and the cathode of D103 (+). Connect the oscilloscope across the primary winding of T101.

Increase the DC-supply voltage slowly and check that the oscillator starts at a voltage of  $11.5V \pm 1V$ . The signal being observed on the oscilloscope must be a squarewave of  $\pm$  the applied voltage with a periode time of  $7.7 \mu s \pm 0.5 \mu s$ . DC-Current consumption must be  $90 \text{ mA} \pm 20 \text{ mA}$  at a supply voltage of 15V. Check that the oscillator stops at a DC-supply voltage of  $9V \pm 1V$ . Remove the DC-supply.

#### 2) Adjusting the primary switcher

Remove PCM451. Connect the 25 Ohm/30W resistor and the voltmeter to the two idle battery connectors. Connect the variable mains transformer to the mains input and adjust the voltage to 220VAC. After app. 5 sec (depending on how long it has been off) the primary switcher will be on.

Adjust the output voltage to  $27.6V \pm 0.1V$  on P101.

Remove the load resistor.

#### 3) Adjusting + 5V, checking the output voltages

Reinsert PCM451. Plug the "logical test card" into J105-J106. Connect the test card to 5VDC external power supply. Connect the light loads +5V 5A, -12V 0.5A and +12V 2A to the outputs J108.

Turn on the mains 220VAC.

Press the "ON" button on the "logical test card" when the green LED is on.

Check by means of the oscilloscope, that the signals across D108 and accross D113 are squarewaves with a periode time of  $16 \mu s \pm 2 \mu s$ .

Adjust P1 (+5V adjust) until  $+5.1V \pm 0.05V$  is measured on J108. check  $+12V \pm 0.6V$  and  $-12V \pm 0.6V$ .

Check that the above mentioned limits are still met with heavy load applied (+5V 24A and +12V 10A). The heavy load is to be applied for no more than 20 seconds. The rest of the testprocedure is carried out under light load condition. Check that the 27.6V rail on the battery connections is stable within  $\pm 0.5V$  at 187VAC as well as 264VAC mains voltage.

#### 4) Testing the control logic

Install MF306 (two batteries).

Adjust the line voltage to 220VAC. When POW451 is turned on by means of the green power switch two LED's will be turned on on the "logical test board". The green LED indicates POK. The red LED indicates NOT OVERTEMP.

Press the "ON" button on the "logical test card". Now the +5V, +12V and -12V outputs will go active, and the yellow LED will turn on, indicating that the +5V supply is within operating limits.

Heat NTC2 (located near the outputs) until the green and red LED turn out. Stop heating and check, by listening, that the fan runs faster until it has cooled down the NTC.

Check that POW451 can be turned off and restarted by means of the switches on the "logical test board".

Lower the line voltage to 170VAC. The green POK LED must turn off at once. After app. 13 seconds POW451 must switch off its outputs. the yellow LED will turn off indicating POWERRESET. App. 20 sek. later the red LED will turn off indicating that PCM451 has entered standby mode.

4. POWER SPECIFICATIONS

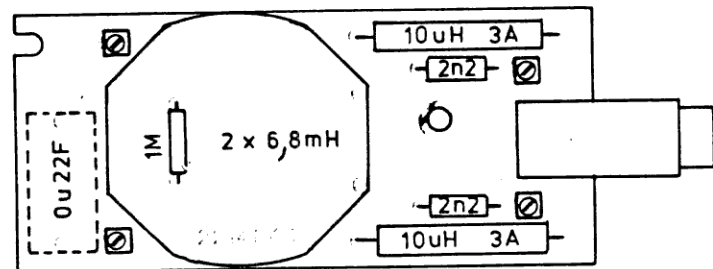
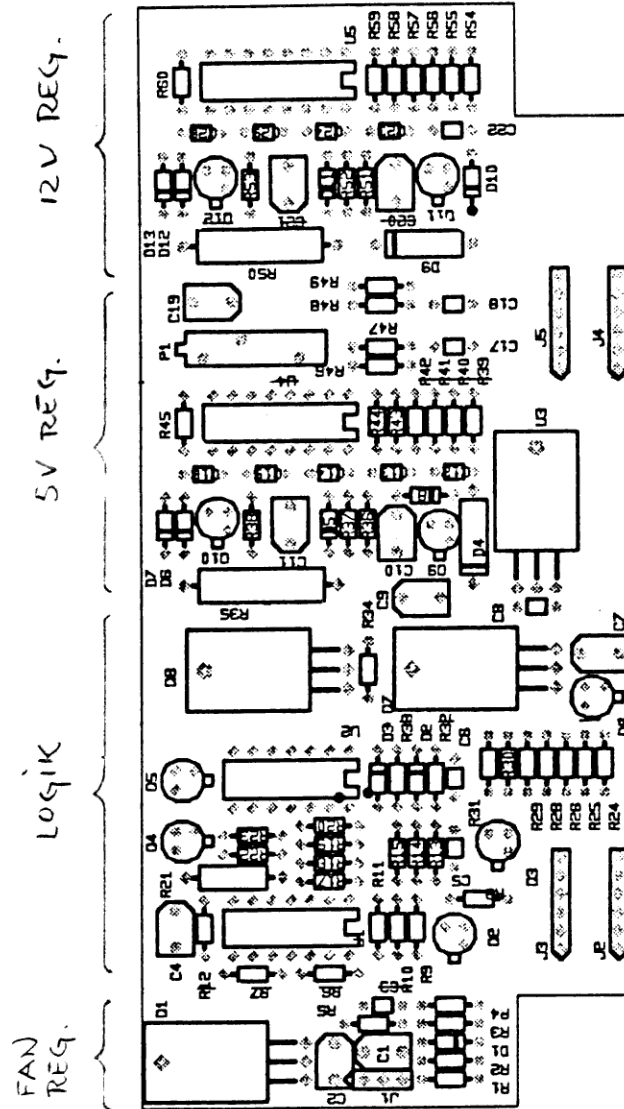
Input voltage                      220VAC +20%-15% 50Hz  
 Mains frequency                    47 Hz to 63 Hz  
 Power consumption                370 W max.  
 Output voltages

| Voltage | Tolerance      | I max                             |
|---------|----------------|-----------------------------------|
| +12V    | <u>+</u> 0.25V | 6.5A constant<br>10A intermittent |
| +5,1V   | <u>+</u> 0.1 V | 24A                               |
| -12V    | <u>+</u> 0.6 V | 0.5A                              |

With MF306 Battery Backup Unit installed and fully charged,  
 POW451 is able to supply 200W output power for 13 seconds during  
 mains blackout.

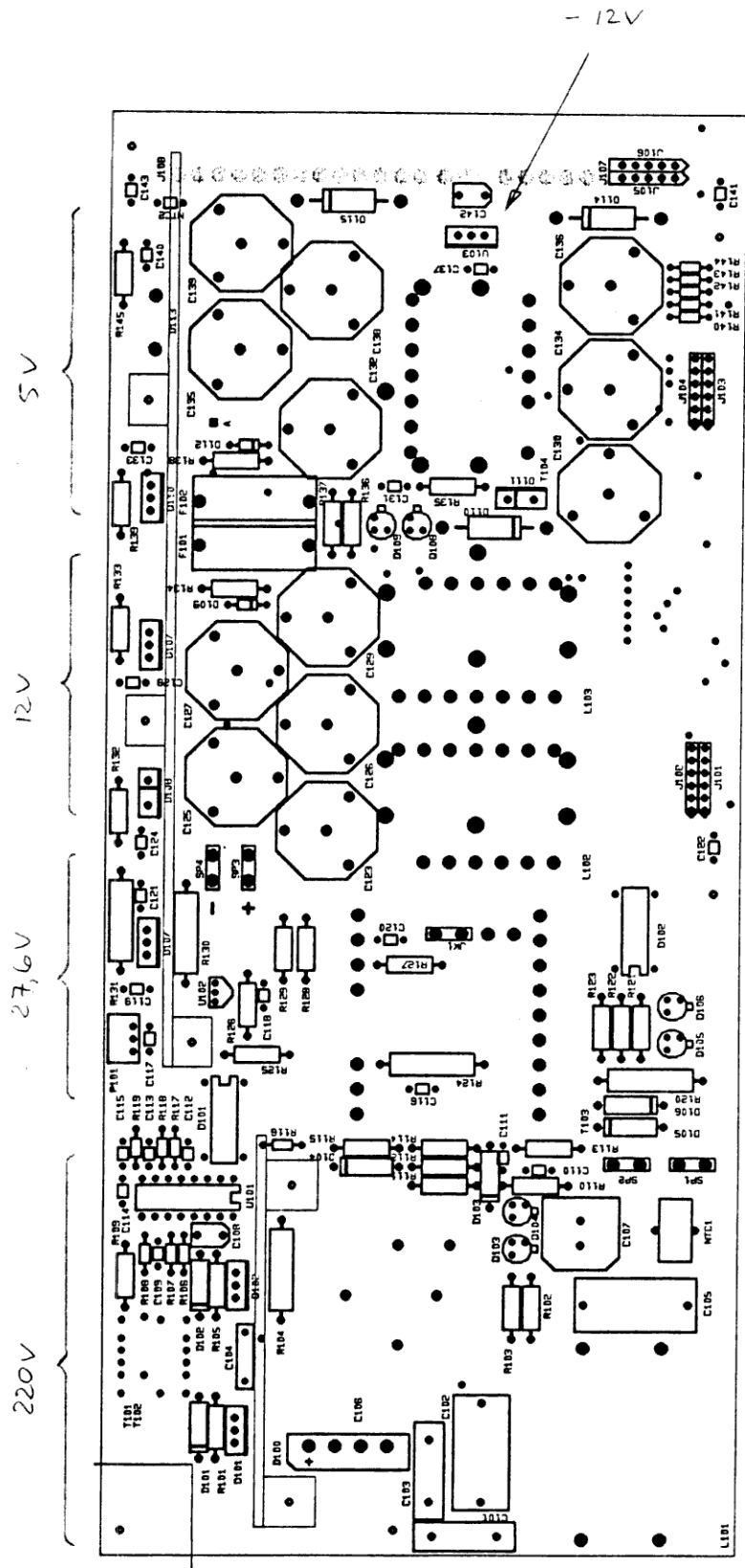
**5. WHERE TO FIND**

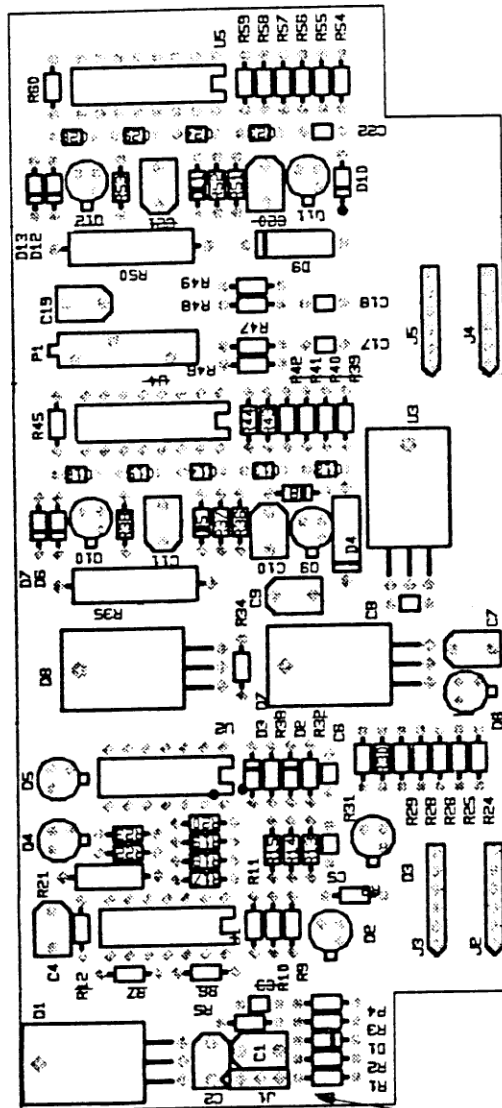
The following pages are intended to be of help in finding particular parts of circuitry in POW451.



PCM 451

NEF 451





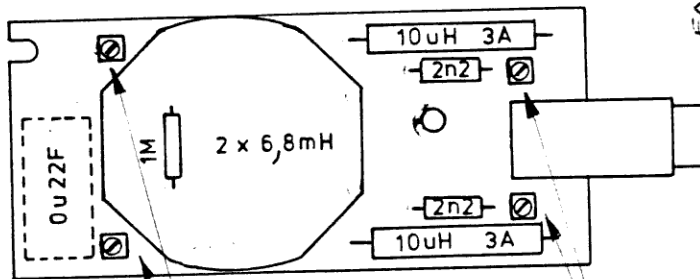
|          |    |    |            |
|----------|----|----|------------|
| GND      | 0  | 0  | 12V FB     |
| 12V FUSE | 0  | 0  | 12V GATE   |
| 5V FUSE  | 0  | 0  | 12V SOURCE |
| 27,6V    | 0  | 0  | 5V FB      |
| 27,6V    | 0  | 0  | 5V GATE    |
| GND      | 0  | 0  | 5V SOURCE  |
|          | JS | J4 |            |

PCM 451

|      | J3 | J2 |            |
|------|----|----|------------|
| - ON | 0  | 0  | TUFF       |
| CC2E | 0  | 0  | GND        |
| CC2C | 0  | 0  | - OVETTEMP |
| PCR  | 0  | 0  | - PWILE    |
| SV   | 0  | 0  | NTC        |
| 12V  | 0  | 0  | GND        |

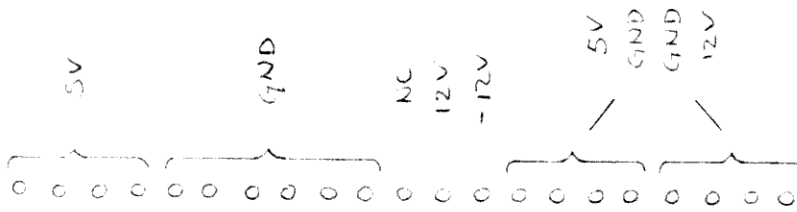
|       |    |   |
|-------|----|---|
| +     | +  | + |
| FAN 0 | 0  | 0 |
| FAN 0 | 0  | 0 |
| FAN 0 | 0  | 0 |
|       | J1 |   |

NEF 451



220V IN

220V OUT



GND  
-ON  
TOFF  
NC  
NC

GND  
POK  
- OVERTEMP  
- POWRES  
NC

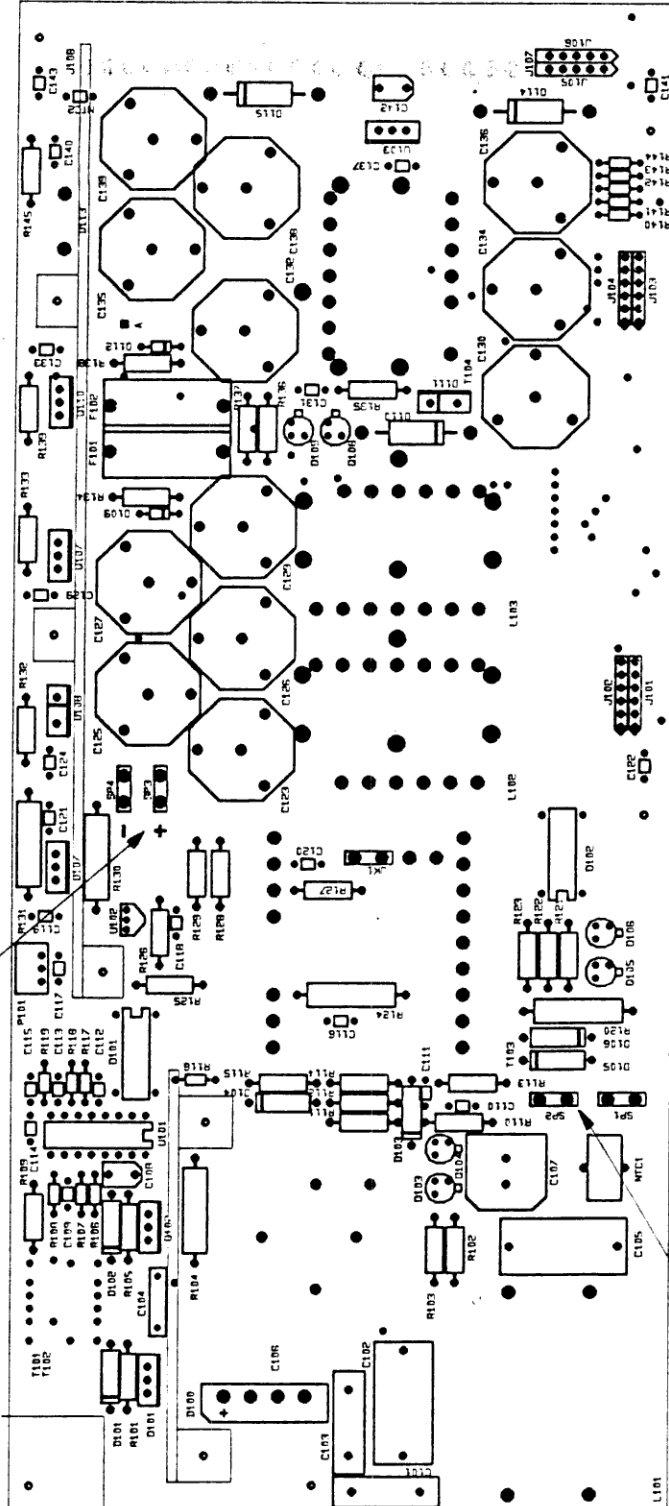
12V FB C  
12V GATE C  
12V SOURCE C  
5V FB C  
5V GATE C  
5V SOURCE C

TOFF C  
GND C  
- OVERTEMP C  
- POWRES C  
NTC C  
GND C

PMB 451

220V IN

27.6V



Safety Components

## Important

To protect the user against voltage and fire hazards, the components listed below must not be replaced by other types than specified.

Component numbers refer to diagram.

| Component no.    | Type,                               | Manufacturer                                                    |
|------------------|-------------------------------------|-----------------------------------------------------------------|
| L201             |                                     | RC PLSNO. 6209801 KBL801                                        |
| L202+203+205+206 | 6U 6A                               | FASTRON MSSC/A-6R0-00<br>FERROPERM 1585 6U 6A                   |
| C213+105+102     | 220nF-250v                          | RIFA PME 271                                                    |
| S1               | 220V switch                         | RUSSENBERGER 310FB5N 220V                                       |
| L204+101         | 2x6m8 4A                            | SIEMENS B82725-A2402-N1<br>G.U. HARTMANN 210025-13              |
| F201             | FUSE T 2                            |                                                                 |
| C214+215         | 2.2nF-400V<br>2.2nF-400V            | ROEDERSTEIN RKP 619<br>FERROPERM 9/0138.9 D                     |
| NTC1             | NTC                                 | SIEMENS Q632`023-K2330-M                                        |
| D100             | KBU4G                               | GENERAL INSTRUMENTS                                             |
| C106             | 330U 385V<br>330U 385V<br>470U 385V | PHILIPS 2222052 58331<br>RIFA PEH165XF 3330<br>FRAKO ELN470-385 |

|          |                 |                                             |
|----------|-----------------|---------------------------------------------|
| T103     | MAINS TRANSF.   | RC PLSNO. 1901192                           |
| O101+102 | OPTOCOUPLER     | AEG CNY65                                   |
| F101     | FUSE WITH LEADS | CHURTER 034.1924<br>ELU 179020+205000/20    |
| F102     | FUSE WITH LEADS | SHURTER 034.1926<br>ELU 179020/10a+20500/20 |