



Sailor

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**INSTRUKTIONSBOG FOR
SAILOR N1409**

**INSTRUCTION BOOK FOR
SAILOR N1409**



A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

1. GENERAL DESCRIPTION
 - 1.1. TECHNICAL DATA
 - 1.2. PRINCIPLE OF OPERATION
2. SERVICE
 - 2.1. MAINTENANCE
 - 2.2. RECOMMENDED MEASUREMENT INSTRUMENTS
 - 2.3. PERFORMANCE CHECK
 - 2.4. SELF-MADE TEST LOAD
 - 2.5. NECESSARY ADJUSTMENT AFTER REPAIR
 - 2.6. TROUBLE SHOOTING
 - 2.7. PIN CONFIGURATIONS AND SCHEMATIC DIAGRAMS
3. CIRCUIT DESCRIPTIONS AND DIAGRAMS WITH MEASUREMENTS
 - 3.1. INPUT FILTER (MODULE 600)
 - 3.2. AUXILIARY POWER SUPPLY (MODULE 100, 200)
 - 3.3. DELAY UNIT AND BLOWER CIRCUIT (MODULE 100, 500)
 - 3.4. POWER UNIT I
 - 3.5. POWER UNIT II
4. COMPONENT LOCATIONS
 - 4.1. POWER SUPPLY CONTROL UNIT (MODULE 100)
 - 4.2. FILTER BOARD AND AUX. P.S. (MODULE 200)
 - 4.3. CONNECTION BOARD I (MODULE 300)
 - 4.4. CONNECTION BOARD II (MODULE 400)
 - 4.5. INPUT RELAYS (MODULE 500)
 - 4.6. MAINS FILTER (MODULE 600)
 - 4.7. AC LINE FILTER
 - 4.8. TOP VIEW
 - 4.9. DISASSEMBLING FROM T1130
 - 4.10. MAIN DIAGRAM
5. PART LISTS

CONTENTS:

1. GENERAL DESCRIPTION
- 1.1. TECHNICAL DATA
- 1.2. PRINCIPLE OF OPERATION

1. GENERAL DESCRIPTION

SAILOR N1409 is an AC power supply intended to supply a SAILOR SSB short wave set, when the set has to be supplied from AC-mains.

SAILOR N1409 is a switch mode power supply which reduces power consumption.

SAILOR N1409 has a built-in delay unit which ensures the proper sequence for applying voltages to the transmitter, regardless of how the MAIN SWITCH is operated.

SAILOR N1409 with MAIN SWITCH in position RECEIVER ONLY. Only the receiver is supplied and low power consumption is achieved.

SAILOR N1409 is provided with thermal breakers which switch off the set if the temperature inside the power supply gets too high.

SAILOR N1409 fits into SAILOR 19" rack system. The power supply is incorporated in the transmitter module T1130.

1.1. TECHNICAL DATA

The power supply N1409 delivers all necessary voltages to a SAILOR SSB short wave set 1000/B with an output power of 400 W PEP in the frequency range 1.6 - 27.5 MHz.

INPUT VOLTAGE: 220/237V AC, frequency 50 - 60 Hz.

INPUT CURRENT: by 220V AC INPUT
2-tone approx. 6.5A
A3J approx. 4.5A
A3H approx. 6.0A
R.O. approx. 0.38A

OUTPUT VOLTAGES: POWER UNIT I
8V I_{max} 2.0A
-45V I_{max} 0.15A
22V I_{max} 3.2A

POWER UNIT II
28V I_{max} 3.4A
38V I_{max} 14A

AC VOLTAGE
24V AC for blowers I_{max} 2A

OPERATION TEMPERATURE RANGE: -15°C to $+55^{\circ}\text{C}$

COOLING: With MAIN SWITCH in position RX-ONLY and the temperature inside the power supply exceeding $+55^{\circ}\text{C}$ the internal blower will start automatically. When the temperature falls below $+45^{\circ}\text{C}$ the blower stops.

With MAIN SWITCH in position ON the internal blower is running when transmitter is keyed.

If temperature in transmitter is too high the power supply is reduced from 38V to 30V. If temperature is further increasing the Power Unit II is blocked and blowers start. When temperature is decreased blowers stop and Power Unit II is unblocked again.

1.2. PRINCIPLE OF OPERATION

The power supply N1409 consists of three power supplies.

Power Unit I is a forward converter producing low power voltage for receiver, exciter and transmitter.

Power Unit II is a symmetrical half bridge push-pull converter producing high power to the transmitter.

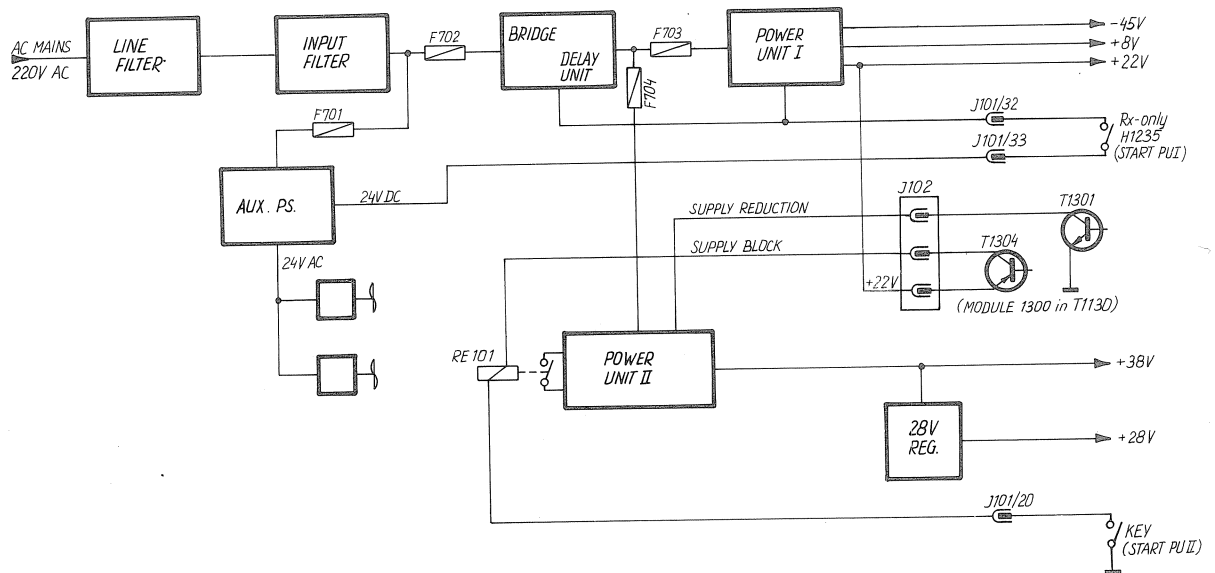
An auxiliary power supply produces an internal 24V DC and a 24V AC for the blowers.

Aux. P.S. is always switched on when N1409 is connected to AC-mains.

PU I is working when the set is switched on.

PU II is only working when PU I is switched on and the transmitter is keyed.

N1409 is switched on/off by the switches in H1235 rack system.



BLOCK DIAGRAM N1409

CONTENTS:

- 2. SERVICE
- 2.1. MAINTENANCE
- 2.2. RECOMMENDED MEASUREMENT INSTRUMENTS
- 2.3. PERFORMANCE CHECK
- 2.4. SELF-MADE TEST LOAD
- 2.5. NECESSARY ADJUSTMENT AFTER REPAIR
- 2.6. TROUBLE SHOOTING
- 2.7. PIN CONFIGURATIONS AND SCHEMATIC DIAGRAMS

2. SERVICE

2.1. MAINTENANCE

When the SAILOR Short Wave Set type 1000/B has been correctly installed, the maintenance of the power supply can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years.

A performance check list is enclosed in the PERFORMANCE CHECK section. Also inspect cables and plugs for mechanical defects and corrosion.

Any repair of the set should be followed by a check described in the section NECESSARY ADJUSTMENT AFTER REPAIR.

2.2. RECOMMENDED MEASUREMENT INSTRUMENTS

MULTIMETER PHILIPS PM2505

OSCILLOSCOPE PHILIPS PM3214

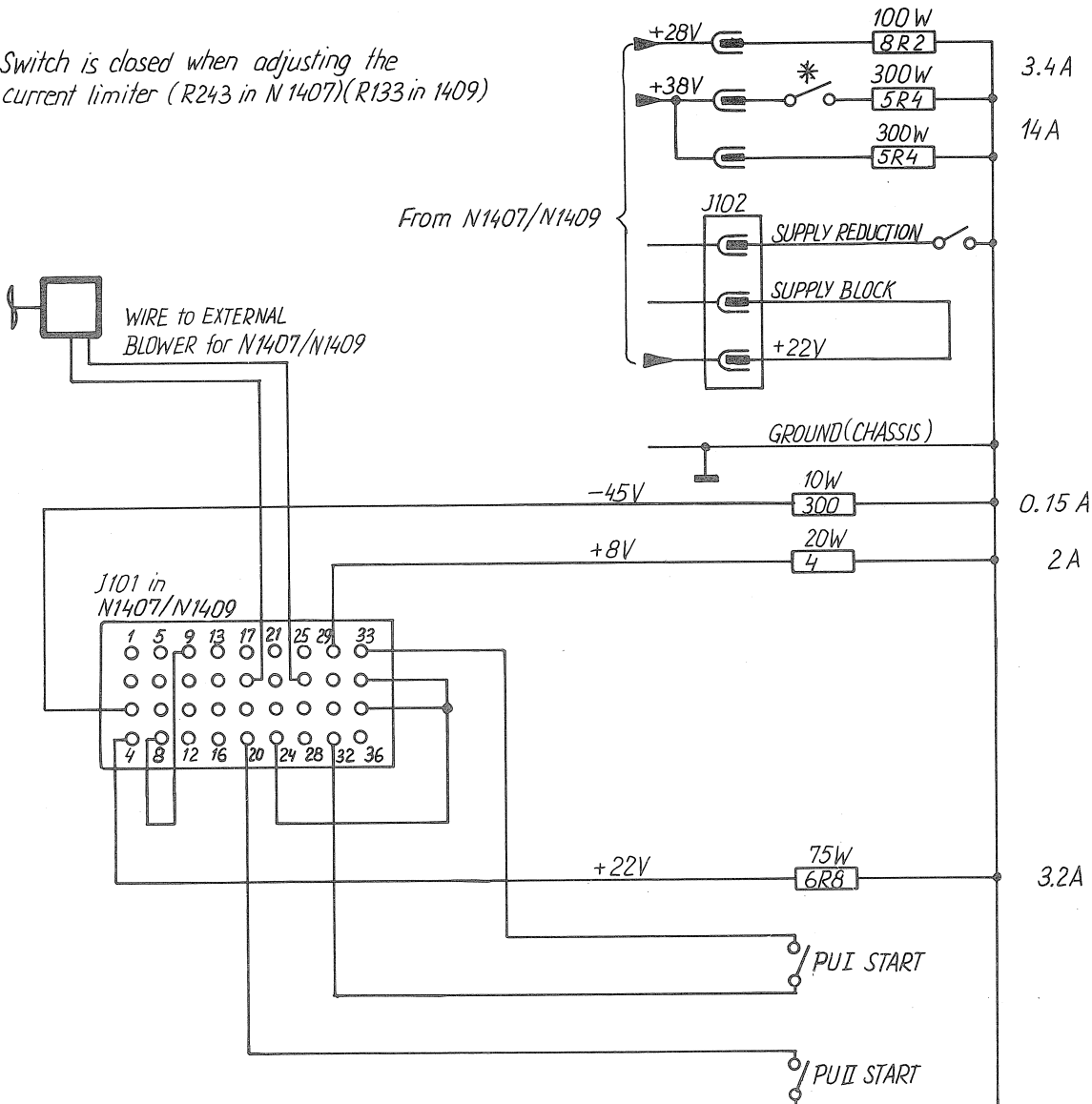
Because of high voltage in the power supply it is recommended to use an oscilloscope probe which can withstand at least 1000V DC, e.g. PHILIPS PM8932.

2.3. PERFORMANCE CHECK

1. N1409 is mounted in T1130 (1000/B rack).
2. Connect AC-mains. Normally 220V AC; if over approx. 235V AC then strap TR701 to 240V AC.
3. Check Aux. P.S. 24V DC can be measured at R101 for regulator IC701 and at C136 for regulator IC106.
4. Push "RX-ONLY" (switches on PU I).
5. Check 22V, 8V and -45V output voltages. If necessary then adjust to 22.0V with R154.
6. Push "ON" button and press key.
7. Check 28V and 38V output voltage. If necessary then adjust to 28V with R165 and to 38V with R169.
8. Current limiters cannot be adjusted.
9. While pressing the key check that both blowers are running.

2.4 SELF MADE TEST LOAD

* Switch is closed when adjusting the current limiter (R243 in N1407)(R133 in 1409)



SELFMADE TEST LOAD FOR N1407/N1409

2.5. NECESSARY ADJUSTMENT AFTER REPAIR (USING SELFMAD TEST LOAD)

POWER UNIT I

CAUTION!

When AC-mains is connected to P103 there is always mains in the power supply.

1. Connect selfmade test load to N1409 outputs.
2. Remove the fuses F702, F703 and F704. Not F701.
3. Connect AC-mains. If this is over 235V AC, then connect transformer TR701 to the terminal marked "240V".
4. Check 24V DC from IC701 (R101) and IC106 (C136).
5. Connect scope probe to collector of T102 and scope ground to chassis. Let the scope be triggered on positive going edge of delay pulse.
Switch on PU I and observe the delay pulse at 45 - 50 ms.
Switch off PU I with PU I start switch.
6. Connect scope to base and emitter of T703. Can be done by connecting the scope probe to D114 and scope ground to R131.
7. Switch on PU I (RX-ONLY).
8. Check with scope:
Soft start: Square wave builds up slowly (approx. 100 ms).
Frequency: Approx. 25 kHz (40 usecs).
Duty cycle: Approx. 15 %.
Reverse bias: See fig. on diagram.
9. Switch off PU I with PU I start switch.
10. Turn R144 in middle position.
Turn R154 counter clockwise to stop.
Replace F702 and F703.
11. Switch on PU I and switch also PU II on because of the current to RE101 while adjusting the current limiter.
12. Adjust 22V with R154 to 22.0V.
13. Adjust current limiter with R144.
Turn R144 until PU I just goes out of current limiting.
Check 8V output to approx. 8.6V and -45V to approx. -45V.
14. Switch off PU I and PU II.

POWER UNIT II

When PU II is switched on, it is always necessary to cool the switch transistors T701 and T702 and the output rectifier D704. It is recommended to mount N1409 in a T1130 chassis with a blower to cool the power supply.

N1409

Necessary adjustment after repair continued:

1. Fuse F704 is removed.
2. Check PU I and switch off PU I
3. Check base driver of T701.
Connect scope probe to cathode of D109 and scope ground to R126
(in connection to emitter of T701).
4. Switch on PU I and PU II and check on scope:
Soft start: Drive signal builds up slowly (approx. 1.5 secs).
Frequency: Approx. 20 kHz (50 usecs).
Duty cycle: Approx. 45%
Reverse bias: See fig. on diagram.
5. Switch off PU I and PU II and connect scope probe to cathode of
D111 and scope grounds to R128 (in connection to emitter of T702).
6. Switch on PU I and PU II and check on scope:
Soft start: Drive signal builds up slowly (1.5 secs).
Frequency: Approx. 20 kHz (50 usecs).
Duty cycle: Approx. 45%
Reverse bias: See fig. on diagram.
7. Switch off PU I and PU II.
Turn R133 clockwise to stop.
Turn R169 counter clockwise to stop.
Turn R165 in middle position.
8. Replace fuse F704.
9. Switch on PU I and PU II.
10. Turn R133 out of current limiting.
Adjust 38V output with R169 to 38.0V.
Adjust 28V output with R165 to 28.0V.
Adjust current limiter with R133 so the 38V output is 35.5V
with full load at 38V output and at 28V output.

While PUIII is working with full loads some noise and "jitter"
occurs.

2.6. TROUBLE SHOOTING

FAILURE IN POWER UNIT I

1. Bad connections in plug to P103 or J101.
2. Auxiliary power supply is out of function.
 - a) Check fuse F701.
 - b) Check 24V DC from IC701 and IC106.
3. Relay RE501 is not activating.
 - a) There is no 24V DC on RE501 when PU I is started.
 - b) RE501 is defective.
4. Fuse F702 is blown out.
 - a) Diode D701 or capacitor C701 is defective.
5. Fuse F703 is blown out and T703 is short-circuited.
 - a) Remove T703 and F703 and check if T110 and T111 also are damaged. If damaged then repair.
 - b) Start PU I and check if base drive to T703 is correct.
6. PU I starts up but goes into "hiccup mode".
 - a) Wrong adjustment of current limiter R144 or of voltage adjuster R154.
 - b) Output voltage is short-circuited or overloaded.
 - c) One of the output diodes is damaged.
 - d) Failure in the control loop.

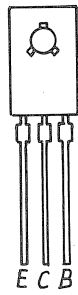
FAILURE IN POWER UNIT II

1. Relay RE101 is not activated when handset key is pressed.
 - a) PU I is out of function.
 - b) Handset key is out of function.
2. Supply is blocked.
 - a) Temperature protection unit in T1130 blocks the power supply because of overheating of the transistors in the power amplifier in T1130. Check also the blowers and air filter.
 - b) Bad connection of J102.
 - c) Over- and undervoltage shut-down at IC101.
3. Supply starts up but goes into "hiccup mode".
 - a) Wrong adjustment of current limiter R133.
 - b) Output voltage is short-circuited or overloaded.

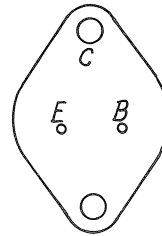
2.7. PIN CONFIGURATION

FRONT VIEW

BOTTOM VIEW



BD131
BD138
BD680
BDX43
BDX47



MJ802
BUV 19
BUS 12
BUX 98



BD649
BD650
BD808
BDX 34B



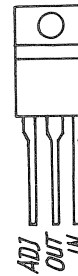
BC338
BC547
BC548
BC557
BC558



MC 7824 CT



BC639
BC640



LM317T



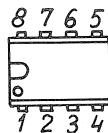
MPS-A06



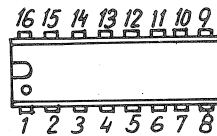
MC 78L08 ACP

TOP VIEW

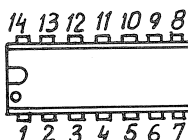
TOP VIEW



MC 1455 P1
LM 358 N



TDA 1060A



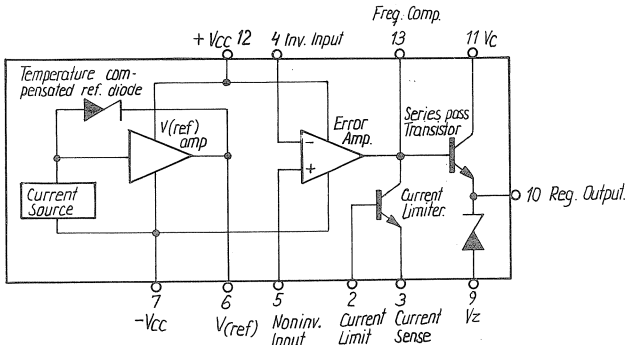
MC 1723 CP
MC 14013 BCP



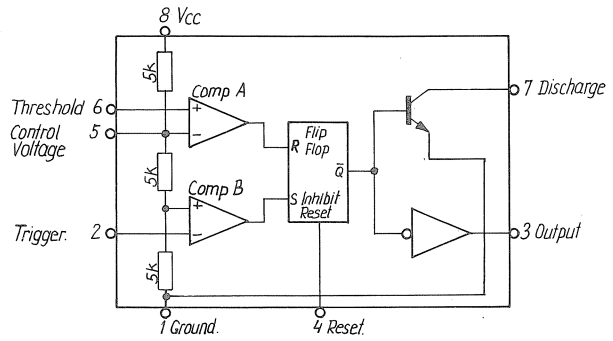
TDA 4718A

PIN CONFIGURATION cont.

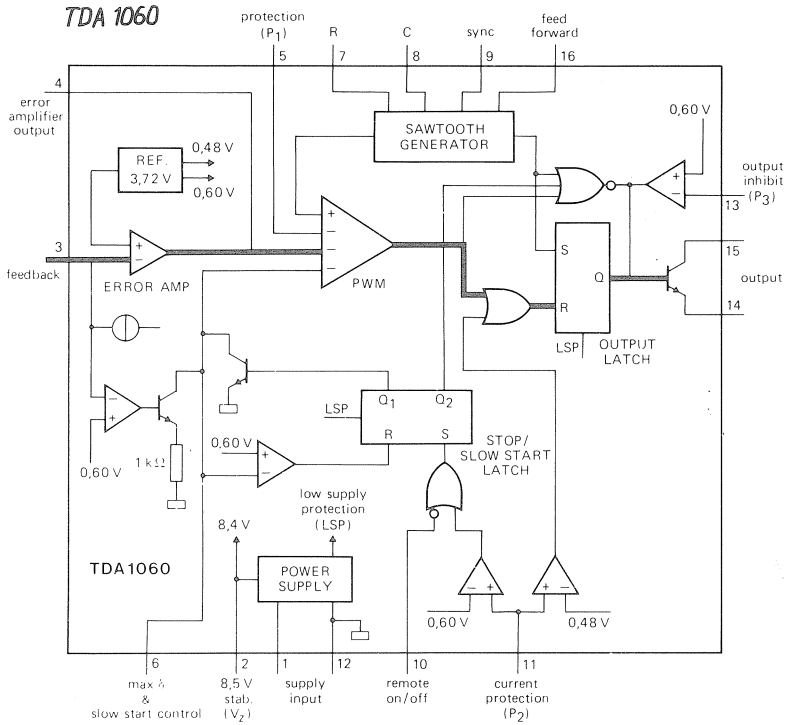
MC 1723



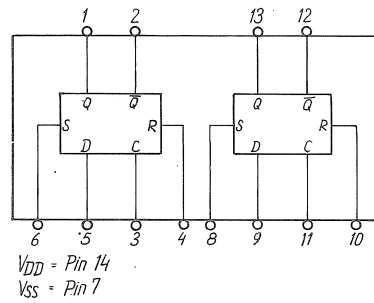
MC 1455



TDA 1060

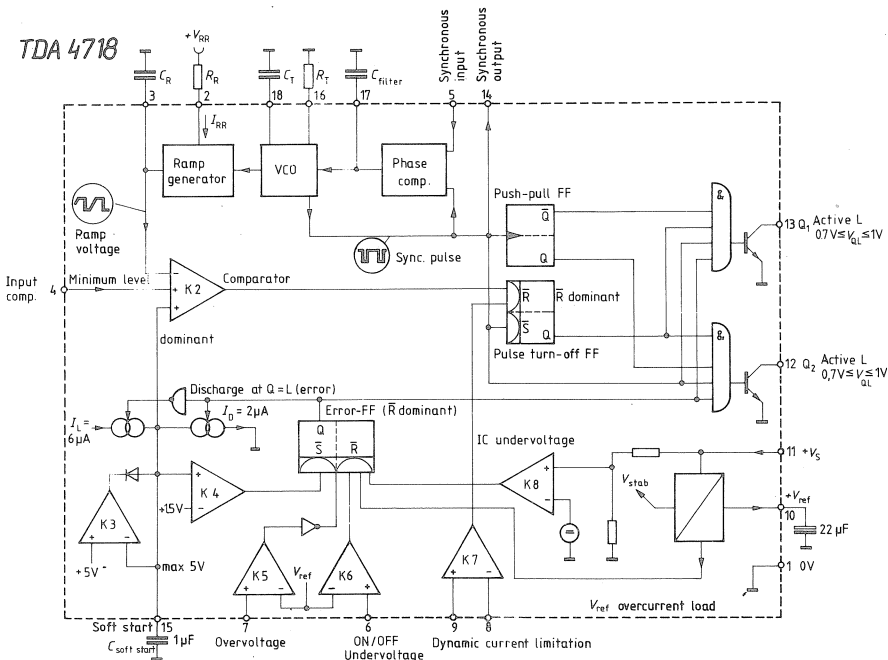


MC 14013B

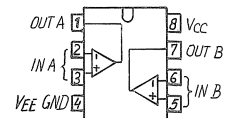


Block diagram of the TDA1060

TDA 4718



LM 358



CONTENTS:

- 3. CIRCUIT DESCRIPTIONS AND DIAGRAMS WITH MEASUREMENTS
 - 3.1. INPUT FILTER (MODULE 600)
 - 3.2. AUXILIARY POWER SUPPLY (MODULE 100, 200)
 - 3.3. DELAY UNIT AND BLOWER CIRCUIT (MODULE 100, 500)
 - 3.4. POWER UNIT I
 - 3.5. POWER UNIT II

3. CIRCUIT DESCRIPTIONS AND DIAGRAMS WITH MEASUREMENTS

3.1. INPUT FILTER (MODULE 600)

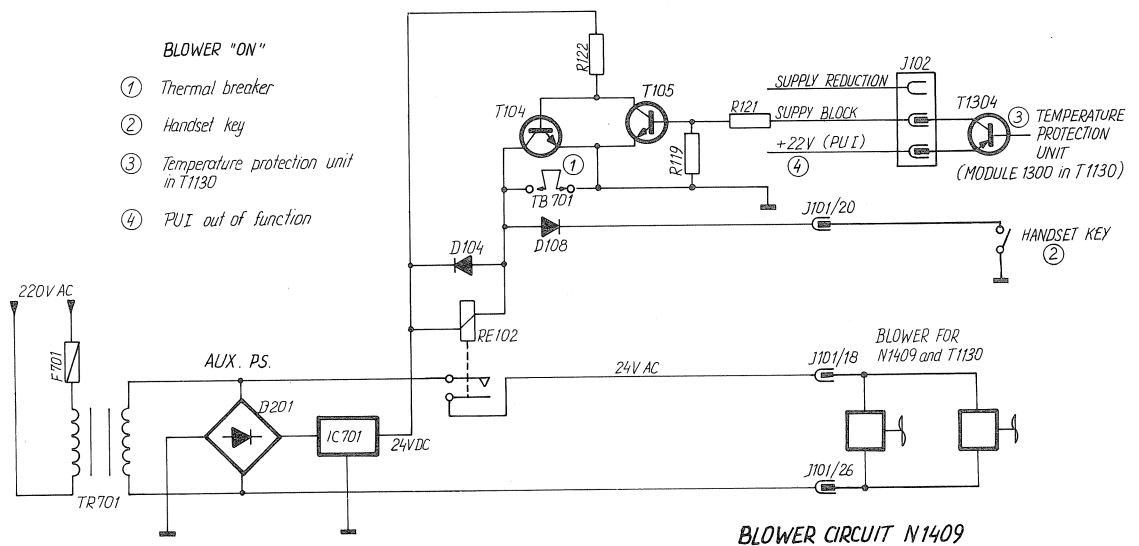
To suppress switch noise, the power supply has a mains input filter (module 600) and an AC Line Filter mounted outside the rack.

CAUTION! Because of AC-mains, N1409 must be grounded (earth connection to chassis).

3.2. AUXILIARY POWER SUPPLY (MODULE 100, 200)

AC-mains is led through fuse F701 to transformer TR701. If AC-mains is over approx. 235V RMS, the transformer TR701 has to be connected to the terminal marked 240V. The secondary of TR701 produces 24V AC for the blowers mounted in the rack. The bridge D201 rectifies the 24V AC and the DC voltage is then regulated to 24V DC in IC701 and IC106.

Even when all fuses are removed, mains is still present in the set. Always remove mains plug from P103 when working with the power supply. For about 15 minutes there is still high voltage on switch transistors and transformer because of capacitor C701.



3.3. DELAY UNIT AND BLOWER CIRCUIT (MODULE 100, 500)

Mains current is led through fuse F702 and to relay RE501, which turns on when starting PU I. After 45 - 50 ms, determined by the delay unit, relay RE502 turns on and short-circuits R401, which limits the inrush current through D701. The delay is produced by a timer circuit IC102 and determined by R118 and C113. Switch on PU I makes 24V DC at R120 and is regulated to 9.1V by means of D107.

By means of RE102 the blowers can be switched on in four ways. RE102 is always biased with 24V DC from aux. P.S.

If temperature in the whole power supply exceeds 55°C, the thermal breaker TB701 is switched on and starts the blowers until temperature is approx. 40°C.

When transmitter is keyed, diode D108 is grounded via handset key and the blowers are running.

The temperature protection unit in the transmitter unit will break the connection between +22V and supply block terminal at J102.

If PU I is out of function, the transistor T105 is then off and T104 is on, which turns on the blowers and blocks the PU II.

3.4. POWER UNIT I

PU I is constructed as a multiple output forward switch mode converter and is regulated after the pulse width modulation principle. The switch transistor T703 is controlled by IC103 which creates a square wave signal. The "ON"-time (duty-cycle) mainly depends on the input voltage.

Transformer TR703 has a demagnetizing winding from pin 1 to pin 3, which prevents the transformer from saturating.

During the "ON"-time of T703 a current is established in the primary of TR703. A voltage is transferred to the secondary, say pin 8 to pin 9 and creates a current through D702. The choke L701 is charged and acts as an energy reservoir. Finally the current is smoothed by the capacitors C215 - C216 before it goes out to the load.

During the "OFF"-time of T703, the voltage is reversed at the secondary winding and D702 is reversed-biased. But the choke L701 discharges and sends a current through the load and back through D703.

Resistor R205 ensures a minimum load for good regulation. Resistor R303 and capacitor C303 prevent unwanted oscillations. The two other outputs are acting in the same way.

The switch current is led through TR401, which creates a voltage by means of C119 and D116. Voltage over R144 is proportional to the current and is led to IC103 pin 11, where it regulates the duty-cycle and then the output voltage. It performs a dynamic current limiter for PU I and is adjusted with R144.

An increase in the load current and then in the primary switch current will create a higher voltage at pin 11 and the PU I will go in continuous soft start ("hiccup mode") until the extra load is removed.

The controlled square wave from IC103 pin 14 turns on T110 and by means of TR103 a current goes through D114 and turns on the switch transistor T703. The base current of T703 flows through capacitor C118 and D115, back to TR103. The charging of C118 is turning on T703 very fast. In the rest of the on-period, the base current goes through resistor R131, back to TR103. The diodes D403 and D114 form a "baker clamp" configuration which prevents hard saturation of T703 to make it switch faster.

POWER UNIT I cont.:

At the beginning of the "off-period" the polarity of TR103 is reversed. The voltage over C118 has now connection to the base of T703 via T111 and gives negative bias to T703 which turns off T703 very fast. The discharge time of C118 is so long that T703 is always reversed biased when it is off.

The pulse width modulator IC103 has many features. The duty-cycle is limited to approx. 40 % by means of R149 and R156. The capacitor C126 determines the soft start time which reduces the peak current in T703 and the output diodes when starting up the PU I. The switch frequency of 25 kHz is determined by resistor R159 and capacitor C128. Resistor R145 limits the supply current for IC103. The voltage supply for the output of IC103 is determined by means of R137 and R142, while D117 limits the voltage at pin 15.

IC103 provides protection in the event of a fault in the regulation loop. In open-circuit case pin 3 is going positive by means of an internal current source and the duty-cycle is reduced to near zero.

In short-circuit case pin 3 is pulled down to 0V. If the voltage is below 0.6V at pin 3 the duty-cycle is reduced to approx. 15%. If fuse F703 is removed the regulation loop will react as it was short-circuited and the duty-cycle is at the reduced value and not at the maximum attainable.

Output voltage of PU I is adjusted with R154 and is led to pin 3 to regulate the duty-cycle. C127, R155 and R157 stabilize the regulation loop. If output voltage should come over 24V, the zener diode D118 will conduct and the voltage over R148 will try to shot down the PU I. Only the 22V output is regulated. The other two outputs follow the regulation of the 22V.

The transistors T113 and T114 work as switch for -45V output and is controlled by the 8V to the receiver. The relays RE103, RE104 and RE105 which switch on the output voltages to the rack are controlled by the switches in the rack H1235.

N1409

3.5. POWER UNIT II

When transmitter is keyed the relay RE101 switches on. The antenna tuner AT1500 gets 22V supply via J101 pin 7. The voltage at IC101 pin 6 and pin 7 is determined by R106, R105 and R104. These inputs form an over- and undervoltage protection. If TR701 is connected for 240V AC, "overvoltage" shot down occurs at approx. 265V AC mains input. If TR701 is connected for 220V AC, "undervoltage" shot down occurs at approx. 180V AC mains input.

Switching on PU II means that transistor T101 is turned off and C107 can be charged by IC101 and create a soft start function at pin 15 to limit the peak current in the switch transistors and the output diodes.

The IC101 has two outputs, pin 12 and pin 13, working as push-pull and are active low. The switch frequency is 20 kHz, but the frequency of the internal sawtooth oscillator is 40 kHz, determined by R110 and C108. The ramp of the sawtooth oscillator is determined by R103 and C106. The duty-cycle is limited to approx. 45 % by means of R107 and R108. Regulation of the duty-cycle is also on pin 4. The regulation signal to control the output current and voltage is created in IC105.

Voltage supply for IC101 and IC105 is regulated by R101 and D101.

Explanation of one of the switch circuits: The pulse from IC101 pin 12 turns on T107, which by means of TR102, D111, C116, and D112 turns on the switch transistor T702. When C116 is charged the current flows through R128 back to TR102. To turn off T702, TR102 reverses polarity. The voltage over C116 will through R128 turn on T109 and the negative voltage of C116 is then through T109 connected to the base of T702 which is turned off. During the off-period, T702 is always reverse biased. The "baker clamp" diodes D111 and D402 prevent T702 from saturating and this makes it switch faster. The resistor R139 and the capacitors C134, R405 and C402 prevent unwanted oscillations and voltage transients. The other switch circuit around T701 works in the same way.

The transformer TR702 is connected in a symmetrical half bridge configuration and is hanged up in the middle of the rectified mains. If T701 is off and T702 is on, the current flows through C403 - C407 and in the primary of TR702 and through T702. Next period T702 is off and T701 is on. The current now flows in the opposite direction, through T701, TR702 and C408 - C412.

The output voltage is rectified in D704. The choke L702 is an energy reservoir. Together with C206 - C211 it is smoothing the output current.

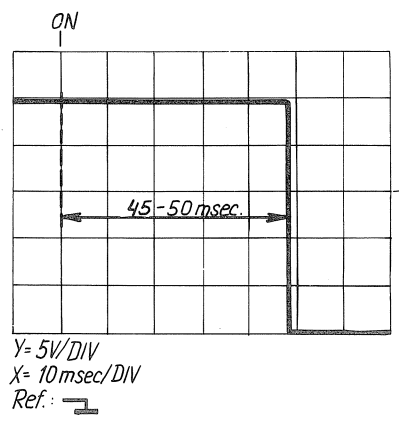
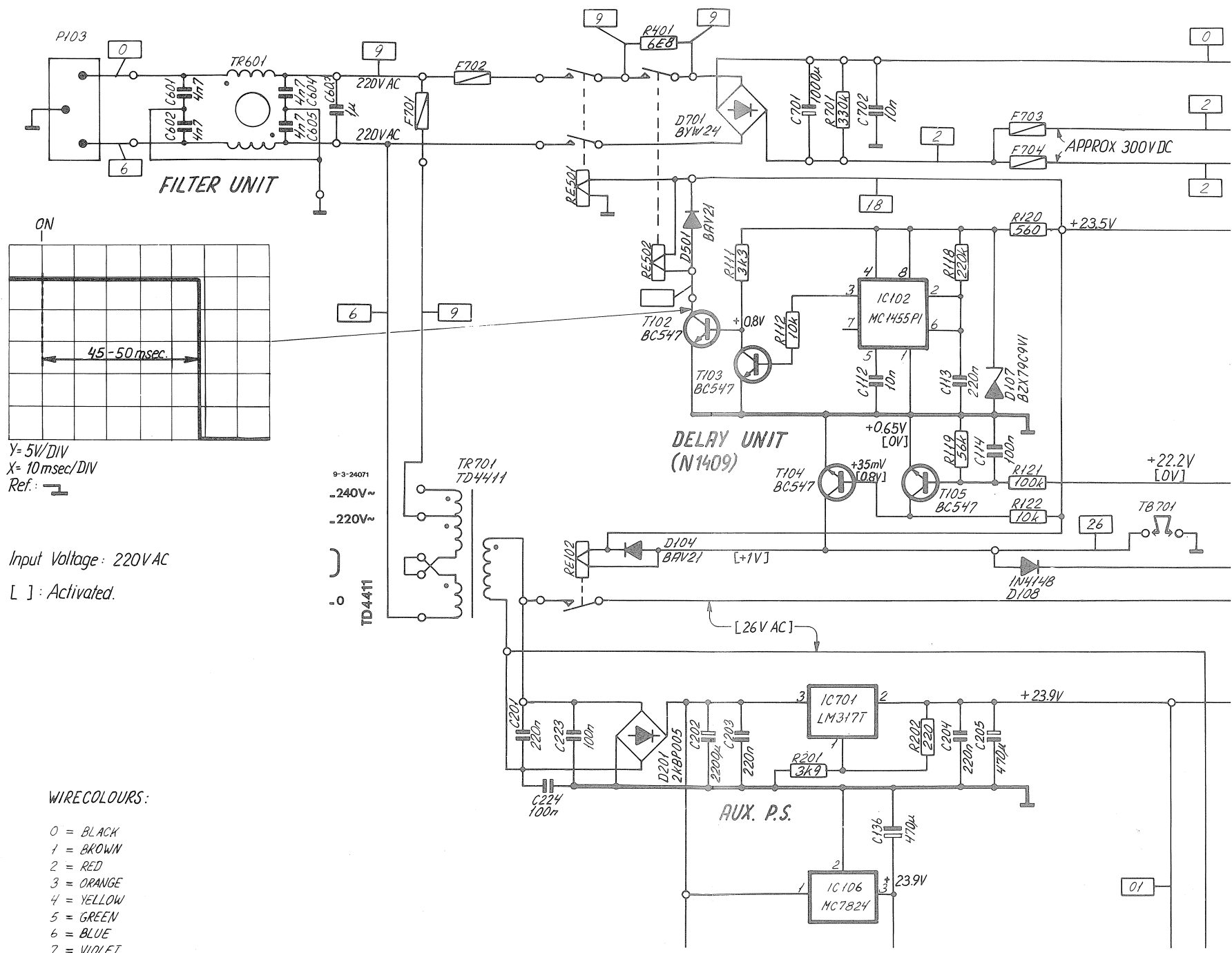
The output voltage of 38V is regulated by IC105b. The reference voltage is taken from D121. Adjustment is done with R169. If the output voltage increases, pin 7 will go low and pull down IC101 pin 4, which reduces the duty-cycle and with it the output voltage. R172 has to be connected to ground to get 38V. For supply reduction to the transmitter, R172 is released from ground and the output voltage is approx. 30V.

A current limiter is performed by IC105a. R206 is the current sense and is made of a konstantan wire. If current comes over the level determined by R133, the output pin 1 goes low and turns on T112, which again pulls down the reference voltage for IC105b. This means that the output voltage to the transmitter will be reduced. D120 protects T112 while its base voltage is high.

POWER UNIT 2 cont.:

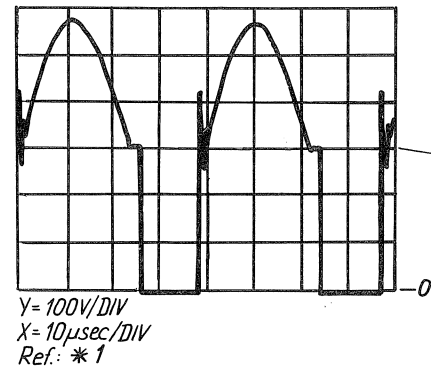
The current limiter is made slow with C125 to prevent variation from the modulation of the transmitter. It cannot protect the output transistors or diodes against short circuit of the output.

The 28V output is regulated by IC104 and is adjusted with R165. Transistor T704 turns on and the current flows through L202 to C217 and load. The voltage increases at pin 4 and IC104 turns off T704. The current flows continuously into L202 and back through D206. The voltage will decrease at pin 4 and IC104 turns on T704 again. The regulator is then self oscillating. R208 forms a current limiter.



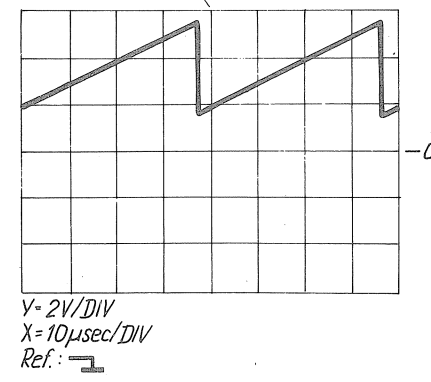
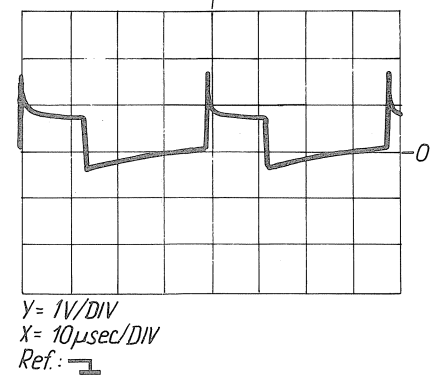
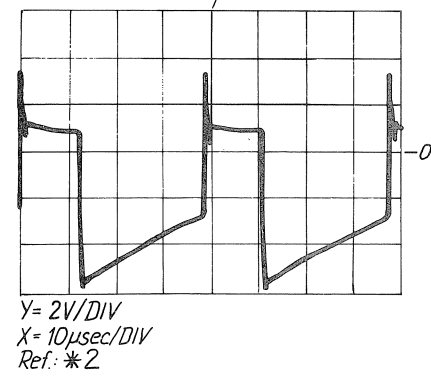
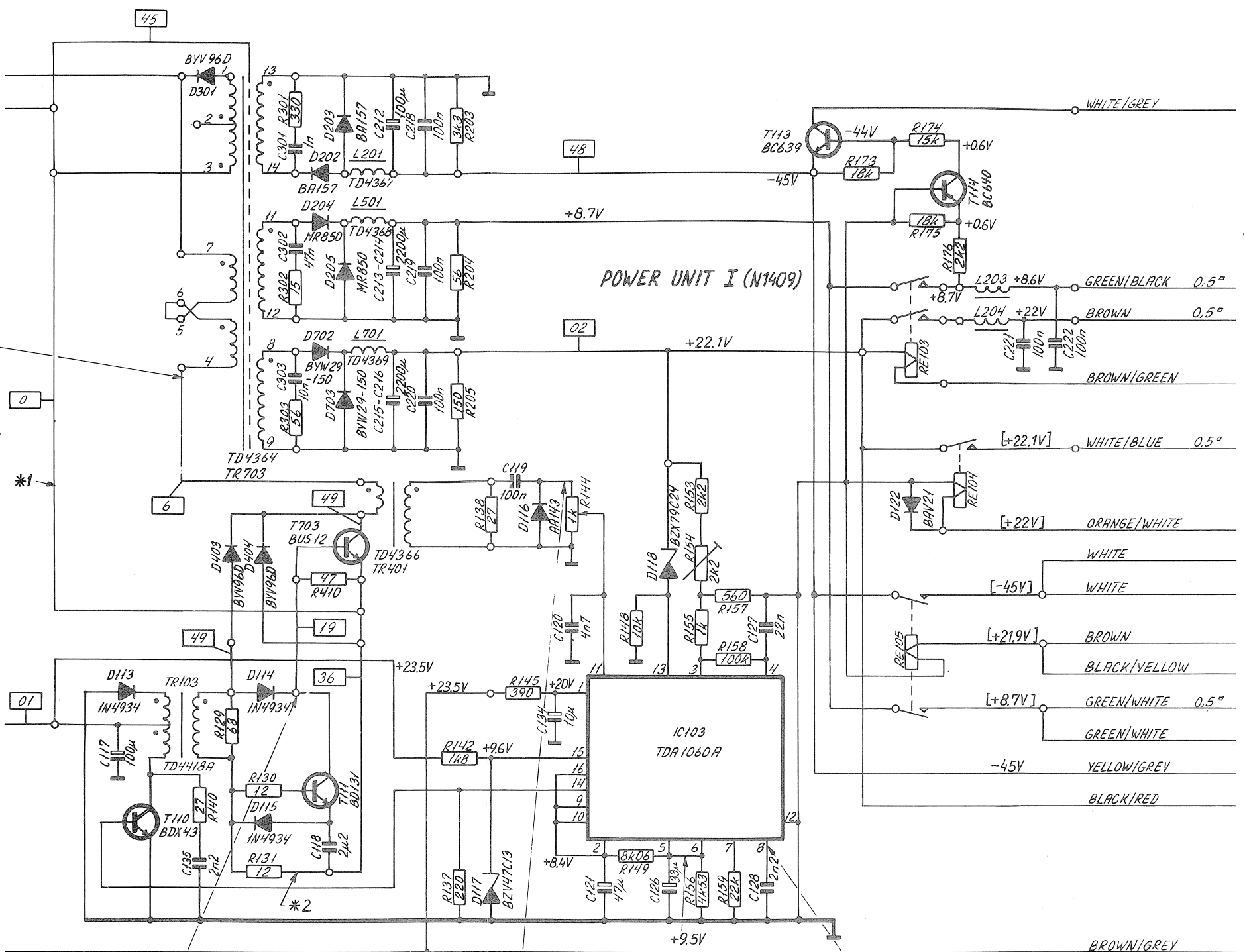
Input Voltage: 220V AC
[] : Activated.

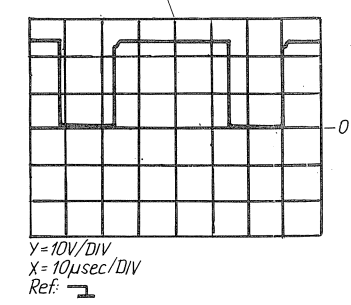
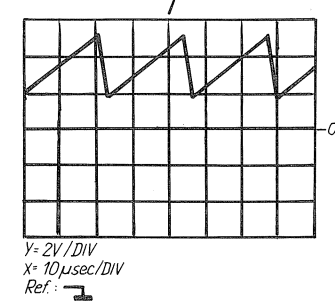
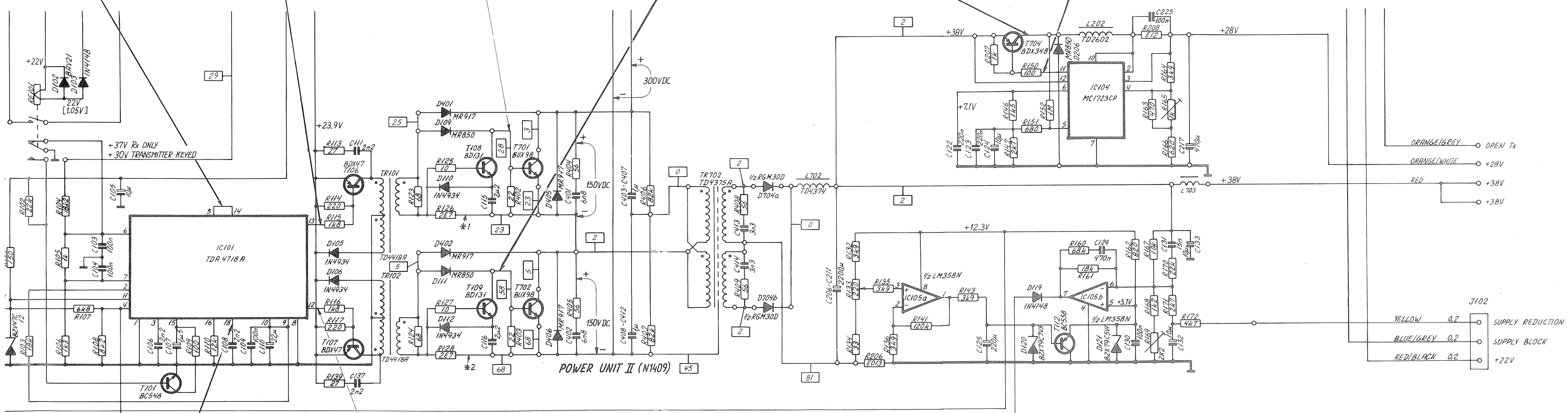
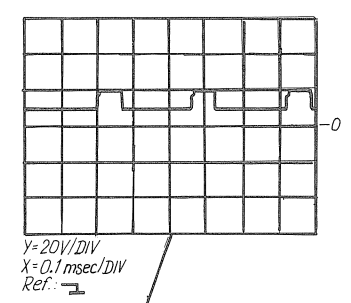
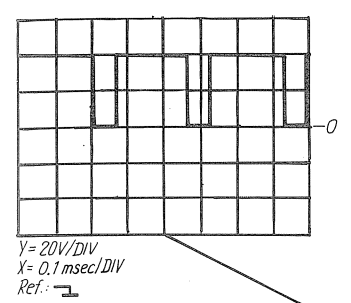
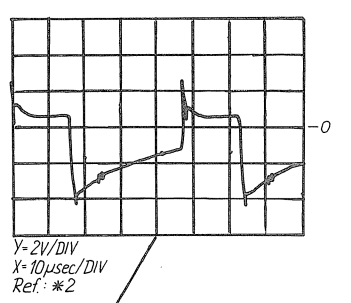
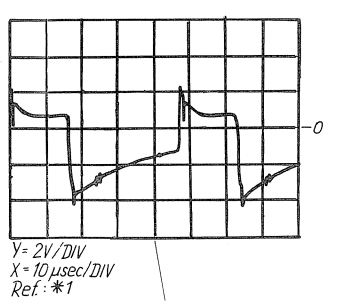
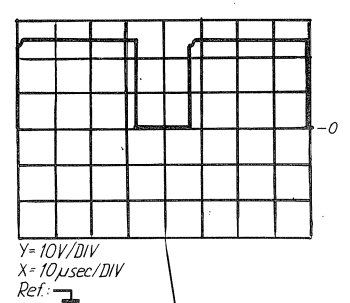
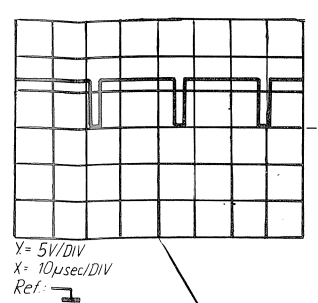
- WIRE COLOURS:
- 0 = BLACK
 - 1 = BROWN
 - 2 = RED
 - 3 = ORANGE
 - 4 = YELLOW
 - 5 = GREEN
 - 6 = BLUE
 - 7 = VIOLET
 - 8 = GREY
 - 9 = WHITE



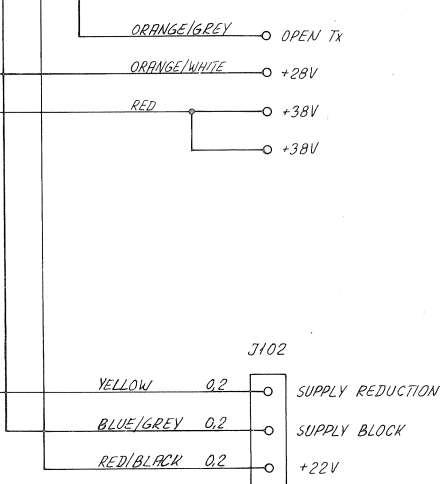
Input voltage : 220V AC

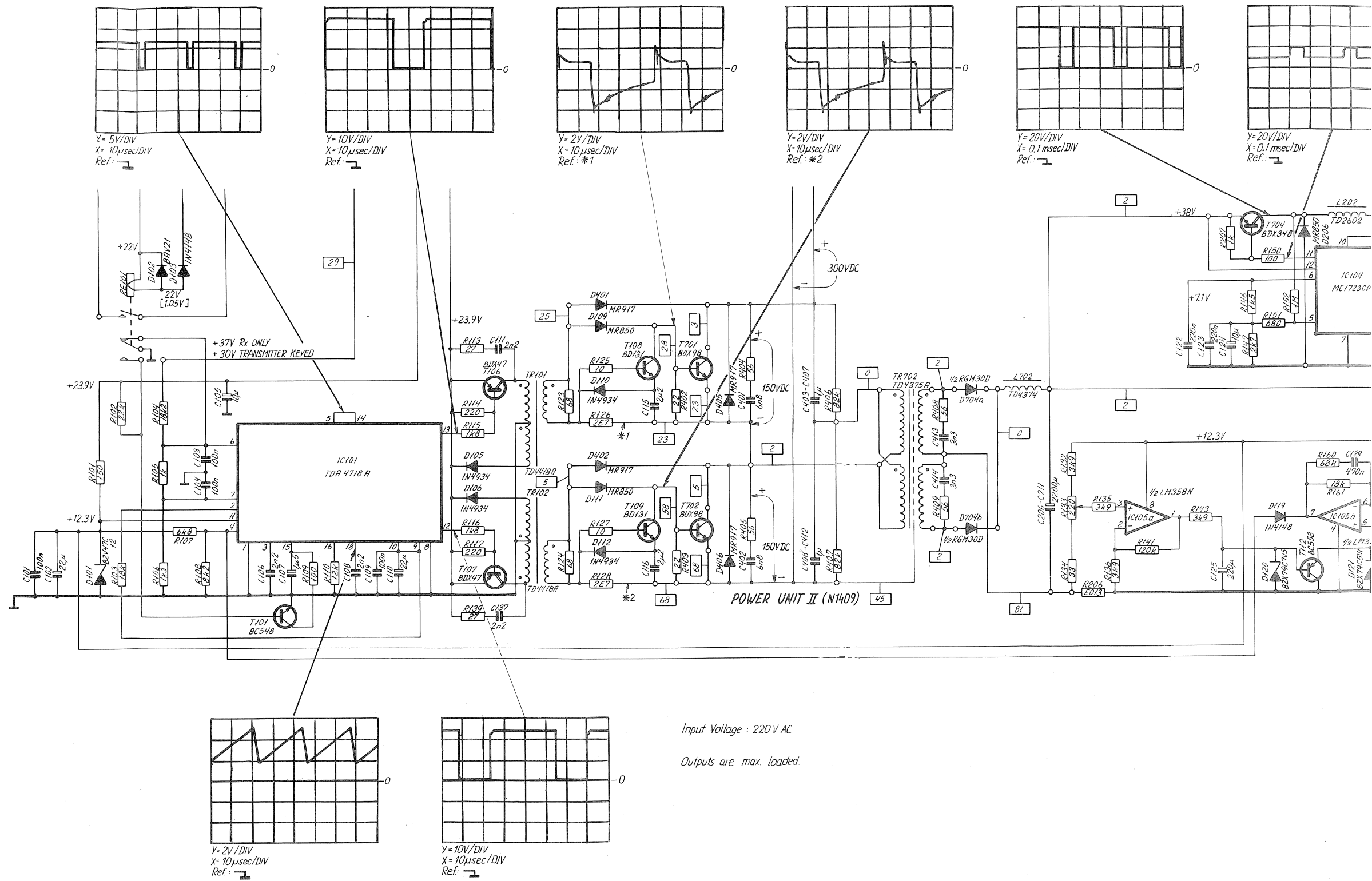
Outputs are max. loaded.





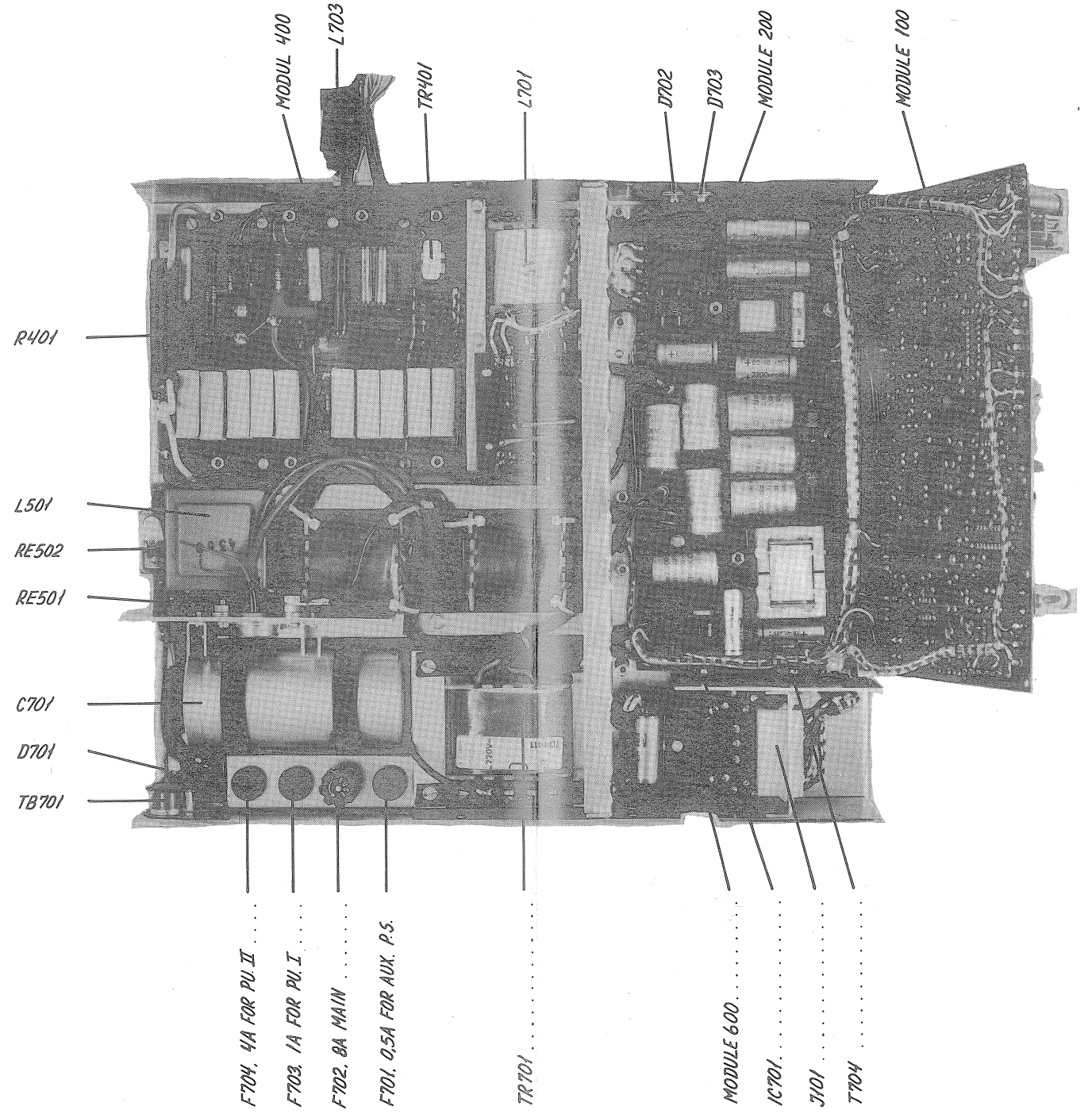
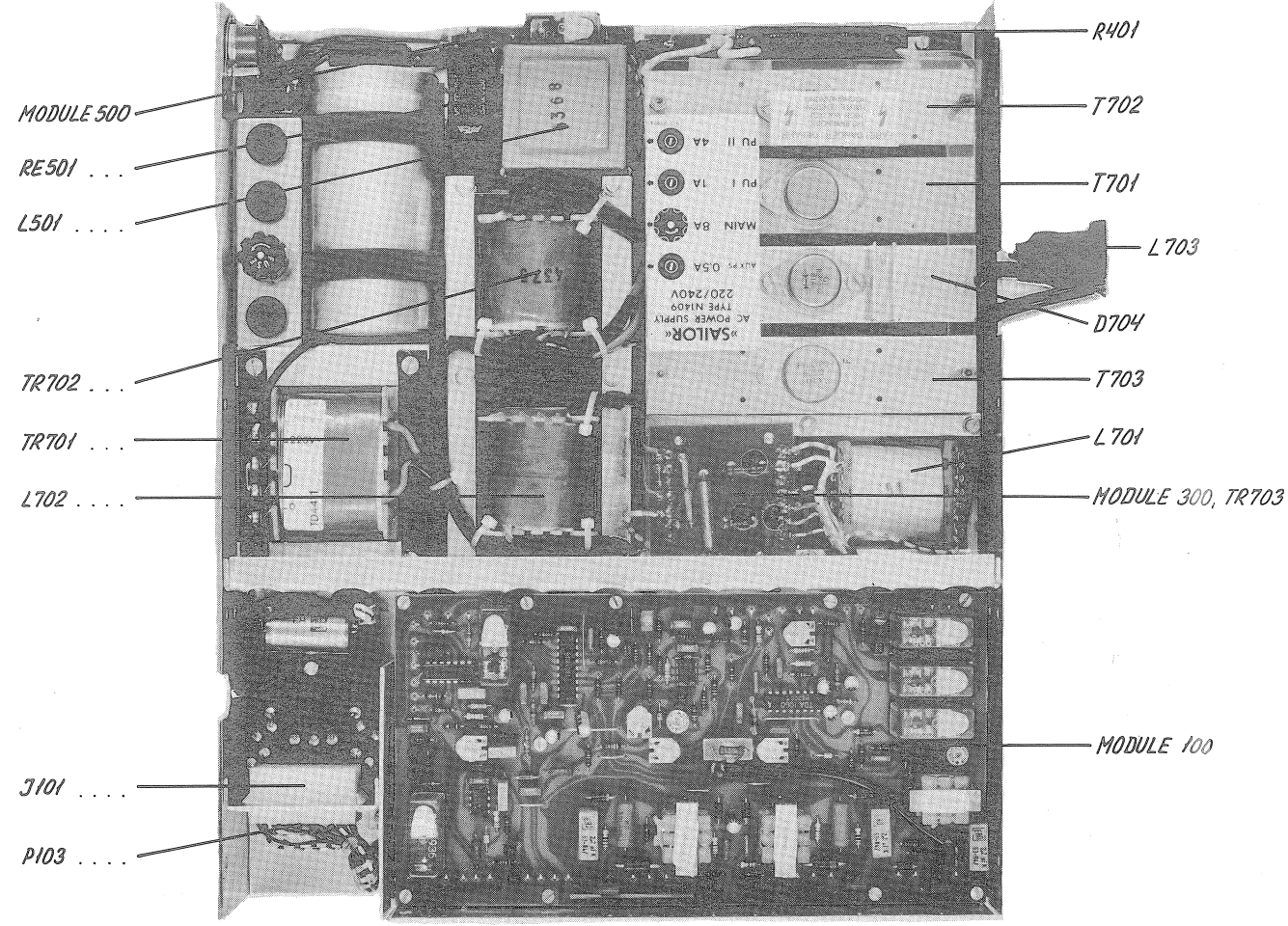
Input Voltage : 220 V AC
Outputs are max. loaded.





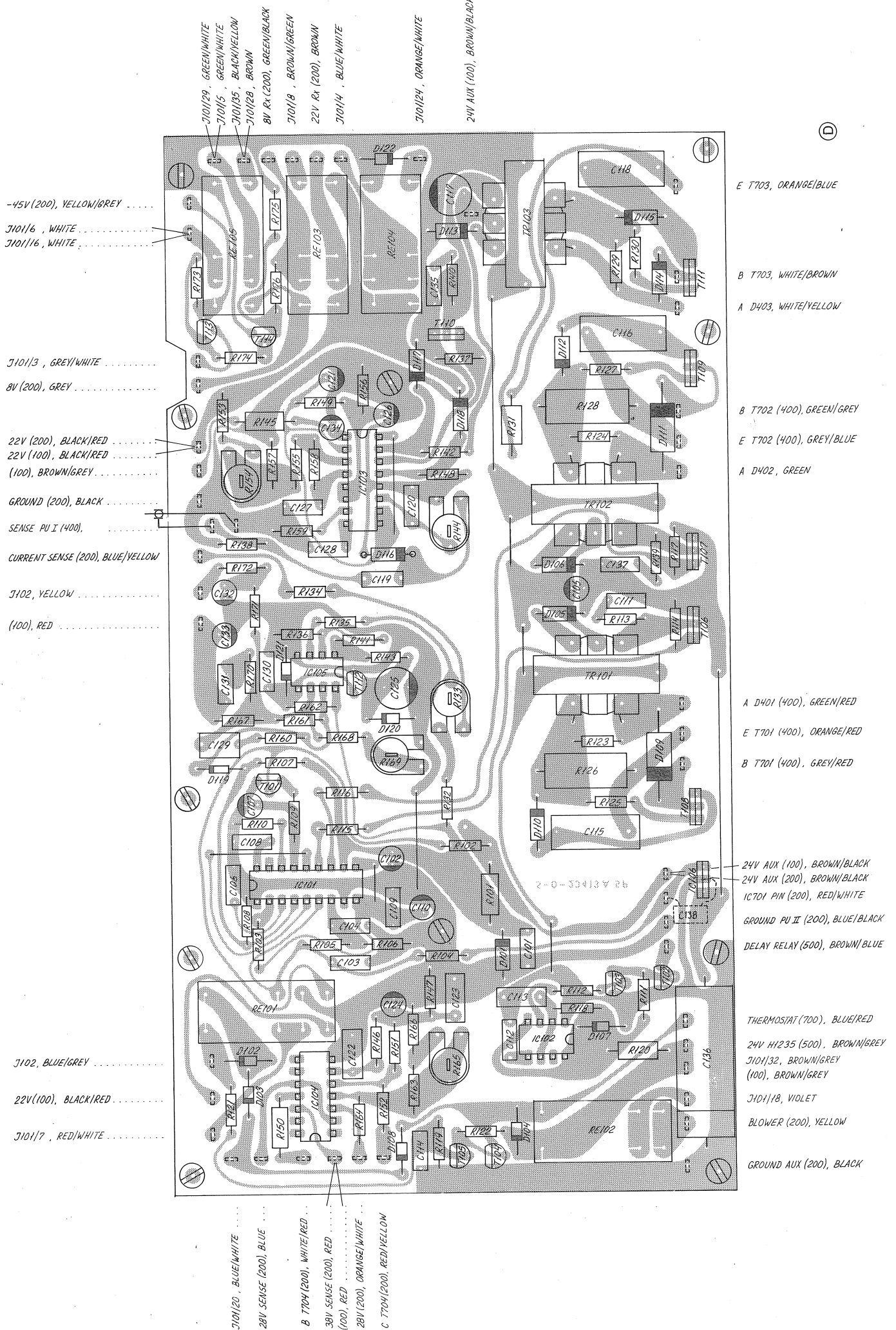
CONTENTS:

- 4. COMPONENT LOCATIONS
 - 4.1. POWER SUPPLY CONTROL UNIT (MODULE 100)
 - 4.2. FILTER BOARD AND AUX. P.S. (MODULE 200)
 - 4.3. CONNECTION BOARD I (MODULE 300)
 - 4.4. CONNECTION BOARD II (MODULE 400)
 - 4.5. INPUT RELAYS (MODULE 500)
 - 4.6. MAINS FILTER (MODULE 600)
 - 4.7. AC LINE FILTER
 - 4.8. TOP VIEW
 - 4.9. DISASSEMBLING FROM T1130
 - 4.10. MAIN DIAGRAM

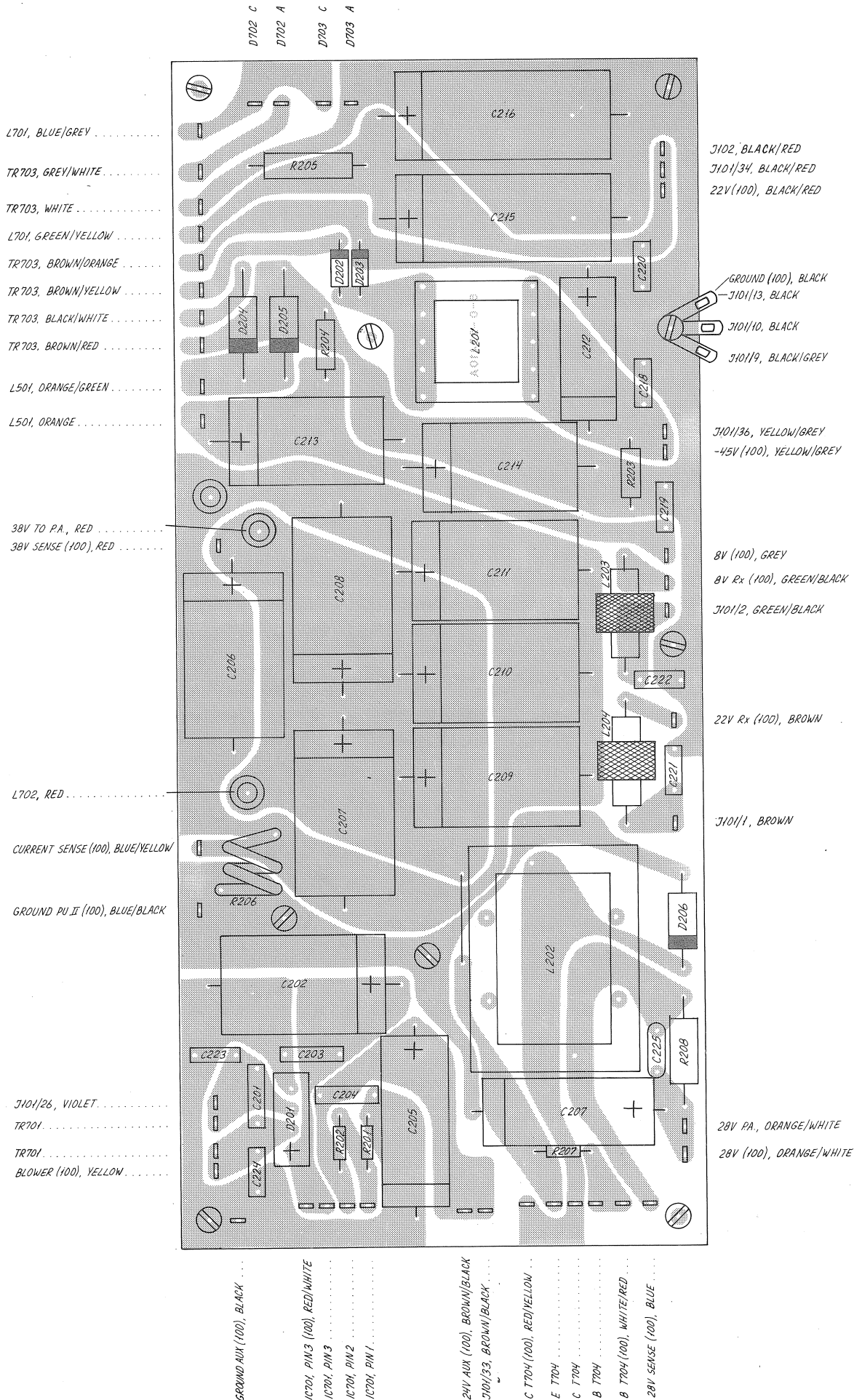


4.1. POWER SUPPLY CONTROL UNIT MODULE 100

NI409
4-6-23413D

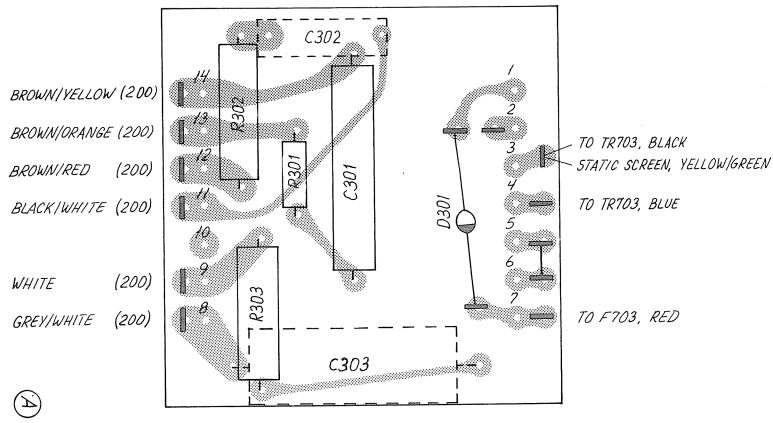


4.2. FILTER BOARD AND AUX. P.S. MODULE 200

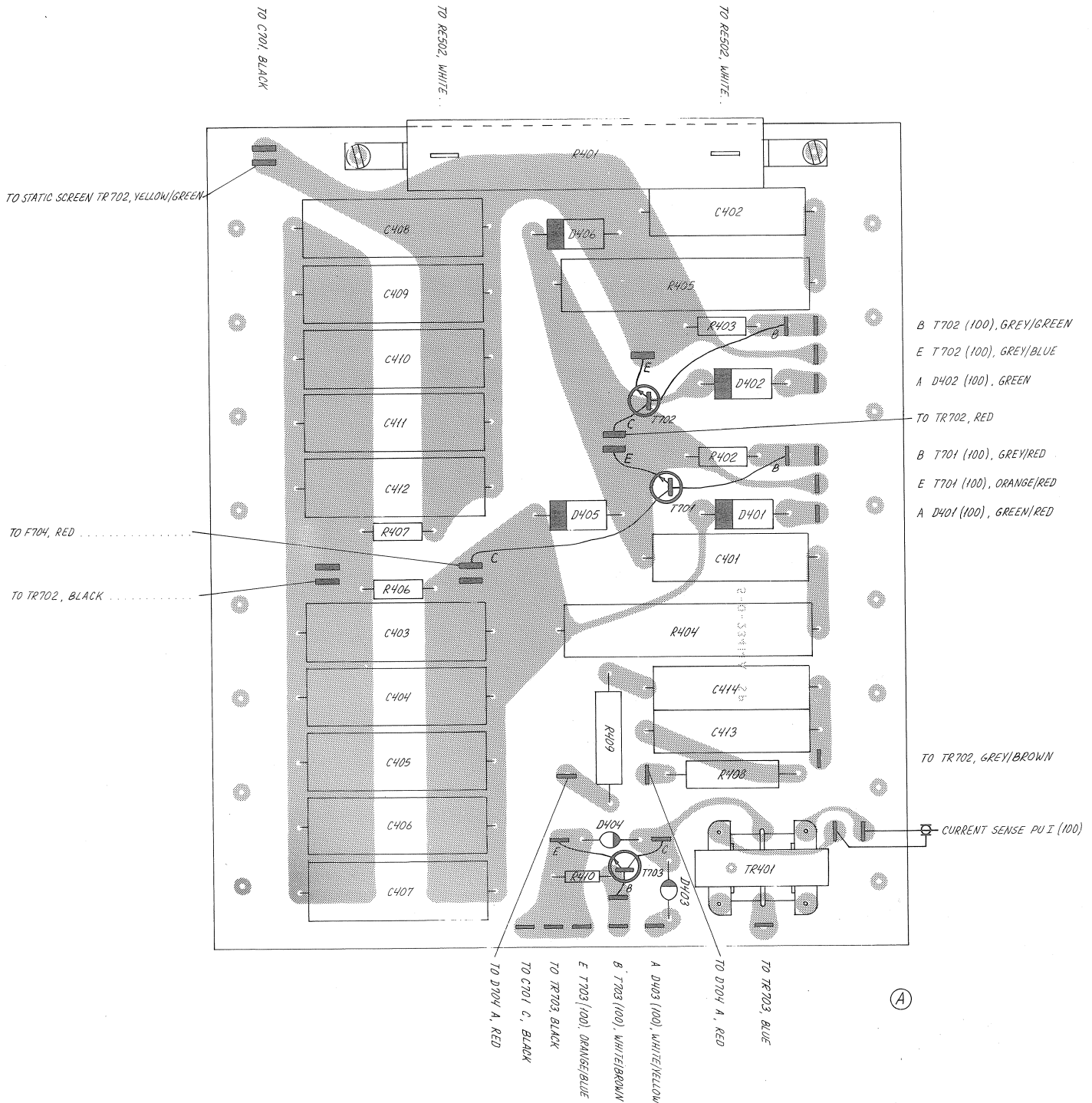


N1409 4-6-23410

4.3. CONNECTION BOARD I MODULE 300

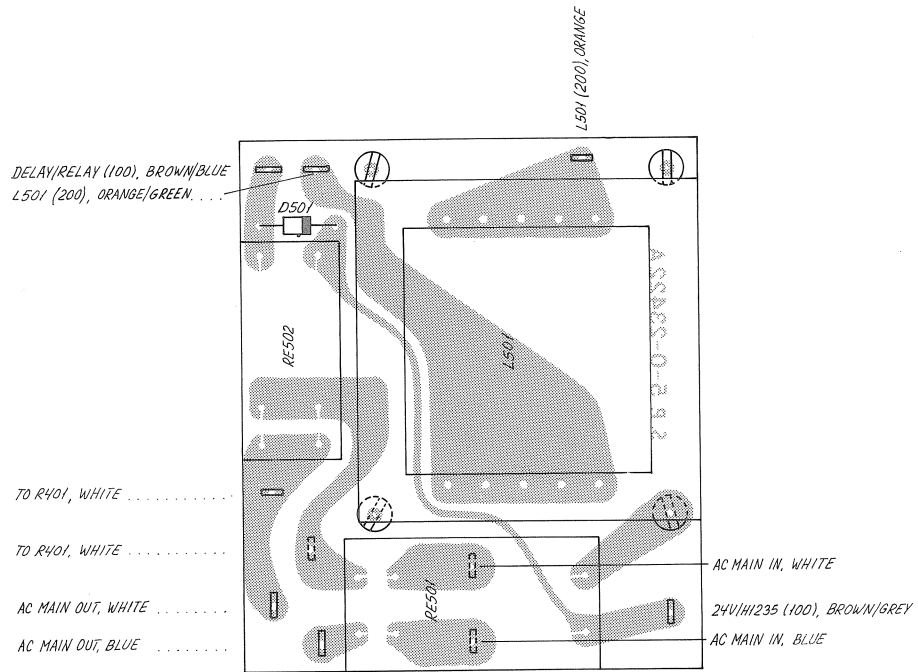


4.4. CONNECTION BOARD II MODULE 400

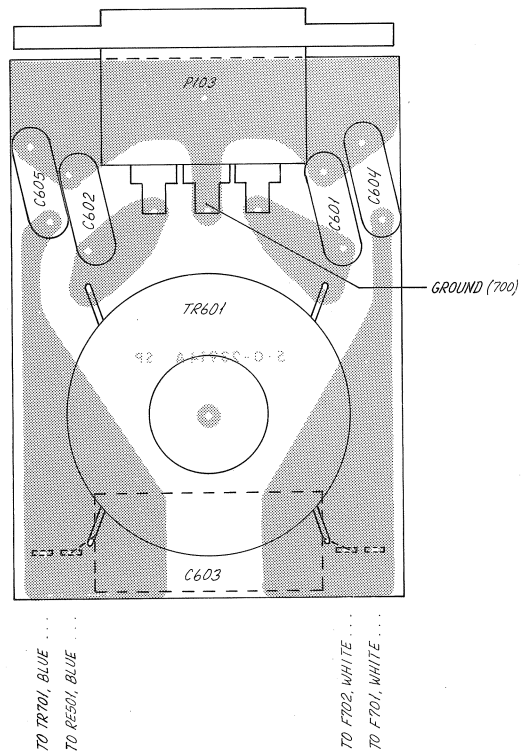


N1409 4-6-23820A/4-6-234 14A

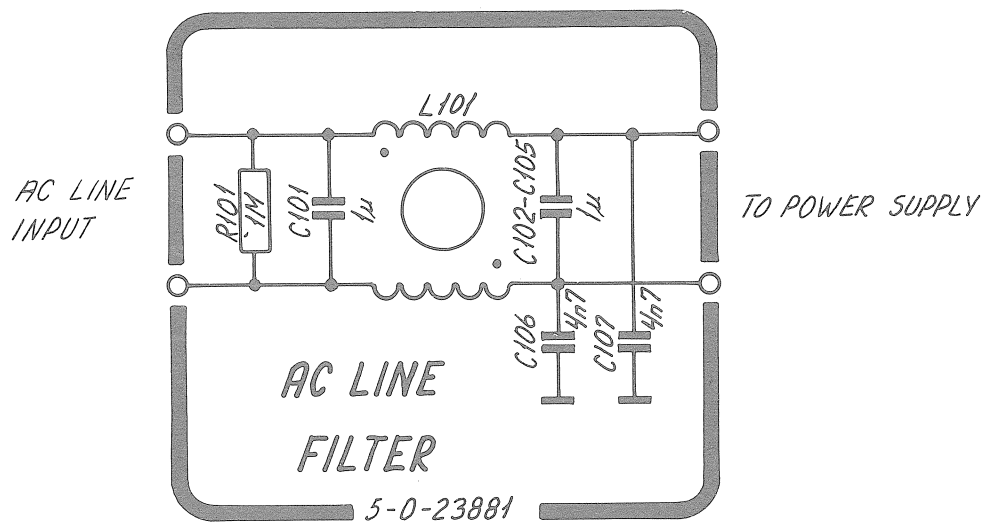
4.5. INPUT RELAYS MODULE 500



4.6. MAINS FILTER MODULE 600



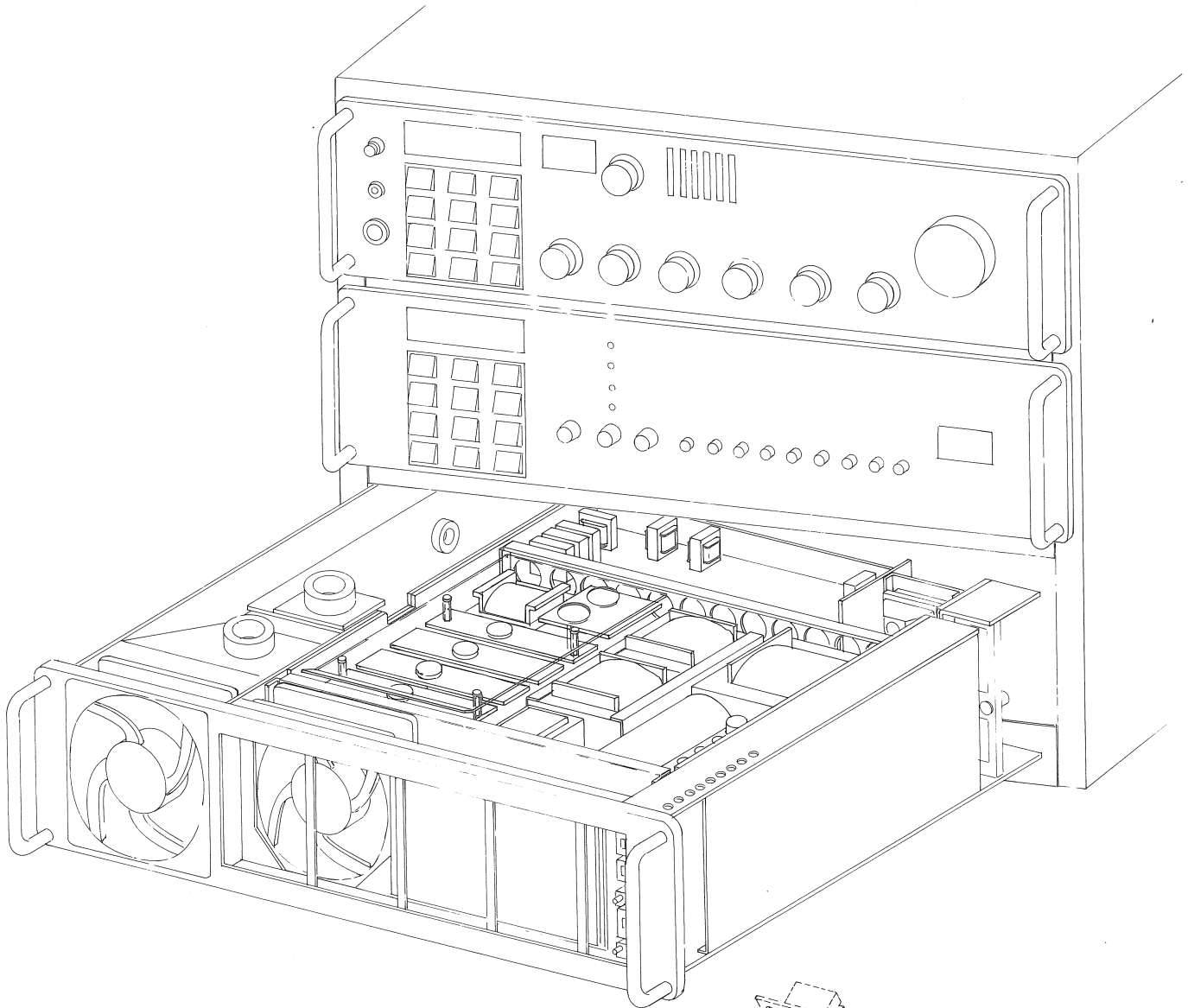
N1409 - U8/86



POSITION	DESCRIPTION	MANUFACTURER	TYPE	S.P. NUMB	
	AC LINE FILTER	FOR N1409	ESPERA	PRINT NR 5-0-23881	608521
C101	CAPACITOR POLYESTER	1μF 10% 250V AC	*ERO	F1772	11.043
C102	CAPACITOR POLYESTER	1μF 10% 250V AC	*ERO	F1772	11.043
C103	CAPACITOR POLYESTER	1μF 10% 250V AC	*LRO	F1772	11.043
C104	CAPACITOR POLYESTER	1μF 10% 250V AC	*ERO	F1772	11.043
C105	CAPACITOR POLYESTER	1μF 10% 250V AC	*ERO	F1772	11.043
C106	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
C107	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
L101	COIL	TL382	BB	T6.6-0-25900	400382
R101	RESISTOR	1 MOHM 5% 0.33W	PHILIPS	2322 181 53105	01.275

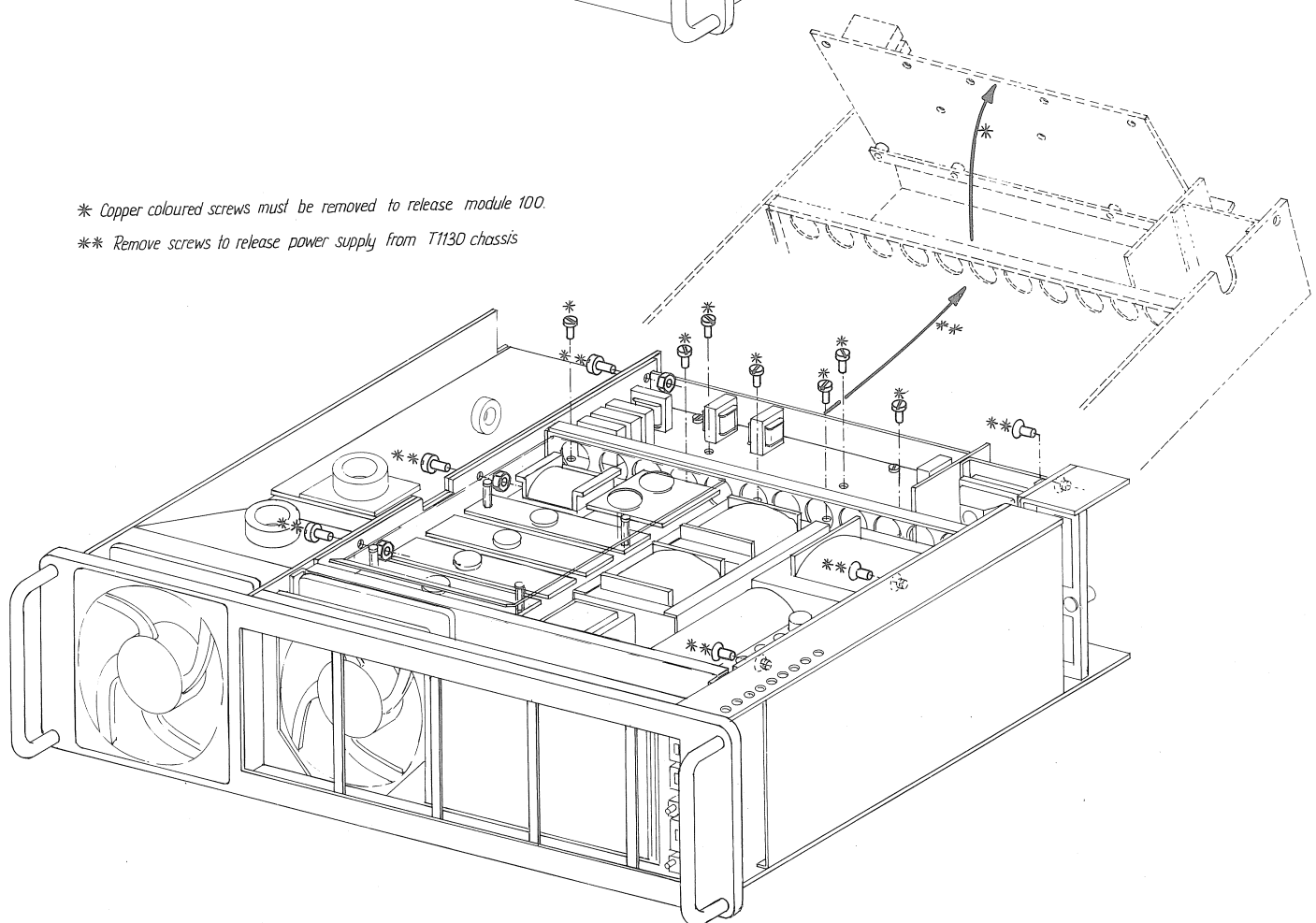
AC LINE FILTER N1409

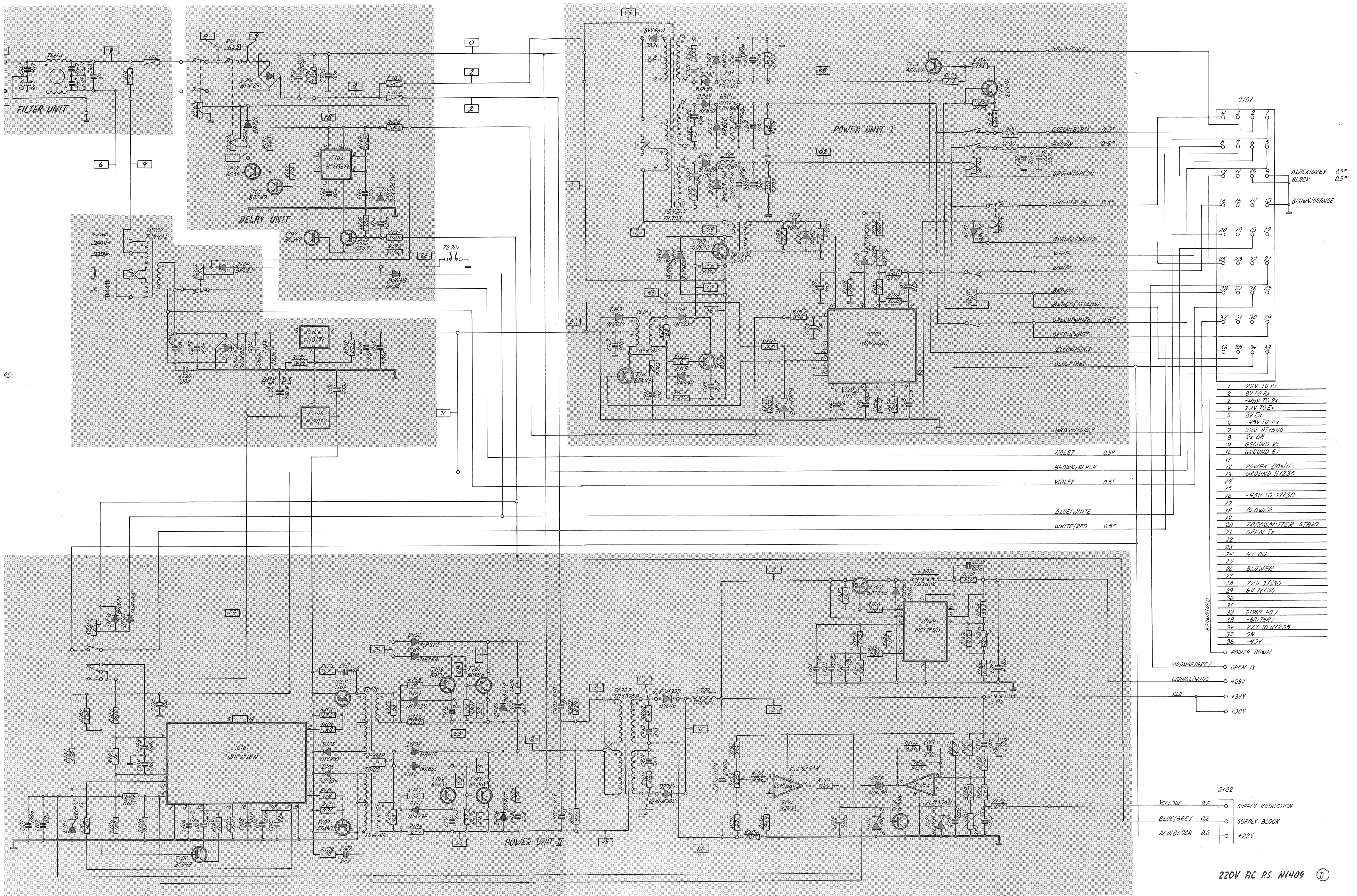
4.9. DISASSEMBLING FROM T1130



NI1409 4-0-24977 4-0-24978

- * Copper coloured screws must be removed to release module 100.
- ** Remove screws to release power supply from T1130 chassis

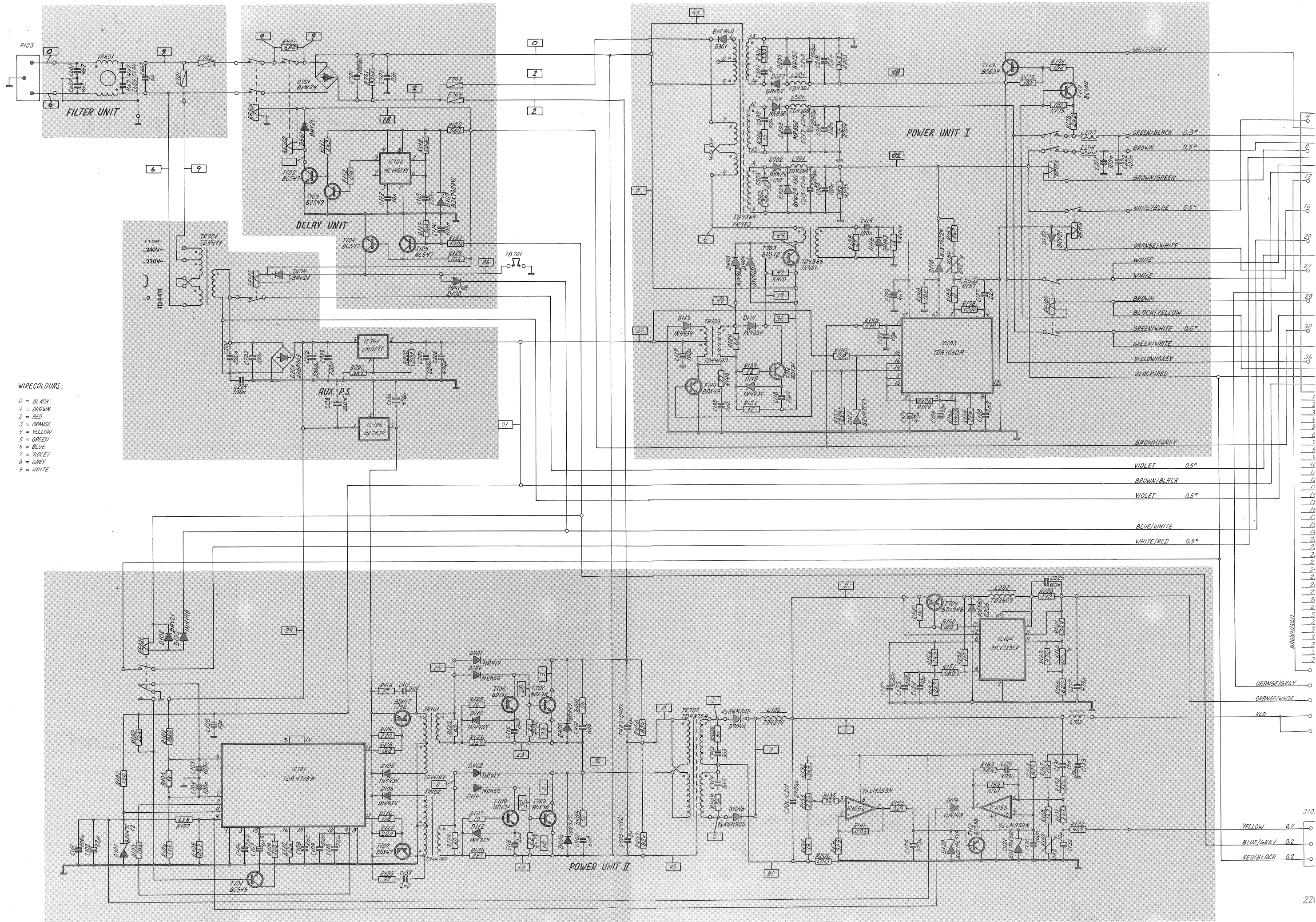




- 1 22V TO Rx
- 2 8V TO Rx
- 3 -45V TO Rx
- 4 22V TO Ex
- 5 8V Ex
- 6 -45V TO Ex
- 7 22V RT1500
- 8 Rx ON
- 9 GROUND Rx
- 10 GROUND Ex
- 11
- 12 POWER DOWN
- 13 GROUND H1235
- 14
- 15
- 16 -45V TO T113D
- 17
- 18 BLOWER
- 19
- 20 TRANSMITTER START
- 21 OPEN Tx
- 22
- 23
- 24 HT ON
- 25
- 26 BLOWER
- 27
- 28 22V T113D
- 29 8V T113D
- 30
- 31
- 32 START PUL I
- 33 +BATTERY
- 34 22V TO H1235
- 35 ON
- 36 -45V
- POWER DOWN

- ORANGE/GREY ○ OPEN Tx
 - ORANGE/WHITE ○ +28V
 - RED ○ +38V
 - +38V
- J102**
- YELLOW 0.2 ○ SUPPLY REDUCTION
 - BLUE/GREY 0.2 ○ SUPPLY BLOCK
 - RED/BLACK 0.2 ○ +22V

4.10. MAIN SCHEMATIC DIAGRAM N1409



CONTENTS:

5. PART LISTS

POSITION	DESCRIPTION	MANUFACTOR	TYPE	S.P.NUMBER
	AC POWER SUPPLY f T1130	N1409	ESPERA	AC POWER SUPPLY f T1130 808476
100	POWER SUPPLY CONT. N1409	MODULE 1/100	ESPERA	5-0-23413B 608532
200	FILTER & AUX. P.S. N1409	MODULE 2/200	ESPERA	5-0-23410D 608531
				N1409
300	CONNECTION BOARD I N1409	MODULE 3/300	ESPERA	5-0-23819A 608515
400	CONNECTION BOARD II N1409	MODULE 4/400	ESPERA	5-0-23414A 608530
500	INPUT RELAYS N1409	MODULE 5/500	ESPERA	5-0-23422A 608519
600	MAINS FILTER N1409	MODULE 6/600	ESPERA	5-0-23914C 608520
C701	CAPACITOR ELECTROLYTIC	1000uF 350V IS	FRAKO	EKBC IS 14.795
C702	CAPACITOR POLYESTER	10nF 10% 1500V	ERO	KP1832 13.300
D701	DIODE BRIDGE	400V/25A	MOTOROLA	MDA2504 27.113
D702	DIODE	BYW29-150	PHILIPS	BYW29-150 27.120
D703	DIODE	BYW29-150	PHILIPS	BYW29-150 27.120
D704	DIODE FAST RECOVERY	2x30A/200VDC	GI	RP 30 DM 27.775
F701	FUSE	0.5A T 05x20mm	ELU	17912000500 45.504
F702	FUSE	8A M 6.3x32	WICKMANN	314008 45.628
F703	FUSE	1AT 250V 5x20mm	ELU	179 120 1AT 45.506
F704	FUSE	4A T 05x20mm	ELU	17912004000 45.573
IC701	VOLTAGE REGULATOR	ADJUSTABLE 1.5A	NATIONAL*	LM317T 31.055
L701	COIL	TD4369	TRADANIA	TD4369 22.162
L702	COIL	TD4374	TRADANIA	TD4374 22.163
L703				COMPLETE CHOKE TL383 700383
				N1407/N1409
R701	RESISTOR MF	330k OHM 1% 0.6W	PHILIPS	2322 156 13304 03.270
T701	TRANSISTOR	BUX98	THOMSON-CSF	BUX98 29.220
T702	TRANSISTOR	BUX98	THOMSON-CSF	BUX98 29.220
T703	TRANSISTOR	BUS12	PHILIPS	BUS12 29.202
T704	TRANSISTOR	BDX34B	MOTOROLA	BDX34B 29.105
TB701	THERMAL BREAKER	ON:55 OFF:40	* COMEPA	25 0 98 21 055 040 44.010
				MARKED 923
TR701	TRAFO	TD4411	TRADANIA	TD4411 22.154
TR702	TRANSFORMER	TD4375A	TRADANIA	TD4375A 22.164
TR703	TRANSFORMER	TD4364	TRADANIA	TD4364 22.167

POSITION	DESCRIPTION	MANUFACTOR	TYPE	S.P.NUMBER
	POWER SUPPLY CONT. N1409	MODULE 1/100	ESPERA	5-0-23413B 608532
C101	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C102	CAPACITOR ELECTROLYTIC	22uF 20% 25VDC	ERO	EKI 00 AA 222 E M9 14.514
C103	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C104	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C105	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ERO	EKI 00 AA 210 F M9 14.512
C106	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C107	CAPACITOR ELECTROLYTIC	1.5uF 20% 50VDC	ERO	EKI 00 AA 115 H M9 14.507
C108	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C109	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C110	CAPACITOR ELECTROLYTIC	22uF 20% 25VDC	ERO	EKI 00 AA 222 E M9 14.514
C111	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C112	CAPACITOR MKT	10nF 5% 250V	ERO	MKT1818-310/254 11.167
C113	CAPACITOR MKT	0.22uF 10% 63V	ERO*	MKT1818 11.090
C114	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C115	CAPACITOR POLYESTER	2.2uF 10% 63V	ERO	MKT1822 11.140
C116	CAPACITOR POLYESTER	2.2uF 10% 63V	ERO	MKT1822 11.140
C117	CAPACITOR ELECTROLYTIC	100uF -10/+50% 25VDC	ERO	EKM 00 CC 310 E G5 14.610
C118	CAPACITOR POLYESTER	2.2uF 10% 63V	ERO	MKT1822 11.140
C119	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C120	CAPACITOR MKT	4.7nF 10% 400V	SIEMENS	B32510-D6472-K000 11.373
C121	CAPACITOR ELECTROLYTIC	47uF 20% 10VDC	ERO	EKI 00 AA 147 C M9 14.522
C122	CAPACITOR MKT	0.22uF 10% 63V	ERO*	MKT1818 11.090
C123	CAPACITOR MKT	0.22uF 10% 63V	ERO*	MKT1818 11.090
C124	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ERO	EKI 00 AA 210 F M9 14.512
C125	CAPACITOR ELECTROLYTIC	220uF -10/+50% 10VDC	ERO	EKM 00 CC 322 C G5 14.630
C126	CAPACITOR ELECTROLYTIC	33uF 20% 16VDC	ERO*	EKI 00 AA 233 D M9 14.518
C127	CAPACITOR MKT	22nF 10% 250V	SIEMENS	B32510-D3223-K000 11.297
C128	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C129	CAPACITOR MKT	470nF 10% 100V	SIEMENS	B32510-D1474-K000 11.231
C130	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-G 11.180
C131	CAPACITOR MKT	15nF 5% 250V	ERO	MKT1818 11.170
C132	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ERO	EKI 00 AA 210 F M9 14.512
C133	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ERO	EKI 00 AA 210 F M9 14.512
C134	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ERO	EKI 00 AA 210 F M9 14.512
C135	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C136	CAPACITOR ELECTROLYTIC	470uF -10/+50% 40V	ERO	EB 00 HE 347 G 14.576
C137	CAPACITOR MKT	2.2nF 10% 400V	SIEMENS	B32510-D6222-K000 11.165
C138	CAPACITOR MKT	0.22uF 10% 63V	ERO*	MKT1818 11.090
D101	DIODE ZENER	12V	THOMSON-CSF	BZV47C12 26.750
D102	DIODE	BAV21	PHILIPS	BAV21 25.340
D103	DIODE	1N4148 HIGH SPEED	ITT	1N4148 25.131

POSITION	DESCRIPTION		MANUFACTURER	TYPE	S.P. NUMBER
D104	DIODE	BAV21	PHILIPS	CARTON BAV21	25.340
D105	DIODE	1N4934	MOTOROLA	1N4934	25.155
D106	DIODE	1N4934	MOTOROLA	1N4934	25.155
D107	DIODE ZENER	9.1V 5% 0.4W BZX79C9V1	PHILIPS	BZX79C9V1	26.546
D108	DIODE	1N4148 HIGH SPEED	ITT	1N4148 CARTON	25.131
D109	DIODE FAST RECOVERY	50V/3A Trr=150nS.	MOTOROLA	MR850	25.225
D110	DIODE	1N4934	MOTOROLA	1N4934	25.155
D111	DIODE FAST RECOVERY	50V/3A Trr=150nS.	MOTOROLA	MR850	25.225
D112	DIODE	1N4934	MOTOROLA	1N4934	25.155
D113	DIODE	1N4934	MOTOROLA	1N4934	25.155
D114	DIODE	1N4934	MOTOROLA	1N4934	25.155
D115	DIODE	1N4934	MOTOROLA	1N4934	25.155
D116	DIODE SCHOTTKY	BAT 43	THOMSON-CSF	BAT43	27.600
D117	DIODE ZENER	BZV47C13	THOMSON-CSF	BZV47C13	26.752
D118	DIODE ZENER	24V 5% 0.4W BZX79C24	PHILIPS	BZX79C24	26.572
D119	DIODE	1N4148 HIGH SPEED	ITT	1N4148 CARTON	25.131
D120	DIODE ZENER	7.5V 5% 0.4W	PHILIPS	BZX79C7V5	26.539
D121	DIODE ZENER	5.1V 5% 0.4W	PHILIPS	BZX79C5V1	26.527
D122	DIODE RECTIFIER	1N4002 100V/1A	ITT	1N4002 (03/04/05/06/07)	25.100
IC101	INTEGRATED CIRCUIT	TDA4718A	SIEMENS	TDA4718A	31.490
IC102	INTEGRATED CIRCUIT	MC1455P1	TEXAS*	NE 555 P	31.205
IC103	INTEGRATED CIRCUIT	TDA1060	PHILIPS	TDA1060	31.460
IC104	INTEGRATED CIRCUIT	MC1723 CP	NAT./SGS*	LM 723 CN	31.230
IC105	INTEGRATED CIRCUIT	LM358N	TEXAS*	LM358 P	31.100
IC106	INTEGRATED CIRCUIT	MC7824CT	MOTOROLA	MC7824CT	31.251
R101	RESISTOR	150 OHM 5% 1.6W	PHILIPS	2322 191 31501	04.179
R102	RESISTOR MF	22k OHM 5% 0.4W	* PHILIPS	2322 181 53223	01.233
R103	RESISTOR MF	18k OHM 5% 0.4W	* PHILIPS	2322 181 53183	01.231
R104	RESISTOR	18.2 KOHM 1% 0.4W	*PHILIPS	2322 156 11823	03.431
R105	RESISTOR	1 KOHM 1% 0.4W	*PHILIPS	2322 156 11002	03.395
R106	RESISTOR MF	1k3 OHM 1% 0.6W	* PHILIPS	2322 156 11302	03.402
R107	RESISTOR MF	6.8k OHM 5% 0.4W	* PHILIPS	2322 181 53682	01.220
R108	RESISTOR MF	8.2k OHM 5% 0.4W	* PHILIPS	2322 181 53822	01.222
R109	RESISTOR MF	100 OHM 5% 0.4W	* PHILIPS	2322 181 53101	01.175
R110	RESISTOR MF	12k OHM 5% 0.4W	* PHILIPS	2322 181 53123	01.227
R111	RESISTOR MF	3.3k OHM 5% 0.4W	* PHILIPS	2322 181 53332	01.212
R112	RESISTOR MF	10k OHM 5% 0.4W	* PHILIPS	2322 181 53103	01.225
R113	RESISTOR MF	27 OHM 5% 0.4W	* PHILIPS	2322 181 53279	01.160
R114	RESISTOR MF	220 OHM 5% 0.4W	* PHILIPS	2322 181 53221	02.162
R115	RESISTOR MF	1.8k OHM 5% 0.4W	* PHILIPS	2322 181 53182	01.206
R116	RESISTOR MF	1.8k OHM 5% 0.4W	* PHILIPS	2322 181 53182	01.206

POSITION	DESCRIPTION		MANUFACTURER	TYPE	S.P. NUMBER
R117	RESISTOR MF	220 OHM 5% 0.4W	* PHILIPS	2322 181 53221	02.162
R118	RESISTOR MF	220k OHM 5% 0.4W	* PHILIPS	2322 181 53224	01.258
R119	RESISTOR MF	56k OHM 5% 0.4W	* PHILIPS	2322 181 53563	01.243
R120	RESISTOR	560 OHM 5% 1.6W	PHILIPS	2322 191 35601	04.193
R121	RESISTOR MF	100k OHM 5% 0.4W	* PHILIPS	2322 181 53104	01.250
R122	RESISTOR MF	10k OHM 5% 0.4W	* PHILIPS	2322 181 53103	01.225
R123	RESISTOR MF	68 OHM 5% 0.4W	* PHILIPS	2322 181 53689	01.170
R124	RESISTOR MF	68 OHM 5% 0.4W	* PHILIPS	2322 181 53689	01.170
R125	RESISTOR MF	10 OHM 5% 0.4W	* PHILIPS	2322 181 53109	01.150
R126	RESISTOR	2.7 OHM 10% 5W	PHILIPS	2322 329 35278	05.735
R127	RESISTOR MF	10 OHM 5% 0.4W	* PHILIPS	2322 181 53109	01.150
R128	RESISTOR	2.7 OHM 10% 5W	PHILIPS	2322 329 35278	05.735
R129	RESISTOR MF	68 OHM 5% 0.4W	* PHILIPS	2322 181 53689	01.170
R130	RESISTOR MF	12 OHM 5% 0.4W	* PHILIPS	2322 181 53129	01.152
R131	RESISTOR	12 OHM 5% 1.6W	PHILIPS	2322 191 31209	04.136
R132	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R133	POTENTIOMETER TRIMMING	220 OHM 20% 0.3W	NOBLE	TM8-KV2-1S	07.780
R134	RESISTOR MF	33 OHM 5% 0.4W	* PHILIPS	2322 181 53339	01.162
R135	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R136	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R137	RESISTOR MF	220 OHM 5% 0.4W	* PHILIPS	2322 181 53221	02.162
R138	RESISTOR MF	27 OHM 5% 0.4W	* PHILIPS	2322 181 53279	01.160
R139	RESISTOR MF	27 OHM 5% 0.4W	* PHILIPS	2322 181 53279	01.160
R140	RESISTOR MF	27 OHM 5% 0.4W	* PHILIPS	2322 181 53279	01.160
R141	RESISTOR MF	120k OHM 5% 0.4W	* PHILIPS	2322 181 53124	01.252
R142	RESISTOR MF	1.8k OHM 5% 0.4W	* PHILIPS	2322 181 53182	01.206
R143	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R144	POTENTIOMETER TRIMMING	1 KOHM 20% 0.3W	NOBLE	TM8-KV2-1S	07.784
R145	RESISTOR	390 OHM 5% 1.6W	PHILIPS	2322 191 33901	04.189
R146	RESISTOR MF	1k5 OHM 5% 0.4W	* PHILIPS	2322 181 53152	01.204
R147	RESISTOR MF	2.7k OHM 5% 0.4W	* PHILIPS	2322 181 53272	01.210
R148	RESISTOR MF	10k OHM 5% 0.4W	* PHILIPS	2322 181 53103	01.225
R149	RESISTOR	8.06 KOHM 1% 0.4W	*PHILIPS	2322 156 18062	03.422
R150	RESISTOR	100 OHM 5% 1.6W	PHILIPS	2322 191 31001	04.175
R151	RESISTOR MF	680 OHM 5% 0.4W	PHILIPS	2322 181 53681	01.195
R152	RESISTOR MF	1M OHM 5% 0.4W	* PHILIPS	2322 181 53105	01.275
R153	RESISTOR MF	2.2k OHM 5% 0.4W	* PHILIPS	2322 181 53222	01.208
R154	POTENTIOMETER TRIMMING	2.2 KOHM 20% 0.3W	NOBLE	TM8-KV2-1S	07.786
R155	RESISTOR MF	1k OHM 5% 0.4W	* PHILIPS	2322 181 53102	02.200
R156	RESISTOR	4.53 KOHM 1% 0.4W	*PHILIPS	2322 156 14532	03.417
R157	RESISTOR MF	560 OHM 5% 0.4W	* PHILIPS	2322 181 53561	01.193
R158	RESISTOR MF	100k OHM 5% 0.4W	* PHILIPS	2322 181 53104	01.250
R159	RESISTOR MF	22k OHM 5% 0.4W	* PHILIPS	2322 181 53223	01.233
R160	RESISTOR MF	68k OHM 5% 0.4W	* PHILIPS	2322 181 53683	01.245

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P. NUMBER
R161	RESISTOR MF	18k OHM 5% 0.4W	* PHILIPS	2322 181 53183	01.231
R162	RESISTOR MF	820 OHM 5% 0.4W	PHILIPS	2322 181 53821	01.197
R163	RESISTOR MF	470 OHM 5% 0.4W	* PHILIPS	2322 181 53471	01.191
R164	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R165	POTENTIOMETER TRIMMING	1 KOHM 10% 0.5W	* PHILIPS	2322 482 22102	07.660
R166	RESISTOR MF	620 OHM 5% 0.4W	* PHILIPS	2322 181 53621	01.194
R167	RESISTOR MF	10k OHM 5% 0.4W	* PHILIPS	2322 181 53103	01.225
R168	RESISTOR MF	1.2k OHM 5% 0.4W	* PHILIPS	2322 181 53122	01.202
R169	POTENTIOMETER TRIMMING	2.2 KOHM 20% 0.3W	NOBLE	TM8-KV2-1S	07.786
R170	RESISTOR MF	22k OHM 5% 0.4W	* PHILIPS	2322 181 53223	01.233
R171	RESISTOR MF	2.7k OHM 5% 0.4W	* PHILIPS	2322 181 53272	01.210
R172	RESISTOR MF	4.7k OHM 5% 0.4W	* PHILIPS	2322 181 53472	01.216
R173	RESISTOR MF	18k OHM 5% 0.4W	* PHILIPS	2322 181 53183	01.231
R174	RESISTOR MF	15k OHM 5% 0.4W	* PHILIPS	2322 181 53153	01.229
R175	RESISTOR MF	18k OHM 5% 0.4W	* PHILIPS	2322 181 53183	01.231
R176	RESISTOR MF	2.2k OHM 5% 0.4W	* PHILIPS	2322 181 53222	01.208
RE101	RELAY	24V DC 10A 2 SK	PASI	KS/U-3-C BV998	21.015
RE102	RELAY	24V DC 18A 1 SL	PASI	KH/A-3 BV936	21.009
RE103	RELAY	24V DC 10A 2 SK	PASI	KS/U-3-C BV998	21.015
RE104	RELAY	24V DC 18A 1 SL	PASI	KH/A-3 BV936	21.009
RE105	RELAY	24V DC 10A 2 SK	PASI	KS/U-3-C BV998	21.015
T101	TRANSISTOR AF	BC548 NPN T0-92	ITT	BC548 (-A/-B/-C)	28.070
T102	TRANSISTOR	BC547	ITT*	BC547	28.062
T103	TRANSISTOR	BC547	ITT*	BC547	28.062
T104	TRANSISTOR	BC547	ITT*	BC547	28.062
T105	TRANSISTOR	BC547	ITT*	BC547	28.062
T106	TRANSISTOR	BD680	MOTOROLA*	BD680	29.338
T107	TRANSISTOR	BD680	MOTOROLA*	BD680	29.338
T108	TRANSISTOR	BD131	PHILIPS	BD131	29.050
T109	TRANSISTOR	BD131	PHILIPS	BD131	29.050
T110	TRANSISTOR	BDX43	PHILIPS	BDX43	29.120
T111	TRANSISTOR	BD131	PHILIPS	BD131	29.050
T112	TRANSISTOR	BC558	PHILIPS	BC558	28.097
T113	TRANSISTOR	BC639	PHILIPS*	BC639	28.120
T114	TRANSISTOR	BC640	PHILIPS	BC640	28.124
TR101	TRANSFORMER	TD4418	TRADANIA	TD4418	22.155
TR102	TRANSFORMER	TD4418	TRADANIA	TD4418	22.155
TR103	TRANSFORMER	TD4418	TRADANIA	TD4418	22.155

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P. NUMBER
	FILTER & AUX. P.S. N1409	MODULE 2/200	ESPERA	5-0-23410D N1409	608531
C201	CAPACITOR MKT	220nF 10% 100V	SIEMENS	B32511-D1224-K000	11.227
C202	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C203	CAPACITOR MKT	220nF 10% 100V	SIEMENS	B32511-D1224-K000	11.227
C204	CAPACITOR MKT	220nF 10% 100V	SIEMENS	B32511-D1224-K000	11.227
C205	CAPACITOR ELECTROLYTIC	470uF -10/+50% 40V	ERO	EG 00 HE 347 G	14.576
C206	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C207	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C208	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C209	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C210	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C211	CAPACITOR ELECTROLYTIC	2200uF 40V	FRAKO	EFZ-1	14.745
C212	CAPACITOR ELECTROLYTIC	100uF -10/+50% 63V	ERO	EG 00 GD 310 J	14.562
C213	CAPACITOR ELECTROLYTIC	2200uF -10/+50% 25V	ERO	EG 00 KG 422 E	14.715
C214	CAPACITOR ELECTROLYTIC	2200uF -10/+50% 25V	ERO	EG 00 KG 422 E	14.715
C215	CAPACITOR ELECTROLYTIC	2200uF -10/+50% 16V	ERO	EG 00 KE 422 D	14.710
C216	CAPACITOR ELECTROLYTIC	2200uF -10/+50% 16V	ERO	EG 00 KE 422 D	14.710
C217	CAPACITOR ELECTROLYTIC	470uF -10/+50% 40V	ERO	EG 00 HE 347 G	14.576
C218	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C219	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C220	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C221	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C222	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C223	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C224	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
C225	CAPACITOR MKT	100nF 10% 100VDC	ERO	MKT 1818-410/01 5-6	11.180
D201	DIODE BRIDGE	50VDC 1.5A	G.I.*	2KBP005	27.104
D202	DIODE	1N4936	MOTOROLA	1N4936	25.157
D203	DIODE	1N4936	MOTOROLA	1N4936	25.157
D204	DIODE FAST RECOVERY	50V/3A Trr=150nS.	MOTOROLA	MR850	25.225
D205	DIODE FAST RECOVERY	50V/3A Trr=150nS.	MOTOROLA	MR850	25.225
D206	DIODE FAST RECOVERY	50V/3A Trr=150nS.	MOTOROLA	MR850	25.225
L201	COIL	TD4367	TRADANIA	TD4367	22.165
L202	COIL	TD2602	TRADANIA	TD2602	22.133
L203	CHOKE	TL079	ESPERA	TL079	400079
L204	CHOKE	TL079	ESPERA	TL079	400079
R201	RESISTOR MF	3.9k OHM 5% 0.4W	* PHILIPS	2322 181 53392	01.214
R202	RESISTOR MF	220 OHM 5% 0.4W	* PHILIPS	2322 181 53221	02.162
R203	RESISTOR	3.3 KOHM 5% 1.6W	PHILIPS	2322 191 33302	04.209
R204	RESISTOR	56 OHM 5% 1.6W	PHILIPS	2322 191 35609	04.149
R205	RESISTOR	150 OHM 5% 4W	PHILIPS	2322 330 22151	05.778

N1409 31/88.

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
R207	RESISTOR MF	1k OHM 5% 0.4W	* PHILIPS	2322 181 53102	02.200
R208	RESISTOR	0.12 ohm 10% 3W	PHILIPS	2322 329 33127	05.120

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
	CONNECTION BOARD 1 N1409	MODULE 3/300	ESPERA	5-0-23819A	608515
C301	CAPACITOR POLYESTER	1nF 5% 2000V	ERO	KP1832	13.290
C302	CAPACITOR POLYESTER	47nF 10% 400V	ERO	MKT1822	11.131
C303	CAPACITOR POLYESTER	10nF 10% 1500V	ERO	KP1832	13.300
D301	DIODE	BYV96E	PHILIPS	BYV96E	25.320
R301	RESISTOR	330 OHM 5% 1.6W	PHILIPS	2322 191 33301	04.187
R302	RESISTOR	15 OHM 5% 2.5W	PHILIPS	2322 192 31509	04.654
R303	RESISTOR	56 OHM 5% 2.5W	PHILIPS	2322 192 35609	04.667

POSITION	DESCRIPTION	MANUFACTOR	TYPE	S.P.NUMBER
CONNECTION BOARD II N1409 MODULE 4/400		ESPERA	5-0-23414A	608530
C401	CAPACITOR POLYESTER	ERO	KP1832	13.340
C402	CAPACITOR POLYESTER	ERO	KP1832	13.340
C403	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C404	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C405	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C406	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C407	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C408	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C409	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C410	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C411	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C412	CAPACITOR POLYESTER	PHILIPS	2222 341 89105	11.759
C413	CAPACITOR POLYESTER	ERO	KP1832	13.325
C414	CAPACITOR POLYESTER	ERO	KP1832	13.325
D401	DIODE	MOTOROLA**	MR917	25.230
			NOT PREFERRED	
D402	DIODE	MOTOROLA**	MR917	25.230
			NOT PREFERRED	
D403	DIODE	PHILIPS	BYV96E	25.320
D404	DIODE	PHILIPS	BYV96E	25.320
D405	DIODE	MOTOROLA**	MR917	25.230
			NOT PREFERRED	
D406	DIODE	MOTOROLA**	MR917	25.230
			NOT PREFERRED	
R401	RESISTOR	DANOTHERM	GRF 10/63 L MED BESLAG	05.845
R402	RESISTOR	PHILIPS	2322 156 12209	03.159
R403	RESISTOR	PHILIPS	2322 156 12209	03.159
R404	RESISTOR	DANOTHERM	VC-10	05.132
R405	RESISTOR	DANOTHERM	VC-10	05.132
R406	RESISTOR	PHILIPS	2322 156 18203	03.240
R407	RESISTOR	PHILIPS	2322 156 18203	03.240
R408	RESISTOR	PHILIPS	2322 330 22569	05.769
R409	RESISTOR	PHILIPS	2322 330 22569	05.769
R410	RESISTOR MF	* PHILIPS	2322 181 53479	01.166
TR401	TRANSFORMER	TRADANIA	TD4366	22.161

N1409 31/88.

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
	INPUT RELAYS N1409	MODULE 5/500	ESPERA	5-0-23422A	608519
D501	DIODE	BAV21	PHILIPS	BAV21	25.340
L501	TRANSFORMER	TD4368	TRADANIA	TD4368	22.166
RE501	RELAY	24V DC 10A 2 SL.	PASI	WSA/GD-10-C	21.022
RE502	RELAY	24V DC 18A 1 SL.	PASI	KH/A-3 BV936	21.009

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
	MAINS FILTER N1409	MODULE 6/600	ESPERA	5-0-23914C	608520
C601	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
C602	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
C603	CAPACITOR POLYESTER	1uF 10% 250V AC	ERO	F1773	11.080
C604	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
C605	CAPACITOR CERAMIC	4.7N 5KV CL2	FERROPERM	9/0138,9 "D"	16.153
TR601	TRANSFORMER	TL384	TRANS ELECTRO	6-3-23915D	400384