



# Sailor

# Sailor

**INSTRUKTIONSBOG FOR  
SAILOR BATTERILADER N1404**

**INSTRUCTION BOOK FOR  
SAILOR BATTERY CHARGER N1404**



**A/S S. P. RADIO · AALBORG · DENMARK**

S A I L O R  
INSTRUCTION BOOK  
FOR  
BATTERY CHARGER  
TYPE  
N1404

N1404

S. P. RADIO A/S, AALBORG, DENMARK

CONTENTS:

GENERAL

CONTROLS

PRINCIPLE OF OPERATION AND TECHNICAL DATA

CIRCUIT DESCRIPTION

FIG.

SCHEMATIC DIAGRAMS

PARTS LIST

## GENERAL

The SAILOR battery charger N1404 is intended for use in conjunction with the SAILOR short-wave programme.

The charger unit is used when the station is supplied from 24V DC (power supply N1400).

The charger unit is constructed in such a way that when installed with the station it becomes an integral part of the station (the lower drawer in the rack-system). This means that the installation of a station equipped with the N1404 is very simple.

The front panel of the SAILOR battery charger is equipped with the necessary meters and control lamps which fulfil the authorities' requirements. This means that there is no need for a separate meter panel.

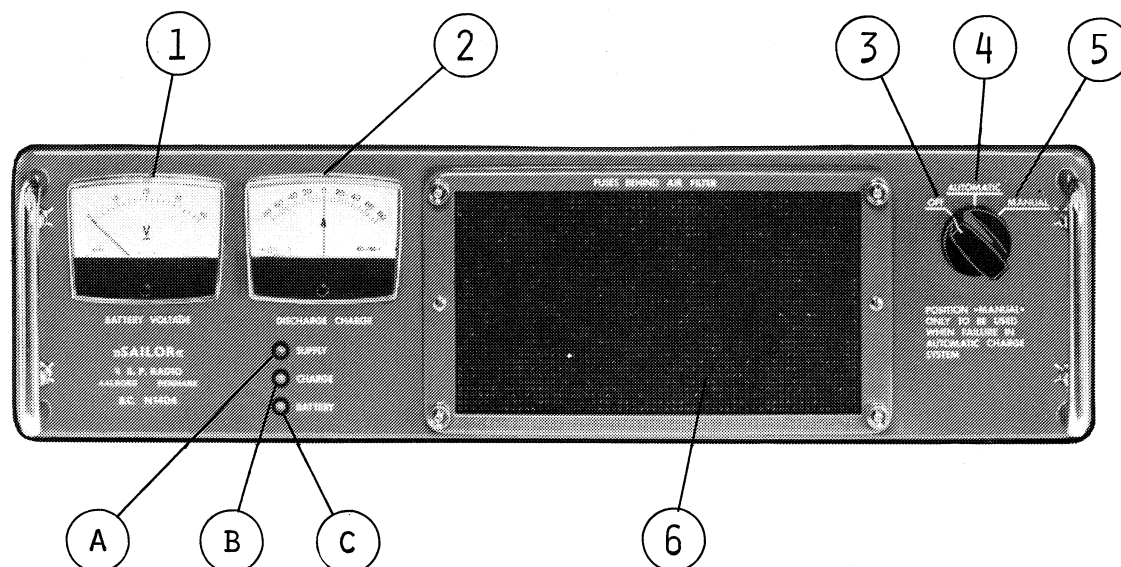
The battery charger is automatic and can, if the automatic section fails, be used as an ordinary manual charger simply by turning the main switch from pos. AUTOMATIC to pos. MANUAL.

The automatic section of the battery charger is fitted within a compact plug-in unit, which can easily be changed.

The charger unit and its connections to the station are constructed in such a way that you will have max. charging rate when the station is on. This means that the charge condition of the battery remains almost unaltered even after hours of continuous use of the station.



## CONTROLS



- ① Voltmeter: indicates the battery voltage.
- ② Ammeter: indicates the charge - or discharge current.
- ③ Main switch pos. OFF:  
The battery charger is switched OFF with the voltmeter ① and ammeter ② in function.
- ④ Mainswitch pos. AUTOMATIC.  
The battery charger is switched on and automatically controlling the charge current.  
  
The control lamp (A) SUPPLY is on and indicates that AC mains is present.  
The control lamp (B) CHARGE is on as long as the battery is not fully charged.  
The control lamp (C) BATTERY is on when the battery is fully charged (trickle-charging)
- ⑤ Main switch pos. MANUAL.  
This position is used should the automatic charge system fail.  
  
By manual control, the voltmeter reading ① shall be kept between 26 and 29 volts. If the voltmeter reading is more than 29 volts, switch OFF the charger-unit. If the voltmeter reading is less than 26 volts, switch on the charger-unit pos. MANUAL. When the transmitter is on the charger-unit should be on too pos. MANUAL.  
  
If it is impossible to increase the battery voltage to 29 volts with the ammeter ② indicating charge current, the reason may be a defective battery or a leakage.  
  
In position MANUAL the control lamps (A) (B) (C) are of no consequence.
- ⑥ AIRFILTER: the AIRFILTER has to be cleaned at regular intervals (look up the section CLEANING OF AIR FILTER in the OPERATING INSTRUCTIONS FOR SAILOR MF/HF TELEPHONY STATION).

# PRINCIPLE OF OPERATION AND TECHNICAL DATA

## AUTOMATIC

The automatic section of the charger-unit switches between two charge modes, MAIN CHARGING and TRICKLE CHARGING.

By increasing battery voltage (charge) the automatic section switches from main charging to trickle charging when the gasvoltage is reached (the gasvoltage is the voltage where the battery starts gassing). By decreasing battery voltage (discharge) the automatic section switches from trickle charging to main charging at a voltage approx. 12% below the gasvoltage.

When the mainswitch is in pos. MANUAL, the automatic section is out of function and main charging is always on.

## MAIN CHARGING

40 Amps. at 25 volts terminal voltage and nominal input voltage (AC). The variation of the main charging as a function of the terminal voltage and the input voltage (AC) is in accordance with the DIN 41774 (Halbleiter-Gleichrichtergeräte mit W-Kennlinie für das Laden von Bleibatterien).

## TRICKLE CHARGING

Low charging rate which compensates for the external and internal discharge of the battery.

## COOLING SYSTEM

Convection and forced air cooling.

The blower is not running continuously but is controlled by thermostats located at the heat sink for rectifier and at the main transformer.

## PROTECTION AGAINST OVERLOAD

Thermostats located inside the transformer-windings and on the rectifier heat sink disconnect the charger if the temperature goes too high. When the temperature returns to normal level the charger is activated again.

## SUPPLY VOLTAGE

The charger can be delivered in two versions. One version where the supply voltage can be adjusted in the range 205 - 265V AC in 10 steps, and another one which can be adjusted in the range 105 - 140V AC in 10 steps.

To ensure full performance the charger must be adjusted for the actual supply voltage. The actual supply voltage at the location must be measured when the ships generator is running under normal conditions.

The method of adjusting the charger-unit in accordance with the actual voltage is shown at fig. 1.

## INTERFERENCE SUPPRESSION (R.F.I.).

The charger unit fulfils the requirements stated in the V.D.E. regulation as "KLEINSTORGRAD" equipment.

# CIRCUIT DESCRIPTION

## AUTOMATIC

The automatic unit changes between the two modes, main charging (CHARGE) and trickle charging (BATTERY) dependent on the battery voltage. When the battery under charge reaches a voltage of 28.8V it is changed to trickle charging. It stays in this mode until the battery voltage falls below 25.5V. At this point the charger returns to main charging mode.

The changing is carried out by means of a relay changing between two winding ratios of the main transformer. This relay is controlled by a reference, sense- and changing unit on the output side (DC) and a logical circuit including a time delay.

On the input side R224 and R225 create a reference voltage, which is fed into IC202B. IC202A senses the battery voltage via a voltage divider and the preset potentiometer R230 adjusts for max. permissible battery voltage (normal 28.8V). IC202A performs as a voltage follower and filter. For increasing voltage at the battery there will be 0V on the output of IC202B and the attenuated and filtered battery voltage is further attenuated in R226 and R223 before it is compared to the reference at IC202B. At maximum battery voltage (the gasvoltage) the output of IC202B goes positive, the shift information is transferred to the AC side. Furthermore R226 and R223 no longer perform as a voltage attenuator and thus the battery voltage can decrease approx. 12 %, before IC202B switches again.

Via IC201A, IC201B and IC201C, T205 will be switched off, whereby T203 is turned on and RE201 and D103 will respectively be activated and turned off. To get stable switching a time delay is introduced by means of C207 and R221, so that RE201 after releasing remains in that state for some seconds, no matter what the information from IC202B may be. In the same way there is a time delay, due to C206 and R220, when the relay is activated again.

For indicating the charge mode in pos. AUTOMATIC there are three LED's. D101 (SUPPLY) lights when the charger is turned on. D102 (BATTERY) lights in the trickle charge mode. D103 (CHARGE) lights in the main charge mode and simultaneously D102 is turned off, as both diodes are controlled by the information from IC202B. If the charger is in position MANUAL, the automatic section is out of function and the charge mode is main charging, even if the automatic plug-in unit is removed.

## MAIN TRANSFORMER/RECTIFIER

The charger unit has two main transformers, which have their primary windings in parallel connection and their secondary windings each connected to a rectifier bridge.

The primary voltage adjustment and the shift between main charging and trickle charging is carried out by means of connectors on the main transformers.















The R101 resistor in series connection with the connectors for trickle charging protects the contacts in RE201 by limiting the peak current.

SUPPLY VOLTAGE ADJUSTMENT:















Measure the ship's AC voltage when the ship's generator is running under normal conditions.

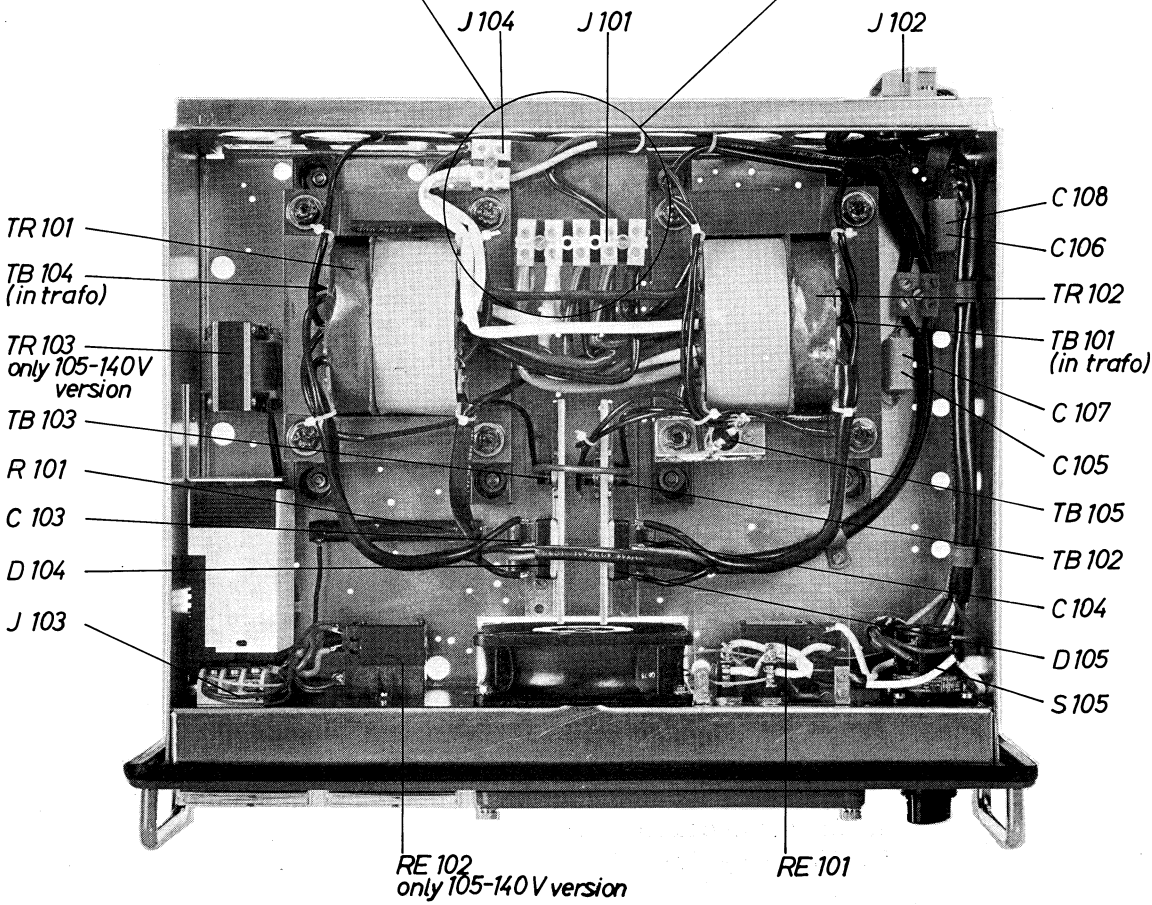
Find in the supply voltage scheme the voltage which is nearest to the measured voltage. Connect yellow wire in 2-pole terminal and brown wire in 5-pole terminal corresponding to the selected voltage.

205-265V Version

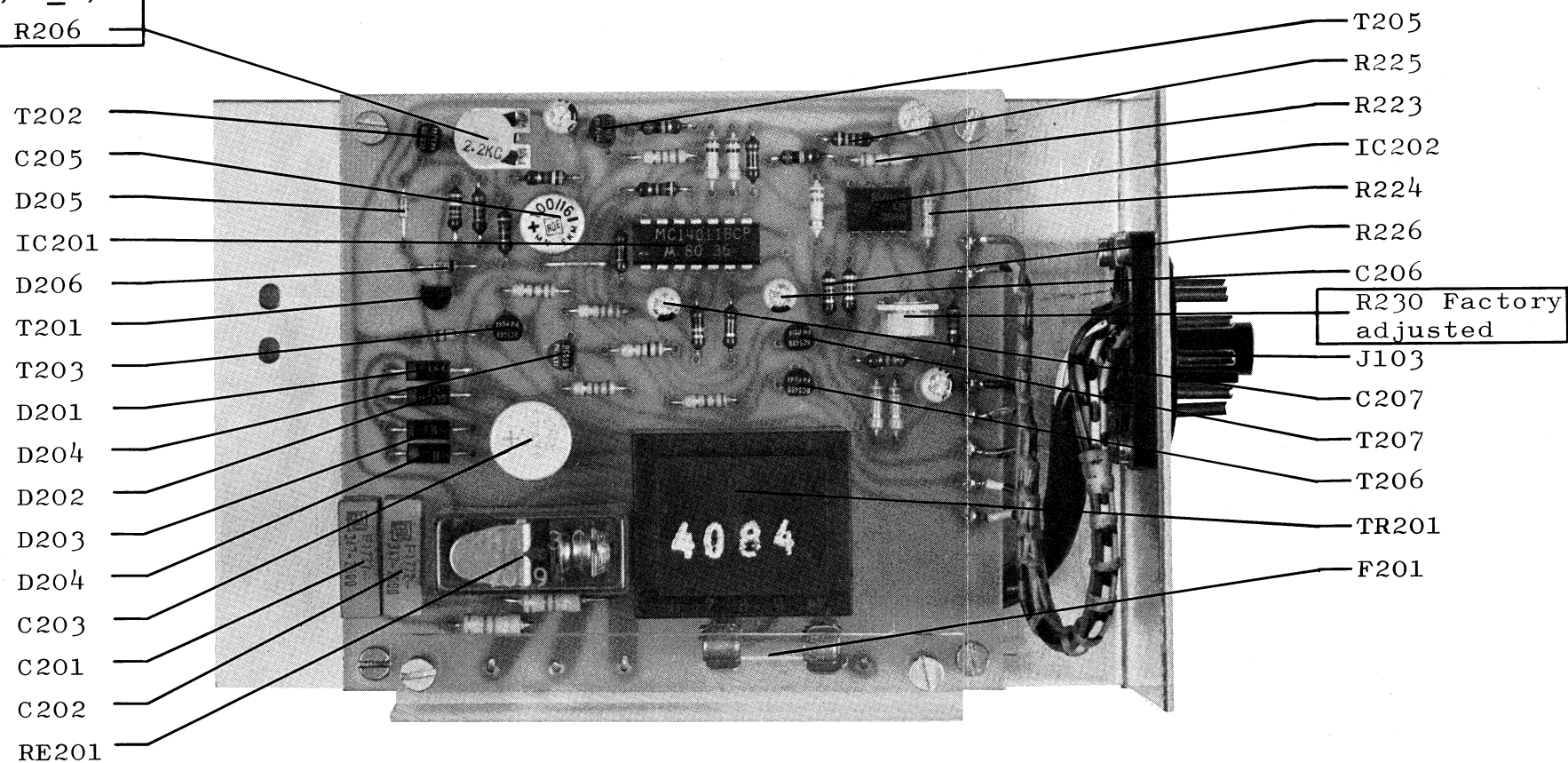
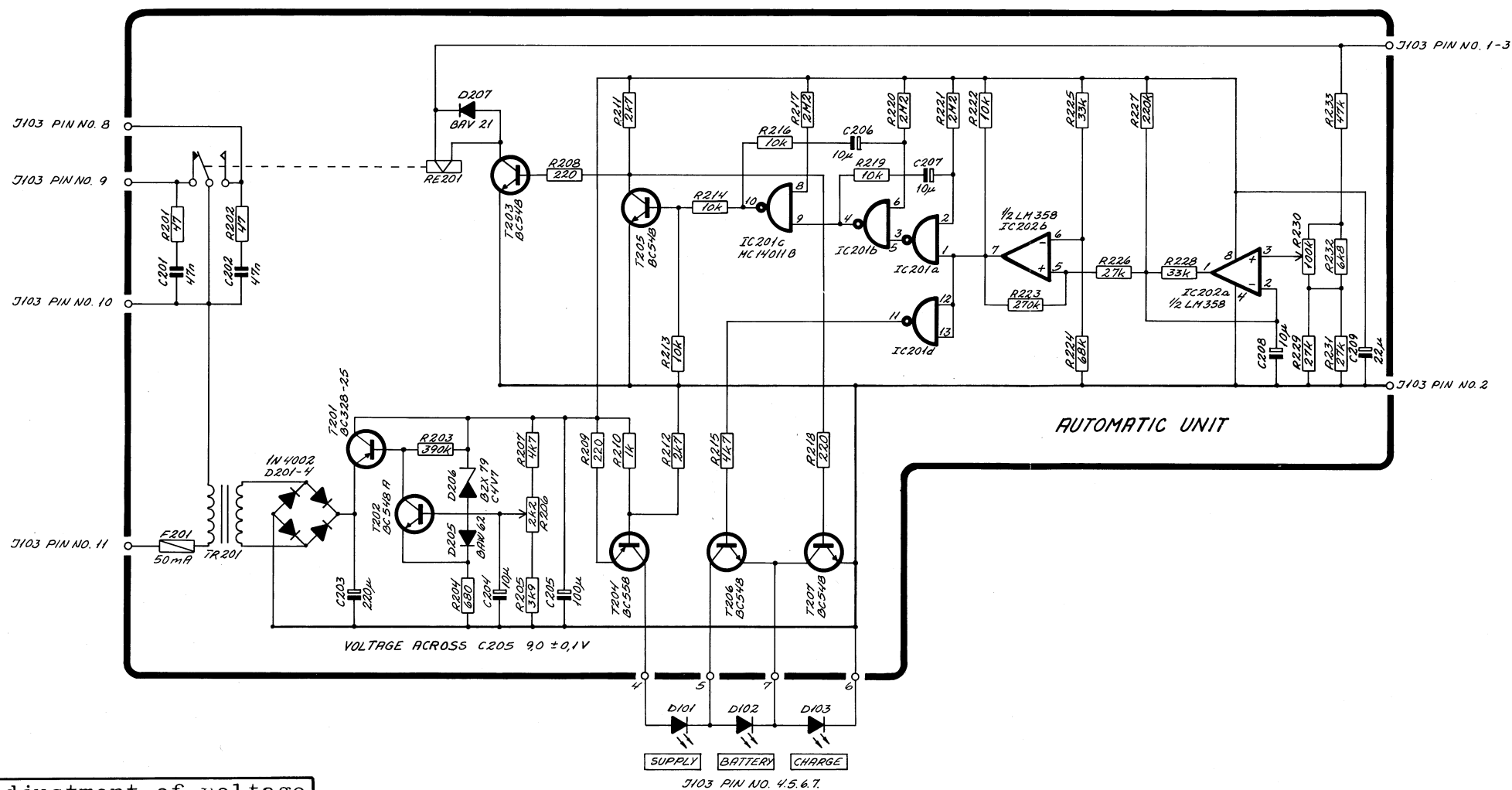
	253	246	239	232	224
	228	220	213	206	200
SUPPLY VOLTAGE ADJUSTMENT SCHEME					
					
					

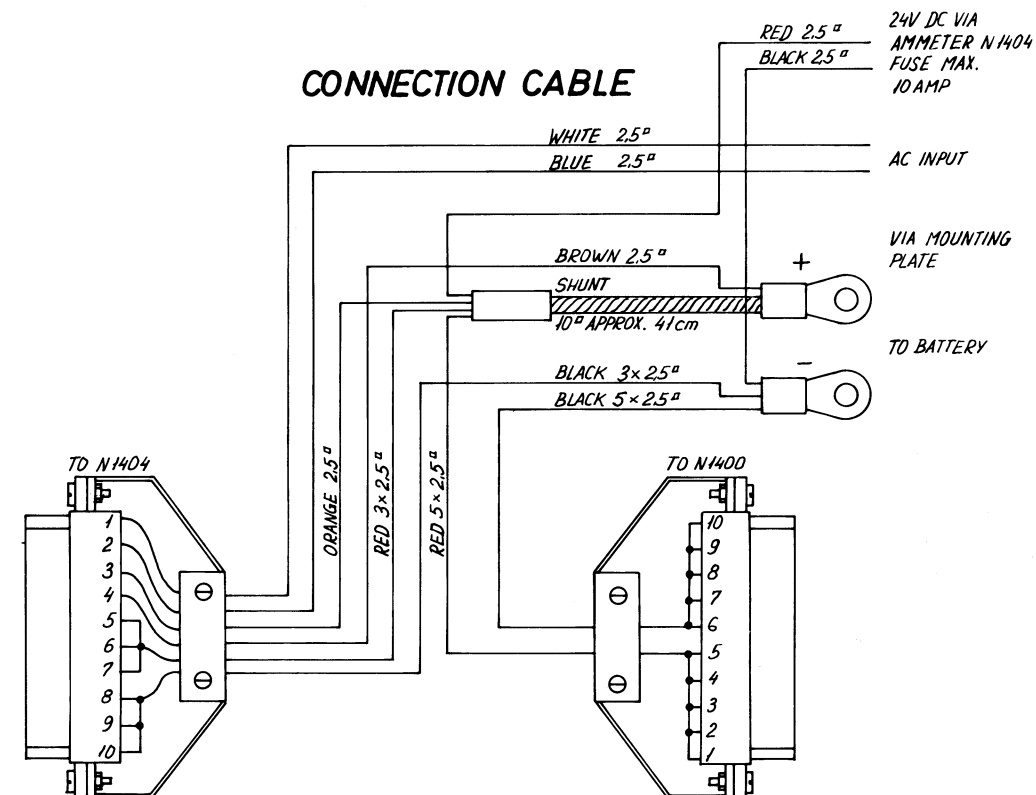
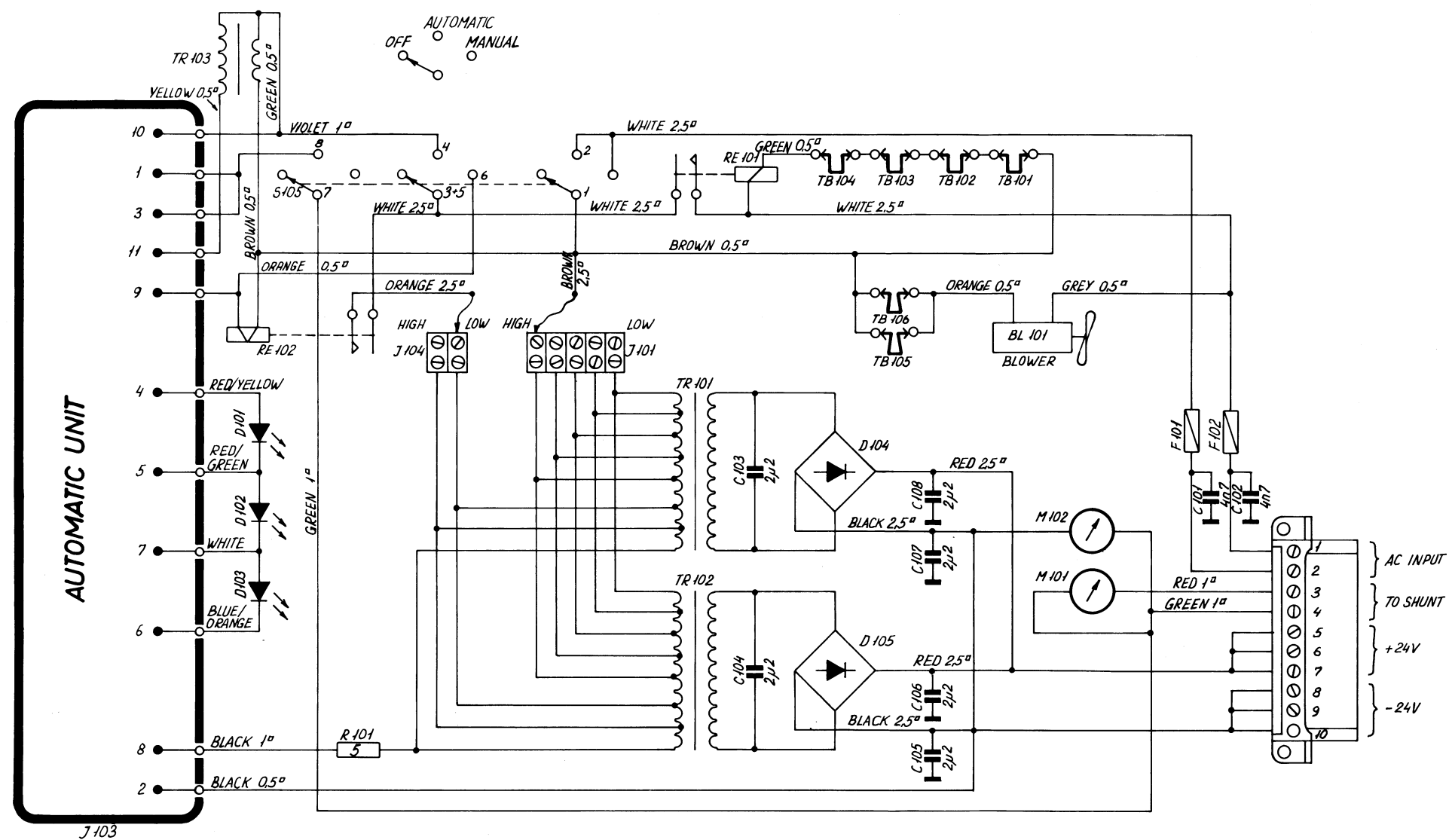
105-140V Version

	138	134	131	127	123
	123	120	116	112	108
SUPPLY VOLTAGE ADJUSTMENT SCHEME					
					
					

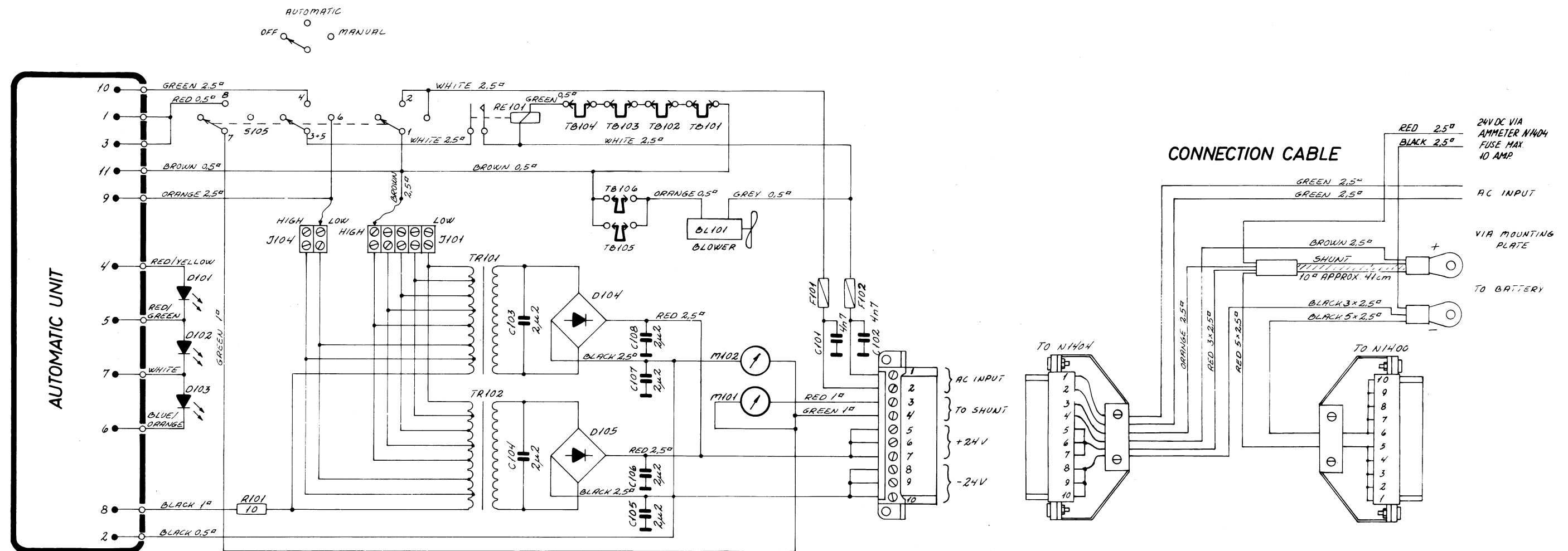








® N1404 105-140V VERSION



® N1404 205-265V VERSION

<i>Symbol</i>	<i>Description</i>			<i>Manufact.</i>	
C101	Capacitor ceramic	4.7 nF	5KV	Ferroperm	9/0138.9 insul.
C102	Capacitor ceramic	4.7 nF	5KV	Ferroperm	9/0138.9 insul.
C103	Capacitor polycarbonate	2.2 uF	250V	Philips	2222 341 49225
C104	Capacitor polycarbonate	2.2 uF	250V	Philips	2222 342 49225
C105	Capacitor polycarbonate	2.2 uF	100V	Philips	2222 341 29225
C106	Capacitor polycarbonate	2.2 uF	100V	Philips	2222 341 29225
C107	Capacitor polycarbonate	2.2 uF	100V	Philips	2222 341 29225
C108	Capacitor polycarbonate	2.2 uF	100V	Philips	2222 341 29225
D101	Diode LED			Mer-el	XC5053Y
D102	Diode LED			Mer-el	XC5053Y
D103	Diode LED			Mer-el	XC5053Y
D104	Diode bridge			Motorola	BYW 62
D105	Diode bridge			Motorola	BYW 62
J101	Terminal strip	5 pole		J.Nielsen	1553
J102	Plug	STV 2/10		Weidmüller	3338.6
J103	Socket for automatic unit			Danotherm	T437/11 pole
J104	Terminal strip	2 pole		J.Nielsen	1553
M101	Meter	80-0-80A		SEW	KR45
M102	Meter	0-40V		SEW	KR45
S105	Switch Kraus & Naimer			C.Thiim	AYK 881
TB101	Thermal breaker OFF 120°C ON 77°C			Tradania	
TB102	Thermal breaker OFF 100°C ON 71°C			Comepa	25.2.94.21.100/071
TB103	Thermal breaker OFF 100°C ON 71°C			Comepa	25.2.94.21.100/071
TB104	Thermal breaker OFF 120°C ON 77°C			Tradania	
TB105	Thermostat ON 70°C OFF 55°C			Elmwood	2455R-88-915
TB106	Thermostat ON 70°C OFF 55°C			Elmwood	2455R-88-915

<i>Symbol</i>	<i>Description</i>		<i>Manufact.</i>	
	<u>105-140V VERSION ONLY</u>			
BL101	Blower	115V AC	PAPST	TYP 4500N
F101	Fuse	20 A	Wickmann	314.020
F102	Fuse	20 A	Wickmann	314.020
R101	Resistor 5 ohm	50 W	Danotherm	GRF 50L
RE101	Relay		PASI	CR/A-7-C
RE102	Relay		PASI	CR/A-7-C
TR101	Transformer 24V/20A-110V		Tradania	TD 4151
TR102	Transformer 24V/20A-110V		Tradania	TD 4151
TR103	Transformer		Tradania	TD 4152
	<u>205-265V VERSION ONLY</u>			
BL101	Blower	220V AC	PAPST	TYP 4550N
F101	Fuse	10 A	Wickmann	314.010
F102	Fuse	10 A	Wickmann	314.010
R101	Resistor 10 ohm	50 W	Danotherm	GRF 50L
RE101	Relay		PASI	CR/A-8-C
TR101	Transformer 24V/20A-220V		Tradania	TD 4138
TR102	Transformer 24V/20A-220V		Tradania	TD 4138



A		AUTOMATIC UNIT N1404 S.P.			Module: 200
Symbol	Description			Manufact.	1/2
R201	Resistor	47 ohm $\pm 5\%$	0.5W	Philips	2322 212 13479
R202	Resistor	47 ohm $\pm 5\%$	0.5W	Philips	2322 212 13479
R203	Resistor	390Kohm $\pm 5\%$	0.33W	Philips	2322 211 13394
R204	Resistor	680 ohm $\pm 5\%$	0.33W	Philips	2322 211 13681
R205	Resistor	3,9Kohm $\pm 5\%$	0.33W	Philips	2322 211 13392
R206	Potentiometer	2,2Kohm $\pm 20\%$		Noble	TM8KV2-1S/2K2
R207	Resistor	4 7Kohm $\pm 5\%$	0.33W	Philips	2322 211 13472
R208	Resistor	220 ohm $\pm 5\%$	0.33W	Philips	2322 211 13221
R209	Resistor	220 ohm $\pm 5\%$	0.33W	Philips	2322 211 13221
R210	Resistor	1Kohm $\pm 5\%$	0.33W	Philips	2322 211 13102
R211	Resistor	2,7Kohm $\pm 5\%$	0.33W	Philips	2322 211 13272
R212	Resistor	2,7Kohm $\pm 5\%$	0.33W	Philips	2322 211 13272
R213	Resistor	10Kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R214	Resistor	10Kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R215	Resistor	4,7Kohm $\pm 5\%$	0.33W	Philips	2322 211 13472
R216	Resistor	10Kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R217	Resistor	2,2Mohm $\pm 5\%$	0.33W	Philips	2322 241 23225
R218	Resistor	220 ohm $\pm 5\%$	0.33W	Philips	2322 211 13221
R219	Resistor	10Kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R220	Resistor	2,2Mohm $\pm 5\%$	0.33W	Philips	2322 241 23225
R221	Resistor	2,2Mohm $\pm 5\%$	0.33W	Philips	2322 241 23225
R222	Resistor	10Kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R223	Resistor	270Kohm $\pm 5\%$	0.33W	Philips	2322 211 13274
R224	Resistor	68Kohm $\pm 5\%$	0.33W	Philips	2322 211 13683
R225	Resistor	33Kohm $\pm 5\%$	0.33W	Philips	2322 211 13333
R226	Resistor	27Kohm $\pm 5\%$	0.33W	Philips	2322 211 13273
R227	Resistor	220Kohm $\pm 5\%$	0.33W	Philips	2322 211 13224
R228	Resistor	33Kohm $\pm 5\%$	0.33W	Philips	2322 211 13333
R229	Resistor	27Kohm $\pm 5\%$	0.33W	Philips	2322 211 13273
R230	Resistor	100Kohm $\pm 20\%$		Noble	TM8KH1-1S/100K
R231	Resistor	27Kohm $\pm 5\%$	0.33W	Philips	2322 211 13273
R232	Resistor	6,8Kohm $\pm 5\%$	0.33W	Philips	2322 211 13682
R233	Resistor	47Kohm $\pm 5\%$	0.33W	Philips	2322 211 13473

## AUTOMATIC UNIT N1404 S.P.

Module: 200

<i>Symbol</i>	<i>Description</i>	<i>Manufact.</i>	<i>2/2</i>
C201	Capacitor polyester 47nF/250V AC	ERO	F 1772 347 2000
C202	Capacitor polyester 47nF/250V AC	ERO	F 1772 347 2000
C203	Capacitor electrolytic 220uF/25V	ROE	EKM 00 FD 322E
C204	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C205	Capacitor electrolytic 100uF/16V	ROE	EKI 00 CC 310D
C206	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C207	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C208	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C209	Capacitor electrolytic 22uF/25V	ROE	EKI 00 AA 222E
D201	Diode	Motorola	1N4002
D202	Diode	Motorola	1N4002
D203	Diode	Motorola	1N4002
D204	Diode	Motorola	1N4002
D205	Diode	Philips	BAW62
D206	Diode zener	Philips	BZX79C4V7
D207	Diode	Philips	BAV21
T201	Transistor	Philips	BC328-25
T202	Transistor	Philips	BC548A
T203	Transistor	Philips	BC548
T204	Transistor	Philips	BC558
T205	Transistor	Philips	BC548
T206	Transistor	Philips	BC548
T207	Transistor	Philips	BC548
IC201	Integrated circuit	Motorola	MC14011 BCP
IC202	Integrated circuit	National	LM358N
RE201	Relay	PASI	KH/U-3-C
TR201	Transformer	TRADANIA	TD 4084
F201	Fuse 50mA time-lag	ELU	50mA/5x20mm