

Bang & Olufsen

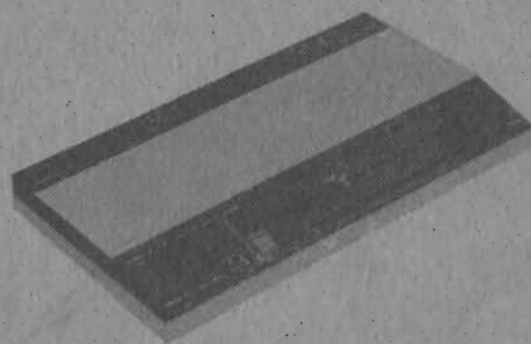
RYLAND HUNTLEY & Co.

15 OLD BOND ST.

BATH

Telephone 4332

AUDIO EQUIPMENT SPECIALISTS



BEOMASTER 2200

TYPE 1601

SERVICE MANUAL



CONTENTS

	SECTION
Technical data	1
Disassembly	2
Functional description	3
Adjustments	4
Service tips	5
Electrical parts list	6
Parts list	7
Diagrammes, PC-boards, TR-, Diode- and IC lists	8

INTRODUCTION

The Beomaster 2200 type 1601 is the first Bang & Olufsen model in which the electric connections between PC boards are made according to the wire wrap system.

The bottom plate of the receiver is fitted with square plug-pins around which wires are wrapped mechanically without soldering.

The PC boards have mating female plugs, and all units can be removed from the set without soldering. This also applies to the two separate output stages and their associated cooling elements.

These service instructions are drawn up in such a manner that they follow the physical layout of the receiver.

On the diagram pages, each PC board unit is framed, and plug connections are marked with their destinations on other units. Separate drawings show locations of plugs in the bottom plate and their interconnections.

For each PC board unit, the placement of components is shown viewed from the etched side. Position numbers are printed on the PC board.

The Service Manual is complete, and supplementary sheets will be issued only in case of major modifications.

TECHNICAL DATA AMPLIFIER

Power output 1000 Hz, RMS	2 x 40 W/4 ohms 2 x 30 W/8 ohms
Music power	2 x 75 W/4 ohms 2 x 40 W/8 ohms
Speaker impedance	4 ohms
Harmonic distortion	
1000 Hz, 50 mW	<0.05 %
Intermodulation DIN 45 500	<0.1 %
Frequency range DIN 45 500 ± 1.5 dB	20 – 30,000 Hz
Power bandwidth, 1 % distortion	10 – 50,000 Hz
Damping factor 1000 Hz	>25
Input, PHONO	2,3 mV/47 kohms
Input, TAPE	230 mV/470 kohms
Signal-to-noise ratio DIN 45 500	
50 mW, PHONO	>60 dB
50 mW, TAPE	>60 dB
Channel separation DIN 45 500, 1000 Hz	>50 dB
250 – 10,000 Hz	>40 dB
Output, TAPE	100 mV/100 kohms
Headphones	Max. 13 V/200 ohms
BASS, 40 Hz	± 12 dB
TREBLE, 12,500 Hz	± 12 dB

FM

Range	87.5 – 108 MHz
Sensitivity, stereo, 46 dB	20 µV/75 ohms
Frequency range DIN 45 500 ± 1.5 dB	20 – 15,000 Hz
Harmonic distortion DIN 45 500	<0.4 %
Stereo channel separation 1000 Hz	>35 dB
Pilot suppression 19 kHz	>65 dB
38 kHz	>100 dB

AM

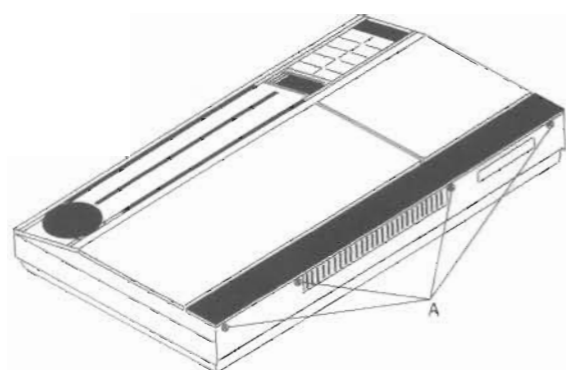
LW	147 – 350 kHz
MW	520 – 1610 kHz
Sensitivity 20 dB LW 200 kHz	100 µV
Sensitivity 20 dB MW 1000 kHz	90 µV
Bandwidth 3 dB	5.5 kHz

OTHER DATA

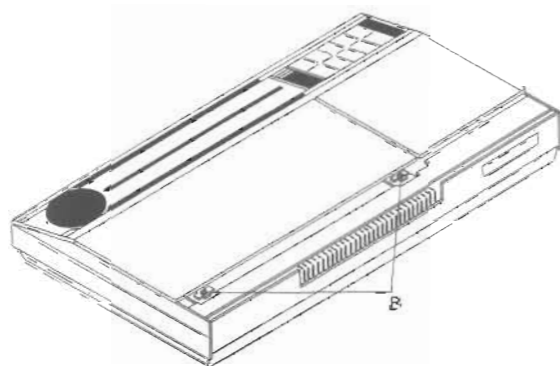
Power supply	110 - 130 - 226 - 240 volts
Power consumption	15 – 175 W
Dimensions W x H x D	54 x 7.5 x 30.5 cm
Weight	8.5 kg

Subject to change without notice.

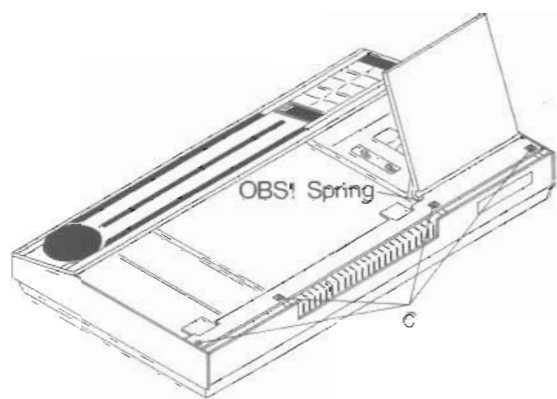
DEMONTERING AF BAGPROFIL
DISMOUNTING OF BACKPLATE
ABMONTIERUNG VON RÜCKWÄRTIGER
ABDECKUNG



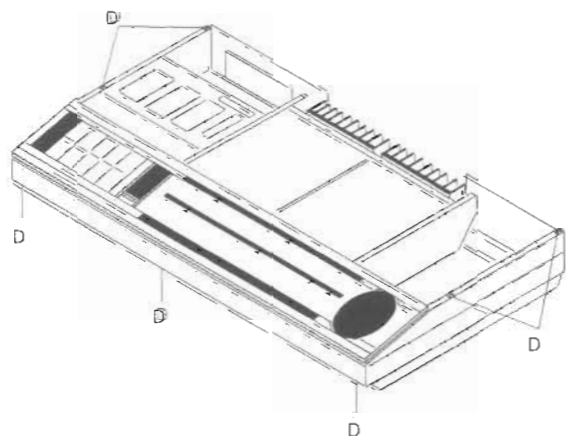
DEMONTERING AF STOR TOPPLADE
DISMOUNTING OF BIG TOP PLATE
ABMONTIERUNG VON GROSSER
ABDECKPLATTE



DEMONTERING AF LILLE TOPPLADE
DISMOUNTING OF SMALL TOP PLATE
ABMONTIERUNG VON KLEINER
ABDECKPLATTE

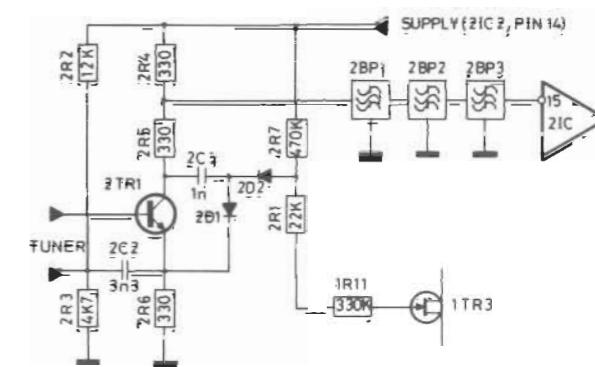


DEMONTERING AF KABINET
DISMOUNTING OF CABINET
ABMONTIERUNG VON GEHÄUSE

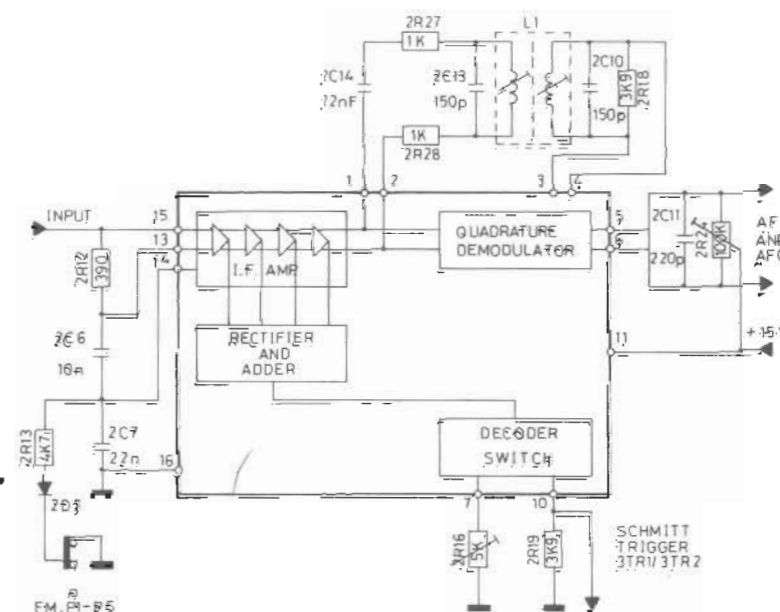


FUNCTIONAL DESCRIPTION

FM IF

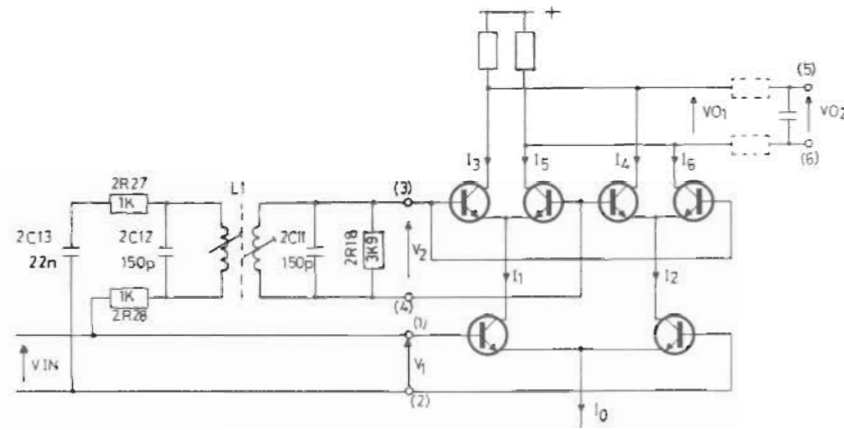


The IF signal from the VHF tuner, known from previous designs, is fed to the first IF amplifier stage, 2TR1. 2D1 and 2D2 rectify and voltage-double a part of the signal. This level-dependent DC voltage is fed via 2R1 and 1R11 back to the RF stage as AGC bias. Moreover, the signal is fed via bandpass filters BP 1, 2 and 3 forward to 2IC1 (TCA 420A) which incorporates both an IF amplifier and a quadrature detector.

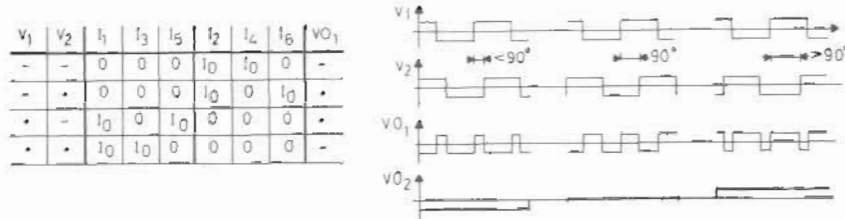


The signal is fed to the IF amplifier input, pins 13 and 15, which must have a DC path between them on account of the DC bias applied to the first transistor of the amplifier. The amplifier is composed of four identical differential amplifiers. From the amplifier, the signal is fed to the quadrature detector and demodulated. The audio signal is available at pins 5 and 6. In addition, a part of the signal from each of the four amplifier stages is rectified and added. This DC voltage is used to switch the stereo decoder to mono when the incoming signal is weak. To prevent signal pickup through the IF amplifier while playing other programs than FM ones, the IF amplifier is muted when all FM program selectors are in the OFF position, by connecting pin 14 of 2IC1 to chassis potential through 2R13, 2D3 and the switch. 2D3 ensures that the tuning voltage cannot reach pin 14.

QUADRATURE DETECTOR

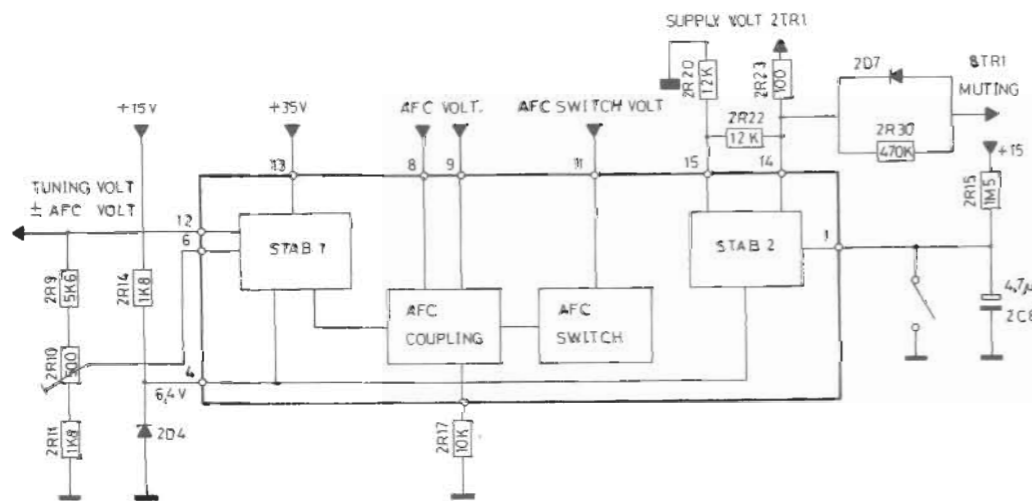


The quadrature detector in TCA 420A consists of a phase detector and a phase shift network. The operation of the phase detector appears from the sketch.



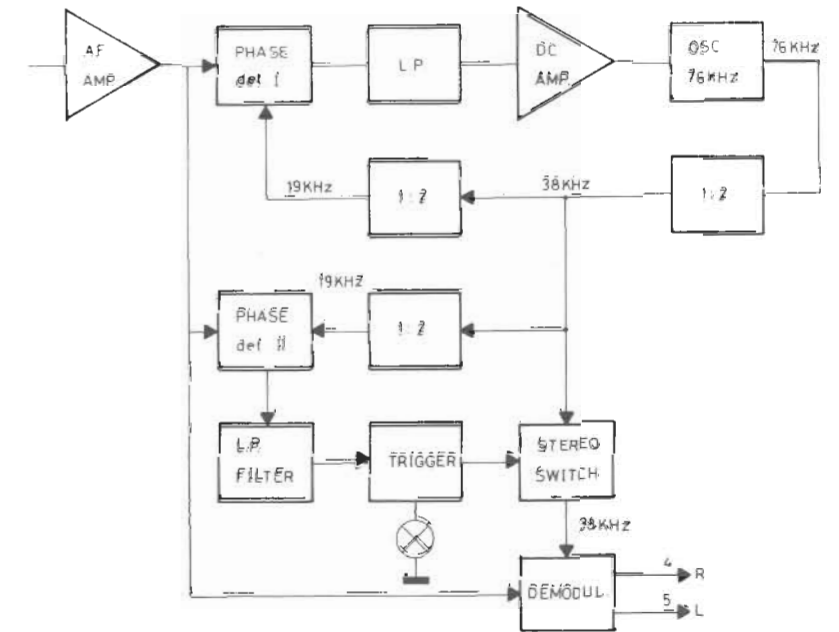
The IF signal is applied to the V_{in} terminals. By means of the phase shift network L1 and associated components, the phase between the two input voltages, V_1 and V_2 , is shifted as a function of the frequency applied. From the time diagram it will appear that the DC value of the output voltage (V_{O2}) is zero for a phase shift of 90° , negative when the phase shift is less than 90° and positive when the phase shift is greater than 90° . If V_{in} is a frequency-modulated signal, the phase between V_1 and V_2 be shifted "in step" with the modulation, and the output voltage V_{O2} will be proportional thereto and consequently is the demodulated signal. The demodulated signal is taken off at pins 5 and 6 of 2IC1 for AFC and balance light. The signal from pin 5 is fed to the stereo decoder.

TUNING VOLTAGE

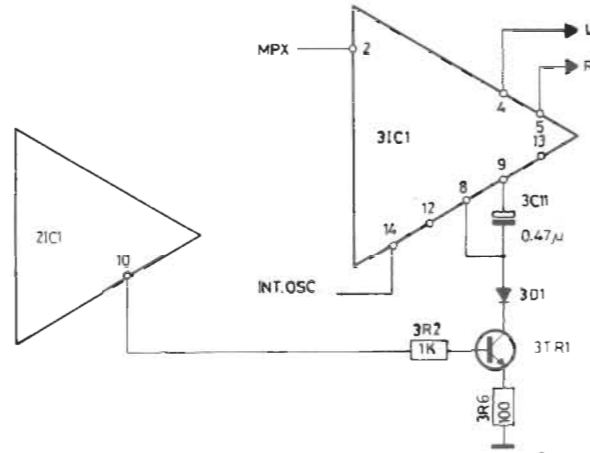


2IC2 is used to stabilise the voltage for the tuning potentiometers. The IC contains several circuits which are not used. These are not shown in the sketch.

STEREO DECODER

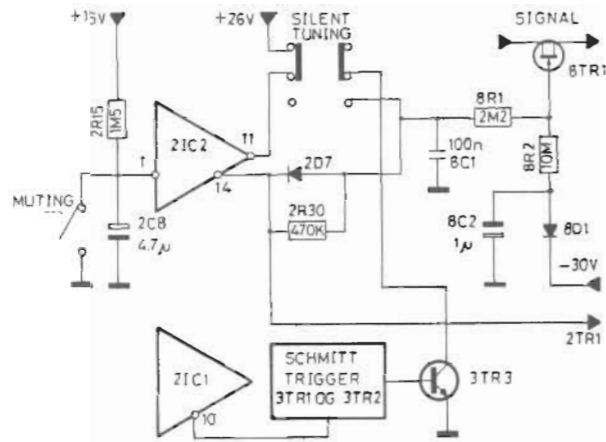


The AF signal is fed to pin 2 of the stereo decoder 3IC1. The block diagram shows 3IC1. As will be seen, the IC contains an oscillator operating at 76 kHz. The internal oscillator is locked by the 19-kHz component of the MPX signal. This principle provides excellent long-term stability. The MPX signal from the detector is fed to an amplifier, from where the signal is fed to the demodulator and the phase detectors. The phase detectors compare the 19-kHz signal from the internal oscillator with the 19-kHz component of the MPX signal. The correction voltage from phase detector I (dependent on the phase relations between the external and internal 19-kHz signals) is fed via an LP filter and a DC amplifier to a DC-controlled 76-kHz oscillator. This oscillator is adjustable from outside with trimmer capacitor 3C8. To turn on the stereo indicator and activate the stereo switch both the 19-kHz component of the MPX signal and the 19-kHz signal from the internal oscillator must be present. When this occurs, phase detector II activates a trigger circuit which turns on the lamp and, via the stereo switch, feeds 38-kHz signal to the demodulator. The stereo signal can now be taken off at pins 4 and 5. Because of the low signal-to-noise ratio in the case of weak incoming signals it is desirable to have automatic switching to mono when the signal at the aerial input falls below a given level (approx. 10 μ V). This level is adjustable with 2R16.



This is accomplished as follows: The voltage at pin 10 of 2IC1 increases at low levels. This causes 3TR1 to conduct. 3TR1 therefore connects pin 8 of 3IC1 to chassis potential. As a result of this, the internal stereo switch cuts off so that the 38-kHz signal cannot reach the demodulator. The signal accordingly comes out in mono at both outputs.

MUTING



There are two kinds of muting:

- (1) Muting between FM stations (silent tuning)
- (2) Muting while switching programs.

The set is muted by transistors 8TR1. These transistors are in series with the signal path, and the gates are normally at approx. 0 V (the transistors are ON). During muting, the gates receive a negative voltage of approx. -6 V, causing the transistors to go OFF and block the signal to the output amplifiers. The negative gate bias is generated by voltage division from -30 V. 8C2 retains the negative bias during the off function.

SILENT TUNING

When the silent tuning switch is in the ON position and the signal goes below a given level, the voltage at pin 10 of 2IC1 will increase from 0.5 V to 1.0 V. This change activates the Schmitt trigger (3TR1 and 3TR2), and 3TR3 will be forward biased so that 8R1 is connected to chassis potential, the gate of 8TR1 goes negative and the signal is muted.

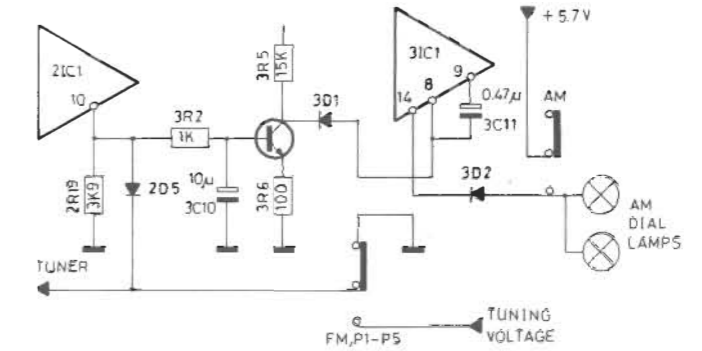
MUTING WHILE SWITCHING PROGRAMS

The pushbutton switch carries a small switch (Muting) which is closed briefly every time the pushbutton switch is operated. This switch short-circuits pin 1 of 2IC2 to chassis potential, and pin 14 therefore also goes towards 0. This voltage change is applied to 8TR1 via 2D7, 2R30 and 8R1, thus muting the signal.

2R15 and 2C8 as well as 2R30 and 8C1 ensure slow restoration of the signal path.

From pin 14 of 2IC2, supply voltage is also taken off for the first IF-amplifier transistor (2TR1), thereby avoiding mislocking of stations while switching programs seeing that the IF section and hence also the AFC control are switched off while switching programs.

OTHER REQUIREMENTS FOR MUTING CIRCUIT



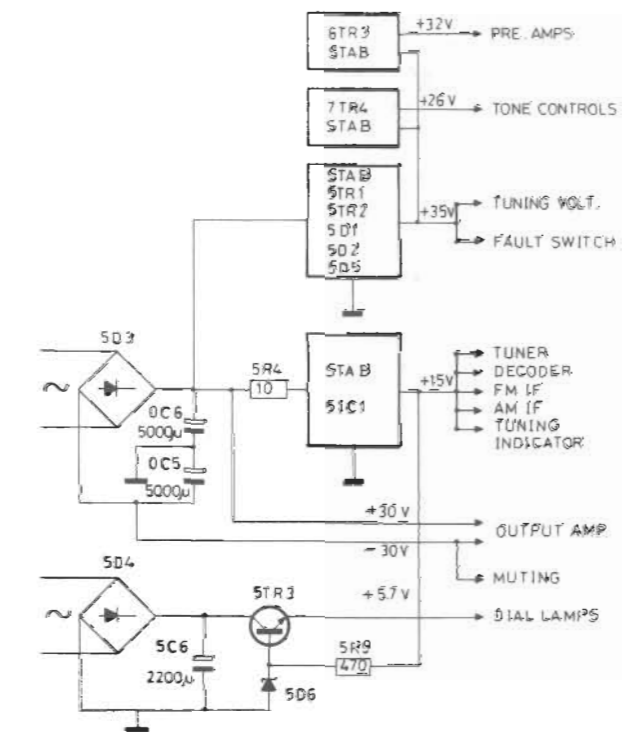
When the set is not in one of the FM modes, the voltage at pin 10 of 2IC1 will increase to approx. 1 V as no IF signal is present.

To avoid consequent activation of the muting circuit, a diode, 2D5, is inserted from pin 10 via the pushbutton switch to chassis potential.

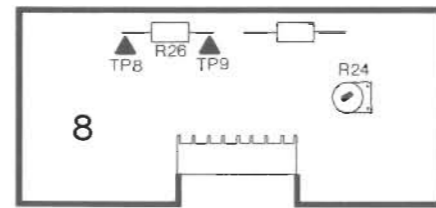
This ensures that the voltage at pin 10 will not exceed 0.7 V.

To prevent interference from the stereo decoder during AM reception, the decoder is cut off by a positive voltage (5.7 V), applied at pin 14. This voltage is transmitted via 3D2 from the AM dial lamps.

POWER SUPPLY



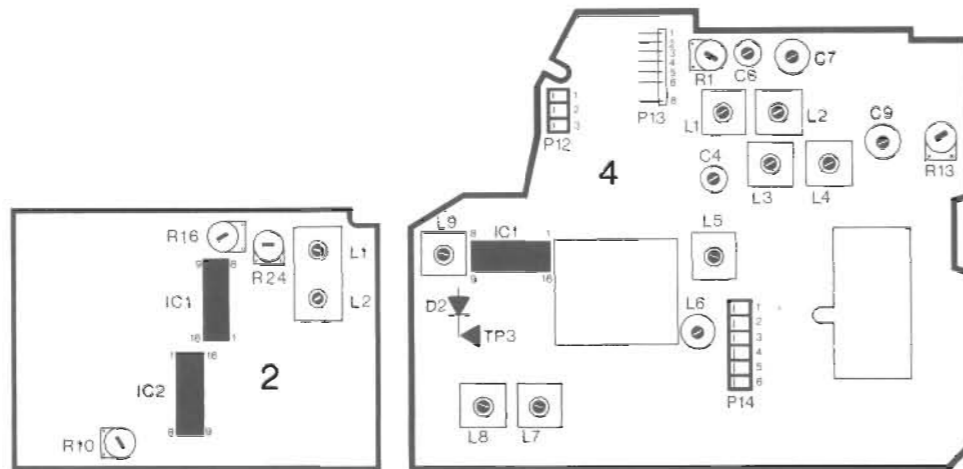
ADJUSTMENTS



ADJUSTMENT OF NO-SIGNAL-CURRENT

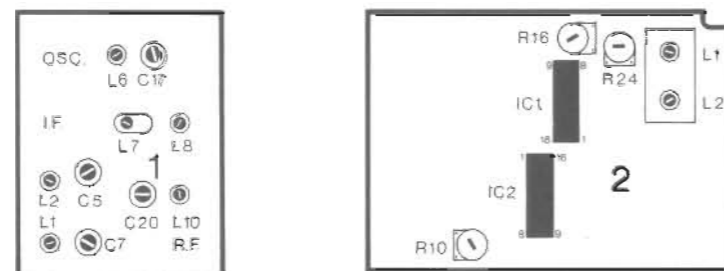
Adjust no-signal-current with receiver cold and volume control turned down. **SPEAKERS MUST NOT BE CONNECTED.**
With 8R24 adjust to 30 mA in collector of 0IC1, or adjust to 12 mV measured across emitter resistor 8R26.

TUNING VOLTAGE



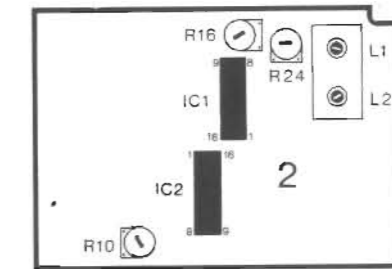
Depress FM and turn FM dial toward mechanical stop in the right side.
Adjust 2R10 to 25.5 V, measured on pin 12 on 2IC2.
Turn FM dial toward mechanical stop in the left side.
Adjust 4R1 to 4.6 V, measured on P12 pin 1.

FRONT END, TUNER



Set dial to 89 MHz.
Set sweep generator to 89 MHz.
With 1L10, 1L1, 1L2, and 1L6 adjust to max. IF curve, measured on pin 10 of 2IC1.
Set dial to 106 MHz.
Set sweep generator to 106 MHz.
With 1C20, 1C7, 1C5, and 1C17 adjust to max. IF curve.
Check dial alignment — repeat adjustment procedure if necessary.
Set dial to 97 MHz.
Set sweep generator to 97 MHz.
With 1L7 and 1L8 adjust to max. IF curve.

IF AND DETECTOR



Set receiver to weak signal, $< 10 \mu\text{V}$, AFC off, and measure DC voltage on pin 10 of 2IC1.
Set receiver to min. DC voltage, ($< 1 \text{ V}$) on pin 10, which corresponds to correct setting on signal.
Set receiver to a strong signal, 0.5 mV.
With detector coils, 2L1 and 2L2, adjust to max. output measured on pin 5 of 2IC1. With 2L2 may be adjusted to min. distortion, measured on pin 5 of 2IC1.
Adjust then 2R24 to 0 V between pin 5 and pin 6 of 2IC1.

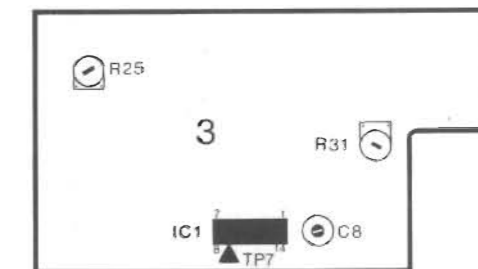
TUNING INDICATOR

Tune in a FM station correctly. (0 V between pin 5 and pin 6 on 2IC1).
Adjust with 3R25 till both lamps show identical brilliance.

LEVEL

Apply a signal of $5 \mu\text{V}$ to aerial input.
Set treble control to mid-position, AFC not to be activated.
Set receiver correctly to signal generator frequency, e. g. 97 MHz.
Adjust 2R16 so that muting starts functioning.
This adjustment is accessible from outside in case of special reception conditions.

DECODER



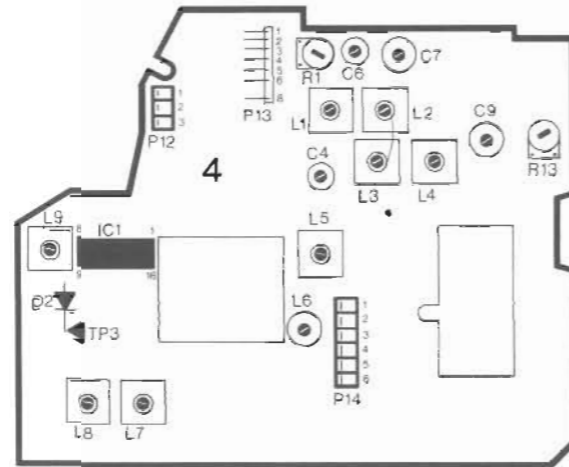
Tune in a mono station.
With 3C8 adjust internal oscillator exactly to 19 kHz, measured on 3TP7.
The accuracy can be checked in two ways:
1. Connect frequency counter to 3TP7.
2. Connect 19 kHz from 3TP7 to Y-input on oscilloscope and 19 kHz from a stereocoder to the X-input. When the Lissajous figure is stationary, the adjustment is correct.
A third way to adjust the internal oscillator is as follows:
3. Tune in a stereo station.
Turn 3C8 to one side until the stereo lamp turns off. Turn then 3C8 to the other side until the stereo lamp turns off. The setting midway between these two settings represents the correct adjustment.

CHANNEL SEPARATION

Connect stereo decoder to aerial input f. mod. 1 kHz, Δf 40 kHz, pilot 8-10 %, AFC on.
Connect wattmeter to amplifier output.
Set treble control to min.

With 3R31 adjust to min. output in unmodulated channel.
Adjustment should be made both with unmodulated left channel and unmodulated right channel.
The coils 3L3, 3L4, 3L5, and 3L6 are factory pre-adjusted and should not be touched.

AM IF



Set receiver to MW. Tuning control to 575 kHz on dial.
Connect sweep generator to pin 1 of 4IC1 and set to 468 kHz, Δf 10 kHz, (IF can be 468 kHz \pm 1.5 kHz due to tolerances on ceramic filters).
Connect oscilloscope to 4TP3.
Set cores of 468 kHz parallel trap 4L5 and series trap 4L6 so that they are almost fully out.
With 4L7, 8, 9 adjust for max. symmetrical IF curve.
NOTE: Use weakest possible signal while aligning, so as to avoid activating the AGC.

PARALLEL AND SERIES TRAPS

Connect signal generator to aerial input via dummy aerial. Set generator to approx. 468 kHz, mod. 30% 400 Hz.
Connect wattmeter to amplifier output and set treble control to minimum.
Set signal generator frequency for max. wattmeter reading.
With 4L5 and 6 adjust for min. wattmeter reading.

MW OSCILLATOR AND AERIAL INPUT CIRCUITS

Connect signal generator to aerial input via dummy aerial. Set generator to 575 kHz, mod. 30% 400 Hz.
Connect wattmeter to amplifier output.
Depress MW; set receiver to 575 kHz.
With 4L1 tune oscillator so that receiver is centered on transmitting frequency.
With 4L3 adjust for max. wattmeter reading.
Set signal generator and receiver to 1495 kHz.
With 4C6 set oscillator to frequency.
With 4C4 adjust aerial input circuit for max. response.
Repeat above procedure until dial is in correct alignment and aerial input circuit is tuned for max. response.
End with 4C4.

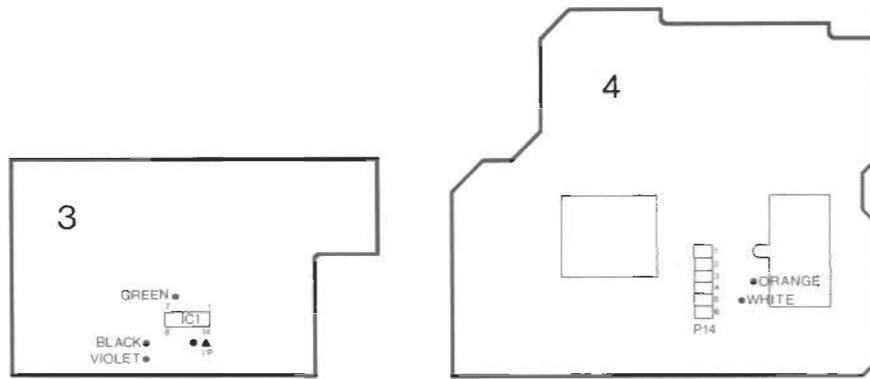
LW OSCILLATOR AND AERIAL INPUT CIRCUITS

Depress LW. Set signal generator and receiver to 155 kHz.
With 4L2 bring oscillator into alignment.
With 4L4 tune aerial input for max. response.
Set signal generator and receiver to 320 kHz.
With 4C7 bring oscillator into alignment.
With 4C9 tune aerial input circuit for max. response.
Repeat above procedure until dial is in correct alignment and aerial input circuit is tuned for max. response.
End with 4C9.
NOTE: When aligning the AM oscillators use a weak signal, adjusting by ear for max. noise suppression in the centre of the frequency.

AM INDICATOR BRILLIANCE

Turn 4R13 to the right.
Set dial out of station.
With 4R13 adjust till voltage on P14 pin 4 has fallen by 30 mV, or the light intensity from the indicator lamps starts changing.

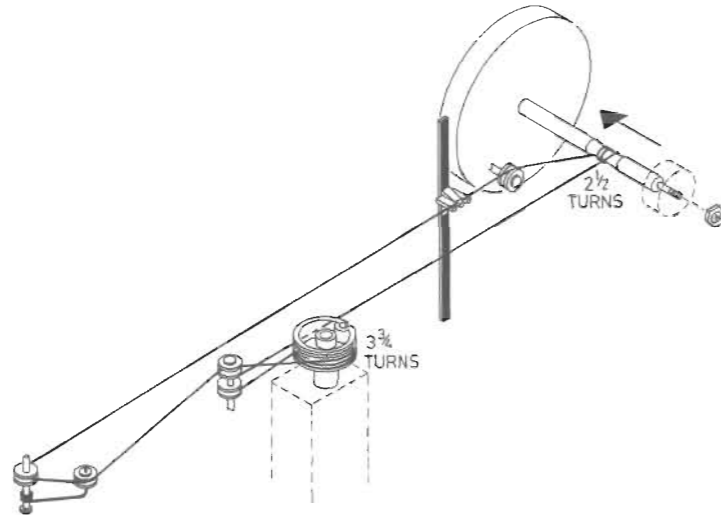
SERVICE TIPS



The easiest way to remove PC boards is as follows: After having removed the screws, carefully pull at the PC plugs with a pair of sharp-nosed pliers. The colour code used for the leads is as shown in the sketch.

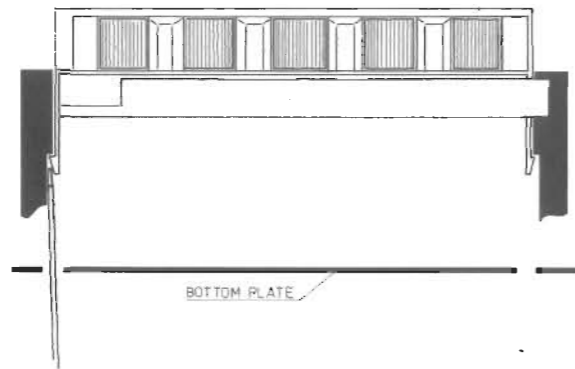
PC BOARDS

DIAL DRIVE



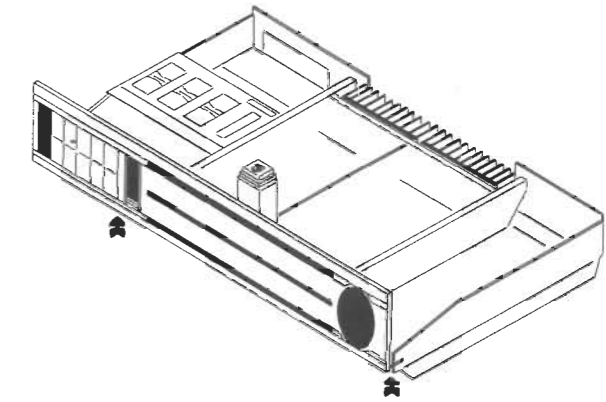
Cut dial cord (Index No. 3955016) to a length of 110 cm and tie the ends together. Place the knots in the "eye" on the grooved wheel. Fit the cord as shown in the sketch.
NOTE: The dial flywheel must be removed before the dial cord can be fitted.

PRESET UNIT



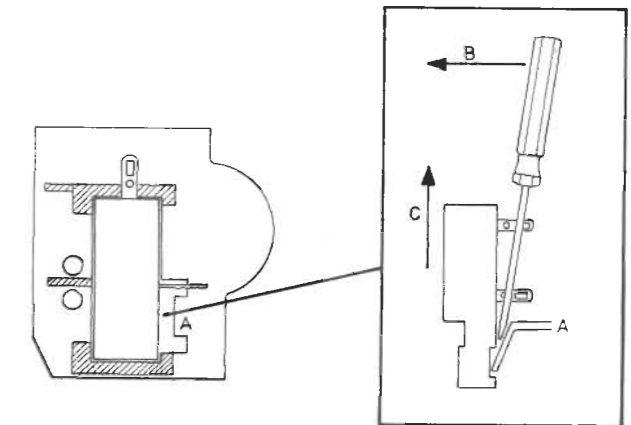
To remove the preset drawer, put a screwdriver up through the two holes in the bottom, below the preset drawer, and tip the sliding arms out of the locks.

OPERATING PANEL IN SERVICE POSITION



MAINS SWITCH

Replacement of mains switch in the PREH pushbutton unit.



Dismounting:

For dismounting a thin screwdriver or the like is used which is pressed between the switch and the locking pin A. The screwdriver is pressed towards the switch and at the same time the switch is pulled as shown by arrows B and C.

Mounting:

Mount the switch in the cutout of the pushbutton unit and press it until a "click" indicates that the tap A locks. Activate the switch button and one of the other buttons a couple of times to secure that the switch arm of the unit has clutched the switch arm of the mains switch.

ELECTRICAL PART LIST

Table with 3 columns: Component ID, Value, and Description. Includes parts like OR1 (5010054 1 Mohms), OR2 (5300100 100 kohms), and OR3 (5310071 2 x 47 kohms LOG. VOLUME).

Table with 3 columns: Component ID, Value, and Description. Includes parts like OC1 (4010018 1 nF 250 V), OC2 (4010018 1 nF 250 V), and OC3 (4010018 1 nF 250 V).

Table with 3 columns: Component ID, Value, and Description. Includes parts like OIL1 (8230062 6 V 1 W), OIL2 (8230062 6 V 1 W), and OIL3 (8230062 6 V 1 W).

Table with 3 columns: Component ID, Value, and Description. Includes parts like OF1 (6600022 1.6 A T 250 V S IEC 127), OF2 (6600022 1.6 A T 250 V S IEC 127), and OF4 (6600006 1A T 250 V S IEC 127).

FRONT END, TUNER, 8050071, PC1

Table with 3 columns: Component ID, Value, and Description. Includes parts like R1 (5001050 47 kohms), R2 (5010141 27 kohms), and R3 (5010041 5.6 kohms).

Table with 3 columns: Component ID, Value, and Description. Includes parts like C1 (4010008 1 nF - 20 + 50 % 400 V), C2 (4010008 1 nF - 20 + 50 % 400 V), and C3 (4010008 1 nF - 20 + 50 % 400 V).

Table with 3 columns: Component ID, Value, and Description. Includes parts like L1 (8020121 RF (prim.)), L2 (8020122 RF (sec.)), and L3 (6830052 3.8 uH).

Table with 3 columns: Component ID, Value, and Description. Includes parts like 6702001 Ferrit-core F100 (white), 6702008 Ferrit-core F10 (red), 6479001 Glassbushing, and 2816146 Bronze spring.

IF SECTION, 8002300, PC2

Table with 3 columns: Component ID, Value, and Description. Includes parts like R1 (5010079 22 kohms), R2 (5010046 12 kohms), and R3 (5010048 4.7 kohms).

Table with 3 columns: Component ID, Value, and Description. Includes parts like R21 (5010049 100 kohms), R22 (5010046 12 kohms), and R23 (5010065 100 ohms).

Table with 3 columns: Component ID, Value, and Description. Includes parts like C1 (4200298 1 uF 63 V), C2 (4011025 3.3 nF), C3 (4010027 1 nF), and C4 (4010027 1 nF).

Table with 3 columns: Component ID, Value, and Description. Includes parts like BP1 (8030001 10.7 MHz), BP2 (8030001 10.7 MHz), BP3 (8030001 10.7 MHz), and L1 (8010141 FM-Detector).

Table with 3 columns: Component ID, Value, and Description. Includes parts like P2 (7210135 Socket 6 pin), P4 (7210137 Socket 4 pin), and 7500080 Contact pin.

STEREO DECODER AND INDICATOR CIRCUIT, 8002299, PC3

Table with 3 columns: Component ID, Value, and Description. Includes parts like R1 (5010045 47 kohms), R2 (5010040 1 kohms), R3 (5010362 180 ohms), and R4 (5020034 18.7 kohms).

Table with 3 columns: Component ID, Value, and Description. Includes parts like C2 (4003130 47 pF), C3 (4200322 4.7 uF), C4 (4200099 100 uF), and C5 (4200322 4.7 uF).

Table with 3 columns: Component ID, Value, and Description. Includes parts like L2 (8022066 114 mH), L3 (8022079 78 mH), L4 (8022079 78 mH), L5 (8022079 78 mH), L6 (8022079 78 mH), P5 (7210135 Socket 6 pin), and P9 (7210134 Socket 5 pin).

AM SECTION, 8002312, PC4

Table of components R1-R23 and C1-C30 for AM SECTION, 8002312, PC4. Includes values like 10 kohms ± 20% Lin., 100 ohms ± 5% 1/8 W, etc.

Table of components C1-C30 for AM SECTION, 8002312, PC4. Includes values like 4000016 10 pF ± 2% 63 V, 4100055 470 pF ± 2.5% 63 V, etc.

Table of components L1-L9 for AM SECTION, 8002312, PC4. Includes values like 8020262 MW Osc., 8020261 LW Osc., etc.

Table of components P12-P14 and X1-X2 for AM SECTION, 8002312, PC4. Includes values like 7210136 Socket 3 pol., 7220130 Plug 7 pins, etc.

POWER SUPPLY, 8002311, PC 5

Table of components R1-R15 for POWER SUPPLY, 8002311, PC 5. Includes values like 5010053 15 kohms ± 5% 1/8 W, 5010053 15 kohms ± 5% 1/8 W, etc.

Table of components C1-C12 for POWER SUPPLY, 8002311, PC 5. Includes values like 4130106 330 nF ± 20% 100 V, 4130106 330 nF ± 20% 100 V, etc.

Table of components P31 for POWER SUPPLY, 8002311, PC 5. Includes values like 7210143 Socket 9 pol., 6275345 Wire bundle for 5.7 V supply, etc.

PRE AMPLIFIER, 8002306, PC6

Table of components R1-R21 and R22-R41 for PRE AMPLIFIER, 8002306, PC6. Includes values like 5010047 120 kohms ± 5% 1/8 W, 5010047 120 kohms ± 5% 1/8 W, etc.

Table of components C1-C10 and C11-C20 for PRE AMPLIFIER, 8002306, PC6. Includes values like 4201069 2.2 µF 35 V, 4130100 68 nF ± 10% 250 V, etc.

Table of components 7220148, 72101047, 7210152, 7210089, 7210088, 7402042, F18, P19, P20, P21 for PRE AMPLIFIER, 8002306, PC6. Includes values like 7220148 Plug for FRONT END/TUNER, 72101047 Socket for loudspeaker, etc.

STONE AMPLIFIER, 8002309, PC 7

Table of components R1-R15 and R16-R36 for STONE AMPLIFIER, 8002309, PC 7. Includes values like 5010064 2.2 kohms ± 5% 1/8 W, 5010061 2 x 20 kohms spec. BALANCE, etc.

Table of components C1-C10 and C11-C27 for STONE AMPLIFIER, 8002309, PC 7. Includes values like 4000069 100 pF ± 5% 63 V, 4200322 4.7 µF 63 V, etc.

C28 4130100 68 nF ± 10 % 250 V
C29 4010024 10 nF ± 10 % 100 V

C30 4200296 2.2 μF 63 V
C31 4010008 1 nF -20 +50 % 400 V

P23 7220131 Plug 3 pins
7402088 Switch STEREO/AFC
6275344 Wire bundle

OUTPUT AMPLIFIER, 8002310, PC 8

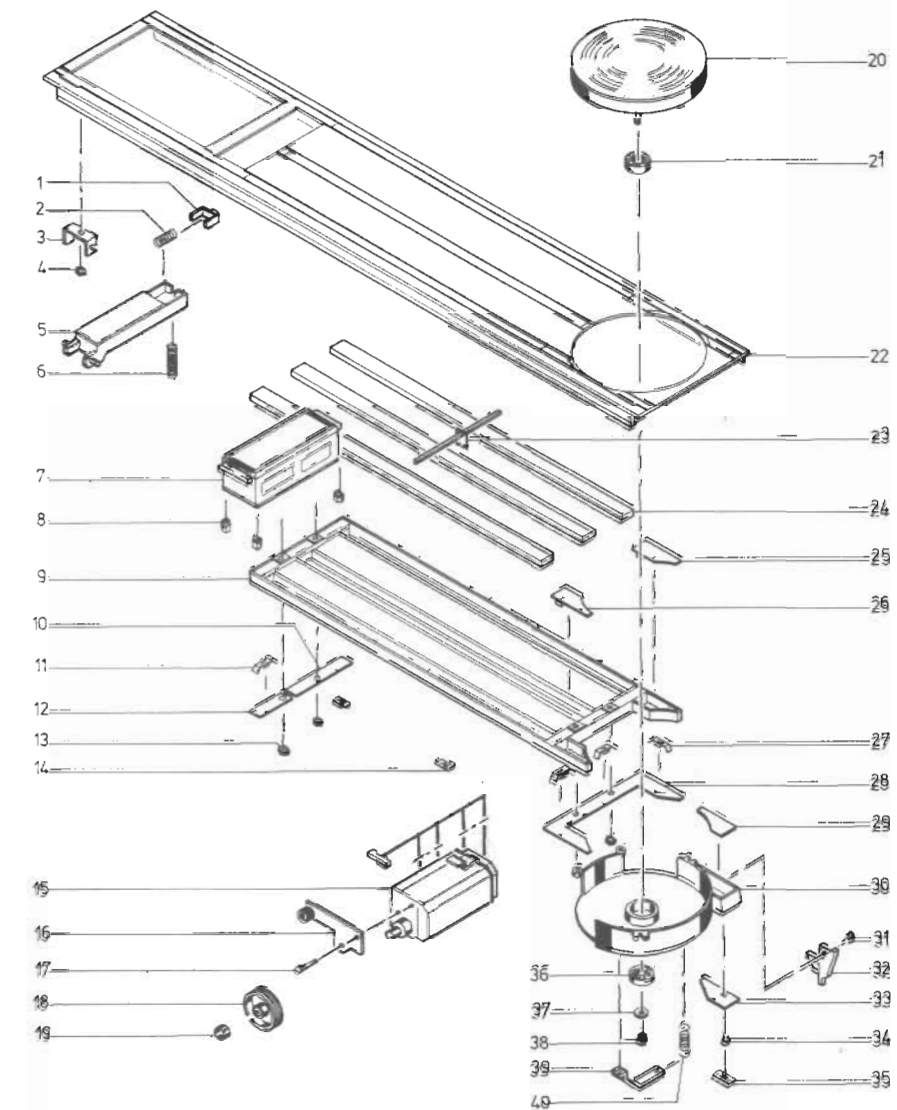
R1 5010245 2.2 Mohms ± 5 % 1/8 W	R16 5010053 15 kohms ± 5 % 1/8 W
R2 5010638 10 Mohms ± 5 % 1/8 W	R17 5010154 8.2 kohms ± 5 % 1/8 W
R3 5010298 2.7 kohms ± 5 % 1/8 W	R18 5010154 8.2 kohms ± 5 % 1/8 W
R4 5001036 3.3 kohms ± 10 % 1/2 W	R19 5010144 680 ohms ± 5 % 1/8 W
R5 5010079 22 kohms ± 5 % 1/8 W	R20 5010000 270 ohms ± 5 % 1/8 W
R6 5010120 220 kohms ± 5 % 1/8 W	R21 5010000 270 ohms ± 5 % 1/8 W
R7 5010053 15 kohms ± 5 % 1/8 W	R22 5010039 68 ohms ± 5 % 1/8 W
R8 5010000 270 ohms ± 5 % 1/8 W	R23 5010000 270 ohms ± 5 % 1/8 W
R9 5010068 820 ohms ± 5 % 1/8 W	R24 5370174 250 ohms lin.
R10 5010079 22 kohms ± 5 % 1/8 W	R25 5010065 100 ohms ± 5 % 1/8 W
R11 5010067 560 ohms ± 5 % 1/8 W	R26 5100166 0.39 ohms ± 10 % 2 W
R12 5010403 27 ohms ± 5 % 1/8 W	R27 5100166 0.39 ohms ± 10 % 2 W
R13 5010000 270 ohms ± 5 % 1/8 W	R28 5000085 4.7 ohms ± 10 % 1/2 W
R14 5010039 68 ohms ± 5 % 1/8 W	R29 5010079 22 kohms ± 5 % 1/8 W
R15 5010611 150 ohms ± 5 % 1/8 W	

C1 4130075 100 nF ± 20 % 250 V	C8 4000057 47 pF ± 5 % 63 V
C2 4200298 1 μF 63 V	C9 4130078 47 nF ± 20 % 250 V
C3 4200298 1 μF 63 V	C10 4011022 4.7 nF -20 +100 % 40 V
C4 4011022 4.7 nF -20 +100 % 40 V	C11 4010060 22 nF -20 +100 % 40 V
C5 4010027 1 nF ± 10 % 100 V	C12 4130104 220 nF ± 20 % 100 V
C6 4201074 47 μF 40 V	C13 4130104 220 nF ± 20 % 100 V
C7 4200100 22 μF 40 V	C14 4000020 4.7 pF ± 0.25 pF 63 V

L1 6850114 0.5 μH

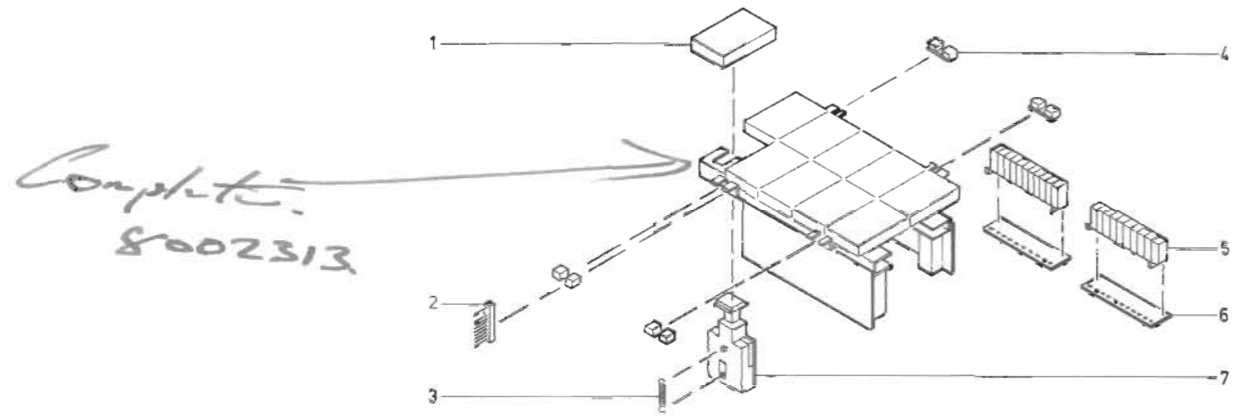
P24 -
P25 7210145 Socket 8 pol.

PARTS LIST FOR 2568368



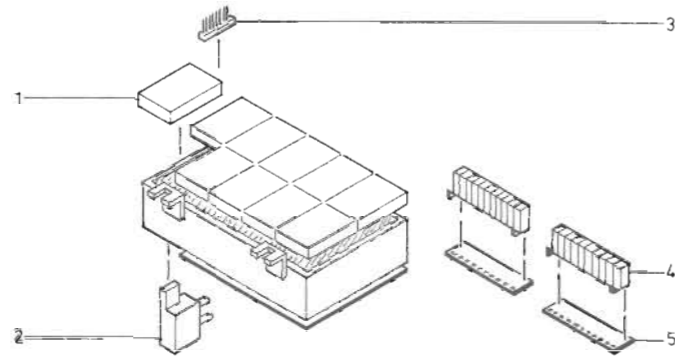
1 3034037 Locking piece	21 2900005 Ball bearing
2 2812073 Spring	22 2568383 Operating panel
3 3030036 Bracket	23 3190070 Pointer
4 2380011 Nut M3	24 3370111 Light emitter
5 2775459 Button	25 3370109 Window, red
6 2812073 Spring	26 3370108 Window, green
7 5310071 Volume potentiometer	27 3151149 Bronze spring
8 2380118 Nut	28 6140641 PC board with cord pulley
9 3131153 Dial background	29 3370110 Window, red
10 6140553 PC board	30 3150043 Housing
11 3151149 Bronze spring	31 2390068 Clip
12 6140580 PC board	32 2854955 Arm
13 2380011 Nut M3	33 6140552 PC board
14 2395019 Spire	34 2390068 Clip
15 4310012 Variable capacitor, complete	35 2395019 Spire
6275347 Wire bundle with socket	36 2900005 Ball bearing
3152227 Clamp for fastening	37 2620028 Rubber washing
5300100 Potentiometer 100 kohms	38 2380116 Nut M4
3122091 Bracket	39 2905073 Arm
17 2036217 Screw AM 2.6 x 8 DIN 84	40 2810086 Spring
18 2724047 Cord wheel	6275349 Wire bundle for lamps
19 2395031 Spire	3955001 Dial cord
20 2794071 Fly wheel	

PARTS LIST FOR 8002313 (PETRICK)



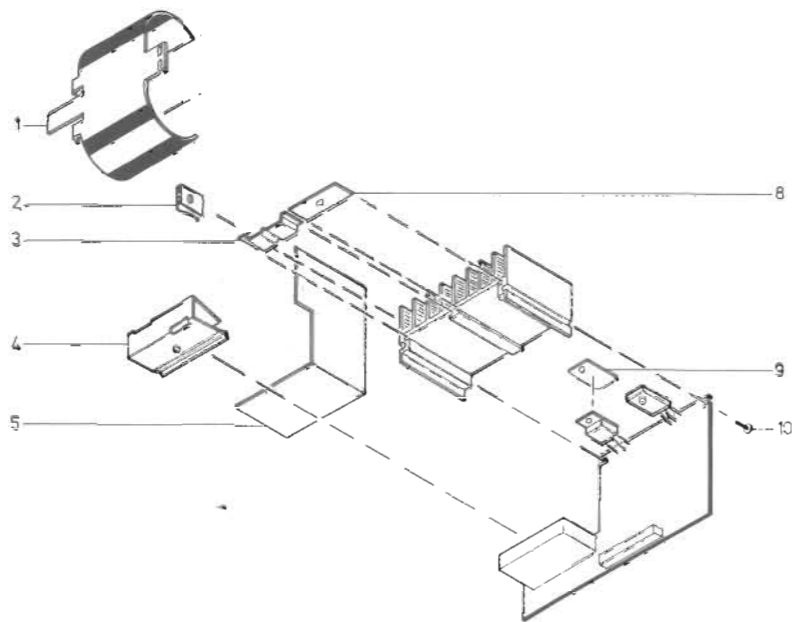
- | | |
|---------------------------|---|
| 1 2775573 Button | 6 6140551 PC board for socket |
| 2 7220116 Plug | 7 7450039 Mains switch mounted with sockets |
| 3 2810092 Spring | 3980033 Glue for buttons |
| 4 3172079 Isolating piece | |
| 5 7210144 Socket | |

PARTS LIST FOR 8002313 (PREH)



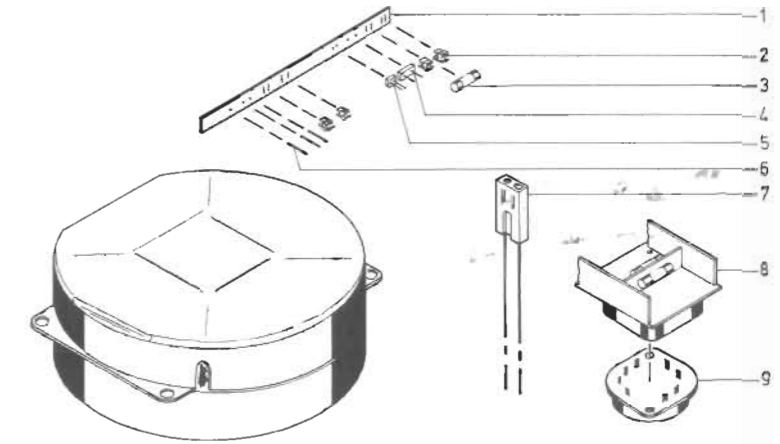
- | | |
|---|-------------------------------|
| 1 2775574 Button | 3 7220116 Plug |
| 2 7450042 Mains switch mounted with sockets | 4 7210144 Socket |
| | 5 6140551 PC board for socket |

PARTS LIST FOR 8002311



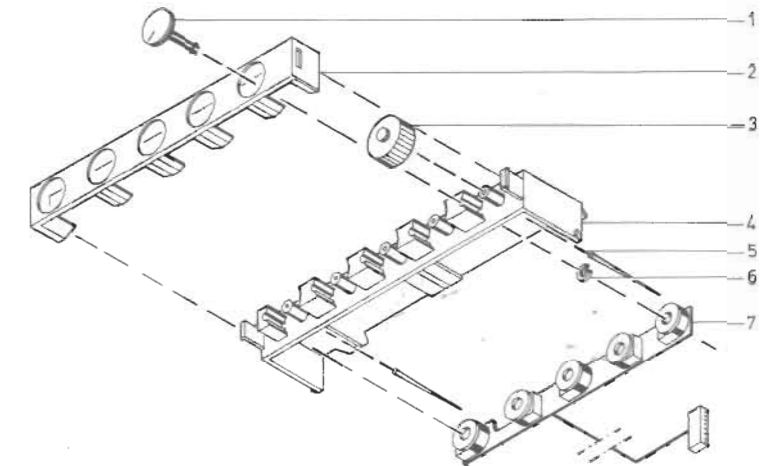
- | | |
|-------------------------|--|
| 1 2514031 Clamp | 8 2816136 Bronze spring |
| 2 2395037 Spire | 9 2622248 Mica sheet TO-220 |
| 3 2816152 Bronze spring | 10 2013212 Screw 2.9 x 6.5 DIN 7981, black |
| 4 2816147 Bronze spring | |
| 5 3358122 Bracket | |

PARTS LIST FOR 8013174



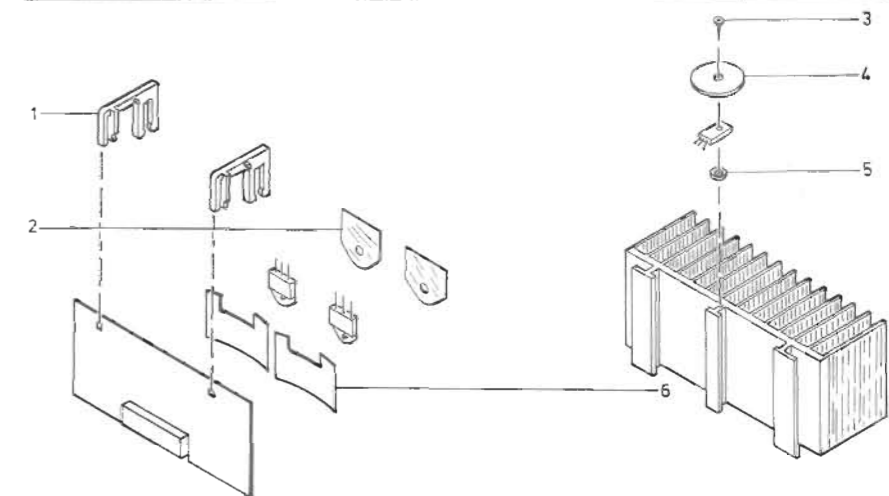
- | | |
|-------------------------------------|------------------------------------|
| 1 6140540 PC board | 6 7500080 Pin |
| 2 7200038 Holder | 7 6273781 Socket, mounted |
| 3 6600006 Fuse 1A - T/250 V IEC 127 | 8 3131139 Housing |
| 4 7220121 Plug | 6600022 Fuse 1.6 A-T/250 S IEC 127 |
| 5 7220129 Plug | 9 7400119 Mains switch |

PARTS LIST FOR 8002333



- | | |
|-------------------|-------------------------------------|
| 1 2700021 Pointer | 5 2994019 Guide pin |
| 2 3164265 Cover | 6 2390046 Locking ring RS4 DIN 6799 |
| 3 2794069 Roll | 7 8002314 PC unit, complete |
| 4 3152211 Holder | 6275348 Wire bundle with plug |

PARTS LIST FOR 8002310



- | | |
|---|------------------------------|
| 1 2515028 Holder | 4 2622270 Isolating washer |
| 2 2622250 Mica sheet TO-3 | 5 2622041 Washer 3.2 DIN 125 |
| 3 2013213 Screw 2.9 x 9.5 DIN 7981, black | 6 2816120 Bronze spring |

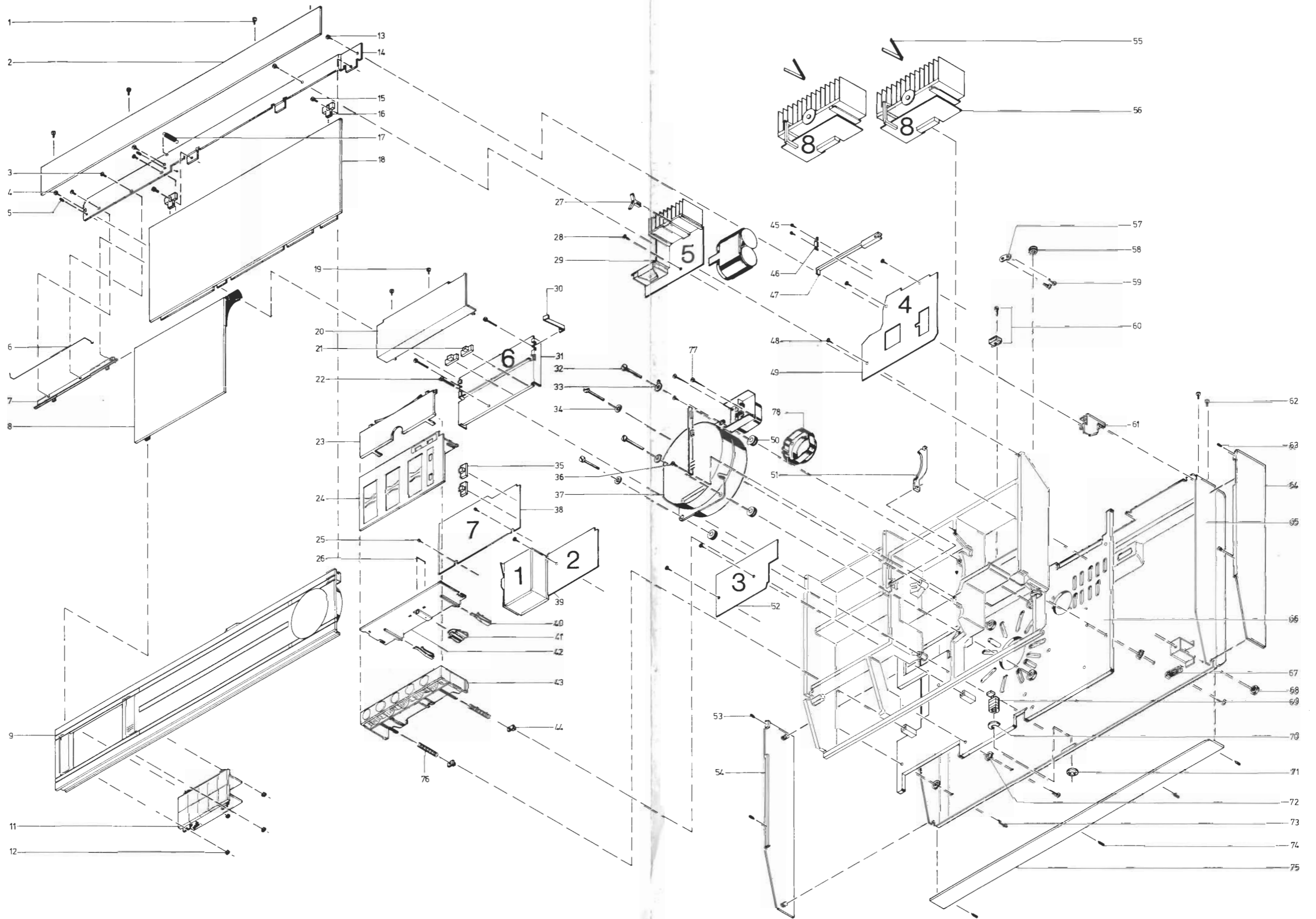
PARTS LIST

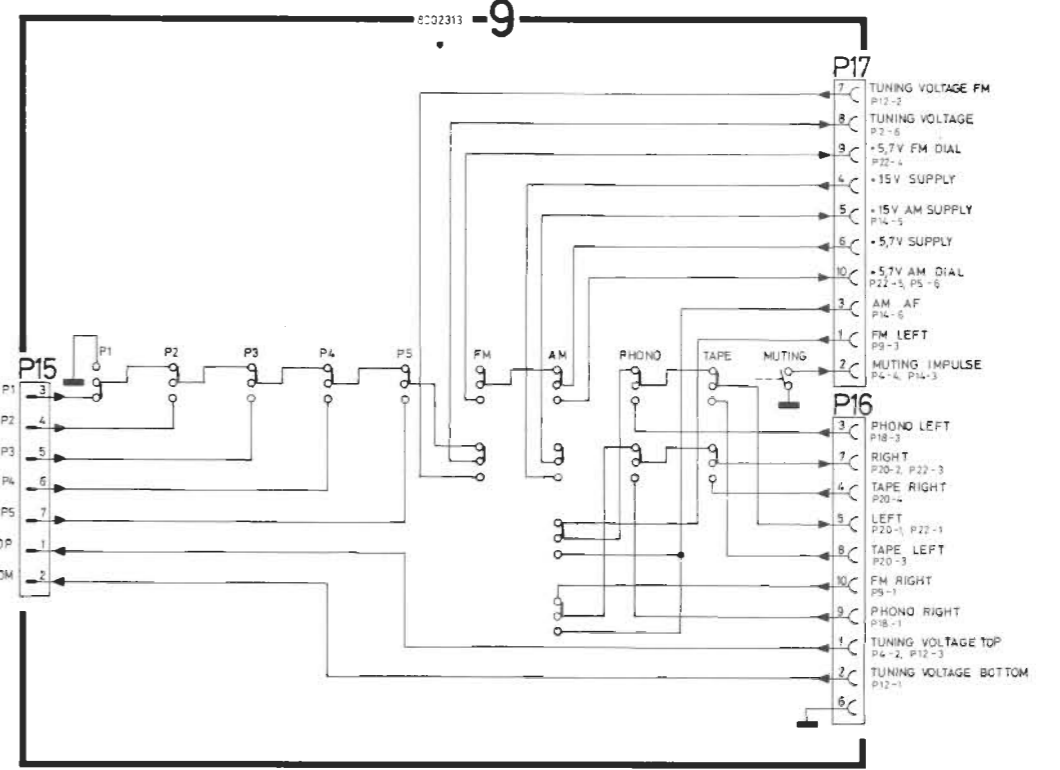
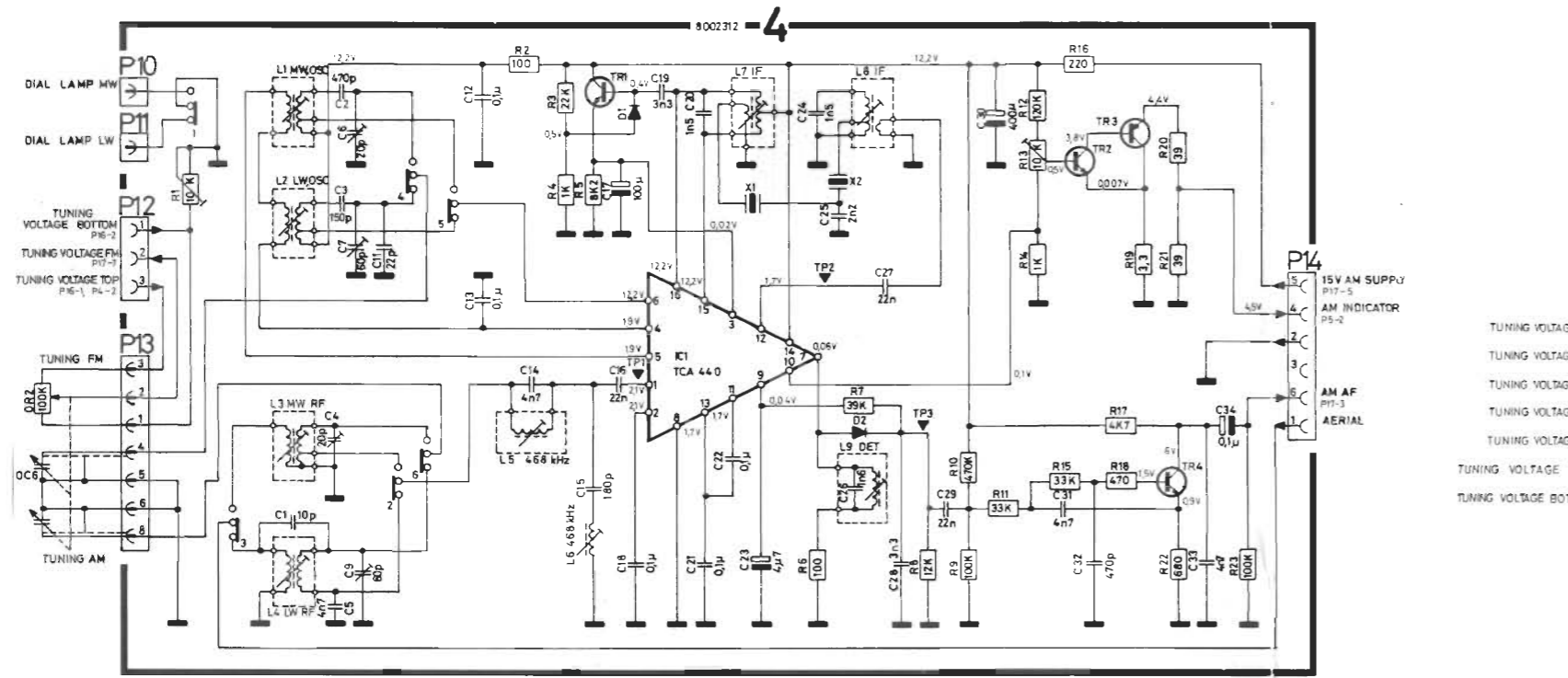
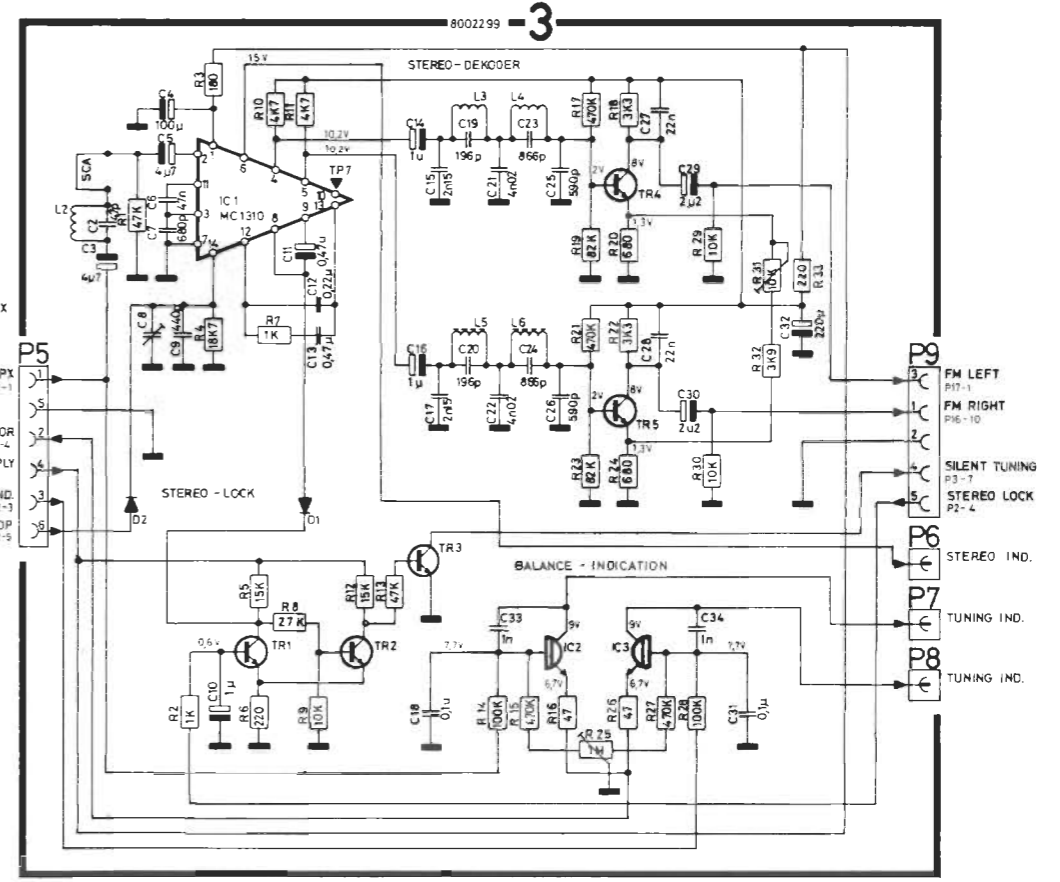
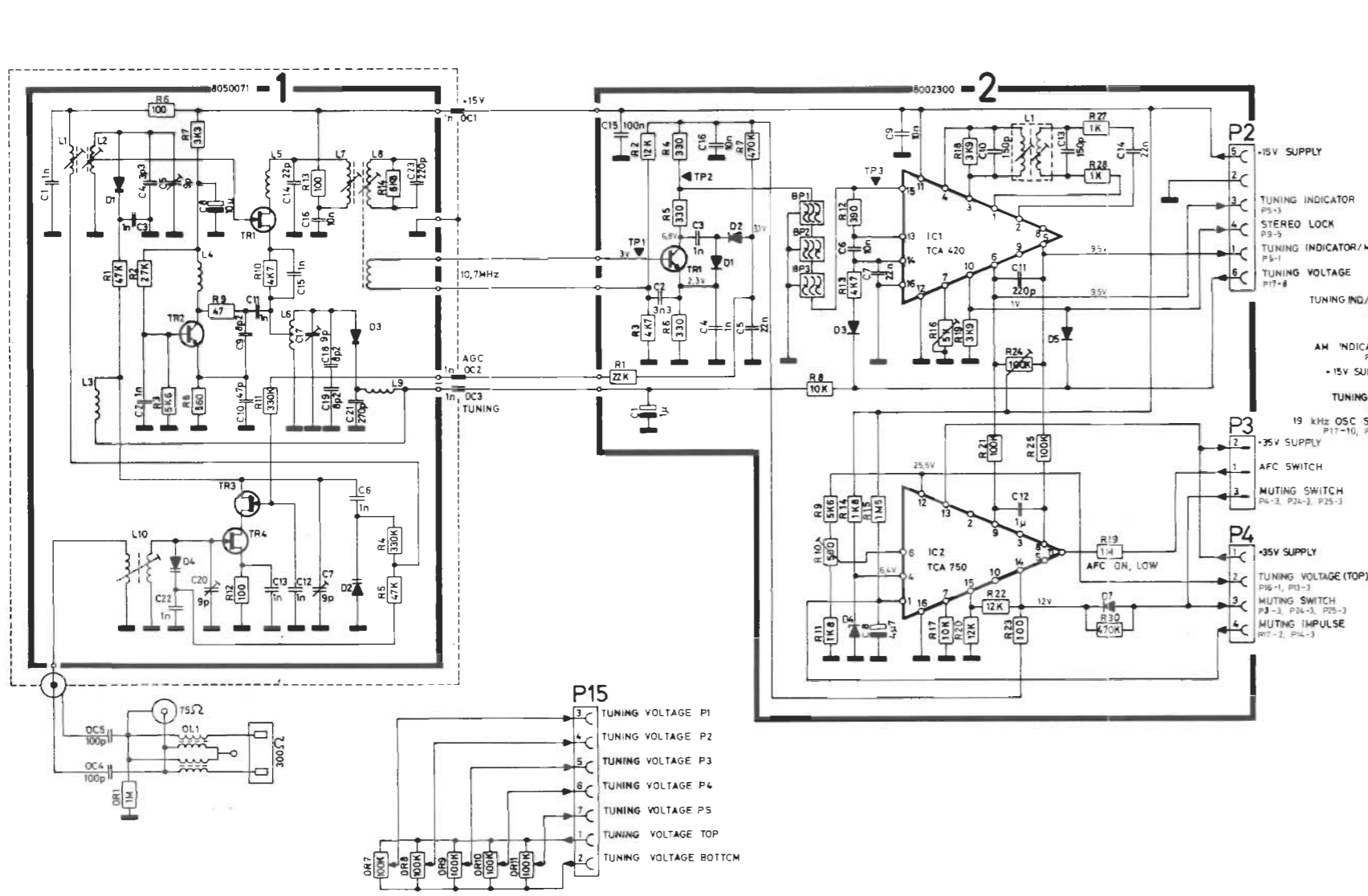
1	2039010	Screw AM 3 x 6 DIN 7985, black	44	3014035	Guide plate
2	2568364	Moulding	45	2011201	Screw 2.2 x 6.5 DIN 7981, black
3	2013008	Screw 2.9 x 6.5 DIN 7982, black	46	3122089	Holder
4	2013213	Screw 2.9 x 9.5 DIN 7981, black	47	2854057	Arm
5	2072916	Threaded pin M3 x 4 DIN 916	48	2013063	Screw 2.9 x 6.5 black
6	2819140	Spring	49	8002312	PC 4
7	3030033	Hinge		2854062	Arm for switch
8	2568385	Cover	50	2938125	Rubber bushing
* 9	2568368	Operating panel, complete	51	3011006	Arm
* 11	8002313	Pushbutton unit, complete	52	8002299	PC 3
12	2380011	Nut M3		3302279	Screen
13	2039010	Screw AM 3 x 6 DIN 7985, black		3302280	Screen, bottom
14	3452270	Bracket	53	2070034	Threaded pin M 3 x 5 DIN 914
15	2039007	Screw AM 3 x 3 DIN 7985	54	3412441	Cabinet (3 parts) teak
16	3034035	Holder		3412443	Cabinet (3 parts) rosewood
17	2810088	Spring		3412444	Cabinet (3 parts) oak
18	2568367	Top plate		3412445	Cabinet (3 parts) white
19	2013212	Screw 2.9 x 6.5 DIN 7981, black	55	2816137	Bronze spring
20	3164253	Cover	* 56	8002310	PC 8, complete
21	2775350	Button	57	3034036	Mains lead clamp
22	2039013	Screw AM 3 x 16 DIN 7985	58	2938125	Rubber bushing
23	3164261	Cover	59	2013213	Screw 2.9 x 9.5 DIN 7981, black
24	3168077	Operating panel	60	3152195	Aerial holder
25	2011004	Screw 2.2 x 4.5 DIN 7981, black	61	2548132	Bracket
26	2819138	Spring	62	2039010	Screw AM 3 x 6 DIN 7985, black
27	2576099	Spacer	63	2070034	Threaded pin M 3 x 5, DIN 914
28	2013063	Screw 2.9 x 6.5, black	64	3412441	Cabinet (3 parts) teak
* 29	8002311	PC 5, complete		3412443	Cabinet (3 parts) rosewood
30	2816056	Bronze spring		3412444	Cabinet (3 parts) oak
31	8002306	PC 6, complete		3412445	Cabinet (3 parts) white
32	2042230	Screw AM 4 x 35 DIN 84	65	3112206	Bottom
33	7530010	Solder tag	66	3454214	Bottom plate, mounted
34	2622024	Washer 4.3		2380016	Nut M4
35	2775350	Button	67	2574059	Support for operating panel
36	2013008	Screw 2.9 x 6.5 DIN 7982, black	68	3035026	Plastic foot
* 37	8013174	Mains transformer, complete	69	6273789	Jack socket, mounted
38	8002309	PC 7	70	2576088	Spacer
39	8002300	PC 1 + 2, complete	71	2389045	Nut
	8050071	PC 1, FM front end	72	2576091	Bushing
	2038201	Screw AM 3 x 3 DIN 84	73	2015066	Screw 3.5 x 16, black
	2816146	Bronze spring	74	2070034	Threaded pin M3 x 5 DIN 914
	3302270	Screen top, detector	75	3412441	Cabinet (3 parts) teak
	3302269	Screen, bottom, detector		3412443	Cabinet (3 parts) rosewood
40	2816138	Bronze spring		3412444	Cabinet (3 parts) oak
41	2816142	Bronze spring		3412445	Cabinet (3 parts) white
42	3014034	Guide plate	76	2812076	Spring
* 43	8002333	Preset unit, complete	77	2013204	Screw 2.9 x 13 DIN 7981
			78	3131050	Housing

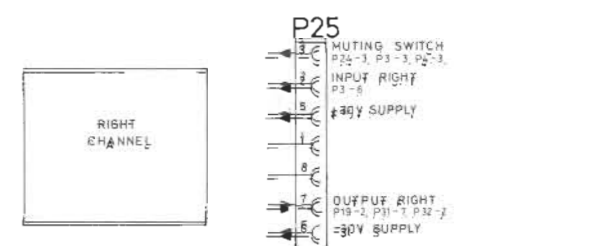
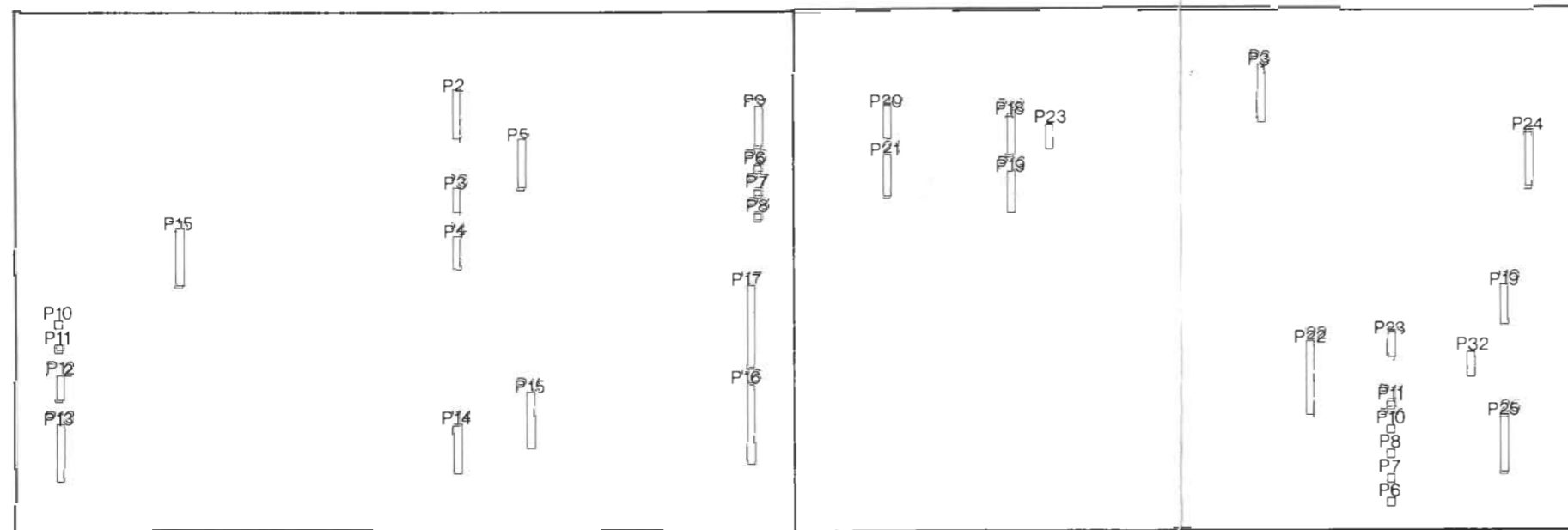
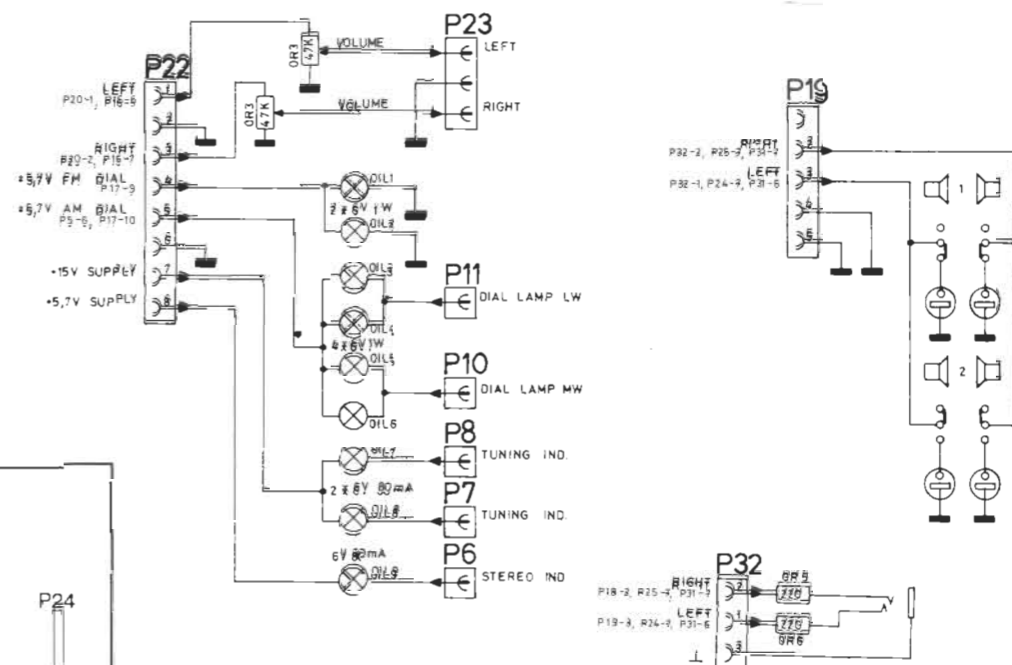
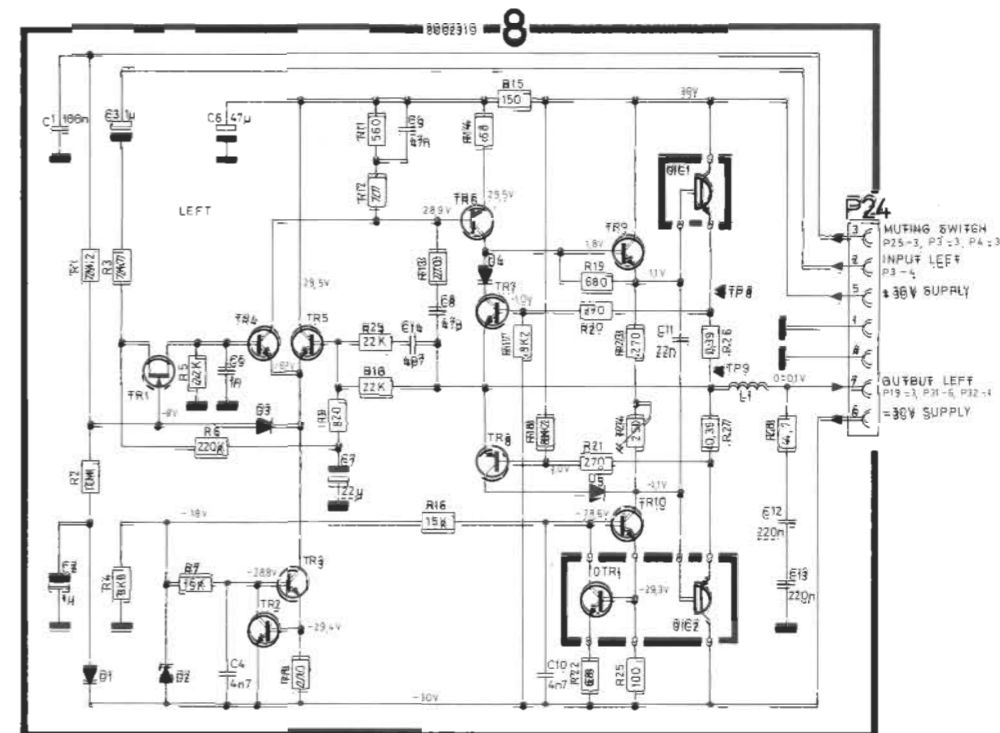
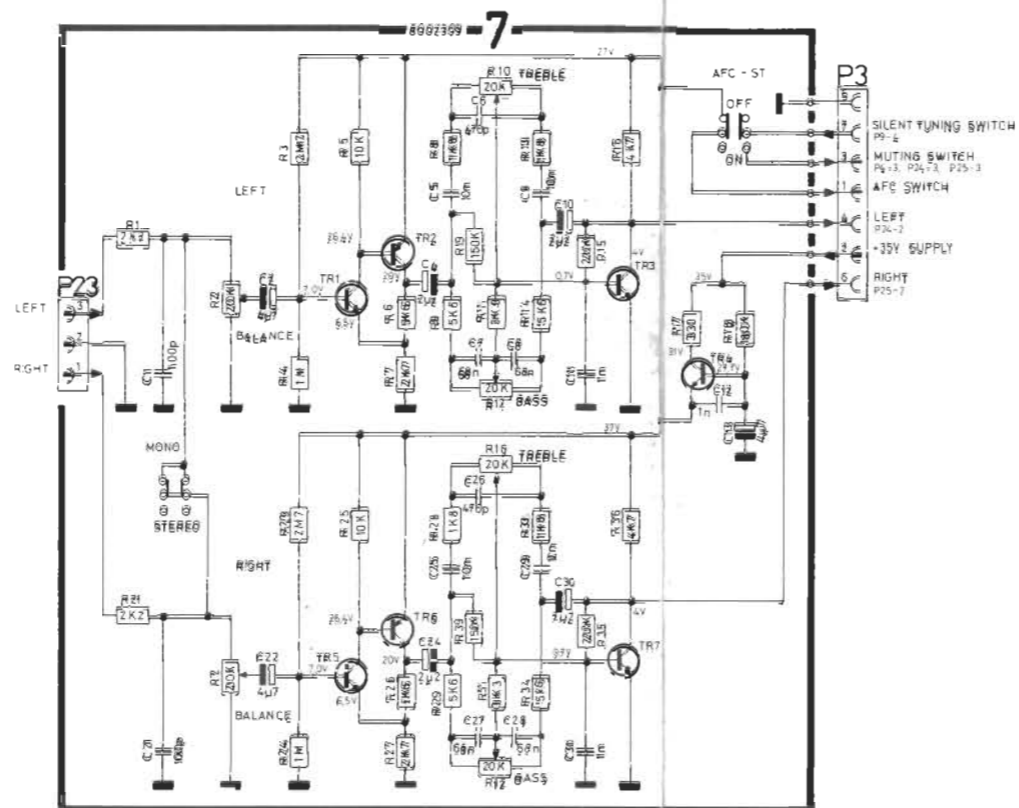
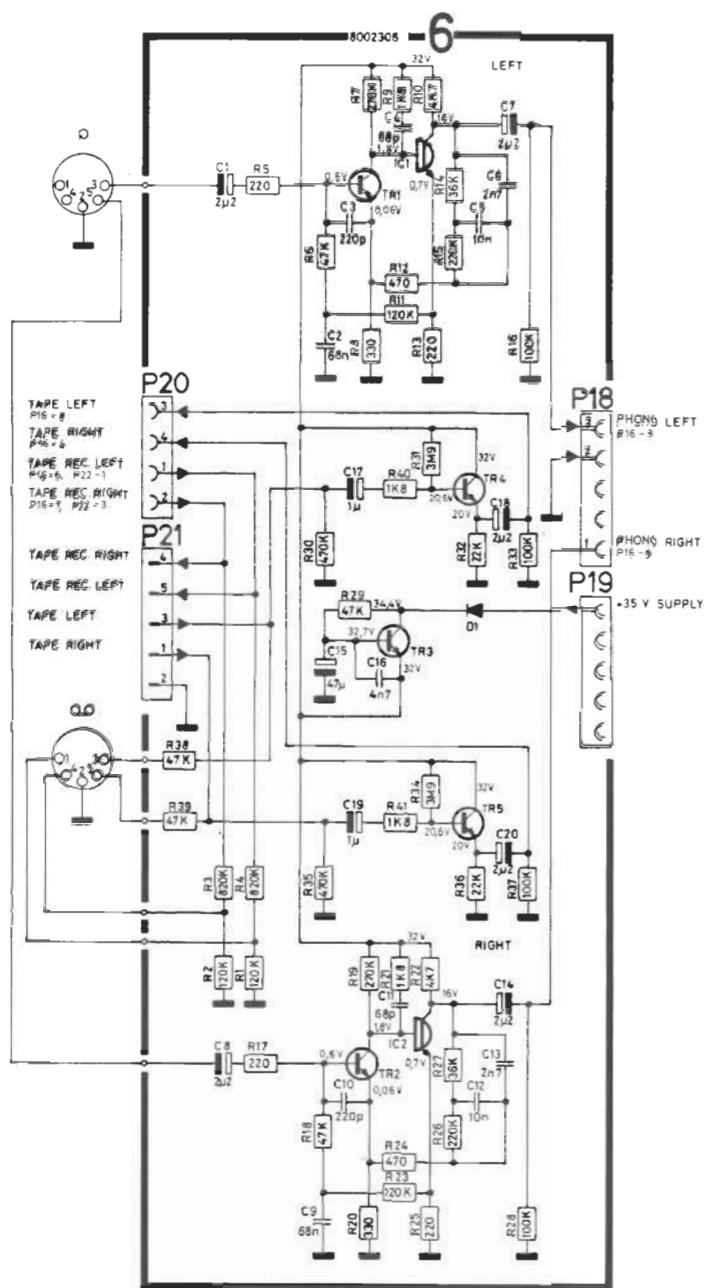
* See separate parts list

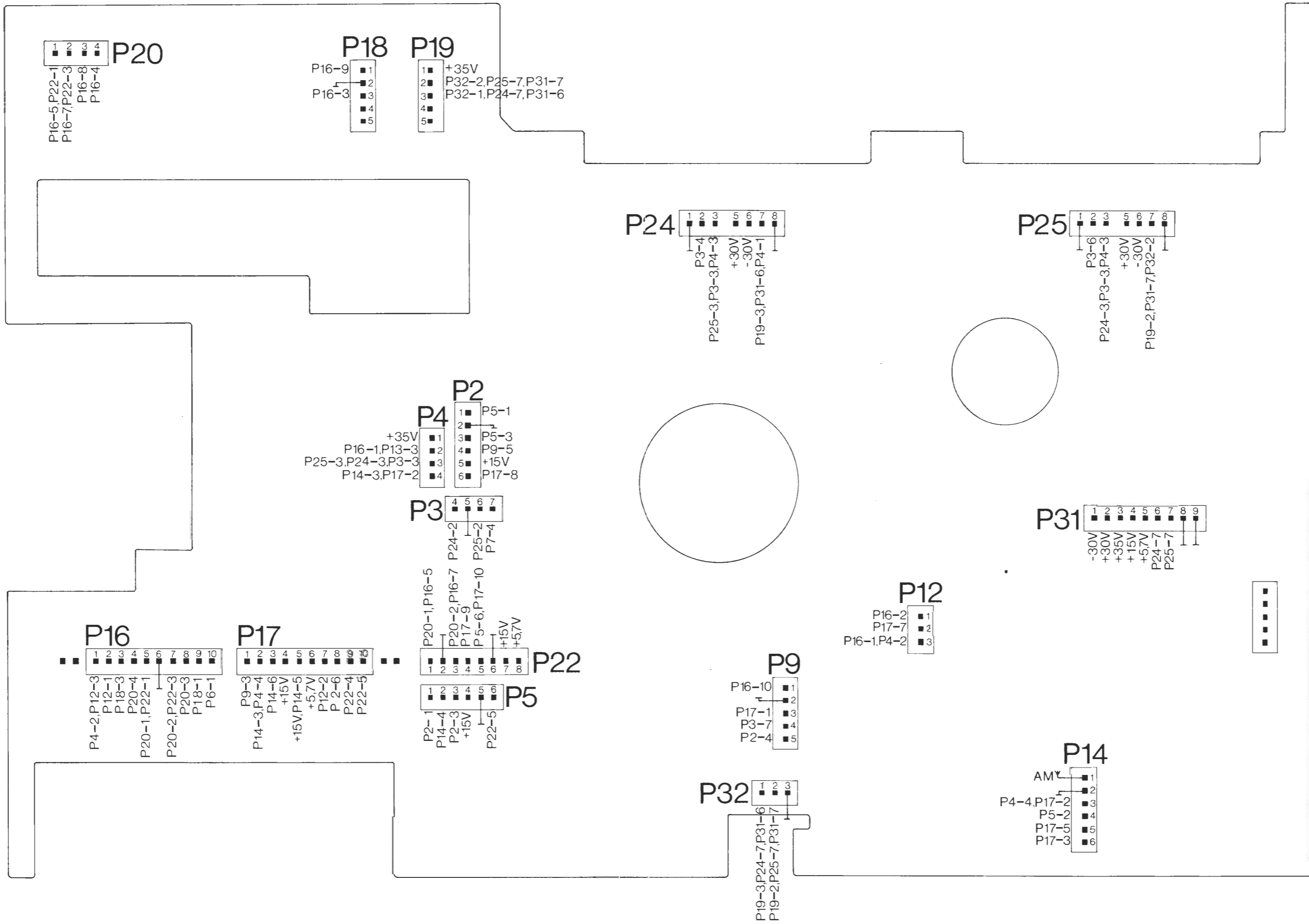
PARTS NOT SHOWN

3391477 Outer carton
 3397266 Foam packing (right)
 3397267 Foam packing (left)
 3532125 Diagramme
 3984005 Lubricant for friction arm
 ROCOL KILOPOISE 0868









POWER SUPPLY, 8002311 PC 5

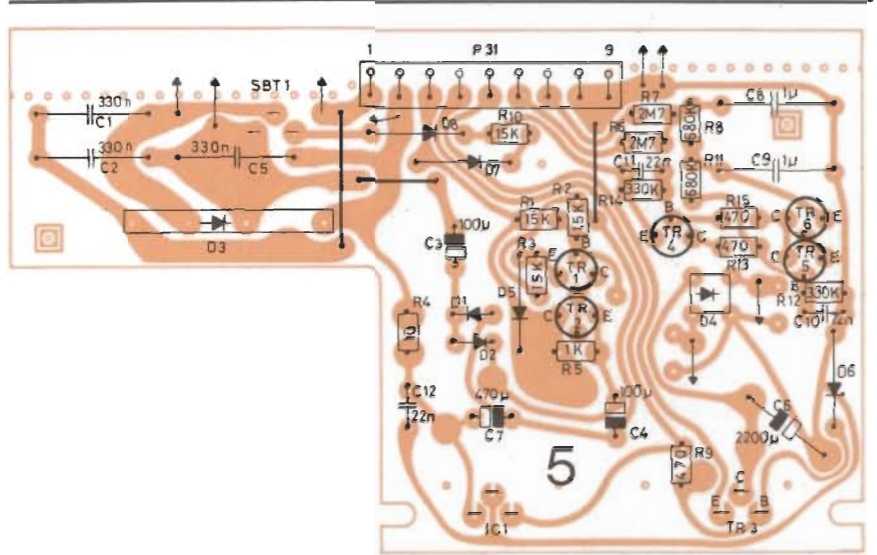
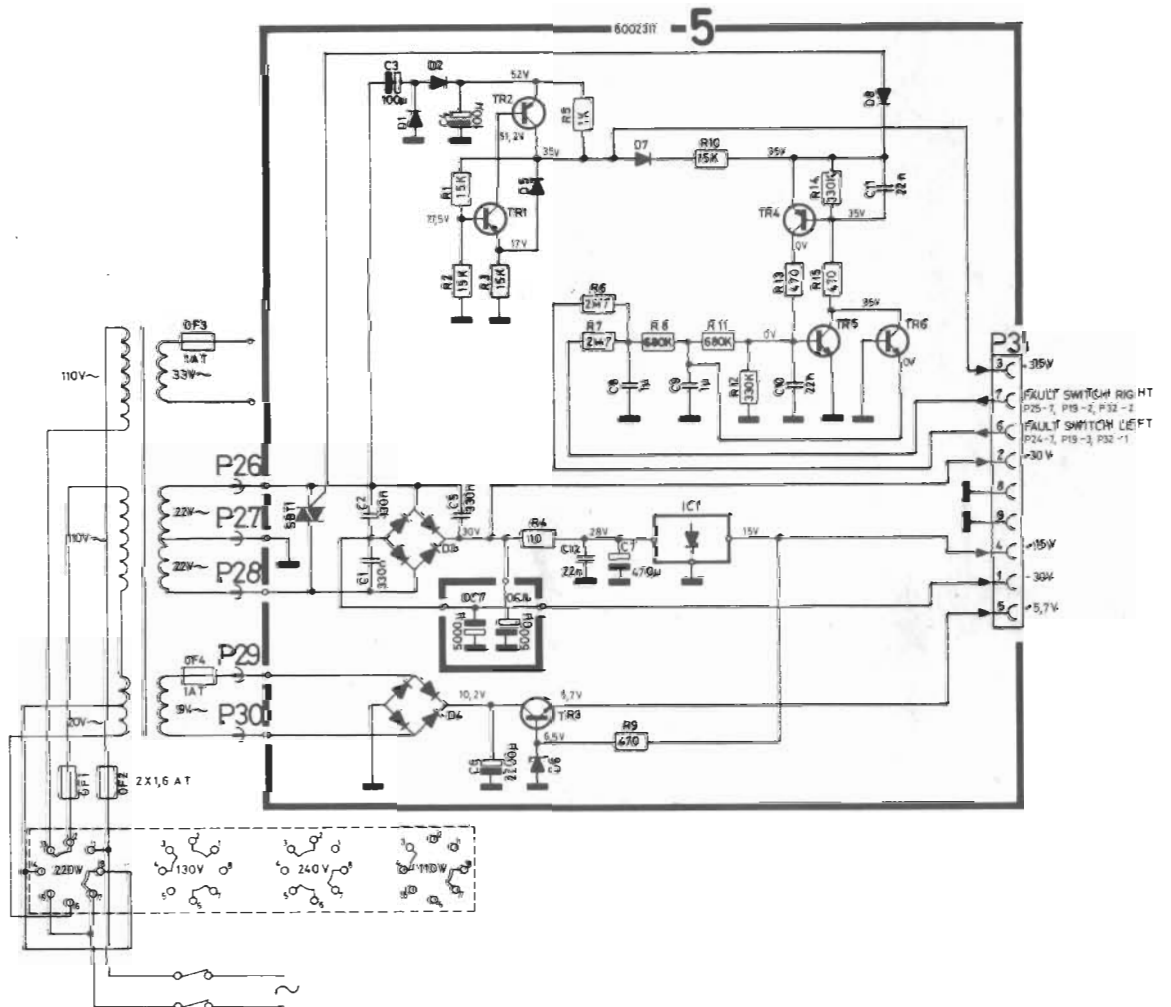
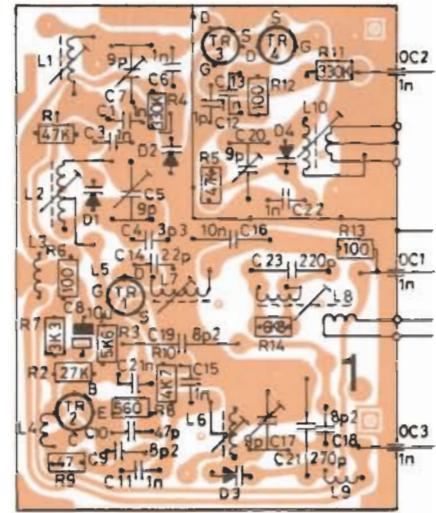


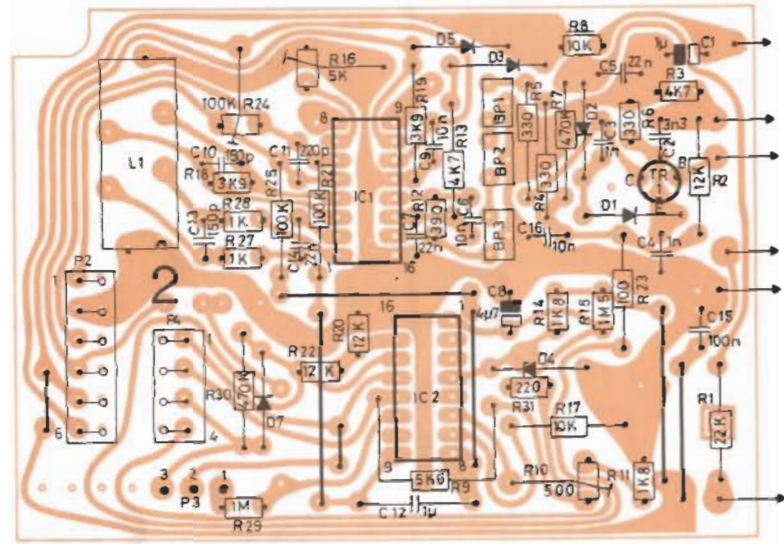
DIAGRAMME FOR PC 5



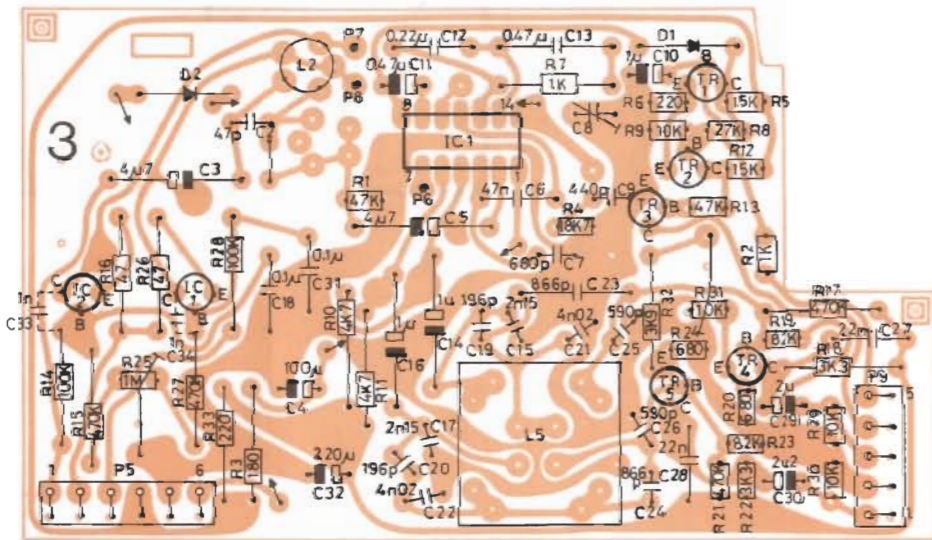
FRONT END, TUNER, 8050071, PC 1



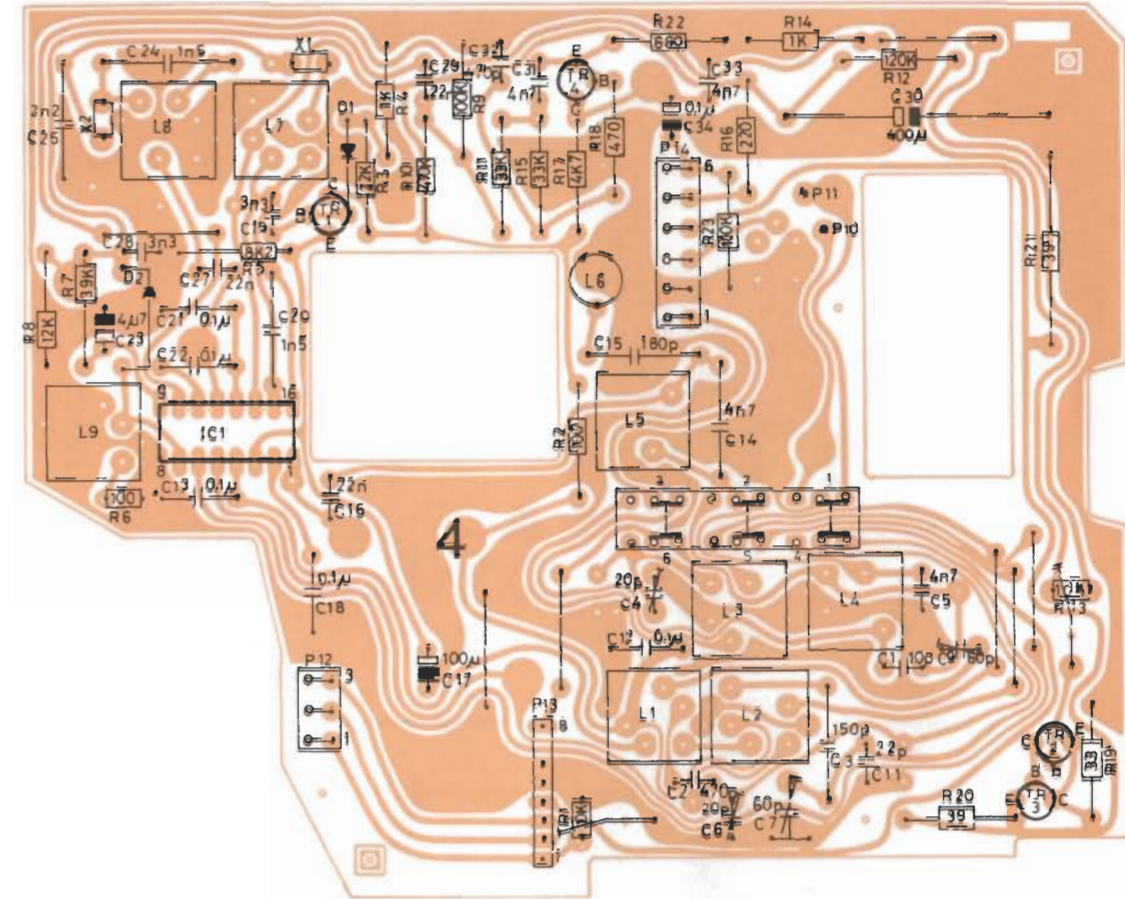
IF SECTION, 8002300, PC 2



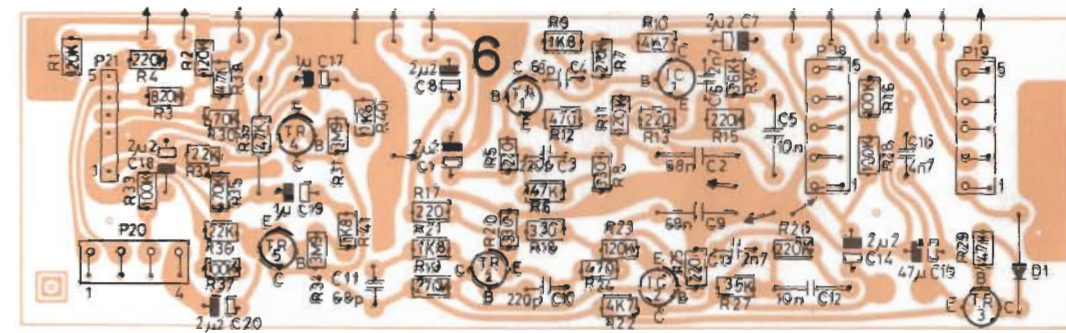
STEREODECODER AND INDICATOR CIRCUIT, 8002299, PC 3



AM SECTION, 8002312, PC 4



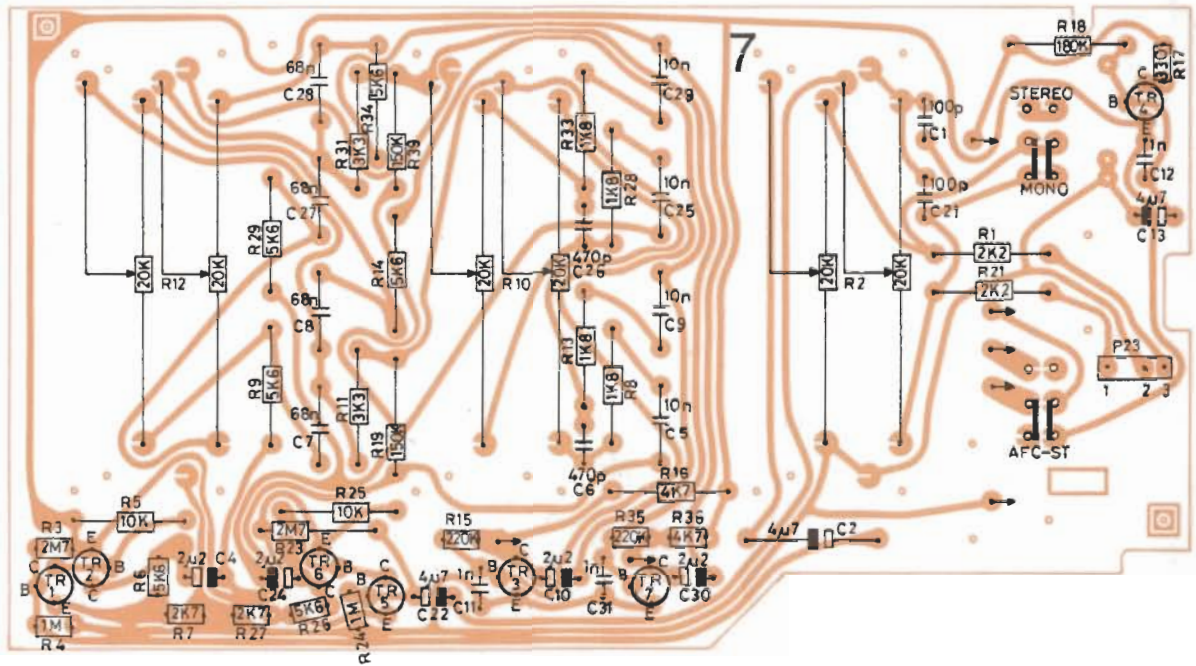
PRE-AMPLIFIER, 8002306, PC 6



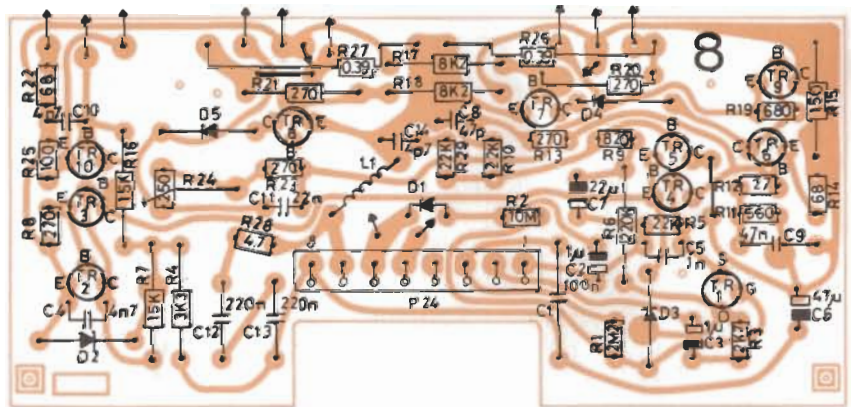
8-7

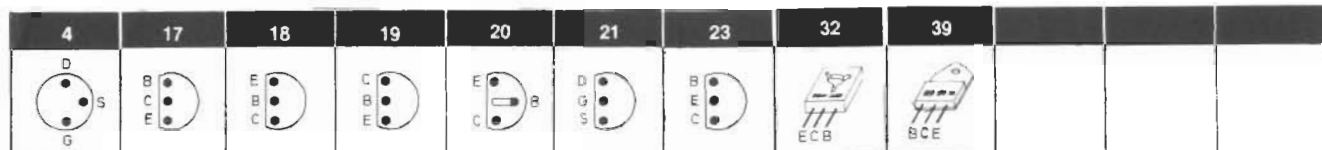
Bang & Olufsen

7
TONE AMPLIFIER, 8002309, PC 7



8
POWER AMPLIFIER, 8002310, PC 8





TRANSISTOR AND IC LIST

OTR1	8320383	32	BO 135
		32	BD 165 S
OIC1	8340042	39	TIP 141
OIC2	8340041	39	TIP 146
1TR1	8320136	21	TIS 88
		4	U 1981 E
		21	SPF 2060
1TR2	8320112	23	BF 495
		23	BF 255
1TR3	8320119	21	TIS 88A
1TR4		21	2N 5245
2TR1	8320311	23	BF 240
2IC1	8340033		TCA 420A
2IC2	8340090		TCA 750
3TR1	8320097	18	BC 547B
3TR2		18	BC 182B
3TR3		17	BC 182BL
		18	BC 237B
		18	BC 171B
3TR4	8320285	18	BF 548C
3TR5			
3IC1	8340103		MC 1310
			MC 1310N
			CA 1310E
3IC2	8340028	19	MPS A13
3IC3		19	SPS 5418
		19	TPS A13
4TR1	8320108	18	BC 172 B
4TR2		18	BC 548 B
		18	BC 183 B
		17	BC 183 BL
		18	BC 238 B
4TR3	8320104	18	BC 558 B
		18	BC 252 B
		18	BC 308 B
		18	BC 313 B
		17	BC 313 BL

4TR4	8320108	18	BC 172B
		18	BC 548B
		18	BC 183B
		17	BC 183BL
		18	BC 238B
4IC1	8340031		TCA 440
5TR1	8320237	20	BC 546 B
5TR2	8320324	19	MPSA 55
5TR3	8320388	32	BD 185
5TR4	8320242	20	BC 556B
5TR5	8320237	20	BC 546B
5TR6			
5IC1	8340064		LM 340T-15 V
			PA 7815 C
			7815 CU
6TR1	8320344	18	BC 550B
6TR2		18	BC 384B
6TR3	8320097	18	BC 547B
		18	BC 182B
		17	BC 182BL
		18	BC 237 B
		18	BC 171B
6TR4	8320095	18	BC 549B
6TR5		18	BC 184BN
6IC1	8340054	19	MPSA 13
6IC2		19	TPSA 13
7TR1	8320095	18	BC 549B
		18	BC 184BN
7TR2	8320069	18	BC 559B
		18	BC 214B
		17	BC 214BL
7TR3	8320095	18	BC 549B
		18	BC 184BN
7TR4	8320097	18	BC 547B
		18	BC 182B
		17	BC 182BL
		18	BC 237B
		18	BC 171B
7TR5	8320095	18	BC 549B
		18	BC 184BN

7TR6	8320069	18	BC 559B
		18	BC 214B
		17	BC 214BL
7TR7	830095	18	BC 549B
		18	BC 184BN
8TR1	8320119	21	TIS 88A
		21	2N 5245
8TR2	8320108	18	BC 548B
		18	BC 183B
		17	BC 183BL
		18	BC 238B
		18	BC 172B
8TR3	8320097	18	BC 547B
		18	BC 182B
		17	BC 182 BL
		18	BC 237 B
		18	BC 171B
8TR4	8320377	18	BC 547C
8TR5		18	BC 182C
		17	BC 182CL
8TR6	8320365	19	MPSH 54
8TR7	8320108	18	BC 548B
		18	BC 183B
		17	BC 183BL
		18	BC 238
		18	BC 172B
8TR8	8320104	18	BC 558B
		18	BC 213B
		17	BC 213 BL
		18	BC 308B
		18	BC 252B
8TR9	8320321	19	MPSA 06
8TR10			

DIODE LIST

1D1-1D2	8300041	BB103 green	5D4	8300247	B40C1500
1D3-1D4	8300050	BB103 blue BAX 13	5D5	8300031	ZPD 18 V BZX 18 V
2D1-2D3	8300058	SFD 184 IN 4148	5D6	8300286	ZN 6,5 V
2D4	8300283	6,4 V 5 %	5D7-5D8	8300058	SFD 184 IN 4148
2D5-2D7	8300058	SFD 184 IN 4148	5SCS1	8300230	2N 6342 A/W
3D1-3D2	8300058	SFD 184 IN 4148	6D1	8300058	SFD 184 IN 4148
4D1	8300058	SFD 184 IN 4148	8D1	8300058	SFD 184
4D2	8300024	AA119	8D3		IN 4148
5D1-5D2	8300023	IN 4002	8D4-8D5		
5D3	8300275	B80C5000/3300	8D2	3300029	BZX 79-12V
			8D3-8D5	8300058	SFD 184 IN 4148

MÅLEBETINGELSER
FOR DIAGRAM

DC spændinger er målt i forhold til stel med voltmeter (indre modstand 11 Mohm).
Spændingerne er målt uden signal, med henholdsvis FM og AM knap nedtrykket.
FM signalniveauer er målt ved Δf 40 kHz, f. mod. 1 kHz og antennesignal på 0,5 mV (1 mV EMK).
LF følsomheder er målt ved 40 W output.
Balance, bas, diskant på 0, volume på max.
Udgang belastet med 4 ohm, input 1 kHz.

MEASURING CONDITIONS
FOR DIAGRAM

DC voltages are measured in relation to chassis with voltmeter (inner resistance 11 Mohms).
Voltages are measured without signal, with FM and AM button, respectively, depressed.
FM signal levels are measured at Δf 40 kHz, f. mod. 1 kHz, and aerial signal of 0,5 mV (1 mV EMK).
AF sensitivities are measured at 40 W output.
Balance, bass, treble on 0, volume on max.
Output loaded with 4 ohms, input 1 kHz.

MESSBEDINGUNGEN FÜR
SCHALTBILD

DC spændinger er målt i forhold til stel med voltmeter (indre modstand 11 Mohm).
Spændingerne er målt uden signal, med henholdsvis FM og AM knap nedtrykket.
FM signalniveauer er målt ved Δf 40 kHz, f. mod. 1 kHz og antennesignal på 0,5 mV (1 mV EMK).
LF følsomheder er målt ved 40 W output.
Balance, bas, diskant på 0, volume på max.
Udgang belastet med 4 ohm, input 1 kHz.

FORKLARING TIL
DIAGRAMMER

Alle stikforbindelser er forsynet med et stiknummer og et antal bennumre, f. eks. P3, bennumre 1 til 3. Endvidere er anført til hvilken eller hvilke stikken forbindelsen går hen, f. eks. MUTING SWITCH P4 - 3, P24 - 3 og P25 - 3, og det betyder at der er forbindelse til ialt 3 andre stik.
Fødespændinger, som er forbundet til et større antal stik, benævnes blot med f. eks. +35 V SUPPLY.







-  Hunstik på printplade eller korte ledninger, der sluttes til stikken i bundpladen.
-  Stikken på printplade.
-  Øvrige han- og hunstikforbindelser, f. eks. til nettransformator og indikatorlamper.




DIAGRAM
DESIGNATIONS

All plug connections have a plug number and a number of pin numbers, e. g. P3, pin numbers 1 to 3. Also indicated are pin destinations of individual connections, e. g. MUTING SWITCH P4 - 3, P24 - 3 and P25 - 3, meaning that the connection goes to a total of three other plugs.
Supply voltages connected to a large number of plugs simply carry such designations as +35 V SUPPLY.

-  Female plug on PC board, or short leads that are connected to plug pins in the bottom plate.
-  Plug pin on PC board.
-  Other male and female plug connections, e. g. to mains transformer and indicator lamps.

ERKLÄRUNG ZU DEN
SCHALTBILDERN

Alle Steckerverbindungen sind mit einer Steckernummer und einer Anzahl Stiftnummern, z. B. P3, Stiftnummern von 1 bis 3, versehen. Ferner ist angeführt, zu welchen Stift oder Stiften die Verbindung hingehet, z. B. MUTING SWITCH P4-3, P24-3 und P25-3, und dies bedeutet, das Verbindung an insgesamt drei anderen Steckern besteht.
Speisespannungen, die an eine größere Anzahl Stecker angeschlossen sind, werden bloß mit beispielsweise +35 V SUPPLY bezeichnet.

-  Buchse auf der Leiterplatte oder kurze Leitungen, die an Steckerstifte auf der Bodenplatte angeschlossen werden.
-  Steckerstifte auf der Bodenplatte.
-  Sonstige Stecker- und Buchsenverbindungen, beispielsweise an Netztransformator und Anzeigelampen.

FM SIGNALNIVEAUER/
FM SIGNAL LEVELS/
UKW SIGNALNIVEAUS

2TP1	20 mV
2TP2	500 mV
2TP3	50 mV

FØLSOMHEDER/
SENSITIVITIES/
EMPFINDLICHKEITEN

P24, pin 2	520 mV	P16, pin 7	200 mV
P25, pin 2	520 mV	Phono	2,2 mV
P16, pin 5	200 mV	Tape	220 mV

TESTPUNKTER/TESTPOINTS/
TESTPUNKTE

2IC2, pin 12	Tuning voltage, top	2IC1, pin 5 and 6	FM detector balance
P12, pin 1	Tuning voltage, bottom	3TP7	19 kHz
2IC1, pin 10	FM IF	4TP1	AM input signal
2IC1, pin 5	FM detector output	4TP3	AM - IF