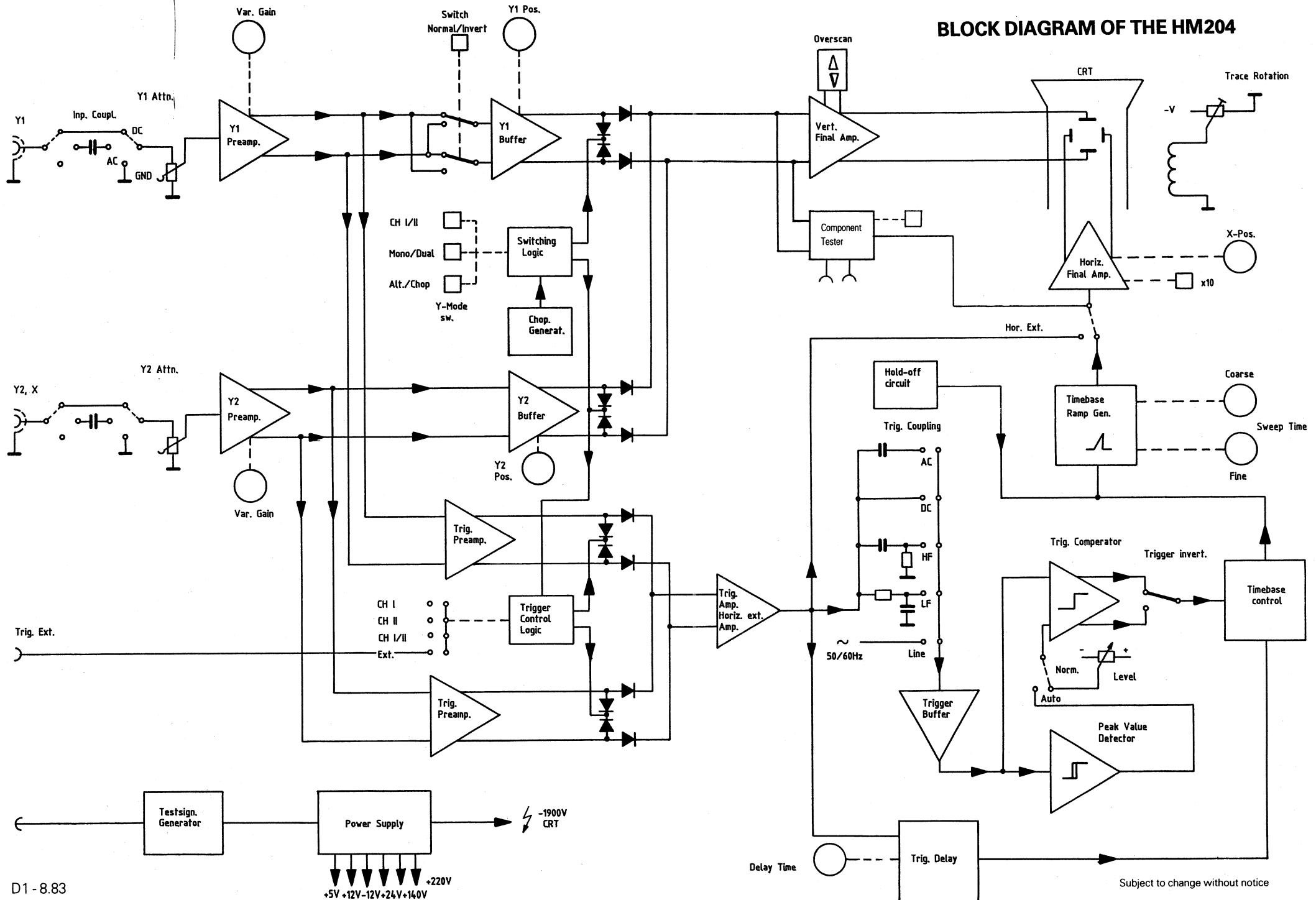


SERVICEANLEITUNG

HAMEE

BLOCK DIAGRAM OF THE HM204



IDENTIFICATION OF ELECTRICAL COMPONENTS HM204

Electrical components on certain parts of the HM204 are marked such that the first numeral is on:

Chassis

Y-inputs, Trig. ext. input, Component tester connector, Eyelet (Calibrator), Trace rotation coil, LED, Appliance inlet, Power switch, Power transformer

EY-Board I + II

Attenuator and Preamplifier Ch.I + II

XY-Board

Y-Intermediate amplifier Ch.I + II, Channel selection flip-flop, Y-Gate driver stages, Chopper generator, Trig. and ext. X-Signal amplifier, Trig. gate driver stages, Component tester, X-Final amplifier, LV-Power, Calibrator, Check point strip 8-13

Trigger Board (TB-Board)

Trigger circuit, Timebase circuit, Unblanking circuit, HV-Power, LV-Power 12V_x, Check point strip 1-7

SY-Board

Trigger sign. final ampl.,

YF-Board

Y-Final amplifier, overscan circuit

CRT-Board

CRT

DEL-Board

Trigger selector

TR-Board

IF-Board

Resistor Identification

-  Resistor 0.25W 2% (carbon film)
-  Resistor 0.25W 1% tc = 50·10⁶/K (metal film)
-  Resistor 0.25W 0.5% tc = 50·10⁶/K (metal film)
-  Resistor 0.5W 2% (or for HV) (carbon film)
-  Resistor 4W 2% tc = 400·10⁶/K (metal oxide film)

Check strip

on Trigger Board

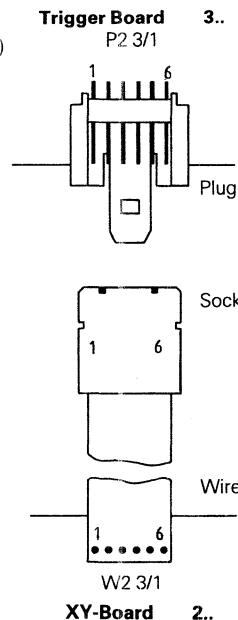
on XY-Board

7	•	22V (–1900V)	13	•	⊥
6	•	–1900V	12	•	+ 1,45V (–12V antipole)
5	•	n.c.	11	•	+220 V
4	•	– 12V	10	•	+140 V
3	•	+ 5V	9	•	+ 6,9 V
2	•	+ 12V _x	8	•	⊥
1	•	+ 24V			

Front

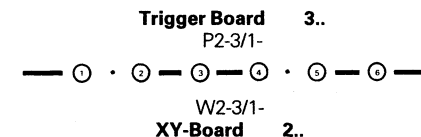
Abbreviations

Al...	Appliance inlet
BR...	Bridge rectifier (Silicium)
C...	Capacitor (fixed)
ChP...	Check point
CN...	Connector
CRT...	Cathode-ray tube
D...	Diode (Silicium)
E...	Eyelet (Calibrator)
F...	Fuse
IC...	Integrated Circuit
L...	Inductor, Coil
LED...	Light emitting diode
P...	Plug
R...	Resistor (fixed)
S...	Switch
T...	Transistor (Silicium)
TR...	Transformer
VC...	Variable capacitor
VR...	Variable resistor
W...	Wire
Z...	Z-Diode



Example: P2-3/1-5 or W2-3/1-5 respectively.

- P = Flat cable plug (soldered on board).
- W = Flat cable wiring (directly soldered on board) with socket (movable).
- 2-3 = Connection between Board 2 (XY-Board) and Board 3 (Trigger-Board).
- 1 = First flat cable connection between Board 2 and 3.
- 5 = Serial number of the wire (in the flat cable).



Color-Abbreviations for insulated wire

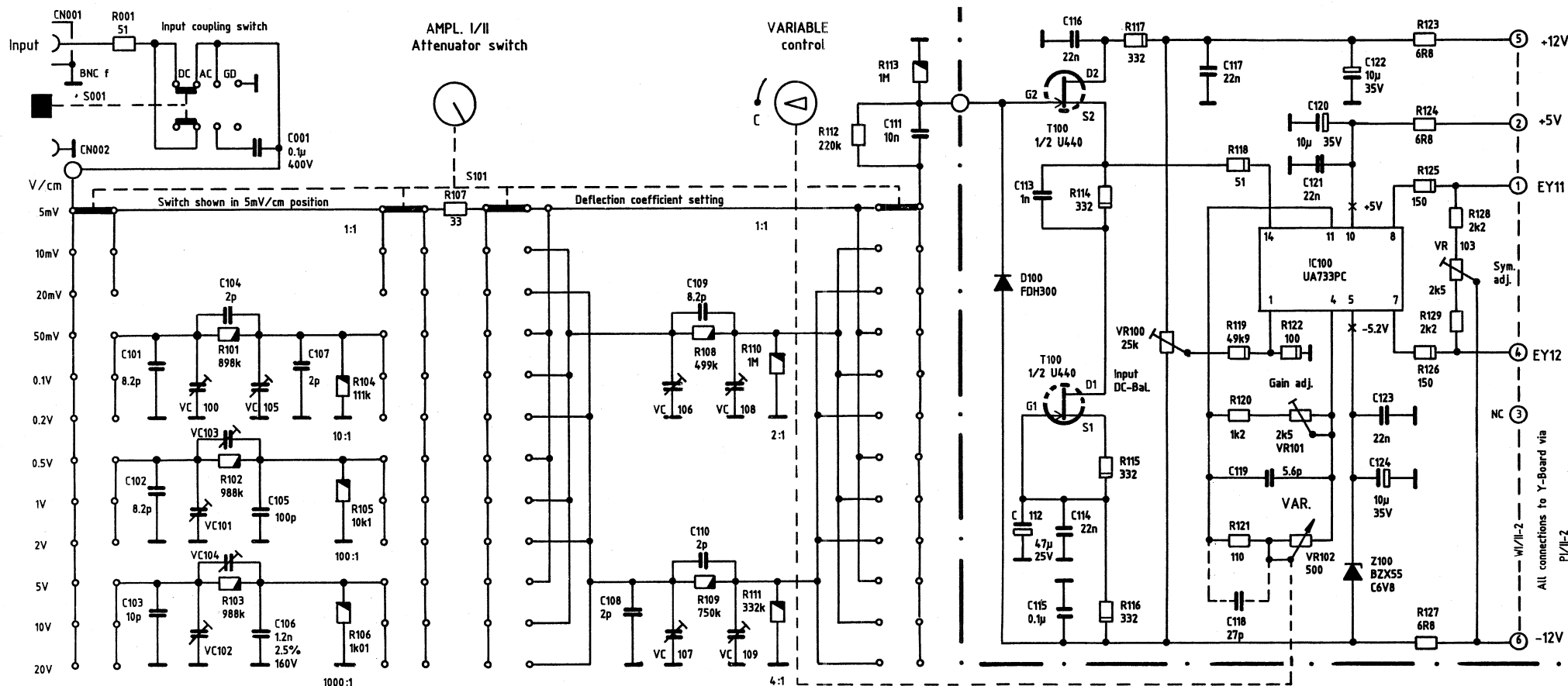
bk = black	ye = yellow	gr = grey
bn = brown	gn = green	wh = white
rd = red	bl = blue	trp = transparent
or = orange	vi = violet	gn/ye = green/yellow stripe

Types and Terminals of Transistors and some ICs	BC237B BC550C BC557B BF297	BF199 BF440	BF422 BF423	BF458 BF459 BUX86/87 BD232	BSX 19	U440	78XXCU The –12V Regulator requires an insulation for package and screw to the chassis.
Bottom View							
Top View							

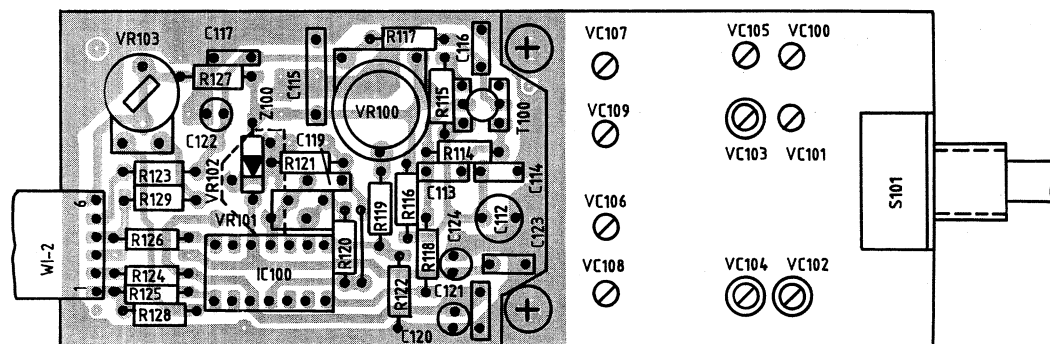
Y-INPUT AND ATTENUATOR CH.I AND CH.II

HM204

Y-PREAMPLIFIER CH.I AND CH.II (Preamp. Board)



Component Locations Preamp. Board and Unit



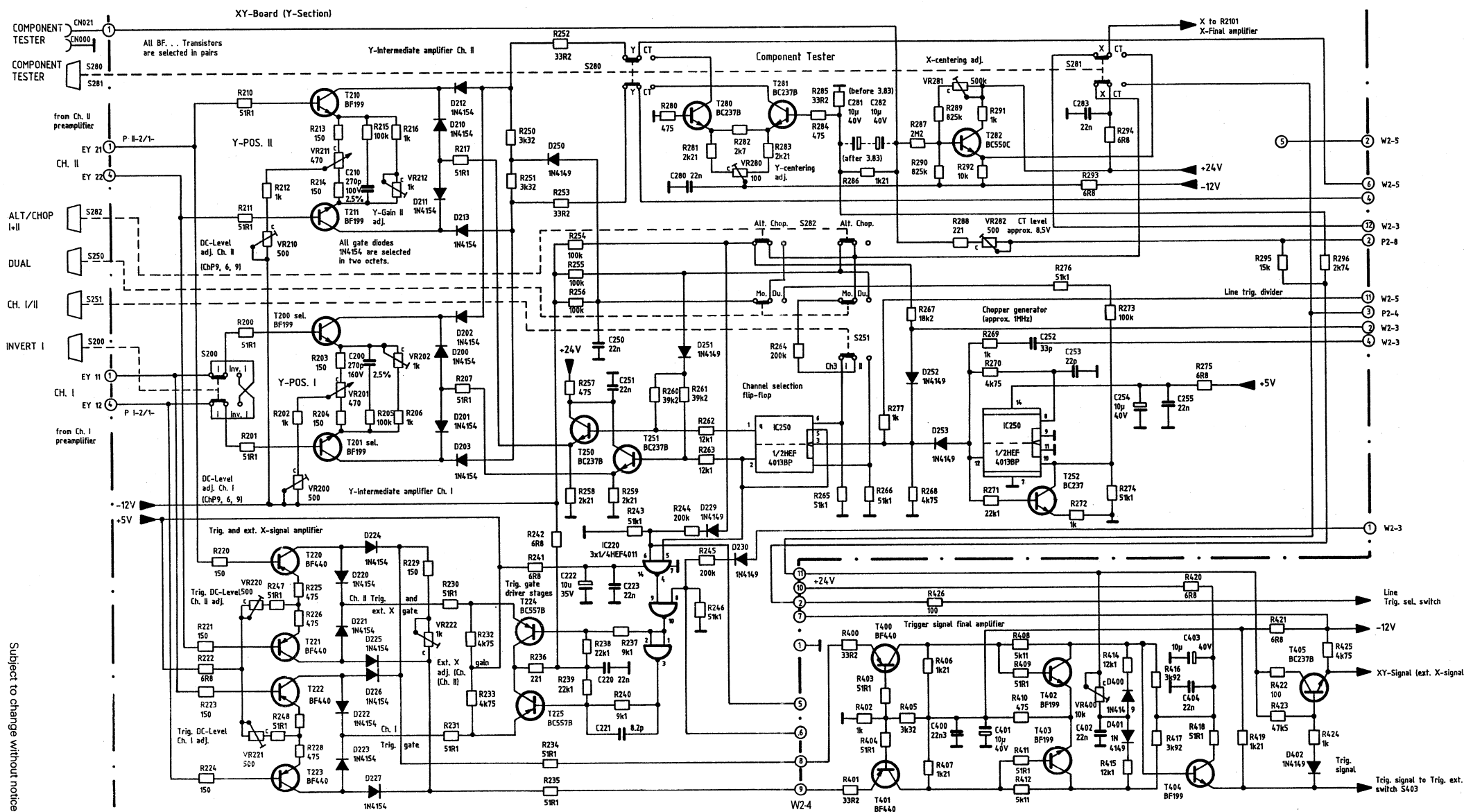
All components on this page exist in both vertical input units.
Distinctive mark (example):
T 100-I refers to CH.I
T 100-II refers to CH.II

All attenuator trimmers
0.8-3pF $t_c = -200 \cdot 10^{-6}/K$ 400V
except VC105
1-5.5pF $t_c = -300 \cdot 10^{-6}/K$ 400V

All attenuator metal film resistors
0.5% $t_c = 50 \cdot 10^{-6}/K$ 0.25W

All fixed capacitors
up to 10pF: $2.5\% \pm 0.25pF$
 $t_c = NPO$ 400V

Y-INTERMEDIATE AMPLIFIER CH.I + CH.II, CHANNEL FLIP-FLOP, CHOPPER GENERATOR, GATES, TRIG. AND X-SIGN. AMPLIFIER, TRIG. SIGNAL FINAL AMPL., COMPONENT TESTER HM204

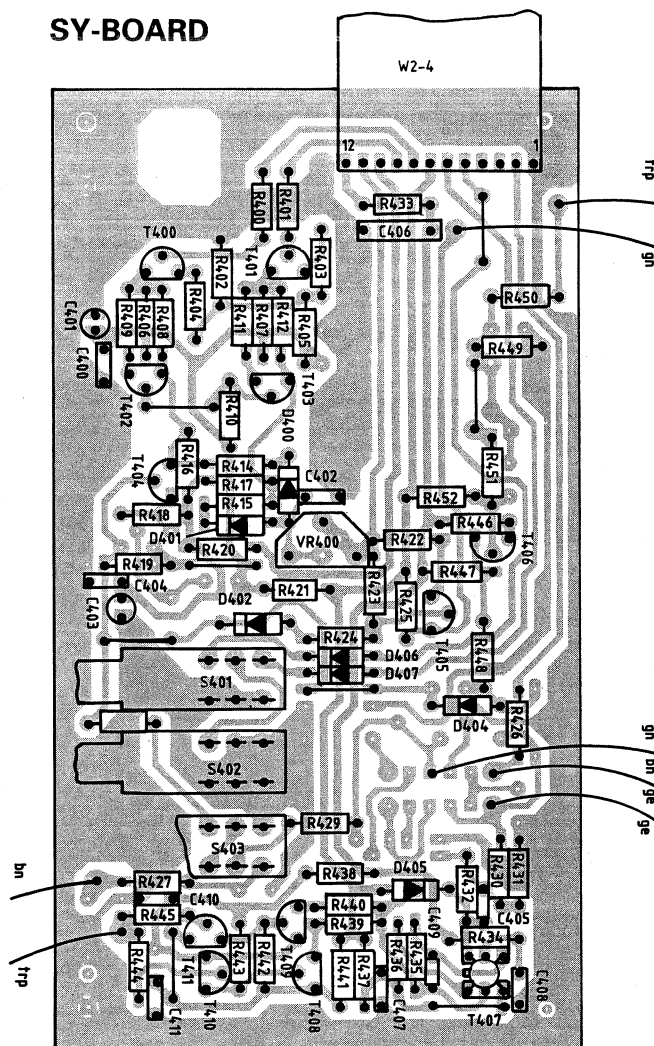




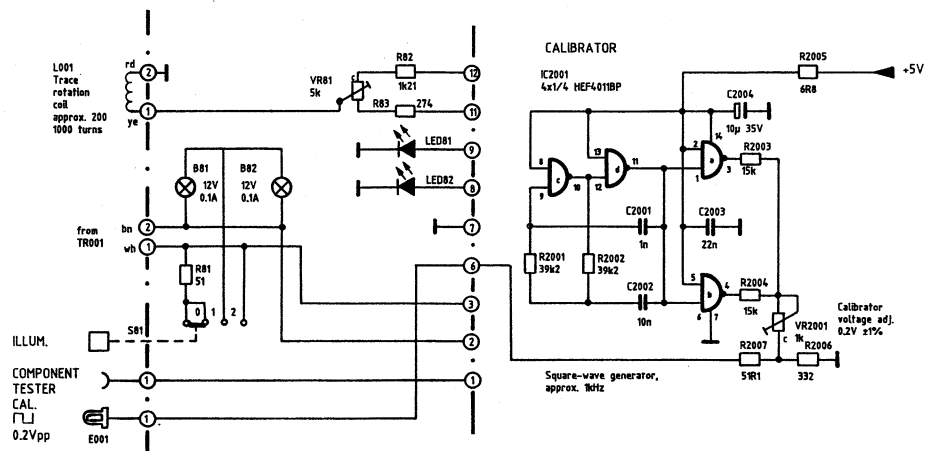
HM204



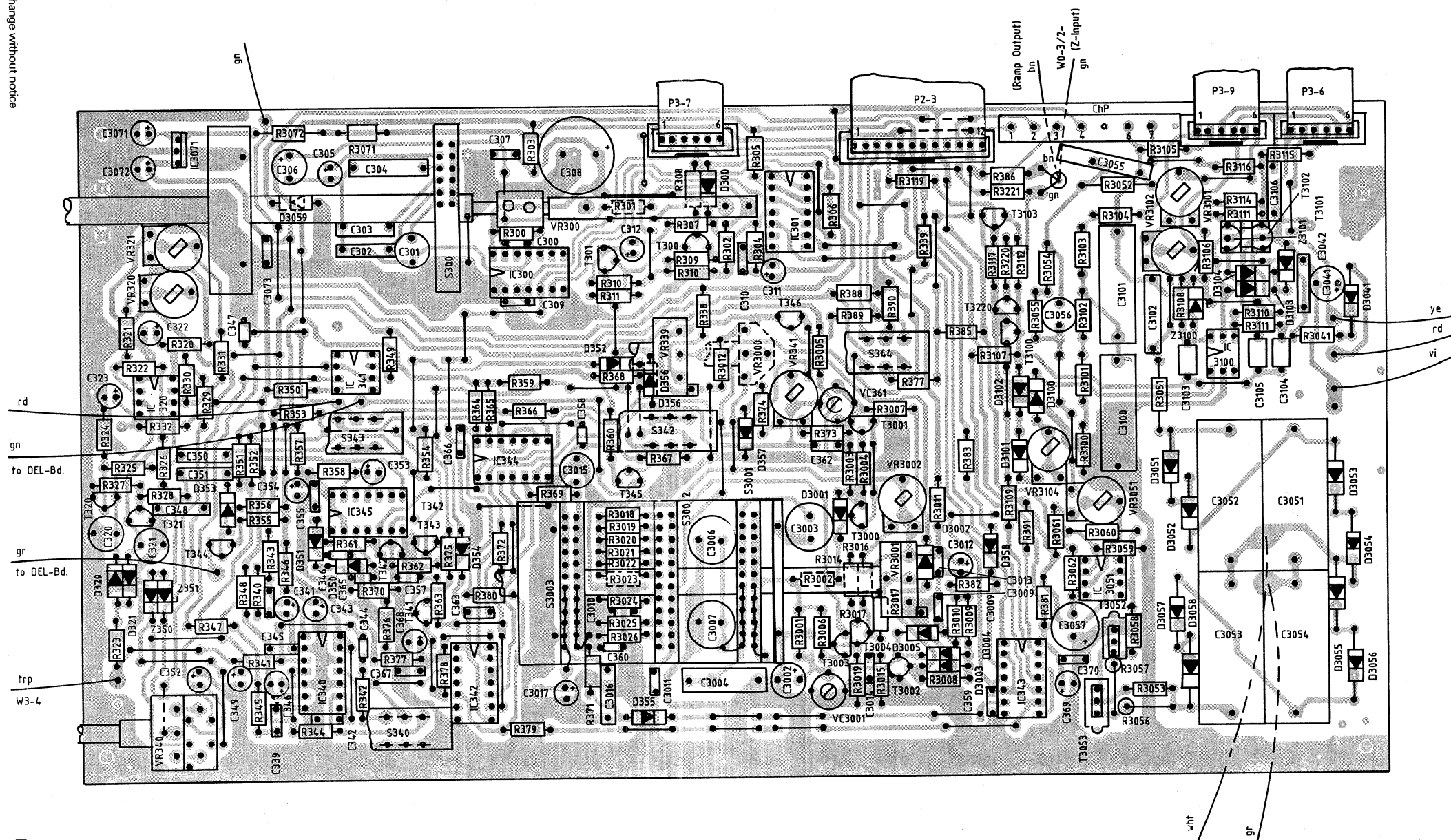
SY-BOARD

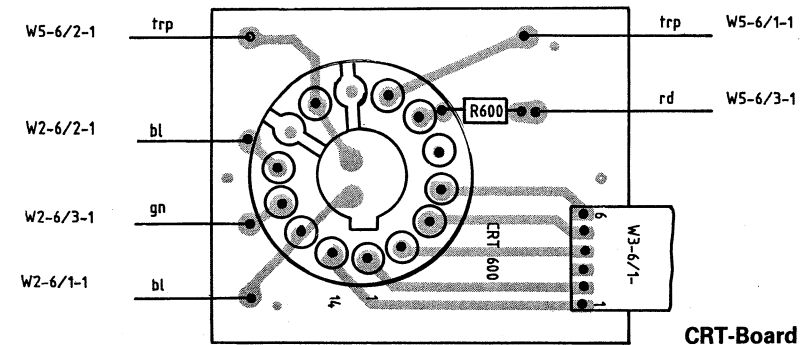
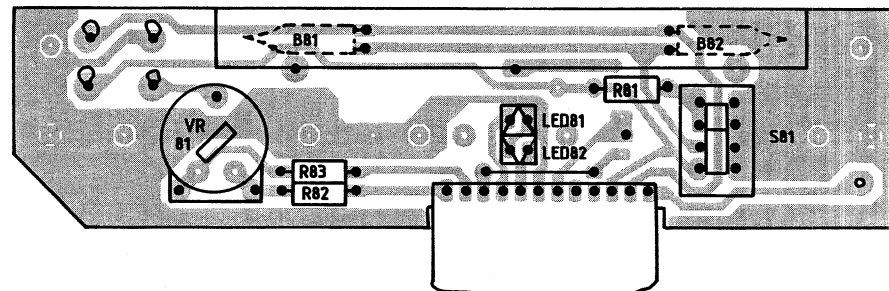




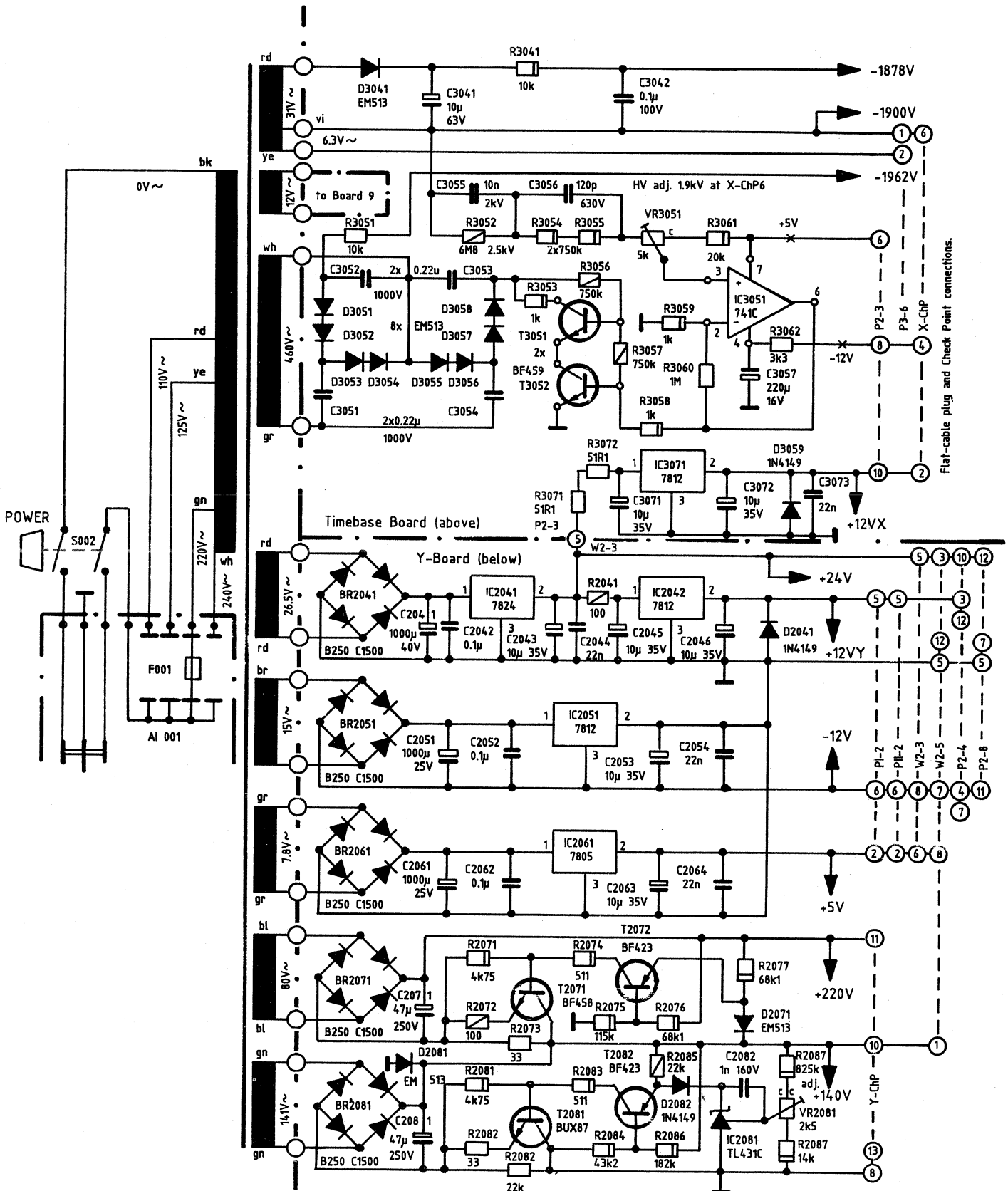


2





POWER SUPPLY HM204



ADJUSTING ADVICES

HM204

(see Adjusting Plan on page A1)

Check of the Unblanking Pulse on ChP 7

Pulse amplitude $22V_{pp} \pm 5\%$ added with $-1900V$ (Caution!).

Check with **test oscilloscope** by means of a **10X probe with 10nF 2kV capacitor between ChP 7 and probe input tip.**

HM204 settings: Input coupling to **GD** (no input signal), **50 μ s/cm**, int. **Auto** triggering (free running), Input attenuator 5mV/cm (unless otherwise specified).

Test scope settings: **1V/cm (DC)**, **0.1 ms/cm**, **internal automatic triggering.**

Display on test scope:

Negative pulse tops exactly horizontal (forward sweep = bright trace on HM204).

Positive pulse tops approx. horizontal (fly back = blanked trace).

Readjustment of VR3104

Adjust the forward current of the optocoupler diode in the middle of the following points:

a) bright spot on the left side of the trace (screen of the HM204),

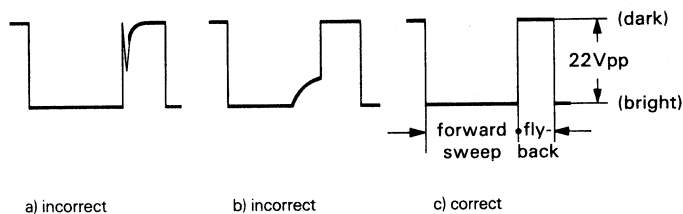
b) shortening on right side of the trace (screen of the HM204).

Between these two points is a wide range (needed for int. temperature variation). With correct adjustment, the edges of the square-wave should not be visible on the test scope.

Then change both **TIMEBASE** settings to **0.5 μ s/cm** (HM204) and **1 μ s/cm** (test scope).

Now steep square-wave edges must be visible on the test scope screen.

Unblanking pulse on ChP 7
(triggering: free run),
seen on test oscilloscope.



Baseline on HM204 screen:

Sequence for important adjustments

Balance CH.I: Adj. **VR100** (see page M3).

Adj. **VR103** using **INVERT I** button (see page T1).

Balance CH.II: Adj. **VR150** (see page M3).

Adj. **VR153** using **Y-POS. II** control (see page T1).

Gain CH.II: Normally, **VR151** is adj. If not, 20mV_{pp} 1kHz sq.-wv. to **CH.II** input, **DC**, depress **CH.I/II** button. Check preamp. output on EY21 (PII-2/1-1) with test scope via 10X probe. Adj. **VR151** for approx. 360mV_{pp} on EY21. Then adj. **VR212** for a display of 4cm on HM204 screen.

X gain (CH.II): Set **AC** input coupling, release all buttons in the Y-section, depress **HOR. EXT.** button with same input signal. Two points are visible in the horizontal axis. Adj. **VR222** for 4cm spacing.

Gain GH.I: If necessary, adj. **VR101** (in same way as CH.II) for approx. 360mV_{pp} on EY11 (PI-2/1-1). Then adj. **VR202** for 4cm display height on HM204 screen.

Automatic Triggering: Set **CH.I** attenuator to 10mV/cm, input 30mV 50kHz sine (3cm display height). Set attenuator to 0.1V/cm (3mm display height). Adj. **VR320 (AT/NORM.** button out) for just triggering. Attenuator to 0.2V/cm: No triggering must be possible. Depress **+/-** button, attenuator to 0.1V/cm, adj. **VR321** for same trigger threshold. Repeat triggering adjustments.

Normal Triggering: Depress **AT/NORM.** button, adj. **LEVEL** control.

Check normal trigger mode using **LEVEL** control with **+/-** button depressed and released.

Check triggering at 20MHz in same way.

DC triggering: TRIGGER SELECTOR to **AC**, depress **AT/NORM.** button, **CH.I** with **DC** input coupling, input signal 50kHz sine 3mm display height (see above Automatic Triggering), adj. **LEVEL** control. Then TRIGGER SELECTOR to **DC**, adj. **VR221**. Repeat this adj. sequence for **CH.II**, adj. **VR220**.

X-Y sensitivity: Depress **CH.I/II** button, set **CH.II** input coupl. to **AC**, attenuator to **5mV/cm**, apply 50kHz sine for 6cm display height. Depress **DUAL, ALT/CHOP, X-Y** buttons. Now display shows a horizontal and a crossing sloping line. Adj. **X-POS.** and **Y-POS.I** and **II** controls so that the horizontal and the sloping line are centered. Length of horizontal line and (projected) height of sloping line should be 6cm. The point of intersection should be approx. in center of graticule.

