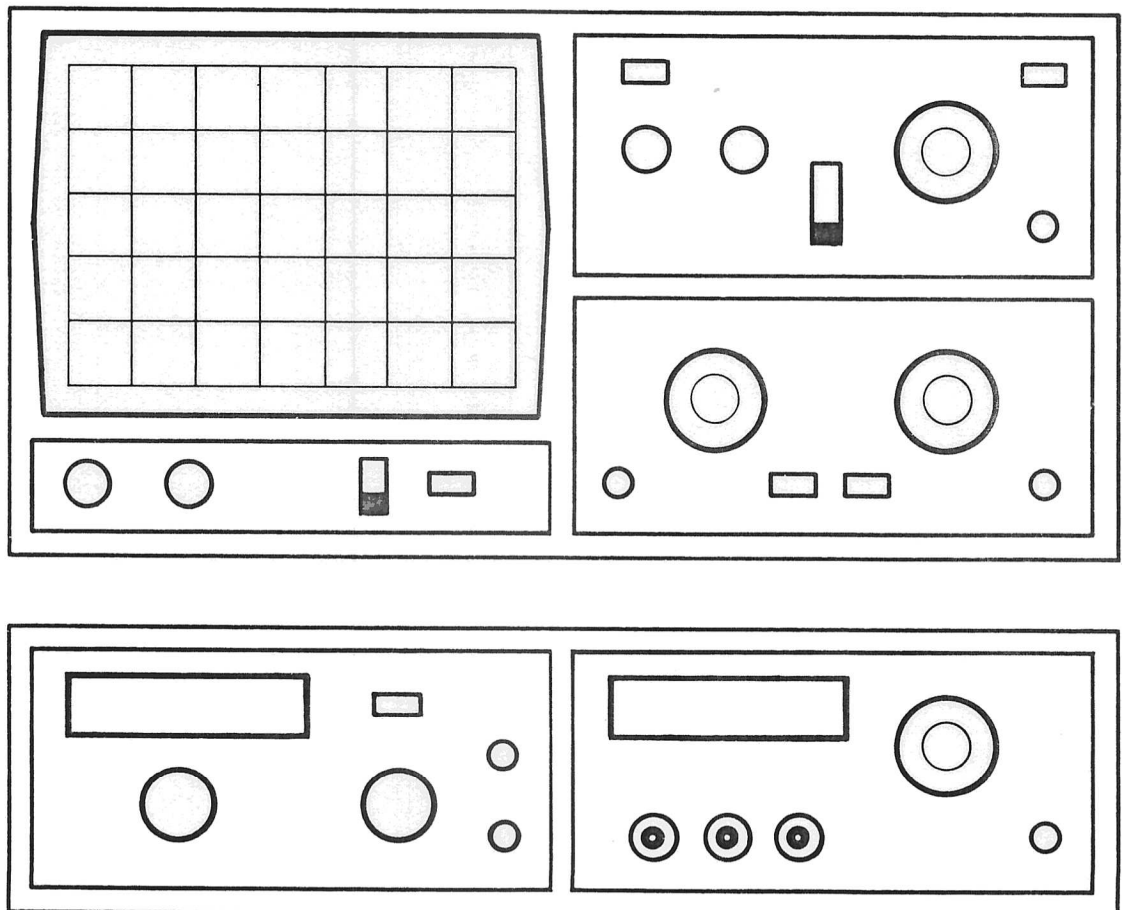


HAMEG

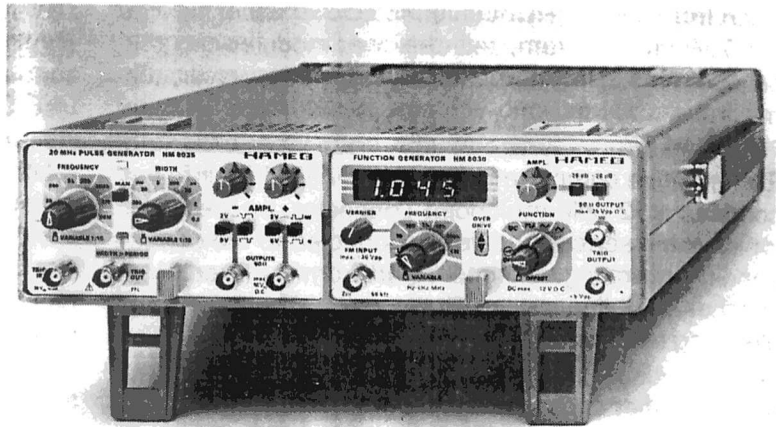
Instruments

MANUAL

**Grundgerät
HM 8001**



Specification



HM8001 Mainframe with 2 modules (not included)

General

Mainframe with power supply accommodates any 2 modules.
2 BNC connectors on rear panel for external interconnection to each module compartment.

Module Supply Voltages

2x 8V_{AC}, max. 0.5A each

2x 5V_{DC}, max. 0.6A each

4x 5-20V_{DC}, max. 0.5A each

Voltages between 5V and 20V are programmable from each module.

Polarity: optional

Power Consumption per Module:

max. 18Watts

All DC voltages are electronically stabilized, floating and **short circuit proof**.

AC test voltage to chassis: 500V

Other Information

Power switch on front panel between the two modules.

Line Voltage: 110, 125, 220, 240V AC

Permissible Line Fluctuation: $\pm 10\%$.

Power Consumption: max. 50Watts

Line Frequency Range: 50-60Hz

Protective System: Safety Class I (IEC 348)

Case (mm): B 285, H 75, T 365

Weight: approx. 4 kg. **Color:** techno-brown

2 tilt stands

4 footrests for stacking

Subject to change without notice

HM 8001 Mainframe

- Compartments for 2 Modules
- Rear Panel Signal Interconnection
- Independent Voltage Supplies
- Multi-Stack Possibility with Footrests

The **HM8001 Mainframe** accommodates up to two modules of the **HM8000 Modular System Series**. A total of **eight independent floating voltages** can individually supply all module types. Each plug-in module of the HM8000 System is fully operational immediately after insertion into mainframe.

The Mainframe HM8001 has been designed to match the new **HAMEG flat line oscilloscope** series and thus enables the user to assemble a complete variable test rack in a minimum of space. The mainframe may be placed above or below the oscilloscope, or it may be stacked with other mainframes. Four footrests on top of the mainframe ensure the stability of multi-stacked instruments even when in the tilt position.

Optional Accessories

HZ20 BNC/Banana plug adapter.

HZ33 BNC to BNC coaxial cable (0.5 m).

General Information

Apart from the plug-in modules listed overleaf of the HM 8000 Modular System, self-designed modules can also be operated using the blank HM8050. However, the maximum power and voltage levels must not be exceeded.

Each module compartment of the HM8001 Mainframe contains a 22 pole multipoint connector, by means of which the inserted module is connected to the corresponding operating voltages. Apart from the fixed 5V_{DC} all other DC voltages can be programmed from the module using resistors and wire connectors.

The operating voltages of the modules are independent of each other and adjacent modules do not influence each other's functions. Therefore, no modifications are necessary to the mainframe for the supply voltage of each individual module.

Refer to circuit diagram and programming instructions for further details.

Safety

This instrument has been manufactured and tested according to **IEC 348** – Safety Requirements for Electronic Measurement Apparatus, and has left the factory in perfect safety condition. To preserve this and ensure operation without danger, the user must observe all recommendations and warning remarks contained in these Operating Instructions.

The case, chassis, ground and the rear signal terminals are connected to the Safety Earth conductor (**Safety Class I**). The instrument's power cable must be plugged into an approved three-contact electrical outlet, which meets International Electrotechnical Commission (IEC) safety standards.

Warning!

Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the instrument dangerous. Intentional interruption is prohibited.

The mains/line plug must be inserted before connections are made to measuring or control circuits.

All secondary windings of the mains transformer are tested against each other and against ground by HAMEG at 650V, 50 Hz for 1 sec. and also the insulation of both rear BNC-terminals.

The instrument must be disconnected and secured against unintentional operation if there is any suggestion that safe operation is not possible. This may occur:

- if the instrument has visible damage,
- if the instrument has loose parts,
- if the instrument does not function,
- after long storage under unfavourable circumstances (e. g. outdoors or in moist environments),
- after excessive transportation stress (e. g. in poor packaging).

When removing or replacing the metal case, the instrument must be completely disconnected from all voltage sources.

Operating Conditions

The instrument has been designed for indoor use.

Admissible ambient temperature range during operation: +10°C... +40°C and for storage or transportation: –40°C... +70°C. If condensed water exists in the instrument, it should not be turned on before acclimatization is achieved. In some cases (an extremely cold mainframe or module) about two hours should be allowed before putting the instrument into operation. The instrument should be placed in a clean and dry room. In other words, the instrument may not be put into operation in explosive, corrosive, dusty, or moist environments. The instrument may be operated in any position, however, the convection cooling must not be impaired. Therefore, when the instrument is in continuous operation it should be used in the horizontal position preferably on its tilt stand.

Warranty

Before being shipped each module is subjected to a final 10 hour quality control test. Most failures can be detected by means of intermittent operation during this test. Nevertheless, a component may fail but only after a longer period of operation. **All HAMEG instruments are under warranty for a period of two years**, provided that the instrument has not undergone any modifications. HAMEG will repair or replace products, which prove to be defective during the warranty period. No other warranty is expressed or implied. HAMEG is not liable for consequential damages. It is recommended that the instrument be repackaged in the original manner during transport for maximum protection. We regret that transportation damage due to poor packaging is not covered by this warranty.

In case of any complaint, attach a tag to the instrument with a description of the fault observed. Please supply name and department, address and telephone number to ensure rapid service.

Quick service and repairs are best assured by directly contacting one of the HAMEG subsidiaries or authorized distributors in the respective country.

HAMEG-Addresses:

West Germany: HAMEG GmbH

Kelsterbacher Str. 15-19; 6000 FRANKFURT am Main 71
Tel. (069) 67 805-0, Telex 413 866

France: HAMEG S.a.r.l.

5-9, av. de la République; 94800-VILLEJUIF
Tél. (1) 46 77 81 51, Télex 270 705

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Villarroel 172-174; 08036 BARCELONA
Teléf. (93) 230 1597

Great Britain: HAMEG LTD

74-78 Collingdon Street; LUTON, Bedfordshire LU1 1RX
Tel. (0582) 41 31 74, Telex 825 484

United States of America: HAMEG, Inc.

88-90 Harbor Road; PORT WASHINGTON, N. Y. 11050
Phone (516) 883 3837, TWX (023) 497 4606

Installation

If the HM8001 is to be stacked with other mainframes or HAMEG Oscilloscopes, the exact positioning is only ensured by the footrests delivered with the instrument. These should be attached to the top of each instrument (except the uppermost one) using the double-sided adhesive tape provided. Insert the footrests into the appropriate ventilation holes on top of the lower instrument in such a way that they correspond exactly with the positioning of the feet on the instrument to be stacked above. Instruments stacked in a tilted position will now be prevented from slipping. Put the undermost HM8001 Mainframe into tilt position by swinging forward the tilt stands (fixed on front feet).

When stacking several instruments, ensure that ventilation is not impaired in any way. Instruments with the highest power consumption should preferably be stacked uppermost.

Operating Procedure

Before connecting the mainframe, check that the instrument is set to the correct mains/line voltage. All instruments shipped to West European countries are preset to 220V (U.K. 240V). Instructions for setting the mains voltage can be found in the corresponding section overleaf.

The main aspect of operating the mainframe is the actual insertion of the plug-in modules in the left or right compartment as desired.

Before inserting or exchanging modules, switch off the mainframe. A small circle (o) is now revealed on the red button in the front centre of the mainframe. If the BNC sockets on the rear panel were in use, disconnect all BNC cables for safety reasons.

Insert the module until locked in place, to ensure good connection with its operating voltages. After pressing the power button, both mainframe and module are fully operational.

Module Power Supply

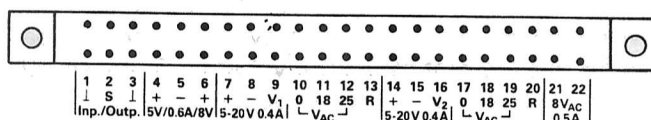
All supply voltages required for module operation are generated by the built-in power supply unit of the HM8001. As already mentioned, both module compartments are electrically separate from each other. The multipoint connectors in the module compartments are numbered from 1 to 22. Further markings indicate the type of voltage and potential across the terminals. In some cases, several different types of voltages or even different values can be drawn from one voltage source, as can be seen from the following diagram and from the circuit diagram. The AC voltages of the secondary windings are applied to the terminals marked V_{AC} . Rectification and/or voltage regulation therefore can be carried out in the modules if desired.

No. 2 contacts are directly connected to the rear panel BNC terminals, through which signals are fed or supplied in some modules. They can also be connected to control points in the modules. **Caution! A potential higher than 42V must not be applied under any circumstances.**

No. 1 and 3 terminals serve as appropriate ground connection for the BNC sockets and other applications. No. 1 and 3 are connected to the HM8001 chassis, case, and the earthing contact of the appliance inlet.

When operating self-designed modules, the power consumption per module must not exceed 18 Watts.

Values assigned to multipoint connector



Programming

Except for the fixed +5V, all other regulated DC voltages available in the mainframe HM8001 can be programmed on the module's PCB connector by means of a resistor and wire connector. The latter are already incorporated into all complete modules.

The reference voltages, precisely calibrated during manufacture, ensure a high recurrence accuracy of the output DC voltages when a low tolerance resistor is used for programming. Without the resistor each output (contacts 8-7 or 15-14) supplies +5.2V DC, provided that a wire connector has been mounted on the module's PCB connector (contacts 13-11 or 20-18).

Higher voltages can be programmed according to the following table:

V_a across 8 and 7 (or 15 and 14)	Wire connector across	Resistor R_s across 8 and 9 (or 15 and 16)
5.2V		no resistor
10V	13 and 11	3.92 k Ω
12V	(20 and 18)	2.8 k Ω
15V		1.96 k Ω
18V	13 and 12	1.5 k Ω
20V	(20 and 19)	1.3 k Ω

The R_s resistor can be calculated using the following equation:

$$R_s = \frac{18.8}{V_o - 5.2} \quad (R_s \text{ in k}\Omega / V_o \text{ in V})$$

Service and Maintenance

Removal of Case

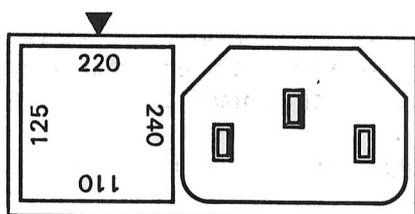
Detach mains/line cord and any other connected cables from case. Remove both screws on rear panel and, holding case firmly in place, pull chassis forward out of case. When later replacing the case, care should be taken to ensure that it properly fits under the edges of the front and rear panels.

Any adjustment, maintenance or repair of the opened instrument under voltage must be avoided if ever as possible and, if inevitable, must be carried out only by a skilled person, who is aware of the hazard involved.

Mains/Line Voltage Change

On delivery, the instrument is set to AC 220V mains/line voltage. All units delivered in the USA have been set to AC 125V and all units delivered in the United Kingdom are set to AC 240V in each case with the correct fuse. The instrument has an appliance inlet at the rear. This device contains the power fuse, which is interchangeable for the different mains/line voltages. The fuse holder with its square top plate can be pulled out by means of a small screwdriver (after disconnection of the power cord from the appliance inlet). **Change the power voltage** by turning this plate 90 degrees for each of the four power voltages marked on the plate (see triangle **above** the fuse holder). The fuse holder should then be plugged in again in the desired position, which should be **the closest to the measured mains/line voltage in your area**.

The power fuse has to match the set mains/line voltage and must be changed if necessary. Make sure that only fuses with the required rated current and of the specified type are used for replacement. Both the use of makeshift fuses and short-circuiting of fuse holders are prohibited.



Required power fuse-link:

5x20mm, slow-blow, 250V~, C, to IEC 127/III; DIN 41662.

Mains/line voltage	Rated current
110V~ ± 10%	T 1.6A
125V~ ± 10%	T 1.6A
220V~ ± 10%	T 0.8A
240V~ ± 10%	T 0.8A

Calibration and Test Instructions

Remove case to calibrate and test instrument. All voltages for operating the modules are supplied from the multipoint connector contacts in the individual module compartments. The easiest way of testing is by measuring them on inserted high power consumption modules (e.g. **HM8030** or **HM8035**.) However, high power consumption can also be simulated using resistors with the following values:

for 2x5V DC = 2x8.2Ω, 4Watts

for 4x20V DC = 4x50Ω, 8Watts

To avoid damaging the multipoint connector contacts, the resistors should be linked to a corresponding 22 pole connector, onto which the required 1.3kΩ resistors and the four appropriate wire connectors can be soldered for programming the 4x20 V potential. The diagram at the foot of this page shows the values assigned to the multipoint connector contacts.

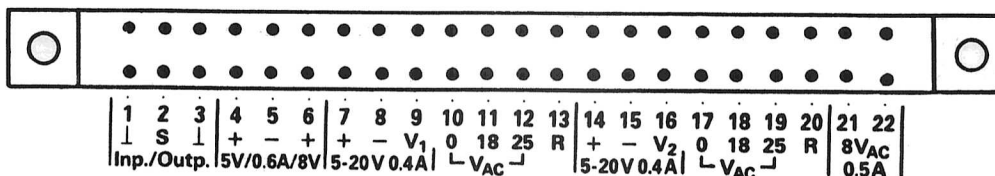
The accuracy of the DC voltages is partly dependent on the reference voltage setting and the tolerance of the resistors used for programming. With the 1% accuracy set during manufacture and when using 1% resistors, the max. error is not more than 2%. Variations in the mains/line voltage of ± 10% should not affect the supply voltages by more than 0.5%. The highest tolerable hum and noise level is max. 3mV_{pp}. Only voltmeters with at least 0.1% accuracy should be used for all measurements. These should be connected directly to the multipoint connector contacts, as otherwise voltage drops could influence the test results.

If the specified tolerances are not met, the cause must be located and recalibration of the reference voltages may possibly be necessary. The adjustment R-trimmer for the left module compartment is located on PCB AL1 and for the right compartment on AL2. The 5V setting is adjusted using VR3 and VR6. VR1 and VR2 trimmers serve to calibrate the programmable voltages for the left compartment and VR4 with VR5 for the right. Without programming resistors these voltages are factory-set to 5.2V. An insulated screwdriver should be used during all calibration procedures.

Cleaning the HM8001

The exterior of the mainframe should be regularly cleaned with a small brush. Stubborn stains on case, handle, plastic and aluminium parts should be wiped with a damp cloth (water + 1% mild detergent). Remove grease with methylated spirit or a suitable spirit-based cleaning agent. Utmost care should be taken to ensure that no cleaning fluid drops inside the instrument.

Contact plan of multipoint connector inside module compartment. (See also circuit diagram.)

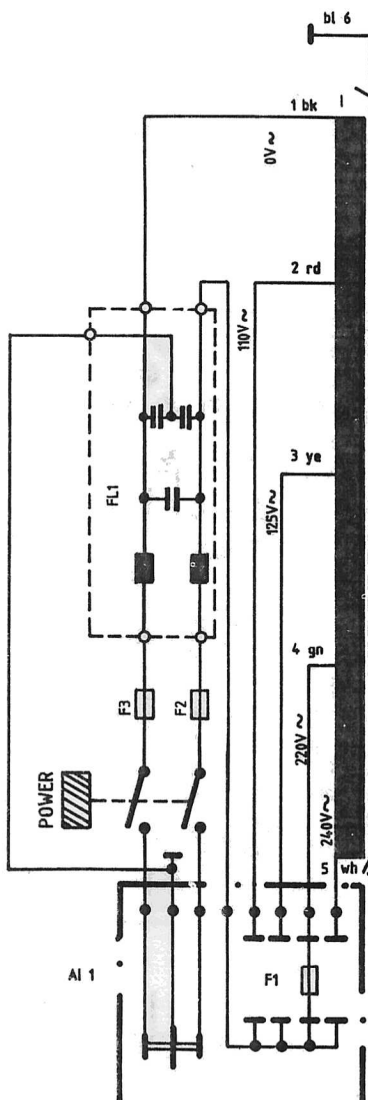


Netzteil Alimentation

Power Transformer TR 1

Core: PM82 x 33.5
Armco M6x
(tempered)
Bobbin: M74 x 33.5
Polyamid + 30%
glass fiber
BV: 031/0035 K+G

Watts (max.): 50
Amps. (max.): 0,25
at 220V 50Hz
(Power input dependent
on plug-in types.)



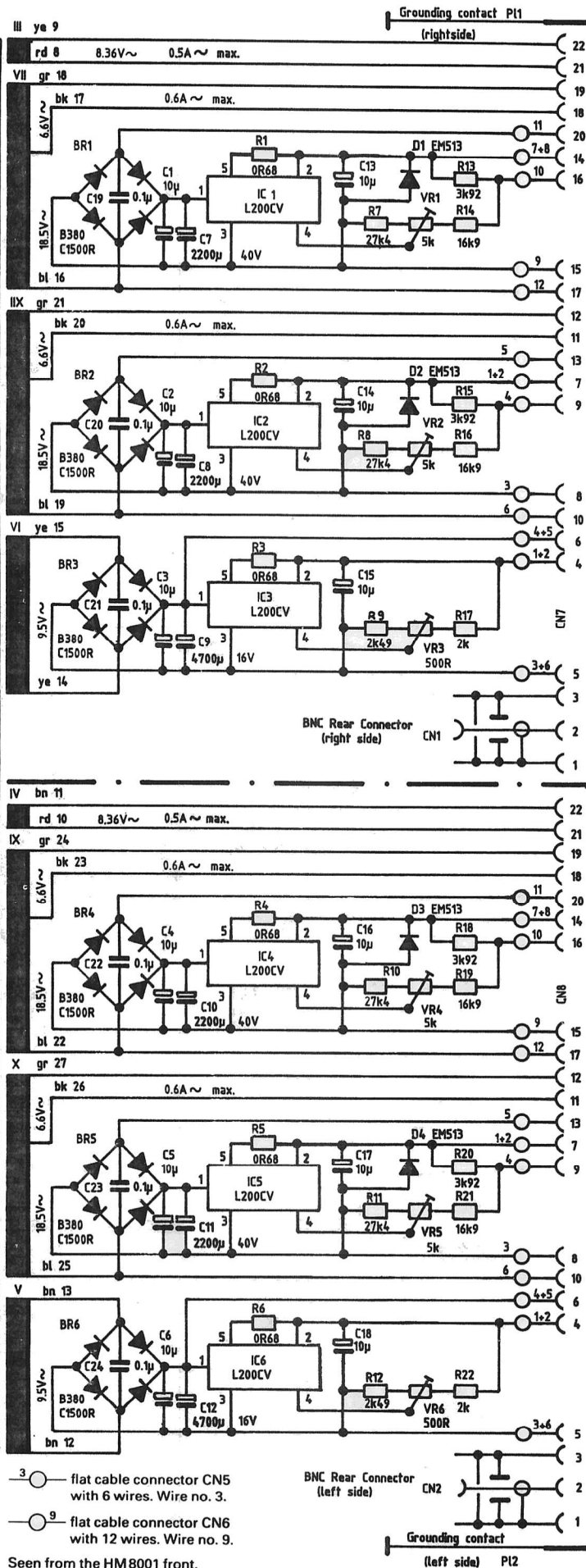
Safety Class I
(with Safety Earth Conductor)
AC 50...60Hz

POWER FUSE LINKS

Type: IEC 127-III
DIN 41662
SEV 1064
BS 4265

5x20mm, time lag, 250V, C

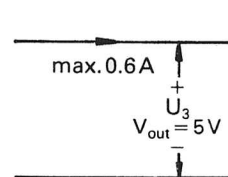
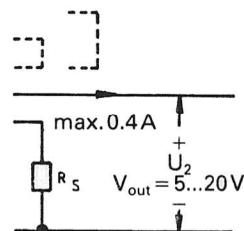
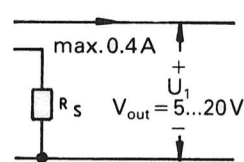
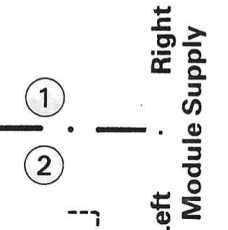
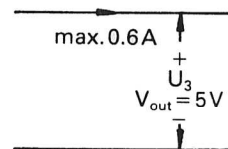
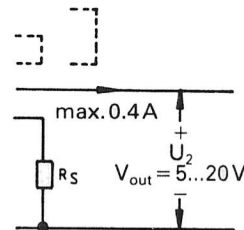
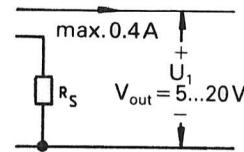
F1: 110V } T1.6A
125V }
220V } T0.8A
240V }



Power Supply Fuente de alimentacion

$V_{out} = 5...15V$
 $V_{out} = 15...20V$

Jumper connection



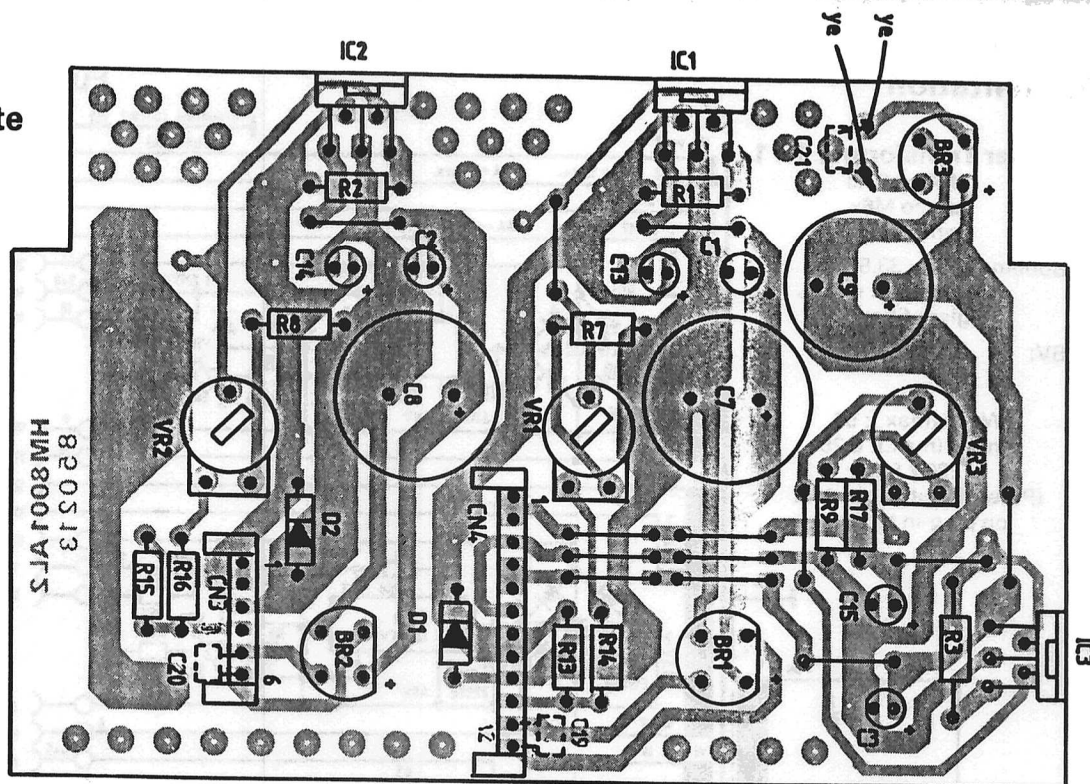
$$R_s = \frac{18.8}{V_a - 5.2}$$

(R_s in k Ω ; V_a in V)

LP-AL 2

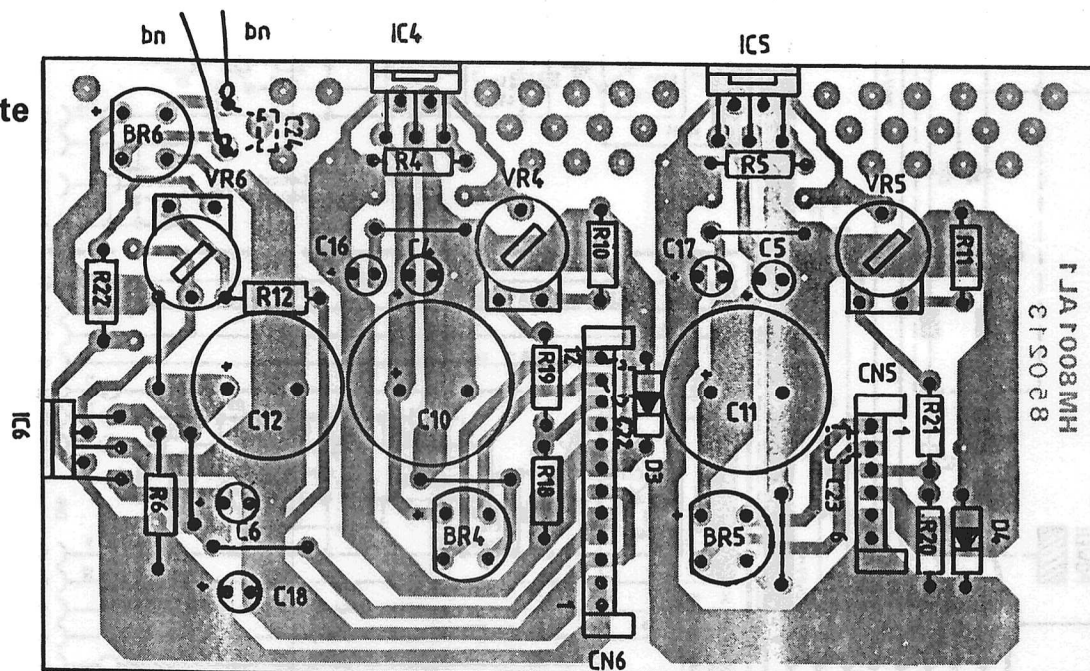
Rechte Leiterplatte
Right Board
Circuit droit
Placa derecha

8001 / P 89-35



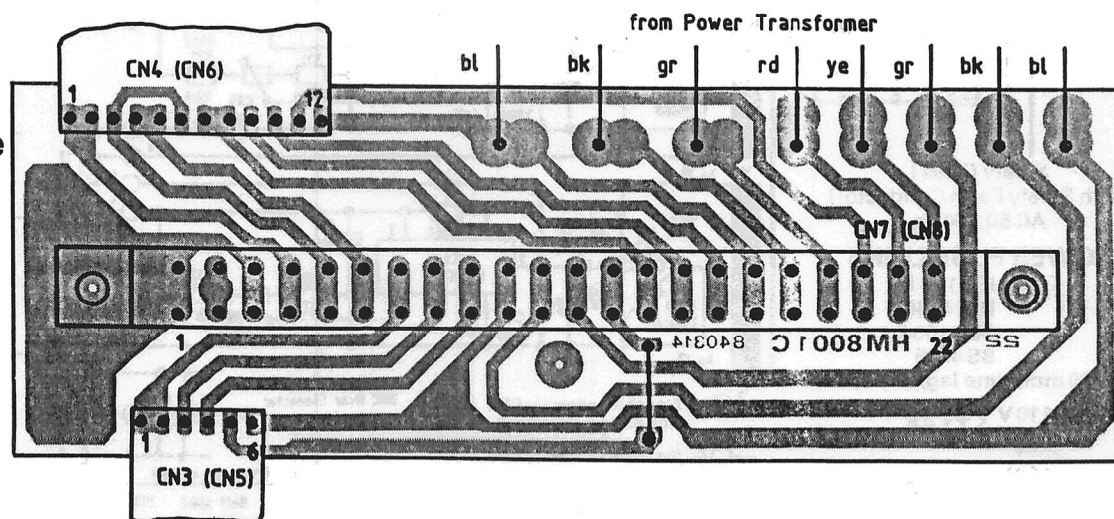
LP-AL 1

Linke Leiterplatte
Left Board
Circuit gauche
Placa izquierda



LP-C

Buchsenplatte
Connector
Connecteur
Conector



Liste elektronischer Teile

Electronic Parts List

Ref. No.	Description	HAMEG Part No.	Ref. No.	Description	HAMEG Part No.
R 1	0,68 Ω 5% Tk100		C 1	10 μ F 63V	
R 2	0,68 Ω		C 2	10 μ F 63V	
R 3	0,68 Ω		C 3	10 μ F 35V	
R 4	0,68 Ω		C 4	10 μ F 63V	
R 5	0,68 Ω		C 5	10 μ F 63V	
R 6	0,68 Ω		C 6	10 μ F 35V	
R 7	27,4k Ω 1% Tk50		C 7	2200 μ F 40V	
R 8	27,4k Ω		C 8	2200 μ F 40V	
R 9	2,49k Ω		C 9	4700 μ F 16V	
R 10	27,4k Ω		C 10	2200 μ F 40V	
R 11	27,4k Ω		C 11	2200 μ F 40V	
R 12	2,49k Ω		C 12	4700 μ F 16V	
R 13	3,92k Ω		C 13	10 μ F 35V	
R 14	16,9k Ω		C 14	10 μ F 35V	
R 15	3,92k Ω		C 15	10 μ F 35V	
R 16	16,9k Ω		C 16	10 μ F 35V	
R 17	2k Ω		C 17	10 μ F 35V	
R 18	3,92k Ω		C 18	10 μ F 35V	
R 19	16,9k Ω		C 19	0,1 μ F 100V MKS	
R 20	3,92k Ω		C 20	0,1 μ F 100V MKS	
R 21	16,9k Ω		C 21	0,1 μ F 100V MKS	
R 22	2k Ω		C 22	0,1 μ F 100V MKS	
VR 1	5k Ω 20% lin.		C 23	0,1 μ F 100V MKS	
VR 2	5k Ω 20% lin.		C 24	0,1 μ F 100V MKS	
VR 3	500 Ω 20% lin.		D 1	EM513	
VR 4	5k Ω 20% lin.		D 2	EM513	
VR 5	5k Ω 20% lin.		D 3	EM513	
VR 6	500 Ω 20% lin.		D 4	EM513	
			BR 1	B380 C1500R	
			BR 2	B380 C1500R	
			BR 3	B380 C1500R	
			BR 4	B380 C1500R	
			BR 5	B380 C1500R	
			BR 6	B380 C1500R	
			IC 1	L200 CV voltage reg.	
			IC 2	L200 CV voltage reg.	
			IC 3	L200 CV voltage reg.	
			IC 4	L200 CV voltage reg.	
			IC 5	L200 CV voltage reg.	
			IC 6	L200 CV voltage reg.	
			TR 1	0031/0045	
			F 1	1,6AT/0,8AT Type 19202	
			F 2	1,6A träge/time lag	
			F 3	1,6A träge/time lag	
			FL 1	AV3100ZC 1,6A	

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