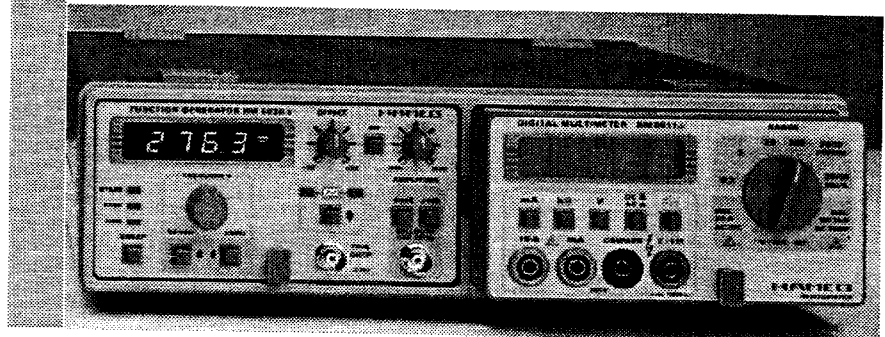


# Handbuch

## Operating Manual

### HM8001-2

Grundgerät  
Mainframe  
Appareil de basa  
Aparato base



**Grundgerät HM8001-2** (Module nicht im Lieferumfang)

# Mainframe HM8001-2

- **Compartment for 2 Modules**
- **Rear Panel Signal Interconnection (Option HO801)**
- **Independent Voltage Supplies**
- **Multi-Stack Possibility with Footrests**

The Mainframe **HM8001-2** with its incorporated power supplies is the basis for the **HAMEG Modular System 8000**. It accommodates any two System 8000 modules. With a total of 8 completely independent and floating voltages, all module types can be powered individually. The maximum total power output of each mainframe is **36Watts**. Loads which draw excessive power will activate the transformer's safety shut-down protection until removed. The 8000 series modules use less than **11Watts** of power each under normal circumstances, with the exception of the Power Supply **HM8040**, which requires **25Watts** by itself and should not be used in conjunction with another **HM8040**

module in its mainframe. In case the HM8001-2 is equipped with the option **HO801**, four BNC terminals are provided on the rear side of the HM8001-2 which allow signals from or to the module to be interfaced.

The mechanical strength of the mainframe allows to store up to 5 units on top of each other. A great number of measuring options can thereby be combined in very limited space. Each Mainframe has easily removable foot rests on its top which keep stacked on each other from sliding. The Mainframe of the **Modular System 8000** can also be stacked with any other **HAMEG instruments**, such as Oscilloscope and System 8100 Instruments.

## Specification

Reference Temperature:  $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$

## General

Mainframe with power supply accommodates any 2 modules.

4 BNC connectors on rear panel for external interconnection to each module compartment (Option HO801)

## Module Supply Voltages

**2x8V<sub>AC</sub>**, max. 0,5A each

**2x5V<sub>DC</sub>**, max. 1A each

**4x20V<sub>DC</sub>**, max. 0,5A each

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

**Polarity:** Optional

**Power Consumption per Module:** max 25Watt  
All DC voltages are electronically stabilized,

floating and short circuit proof.  
AC test voltage to chassis: 500V

## General Information

Power switch on front panel between the two modules.

**Line voltage:** 115/230V~

Permissible Line Fluctuation:  $\pm 10\%$

Line Frequency Range: 50-60HZ

**Power Consumption:** max 110Watt

Protective System: Safety Class I (IEC 348)

Case (mm): **W** 285, **H** 75, **D** 365

Weight: approx. 4kg

Color: techno-braun

2 tilts stands

4 footrests for stacking

## General information

The operator should not neglect to carefully read the following instructions and those of the mainframe HM8001-2, to avoid any operating errors and to be fully acquainted with the module when later in use.

After unpacking the module, check for any mechanical damage or loose parts inside. Should there be any transportation damage, inform the supplier immediately and do not put the module into operation.

This plug-in module is primarily intended for use in conjunction with the Mainframe HM8001. When incorporating it into other systems, the module should only be operated with the specified supply voltages.

## Safety

This instrument has been designed and tested in accordance with **IEC Publication 1010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use**. It corresponds as well to the CENELEC regulations EN 61010-1. All case and chassis parts are connected to the safety earth conductor. Corresponding to Safety Class 1 regulations (three-conductor AC power cable). Without an isolating transformer, the instruments 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 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 the mains supply. If any measurement or calibration procedures are unavoidable on the opened-up instrument, these must only be carried out by qualified personnel acquainted with the danger involved.

## Symbols as Marked on Equipment



ATTENTION refer to manual.



DANGER High voltage.



Protective ground (earth) terminal.

## Operating conditions

The ambient temperature range during operation should be between +10°C and +40°C and should not exceed -40°C or +70°C during transport or storage. The operational position is optional, however, the ventilation holes on the HM8001 and on the plug-in modules must not be obstructed.

## Warranty

Before being shipped, each plug-in module must pass a 24 hour quality control test.

Provided the instrument has not undergone any modifications Hameg warrants that all products of its own manufacture conform to Hameg specifications and are free from defects in material and workmanship when used under normal operating conditions and with the service conditions for which they were furnished. The obligation of HAMEG hereunder shall expire two (2) years after delivery and is limited to repairing, or at its option, replacing without charge, any such product which in Hameg's sole opinion proves to be defective within the scope of this warranty.

This is Hameg's sole warranty with respect to the products delivered hereunder. No

statement, representation, agreement or understanding, oral or written, made by an agent, distributor, representative or employee of, which is not contained in this warranty will be binding upon Hameg, unless made in writing and executed by an authorized Hameg employee. Hameg makes no other warranty of any kind whatsoever, expressed or implied, and all implied warranties of merchantability and fitness for a particular use which exceed the aforesaid obligation are hereby disclaimed by Hameg be liable to buyer, in contract or in tort, for any special, indirect, incidental or consequential damages, expenses, losses or delays however caused.

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.

The instrument should be returned in its original packaging for maximum protection. We regret that transportation damage due to poor packaging is not covered by this warranty.

## **Maintenance**

The most important characteristics of the instruments should be periodically checked according to the instructions provided in the sections "Operational check and "Alignment procedure. To obtain the normal operating temperature, the mainframe with inserted module should be turned on at least 60 minutes before starting the test. The specified alignment procedure should be strictly observed.

When removing the case detach mains/line cord and any other connected cables from case of the mainframe HM8001-2. 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 frames.

After removal of the two screws at the rear of the module, both chassis covers can be lifted. When reclosing the module, care should be taken that the guides engage correctly with the front chassis.

## **Operation of the module**

Provided that all hints given in the operating instructions of the HM8001-2 Mainframe were followed especially for the selection of the correct mains voltage start of operation consists practically of inserting the module into the right or left opening of the mainframe. The following precautions should be observed:

Before exchanging the module, the mainframe must be switched off. A small circle (o) is now revealed on the red power button in the front centre of the mainframe.

If the BNC sockets at the rear panel of the HM8001-2 unit were in use before, the BNC cables should be disconnected from the basic unit for safety reasons. Slide in the new module until the end position is reached.

Before being locked in place, the cabinet of the instrument is not connected to the protective earth terminal (banana plug above the mainframe multipoint connector). In this case, no test signal must be applied to the input terminals of the module.

Generally, the HM8001-2 set must be turned on and in full operating condition, before applying any test signal. If a failure of the measuring equipment is detected, no further measurements should be performed. Before switching off the unit or exchanging a module, the instrument must be disconnected from the test circuit.

## **Installation**

If the HM8001-2 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 HM8001-2 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 230V~. For switching over to 115V~ use the mains/line selector switch on the rear side of the instrument.

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 top of 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.

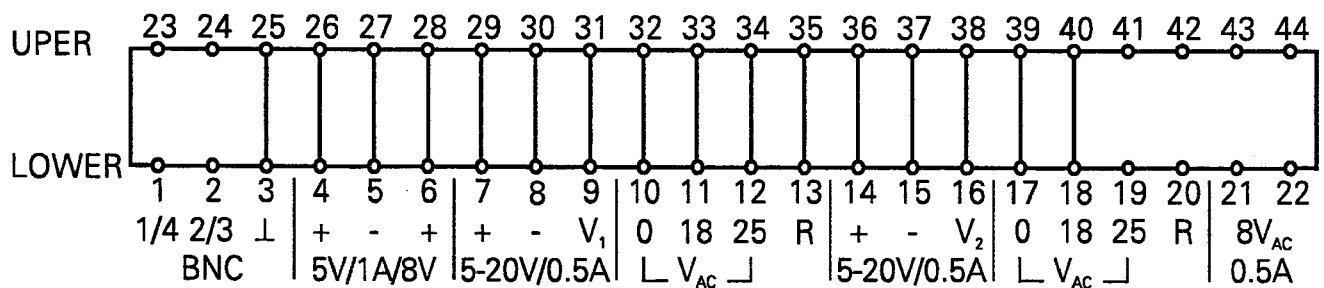
### General Information

Apart from the plug-in modules listed overleaf of the HM 8000 Modular System, self-designed modules can also be operated using the blank HM8080. However, the maximum power and voltage levels must not be exceeded.

Each module compartment of the HM8001-2 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<sub>DC</sub> 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 others 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.



Values assigned to multipoint connector

### Module Power Supply

All supply voltages required for module operation are generated by the built-in power supply unit of the HM8001-2. 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<sub>AC</sub>. Rectification and/or voltage regulation therefore

can be carried out in the modules if desired. In case the HM8001-2 is equipped with the option HO801, no. 1 and 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.**

Terminal no. 3 serves as a appropriate ground connection for the BNC sockets and other applications. No. 3 is connected to the HM8001-2 chassis, case, and the earthing contact of the appliance inlet.(Side 12)

**Maximum Power supplied**

The maximum total power output of each mainframe is **36Watts**. Loads which draw excessive power will activate the transformer's safety shut-down protection until removed. The 8000 series modules use less than **11Watts** of power each under normal circumstances, with the exception of the Power Supply **HM8040**, which requires **25Watts** by itself and should not be used in conjunction with another **HM8040** module in it's mainframe.

When operating self-designed modules, the power consumption per module must not exceed **25Watts**.

**Programming**

Except for the fixed +5V, all other regulated DC voltages available in the mainframe HM8001-2 can be programmed on the modules 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 modules PCB connector (contacts 13-11 or 20-18).

Higher voltages can be programmed according to the following table:

V <sub>o</sub> across 8 and 7 (or 15 and 14)	Wire connector across	Resistor R <sub>s</sub> across 8 and 9 (or 15 and 16)
5,2V 10V 12V 15V	13 and 11 (20 and 18)	no resistor 3,92 kΩ 2,80 kΩ
18V 20V	13 and 12 (20 and 19)	1,5 kΩ 1,3 kΩ

The R<sub>s</sub> resistor can be calculated using the following equation:

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

**Removal of Case**

Detach mains/line cord and any other connected cables from case. Remove the 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 230V mains/line voltage. All units delivered in the USA have been set to AC 115V and all units delivered in the United Kingdom are set to AC 230V 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 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 switching over the voltage selector switch. The fuse holder should then be plugged in again in the desired position.

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.

<b>Mains/line voltage</b>	<b>Rated current</b>
<b>115 V~ ±10%:</b>	<b>T 2 A</b>
<b>230 V~ ±10%:</b>	<b>T 1 A</b>

### 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 2x 5V DC = 2x5Ω, 5Watts
- for 4x20V DC = 4x40Ω, 10Watts

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 4x20V potential. The dia-

gram 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<sub>pp</sub>. 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.

### Cleaning the HM8001-2

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.



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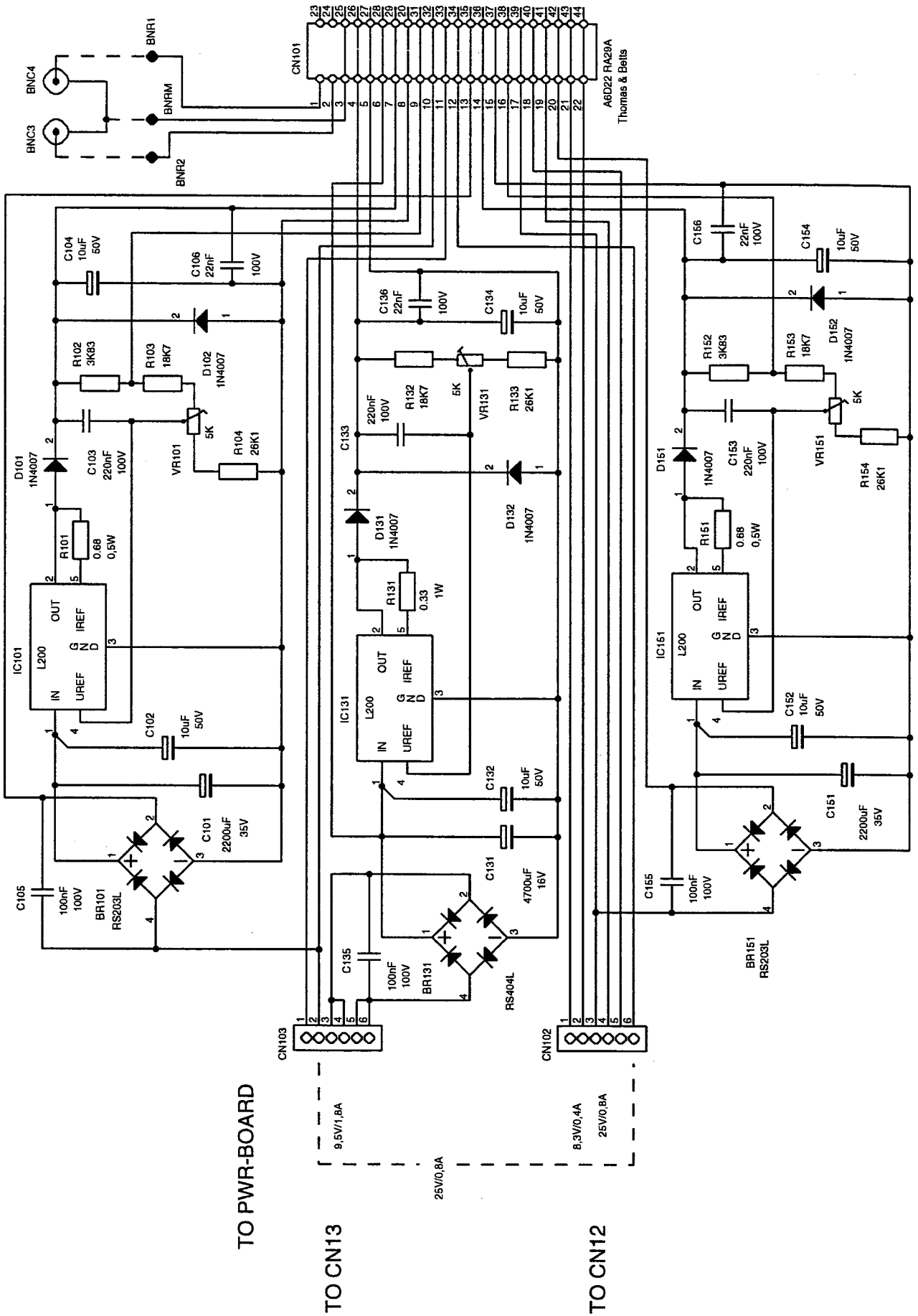
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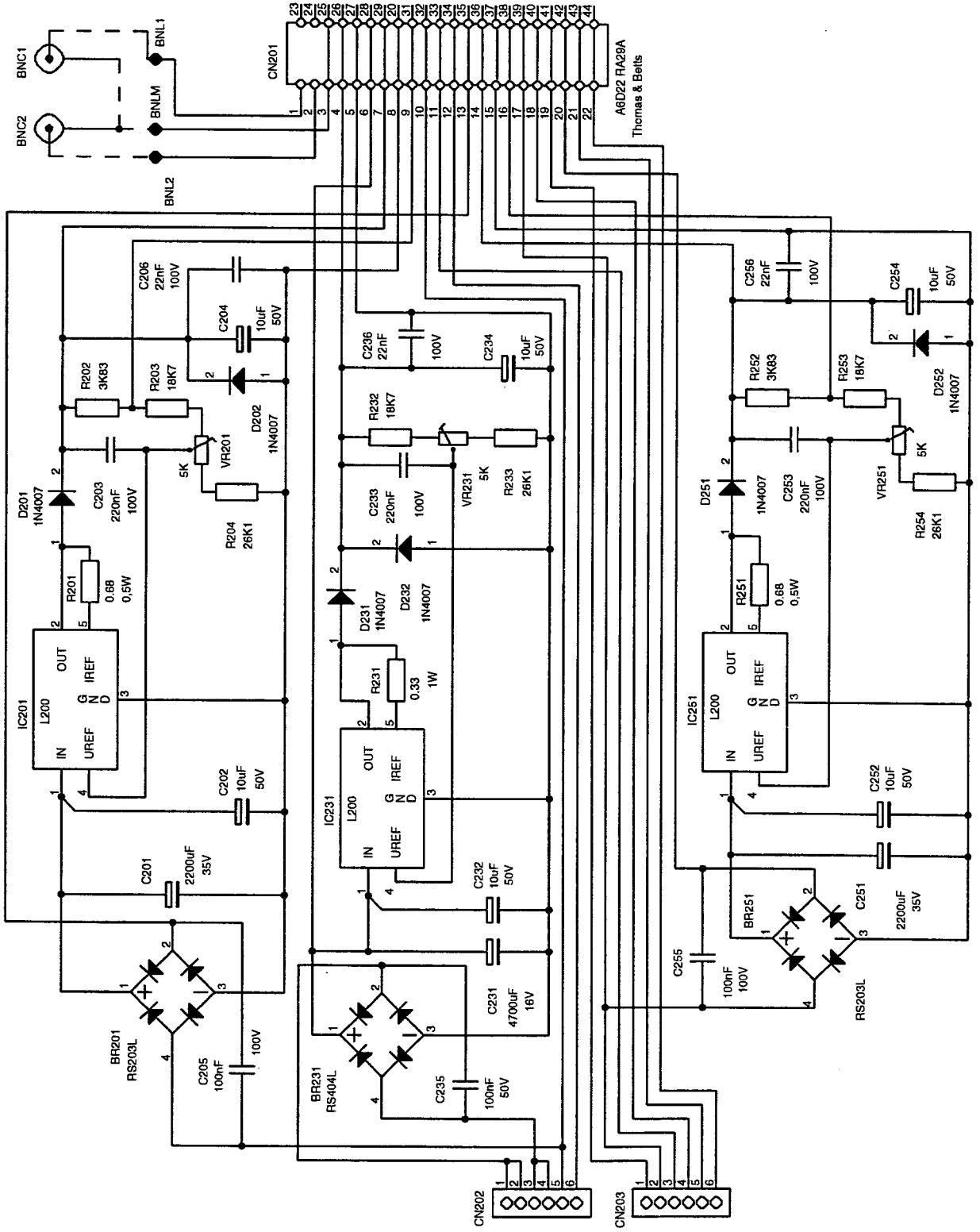
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# HM8001-2 left board



TO  
PWR-BBOARD

9.5V/1.8A  
25V/0.8A  
25V/0.8A

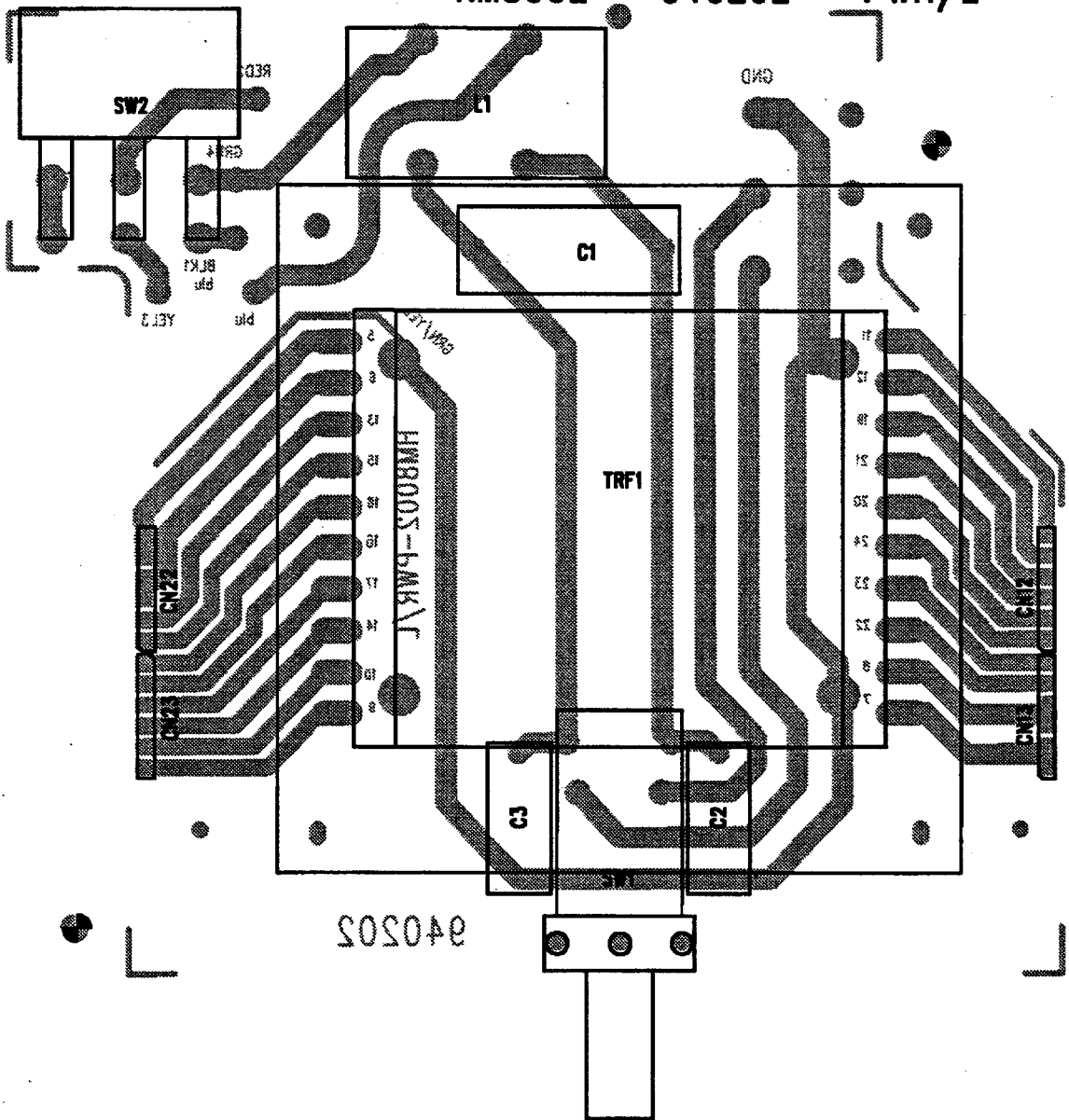
TO CN22

8.3V/0.4A

TO CN23

AGD22 RA28A  
Thomas & Betts

# HM8002 - 940202 - PWR/L



Right board

