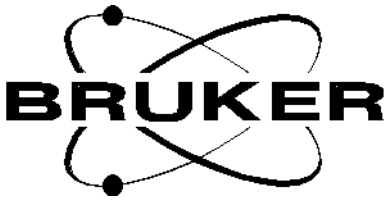


# POWER ROUTER DIGITAL

## Technical Manual

**Version 003**

**BRUKER**

The information in this manual may be altered without notice.

BRUKER accepts no responsibility for actions taken as a result of use of this manual. BRUKER accepts no liability for any mistakes contained in the manual, leading to coincidental damage, whether during installation or operation of the instrument. 

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# Contents

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# OVERVIEW 1

The HP POWER ROUTER is designed to route HF signals from the transmitter to the probehead. Different types of measurements require their own amplifier configuration (DSX, DMX HIGH POWER, DMX HIGH POWER 3rd channel, DMX XBB 1kW)

The autotuning signals for the X and 1H channels are generated in the sensor module.

The HP POWER ROUTER has its own power supply.

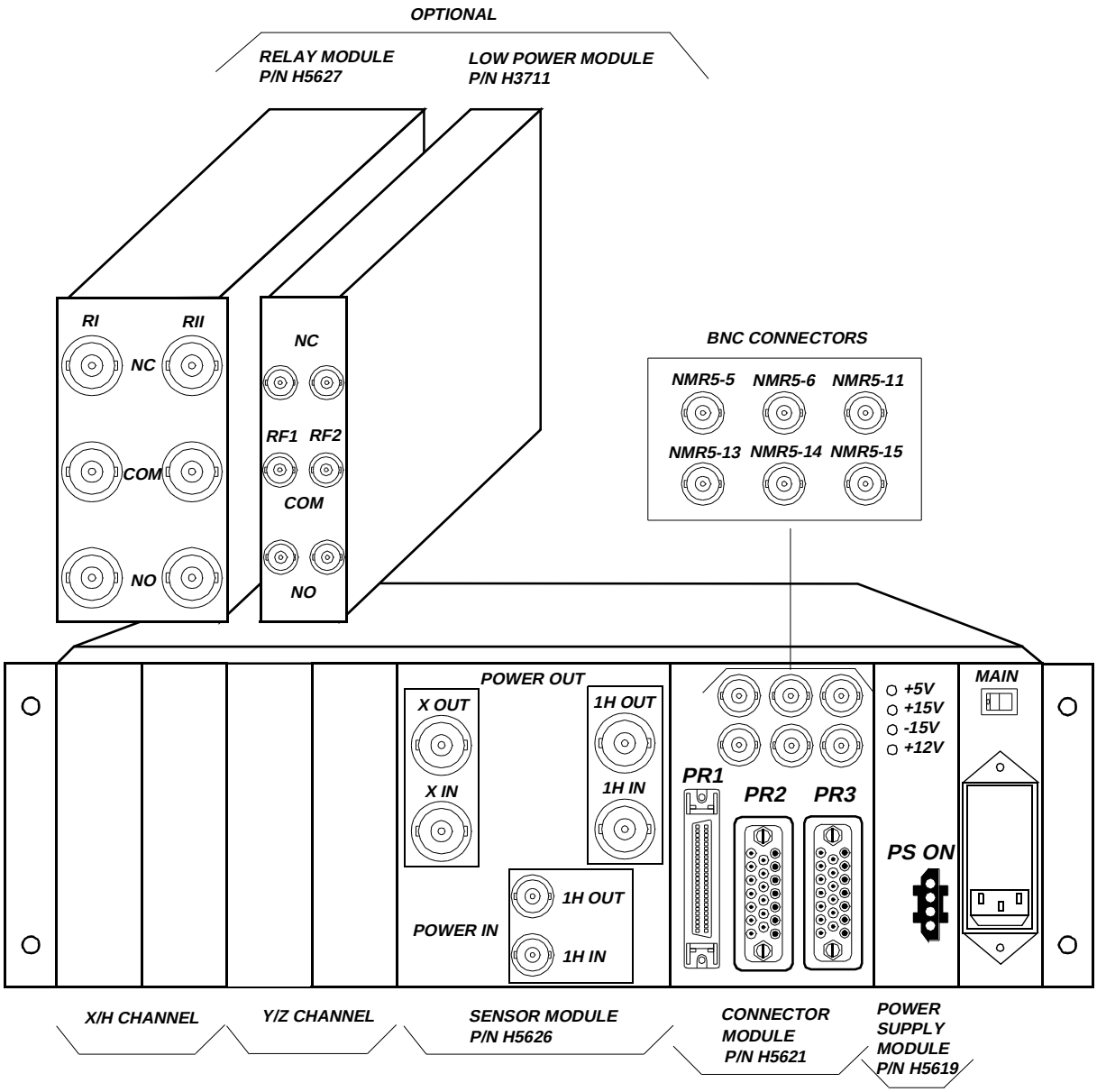
The HP POWER ROUTER is connected to the TCU, TRANSMITTER (GAIN and BLANKING signals), the HIGH VOLTAGE SUPPLY and the B-HPCU (***page 11***).

The unit is located in the spectrometer for DSX and DMX HIGH POWER. The basic version has one LOW POWER MODULE (DMX XBB 1kW) or one RELAY MODULE (DSX, DMX HIGH POWER, DMX HIGH POWER 3rd channel). It is possible to equip the X/H, Y/Z channel with a LOW POWER MODULE or a RELAY MODULE (***page 9***)

# HP POWER ROUTER MODULES

# 2

*Figure 2.1. POWER ROUTER DIGITAL*



## THE POWER SUPPLY MODULE 2.1

The power supply board generates the following voltages: +15V, -15V, +12V, +5V.

Each correct voltage is indicated by a green LED on the front panel and is protected with a fuse.

| | | |
|---|---|---|
| +15V fused by | F1: | 0.63A |
| +24V AC fused by | F2: | 3.15A |
| +12V fused by | F3: | 0.8A |
| -15V fused by | F4: | 0.63A |
| +5V fused by | F5: | 0.8A |

The 24V AC switched by the solid state relay on the motherboard is connected to the QIKMATE connector (PS ON) on the frontpanel.

There is only one connector slot available on the motherboard to insert the power module ***page 9***.

## THE CONNECTOR MODULE 2.2

All input signals from the TCU (Timing Control Unit) are low active. The following programmable signals are connected to the BNC's on the front panel (***page 9***).

NMR5_5

NMR5_6

MMR5_11

NMR5_13

NMR5_14

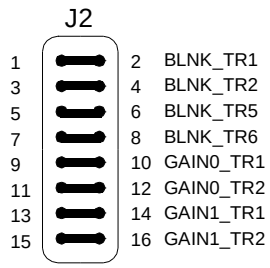
NMR5_15

All STRAYFIELD signals are brought through from SCSI (PR1) to the burndy2 (PR3) connector (***page 20***). The blanking and the gain signals are connected to the line driver (74AS805). It is possible to invert the logic of each signal by placing jumpers on J2.

## *DEFAULT JUMPER SETTINGS ON BOARD* *2.2.1*

Function: When a jumper is populated, the relevant signal will be inverted.

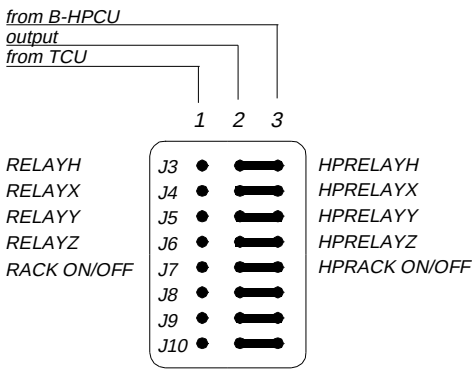
*Figure 2.2. Jumper J2*




Function: When all the jumpers are populated on the right side, the signals will come from the B-HPCU.

When all the jumpers are populated on the left side the signals will come from the TIMING CONTROL UNIT (TCU).

*Figure 2.3. Jumpers 3-10*



## *THE SENSOR MODULE* *2.3*

Inside the sensor box there are three different power sensors.

1. For X-channel P/N. H5646 max. power 1kW
2. For H-channel P/N. 19535 max. power 1kW
3. For 1H IN-channel P/N.12285 max power 40W

The directional coupler for the X channel generates two voltages (FORWX, REFLX).

The directional coupler for the H channel generates two voltages (FORWH, REFLH).

The directional coupler for the 1HIN generates a single voltage (REFIN1H).

The voltages generated are proportional to the forward power and the reflected power. After digitisation in the B-HPCU they are used to the control the LED's on the B-HPCU keyboard. The FORWX, FORWH and REFIN1H signals are used to by the autotuning in the B-HPCU to get minimum reflected power in the amplifier.

## *THE RELAY MODULE* *2.4*

The relay module for the X/H channel has a fixed position on the left side in the rack. To its immediate right it is possible (optional) to insert a second relay module for a Y/Z channel ***page 9***.

The relay module routes the signals coming from the amplifier (BLAX300, BLARH100) to the 1H, X transmitters or cavities.

Function: see wiring relay module ***page 24***.

Refer to the wiring table (HIGH POWER CABINETT MANUAL) for instructions on how to connect the relay module (s).

### *ELECTRICAL CHARACTERISTICS* *2.4.1*

**MAX. Input power:** 300W DC at 1,000MHz, 1kW PEP at up to 30MHz.

**MAX. Frequency:** 2,500MHz, (less than 1: 1.5VSWR).

**Insertion loss:** Less than 0.2dB at 1.5GHz.

**Circuit impedance:** 50 ohms

## *THE LOW POWER MODULE* *2.5*

For low power module measurements it is possible to insert one (X/H channel) or two (X/H Y/Z channels) LOW POWER MODULES. These are inserted in the same positions as the relay modules.

Refer to the wiring table (HIGH POWER CABINET MANUAL) for instructions on how to connect the relay power module (s).

### *ELECTRICAL CHARACTERISTICS* *2.5.1*

The LOW POWER MODULE allows very fast switching of HF signals

(5-600MHz), which are used for switching transmitters with 1 Vpp signals.

- The transmission loss is adjustable to 0dB
- The insertion loss is higher than 70dB over the whole frequency range.
- The switching time is less than 2us.

# PIN ASSIGNMENT 3

## TIMING CONTROL UNIT (T1) 3.1

*Figure 3.1. Connector T1*

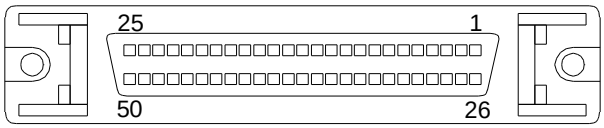



*Table 3.1. CONNECTOR (T1)*

| Connector T1 TCU (solid) SCSI | | | |
|---|---|---|---|
| PIN (right row) | SIGNAL | PIN (left row) | SIGNAL |
| 1 | BLNK_TR1 | 26 | GND |
| 2 | NMR5_0 | 27 | NMR5_1 |
| 3 | NMR5_2 | 28 | GND |
| 4 | BLNK_TR2 | 29 | GND |
| 5 | NMR5_3 | 30 | NMR5_4 |
| 6 | NMR5_5 | 31 | GND |
| 7 | BLNK_TR5 | 32 | GND |
| 8 | NMR5_6 | 33 | GND |
| 9 | BLNK_TR6 | 34 | GND |
| 10 | NMR5_7 | 35 | NMR5_8 |
| 11 | TRIG3 | 36 | GND |
| 12 | NMR5_9 | 37 | NMR5_10 |
| 13 | NMR5_11 | 38 | GND |
| 14 | NMR5_12 | 39 | GND |

*Table 3.1. CONNECTOR (T1)*

| Connector T1 TCU (solid) SCSI | | | |
|---|---|---|---|
| PIN (right row) | SIGNAL | PIN (left row) | SIGNAL |
| 15 | NMR5_13 | 40 | GND |
| 16 | NMR5_14 | 41 | GND |
| 17 | NMR5_15 | 42 | GND |
| 18 | NMR6_0 | 43 | NMR6_1 |
| 19 | NMR6_2 | 44 | GND |
| 20 | NMR6_3 | 45 | GND |
| 21 | NMR6_4 | 46 | GND |
| 22 | NMR6_5 | 47 | GND |
| 23 | NMR6_6 | 48 | GND |
| 24 | NMR6_7 | 49 | GND |
| 25 | TRIG2 | 50 | GND |

## *Connector PR1* *3.2*

*Figure 3.2. Connector PR1*

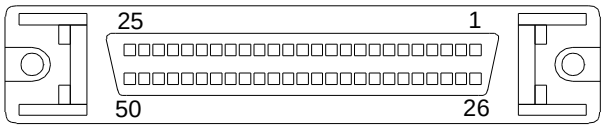



*Table 3.2. Connector (PR1)*

| Connector PR1 High Power Router SCSI | | | |
|---|---|---|---|
| PIN (right row) | SIGNAL | PIN (left row) | SIGNAL |
| 1 | BLNK_TR1 | 26 | GND |
| 2 | GAIN0_TR1 | 27 | GAIN1_TR1 |
| 3 | NMR5_2 | 28 | GND |
| 4 | BLNK_TR2 | 29 | GND |
| 5 | GAIN0_TR2 | 30 | GAIN1_TR2 |
| 6 | NMR5_5 | 31 | GND |
| 7 | BLNK_TR5 | 32 | GND |
| 8 | NMR5_6 | 33 | GND |
| 9 | BLNK_TR6 | 34 | GND |
| 10 | RELAYH | 35 | RELAYX |
| 11 | EXTERNAL1 (MAS TRIG-GER) | 36 | GND |
| 12 | RELAYY | 37 | RACK ON/OFF |
| 13 | NMR5_11 | 38 | GND |
| 14 | RELAYZ | 39 | GND |
| 15 | NMR5_13 | 40 | GND |
| 16 | NMR5_14 | 41 | GND |
| 17 | NMR5_15 | 42 | GND |
| 18 | SF_ STEP1DIR | 43 | SF_LB_SELECT |

*Table 3.2. Connector (PR1)*

| Connector PR1 High Power Router SCSI | | | |
|---|---|---|---|
| PIN (right row) | SIGNAL | PIN (left row) | SIGNAL |
| 19 | SF_DCMOTSTART | 44 | GND |
| 20 | SF_STEP1_CLK | 45 | GND |
| 21 | SF_STEP2_CLK | 46 | GND |
| 22 | SF_RESET_STEPPER1 | 47 | GND |
| 23 | SF_DCMO_RESET | 48 | GND |
| 24 | SF_GOTO_POSITION | 49 | GND |
| 25 | SF_EXTERNAL2 | 50 | GND |

## *Connector PR2* *3.3*

*Figure 3.3. BURNDY1 (PR2)*

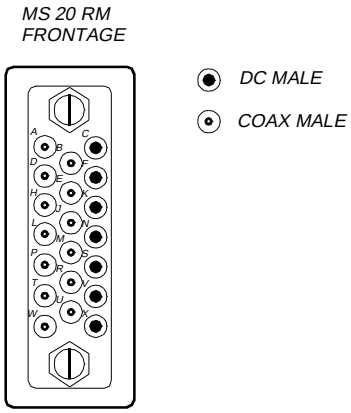



*Table 3.3. BURNDY1 (PR2)*

| PIN | SIGNAL | Typ |
|---|---|---|
| A | BLNK_TR1 (X) | COAX |
| D | BLNK_TR1_2 | COAX |
| H | BLNK_TR2 (1H) | COAX |
| L | BLNK_TR5_1 (Y) | COAX |
| P | BLNK_TR5_2 (Y AMT) | COAX |
| T | BLNK_TR6 | COAX |
| W | GAIN0_TR1 (X) | COAX |
| B | GAIN0_TR2 (1H) | COAX |
| E | GAIN1_TR1 (X) | COAX |
| J | GAIN1_TR2 (1H) | COAX |
| M | NMR5_2 | COAX |
| R | Hin_REFL | COAX |
| U | EXTERNAL1 (MAS TRIGGER) | COAX |
| C | | DC |
| F | | DC |
| K | | DC |
| N | | DC |
| S | | DC |
| V | | DC |
| X | | DC |

## *Connector PR3* *3.4*

*Figure 3.4. BURNDY2 (PR3)*

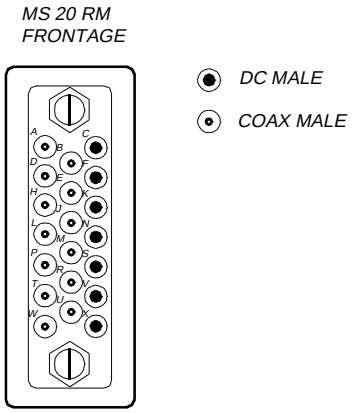



*Table 3.4. BURNDY2 (PR3)*

| Pin | Signal | Typ |
|---|---|---|
| A | SF_STEP1DIR | COAX |
| D | SF_DCMOTSTART | COAX |
| H | SF_STEP1_CLK | COAX |
| L | SF_STEP2_CLK | COAX |
| P | SF_RESET_STEPPER1 | COAX |
| T | SF_DCMO_RESET | COAX |
| W | SF_GOTO_POSITION | COAX |
| B | SF_EXTERNAL2 | COAX |
| E | SF_LB_SELECT | COAX |
| J | X_FORW | COAX |
| M | X_REFL | COAX |
| R | H_FORW | COAX |
| U | H_REFL | COAX |
| C | HPRELAYH- | DC |
| F | HPRELAYX- | DC |
| K | HPRELAYY- | DC |
| N | HPRELAYZ- | DC |
| S | HPRACK_ON/OFF- | DC |
| V | GND | DC |
| X | | DC |

# POWER CONNECTION 4

## Transformer 4.1

Primary: 230V 50/60 Hz total power 89VA

Secondary: 8V 0.8A fused by F5 (0.8A/250V time-lag) on power board
17V 0.63A fused by F1 (0.63A/250V time-lag) on power board
17V 0.63A fused by F4 (0.63A/250V time-lag) on power board
14V 1.0A fused by F3 (0.8A/250V time-lag) on power board
24V 2.0A fused by F2 (3.15A/250V time-lag) on power board
(at BOARD REVISION B)

## Main filter 4.2

Fuses in main filter 2x0.8A/ 250V time lag.

# WIRING 5

## RELAY MODULE X/1H 5.1

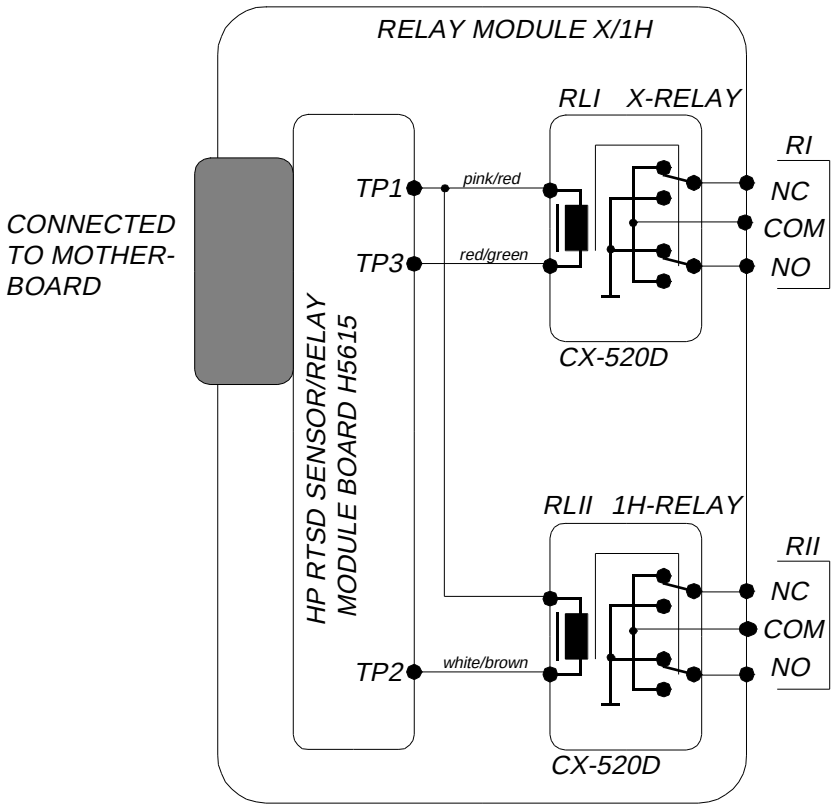
*Table 5.1. X-RELAY*

| | Jumper J3-J10 on the left side | Jumper J3-J10 on the right side |
|---|---|---|
| | COM | COM |
| NO | RELAYX (LOW) | HPRELAYX (LOW) |
| NC | RELAYX (HIGH) | HPRELAYX (HIGH) |

*Table 5.2. 1H-RELAY*

| | Jumper J3-J10 on the left side | Jumper J3-J10 on the right side |
|---|---|---|
| | COM | COM |
| NO | RELAYH (LOW) | HPRELAYH (LOW) |
| NC | RELAYH (HIGH) | HPRELAYH (HIGH) |

*Figure 5.1. WIRING RELAY MODULE X/1H*



## *RELAY MODULE Y/Z* *5.2*

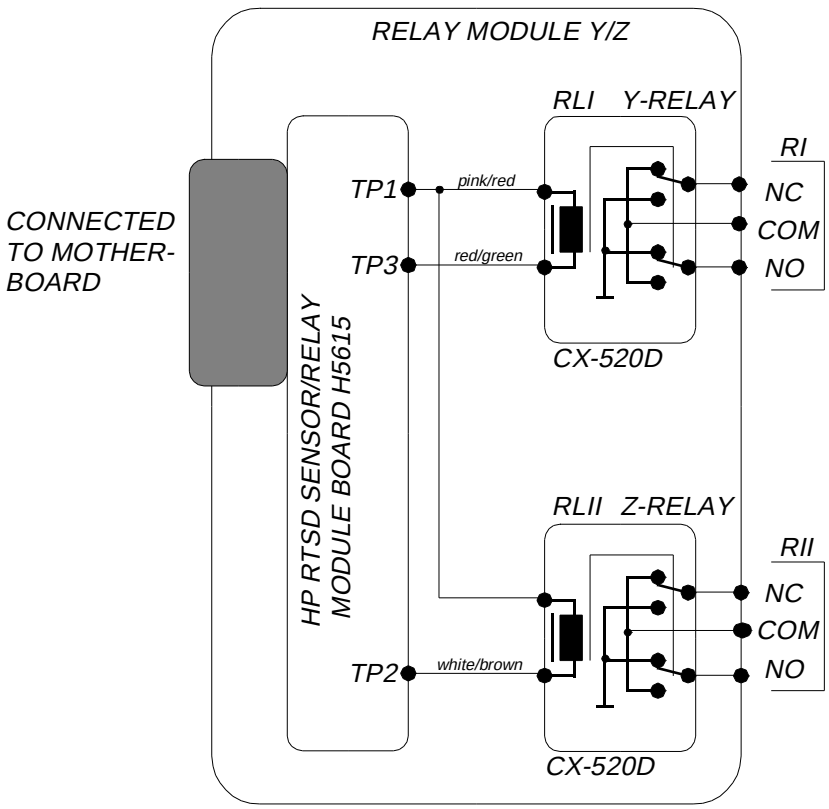
*Table 5.3. Y-RELAY*

| | Jumper J3-J10 on the left side | Jumper J3-J10 on the right side |
|---|---|---|
| | COM | COM |
| NO | RELAYY (LOW) | HPRELAYY(LOW) |
| NC | RELAYY (HIGH) | HPRELAYY (HIGH) |

*Table 5.4. Z-RELAY*

| | Jumper J3-J10 on the left side | Jumper J3-J10 on the right side |
|---|---|---|
| | COM | COM |
| NO | RELAYZ (LOW) | HPRELAYZ (LOW) |
| NC | RELAYZ (HIGH) | HPRELAYZ (HIGH) |

*Figure 5.2. WIRING RELAY MODULE Y/Z*



# *SCHEMATICS*

***HP RTSD CONNECTOR and DRIVER BOARD*** ***A.1***

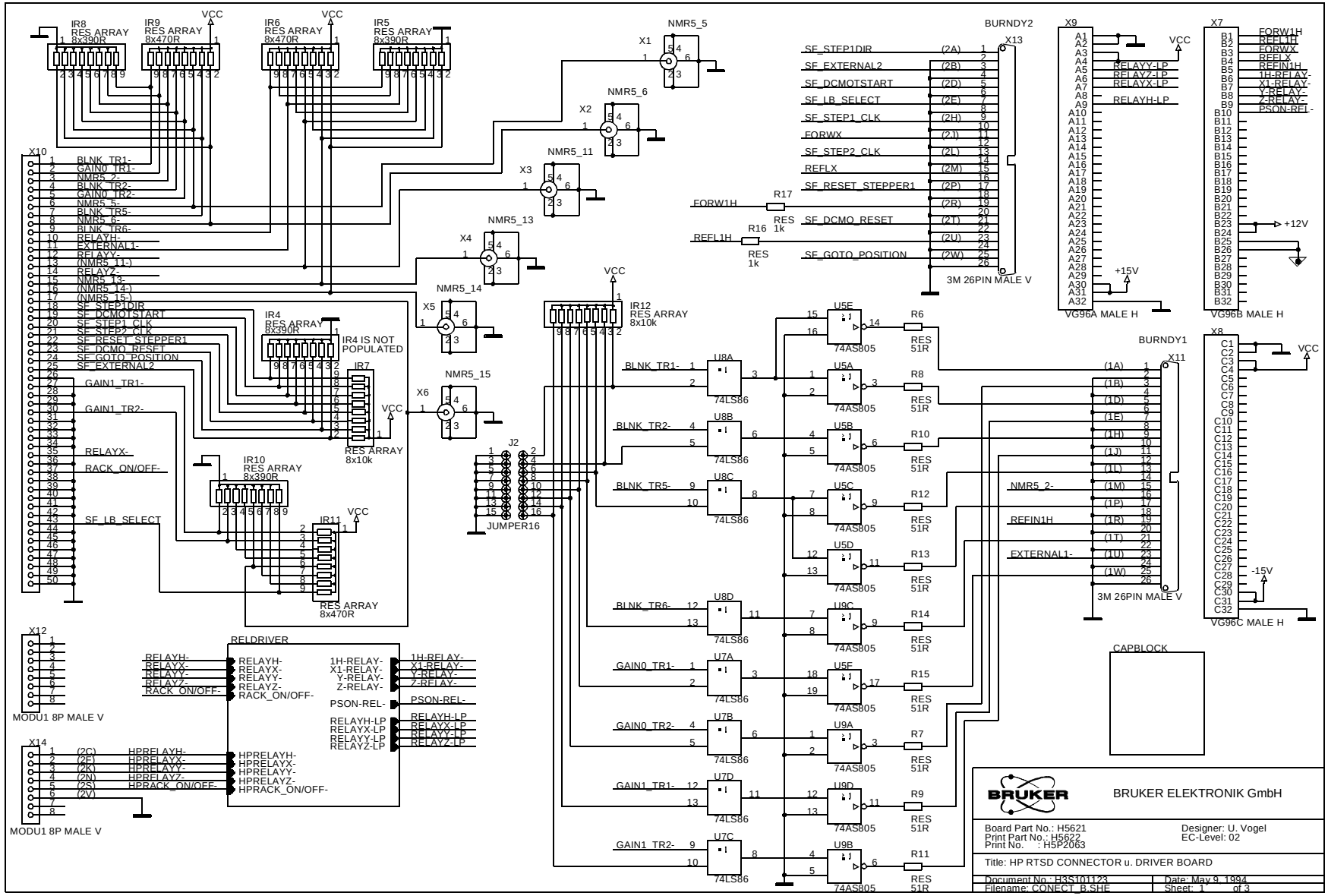



*Figure A.1. HP RTSD CONNECTOR and DRIVER BOARD*

*Figure A.2. HP RTSD CONNECTOR and DRIVER BOARD*

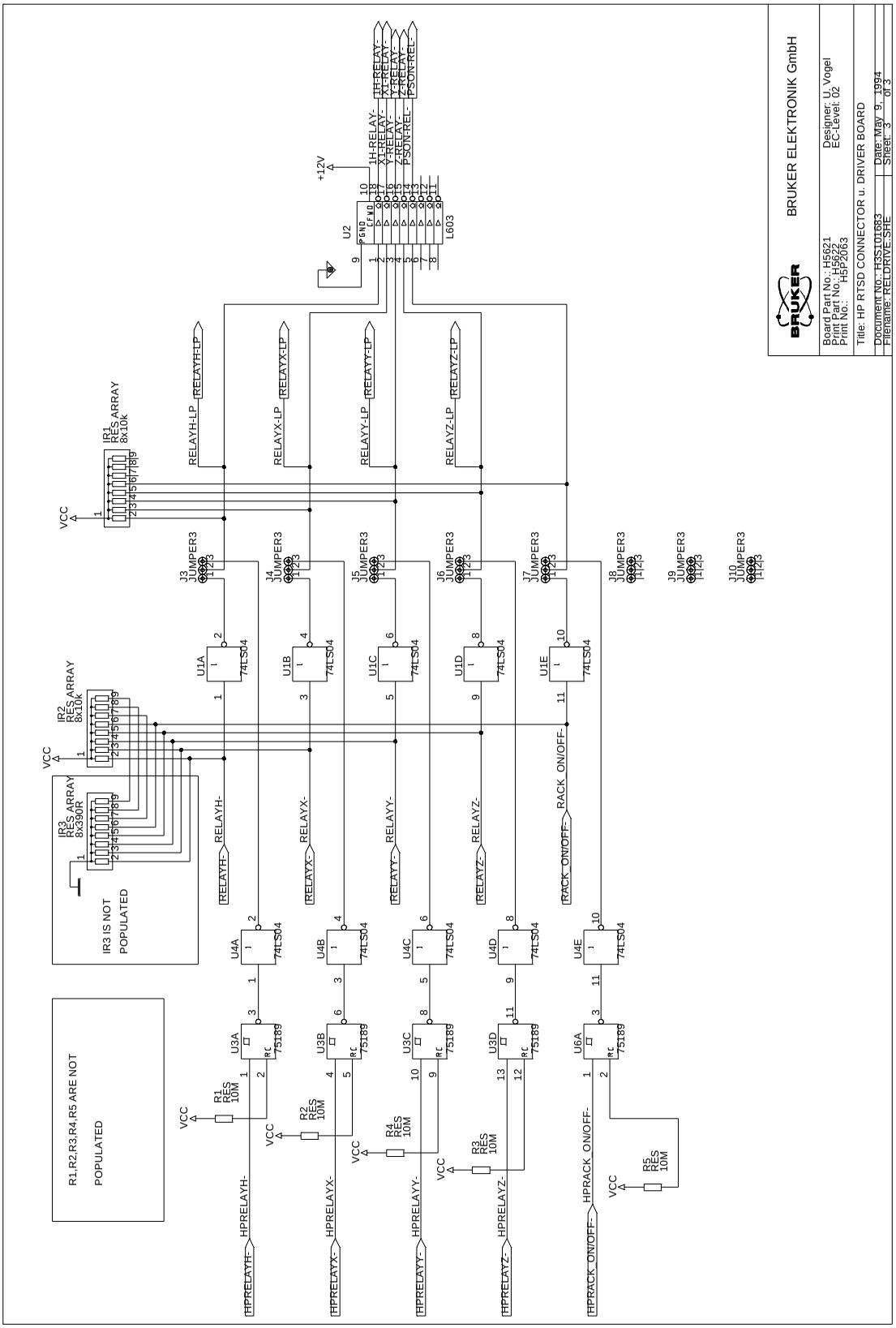
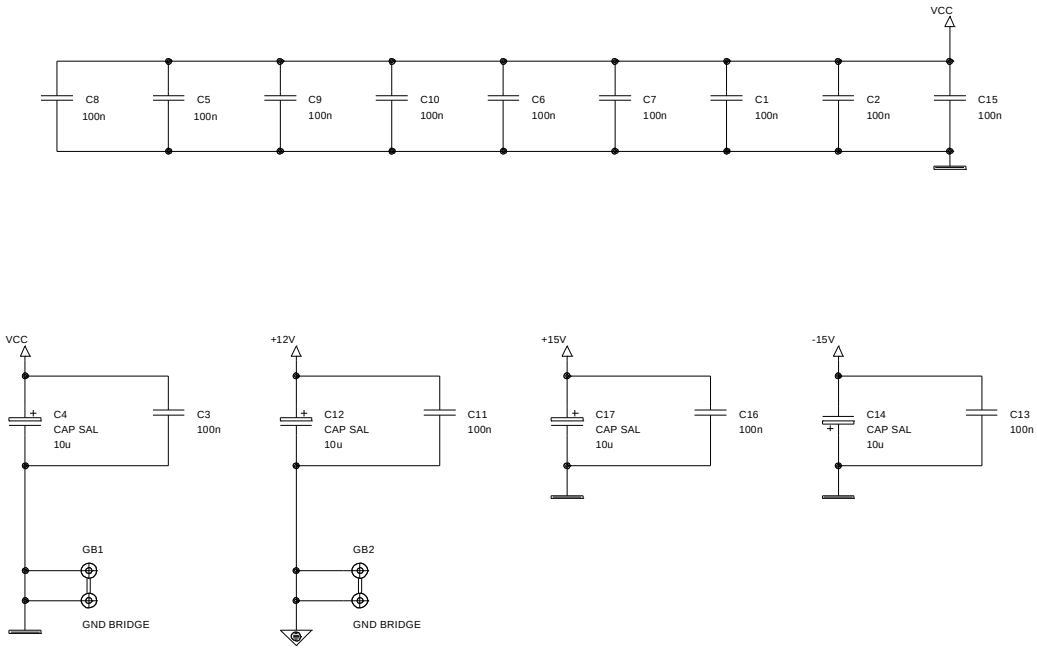


*Figure A.3. HP RTSD CONNECTOR and DRIVER BOARD*




BRUKER ELEKTRONIK GmbH

Board Part No.: H5621
Print Part No.: H5622
Print No.: H5P2063

Designer: U. Vogel
EC-Level: 02

Title: HP RTSD CONNECTOR u. DRIVER BOARD

Document No.: H4S101133
Filename: CAPBL_B.SHE

Date: May. 9, 1994
Sheet: 2 of 3

*Figure A.4. HP RTSD POWER SUPPLY BOARD*

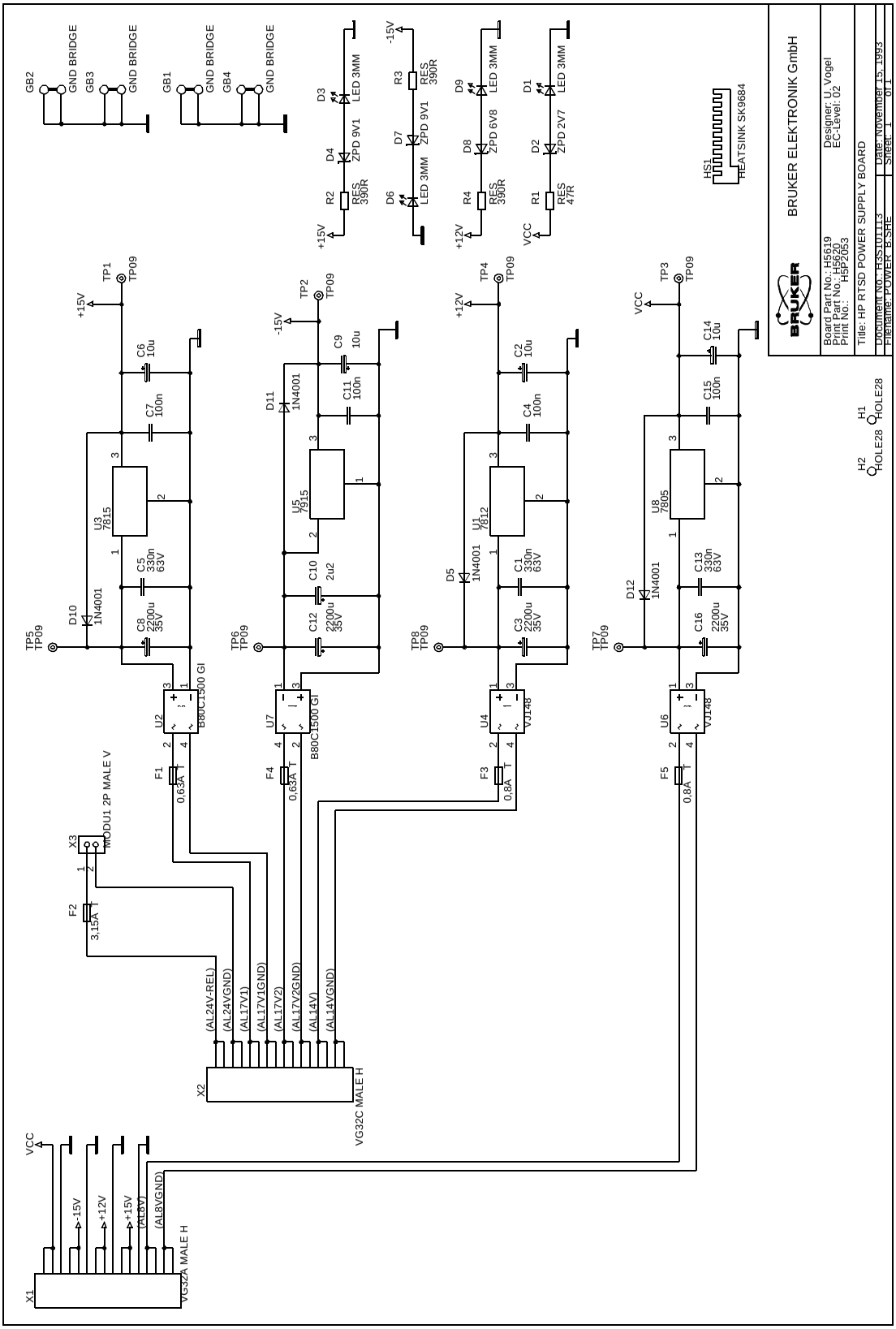


*Figure A.5. HP RTSD SENSOR/RELAY - MODULE BOARD*

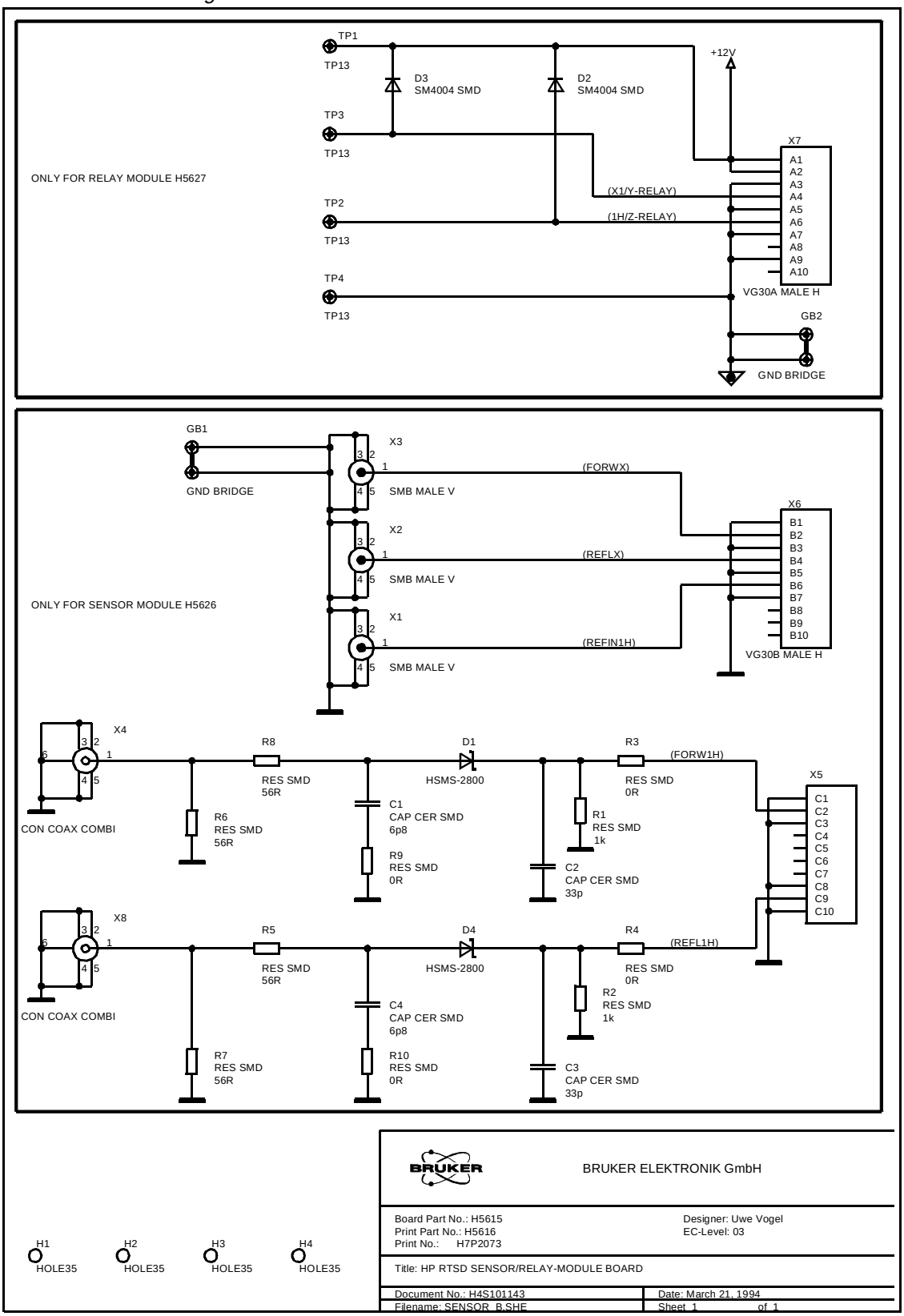


*Figure A.6. HP RTSD MOTHER BOARD*

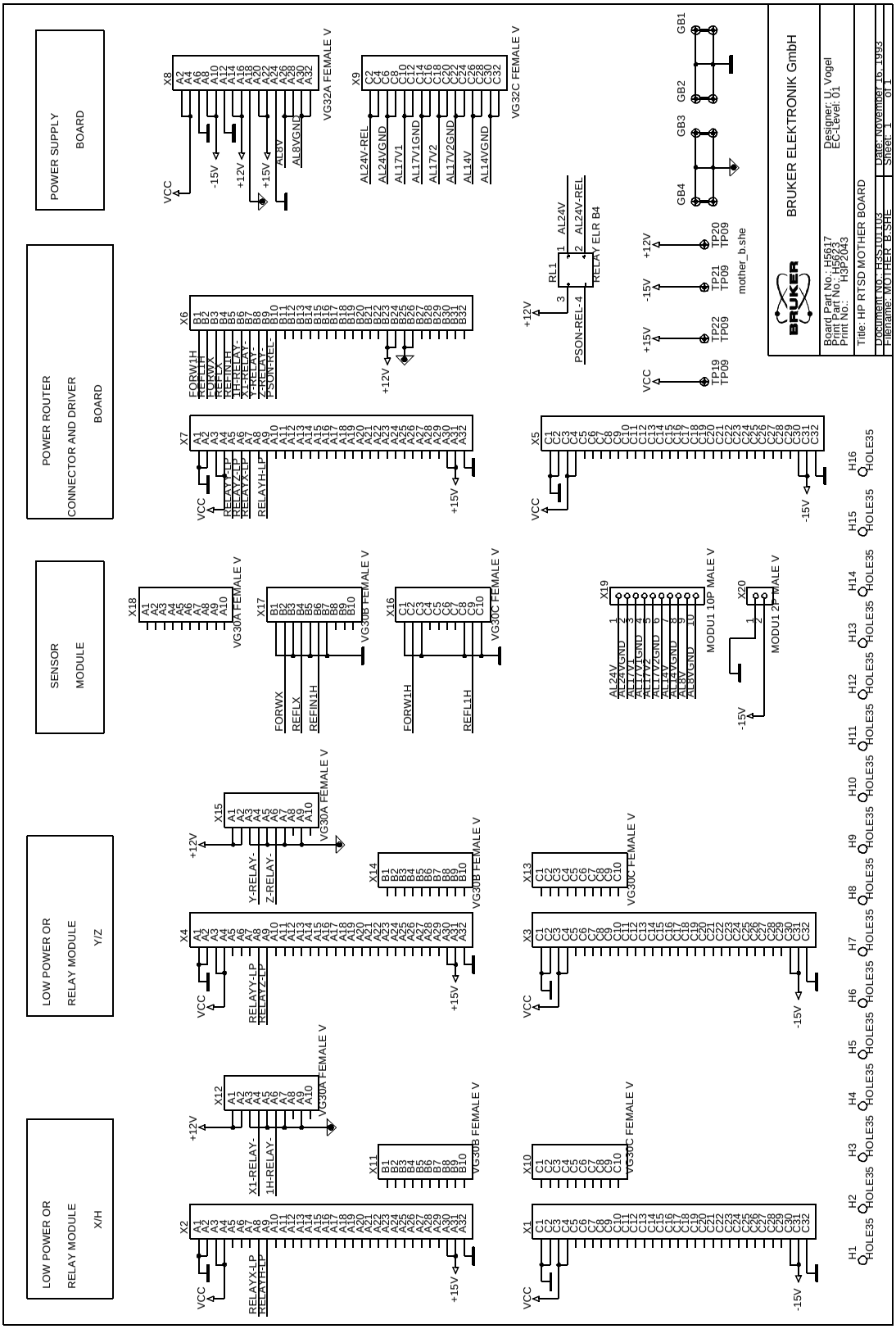
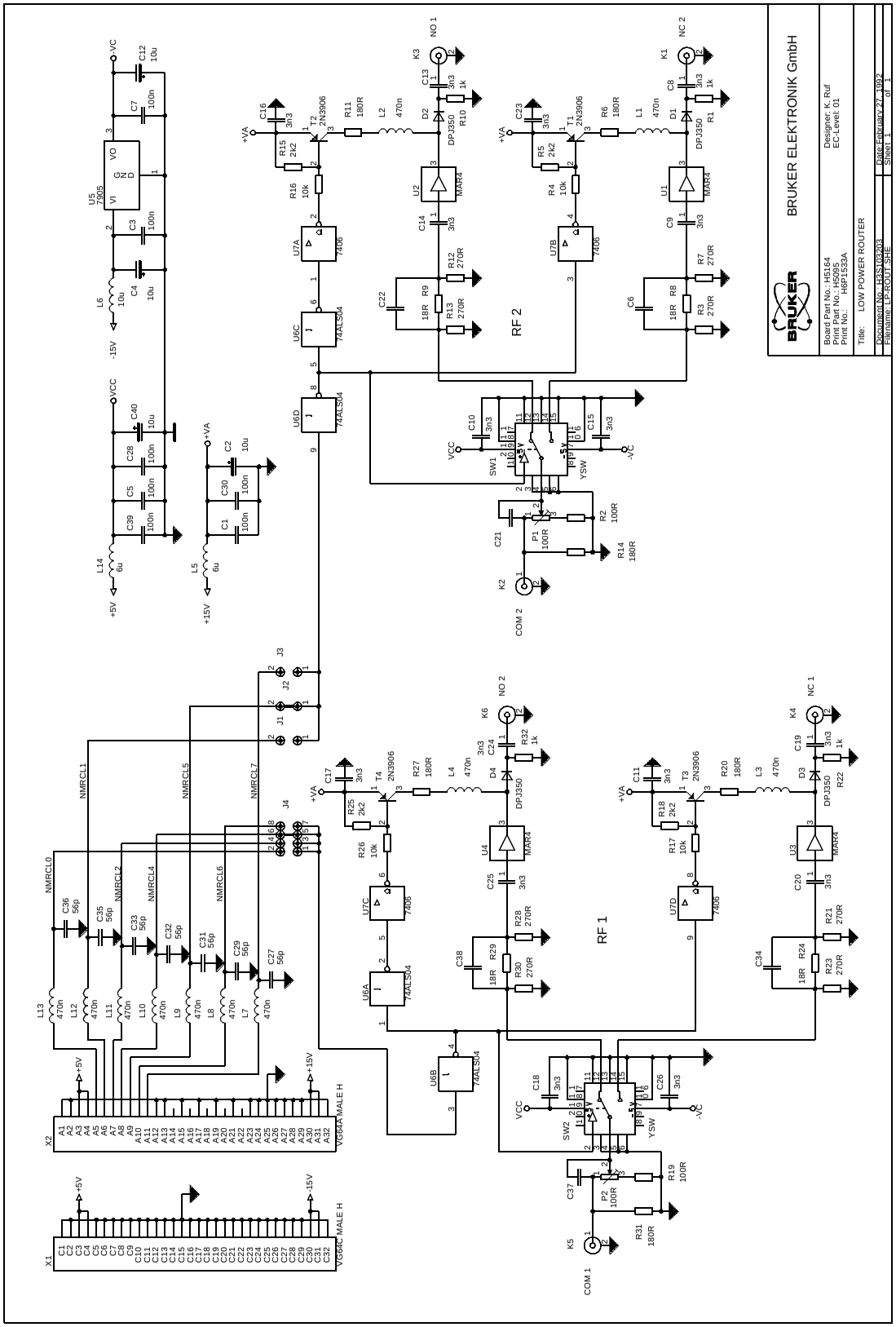


*Figure A.7. LOW POWER ROUTER*



# Figures

# Figures

# Tables

# Tables