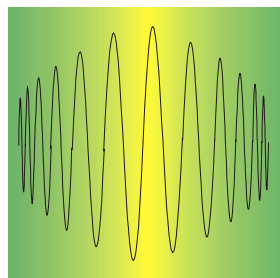


High Tone Power Therapy Device



HiToP[®] 181-H

Service manual for the
patient device

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Notations

Times New Roman in type size 11 - descriptions and explanations

Arial in type size 10 - functions and keys of the current stimulation device

Pictographs



Attention

Warnings which have to be observed by all means !

!! *Note* Information that will facilitate your work.

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Overview

Chapter 1 describes the basic characteristics of the patient device.

Chapter 2 specifies all relevant technical data of the device which are necessary for operation or repair works.

Chapter 3 describes all components, their function, characteristic features and notices for service. On the plates, there are indicated only components which are important for functionality. Components which are not relevant for the understanding of the mounting or for service are not indicated.

Chapter 4 describes the adjustment of the device. The necessary measurement instruments and aids for the individual adjustment steps are indicated.

Chapter 5 provides service notices concerning how to check the functionality of the individual components.

Chapter 6 explains the individual steps which are necessary for the replacement of certain components.

Chapter 7 refers to safety controls.

Chapter 8 is a list of components and spare parts indicating the order number.

Chapter 9 provides the block diagram, wiring and the circuit diagrams of the individual components.

The **Appendix** comprises the Test Certificate of safety controls of the high tone therapy device.

1 Purpose

1.1 HiToP® 181-H

The variant - **HiToP® 181-H** – is a patient unit which will be programmed by the physician at his practice with a fixed type of current and a fixed duration of treatment time. Therefore, the device is protected against erroneous operation and can be applied easily by the patient in his familiar environment.

1.2 SimulFAM® *i*

A slow frequency travers of up to three octaves is realized. The minimum of the amplitude is passed with the minimum of frequency. The maximum of the amplitude is passed with the maximum of frequency. This therapy activates the metabolism in the body without any irritation effect.

1.3 SimulFAM® *X*

A frequency travers of three octaves is realized. The frequency travers is realized with different speed (0,1 - 200 Hz). This therapy activates the metabolism in the body but has an irritation effect.

2 Technical data

Mains voltage and frequency:	100 – 115 V \pm 10 %, 230 V, 48 - 62 Hz	
Current consumption:	With 115 V: max. 700 mA With 230 V: max. 350 mA	
Mains fuses:	With 115 V: 2,5 AT with 230 V: 2,5 AT	
Output current:	max. 250 mA	
Output voltage:	max. 70 V eff.	
Admissible loaded impedance:	30 Ω ...5 k Ω	
MDD device class:	IIa	
Safety class:	I in accordance to IEC 601 / VDE 0750	
Safety degree:	BF in accordance to IEC 601	
Protection against ingress of water:	IP X1	
Dimensions:	6 cm x 23 cm x 32 cm (H x D x W)	
Weight:	max. 3,7 kg (without accessories)	
Color:	white RAL 9002 and grey RAL 7016	
Display:	LCD backlighted, 122 x 32 dots full graphic	
Buffer battery:	CR 2032	
Surrounding conditions:	Operation of the device:	Temperature range +10 °C ... +40 °C Relative air humidity 30 ... 75 %
	Transport and storage:	Temperature range +5 °C ... +50 °C Relative air humidity < 90 %, not condensing
Types of current:	Sinusoidal currents of 4096 - 32768 Hz Frequency modulated currents of 0,1 Hz - 200 Hz	

gbo Medizintechnik AG reserves the right to modify the design and specification without prior notice.

3 Description of Function

3.1 Main board

On the main board, the therapy frequencies are generated, amplified and transferred floating to the patient output by a transformer. A microcontroller does the complete control of the system. The infrared interface serves for programming the patient device.

3.1.1 Power supply

The device is supplied with the national supply voltage through a module which consists of supply filters and primary fuses. The admissible input voltages are 115 / 230 V with a power frequency of 48 - 62 Hz.

The secondary voltages are generated by a toroidal transformer, a rectifier and a voltage regulator.

The power supply provides the following output voltages:

Voltage	max. constant current	Use
5 V	0,5 A	Supply of logic
+15 V	1,5 A	Supply of power output transformer
+12 V	0,5 A	Supply of analogous signals

3.1.2 Signal amplifier

The signal amplifier consists of a frequency generator, an amplifier, a transformer and the patient relay.

The microcontroller is responsible for the control of the signal amplifier. The integrated 2-channel D/A converter generates the analogous voltage for the control of frequency and the amplitude of the output signal. The integrated 8-channel A/D converter takes up the measured values of the output voltage and output current.

The frequency generator generates a sinusoidal output signal the frequency of which is modified analogously to the control voltage. The amplitude is also modified analogously to the control voltage of the microcontroller.

The output of the frequency generator is amplified to a voltage which is directly coupled to an output transformer. The transformer generates a floating output voltage which is measured at the patient output. The voltage transformer is equipped with a measuring unit which measures the output voltage in the patient circuit. There is a current transformer in the patient circuit which measures the output current in this circuit.

The patient relay separates the patient from the circuit.

3.1.3 Infrared interface

The infrared interface enables the programming of the patient device. The TTL level of the serial interface of the microcontroller is transformed into an infrared signal by means of a special component.

3.1.4 Firmware programming interface

The microcontroller is internally equipped with a flash ROM to store the firmware. By connecting a special cable to the program-plug, the firmware can be loaded with a PC.

3.2 Front board

The front board is connected with the main board by a ribbon cable. The display is connected directly with the front board through a connector. Furthermore, the incremental encoder, keys and LEDs of the key pad are connected with this board. Additionally, the beeper and the generator of the contrast voltage are placed on that board.

3.3 Display 122 x 32

The display is a graphic display with a built-in controller which is controlled by the microcontroller. It is backlighted by LEDs.

4 Adjustment instructions

The function generator XR2206 generates a sinusoidal signal which can be measured at Pin 2 and/or at the measuring point of XR2206 with an oscilloscope:

Set the offset at the measuring point X12 with the offset potentiometer R44 to the minimum.

5 Service instructions

5.1 Storage of a new firmware version

The patient device provides the possibility to store a new firmware by means of a special interface. For this, you need to have a PC which is connected with the patient device via a serial interface.

Procedure:

1. The microcontroller is internally equipped with a flash ROM to store the firmware. By connecting a special cable to the program plug, the firmware can be loaded with a PC.
2. Execute the **DOWNLOAD** program on the PC.
3. You can follow the process on the display of the patient device and on the PC.



Attention

By no means shall the current supply of the patient device be interrupted during the flash ROM programming! During this process, you do not have any possibility for intervention!

!! ***Notice*** Check the functionality of the device briefly.



Attention

If the transmission has been interrupted for any reason, restart the patient device and proceed as indicated above.

6 Dismounting - Mounting flow chart



Attention

Before opening the device, unplug the mains plug !!

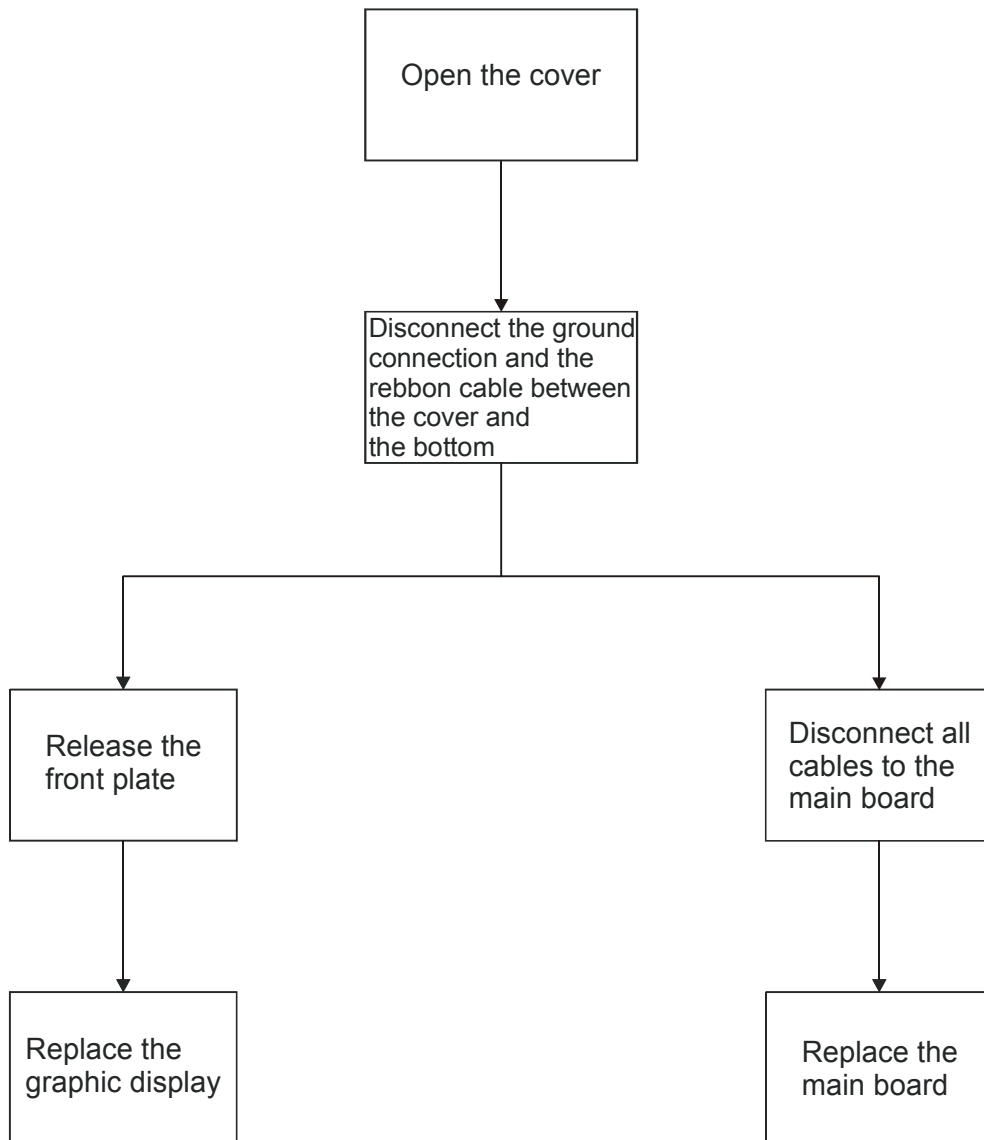


Figure 1: Dismounting - Mounting flow chart

7 Safety controls

7.1 Protective earth conductor test

Upon the mounting of the device, the earth conductor has to be checked in accordance with the test report (see attachment).

7.2 Control of the leakage current

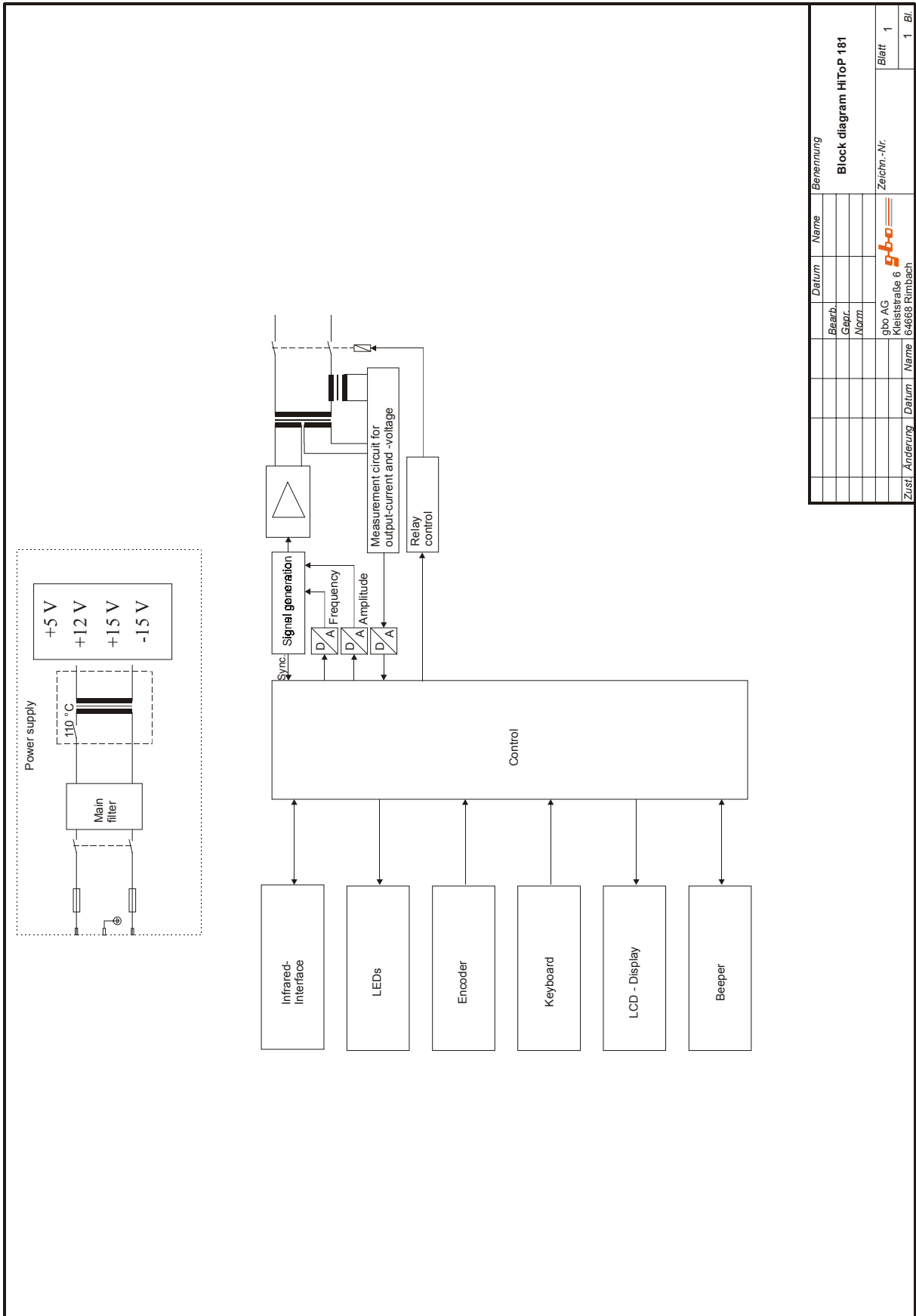
When a printed circuit board is replaced, it is necessary to measure the leakage current additionally; see the attached test report.

8 Spare parts list

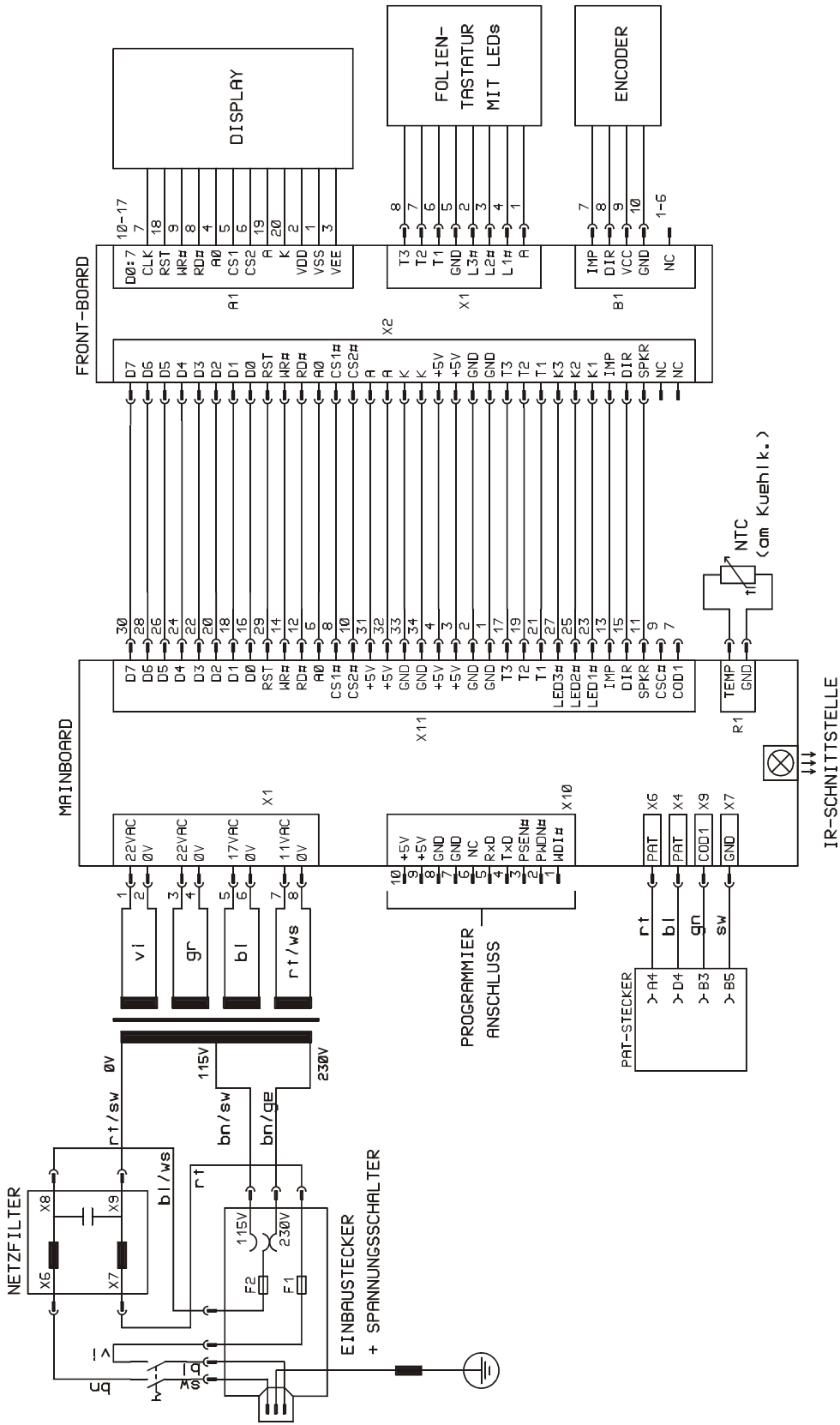
Component:	Order number:
Adjustment knob	014-5-0001-E
Battery	007-4-4015-E
Display	005-4-2021-E
Incremental encoder	007-2-7030-E
Main board	017-1-0006-E
Terminal block	011-5-0121-E
Transformer	017-4-4001-E
Front board	017-1-0007-E

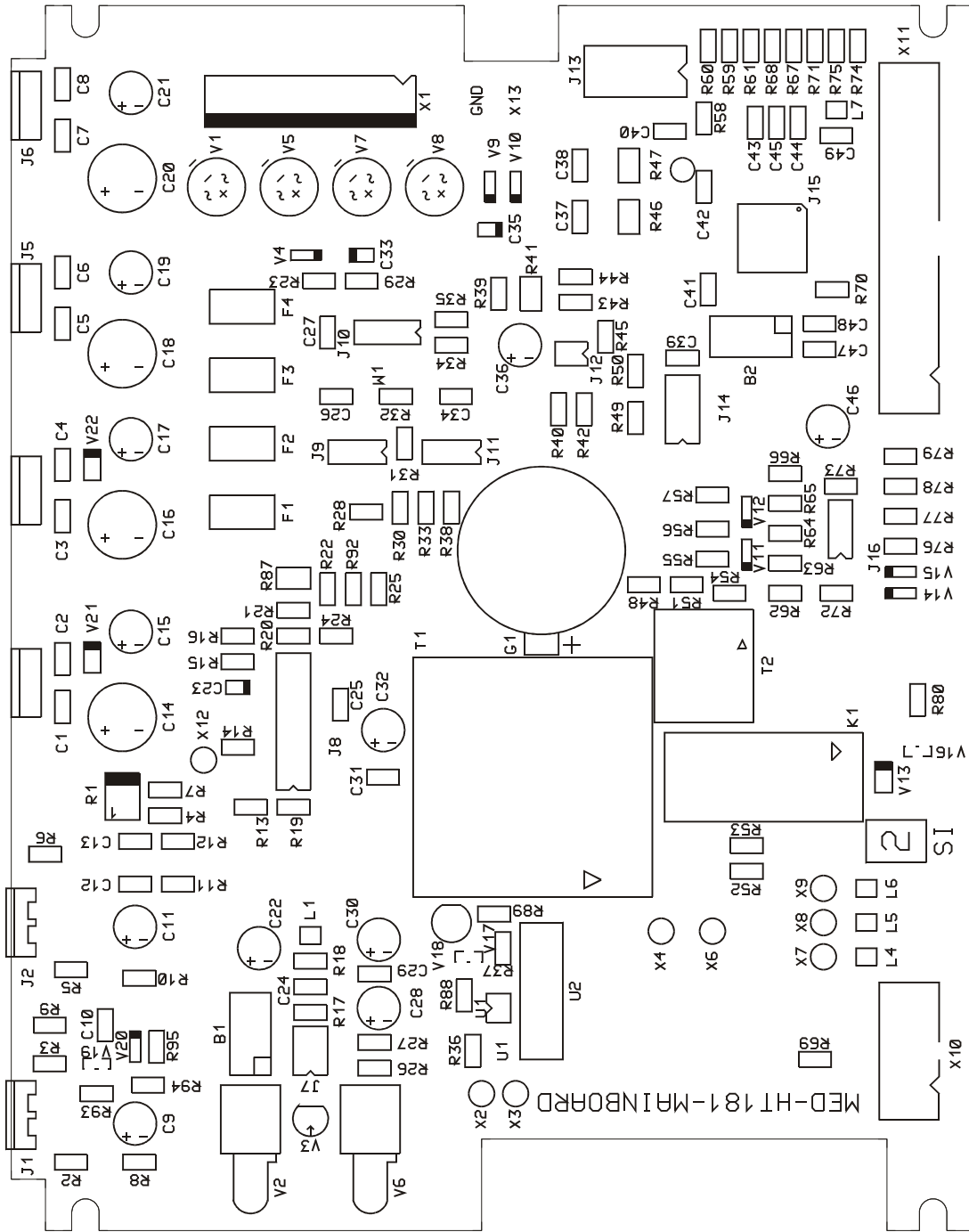
9 Block diagram, wiring and circuit diagrams

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HiToP 181-Front board	Index 2	25



Benennung		Datum		Name	
Block diagram HiToP 181					
Bearb.					
Gepr.					
Norm.					
gbo AG		Zeichn.-Nr.		Blatt	
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Zust./Aenderung		Datum		Name	
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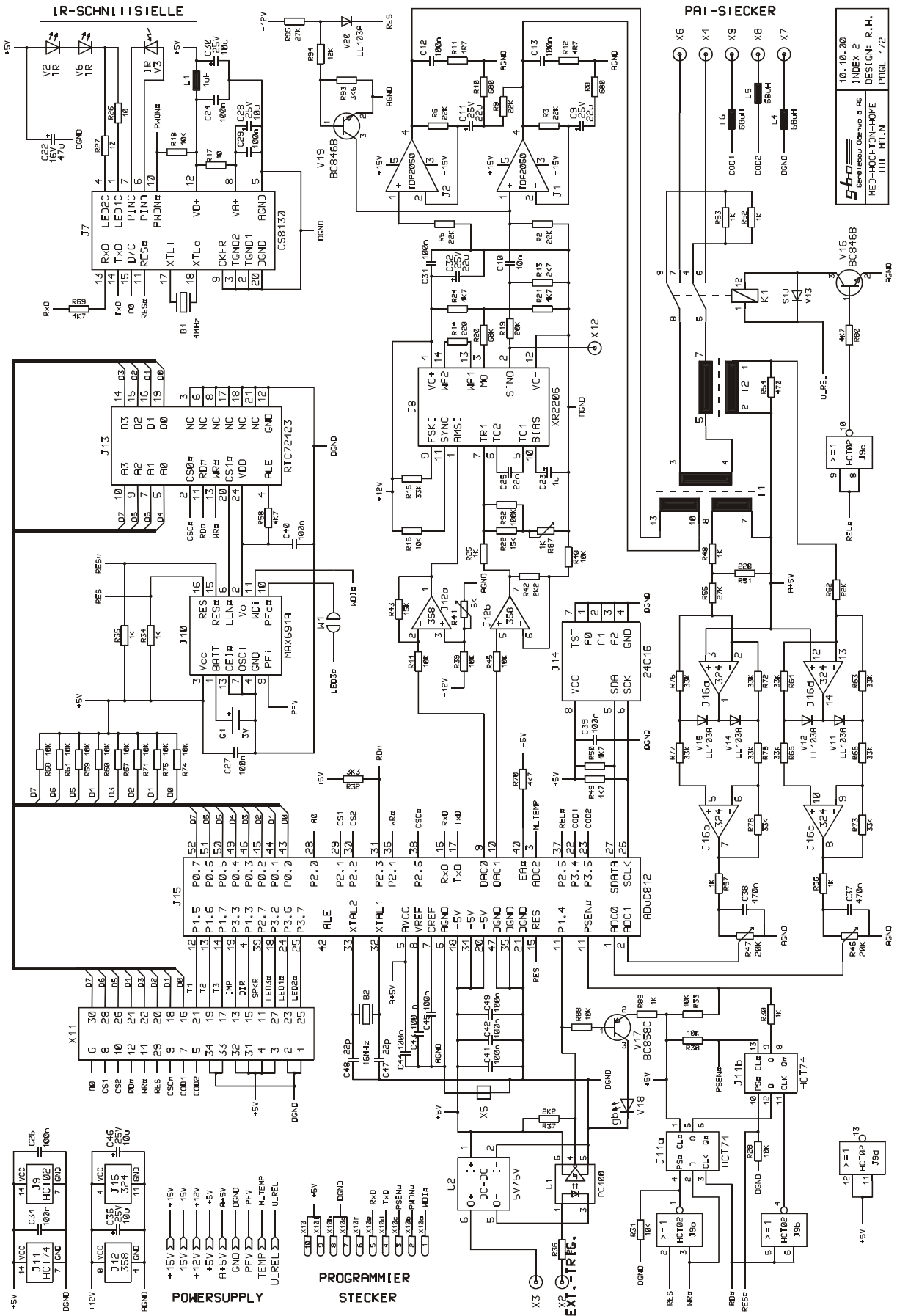




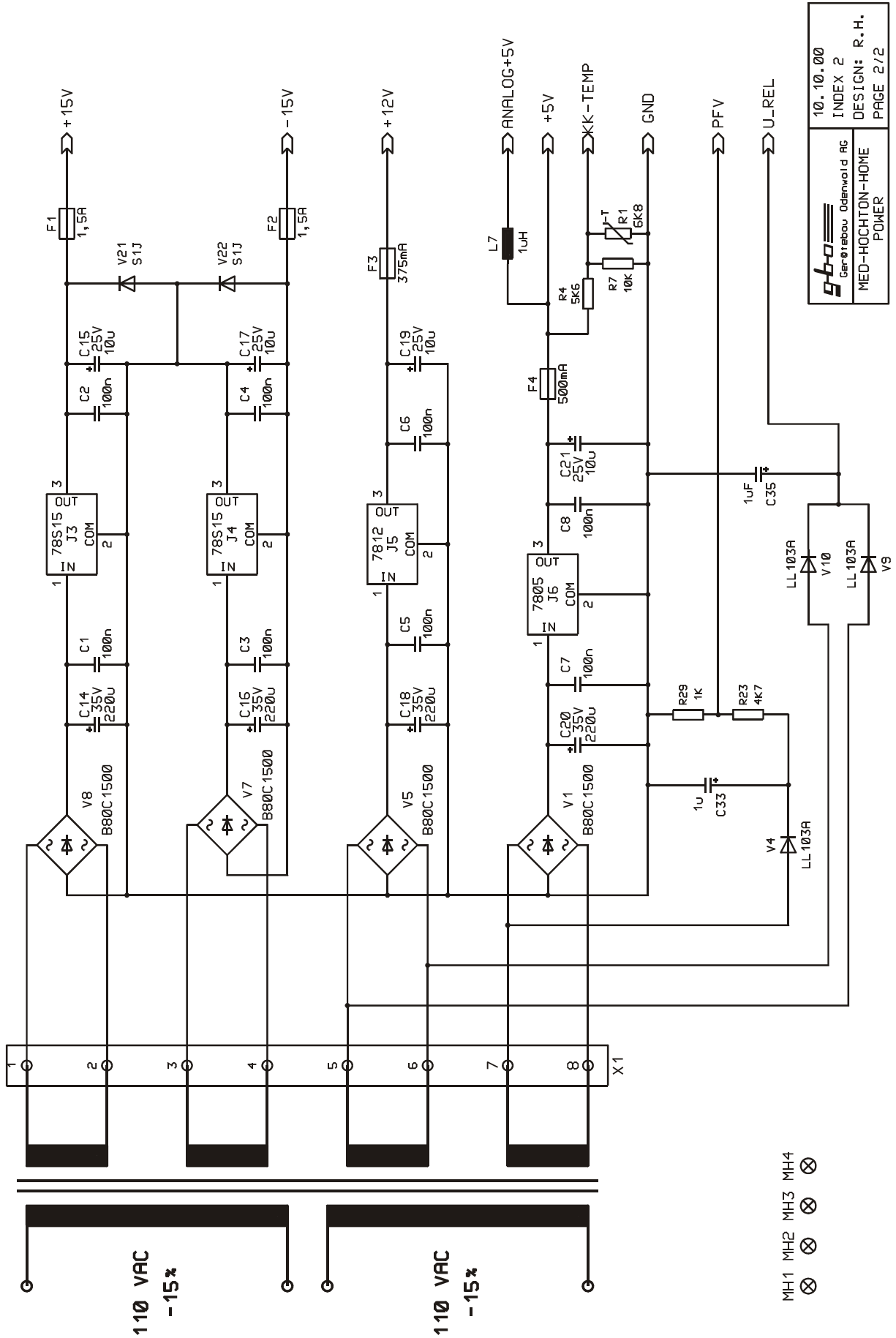
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LAYER: SILK-SCREEN

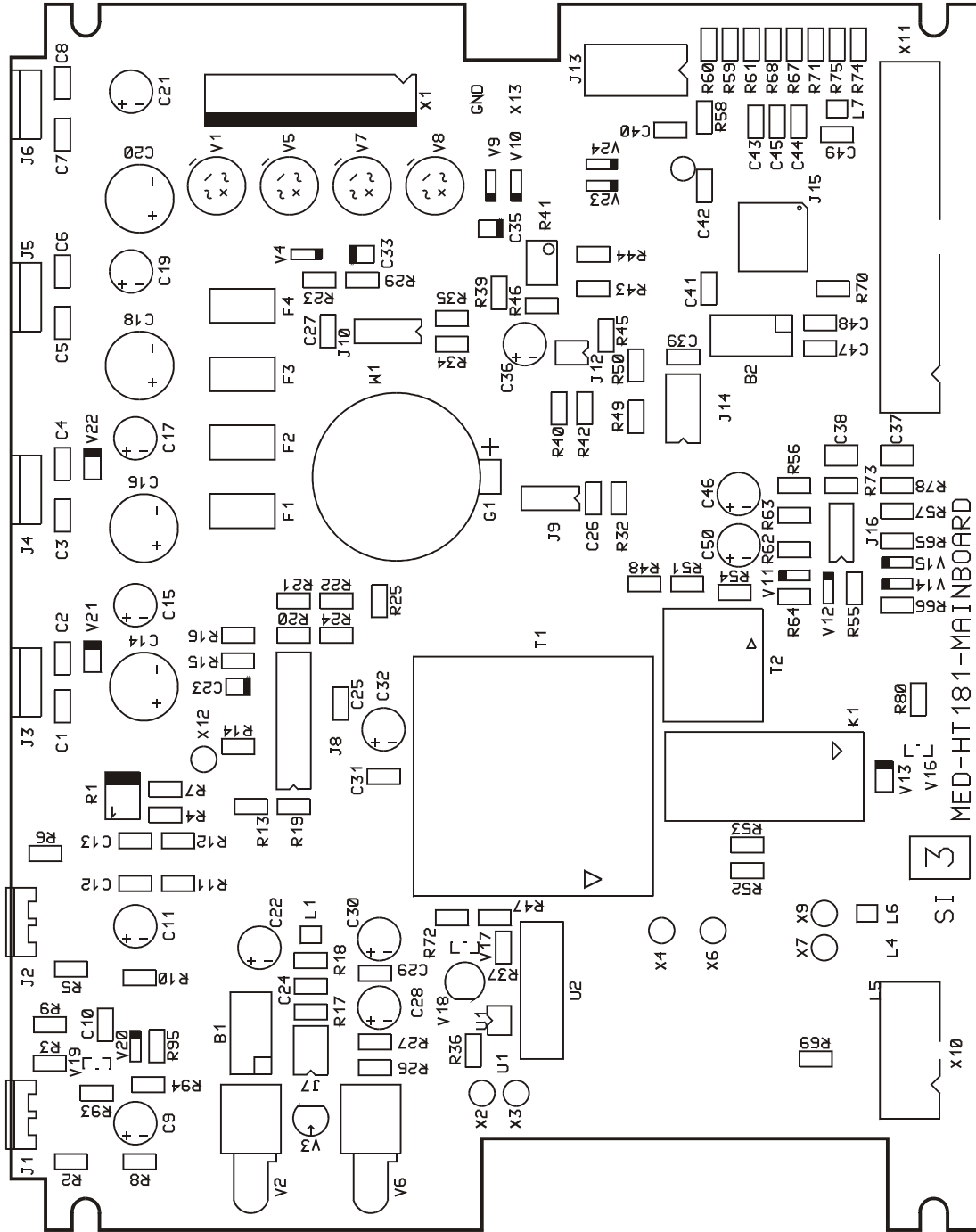
VERSION: 2.1
DATUM: 10.10.00

gbo HT181-MAINBOARD
LAYOUT gbo-Nr.: 017-4-7101



10. 10. 000
INDEX 2
DESIGN: R. H.
NEO-HOCHTUN-ADME
HITH-MRTN



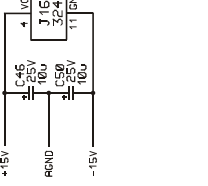
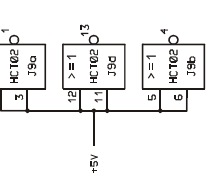
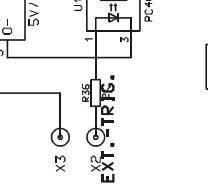
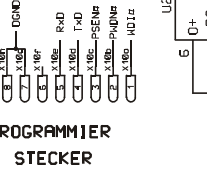
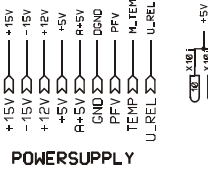
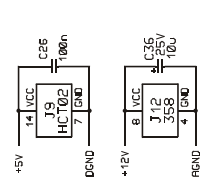
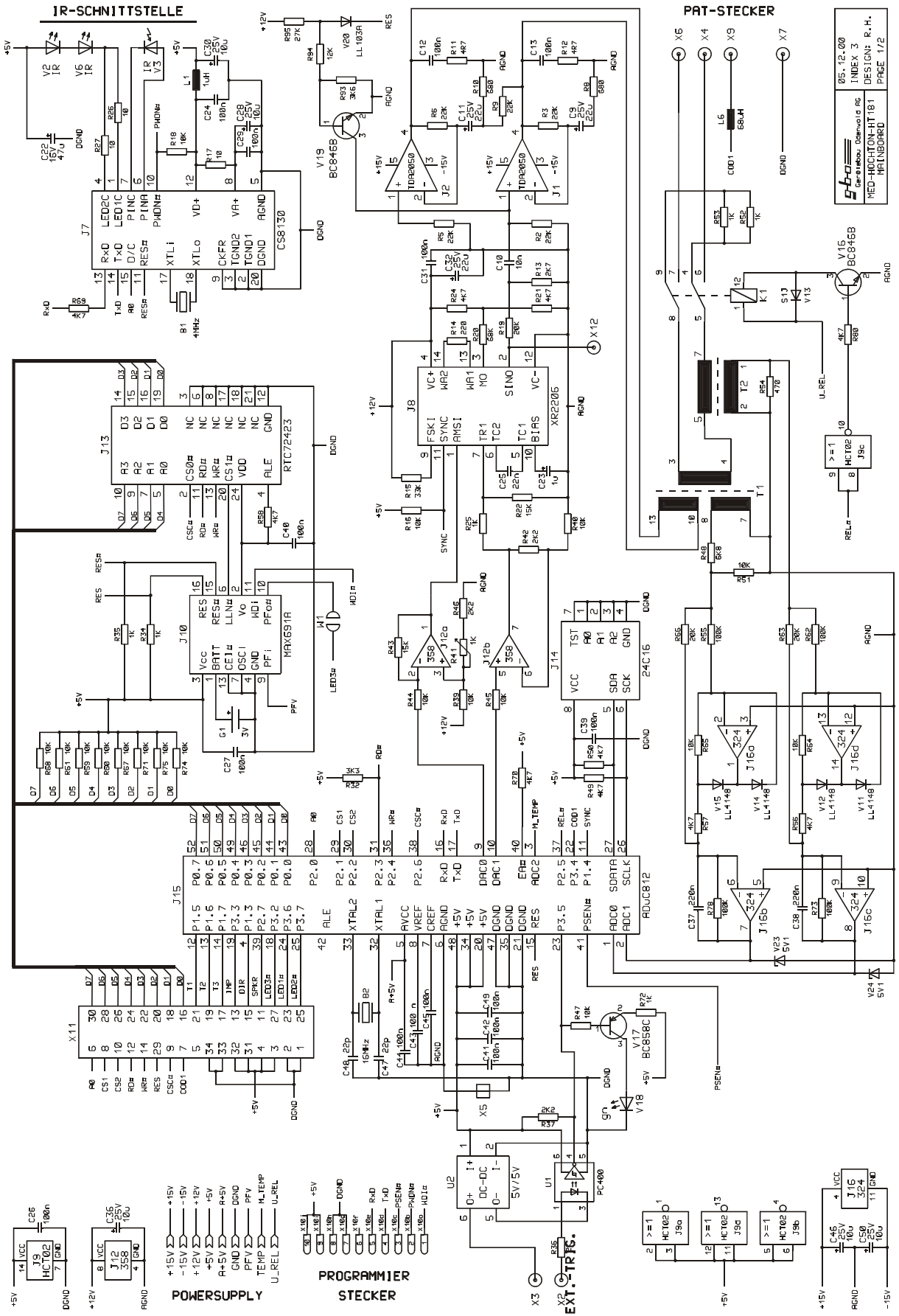


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LAYER: BOIKGEREBN

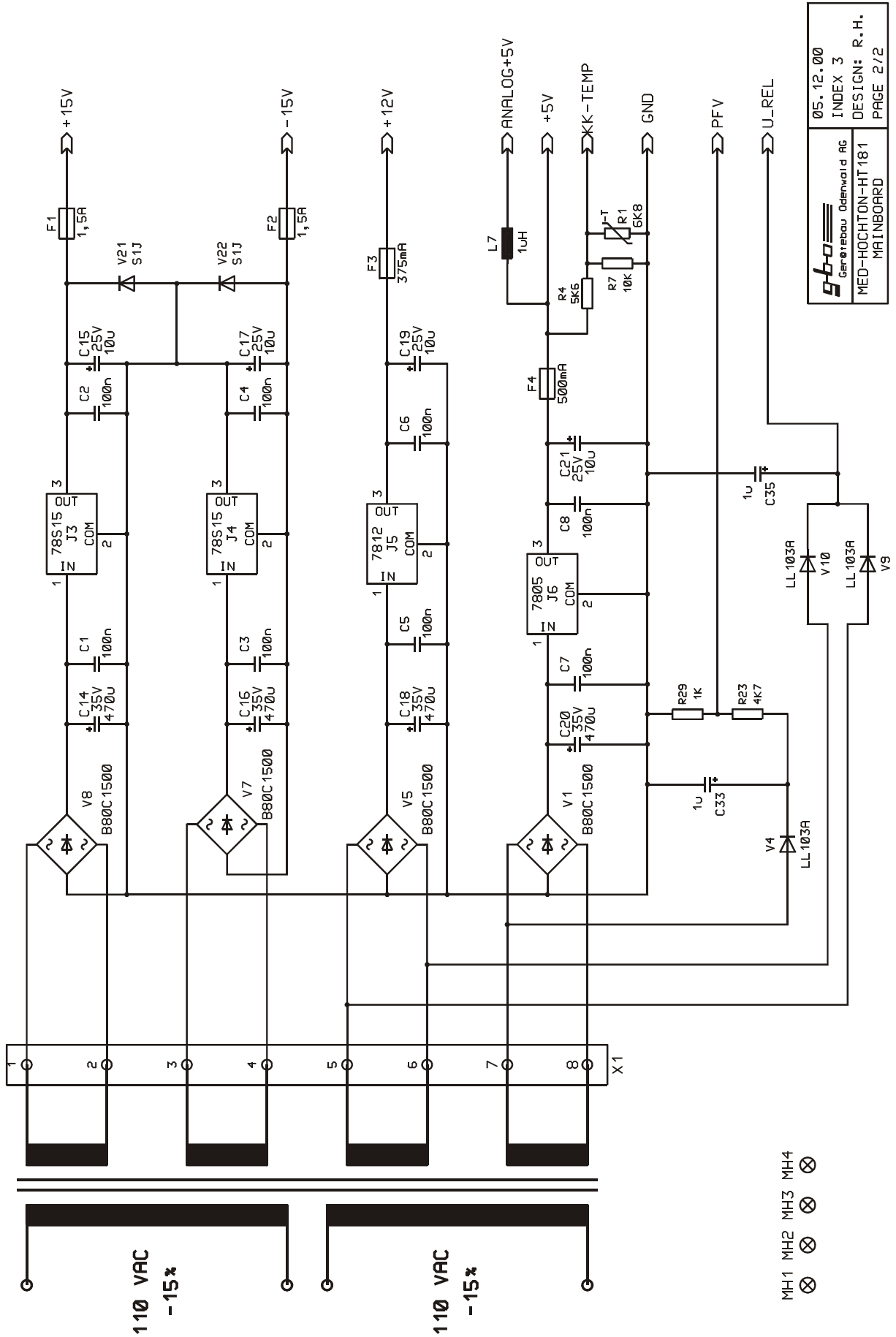
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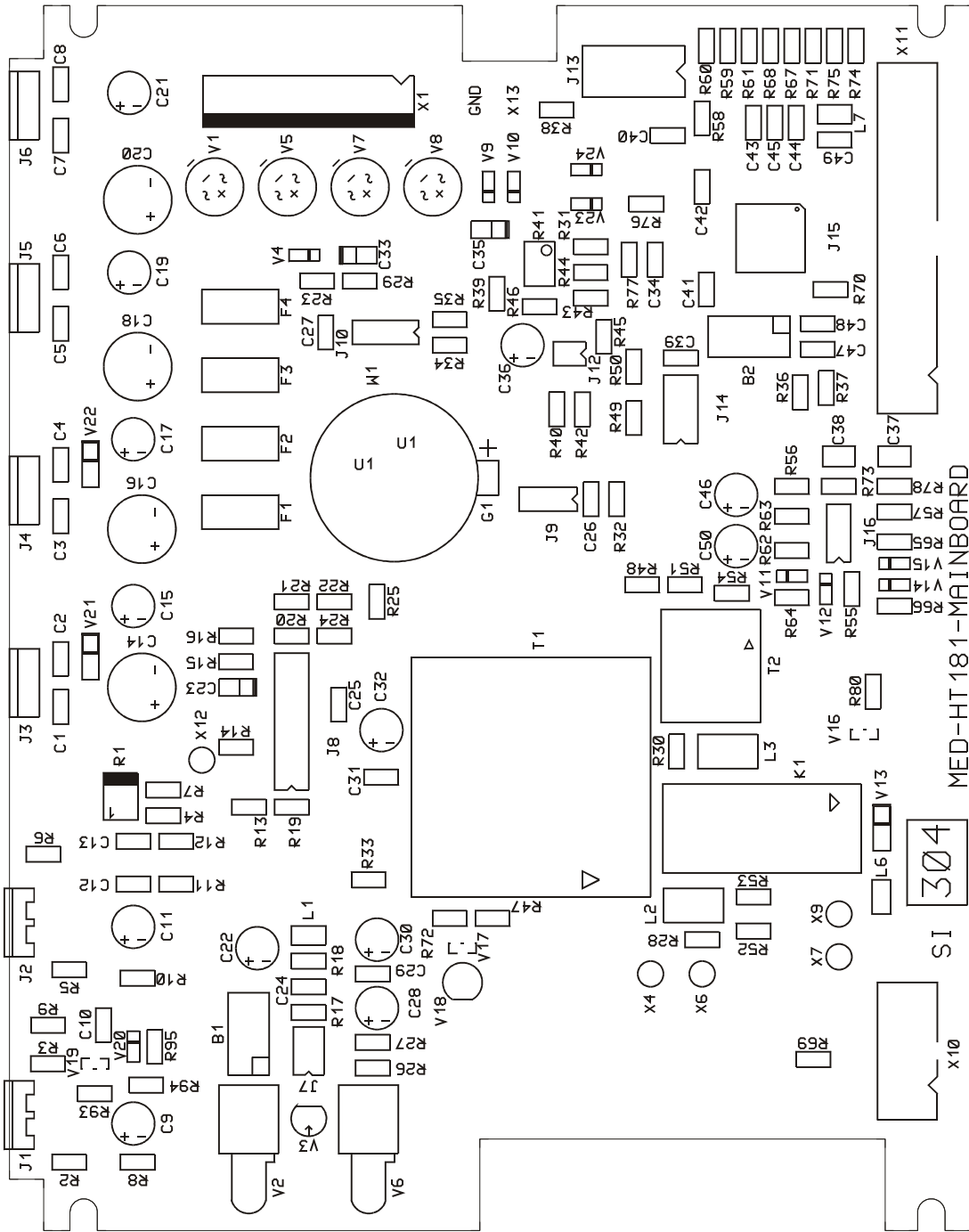
HT 181-MAINBOARD
LAYOUT gbo-Nr.: 017-4-7101/2

MED-HT 181-MAINBOARD



DES. 12.00
INDEX 3
DESIGN R. H.
MED-HOCHTON-HT 181
MAINBOARD
PAGE 1/2





DESIGN: R. HAUPTLEISCH
LAYER: SILK-SCREEN

INDEX: 4
DATUM: 20.04.01

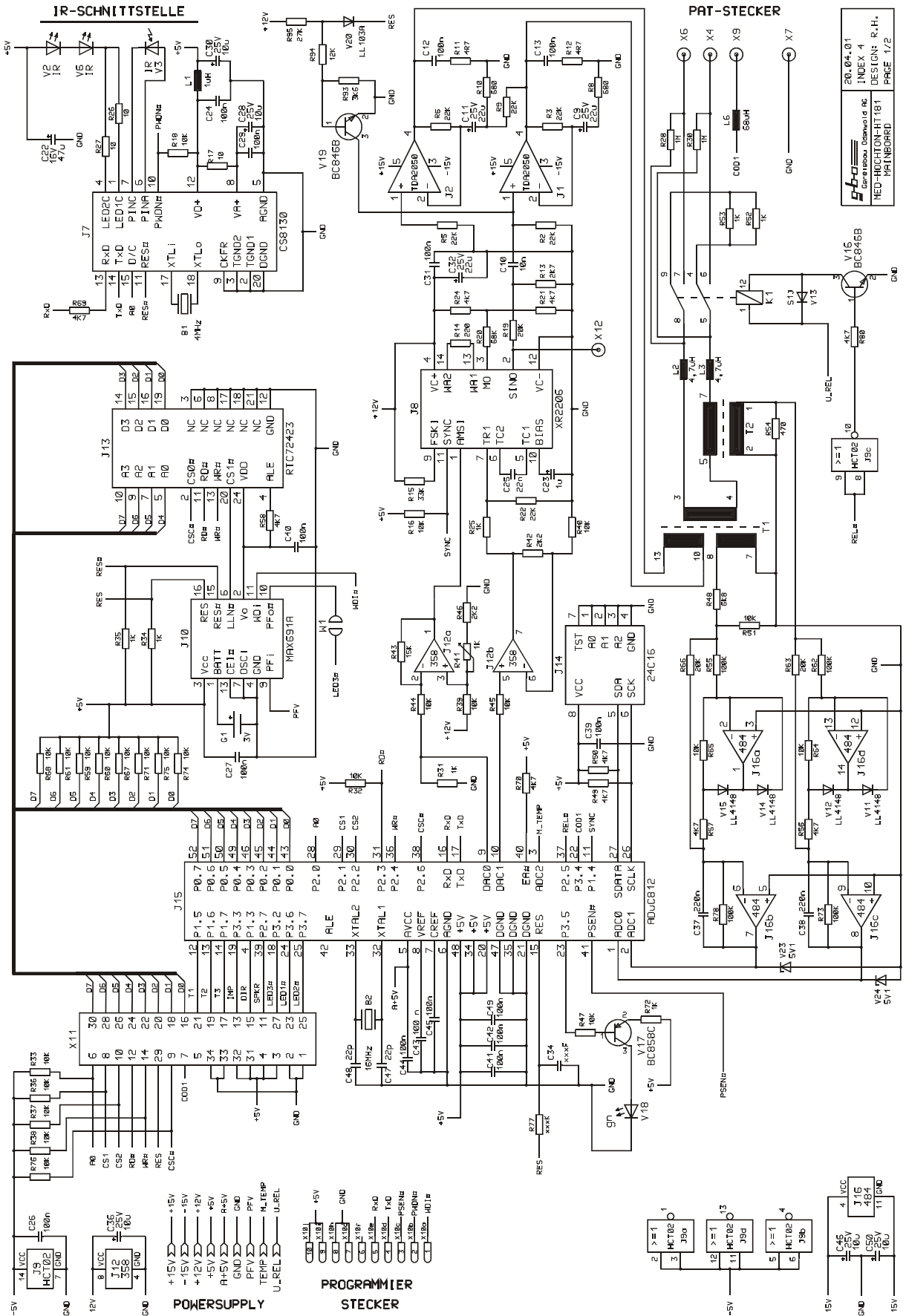
HT181-MAINBOARD
LAYOUT gbo-Nr.: 017-4-7101/3

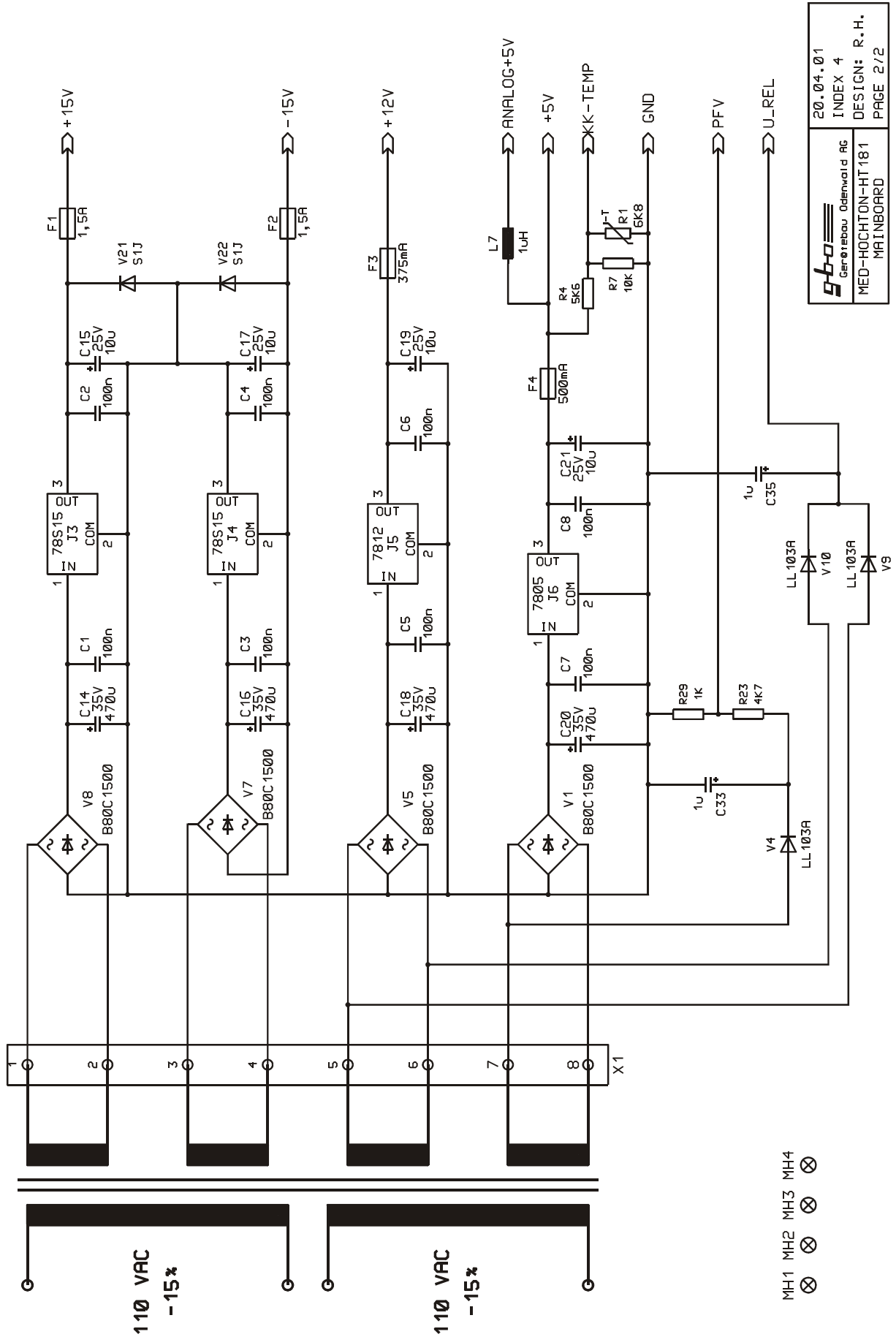
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MED-HT 181-MAINBOARD

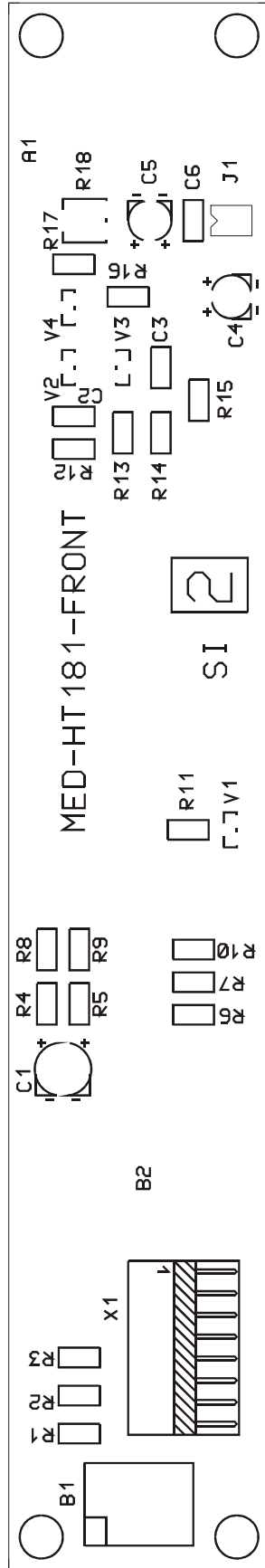
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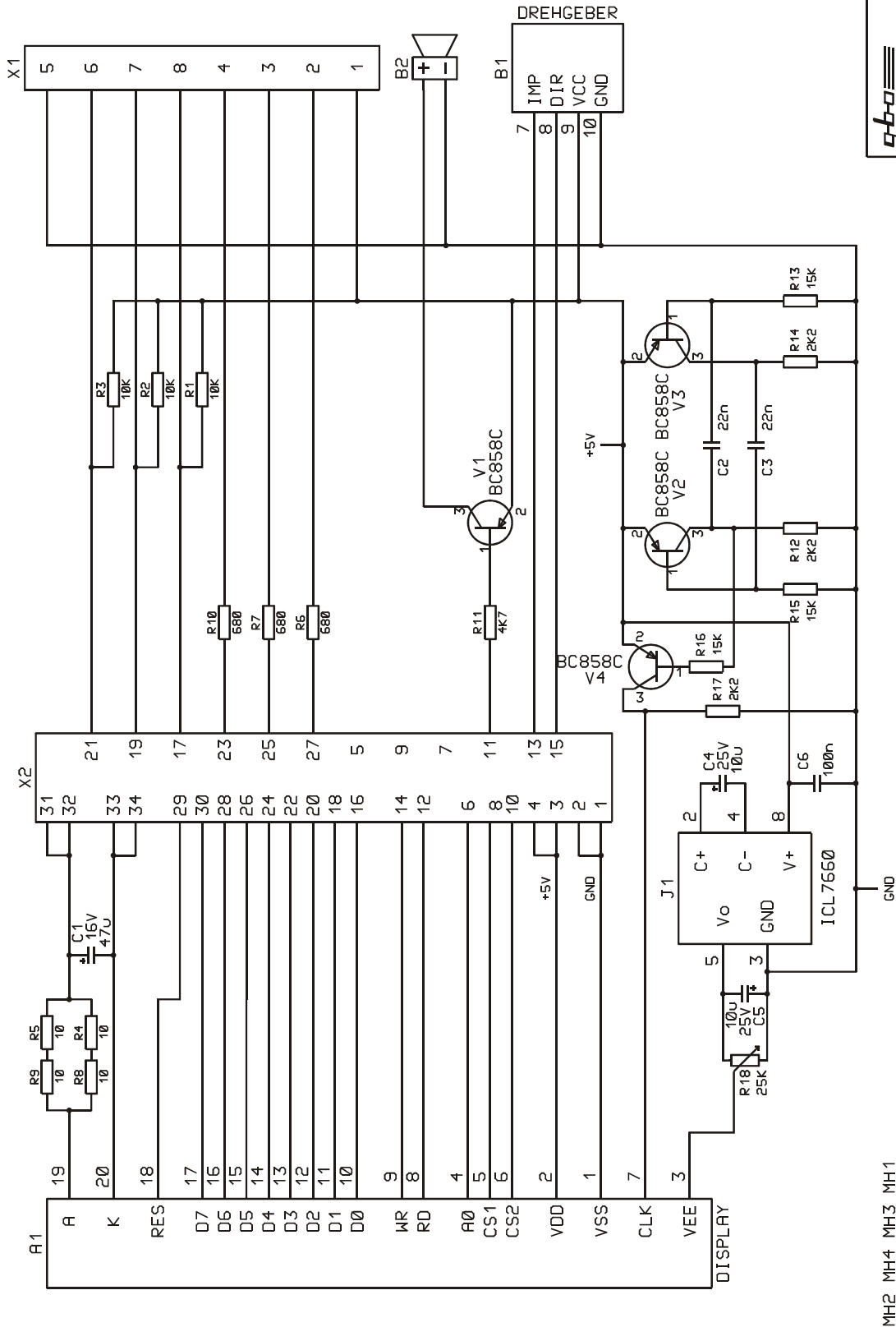
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gbo MED HiToP181 FRONT SCHALT-INDEX: 2 DESIGN: R.HAUPTFLEISCH
 LAYOUT gbo-Nr.: 017-4-7102/1 DATUM: 22.12.00 LAYER: TOP-SILK-SCREEN





 Gerätebau Odenwald AG MED-HOCHTON-HT 181 FRONT-PANEL	11. 12.00
	INDEX 2
	DESIGN: R.H.
	PAGE 1/1

Correction sheet

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