

Nord Electro 2 Service Manual

Revision history

Rev. 1.0

First release.

Overview

There are three different Nord Electro 2 models:

- 61 note keyboard version
- 73 note keyboard version
- rack version



Rack version



63 note keyboard version



73 note keyboard version

Uploading OS and sounds

The operating system and sampled sounds are stored in FLASH circuits on the main board. For information on how to update the OS and uploading sounds, visit www.clavia.se. Click on Products/Nord Electro 2 and then choose either "free software" or "free sounds".

Returning to factory settings

It is not possible to return to factory settings without connecting the Nord Electro to a computer. Once connected, you can dump the factory settings and the latest OS. Visit <http://www.clavia.se> for details.

Running the test program

The test program is stored in an EPROM located in position U17. If the version is older than 0.20, there is no test program available. To find out which EPROM version that is installed, the Nord Electro needs to be opened.

In order to trace a hardware error easier, each Nord synthesizer has a test program. This program is primarily used in production in order to test all functions. However, any user can access the test program by holding down certain buttons at power up. The functions provided by the test program allow a quick and easy search for possible errors in the hardware. Test results are shown on the Electro's display. If a test is successful, the display reads "rd". If errors are detected, an error code is shown in the display. The error codes are listed under the section "Error codes" at the end of this document.

WARNING: Improper use of the test program can result in malfunctioning of the synth. It may only be used by qualified service personnel and is not intended for end users.

In order to execute the different tests on a Nord Electro 2, press and hold **<program 1+3+5>** at power up. All LEDs and the display should now be lit. After finishing each test successfully, the test program jumps forward to the next step. The active test is shown in the display. To toggle manually between tests, press **<shift + up>** or **<shift + down>**.

Checking the LEDs and buttons



Press all buttons to switch off the LEDs. Once switched off, they can not be switched on again without restarting the test. Switching off all LEDs makes the test jump forward to the next stage.

Checking the knobs



Turning a knob from fully counter clockwise to fully clockwise should generate a value between 0 and 7F, respectively. The value is shown in the display. It should change linearly with the potentiometer travel. Turning each knob fully counter clockwise to fully clockwise makes the test jump forward to the next stage.

Checking the keyboard



Press one key at a time to check its function. If a "note on" message from that key is detected, the display counts up one step. When all keys are pressed, the test jumps forward to the next stage. This test does not report velocity response.

Checking the pedal inputs



Connect a sustain pedal to the sustain pedal input, a switch pedal to the Rotor speed input and a control or volume pedal to the Control pedal input. Pressing and releasing the sustain pedal should generate values 0 and 7F, shown in the display. This applies to the Rotor speed input as well. Rocking the control pedal back and forth should generate values between 0 and 7F, shown in the display. For Yamaha control pedals, you have to switch the tip and ring signals for the pedal to work properly with the Electro 2. See this document:

http://www.clavia.se/nordelectro/fc7_modification.htm.

To make the test jump forward to the next stage, unplug all pedals and then reconnect and unplug the control pedal.

Checking the DAC



This test should output a clean sine wave on the left (d1) and right (d2) outputs. Toggle the output with **<STORE>**. Adjust the volume with the volume knob. If the output is distorted, try adjusting the trim pots found in the lower left corner of the main board (VR2 for left output, VR1 for right) with a non conductive (ceramic) screwdriver.



Hardware structure

The hardware is common for all three products; one power supply unit, one main board and one panel board.

Power Supply

The Nord Electro is supplied internally with several different voltages. These are +3.3 V, ± 5 V and ± 12 V. For more information on where to measure these voltages, see the schematic for the power supply. The fuse should be 300 mA for a 115 V and a 100 V supply, and 125 mA for a 230 V supply.

Main board

The main board is equipped with four DSPs (U16-U19), which are controlled by a host processor (U14) with two RAM circuits (U9-U10, 128k*8 bits each). The code for the host processor is stored in an EPROM (U17). OS and sampled sounds (all sounds except organ) are stored in four FLASH circuits (U1-U4, 4M*16 bits each). Audio D/A conversion is done by U20. A/D conversion of the control pedal takes place on the panel board (see schematic for details). All input and output jacks are filtered from radio signals with an EMI-filter. External jacks are a 26 pole connector for the panel board, a 10 pole connector for the power supply unit and two keyboard connectors.

Panel Board

On the panel board you will find all control functions of the Nord Electro. It is also on the panel board that the model of the Nord Electro is hardware configured. See section "How to configure keyboard or rack version" for details. The panel board is connected to the main board with a 26 pole ribbon cable. It is through this cable the panel board gets its current supply.

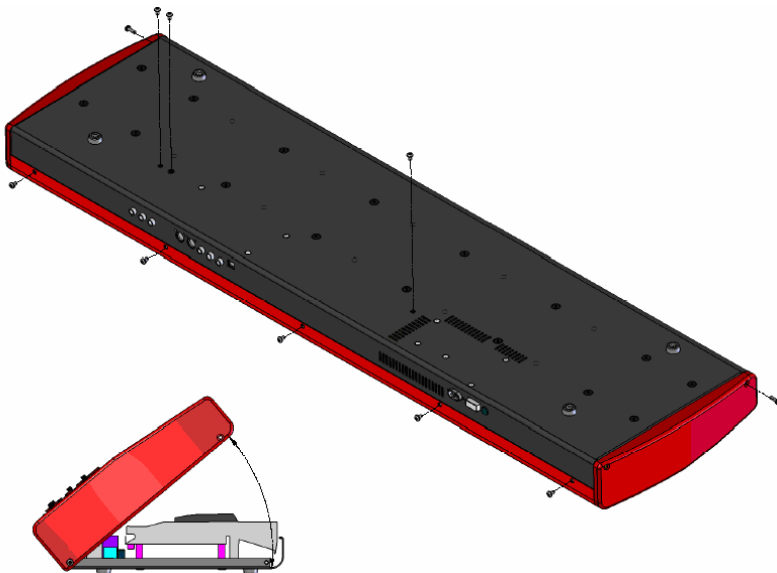
How to detach the circuit boards

WARNING: Take necessary precautions against ESD before handling the circuit boards.

Opening the synth

Keyboard version:

Loosen the screws as shown in the figure below. Lift the front of the wooden ends to open the top.



The picture shows which screws that should be removed on a Nord Electro 73 key version. For the 63 key version, the two screws close to each other at the top of the picture does not exist.

Rack version

Loosen the two screws on the back side and the two screws on the front side that holds the top to the chassis. You can now lift off the top.

Removing the Power Supply Unit

Loosen the five screws holding the PSU to the chassis. Loosen the two screws on the back panel next to the AC inlet. Finally remove the 10 pole ribbon cable connector and lift out the PSU.

Removing the Main Board

Loosen the four screws holding the main board to the chassis. Loosen the nuts and remove the washers around the 1/4" jacks on the back panel. Also loosen the four screws holding the MIDI IN and OUT jacks to the chassis. Remove the 26 pole ribbon cable connector to the panel board, the 10 pole ribbon cable connector to the PSU and the two ribbon cable connectors to the keyboard. You can now lift out the main board.

Removing the Panel Board

Pull off all knobs on the front panel (not the buttons). Remove the ribbon cable connector from the panel board. Loosen the last two screws holding the top to the chassis. Loosen the nine screws holding the panel board to the top. You can now lift out the panel board.

How to configure keyboard or rack version

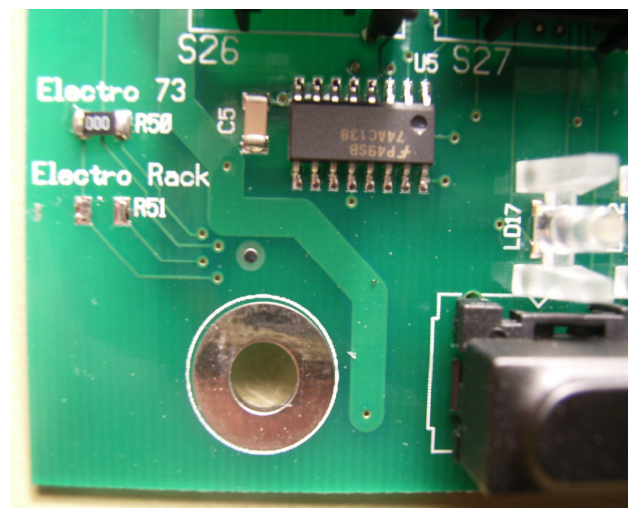
The model of a Nord Electro (61, 73, rack) is decided by two 0 (zero) ohm resistors (R50, R51) found in the lower left corner of the panel board. In order to reach the resistors, the panel board needs to be detached. If the panel board is not properly configured, you get problems like:

- High notes trig low notes or notes are triggered randomly.
- Keyboard not working at all.
- Buttons affect other parameters.

The configuration scheme is:

	Zero ohm resistor in position	
	R50	R51
Electro 61	No	No
Electro 73	Yes	No
Electro rack	No	Yes

The picture to the right shows how a panel board for a Nord Electro 73 key version should be configured.



Updating the software

The software version is briefly shown in the display when you power on the Nord Electro/Electro 2. For more information on how to update the software, visit <http://www.clavia.se>.

Known or common errors

Many of the errors that occur can be related to the improper use of the synthesizer. Before it can be established that a hardware error has occurred, check the manual and the FAQ on www.clavia.se for information. In some cases an error can be cured by updating the software. See www.clavia.se for more information on how to update the software. If the possibility of a software error can be excluded, check the following:

- Is the fuse blown? Many times the problem can be as simple as that. Also check the power rating on the back panel to make sure that it complies with your country.
- Does all voltages appear on the power supply unit/main board? For information on where to measure the different voltages, see the schematic.
- Is there a bad connection? Check all ribbon cables and connectors to see that they are fixed in their respective positions.
- Is there a bad solder joint? A bad solder joint might be difficult to discover on surface mount components, but should be easy to find on hole mount components like jacks and connectors.
- Are all components and connectors in good condition? Inspect the card to see if the problem can be detected visually.
- In general, some types of errors that are hard to trace might be cured by cleaning the board with an electronic cleaning solvent. Sometimes this can remove conductive debris that shorts out tightly spaced component pins. It might also help to gently scratch the surface between component pins with a scalpel or a similar fine tipped instrument in order to remove debris.

The above list is by no means complete, but it can give an indication on where the problem might be located.

Input or output jacks not working

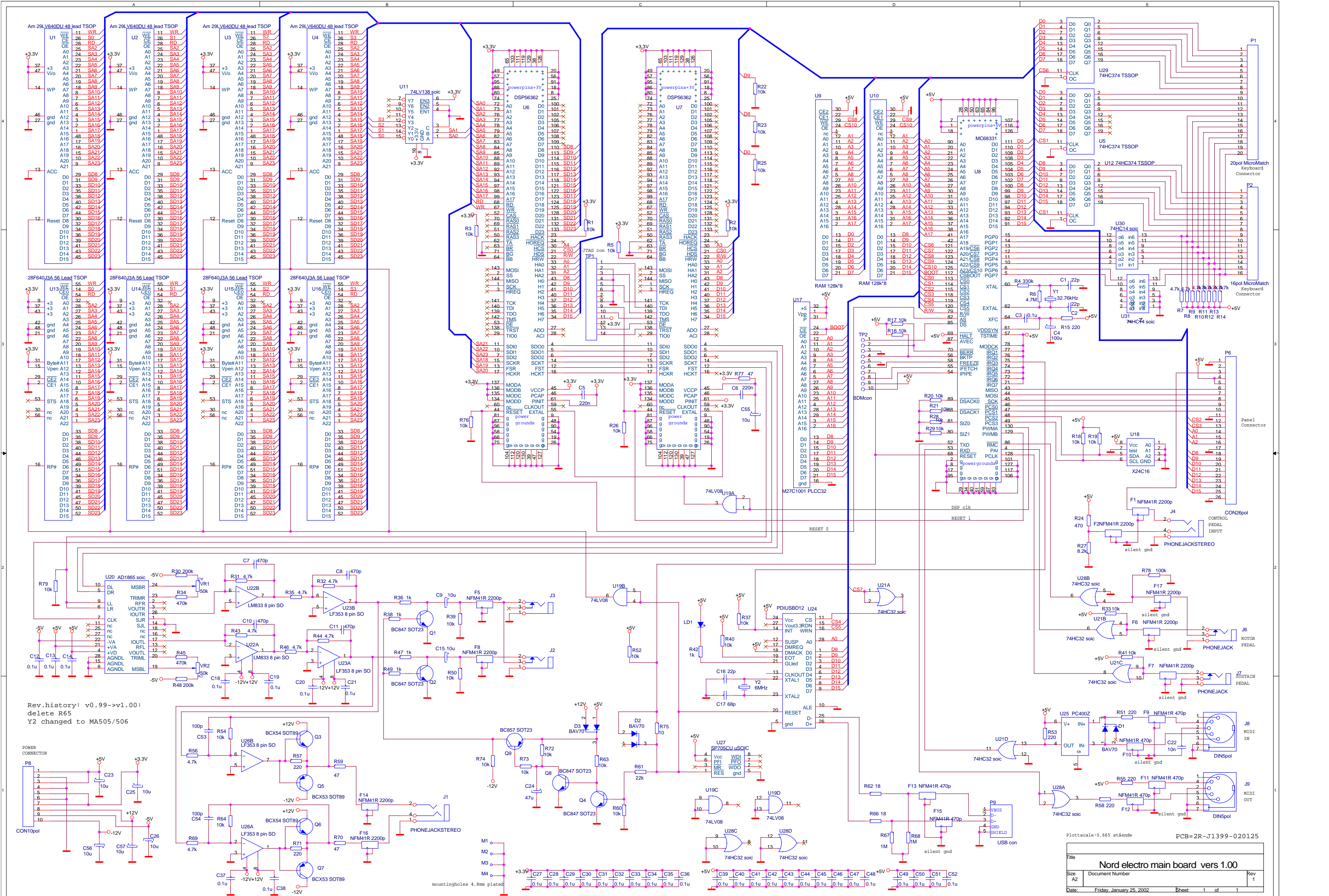
The Nord Electro is built with high quality components and the circuit boards are well protected in a steel chassis to withstand physical strain. However, input and output jacks are exposed to possible damage, for example when dropping the synth. If a jack is not working, check the EMI-filter for that jack too see that it conducts. Use a multimeter or other appropriate equipment to measure conductance. Measure at the outer ends of the EMI-filter. See the schematic for details on where to find the EMI-filter for each jack. Also check for bad solder joints or cracks in the PCB.

Display shows 'E7'

This error code indicates that there are errors on the software in FLASH. The problem can be cured by updating the software to the latest version. The software is uploaded via MIDI with an update program that can be downloaded at www.clavia.se. Follow the instructions as displayed by the program. In some cases, this might not cure the problem.

Some keys not working or one key trigs several notes

This problem is most likely to occur if circuits U5, U12 and U29 on the main board are faulty. Inspect them visually to see if any of them seem to be in bad condition.



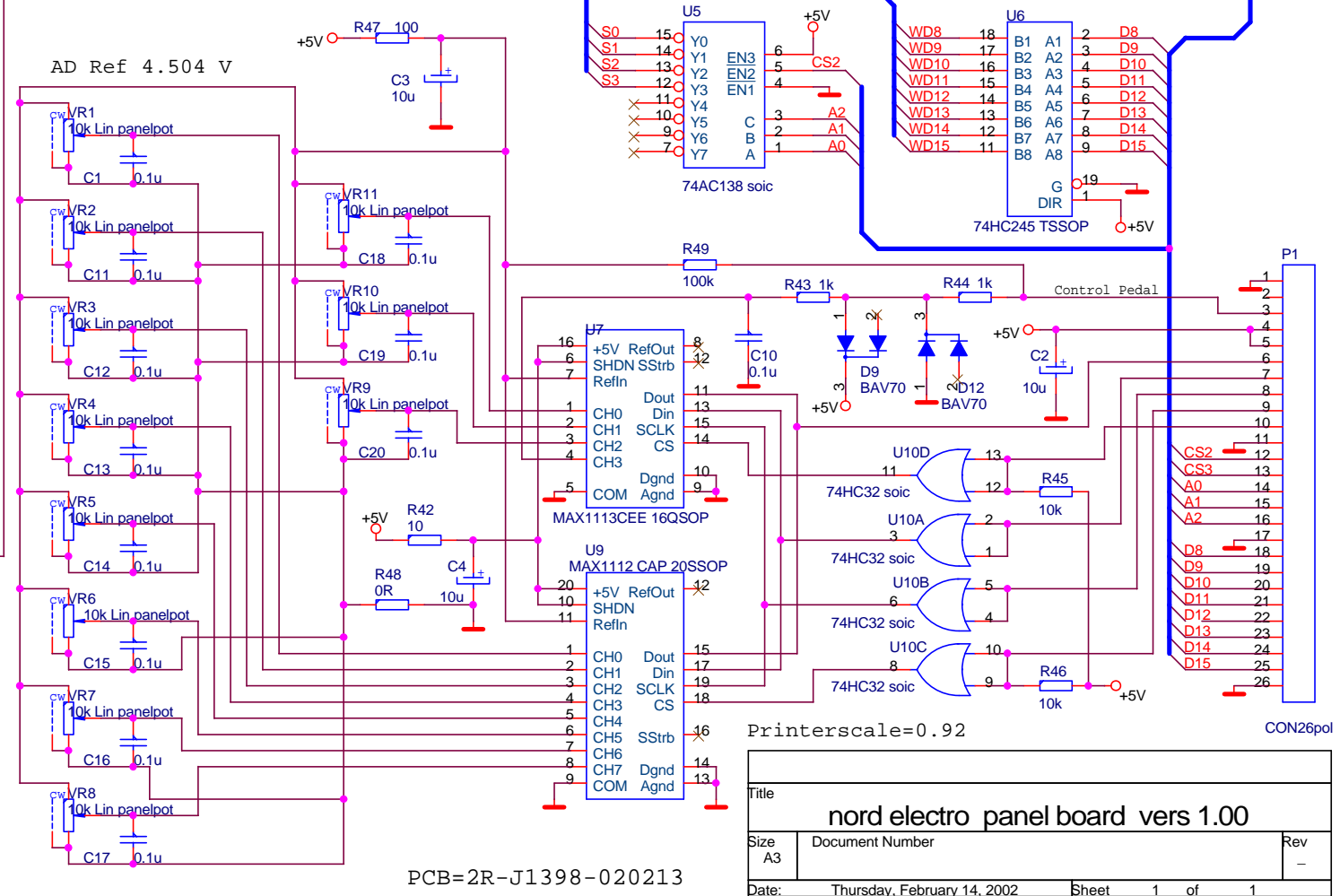
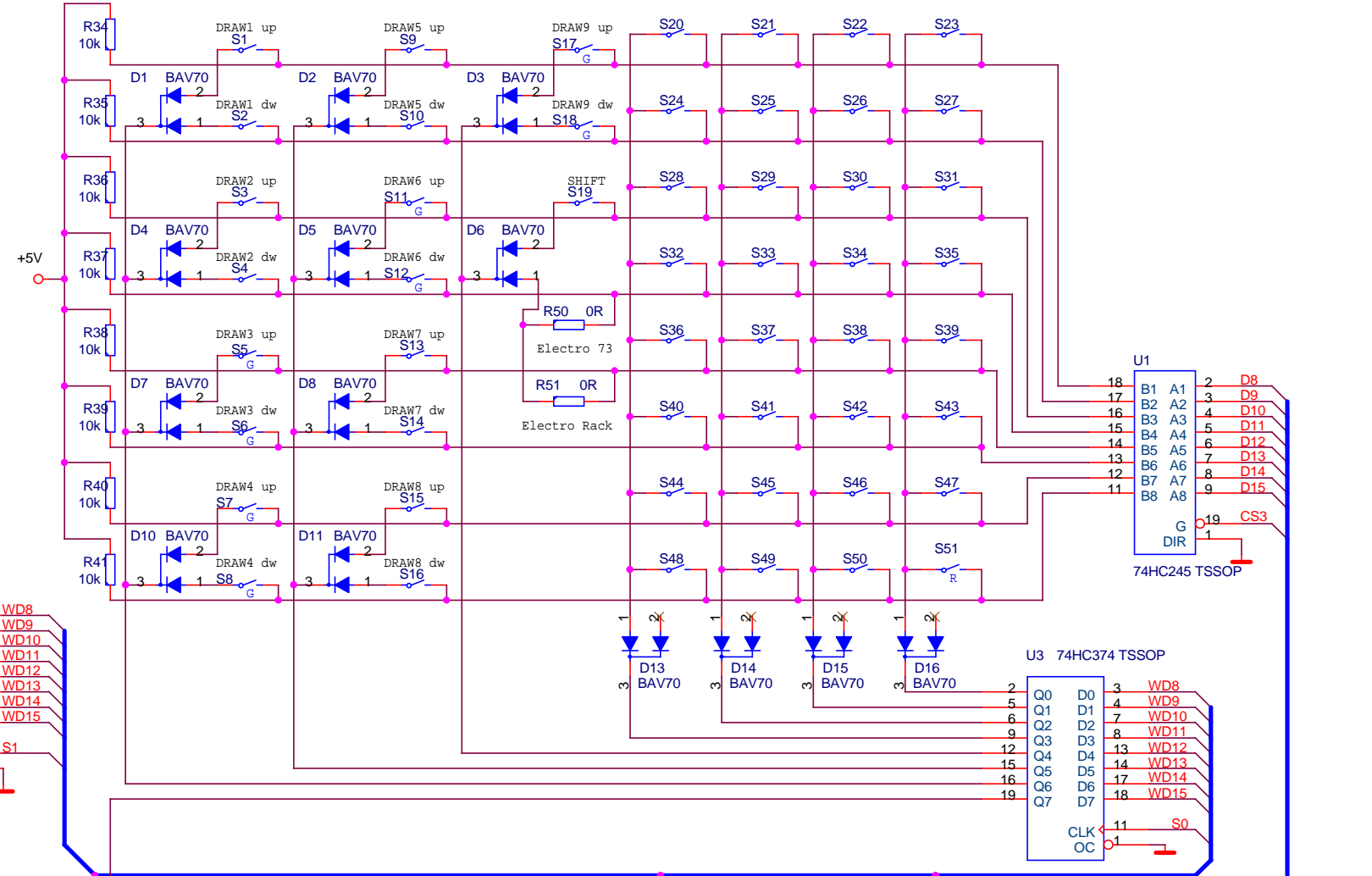
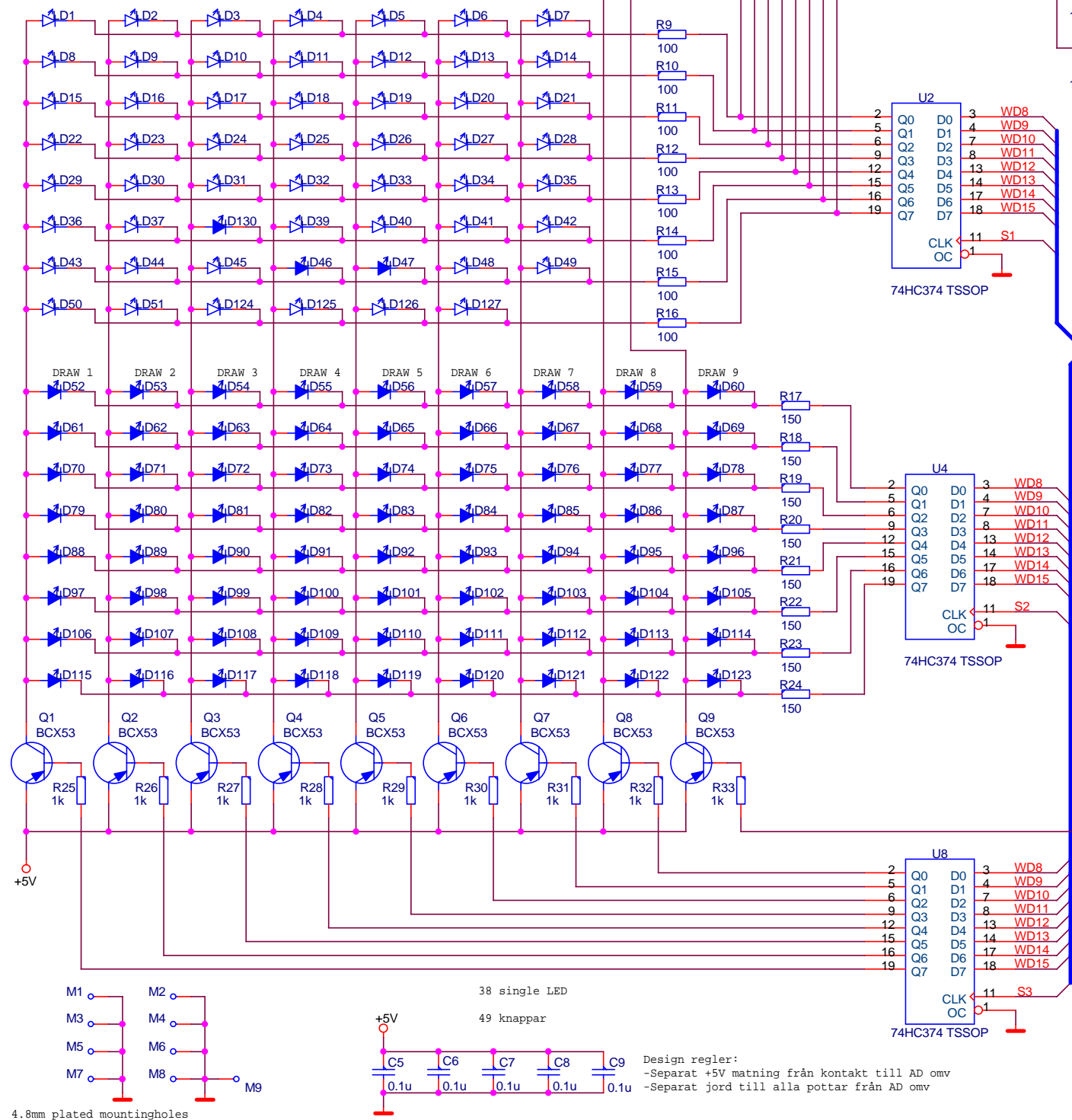
Rev.history: v0.99->v1.00:
delete R65
Y2 changed to MA505/506

PlotScale=0.665 stände PCB=2R-J1399-020125

Title		
Nord electro main board vers 1.00		
Size	Document Number	Rev 1
A2		
Date:	Friday, January 25, 2002	Sheet 1 of 1

Rev.history:
 v.0.91->v.0.92:Ld125=green, fixed in assy.dwg.
 Bot.peelable mask added.
 v.0.92->v.1.00:2 resistors added (0R) for
 version handling,R50,S1. Old R100 and R101
 renamed to R48 and R49. LD130,red,added.
 P2 deleted.

Fylld lysdiod är röd.
 Ej fylld lysdiod är grön.



4.8mm plated mountingholes

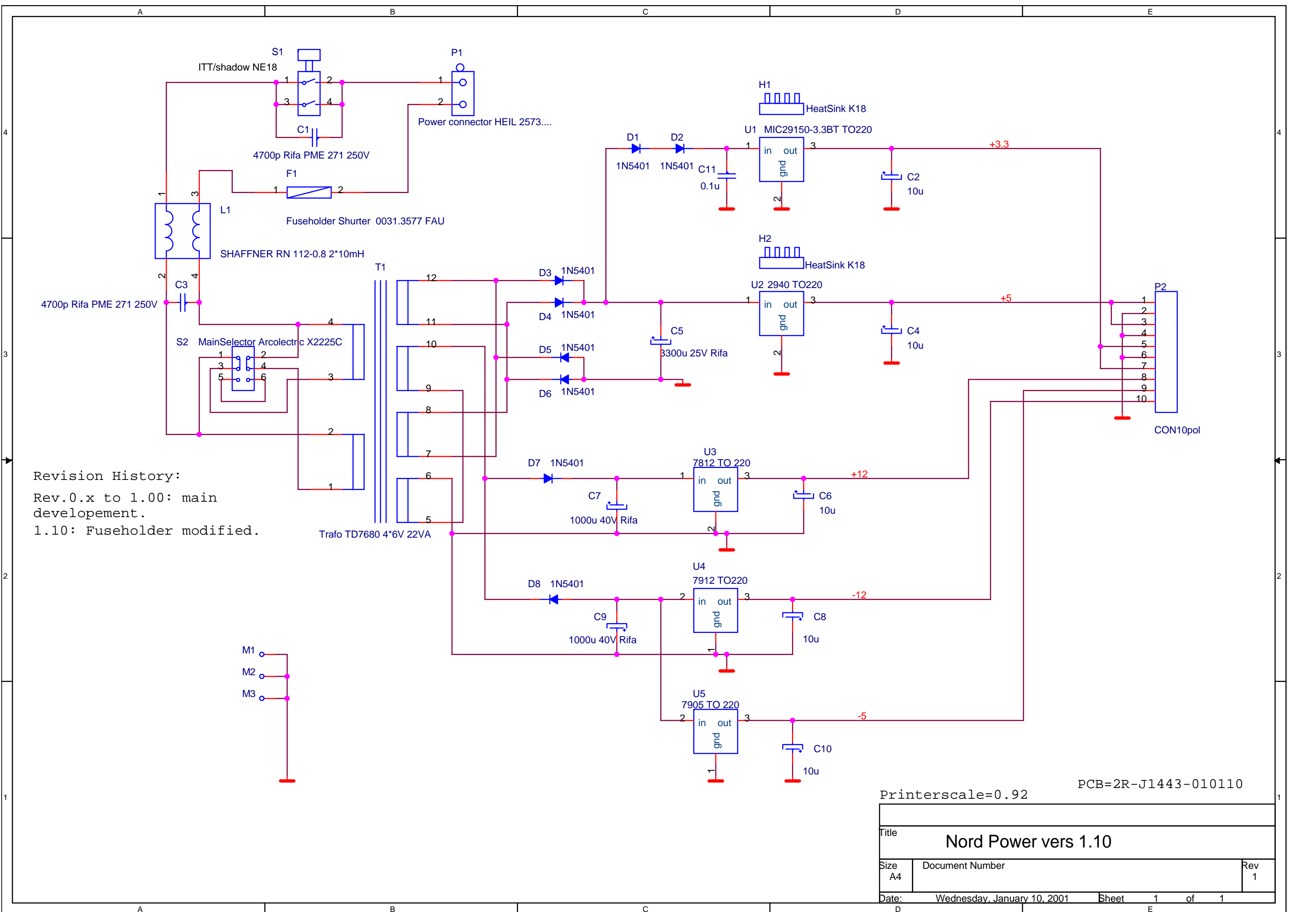
38 single LED
 49 knappar

Design regler:
 -Separat +5V matning från kontakt till AD omv
 -Separat jord till alla pottar från AD omv

PCB=2R-J1398-020213

Printerscale=0.92 CON26pol

Title nord electro panel board vers 1.00		
Size A3	Document Number	Rev -
Date: Thursday, February 14, 2002	Sheet 1 of 1	



Revision History:
 Rev.0.x to 1.00: main development.
 1.10: Fuseholder modified.