nord lead® 2x

SERVICE MANUAL

Clavia

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The Nord Lead 2X Service manual is arranged to help our service centers in the best way possible. However the Nord Lead 2X user manual is a very useful guide, use it as a reference in addition to this service manual. If you have access to internet you'll find the user manual available for download and also a lot of useful information on our website www.clavia.se

⚠ The information in this service manual is intended for service centers that repair Clavia products. It may **not** be copied, reposted, modified, served from other web pages, made into derivative works or distributed to other sources such as end users or retailers that do not repair Clavia products.

⚠ Information is only valid for Nord Lead/Rack 2 when stated in text.

⚠ Important safety information

Dangerous voltage levels are present within the unit.

- Unit should be opened exclusively by qualified service personnel.
- Always disconnect the power supply cord before opening to avoid electrical shock.
- Components and complete circuitboards may only be put into service when they are securely fixed in the instrument casing.

Take necessary precautions against ESD before opening the unit.

Revision history

rev. 1.0 - First release.
rev. 1.1 - Added pictures.
- Layout changes
- Updated Hw / Sw section, overview section
- Added part list.

Overview

Product line

There are two different
Nord 2/2X Models:

- 4 octave keyboard version
- Rack version

Internal memory

	Nord Lead 2	Nord Lead 2X
Polyphony	16 voices	20 voices
Memory capability	40 user programs 400 programs in total with 64 kB PCMCIA expansion card	4 x 99 user programs 100 user performances 4 x 10 user percussion kits 6 x 99 factory programs 3 x 100 factory performances
Audio Quality	18bit 44,1 kHz	24 bit 96 kHz

Fuse ratings

Voltage	115 V	230 V
Fuse	300 mA	125 mA

Physical Dimensions

Lead 2	**Lead 2X**	**Rack 2**	**Rack 2X**
W: 865 mm	W: 865 mm	W: 435 mm	W: 435 mm
D: 265 mm	D: 265 mm	D: 210 mm	D: 210 mm
H: 105 mm	H: 105 mm	H: 105 mm	H: 105 mm
Weight: 6,7Kg	Weight: 5,3Kg	Weight: 4,5 Kg	Weight: 4,5 Kg

Test program

Running the test program

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.
The functions provided by the test program allow a quick and easy search for possible errors in the hardware.

⚠**WARNING:** Improper use of the test program or powering off the synth during a test can result in malfunction of the synth. The test program may only be used by qualified service personnel and is not intended for end users.

Navigating through the test program
In order to execute the different tests on a Nord Lead 2/2X, first make sure power is turned on. Press **[SHIFT + SYSTEM + SLOT X]** where X stands for one of the following tests:

A: Knob test. Turn each knob fully counter clockwise, fully clockwise and then fully counter clockwise again. A completely tested knob is indicated by a dot and a hyphen. The knobs has to be turned in order, starting with the Master Level. Find the next knob by first trying the one closest to the previous position. Exit the test with the **[PANIC]** button. Reset the test with the **[DEMO]** button. If an error shows up, try performing the simple knob test described in the next section.
B: Button test. Pressing each button should turn on the corresponding LED or LED group. The buttons have to be pressed in order, starting with **[CLEAR]**. Find the next knob by first trying the one closest to the previous position. Once a knob has been lit, it cannot be switched off. Pressing all the buttons exits the test. You can also exit the test manually by pressing the **[PANIC]** button.
C: Pitch stick calibration test. Tests that the pitch stick is calibrated. The value shown in the display should be between 72 and 96. If the value is too small, this is indicated by a dot. If the value is too large, this is indicated by a hyphen. Exit the test by pressing the **[PANIC]** button.
D: Button and pitch stick test. This test differs from the tests above in a way that the knobs do not have to be turned in any specific order. However, a knob must be fully tested before the next one can be tested. This is done by turning a knob fully counter clockwise, fully clockwise and then fully counter clockwise again.
A completely tested knob is indicated by a dot and a hyphen.
The pitch stick is tested by moving it fully to the left, then right and finally to the left again. Hold the pitch stick in the leftmost position in order to continue testing another function.

Simple knob test
It is possible to perform a more simple test of the knobs than the one described in the previous section. To perform the simple knob test, first make sure the power is turned on, and then press **[SHIFT + LFO1WAVEFORM SELECT]**. This test does not keep track on if all knobs have been tested, instead any knob can be turned in no particular order. The knob position is shown on the LED display. This test can also be used to display the position of the pitch stick and modulation wheel.

Checking the outputs
The Nord Lead 2X has the possibility to output a clean sine wave on each of the outputs. This is not possible on the Nord Lead 2. To check the function of a single output, first make sure the synth is on.
Enter performance mode by pressing **[PERF. MODE]**
and then press **[SHIFT + OSC KBD TRACK]**.
This should output a clean sine wave on output A when pressing a key.
Toggle outputs by pressing the same button combination.
Exit the test by pressing **[PERF. MODE]**.

Calibrating the DACs

The Nord Lead 2 is equipped with two stereo D/A converters running at 18 bits 44,1kHz (U39 and U42). The DACs are calibrated with trim potentiometers (trimmers) at the factory for lowest possible distortion. In some rare cases, it might be necessary to perform a new calibration of the DACs.

First, read section "Opening the synth". Locate trimmers VR1-VR4 on the main board (index corresponding to the respective output).
Play a program consisting of a single sine wave and trim until you hear no distortion.

The Nord Lead 2X is equipped with D/A converters that does not need to be calibrated.

Hardware

Hardware structure

The hardware is common for all four Nord 2/2X products: one power supply unit, one main board and one panel board.

Power supply
The Nord Lead 2X is supplied with several different voltages from the power board. These are +3.3V, ±5V and ±12V. For more information on where to measure these voltages see the appropriate schematic. The Power supply is connected to the main board with a 10 pole connector **P2** *(22480).*

Main Board
Nord Lead 2
The main board is equipped with four DSPs **U6-U8**, **U22** which are controlled by a host processor **U4** with two RAM circuits **U2** and **U3** (128k*8 bits) where programs and performances are stored. Boot code for the host processor and OS is stored in the BootPROM **U9** (512k*8 bits). Various other information, for example some user settings are stored in an EEPROM **U10** (512k*8). The user program memory can be expanded with a 64kB SRAM based PCMCIA card. Larger cards can be used but only 64 kB can be addressed. Audio D/A conversion is done by **U15** and **U17**. 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 connectors are a 10 pole connector for the power supply unit, a 20 pole connector for the panel board and two keyboard connectors.

Nord Lead 2X
The main board is equipped with two DSPs **U2** and **U3** *(21360)* which are controlled by a host processor **U5** *(21320)* with two RAM circuits **U6** and **U7** *(21410)* (128k*8 bits) where programs and performances are stored. Boot code for the host processor and OS is stored in the BootPROM **U9** *(23710)* (512k*8 bits).
Audio D/A conversion is done by **U13** and **U17** *(23430)* (24 bit 96kHz).
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 connectors are a 10 pole connector for the power supply unit **P4** *(22480)*, a 20 pole connector for the panel board **P3** (22500) and two keyboard connectors **P1** and **P2** *(22670)*.

Panel Board
On the panel board you will find all control functions of the Nord Lead 2/2X. The panel board is connected to the main board with a 20 pole connector **P1** *(22500)*. The main characteristics are main LED display *(20780)*, pitch stick *(10190)* and Mod wheel.
Lead /rack 2 panel board has hole mounted components.

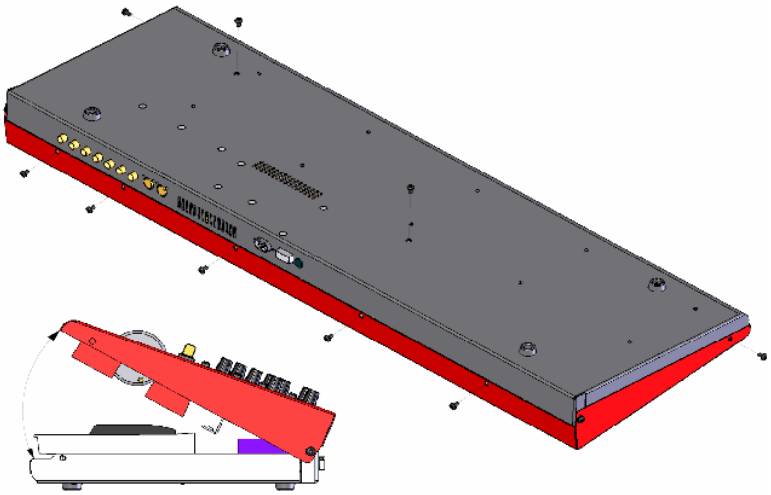
Opening the synth

WARNING: Take necessary precautions against ESD before opening the synth.

Nord Lead 2X
Loosen the screws as shown in the figure. (9x40018)
The two screws on the sides work as hinges. Lift in the front to open the top.

Nord Lead 2
(8x40018)

Nord Rack 2/2X
Unscrew the 4 panel screws *(40018)* Gently slide the top forward and lift it of.



Picture shows Nord Lead 2X

Removing the Power Supply Unit
Loosen the five screws *(40262)* holding the PSU to the chassis. Loosen the two screws *(40013)* on the back panel next to the AC socket. Finally remove the 10 pole ribbon cable *(22340)* and lift out the PSU.

Removing the Main Board
Loosen the three screws *(40262)* holding the main board to the chassis. Loosen the nuts and remove the washers around the ¼" jacks on the back panel. Also loosen the four screws *(40010)* holding the MIDI jacks to the chassis. Remove the 20 pole ribbon cable *(22400)* to the panel board, the 10 pole ribbon cable *(22430)* to the PSU and the two ribbon cables *(22290)* to the keyboard.
You can now lift out the main board.

Removing the Panel Board
Pull off all knobs *(22900)* on the front panel (not the buttons). Remove the ribbon cable *(22400)* from the panel board. Loosen the last two screws *(40018)* holding the top to the chassis. Loosen the nine screws *(40262)* holding the panel board to the upper lid.
You can now lift out the panel board.

Hardware configuration

The N2X model (Lead, Rack) is decided by pos C17 and C19 on the panel board, rack version has 0 ohm resistors on this position while the Lead version has 100nF capacitors mounted. The Lead panel board *(69177)* features both pitch stick *(10190)* and modulation wheel *(23040)* which the rack version does not have.

Hardware versions

Main board	BootPROM	Notes
ver. 0.4	V1.0	

Software

Uploading OS and sounds
The software version is briefly shown on the LED display when you power up the Nord Lead 2X. To update the software, the BootPROM **U9** needs to be changed.
For ordering information, contact Clavia at service@clavia.se.

Returning to factory settings
In order to return to factory settings, press <shift + mod env> after the Nord Lead 2/2X has powered up. The original programs are restored as they were programmed when the unit left the factory.

All factory presets are available for download at www.clavia.se

Spare Parts

For Nord Lead 2 parts please contact service@clavia.se

Mechanical:

Part no.	Item
40219	Angle bracket, support NL2x
40240	Angle bracket, swan
22090	Cable 3pol mod.wheel
40081	Display window, red N3/N2X
40162	Keyboard 4 Oct. NL2X
22290	Keyboard cable
22900	Knob D-form with grey line
40168	Lower lid Nord Lead 2X
40184	Lower lid Nord Rack 2X
50186	Manual N2X
40008	Modulation wheel
40056	Nut M3
40068	Pop rivet 3,2x8
20680	Pot Cermet 10kohm mod.wheel
23040	Pot. mod wheel N2/3/NM2
22430	Ribbon cable 10 pol NR3/NER
22400	Ribbon cable 20 pol N2/3/dd4
40070	Rubber foot 19mm
50172	Rubber pipe Mod wheeel
40262	Screw M4x6
40010	Screw, midi
40013	Screw, AC input
40017	Screw, keyboardNL2/transformer
40025	Screw, modulation wheel
40026	Screw, pitch stick/upper lid
40018	Screw, upper/lower lid
40208	spacer screw mod wheel, short
40167	Upper lid Nord Lead 2X
40183	Upper lid Nord Rack 2X

Panel Board:

Part no.	Item
69177	Panelboard NR2X
69169	Panelboard Nord Lead 2X
20960	10uF/35V 5,0x6,0 Ellyt SMD
23970	1uF/50V 3,0x5,3 Ellyt SMD
20700	Diod Bav70 Sot23
21930	74HC245 TSSOP
21940	74HC374 TSSOP
21920	74AC138 So16
21480	LF353D So 8
23320	MX7574JCWN+
21870	74HC4051 So16
21460	LF412CD SO8
21810	74HC32 So14
23330	Regulator 6v yt
20860	LED lens single, N2X
20780	LED Eight
22500	Connector 20 pole
22710	Connector 3 pole, 90 deg.
10190	Pitch stick complete, short cable
20060	350ohm 0,1% 5ppm MK2
22030	Button black Nord/ddrum
22040	Button red Nord
20640	Pot.10kA Lin. Nord

Main board:

Part no.	Item
69067	Main board Nord 2X
20980	100uF/16V 6,3x6,0 Ellyt SMD
20960	10uF/35V 5,0x6,0 Ellyt SMD
20940	1uF/35V 4,0x5,5 Ellyt SMD
20970	47uF/35V 6,3x6,0 Ellyt SMD
20700	Diod Bav70 Sot23
23110	EMI-Filter 2,2nF,+50/-20% 100V
23100	EMI-Filter 470pF,+50/-20% 100V
21960	Transistor BCX54 Sot89 NPN
21970	Transistor BC847B Sot23 NPN
21950	Transistor BCX53 Sot89 PNP
21980	Transistor BC857B Sot23 PNP
21940	74HC374 TSSOP
21360	DSP N3/NE/N2X
21320	Host N3/NE/N2X
21410	SRAM 1Mb N3/NE/N2X
23710	BootPROM N2X, programmed
23400	EEprom N2X
21900	74LV08 So14
21730	74HCT32 So14
23430	Dac N2X/NMG2/NS
21520	Op amp LM833M
21480	LF353D So 8
21570	PC 400TSo
23410	Resetcircuit N2X
23080	Crystal 32,768 KHz SMD
22600	Connector 1/4" Stereo
22590	Connector 1/4" Mono
22640	Connector din 5pol Midi
22670	Connector 16 pole, micromatch
22500	Connector 20 pole
22480	Connector 10pol

Power board:

Part no.	Item
69074	Power board N3/NE/N2X
20910	Capacitor 4700pF X2
20950	10uF/63V 2m Elektrolyt
21020	3300uF/25V 85gr Ellyt axiell
20990	1000uF/40V 85gr Ellyt axiell
50061	Plastic strip black 200mm
20930	100nF/63V/10% 2m Polyester
20730	Diod 1N5404 3A
22840	Fuse house nord/dd4/mod
40076	Heatsink
23120	Drossel RN112-0,8/02
22620	Socket AC N3/NE
22480	Connector 10pol
22000	Powerswitch On/off
22020	Button grey power on/off
22630	AC-Switch
22780	Trafo N2X/N3/NE Eur/Usa
40017	Screw, keyboardNL2/transformer
21650	Regulator -3,3 BT
22960	Insulating insert TO-220
40042	Screw, regulator powerboard
40056	Nut M3
21660	Regulator -5Low
21680	Regulator +12V
21700	Regulator -12V
21690	Regulator -5V
40176	Plastic isolator
40180	Spacer 2mm Nylon