

nord[®] MODULAR G2



SERVICE MANUAL

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The Nord Modular G2 Service manual is arranged to help our service centers in the best way possible. However the Nord Modular G2 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.

 In this manual the Nord Modular G2/G2X will be referred to as **Nord Modular G2**

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 - Corrected test program instructions.
 - Added pictures.
- rev. 1.2 - Layout changes
 - Updated Hw / Sw section, overview section
 - Added part list, error codes and USB patch instructions

Overview

Product line

There are three different Nord Modular G2 Models:

- 3 octave keyboard version (G2)



- 5 octave keyboard version (G2x)

This model features a top mounted XLR microphone input and three modulation wheels. It also has the voice expansion board installed as standard.



- Rack version (G2 Engine)



Internal memory

The Nord Modular G2 has 4096 memory locations to store Patches (32 Banks with 128 memory locations each) and 1024 memory locations for Performances (8 Banks with 128 locations each).

Fuse ratings

Voltage	115 V	230 V
Fuse	300 mA	125 mA

Physical Dimensions

Modular G2

W: 665 mm / 26,2"

D: 284 mm / 11,2"

H: 104 mm / 4,1"

Weight: 5,1Kg / 11,24 lbs

Modular G2x

W: 1007 mm / 39,6"

D: 294 mm / 11,6"

H: 104 mm / 4,1"

Weight: 8,21Kg / 18,07 lbs

Modular G2 Engine

W: 437 mm / 17,3"

D: 120 mm / 4,7"

H: 44 mm / 1,8"

Weight: 1,9Kg / 4,19 lbs

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 on the hardware. On the Nord Modular G2 the five displays guide the user through the test program. To run the test program on a Nord Modular G2 Engine you have to connect an external panel board to the G2 Engine. For more information, see section "testing the G2 Engine" in this document.

⚠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.

In order to execute the different tests on a Nord Modular G2, press and hold buttons **[Performance Mode + Display Mode + Store]** at power up. When test mode is entered, a DRAM test is performed. After the DRAM test has finished successfully, the test program will start. The DRAM test progress is indicated by the LED's on the leftmost encoder on the front panel (indicated by MIDI and USB LED's on the Engine). The LED's are divided into three groups, where each group of LED's represents a part of the DRAM test procedure. During the DRAM test, the LED groups will light up, one by one. If errors are detected, one of the three groups will flash:

- If the first LED group is flashing, error has been detected on **U13**.
- If the second LED group is flashing, error has been detected on **U12**.
- If the third LED group is flashing an address bus error has been detected.

Navigating through the test program

- Press the slot button **[A]** to enter a test and to select a test menu.
- Press slot button **[D]** When a test has finished, to exit the test.
- Press **[Navigator Up]** or **[Navigator Down]** to toggle between groups of tests.
- Press **[Navigator Left]** or **[Navigator Right]** to toggle between tests within groups.
- Press **[KBSplit]** to start or reset a test.

A text guiding through the different tests should appear on the LCDs.

Available tests are:

MNB: Main board

1. **Main board test.** Performs tests 3-8.
2. **Final test.** This test is used in production.
3. **EEPROM test.**
4. **Quick Flash test.** Performs a quick test of the Flash circuits. The entire memory area is not tested. To test the entire memory area, perform test number 14. Flash data is not altered.
5. **DSP.** Tests the four DSPs, including external memory and communication between DSPs.
6. **DAC.** Tests the two D/A converters. Outputs a clean sine wave on the four outputs. Toggle between outputs with [**Navigator Up**] or [**Navigator Down**].
7. **ADC.** Tests the two A/D converters. Audio connected to IN1 should be heard on OUT1, IN2 on OUT2 etc.
8. **USB.** Shows the USB chip ID. This test can not detect if the USB communication with a computer is functional. To test USB communication, simply connect the G2 to a computer running the G2 editor. The editor should automatically find the G2.
9. **MIDI.** Tests MIDI communication.
10. **Keyboard.** Press one key at a time. Tests velocity response and counts the number of keys pressed.
11. **Pedal.** Tests the control and sustain pedal input jacks.
12. **Engine LED test.** Not applicable on G2/G2X.
13. **Engine reset test.** Not applicable on G2/G2X.
14. **Flash test.** Tests the entire Flash memory area. The test takes approximately 18 minutes to complete. Flash data is not altered.

PNL: Panel board

1. **Full.** Performs all of the tests below.
2. **Buttons.** Press the buttons as indicated to verify their function.
3. **LCDs.** Test the LCD panels.
4. **LED's.** Lights the LED's in groups in order to verify their function visually.
5. **Encoders.** Tests all of the encoders. Requires that each encoder is turned two turns.
6. **Pitch stick calibration range.**
7. **Pitch stick base value.**
8. **Pitch stick.** Tests the pitch stick function.
9. **ADC.** Tests the function of the A/D converter on the panel board.

SYS: Contains system operations. Tests 5-8 are only for internal use.

1. **Serial number.** Displays the serial number.
2. **Checksum.** For internal use only.
3. **FLASH status.** Displays the Flash memory status (erased/not erased/cleared)
4. **PWM voltage.** This test can be used to debug the pitch stick calibration voltage.
5. **OS killer.** This utility will write random errors into the OS section of the Flash memory.
6. **Erase FFS.** This tool is used to erase the Flash file system section.
7. **Erase OS.** This tool is used to erase the OS section of the Flash memory.
8. **Erase All.** This tool is used to erase the entire Flash memory.

Testing the G2 Engine

In order to run the test program on a G2 Engine, you have to connect a G2 panel board. This does not allow the G2 Engine to be run as a full G2/G2X, but is merely a way to run the test program.

Make sure the power to the G2 Engine is turned off. Connect the panel board to the G2 Engine main board with the 26 pole ribbon connector. Press the "hidden" update mode button inside the hole to the right of the G2 Engine logotype and power on the synth. The test program is now executed and should behave in the same way as if this configuration was a full G2/G2X.

For instructions on how to use the test program, see section "Running the test program".



Error Codes

EEPROM ERRORS:

"ERR: check U36"

-check U36, U14 (pin 35,43), R152 and R66

DSP TEST ERRORS:

Error message will indicate if the error is on main board or expansion board (if installed)

For example *"ERR: Mnb Uxx boot"* or *"ERR: Exp Uxx SRAM"*

"ERR: Mnb/Exp Uxx boot" (DSP not starting)

"ERR: Mnb/Exp Uxx SRAM" (Ext DSP memory error)

"ERR: SDOx Mnb/Exp Uxx" (Serial bus error)

SDOx = SDO1-SDO3 Mnb Uxx = U16-U20, Exp Uxx = U5-U8

FLASH TEST ERRORS:

"ERR: Check U7/U37"

-check U7 or U37

Hardware

Hardware structure

The hardware structure is common for the Nord Modular G2/G2X:

One power supply unit, one main board and one panel board.

The G2X also has the voice expansion board installed as standard.

The Nord Modular G2 Engine has all the functions of the G2/G2X, but is not equipped with a panel board. The power supply unit also has a different component layout.

Power supply

The Nord Modular G2 is supplied with several different voltages from the power supply. These are +3.3V, +5V and $\pm 12V$. For more information on where to measure these voltages, see the schematic for the power supply. There are also two voltages supplied from the main board. **U25** (22340) supplies the Host and DSP's with +1.8V, **U38** (21540) supplies the audio D/A with +5V. The Power supply is connected to the main board with a 10 pole connector **P2** (22480).

Main Board

The main board is equipped with four DSP's **U16-U19** (23280), which is controlled by a host processor **U14** (23180) with two DRAM circuits **U12** and **U13** (23170) (1M*16 bits). Boot code for the host processor is stored in the BootPROM **U21** (23890) (512k*8 bits). OS, user patches and performances are stored in another Flash memory **U7/U37** (24000) (16M*16 bits). Various other information, for example user settings is stored in an EEPROM **U36** (24147) (2k*8 bits).

Audio D/A conversion is performed by **U32** and **U33** (23430).

A/D conversion of the control pedal takes place on the panel board **U12** (23370).

All input and output jacks are filtered from radio signals with an EMI-filter (23110) (component designator prefix F). External connectors are a 26 pole connector for the panel board **P7** (22520), a 10 pole connector for the power supply unit **P9** (22480), two keyboard connectors **P1** (22680) and **P2** (22670), one four pole connector for the after touch strip **P10** (23790), two three pole connectors for Mic **P12** (23480), Mic Level **P11** (23480) and two connectors for the expansion board **P3** (23500) **P4** (23490).

Panel Board

On the panel board you will find all control functions of the Nord Modular G2. The main characteristics are main program encoder (22890), pitch stick (NMG2 10190, NMG2X 10295), the five LCD's (23300) and the eight encoders (24010). The panel board is connected to the main board with a 26 pole connector (22520).

Opening the synth

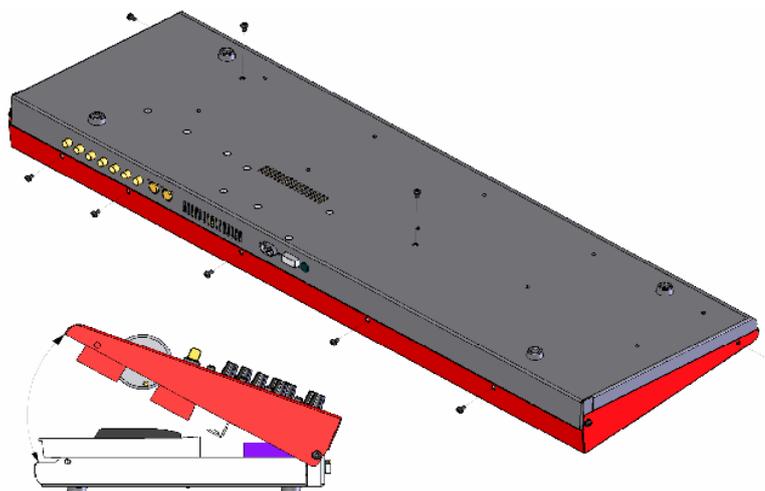


WARNING: Take necessary precautions against ESD before opening the synth.

Nord Modular G2x

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.

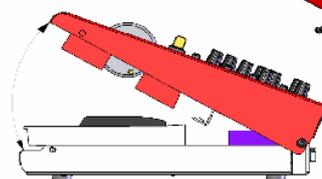


Nord Modular G2

Opens up similar to the G2x.

Nord Modular G2 Engine

Unscrew the nine panel screws (9x40203) Gently slide the top forward and lift it off. When mounting back the top, make sure the LEDs are aligned to fit in their respective holes.



Picture shows Nord Modular G2x

Removing the Power Supply Unit

Loosen the six 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 (G2/G2X - 23880 G2E - 23930) and lift out the PSU.

Removing the Main Board

Unscrew the five screws (40262) holding the main board to the chassis. If an expansion board is installed (factory installed on G2X), remove it by unscrewing the three screws (40262) holding it to the main board. Remove the distance screws (40195) with a wrench. Loosen the nuts and remove the washers around the 1/4" jacks on the back panel. Also unscrew the six screws (40010) holding the MIDI jacks to the chassis. Remove the 26 pole ribbon cable (23830) to the panel board, the 10 pole ribbon cable (23880) to the PSU, the 2 pole Mic XLR cable (23291), 3 pole cable to Mic Level pot (23840) (not on G2 Engine), the 4 pole after touch cable (24080) (not on Engine) and the keyboard cables **G2x** (P1-24090 P2-24100) **G2** (P1-22420). You can now lift out the main board.

Removing the Panel Board

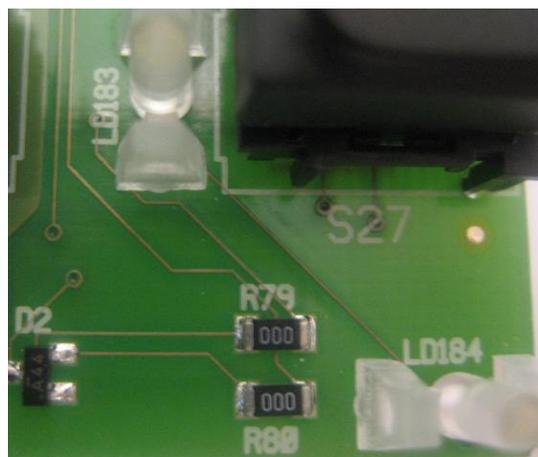
Pull off the knobs for Master Level and Mic Level. Remove the 26 pole ribbon cable (23830) from the panel board. Remove the 3 pole connector for the mod wheel (23040) and the pitch stick cables. Unscrew the last two screws (40038) holding the top to the chassis. Remove the 3 pole cable (23840) to Mic Level pot. Loosen the eleven screws (40262) holding the panel board to the upper lid. You can now lift out the panel board.

Hardware configuration

The Nord Modular G2 model (G2, G2x) is decided by two 0 (zero) ohm resistors **R79-R80** found in the lower right corner of the panel board. In order to reach the resistors, the panel board needs to be detached. See section “Opening the synth” for details

	Zero ohm resistor in pos.	
	R79	R80
G2	Yes	Yes
G2x	No	No

The picture to the right Shows how a panel board for a Nord Modular G2 should be configured.



Hardware versions

Main board	BootPROM	Notes
ver. 0.9	v0.28	

⚠ Important note

-The latest available OS version will work on all officially released main board versions. However old OS versions might NOT work on newer main boards. Always use the latest OS version!

Installing the USB transient patch.

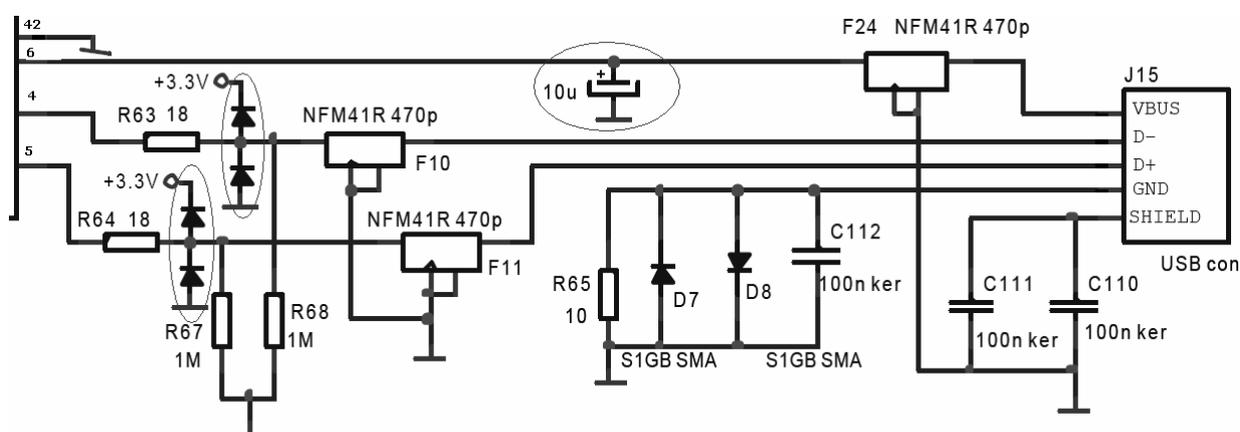
This document describes which components that needs to be added to a G2 main board in order to eliminate the possibility that the USB circuit takes damage when connecting the Nord Modular G2 to a computer.

This patch needs to be installed as well as replacing the USB circuit **U24** (23190).

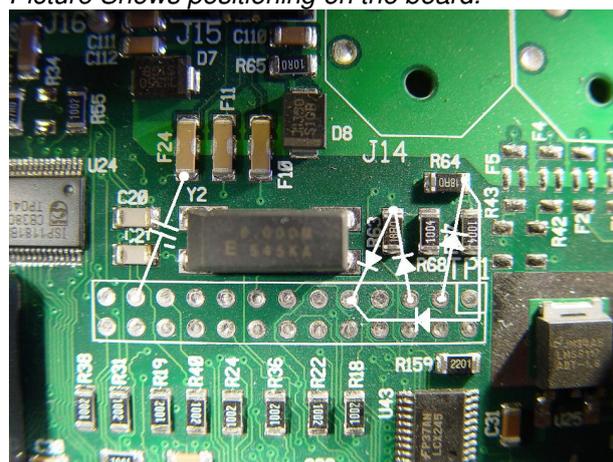
The modification involves mounting of four clamping diodes and one bypass capacitor. Any diode similar to the S1GB shown in the schematics will work. Clavia uses 1N4004, the capacitor value is 10 μ F.

Added components are circled:

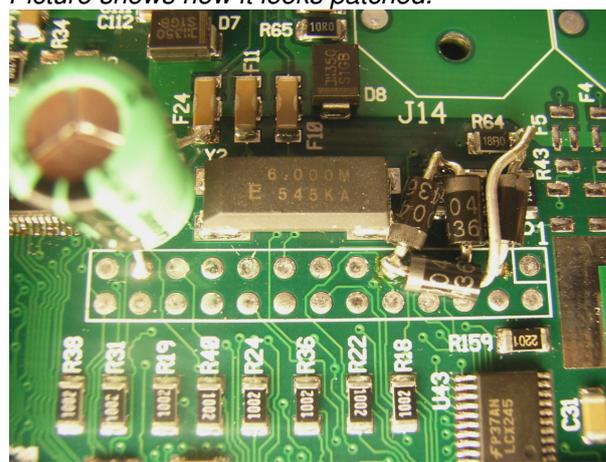
The picture below shows part of the schematics for the G2 Main board (USB section)



Picture Shows positioning on the board.



Picture shows how it looks patched.



Software

Uploading OS and sounds

The Nord Modular G2 contains no samples. Therefore no samples can be uploaded or played. The software for the Nord Modular G2 is included in the download of the editor. For instructions on how to update the software visit www.clavia.se there you can find the latest Software packages.

The software version is briefly shown on the LCD when you power up the Nord Modular G2 (not on G2 engine).

⚠ Important Update Note

Before downloading and installing the latest software version, make sure you save the patches from the G2 internal memory to a computer. Clavia can in no way be held responsible for any loss of data on your system.

Factory presets

The factory patch and sound library is available for download at www.clavia.se

Spare Parts

Mechanical:

Part no.	Item
23840	Cable 3pol pot NMG2
24080	Cable AfterTouch
22460	Cable clip, adhesive
24110	Flat cable, Micromatch 10 poles
40169	Keyboard 3 Oct. NMG2
40193	Keyboard 5 Oct. NMG2X
22420	Keyboard cable
24090	Keyboard cable
24100	Keyboard cable
22900	Knob D-form with grey line
20750	LED Green 3mm HLMP-1585
20750	LED Green 3mm HLMP-1585
40175	Lower lid NMG2
40173	Lower lid NMG2E
40202	Lower lid NMG2X
40008	Modulation wheel
40209	Modulation wheel diod
40056	Nut M3
40068	Pop rivet 3,2x8
23040	Pot. mod wheel N2/3/NM2
23930	Ribbon cable 10 pol
23880	Ribbon cable 10pol*140
23830	Ribbon cable 26pol*
40070	Rubber foot 19mm
40195	Screw distance
40262	Screw M4x6
40010	Screw, midi
40013	Screw, AC input
40040	Screw, keyboard G2
40026	Screw, pitch stick/upper lid
40203	Screw, top-lower lid NMG2E
40018	Screw, upper/lower lid
40174	Upper lid NMG2
40172	Upper lid NMG2E
40201	Upper lid NMG2X
40046	Washer BRB 4,3*9*0,8
23291	XLR connector w/ cable

Mechanical:

Part no.	Item
60179	Expansion board NMG2
20960	10uF/35V 5,0x6,0 Elyt SMD
23160	Sram NMG2/NS 4MB
23280	DSP NMG2/NS
23490	Connector 20 pole, male
23500	Connector 20 pole, female

NMG2X mod. Wheel

61028	Mod wheel board
24040	Connector 10 pole, micromatch
22710	Connector 3 pole, 90 deg.
24030	Connector 2 pole, 90 deg.

40222	Angle bracket, mod wheel x1
40207	Angle bracket, swan NMG2X
23040	Pot. mod wheel N2/3/NM2
20680	Pot Cermet 10kohm mod.wheel
40049	Washer, dd4 mono/stereo socket
40209	Modulation wheel diod
40214	Heat-shrink tube 1,6mm
20750	LED Green 3mm HLMP-1585

40223	Angle bracket, mod wheel x2
40206	Angle bracket, single NMG2X
23040	Pot. mod wheel N2/3/NM2
22090	Cable 3pol mod.wheel
20680	Pot Cermet 10kohm mod.wheel
40049	Washer, dd4 mono/stereo socket
40209	Modulation wheel diod
40218	Modhjul beh diod
50172	Rubber pipe Mod wheeel
24050	Kabel 2pol Modhjul NMG2X
40214	Heat-shrink tube 1,6mm
20750	LED Green 3mm HLMP-1585

Panel board:

Part no.	Item
69172	Panelboard NMG2
69026	Panel board NMG2X
10190	Pitch stick complete, short cable
10295	Pitch stick complete, long cable
20060	350ohm 0,1% 5ppm MK2
20200	Trim resistor, pitchstick
20640	Pot.10kA Lin. Nord
20660	Pot.Cermettrim 10kohm SMD
20700	Diod Bav70 Sot23
20720	Diod Bav 56 sot23
20820	LED lens 15, N3/NM2
20830	LED lens shield 15, N3/NM2
20860	LED lens single, N2X/N3/NE/NM2
20960	10uF/35V 5,0x6,0 Ellyt SMD
21460	LF412CD SO8
21480	LF353D So 8
21920	74AC138 So16
21930	74HC245 TSSOP
21940	74HC374 TSSOP
21950	Transistor BCX53 Sot89 PNP
22030	Button black Nord/ddrum
22040	Button red Nord
22050	Button grey NE
22520	Connector 26 pole
22710	Connector 3 pole, 90 deg.
22880	Knob 21mm black N3/NM2
22890	Rotary encoder
22940	Cover for 21mm knob
22950	Knob neutral for N3/NMG2

Panel board:

Part no.	Item
23250	74LCX32 To
23260	74LCX00M
23300	Display LCD NMG2
23310	74HCT374 TSSOP
23370	MAX1039AEEE
23480	Connector 3 pole
23780	Pin header 1x16
24010	Encoder N3/NMG2 (Bourns)
24040	Connector 10 pole, micromatch
25608	74LCX245 TSSOP
40235	Plastic rivet 2,5x4,6

Main board:

Part no.	Item
69077	Main board NMG2
69178	Mainboard NMG2E
20700	Diod Bav70 Sot23
20740	LED Red 3mm HLMP-1385
20940	1uF/35V 4,0x5,5 Elyt SMD
20960	10uF/35V 5,0x6,0 Elyt SMD
20970	47uF/35V 6,3x6,0 Elyt SMD
20980	100uF/16V 6,3x6,0 Elyt SMD
21300	EEprom N2/dd4/EI/NMG2
21400	Flash NE/G2
21480	LF353D So 8
21520	Op amp LM833M
21540	Regulator 5,0
21570	PC 400TSo
21810	74HC32 So14
21930	74HC245 TSSOP
21940	74HC374 TSSOP
21950	Transistor BCX53 Sot89 PNP
21960	Transistor BCX54 Sot89 NPN
21970	Transistor BC847B Sot23 NPN
21980	Transistor BC857B Sot23 PNP
22480	Connector 10pol
22520	Connector 26 pole
22590	Connector 1/4" Mono
22600	Connector 1/4" Stereo
22610	Connector 1/4" Stereo/switch
22640	Connector din 5pol Midi
22670	Connector 16 pole, micromatch
22680	Connector 20 pole, micromatch
22690	USB connector Type B
23060	crystal 6 Mhz SMD
23100	EMI-Filter 470pF,+50/-20% 100V
23110	EMI-Filter 2,2nF,+50/-20% 100V
23160	Sram NMG2/NS 4MB
23170	Dram 16Mbit
23180	Host NMG2/NS
23190	USB circuit NMG2/NS
23200	Resetcircuit NMG2/NS
23270	Crystal oscillator 56,620363 Mhz
23280	DSP NMG2/NS
23340	Regulatorv1,8v yt
23350	74AC14
23360	Diod S1GB-13
23430	Dac N2X/NMG2/NS

Main board:

Part no.	Item
23480	Connector 3 pole
23490	Connector 20 pole, male
23500	Connector 20 pole, female
23510	Resetbutton NMG2E
23540	ADC NMG2
23680	MCP6022-I/SN
23790	Connector 4 pole, after touch
23890	BootPROM NMG2, programmed
23960	220uF/25V Elyt axiell
25608	74LCX245 TSSOP

Power board:

Part no.	Item
69175	Power board NM2E
69183	Power board NMG2
20740	LED Red 3mm HLMP-1385
20910	Capacitor 4700pF X2
20960	10uF/35V 5,0x6,0 Elyt SMD
22000	Powerswitch On/off
22020	Button grey power on/off
22480	Connector 10pol
22620	Socket AC N3/NE
22630	AC-Switch
22770	Trafo NMG2/NS
22840	Fuse house nord/dd4/mod
23120	Drossel RN112-0,8/02
23560	1000u/35V Nichicon
23590	Diod ES3AD SMC
23600	Effect drossel
23610	Regulator +5,0 Yt
23620	Regulator +3,3 Yt
23630	Regulator +12 Yt
23640	Regulator -12V Yt
23800	470u/50V
23900	Diod SS34 Schottky
23960	220uF/25V Elyt axiell
40017	Screw, keyboardNL2/transformer
40176	Plastic isolator
40179	Plastic isolator NMG2E
40180	Spacer 2mm Nylon