OBXa MIDI KIT
User's Manual

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INTRODUCTION

Thank you for purchasing an Encore product.
We hope you are as excited about analog synthesis as we are!

The OBXa-MK allows your Oberheim OBXa to receive MIDI data and perform as a basic MIDI controller.

In addition to giving your OBXa MIDI capability, we have expanded the patch storage from 32 up to 120, giving an earlier OBXa the same capability as a later one.

If you purchased your OBXa second hand and didn't receive the factory sounds, don't worry, because we have included them! You can load them at any time using a special power on sequence. You may then edit them to suit your own tastes.

One of the most important features of the OBXa-MK is the storage of patches and firmware in flash ROM. The OBXa-MK can now be upgraded with bug fixes and new features using MIDI. The patches are also stored in flash ROM, and this means no more battery maintenance issues!

The next section of this manual is a quick reference guide which gives you step-by-step instructions for performing the new procedures.

Quick Reference Guide

Controls

The primary buttons you will use in conjunction with your OBXa MIDI KIT are listed below.

MANUAL is used to enter MIDI mode.

PROGRAM BUTTONS are used to select the MIDI function you wish to perform.

GROUP BUTTONS are used to select the value of the respective MIDI function.

How to Enter MIDI Mode

- Momentarily press the [MANUAL] button.
- The MANUAL LED will flash, indicating that you are in MIDI mode. If you press it for more than 1/2 second, you will enter the normal manual mode.

How to Exit MIDI Mode

- Momentarily press the [MANUAL] button.
- The MANUAL LED will return to its previous state.

How to send a MIDI tune request

- Press the [AUTO] button.
  This will tune the OBXa and also send a MIDI tune request for any other synthesizer that can receive the command.

How to toggle MIDI Program enable

- Make sure that you are in MIDI mode.
- Press the [PROGRAM 2] button. GROUP A LED will be on if the OBXa responds to MIDI program changes. Any GROUP button will toggle GROUP A LED. When the LED is off, the OBXa will ignore program change messages.

How to Change MIDI Channels

- Make sure that you are in MIDI mode.
- Press the [PROGRAM 1] button. One or more of the 4 group LEDs will light showing the current MIDI channel. Press a combination of GROUP buttons to select a new MIDI channel. See the GROUP map on the next page. (The MIDI channel isn't 'saved' until you exit MIDI mode.)

Quick Reference Guide, cont

Group MAP

In the following table, an "O" indicates the LED is ON, and an “X” indicates the LED is OFF. Group A is on the left, and Group D is on the right. (This table is a binary increment with the LSB on the left.)

Oxxx	- CHANNEL 1
xOxx	- CHANNEL 2
OOxx	- CHANNEL 3
xxOx	- CHANNEL 4
OxOx	- CHANNEL 5
xOOx	- CHANNEL 6
OOOx	- CHANNEL 7
xxxO	- CHANNEL 8
OxxO	- CHANNEL 9
xOxO	- CHANNEL 10
OOxO	- CHANNEL 11
xxOO	- CHANNEL 12
OxOO	- CHANNEL 13
xOOO	- CHANNEL 14
OOOO	- CHANNEL 15 (All LEDs on)

How to Save a Patch via System Exclusive

- Select the patch to be saved.
- Enter MIDI mode.
- Press [PROGRAM 7]. The OBXa-MK is now ready to dump the current patch. Press any of the group buttons to actually dump the selected patch to MIDI.

How to Save All Patches via System Exclusive

- Enter MIDI mode.
- Press [PROGRAM 8]. The OBXa-MK is now ready to dump all the patches. Press any of the group buttons to actually start dumping patches to MIDI.

How to Load the Factory Sounds

- Turn off the OBXa.
- Press and hold [CHORD]. While holding [CHORD], turn on the power.

WHAT'S NEW

Expanded Memory

The original OBXa had the ability to save 32 patches. Later in production, Oberheim expanded this to 120 patches.
With the OBXa-MK, you can now save 120 patches regardless of the actual production configuration. All the patches are accessible from the front panel, or by sending MIDI program change commands ranging from 0 to 119.

ROM Patches

The original late model OBXa came programmed with 104 factory sounds. They were supplied on cassette tape, but have commonly been lost or damaged. We have included this preset data in the OBXa-MK. They can be loaded into RAM by turning on the OBXa while holding the CHORD button. *This will erase any previous sounds in those locations.*

MIDI Messages

The OBXa-MK responds to the following types of messages:

NOTE ON, ***NOTE OFF, PROGRAM CHANGE, CONTROL CHANGE***, ***PITCH BEND, and SYSTEM EXCLUSIVE***

The follow is a list of the MIDI controllers that the OBXa-MK responds to:

Control Number (dec)	**(hex)**	**Function**
1	01h	LFO freq depth
5	05h	Portamento time
7	07h	Loudness envelope sustain (VCA Sustain)
16	10h	Filter cutoff
17	11h	Filter resonance
18	12h	Filter modulation
19	13h	Oscillator Pulse Width
20	14h	VCF Attack
21	15h	VCF Decay
22	16h	VCF Sustain
23	17h	VCF Release
24	18h	VCA Attack
25	19h	VCA Decay
26	1Ah	VCA Sustain
27	1Bh	VCA Release
28	1Ch	*Osc Freq 1
29	1Dh	*Osc Freq 2
30	1Eh	*Osc 2 Detune

64	40h	Sustain
80	50h	Modulation LFO Rate
81	51h	Modulation Pulse Width Depth
82	52h	*LFO Mod PW to Osc1
83	53h	*LFO Mod PW to Osc2
85	55h	*LFO routing to Osc1
86	56h	*LFO routing to Osc2
87	57h	*LFO routing to Filter
88	58h	*LFO Shape: Sine / Square / S&H
89	59h	*SPLIT / DOUBLE
90	5Ah	*UPPER / LOWER
102	66h	*VCO1 Saw / Pulse
103	67h	*Balance
104	68h	*VCO1 Sync
105	69h	*VCO2 Filter Envelope
106	6Ah	*VCO2 Saw / Pulse
108	6Ch	*FILTER Osc1
109	6Dh	*FILTER Osc2: Off, 1/2, Full
111	6Fh	*FILTER Noise
112	70h	*FILTER 4 Pole
113	71h	*FILTER Track
114	72h	*Unison
123	7Bh	All notes off

*new in 2014.

WHAT'S NEW, cont

System Exclusive Commands

00 - Single Patch Load
F0 00 00 2F 08 00 <number> <patch data> F7
<number> Patch number to load sysex data

01 - Request Data
F0 00 00 2F 08 01 <type> <number> F7
<type> 00 to request 120 patches
01 to request a single patch
02 to request edit buffer

<number> is patch number when type 01.
Nonexistent when type 00 or type 02.

NOTE: When you request all 120 patches, each patch is sent individually in ascending order.

02 - Edit Buffer Load
F0 00 00 2F 08 02 <edit buffer data> F7
<edit buffer data> is the same as patch data, but it is only placed in the temporary edit buffer. It would be a good place for an editor to deposit data while editing, instead of writing to flash memory constantly.

03 - Reserved for firmware updates.

04 - Save Edit Buffer to Patch #
F0 00 00 2F 08 04 < number > F7
<number> is patch #. Once you're done editing the edit buffer, this will save it permanently to flash memory. This is typical for a software editor to perform.

Universal Device Inquiry message < F0 7E 7F 06 01 F7 >
OBXaMK responds with:

F0 7E 7F 06 02 Universal Device Reply

00 00 2F Encore Manufacturer ID

00 00 Family ID, LSB first

00 08 Family Member, LSB first

00 01 02 00 Software revision (ex: 01.20 in 2014)

F7 End-Of-Exclusive

The controllers modify the OBXa as if you were turning the OBXa knobs while in edit mode. This is important to remember when using MIDI controllers. They may not behave exactly as you might expect. For example, when the mod lever is used on the OBXa, it only adds the triangle waveshape as a modulation. Using the MIDI mod lever, the OBXa-MK will "add" whatever LFO waveshape is programmed for the current patch. If the LFO is not routed anywhere, the MIDI controller won't work. On the other hand, you can use the square or S/H function for a controlled LFO if it's enabled as part of the patch.

The OBXa-MK can also send MIDI note information when you play its keyboard. It cannot send pitchbend or modulation because the CPU doesn't have control of them. That is a limitation of the original design. Also, the pitch bend from MIDI is limited to one whole step. This is because we had to "trick" the OBXa into performing pitch bend. The built in pitch bender directly modifies the voice cards without CPU intervention. The CPU can roughly pitch a voice with one control voltage, and then it has to get it really in tune with a fine adjustment control voltage. We are controlling these to allow pitch bend from MIDI. If the voices are not dead-center tuned, the pitch bend on some notes may reach the limit before others. This has a side effect of possibly detuning a chord.

Installation Instructions

Note: Before performing these instructions, please read through them once. This will help you become familiar with the procedure and possibly prevent mistakes.

- Save the patches.
- Unplug the OBXa from the AC line and any other audio cables.
- Open the OBXa. There are a total of 4 screws you must remove: 2 on the top left wood edge, and 2 on the top right wood edge.
- Mount the three MIDI jacks on the back panel. You will need to drill a 5/8" hole for each MIDI jack. We recommend using a chassis punch. Be sure to check for obstructions, wires, etc... behind the area you are planning to drill. Clean all loose metal before continuing on to the next step. The flanges of the MIDI jacks should go on the outside of the OBXa to cover any imperfections in the holes. Use a 5/64" (.078") drill bit for the mounting holes. The supplied screws should thread into the back panel.
- Remove the microprocessor from its socket. (It is U101)
- Remove the following ICs: U102, U103, U104, U164, U108, U109, U110, U111, and U117.
  Note #1: There were several revisions of OBXa CPU board and not all of these ICs are populated in all models.
  Note #2: Early OBXas had a power on mute circuit which utilized part of U117. If after installing this kit, you find the output is very quiet, bend up pins 3 and 11 so they will not touch anything and re-install back in the socket. If your U117 was soldered directly into the PCB, just cut those two pins so they break connection.
- Remove the 2 screws from the CPU BOARD as shown in Figure 1.
- Install the two included 1" spacers in the holes where the screws were.
- Plug the 40 pin ribbon cable in socket U101 as shown in Figure 2.
- Position the OBXa-MK over the two spacers and secure it with the two screws that were removed earlier.
- Solder the eight wires to the 3 MIDI jacks as shown in Figure 2.
- Close the OBXa and secure the 4 outer screws. That's it!

Figure 1

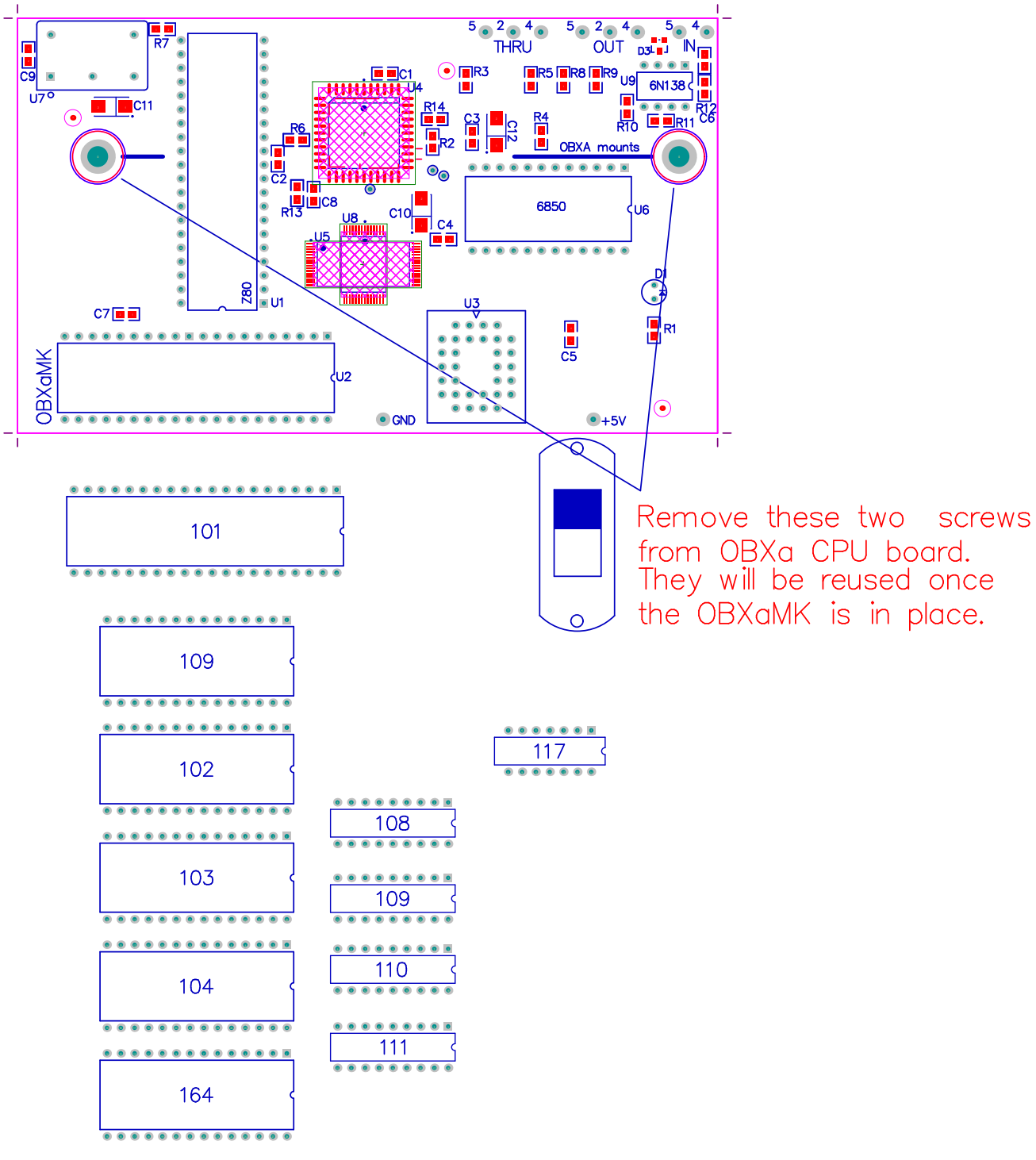
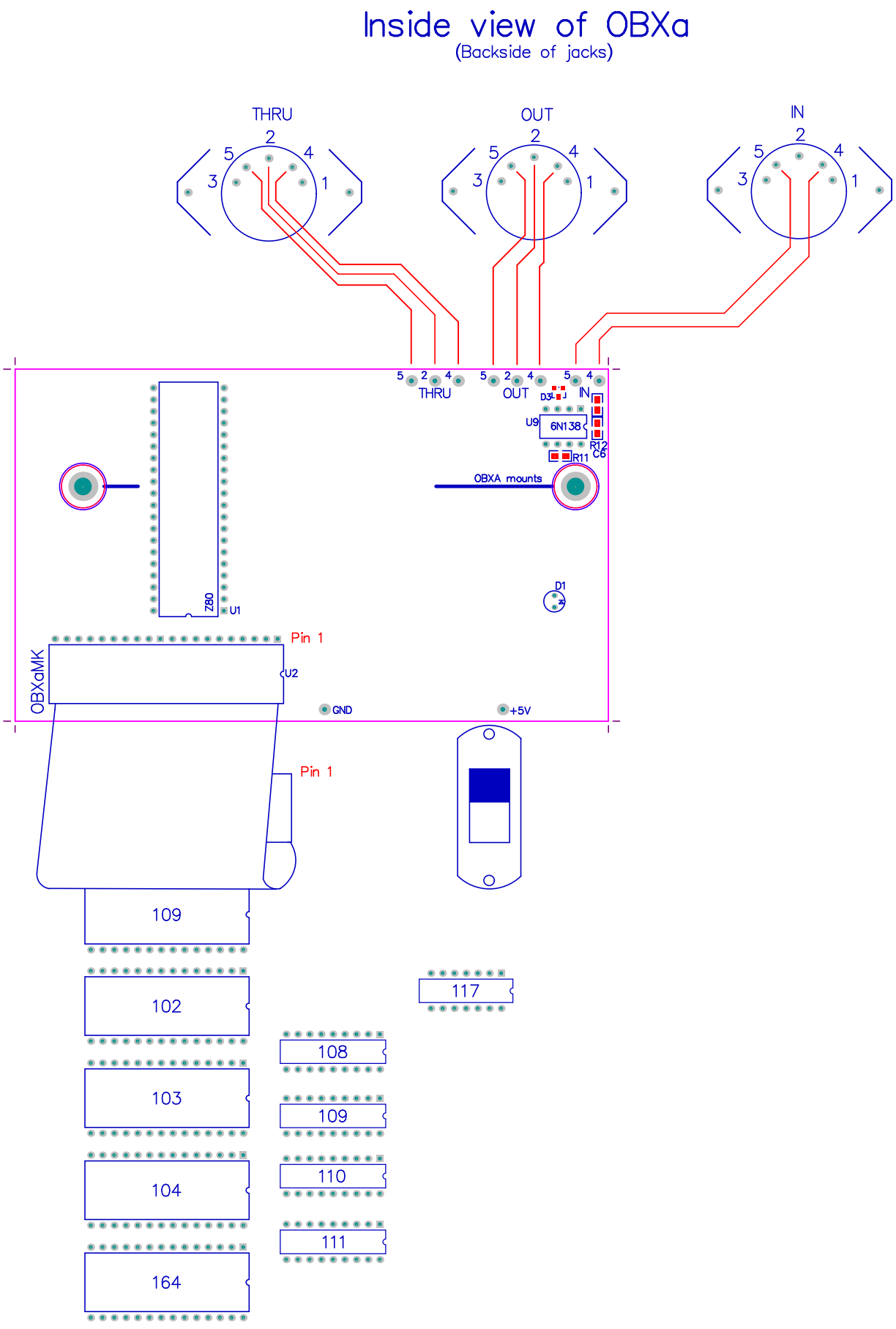

THRU
OUT
IN
6N138
OBXA mounts
6850
Z80
OBXaMK
GND
+5V
Remove these two screws from OBXa CPU board. They will be reused once the OBXaMK is in place.
101
109
102
103
104
164
108
109
110
111
117

Figure 2


Inside view of OBXa
(Backside of jacks)
THRU
OUT
IN
5
2
4
3
1
THRU
OUT
IN
D3
U9
6N138
R12
C6
R11
OBXA mounts
D1
Z80
U1
Pin 1
OBXaMK
U2
GND
+5V
Pin 1
109
102
103
104
164
108
109
110
111
117

MIDI

OBXa-MK MIDI IMPLEMENTATION VERSION 1.2

CHANNEL VOICE MESSAGES

STATUS	Data Bytes	Description
1000 xxxx	0kkk kkkk	Note off.
	0vvv vvvv	0vvv vvvv = note off
1001 xxxx	0kkk kkkk	Note on.
	0vvv vvvv	0vvv vvvv = 7FH
1011 xxxx	0ccc cccc	Control Change.
	0vvv v000	0ccc cccc = Control number (e.g. 01 = Mod lever)
		0vvv vvvv Control value. (range 0-7FH)
1100 xxxx	0nnn nnnn	Program select.
		0nnn nnnn = 0 through 77h
1110 xxxx	0vvv vvvv	Pitch Bend change LSB
	0vvv vvvv	Pitch Bend change MSB

CHANNEL MODE MESSAGES

1011 xxxx	0111 1011	All Notes Off. The OBXa-MK turns off all notes that were turned on by MIDI.

SYSTEM MESSAGES

1111 0000	00 00 2Fh	System Exclusive, Encore ID number
	08	Device number OBXa-MK = 08h
	pph	Command Byte1 : See description of command byte.
	qqh	Command Byte2 : Program number.
	data	Program Data
	F7h	End of System Exclusive Status Byte.

Command Byte Description- pp:

00	-	Request Data from OBXa-MK
01	-	Single Patch Load
02	-	Edit Buffer Load