OB-X MIDI KIT
User's Manual

INTRODUCTION

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

The OBX-MK allows your Oberheim OB-X to receive MIDI data
and perform as a MIDI controller.

In addition to giving your OBX MIDI capability, we have
expanded the patch storage from 32 up to 120! Now you can
load several groups of sounds previously stored on tape.

If you purchased your OBX second hand and didn't receive the
factory sounds, don't worry, because we have included them!
You can load them into the first 32 patch locations if necessary.
You may then edit them to suit your own tastes.

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 OB-X 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 OB-X 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 OBX responds to MIDI program changes. Any GROUP button will toggle GROUP A LED. When the LED is off, the OBX 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.

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 OBX-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 OBX-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 into the first 32 patches

- Turn off the OB-X.
- Press and hold [RESET]. While holding [RESET], turn on the power.

WHAT'S NEW

Expanded Memory

The original OB-X allowed you to save 32 patches. With the OBX-MK, you can now save 120 patches! The selection has been expanded by using combinations of the GROUP buttons. 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 OB-X came programmed with 32 factory sounds. They were supplied on cassette tape, but have commonly been lost or damaged. We have included these sounds in the OBX-MK! They can be loaded into the first 32 RAM locations if necessary by turning on the OBX while holding the RESET button. *This may be called CHORD depending on the vintage of OBX.* This will erase any previous sounds in those 32 locations.

MIDI Messages

The OBX-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 OBX-MK responds to:

Control	Function
01h	LFO freq depth
05h	Portamento time
07h	Loudness envelope sustain (VCA Sustain)
10h	Filter cutoff
11h	Filter resonance
12h	Filter modulation
13h	Oscillator Pulse Width
14h	VCF Attack
15h	VCF Decay
16h	VCF Sustain
17h	VCF Release
18h	VCA Attack
19h	VCA Decay
1Ah	VCA Sustain
1Bh	VCA Release
40h	Sustain
50h	Modulation LFO Rate
51h	Modulation Pulse Width Depth
7Bh	All notes off

WHAT'S NEW, cont

System Exclusive Commands

00 - Single Patch Load
F0 00 00 2F 06 00 <number> <patch data> F7
<number> Patch number to load sysex data

01 - Request Data
F0 00 00 2F 06 01 <type> <number> F7
<type>   00   to request 120 patches
               01   to request a single patch

<number> nonexistent when type 0. Patch number
               when type 1.
NOTE: When you request all 120 patches, each patch is sent individually in ascending order.

The controllers modify the OBX as if you were turning the OBX 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 OBX, it only adds the triangle waveshape as a modulation. Using the MIDI mod lever, the OBX-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 OBX-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's 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 OBX 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, 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.
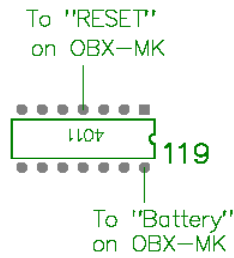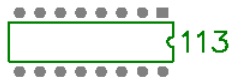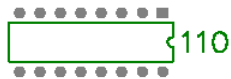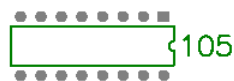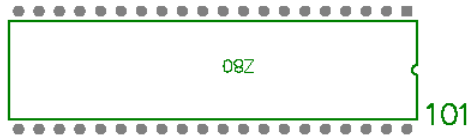
Installation Instructions

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

o   Save the patches.

o   Unplug the OB-X from the AC line and any other audio/MIDI cables.

o   Open the OB-X. 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.

o   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 OB-X to cover any imperfections in the holes. Use a 5/64" (.078") drill bit for the mounting holes. The supplied screws should thread right into the back panel.

o   Remove the 4 EPROMs from the CPU BOARD as shown in Figure 1.

o   Remove the microprocessor from its socket. (It is U101)

o   Remove the following ICs: U105, U106, U110, U111, U112, U113

o   Remove the 3 screws from the CPU BOARD as shown in Figure 1.

o   Install the three included 1" spacers in the holes where the screws were.

o   Plug the 40 pin ribbon cable in socket U101 as shown in Figure 2.

o   Solder the Battery wire to pin 14 of U119 as shown in Figure 2.

o   Solder the PUP wire to pin 4 of U119 as shown in Figure 2.

o   Position the OBX-MK over the three spacers and secure it with the three screws that were removed earlier.

o   Install the microprocessor into the empty socket on the OBX-MK.
    (It is socket U1 on the OBX-MK) **Make sure the MEMORY PROTECT SWITCH IS OFF!** (The unit will not work otherwise)

o   Solder the eight wires to the 3 MIDI jacks as shown in Figure 2. (Notice the orientation of the three "OUT" wires.)

o   Close the OB-X and secure the 4 outer screws. That's it!

Figure 1

OBX PROCESSOR BOARD

Z80 101

EPROM 126

EPROM 102

EPROM 103

EPROM 104

105

106

110

111

112

113

To "RESET"
on OBX—MK

4011 119

To "Battery"
on OBX—MK

REMOVE THESE 3 SCREWS

Figure 2

Inside view of OBX
(Backside of jacks)

THRU
4 1
2
5 3

OUT
4 1
2
5 3

IN
4 1
2
5 3

PIN 1 !!

RIBBON CABLE

To "RESET"
on OBX–MK

To "Battery"
on OBX–MK

119
104

PIN 1 !!

Battery

IN
5 4

OUT
5 2 4

THRU
5 2 4

U1

U5

U6

U2

U4

U3

U8

RESET

OBXMK Encore Electronics
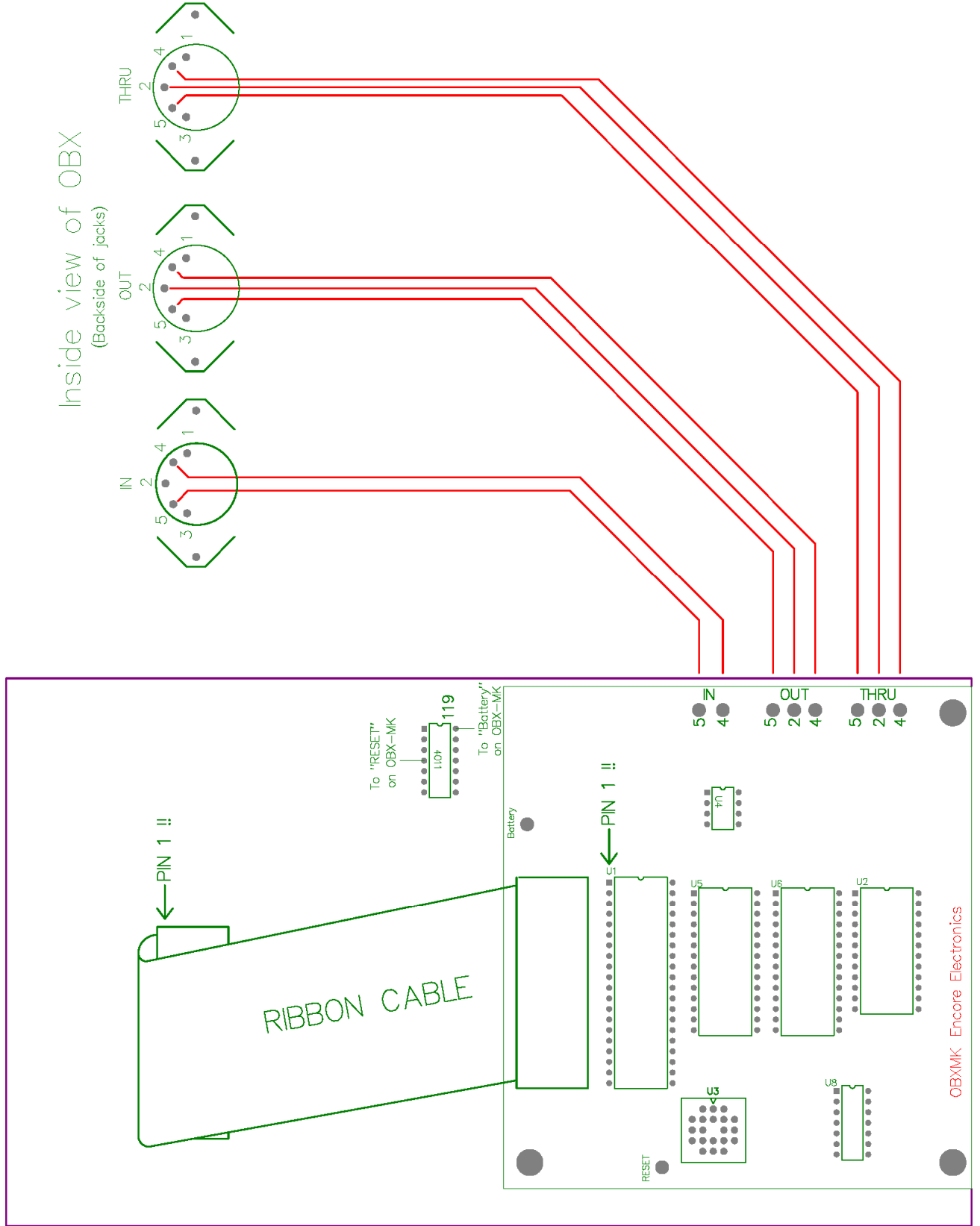
MIDI

OBX-MK MIDI IMPLEMENTATION VERSION 1.00

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 OBX-MK turns off all notes that were turned on by MIDI.

SYSTEM MESSAGES

1111 0000	00 00 2Fh	System Exclusive, Encore ID number
	06	Device number OBX-MK = 06h
	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 OBX-MK
01	-	Single Patch Load