M-AUDIO

OZONIC

37-Key Audio/MIDI Interface and Controller

ENGLISH • FRANÇAIS • DEUTSCH • ESPAÑOL • ITALIANO • 日本語

USER GUIDE

English

Introduction

Congratulations on purchasing M-Audio's Ozonic—the completely integrated audio/MIDI production and performance tool designed to streamline making music with your computer. Whether you're an advanced user or are making music on the computer for the very first time, we strongly recommend that you read through this Users Guide to learn about proper installation, operation, and advanced functionality.

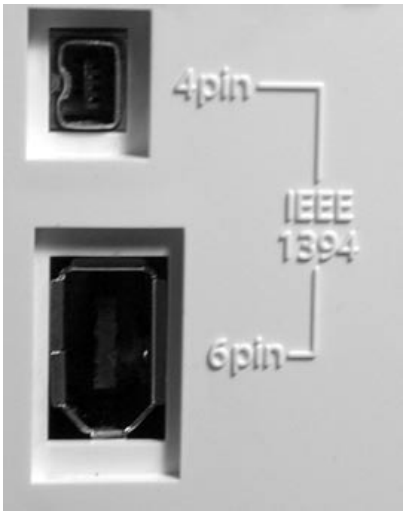
What's in the Box

Your Ozonic package contains the following:

- Ozonic audio/MIDI interface
- CD-ROM containing Driver Software and User Manual in PDF format
- Printed QuickStart Guide
- CD-ROM containing Reason Adapted Express software
- 1 meter 6-pin to 6-pin IEEE 1394 (FireWire) cable
- 12VDC 1000mA power supply

About the Ozonic

A single IEEE 1394 cable connects the Ozonic to your computer's FireWire port. If your PC is not equipped with a native FireWire port, you may purchase a FireWire PCI card at any computer electronics retailer. Check M-Audio's Support Knowledge Base on the M-Audio website (http://www.m-audio.com) for information on compatible IEEE 1394/FireWire PCI adaptors.



IMPORTANT:
The Ozonic comes with a high quality six-pin to six-pin FireWire cable. We strongly suggest that you use this cable, or one of equal quality, for optimum audio performance. Your computer is equipped with either a six-pin or a four-pin interface, while the connector on the Ozonic is six-pin. The Ozonic requires a powered six-pin FireWire connection in order to receive bus power; if your computer has a four-pin connection or a 6-pin connection that does not provide power, you will need to use the supplied power adapter with an adapter cable.

(**Note:** Some computer manufacturers may use a different nomenclature to refer to their FireWire connections, such as Sony's "iLink," or simply "1394" — when in doubt, consult the owner's manual for your computer.)

IMPORTANT:
Reports have come to our attention of isolated problems when hot-plugging IEEE 1394 (a.k.a. "FireWire") devices. (Hot-plugging refers to making 1394/FireWire connections when one or more of the devices—including the computer—is on.) When hot-plugging, there are rare occurrences where either the FireWire peripheral or the FireWire port on the host computer is rendered permanently inoperable. While M-Audio products adhere rigidly to the FireWire industry standard and pass stringent internal testing, the possibility remains that hot-plugging your M-Audio FireWire interface with some computers may result in the type of problem described here.

We strongly encourage you to protect your equipment by refraining from hot-plugging any bus-powered FireWire device, including the M-Audio Ozonic. Connect your FireWire device while both the computer and FireWire device are powered off. Power on the FireWire device, then turn the computer on last. If you are using bus power (systems with IEEE1394 6-pin connectors) make sure you make the cable connection first, then turn the FireWire device power switch on, and turn the computer system on last.

M-Audio is being proactive in investigating any issues that may adversely affect our customers. **Please consult the Knowledge Base in the Support section at www.m-audio.com for updates on this important issue.**

Ozonic Overview

The Ozonic is a 37-note MIDI keyboard and a 24-bit/96kHz audio interface equipped with four inputs: one XLR that fully supports phantom-powered microphones, one unbalanced 1/4" instrument jack, and two unbalanced 1/4" TS jacks. There are four analog outputs, two on 1/4" TRS (balanced) and two on 1/4" TS (unbalanced) jacks. There is a stereo headphone output and MIDI in/out ports. All of these options make the Ozonic a perfect integrated choice for performance or studio environments in a computer music set up.

The Ozonic's easy-to-use software Control Panel provides you with powerful routing and mixing control. You can route any combination of input pairs to any of the analog output pairs. This will give you complete control over the software returns from the computer host or the hardware direct monitoring streams. You can take advantage of ultra-low latency software monitoring with built-in ASIO drivers, and near-zero latency hardware direct monitoring.

With the Ozonic Headphone Stream Select function you can select which output pair you want to monitor, allowing you to pre-listen to an audio stream before it goes live. The Ozonic also has hardware level controls for each output pair, allowing for real time mixing of the different audio streams, including Direct Monitoring.

The Ozonic has 40 assignable MIDI controllers that include a joystick, 8 knobs, 9 sliders, Pitch Bend and Modulation wheels, and 14 assignable buttons (including Transport buttons). The keyboard also has an assignable Aftertouch control.

There are also 6 real-time function buttons that include Zone and Group controls and10 memory access buttons that can access the 20 on-board memories.

Features

Main Keyboard

- 37-note full-size, touch-sensitive, synth-action keybed, with assignable Aftertouch controller
- 1 MIDI In / 1 MIDI Out port
- joystick controller
- 8 fully assignable rotary MIDI controller knobs
- 9 assignable sliders
- 14 assignable buttons (including Transport)
- 10 Preset Select buttons with 2 layers and dual-function keypad
- assignable Pitch Bend and Modulation wheels
- 20 non-volatile memories
- 5 Transport Control buttons
- Octave and Transpose Up and Down buttons
- Sustain Pedal input
- Expression Pedal input
- 6 real-time function buttons
- 12 V DC power port
- On/Off button

Power:

- FireWire bus powered*
- DC IN for external PSU if not using FireWire bus for power

MIDI Data from buttons:

- Note On
- Note On/Off Toggle
- MIDI CC On/Off Toggle
- Program, Bank LSB, Bank MSB presets
- MIDI Machine Control functions
- GM/GM2/XG SysEx Messages

MIDI Features:

Ports:

- External MIDI Out
- External MIDI In
- 2 x FireWire MIDI Out (one to MIDI Out, one to keyboard)
- 2 x FireWire MIDI In

MIDI Data from controllers:

- MIDI control number
- RPN/NRPN
- GM/GM2/XG SysEx Messages
- All controls fully programmable to MIDI controller number
- All controls fully programmable to MIDI channel
- Drawbar mode for faders
- Controller Mute, mutes controller output to avoid parameter jumps
- Memory Dump via SysEx
- Enigma librarian and parameter editor for storing and organizing setups
- Pitch Bend
- Program, Bank LSB, Bank MSB

Audio

- 4 x 6 analog I/O on 1 x XLR mic input, 1 x 1/4" instrument input and 2 x 1/4" TS jacks
- 2 x TRS (balanced) and 2 x TS outputs
- 1 Headphone output
- Headphone Level knob
- Headphone Stream Select/Merge knob
- Direct Monitor Level knob
- Phantom Power On/Off switch for XLR input on rear of unit and activation LED for Input 1 on top panel
- Gain Control dual concentric knob for Inputs 1 & 2
- Signal/Clip LEDs for each Gain Control
- Volume sliders for Outputs 1 & 2 and Outputs 3 & 4

*Powered 6-pin FireWire port required for bus-powered operation
Note: 6-Pin PCMCIA cards do not supply power

Minimum System Requirements*

IMPORTANT: The Ozonic is supported under Windows XP; it is not supported under Windows 98, 98SE or Windows ME or 2000. You must be running Service Pack 1 (SP1) or later. Visit the Windows update web pages (http://windowsupdate.microsoft.com/) to make certain you have the most current updates and fixes supplied by Microsoft.

On the Macintosh, the Ozonic is supported under Mac OS X version 10.2.8 or version 10.3.4 or later. Earlier versions of Mac operating systems are not supported.

Windows

- Pentium 3 – 800 MHz or higher (CPU may be higher for laptops)
- 256 MB RAM
- DirectX 9.0b or higher
- Windows XP (SP1) or higher (Windows 98, Me, NT, or 2000 not supported)

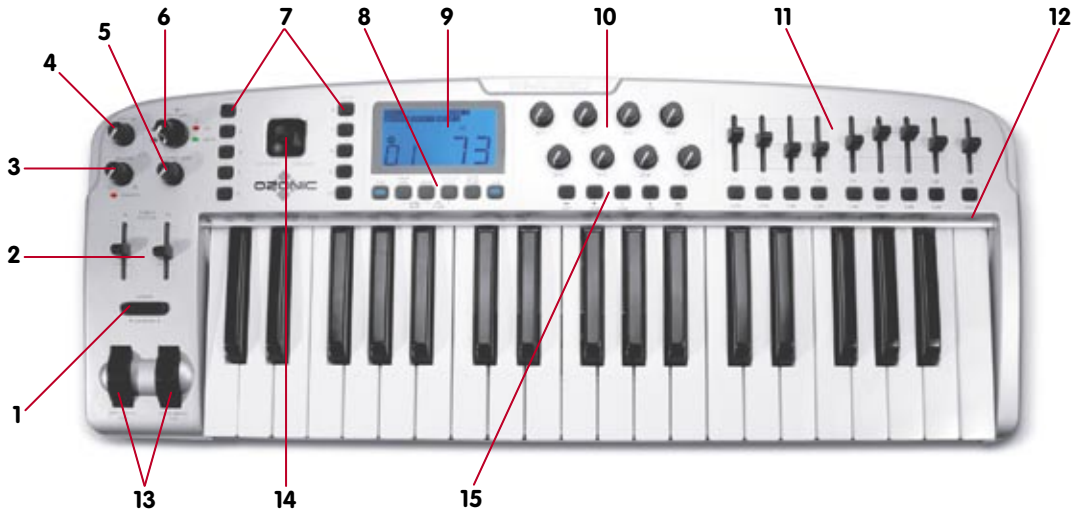
Mac OS

- Macintosh G3** 800/G4** 733 MHz or higher (CPU may be higher for laptops)
- OS X 10.2.8 W/ 256 MB RAM
- OS X 10.3.4 or greater w/ 512 MB RAM

* M-Audio suggests you also check the minimum system requirements for your software, as they may be greater than the above.
** G3/G4 accelerator cards not supported.

Controls and Connectors

Top Panel Diagram



Top Panel Descriptions

1. **Octave +/- Button:** allows you to shift the octave of the keyboard up or down to extend the range of the keybed
2. **Output Level Sliders:** controls the volume level of both output pairs
3. **Headphone Source Knob:** controls which audio output stream the headphones will monitor
4. **Headphone Level Knob:** controls the headphone volume level
5. **Direct Monitor Level Knob:** controls the amount of the input signal sent directly to the outputs
6. **Input Gain Knob:** controls the mic and instrument gain for Inputs 1 & 2
7. **Preset/Zone/Group Selector Buttons:** 10 preset memory buttons for both Bank A and B allow you to select Zones and Groups
8. **Real-Time Advanced Function Buttons:** control the MIDI functions that you will use in real time; programming functions are on the keybed
9. **LCD Screen:** shows all MIDI activity
10. **8 Rotary Knobs:** 8 MIDI-assignable knobs
11. **9 Faders:** 9 MIDI-assignable sliders
12. **Programming Functions:** advanced MIDI programming functions
13. **Pitch Bend and Modulation Wheels:** control sound manipulation of pitch and modulation
14. **The Joystick**
15. **14 MIDI Assignable Buttons**

Back Panel Descriptions

1. **Mic Input:** This connection will accept a low-impedance microphone connected on a standard three-pin balanced XLR. The microphone input supports the standard 48V phantom power used in professional condenser microphones.
2. **Instrument Input:** This connection allows you to plug in an instrument, such as a guitar, bass. The input is balanced, and supports unbalanced (TS) jacks.
3. **Line Inputs**: These two connections allow for line-level inputs, such as those from a CD or tape player. You can use them for two separate mono devices or a single stereo unit.
4. **Headphone Output**: The Headphone Output is rated to accept headphones in a broad range of impedances—between 32 and 600 ohms.
5. **Line Outputs**: The first two line outputs are balanced (TRS) while the third and fourth line outputs are unbalanced (TS).
6. **Phantom Power**: This switch allows you to turn phantom power on and off on the microphone input (see number 1, above).
7. **MIDI Input and Output**: These are standard 5-Pin DIN MIDI In and Out jacks.
8. **FireWire Port:** The FireWire (IEEE 1394) port allows you to connect to your computer. We recommend connecting the Ozonic at the end of any chain of FireWire devices and connecting only self-powered devices to the input.
9. **DC Power Supply Port:** Connect the 12VDC 1000mA power supply to this jack when using the Ozonic with a four-pin FireWire connection. Use only the power supply provided with the unit or a power supply of equivalent quality with a positive center pin.
10. **On/Off Switch:** Powers the Ozonic on and off.
11. **Kensington Lock Hole:** This connector is compatible with **Kensington**® security cables to protect your device from theft.
12. **Sustain /Expression Pedals**

Driver Installation

Windows XP

NOTE:
Do NOT connect the Ozonic to your computer before you have run the installer application and shut down your computer. If you are going to use bus power (systems with IEEE1394 6-pin connectors) make sure you make the cable connection first, then turn the FireWire device power switch on, and turn the computer system on last.

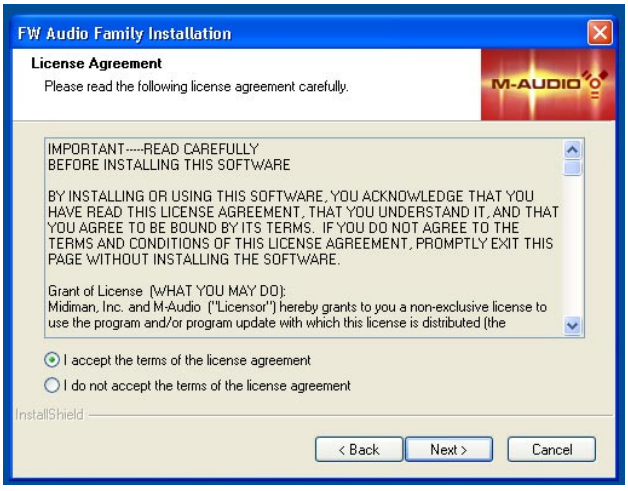
For the Ozonic to function properly, you need to have installed Service Pack 1 or higher if using Windows XP. To install a Service Pack, please consult http://www.microsoft.com for instructions.

Additionally, you'll need DirectX 9.0b or higher. The Ozonic driver installer will detect whether or not you have the proper version of DirectX installed. If you need to upgrade, you will be prompted to do so. DirectX 9.0b can be found on the included driver CD-ROM.

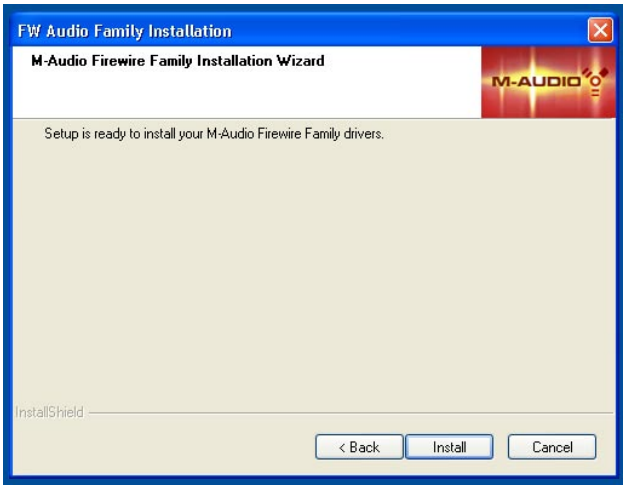
During the course of installation, messages about the Microsoft Digital Signature for the driver will appear. Microsoft tests drivers to ensure they work properly with their operating systems. While driver signing makes installation and operation more streamlined, it is not a necessity for a device to function properly with the operating system. Currently, M-Audio's FireWire drivers are not digitally signed. However, M-Audio is committed to providing the best possible drivers for our products and we constantly evaluate and test our drivers to ensure that they work properly. As a result, there is no need to worry about the driver not being signed.

1. Insert the Driver CD-ROM into your computer's CD-ROM drive.
2. From the Start menu, select "Run…" then click the Browse button. Browse to the CD drive, locate the "Ozonic" folder, then select the Ozonic installer from within that folder.
3. Double click on the installer icon to begin the installation.

4. Verify that you have no other programs running (especially anti-virus programs, which may interfere with the installation), andv then click "Next" to begin the installation.
5. After you've read the license agreement, please click the "I accept..." circle if you agree to the terms. Then click "Next" to continue.



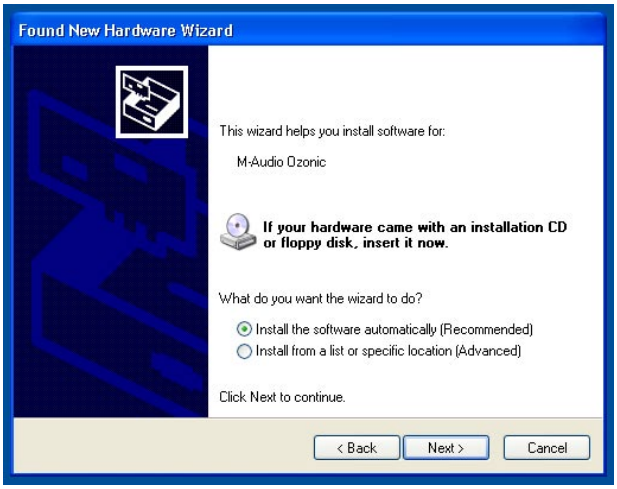
6. Click "Install" to continue.
7. The installer will prompt you to enable DVD/CD performance enhancement settings. In most cases, you should leave these in their default (selected) settings. While Windows is most likely already configured in this way, these settings will ensure that you will be able to hear your DVD/CD player's playback through the Ozonic. Click "Next."



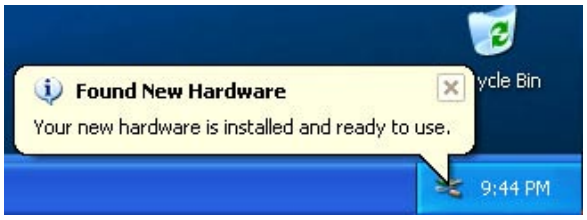
8. During the installation, you will be prompted with a message warning that the driver software has not passed Windows Logo testing. Select "Continue Anyway" and proceed with the installation.
9. Once the installer has finished copying the files, you will see the Installation Complete screen. You will then be prompted to shut down your computer. Click "Finish" to proceed.

10. After the computer has powered off, connect the Ozonic to your computer's FireWire port and power it on. Once the Ozonic is connected, turn on your computer. Once Windows has loaded, the New Hardware Wizard will open. Choose the default selection, "Install the software automatically." Click "Next." Windows will locate and install the Ozonic Bootloader files.
11. During the installation, you will be prompted with a message warning that the driver software has not passed Windows Logo testing. Select "Continue Anyway" and proceed with the installation.

12. The Found New Hardware Wizard will run a second time to install the Ozonic driver software. Choose the default selection, "Install the software automatically." Click "Next."



13. You will again be prompted by the Windows Logo Testing notice. Again, click "Continue Anyway" and proceed with the installation.
14. Click "Finish" to complete the installation. Your Ozonic is now ready to use.
15. You will see the M-Audio Ozonic control panel icon in your system tray (lower right corner of your desktop). Click on the icon to open the control panel.



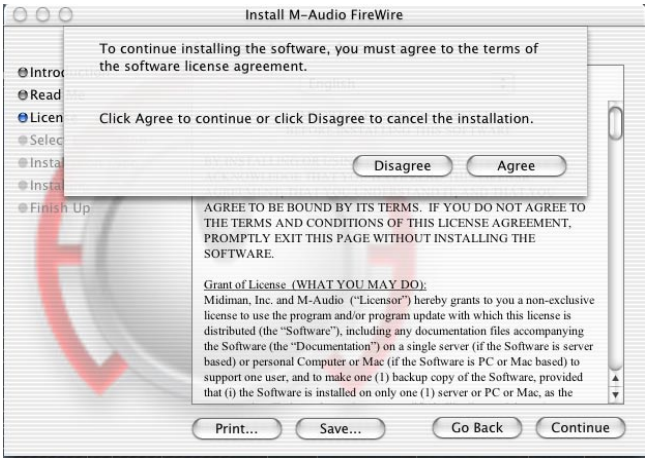
Mac OS X

Never connect or disconnect the Ozonic while the computer is on. If you are going to use bus power (systems with IEEE1394 6-pin connectors), make sure you make the cable connection first, then turn the FireWire device power switch on, and turn the computer system on last.

Installation note: There are differences in administrator authorization between OS 10.2.X and OS 10.3.X. For 10.2.8 or higher, you may be prompted for your administrator password at the beginning of the installation. For 10.3 or higher, you may be prompted for the password just before the installation begins.

1. Insert the Driver CD-ROM into your CD-ROM drive and browse to the CD-ROM to view its contents. Locate and open the "Ozonic" folder, then open the folder for OS X.
2. Double-click the M-Audio Ozonic Installer.dmg file. An icon labeled "Ozonic" will appear on your desktop.
3. Double-click on the Ozonic icon. The file named M-Audio Ozonic Installer.mpkg will appear. Double-click on the installer file.
4. The introduction screen will now appear. Click "Continue" to proceed.

5. The next screen contains the release notes, with buttons that allow you to print or save at this point. When you are done reading the release, click "Continue" to proceed.
6. The next screen displays the software license agreement, with buttons that allow you to print or save this agreement. When you are done reading the agreement, click "Continue" to proceed.
7. Once you click "Continue," a notice will appear asking you to agree or disagree. If you agree, then installation will proceed. If you choose to disagree, the installation will not proceed.



8. Select your OS X hard drive. Click "Continue."
9. The next screen provides you with options for installing the Ozonic driver. We recommend that you perform the Basic Installation. To do so, click "Install." If you wish to customize your installation, click on the "Customize" button.

10. Enter your administrator name and password, and click "OK" to continue.
11. At this point, you will see a message detailing the remaining steps for the installation. Read these steps, then press "OK."

12. When the installation is complete, click "Close" to complete the wizard.
13. Once the installer is finished, shut down your computer. Plug the Ozonic into your computer's FireWire port, then press the power button to switch the Ozonic on. Once you have completed this, turn the computer back on.

14. Once the operating system has loaded, go to "System Preferences" in the Apple Menu. Select the "Sound" preference panel, and click the "Output" tab. Select "M-Audio Ozonic" to choose the Ozonic as your default output device.

Hardware Connections

Audio

ATTENTION: You must shut down your computer any time you wish to connect or disconnect the Ozonic from the system. Failure to do so may cause damage to either your computer's or Ozonic's FireWire ports. Please review the hot-plugging advisory at the beginning of this manual for additional information.

Connect the Ozonic's Line Outputs 1 and 2 to your amplifier, powered monitors or mixer. For two-channel stereo operation, the default outputs are channels 1 and 2. (You may change this in Ozonic's Control Panel if you desire. You can also connect the Ozonic's four line outputs to a standalone mixer.

Connect your headphones to the Ozonic's headphone outputs.

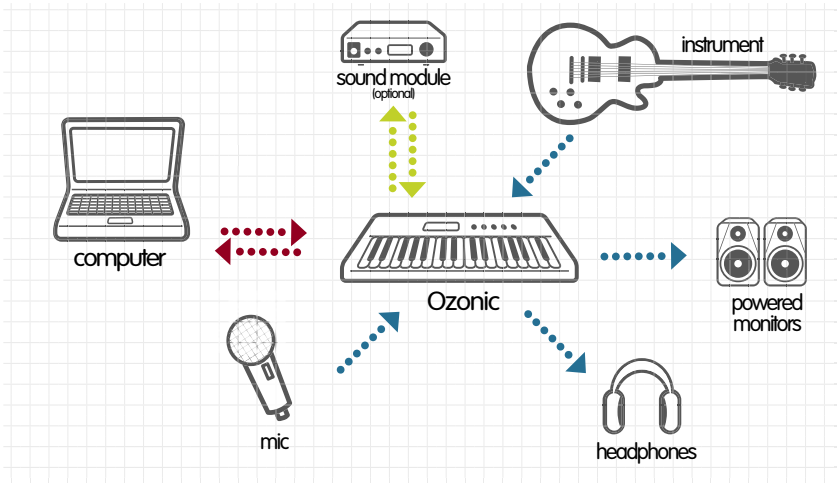
Connect a microphone (using an XLR connector) or instrument (using only a TRS/TS connector) such as an electric guitar or bass to the Inst Input Channel 2. Connect your line level analog source such as instruments or preamps, a CD deck, or turntable preamp to the Ozonics's analog Line Inputs 3 and 4.

MIDI

IIn addition to the FireWire MIDI connection to your computer, you can connect your MIDI device's MIDI Output to Ozonic's MIDI Input. Connect your MIDI device's MIDI Input to the Ozonic's MIDI Output.

Shown in the illustration below is a MIDI controller keyboard plugged into the Ozonic's MIDI input. A MIDI sound module is connected to the Ozonic's MIDI output.

CONNECTION DIAGRAM



The Software Control Panel

Ozonic's driver software installation includes a Control Panel—a simple yet powerful interface with your computer and Digital Audio Workstation software. The Control Panel gives you a software mixer with 4 virtual outputs from your audio software, and 4 input channels from the Ozonic's hardware inputs. Each mixer channel input pair may be routed to any of the Ozonic's analog outputs.

The Ozonic Control Panel is installed in your system after you have completed the driver installation procedure. To open the Control Panel:

In Windows – A tiny icon in the shape of a knob will be placed in the system tray, generally located at the bottom of your Windows desktop. Double click this icon to open the Control Panel.

On the Mac – The Ozonic Control Panel can be found in System Preferences. In OS X, go to Apple Menu > System Preferences > M-Audio FireWire.

In either Windows or on the Mac, the Ozonic Control Panel can also be opened from an ASIO-compliant music program's audio setup page (ASIO not applicable to Mac OS X).

The Ozonic Control Panel gives you a great deal of control, and you may find that the default settings are sufficient for your needs. Depending on how you record, you may never have to make an adjustment to these settings. But in the event that you want to customize your settings, the following section explains the Control Panel in great detail.

Global Menus

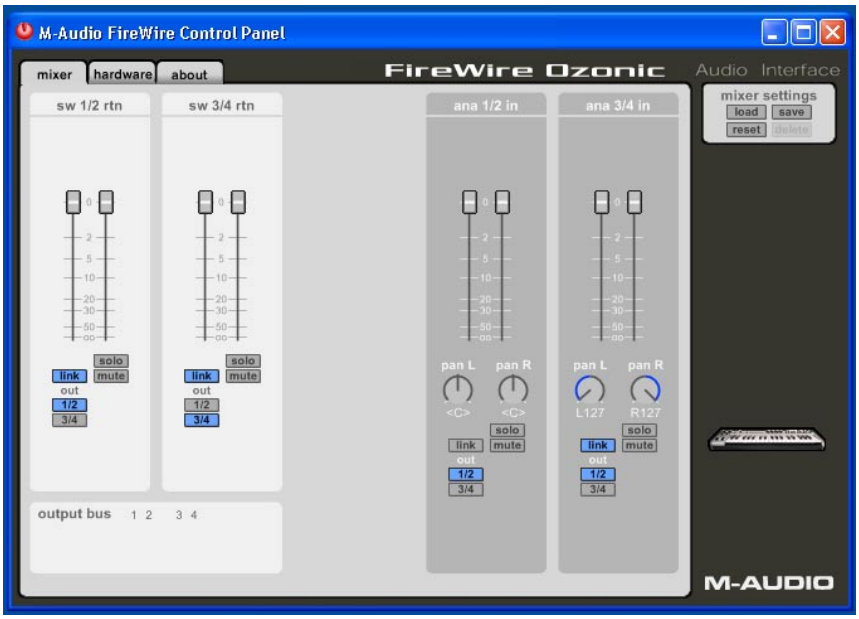
The following Control Panel features are available on all pages of the Control Panel:

■ **Mixer Settings** – The reset button returns the Control Panel settings to their default values. The Default Values for the Ozonic Control Panel are listed at the end of this section.

The **load, save** and **delete** buttons will open a Windows or Mac file dialog box. To save a set of Control Panel settings, click the **save** button. Then, from the Save dialog box, name the setting and click "OK." After you have saved a set of Control Panel settings, clicking the **load** button will allow you to select and load your saved settings. To delete saved settings, click the **delete** button and select the setting that you wish to delete.

Mixer Page

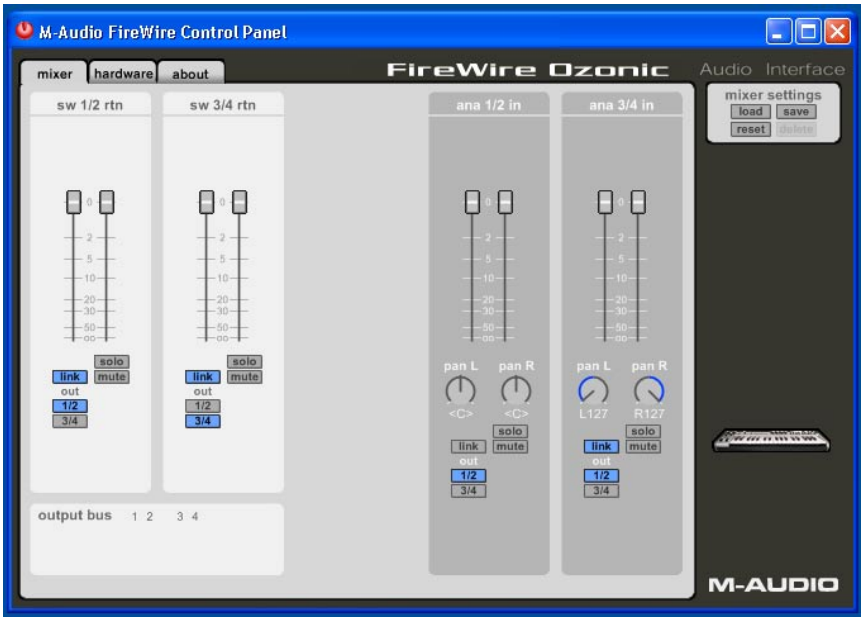
The **mixer** page provides output routing and control of the Ozonic's analog inputs and software returns. There are up to four virtual channels returning from your Digital Audio Workstation software.



■ **Software Returns** – The **mixer** page provides up to four virtual audio returns from your audio application, displayed in channel pairs. These returns will appear in your audio program's output assignment and mixer settings as available audio outputs.

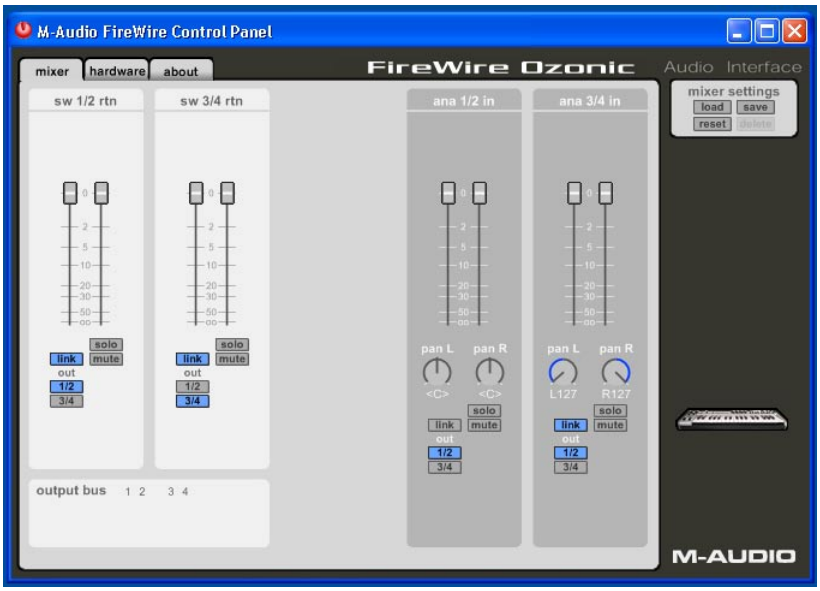
It is likely that you will control the software output monitor levels from your audio program's mixer, and will want to keep the Control Panel mixer faders at their maximum level. However, you may find it convenient to adjust them here, if, for example, you are setting up a balance between input levels and **sw rtn** levels.

In order to route these channels, select the appropriate button in the Channel Strip (either 1/2, for Output pair 1 and 2 or 3/4, for Outputs 3 and 4). By default, software returns 1 and 2 are routed to Output pair 1 and 2; software returns 3 and 4 are routed to Output pair 3 and 4.



■ **Hardware Inputs** – The **mixer** page also provides software level control for direct monitoring of Ozonic's analog inputs. These pairs are labeled **1/2 in** and **3/4 in**.

The software routing of the hardware inputs is the same process as for the software returns. Press **1/2** or **3/4** or both to select routing options. When you press one of the software buttons it will light, meaning that the audio signal is being routed to that pair of outputs.



■ **Output Routing** – Software returns 1-4 may be assigned to any of the Ozonic's analog outputs by clicking the output button of the desired output pair. These are labeled **1/2** and **3/4.**

All analog output pairs may be selected (the buttons turn blue when active) for each **mixer** input channel pair. If multiple **mixer** channels are assigned to the same output pair, the signals will be summed at the assigned output. Note that clipping of summed signals is possible, so keep an eye on your output level meters when summing mixer channels.

■ **Stereo Linking** – Both software return channels are controlled by software faders; pairs can be linked for stereo operation by clicking the channels' **link** button. The buttons turn blue when active. Once the channels are linked, grabbing and moving one fader will move both faders in unison.

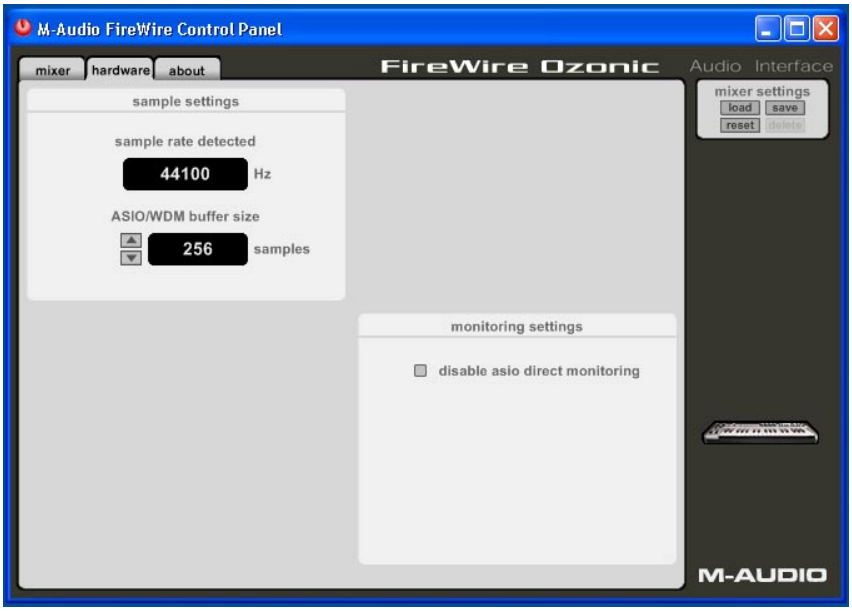
■ **Mute Button** - Selecting the **mute** button (the button turns red) will cause that channel pair to cease audio output. Deselecting the **mute** button will resume audio output on that channel pair.

■ **Solo Button –** Selecting the **solo** button (the button turns yellow) will cause all other channels to cease audio output. Deselecting the **solo** button will resume audio output on all channels. Multiple solo selections are possible.

■ **Panning** - The input channel pairs also offer virtual **pan** pots. As with any typical mixer, the **pan** works in conjunction with the Output Routing assign buttons to enable you to route the signal as you wish.

Hardware Page

The **hardware** page gives you access to important information about the functions of Ozonic.



The **hardware** page design and function will vary slightly, depending on your platform and operating system. Shown below is the **hardware** page from a Windows installation.

■ **Sample Rate Detected** – This field displays the detected sample rate that is being received. Ozonic will detect and display the sampling rate as set by your audio software or your computer's operating system via the IEEE 1394 (FireWire) bus.

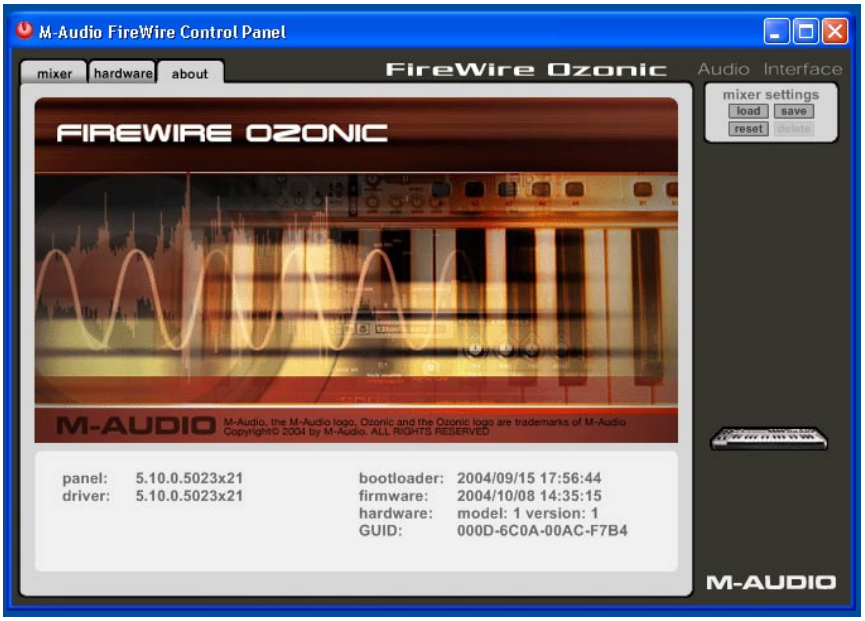
■ **ASIO/WDM Buffer Size** – This field allows you to select the buffer size you wish to work with. Smaller buffer sizes result in lower latency (the time it takes for your input signal to pass through your audio software and appear at the outputs), but may not function well with slower systems. The default buffer size setting is 256. This setting may adequately serve your purposes, but you can experiment with lower settings if you wish. If you experience stuttering or crackling in your audio playback, try using a larger buffer size.

NOTE: This section does not apply to Mac OS X, and will not appear if you are running that operating system. Mac OS X does not support ASIO (or WDM).

About Page

This page contains information on your hardware and current driver software versions. This information may be helpful if you ever have to update the driver software or need to call for technical support. Clicking the M-AUDIO logo in the lower right hand corner will link you directly to our website if you are currently online.

Firmware Info – This field displays the current firmware version of your Ozonic.



Ozonic Default Values	
Device Setting	**Default Setting**
Fader Levels	0dB for all software return and input channels
Link – 1/2 software return	ON
Link – 3/4 software return	ON
Link – 1/2 input	OFF
Link – 3/4 input	ON
Pan – 1/2 software return	Panned hard left for ch 1 software return and hard right for ch 2 software return
Pan – 3/4 software return	Panned hard left for ch 3 software return and hard right for ch 4 software return
Pan – 1/2 input	Panned center for both ch 1 input and ch 2 input
Pan – 3/4 input	Panned hard left for ch 3 input and hard right for ch 4 input
Solo	Solo OFF for all software return and input channel pairs
Mute	OFF for all software return and input channel pairs
Routing – 1/2 software return	Out 1/2
Routing – 3/4 software return	Out 3/4
Routing – 1/2 input	Out 1/2
Routing – 3/4 input	Out 1/2
ASIO/WDM buffer size	256 sample – Windows Only

Using Your Ozonic

The following sections address a number of real-life situations that you may encounter while using your Ozonic. These brief tutorials should help guide you. Also check the M-Audio website from time to time for additional tutorials or FAQs.

Setting Up Your Recording Levels

■ **Using the Mic/Inst Inputs** – Connect your microphone or instrument to the Ozonic's back panel Mic or Inst input. If you are using a microphone with active circuitry (such as a condenser) then be certain to activate the Phantom Power switch (after connecting the condenser microphone to the XLR input). The Input Gain is on a dual concentric knob. The inner, top knob controls the microphone gain, while the outer, lower knob is used to set the instrument gain. Adjust each channel's Input Gain to achieve a fairly steady green Signal LED without triggering the red Clip LED while audibly testing your input levels (i.e., strumming the guitar, or speaking into the mic).

> **NOTE:** When recording with microphones, it is best to keep the mic at some distance from the main speakers, or use headphones to monitor. Feedback may occur when microphones are too close to speakers.

■ **Using the Line Inputs** – Connect the line level output of your external audio device to any of the Ozonic's rear panel Line Inputs. You can adjust the levels of these inputs in the Ozonic Driver Control Panel.

The signal level that you receive at the Line Inputs will be the signal level that you record. Any adjustments to that signal level must be made at the source. If you have an output level control on the device that you have connected to the Ozonic's line inputs, adjust that output level control to change the recording level. Most recording software will allow you to add gain to a recorded track that was not made at too low of an initial level, but be careful that the recording level is not reaching digital clipping (signal over 0dB, going into the red) while recording.

You will then want to route the input signal to your audio software's inputs. Refer to the below section on "Monitoring Your Inputs for Recording," and your software's documentation for more information.

Monitoring Your Inputs for Recording

Ozonic supports ASIO direct monitoring, ASIO software monitoring and WDM input monitoring, as well as CoreAudio in Mac OS X. Ozonic also supports direct hardware monitoring independent of the software's monitoring capability.

■ **ASIO Direct Monitoring** – Many applications that support ASIO 2.0 also support ASIO Direct Monitoring. In direct monitoring mode, the input signal is sent to the application and then directly to the Ozonic's outputs, without passing through the application itself. The advantage is that there is only a small amount of latency introduced. However, since the audio is bypassing the software application, you cannot add software effects or EQ plug-ins to the signal being monitored.

ASIO direct monitoring, when enabled, will allow you to control the monitor levels (and muting) of the Ozonic's **mixer** inputs directly from the program. Once you have assigned an input channel in the music software to an Ozonic input, the music software's mixer will take control of the Ozonic Control Panel **mixer**'s input channels.

If your audio application supports ASIO Direct Monitoring, you can enable it in your audio software's ASIO or audio control panel or setup page. Please refer to your audio software's documentation for additional information. Also see the above section, "Direct Monitoring On/Off," for information on using the A/B momentary switch in conjunction with ASIO Direct Monitoring.

■ **ASIO Software Monitoring** (not applicable to Mac OS X) – Your ASIO program may only support simple software monitoring—not ASIO Direct Monitoring—or, you may simply prefer this method of monitoring. In ASIO software monitoring, the input signals are monitored through your audio software and its mixer. Although you can now monitor your inputs with effects and EQ plug-ins, a certain amount of latency is introduced by monitoring through your software. Ozonic supports the ultra-low latency ASIO standard. However your actual latency is influenced by a number of factors including your computer hardware, processor speed and selected buffer size both in your Ozonic Control Panel and your music software.

If your audio application supports ASIO software monitoring (sometimes referred to as "throughput monitoring"), you can enable it in your audio software's ASIO or audio control panel simply by selecting the Ozonic's ASIO driver for that program (providing that ASIO Direct Monitoring is switched off). Please refer to your audio software's documentation for additional information on setting up your tracks for recording.

■ **WDM Input Monitoring** – If you are running a WDM-compliant application (WDM does not apply to Mac users), Ozonic supports input monitoring through your audio software. In most cases, WDM offers extremely low latency monitoring, even when using plug-in effects and EQ.

If your application supports WDM and direct monitoring, you may enable it in your audio software's configuration window. Please refer to your audio software's documentation for additional information.

■ **Direct Monitoring** — In direct hardware monitoring mode, the input signal is sent directly to the Ozonic's outputs. If you are running a program that is not ASIO compliant or does not have WDM input monitoring (such as Sound Forge, or some earlier programs) this type of monitoring may be necessary. Even if your software program does have ASIO tape-type or WDM input low-latency monitoring, you may choose to direct (hardware) monitor the Ozonic's inputs in this fashion, and enjoy near-zero latency monitoring.

As mentioned earlier, with ASIO direct monitoring, the audio software will take control over the Ozonic **mixer**'s input channels. With manual direct monitoring, you must control the Ozonic mixer's input channels manually. Here's how:

1. Open your audio software and the Ozonic Control Panel.
2. In the Ozonic Control Panel, click the **mixer** tab. (Let's assume that we're monitoring with the analog Line Inputs 1 and 2.) Assign the **analog in 1/2** channel output routing to Output **1/2**, and bring up the channel's faders until you begin to hear the source that is connected to the line inputs.
3. Use the Direct Monitoring Level knob on the Ozonic to raise or lower the direct monitor signal that is being sent directly to the outputs.
4. Please note that the Input signal will also be sent to the FireWire bus and the host software application at the same time as the direct monitor signal is sent to the Outputs. This will allow you to record and monitor in real time.

The advantages to this type of monitoring are obvious (very low latency), though the inability to add effects can be seen as a drawback. You will also find that it helps to take the time to get the correct level adjustment between the Input channels in the driver control panel and the hardware level knob.

General Recording Instructions

Ozonic's analog inputs will appear as inputs in your audio software. Depending on your application of choice, these may be labeled as ASIO, WDM, or CoreAudio inputs, and may be shown as either mono or stereo inputs. For example, in an ASIO-based application (e.g., Cubase or Nuendo,) the Ozonic's inputs will appear as:

- Ozonic Analog Input 1
- Ozonic Analog Input 2
- Ozonic Analog Input 3
- Ozonic Analog Input 4

The above driver devices correspond to their respective hardware inputs on the Ozonic, and their naming is designed to reflect that. Choose an available track in your audio software and route the input signal to it. To do this, select the input source for the track and enable it for recording. Refer to your audio software's documentation for further information.

Setting the Sample Rate

In most cases, you will want to set the sample rate from within your audio software. This is covered in more detail in the "Hardware Page" section, and in "Setting Up Your Record Levels."

MIDI Functions

Keyboard and MIDI

■ Introduction

Before you begin exploring the MIDI section of the manual, please refer to the beginning of this guide and read the Ozonic installation information that applies to your operating system. It is necessary to install the Ozonic and ensure it is working properly before you begin to work with the MIDI functions.

■ Testing Your Ozonic with Your Computer Software

We also recommend that you verify that your software application is properly communicating with the Ozonic keyboard. Most software applications have a MIDI Input indicator. To confirm data is received, press any key on the keyboard.

If you encounter any issues or the software receives no data, please verify that you have selected the keyboard's driver as the MIDI Input for your software. In addition, please read the troubleshooting section at the back of this manual and consult the manual that came with your software for proper configuration within the software application.

■ Edit Mode

This manual will frequently refer to the "Edit mode." Edit mode defines the state of the Ozonic when the EDIT button has been pressed.

In Edit mode, the Ozonic's keyboard is used for selecting functions. These functions are listed above each key on the keyboard. The top octave of the Ozonic keyboard is used to enable numerical data entry in Edit mode.

When entering numerical values in Edit mode, the LCD display shows the value entered. This value will update as you enter numerical data.

When the Ozonic enters Edit mode, the function button will light. The ENTER key must be pressed each time the numerical data entry keys are used to enter a value. This will save that value. To exit Edit mode simply press the EDIT button again, the LED will no longer be lit and you will have restored the keyboard

Basic Operation of Ozonic's MIDI interface

■ Setting the Global MIDI Channel

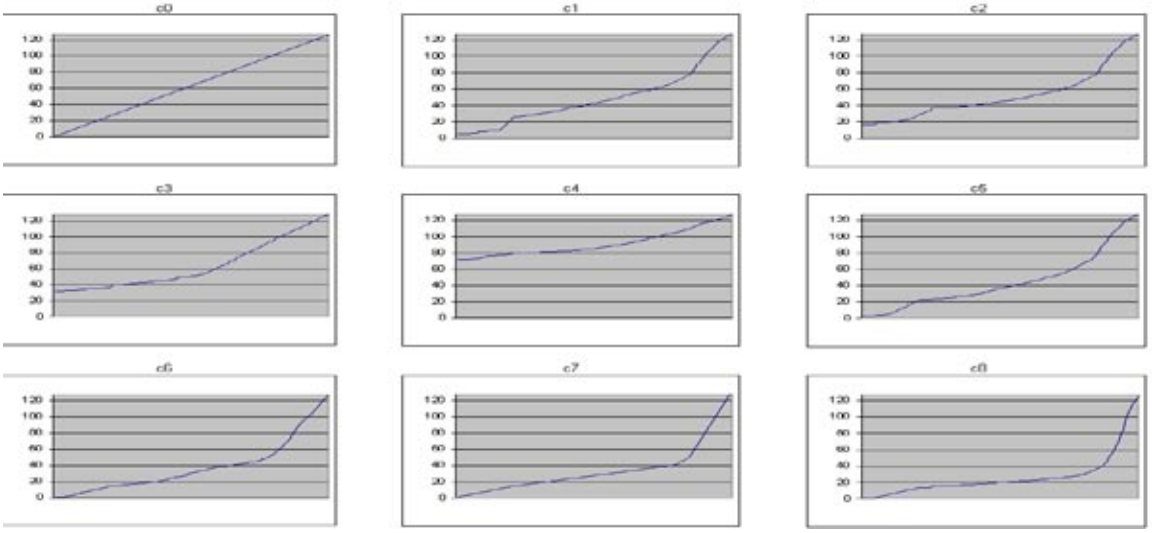
Ozonic can transmit on any of the standard 16 MIDI channels. If you are using a computer-based system, the software usually controls the routing of MIDI signals.

If you are using a MIDI sound module or connecting to another piece of MIDI equipment, you will need to make sure that both your Ozonic keyboard and the receiving unit are set to the same MIDI channel. The Global MIDI Channel affects the keyboard, Program, and Bank Changes, plus whatever controllers have been set to respond to the global setting.

1. Press the EDIT button.
2. Press the GLOB CHAN key.
3. The LCD will display the "GLOB CHAN" symbol. The 3-digit display will show the currently selected global channel, preceded by a 'c'.
4. Type in the MIDI channel number (01-16) using the numerical data entry keys.
5. Press the ENTER key to confirm.

■ Setting the Velocity Curve

You may want to adjust the way the keyboard responds to your individual playing style. If so, we have designed 9 velocity curves for the Ozonic, ranging from the ultra-dynamic to more constant velocity values:



There are also three fixed velocity settings that send out a velocity of 64, 100 or 127. These are identified on the Ozonic as curves F1-F3, respectively.

To change the velocity curve:

1. Press the EDIT button.
2. Press the VEL CURVE key.
3. Use the numerical data entry keys to select the velocity curve.

■ Octave

The keyboard can shift up or down to give you access to 11 octaves.

1. Press OCTAVE UP key for every octave you want to shift the keyboard up. The LCD will display the current Octave setting and the "OCT" symbol.
2. Press OCTAVE DOWN for every octave you want to shift the keyboard down.

■ Transpose

You can transpose the keyboard to change the key of the music you are playing without changing the key you are playing in.

1. Press TRANSPOSE (OCTAVE UP and OCTAVE DOWN together). The LCD will display the current Transpose setting and the "TRANS" symbol.
2. Press the Octave UP or DOWN key for every semi tone you want to transpose up or down.

■ Pitch Bend Wheel

Use the Pitch Bend wheel to bend the notes played on the keyboard up or down. This allows you to play phrases not normally associated with the keyboard, such as guitar riffs.

Your sound source determines how far you can bend the note. It is typically set to two semitones but can be up to two octaves up or down. When you release the control, it will reset back to 0.

The Pitch Bend control on your Ozonic keyboard is fully MIDI assignable.

■ Modulation Wheel

The Modulation control is used for modulation of the sound being played. This type of real-time controller was introduced on electronic keyboards to give the performer the option of adding vibrato to similar to acoustic instruments.

The Modulation control on your Ozonic keyboard is fully MIDI assignable.

■ **Sustain and Expression Pedals**

Ozonic will use any polarity foot switch (not included) that is plugged into the Sustain input on the back of the keyboard. Ozonic will automatically detect the correct polarity on power up. If you want to reverse the polarity, just make sure the pedal is depressed when you switch on your Ozonic. The Volume input allows you to plug in an Expression pedal (not included).

The Sustain pedal is normally used for sustaining the sound you are playing without having to keep your hands on the keyboard, while the Expression pedal is normally used to affect the volume of the instrument you are playing.

You can program the Sustain pedal to send out MIDI notes so that you can trigger samples on different MIDI channels. You can also send Program Changes or any other MIDI messages that can be sent from the 14 assignable MIDI buttons on your Ozonic.

The Expression or Volume pedal can be assigned to control pan, pitch bend sensitivity, tuning, portamento, or any other MIDI message that can be sent from the nine assignable faders, or eight rotary dials. Once again, the 2 foot pedals and the Expression pedal can have a different MIDI assignment for each Zone.

For more information, please refer to the "Programming the Controllers" section later in this manual.

■ **Program Changes**

You can send out a Program Change message to any sound card, sound module, instrument or other MIDI device that will receive this standard MIDI message. The Program Change will be sent on all active Zones. This means that the Program Change will be sent to all channels that have been configured for the active Zones. These Program Changes will be sent every time you change a preset.

1. Press the EDIT button.
   The keyboard will enter Edit mode.
2. Press the PROGRAM key on the keyboard. The LCD will display the current Program value to be sent, as well as the "PROG" symbol.
3. Type in the program number you wish to send, using the numerical data entry keys.
4. Press the ENTER key to confirm.

Program Changes and Bank Changes (see below) work closely with Zones. For more information on Zones, please see the Advanced Programming section later in this manual.

You can also program the assignable buttons to send out fixed program messages to individual MIDI channels. For further information regarding this method, please see the Advanced Programming section later in this manual.

■ **Bank Changes**

If the receiving device has more than 128 programs, you can access the additional banks by sending out Bank Change LSB and MSB messages.

1. Press the EDIT button. The keyboard will enter Edit mode.
2. Press the BANK LSB or BANK MSB key on the keyboard. The LCD will display the current Program value to be sent, as well as the "BANK" symbol and "LSB" or "MSB" symbol.
3. Type in the Bank number you wish to send, using the numerical data entry keys.
4. Press the ENTER key to confirm.

Please check your receiving device's documentation to ensure that it will respond to these messages. For more information about LSB and MSB, please refer the Advanced Programming Functions section, later in this manual.

Basic Programming Functions

■ **Recalling Presets/Memories**

Ozonic has 20 factory-programmed presets that are split into two banks, named A and B. Bank A is selected by default. Pressing the BANK A/B button switches between the two memory banks and the 10 memory buttons will correlate to that bank, either bank A or bank B. The selected bank is always visible on the LCD display except when the Zone/Group Select button is activated.

The following is a list of all the presets contained in the 20 memory locations:

A1 = GM
A2 = XG/GM2 with layered keyboard
A3 = Reason Mixer
A4 = Reason Malstrom
A5 = Reason Subtractor
A6 = Reason NN-19
A7 = Reason Dr-Rex
A8 = Reason Re-Drum
A9 = Reason Effects set
A10 = Undefined MIDI CC's Bank 1

B1 = GM 3 track Mixer with 3 active voices.
B2 = sequencer control setup
B3 = NI B4
B4 = NI Pro 53
B5 = Steinberg PPG Wave 2V
B6 = Steinberg Halion
B7 = G-Media Oddity
B8 = AAS Lounge Lizard
B9 = Rebirth
B10= Undefined MICI CC's Bank 2

*Some applications do not have any default settings and require you to set the MIDI controllers for the application's parameters yourself. This normally involves setting the application into MIDI Learn mode, clicking on a controller and moving the dial. With such an application, it is a good idea to use controller numbers that generally do not have any function associated with them. Ableton Live is an example of an application that uses a MIDI Learn feature.

■ Saving and Organizing Presets

Once you have familiarized yourself with the Ozonic keyboard presets, you may want to save and reorganize the order of Presets to suit your setup.

Note that the factory presets are stored in ROM within the keyboard and can be restored at any time.

To Recall a Preset:

1. Press the BANK A/B button to select the bank of the desired preset.
2. Recall the preset (A1-A10 or B1-B10) by pressing the corresponding memory button.

To Store a Preset:

1. First, follow the steps above to select a preset.
2. Press the STORE button.
3. Press the BANK A/B button again to select the Bank you want the preset saved in.
4. Press the correct memory button.
5. The memory will store to the selected preset number after a three second saving period.

The above will recall a preset and then save that preset to a new location.

If you want to reset the Ozonic back to the factory defaults, hold down the OCTAVE UP and DOWN buttons while switching the keyboard on.

NOTE: Restoring the factory presets will erase all setups you have programmed and stored to memory.

You can also organize and store your presets and any programmed memories on your computer using the Enigma software. This software is available as a free download at www.m-audio.com. All you have to do is register your M-Audio product.

■ Sending a Snap Shot

Press the BANK A/B and STORE buttons together to send a SNAP SHOT of the current controller assignments.

When you send a Snap Shot, the data for an individual controller is sent on the channel that controller is assigned to.

Snap Shot is one way of synchronizing the receiving device with the faders and rotary controllers on your keyboard. The function can also be used as a creative tool, with interesting and surprising results.

This function can also be to set up the control parameters at the start of a song. If you set all the controller values to obtain the desired effect levels in your song, you can then record the Snap Shot to ensure the song will always play back with the correct effect levels. To do this, put your sequencer into Record mode and press the Snap Shot buttons.

■ Muting All Controllers

To Mute all of the Ozonic's controllers, press the function button labeled MUTE.

This feature allows you to alter the position of any controller without affecting the settings of your software. Use this feature if you are switching between presets with the controllers out of position. You will be able to move the controller to a position relative to the software's controller value, rather than causing the software's controller value to jump.

■ Null Mode

Null mode allows you to switch from preset memory to preset memory without losing the last value the MIDI controller was sending.

Each time you recall a different memory, the values of all your controllers are remembered by the Ozonic before the new memory is recalled. If Null mode is enabled and you go back to a previous memory, the controllers will all be muted until the last used value that was sent by that controller has been reached. This means that if a controller is altered from the remembered Null value for the recalled preset, no MIDI data will be sent out until the Null value of a controller is reached.

If you turn a controller that is altered from its Null value, the LCD will display the Offset value for the controller. The Offset value is the numeric distance the controller is from its Null value. If the Offset is a negative value, the Null value is above the controller's current position. If the Offset is positive, the Null value will be below the controller's current position. The Offset value will increase or decrease towards 0 as you move the controller nearer to its Null value.

Once the actual stored value is reached, the display will switch to showing that value. If the NULL symbol is displayed on the LCD, the current LCD value is an Offset rather than a standard value. Once the Null value is reached, the NULL symbol will disappear.

Null mode is activated by pressing the NULL button. The button will light to indicate that Null mode is active. To de-activate Null mode, press the button again so that it is no longer lit.

■ Selecting a Controller for Editing

To assign a MIDI CC to one of the Ozonic's controllers, it needs to be selected for editing.

1. Press the EDIT button, then the CTRL SEL key.
2. Type in the number of the controller using the numerical data entry keys.
3. Press the ENTER key to confirm.

or

1. Simply move the controller, assignable button, or pedal to select it for editing.
2. Press the EDIT button.

■ Assigning MIDI CC's

After you have selected the controller you wish to edit, you can change the assigned MIDI CC number in the following way:

1. Press the EDIT button, then the CTRL ASGN key. The LCD will indicate the currently assigned MIDI CC number. The "CC" symbol will also flash.
2. Type in a new MIDI CC value using the numerical data entry keys.
3. Press the ENTER key to confirm.

■ The Joystick

Ozonic's joystick has two dimensions, and four MIDI controllers associated with it. If you recall the factory preset 1, "GM Preset," moving the joystick up sends a filter cut-off frequency message (MIDI CC 74), while moving the joystick from left to right sends a filter resonance message (MIDI CC 71). Try this out with Reason's Malström synth. You'll find you can make some very interesting sounds!

The other two controllers are set to OFF (MIDI CC 0) in this preset. It is possible to set these to send any controller message that can be sent from a rotary dial or fader (please see Appendix B). If you assign a message to these two extra controllers, they will work in the opposite direction to the cut-off and resonance messages already assigned. Of course, you can also change the cut-off and resonance messages to whatever you like.

It is necessary to use the Control Select key to select the four joystick controllers for edit. The various joystick controllers are:

Left to Right	B18
Right to Left	B19
Bottom to Top	B20
Top to Bottom	B21

■ The Aftertouch Strip

The Aftertouch strip is made of pressure-sensitive material that lies beneath the keys on your Ozonic keyboard. Aftertouch is useful for replicating acoustic instrument sounds. Try varying the pressure while playing Ozonic's keys.

The Aftertouch strip is an assignable controller, just like the rotary dials and faders on your Ozonic. Therefore, you can assign it to any of the MIDI messages outlined in appendix B that the faders can be assigned to. It does not have to be assigned to Aftertouch, although this is the case in many of the presets.

Useful settings for this Aftertouch strip are:

- OFF = the strip generates no controller data at all.
- 131 = The strip generates Channel Aftertouch.
- 001 = The strip generates modulation.

MIDI IN and OUT

The MIDI In and MIDI Out ports have different uses depending on how you intend to connect and power Ozonic.

■ About the MIDI In Port

An external MIDI device connected to the Ozonic's MIDI In port can send data to the host via the FireWire bus. This is achieved using a second FireWire MIDI Out. When you select the MIDI Devices section of your sequencer, you will see two Ozonic FireWire MIDI Ins. The first of these is used to receive the Ozonic controller data, the second is used to receive data from the other device connected to the Ozonic's MIDI In plug. Ozonic is thereby acting as a MIDI-to-FireWire interface for the other MIDI device.

■ About the MIDI Out Port

The Ozonic can also interface with other MIDI devices. By default (i.e. when you switch the unit on), all controller data is sent out via the MIDI output as well as the FireWire out.

If you are using a host application that can pick up multiple-input drivers, you will be able to use Ozonic's MIDI input and the Ozonic surface to record MIDI data and send it all out through the Ozonic's MIDI output.

> **Important note:** The Ozonic is not a MIDI THRU device. Therefore, MIDI data received at the Ozonic's MIDI In port can never be sent directly to the Ozonic's MIDI Out port. However, if the Ozonic is connected via FireWire to a computer, data received at the MIDI In can be transmitted to the MIDI Out port, since the data is sent to the computer and received back from the computer. MIDI Out from Host mode must be engaged for this to occur.

■ MIDI Out from Host Mode

MIDI Out from Host mode allows you to determine the way MIDI data is sent from the Ozonic. When MIDI Out from Host mode is engaged, the MIDI plug symbol in the LCD screen will be active and data transmitted to the Ozonic's MIDI Out will be merged to the internal MIDI data stream (e.g. the controllers and keyboard) and the PC stream If the MIDI plug symbol is not visible, then MIDI out from Host is deactivated, and data sent to the MIDI Out port is only coming from the computer's host application.

To activate MIDI Out from Host mode:

1. Press the EDIT button.
2. Press the MIDI OUT key.

The LCD display will show the "MIDI plug" symbol, indicating that the MIDI Out port is now set to transmit data from the Host. Edit mode will automatically cancel.

To disengage MIDI Out from Host mode:

1. Press the EDIT button.
2. Press the MIDI OUT key. The 'MIDI plug' symbol will disappear from the LCD display.

Advanced Programming Functions

■ **Zones**

The Zone feature can be used to create up to three keyboards in one by splitting the keyboard into sections. Using Zone Edit mode, each of the three possible Zones can be assigned an upper and lower key limit to specify which section of the keyboard should be assigned to a specific Zone.

■ **Enabling/Disabling Zones**

The three Zones are enabled and disabled using memory buttons 1, 2 and 3, respectively.

To enable a Zone:

1. Press the ZONE/GRP SELECT button.
2. Press the required memory button accordingly.

Note: When you enable a single zone, the other two Zones will be disabled. To enable multiple Zones, press the required Zone buttons at the same time.

Zones have a number of parameters associated with them. These parameters are all assigned during Edit mode. Once Edit mode is entered, any edits of Zone parameters will apply only to the Zone that is currently enabled. The LCD will always inform you which Zones are enabled. It is possible to enable a different Zone or Zones while you are in Edit mode. Below please find descriptions of the various Zone parameters and how to edit them.

■ **Zone Channel**

If you want to use the Zone feature to control several different instruments, you will need to set each of the Zones to transmit on different channels.

To assign the channel of a Zone:

1. Select the Zone you want to edit.
2. Press the EDIT button.
3. Press the ZONE CHAN key. The last selected Zone will flash in the LCD.
4. Enter the new channel number (00 to 16) using the numerical data entry keys.
5. Press ENTER to confirm.

Note: assigning the Zone to Channel 0 will set it to transmit on the Global Channel.

■ **Zone Range**

The Zone Range defines the upper and lower limits of the keys contained in a Zone. To set the range of a Zone:

1. Select the Zone you want to edit.
2. Press the ZONE RANGE button.
3. Press a key on the keyboard to select the lower limit of the Zone. The note will be displayed by the small digits on the LCD display.
4 Press a second key on the keyboard to select the upper limit of the Zone. The note will be displayed on the large digits of the LCD display.

Once two keys have been pressed, the keyboard will automatically return to normal, and the range of the edited Zone will be updated.

It is possible to edit multiple Zones at the same time. In this case, the range that is displayed before editing will be that of the last selected Zone. However, all of the selected Zone's symbols on the LCD display will be flashing to clearly indicate the Zones that are to be edited.

Note: It is possible for Zones to overlap to create the effect of "layered" keyboards.

■ **Octave and Transpose Functions within a Zone**

Each Zone that you set up on your keyboard can be octave-shifted, or transposed, separately from any other Zones.

To set the octave or transpose of a Zone:

1. Select the Zone(s) you want to edit.
2. Press the ZONE RANGE button.
3. Use the OCTAVE buttons to select the new octave/semitone.

■ **More About Program, Bank LSB and Bank MSB Messages**

When Program, Bank LSB and Bank MSB messages are sent from the Ozonic, they apply only to the active Zones. If two Zones are selected, and set to transmit on different channels, the Program or Bank message will be sent on both channels. If you only want to send a Program or Bank Message to one Zone, please be sure to deactivate all other Zones.

For a detailed description of Program and Bank messages, please see the MIDI Messages Explained section later in this manual.

Programming the Controllers

■ Introduction to Programming Options

Each of the Ozonic's controllers can send MIDI CC, RPN/NRPN, GM 1&2, and SysEx messages. They can also be assigned to individual MIDI channels.

MIDI CC (continuous controller) numbers are part of the standard MIDI specifications and are typically used to control the real-time changing of parameters in musical equipment. For a complete list of standard MIDI controller numbers from 0 to 131, please see Appendix E.

Any of the real-time controllers on the keyboard can be assigned to a MIDI CC number; the assignable buttons and pedals have slightly different options from the faders or rotary controllers.

The two charts show the transmit messages that can be programmed for each of the knobs, faders, and assignable buttons.

Please pay extra attention to the differences between programming the faders or knobs and programming the buttons.

■ The Fader and Rotary Dials:

MIDI CC	Description	Data 2	Data 3
0-119	Standard MIDI CC's	Max	Min
120-127	Channel Mode Messages	Max	Min
128	Pitch Bend Sensitivity	-	-
129	Channel Fine Tune	-	-
130	Channel Coarse Tune	-	-
131	Channel Pressure	-	-
132	RPN coarse	RPN LSB	RPN MSB
133	RPN fine	RPN LSB	RPN MSB
134	NRPN coarse	NRPN LSB	NRPN MSB
135	NRPN fine	NRPN LSB	NRPN MSB
136	Master Volume GM*	-	-
137	Master Pan GM*	-	-
138	Master Coarse Tune GM*	-	-
139	Master Fine Tune GM*	-	-
140	Chorus Mod rate GM2*	-	-
141	Chorus Mod Depth GM2*	-	-
142	Feedback GM2*	-	-
143	Send to Reverb GM2*	-	-
144	Pitch Bend	-	-
OFF	Controller Off***	-	-

■ **The Buttons and Pedal:**

MIDI CC	Description	Data 1	Data 2	Data 3
0-119	Standard MIDI CC's	-	Toggle Value 2	Value 2
120-127	Channel Mode Messages	-	Toggle Value 2	Value 2
128	Pitch Bend Range	-	Sensitivity Value	-
129	Channel Fine Tune	-	Tuning Amount	-
130	Channel Coarse Tune	-	Tuning Amount	-
131	Channel Pressure	-	Pressure Amount	-
132	RPN Coarse	Value	RPN LSB	RPN MSB
133	RPN Fine	Value	RPN LSB	RPN MSB
134	NRPN Coarse	Value	NRPN LSB	NRPN MSB
135	NRPN Fine	Value	NRPN LSB	NRPN MSB
136	Master Volume GM*	-	Volume LSB	Volume MSB
137	Master Pan GM*	-	Pan LSB	Pan MSB
138	Master Coarse Tune GM*	-	Tuning LSB	Tuning MSB
139	Master Fine Tune GM*	-	Tuning LSB	Tuning MSB
140	Chorus Mod rate GM2*	-	Mod Rate	-
141	Chorus Mod Depth GM2*	-	Mod Depth	-
142	Feedback GM2*	-	Feedback Level	-
143	Send to Reverb GM2*	-	Reverb Send Level	-
144	Pitch Bend	-	Pitch Shift LSB	Pitch Shift MSB
145	Program/Bank Preset	Program	Bank LSB	Bank MSB
146	MIDI CC (on/off)	MIDI CC	Button Press Value	Button Release Value
147	Note (on/off)	Note	Velocity Off	Velocity On
148	Note (on/off toggle)	Note	Velocity Off	Velocity On
149	MMC Command**	-	Command select.	-
150	Reverb type GM2 *	-	Type	-
151	Reverb time GM2 *	-	Time	-
152	Chorus type GM2*	-	Type	-
153	MIDI CC Decrement	MIDI CC	Start Value	End Value
154	MIDI CC Increment	MIDI CC	Start Value	End Value
OFF	Controller Off***	-	-	-

* General MIDI SysEx messages
** General MIDI 2 SysEx messages
*** MMC SysEx messages
**** Press "0", and then press the Enter key. Next press the Octave down button.

■ **Assigning an Individual MIDI Channel**

1 Select the controller you want to edit using one of the two methods described earlier.
2 Press the EDIT button, then the CHAN ASGN key. The LCD will show the current channel assignment of the selected controller, preceded by a "c."
3 Type the MIDI channel number (0-19) you want the controller to send to, using the numerical data entry keys.
4 Press the ENTER key to confirm.

If the controller is assigned to channel 0, it will transmit on the Global Channel. Information about the Global Channel is given in the Basic Operations of the Ozonic's MIDI Interface section.

Channels 17-19 are used to define Zone Channels 1, 2, and 3, respectively. If a controller is assigned to channels 17-19, it will always transmit on whichever channel the appropriate Zone is assigned to. For more information on a Zone's channel, please see the Advanced Programming Functions section.

■ **Group A Controllers**

Note: For information on Group A memory recall, please review the next section.

A Group A controller refers to any controller that can have a different MIDI CC assignment for each Zone. On your Ozonic, such controllers include the Pitch Bend wheel, Modulation wheel, Aftertouch strip and the pedals. Although the Transport buttons belong to group A, they are not considered a Group A controller.

In order for the Group A controller to transmit on all Zones, the channel assignment must be set to 0. If a Group A controller is assigned to any channel other than 0, it will use the relevant Zone channel for output.

When you press the CTRL ASGN key and a Group A controller is selected, the MIDI message you assign to the Group A controller will apply to all the Zones that are active at that time. This means the MIDI CC you have assigned to the Group A controller will be transmitted on all the channels the selected Zones were assigned to.

To prevent the Group A controller from transmitting on more than one Zone, assign the Group A controller to "OFF". This will prevent the Group A controller from having an affect on any of the other Zones.

This method allows you to assign the Group A controller to certain Zones, independent of the Zone's channel. If you do not want a Group A controller to affect certain Zones:

1 Select the desired Group A controller.
2 Press the EDIT button, followed by the CTRL ASGN key.
3 Press the ZONE/GRP button and make sure that only the Zones you DON'T want the controller to affect are selected.
4 Enter "0" to select OFF.
5 Press Enter, then Press the Octave Down key

Note: If a Zone is not enabled, the Group A controller will NOT transmit the data that is assigned to that Zone.

■ **Group Recall/Store**

Ozonic's controllers are grouped into Groups A, B and C.

Group A:
- Pitch Bend wheel
- Modulation wheel
- Aftertouch strip
- 5 Transport buttons
- Sustain pedal (not included)
- Expression pedal (not included)
- All settings for the 3 Zones

Group B:
- 8 rotary dials

Group C:
- 9 faders
- 9 buttons below the faders

To make it more clear which group a controller belongs to, the controller has been given a letter and a number. The letter represents the group the controller belongs to.

When you press STORE or any memory button, you will see the LCD flashing the group symbols that are set to be overwritten. You can change which groups you want to affect by pressing the ZONE/GRP SELECT button and selecting only groups you want to edit/recall.

Note: Because Group A contains all the Zone information as well, Group A must be active to store or recall any Zone setups.
Important Note: Always check the active groups before pressing the STORE button. Otherwise you might not store all of your controller assignments.

Example 1: If you want to store only the faders to a preset:
1. Press the ZONE/GRP SELECT button and press the desired Group button (this will de-select all other groups that were enabled previously). You should then see only Group C flashing on the LCD display.
2. Press STORE.
3. Enter the number of the preset that you want to store the fader assignments to.

Example 2: If you want to recall only the Zone settings of a preset:
1. Press the ZONE/GRP SELECT button and press the desired Group button (this will de-select all other groups that were enabled previously). You should then see only Group C flashing on the LCD display
2. Press STORE. You should then see only Group A flashing on the LCD display.
3. Enter the number of the preset that you want to store the Zone settings to.

■ **Limiting the Range of the Controls**

Normally, the range of a MIDI controller is 0 to 127. It is possible to limit the maximum and minimum in this range.

1. Press the EDIT button, followed by the DATA 2 (MIN) key. The LED will display the current minimum limit of the controller.
2. Type in the minimum desired value using the numerical data entry keys.
3. Press the ENTER key to confirm. The controller's CC assignment will be displayed on the LCD.
4. Press the DATA 3 (MAX) key. The LCD will display the current maximum limit of the controller.
5. Type in the maximum value using the numerical data entry keys.
6. Press the ENTER key to confirm.

It is possible to limit the range of any rotary dial, the fader, or the Pitch Bend and Modulation controls. The buttons and the pedal can be set to decrement or increment between two limits. To do this:

1. Press the EDIT button, followed by the CTRL ASGN key.
2. Enter "153" for decrement or "154" for increment.
3. Press the ENTER key to confirm.
4. Press the DATA 1 key.
5. Enter the value of the MIDI CC you want the button to send out.
6. Press the ENTER key to confirm.
7. Enter the limits as described above.

■ Setting Toggle Values for the Buttons

The 14 assignable buttons and the pedal can be assigned to toggle between two values.

1. Press the EDIT button, followed by the DATA 2 (MIN) key.
2. Type in "15" using the numerical data entry keys.
3. Press the ENTER key to confirm.
4. Press the DATA 3 (MAX) key.
5. Type in "74" using the numerical data entry keys.
6. Press the ENTER key to confirm.

If you want the button to send the same value every time, enter the same value for both Minimum and Maximum.

The above method will toggle the button value each time it is pressed. It is possible to set the button to send one value when you pressed, and another value when released.

1. Press the EDIT button, followed by the DATA 1 key.
2. Type "146" using the numerical data entry keys.
3. This sets the button up for MIDI CC (On/Off) mode, as shown in Appendix B.
4. Press ENTER to confirm.
5. Assign the two toggle values for press (DATA 3) and release (DATA 2) as described above.

■ RPN/NRPN, GM 1&2 SysEx and Other Messages

The standard MIDI controller numbers range from 0 to 127. The list of MIDI CC's that can be assigned to the controllers of the keyboard has been extended to include RPN/NRPN, MMC, and General MIDI 1&2 SysEx messages.

These advanced messages are as easily programmed by entering values 128 to 154 when programming MIDI CCs. The charts in Appendix B show which number corresponds to each message.

To program the values required for these advanced messages, press the EDIT button to begin Edit Mode. After entering Edit Mode, press the DATA 1, DATA 2 or DATA 3 button. For more information, please refer to Appendix B.

■ Assigning MMC Control to a Button

1. Select the button you want to control the MMC message.
2. Press the EDIT button, then the CTRL ASGN key.
3. Type in "149" using the numerical data entry keys.

This is the number that corresponds to the MMC instruction (Appendix B)..

4. Next, Type in "127" using the numerical data entry keys. This ensures that the message is set to all device ID numbers. For more information about this, please read "About SysEx Messages & Device ID."
5. Press the DATA 2 key.
6. Enter a number from the chart below to select the MMC message you want:

Number	MMC Command
01	STOP
02	PLAY
03	DEFERRED PLAY
04	FAST FORWARD
05	REWIND
06	RECORD STROBE
07	RECORD EXIT
08	RECORD PAUSE
09	PAUSE
10	EJECT
11	CHASE
12	COMMAND ERROR RESET
13	MMC RESET

■ Assigning RPN/NRPN to a Fader/Rotary Controller

Note: For a detailed description of RPN/NRPN data see the "MIDI Mesages Explained" section.

1. Select the desired control as described earlier.
2. Press the EDIT button, then the CTRL ASGN key.
3. While the display is flashing, enter controller "132" for RPN Coarse, "133" for RPN Fine, 134 for NRPN Coarse or 135 for NRPN Fine using the numerical data entry keys or OCTAVE buttons.
4. Press Enter to confirm the number entered.
5. Press the DATA 3 key. This assigns the number for the RPN/NRPN MSB.
6. Press the DATA 2 key. This assigns the number for the RPN/NRPN LSB.
7. Finally, set the channel the message should be sent on.

Many data sheets for synths make use of NRPN messages and will give the MSB and LSB values that should be entered for DATA 3 and DATA 2 (See Appendix F). Some manuals may only give the hex values, but Ozonic requires the decimal value be entered. Convert hexadecimal values to decimal values using the Windows calculator; select Scientific mode, select Hex, then enter the hexadecimal value needed to convert. Press the Dec button to convert it to a decimal value. Please reference Appendix C for more information.

■ Assigning a Note to a Button

The following shows the procedure for setting a button to transmit a MIDI Note On message when pressed, and a MIDI Note Off message when released.

1. Press the EDIT button, then the CTRL ASGN key.
2. Enter "147" using the numerical data entry keys.
3. Press the ENTER key to confirm.
   This is the MIDI CC number that corresponds to Note On/Off mode (see Appendix B).
4. Press the DATA 3 key.
5. Enter "100" using the numerical data entry keys.
6. Press the ENTER key to confirm. This means when you press the button, a Note On message is sent out with a velocity of 100.
7. Press the DATA 2 key.
8. Enter "0" using the numerical data entry keys.
9. Press the ENTER KEY to confirm. This means when you release the button, a Note Off message will be sent out.
10. Press the DATA 1 key.
11. Enter "64" using the numerical data entry keys.
12. Press the ENTER key to confirm. This means you are sending out MIDI note 64 or E4, each time you press the button.

The MIDI note numbers are given in Appendix D.

■ About SysEx Messages and Device ID

When transmitting SysEx messages, the individual control channel number does not define a transmit channel, but a Device ID. When the CHAN key is pressed, the "c" is NOT displayed in the LCD screen.

Device IDs range between 00–127. In most cases, the Device ID should be set at 127. This means that all devices will receive the SysEx message.

The Device ID for a SysEx message assigned to a controller cannot be changed using the

DEV ID key. This key is used for varying the global Device ID of Ozonic.

For more information, please reference the "SysEx Messages" and "Device ID" sections.

■ Non-Volatile Memory

Ozonic uses non-volatile memory, allowing the memory to save after powering down and restarting. The current controller and channel assignments are stored whether you have stored the setup to a memory location or not. The Program, Bank LSB and Bank MSB data, Global Channel setting, MIDI Out from HOST setting and last used memory preset are also stored.

■ Memory Dump

Press EDIT, then the MEM DUMP key to send out SysEx data packets that represent the 20 memories set up in the Ozonic. This can be used for storing or backing up the contents of the memory presets externally.

It is possible to record the complete Memory Dump to a standard sequencer. Recall the Memory Dump by playing the MIDI track containing the recorded Memory Dump, making sure that the Ozonic's drivers are selected as the output for that particular track.

A Memory Dump or a Memory Send does not affect the current controller assignments to the keyboard. Recall a preset to access the new memory settings after a Memory Dump has been sent to the keyboard.

Press the EDIT button, then the MEM DUMP key to send out a number of SysEx data packets that represent the 20 memories set up in the Ozonic. This can be used for storing or backing up the contents of the memory presets externally.

■ Assigning the Device ID

The Device ID is a way of differentiating between multiple keyboards. Press EDIT, then the DEV ID key to assign a Device ID to the Ozonic. The default Device ID is 127 when a Memory Dump is performed. It is recommended to keep the Device ID setting as 127.

If a Device ID is assigned to any number other than 127, the Memory Dump performed will be specific to the Ozonic with the same device ID. If the Device ID of the Ozonic differs from the one recorded with the Memory Dump, the data will be ignored.

When the DEV ID key is pressed, the LCD display represents the assigned Device ID. It is possible to enter a new Device ID using the numerical data entry keys. Press the ENTER key to confirm.

For more information on SysEx messages and device ID, please reference the "MIDI Messages Explained" section of this manual.

■ Returning to the Factory Default Setting

You can reset the Ozonic back to the factory defaults on power-up by holding down the OCTAVE UP/DOWN buttons.

Note: Restoring the factory presets will erase all setups you have stored to memory.

MIDI Messages Explained

■ **Program & Bank Changes**

The original GM MIDI specification allowed for only 128 voices, numbered from 0-127. It is possible to access a different voice by sending a Program Change.

In order to expand on the GM set of voices, Bank Changes were devised. Each bank contains 128 patches that can be accessed using a Program Change. 16,384 available banks can be accessed by sending a 14-bit Bank Change message. The first 7 bits of this message are sent in a single byte known as the Bank LSB. The last 7 bits are specified by another byte known as the Bank MSB. The BANK LSB is used most commonly. This allows for 128 Bank Changes, and often there is no need to send a Bank MSB.

Almost all MIDI devices respond to the Program Change, but some that do not conform to the GM set of voices use the Program Change message for other purposes. Many VST instruments have adopted this approach, allowing the use of a Program Change to change the instrument patch. (The FM7 by Native Instruments is an example of this.)

Bank Changes are used more rarely. Bank Changes are useful in manufacturer's extensions to the MIDI specification, such as Roland's GS specification and Yamaha's XG specification. Both of these require the specification of a Bank Change in order to access the extra voices and effects that these specifications provide.

Sending Program, Bank LSB and Bank MSB data is done by pressing the EDIT button followed by the PROGRAM, Bank LSB or Bank MSB key, and then entering the Program or Bank Change desired.

■ **RPN/NRPNs**

Non-registered parameter numbers (NRPN's) are device-specific messages that enable the control of synths via MIDI. The MIDI specification defines parameter numbers to allow manufacturers to specify their own controllers. The more common of these have been registered by the MIDI Manufacturer's Association and are part of the MIDI specification (hence the term Registered Parameter Numbers – RPN's). (See Appendix F for additional information.)

MIDI controllers 98 and 99 represent the NRPN LSB and MSB respectively, while 100 and 101 represent the RPN LSB and MSB. This can be seen in the MIDI controllers list in Appendix E. To transmit an NRPN/RPN, these two controller messages are sent along with their user-specified values. An additional controller message and value needs to be sent to specify the (coarse or fine) value adjustment. This is specified by controller number 6 (Data Entry) for coarse adjustments or number 38 for fine adjustments.

Devices that receive NRPN messages will list NRPNs in the User Manual. It is essential that the NRPN MSB and LSB messages are sent together. Both will be specified in the device's manual, but typically only in Hexadecimal format. If this is the case, you may refer to Appendix C for help translating the value to decimal.

■ **SysEx**

System Exclusive (SysEx) messages were defined in the MIDI specification to allow control of individual devices via MIDI. The format of SysEx messages allows virtually any function to be performed via MIDI if the receiving device can read and translate the message. This allows devices to send audio sample memory data, memory dumps, controller settings, and much more. It also allows the controllers of one device to be controlled by another.

It is not possible to program your own specified SysEx message into the Ozonic. However, several useful SysEx messages are pre-programmed into the keyboard. They can be accessed by assigning the appropriate MIDI CC to a controller (see Appendix B).

A SysEx message is not transmitted on any specified channel. All SysEx messages contain a Device ID, which is used to single out devices to respond to the SysEx message. All other devices are ignored. If you are using a SysEx message on the Ozonic, the Global Channel is ignored. When you press the Channel Assign key, you will enter a Device ID instead. This is indicated by the fact that the LED displays a 3-digit number, not a 2-digit number proceeded by a "c."

Device IDs run from 00 to 127. 127 is the default device number setting on the Ozonic. This setting transmits the SysEx message to all devices.

It is not possible to program the controllers of the Ozonic with your own SysEx messages, there are software applications that can receive a MIDI input signal and transmit a different, user-specified message. You can program your SysEx messages into the translator software, and then translate the incoming data from the keyboard to your SysEx, depending on the controller you are using.

Troubleshooting

The Ozonic has been designed to give you high performance and professional quality audio. It has been tested under a wide range of systems and operating conditions. However, there are a virtually limitless number of operating scenarios, any of which could affect your system's performance. Though this section cannot cover all possible issues you may encounter, we would like to offer you some suggestions for dealing with common problems.

We recommend that you avoid connecting too many devices. The FireWire bus is a dependable, high-speed, high-bandwidth protocol that is ideally suited for digital audio. Nevertheless, it is important to remember that audio and multimedia streaming places considerable demands on your processor and the FireWire bus. Although it is theoretically possible to chain multiple FireWire devices in series, doing so has the potential to degrade your audio performance.

Generally, FireWire devices do not suffer from the IRQ conflicts often encountered with PCI cards on Windows PCs. If you are having trouble getting audio in or out of your Ozonic, please check the following:

If you have no sound:

- Check to see if the Ozonic drivers are properly installed. In Windows XP, go to the Control Panel and double-click the System icon (under Performance and Maintenance if you are in Category view). Select the Hardware tab and click the Device Manager button. Click the plus sign ("+") next to Sound, Video and Game Controllers, and locate the Ozonic listing. If you see a question mark or exclamation point next to it, or if you don't see it listed, you may need to reinstall the driver software.
- Make sure your audio software has been set up to use the Ozonic. Open your application's audio settings page and check to see if the Ozonic's ASIO, WDM, or CoreAudio drivers have been selected.
- If you're certain the Ozonic is correctly installed and configured for your audio software, check your signal path. Make sure your inputs are routed correctly by verifying that your application is receiving the audio signal. Make sure your outputs are routed correctly so that your signal is sent to your headphones, amp and/or monitors.
- Check your audio connections and cables to make sure everything is plugged in correctly.
- Check to make sure the Power button is enabled.

If you are experiencing clicks and pops in your recordings:

- Make sure your input levels are not too hot, as this can cause distortion and clipping. Check the input level meters in your audio application.
- You might want to try using a larger buffer size. Larger buffer sizes can increase input latency time, but if you're mixing, for example, this is not an issue. Increasing the buffer size can be helpful, particularly in the case of older or lower-powered systems.
- If you have "daisy-chained" other FireWire devices, try using the Ozonic without them to see if this works better. The noise might be due to a low power situation on the bus, or a bus-master conflict.

My M-Audio keyboard suddenly stopped working after having performed fine since installation.

- Switch off the unit and leave for 10 seconds. Then restart your computer and try again. If the problem persists you may have to re-install drivers for the unit.

My drivers are listed in the Device Manager and are said to be working OK, but the keyboard is not recognized in any software.

- Win2000 and XP have a limitation to how many MIDI device drivers you can have installed at any one time. There is no indication that you are using the maximum number of drivers – the drivers will install as if there is not a problem.
- To fix this problem: Go to http://www.m-audio.com and locate the above question. You will find a link to an exe file that will solve this problem for you.

I have plugged in a sustain pedal to my M-Audio keyboard, but it works the wrong way round.

- The polarity of the sustain pedal is calculated by the keyboard when it is powered up. On power up, the sustain pedal is assumed to be in the OFF position. So, if you want the sustain pedal to be off when it is un-pressed, make sure the pedal is un-pressed when you power up.

When I press a key, there is a delay before I hear any sound.

- This delay is known as latency. Latency with MIDI signals is due to the soft-synth you are using. MIDI data is simply control data. The MIDI is read by the soft-synth. The soft-synth then completes a large number of complex calculations, in order to produce the sound you hear. All this takes time. If you already have an adequate sound card, try re-installing the latest drivers for the sound card, or try reducing the buffer sizes of the audio drivers.
- If you feel that you may need a new or upgraded sound card please visit www.m-audio.com.

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Technical Info

Modifications not authorized by the manufacturer may void users authority to operate this device.

Note:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CE

M-AUDIO® Ozonic

FC Tested to comply with FCC standards

FOR HOME OR STUDIO USE

ESD and Fast Transient may cause the unit to temporarily malfunction.
Switch off and on again to restore normal operation.

Appendices

Appendix A - MIDI Implementation Chart

Function	Transmitted	Received	Remarks
Basic :Default Channel: Changed	1-16 1-16	X	
:Default Mode :Messages :Altered	--------- X *********	X	
Note Number: True Voice	0-127 *********	X	
Velocity: Note ON : Note OFF	0 X	X	
After : Keys Touch :Ch's	X 0	X	
Pitch Bend	0	X	
Control 0-119 Change 120-127	0 0	X X	
Program Change: True Number	0-127 *********	X	
System Exclusive	GM, GM2, MMC	Memory Dump	
Song Position Common: Song Select	X X	X	
System :Clock Exclusive: Commands	X X	X	
Aux :Local ON/OFF Messages :All Notes OFF :Active Sense :Reset	0 0 0 0	X	
Notes:	0 = YES	X=NO	

Appendix B - Assignable MIDI CC's on Ozonic

B1 - The Fader and rotary Controllers:

MIDI CC	Description	Data Lsb (Press Twice)	Data Msb (Press Twice)
0-119	Standard MIDI CC's	-	-
120-127	Channel Mode Messages	-	-
128	Pitch Bend Sensitivity	-	-
129	Channel Fine Tune	-	-
130	Channel Coarse Tune	-	-
131	Channel Pressure	-	-
132	RPN Coarse	RPN LSB	RPN MSB
133	RPN Fine	RPN LSB	RPN MSB
134	NRPN Coarse	NRPN LSB	NRPN MSB
135	NRPN Fine	NRPN LSB	NRPN MSB
136	Master Volume GM*	Volume LSB	Volume MSB
137	Master Pan GM*	Pan LSB	Pan MSB
138	Master Coarse Tune GM*	Tuning LSB	Tuning MSB
139	Master Fine Tune GM*	Tuning LSB	Tuning MSB
140	Chorus Mod Rate GM2*	Mod rate	-
141	Chorus Mod Depth GM2*	Mod depth	-
142	Feedback GM2*	Feedback level	-
143	Send to Reverb GM2*	Reverb send level	-
144	Pitch Bend	Pitch shift LSB	Pitch shift MSB
255	Controller Off***	-	-

* Sys Ex messages
** MMC Sys Ex messages
*** This value cannot be typed in using the numerical keypad. Type in 144 and then press the Preset + button to set this value.

B2 - The Buttons and Pedal:

MIDI CC	Description	Program (Press Twice)	Data Lsb (Press Twice)	Data Msb (Press Twice)
0-119	Standard MIDI CC's	-	Toggle value 2	Toggle value 1
120-127	Channel Mode Messages	-	Toggle value 2	Toggle value 1
128	Pitch Bend Range	-	Sensitivity value	-
129	Channel Fine Tune	-	Tuning amount	-
130	Channel Coarse Tune	-	Tuning amount	-
131	Channel Pressure	-	Pressure amount	-
132	RPN Coarse	Value	RPN LSB	RPN MSB
133	RPN Fine	Value	RPN LSB	RPN MSB
134	NRPN Coarse	Value	NRPN LSB	NRPN MSB
135	NRPN Fine	Value	NRPN LSB	NRPN MSB
136	Master Volume GM*	-	Volume LSB	Volume MSB
137	Master Pan GM*	-	Pan LSB	Pan MSB
138	Master Coarse Tune GM*	-	Tuning LSB	Tuning MSB
139	Master Fine Tune GM*	-	Tuning LSB	Tuning MSB
140	Chorus Mod Rate GM2*	-	Mod rate	-
141	Chorus Mod Depth GM2*	-	Mod depth	-
142	Feedback GM2*	-	Feedback level	-
143	Send to Reverb GM2*	-	Reverb send level	-
144	Pitch Bend	-	Pitch shift LSB	Pitch shift MSB
145	Program/Bank Preset	Program	Bank LSB	Bank MSB
146	MIDI CC (on/off)	MIDI CC	Button press value	Button release value
147	Note (on/off)	Note	Velocity off	Velocity on
148	Note (on/off toggle)	Note	Velocity off	Velocity on
149	MMC Command**	-	Command select.	-
150	Reverb Type GM2 *	-	Type	-
151	Reverb Time GM2 *	-	Time	-
152	Chorus Type GM2*	-	Type	-
153	MIDI CC Decrement	MIDI CC	Start value	End value
154	MIDI CC Increment	MIDI CC	Start value	End value
255	Controller Off***	-	-	-

* Sys Ex messages
** MMC Sys Ex messages
*** This value cannot be typed in using the numerical keypad. Type in 144 and then press the Preset + button to set this value.

Appendix C - Hexadecimal Conversion Chart

Hexadecimal to Decimal Conversion Chart

Hexadecimal Value	Decimal Value	Hexadecimal Value	Decimal Value	Hexadecimal Value	Decimal Value
0	0	2B	43	56	86
1	1	2C	44	57	87
2	2	2D	45	58	88
3	3	2E	46	59	89
4	4	2F	47	5A	90
5	5	30	48	5B	91
6	6	31	49	5C	92
7	7	32	50	5D	93
8	8	33	51	5E	94
9	9	34	52	5F	95
0A	10	35	53	60	96
0B	11	36	54	61	97
0C	12	37	55	62	98
0D	13	38	56	63	99
0E	14	39	57	64	100
0F	15	3A	58	65	101
10	16	3B	59	66	102
11	17	3C	60	67	103
12	18	3D	61	68	104
13	19	3E	62	69	105
14	20	3F	63	6A	106
15	21	40	64	6B	107
16	22	41	65	6C	108
17	23	42	66	6D	109
18	24	43	67	6E	110
19	25	44	68	6F	111
1A	26	45	69	70	112
1B	27	46	70	71	113
1C	28	47	71	72	114
1D	29	48	72	73	115
1E	30	49	73	74	116
1F	31	4A	74	75	117
20	32	4B	75	76	118
21	33	4C	76	77	119
22	34	4D	77	78	120
23	35	4E	78	79	121
24	36	4F	79	7A	122
25	37	50	80	7B	123
26	38	51	81	7C	124
27	39	52	82	7D	125
28	40	53	83	7E	126
29	41	54	84	7F	127
2A	42	55	85		

Appendix D - Useful MIDI data

General MIDI Instruments

Piano	Bass	Reed	Synth Effects
0 Acoustic Grand Piano	32 Acoustic Bass	64 Soprano Sax	96 SFX Rain
1 Bright Acoustic Piano	33 Fingered Bass	65 Alto Sax	97 SFX Soundtrack
2 Electric grand Piano	34 Electric Picked Bass	66 Tenor Sax	98 SFX Crystal
3 Honky Tonk Piano	35 Fretless Bass	67 Baritone Sax	99 SFX Atmosphere
4 Electric Piano 1	36 Slap Bass 1	68 Oboe	100 SFX Brightness
5 Electric Piano 2	37 Slap Bass 2	69 English Horn	101 SFX Goblins
6 Harpsichord	38 Syn Bass 1	70 Bassoon	102 SFX Echoes
7 Clavinet	39 Syn Bass 2	71 Clarinet	103 SFX Sci-Fi
Chromatic Percussion	**Strings/Orchestra**	**Pipe**	**Ethnic**
8 Celesta	40 Violin	72 Piccolo	104 Sitar
9 Glockenspiel	41 Viola	73 Flute	105 Banjo
10 Music Box	42 Cello	74 Recorder	106 Shamisen
11 Vibraphone	43 Contrabass	75 Pan Flute	107 Koto
12 Marimba	44 Tremolo Strings	76 Bottle Blow	108 Kalimba
13 Xylophone	45 Pizzicato Strings	77 Shakuhachi	109 Bag Pipe
14 Tubular bells	46 Orchestral Harp	78 Whistle	110 Fiddle
15 Dulcimer	47 Timpani	79 Ocarina	111 Shanai
Organ	**Ensemble**	**Synth Lead**	**Percussive**
16 Drawbar Organ	48 String Ensemble 1	80 Syn Square Wave	112 Tinkle Bell
17 Percussive Organ	49 String Ensemble 2	81 Syn Sawtooth Wave	113 Agogo
18 Rock Organ	50 Syn Strings 1	82 Syn Calliope	114 Steel Drums
19 Church Organ	51 Syn Strings 2	83 Syn Chiff	115 Woodblock
20 Reed Organ	52 Choir Aahs	84 Syn Charang	116 Taiko Drum
21 Accordion	53 Voice Oohs	85 Syn Voice	117 Melodic Tom
22 Harmonica	54 Syn Choir	86 Syn Sawtooth Wave	118 Syn Drum
23 Tango Accordion	55 Orchestral Hit	87 Syn Brass & Lead	119 Reverse Cymbal
Guitar	**Brass**	**Synth Pad**	**Sound Effects**
24 Nylon Acoustic	56 Trumpet	88 New Age Syn Pad	120 Guitar Fret Noise
25 Steel Acoustic	57 Trombone	89 Warm Syn Pad	121 Breath Noise
26 Jazz Electric	58 Tuba	90 Polysynth Syn Pad	122 Seashore
27 Clean Electric	59 Muted Trumpet	91 Choir Syn Pad	123 Bird Tweet
28 Muted Electric	60 French Horn	92 Bowed Syn Pad	124 Telephone Ring
29 Overdrive	61 Brass Section	93 Metal Syn Pad	125 Helicopter
30 Distorted	61 Syn Brass 1	94 Halo Syn Pad	126 Applause
31 Harmonics	62 Syn Brass 2	95 Sweep Syn Pad	127 Gun Shot

MIDI Note Numbers

Octave (n)	Note Numbers											
	Cn	C#n	Dn	D#n	En	Fn	F#n	Gn	G#n	An	A#n	Bn
-1	0	1	2	3	4	5	6	7	8	9	10	11
0	12	13	14	15	16	17	18	19	20	21	22	23
1	24	25	26	27	28	29	30	31	32	33	34	35
2	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59
4	60	61	62	63	64	65	66	67	68	69	70	71
5	72	73	74	75	76	77	78	79	80	81	82	83
6	84	85	86	87	88	89	90	91	92	93	94	95
7	96	97	98	99	100	101	102	103	104	105	106	107
8	108	109	110	111	112	113	114	115	116	117	118	119
9	120	121	122	123	124	125	126	127				

Appendix E - Standard MIDI Controller numbers (MIDI CC's)

00	Bank Select
01	Modulation
02	Breath Control
03	Controller 3
04	Foot Control
05	Porta Time
06	Data Entry
07	Channel Volume
08	Balance
09	Controller 9
10	Pan
11	Expression
12	Effects Controller 1
13	Effects Controller 2
14	Controller 14
15	Controller 15
16	Gen Purpose 1
17	Gen Purpose 2
18	Gen Purpose 3
19	Gen Purpose 4
20	Controller 20
21	Controller 21
22	Controller 22
23	Controller 23
24	Controller 24
25	Controller 25
26	Controller 26
27	Controller 27
28	Controller 28
29	Controller 29
30	Controller 30
31	Controller 31
32	Bank Select LSB
33	Modulation LSB
34	Breath Control LSB
35	Controller 35
36	Foot Control LSB
37	Porta Time LSB
38	Data Entry LSB
39	Channel Volume LSB
40	Balance LSB
41	Controller 41
42	Pan LSB
43	Expression LSB
44	Controller 44
45	Controller 45
46	Controller 46
47	Controller 47
48	Gen Purpose 1 LSB
49	Gen Purpose 2 LSB
50	Gen Purpose 3 LSB
51	Gen Purpose 4 LSB
52	Controller 52
53	Controller 53
54	Controller 54
55	Controller 55
56	Controller 56
57	Controller 57
58	Controller 58
59	Controller 59
60	Controller 60
61	Controller 61
62	Controller 62
63	Controller 63
64	Sustain Pedal
65	Portamento
66	Sostenuto
67	Soft Pedal
68	Legato Pedal
69	Hold 2
70	Sound Variation
71	Resonance
72	Release Time
73	Attack Time
74	Cut-off Frequency
75	Controller 75
76	Controller 76
77	Controller 77
78	Controller 78
79	Controller 79
80	Gen Purpose 5
81	Gen Purpose 6
82	Gen Purpose 7
83	Gen Purpose 8
84	Portamento Control
85	Controller 85
86	Controller 86
87	Controller 87
88	Controller 88
89	Controller 89
90	Controller 90
91	Reverb Depth
92	Tremelo Depth
93	Chorus Depth
94	Celeste (De-tune)
95	Phaser Depth
96	Data Increment
97	Data Decrement
98	Non-Reg Param LSB
99	Non-Reg Param MSB
100	Reg Param LSB
101	Reg Param MSB
102	Controller 102
103	Controller 103
104	Controller 104
105	Controller 105
106	Controller 106
107	Controller 107
108	Controller 108
109	Controller 109
110	Controller 110
111	Controller 111
112	Controller 112
113	Controller 113
114	Controller 114
115	Controller 115
116	Controller 116
117	Controller 117
118	Controller 118
119	Controller 119

Channel Mode Messages

120	All Sound off
121	Reset all Controllers
122	Local Control
123	All Notes Off
124	Omni Off
125	Omni On
126	Mono On (Poly Off)
127	Poly On (Mono Off)

Extra RPN Messages

128	Pitch Bend sensitivity
129	Fine Tune
130	Coarse Tune
131	Channel Pressure

Appendix F - Roland GS and Yamaha XG NRPN Support to Roland JV/XP

NRPN MSB	NRPN LSB	Data MSB	Data LSB
CC99	CC98	CC06	CC38
01	08	00-7F	n/a (-64 - 0 - +63) Vibrato Rate (relative change)
01	09	00-7F	n/a (-64 - 0 - +63) Vibrato Depth (relative change)
01	0A	00-7F	n/a (-64 - 0 - +63) Vibrato Delay (relative change)
01	20	00-7F	n/a (-64 - 0 - +63) Filter Cutoff Freq. (relative change)
01	21	00-7F	n/a (-64 - 0 - +63) Filter Resonance (relative change)
01	63	00-7F	n/a (-64 - 0 - +63) EG (TVF&TVA) Attack Time (relative change)
01	64	00-7F	n/a (-64 - 0 - +63) EG (TVF&TVA) Decay Time (relative change)
01	66	00-7F	n/a (-64 - 0 - +63) EG (TVF&TVA) Release Time (relative change)
*14	00-7F	00-7F	n/a (-64 - 0 - +63) Drum Filter Cutoff Freq. (relative change)
*15	00-7F	00-7F	n/a (-64 - 0 - +63) Drum Filter Resonance (relative change)
*16	00-7F	00-7F	n/a (-64 - 0 - +63) Drum EG Attack Rate (relative change)
*17	00-7F	00-7F	n/a (-64 - 0 - +63) Drum EG Decay Rate (relative change)
18	00-7F	00-7F	n/a (-64 - 0 - +63) Drum Instrument Pitch Coarse (relative change)
*19	00-7F	00-7F	n/a (-64 - 0 - +63) Drum Instrument Pitch Fine (relative change)
1A	00-7F	00-7F	n/a (0 to Max) Drum Instrument Level (absolute change)
1C	00-7F	00-7F	n/a (Random, L>C>R) Drum Instrument Panpot (absolute change)
1D	00-7F	00-7F	n/a (0 to Max) Drum Instrument Reverb Send Level (absolute change)
1E	00-7F	00-7F	n/a (0 to Max) Drum Instrument Chorus Send Level (absolute change)
%1F	00-7F	00-7F	n/a (0 to Max) Drum Instrument Variation Send Level (absolute change)

* added by Yamaha XG; % changed from Delay to Variation by Yamaha XG

Appendix G - General MIDI Reverb and Chorus Types

Reverb Types

0: Small Room

1: Medium Room

2: Large Room

3: Medium Hall

4: Large Hall

8: Plate

Chorus Types

0: Chorus 1

1: Chorus 2

2: Chorus 3

3: Chorus 4

4: FB Chorus

5: Flanger

Specifications

General	Sample Rates . . . . . 44.1, 48, 88.2, and 96 kHz
Line Inputs	Max Input . . . . . +1.5 dBV (1.183 Vrms) @48kHz, +2.3 dBV (1.310 Vrms) @ 96 kHz
	Signal to Noise Ratio . . . . . -106 dB (a-weighted)
	Dynamic Range . . . . . 106 dB (a-weighted)
	THD + N 0.00266%
	Frequency Response . . . . . +/-0.3 dB, 20Hz to 40kHz @ 96kHz
	Crosstalk . . . . . -108 dB
	Impedance . . . . . 10k Ohms
Microphone Input	Available Gain . . . . . 42 dB
	Signal to Noise Ratio . . . . . -103 dB (a-weighted)
	Dynamic Range . . . . . 103 dB (a-weighted)
	THD + N 0.00188%
	Frequency Response . . . . . +/-0.4 dB, 20Hz to 40kHz @ 96 kHz
	Impedance . . . . . 3.5k Ohms
Instrument Input	Available Gain . . . . . 35 dB
	Signal to Noise Ratio . . . . . -100 dB (a-weighted)
	Dynamic Range . . . . . 100 dB (a-weighted)
	THD + N 0.00215%
	Frequency Response . . . . . +/-0.4 dB, 20Hz to 40kHz @ 96 kHz
	Impedance . . . . . 200k Ohms
Line Outputs	Max Output (balanced) . . . . . +10.2 dBu (2.524 Vrms)
	Signal to Noise Ratio . . . . . -105 dB (a-weighted)
	Dynamic Range . . . . . 105 dB (a-weighted)
	THD + N 0.00319%
	Frequency Response . . . . . +/-0.3 dB, 20Hz to 40kHz @ 96 kHz
	Crosstalk . . . . . -122 dB
	Impedance (balanced) . . . . . 300 Ohms
Headphone Outputs	Max Output . . . . . -2.1 dBV (0.784 Vrms) into 32-ohms
	Signal to Noise Ratio . . . . . -105 dB (a-weighted)
	Dynamic Range . . . . . 105 dB (a-weighted)
	Frequency Response . . . . . +/-0.3 dB, 20Hz to 40kHz @ 96 kHz
	Output Impedance . . . . . 75 Ohms
	Working Headphone Impedance . . . . . 32 to 600 Ohms

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