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SoundEngine  
Operation Manual  
© 1993 by E-mu Systems, Inc.

■ FI ??? Rev. A

E-mu Systems, Inc.  
1600 Green Hills Road  
P.O. Box 660015  
Scotts Valley, CA 95067-0015  
U.S.A.  
(408) 438-1921

Important Notice: In order to obtain warranty service on your SoundEngine, the serial number sticker on the unit must be intact, and you must have a sales receipt or other proof of purchase. If there is no serial number sticker on your SoundEngine, please contact E-mu Systems at once.

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## ***Important Safety Instructions***

Please read the following information before operating your SoundEngine.

### **Safety Information**

- ▼ The SoundEngine should only be connected to a power supply of the type described in the operating instructions or as marked on the product.
- ▼ Make sure that the power cord for the SoundEngine's AC adaptor is not located where it may be walked on, crushed or pinched.
- ▼ Before connecting the AC adapter to the SoundEngine, make sure it is disconnected from the wall outlet (mains). Always connect the AC adapter to the SoundEngine *First*, then plug the adapter into the wall outlet.
- ▼ Do not operate the SoundEngine near water.
- ▼ This product, either alone or in conjunction with an amplifier, headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable.
- ▼ This product should be located away from heat sources such as radiators, heat registers or other products that produce heat.
- ▼ This product may be equipped with a polarized line plug (one blade wider than the other). This is a safety feature. If you are unable to insert this plug into an outlet, contact an electrician to replace your obsolete outlet. Do not defeat the safety purpose of this plug.
- ▼ Care should be taken so that objects and liquids are not spilled into the enclosure through openings.

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***Important Safety Instructions***

- ▼ The SoundEngine may generate radio frequency energy which could possibly affect TV and radio reception. If this is the case, simply move the SoundEngine to another location.
- ▼ The SoundEngine should be serviced by qualified personnel when:
  - A. The AC Adapter, cord or plug has been damaged; or
  - B. Objects have fallen into, or liquids have spilled into the product; or
  - C. The product has been exposed to rain; or
  - D. The product does not appear to operate normally or exhibits a marked change in performance; or
  - E. The product has been dropped or the enclosure damaged.
- ▼ The SoundEngine contains no user servicable parts. All servicing should be referred to qualified personnel.

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## ***INTRODUCTION***

Thank you for purchasing the SoundEngine Music Module. The SoundEngine integrates a Proteus 16-bit sampled sound module and a MIDI interface in one convenient package.

### **Features**

- 16-bit quality sampled sounds. Sampling is the process of digitally recording sounds and playing them back. E-mu's state-of-the-art digital sampling gives you all the vibrancy of real musical instruments.
- 128 General MIDI sound presets and 10 different drum sets will improve the sound of any General MIDI sequence.
- On-board digital sound effects. Reverb and Chorus give your music and MIDI sequences a professional touch.
- 16-channel MIDI capability lets you assign up to 16 different instruments, on separate tracks, to play together like a real orchestra.
- 32 note polyphony lets you play even the most advanced music scores or song sequences.
- Includes easy to use, professional-grade sequencing and sound editing programs.
- Built-in MIDI interface and computer printer thru port so you don't have to switch cables when you want to use your printer.

### **Who can use the SoundEngine?**

- Home/Computer musicians
- "Multi-Media" developers or users
- Home/Computer musicians





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***BASIC OPERATION***

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## **Overview of the SoundEngine**

The SoundEngine is a combination Sound Module and MIDI Interface.

The *Sound Generator* portion of the SoundEngine can produce up to 32 different instruments simultaneously. There are 128 different sounds, called *Presets*, as well as 64 drum kits. All the sounds are generated using a process called *Sampling*, which works somewhat like a tape recorder in that “real” instruments are recorded and then played back at different pitches. Because of this technique, the SoundEngine sounds are incredibly realistic.

The *MIDI Interface* part of the SoundEngine turns your Macintosh into a powerful music composition and sound creation laboratory. MIDI is a universal standard interface for controlling musical equipment. There are literally thousands of programs and devices available which use this powerful interface standard.

The SoundEngine can be used with a MIDI sequencer or as a stand alone sound module. Or, it can simply be used as MIDI interface to control any MIDI instrument(s).

To use the SoundEngine, you will need either a Macintosh computer (any model), a MIDI keyboard, or both.

### **MIDI Channels**

The SoundEngine can receive on up to 16 MIDI channels simultaneously. A MIDI channel is rather like a channel on your TV set. If you tune in to one channel, you will not receive the other channels. The SoundEngine is like a TV with 16 screens! You can tune-in and listen to up to 16 different musical lines at once, selecting a different preset (*sound*) for each.

### **General MIDI Sounds**

The presets (or complete sounds) in the SoundEngine conform to the General MIDI specification. General MIDI is basically a

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## ***Overview of the SoundEngine***

minumun set of features for an instrument and a standard organization of the sound locations so that sequences written on one instrument will play back correctly on another instrument. For example, General MIDI says that preset number 1 will always be an acoustic grand piano and that preset 7 will be a harpsichord. All of the 128 General MIDI presets have been arranged in a standard order. *See Also - About MIDI on page ??*

### **Drum Kits**

In addition to the 128 presets, General MIDI defines one drum preset which contains 61 drum and percussion sounds mapped across the keys of the keyboard. The SoundEngine goes quite a bit further by allowing you to select one of 64 different drum kits. Drum kits are always placed on MIDI channel 10, as defined by the General MIDI standard. Drums are always given top priority when playing back a sequence. The SoundEngine allocates a minimum of 4 channels to the drums to ensure that the percussion part of the sequence always will sound.

### **Digital Reverb & Chorus**

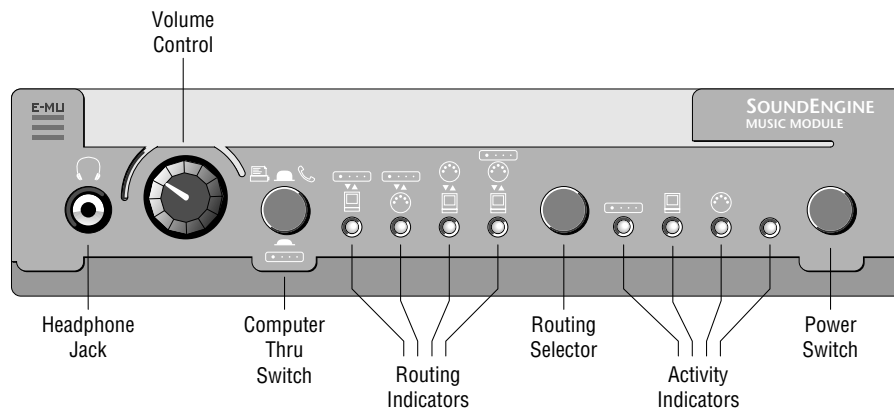
The SoundEngine contains a built-in digital effects processor which is used to add warmth and depth to the sound. Reverb is used to simulate the sound of a room such as a large auditorium or church. Chorus simulates the sound of many instruments (hence the name) and is used to make the sound thicker. In addition to reverb and chorus, the SoundEngine contains several other effects, such as digital delay (for echoes and doubling) and a flanger (for effects) .

### **Sound Editing**

The Edit-One program allows you to control the global functions of the SoundEngine and edit sounds in a limited way. If you want full-featured sound editing capabilities for designing your own custom sounds, the Opcode Galaxy program is available which provides access to every SoundEngine parameter.

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## Front Panel



### Headphone Jack

Accepts standard “Walkman” type stereo headphones from 8 to 150 ohms.

### Volume Control

Adjusts the volume of the line outputs and the headphone output.

### Computer Thru Switch

Allows you to switch between the SoundEngine or your Printer (Modem).

### Routing Indicators

Indicate the current SoundEngine routing mode. See page 13 for additional information.

### Routing Selector

Selects one of the four SoundEngine routing modes.

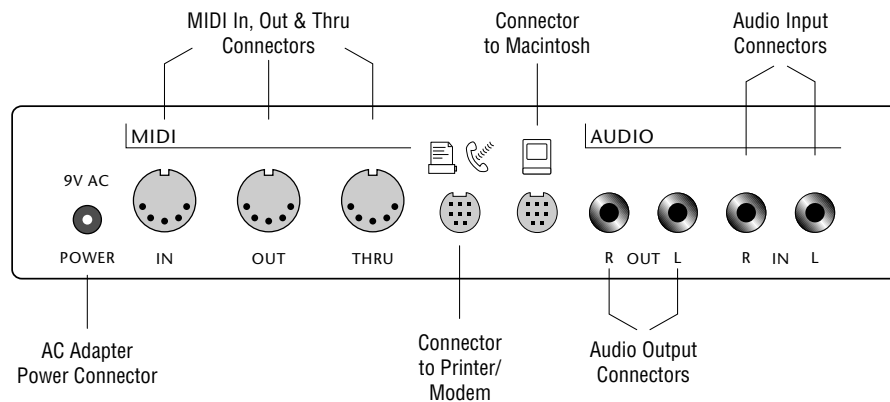
### Activity Indicators

Light to show that the SoundEngine is sending or receiving data. The rightmost green LED shows that the unit is turned on.

### Power Switch

Turns the SoundEngine On and Off.

## Rear Panel



### Power Connector

Connects to the AC wall adapter and supplies power to the SoundEngine.

### MIDI Connectors

*MIDI In* ..... Receives data from any MIDI instrument (such as a keyboard) .

*MIDI Out*..... Transmits data from the SoundEngine or Macintosh.

*MIDI Thru* ... A copy of the MIDI data which is received at the MIDI In port.

### Printer/Modem Connector

Connects to your Printer or Modem.

### Macintosh Connector

Connects to the Printer or Modem port of your Macintosh computer.

### Audio Input Connectors

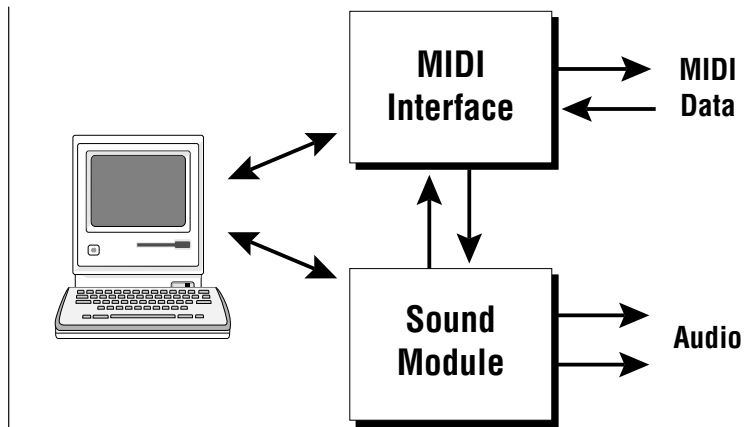
Allow you to mix another stereo audio signal (such as another instrument or a CD player) in with the SoundEngine audio outputs.

### Audio Output Connectors

Connect to your stereo sound system. The audio outs are standard line level (??dB) signals

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## Basic Operation

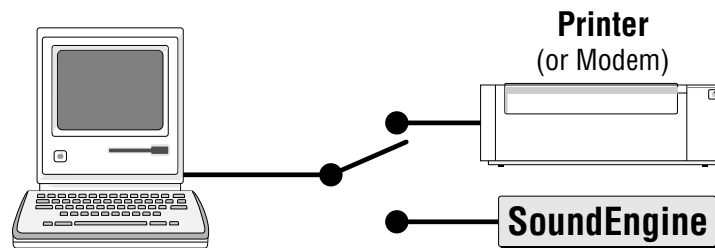


The SoundEngine is really two devices in one.

- A high-quality, 16-bit sound module.
- A Macintosh MIDI interface.

As shown in the diagram above, the Macintosh can communicate with the Sound Module, the MIDI interface or both at once.

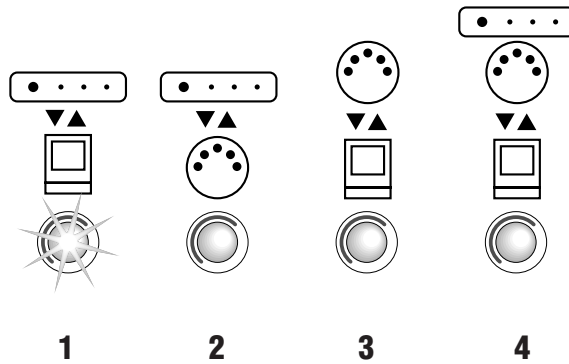
The Computer Thru switch on the front panel allows you to have the SoundEngine and your printer (or modem) connected at the same time and switch between them.



## Basic Operation

### Routing Modes

The SoundEngine has four different routing modes which define the way it will be used.

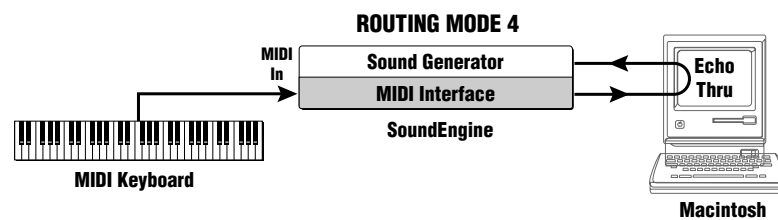


**Routing Mode 1 - Computer Controlled Sound Module**

**Routing Mode 2 - MIDI Controlled Sound Module**

**Routing Mode 3 - MIDI Interface**

**Routing Mode 4 - Sound Module and MIDI Interface**



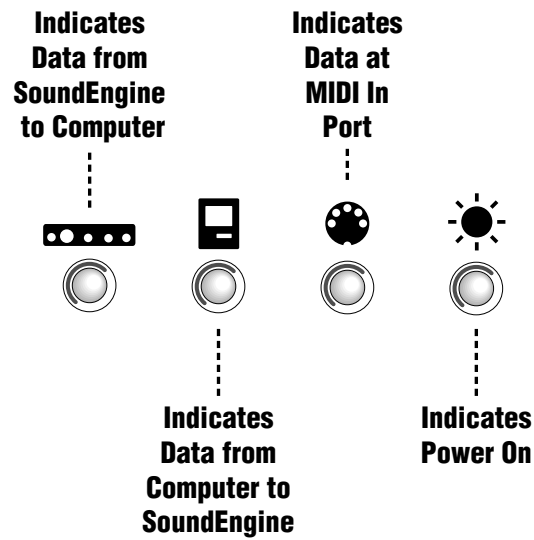
*Routing Mode 4 requires that you are running a MIDI software program which has Keyboard Thru mode enabled.*

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## **Basic Operation**

### **Activity Indicators**

The SoundEngine has four Activity Indicators which show data flowing in and out of the SoundEngine. These indicators are very useful in diagnosing problems with the MIDI system.



### **Missed Data Indicator**

The Power On indicator will flash if data is missed while transferring data between the SoundEngine and the Macintosh in routing mode four. Missed data could occur by playing your MIDI keyboard while a SysEx transfer is taking place. Therefore playing the keyboard in mode four during SysEx transfers is NOT RECOMMENDED.



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***CONNECTION DIAGRAMS***

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## **Routing Mode 1     Macintosh Controlling the SoundEngine**

In this mode, the SoundEngine is used as a computer controlled sound source without using a MIDI keyboard.

Connect the SoundEngine as shown in the diagram on the facing page. Any stereo system that has Line Level inputs may be used. For Mono operation, connect only one side (L or R).

### **Connections**

Before making any connections, turn all the equipment Off.

1. Connect the Macintosh connector on the SoundEngine to either the Printer or Modem port on your Macintosh. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack on the SoundEngine.
2. Connect the Audio Out from the SoundEngine to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
3. Connect the AC Adapter to the power connector on the rear of the SoundEngine, then plug it into the wall outlet. *Always connect the AC Adapter to the SoundEngine first, then into the wall!*

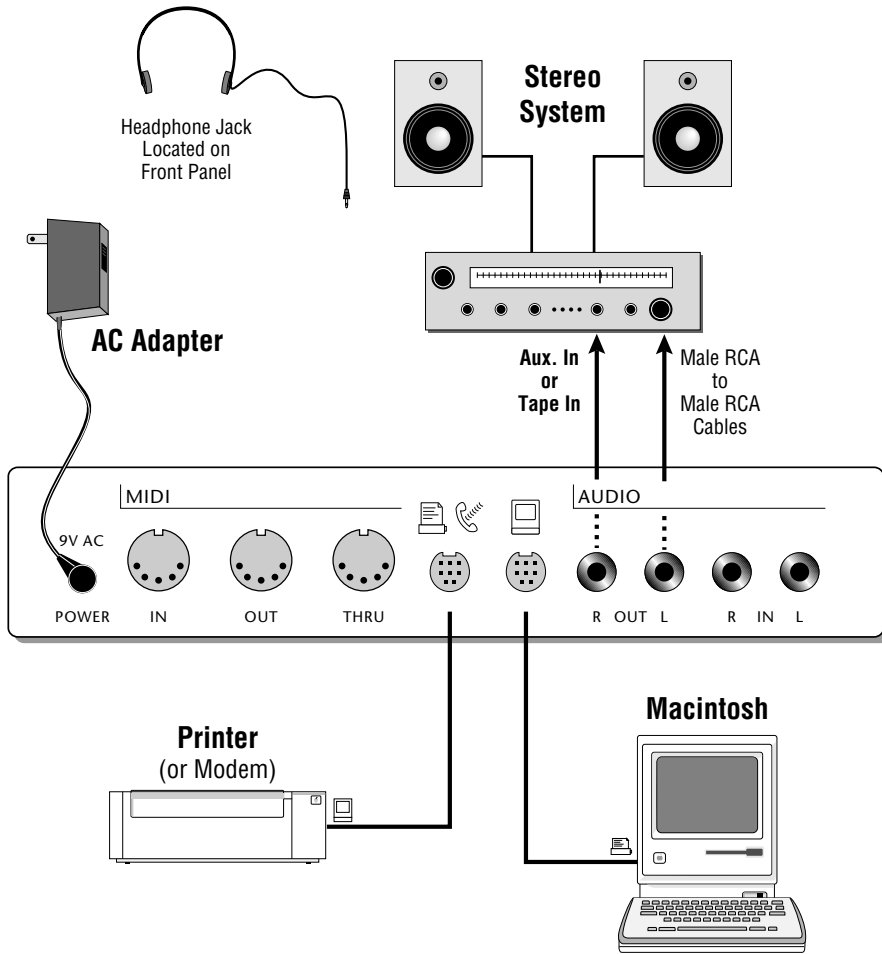
### **Power Up!**

1. Turn on the power using the front panel switch. The green power LED should light.
2. Switch on the power to your Macintosh.
3. Turn the volume control on your stereo system to minimum, then switch its power on.

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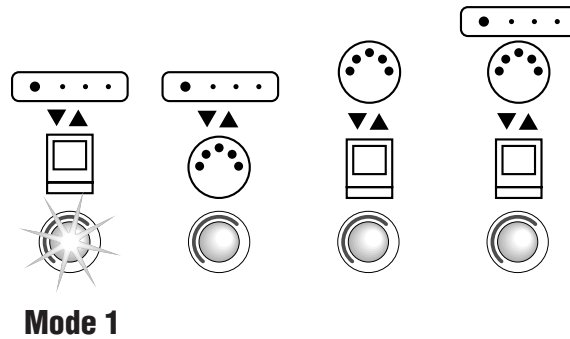
## **Routing Mode 1**

### **SoundEngine-Macintosh Connection Diagram**



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## **Routing Mode 1     Macintosh Controlling the SoundEngine**



### **Operation**

1. Press the Routing Mode Selector button repeatedly until the Mac-SE LED is lit, as shown in the diagram above. (SoundEngine powers up this way.) In this mode incoming MIDI messages will be ignored. Only the Macintosh will control the SoundEngine.
2. Press the Computer Thru button IN to connect the SoundEngine to the Mac. (With the button OUT, the Macintosh is connected to your Printer or Modem.) If the routingLED is flashing, it means that the Computer Thru button is not depressed.
3. Open one of the demo sequences from the EZVision sequencer program. Refer to the EZVision manual for details on sequencer operation.
4. With the sequence playing, slowly turn up the volume control on your stereo system until a comfortable listening level is reached. The computer activity LED should be flashing.

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## ***Routing Mode 1      Macintosh Controlling the SoundEngine***

▼ *NO SOUND? Check the following:*

- Is the serial cable connected between the Macintosh and the SoundEngine?
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Make sure the Routing Selector on the SoundEngine is set to Mode 1.
- Check your stereo system routing switch and volume control. You can also check the SoundEngine output using stereo headphones.
- If the computer activity LED is not flashing, make sure EZVision is set to transmit on the same serial port that you have connected to the SoundEngine. (Check MIDI Setup in EZVision.)

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## **Routing Mode 2**

## **MIDI Sound Source**

In this mode, the SoundEngine is played directly from a MIDI keyboard without the need for a computer. Any keyboard which has a MIDI Out jack can be used.

Connect the SoundEngine as shown in the diagram on the facing page. Any stereo system that has Line Level inputs may be used. For Mono operation, connect only one side (L or R).

### **Connections**

Before making any connections, turn all the equipment Off.

1. Connect the MIDI Out from your MIDI keyboard to the MIDI In on the SoundEngine.
2. The audio outputs of your MIDI keyboard (if any) can be connected to the Audio Inputs of the SoundEngine so that both the MIDI keyboard and the SoundEngine can be heard.
3. Connect the Audio Outputs from the SoundEngine to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
4. Connect the AC Adapter to the Power connector on the rear of the SoundEngine, then plug it into the wall outlet. *Always connect the AC Adapter to the SoundEngine first, then into the wall!*

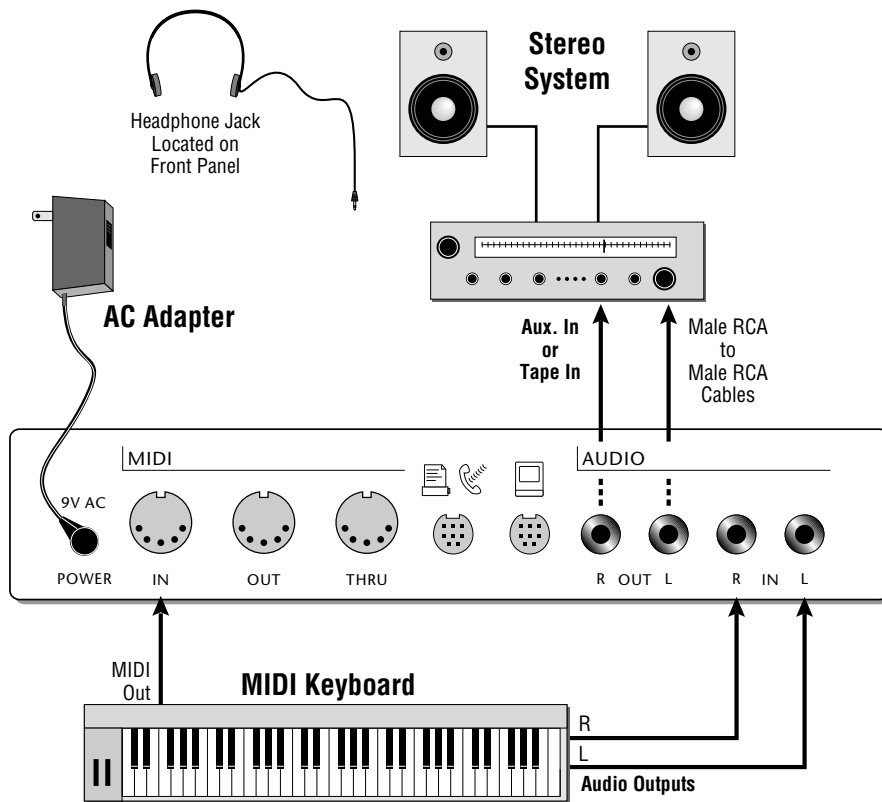
### **Power Up!**

1. Turn on the power using the front panel switch. The green power LED should light.
2. Switch on the power to your MIDI keyboard.
3. Turn the volume control on your stereo system to minimum, then switch its power on.

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## ***Routing Mode 2***

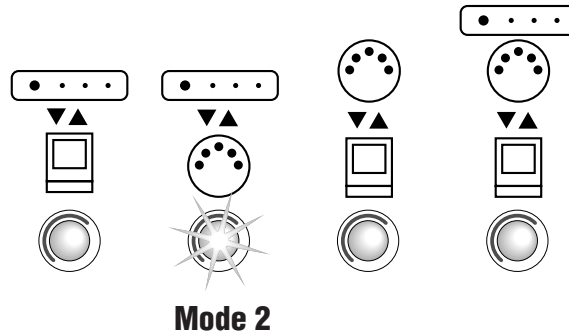
### ***Connecting the SoundEngine to a MIDI Keyboard***



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## Routing Mode 2

## MIDI Sound Source



### Operation

1. Press the Routing Mode Selector button repeatedly until the SE-MIDI LED is lit, as shown in the diagram above. In this mode the Macintosh is disconnected from the system. Only the MIDI port will control the SoundEngine.
2. Play your MIDI keyboard and verify that the MIDI Activity LED flashes.
3. Slowly turn up the volume control on your stereo system until a comfortable listening level is reached.
4. You should now be hearing the SoundEngine and possibly your MIDI keyboard if its outputs are connected.
5. Change the preset (program) on your MIDI keyboard. The SoundEngine's preset should change as well.



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## ***Routing Mode 2***

## ***MIDI Sound Source***

▼ *NO SOUND? Check the following:*

- Is the MIDI cable connected between your MIDI keyboard MIDI Out and the SoundEngine MIDI In?
- Make sure the Routing Selector on the SoundEngine is set to Mode 2.
- Check your stereo system routing switch and volume control. You can also check the SoundEngine output using stereo headphones.
- If the MIDI activity LED is not flashing, make sure your MIDI keyboard is setup to transmit MIDI data.

▼ *NO PRESET CHANGE? Check the following:*

- Each time you change a preset on your MIDI keyboard, the MIDI activity LED should blink once. If not, check the MIDI cable again and make sure your MIDI keyboard is programmed to transmit program changes.

In this mode, the SoundEngine is used as a Macintosh MIDI interface, ignoring the SoundEngine's sound producing capabilities.

Connect the SoundEngine as shown in the diagram on the facing page.

### **Connections**

Before making any connections, turn all the equipment Off.

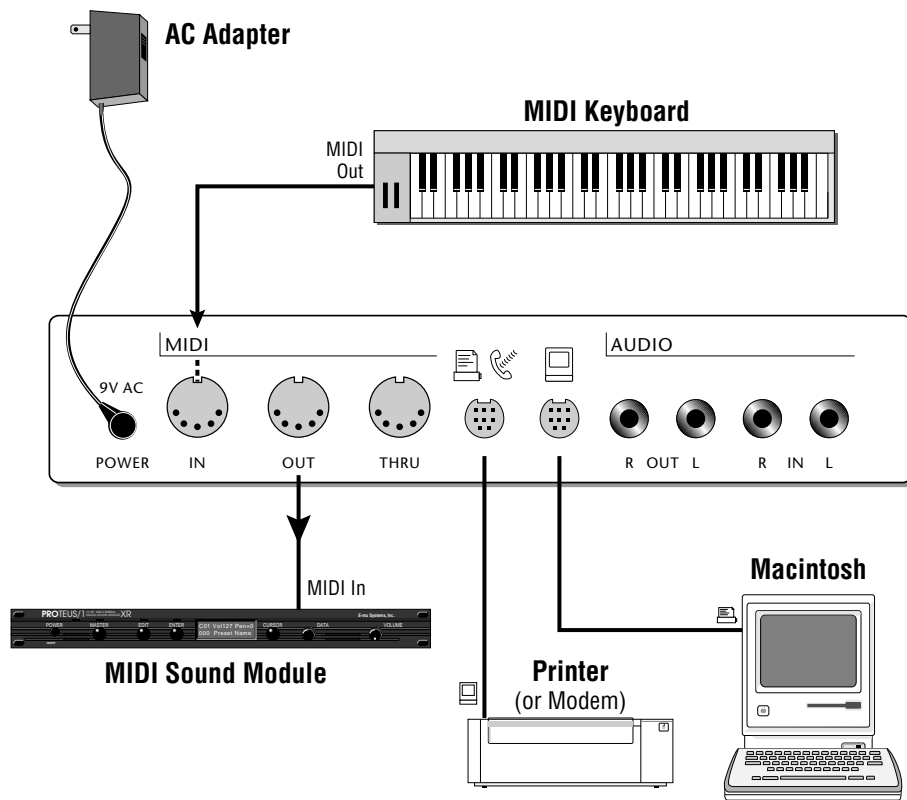
1. Connect the Macintosh connector on the SoundEngine to either the Printer or Modem port on your Macintosh. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack (Computer Thru) on the SoundEngine.
2. Connect the AC Adapter to the Power connector on the rear of the SoundEngine, then plug it into the wall outlet. *Always connect the AC Adapter to the SoundEngine first, then into the wall!*
3. Connect MIDI Out of your MIDI keyboard to MIDI In of the SoundEngine. Connect MIDI Out of the SoundEngine to MIDI In of your MIDI keyboard.

### **Power Up!**

1. Turn on power to the SoundEngine using the front panel switch. The green power LED should light.
2. Switch on the power to your Macintosh.
3. Switch on the power to your MIDI keyboard and Sound Module (if connected).

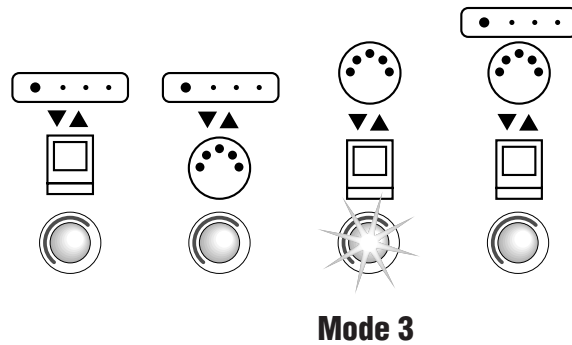
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## ***Routing Mode 3*** ***Connecting the SoundEngine as a MIDI Interface***



## Routing Mode 3

## MIDI Interface



### Operation

1. Press the Routing Mode Selector button repeatedly until the Mac-MIDI LED is lit, as shown in the diagram above.
2. Play a few keys on your MIDI keyboard. The MIDI activity LED should flash.
3. You may now use the EZVision sequencer, Edit One or other MIDI program on the Macintosh. The SoundEngine will function as a MIDI Interface.

#### ▼ PROBLEMS? Check the following:

- Is the MIDI Activity LED flashing when you play keys on the keyboard? If not, check the MIDI cable connection and make sure your keyboard is programmed to transmit MIDI data.
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Check the MIDI setup in whatever program you are running. The selected serial port on the MIDI Setup should match the port connected to the SoundEngine.

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## **Routing Mode 4**

## **Sound Module & MIDI Interface**

In this mode, the SoundEngine is used both as a Macintosh MIDI interface and a sound module at the same time.

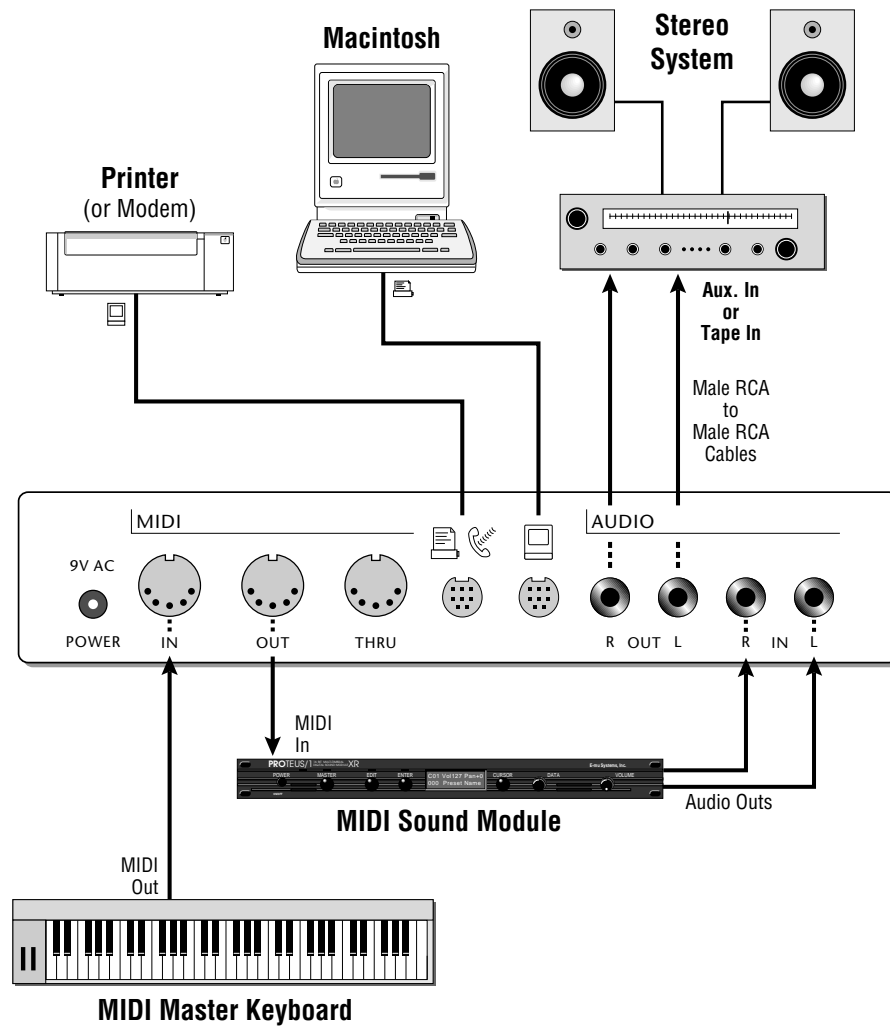
Connect the SoundEngine as shown in the diagram on the facing page. Any stereo system that has Auxiliary or Tape inputs may be used. For Mono operation, connect only one side (L or R).

### **Connections**

1. Connect the MIDI Out from your MIDI keyboard to the MIDI In on the SoundEngine.
2. Connect the MIDI Out from the SoundEngine to the MIDI In on your other MIDI sound module(s).
3. Connect the Macintosh connector on the SoundEngine to either the Printer or Modem port on your Macintosh. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack (Computer Thru) on the SoundEngine.
4. The audio outputs of your MIDI keyboard (or MIDI sound module) can be connected to the Audio Inputs of the SoundEngine so that both the MIDI keyboard and the SoundEngine can be heard.
5. Connect the Audio Out from the SoundEngine to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
6. Connect the AC Adapter to the Power connector on the rear of the SoundEngine, then plug it into the wall outlet. *Always connect the AC Adapter to the SoundEngine first, then into the wall!*

## Routing Mode 4

### Sound Module & MIDI Interface Connection



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## **Routing Mode 4**

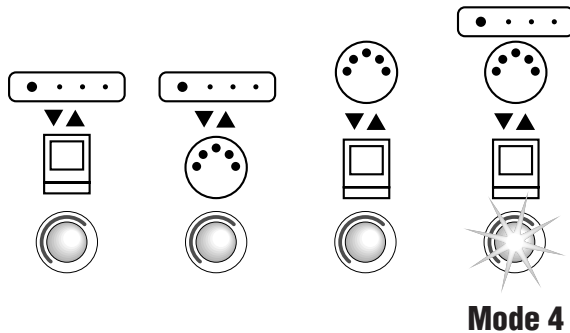
## **Sound Module & MIDI Interface**

### **Power Up!**

1. Turn down the volume control on the SoundEngine, your MIDI keyboard, and your sound system.
2. Turn on the power to the SoundEngine using the front panel switch. The green power LED should light.
3. Switch on the power to your MIDI keyboard and sound module.
4. Switch on the power to your Macintosh.
5. Switch on the power to your stereo system.
6. Turn up the volume on the SoundEngine and your MIDI sound module.

### **Operation**

1. Press the Routing Mode Selector button repeatedly until the MIDI-Mac-SoundEngine LED is lit, as shown in the diagram below.
2. Play a few notes on your MIDI keyboard. The MIDI In activity LED should flash indicating that the SoundEngine is receiving MIDI data.



3. Open EZVision or another sequencer program. Make sure that the proper serial port on the Mac is selected and that Keyboard Thru mode is On

*IMPORTANT*

*The SoundEngine will NOT play in Mode 4 until a MIDI Sequencer or other program is running with Keyboard Thru mode On.*

*(Note: Keyboard Thru mode is also called Echo Thru, Echo Keyboard or MIDI Thru on other MIDI applications.)*

4. Play your MIDI keyboard while slowly turning up the volume on your stereo system. Both the Computer Activity and the MIDI Activity LEDs should flash when you play keys. You should also be hearing sound at this point.

▼ *NO SOUND? Check the following:*

- Is the MIDI cable connected between your MIDI keyboard MIDI Out and the SoundEngine MIDI In?
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Make sure the Routing Selector on the SoundEngine is set to Mode 4.
- Check your stereo system routing switch and volume control. You can also check the SoundEngine output using stereo headphones.
- If the MIDI Activity and the Computer Activity LEDs are not BOTH flashing when you play keys, turn on Keyboard Thru mode in the Setup menu of EZVision.



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***OPERATIONS***

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## **Basic Definitions**

### **Preset**

A preset is a instrument sound such as a Grand Piano, Electric Guitar or a Violin. Presets are sometimes called Programs in other equipment.

### **MIDI Program Change**

Presets (or programs) can be changed via MIDI command. MIDI can select up to 128 different presets. On the SoundEngine Music Module presets can only be changed by MIDI command.

### **MIDI Channel**

MIDI contains 16 separate channels each of which can control a different preset or sound in the Music Module. Each MIDI channel also has its own set of controllers such as Volume, Pitch Bend and Pan Position which will only affect that channel.

### **Drum Kits**

The Music Module contains a number of drum kits (128 total) which can ONLY be accessed using MIDI channel 10 (The percussion channel).

### **Effects**

Effects such as reverberation and echo, are applied to selected presets of the Music Module in order to add spacial complexity to the sound or for special effects. The Music Module has two effect processors for the entire machine.

### **Polyphony**

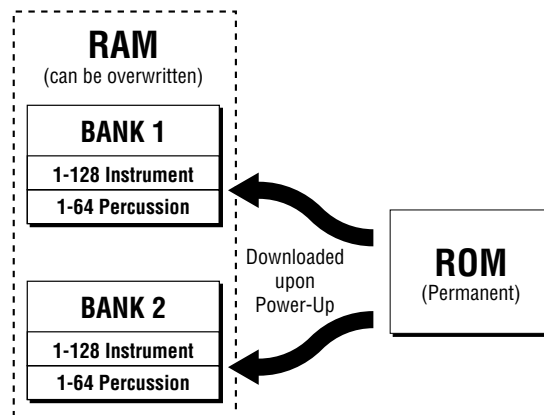
Polyphony describes the maximum number of notes an instrument can play simultaneously. The Music Module is 32 note polyphonic.

## ROM and RAM Preset Banks

### Preset Banks

The Music Module contains two banks of 128 General MIDI compatible presets and 64 percussion presets. Upon power-up both preset banks are automatically downloaded into RAM from permanent ROM. These RAM banks can be overwritten with other preset sounds using the sound editor computer software.

The Music Module normally uses Bank 1. Bank 2 can be switched in using the editor program or by MIDI SysEx command. Only one of the banks can be accessed at a time.



The two banks consist of 128 instrument presets and 64 percussion presets. Percussion presets can only be accessed on MIDI channel 10 by selecting preset numbers from 0-63. Selecting a percussion preset higher than 63 will not have any effect. All of the other channels can select instrument presets 0-127.



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## **Selecting Presets on the Music Module**

### **Selecting Instrument Presets**

If you are using a MIDI keyboard which has preset selection buttons, simply select the program from the front panel of your keyboard and the Music Module preset of the same number will be selected as well. If your MIDI keyboard cannot select presets up to 128, the editor program can be used to select any available preset.

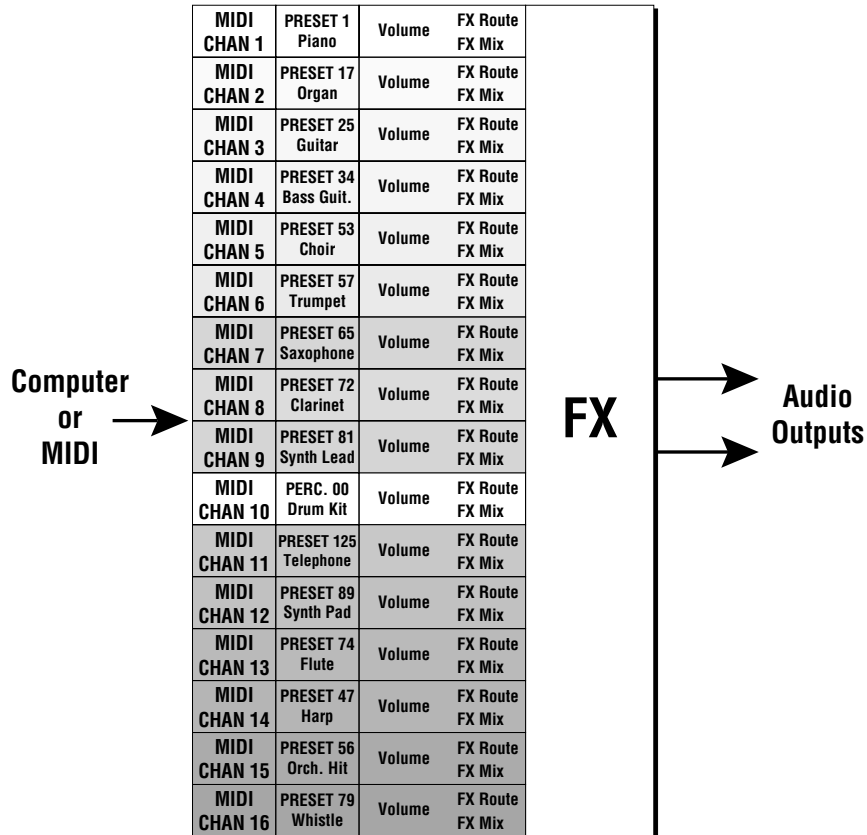
▼ If your keyboard HAS preset selection facilities but the Music Module program does not change, it may be because MIDI preset selection has been turned Off on your MIDI keyboard. Refer to the operation manual of your MIDI keyboard to find out how to turn MIDI Program Change On.

▼ If you have a MIDI keyboard WITHOUT preset selection capabilities or if your MIDI keyboard cannot access all 128 preset programs, your computer can be used to change presets on the Music Module. Presets can be selected using either the Edit-One or EZ Vision programs supplied with the Music Module. Any sequencer program can perform MIDI preset (program) changes.

### **Selecting Percussion Presets**

Percussion presets are selected just like an instrument preset on MIDI channel 10 ONLY. Channel 10 is the percussion channel. Channel 10 only responds to presets 1-64. All other program change numbers will simply be ignored.

## SoundEngine Music Module



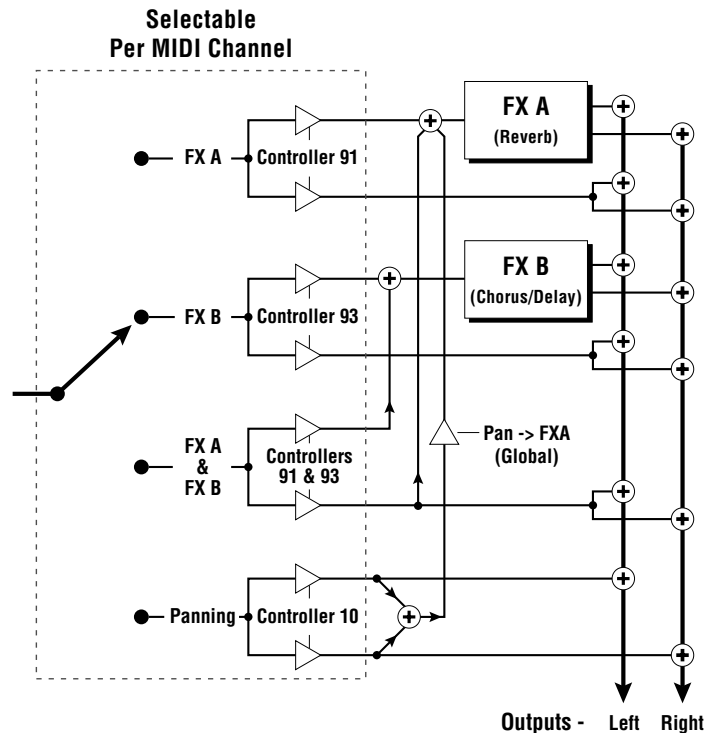
### The SoundEngine Music Module

The SoundEngine Music Module is 16 part multi-timbral, meaning that each of the 16 MIDI channels can play a different sound (preset). Additionally, each preset has an associated Volume, Effects Routing and Effects Mix (how much effect). These parameters may be changed via your MIDI keyboard or sequencer program at any time via MIDI command allowing automated mixing and effect amounts.

## Effects Section

### Effects Routing

The Music Module contains two separate effects processors, FX A and FX B. The effect for each of the two processors is selected for the entire unit. For each MIDI channel, you can select one of the four effect busses and the amount of the effect. Selecting panning allows you to position the sound in the stereo field. An additional path, Pan -> FX A, allows a programmable amount of the panning signal to be sent through FX A so that you can have panning as well as effect. There is only one Pan -> FX A amount for the entire machine, therefore any MIDI channels using the Pan routing will have the same amount of reverb signal applied.



---

## ***Types of Effects***

Effect bus selection and the type of effect is accomplished using the editor program or by SysEx command. The effects amounts or pan positions are controlled by sending a MIDI continuous controller value on the appropriate MIDI channel.

Both effect processors have a variety of different effects available. Effect A is normally used for reverb. Reverb is the sort of effect that sounds good with just about everything. Chorus and delays are useful for accents and special effects. Using the editor program you can select *one* A effect and *one* B effect for the entire Music Module. The effect routings and amounts are programmable for each MIDI channel using the editor program or your MIDI sequencer.

### **EFFECT A Reverb/Delay Effects**

*Room*  
*Warm Room*  
*Small Room 1, 2*  
*Plate 1, 2*  
*Chamber 1, 2*  
*Hall 1, 2, 3*  
*Early Reflection 1-4*  
*Rain*  
*Delay*  
*Cross Delay*  
*Echo*

### **EFFECT B Chorus/Delay Effects**

*Stereo Chorus*  
*Stereo Flange*  
*Phaser*  
*Delay*  
*Cross Delay*

---

## ***Types of Effects***

### **Reverbs**

Reverbs are basically room simulations of different types with various wall surfaces and furnishings. A plate is a type of mechanical reverb unit which sounds smooth and clean.

### **Early Reflections**

These are simply the initial complex echoes from various rooms without the decay portion of the reverb.

### **Rain**

A special effect which creates a flurry of rapid, multiple echoes.

### **Delay**

A short echo effect useful to thicken a sound or for sound effects.

### **Cross Delay**

A short echo effect in which the echoes criss-cross from side to side.

### **Echo**

A long echo effect.

### **Stereo Chorus**

Simulates more than one instrument playing. Chorus can also be used to thicken the sound.

### **Stereo Flange**

Flanging creates a sweeping jet-filter effect when used with harmonically-rich sounds such as string sections.

### **Phaser**

Creates a swirly animation when used with harmonically-rich sound such as strings and can also be used to thicken-up a thin sound.



---

## Using Effects

### Effect A

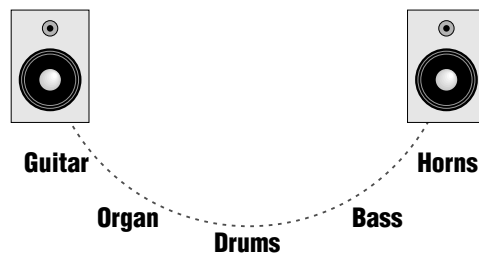
Effect A (Reverb) will probably be your main effect. Reverberation is such a great effect that you may be tempted to use it on everything. Often it is better to use reverb on some presets and not others to create a different sonic space for each sound. By varying the reverb amount, you can give each sound a slightly different feel. Sounds with little or no reverb tend to sound closer to the listener and have more definition.

### Effect B

These effects can be used for accents, pseudo reverb (using delay) or for special effects. Instruments such as electric guitars, electric pianos and strings can benefit from tasteful amounts of chorus or flanging. Both effects can serve to fatten the sound and add animation to an otherwise static sound. String sections become lush pads using chorus. The phaser can be used on the drawbar organ preset to simulate its characteristic rotating speaker sound.

### Panning

Panning is used to change the position of the sound between the stereo speakers just like the balance control on your home stereo. This allows you to shift the apparent position of a sound in the area in front of the listener. Panning each instrument to a slightly different position creates a realistic sound picture and helps impart a distinct identity to each sound.



*Panning helps create a distinct identity for each sound.*

---

## Using Effects

### Programming Effects

1) *Select the type of Effect and the Routing:* The effect type (Room, Hall, Chorus, etc.) and routing (Reverb, Chorus, Both or Pan) can be programmed from either the editor program or using a MIDI SysEx command.

2) *Set the Effect Amount:* The effect amounts for each are controlled by MIDI continuous controller messages from your sequencer. For example, controller message #91 sent on MIDI channel 1 will only control the reverb amount on that channel. The controller number must match the type of effect routing for the controller to have any effect. For example, trying to control the amount of reverb when you have chorus selected will not have any useful effect. The MIDI continuous controller numbers for the effect routings are shown below.

<b>EFFECT ROUTING</b>	<b>CONTROLLER #</b>	<b>RANGE</b>
<b>Reverb Amount</b>	<b>91</b>	<b>0 to 14</b>
<b>Chorus Amount</b>	<b>93</b>	<b>0 to 14</b>
<b>Reverb &amp; Chorus</b>	<b>91 or 93</b>	<b>0 to 14</b>
<b>Pan Position</b>	<b>10</b>	<b>-7 to +7</b>

---

## ***Voice Channel Assignment***

The Music Module has a total of 32 voice channels. However, some presets use 2 of these channels so the actual polyphony will vary according to which presets are in use. You should not ever run out of notes unless you are running a very complicated sequence. When more notes are played than the Music Module has channels, it *steals* one. MIDI channel numbers are used to determine the voice stealing algorithm. The percussion channel (#10) has the highest priority (the least chance of being stolen).

### ***Channel Prioritization of the Music Module***

**10, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16**

When sequencing, you should put your most important parts on lower numbered MIDI channels and less important parts on the higher numbered channels.

### **Expression Controller**

MIDI Controller D has been programmed to control Expression. The Expression Control increases the volume of the particular MIDI channel by up to 6 dB and is used to bring up a solo or lead instrument from the rest of the "band". Continuous controller #11 is the standardized Expression Controller number. Expression control can be transmitted from your MIDI keyboard or sequencer.



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## ***MASTER/GLOBAL FUNCTIONS***

### **Note**

The Master/Global functions are accessed using the editor program supplied with the Music Module.



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## ***Master/Global Functions***

### **Master Tune**

Master Tune adjusts the overall tuning of all presets so that the Music Module can be tuned to other instruments. The master tuning range is  $\pm 1$  semitone in 1/64th semitone increments. A master tune setting of "00" would indicate that the Music Module is perfectly tuned to concert pitch (A=440 Hz).

### **Transpose**

This function transposes the key of the Music Module in semitone intervals. The transpose range is  $\pm 12$  semitones or one octave. The transpose function allows you to play in any key without transposing your playing.

### **Pitch Bend Range**

When NOT in General MIDI mode, this function sets the range of your MIDI keyboard pitch wheel or lever in semitones. The maximum pitch bend range is  $\pm 12$  semitones. Set the range for the amount of pitch bend you prefer. The default pitch bend range is  $\pm 02$  semitones.

### **Preset Change**

This function lets the Music Module utilize or ignore incoming MIDI preset change commands for each channel. Note that MIDI can only select presets 1-128.

### **MIDI Enable**

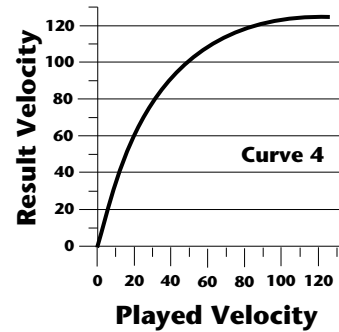
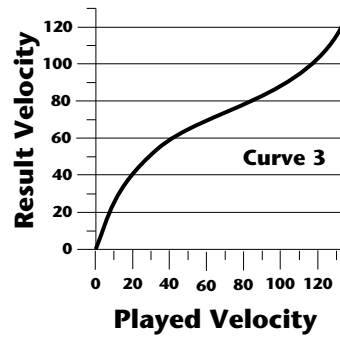
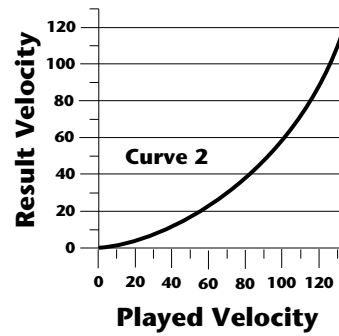
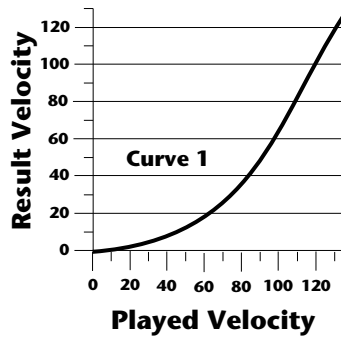
When in MIDI Multi mode, this function lets you turn each MIDI channel On or Off. This is useful when you have other MIDI devices connected and do not want the Music Module to respond to the MIDI channels reserved for the other devices.

---

## Master/Global Functions

### Velocity Curve

Incoming velocity data can be modified by a velocity curve in order to provide different types of dynamics in response to your playing or to better adapt to a specific MIDI controller. This function allows you to select one of the four velocity curves or leave the velocity data unaltered (Off).

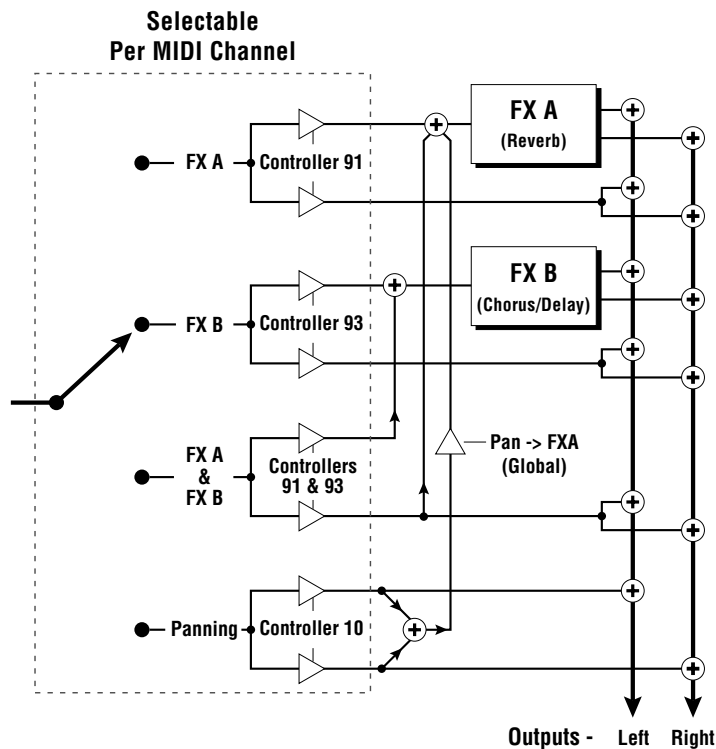




## Master/Global Functions

### Effect Routing

This function allows you to select one of the four effects routings for each of the 16 MIDI channels. The Music Module contains two separate effects processors, FX A and FX B. Selecting FX A & FX B sends the preset on that MIDI channel through both processors. Selecting panning allows you to position the sound in the stereo field. An additional path, Pan -> FX A, allows a programmable amount of the panning signal to be sent through FX A so you can have panning as well as an effect. There is only one Pan -> FX A amount for the entire machine. The effects amounts and pan positions are controlled by sending a MIDI continuous controller value on the appropriate MIDI channel.



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## ***Master/Global Functions***

### **MIDI Overflow**

When on, if you play more notes than the Music Module has channels (32), the additional note data will be directed out the MIDI Out port to a second Music Module in order to increase the polyphony to 64 channels. MIDI Overflow can be turned On or Off.

### **MIDI Controller Assign**

The Music Module allows you to assign up to four realtime control sources from your MIDI controller. These control sources could be modulation wheels, data sliders or whatever. In this screen, you set up which controllers will be received by the Music Module. These should match the MIDI controller numbers output by your MIDI keyboard. What kind of effect the controllers will actually have is pre-programmed separately as part of each preset. The MIDI controllers are each assigned a letter, A-D. Each controller letter can be assigned to a MIDI realtime controller from 01-31.

Note: If controller numbers 7 or 10 are selected, they will override the standard MIDI volume and pan control routings.

### **MIDI Footswitch Assign**

Like the MIDI Controllers, 3 MIDI footswitches can be assigned to MIDI footswitch numbers. Footswitches can be assigned numbers from 64-79. Destinations for the footswitch controllers are pre-programmed as part of each preset.

## General MIDI On/Off

The Music Module can be switched OUT of General MIDI mode. *There are several differences in the Music Module when NOT in General MIDI mode.*

- Channel 10 is not reserved exclusively for drums. All 193 presets can be accessed and all can be used on channel 10.
- The General MIDI voice channel assignment which protects channel 10 and gives low numbered channels highest priority is replaced with a rotational algorithm. No MIDI channel has priority over any other.
- Presets are numbered from 000-192. Presets 128-192 can be accessed using a Program -> Preset Mapping function. Incoming MIDI program (preset) changes can be translated into a different numbered preset. Each of the 128 preset numbers can be programmed to call up any of the 192 presets in a Music Module bank. For example, the program -> preset map could be programmed so that selecting program 26 on your MIDI controller calls up preset 129 in the Music Module. Without preset mapping, preset 129 could not be accessed over MIDI.

	0	1	2	3	4	5	6	7	8	9
00	00	01	02	03	04	05	06	07	08	09
10	44	191	50	01	15	88	151	78	99	88
20	34	73	106	55	43	75	129	120	121	180
30	30	31	32	33	34	35	36	37	38	39
40	40	41	42	43	44	45	46	47	48	49
50	50	51	52	53	54	55	56	57	58	59
60	60	61	62	63	64	65	66	67	68	69
70	70	71	72	73	74	75	76	77	78	79
80	80	81	82	83	84	85	86	87	88	89
90	90	91	92	93	94	95	96	97	98	99
100	100	101	102	103	104	105	106	107	108	109
110	110	111	112	113	114	115	116	117	118	119
120	120	121	122	123	124	125	126	127		

*This chart shows how MIDI preset changes can be re-mapped. In this example, program changes 10-29 have been re-mapped. All other programs will be selected normally.*



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***ABOUT MIDI***



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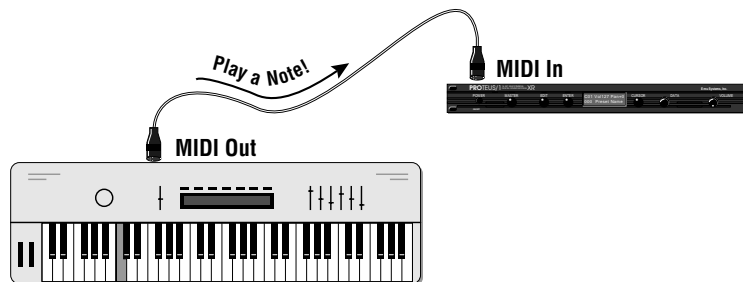
## About MIDI

### What it is

MIDI stands for Musical Instrument Digital Interface. MIDI is a worldwide standard interface which allows electronic musical instruments and computers to be connected together.

- MIDI cables and hardware are standardized so that equipment from different manufacturers will connect with a standard cable.
- The language that MIDI uses is standardized so that any MIDI instruments can communicate with each other.

At the most basic level, you can connect a MIDI keyboard to another MIDI instrument and be assured that the two will work together.



*A simple MIDI setup where one MIDI instrument controls another.*

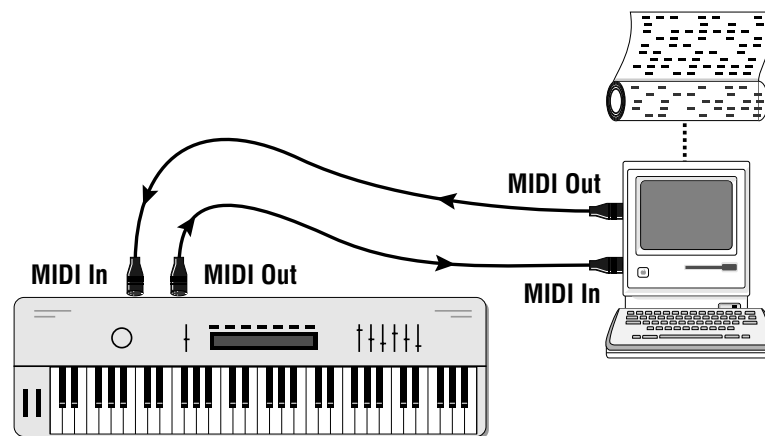
The MIDI cable does not carry sound information. Instead it transmits digital information about which keys were pressed, how hard they were pressed, when a key is released, and so on. In other words MIDI consists of *Control Information*. The MIDI cable is unidirectional, meaning that data can only flow in one direction. In order for instruments to talk back and forth, you would need two MIDI cables.

In the diagram above, the keyboard is the *MIDI Controller*. Other MIDI controllers include MIDI Guitar Controllers, MIDI Wind Controllers, and MIDI Drum Controllers.

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## About MIDI

This digital information can be recorded into a computer and played back later. This is somewhat like a player piano and its punched paper roll. The roll does not record the sound information, it just tells the piano which notes to play.



*MIDI conveys control information about which notes were played. A computer can record this information and play it back like a player piano.*

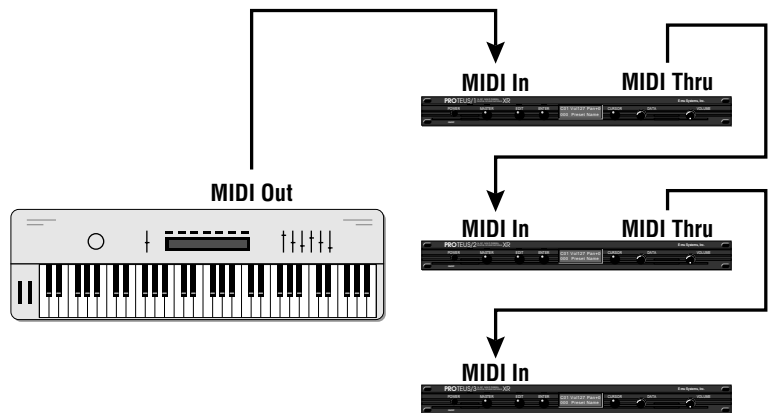
A device or a computer program that records sequences of Note On and Note Off messages is called a *Sequencer*. When you play the MIDI keyboard, it sends MIDI messages on its MIDI Out port to the computer sequencer, which records what keys were played and when they were played. When the sequence is played back, the computer sends the MIDI messages back to the keyboard which plays back the recorded performance.

Some MIDI devices have a third type of jack called *MIDI Thru*. MIDI Thru is simply a copy of the data from the MIDI In jack and allows you to connect several MIDI devices together in a daisy-chain arrangement.



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## About MIDI



*MIDI Thru allows you to “daisy-chain” several MIDI instruments.*

In addition to Note On and Note Off messages, *Velocity* information about how hard a key was pressed is also transmitted over MIDI. Almost all MIDI keyboards transmit velocity data. Velocity data is important in that it helps convey the emotion in the music. MIDI can recognize 127 different velocities

### Program Change

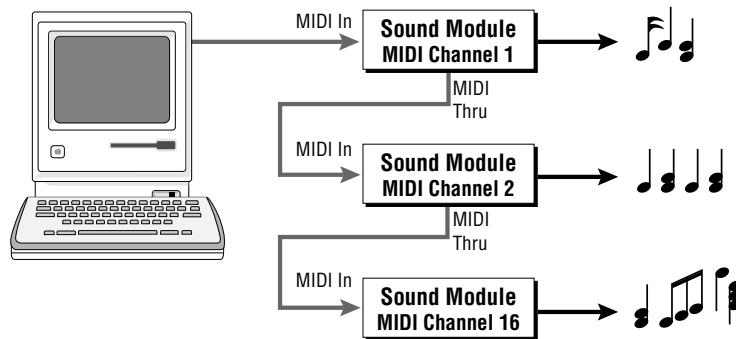
Another important type of MIDI message is the *Program Change*. The program change command tells the sound generator which sound to play, whether it be a piano, a trumpet, a helicopter or whatever. Over MIDI you can select from a palette of 128 different programs (or sounds). Suppose we wanted to playback a sequence of piano music with a guitar sound? No problem. Simply send a program change message telling the General MIDI synthesizer or sound module to play program 25, which is a nylon string guitar. Want to hear the same song played with bird tweets? Send program change number 124. Since the note information is separated from the sound, it's easy to try out your music with different instruments.

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## About MIDI

### MIDI Channels

So far we have been talking about just one sound at a time. However, using MIDI you can have up to 16 different instruments playing at one time. This is because there are MIDI provides 16 independent *Channels* of information for driving up to 16 synthesizers or other MIDI devices. A MIDI channel is rather like a channel on your TV set. If you tune in to one channel, you will not receive the other channels. The Music Module can receive on up to 16 MIDI channels simultaneously, which is like a TV with 16 screens! You can tune-in and listen to up to 16 different musical lines at once, selecting a different preset (*sound*) for each.



*Each of the 16 MIDI channels can play a separate musical line using a different sound.*

### MIDI Modes

There are four basic MIDI modes which determine how a MIDI instrument (such as the Music Module) will respond to a channelized MIDI message.

- *Omni Mode* - The instrument will respond to any and all MIDI channels.
- *Poly Mode* - The instrument will respond polyphonically to the selected MIDI channel only.
- *Mono Mode* - The instrument will respond monophonically only to the selected MIDI channel. This mode is used mainly for MIDI guitar and wind controllers.
- *Multi Mode* - This mode is similar to Poly Mode, except that the instrument can respond to multiple MIDI channels. This mode is very important in a multi-timbral instrument such as the Music Module.

The Music Module incorporates all four MIDI modes.

### Pitch Bend & Continuous Controllers

This is another type of MIDI message which is used to smoothly bend the pitch of a sound up or down (like a slide trombone). Most MIDI keyboards have a set of controls or wheels on the left side which are used for pitch bending and other functions. These controls can be wheels, knobs or levers. The pitch bend control is usually spring-loaded. The other control, traditionally called the modulation wheel or lever, is a general purpose control whose function can vary, depending on the sound module.

Pitch benders and modulation wheels come under a whole new category of MIDI messages called *Continuous Controllers*. Continuous controllers are normally used to add additional expression or control to your playing. These messages are channelized

---

## About MIDI

so that each of the 16 MIDI channels has its own set of Continuous Controllers. The MIDI specification provides for no less than 121 controllers per channel!

### Standardized MIDI Controller Numbers

1. Modulation Wheel or Lever
2. Breath Controller
3. Undefined
4. Foot Controller
5. Portamento Time
6. Data Entry MSB
7. Main Volume
8. Balance
9. Undefined
10. Pan
11. Expression Controller
12. Effect Control 1
13. Effect Control 2
  
64. Sustain Pedal
65. Portamento On/Off
66. Sostenuto
67. Soft Pedal
  
91. Reverb Depth (FX A)
93. Chorus Depth (FX B)

Many of these controls have standardized numbers. For example, *Volume* is assigned to controller number 7 and Stereo position or *Pan* is assigned to number 10. The pedals of a piano are also represented by standardized continuous controllers: Sustain Pedal = 64, Sostenuto Pedal = 66, Soft Pedal = 67. The Music Module can respond to 49 of the available controller numbers.

### System Messages

System messages include start/stop commands for starting sequencers and drum machines, MIDI clocks for synchronization. These messages are independent of channel assignments and act upon the entire system, hence their name.

**System Exclusive**

There is another category of MIDI system messages called *System Exclusive*. System Exclusive messages (or SysEx for short) are synthesizer-specific. In other words, each type of synthesizer or sound module has its own set of specialized messages. System Exclusive messages on the Music Module allow you or your computer to Remote Control every parameter on the Music Module. This is important, since the Music Module doesn't have many controls on its front panel. Thanks to SysEx and the Opcode Galaxy program, you can program literally hundreds of parameters on the Music Module if so desired. System Exclusive also allows you to transfer new sound programs into the Music Module. These sounds can either be purchased or of your own creation. Thus, you are NOT locked into a fixed set of sounds and you can customize the sounds to suit your own taste. The range of sounds is only limited by your imagination.

**General MIDI**

General MIDI is an optional set of guidelines which were developed to make MIDI even easier to use. General MIDI defines a minimum set of standards and regulate where sounds will be located within all General MIDI instruments. For instance, an acoustic grand piano will always be located at program #1; a nylon acoustic guitar will always be located at program #25, and so forth. Without General MIDI, sounds can be located wherever a particular manufacturer wants to put them. This can lead to confusion when trying to find a particular sound.

General MIDI also specifies that MIDI channel 10 will be used for percussion sounds only. It further specifies the keyboard locations of the various percussion instruments. General MIDI insures that sequences created on one synthesizer will play correctly on another.

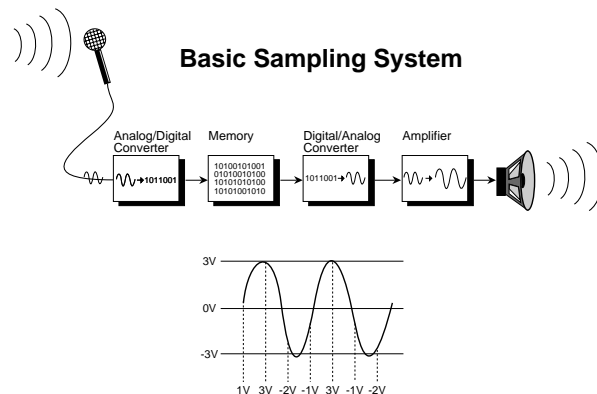
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## About the Sounds

The SoundEngine Music Module utilizes digital recordings of real instruments for the basis of its sound. This is similar to a tape recorder except that in the Music Module, the sounds are permanently recorded on digital memory chips instead of tape.

To perform this modern miracle, sounds and instrument waveforms are first sampled (recorded) into the Emulator III, our top of the line, 16 bit stereo digital sampler. After the sounds have been truncated, looped and processed, they are “masked” into the Music Module ROM (Read Only Memory) chips.

Conceptually, the sampling process is very simple, as shown in the Basic Sampling System diagram. As a sound wave strikes the diaphragm of a microphone, a corresponding voltage is generated. To sample the sound, the voltage level is repeatedly measured at a very high rate and the voltage measurements are stored in memory. To play the sound back, the numbers are read back out of memory, converted back into voltages, then amplified and fed to a speaker which converts the voltage back into sound waves. Of course, playing back 32 channels at different pitches tends to complicate matters, but this is basically how it works. In the Music Module, we have left out the Analog/Digital converter stage since the sounds are already sampled for you.



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***GLOSSARY***

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## ***Glossary***

### *AHDSR*

Abbreviation for Attack, Hold, Decay, Sustain, Release. These are basic parameters found on a synthesizer envelope generator. An envelope generator shapes various parameters of the sound over time, such as the volume or tonal content.

### *Aftertouch*

The ability of an instrument to respond to pressure applied to keyboard after the initial depression of the key.

### *Amplifier*

A device which increases the level of a signal.

### *Amplitude Modulation*

A change in level of a signal. For example, if a volume of a signal is modulated in a cyclical fashion, the musical effect is known as Tremolo.

### *Analog*

Data (signal) presented in non-digital, continuous form.

### *Attack*

The beginning of a sound transient. Or, the rate at which a sound reaches its maximum initial volume.

### *Bit*

A bit is a single piece of digital information assigned a value of 0 or 1 (off or on). Computers use words which are combinations of bits.

### *Bit Resolution*

The number of bits used in a digital audio system (such as the Music Module). The higher the number of bits that are used, the greater the dynamic range of the system. The Music Module is a 16 bit system, which is the same as a Compact Disk.

### *Byte*

A computer word made up of eight bits.



---

## **Glossary**

### *Cent*

A unit of pitch equal to 1/100th of a semitone.

### *Channel, MIDI*

An information pathway through which MIDI information is sent. MIDI provides for 16 available channels, each of which can address one MIDI instrument.

### *Chorus*

A voice doubling effect created by layering two identical sounds with a slight delay (20-50mS) and slightly modulating the frequency of one or both of the sounds.

### *Continuous Controller Messages*

A type of MIDI message used to add expression to a sound while it is playing.

### *Crossfade*

To gradually fade out one sound while another sound fades in so that a seamless transition is made between the two sounds.

### *Cursor*

A visual indicator showing the position of the next entry.

### *Data*

Information a computer needs in order to make decisions or carry out a particular action. Sound data is the digital information that is used to re-create the sound.

### *Delay*

A controllable time parameter giving the ability to start an event only after a predetermined amount of time.

### *Default*

The setting that a device uses if none have been selected by the user.

---

## ***Glossary***

### *Digital*

Equipment that uses quantities represented in binary (0 and 1) numbers.

### *Display*

A device that conveys information in visual form.

### *Dynamic Range*

The range of the softest to the loudest sound that can be produced by an instrument.

### *Edit*

To change or modify information. To change parameters or modify existing information.

### *Envelope Generator*

A device, usually triggered by pressing a key on a keyboard, that generates a programmable, changing curve with respect to time. The resulting envelope can be programmed to automatically change various parameters within the synthesizer.

### *Equal Temperament*

A scaling system where the octave is divided into twelve equal parts. The ratio of frequencies between any two adjacent notes is exactly the same. Most keyboard instruments are scaled in this manner.

### *Equalization*

A process by which various frequency ranges in the sound can be increased or decreased. Equalization can be used to make a sound more natural or to make it sound radically different.

### *Flange*

An effect created by layering identical sounds with a slight delay (1-20mS) and mixing the two sounds back together causing a complex comb filtering effect.

---

## **Glossary**

### *Frequency*

The number of cycles of a waveform occurring in a second.

### *Frequency Modulation*

Abbreviated FM. The process of changing the pitch of a wave by another cyclic wave. If a low frequency is used to modulate the wave, the musical effect is called vibrato (as when a singer modulates his or her voice).

### *General MIDI*

An optional set of guidelines for MIDI instruments which provides standards for compatibility between instruments. General MIDI specifies such things as the minimum number of voices, location of programs, percussion locations, etc. The idea being that music created on one MIDI instrument can be played back on another instrument even if it is made by a different manufacturer.

### *Ground Loop*

A hum caused by currents circulating through the ground side of a piece of equipment or a system.

### *Hertz (Hz)*

A unit of frequency equal to 1 cycle per second.

### *Interface*

A device which allows two different pieces of equipment to interconnect. A MIDI interface allows musical instruments and computers to interconnect.

### *Keyboard Assignment*

The assignment of specific sounds to an area of the keyboard.

### *Kilobyte*

One thousand bytes of data. (*Actually 1024 bytes of data, but close enough to 1000.*)

---

## **Glossary**

### *Layering*

The ability to place two or more sounds on the same keyboard keys in order to create a thicker sound.

### *LFO*

Abbreviation for Low Frequency Oscillator. An oscillator used for modulation whose frequency is below the audible range (20 Hz).

### *Line Output*

A high level audio output such as the output from a CD player or tape recorder.

### *Loop*

Looping is the process of repeating a portion of the sound over and over in order to create a sustaining sound. The looping will usually continue as long as the key is pressed.

### *Mapping, MIDI*

The ability of a instrument to select a different, programmable program change message than the one received. For example, a MIDI mapper could be programmed to call up program 21 whenever program 01 was selected.

### *Megabyte*

One million bytes. (*Well... actually 1,048,576 bytes of data, but close enough .*)

### *MIDI*

Acronym for Musical Instrument Digital Interface. MIDI enables synthesizers, sequencers, computers, etc. to be connected together using a standard interface and language.

### *MIDI Channel*

MIDI contains the provision for up to 16 channels which can each play a separate sound and musical line.

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## **Glossary**

### *MIDI Interface*

A device which allows multiple musical instruments or musical instruments and computers to interconnect.

### *MIDI Port*

The hardware connector using a five-pin DIN type jack.

### *MIDI Software*

A computer program which can record/play back, modify, or otherwise manipulate MIDI data.

### *MIDI Song File*

A standard format for transferring MIDI song data between devices. Because it is a standard, songs can be played on different types of equipment.

### *Modulation*

The process of one sound or control source influencing a parameter of a sound.

### *Multi-timbral*

The ability of a musical instrument to produce two or more sounds or timbres at the same time.

### *Notation Software*

A computer program which displays MIDI note messages in standard musical notation.

### *Pan*

To move an audio signal from one output to another (left to right) in order to change the apparent position of the sound.

### *Patch*

Refers to a particular sound created on a synthesizer.

### *Percussion Mapping*

The keyboard positions of percussion sounds, where each key plays a different sound.

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## **Glossary**

### *Percussion Sound*

Sounds of percussion instruments such as drums, cymbals wood blocks, etc.

### *Pitch Bend*

A MIDI channel message which allows the pitch of a sound to be smoothly changed by the player.

### *Polyphony*

The number of simultaneous notes that an instrument is able to play at once. The Music Module is 32 note polyphonic.

### *Port*

The hardware connector through which digital data is transmitted or received.

### *Preset*

A preprogrammed sound and control setup on an electronic musical instrument. Also called Programs in MIDI. Presets or programs can be made up in advance of a performance, stored in memory, then recalled instantly when desired.

### *Program Change Message*

A MIDI channel message used to select different programs (presets).

### *Realtime*

Occurring in actual time or live.

### *Reverb*

Short for Reverberation. Reverb gives the effect of playing in various types of room such as in a cathedral, or large hall.

### *Sampling*

The process of digitally recording a sound.

### *Sequencer*

A device or software program which records and plays back performance data such as key presses, program changes, control

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## ***Glossary***

changes, etc. A sequencer works like a player piano in that the actions of the player are recorded, not the actual sounds.

### *Serial Interface*

A computer interface in which data is passed over a single line, one bit at a time. MIDI uses a serial interface.

### *Software*

The programs or sets of instructions describing the tasks to be performed by a computer. A computer program

### *Synthesizer*

A device which is capable of generating a variety of sounds.

### *Timbre*

Tone color. The quality of a sound that distinguishes it from another sound with the same pitch.

### *Velocity*

A MIDI parameter which describes how quickly a key was depressed.

### *Vibrato*

A cyclic change in pitch, usually in the range of 7 to 14 Hz.





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***REFERENCE SECTION***

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## **Preset Listing**

## **Banks 1 & 2**

### **Keyboards**

1. Acoustic Grand Piano
2. Bright Acoustic Piano
3. Electric Grand Piano
4. Honky Tonk Piano
5. Electric Piano1
6. Electric Piano2
7. Harpsichord
8. Clavinet

### **Chromatic Percussion**

9. Celesta
10. Glockenspiel
11. Music Box
12. Vibraphone
13. Marimba
14. Xylophone
15. Tubular Bells
16. Dulcimer

### **Organ**

17. Drawbar Organ
18. Percussive Organ
19. Rock Organ
20. Church Organ
21. Reed Organ
22. Accordion
23. Harmonica
24. Tango Accordion

### **Guitar**

25. Nylon String Guitar
26. Steel String Guitar
27. ElectricGuitar (Jazz)
28. Electric Guitar (Clean)
29. ElectricGuitar (Muted)
30. Overdrive Guitar
31. Distortion Guitar
32. Harmonics

### **Bass**

33. Acoustic Bass
34. Electric Bass (finger)
35. Electric Bass (pick)
36. Fretless Bass
37. Slap Bass 1
38. Slap Bass 2
39. Synth Bass 1
- 40 Synth Bass 2

### **Strings**

41. Violin
42. Viola
43. Cello
44. Contrabass
45. Tremolo
46. Pizzicato
47. Orchestral Harp
48. Timpani

### **Ensemble**

49. String Ensemble 1
50. String Ensemble 2
51. Synth Strings 1
52. Synth Stings 2
53. Choir Aahs
54. Voice Oohs
55. Synth Voice
56. Orchestra Hit

### **Brass**

57. Trumpet
58. Trombone
59. Tuba
60. Muted Trumpet
61. French Horn
62. Brass Section
63. Synthbrass 1
64. Synthbrass 2

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## **Banks 1 & 2**

## **Preset Listing**

### **Reeds**

- 65. Soprano Sax
- 66. Alto Sax
- 67. Tenor Sax
- 68. Baritone Sax
- 69. Oboe
- 70. English Horn
- 71. Bassoon
- 72. Clarinet

### **Pipes**

- 73. Piccolo
- 74. Flute
- 75. Recorder
- 76. Pan Flute
- 77. Blown Bottle
- 78. Shakuhachi
- 79. Whistle
- 80. Ocarina

### **Synth - Lead**

- 81. Synth Lead 1 (square)
- 82. Synth Lead 2 (sawtooth)
- 83. Synth Lead 3 (calliope)
- 84. Synth Lead 4 (chiff)
- 85. Synth Lead 5 (charang)
- 86. Synth Lead 6 (voice)
- 87. Synth Lead 7 (fifths)
- 88. Synth Lead 8 (bass & lead)

### **Synth - Pad**

- 89. Synth Pad 1 (new age)
- 90. Synth Pad 2 (warm)
- 91. Synth Pad 3 (polysynth)
- 92. Synth Pad 4 (choir)
- 93. Synth Pad 5 (bowed)
- 94. Synth Pad 6 (metallic)
- 95. Synth Pad 7 (halo)
- 96. Synth Pad 8 (sweep)

### **Synth - Effects**

- 97. Synth FX 1 (rain)
- 98. Synth FX 2 (soundtrack)
- 99. Synth FX 3 (crystal)
- 100. Synth FX 4 (atmosphere)
- 101. Synth FX 5 (brightness)
- 102. Synth FX 6 (goblins)
- 103. Synth FX 7 (echoes)
- 104. Synth FX 8 (sci-fi)

### **Ethnic**

- 105. Sitar
- 106. Banjo
- 107. Shamisen
- 108. Koto
- 109. Kalimba
- 110. Bagpipe
- 111. Fiddle
- 112. Shanai

### **Percussion**

- 113. Tinkle Bell
- 114. Agogo
- 115. Steel Drums
- 116. Woodblock
- 117. Taiko Drum
- 118. Melodic Tom
- 119. Synth Drum
- 120. Reverse Cymbal

### **Sound Effects**

- 121. Fret Noise
- 122. Breath Noise
- 123. Seashore
- 124. Bird Tweet
- 125. Telephone
- 126. Helicopter
- 127. Applause
- 128. Gunshot

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**Drum Sets**  
*(MIDI Channel 10)*

**Banks A & B**

- |     |                |     |                  |
|-----|----------------|-----|------------------|
| 1.  | STANDARD**     | 40. | mc-64/32*        |
| 2.  | Standard Link  | 41. | BRUSH            |
| 3.  | AMBIENT**      | 42. | MC-64 Link 2*    |
| 4.  | Ambient Link   | 43. | MC-64 Link 1*    |
| 5.  | SPATIAL KIT    | 44. | Kicks**          |
| 6.  | STUDIO DRUMS   | 45. | Kick Link        |
| 7.  | GATED**        | 46. | Snares**         |
| 8.  | Gated Link     | 47. | Snare Link 1     |
| 9.  | ROOM**         | 48. | Snare Link 2     |
| 10. | Room Link      | 49. | Orchestral**     |
| 11. | SLAPBACK SET   | 50. | Orchestra Link 1 |
| 12. | RADICAL KIT    | 51. | Orchestra Link 2 |
| 13. | MODERN         | 52. | STRONG SET       |
| 14. | SPACE DRUMS    | 53. | MUFFLED SET      |
| 15. | FLANGE KIT     | 54. | PUNCHY KIT       |
| 16. | REVERSE        | 55. | DRY SET          |
| 17. | POWER**        | 56. | MONDO KIT        |
| 18. | Power Link 1   | 57. | Empty Preset     |
| 19. | Power Link 2   | 58. | R & B KIT        |
| 20. | CHORUS DRUMS   | 59. | CLUB SET         |
| 21. | FOLK KIT**     | 60. | PICCOLO SET      |
| 22. | Folk Link      | 61. | Jingle Bells*    |
| 23. | Electro Link 1 | 62. | Bell tree A*     |
| 24. | Electro Link 2 | 63. | Bell tree B*     |
| 25. | ELECTRONIC**   | 64. | Heli Link*       |
| 26. | TR-808**       |     |                  |
| 27. | TR-808 Link    |     |                  |
| 28. | BOOMER DRUMS** |     |                  |
| 29. | Boomer Link    |     |                  |
| 30. | ROCK DRUMS     |     |                  |
| 31. | BIG SET        |     |                  |
| 32. | TIGHT SET      |     |                  |
| 33. | JAZZ**         |     |                  |
| 34. | Jazz Link      |     |                  |
| 35. | LOUNGE SET     |     |                  |
| 36. | BIG BASS DRUM  |     |                  |
| 37. | STEREO KIT     |     |                  |
| 38. | PITCH DROP     |     |                  |
| 39. | PITCH RISE     |     |                  |

***Kits in ALL CAPS***

Alternate sets which are compatible with General MIDI sequences.

\* Indicates a linked preset.

\*\* Linked to the following preset(s).

## **General MIDI Standard Drum Sets**

Kick Drum 2	35	
Kick Drum 1	36	
Snare Drum 1	38	Rim Shot
Snare Drum 2	40	Hand Clap
Low Floor Tom	41	
High Floor Tom	43	Closed Hi-Hat
Low Tom	45	Pedal Hi-Hat
Low Mid Tom	47	Open Hi-Hat
High Mid Tom	48	
High Tom	50	Low Crash Cymbal
Chinese Cymbal	52	Low Ride Cymbal
Ride Cymbal Bell	53	
Splash Cymbal	55	Tambourine
High Crash Cymbal	57	Cowbell
High Ride Cymbal	59	Vibraslap
High Bongo	60 <b>C4</b>	
Muted High Conga	62	Low Bongo
Low Conga	64	Open High Conga
High Timbale	65	
Hi Agogo	67	Low Timbale
Cabasa	69	Low Agogo
Short Whistle	71	Maracas
Long Whistle	72	
Long Guiro	74	Short Guiro
High Wood Block	76	Claves
Low Wood Block	77	
Open Cuica	79	Mute Cuica
Open Triangle	81	Mute Triangle
Jingle Bell	83	Shaker
Bell Tree	84	
Muted Surdo	86	Castanets
		Open Surdo

---

## **Specifications**

<i>Audio Channels:</i>	32
<i>Audio Outputs:</i>	2
<i>Max. Output Level:</i>	+4 dB into 600Ω
<i>Output Impedance:</i>	1KΩ
<i>MIDI:</i>	In, Out, Thru
<i>Data Encoding:</i>	16 bit Linear
<i>Sample Playback Rate:</i>	39 kHz
<i>Signal to Noise:</i>	>90 dB
<i>Dynamic Range:</i>	>90 dB
<i>Frequency Response:</i>	20 Hz-15 kHz
<i>THD +N:</i>	<.05%
<i>IMD:</i>	<.05%
<i>Stereo Phase:</i>	Phase Coherent ±1° at 1 kHz
<i>Power Requirements:</i>	25 watts
<i>Dimensions:</i>	H: 1.5" W: 7.25" L: 9.5"
<i>Weight:</i>	2 lb, 12 oz (1.25 Kg)

## *MIDI Implementation Chart*

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	No No	1 1-16	
Mode	Default Messages	Yes	Mode 1, 3, 4 MONO, POLY OMNI, ON/OFF *	* Mode change is ignored in general MIDI mode.
Note Number	True Voice	No No	0-127 0-127	
Velocity	Note ON Note OFF	No No	Yes v=1-127 No	
After Touch	Keys Channels	No No	Yes Yes	
Pitch Bender		No	Yes	
Control Change		No	Yes	0-31 64-79
Program Change	True Number	No No	Yes 0-127 Yes 0-127	
All Sound Off		No	Yes	
All Notes Off		No	Yes	
Reset All Controllers		No	Yes	
System Exclusive		Yes	Yes	
System Common	:Song Pos :Song Sel :Tune	No No No	No No No	
System Real Time	:Clock :Commands	No No	No No	
Aux Messages	:Local On/Off :Active Sense :Reset	No No No	No No No	
<b>Notes:</b> Pan 0=hard left 127=hard right Mode 1: OMNI ON, POLY    Mode 2: OMNI ON, MONO Mode 3: OMNI OFF, POLY    Mode 4: OMNI OFF, MONO				

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## ***MIDI Specifications***

### **About this MIDI Specification**

This section of the manual is included to provide a complete MIDI specification for programmers or MIDI power users. Most of the Music Module's sound programming functions are only accessible via MIDI SysEx. The Edit One program by Opcode allows access to all of the synthesizer parameters.

### **Dual MIDI Modes**

The SoundEngine Music Module incorporates two MIDI modes which affect the way the Music Module responds to incoming MIDI messages.

### **Mode 1 - General MIDI Mode - F0 7E 00 09 01 F7**

The Music Module responds according to the General MIDI spec. On power-up, this mode is automatically invoked and both banks of General MIDI presets are loaded into RAM. General MIDI mode has several features that differ from Non-General MIDI mode.

- Channel 10 is dedicated to drums. Incoming preset changes on channel 10 are automatically routed to percussion presets which are internally mapped at preset locations 129-192. Preset numbers greater than #63 will be ignored on channel 10.

- Voice channels are assigned to MIDI channels in the order: 10, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16. There are also default minimum voice channels assignments.

*Channel 1:* 8 minimum voice channels  
*Channels 2-3:* 4 minimum voice channels  
*Channels 4-9:* 2 minimum voice channels  
*Channel 10:* 4 minimum voice channels  
*Channels 11-16:* 0 minimum voice channels



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## ***MIDI Specifications***

These minimum channel numbers can be changed via System Exclusive command, however the sum of the minimum number of voice channels cannot exceed 32.

- Channel Volumes and Expression Controller. The Music Module powers up with all channel volumes set to 100 instead of the maximum of 127. This allows use of an expression controller (on continuous controller channel 11) to increase the volume of any given channel by up to 6dB.

### **Mode 2 - Proteus Mode - F0 7E 00 09 02 F7**

In this mode, the Music Module behaves in a manner very similar to the Proteus line of sample players, with the addition of digital effects. (Proteus is E-mu's line of professional sound modules utilizing technology and architecture very similar to the Sound Engine Music Module.)

- MIDI channel 10 is NOT reserved for drums. It acts the same as any other MIDI channel.
- Voice channels are assigned in a circular order with a voice stealing algorithm based on the release of a voice channel's volume envelope. There is no feature to assign a minimum number of voice channels per MIDI channel.
- Channel volumes default to 127 on power-up. There is no expression controller.
- Presets range from 000-192. A Program->Preset mapping feature allows presets higher than 127 to be accessed over MIDI.

## MIDI Specifications

### Received Channel Commands

Channels number (n) = 0-15. Message bytes are represented in hex. All other numbers are decimal. Running Status is supported.

Command	Message	Comments
<i>Note Off</i>	8n kk vv	rel. velocity ignored
<i>Note On</i>	9n kk vv	velocity 0 = note off
<i>Key Aftertouch</i> •	An kk vv	kk=0-127 vv=0-127
<i>Program Change</i>	Cn vv	0-127
<i>Channel Aftertouch</i>	Dn vv	0-127
<i>Pitch Bend</i>	En ll mm	l = lsb, m = msb
<i>Realtime Controller</i>	Bn cc vv	cc = 00-31
<i>Footswitch</i>	Bn cc vv	cc=64-79, vv≥64=on
<i>Volume</i>	Bn 07 vv	0-127
<i>Pan</i>	Bn 0A vv	0 = hard left, 127 = hard right
<i>Effect A Amount</i>	Bn 5B ee	ee = effect A amt.
<i>Effect B Amount</i>	Bn 5D ee	ee = effect B amt.
<i>Reset All Controllers</i>	Bn 79 00	ignored-omni mode
<i>All Notes Off</i>	Bn 7B 00	ignored-omni mode
<i>Omni Mode Off</i> * †	Bn 7C 00	**
<i>Omni Mode On</i> * †	Bn 7D 00	**
<i>Mono Mode On</i> * †	Bn 7E 00	**
<i>Poly Mode On</i> * †	Bn 7F 00	**

\* Proteus Mode Only

† Special Notes: See following page

\*\* forces all notes & controls off

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## ***MIDI Specifications***

**† Special Notes** in Proteus Mode (from previous page)

<i>From Omni Mode</i>	Omni Off turns Poly On.
<i>From Poly Mode</i>	Omni On turns Omni On; Mono On turns Mono On.
<i>From Mono Mode</i>	Mono Off turns Poly On; Omni On turns Omni On.
<i>From Multi Mode</i>	Omni On turns Omni On; Omni Off or Mono Off turns Poly On; Mono On turns Mono On.

All other changes have no effect.

### **General Information For Sound Engine Music Module SysEx**

- Product ID for SoundEngine Music Module is *04*.
- Device ID is *00*.
- Parameter Number and Parameter Value are 2 bytes each.
- Since MIDI data bytes cannot be greater than [7F] (127 decimal), the data values are “nibble-ized” to a 14-bit signed 2's complement format.
- There is only one edit buffer which is for the current preset (the preset shown in the display). Only one preset at a time can be edited via SysEx commands and changing the current preset erases the edit buffer.

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## **MIDI Specifications**

### **MIDI SysEx Commands**

For system exclusive commands, the following format is used:

F0	system exclusive status byte
18	E-mu ID byte
04	product ID byte
00	device ID byte
cc	command byte
...	data bytes
F7	EOX

### **SysEx Editing**

Preset and setup parameters may be edited individually using system exclusive commands. The preset being edited is the active preset (the preset on the basic or global channel). The value of a given parameter may be changed by sending a *parameter value* command. The value of a parameter may be read by sending a *parameter value request*, to which the machine will respond by sending back the parameter value. Please note that there is only one edit buffer

Two MIDI bytes (lsb, msb) are required for each 14 bit data word. Bits 0-6 are sent first, followed by bits 7-13 in the next MIDI byte. All data words are signed 2's complement values with sign-extension out to the most significant bit (bit 13). This convention applies to all data words, regardless of the parameter's value range.

Preset data may also be transmitted or received in a single block (one complete preset) using system exclusive commands. A *preset data request* may be issued by a host computer, to which the machine will respond sending the data block for the requested preset. Conversely, the computer may send new preset data which will replace the specified preset.

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## ***MIDI Specifications***

The preset memory on the Music Module is *volatile*, meaning that any changes made to presets will be lost unless the data is saved to the host computer. The factory ROM presets are automatically downloaded into RAM on power-up.

The editor package supplied with the Music Module contains a full-featured librarian which makes it easy to build a custom library of sounds.

*Warning:* When transferring preset banks and tuning table data back and forth from the Music Module to a computer, the data should be recorded as you would a regular sequence. Sending the data in one huge chunk will clog the input buffer on the Music Module unless a time period of approximately 100 mS is inserted between each preset.

## MIDI Specifications

### Received System Exclusive Commands

Command	Message	Comments
<i>Preset Data Req.</i>	F0 18 04 00 00 ll mm F7	ll= preset # lsb mm = msb see note 6
<i>Preset Data</i>	F0 18 04 00 01 ll mm ... cs F7	cs=checksum
<i>Parameter Value Request</i>	F0 18 04 00 02 pl pm F7 pl = parameter # lsb pm = msb	
<i>Parameter Value</i>	F0 18 04 00 03 pl pm vl vm F7 pl = parameter # lsb pm = msb vl = value lsb vm = msb	
<i>Tuning Table Req.</i>	F0 18 04 00 04 F7	see note 7
<i>Tuning Table</i>	F0 18 04 00 05 ... .. F7	262 bytes
<i>Program Map Req.</i>	F0 18 04 00 06 F7	see note 8
<i>Program Map Data</i>	F0 18 04 00 07 ... .. F7	262 bytes
<i>Master Setting Req.</i>	F0 18 04 00 08 F7	
<i>Version Request</i>	F0 18 04 00 0A F7	see note 1
<i>Configuration Req.</i>	F0 18 04 00 0C F7	see note 2
<i>Instrument List Req.</i>	F0 18 04 00 0E F7	see note 3
<i>Preset List Request</i>	F0 18 04 00 12 F7	see note 4
<i>Master Volume Set</i>	F0 18 04 00 14 vv F7	vv = Vol 0-127
<i>Master Volume Req.</i>	F0 18 04 00 16 F7	
<i>Front Panel Request</i>	F0 18 04 00 17 F7	see note 9

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## MIDI Specifications

### Received System Exclusive Commands

<b>Command</b>	<b>Message</b>	<b>Comments</b>
<i>Switch Press</i>	F0 18 04 00 19 0s F7	<i>see note 9</i>
<i>Current Bank Req.</i>	F0 18 04 00 1A F7	
<i>Bank Select</i>	F0 18 04 00 1B bb F7	<i>bb = 0 or 1</i>
<i>Option Status</i>	F0 18 04 00 1C oo F7	<i>see note 10</i> <i>oo = option #</i>
<i>Set Option Status</i>	F0 18 04 00 1D oo vv F7	<i>see note 10</i> <i>oo = option #; vv = status; 00 = Off, 01 = On</i>
<i>Read Min Voices</i>	F0 18 04 00 1E cc F7	<i>see note 10</i> <i>cc = MIDI chan 0-15</i>
<i>Set Min Voices</i>	F0 18 04 00 1F cc vv F7	<i>see note 10</i> <i>cc = MIDI chan 0-15; vv = min # of voices per channel</i>
<i>Read Max Voices</i>	F0 18 04 00 20 cc F7	<i>see note 10</i>
<i>Set Max Voices</i>	F0 18 04 00 21 cc vv F7	<i>see note 10</i>
<i>Save Edit Buffer</i>	F0 18 04 00 22 ll mm F7	<i>see note 11</i>
<i>System Reset</i>	F0 18 04 00 23 F7	<i>resets system to</i> <i>power-up condition</i>
<i>General MIDI On</i>	F0 7E 00 09 01 F7	<i>turns general</i> <i>MIDI On</i>
<i>General MIDI Off</i>	F0 7E 00 09 02 F7	<i>turns general</i> <i>MIDI Off</i>

## MIDI Specifications

### Transmitted System Exclusive Commands

Command	Message	Comments
<i>Preset Data</i>	F0 18 04 00 01 ll mm ... .. cs F7 <i>ll</i> = preset # <i>lsb</i> <i>mm</i> = <i>msb</i> <i>cs</i> = <i>checksum</i>	
<i>Parameter Value</i>	F0 18 04 00 03 pl pm vl vm F7 <i>pl</i> = parameter # <i>lsb</i> <i>pm</i> = <i>msb</i> <i>vl</i> = value <i>lsb</i> <i>vm</i> = <i>msb</i>	
<i>Tuning Table Data</i>	F0 18 04 00 05 ... .. F7 <i>TT data</i> = 256 bytes	
<i>Program Map Data</i> * ... .. F7		F0 18 04 00 07 <i>see note 8</i>
<i>Version Data</i>	F0 18 04 00 0B 01 r1 r2 r3 F7	<i>see note 1</i>
<i>Configuration Message</i>	F0 18 04 00 0D pl pm s1 l1 m1 s2 l2 m2 F7	<i>see note 2</i>
<i>Instrument List</i>	F0 18 04 00 0F (14 bytes/instr.) ... F7	<i>see note 3</i>
<i>Preset List</i>	F0 18 04 00 13 (13 bytes/preset) ... .. F7	<i>see note 4</i>
<i>Master Volume</i>	F0 18 04 00 14 vv F7	vv = vol 0-127
<i>Front Panel Data</i>	F0 18 04 00 18 aa...aa cc ll F7	<i>see note 9</i>
<i>Current Bank #</i>	F0 18 04 00 1B bb F7	bb = bank # 0 or 1
<i>Option Status</i>	F0 18 04 00 1D oo vv F7	<i>see note 10</i>
<i>Min Voices</i>	F0 18 04 00 1F cc vv F7	<i>see note 10</i>
<i>Max Voices</i>	F0 18 04 00 21 cc vv F7	<i>see note 10</i>

\* *Proteus mode only*



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## ***MIDI Specifications***

### **• Note 1 - Version Request**

This command allows identification of machine type and software revision. The Music Module will respond to the request with the version data: F0 18 04 00 0B 01 r1 r2 r3 F7  
r1, r2, r3 = software revision # in ascii (decimal point between r1 & r2).

### **• Note 2 - Configuration Message**

This MIDI command is used to identify the sound sets in a given Music Module. The configuration request command is: F0 18 04 00 0C F7

The Music Module will respond to this command with the configuration message: F0 18 04 00 0D p1 pm s1 l1 m1 s2 l2 m2 F7

where p1 and pm are the lsb and msb of the total number of presets, s1 and s2 are the ID numbers of the sound sets contained in this unit, and n1=l1, m1 and n2=l2, m2 represent the lsb and msb of the number of instruments in each sound set. If no expansion set is present, s2 will be 7F and n2 will be zero. *Sound Engine General MIDI Sound Set = 5.*

### **• Note 3 - Instrument List**

This MIDI command allows external software to upload the instrument list as an array of ASCII strings. The instrument list request command is:

F0 18 04 00 0E F7

The Music Module will respond to this command with the instrument list message:

F0 18 04 00 0F (14 bytes per instrument) ... .. F7

---

## **MIDI Specifications**

The instruments are transmitted in the same order they appear to the user on the Music Module. Note that a given instrument's position in this list may be different from its actual number within the sound set.

instrument entry:      il im (11 ascii bytes) 00

Each instrument entry in the list consists of the actual instrument number (as defined in "Sound Sets" - note 12) in lsb, msb format, followed by the instrument name (11 ascii characters plus a zero terminator) for a total of 14 (decimal) bytes. The first instrument is #1 as displayed on the Music Module. The total number of instrument names is equal to (n1+n2) in the configuration message above.

### **• Note 4 - Preset List**

This MIDI command allows external software to upload all preset names as an array of ASCII strings. The preset list request command is:

F0 18 04 00 12 F7

The Music Module will respond to this command with the preset list message:

F0 18 04 00 13 (13 bytes per preset) ... .. F7

Each preset name is 12 ascii characters, plus a zero terminator, for a total of 13 (decimal) bytes. The first preset is #0. The total number of preset names is equal to pp in the configuration message above.

---

## MIDI Specifications

### • Note 6 - Preset Data Request

Music Module presets are organized into ranges. Each range consists of 64 presets. The Music Module has three ranges of presets (0-191). Ranges may be requested using the preset request command and the appropriate preset code listed below. The two codes for ranges 0-63, 64-127 are functionally identical.

Preset Range	Preset Code	MIDI Message
0-63	1024	F0 18 04 00 00 00 08 F7
64-127	1025	F0 18 04 00 00 01 08 F7
128-191	1026	F0 18 04 00 00 02 08 F7
64-127	-1	F0 18 04 00 00 7F 7F F7
0-63	-2	F0 18 04 00 00 7E 7F F7

### • Note 7 - Alternate Tuning

The “user tuning table” allows any key to be tuned to an arbitrary pitch over an 8 octave range. If selected in the preset, an alternate tuning may be achieved by modifying the tuning values from the front panel or downloading a new table into the machine. The table consists of 128 words, corresponding to the MIDI key range. Each word is a pitch value expressed in 1/64 semitones, offset from key number 0 (c-2). Therefore, for equal temperament, each entry in the table would be equal to its key number times 64.

### • Note 8 - Program Mapping (*Proteus Mode only*)

MIDI program changes will normally correspond to internal preset numbers 0-127. However, the user may “re-map” any MIDI program number, assigning it to an arbitrary internal preset. This feature allows any of the internal presets to be selected from a MIDI keyboard controller.

---

## **MIDI Specifications**

### **• Note 9 - Front Panel Data**

The front panel request uploads the ASCII text data that would normally be displayed on the LCD of a standard Proteus. The request message is: *FO 18 04 00 17 F7*.

The Sound Engine Music module responds with: *FO 18 04 00 18 aa...aa cc 01 F7*. Where *aa = 32 ASCII* bytes representing the text on the screen, starting in the top left hand corner of the LCD and moving to the bottom right. *cc = LCD cursor position* (0 to 1F, 0 = top left, 10 = bottom left, 1F = bottom right). If a cursor position is specified that exceeds 32, then the cursor will disappear from the screen. This condition is called "Cursor at Rest" and is used for a one way system dialog to the user.

*01 = LED Status Bits (1 = on, 0 = off)*

Bit 0: Master LED

Bit 1: Edit LED

Bit 2-3: Enter LED; 0 = off, 1 = on, 2 = flashing

Bit 4-7 Unused, always zero

Switch Press command is: *FO 18 04 00 19 0s F7*, where *s* is the switch number defined below.

- 0 Master switch press and release
- 1 Edit switch press and release
- 2 Enter switch press and release
- 3 Rotary Encoder decrement by one
- 4 Cursor switch press and release
- 5 Rotary Encoder increment by one

---

## ***MIDI Specifications***

### **• Note 10 - User Definable Options**

Several options can be enabled or disabled via SysEx messages. These options apply only to General MIDI mode. Upon exiting General MIDI mode options will be restored to default settings.

*Read Option Status* - Reports the status of the selected option.

*Set Option Status* - Turns the selected option Off or On.

*Read Minimum Voices* - Reads the current minimum number of voices for the designated MIDI channel.

*Set Minimum Voices* - Sets the minimum number of voices allocated to a given MIDI channel.

*Read Maximum Voices* - Reads the current maximum number of voices allocated to the designated channel.

*Set Maximum Voices* - Sets the maximum number of voices allocated to a given MIDI channel.

#### *Option 0 - MPC Map (default on)*

All incoming MIDI data on channels 13-16 is ignored. This option maintains compatibility with the MPC extended model.

#### *Option 1 - MIDI Channel Prioritization (default on)*

This option enables and disables the General MIDI channel prioritization and minimum/maximum polyphony scheme. The default minimums are: Channel 1:8, channels 2-3:4, channels 4-9:2, channel 10:4, channels 11-16:0. The default maximums are all 32, except for the percussion channel which defaults to 16. When Off, channel priority reverts to a circular assignment mode.

#### *Option 2 - Exclusive Drums (default off)*

Exclusive Drums prevents percussion and instrument parts from ever stealing voices from each other. This works by limiting the non-percussion polyphony to 32-n, where n is the maximum

---

## **MIDI Specifications**

polyphony assigned to the non-percussion channel. For example, if the maximum number of percussion voices is 8, there will be a maximum of 24 voices available for other instruments. When this option is selected, the individual maximum-voice settings for the non-percussion channels will not be in effect. Option 1 must be turned on for this option to have any effect.

### *Option 3 - Single Assign Drums (default off)*

This option causes new notes on the percussion channel to mute any of the currently sounding voice channels having the same MIDI note number. Option 1 must be On for this option to have any effect.

### *Option 4 - Show Preset Plus One (default on)*

Whenever a preset is displayed, an offset of one is added to the number. This means that the presets correspond to the General MIDI numbering scheme (1-128). With this option off, the numbering scheme becomes 0-127.

### **• Note 11 - Save Edit Buffer**

The Save Edit Buffer command causes the contents of the edit buffer to be sent to the designated preset number.

### **Preset Data Format**

Preset data is transmitted and received using the following format: The standard system exclusive header is followed by the preset number (lsb, msb), a 14 bit word for each preset parameter value (lsb, msb) starting at parameter #0 and continuing upward, a one-byte checksum, and the end-of-exclusive byte (F7). The checksum is the modulo 128 sum of all the parameter value bytes; that is, all of the data bytes following the preset number and before the checksum.

---

## ***MIDI Specifications***

### **PRESET PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
0-11	preset name (12 ascii characters)	32-127
12-14	preset link 1-3	0-191
15-18	preset, link 1-3 low key	0-127
19-22	preset, link 1-3 high key	0-127
23	pri instrument	0-255
24	pri sound start offset	0-127
25	pri tuning (coarse)	-36 to +36
26	pri tuning (fine)	-64 to +64
27	pri volume	0-127
28	pri pan	-7 to +7
29	pri delay	0-127
30	pri low key	0-127
31	pri high key	0-127
32	pri alt. volume attack	0-99
33	pri alt. volume hold	0-99
34	pri alt. volume decay	0-99
35	pri alt. volume sustain	0-99
36	pri alt. volume release	0-99
37	pri alt. volume envelope on	0-1
38	pri solo mode	0-1

---

## ***MIDI Specifications***

### **PRESET PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
39	pri chorus	0-15
40	pri reverse sound	0-1
41	sec instrument	0-255
42	sec sound start offset	0-127
43	sec tuning (coarse)	-36 to +36
44	sec tuning (fine)	-64 to +64
45	sec volume	0-127
46	sec pan	-7 to +7
47	sec delay	0-127
48	sec low key	0-127
49	sec high key	0-127
50	sec alt. volume attack	0-99
51	sec alt. volume hold	0-99
52	sec alt. volume decay	0-99
53	sec alt. volume sustain	0-99
54	sec alt. volume release	0-99
55	sec alt. volume envelope on	0-1
56	sec solo mode	0-1
57	sec chorus	0-15
58	sec reverse sound	0-1



---

## ***MIDI Specifications***

### **PRESET PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
59	crossfade mode	0-2
60	crossfade direction	0-1
61	crossfade balance	0-127
62	crossfade amount	0-255
63	switch point	0-127
64	LFO 1 shape	0-4
65	LFO 1 rate	0-127
66	LFO 1 delay	0-127
67	LFO 1 variation	0-127
68	LFO 1 amount	0-127
69	LFO 2 shape	0-4
70	LFO 2 rate	0-127
71	LFO 2 delay	0-127
72	LFO 2 variation	0-127
73	LFO 2 amount	0-127
74	aux. envelope delay	0-127
75	aux. envelope attack	0-99
76	aux. envelope hold	0-99
77	aux. envelope decay	0-99
78	aux. envelope sustain	0-99

---

## **MIDI Specifications**

### **PRESET PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
79	aux. envelope release	0-99
80	aux. envelope amount	-128 to +127
81-86	key/vel source 1-6	0-1
87-92	key/vel dest 1-6	0-33 <i>see note 13</i>
93-98	key/vel amount 1-6	-128 to +127
99-106	realtime source 1-8	0-9
107-114	realtime dest 1-8	0-24 <i>see note 13</i>
115-117	footswitch dest 1-3	0-10
118-121	controller amount A-D	-128 to +127
122	pressure amount	0-127
123	pitch bend range	0-13
124	velocity curve	0-5
125	keyboard center	0-127
126	effect routing	0-3
127	keyboard tuning	0-5

### **GLOBAL/SETUP PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
256	MIDI basic channel	0-15
257	MIDI volume (basic channel)	0-127
258 *	MIDI pan (basic channel)	-8 to +7

\* A value of -8 = "P"

The entire message to set pan to P = F0 18 04 00 03  
02 02 78 7F F7

---

## ***MIDI Specifications***

### **GLOBAL/SETUP PARAMETERS**

<b>Parameter #</b>	<b>Parameter Name</b>	<b>Range</b>
259	current preset (basic channel)	0-383
260	master tune	-64 to +64
261	transpose	-12 to +12
262	global pitch bend range	0-12
263	global velocity curve	0-4
264	MIDI mode	0-3
265	MIDI overflow	0-1
266-269	controller A-D numbers	0-31
270-272	footswitch 1-3 numbers	0-15
273	mode change enable	0-1
274	device ID number	0-15
384-399	MIDI channel enable	0-1
400-415	MIDI program change enable	0-1
416-431	FX bus select	0-3
512-639	MIDI program/preset map	0-383
1459-1474	effect assign (Ch. 1-16)	0-3
1475	effect A type	0-19
1477-1486	effect A parameter values	0-100
1487	effect B type	0-5
1489-1498	effect B parameter values	0-100
1499	pan -> effect A amount	0-14

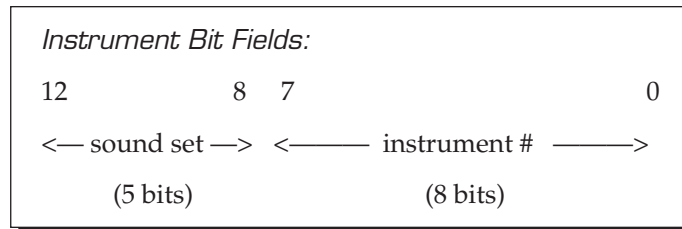
---

## **MIDI Specifications**

### **• Note 12- Sound Sets**

A Music Module sound set consists of sample data (sound ROMs), plus additional instrument data in the program ROMs. Each sound set has a unique ID number. The sound set for the Music Module is #5.

It is necessary to include the sound set number as part of the instrument number when exchanging data. The complete instrument number contains two fields: bits 8-12 specify the sound set (0-31) and bits 0-7 specify the instrument within the sound set (0-255).



Within any given sound set, the first instrument is #1 and #0 selects "None".

The "magic number" 1280 represents the start number for the standard Music Module instruments. To calculate the complete instrument number follow the instructions below. ,

$$\text{SysEx Instr. No.} = 1280 + \text{Music Module Instr. No.}$$

Next you must convert the SysEx Instr. No. to a 14-bit MIDI number. See the information on the following pages.

---

## MIDI Specifications

*Example:*

Suppose we want to change the instrument to I002 Piano Pad.

- 1)  $1280 + 2 = 1282$
- 2)  $1282 \div 128 = 10$  r-2 = 10 (ignore remainder)
- 3) 10 in Hex = 0A = msb
- 4) remainder 2 in Hex = 02 = lsb
- 5) SysEx Instrument Number = 

lsb	msb
02	0A

The complete message to change the primary instrument to #02:

*F0 18 04 00 03 17 00 02 0A F7*

### • 14-bit Signed 2's Complement Numbers

If the data value is negative, you must first take the 2's complement of the number: In the case of a 14-bit number this is equivalent to adding 16384 to the original negative value. To fit the 7 bit MIDI protocol, numbers must be "nibble-ized".

To get the 14-bit nibble-ized value (of a positive value or a 2's complemented negative value):

*msb = value DIV 128 (divide and ignore the remainder)*

*lsb = value MOD 128 (divide and use only the remainder)*

To go the other way (convert 14 bit signed 2's complement to a signed real number)

Raw Value = (msb\*128) + lsb (gives you the unsigned raw value)

if Raw Value  $\geq$  8192 ( $8192 = 2^{13}$ )

then Signed Value = Raw Value - 16384 ( $16384 = 2^{14}$ )

---

## **MIDI Specifications**

Example: To find the “nibble-ized” Hex value of -127:

- 1)  $-127 + 16384 = 16252$
- 2)  $16252 \div 128 = 126 \text{ r-}124$
- 3)  $126 \text{ in Hex} = 7E = \text{msb}$
- 4)  $124 \text{ in Hex} = 7C = \text{lsb}$
- 5) *Parameter value would be transmitted as 7C 7E*

Example: To find the “nibble-ized” Hex value of parameter #257:

- 1)  $257 \div 128 = 2 \text{ r-}1$
- 2)  $2 \text{ in Hex} = 02 = \text{msb}$
- 3)  $1 \text{ in Hex} = 01 = \text{lsb}$
- 4) *Parameter number would be transmitted as 01 02*

---

## ***MIDI Specifications***

### **• Note 13 - Patchcord Destinations**

The order in which patchcord destinations appear on the screen does not necessarily match the SysEx ordering.

### **KEY/VELOCITY CONTROLLERS**

<b>MIDI value</b>	<b>Destination</b>
0	Off
1	Pitch
2	Primary Pitch
3	Secondary Pitch
4	Volume
5	Primary Volume
6	Secondary Volume
7	Attack
8	Primary Attack
9	Secondary Attack
10	Decay
11	Primary Decay
12	Secondary Decay
13	Release
14	Primary Release
15	Secondary Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Auxiliary Envelope Amount
22	Auxiliary Envelope Attack
23	Auxiliary Envelope Decay

---

## ***MIDI Specifications***

### **KEY/VELOCITY CONTROLLERS**

<b>MIDI value</b>	<b>Destination</b>
24	Auxiliary Envelope Release
25	Sound Start
26	Primary Sound Start
27	Secondary Sound Start
28	Pan
29	Primary Pan
30	Secondary Pan
31	Tone
32	Primary Tone
33	Secondary Tone

### **REALTIME CONTROLLERS**

<b>MIDI value</b>	<b>Destination</b>
0	Off
1	Pitch
2	Primary Pitch
3	Secondary Pitch
4	Volume
5	Primary Volume
6	Secondary Volume
7	Attack
8	Primary Attack
9	Secondary Attack
10	Decay
11	Primary Decay



---

## ***MIDI Specifications***

### **REALTIME CONTROLLERS**

<b>MIDI value</b>	<b>Destination</b>
12	Sec. Decay
13	Release
14	Primary Release
15	Secondary Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Auxiliary Envelope Amount
22	Auxiliary . Envelope Attack
23	Auxiliary . Envelope Decay
24	Auxiliary . Envelope Release

### **REALTIME CONTROLLERS**

<b>MIDI value</b>	<b>Source</b>
0	Pitch Wheel
1	Controller A
2	Controller B
3	Controller C
4	Controller D
5	Key Aftertouch
6	Channel Aftertouch
7	LFO 1
8	LFO 2
9	Auxiliary Envelope

---

## ***MIDI Specifications***

### **FOOTSWITCH CONTROLLERS**

<b>MIDI value</b>	<b>Destination</b>
0	Off
1	Sustain
2	Primary Sustain
3	Secondary Sustain
4	Alternate Volume Envelope
5	Primary Alternate Volume Envelope
6	Secondary Alternate Volume Envelope
7	Alternate Volume Release
8	Primary Alternate Volume Release
9	Secondary Alternate Volume Release
10	Cross Switch

---

## ***Product Warranty***

Please read this warranty, as it gives you specific legal rights.

### **Length of Warranty**

This warranty covers all defects in materials and workmanship for a period of one year from the date of purchase by the original owner, provided that the Warranty Registration Card is filled out and returned to E-mu Systems within 14 days from the date of purchase. Cases may arise where E-mu's Service Department or one of E-mu's authorized service centers will ask for a copy of your sales receipt to facilitate warranty service. Please keep your purchase receipt in a safe place.

### **E-mu Systems does not cover:**

- Damages due to improper or inadequate maintenance, accident, abuse, misuse, alteration, unauthorized repairs, tampering, or failure to follow normal operating procedures as outlined in the owner's manual.
- Deterioration or damage of the cabinet.
- Damages occurring during any shipment of the product for any reason.
- An E-mu product that has in any way been modified by anyone other than E-mu Systems, Inc.

### **Limitation of Implied Warranties**

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E-mu Systems' liability for a product found defective is limited to repair or replacement of the unit, at E-mu's option. In no event shall E-mu Systems be liable for damages based on inconvenience, whether incidental or consequential, loss of use of the unit, loss of time, interrupted operation or commercial loss, or any other consequential damages.

Some states do not allow limitation of the duration of implied warranties or the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

---

## ***Product Warranty***

### **How To Obtain Warranty Service**

All E-mu products are manufactured with the highest standards of quality. If you find that your instrument does require service, it may be done by an authorized E-mu service center. If you are unable to locate a service center in your area, please contact E-mu Systems Service Department at (408) 438-1921. They will either refer you to an authorized service center or ask that you return your instrument to the factory. When returning an instrument to the factory, you will be issued a Return Authorization number (RA). Please label all cartons, shipping documents and correspondence with this number. E-mu suggests you carefully and securely pack your instrument for return to the factory. Mark the outside of the shipping carton clearly with your RA number. Send to E-mu Systems, Inc. 1600 Green Hills Road, Scotts Valley, California, 95066. You must pre-pay shipping charges to the service location. E-mu Systems will pay return shipping fees. You will be responsible for any damage or loss sustained during shipment in any direction.

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