



*The intelligent  
composing and  
performing  
system*

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# Welcome to M

M is an interactive composing and performing system that takes notes and chords that you specify and manipulates them, under your control, to create musical compositions which unfold during live performance.

M contains many unique and useful features, including:

- A variety of sophisticated recording and note editing techniques.
- Controls for the selective re-ordering and randomization of musical material.
- A capability for automating changes in MIDI velocities, note densities, rhythms, legato-staccato articulations, and accents.
- "Snapshots" that store and recall any configuration of screen controls, and Slideshows, which are sequences of Snapshots.
- A means for synchronizing M with an external device, such as a drum machine.
- A performance system which allows you to "conduct" by dragging the mouse within the Conducting Grid, or to control the program from a MIDI keyboard, or to perform by selecting screen controls with the mouse.

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## About This Manual

The manual is divided into three kinds of chapters: beginning tutorial (1-3), advanced tutorial (4-12), and feature reference (13-22). The tutorials lead you step by step into the world of M. While M may appear to be a complex program, we've worked hard to make things clear and simple, and we think you'll find the time spent going through the tutorials well worth it. We've also spiced the tutorials with suggestions for getting the most out of this powerful composing environment.

The reference section is designed to explain each feature, and will be helpful when you're exploring on your own after completing the tutorial.

# Table of Contents

---

<b>1</b>	<b>Setting Up</b>	<b>7</b>
	System Requirements	7
	Setting Up External MIDI Equipment	7
<hr/>		
<b>2</b>	<b>Guided M Tour</b>	<b>8</b>
	Screen Layout	8
	Four by Six	9
	Edit Windows	10
	Using M's Windows	11
	Using the Screen Controls	11
<hr/>		
<b>3</b>	<b>Beginning Tutorial</b>	<b>15</b>
	The Midi Assignment Window	15
	Creating Voice 1	17
	Creating Voice 2	25
	Simple Performing	30
<hr/>		
<b>4</b>	<b>Recording Patterns</b>	<b>32</b>
	1. Choose a Pattern	32
	2. Choose an Input Channel	33
	3. Monitor your recording	33
	4. Enable Record	35
	5. Select a Record Mode	36
	6. Play using one of the Record Modes	37
	A Concluding Word	41
<hr/>		
<b>5</b>	<b>Editing Patterns</b>	<b>42</b>
	Using The Pattern Editor	42
	Editing with the Mouse	46
	The Step Editing Tools	48
	MIDI Editing	51
	The Pattern Menu Editing Commands	55
	The Edit Menu Commands	56
	Editing with the Output Length Numerical	57
<hr/>		
<b>6</b>	<b>Playing Voices</b>	<b>58</b>
	Hearing a Voice	58
	Other Playback Controls	61
	Time Base and Phase	63
<hr/>		
<b>7</b>	<b>Variables</b>	<b>66</b>
	Using M's Variables	66
	Transposition	68
	Note Density	70
	Velocity Range and Accents	71
	About the Cyclic Editor	72
	Creating Rhythms	76

---

	Working with Phrasing	79	
	Time Distortion	82	
	Note Order	87	
	The Pattern Group Variable	88	
	Orchestration	89	
	Sound Choice	90	
	Performing with Variables	91	
<b>8</b>	<b>Conducting</b>		<b>92</b>
	About Conducting	92	
	Copying and Swapping Variable Positions	95	
	Continuous Conducting	96	
	Automatic Conducting	98	
<b>9</b>	<b>Snapshots and Slideshows</b>		<b>101</b>
	Changing Groups of Variables Together	101	
	About Snapshots	102	
	About Slideshows	106	
<b>10</b>	<b>The Input Control System</b>		<b>110</b>
	Performing with the Input Control System	110	
	One-Step Controls	111	
	Two-Step Controls	114	
<b>11</b>	<b>Other Performance Controls</b>		<b>116</b>
	Mouse Advance	116	
	Transposing Voices from your MIDI Keyboard	117	
	Playing along with M	118	
<b>12</b>	<b>Movies and Midi Files</b>		<b>120</b>
	Making a Movie	120	
	Saving a Movie	121	
	Importing a MIDI File	122	
<b>13</b>	<b>The Patterns Window</b>		<b>126</b>
	Input Controls	126	
	Output Controls	129	
<b>14</b>	<b>The Pattern Editor Window</b>		<b>132</b>
	Display Controls	132	
	Editing Grid	133	
	Step Editing Tools	134	
	MIDI Edit Range Bar	135	
	Editor Sound Enable	136	
	Record Mode, Insertion Mode, Drum Machine Mode Selector	137	
<b>15</b>	<b>The Conducting Window</b>		<b>138</b>
	Buttons	138	
	Tempo	139	
	Conducting Grid	140	

<b>16</b>	<b>The Variables Windows</b>	<b>142</b>
	Features of Variables	142
	The Variables Window	143
	Cyclic Variables Window	144
	Midi Window	146
<hr/>		
<b>17</b>	<b>Variable Edit Windows</b>	<b>147</b>
	About Edit Windows	147
	Using The Variable Edit Windows	148
	Cyclic Editor	151
<hr/>		
<b>18</b>	<b>The Snapshot Window</b>	<b>154</b>
	Drag Area	154
	Snapshot Controls	154
	Slideshow Controls	156
<hr/>		
<b>19</b>	<b>The File Menu</b>	<b>159</b>
	New	159
	Open...	159
	Open Midi File...	160
	Save, Save As...	163
	Save Movie As Midi File...	163
	Save State As Startup	163
	Midi Assignment...	164
	Midi Setup...	167
	Quit	168
<hr/>		
<b>20</b>	<b>The Edit Menu</b>	<b>169</b>
	Cut, Copy, Paste	170
	Clear	170
	Paste Notes	171
	Change to Rests	171
	Fill With Rests	171
	Insert Paste/Paste at End	171
	Erase Snapshot	172
<hr/>		
	<b>The Variables, Pattern, and Windows Menus</b>	<b>173</b>
	The Variables Menu	173
	The Pattern Menu	173
	The Windows Menu	178
<hr/>		
<b>22</b>	<b>The Options Menu</b>	<b>179</b>
	Use Metronome	179
	Send Clock Modem	180
	Send Clock Printer	180
	Send Clock	180
	External Clock	180
	Tap Affects Velocity	180
	Don't Scramble Rests	181
	Slideshow Record Wait	181
	No Zoom Rects	181

Sustain Enters Rests	181
Midi Conduct	182
Second Order Transpose	182
No Cyclic Blinking	182
Sync Restarts Sequence	182
Editor Sound While Playing	182
Locked Marked Variables	183
Echo In Background	183

---

**Appendix A - M 2.5 Power User Guide**                      **184**

Modified Mouse Actions	184
Keyboard Equivalents to M Commands	185

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**Appendix B - M Input Control System**                      **187**

Input Control System Template	187
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**Index**    **188**

# 1 Setting Up

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## System Requirements

M runs either as a 68K or PowerPC native mode depending on the type of processor you have. M requires at least one of the following for music output:

- Quicktime Musical Instruments
- OMS 1.2 or later
- Apple MIDI Manager

M can take advantage of the features of any of the above extensions you have; however, it will not run unless you have at least one of them. Quicktime Musical Instruments is part of Quicktime 2.5, which can be downloaded at the [quicktime.apple.com](http://quicktime.apple.com) web site. OMS is available for downloading from the Opcode Systems, Inc. web site at [www.opcode.com](http://www.opcode.com). The MIDI Manager is no longer supported or readily available, but if you don't have a copy, perhaps one of your friends does.

## Installing the Required System Extensions

Please refer to the instructions that come with OMS or Quicktime for installing these programs. We will note that if you are planning to use Quicktime Musical Instruments with OMS, you may need to double-click the Quicktime Music icon in the OMS Setup application and click the **On** radio button to enable the synthesizer.

---

## Setting Up External MIDI Equipment

You may not be using external MIDI equipment with M if you are going to use Quicktime Musical Instruments. However, if you do have external MIDI equipment, we recommend using OMS. You can then configure your MIDI setup using the OMS Setup application, allowing you to refer to your devices by name. Note that you can tell OMS about your MIDI equipment when you first run M or another OMS-compatible application.

## 2 Guided M Tour

M turns your computer into an interactive composing and performing environment.

Instead of merely playing back what you've already composed, M becomes a part of the actual process of composition. You enter your basic musical ideas and materials as melodies, chords, and rhythms, and then work with M to transform those ideas into finished compositions.

M's powerful tools and musical controls let you work so quickly and interactively that the line between composing and performing becomes blurred. You're composing and performing at the same time, and with a vast array of controls. You can control your music by clicking and dragging the mouse on the computer screen, by "conducting" in the Conducting Grid, by pressing keys on your computer keyboard, or by playing specific notes on your MIDI keyboard.

When working with M, you hear the musical results of everything you do *while* you're doing it, virtually without dropping a beat, so that you can try new things and explore musical ideas quickly, efficiently, and with immediate satisfaction.

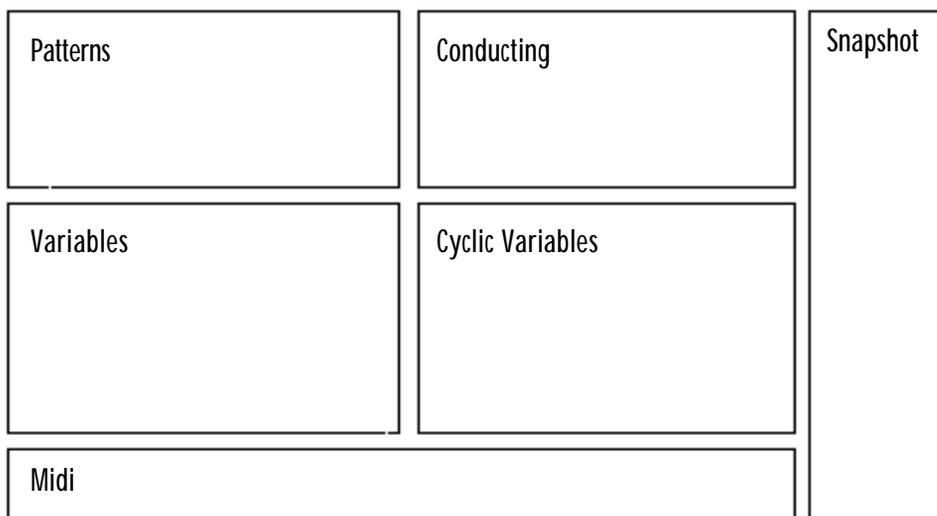
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### Screen Layout

Start the program by double-clicking on the program icon from the Finder and look at the main screen. M's main screen is a musical control panel which lets you do many things simultaneously and gives you a visual overview of all of the program's operations.

There are six windows in the main screen. Each window contains a particular grouping of controls, and the controls in all of the windows are interrelated as different parts of the same musical process. All of M's main screen windows are always active so that you can use any control whenever you like.

The six windows of the main screen are shown in the following diagram.



The **Patterns Window** contains four rows of controls for creating and managing Patterns. A **Pattern**, in M, is a collection of notes that can be transformed in a variety of ways. The Patterns Window also contains some controls for managing Voices. A **Voice** in M is a "path" through the program which begins with a Pattern.

The **Conducting Window** contains controls that allow you to affect the operations of the whole program. You can change certain aspects of the program's operation in the **Conducting Grid**; you can start and stop the music, change the tempo, and do lots of other things that we'll describe later in this manual.

The **Variables Window** contains controls that allow you to transform M's Voices. A **Variable** in M is a category of transformation. In the Variables Window, you can change note ordering, transposition, texture, and density; you can introduce rhythmic "feel"; and you can set MIDI velocity ranges. You can also choose between different groups of Patterns that you've created.

The **Cyclic Variables Window** contains controls that allow you to establish cyclic variation for note durations, legato-staccato articulations, and accents.

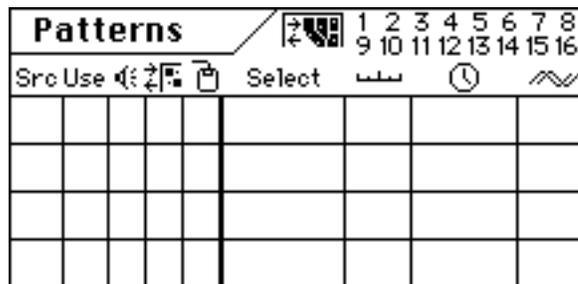
The **Midi Window** contains controls that allow you to direct your Voices' outputs to different MIDI channels and to send program (patch) change numbers to your synthesizers.

The **Snapshot Window** contains controls that allow you to store and recall groups of other screen controls. You can also record and play back sequences of Snapshots, which we call **Slideshows**.

## Four by Six

Notice that there is a recurring design theme of *four* throughout the main screen.

The Patterns Window, for example, consists of four horizontal rows, one for each Pattern.

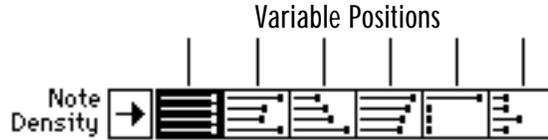


In the Variables and Cyclic Variables windows, there are four levels in each box. Each level represents a Voice. The top level in each box, for example, represents Voice 1, the second from the top represents Voice 2, and so on.



Notice also that there is a recurring design theme of *six* throughout the screen.

There are, for example, six boxes, horizontally arranged, for each Variable in the Variables Window. There are also six boxes, vertically arranged, for each Variable in the Cyclic Variables Window. We call these boxes **Variable Positions**. Each of the Variable Positions represents a group of settings for a Variable. By clicking on a Variable Position during a performance, you can instantly change from one group of settings to another.



If the arrow associated with a Variable is highlighted, as shown below, you can also move from one Variable Position to another by "conducting" in the Conducting Grid.

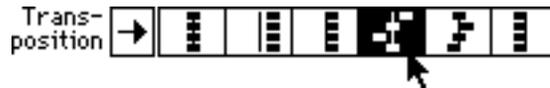



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## Edit Windows

Each of the Variable Positions is associated with an **Edit Window**. In the Edit Windows, you determine what the contents of the Variable Positions are.

The Edit Windows are accessed either through menu commands or by double-clicking on a Variable Position. One example of an Edit Window in M, is the Transposition Edit Window, in which you can set a transposition independently for each of the Voices. Open it by double-clicking in one of the six Transposition Variable Positions.



The following window will appear.

Transposition	
Note	Octave
1	C 4
2	C 3
3	C 2
4	C 3

Middle C = C3  
(No Transposition)

---

## Using M's Windows

All of M's main screen windows and Edit Windows can be moved on the screen so that you're looking at what's important to you. To move the Transposition Edit Window, for example, just drag the word **Transposition** to a different location on the screen.



Drag Window with Title Bar

In most applications, you work only in the one window which is active. In M, all of the main screen windows are open and active at the same time, so that you can use them all simultaneously during performance.

Edit Windows are the only windows which can be closed. To close an Edit Window, click inside the triangle in the upper left hand corner. If you haven't yet closed the Transposition Edit Window, close it now.



Close Box

When many windows are open at the same time on the screen, some will be covered up by others. To bring a particular window to the front, click in its title area, or choose its name from the Windows Menu, or Command-click anywhere inside the window.

---

## Using the Screen Controls

The design of M's screen controls isn't quite the same as a typical program. That's because M is intended for interacting with an ongoing musical process. M's user interface is easy to learn, however, and once you spend a little time with the program, you'll be working the controls with ease and using your computer as a *performance instrument*.

### Buttons

First, there's the simple push button. Click on it once to trigger an action.



Snapshot Button



Blink Everything  
Button



Start Button

Then, there's the toggle button. Click on it to turn a control to its opposite state. The Play-Enable Buttons in the Patterns Window are toggle buttons. Click once on the Play-Enable toggle and the speaker icon will disappear, indicating that its Voice will not be heard during playback. Click again and the speaker icon will reappear, indicating that its Voice will be heard during playback.

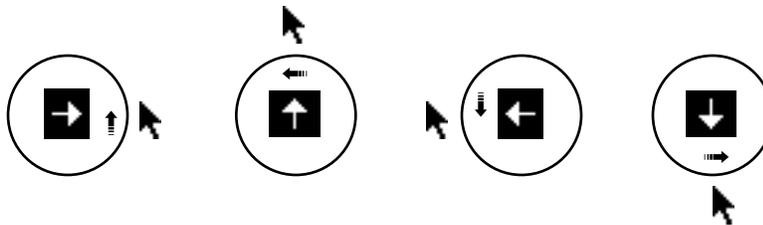


There are also arrow buttons, so-called because they display arrows. They're called **Conducting Arrows**. To highlight a Conducting Arrow button, click on it. To unhighlight it, click again.

The Conducting Arrow buttons are used to connect Variables to the Conducting Grid. The direction in which a Conducting Arrow is pointing indicates the axis in the Conducting Grid along which you can "conduct" the selection of one a Variable's six Positions. To change the direction in which an Conducting Arrow is pointing, click on the Conducting Arrow and hold the mouse button down. The Conducting Arrow will rotate. Release the mouse button when the Conducting Arrow is pointing in the direction you want.



Or, to use another method, click on the Conducting Arrow and then drag in a circle outside of its box.



## The Numerical

A **Numerical** is a box which contains a letter, number, or graphic that can be changed with the mouse.

Look in the Conducting Window and find the Tempo Numerical. It's located to the right of the word **Tempo**.



We'll change the Tempo Numerical to a higher value. Position the cursor in the top half of the numerical's box and press the mouse button.



The cursor will change to a thin upward-pointing arrow and the numerical's value will increase.

To change the value of the Tempo Numerical to a lower value, position the cursor in the lower half of the box and press the mouse button. The cursor will change to a thin downward-pointing arrow and the numerical's value will decrease.

You can also use a slider gesture to change the value of a numerical. Click on a numerical and, still holding down the mouse button, move the cursor upwards or downwards outside of the numerical's box. The cursor will disappear and the numerical's value will change. For practice, change one of the Phase Numericals at the far right-hand side of the Patterns Window, or change one of the Sound Choice Numericals in the Midi Window.



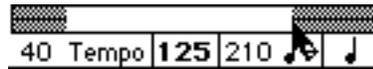
## The Range Bar

The **Range Bar** is used to define a range within which a value will vary. The normal procedure is to click at the point in the bar where you want the high or low end of the range to begin, then drag to the other end of the range.

The one range bar on the main screen is the Tempo Range Bar, in the Conducting Window. Click in the left half of the range bar and drag the mouse to the right. You'll be drawing out a white range for variation in Tempo.



Look beneath the Tempo Range Bar to either side of the Tempo Numerical. You'll see numbers which indicate the current high and low tempo range values. Try setting the Tempo Range Bar so that the low end is around 40 and the high end is at 210.

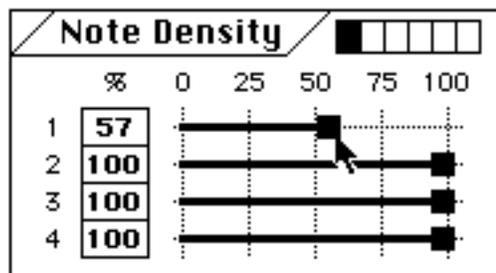


If you want to set a range bar to a single value, click anywhere in the bar, without dragging. Just for fun, set the Tempo Range Bar to a single value of 120.



## The Slider

Open the Note Density Edit Window by double-clicking in one of the Note Density Variable Positions. The primary controls in the Note Density Edit Window are sliders, which let you set values by dragging "handles" left or right. Note that there's a numerical value to the left of each slider, showing a precise value.



To move a slider, position the mouse cursor on a slider "handle" and drag it left or right. Try it. When you're done, close the window by clicking in the triangle in the upper left-hand corner.

## The Picture Matrix

The **Picture Matrix** is a pop-up menu in which you can select any of the displayed icons. Each box in the Use Column, in the Patterns Window, triggers a Picture Matrix. Press the mouse button in one of the boxes. The Picture Matrix shown below will appear.



Then drag the mouse to the side and release the mouse button on one of the icons. The selected icon will appear in the Use Box.

## Other Controls

There are several other types of screen controls used in specific cases, such as the controls in the Note Order Variable, the graph functions in the Time Distortion Variable, and the Editing Grids in the Cyclic Editor. We'll explain how they work in those sections of the manual where we describe their functions. You'll find that they follow from the principles you've learned in this guided tour.

# 3 Beginning Tutorial

In this chapter, we'll show you how to get M to play notes through your MIDI setup or Quicktime Musical Instruments, and, if you're using an external input device, receive incoming MIDI data. Then we'll guide you through creating two Voices and performing with them.

Be sure that your synthesizers are connected correctly, as described in Chapter 1, and be sure that you're familiar with M's windows and screen controls, as described in Chapter 2.

---

## The Midi Assignment Window

Before we start, we need to introduce some terminology. M has Input and Output Channels. These are similar to MIDI channels, except that an M Output Channel can be mapped to a specific MIDI device and channel. Input Channels are similar: incoming MIDI received by a particular device on a particular channel is mapped to an M Input Channel you specify. The mapping is what happens in the Midi Assignment window. It is usually very simple, but when using OMS, it can be quite complex.

Choose **Open...** from the **File** menu and open the tutorial M document called **Jumping Right In**. Then choose **Midi Assignment...** from the File menu. The Midi Assignment window lets you choose the MIDI sources and destinations that M uses. The description of how to use the Midi Assignment window is divided into three parts, depending on how your setup is configured. Please refer to the appropriate section for your situation.

### Using only Quicktime Musical Instruments (no OMS)

In this case, you won't need to use the Midi Assignment window except for its advanced features to be discussed in later chapters. You won't have any input device, so you will need to use the Pattern Editor to create new note material for M to play. So you'll see that the Input Channels section of the window contains a blank entry for each of the 16 MIDI channels, and the Output Channels section of the window lists QuickTime for each channel. The other features of the window will be explained in later chapters, so you can proceed by closing the Midi Assignment window or moving it out of the way.

### Using the MIDI Manager Without OMS

When using the MIDI Manager, the Input Channels section of the Midi Assignment window lists MIDI Mgr In as the source for all channels, and the Port/Device column of the Output Channels section lists either Modem, Printer, or QuickTime (if you are using QuickTime Musical Instruments) for each channel. By default, all Output Channels will be set to Modem.

### Midi Assignment

Input Channels			Output Channels		1st Send	
	Port/Device	Chan	Port/Device	Chan	Pgm	Msg...
1	MIDI Mgr In	1	Modem	1	1	
2	MIDI Mgr In	2	Printer	2	1	
3	MIDI Mgr In	3	QuickTime	3	1	
4	MIDI Mgr In	4	Modem	4	1	
5	MIDI Mgr In	5	Modem	5	1	
6	MIDI Mgr In	6	Modem	6	1	
7	MIDI Mgr In	7	Modem	7	1	
8	MIDI Mgr In	8	Modem	8	1	
9	MIDI Mgr In	9	Modem	9	1	
10	MIDI Mgr In	10	Modem	10	1	
11	MIDI Mgr In	11	Modem	11	1	
12	MIDI Mgr In	12	Modem	12	1	
13	MIDI Mgr In	13	Modem	13	1	
14	MIDI Mgr In	14	Modem	14	1	
15	MIDI Mgr In	15	Modem	15	1	
16	MIDI Mgr In	16	Modem	16	1	

**MIDI Conducting**

Ctrl# 1 ↔ Ctrl# 2

**Send Sync**

MIDI Mgr Clock

**MIDI Messages**

Omni On    Omni Off

Mono Mode    Poly Mode

Local Control On

Local Control Off

System Reset

All Notes Off .

Panic

When using the MIDI Manager, M has one input and two outputs (called Modem and Printer for historical reasons). You use the PatchBay application that comes with MIDI Manager to connect M's inputs and outputs to the Apple MIDI Driver or another MIDI Manager application. The most common configuration: the Apple MIDI Driver input (which receives MIDI in from your keyboard) to M's input and the Modem output to the Apple MIDI Driver Modem output. (Note that the Apple MIDI Driver may not be compatible with newer computers and/or systems; you may have to use the MIDI Manager with OMS.)

To switch an Output Channel's Port/Device from Modem to Printer (or to QuickTime), click on the word Modem and it changes to Printer. Click again and it will change back to Modem (or to QuickTime, if you have it installed).

Before closing the Midi Assignment window, make sure that the currently assigned Port/Device for each Output Channel corresponds to something that is properly connected, both from your computer's MIDI interface and from M in the PatchBay window.

## Using OMS

OMS and the Midi Assignment window provide a lot of possibilities, but for the purpose of getting started, we'll try to make it as simple as possible. When you open the Midi Assignment window you will see an OMS input device listed for each M Input Channel and an OMS output device listed for each M Output Channel. You'll want to ensure that the Input Channels are all set to a device or port that corresponds to your MIDI keyboard or other controller and that the Output Channels are set to a device or port that you can listen to.

To change the port or device for an Input or Output Channel, click on the name you want to change. You will get a pop-up menu of all the available Input or Output devices. Choose the one you want.

### Midi Assignment

Input Channels		Output Channels		1st Send	Send
Port/Device	Chan	Port/Device	Chan	Pgm	Msg...
1	DX7 Keyboard	1	QuickTime	1	1
2	DX7 Keyboard	2	QuickTime	2	1
3	DX7 Keyboard	3	QuickTime	3	1
4	DX7 Keyboard	4	QuickTime	4	1
5	DX7 Keyboard	5	QuickTime	5	1
6	DX7 Keyboard	6	QuickTime	6	1
7	DX7 Keyboard	7	QuickTime	7	1
8	DX7 Keyboard	8	QuickTime	8	1
9	DX7 Keyboard	9	QuickTime	9	1
10	DX7 Keyboard	10	QuickTime	10	1
11	DX7 Keyboard	11	QuickTime	11	1
12	DX7 Keyboard	12	QuickTime	12	1
13	DX7 Keyboard	13	QuickTime	13	1
14	DX7 Keyboard	14	QuickTime	14	1
15	DX7 Keyboard	15	QuickTime	15	1
16	DX7 Keyboard	16	QuickTime	16	1

**MIDI Conducting**

Ctrl# 1 ↔ Ctrl# 2

**Send Sync**

None

**MIDI Messages**

Omni On   Omni Off

Mono Mode   Poly Mode

Local Control On

Local Control Off

System Reset

All Notes Off %.

Panic

## Creating Voice 1

### 1. Hear What You're Playing

Note: If you're not using a MIDI keyboard with M, skip to step 4 below.

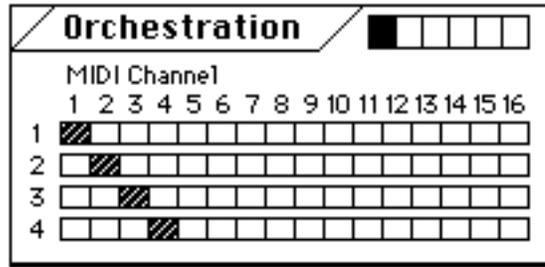
You're about to enter some notes into Pattern 1. If you're using a MIDI keyboard, you want to hear what you're playing while you're playing. What do you do?

If your keyboard is a synthesizer, you'll hear what you're playing directly. But if your keyboard is a controller for another synthesizer, you'll want to direct your input through M to whatever MIDI channel your synthesizer is receiving on. If you don't know what channel your synthesizer is receiving on, consult the operation manual and check your synthesizer's settings.

Look in the Midi Window at the bottom of the screen. Double-click on the first Position in the **Orchestration** Variable.



The **Orchestration Edit Window** will open.



The row labelled **1** in the Orchestration Edit Window sends the output of Voice 1 to any of the sixteen M Output Channels. Select, by clicking on them, the boxes that correspond to the receive channels of your synthesizers. As shown above, for example, Voice 1 is being sent to Output Channel 1. We'll assume, in this tutorial, that your keyboard sending on MIDI channel 1.

Close the Orchestration Edit Window by clicking in the close triangle in the upper left-hand corner of the window.

Then look at the first horizontal row in the Patterns Window.



Notice the words and icons above the row: **Src**, **Use**, a speaker, a section of the Orchestration Variable with two small arrows next to it, and a mouse with a baton. Click in the first box below the icon showing a section of the Orchestration Variable.



A check mark will appear. You've just enabled **Echo-Thru-Orchestration**, which sends the output of your keyboard through the Pattern to the M Output Channels you've selected in the Orchestration Variable. Play on your MIDI keyboard. You'll hear what you play.

## 2. Enable Record

Still in the Patterns Window, press the mouse button while pointing in the first box below **Use**. A **Picture Matrix** will pop out to the right.



Still pressing the mouse button, drag the mouse to the right and release the button on **R**. The **R** will appear in the box.



Be sure that the numerical below **Src** (Source Channel) reads **All**, indicating that M is receiving on all MIDI channels.

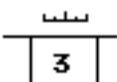


### 3. Play

Play the following notes on your MIDI keyboard.



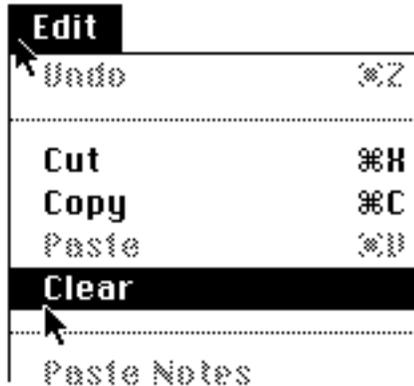
After you play, the **Output-Length Numerical** should read **3**, indicating the number of notes you've recorded.



If you make a mistake in playing or if you want to erase the Pattern for any reason, do the following. Click on the **Select Box** for Pattern 1.



Then choose **Clear** from the **Edit** menu. This will erase the Pattern.



Then play again.

Once you've finished entering notes into Pattern 1, disable Record by pressing the mouse button in the first row under **Use**, dragging to the dash in the Picture Matrix, then releasing the mouse button.

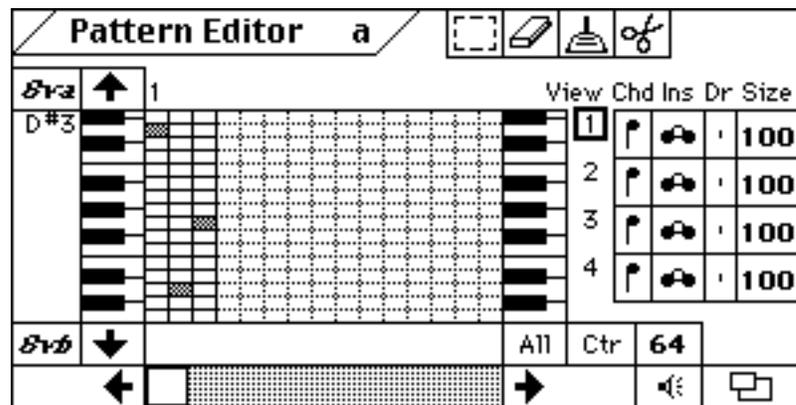
#### 4. Use the Pattern Editor to Enter or Fix Notes

You'll either be at this step because you don't have a MIDI keyboard to enter notes or because you've finished entering notes with your MIDI keyboard.

Double-click on the Select Box for Pattern 1.



You will see the **Pattern Editor** window, which displays the notes in a Pattern in a piano-roll fashion and lets you edit them. If you've already played something into M, you should see something similar to the following melody.



If not, just click on the grayed-out little rectangles where the notes appear below, and you can enter the melody. If you played the melody incorrectly, click in the Pattern Editor to fix it. Clicking on a note that is already present removes it from a Step, clicking on a

rectangle without a note adds it. Steps that are present in a Pattern are outlined in black, those that are beyond the current end of the Pattern are outlined in gray.

The Pattern Editor changes a Pattern as you edit it. You will also notice that you hear the steps of the Pattern playing through the current orchestration. That's because the **Editor Sound Enable** control is on. Click the speaker icon to turn it off if it bothers you.



We'll show you more about the Pattern Editor in Chapters 5 and 14, but, especially if you don't have a MIDI keyboard, you can use the Pattern Editor in this simple way to enter basic melodic patterns.

## 5. Listen to What You've Recorded

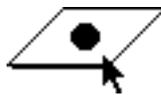
Click on the **Start Button**, which initiates playback. Or press the Space bar on the computer keyboard.



You should be hearing what you played, perhaps with some minor rhythmic variation. If you're not hearing anything, click on the **Play-Enable Button** for Voice 1, so that a speaker icon appears.

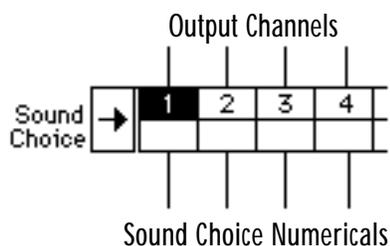


Click on the **Stop Button** whenever you like. Or press the Return key on the computer keyboard.

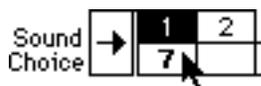


## 6. Select a Sound

Are you hearing the sound you want? If not, look at the **Sound Choice** Variable in the Midi Window. Look particularly at the leftmost numerical in the first row, below the number **1**. The **1** indicates Output Channel 1.



The numerical under **1** is blank, which means that no program change has been sent, but the numerical can be changed to read the program number for the sound you'd like. Change it. Try for a sound something like a double-bass. The program change won't be sent to your synthesizer until you release the mouse button.



**Note:** If M's program numbers are one off from your synthesizer's numbers, refer to **Midi Assignment** in the File menu, described in Chapter 13.

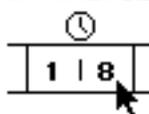
## 7. Set the tempo

To set your Voice's tempo, you'll first set the system tempo with the Tempo Range Bar, then set the Time Base Numericals for the particular Voice.

Set the **Tempo Range Bar**, in the Conducting Window, to about 118 by clicking once in the center of the bar.



Then look in the Patterns Window at the **Time Base** column.



Change the denominator of Voice 1's Time Base Numerical from **4** to **8**, as shown above. You'll hear your notes played twice as fast.

The system tempo is analogous to a conductor's beat. The Time Base Numericals are analogous to the note values that a performer plays in relation to the beat.

## 8. Set accents

Double-click in the first Position of the **Velocity Range** Variable, in the Variables Window.



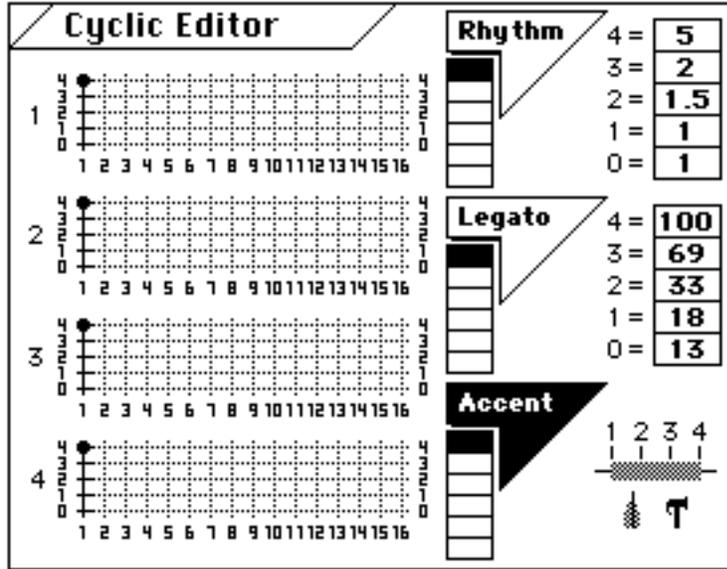
The Velocity Range Edit Window will open. Specify, for Voice 1, the range within which accents will vary, between 48 and 110 as shown below.



Now double-click in the first Position in the **Accent Variable**, in the Cyclic Variables Window.



The **Cyclic Editor Window** will open with the **Accent Button** selected.



The four **Editing Grids** represent the four Voices, 1 - 4, top to bottom. When the **Accent Button** is highlighted, it means that the Editing Grids are showing Accent patterns. (They can also show rhythm and legato-staccato articulations.)

Click on the number **4** below the fourth column of the Editing Grid for Voice 1 (the topmost Editing Grid).



You've set a cycle length of four steps. Notice that when you clicked below the Editing Grid, the accent levels for steps 2, 3, and 4 were set to their default values of level **1**. We're now going to change those values.

Click at level **2** for the second, third, and fourth columns, so that the black dots change their positions in the Editing Grid. You should be hearing an accent cycle of one strong beat followed by three weaker beats.



To get continually varying accents, click on the number **1** below the first column, then drag down the length of the column from level **4** to level **1**, so that almost the entire column is selected. The program will choose randomly from the different levels selected.



But wait. What velocities do the levels represent? The *range* of accent variation is determined in the Velocity Range Edit Window, which should still be open on the screen. To understand the connection between the Velocity Range Edit Window and the Editing Grids, experiment with different ranges in the Velocity Range Edit Window and different Editing Grid settings in the Cyclic Editor Window.

**Note:** Accent variation is dependent upon the sensitivity to MIDI velocity of your synthesizer's current sound. If you don't hear significant changes in accent, experiment with other sounds, as described above in the section on selecting sounds.

---

## Creating Voice 2

### 1. Create a different kind of Pattern

For our second Voice, we'll use chords rather than just single pitches.

Look at the Select Column in the Patterns Window. Option-click on the quarter note icon in the Voice 2 row (second from the top). A new Picture Matrix will pop out.



Drag the mouse to the icon representing two quarter notes stacked in a chord, then release the mouse button. You've put Pattern 2 into **Chord Record Mode**.



### 2. Hear what you're playing

Refer now to the beginning of this chapter, in Section 1 under **Creating Voice 1**. Follow the same routines we described above for setting Echo-Thru-Orchestration, but remember that we're now working with Voice 2, which will always be the second row from the top in any column. In the Orchestration Edit Window, set Voice 2's MIDI output channel numerical to the receive channel of your second synthesizer. Or, if you only have one synthesizer, set Voice 2's MIDI output channel numerical to the same channel as Voice 1.

Click in the Echo-Thru-Orchestration Button for Pattern 2 so that the check mark appears.

Then click on the Echo-Thru-Orchestration Button for Voice 1, so that its check mark disappears, and be sure that Record for Pattern 1 is disabled, so you won't be recording into it again.



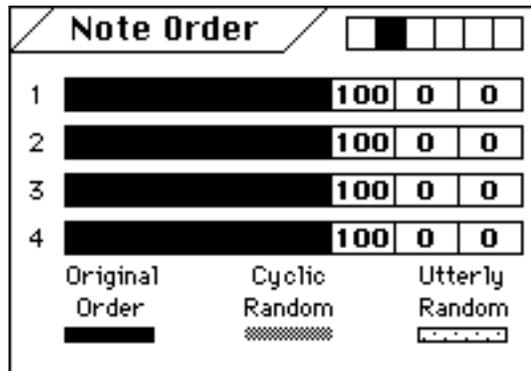


## 7. Give your Voice an improvisational feel

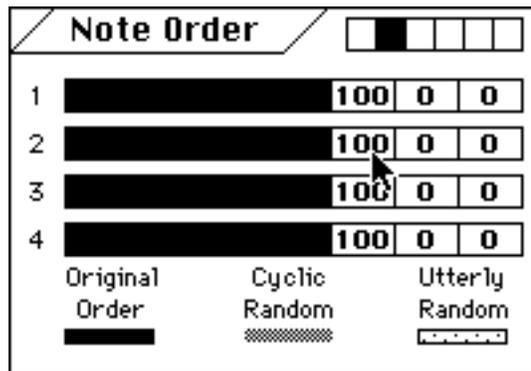
Double-click on the second Position in the **Note Order** Variable, in the Variables Window.



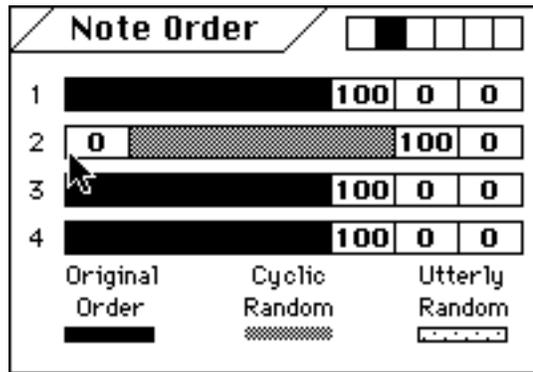
The Note Order Edit Window will open. Notice that the second-from-the-left box in the upper right corner is selected, indicating that you're editing the settings of the second Note Order Variable Position.



Notice that there are three types of note ordering to chose from: **Original Order**, **Cyclic Random**, and **Utterly Random**. These types of note ordering are explained in detail in Chapter 7, but for the moment notice that each type is represented by a number. For now, position the mouse on the leftmost number for Voice 2.



Click and drag the number box all the way to the left. You'll see the black bar change to a gray bar. The numbers in the second box will also change.

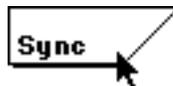


What you're doing is scrambling the order of the notes as they're played by Voice 2, giving your melody an improvisational feel. You aren't changing the order of the notes as they're stored in your Pattern.

Now close the Note Order Edit Window and look at the Note Order Variable on the main screen. The second Note Order Variable Position is still highlighted, indicating that it is that Position which is affecting the music. Just for verification, click on the first Position in the Note Order Variable. You'll hear the note ordering change back to the order in which you first recorded.

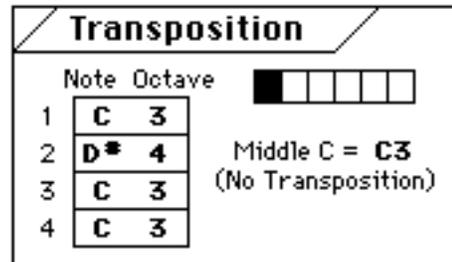
## 8. Listen to both Voices together

Select the Play-Enable Button for Voice 1. You'll hear both Voices playing together. But, alas, Voice 1 and Voice 2 are no longer in sync because you changed Voice 2's Time Base. Click on the **Sync Button**, in the Conducting Window, and they'll be in sync again.



## 9. Transpose Voice 2

Open the Transposition Edit Window by clicking on the first box in the **Transposition** Variable, in the Variables Window. In the second row from the top, change the Transposition Numerical in the Octave Column from **3** to **4**. Voice 2 will be transposed up an octave. Then change the Transposition Numerical in the Note Column from **C** to **D#**. Voice 2 will be transposed up another minor third. C3 represents the key and octave in which a Pattern was originally recorded, and any change from that setting will change your Voice's relative transposition.



## 10. Set accents and articulation

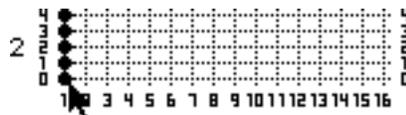
Using the technique described earlier in this chapter, under **Set Accents**, set a velocity range for Voice 2 in the Velocity Range Edit Window.

Then select **Accent** in the Cyclic Variables Window. Following the routines described above for Voice 1, set an accent cycle length of 3 for Voice 2, with one strong and two weak beats.

Still in the Cyclic Editor, click on the **Legato Button**.

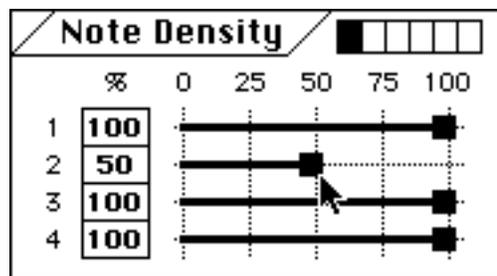


Select a cycle length of one, and set continually varying legato-staccato note articulations by dragging the height of the column from top to bottom with the mouse.



## 11. Set rhythmic variation

Open the Note Density Edit Window by double-clicking in the first Position in the **Note Density Variable**. Change the Note Density for Voice 2 to about 50 percent, which will cause about 50 percent of the Voice's notes to be skipped during playback.



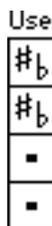
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## Simple Performing

Manipulating the screen controls is one way to perform with M. But there are others. You can, for example, use your MIDI keyboard to vary your Voices while they're playing.

### Transpose with your MIDI keyboard

In the Patterns Window, click in the **Use** Column for Voice 1 and select the sharps-and-flats icon from the Picture Matrix. Do the same for Voice 2.



What you've done is enable **Keyboard Transpose**.

Then play different notes on your MIDI keyboard. Remember that middle C (C3) on your keyboard represents the key in which you originally recorded your Patterns, and that every note you play away from middle-C will transpose a Voice by an equivalent amount.

When you've finished transposing, don't forget to deselect Keyboard Transpose in the Use Column.

## Use the Input Control System

The Input Control System lets you use your MIDI keyboard to control M's functions. To enable the Input Control System, select any Voice's Picture Matrix in the Use Column, then drag to C. Only one Voice, any Voice, needs to be enabled for you to use the Input Control System.



Here's one example of using the Input Control System. If the music is playing, play B below middle C on your MIDI keyboard. The music will stop. If the music isn't playing, play middle C on your MIDI keyboard and the music will start. It's a simple example, but there's lots more you can do. See the Input Control System Template in Appendix B. See also Chapter 10.

# 4 Recording Patterns

A **Pattern** in M is a collection of notes that can be transformed in a variety of ways. A **Voice** in M is a "path" through the program which begins with a Pattern. A Pattern is the first step in a Voice, and the first step in using M is to create a Pattern that contains the kind of pitch information that you want to work with.

In the previous chapter, we've given you an overview of working with M. In this chapter, we'll discuss in greater depth M's procedures for using a MIDI keyboard to record pitches into Patterns.

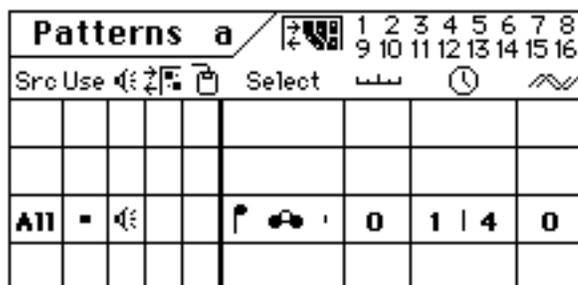
To begin, open the file called **AT-1** (for **A**dvanced **T**utorial 1), which contains some prerecorded Patterns and Voice setups. Once **AT-1** is open, choose **Save as...** from the **File** menu and save the file under another name, for example, **M Work**, so that the original AT-1 file will always be available. Then, as we proceed, save your changes periodically so that, if you decide to take a break, you can pick up the tutorial where you left off.

A final note before proceeding. If you're using several synthesizers, or if you have a polytimbral synthesizer, set up your synthesizers so that you can hear four different sounds, each controlled by a separate MIDI channel. If you're using only one synthesizer, set M's four Voices to your synthesizer's MIDI receive channel. Try to find sounds that have fairly sharp attacks, that can sustain, and that respond to velocity, such as electric piano sounds.

---

## 1. Choose a Pattern

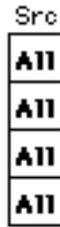
Choose which Pattern, of the four possible ones, you want to record into. The AT-1 file already provides notes recorded in Patterns 1 and 2, so we'll begin here by recording into Pattern 3. The recording controls for Pattern 3 are located in the Patterns Window, third row from the top.



---

## 2. Choose an Input Channel

The **Source Channel** Numerical , under **Src** in the Patterns Window, sets what M Input Channel acts on a Pattern.



**All** means that a Pattern will receive MIDI information on all Input Channels. **All** will be suitable for most situations. But if you're using a keyboard that can send MIDI data on more than one channel, you may want to act on different Patterns simultaneously but independently. Or you may be working with more than one performer or with more than one keyboard. In such cases, you could set each Pattern's Source Numerical to a specific M Input Channel by changing the values in the numericals. The actual MIDI channel and device of an M Input Channel are set in the **Midi Assignment** window, but by default, Input Channels correspond to MIDI channels.

---

## 3. Monitor your recording

Be sure that you can hear what you're playing. Echo your keyboard's output through M to your synthesizer by enabling **Echo-Thru-Orchestration**.

**Note:** If you have a keyboard synthesizer, you'll want to set Local Control Off, so that the keyboard's output goes through M and then out to the synthesizer section of your keyboard. For more information on Local Control Off, refer to the discussion of the Midi Assignment Window in Chapter 19.

The enable buttons for Echo-Thru-Orchestration are located in the Patterns Window under the icon shown below. Click on Pattern 3's enable button for Echo-Thru-Orchestration so that a check mark appears.

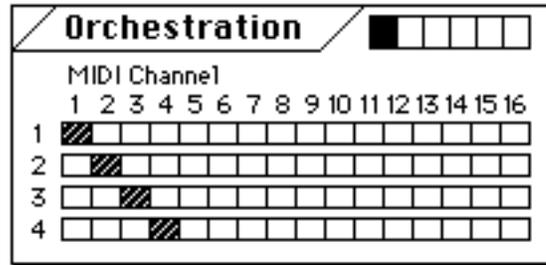


You've connected the MIDI output of your keyboard to the MIDI output channel(s) set for Voice 3 in the **Orchestration** Variable.

The Echo-Thru-Orchestration Enable Button and the Orchestration Variable work together. Double-click on the first Position in the **Orchestration** Variable, in the Midi Window.

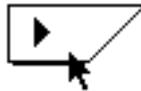


The **Orchestration Edit Window** will open.



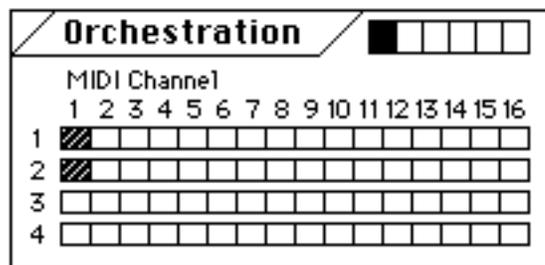
There are four rows of sixteen boxes. The rows, numbered at the left of the window, represent M's four Voices. The sixteen boxes in each row, numbered at the top of the window, represent the sixteen M Output Channels. (The actual MIDI channel and device of an M Output Channel is set using the Midi Assignment window.) When a box in a row is darkened, it means that the Voice represented by that row will be sent on the Output Channel represented by the number over the box. As shown above, Voice 1 is sent on Output Channel 1, Voice 2 on Output Channel 2, Voice 3 on Channel 3, and Voice 4 on Channel 4. We'll use these settings for this tutorial.

To show you how the Orchestration Variable works, we'll play some music. Click on the **Start Button** in the Conducting Window.

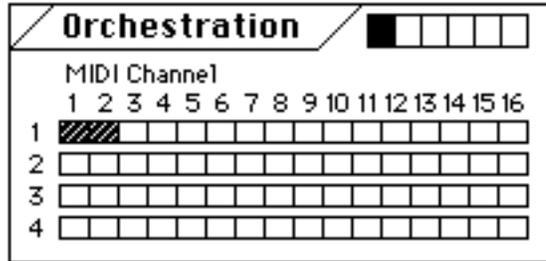


You should hear Voice 1 played by your first synthesizer, and Voice 2 played by your second synthesizer. If you have only one synthesizer, and if it's receiving on Channel 1, you're hearing only Voice 1.

Now click on the first box in row 2 so that it's filled in. Then click on the second box so that it's blank, as shown below. You're hearing Voices 1 and 2 played by your first synthesizer. You've merged the outputs of Voices 1 and 2 to a single Output Channel, in this case Channel 1.



Next, click on the first box in row 2, so that it's blank. Then click on the second box in row 1. You aren't hearing Voice 2, but you are hearing Voice 1 played by both synthesizers, one of them receiving on Output Channel 1, the other receiving on Output Channel 2.

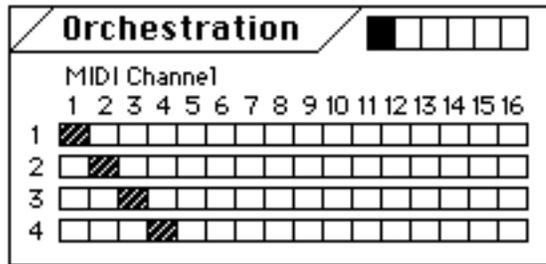


You can send a Voice to any number of M Output Channels.

Now click on the **Stop Button**, if you haven't already.



Restore the Orchestration Variable to the settings shown below.



Close the window by clicking on its close triangle.




---

## 4. Enable Record

Look at the **Use Column** in the Patterns Window.



Press the mouse button in the third box from the top. The **Use Picture Matrix** will pop out.



Drag the mouse to the right and release the mouse button on **R**. The **R** will appear in the Use Column.



You've set Pattern 3 to receive MIDI input data as pitch information.

The **Use Column** lets you determine how incoming MIDI information will be interpreted for each Voice. **R** interprets MIDI data as pitch information. The dash means that incoming MIDI data is ignored. The other icons in the Picture Matrix are discussed in chapters 10 and 11.

---

## 5. Select a Record Mode

Locate the **Select Column** in the Patterns Window and Option-click on the quarter note icon in the Pattern Select Box for Voice 3.



The **Record Mode Picture Matrix** will pop out, containing icons for the three Record Modes.



To select a Record Mode, drag the mouse to one of the icons and release the mouse button. If you try this, re-select the single quarter note icon when you've finished.

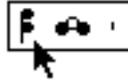
### About the Record Modes

The Record Modes determine how the Patterns will interpret incoming MIDI data. First we'll tell you what the different Record Modes do, then we'll explain how to use them.

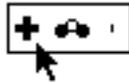
**Single Note Mode**, represented by a single quarter note icon, means that MIDI data will be recorded as single notes. Even when you play a chord of two or more notes, the notes of the chord will be recorded as a string of individual pitches.



**Chord Mode**, represented by two stacked quarter notes, means that MIDI data will be recorded as chords and single notes. When you play a chord of two or more notes, the notes of the chord will be recorded as a chord. When you play single notes, the notes will be recorded as single notes.



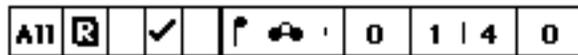
**Build Mode**, represented by the plus sign, allows you to record dense or complex chords that may not be possible to play in real time. When you hold down one note while playing other notes or chords, the notes or chords that you play will all be recorded as part of the same chord. They'll all be played back simultaneously, within the limits of your synthesizer. Letting go of all notes will advance you to the next Pattern step.



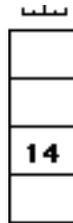

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## 6. Play using one of the Record Modes

Be sure that Single Note Mode is selected for Pattern 3. If you've followed all the steps we've gone through, the row for Voice 3 should look like the one shown below.

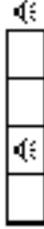


Play a C major triad (three notes), a D minor triad (three notes), and a C major scale (eight notes). You should hear your notes echoed out to your synthesizer that's receiving on MIDI channel 3. When you've finished, the **Output Length Numerical** should read **14**.



The Output Length Numerical reads **14** because all notes recorded in Single Note Mode are separated into individual events.

Now click on the **Play-Enable** Buttons for Voices 1, 2, and 3. The speaker icon will disappear for Voices 1 and 2, and appear for Voice 3.



Click on the Start Button to listen to Voice 3. You'll hear a C major arpeggio, a D minor arpeggio, and a C major scale. Single Note Record Mode records any chords you play as single notes.

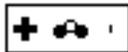
Stop the music by clicking on the Stop Button. Select Pattern 3 by clicking on its box in the Select Column, then choose **Clear** from the **Edit** menu. You've erased Pattern 3. The Output Length Numerical for Voice 3 should change to zero.

Next, select Chord Mode from the Record Mode Picture Matrix for Pattern 3.



Then play a C major triad, a D minor triad, and a C major scale. The Output Length Numerical should now read **10**. Click on the Start Button and you'll hear the two chords followed by the scale.

Clear the Pattern as described above and select Build Mode from the Record Mode Picture Matrix for Pattern 3.



Click on the Start Button. But you won't hear anything yet.

This time, play and hold down the lowest C on your MIDI keyboard. Holding the note down, play a C major triad on C3. Then play a G major triad on G4. Release the low C.

Then play a low F, and while you're holding down the low F, play an F major triad and a C major triad at the high end of the keyboard. It doesn't matter if the triads are played as single notes or as chords, as long as one note, in this case the low F, is held down. The Output Length Numerical will now read 2, and you've heard a widely-voiced C major ninth chord followed by an F major ninth chord. Are you still holding down that F? Good. Now play the same F major triad again. These notes will disappear from the second step in the Pattern.

Release the low F and stop the music. Disable Record for Pattern 3 by selecting the dash in the Use Picture Matrix.

## Using Drum Machine Record Mode

**Drum Machine Record Mode** is a special record mode. It's most effectively used in conjunction with one of the Insertion Modes, either **Overdub Mode** or **Replace Mode**.

Ordinarily, new notes recorded into any Pattern are added to the end of the Pattern. The point of using Drum Machine Record Mode is to put notes into a Pattern at specific beats,

similar to the way you record patterns on a drum machine. But there's no requirement that you use drum sounds.

Select Pattern 4 as your Drum Machine Record Mode Pattern by clicking on the Select Box for Pattern 4. Enable Echo-Thru-Orchestration for Voice 4. Then deselect Play-Enable for Voice 3 and select Play-Enable for Voice 4, so that the speaker icon appears only in the box for Voice 4. Next, enable Record for Pattern 4 by selecting **R** from the Use Picture Matrix. At this point, the Voice 4 row should look like this:



## Using Overdub Mode

Now we'll select Overdub Mode as the insertion mode we want to use. Option-click on the middle icon in Pattern 4's Select box.



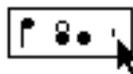
The **Insertion Mode Picture Matrix** pops out. Drag the cursor to the icon representing a white ball stacked on a black ball and release the mouse button.



The Select box should appear as shown below. Overdub Mode adds any new notes or chords to a step that's already there and, in conjunction with Drum Machine Record mode, allows you to build up Patterns of notes on top of each other.



Next, Option-click on the icon at the right side of Pattern 4's Select box.



The **Drum Machine Record Mode Picture Matrix** pops out.



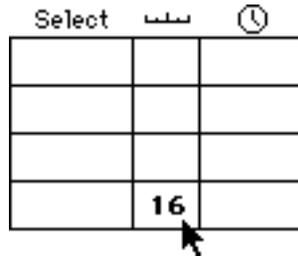
Drag the mouse to the repeat sign icon and release the mouse button. You've selected Drum Machine Record Mode and your Pattern 4 Select Box should look like this:



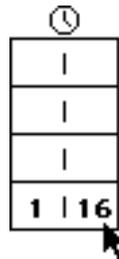
Be sure that you can hear what Voice 4 is playing. Set the Orchestration Variable to the receive channel for your synthesizer. Test it by playing on your MIDI keyboard. But

notice that even though Pattern 4 is enabled for Record, no notes are recorded. That's because Drum Machine Record Mode won't work until you click on the Start Button.

Now we'll create a blank Pattern of 16 steps into which you'll record your Drum Machine Pattern. Hold down the Option key while changing Pattern 4's Output Length Numerical. Set it to read **16**. By Option-clicking on the Output Length Numerical, we've created a Pattern of 16 rests.



Then set Voice 4's Time Base Denominator Numerical to **16**.



Then enable the metronome, so that when we record we can hear where the notes will go. Choose **Use Metronome** from the **Options** menu.



Be sure that the first Positions are selected in the **Note Order** and **Rhythm** Variables, as these have been preset in the AT-1 file. Drum Machine Record Mode is most effective when used with 100 percent original note ordering and a constant rhythm. You may not understand what this means now, but don't worry. We'll explain more in Chapter 7.



Click on the Start Button. You should be hearing a metronome click from the computer speaker at 120 beats per minute.

Locate the beginning of Pattern 4's cycle, so that you can play notes into specific beats. The easiest way to do this is to look at the Pattern Group Variable, in the Variables Window. Look in the box for Pattern Group **a**. You'll see four "bricks" stacked on top of each other. A brick indicates that a Pattern contains notes. Notice that the bricks flash

when a Pattern reaches the beginning of its cycle. Notice the bottom brick, which represents Pattern 4. On the "downbeat," play C3, D3 on beat 5, E3 on beat 9, G3 on beat 13, and B3 on beat 16.

When you've finished playing the notes, you should hear a pentatonic scale in 4 | 4. Add notes at different times in the Pattern loop. Since we're recording in Overdub Mode, notes played at the same time as already recorded notes will be stacked into chords. Stop the music whenever you like.

Now we'll change all of Pattern 4's notes back into rests. Select Pattern 4 by clicking on its Select Box, then choose **Change to Rests** from the **Edit** menu. Don't choose **Clear**. If you choose **Clear**, you'll have to add the rests again.

## Using Replace Mode

Now enable Replace Mode from Pattern 4's Insertion Mode Picture Matrix. Your Select Box should look like this:



Following the same procedures as described above, play some notes. This time, however, notes played at the same time as previously recorded notes will replace the previously recorded notes.

## Using Drum Machine Record Mode with a Drum Machine

Drum Machine Record Mode can be very useful when using M to control drum machines. Once you're a little more familiar with the program, experiment with Drum Machine Record Mode in a way that will give you some interesting percussion patterns from your drum machine or sampler. There are lots of things you can do with Note Ordering, Accent, Rhythm, Note Density, Time Distortion, and other Variables that will take you far beyond the capabilities of any drum machine. You'll need to know what note numbers the sounds correspond to, but that shouldn't be hard to figure out using Echo-Thru-Orchestration.

---

## A Concluding Word

Before you move on to the next chapter, disable Record for Pattern 4 and deselect **Use Metronome** in the **Options** menu.

Then, if you like, listen to all four Voices. Click on Play-Enable for all Voices, or click on one button and drag to the others. Then click on the Start Button. Finally, stop the playback and choose **Save** from the **File** menu to save what you've done so far.

# 5 Editing Patterns

In this chapter, we're going to show you how to use the Pattern Editor, how to use the special editing commands in the Pattern Menu, how to cut, copy and paste Patterns, and how to edit with the Output Length Numerical.

M lets you perform all edit operations while the music is going, so you can hear the effects of your changes immediately.

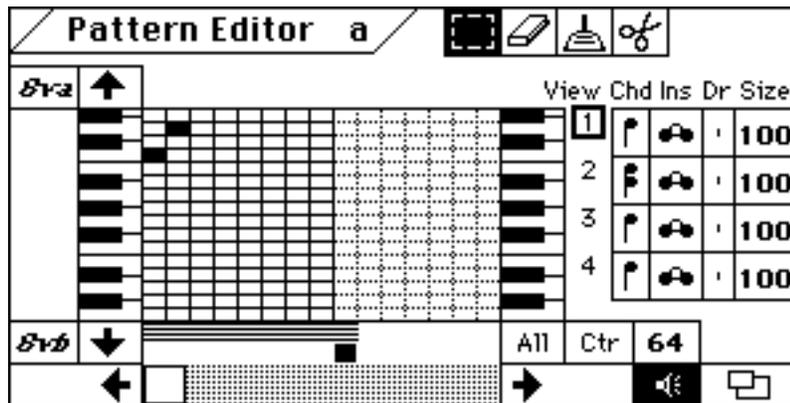
Start by opening your **M Work** file.

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## Using The Pattern Editor

To open the Pattern Editor Window, double-click on the Select Box for a Pattern. Or select a Pattern and then choose **Edit...** from the **Pattern** menu, in which case the Pattern Editor Window will open displaying the selected Pattern. Note that the items in the Pattern menu are not available if no Patterns have been selected.

The Pattern Editor Window will appear.



## About the Pattern Editor

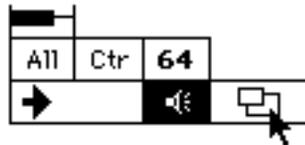
The Pattern Editor is used for editing Patterns that you've already recorded. Its graphic tools can also be used for creating new Patterns.

Notes in a Pattern are displayed in the Pattern Editor as darkened boxes in an **Editing Grid**. You can add or subtract notes by clicking in the Editing Grid with the mouse. You can also perform operations on the entire Pattern or on **Regions** of a Pattern with the **Step Editing Tools**, which you'll find in the upper right-hand corner of the Pattern Editor window.

You can also edit a Pattern with your MIDI keyboard, using M's Record Modes and Insertion Modes.

## The Editor Size Box

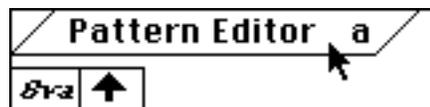
Increase the size of the window by dragging the Size Box in the lower right-hand corner. This will be useful when you have Patterns with a lot of notes that you want to see all at once.



Editor Size Box

## Moving the Window

Next, try moving the window around on the screen by dragging the title. Move it to the upper left hand corner of the main screen, so that you can enlarge it downwards and to the right.



## The Pattern Size Numerical

The **Pattern Size Numerical** allows you to increase the maximum number of notes you can potentially have in a Pattern. You can have up to 999 notes in a Pattern.

Size
42
4
31
17

Change the potential size of a Pattern by clicking and holding on the numerical for that Pattern. If you want to greatly increase the potential size, change the numerical as a slider.

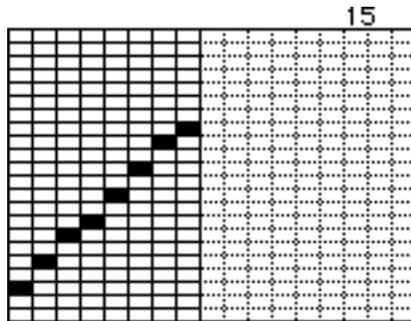
Note that you're increasing the *potential* size of the Pattern. You aren't adding new steps. The point of limiting a Pattern's potential size is to conserve computer memory. Setting up a large Pattern reserves that much space in memory for the notes you'll add to the Pattern. If you don't use all that note space, you're just wasting memory that might be put to better use elsewhere.

## The Editing Grid

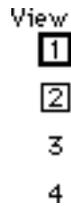
Next, notice the numbers **1 - 4** under the word **View** to the right of the Editing Grid. The boxed-in number is the number of the currently displayed Pattern. Change to another Pattern by selecting another number.



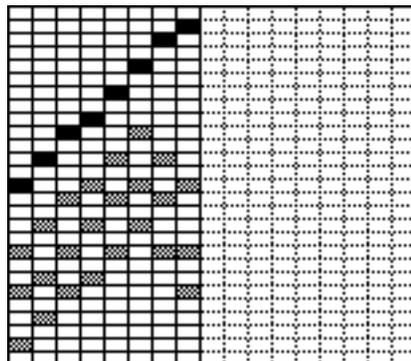
Go back to Pattern 1 by clicking on **1** under **View**. Notice that the lines of the Editing Grid are black in the area containing notes or rests. The empty part of the Editing Grid is drawn in gray lines.



You can see the notes of two Patterns at once, if you like. Shift-click on **2** under **View**. The number **2** will be surrounded with a lighter box than number **1**.



The notes for Pattern 2 will be shown in gray in the Editing Grid. This indicates that you're "just looking" at the notes in Pattern 2, but you can still edit Pattern 1.



Re-size the window to see all the notes, if necessary.

The Pattern Editor Editing Grid displays notes with pitches shown on the vertical axis, and time, in **steps**, shown on the horizontal axis. M's Patterns do not contain duration information. Duration information is determined in other parts of the program.

You can scroll through pitches by clicking on either of the two scroll arrows to the left of the Editing Grid, above and below the keyboard. Click on the bottom arrow, for example, to see more pitches in the lower range.



Scrolling vertically will change the Editing Grid's display of pitches in reference to the keyboards. As you scroll, notice that the pitch indicators at the ends of the left keyboard change, so you always know where you are.

Scroll through the Editing Grid in octaves by clicking and holding on the octave icons next to the scroll arrows. Click on  $\delta va$  to scroll up an octave. Then click on  $\delta vb$  to scroll down an octave, so you're back to where you were.



Notice the Scroll Bar at the bottom of the Editing Grid. Hold down the mouse button on either arrow to see the Editing Grid scrolling horizontally through the steps of the Pattern.



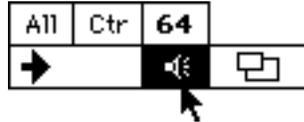
Clicking on the dotted area of the Scroll Bar "pages" you forwards or backwards by one full Editing Grid. Page ahead to the last spot in the Scroll Bar, then return to the beginning.

Dragging the white box (called the Thumb) of the Scroll Bar places you at a location which is proportional to the maximum **size** of the Pattern. A Pattern's size is not the number of steps it contains, but the maximum number of steps it **could** contain. Do the

same thing as you did with paging by dragging the Thumb to the far right, then back as far left as it will go.

## About the Editor Sound Enable

At the bottom right of the window you'll see a speaker icon. Click on it if it's not highlighted.

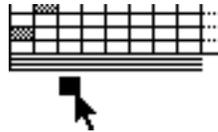


This lets you hear MIDI notes played through the current settings of the Orchestration Variable when you use the MIDI Edit Counter, described below.

## The MIDI Edit Counter

You can play the notes in your Pattern "manually" with the **MIDI Edit Counter**, which sets the point at which recorded MIDI data will affect the Pattern. The MIDI Edit Counter is the black box below the Editing Grid, underneath the horizontal lines.

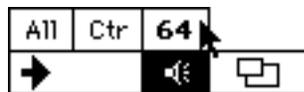
Drag it along the bottom of the Editing Grid to play each step in your Pattern. If your Pattern is longer than the current width of the Editing Grid, you can drag the MIDI Edit Counter past the end of the Editing Grid and it will scroll along with you.



## Playing on the Grid Keyboard

You can also play any note "graphically" through MIDI. Click on any note on the keyboard to the left of the Editing Grid. You'll hear the note played by whatever synthesizer is currently receiving the Pattern displayed in the Editing Grid. This technique is useful when you're creating Patterns directly in the Editing Grid and you want to hear a note before you put it in. It's also useful when you're creating a Pattern that's designed to be used with a drum machine, since you can find the MIDI pitches that correspond to the different sounds on your drum machine.

If the notes you play with the mouse aren't loud enough, try increasing the **Velocity Numerical**, which is just above the Editor Sound Enable speaker icon.



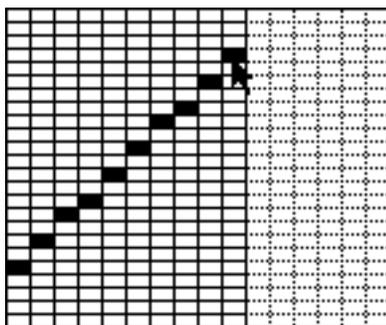
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## Editing with the Mouse

Click on **1** under **View** so that just Pattern 1 is displayed in the Editing Grid. Scroll the Editing Grid so that you can see all eight notes of the scale.

In the Patterns Window (drag the Pattern Editor Window out of the way if you can't see the Patterns Window), deselect Play-Enable for all Voices except Voice 1. Click on the Start Button, in the Conducting Window. You should hear the notes of the C major scale as they're displayed in the Editing Grid of the Pattern Editor.

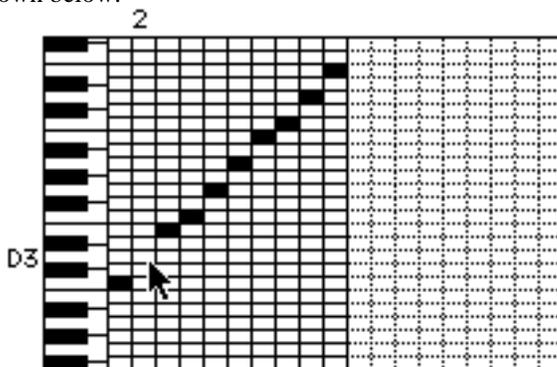
Move the mouse into the Editing Grid and notice, as you move the mouse around, that note names are displayed next to the keyboard on the left and step numbers are displayed above the Editing Grid. Position the mouse at the intersection of step 9 and note D4 (you may need to scroll up or down to find this) and click. The step will fill in and the new note will be heard when the Pattern's playback gets to the last note. Click on the intersection of step 10 and E4. You'll be hearing a ten note C major scale.



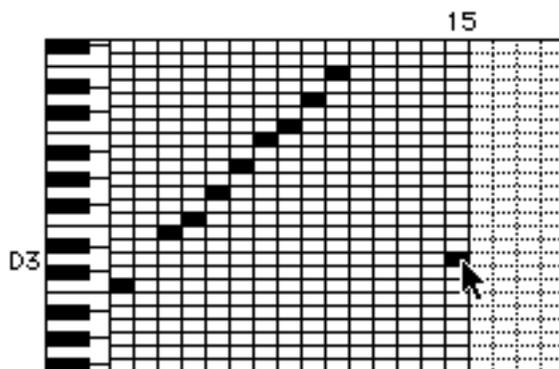
Click in various places throughout the Editing Grid while the music is playing. Even if your Pattern was originally recorded in Single Note Mode, you can create chords by clicking on different pitches in a column. You don't need to be in Chord or Build Mode, since they only apply to how the Pattern reads MIDI input.

You can create chord clusters by dragging down through a column. You can repeat notes by dragging across in a row.

You can delete a note from a step by clicking on a filled-in rectangle. Change step 2 to a rest, as shown below.



Now click on step 15 (scroll to get there if you need to) and notice that the steps between the old end of the Pattern and step 15 have been filled with rests, as shown below.



---

## The Step Editing Tools

The Step Editing Tools allow you to work on groups of notes, rather than single notes.

In the top right-hand corner of the Pattern Editor you'll see a row of four icons representing the four Step Editing Tools. The square with dotted lines is the **Selector**. You also have the **Eraser**, the **Plunger**, used for insertion, and the **Scissors**, used for deletion. These Step Editing Tools can be used to operate on single steps of a Pattern or on **Regions** of a Pattern. A Region is a block of any number of consecutive steps, from one to the total length of the Pattern.

The **Selector** lets you select a Region of the Editing Grid in which to erase, insert, or delete. You can also select Regions in which the Pattern Menu commands will operate.

The **Eraser** removes all the notes from a selected Region and replaces them with rests.

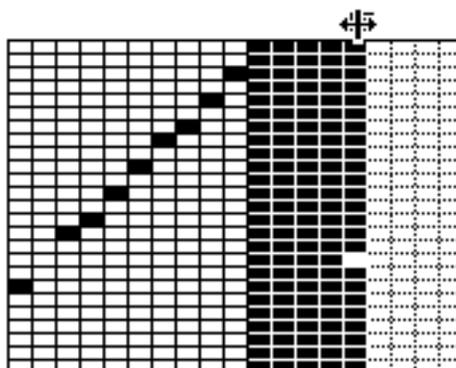
The **Plunger** lets you add steps to your Pattern at any point within the Pattern.

The **Scissors** removes selected steps from the Pattern and decreases the number of events in the Pattern accordingly.

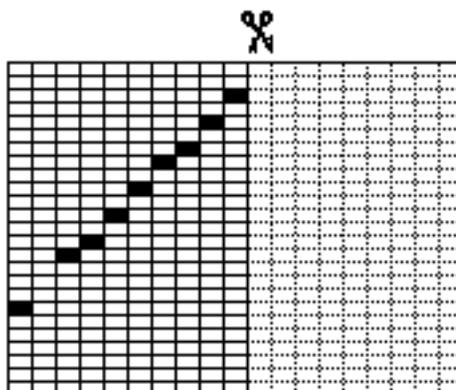
To select a tool, click on its icon. Once you've selected a tool, position the mouse directly above the Editing Grid. The mouse cursor will change to the selected tool.

Let's delete the extra notes in the C major scale that we added above.

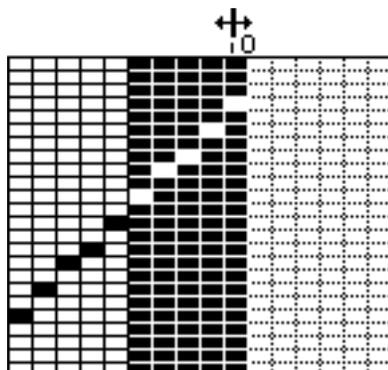
Select the Selector, position it over step 11 in the Editing Grid, then click and drag to step 15. The selected area will be highlighted, as shown in the diagram. Note that you can select only Regions that contain notes or rests.



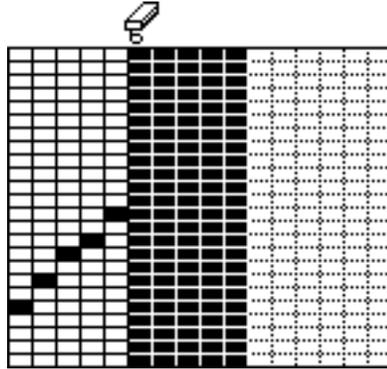
Now we'll cut out the selected Region. Select the Scissors, position it over the selected Region in the Editing Grid and click, and the Pattern will contain only ten steps again.



Restore the ten-note scale by clicking with the mouse at D3 for step 2. Now let's try the Eraser. First, using the Selector, select steps 5-10.

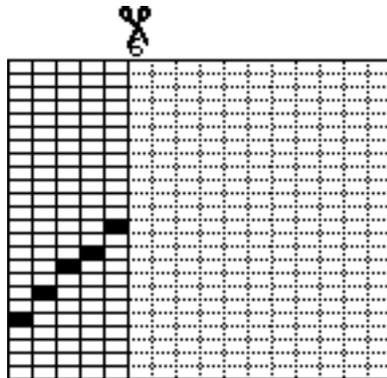


Now, select the Eraser and click above the selected region. All the steps turn to rests.



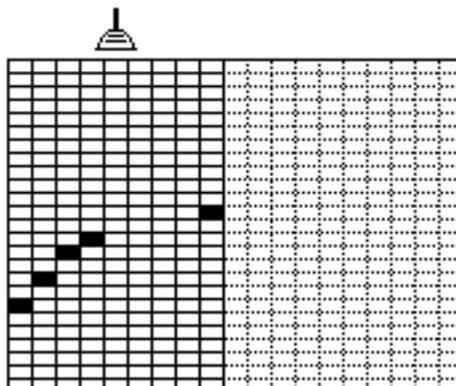
You can also use the Eraser without selecting a Region. Click on a single column above the Editing Grid or click and drag along the top of the Editing Grid. Try erasing step 3 in this way. Restore step 3 again by clicking in the Editing Grid with the mouse.

Next, to make a five-step Pattern, we'll delete the rests we just created. Select steps 5-10 again, then select the Scissors, position it over the selected Region, and click.



You can also click over unselected steps. Clicking repeatedly in one position will delete steps one by one. Delete step 5 in this way, so you're left with four steps. Restore step 5 by clicking in the Editing Grid with the mouse.

Now we'll insert some new notes into the Pattern. Select the Plunger, position it over the Editing Grid at step 5, and click four times.



The total number of steps in the Pattern will increase by four. You can now add notes by clicking in the Editing Grid. Just for the purposes of this tutorial, restore the eight-note C major scale.

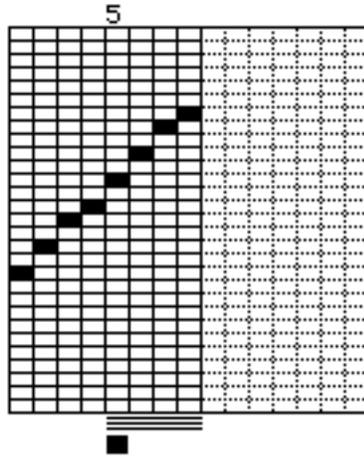
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## MIDI Editing

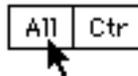
What you've just been doing is graphically editing your Pattern. With another method, which we call **MIDI Editing**, you can add notes to a Pattern or change notes in a Pattern from your MIDI keyboard. It's basically the same process as recording the original Pattern, but MIDI Editing in the Pattern Editor gives you visual control of where notes are added.

Since notes will be played from your keyboard to the Pattern, Record must be enabled for the Pattern you're editing. Enable Record for Pattern 1 and Play-Disable all Voices except Voice 1. Make sure that you can see Pattern 1 in the Editing Grid.

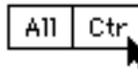
Then look at the area directly beneath the Grid. You'll see a bar made of thin lines which is called the **MIDI Edit Range**. The MIDI Edit Range defines the area on the Editing Grid that can be affected by incoming note data. Set the MIDI Edit Range to extend from step 5 to step 8. You can set it for one step more than the number of steps you already have in your Pattern.



To set the MIDI Edit Range to the entire Pattern, click on the **All** Button in the lower right corner of the Pattern Editor Window.



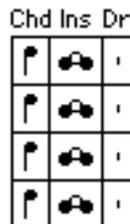
To set the MIDI Edit Range to the current step, indicated by the MIDI Edit Counter, click on the **Ctr** (Counter) Button next to the **All** Button.



Now click on the **All** Button again and drag the MIDI Edit Counter (the black box below the MIDI Edit Range). Notice that you can move it only within the area designated by the MIDI Edit Range. Dragging the MIDI Edit Counter within the MIDI Edit Range sets the point from which MIDI data will affect the Pattern, setting an insert point for adding new notes, for instance. If you don't want to hear the notes in the Pattern as you drag the MIDI Edit Counter, deselect the speaker button at the bottom of the Pattern Editor Window.

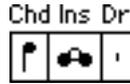
## Using the Record Modes

The Pattern Editor gives you a copy of the Record Mode information shown in the Select Boxes in the Patterns Window. We call this the **Mode Selector**, and it's located to the right of the Editing Grid.

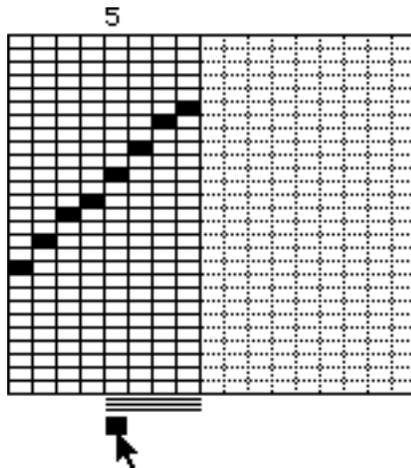


Each column in the Mode Selector contains a Picture Matrix for changing Record, Insertion, and Drum Machine Modes. Click in the row for Pattern 1 in each column and select different items from the Picture Matrices. Notice that as you do, your selection is reproduced in the Select Box for Pattern 1 in the Patterns Window.

Then, for Pattern 1, re-select Single Note Record Mode in the left column, re-select Insert Mode in the middle column, and deselect Drum Machine Record Mode in the last column. The Pattern 1 row should look like this:

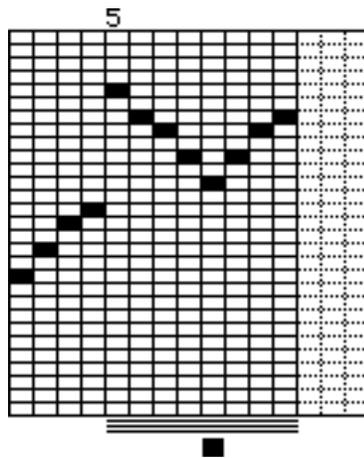


Now drag the MIDI Edit Counter so that it's under step 5.



Drag the MIDI Edit Range from step 5 to step 8.

Be sure that Record is enabled for Pattern 1. Play the following notes in sequence on your MIDI keyboard: D4, C4, B3, A3. You should see the notes appear in the Editing Grid before the G3 that was previously at step 5. Your Pattern should now consist of twelve steps.



Notice that the MIDI Edit Counter stepped along as you played your keyboard. Insert Mode allows you to insert new notes before the current step.

Single Note Mode turns chords into single steps. Play a C major triad and notice that three new notes appear in the Editing Grid.

Select Chord Mode from the **Chd** Picture Matrix for Pattern 1, so that the Picture Matrix looks like this:



Play a C major triad again and notice that it appears in the Editing Grid as a single step of three notes. Select the Scissors and delete the notes you just recorded so that we have a C major scale again.

Re-select Single Note Record Mode for Pattern 1 and choose **Replace Mode** from the **Ins** Picture Matrix for Pattern 1.



Replace Mode allows you to replace the current step with a new note.

Position the MIDI Edit Counter under step 1. Play a G major scale on your MIDI keyboard. As you play the notes, notice that each note of the C major scale is replaced by a note of the G major scale, while the MIDI Edit Counter steps along beneath the Pattern. Drag the MIDI Edit Counter back to step 1 and play a C major scale again to get you back to where you were.

Now position the MIDI Edit Counter under step 5 and click on the **Ctrl** Button to restrict the MIDI Edit Range to step 5. Play different notes on your keyboard and notice how each new note replaces the last, all on step 5. Play G3 to restore the scale.

Then select **Overdub Mode** from the **Ins** Picture Matrix for Pattern 1.



Overdub Mode lets you add new notes to the current step. Try playing some notes on your MIDI keyboard and observe that they appear in the Editing Grid in step 5 to form chords.

If you're in Single Note Mode, each time you play a step the MIDI Edit Counter will advance so that you can overdub the next step. If you're in Chord Mode, you can play a chord over the contents of the current step.

A word about Drum Machine Record Mode. We won't go over it again here, but you may want to try out the Drum Machine Record Mode tutorial again while watching what happens in the Editing Grid.

---

## The Pattern Menu Editing Commands

The **Pattern Menu** contains a number of powerful commands that alter Pattern information as it's stored in memory. These commands operate on a selected Pattern or Patterns or on a selected Region.

To use the Pattern Menu commands, select the Pattern or Patterns by clicking in the Pattern Select Boxes in the Patterns Window, or select a Region in the Editing Grid, then select the appropriate command in the Pattern Menu.

To begin, close the Pattern Editor Window by clicking on its close triangle. Select Pattern 1 in the Patterns Window, then re-open the Pattern Editor Window by choosing **Edit...** from the **Pattern** menu. Now we'll try some of the other editing commands while watching the results in the Editing Grid.

Select Pattern 1 in the View Column, re-size and scroll the Editing Grid so that you can see all of the steps, and drag out a Region of several steps with the Selector.

### Transposing Patterns

Choose **Transpose Up Half Step** from the **Pattern** menu. You'll see the selected Region move up a half step in the Editing Grid. Then choose **Transpose Down Half Step** from the **Pattern** menu. You'll see the selected Region move down a half step in the Editing Grid.

Choose **Transpose Up Octave** from the **Pattern** menu. The Pattern will transpose up an octave in the Editing Grid. Choose **Transpose Down Octave** to restore the Pattern to its original key.

The Transposition commands in the Pattern Menu will transpose a selected Pattern *as it is stored in memory*. Note the difference between these commands and the controls in the Transposition Variable. The Transposition commands in the Pattern Menu change the key in which the selected Pattern was originally recorded. The controls in the Transposition Variable change the transposition of Voices during playback, leaving the Pattern stored in memory in the key in which it was originally recorded.

### Rotating Patterns

Choose **Rotate Forward** from the **Pattern** menu and watch the Editing Grid. You'll see the last step in the Region rotate around to become the first step. The other notes will shift one step forward. Choose **Rotate Backward**, and watch the first step become the last, so that the Region is restored to its original order.

### Reversing the Order of Steps in a Pattern

Choose **Reverse Order** from the **Pattern** menu and observe the Editing Grid. You'll see the Region reverse itself to become a descending scale. Choose **Reverse Order** again and the Region will return to its original state.

### Enlarging Patterns with Rests

Choose **Double with Rests** from the **Pattern** menu while watching the Editing Grid. You'll see a rest inserted after every step in the Region. Select the Scissors and cut out the rests. Then choose **Triple with Rests** from the **Pattern** menu. You'll see two rests

inserted after every step in the Region. Notice in the Patterns Window that the number in the Output Length Numerical has increased as well. Choose **Eliminate Rests** from the **Pattern** menu, and you'll remove all the rests.

## Eliminating Chords

Now, click on **3** in the View Column so that Pattern 3 is displayed in the Editing Grid. It should still have those large chords we recorded earlier when discussing Build Mode. Then select **Eliminate Chords** from the **Pattern** menu and watch what happens. You'll see the notes in the chords turned into individual steps. But be careful! This operation is not reversible.

---

## The Edit Menu Commands

Another way to edit your Patterns is with the commands in the **Edit Menu**. These commands operate on a selected Pattern or on a Region of the Pattern you've selected in the Editing Grid.

**Undo** is unimplemented.

**Cut** deletes the notes of the Pattern or Region and stores them on the computer Clipboard.

**Copy** puts the selected Pattern or Region in the Clipboard without deleting it.

**Paste** replaces the selected Pattern or Region with the contents of the Clipboard. All aspects of the Pattern will be copied, such as Record Modes and Insert Modes. The number of steps pasted into a Region can't exceed the number of steps already in the Region. In other words, if you have a ten-note Region selected and try to paste in a 100-note Region from the Clipboard, only the first ten notes of the new Region will be copied. If, however, you select the entire Pattern and then paste, the entire Clipboard contents will be pasted regardless of the number of notes already in the destination Region.

**Clear** deletes the notes in the selected Pattern or Region.

**Paste Notes**, unlike **Paste**, replaces only the notes of the selected Pattern or Region.

**Change to Rests** removes all notes from a selected Pattern or Region without deleting steps.

**Fill with Rests** fills an entire Pattern, up to its maximum size as determined in the size numerical, with rests.

**Paste at End** will add the contents of the Clipboard to the end of the selected Pattern or Region.

---

## Editing with the Output Length Numerical

In addition to creating blank Patterns, as discussed in the section on Drum Machine Record Mode, the Output Length Numerical can be used to add rests to the end of a Pattern or to delete notes from a Pattern.

Select a Pattern and view it in the Editing Grid. Then, while pressing the Option key on the computer keyboard, increase the Output Length Numerical for the Pattern by 4. You've just added four rests to the Pattern. Now Option-click on the Numerical and change it back to the previous length; the four new rests are deleted from the end of the Pattern.

Save your work before moving on.

# 6 Playing Voices

In this chapter, we're going to discuss the controls that affect the playback of Voices.

Open the M document called **AT-2**. This is a file with four simple Voices that will clearly illustrate the workings of some basic playback mechanisms.

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## Hearing a Voice

There are certain things you must do to be able to hear a Voice.

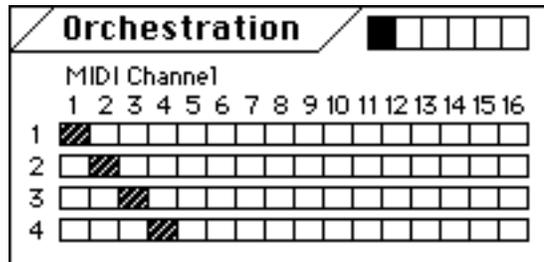
### Set Play-Enable

Be sure that the Play-Enable Button for the Voice is on. For the moment, set the Play-Enable for Voice 1.



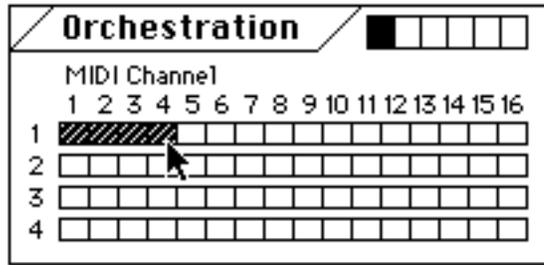
### Select a MIDI output channel

Be sure that the Voice is being sent on the MIDI channel you want, so that your synthesizer will receive it. Double-click on the first Position in the Orchestration Variable in the Midi Window so that the Orchestration Edit Window opens.



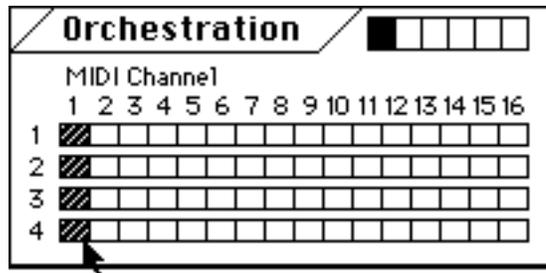
Then click in the row for your Voice (in this case, Voice 1) under the numbers that correspond to the receive channel or channels of your synthesizers. In the Orchestration Edit Window shown above, Voice 1 is sending on MIDI channel 1, Voice 2 on channel 2, and so on.

Try sending a Voice on more than one MIDI channel by clicking in the appropriate MIDI channel boxes in the Voice row.



You can send a Voice on any number of M Output Channels, but if you send a single Voice on too many Channels at once at a fast tempo, the music may slow down.

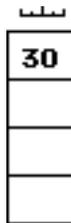
The setting shown below merges Voices on a single Output Channel.



Be sure that the Orchestration Edit Window shows an orchestration which matches your synthesizer setup. Then close the window.

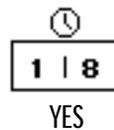
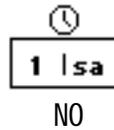
## Set the Output Length

Be sure that the Voice has an Output Length of something other than **0**. If you can't change the Output Length from **0**, it means that there aren't any notes present in the Pattern.



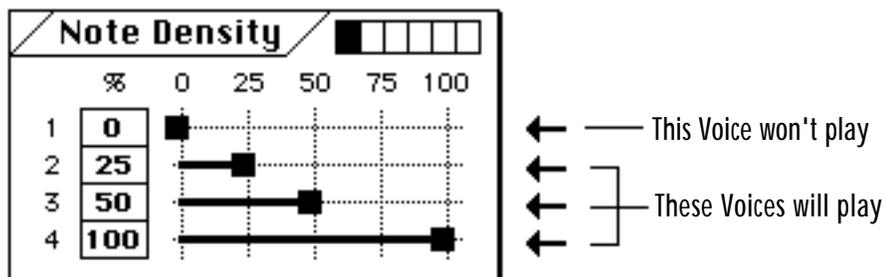
## Set the Time Base

Be sure that the Voice's Time Base Denominator is something other than **sa**, as shown below. **sa** is a special Time Base setting, used for playing a Voice from a MIDI keyboard. We'll discuss it in detail in Chapter 10.



## Set Note Density

Be sure the Voice's Note Density is not set to 0 percent. At 0 percent, the Voice will never play.



## Start and Stop

When the program is playing, the Start Button is highlighted.



The Start Button plays the four Voices "from the beginning." If you click on the Start Button again, the Voices start over again in the same way. This is equivalent to pressing the Sync Button.

Click on the Stop Button to stop the music.



The Stop Button turns all the currently playing notes off, causing them to go into their normal envelope decays. If you stop playback by clicking on the Stop Button, you have no choice but to click on the Start Button to begin playing again, which will reset your Voices to the beginning.

An alternative to stopping the program is to pause it, using the **Pause Button**. Start the program playing again by clicking on the Start Button and then click on the Pause Button. The button will highlight.



Click on the Pause Button again to resume playing, and the button will unhighlight. The Pause Button allows you to stop and start again at the same point—the Voices will "pick up from where they left off." Unlike Stop, using Pause doesn't turn off any notes, it just keeps new notes from happening. This means that organ-type sounds will sustain indefinitely. Other sounds will sustain to their fullest extent.

---

## Other Playback Controls

### Setting a tempo

Once the Voice is playing, we can change its tempo and hear the music slow down and speed up. The tempo control sets the overall basic speed of the M clock. All four Voices play in relation to the same tempo, although they may actually play at different speeds depending upon their Time Base and Rhythm settings.

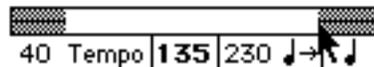
While your Voice is playing, do the following.

Click at an appropriate place in the Tempo Range Bar, which will give you a specific value. As shown below, the Tempo Range Bar has been set to a tempo of 168.



Try clicking at different points in the Tempo Range Bar. You'll hear the tempo "jump" to its new setting.

Next try clicking and dragging in the Tempo Range Bar, which will give you a range of possible values. You can work within that range by changing the Tempo Numerical or by *conducting* the Tempo (we'll explain conducting in Chapter 8).



You can drag in either direction within the Tempo Range Bar, from low to high or from high to low. The tempo will be set at the midpoint of the range you've selected. Once you've set a tempo range, try adjusting the tempo from the mid-point setting by changing the Tempo Numerical. If the music is going, you'll see a thin indicator showing where in the range the actual tempo lies.



Setting a range is essential when you want to conduct tempo, since the span of the Conducting Grid will be equal to that range. More details on this later.

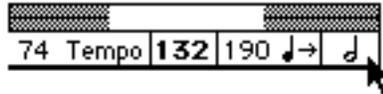
## Using the Metronome

The metronome is useful in certain recording situations, such as recording in Drum Machine Record Mode. It's especially useful in hearing complex rhythmic relationships between Voices.

Start Voice 1. While you're listening to it, choose **Use Metronome** from the **Options** menu. You'll hear a periodic click from the speaker. (If it's not the right volume, adjust the volume with the Control Panel desk accessory.) Because Voice 1 is playing eighth notes, you should hear one click for every two notes in the Voice.

Now we'll adjust the Metronome's Time Base. The Metronome's Time Base is expressed as a ratio between the tempo pulse and the Metronome's click. In *M*, we think of tempo as *always* expressed in quarter notes. The Metronome can be changed to some multiple of those quarter notes.

Try clicking on the quarter note icon at the far right of the Tempo Numerical. This is a **Picture Numerical**, meaning that it's changed as a numerical but it contains pictures instead of numbers. It will scroll up through eighth notes, eighth note triplets (an eighth note with **3** next to it), sixteenth notes and so on, and scroll down through quarter note triplets, half notes, etc. As you scroll, you'll hear the Metronome's click change in relation to the Voice's eighth note pulse .

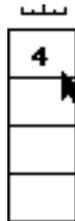


The usual setting for the Metronome is a quarter note. If you set the Tempo Numerical for 120 beats per minute and the Metronome's set for a quarter note, you'll hear 120 clicks every minute. Setting the Metronome Numerical for eighth notes will give you two clicks per tempo pulse. Setting it for half notes will give you one click for every two tempo pulses.

Reset the Metronome Time Base to a quarter note and deselect **Use Metronome** from the **Options** Menu.

## Change the Output Length

You can reduce the number of notes played from a Voice's Pattern by changing the Output Length Numerical. Start Voice 1 and decrease the Output Length Numerical to 4, as shown below.



Now change it to **1**. You should hear one note played again and again. Now change it to **0**. What happens? Set the Output Length Numerical back to its current maximum of **8**.

When you first create a Pattern, the Output Length Numerical will display the number of notes in the Pattern. When you changed the Output Length to something less than 8, you

weren't deleting notes from the end of the Pattern, you were just making the Pattern start over before all of its notes were played.

The Output Length can't be longer than the number of steps in the Pattern. However, if you Option-click while increasing the value of the Output Length Numerical, you can add rests. Refer back to the last chapter, under **Editing with the Output Length Numerical**. When you use the Option-click technique, the change to the Pattern isn't made until you release the mouse from the numerical, so you can adjust it to a precise value.

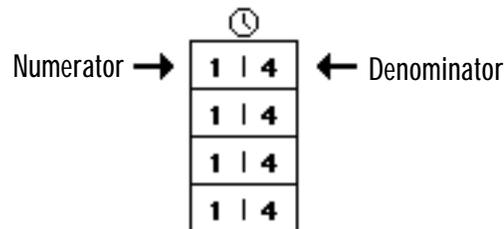
You *permanently* delete notes if you hold down the Option key and decrease the value of the Output Length Numerical.

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## Time Base and Phase

The Time Base controls for each Voice consist of two numericals arranged as a fraction. You'll find these controls in the Patterns Window.

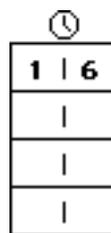
For this section, set Voice 1's Time Base Numericals so that the fraction reads **1** over **4**, as shown below.



Choose **Use Metronome** from the **Options** menu so that you can hear the tempo pulse. Make sure the Metronome Time Base, in the Conducting Window, is set at a quarter note.

The Time Base Denominator, the number on the right of the fraction, sets the basic pulse of your Voice in relation to the overall tempo. A setting of **4** will play quarter notes. A setting of **6** gives you six notes for every whole note, equivalent to dotted eighth notes.

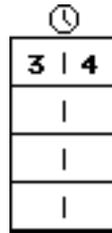
Change Voice 1's denominator to **6**. You should hear six notes for every four clicks of the metronome. Click on the Sync Button to make this relationship a little clearer.



The possible values for the Time Base Denominator are 1 through 9, 11, 12, 13, 15, 16, and 24. As you'll see, increasing the value of the Time Base Denominator speeds up the music. While the music is going try some different settings, then change the Time Base Denominator back to **4**.

The Time Base Numerator, on the left, is like a multiplier for the denominator that allows you to slow things down. If the Time Base Numerator is set to **3**, for example, your Voice will play three times more slowly than it does if the Time Base Numerator is set to **1**, no matter what the denominator is.

Change Voice 1's Time Base Numerator to **3**. You should hear a new note for every three clicks of the metronome.



Change the Time Base Numerator back to **1**. De-select **Use Metronome**.

## Anything Against Anything Else

The Time Base controls are especially important in determining the time relationships between two or more Voices. You can set up interesting cross-rhythms or impossibly complex polyrhythms.

Play-Enable Voice 2. Change its Time Base setting to 1 | 2. You should hear the melody in Voice 1 being played twice as fast as the chords in Voice 2, so that Voice 2 could be said to "accompany" Voice 1.

Try the following combinations:

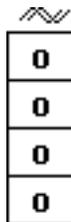
- Voice 1 = 1 | 3, Voice 2 = 1 | 4
- Voice 1 = 1 | 12, Voice 2 = 2 | 1
- Voice 1 = 1 | 9, Voice 2 = 1 | 6
- Voice 1 = 1 | 24, Voice 2 = 1 | 8
- Voice 1 = 1 | 11, Voice 2 = 1 | 7

It's often necessary to use the Sync Button with the Voices any time you change the Time Base Denominator, especially to a higher value. This is because the note relationships between the two Patterns change.

When you're done, set both Voices' Time Base Numericals back to **1 | 4**.

## Try a Little Phase

The **Phase Numerical** is in the Patterns Window under the icon of two sine waves out of phase with each other. It sets the number of **Ticks** by which a Voice will be delayed before playing back.



A Tick is the smallest time division in M. M divides each quarter note (1 | 4 time base) into 96 Ticks. The Phase Numerical allows you to offset each Voice by any number of Ticks up to 199.

To illustrate the use of the Phase Numerical, let's set up two identical Voices. First, select Pattern 1 by clicking on its Select Box. Then choose **Copy** from the **Edit** menu to copy Pattern 1 onto the Clipboard.

Now, in the Variables Window, click on the **b** Position in the **Pattern Group** Variable.



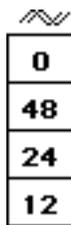
You've just switched the current Pattern Group to **b**, which is empty, so that you can paste your Pattern into it. We'll talk more about Pattern Groups in the next chapter.

The title area of the Patterns Window should now read **Patterns b**.

Select Pattern 1 by clicking on its Select Box. Choose **Paste** from the **Edit** menu. You should see the Output Length Numerical go to **8**. Select Pattern 2 and choose **Paste** again. Now you have two identical Patterns to play with. Select sounds that have a percussive attack without much sustain, such as marimba sounds.

Start the music. You should hear the two Voices playing in unison. Now, click on the Phase Numerical for Voice 2 and gradually increase the Phase offset for Voice 2. You're making Voice 2 go "out of phase" with Voice 1. As you increase the Phase value, Voice 2 lags further and further behind. At first you should hear a subtle phase-shift effect, followed by a rhythmic offset. Increase the Phase Numerical to **48**. You should hear Voice 2 exactly an eighth note behind Voice 1, creating an alternating effect. It's an eighth note because a quarter note is divided into 96 ticks, and 48 is half of 96.

Let's do something else. Paste the same Pattern into the remaining blank Patterns, and Play-Enable all four Voices. Now change the Phase Numerical for Voices 2, 3, and 4 to creating a pseudo-digital delay effect. Try the following settings:



0
48
24
12

You might also want to experiment with your Orchestration Variable settings. One use of the Phase Numerical is to uncouple the attacks of all the Voices so that you achieve more of a "live" feeling in your music, rather than having it sound mechanical.

To help you in Phase calculations, there's a table in the reference section on the Patterns Window which gives the number of Ticks for each Time Base unit. It's relatively easy to calculate yourself. Just divide 384 by the value of the Time Base Denominator. A denominator of **4** (a quarter note), for example, is 96 Ticks because  $384 / 4 = 96$ .

Remember to save your work, if you wish.

# 7 Variables

In M, a **Variable** is some aspect of the music which can be changed. M offers you many Variables which you can use to introduce rhythmic and melodic variety into your music.

In this rather long chapter, we're going to explain how to work with M's Variables.

First, open the **M Work** file that you've been working with.

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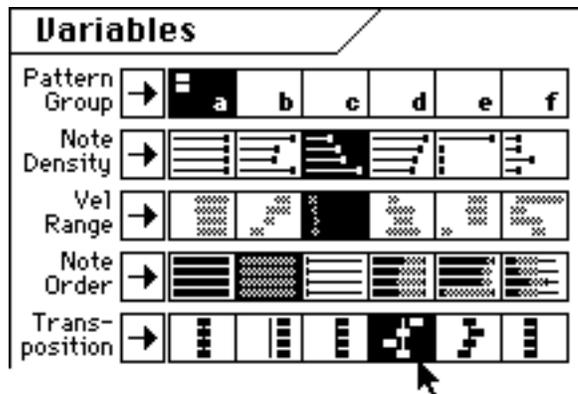
## Using M's Variables

Each Variable has six alternative Positions (except for the Sound Choice Variable, which has 16). One of these is highlighted at any time, which is the Position that affects the music when M is playing.

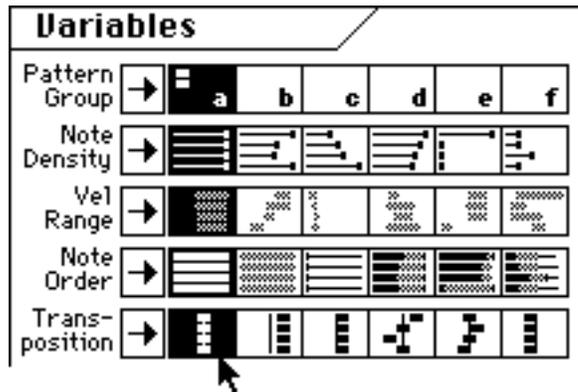
Each Variable is always doing *something*. The essence of using M is to shape what the Variables do until the total result suits you. You do this by using interactive Edit Windows to create alternative settings for each Variable. At the same time, on the main screen, you can be trying different combinations of these settings by selecting alternative Positions.

Each Position in a Variable displays a **miniature representation** of its settings. Usually you'll see four rows of information, with each row affecting one Voice.

Play-Enable all four Voices in the Patterns Window and start the music. Then click wildly on different Positions of the Variables on the screen. You'll hear the music change in different ways.



Now stop the music and re-select the first Positions of all the Variables.

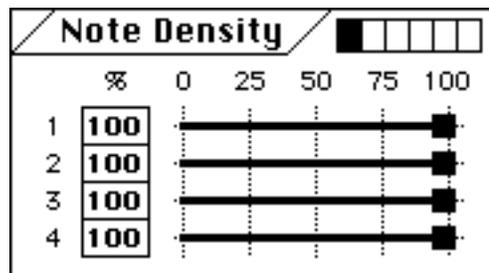


## Editing Variables

The actual settings that make up a Position in a Variable are changed in **Edit Windows** (with the exception of Pattern Group, which is changed in both the Patterns Window and the Pattern Editor; and the Sound Choice Variable, which is changed directly in the Midi Window). You've been using the Orchestration Edit Window extensively in the previous tutorial sections.

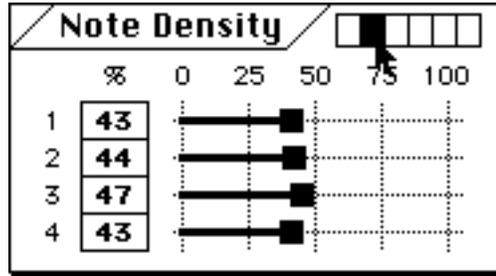
You open Edit Windows by double-clicking on the Position of a Variable you want to alter.

Open the Note Density Edit Window by double-clicking on the **first** Position in the Note Density Variable.



Notice the group of six small boxes to the right of the window title. These are representations of the Variable Positions on the main screen. They show you which Position you're editing. You can also click in these boxes to select another Position to edit. Note that you can select a Position which isn't active on the main screen. This might be a bit confusing at first, but it's extremely powerful in performance. In the window shown above, we know we're editing the first Position of Note Density.

Click on the second box and notice how the settings in the Edit Window change.



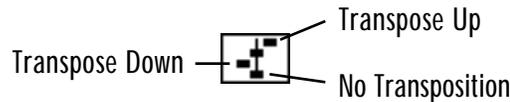
However, if you look in the Variables Window, you'll see that the first Position of Note Density is still the active one.

If you *do* want to change the active Position of a Variable from inside an Edit Window, Option-click on one of the boxes. Option-click on the third box in the Note Density Edit Window and notice how the active Position of Note Density also changes to the third Position.

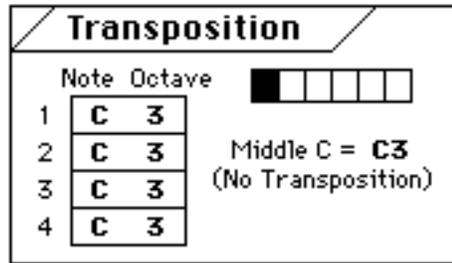
## Transposition

The **Transposition** Variable allows you to transpose the four Voices relative to the keys in which you created their Patterns.

The miniature representation of the Transposition Variable shows an alignment of bricks relative to a vertical line. A brick positioned to the right of the line indicates that the Voice will be transposed up by some amount. A brick positioned to the left of the line indicates the Voice will be transposed down. The farther a brick is away from the line, the greater the amount of transposition.



Double-click on the first Position of the Transposition Variable to open the Transposition Edit Window.



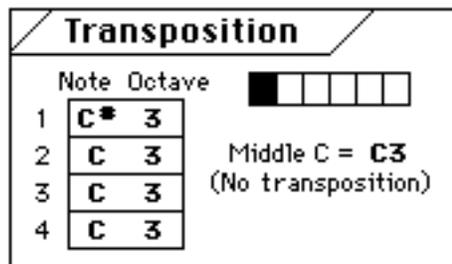
In the Transposition Edit Window, each Voice is represented by a Note Numerical and by an Octave Numerical. The note refers to the key of transposition, where the key in which you've originally composed the Pattern is represented as C. Note that this is a *relative* transposition. If you've made a Pattern in the key of F, for instance, a value of C3 in the Edit Window would still mean no transposition, and you would hear your Voice in F. A value of D3 would then transpose your Voice up two half steps to G.

The Octave Numerical also refers to a relative position, where octave 3 is the octave of the original Pattern. If the Note Numerical is set to C, an Octave Numerical value of 4 would transpose the Voice up an octave and an Octave of 2 would transpose the voice down an octave.

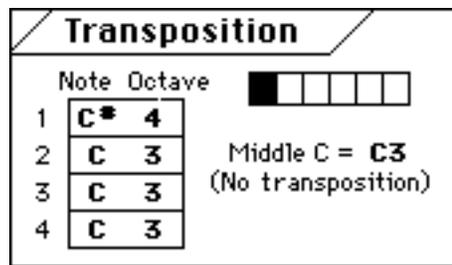
Why this system? Remember in the first tutorial when you transposed a Voice by playing on a MIDI keyboard? The note and octave in the Edit Window represent the note you have to play to get a particular transposition.

Now Play Disable all Voices except Voice 1. Then start the music.

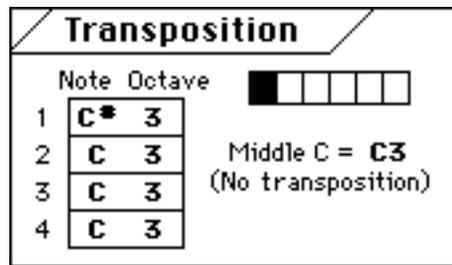
Click on the Note Numerical for Voice 1 so that it changes upward to C#. You'll hear Voice 1 transpose up a half step.



If you keep increasing the Note Numerical, you'll be transposing by half steps. When you go above the note B, the Octave Numerical will increase automatically. Increase the Note Numerical until the transposition reads C#4.



Now decrease the Octave Numerical by 1 so that the transposition is at C#3 again.



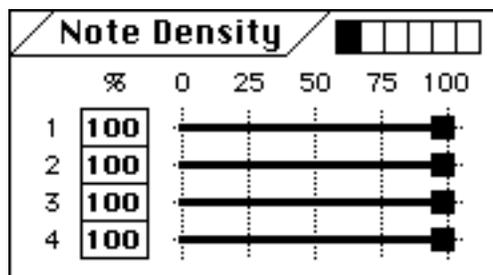
Play-Enable other Voices and try transposing them to different values. If you're conservative, a Transposition Variable Position would contain settings for the four Voices that were related by at least octaves, but obviously, this is not required. Again, when you're done, restore the transposition values to C3 and close the Edit Window.

---

## Note Density

The **Note Density** Variable allows notes to be skipped. This is useful for varying the rhythm and texture of your Voices.

Play-Disable all Voices except Voice 1. Then double-click on the **first** Position in the Note Density Variable to open the Note Density Edit Window.

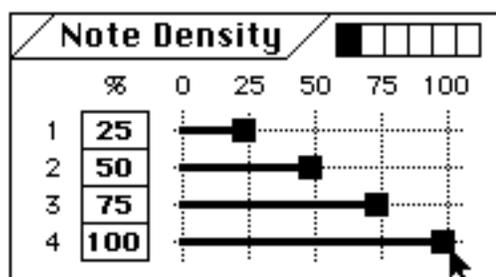


The individual Note Density controls are sliders which indicate the *probability* of a note being played.

Start the music and drag Voice 1's slider to the left so that the numerical in the percentage column reads **50**. You should now hear about half notes from the C major scale and half rests, although the particular notes of the scale that you'll hear are not predictable.

Notes coming from a Pattern pass through a note density "filter" which decides whether they will be played or not. At a setting of 100 percent, every note from the Pattern will be played. With a setting of 50 percent, there's a 50-50 chance that M will play any particular note. If a note is not played, either the previous note will be held out or a "rest" will be played, depending upon how you want to think about it.

To hear this, gradually increase the setting to 90 per cent by using the numerical next to the slider. Then Play-Enable the other voices and vary their Note Densities as well.



When you've got a feel for what's happening, restore the note densities to 100 per cent for all four Voices.

The Note Density Variable is the first one we've looked at that gives us some way of varying rhythm — in this case, by leaving out notes. The next group of Variables we'll discuss, called Cyclic Variables, affect rhythm in a more deterministic way. Because of this, it's often best to start out with the Note Density Variables set at 100 percent, and then wait until you've set the other rhythm Variables before playing with the Note

Density Variable. This order of events will make it easier to hear the Cyclic Variables in action.

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## Velocity Range and Accents

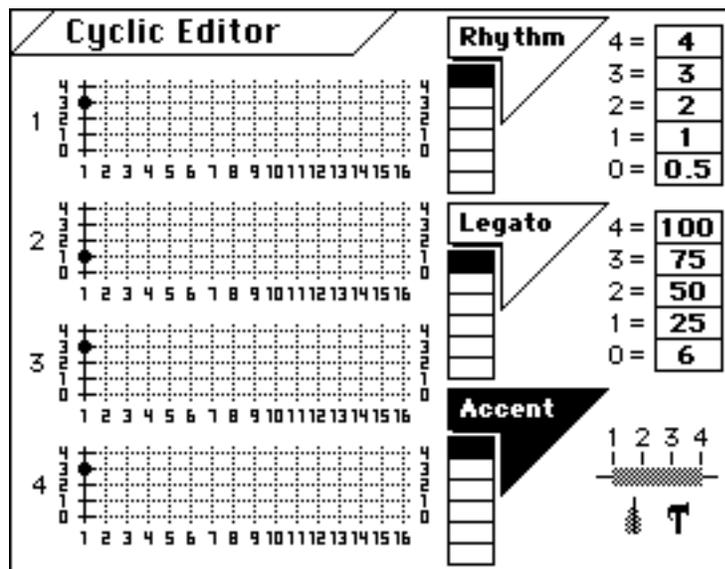
The **Velocity Range** Variable works in conjunction with the **Accent** Variable. It lets you establish ranges within which accent patterns will be generated. Because the range bars of the Velocity Range Variable are so responsive, you can quickly experiment with the balance between voices, or the exaggeration of accents. Since the Velocity Range Variable and the Accent Variable work with each other, we'll look at them together.

Double-click in the first Position in the Velocity Range Variable to open the Velocity Range Edit Window.



Drag this window down to the lower left-hand corner of the screen by clicking and dragging on its title.

Then double-click on the first Position in the Accent Variable, in the Cyclic Variables Window, so that the **Cyclic Editor** opens with Accent selected, as shown below.



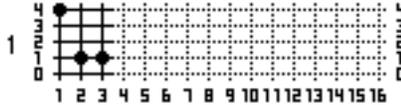
Drag the Cyclic Editor around the main screen, if necessary, so that you can see and work in both windows.

---

## About the Cyclic Editor

Let's talk about the Cyclic Editor in general before we get to specifics.

You create and edit Cyclic Variables in the Cyclic Editor. The Cyclic Variables are cycles of from one to sixteen steps that control accents, rhythms, and note articulations. With an **Accent Cycle**, for example, you can have one accented note followed by two unaccented notes.



What's really cool about M's Cyclic Variables is that a particular step can be a range of values, rather than a single value, in which case M will pick a value from the range at random each time.



By double-clicking on the first Position in the Accent Variable, you opened the Cyclic Editor to edit accents. You can edit all of the Cyclic Variables (Rhythm, Legato, and Accent) in the same Cyclic Editor Window. The Variable that's being edited is highlighted on the right side of the window. The information you create is the same for all three Cyclic Variables; it's just interpreted differently.

## Editing Operations

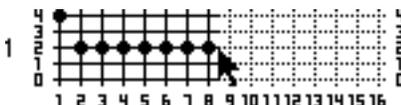
The four Editing Grids, top to bottom, represent the Cycles for each of the four Voices. The vertical lines within each Editing Grid are called **steps**, and they're numbered underneath. The horizontal lines are called **levels**, and they're numbered on the sides of the Editing Grid, from 0 to 4. Generally, a higher level indicates a higher value. As shown in the Editing Grid below, the cursor is pointing to the junction of step 4 and level 3.



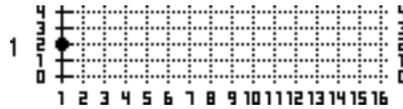
To change the number of steps in a Cycle, click on a number below the Editing Grid. Clicking on **10**, for example, will set up a Cycle of ten steps.

Each step can have either a single value or a range of values. To set a single value for a step, click at the intersection of that step and the desired level. To set a range of values, drag the mouse between different levels. Each time M encounters a step in a Cycle which has a range of values, it will pick one of the values to use.

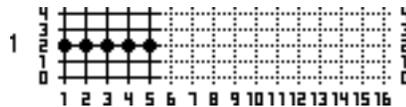
You can also drag horizontally to set a number of steps to the same value, provided you don't exceed the Cycle length.



Here are some example Cycles. To get used to using the Cyclic Editor, duplicate the Patterns you see below in the Editing Grid for Voice 1.



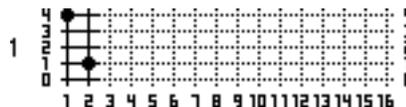
The Cycle above will produce the same value, day in and day out, over and over again. It's exactly equivalent to this:



The Cycle below will produce a continually varying result by picking randomly from all five available steps.



Note that none of the Cycles we've made so far has been truly cyclic at all. They've been either constant or continuously varying. The following Cycle, however, does have a repetitive nature. It alternates between a high and low value.



## Cyclic Variables Blink

As an aid to understanding complex interactions between Cycles of different lengths, we've introduced the rhythmically blinking dot. The first step in the miniature representation of the active Position of a Cycle will blink each time the Cycle plays its first step (unless a Cycle contains only one step, in which case it won't blink). Every rule has its exception.

And every silver lining has its cloud. If you have a lot of rapidly repeating Cycles, the amount of processing time M spends blinking dots can become considerable. If you find that your mouse is acting unresponsively, try choosing **No Cyclic Blinking** from the **Options** menu.

## Experimenting With Velocity Range and Accents

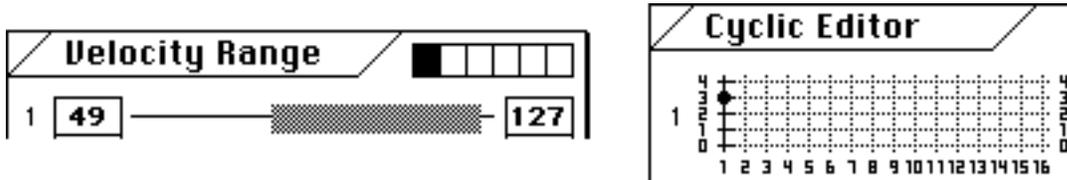
Now, back to the Velocity Range Variable and its connection to the Accent Variable. The Accent Variable's levels 1-4 correspond to quarters of the filled-in area in the Velocity Range Bar. The diagram in the Cyclic Editor Window, as shown below, serves as a graphic reminder that accents, as played by the Cyclic Editor, are dependent on the settings of the Velocity Range Variable.



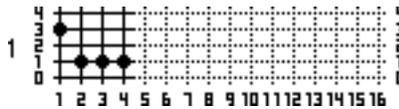
A wide velocity range, set in the Velocity Range Variable, gives you wide changes in dynamics *only* if widely different accent levels have been set in the Cyclic Editor. A narrow range of values in the Cyclic Editor gives you small changes in dynamics. Of course, it also depends on how "velocity sensitive" the sound you're using happens to be. Let's try this out. Remember to use piano-type sounds for this experiment, which will make it easier to hear changes in velocity.

Play-Disable all Voices except Voice 1. Start the music.

Look at Voice 1's velocity range as set in the Velocity Range Edit Window below. It's a fairly wide range, but you don't hear any difference in dynamic level. This is because only one Accent level has been set for Voice 1 in the Cyclic Editor, as shown below.

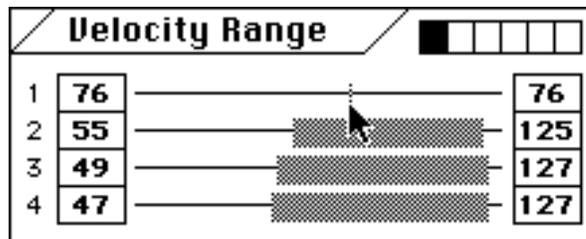


Now, click on the number 4 below the Editing Grid for Voice 1. You'll see the Editing Grid as shown below.



What you've done is set an Accent Cycle of four beats, with the first beat being strongly accented and the rest unaccented. If you don't hear these accents, try a different sound on your synthesizer by changing the appropriate Sound Choice Numerical.

Next, click once anywhere in the Velocity Range Bar for Voice 1.



You've set the Velocity Range Bar to a single value. Consequently, you'll hear only one accent level, even though you've set several values in the Cyclic Editor. Reset the Velocity Range Bar to a wide range of values by dragging within the bar. You can fine-tune the range with the numericals on either end of the bar. Do you hear the differences in accent again?

Next, try drawing out small ranges, starting at the left end and proceeding toward the right end of the velocity range bar. This will show you how you can think of the velocity range both as an amount of accent and as kind of volume control to set loud Voices against soft ones. This can be particularly effective when you've set up each of the six Velocity Range Variable Positions for unique dynamic contrasts between the four Voices,

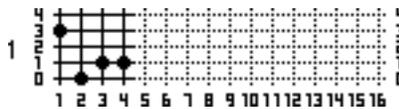
as shown in the group of four Velocity Range Positions below, where each Position "features" a different voice.



## More About Accent Cycles

For each step of an Accent Cycle, we have five levels of accent that correspond to MIDI velocity values. **0** means that any note or chord at the step will not be heard. **1-4** represent progressively higher levels of accent, as mentioned above.

Start the music for Voice 1, if it's not still playing. Now, position the mouse at the intersection of step 2 and level 0 for Voice 1 and click. You'll see what's shown below.



What you should be hearing is an Accent Cycle of one loud note, a rest, and two soft notes.

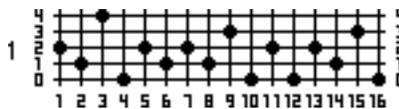
Now click on level 1 for step 2, so that you can hear a note on the second step. Then click on level 4 at step 4 and drag down to level 1, so that you get the Cycle shown below.



This is an Accent Cycle of a loud note, two soft notes, and a note of varying accent. What you've done is to set step 4 so that the program can select randomly from among the different accent levels. Listen to the Cycle several times through to verify that step 4 is different each time.

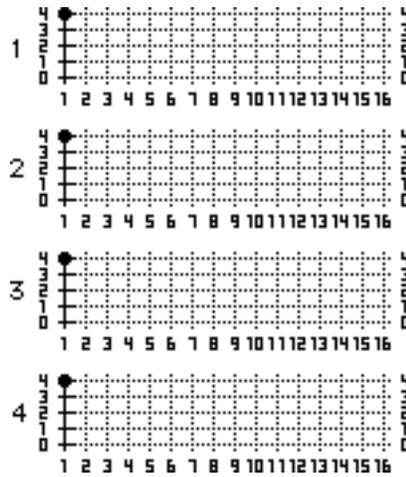
Now drag down the column at step 4 from level 4 to level 0. You should occasionally (about 20 percent of the time) hear a rest at step 4.

Now make a longer Accent Cycle of 16 steps for Voice 1 by clicking on the number **16** below the Editing Grid. As you're listening to the results, experiment with different levels at each step. Then, in the Patterns Window, adjust the Voice's Time Base to **1 | 16**. Set a number of steps to level 0 in odd places, like the Cycle shown below.



Then Play-Enable other Voices and change their Accent Cycles. Remember that you set the range of accent levels in the Velocity Range Variable.

When you've finished experimenting, reset each Accent Cycle to one step at level 4, as shown below. We're doing this to make the accents constant so that we can hear the effect of the other Cyclic Variables clearly.



Close the Velocity Range Edit Window, but leave the Cyclic Editor open. Then, in the Patterns Window, set Voice 1's Time Base back to a more subdued 1 | 4.

## Creating Rhythms

Click on the button labeled **Rhythm** in the Cyclic Editor. You'll see the window as shown below. Make sure that the first Rhythm Variable Position is selected for editing, and that it's also the active Position in the Cyclic Variables Window. In other words, you want to edit the Rhythm that's actually going to affect the music.

The **Rhythm Variable** lets you set the amount of time between the beginning of one note and the beginning of the next. A Rhythm Cycle consists of steps which express how

much time to wait after playing a note before playing the next one. This time is expressed in multiples of the Voice's Time Base, as determined in the Patterns Window, so that a Voice's overall rhythm remains in the same relationship regardless of its Time Base. This relationship is illustrated below.

with a Time Base of: 1 | 4

using Rhythm Values of:

.5	1	2
		

gives you durations of:

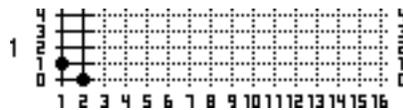
with a Time Base of: 1 | 8

using Rhythm Values of:

.5	1	2
		

gives you durations of:

Here's an example. Set Voice 1's Time Base to 1 | 8, or eighth notes. Make a Rhythm Cycle for Voice 1 that looks like this:



Play-Enable only Voice 1. Then start the music. You should hear a jumpy, swingin' sort of rhythm from Voice 1.

Now set Voice 1's Time Base to 1 | 6. The jumpy, triplet-feel aspect of the rhythm remains the same, but the speed of the Voice has slowed down. Try a Time Base of 1 | 4, then try 1 | 16. Ya gotta love those 32nd notes.

## Rhythm Values

How do we know how different levels in the Rhythm Cycle actually multiply the Time Base? It's done quite flexibly with the **Rhythm Value Numericals**. At the far right of the Cyclic Editor, you'll see a column of numericals, as shown below:

4 =	<b>4</b>
3 =	<b>2</b>
2 =	<b>1.5</b>
1 =	<b>1</b>
0 =	<b>0.5</b>

These are the actual "multiplication factors" assigned to each step for all Rhythm Cycles throughout the program. Let's do an actual calculation in Ticks, M's basic timing unit, to show you how rhythm values are determined.

At the moment, we're using levels 0 and 1 in our Rhythm Cycle. According to the Rhythm Value Numericals, level 0 is .5 and level 1 is 1. The number of Ticks for a 16th

note (Time Base 1 | 16) is 24, where a Tick, as you may recall from our discussion of Phase in Chapter 6, is one 96th of a quarter note. You calculate the number of Ticks for any value of the Time Base by multiplying the Time Base by 384. For example,  $384 * (1 | 4) = 96$ . Or  $384 * (1 | 16) = 24$ .

So, for step 1, we have  $24 * 1$  (the rhythm value for level 1) = 24 Ticks. For step 2, we have  $24 * .5$  (the rhythm value for level 0) = 12 Ticks.

Now change the Time Base to 1 | 6.  $384 * (1 | 6) = 64$ , so step 1 is 64 ticks and step 2 is 32 ticks.

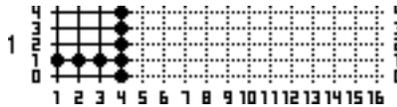
Unless you're really numerically-minded, you probably won't count Ticks like this, so don't worry if this discussion ticked you off, so to speak. We just wanted to give you a feeling for the interrelationship between the Rhythm Cycle, the Rhythm Value Numericals, and the Time Base.

While listening to the music, change the Rhythm Value Numerical assigned to level 0 to 1. Now the rhythm you hear should be perfectly even. Now set it to 1.5. The rhythm becomes uneven and slightly jumpy again. It should be. It's based in 5-tuplets!

## Weighting Rhythmic Randomness

Note that you were able to define level 0 in the Rhythm Value Numericals to generate the same or even a higher time value than level 1. For clarity in looking at rhythms and figuring out what's going on, we suggest leaving them in ascending order at first, but there are some very creative things you can do with the rhythm numericals. Here's one of them:

Change your Rhythm Cycle to look like the one below.



Now set the Rhythm Value Numericals as shown below, so that the lowest one is .5, the next three are 1, and the top one is 1.5.

4 =	<b>1.5</b>
3 =	<b>1</b>
2 =	<b>1</b>
1 =	<b>1</b>
0 =	<b>0.5</b>

What you should hear now is a rhythm which is generally even, but occasionally gets "off" by a factor of a half. Change the Time Base of Voice 1 to 1 | 4, and listen to this Voice against another one which has a Time Base of 1 | 4.

What's going on here is that when M encounters step 4 in the Rhythm Cycle, it chooses one of the five levels in the range you've drawn out. But since most of the levels generate a value of 1, most of the time the rhythm is always the same as it is for the other three steps, which *always* generate a value of 1. Two chances in five, the Rhythm Cycle will produce a value of .5 or 1.5 to mess things up (or straighten them out again).

Note that there's only one set of numericals and that they apply to all the Rhythm Cycles in the program. So you can't compose a Rhythm Cycle for one Voice and then expect to use a new set of numericals for the next one.

As you explore what you can do with rhythmic relationships between Voices, you may need to use the Sync Button to realign the Rhythm Cycles with each other.

So that we can hear more clearly the effects of the other Variables, change the Rhythm Cycle for Voice 1 back to one step and one level, as shown below. Leave the Cyclic Editor open.



## Working with Phrasing

The **Legato Variable** lets you create Cycles of note articulations, or phrasing. A staccato note is different from a legato note in that it is released very shortly after it starts, leaving some silence until the next note begins. A legato note leaves little silence before the next note and may even overlap subsequent notes. Of course, for you to be able to hear this sort of thing, you must have a sound on your synthesizer that can be sustained. Percussive sounds won't allow you to hear much difference. Generally, the sounds most sensitive to legato and staccato phrasing will resemble woodwinds, such as a clarinet. An organ tone will also work very nicely, and even a piano sound can be effective.

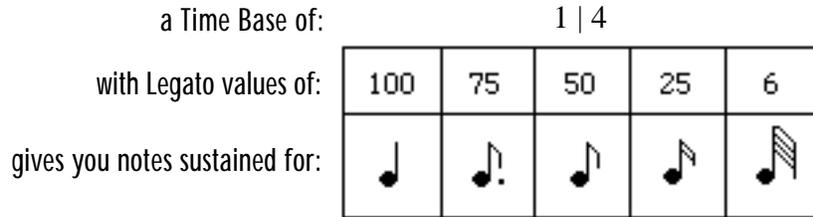
The way to tell, of course, is to phrase the sound yourself on a keyboard. Is there a difference in playing staccato notes as against holding the key down for a while? For demonstrating the Legato Variable, choose a sound on your synthesizer that you can phrase effectively.

Select the Legato Button in the Cyclic Editor, so that the window opens as shown.

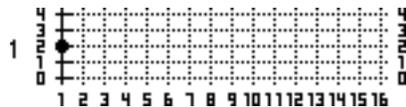
4 =	4
3 =	3
2 =	2
1 =	1
0 =	0.5

4 =	100
3 =	75
2 =	50
1 =	25
0 =	6

As with Rhythm, the actual values of the Legato Variable are determined by a set of **Legato Value Numericals**. As you can see, the current values for Legato are 100, 75, 50, 25, and 6. These numbers express how long the note will be sustained as a percentage of the time between the onset of a note and the onset of the next one. The concept is illustrated in the diagram below.

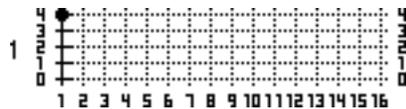


Make sure you're editing the first Position in the Legato Variable, and also be sure that the first Position is the active one. The top Legato Cycle should look like this:



Start the music and listen to Voice 1 alone. You should hear a steady pulse with the notes in the Voice each sustaining for about half a quarter note.

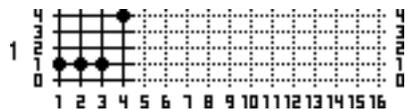
Next, click on level 4 for step 1. You should hear each note sustain for the full quarter note.



The best way to illustrate that Legato is a percentage of the time between notes is to play with the Time Base Denominator. Change it to  $1 | 1$  for Voice 1. Now the notes sustain much longer, but they don't overlap or cut out early.

Now click on level 1 in step 1 of the Legato Cycle. The notes cut off shortly after being played, but one wouldn't necessarily characterize the feeling as staccato. Change the Time Base to  $1 | 16$ . As your mother might say, "Now *that's* staccato!". But the point is that the proportion of time between notes that the note is held remains constant. Return the Time Base to a more subdued  $1 | 4$  again. We don't want you to get too excited.

Now we'll set some Legato Cycles. Create the one shown below for Voice 1. You should hear three staccato notes (short sustain) followed by one legato note (long sustain).



Now we'll use one of M's unique features — that of wildly overlapping notes. Change the top Legato Value Numerical, the one assigned to level 4, to 400 per cent. Now the fourth note in the Cycle sustains over the other three. If your synthesizer is anything like ours, it'll probably start to cut off some of these sustaining notes after a while, or the sound you're using may just die out on its own, but these are things you need to determine as you work. Organ sounds often sustain indefinitely, so extremely long sustained notes can be heard to best advantage.

Reset the value for level 4 to 100 per cent. As with the Rhythm Variable, Legato value assignments apply to all Legato Cycles at all Variable Positions.

Click on step 4 at level 4 and drag the cursor down to 0. You should hear a Cycle of three short notes and one note of randomly varying articulations—sometimes long, sometimes short.



Making the phrasing vary like this in certain places is quite effective in adding that human element we're all searching for. And as with the Rhythm values, you can weight the randomness by manipulating the table of Legato values in clever ways.

## Cyclic Editor Interactions

Before leaving the Cyclic Variables, it's important to make a point about how the three Cyclic Variables relate to one another. Set the Cyclic Editor so that you can edit the first Rhythm Variable Position. Make a rhythm with two steps like the one shown below.



As you listen to the effect of the Legato Cycle, notice that it tracks the rhythm. In other words, the Rhythm Variable is responsible for deciding when to advance the Legato Cycle to its next step. This is also true for the Accent Cycle.

What this means is that even though you have a Legato Cycle which has four steps in it, it's not necessarily going to be exactly four quarter notes in length. Right now, for example, the Legato pattern of length 4 will reset every **three** quarter notes. In that space of time however, four *events* (or rests) will have been played, each of which will have used a successive step from the Legato Cycle.

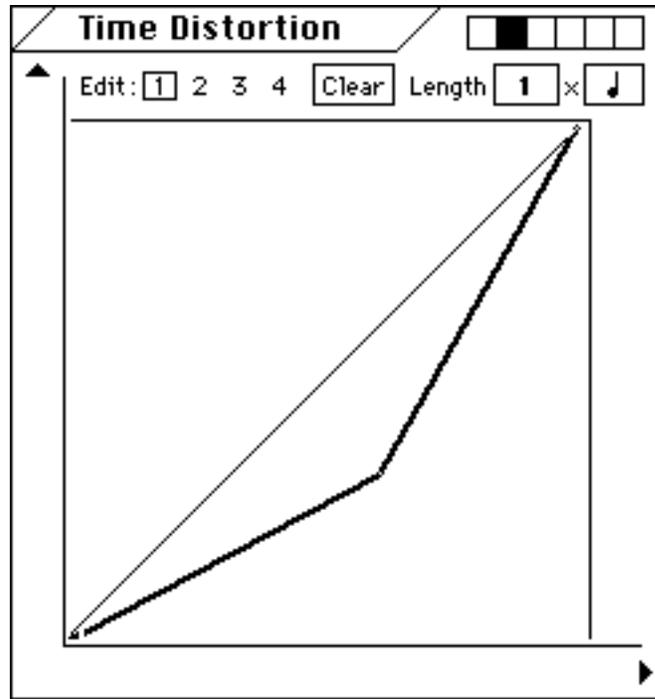
That covers the Cyclic Editor. It's what makes a plodding series of notes in a Pattern come alive into a full-fledged Voice. If you know what's good for you, you'll be spending a lot of your time coming to grips with its power. Work with it for awhile to get a feeling for how the Cyclic Variables affect each other.

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## Time Distortion

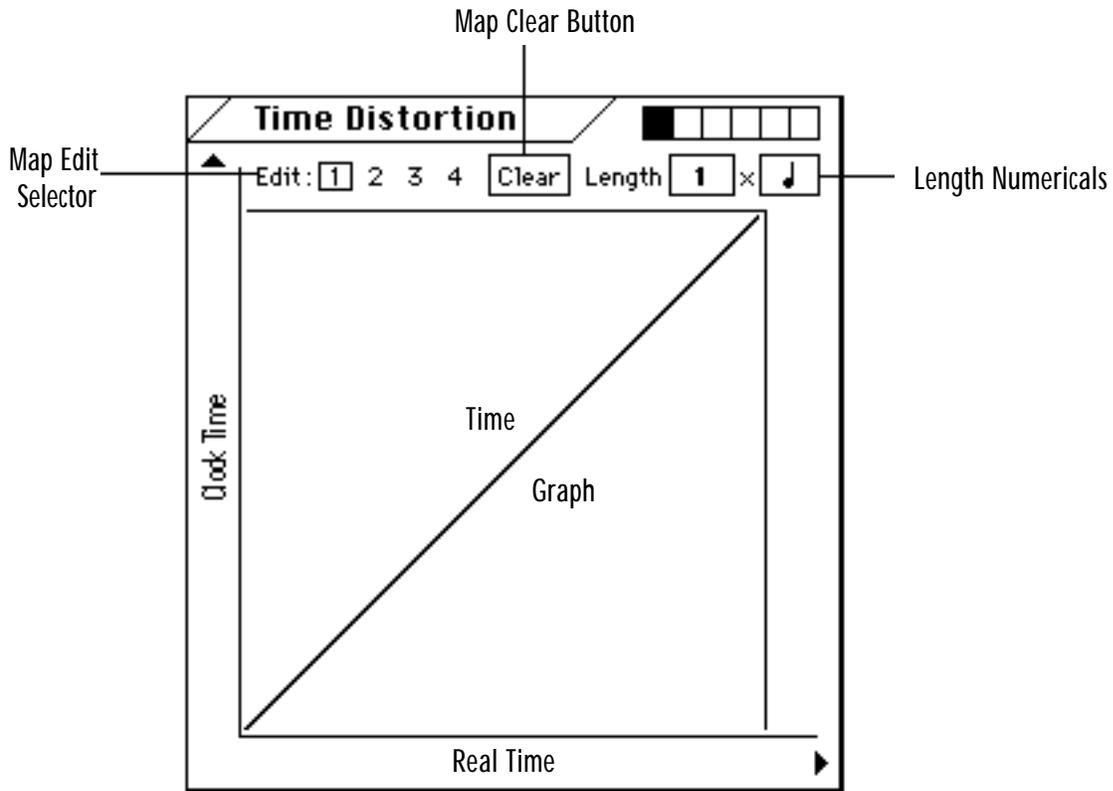
No doubt many of you have been asking yourselves, "What is time distortion anyway?" and "How can time be distorted here on Earth?" You're about to find out.

The **Time Distortion** Variable lets you speed up and slow down a Voice within a fixed amount of time. You've all heard a "swing" or shuffle rhythm. It's simply a slowing down and then a speeding up in the space of a quarter note, so that the eighth note in the middle is delayed. The Time Distortion Map for swing looks like this:



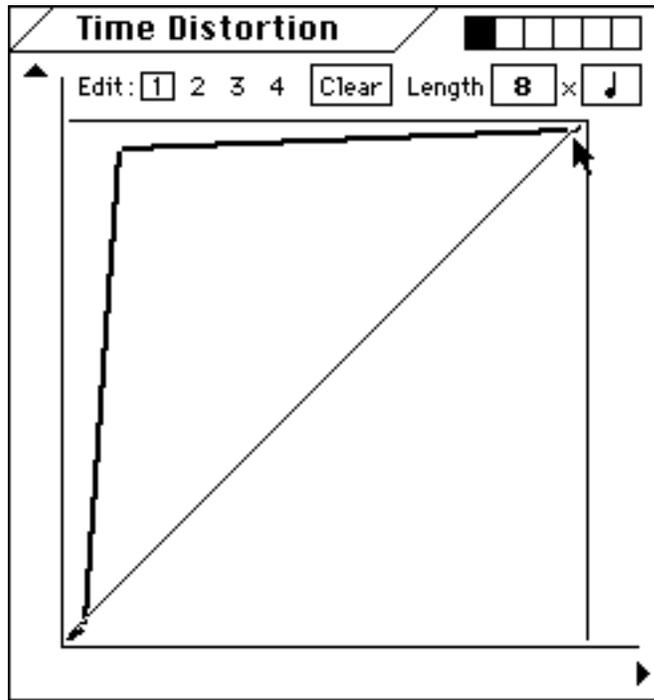
If you choose to distort a longer period of time, say, a whole measure, then you could call Time Distortion *rubato*. The thing about *rubato* playing is that over the whole song, the tempo is consistent. Here too, the same amount of time will go by when you use a Time Distortion Map, it'll just go by rather, well, distorted.

Double-click on the first Position in the Time Distortion Variable. The Time Distortion Edit Window opens with a neutral **Time Distortion Map**. The various controls in the window are labelled in the diagram below.



The central feature of the Time Distortion Map is a graph, represented as a diagonal line. The horizontal axis is **Real Time**. The vertical axis is **Clock Time**. Real Time refers to how much time has actually gone by. Clock Time refers to how many ticks of M's clock have occurred. The length of time covered by the map is variable with the Length Numericals. The graph shown above covers the space of a quarter note, and shows a normal relationship between Real Time and Clock Time, in that ticks of the clock take a consistent amount of Real Time.

In the next map, however, the Voice would play very fast at first and then slow down drastically to fit the chosen amount of Clock Time. This is because almost all the clock ticks occur within the first few moments of Real Time.



Let's try plotting the map you see above. First, set the Length Numerical to eight quarter notes, as shown above. Just change the number **1** to a value of **8** and leave the quarter note alone.

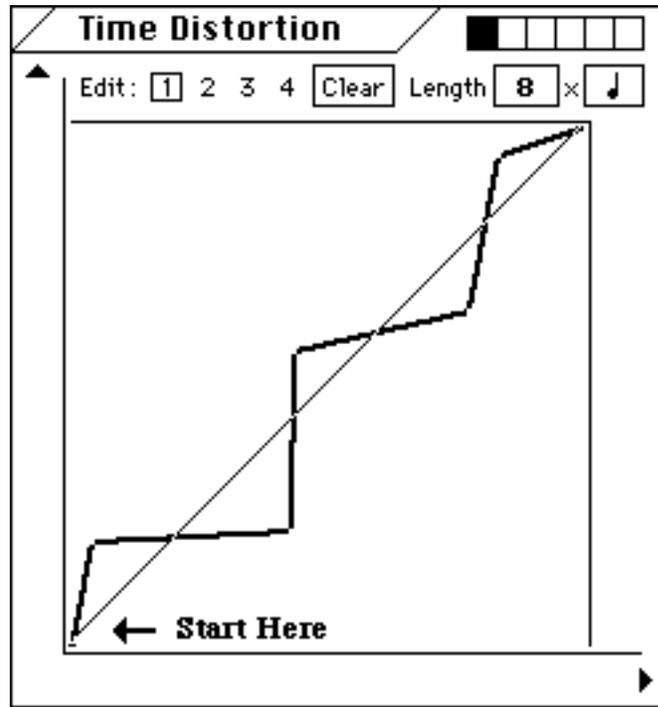
Next, click the mouse where you see the sharp corner of the graph above. The cursor turns into what is sometimes called a "bombsight." Once you release the mouse, you've set a **breakpoint**. A line is automatically drawn from the lower left corner of the map to the breakpoint you've made. And the cursor appears to be attached to a "string" which shows you where the line would go if you were to click the mouse at its current Position to set another breakpoint.

To finish the map, move to the upper right-hand corner and double-click. If you've succeeded in completing the map, the cursor will turn back into an arrow, and the string won't be following you around. If this didn't happen, try double-clicking again.

Start the music. You should hear a flurry of notes, followed by a few very slow notes. After eight quarter notes, the flurry starts again. The Voice will repeat its Time Distortion Cycle until you get tired of listening to it and stop the music.

Now, to clear Voice 1's map, click on the **Clear** Button at the top of the Edit Window.

Let's try drawing a new map for Voice 1. This time, we'll make the map line cross the center line several times, which will give us a constant increase and decrease in the speed of the notes.



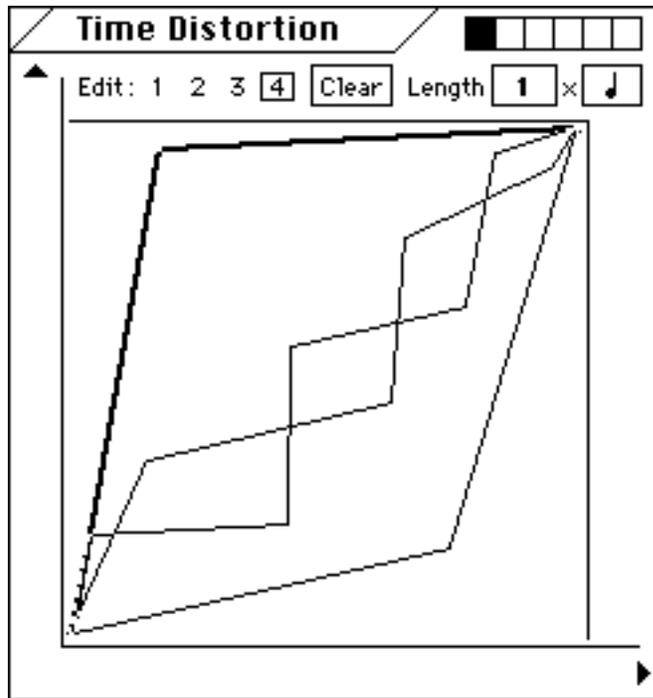
Click on the graph at the corner indicated by the words **Start Here** in the figure above. Move the mouse to the next breakpoint, click again, and so forth until you reach the top. Notice that you must always have the map increasing in time for both axes. The reason for this is that although you can distort time, you can't go backwards into it. Rest assured, however, that we at Intelligent Music are looking into this problem.

Finish the map by double-clicking near the upper right-hand corner.

Start the music and listen to Voice 1 constantly speeding up and slowing down.

You can edit an existing time map by tugging on the breakpoints. The cursor changes to a heavy arrow to indicate you're changing an existing map, rather than creating a new one. Try making the map you created above less angular by dragging the breakpoints towards the center.

Each Voice can have its own Time Distortion Map at each Position of the Time Distortion Variable. You can work on a Time Distortion Map for Voice 2 by clicking on the number **2** next to the word **Edit:** above the graph. At this point, Voice 1's Time Distortion Map is redrawn in a thin line, and you see Voice 2's map as a heavy line that is set to the default ineffectual setting. At any time, the map you're working on will be drawn in a heavier line than the others.



Make an ensemble of Time Distortion Maps such as the one shown above.

We suggest that you keep one Position (such as Position 1) of the Time Distortion Variable free of maps, so that you have a rhythmically neutral setting available when working with other rhythm Variables.

## Working With Rhythm

The Note Density, Velocity Range, and Time Distortion Variables and the Accent, Legato and Rhythm Cyclic Variables all affect rhythm, phrasing, and dynamics in one way or another. Once you understand how they work, you can do things that are impossible and even dangerous with conventional sequencers and composition programs.

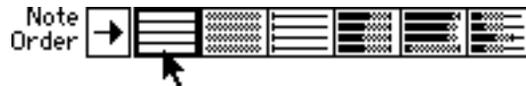
Working with all these Variables together can be a little intimidating, however, so it helps to keep a Position of each Variable which does little or nothing to the music. That way, if ever you get confused about why the music sounds the way it does, you can click on these "safe" Positions until you figure out what's happening. Using these special Positions may also help you concentrate on modifying the Variable of interest without being bothered by extraneous information.

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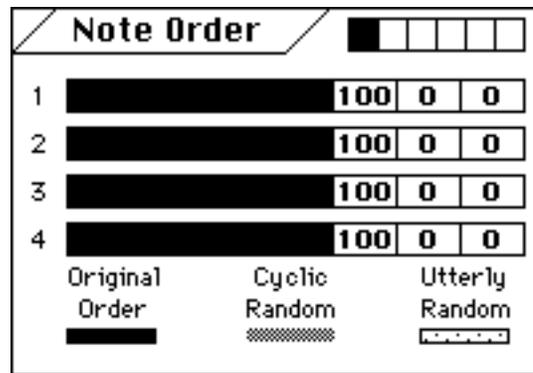
## Note Order

The **Note Order** Variable reorders the notes in your Pattern, creating new melodies from the ones you've recorded. You create a note order setting interactively, so that you can come up with the values that suit a particular musical result. And you can use as much as or as little reordering as you want, or dispense with it altogether, as we've been doing thus far.

Open the Note Order Edit Window by double-clicking on the **first** Position of the Note Order Variable.



The Note Order Edit Window will appear.



The Note Order Edit Window allows you to mix three kinds of note orderings. As indicated at the bottom of the Edit Window, each ordering scheme, as represented in the Note Order Edit Window, has a different "color" associated with it.

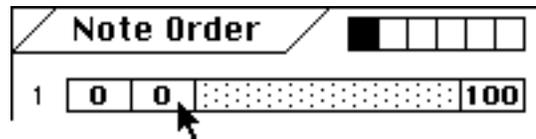
**Original Order** (solid) means that the Voice will play the notes back in the exact order that you recorded them. The window above is set for 100 percent Original Order on all four Voices.

**Cyclic Random** (gray) means that the ordering of the notes of your Pattern has been recomposed and stored as a "copy" of the original Pattern. If you listen to a Voice with 100 per cent Cyclic Random ordering, it will be just as repetitive as it would be with Original Ordering.

**Utterly Random** (polka dot) means that M will continually pick a note or chord from an arbitrary place in your Pattern as it's playing. Remember, the notes aren't new, but the order they're played in is. Unless you have only one note in your Pattern, Utterly Random ordering is nonrepetitive.

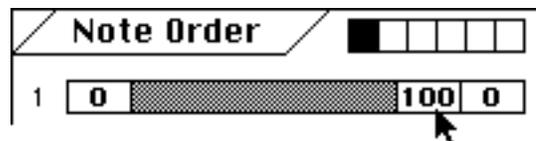
Now start the music and listen to Voice 1. You should hear the C major scale in order from low C to high C.

We're going to change Voice 1's Note Order to 100 per cent Utterly Random. Click on the **middle** numerical-like box and drag it to the left, until the number inside reads **0** and the number in the far-right box, which is the box that indicates the percentage of Utterly Random ordering, reads **100**.



The bar is completely polka-dotted, to indicate that it's truly Utterly Random, and you should hear a random, nonrepetitive reordering of the C major scale.

Now slide the middle box back to the far right-hand side of the bar. As you do this, the bar turns completely gray.



You're hearing a random reordering of the C major scale which repeats every eight notes.

If you're not satisfied with the variation, or if you just want to hear another one, you can change the Cyclic Random ordering without affecting the original Pattern. Select Pattern 1 in the Patterns Window, then choose **ReScramble** from the **Pattern** menu. You should be hearing a new Cyclic Random ordering of the notes of the C major scale.

Now let's do something more interesting. Slide the far-left box, which represents Original Order, toward the center, and pause when you've reached about 50 per cent. Slowly increase the Original Order percentage toward, say, 95 per cent. If you listen carefully, you should begin to hear the feeling of the scale "emerge" from behind the randomly reordered melody. What's happening now is that the Voice picks notes from the Pattern's original order most of the time, but it occasionally picks notes from the Cyclic Random ordering.

Play with the user interface of the Note Order Edit Window. It's one of those things that's hard to explain but easy to figure out intuitively. Just to summarize:

- Slide the left-hand box to increase or decrease Original Order.
- Slide the middle box to the left to increase Utterly Random.
- Slide the middle box to the right to increase Cyclic Random by decreasing Utterly Random.
- Slide the left-hand box to the left to increase Cyclic Random by decreasing Original Order.
- Don't slide the right box (it doesn't move).

---

## The Pattern Group Variable

The **Pattern Group** Variable is a bit different from the other Variables, in that you don't double-click on it to edit its settings. This is because its Edit Window is really the Patterns Window, which is always open.

A Pattern Group stores the notes and chords of four Patterns, one for each Voice. It also stores many of the settings you see in the Patterns Window, including:

- Output Length
- Time Base
- Phase
- Record Modes (Chord, Insert, and Drum Machine)

The miniature representation of a Pattern Group is a box which contains up to four bricks. The presence of a brick indicates whether or not there is any musical material stored in a Pattern. A brick flashes each time the Pattern it represents starts playing over again. This can help you keep track of what step in a Pattern is currently playing. And besides, it looks cool.

Start the music and select the Pattern Group **b** Position, which at this point should have two bricks, assuming that you haven't made some Patterns on your own. Notice that the settings in the Patterns Window change, as well as the title, which is now **Patterns b**.

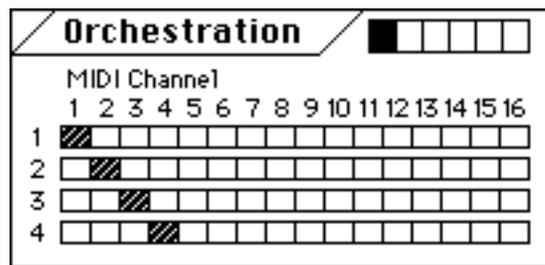


When you want to make Patterns in a new Pattern Group, just select a blank Position in the Pattern Group Variable. The active group letter will be displayed in the title of both the Patterns Window and the Pattern Editor.

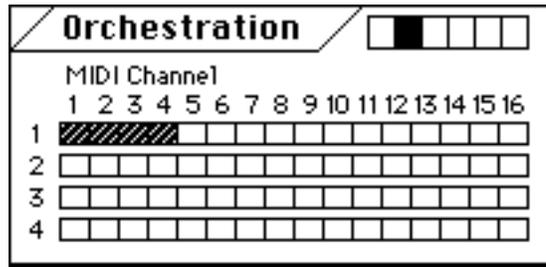
## Orchestration

Since we've already discussed the Orchestration Variable in Chapter 6, we won't cover it in detail again here.

But we would like to observe that creating alternative Positions for the Orchestration Variable can be an effective way to introduce changes in your music during performance. Let's say you have a configuration of channels and voices like the one below, with one channel for each Voice, in Position 1.



Now create Position 2 for Orchestration as shown below.



Start the music. Click on Position 2.

The effect will be that of all four instruments suddenly deciding to play the same line in unison. And the change happens much more smoothly than sending your synthesizer a program change, because any notes still playing are not cut off by a change in orchestration.

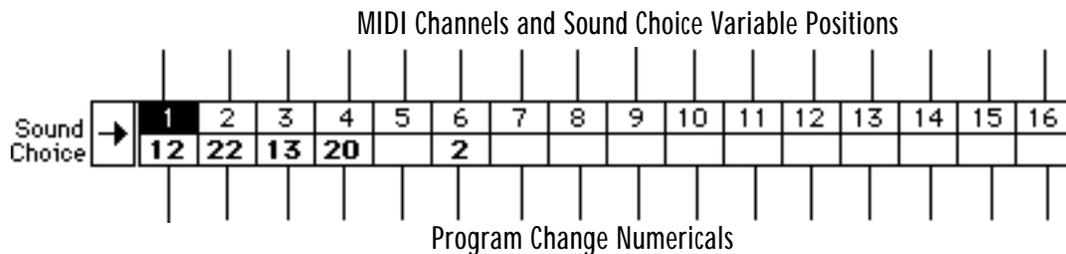
Many people also like to work with the Orchestration Edit Window open all the time, especially in combination with the Sound Choice Variable discussed below. This process of orchestrating Voices can happen exceedingly fast in the interactive M environment.

---

## Sound Choice

The **Sound Choice** Variable lets you send MIDI program changes to your synthesizers in real time. It also lets you save groups of program changes as presets. You can have up to sixteen different presets of program changes for each MIDI channel.

The Sound Choice Variable consists of two rows of sixteen boxes. The top row indicates the current Variable Position, which is highlighted. It also shows the MIDI channel associated with the numerical box below which contains a program change number.



Let's use the Sound Choice Numericals. Select Pattern Group **a** again, Play-Enable the four Voices, and start the music.

Now change a Sound Choice Numerical below the MIDI channel number that corresponds to one of your synthesizers. Notice that the program change won't actually be sent until you release the mouse button. This is different than the way numericals work in the rest of the program.

Next we'll create two Sound Choice presets. Click on the number **2** in the top row to select the second Variable Position. Set some different program change numbers for sounds you like in the appropriate boxes. Setting the numerical to an empty box (the lowest setting of the numerical) means that no program change is sent when you select that Position.

Now, switch back and forth between presets **1** and **2** and listen to the sounds change. When you select a preset, the numbers indicated by the numerals are sent as program changes on the selected MIDI channels.

## Program Number Confusion

You may or may not know this, but synthesizer manufacturers have not managed to agree on how to display the numbers of program changes on the front panels of their instruments. M's default behavior is to use program numbers that start at 1 and go to 128. This is used by instruments made by Yamaha, for example. Other manufacturers, such as Oberheim, start their numbering at 0 and go to 127. Still other synthesizers, such as the Ensoniq ESQ-1, use other schemes for numbering the programs that may not even correspond to decimal numbers. Such is life.

One thing we have included in the software to make life a little easier is an option for each MIDI channel as to whether you want programs to be displayed as 0-127 or 1-128. This is accessed in the Midi Assignment Window, discussed in Chapter 13.

Remember to save your work before you move on.

---

## Performing with Variables

One of the main reasons there are six Positions for each Variable is that you can switch between Positions in performance to make subtle or dramatic changes to the music in real time. A number of methods are available to do this switching:

- Just clicking on a Position
- Conducting with the Baton, or through MIDI (Chapter 8)
- Using the Hold/Do Button (Chapter 9)
- Performing with the Input Control System (Chapter 10)
- Performing with Snapshots and Slideshows (Chapter 9)

In addition, you can use Edit Windows as performance devices. The Velocity Range Edit Window is the most obvious example. Try constantly changing the steps in Accent and Legato Cycles of fixed length. Or try changing channel/Voice assignments in the Orchestration Variable. In planning a performance, you might want to reserve a Variable Position for this kind of work.

# 8 Conducting

Conducting is a special performance technique that essentially lets you change the selected Positions of many Variables simultaneously.

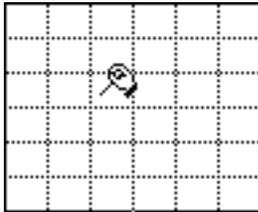
In this chapter, we'll discuss various techniques for conducting.

Start by opening **AT-2**. For this tutorial, select the first Position in each Variable and Play-Enable Voice 1 in Pattern Group **a**.

---

## About Conducting

The importance of conducting as a performance technique is that it provides a powerful way of selecting and associating Variable Positions. Move the cursor into the **Conducting Grid**, in the Conducting Window.



The cursor turns into the **Baton**. Press the button and presto!— the baton in the conductor's hand is raised. Drag the Baton around in the Conducting Grid, occasionally clicking the mouse button. Notice that a black dot is left in the Conducting Grid at the place where you clicked.

## Selecting Variables and Controls for Conducting

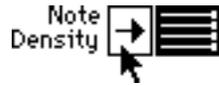
Any Variable or control that has a **Conducting Arrow** associated with it can be conducted. These include all eleven Variables plus Tempo and Snapshots. Look around the main screen and notice that there are boxes with arrows in them next to the name of each Variable, as well as to the left of the Tempo Range Bar, and below the camera icon in the Snapshot Window.



They're the Conducting Arrows. You enable a Variable for conducting by selecting its Conducting Arrow. Click on the Conducting Arrow next to **Note Density** and quickly release the mouse button. The selected Conducting Arrow will look like this:

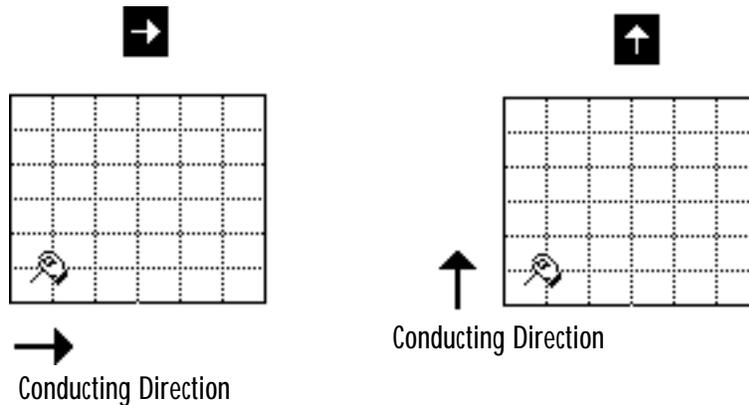


Now click on the Conducting Arrow again, quickly releasing the button. It will unhighlight and conducting will be disabled.



Okay, this may seem repetitive, but select the Note Density Conducting Arrow again to enable it for conducting.

The direction in which a Conducting Arrow is pointing indicates the axis in the Conducting Grid along which its associated Variable is conducted. If a Conducting Arrow is pointing towards the right, for example, the associated Variable's Positions will be conducted from left to right. If the Conducting Arrow is pointing upwards, the associated Variable's Positions will be conducted from bottom to top.



Move the Baton into the Conducting Grid. Drag the mouse from left to right and back again, and notice how the Positions in the Note Density Variable change.

Now let's change the direction of conducting. Click and hold on the Note Density Conducting Arrow. Watch it rotate around as long as you hold. Release the mouse button when the Conducting Arrow is pointing towards the left, like this:



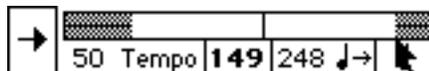
Move the mouse back into the Conducting Grid and drag from left to right again. Notice that the active Position of the Variable now moves from right to left.

Then go back to the Note Density Conducting Arrow and change its direction to point upwards, then return to the Conducting Grid and drag the mouse from top to bottom and back again. When you've finished, deselect the Note Density Conducting Arrow.

There's another way to change the Conducting Arrow direction that you might like a bit more than waiting for the Conducting Arrow to rotate around to the desired direction. We're going to be conducting tempo next, so move to the Conducting Arrow next to the Tempo Range Bar and click on it. Then drag the mouse to the right, outside of the box around the Conducting Arrow, and move in a circle. You'll see that the Conducting Arrow follows the mouse and changes direction as you move. Refer to the diagram in Chapter 2, page 5.

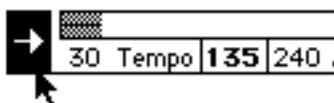
## Conducting Tempo

Now that we've seen conducting in action, we'll actually listen to ourselves conducting tempo, which is probably the most "traditional" conducting activity you can do with M. Set a wide tempo range like the one shown below by dragging in the Tempo Range Bar.



Start the music. Voice 1 will play at the tempo indicated by the Tempo Numerical below the range bar. The current tempo is also indicated by the thin line in the middle of the range bar.

Now set the Conducting Arrow so that it points to the right, and make sure it's selected, as shown below.



Then position the cursor in the left side of the Conducting Grid and click and hold the mouse button. The tempo will immediately decrease to near the lower end of its range. Still holding the mouse button down, slowly drag the Baton from left to right across the Conducting Grid. As you do this, you'll hear the tempo gradually increase. The Tempo Numerical will also increase.

As we did with Note Density, change the direction of the Tempo Arrow and conduct in the direction in which the Conducting Arrow is pointing. When the Conducting Arrow points up, conduct from bottom to top to increase the tempo. When the Conducting Arrow points down, conduct from bottom to top to decrease the tempo. Click in the middle of the Conducting Grid to set the Tempo Numerical to its midpoint and de-select the Tempo Conducting Arrow.

## Conducting Other Variables

We'll start with a simple conducting setup and then move on to some more complex ones.

Open the Transposition Edit Window. Leave Position 1 at C3, then select the second Position for editing, and set its Voice 1 transposition to C#3. Set each successive Position so that it's one step higher than the previous Position. You may also want to set the other Voices to these different transposition values, as we'll be employing them later.

Next, enable conducting for Transposition by selecting its Conducting Arrow and set the Conducting Arrow to point to the left. The Transposition Variable should look something like this:



Start the music and Play-Enable Voice 1 only.

Move into the Conducting Grid and drag the Baton from left to right. Notice how the Voice transposes as you move to different squares.

You don't have to drag in the Conducting Grid. You can also position the Baton anywhere in the Conducting Grid and click. The Variable will jump to the new Position.

Move the Baton to the left-most square and click. Now move to the right-most square and click.

While this is fun, it's not much different than just clicking on Variable Positions. The real power of the Baton and Conducting Grid lies in their ability to let you conduct more than one Variable at a time, in more than one direction.

Enable the Tempo, Note Density, Rhythm, and Transposition Conducting Arrows. Set each one so that it points in a different direction. Start Voice 1 and drag the Baton around in the Conducting Grid. You should hear significant changes in the music, since you'll be changing several Variables' Positions at once. Play-Enable the other Voices and conduct.

Conducting can be a powerful performance tool. When you use M for your own work, you'll need to think carefully about how different Variables will work together when you conduct them.

## Copying and Swapping Variable Positions

One handy thing you can do with M to facilitate conducting is to copy the settings from one Variable Position to another, or to swap two Variable Positions. This way you can arrange the settings of the six Variable Positions so that they make musical sense from left to right, or right to left. We're going to demonstrate this technique with a fun experiment.

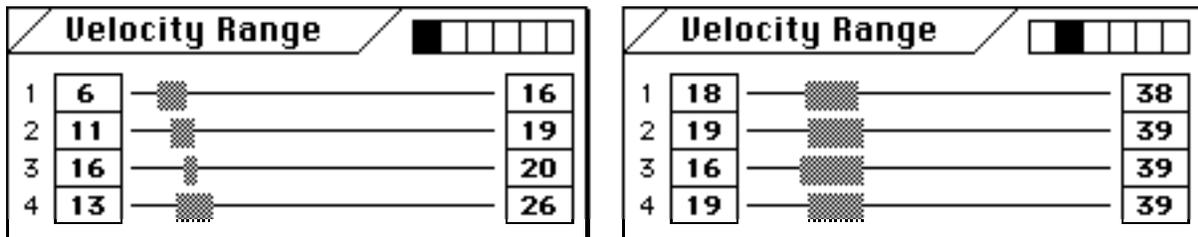
Look at the second Variable Position for Velocity Range. Notice that all four Voices have a rather low Velocity Range. We're going to take this Position and swap it with the first Position. Select the second Position and drag it over to the first, at which point the first Position will highlight too. Release the mouse button and you've swapped Positions 1 and 2.

Now double-click on the new Position 1 to open the Velocity Range Edit Window. Drag the window so that you can see all six Positions of the Velocity Range Variable in the main screen Variables Window.

Hold down the Option key and drag the first Position to the second Position, then release the mouse button. You've just copied the contents of Position 1 to Position 2.



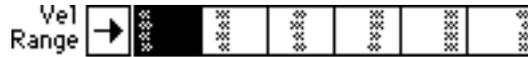
Select Position 2 for editing in the Velocity Range Edit Window. Change each of the four range bars so that they are slightly farther to the right than they were, like this:



Go to the Variables Window and Option-drag Position 2 to Position 3. Select Position 3 for editing in the Velocity Range Edit Window and, once again, set the velocity ranges

for each Voice slightly farther to the right for Position 3 than where they were for Position 2.

Follow the same procedure for Positions 4, 5, and 6 so that when you're done, the Velocity Range Variable looks something like this:



Then enable only Velocity Range and Tempo for Conducting with both Conducting Arrows pointing to the right. Select a Position for the Note Density Variable with a value of 100 per cent for all four Voices. Then Play-Enable all four Voices and start the music.

Now move into the Conducting Grid and drag the Baton from left to right. The music should get faster and louder as you move to the right. Reverse the Tempo Conducting Arrow, so that the music gets louder and slower as you drag to the right. Next, make the Tempo Conducting Arrow point upwards, so that you can conduct velocity and tempo independently.

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## Continuous Conducting

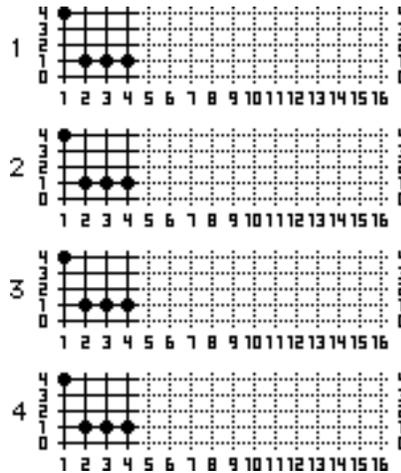
Well, that was fun, but it sure was a lot of work to make all those Velocity Range Variable settings different. Shouldn't there be an easier way to conduct things like velocity in a direct way without having to set up the Variable Positions beforehand? Well, there is, and it's called **Continuous Conducting**.

Continuous Conducting is a way to use the Baton to vary velocity or articulation (legato/staccato) smoothly for any or all Voices, in conjunction with their current Velocity Range, Accent, and Legato settings.

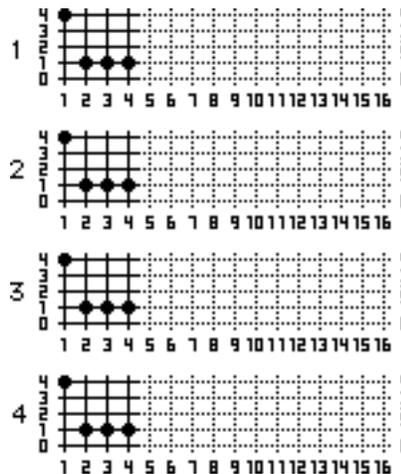
Before we start, create a Velocity Range Variable Position that looks like the one below, and select it as the active Position.



Then select the sixth Position of the Accent Variable, which looks like this:



Then select the sixth Position of the Legato Variable, which looks like this:

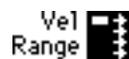


Then, for clarity's sake, de-select any Conducting Arrows you previously selected. Now we'll enable Continuous Conducting for Voice 1's velocity.

First click on the Velocity Range Conducting Arrow, then drag the mouse to the right until you see four small Conducting Arrows, which correspond to the four Voices, pointing to the right. These four Conducting Arrows can also be rotated in any direction. Set the Conducting Arrows so that they look like this:



Then place the cursor in the space next to the Conducting Arrow representing Voice 1, which is the top Conducting Arrow, and click. A small brick will appear, as shown below. This means that only Voice 1 can be conducted continuously. You can, of course, conduct more than one Voice at a time by simply adding bricks for other Voices.



Now start the music and drag the Baton from left to right in the Conducting Grid. The Variable Position won't shift, but you should hear smooth changes in volume as you drag.

The volume should go from nearly inaudible to maximum. But what's even more interesting is that the Accent pattern is perceptible throughout much of the conducting range.

Next, click next to the Voice 2 Conducting Arrow, so that a brick appears, and drag in the Conducting Grid. You should hear both Voices change volume continuously.

Continuous Conducting modifies the effect of the Velocity Range by a constant amount, depending on mouse position. You can cancel this effect on a Voice with any of the following actions:

- removing the Continuous Conducting Enable brick for a Voice
- switching to a new Variable Position manually
- disabling Continuous Conducting, or any kind of Conducting for the Variable altogether
- Option-clicking anywhere in the Conducting Grid.

Disable Continuous Conducting by de-selecting the Velocity Range Conducting Arrow.

Then enable Continuous Conducting for the Legato Variable by clicking and holding on the Legato Conducting Arrow and pulling the mouse to the left so the four Conducting Arrows point to the left. Enable Voice 2 for Continuous Conducting as shown below.



Also make sure that Voice 2 is playing some kind of sustainable sound, i.e., not a bass drum or castanet.

Start the music and drag in the Conducting Grid. You should hear Voice 2 go from playing short, unsustained notes (staccato) to sustained, overlapping notes (legato). Again, you should still be able to hear the effect of the Legato Cycle wherever you drag the Baton.

Continuous Conducting for Legato modifies the values in the Legato cycle in the following way. At the far left position, the maximum continuous value in this case, the Legato value is at most 4 times the current value of the Legato Variable. For example, if Voice 1 is set in the Legato Variable to sustain a note for 50 per cent of its duration, the note will instead sustain for 200 per cent of the duration. At the far right position, the minimum continuous value in this case, the Legato value will be at least 25 per cent of the current value of the Legato Variable. For example, if Voice 1 is set in the Legato Variable to sustain for 50 per cent of its duration, the resulting sustain would be about 12 percent.

---

## Automatic Conducting

When **Automatic Conducting** is enabled, the Baton will walk around the Conducting Grid by itself, thereby relieving you of the intense tedium of conducting yourself. This leaves you free to do other things in a performance, like sing or play the guitar, or operate other M controls. You can even conduct manually while Automatic Conducting is on, if you like the idea of being second-guessed all the time.

You can determine how often the Baton will jump around, whether it will move horizontally or vertically or both, and how far it will jump in each dimension. Then you can just sit back and watch it go.

Let's try it out. Enable conducting for the Transposition Variable and set the Conducting Arrow so that it points to the right.

Click on the **Robot Conductor** icon in the lower part of the Conducting Window. This will enable Automatic Conducting.



Once you've clicked on the Robot, you need to set the range over which the Baton will move for each axis in the Conducting Grid.

To the right of the Robot Conductor icon, you'll see two miniature range bars, one for each axis. Click and drag on the horizontal range bar and set it to its full range. Set the vertical one to the bottom of its range, which disables movement along the vertical axis. Your screen should look like this:



Finally, you need to set the rate of change in Automatic Conducting. This rate is expressed as a multiple of the Tempo.

Change the note icon next to the Robot Conductor as a numerical. It's adjustable from a whole note to an eighth note. Set it to a whole note, which makes the Baton move the least often.



Play-Enable Voice 1 and start the music.

Then move the cursor into the Conducting Grid and click once. Now watch as the amazing Conducting dot indicator dances by itself with grace and charm back and forth along the horizontal axis. It will usually move every four beats. When the dot crosses a line from one box to another in the Conducting Grid, you'll hear the Voice's transposition change.

As you can see, the Automatic Conductor may choose not to move at all sometimes, so the rate of jumping should be thought of as the *minimum* time between changes.

Now enable another Variable for conducting on the vertical axis, such as Velocity Range. Try to conduct Velocity Range manually while Transposition is conducted automatically. With two conductors on stage, you never know what will happen.

Now let M take over in both dimensions. Enable Automatic Conducting on the vertical axis by adjusting the range bar to something like this:



Now both Velocity and Transposition should change automatically. Speed up the rate of conducting to a quarter note. Now each note has a chance of being quite different from the next.

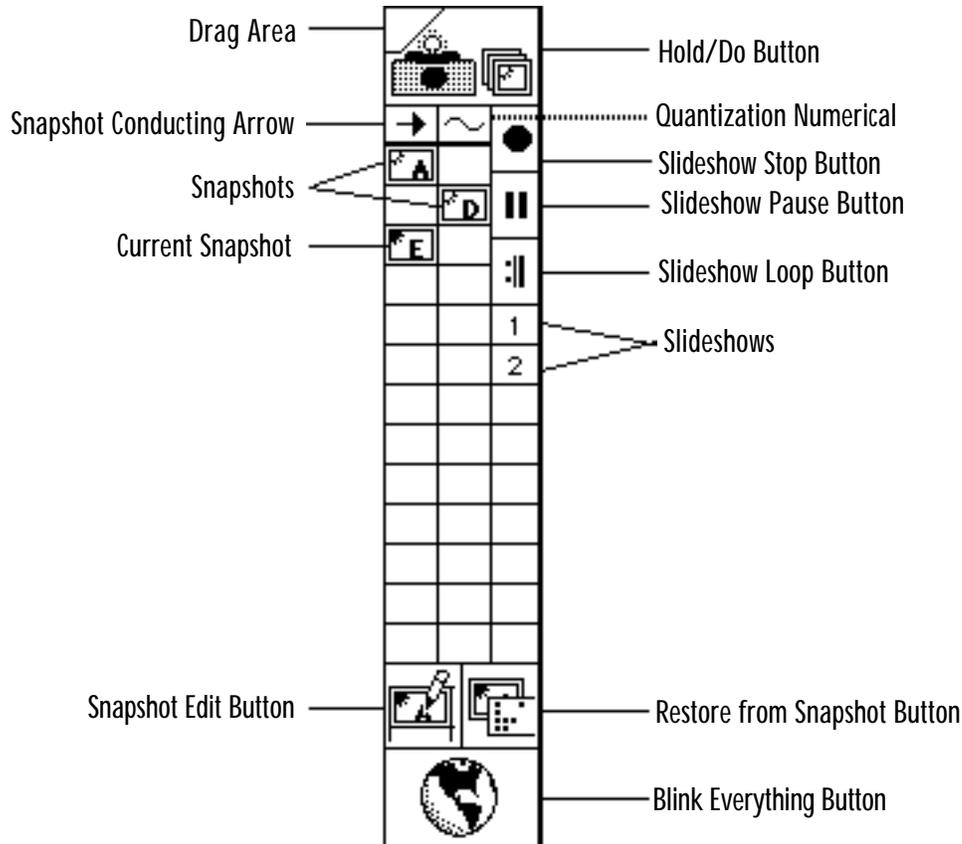
As you can see, it's pretty easy to get a lot of changes happening at once. This can be confusing if you're new to the program, so don't try to use all of M's whiz-bang features at once. Introduce them gradually after you understand what the processes in the program are doing and what you can do to control them.

Remember to save your work when you leave this chapter.

## 9 Snapshots and Slideshows

In this chapter, we're going to show you some of M's more advanced performance functions. These include the **Hold/Do** Button, **Snapshots**, and **Slideshows**.

Open your **AT-2** file. All the controls for this tutorial are located in the Snapshot Window, at the far right of the screen under the camera icon.



---

### Changing Groups of Variables Together

We've already learned about Conducting, which is one way to change the Positions of more than one Variable at once. Another way is to use the **Hold/Do** Button. Hold/Do lets you select any number of new Positions, and Hold them until you're ready to make them happen all at once (i.e., Do). The Hold/Do is the button with the camera and slide icons at the top of the Snapshot Window.

To start, you should close any edit windows that might be open. There's a simple way to do this: choose **Close All Edit Windows** from the **Windows** menu or use the keyboard equivalent, **Cmd-0** (that's a *zero*).

Play-Enable all four Voices. Go around and make sure that each Variable on the screen has its first Position selected.

Now start the music, and click on the Hold/Do Button. It will start blinking.



Now click on the **second** Positions of all the Variables in the Variables Window. They'll start blinking too.

However, from the musical output you should be able to tell that the Variables haven't actually changed their Positions yet. The blinking tells you that the changes are pending—or Holding—until some future time.

Then, click on the Hold/Do Button again. All the Variables change to their blinking Positions together.

Using the Hold/Do Button is a two-stage process. You put Variables on *Hold*, then make them *Do*.

But the most common use for the Hold/Do Button is to create Snapshots.

---

## About Snapshots

A **Snapshot** is a picture of a selected group of screen controls, including Variable Positions, Conducting Arrows, and certain controls in the Patterns Window. In effect it's a record of a Hold/Do action, because you create one in nearly the same way you perform Hold/Do, except that instead of Do, you click on a space in the Snapshot window to store all the blinking screen controls.

You store a particular setup of screen controls in a Snapshot, then recall, or execute, Snapshots in performance to move from one set-up to another. What's more, Snapshots can be **quantized** to occur at just the right time for a smooth change in the music.

The following screen controls can be stored in a Snapshot:

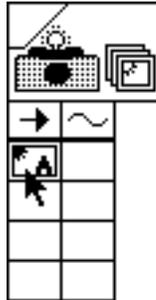
- All Variable Positions.
- Settings of all Conducting Arrows.
- The settings for Src Channel, Play-Enable, Echo-Thru-Orchestration, Mouse Advance, Output Length, Time Base, and Phase for each Voice in the Patterns Window.
- Sync (stored by clicking on the Sync Button when you're gathering up blinking controls).
- Play-Enabling or Play-Disabling the MIDI File Sequence that can play along with the four Voices (see Chapter 12 for details).

One important thing to note regarding Variable Positions stored in Snapshots is that a Snapshot only stores the Position (1-6) of the Variable, not the *contents* at that Position. So, for example, the notes or chords in a Pattern are not stored, just the letter of a Pattern Group, a, b, c, d, e, or f.

Let's look at all the things that can be stored in a Snapshot. Click on the button with the alluring globe icon in it at the bottom of the Snapshot Window. This is the **Blink Everything Button**.



As you can see, the name makes sense, because all the screen controls listed above are now blinking. This button is a shortcut for clicking on Hold/Do and going around the screen and clicking on everything in its current Position. Now we'll make a Snapshot. Click in the upper left box in the Snapshot window, like this:



All the blinking stopped, and a picture of the letter A posing in the sun, to represent Snapshot A, has appeared. (In color on a Mac II, the snapshot would win an amateur photography contest!) There's also a black mark in the sun, to indicate that A is the **current Snapshot**. This is important because several commands which we'll learn about operate on the current Snapshot.

Now go around and change a few things to arbitrarily different values on the main screen. Change Voice 1's Time Base to **23 | 24**. Enable Conducting for the Orchestration Variable. Go wild.

Now click on the globe again, then on the box right next to Snapshot A. We now have Snapshot **B** which contains some different screen control settings.

## Executing the Snapshot

A Snapshot is executed by clicking on its box. Click on the Snapshot A box. Notice how, for example, Voice 1's Time Base returned to **1 | 4**. You should also see that the sun in Snapshot A now has the Current Snapshot indicator. Now click on Snapshot B. The settings return to what they were when we stored Snapshot B.

## Creating a Snapshot with Hold/Do

Sometimes we don't want every setting of the program included in a Snapshot. For these occasions, you can use the Hold/Do Button, just as you did before, except that instead of clicking on Hold/Do again, you select a Snapshot in which you'd like to store all the pending selections. Let's try this technique.

Click on the Hold/Do Button.



Now select the **fifth** Positions of both the Velocity Range and Transposition Variables. They will begin blinking. Go over to the Snapshot Window and click on the box immediately below Snapshot A. You've now created Snapshot C.

Now create Snapshot D with the third Positions of these two Variables, following the steps above.

Start the music. Click on Snapshot C. Did you hear both things change at once? Now click on Snapshot D.

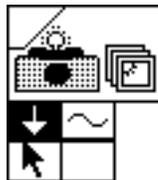
You can also perform Snapshots from the computer keyboard. Type the letter **C**, then **D**, as you watch the screen change and, presumably, hear the music change.

**Note:** The perceptual (musical) effect of a Snapshot will often precede the visual change; this is because the data changes inside M that affect the music are done as fast as possible for a smooth transition from one setup to the next. Then the program worries about drawing the screen.

If you store a new Snapshot in a box already containing a Snapshot, the old Snapshot will be overwritten by the new one. It is not necessary to clear the Snapshot first. Let's make a new Snapshot A, made up of the second Positions of the three Cyclic Variables, Rhythm, Legato, and Accent. Then make up a Snapshot B of the first Positions of these three Variables.

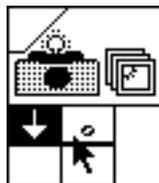
## Conducting Snapshots

It's also possible to conduct Snapshots. Enable Conducting by clicking on the Conducting Arrow at the top of the Snapshot Window and making it point down. Only the first six Snapshots can be conducted, but that's okay for right now, because you only have four.



## Quantizing Snapshots

The point at which the Snapshots change can be executed on the nearest rhythmic unit, as set in the **Quantization Numerical** next to the Conducting Arrow. The wave setting shown above means no quantization. Set the quantization to a whole note, as shown below.



Snapshot quantization is useful for making changes at rhythmically precise locations. It will work with both conducting Snapshots, and executing them individually by typing or clicking. Of course, in this universe as we know it, it's impossible to quantize an event backwards in real time, so the quantization will generally introduce a perceptible delay in the execution of the Snapshot. To compensate for this, you can just anticipate the rhythmic unit a bit and the quantization will happen in the right place. This is easiest to do when Snapshots are quantized to a whole note, as we'll see.

Let's conduct our Snapshots. Start the music and move the Baton into the Conducting Grid. Drag from top to bottom quickly and release the mouse button. Now watch what happens. Successive Snapshots are delayed and executed a whole note apart, corresponding to the order in which you dragged through the Conducting Grid. Pretty impressive, huh?

Now execute the Snapshots manually by typing the letters **A**, **B**, **C**, and **D**. Try to get the feeling of anticipating the whole note so that your Snapshot is executed on time.

Snapshot quantization applies in other parts of the program. For example, click on the Sync Button. Notice that the resetting of all Voices occurred on a whole note.

You can quantize the selection of a new Position for a Variable. Just Shift-click on the new Position. Start the music and Shift-click on different Transposition Variable Positions. The change will be delayed until the next quantization point.

The act of conducting run-of-the-mill Variables (except for Tempo, which isn't really a Variable anyway) can be quantized too. Just hold down the Shift key while you drag the Baton around in the Conducting Grid.

## Editing Snapshots

Besides the globe, there are a couple of other buttons with interesting icons in the Snapshot Window. The **Edit Snapshot Button** is the one with the pencil, above and to the left of the globe. The Edit Snapshot Button operates on the Current Snapshot—the one with the black mark in the sun. Click on Snapshot C, then click on the Edit Snapshot Button.



All of the components of Snapshot C will begin blinking. Now let's add another item to the Snapshot, the Time Base Denominator for Voice 1 in the Patterns Window. (When clicking on numericals while in Hold/Do, you can only select or deselect the numerical for inclusion in a Snapshot. It's really not useful in conjunction with a Hold/Do, since you can't change the value of the numerical.) Now let's store the Snapshot back in location C. You've just edited your first Snapshot.

But that's not all. You can also delete items from Snapshots. Click on Snapshot A, which was made with the Blink Everything Button. Now click on the Edit Snapshot Button.

Click on the blinking Variable Position in Legato. The blinking will stop in the Legato Variable, leaving everything else in the Snapshot. Store this Snapshot again in location A. Deleting items is quite useful in conjunction with Snapshots which you make with the Blink Everything Button, if you want most everything, but not absolutely everything, to be in your Snapshot.

A couple of things that users often want to delete from a "Snapshot of Everything" are the Sync Button and the selection of a Pattern Group. Click on the Blink Everything Button to incite mass blinking, then click on Sync. Sync will stop blinking, so there won't be a Sync performed in the Snapshot. Now click on the blinking Pattern Group Variable Position. Store this Snapshot in location E, for Everything.

You can also use the Edit Snapshot Button to make copies of Snapshots. Click on the Edit Snapshot Button again, which will display the contents of Snapshot A. Now click on location F, right below the box for Snapshot D. Snapshots F and A are now the same.

## Restore From Snapshot

The **Restore From Snapshot Button** gives you back the settings that were in effect before you executed the current snapshot. It's right next to the Edit Snapshot Button.



Execute Snapshot D, then click on the Restore From Snapshot Button. The settings should return to the values they had before Snapshot D was executed. And conveniently, the restore action is quantized, like any other Snapshot.

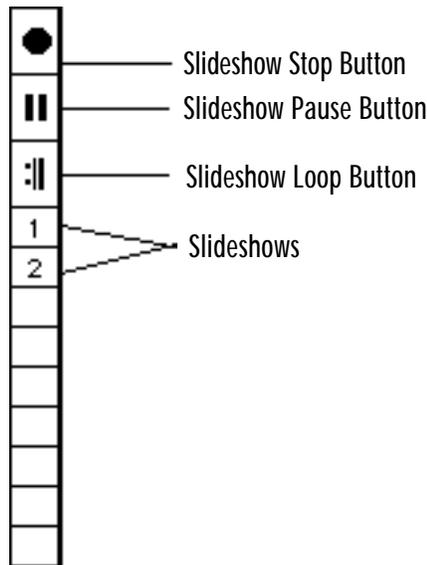
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## About Slideshows

**Slideshows** are automated sequences of Snapshots and quantized Variable Position selections. You can make nine different Slideshows and store them in the column to the right of the two Snapshot columns.

You make Slideshows by "recording" a series of actions. The Slideshow recorder observes both the action and the time in between successive actions, much like a sequencer. Then, when you play back a Slideshow, these actions are reproduced, one after the other, exactly as you performed them.

The controls for Slideshow operation are shown below.



## Recording a Slideshow

Let's record a Slideshow. First Option-click on the first open box in the Slideshow column. You'll see the **Slideshow Pause Button** light up and a circle with the Slideshow number appear in the box. This indicates we're ready to record.

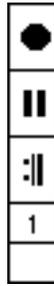


Next, start the music and execute Snapshots A, B, C, D, E, and F in order. As usual, the actual time the Snapshot is executed is affected by the Snapshot quantization. Happily, this is the time that is recorded into the Slideshow, not the moment you type the letter or click on the box.

After executing Snapshot F, click on the **Slideshow Stop Button**.



Slideshow 1's box now shows a plain **1** in it, as shown below.



That was exciting. Let's stop the music for a moment.

Now let's play Slideshow 1 back. You can either click on its box, or type the number **1** on the computer keyboard. Incidentally, typing **0** (zero) on the Mac keyboard is equivalent to Slideshow Stop.

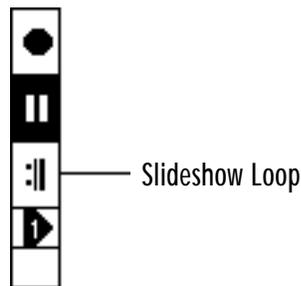
The Slideshow box indicates it's in playback mode with an arrow. However, you don't see or hear anything. That's because the music isn't going, and until it is, the Slideshow Pause Button is lit up.



Now start the music. The Slideshow Pause Button unhighlights, and the Slideshow begins with Snapshot A, then onto B and so forth. After Snapshot F, the Slideshow stops.

Now let's make the Slideshow loop back to the beginning after it plays Snapshot F. With the music still going, execute Slideshow 1 again. Notice that the slideshow doesn't actually start until the Snapshot quantization point.

Now get ready to click on the **Slideshow Loop Button**, shown below. Do it right after you see Snapshot F execute. If you didn't have your act together, just execute the slideshow again and be ready this time.



If you did this right, the Slideshow will loop over and over. You'll also see a set of repeat marks in the Slideshow's box, indicating that this Slideshow knows how to do the loop.

We can also remove the loop by Option-clicking on the Slideshow Loop Button as the Slideshow is playing. Do this now.

You can also Loop the Slideshow directly in recording. When you're about to stop recording a Slideshow, click on Slideshow Loop instead of Stop or Slideshow Stop. The computer keyboard equivalents for Slideshow Loop are the backslash ( \ ) or vertical bar ( | ) keys.

Quantized selections of Positions for Variables can be included in Slideshows too. Option-click on the box below Slideshow 1 to record Slideshow 2.

With the music going, Shift-click on Positions 1 through 6 (in order) in the Transposition Variable, then, for spice, use the Loop technique we just described—click on the Slideshow Loop Button or type a Backslash.

Now type the number **2** to play back your Transposition sonata. As you might imagine, Shift-clicking in the Conducting Grid will add your quantized conducting actions to a recording Slideshow. Conducting Snapshots while recording a Slideshow will always put the Snapshots in the Slideshow, whether you hold the Shift key down or not.

That's it for Snapshots and Slideshows. Save your work.

# 10 The Input Control System

The **Input Control System** allows you to make performance changes from a MIDI keyboard, so that you can perform without using the mouse and without needing the computer in close proximity.

The Input Control System has been designed so that each key on your MIDI keyboard has a different function and will cause specific changes when you press the key.

Performing with M and the Input Control System is something that you can get better at with practice. In particular, you may have to learn to be somewhat precise about which keys to hit at what time.

Start by opening the **AT-2** file.

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## Performing with the Input Control System

Before you do anything, you have to enable the Input Control System. Go to the Patterns Window, open the Picture Matrix in the Use column for any Pattern and select **C**.



You need only one Input Control System Enable icon in the Use column to use the Input Control System.

Also, make sure that the Src Input Channel for the row you selected to use the Input Control System is set to **All**.

Refer to the Input Control System Template in Appendix B for the location of each function key. You'll need to keep it handy as we talk about different Input Control functions.

## A Few Words About the Controls

There are two types of controls in the Input Control System: **One-Step Controls** and **Two-Step Controls**.

The One-Step Controls are activated by pressing a single key, and they are all white keys.

The Two-Step Controls require that two keys be played in succession. The first key is a "code" which interprets the second key, which is a value. The code keys are **black**. The value keys are **white**, and are numbered or lettered on the Template, showing numbers as they apply, or letters which apply to Snapshots.

To perform a One-Step Control, simply press the appropriate key.

To perform a Two-Step Control, press the control key first, which will define the function, then press the value key, which will execute the control for that value and reset the Input Control System for the next command.

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## One-Step Controls

The keys marked **Start** and **Stop** will perform the same function as clicking on the Start and Stop buttons in the Conducting Window. Play-Enable your Voices. Now press the middle C key (**C3**). The Start Button will highlight and the music will start. Now press B below middle C (**B2**). The music will stop.

The key marked **Hold/Do** will perform the same function as the Hold/Do Button in the Snapshot Window. While the music is playing, press the Hold/Do key (**B3**). The Hold/Do Button at the top of the Snapshot Window will start flashing. Now select some new Variable Positions, and press B3 again. The Hold/Do Button will stop flashing, and the Variable Positions will change. Refer back to Chapter 9 for more information about Hold/Do.

Pressing the keys labelled **Play-Enable Toggle** will do the same thing as clicking in the Play-Enable boxes in the Patterns Window. Play-Enable all four Voices, and start the music. Now press any of the Play-Enable Toggle keys (**C1**, **D1**, **E1**, or **F1**). Notice that Play-Enable for each Voice has its own key. You'll see the Play-Enable Toggle for that Voice go blank in the Patterns Window. That Voice will go silent. Press the key again, and you'll see the speaker appear again and you'll hear the Voice. These keys are fun to use in performance to quickly switch Voices in and out.

The key marked **Sync** does the same thing as the Sync Button in the Conducting Window. Start the music, making sure that your Voices are Play-Enabled again, and press the Sync key (**F3**). You'll hear the Voices reset to the beginnings of their cycles.

The **Clear Current Pattern** keys will change the steps in a Pattern to rests while the Pattern is recording, which will give you a Pattern of the same number of steps but without notes. Be careful when using this function. You might erase something you want to save.

The **Stop Any Slideshow** key (**F4**) will stop a Slideshow in playback. If you still have some Slideshows in your file from Chapter 9, execute the Slideshow. Then press the Stop any Slideshow key and it will stop.

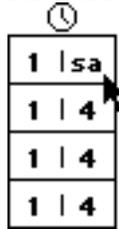
The **Sequence Play-Enable Toggle** key (**C4**), if pressed while the program is playing, will Play-Enable a MIDI Sequence. Pressing this key while a MIDI Sequence is playing will mute the Sequence. The Sequence will continue to play, you just won't hear it. Refer to Chapter 12 under MIDI Sequences for further details.

## Step Advancing Voices

The Step Advance control allows you to manually step a Voice through its sequence of notes, something like the "one key play" feature found on small Casio keyboards. The control keys, as indicated on the Template, are in pairs so that you can "trill" between them, but either key in a pair will do the job. You can Step Advance Voices individually, or together as a group, by playing the appropriate keys. We'll try step advancing Voice 1.

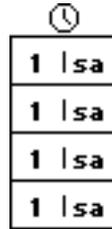
First, Play-Enable all four Voices.

Next, Voice 1 has to be enabled for Step Advance before you can step advance it. To do that, change the right-hand Time Base Numerical in the Patterns Window for Voice 1 to **sa**, which is the position equivalent to zero.



Then click on the Start Button to start the system playing. You'll hear the other Voices playing, but Voice 1 will be silent. Now press either of the Step Advance keys for Voice 1 (**D2** or **E2**). Voice 1 will advance one step every time you press the key. Try trilling between the two keys to get it moving faster.

Stop the music. Now enable Step Advance for all the Voices by setting their Time Bases to **sa**. A quick way to do this is to use M's **Shift-Click on Numerical** feature. Shift-clicking on a numerical copies the last numerical value you set. Since the last thing you did was set Voice 1 to **sa**, just Shift-click on the time denominators for Voices 2, 3, and 4, and they'll change to **sa** too.



Then start the music and press either of the keys labeled **Step Advance all "sa" Voices** (**D3** or **E3**). You'll hear all of the Voices stepping along together each time you press one of the keys. Next, press any of the Step Advance keys for the other Voices (**G2** and **A2**, **G3** and **A3**, and **D4** and **E4**). You'll hear each voice individually advance one step when you press its key once.

Reset the Time Bases to their previous settings when you're done.

## Tempo Controls

**Tap Tempo.** M will note the amount of time between two successive depressions of the key assigned to Tap Tempo and set the tempo accordingly. Usually your taps define how long a quarter note will be, but you can tap in other metric units by setting the External Sync Ratio control in the Conducting Window to something besides a quarter note. Let's try tapping out some tempos.

First, start the music. Then hit the Tap Tempo key (**F2**) twice. The time between taps sets the tempo. Look at the Tempo Numerical and watch it change as you tap twice again. Try tapping very slowly. You should get a slow tempo. Tap faster to set higher tempos. Stop the music.

**Tap Conduct Tempo.** Tap Conduct lets you direct the Tempo of your music from your input control keyboard in much the same way a conductor beats time for an orchestra. Successive taps on the Tap Conduct key establish a quarter note pulse that M follows. We'll show you how it works.

With the music stopped, set Voice 1's Time Base to 1 | 8. Play-Enable Voices 1 and 2. Now tap once on the Tap Conduct Tempo key (C5). You'll see the Start Button highlight and the Tempo Numerical change to read **Tap**.



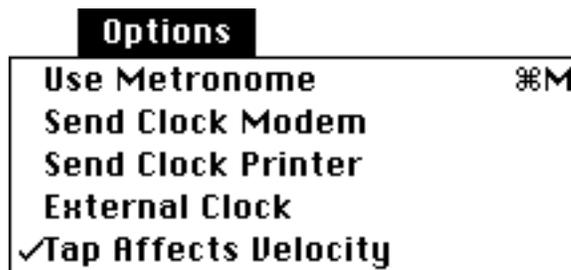
However, you won't hear any music. This is because you have to give M a "beat for nothing" to tell it how fast to start.

Now tap again. You'll hear the two Voices advance a quarter note: two steps for Voice 1 and one step for Voice 2. Now tap a few more times on the Tap Conduct key. You'll hear the Voices step forward by quarter notes. The difference between this and Step Advance is that your tapping sets the tempo for the whole program, rather than the articulation for a single voice or group of voices. You'll see that if you slow down drastically between one tap and another, M waits until it receives the next quarter note to play the Voices.

Now, tap twice on the Tap Conduct key and immediately press the **Freeze Tap Conduct** key (A4). What you've done is freeze the tempo at the value you just tapped. The Voices will continue to play at the tempo you tapped.

Now press the **Accelerando** key (B4). You may or may not hear a very slight increase in tempo as the Voices play. Each time you press the key, the tempo will increase by a small amount. Press the key repeatedly and listen to the Voices speeding up. This is a good way to introduce gradual changes in tempo from your MIDI keyboard. As you can guess, pressing the **Decelerando** key (G4) will introduce gradual decreases in tempo to your Voices. Finally, resume manual control over the tempo by tapping out the beat on the Tap key. Now stop the music by hitting **B2** (the **Stop** key).

Choose **Tap Affects Velocity** from the **Options** menu, so that it's checked. If its already checked, then you don't need to do anything.



This Option lets you change the overall velocity of all of M's Voices by pressing either the Tap Conduct, Freeze Tap, Accelerando, or Decelerando key when you're in Tap Conduct mode. How hard or soft you play the key determines whether the Voices will play louder or softer. If you play the key above a MIDI velocity level of 64 (the defined "medium velocity"), the Voices will play louder than they were. If you play below a level of 64, the Voices play softer. Of course, for this to work, your keyboard must be able to send MIDI velocity information. Let's try it.

Play-Enable Voice 1 only. Start tapping away by hitting the Tap Conduct Tempo key. Begin hitting the Tap key harder, and listen as the Voice plays louder. Now hit it very softly and the Voice will get very quiet. Now hit the Freeze key very hard. The tempo is set at your last tapped tempo, and the Voice plays louder. You can affect the velocity with the Accelerando and Decelerando keys too. Try these keys, and experiment to get a feeling for the kind of keystrokes you need to make to change the volume of the Voices.

As you can see, this can be a very useful feature in performance to create gestural changes in both volume and tempo. When you're finished, stop the music. Tap Conduct is automatically disabled when you click on the Stop Button.

---

## Two-Step Controls

### Variables

You can select Positions for any Variable from a MIDI keyboard.

To select a particular Variable Position, you first press the appropriate **code key** for that Variable, then press the **value key** for the number of the box that you want to select. Note that only one value key may be pressed after pressing a code key. Even if you want to change to another Position in the same Variable, you still have to press the code key first and then another value key.

Let's try a specific example. Start the music. Press the Transposition code key (**A#2**). Now press any of the value keys from **1** to **6** (**D1** to **B1**). You'll hear a transposition change and see the Position change in the Transposition Variable. Try selecting other Transposition Variable Positions, but remember to press the Transposition code key each time before you press a value key.

You'll notice that the value keys are numbered up to 16. This lets you select any of the Sound Choice Variable Positions. If you select any other Variable and press one of the value keys above 6, it will be ignored.

Try switching some other Variable Positions. Refer to the Template to find the code keys for some other Variables, and follow the same procedure as you did for Transposition while listening to the results.

### Performing Snapshots

Value keys are lettered as well as numbered. This lets you use your MIDI keyboard to switch between Snapshot Positions. Pressing the Snapshot code key (**C#4** or, more conveniently, **C#1**), followed by a value key labelled A-Z will select that Snapshot. Use the Input Control System to switch between the Snapshots you have recorded.

You can also edit the Current Snapshot by pressing the **Edit Snapshot** key (**G#4**). And since you know how to switch Variable Positions with the Input Control System, try performing your editing from the keyboard. When you're finished editing, execute a Snapshot from the keyboard, and the blinking Variables will be stored into the the location you specified.

### Input Control of Slideshows

Play Slideshow 1 by pressing the **Play Slideshow** key (**D#4**) followed by the value key for the number 1.

Now try recording into a slideshow, say 5. Hit the **Record Slideshow** key (**F#4**) followed by the value key for the number 5. Execute a couple of Snapshots from the keyboard. Then press the **Stop any Slideshow** key (**F4**).

Note that there's no way to include quantized Variable Position selections made from the Input Control System, so if you want these in your Slideshow, you'll have to use the mouse and computer keyboard.

## Time Base Denominator

The Time Base Denominator (right-hand) Numericals in the Patterns Window may be set from the keyboard by pressing a key marked **Time Base Denominator**, then pressing an appropriate value key. Press the code key for Voice 1's Time Base (**D#1**). Now press value key number **2 (E1)**. You'll see the right-hand numerical in the Time Base box for Voice 1 change to 2, effectively making Voice 1 play at half speed. Try this with the other Voices.

# 11 Other Performance Controls

In this chapter, we'll talk about some additional performance controls. These controls all have special functions that you may find useful in performance.

Start by opening the **AT-2** file.

---

## Mouse Advance

M's Mouse Advance feature is a special performance technique that lets you play selected Voices by moving the mouse cursor around on the screen. Let's try it out.

First, enable Mouse Advance for Voice 1 by clicking on the topmost Mouse Advance Toggle in the Patterns Window. It's the first box in the column under the mouse icon. When you click on it, you'll see a diamond appear in the box.

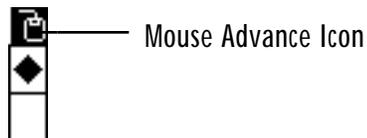


Next, set Voice 1's Time Base to **1 | 16**.

Next, make sure that all the Voices, including Voice 1, are Play-Enabled. Start the music. Notice that you don't hear Voice 1, even though it's been Play-Enabled.

Now, hold down the Option and Command keys on the computer keyboard and move the mouse around. You should hear bursts of notes from Voice 1 playing in tempo whenever the mouse is in motion.

You don't need to hold down the mouse button and it doesn't matter where you move the mouse on the screen. As long as the mouse is moving, Voice 1 will play. Notice that when the Command and Option keys are both depressed the Mouse Advance icon in the Patterns Window is highlighted.



The reason we set Voice 1's Time Base to **1 | 16** is that it makes it easier to hear the Voice in motion, as it were. Mouse Advance tends to work best at higher tempos and faster Time Bases.

Try dragging the mouse around at different speeds. You should hear Voice 1 play a little louder when you drag faster. The speed at which you move the mouse gives you some control over velocity — the faster the movement, the louder the sound. This is dependent, of course, on the velocity values you have set in the Velocity Variable for that Voice.

Another performance technique using Mouse Advance is to move the mouse around continuously and "punch" the Command and Option keys whenever you like. Give it a try. Every time you punch the keys, you'll hear Voice 1 pop in.

Next, stop the music and enable Mouse Advance for all four Voices. This time, push down the **Caps Lock** key on the computer keyboard, start the music, and move the mouse around. You'll hear all four Voices, each in its specified Time Base, as you move the mouse. Depressing the Caps Lock key is a way to use Mouse Advance without tying up both hands.

Mouse Advance is probably most effective when you advance one fast-playing Voice against others that are playing continuously. But experiment, by all means. You'll most likely find the way of working with it that suits you best.

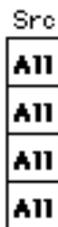
Note that when a Voice is enabled for Mouse Advance and the mouse is not in motion, the notes in the Voice don't step along with the other Voices that are disabled for Mouse Advance. The Voice stays at the last step played until you move the mouse again. This is similar to the way Step Advance in the Input Control System works.

Stop the music, unlock the Caps Lock key, disable Mouse Advance for all Voices, and reset Voice 1's Time Base to **1 | 4**.

---

## Transposing Voices from your MIDI Keyboard

Another useful performance technique is to transpose Voices from your MIDI keyboard. Since the Voice will be reading MIDI input data, the first step is to make sure that the Source Channel for the Voice is set correctly. For now, make sure that the Source Numerical for each Voice is set to **All**.



Next, enable **Keyboard Transpose** for Voice 1 by selecting the sharp-and-flat icon for Voice 1 from the Picture Matrix in the Use column in the Patterns Window.

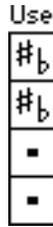


Selecting the Keyboard Transpose function enables you to transpose a Voice in playback by keying notes on your MIDI keyboard. As with the Transposition Variable, **C3** is considered to be no transposition. Playing **E3**, for instance, would transpose the whole Voice up a major third. Playing **C2** would transpose the Voice down one octave.

Next, Play-Enable Voice 1 and start the music. As you listen to the Voice, press the **C#3** key on your MIDI keyboard. You'll hear the Voice transpose up a half-step. Try pressing other keys on your keyboard and listen to the effect. Play-Enable Voice 2 to verify that

only Voice 1 is being transposed. Press the **C3** key again to return Voice 1 to its original key.

Next, enable Keyboard Transpose for both Voices 1 and 2 by selecting the sharp-and-flat icon for Voice 2.



Next, start the music and key different notes on your MIDI keyboard. You'll hear both Voices transpose simultaneously.

Another interesting approach to real time transposition requires two MIDI keyboards, each set to a different MIDI output channel. In **M**, set the Source Channel for Voice 1 to the MIDI output channel of the first keyboard, and the Source Channel for Voice 2 to the second keyboard's output channel, rather than setting both to **All**. Then, by selecting MIDI transposition for each Voice, each Voice could be transposed independently of the other by playing its appropriate keyboard. If you have two keyboards, or one fancy keyboard that does this sort of thing, like a Kurzweil MIDIboard, follow the steps above and try it out.

When you're done, disable Keyboard Transpose by selecting the dash icon from the Picture Matrix for each Voice.



The dash means that MIDI input data is ignored, in effect turning off the input.

Before moving on, reset the Source Channels to **All**.

---

## Playing along with M

You may find in performance that you want to play some notes on your keyboard besides the notes **M** is playing, or just hear the notes from your master controller played by different synthesizers. You can send those notes through the computer to any of your synthesizers with the **Echo Map** controls. Setting up an Echo Map is a two-step process. First you have to enable the Echo Map, and then you have to specify the MIDI channels on which the notes you play will be echoed.

First, enable the Echo Map by selecting the Echo Map Enable icon from the Picture Matrix in the Use Column in the Patterns Window for Voice 1. The icon represents two arrows next to a map of California with major cities indicated.



Only one Echo Map Enable is necessary in the Use column.

Next, select channels in the Echo Map by clicking on the appropriate numbers in the Map icon in the upper right-hand corner of the Patterns Window. You can choose as many channels as you like to echo out on. For now, set up an Echo Map which will send your MIDI note data out on M Output Channels 1 and 2 by clicking on 1 and 2 in the Map.



Then Play-Enable and start Voices 1 and 2. As they are playing, play on your keyboard. You should hear the notes you play from the synthesizers receiving on Channels 1 and 2 as well as the notes in Voices 1 and 2. Stop the music. Try selecting some different Echo channels in the Map that correspond to different synthesizers in your setup, and play your keyboard. You should hear the notes you play echoed by the synthesizers set to those channels. If you want to hear a different timbre from each channel, your synthesizers should be in Poly mode so that they receive on MIDI channels independently.

When you're finished experimenting, disable the Echo Map by selecting the dash icon from the Picture Matrix.

Save your work, if you like.

# 12 Movies and Midi Files

A **Movie** is a record of the MIDI output generated by an M performance. Movies are useful if you've created some compositional material you'd like to use in another program. You capture the material in a performance, save it as a MIDI File, and import the data into another program.

There are many applications that support MIDI Files. The most common use of MIDI Files is to include a Movie captured by M as a part of a sequence in a sequencer program.

M is also able to import MIDI Files and read the information into a Pattern, or play the MIDI file "straight" as a Sequence along with its four Voices.

We're going to guide you through making a Movie, saving it as a MIDI File, importing a MIDI File, reading it into a Pattern, and reading it directly into a Sequence.

Begin by opening the **AT-2** file.

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## Making a Movie

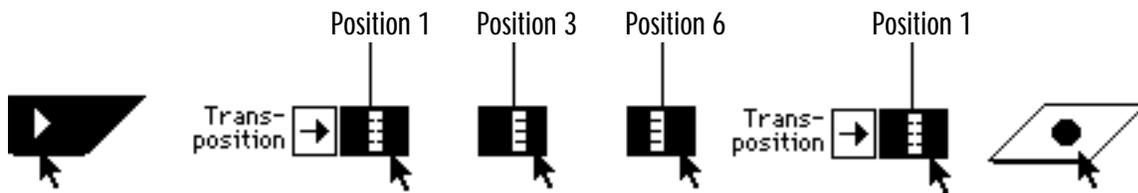
First, Play-Disable all Voices except Voice 1. Next, set the Tempo to a value of around 160. Now click on the **Movie Button** in the Conducting Window. It will highlight.



The idea at this point is to create a simple performance that you can save as a file. What we want you to do is to start the music (don't do it yet), listen to the scale, and click on a different Transposition Variable Position every time the scale repeats — that is, every eight beats, so that the key of the Voice changes every time it cycles around. If you don't click at exactly the right time, don't worry about it. The point is to create something that changes through time.

So, follow these steps. When you're ready, click on Start. Listen to the scale. As it comes around to the beginning, on the ninth beat, click on the *third* Position in the Transposition Variable. When the scale in Voice 1 reaches its beginning again, click on the *sixth* Position in the Transposition Variable. When the scale cycles again, click again on the first Position. Finally, just as the scale reaches the beginning of its cycle again, click on the Stop Button. When you click on Stop, the Movie Button will unhighlight.

Here's the sequence of events.



Got that? Try it.

After you've completed the performance, you'll have a **Movie** stored in memory. You can check by pulling down the **File** menu and seeing if the **Save Movie As Midi File** item is enabled, instead of being grayed-out. This indicates you've filmed your first movie.



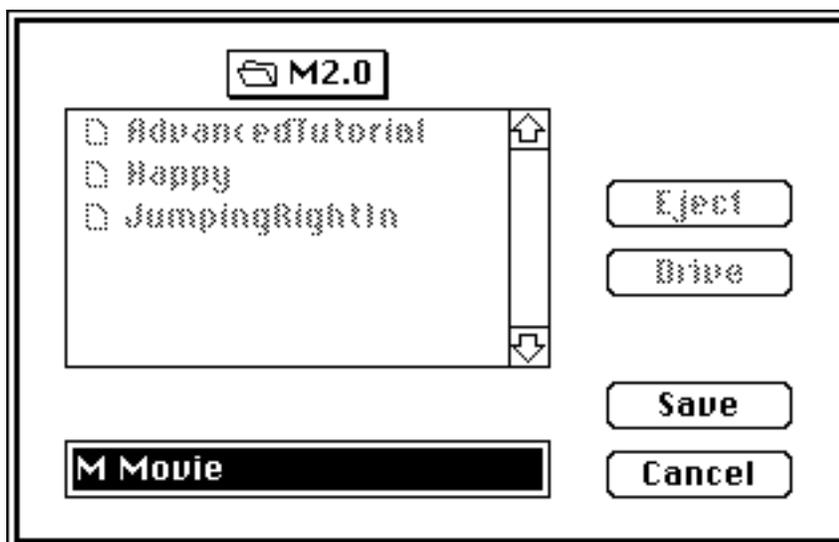
## "Running out of Film"

There is, understandably, a limit to the number of events that can be stored as a **Movie**, and if you exceed the limit, the filming will stop automatically. In any case, your **Movie** will be intact as far as it went. Since we captured such a short performance, it wasn't a problem in the previous example.

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## Saving a Movie

Choose **Save Movie As Midi File...** from the **File** menu. You'll be presented with this dialog.



You'll be asked to name the Movie. The default name is M Movie. Accurate but uninspired. Give it your own name. Now the movie is a MIDI File saved on your disk.

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## Importing a MIDI File

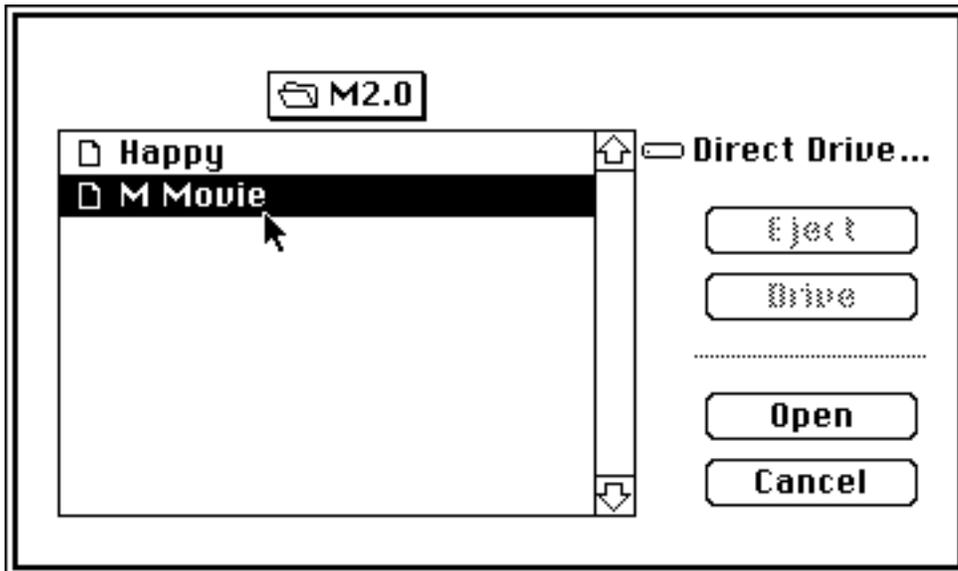
There are two ways M can read a MIDI File: into a Pattern or into a Sequence. If a file is read into a Pattern, it will be as though you recorded the material or created it in the Pattern Editor — it's ready to use just like any other Pattern. If it's read in as a Sequence, all the timing information will be included and M can play it *in addition* to the four Voices, as a separate musical entity. Let's start by reading your MIDI File into a Pattern.

### Reading a MIDI File into Patterns

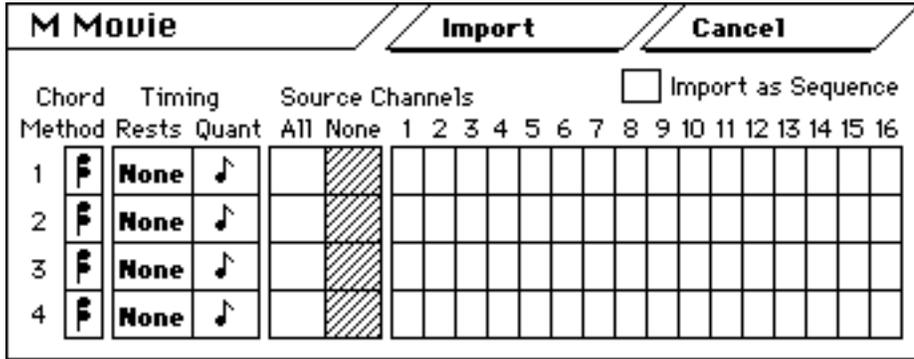
First, and this is important, you need to select the Pattern Group into which you want to read the MIDI file. A MIDI File is always imported into the *currently selected Position* in the Pattern Group Variable. In this case, let's select Pattern Group **b**.



Then choose **Open Midi File...** from the **File** menu. Choose **M Movie** (or whatever you named your movie) from the list in the dialog.



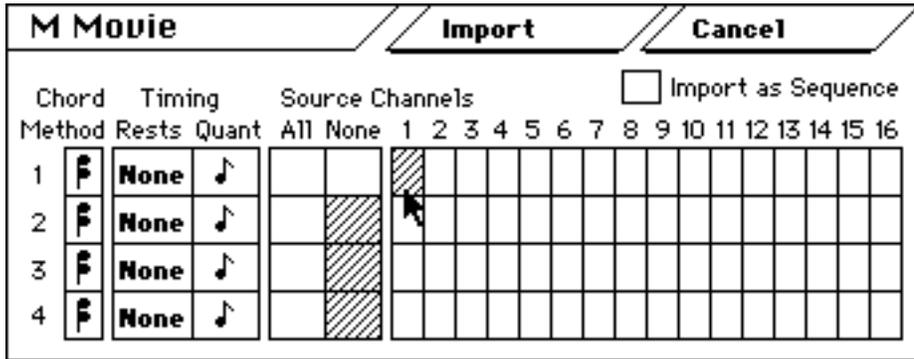
When you do, you'll get the following **Import Dialog** (with your own file name displayed in the title area).



The Import Dialog allows you merge or separate different MIDI channels in the file into one or more of the four Patterns in the current Pattern Group. You can also control how timing information is interpreted when the data in the file is "recorded" into the Pattern.

The controls under the heading of **Source Channels** let you assign data in the MIDI File to be read into specific Patterns.

Since our MIDI File contains only one channel of information (Channel 1), we're just going to assign Channel 1 to Pattern 1. Click in the Channel 1 box for Pattern 1.



For now, leave the other controls set as they are and click on the Import Button.



The program will ask you to wait briefly while the it imports the file. When it's finished, the Import Dialog will close.

Look in the Patterns Window. The Length Numerical for Pattern 1 in Pattern Group **b** should read **32** or so, indicating that the notes from our original performance have been entered into the Pattern.

Let's see if they have. Play-Enable Voice 1 and start the music. You should hear a C major scale, followed by two other transpositions of the the major scale. If you don't hear scales, perhaps the Note Order Variable is not set to 100 Original Order.

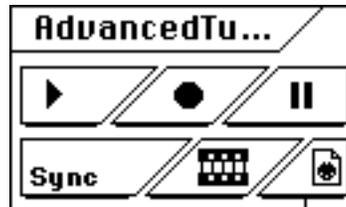


Click on the Import Button.



You've imported to a Sequence. Let's listen to it.

Look over in the Conducting Window. Just to the left of the Conducting Grid you'll notice the **Sequence Play-Enable Toggle**.



Sequence Play-Enable Toggle

Click on it so that it's highlighted.



Now Play-Disable all Voices, and click on Start. You should hear a cheesy rendition of Happy Birthday that modulates through a couple of keys, played by whatever synthesizer is listening to MIDI Channel 1. Notice that the original rhythmic information in the Sequence has been preserved.

Now Play-Enable the four Voices, and you'll hear them too.

A Sequence in M is independent of the Voices, although the controls in the Conducting Window, such as Tempo, Start and Stop, do affect it. Experiment with the Conducting Window controls while listening to the Sequence. Disable the Sequence by clicking on the Sequence Play-Enable Toggle, so that it unhighlights. Enable the Sequence again, and you'll see that the Play-Enable Toggle is like a mute switch — the Sequence continues to "play" even when you're not listening to it.

For more information on Importing MIDI Files, refer to Chapter 19 under **Open Midi File...**

If you save your work before leaving this chapter, the Happy Birthday sequence will be stored as part of your M document, and will be available when you open it in the future.

Chapter 12 concludes the tutorial sections of this manual. Chapters 13 through 22 reference M's features.

# 13 The Patterns Window

The Patterns Window contains controls for processing MIDI input and creating and modifying Patterns. It also contains some controls which affect Pattern output that are stored with Pattern Groups, and the all-important Play-Enable Buttons for the four Voices. Basically, anything which affects a Voice individually and which is not part of a Variable can be found here.

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## Input Controls

### Src (Source Channel)

This numerical selects a specific M Input Channel for information that affects the specific Pattern and Voice. The numerical can be set to a specific Channel 1-16 or, as usually the case, All, where information on any channel is processed.



Distinguishing input channels allows you to perform different M functions with MIDI at the same time. There are many different uses for MIDI input in the program, such as echo rechannelizing, Input Control, recording notes into Patterns, and transposing Voices.

### Use

This control is a Picture Matrix that assigns how MIDI input will affect a particular Pattern and Voice, or in other words, how MIDI information is *used*. The possible selections are:

**Disable**, which causes any incoming notes to be ignored.



**Record**, where incoming notes are recorded into a Pattern, according to its combination of Record Modes.



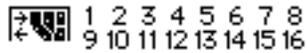
**Keyboard Transpose**, where the Voice's output is transposed by incoming notes. Middle C (C3) is no transposition; notes above C3 transpose the Voice up, and notes below C3 transpose the Voice down.



**Input Control**, which lets you use the Input Control System to perform various actions in the program. Refer to Chapter 10 for details.



**Echo Map Enable**, which sends any MIDI input through the computer to the channels selected in the **Echo Map**, shown below the Echo Map Enable icon. Yes, that's two arrows next to a map of California and other western states with major cities indicated. Users of previous versions of M know there had to be an icon to take the place of the Note Order mouse.



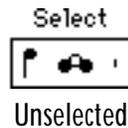
## Echo-Thru-Orchestration

This toggle allows you to send any MIDI input on channels specified by the Voice's Source Channel Numerical through the computer to the Output Channels of the Voice's current Orchestration. This is helpful for recording into a Pattern, since you can hear the same output characteristics while performing on your keyboard as the Voice will use when playing what you've recorded. A check mark indicates that Echo-Thru-Orchestration is active.

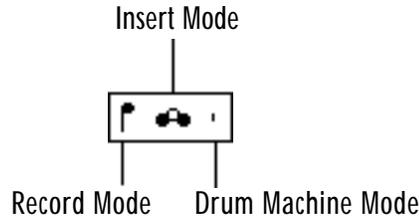


## Pattern Select and Record Modes

Clicking once in this column selects a Pattern for edit operations in the Edit and Pattern Menus. Double-clicking on a Voice's Pattern Select box will open the Pattern Editor on the Voice's current Pattern.



In addition, the three icons inside the Pattern Select box indicate its current Record Modes. You can change these in the Pattern Editor, or, more conveniently, directly in the Patterns Window by Option-clicking on the desired icon. This will bring up one of the Record Mode Picture Matrices, which we'll describe.



**Chord Mode.** This Picture Matrix selects how incoming MIDI data is treated in terms of creating chords or single notes in a Pattern.



**Single Note.** The Pattern separates all MIDI input into single note events.



**Chord.** The Pattern records chords you play as events with chords.



**Build.** The Pattern allows you "build" and edit chords in real time. As long as one note in a chord is sustained, others may be played at any time and are added to an evolving step. In addition, notes which are already in the chord, if played again, are deleted.

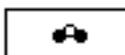


**Insertion Mode.** This Picture Matrix determines how the Pattern records new notes with respect to the existing note information.



Remember that when you're in Record Mode, MIDI input data affects the step in the Pattern at the MIDI Edit Counter, which is displayed and set in the Pattern Editor Window. To help you remember what the icons that represent each Insert Mode do, think of the white circle as the new note, and the black circles as the existing notes.

**Insert.** New notes are added as steps inserted at the MIDI Edit Counter.



**Replace.** New notes replace the step at the MIDI Edit Counter.



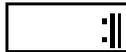
**Overdub.** New notes are added to the notes already in the step (if any) at the MIDI Edit Counter.



**Drum Machine Mode.** This Picture Matrix enables or disables Drum Machine Record, in which the MIDI Edit Counter, which determines where a recorded note is placed in the Pattern, follows the Output counter of the Pattern.



**Enabled.** Drum Machine Record is in effect.



**Disabled.** Drum Machine Record is not in effect.



Drum Machine Record Mode is discussed more thoroughly in Chapters 4 and 5.

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## Output Controls

### Play-Enable

This toggle allows a Voice to be heard when the music is going. When a speaker appears in the box, the Voice will be heard. No speaker, no sound.



### Mouse Advance

This toggle enables a Voice for Mouse Advance, a way to affect the phrasing and note density of a Pattern with mouse gestures. Basically, a Pattern which is enabled for Mouse Advance won't play unless you move the mouse **and** have either the Caps Lock key down or hold both the Option and Cmd keys down.

Refer to Chapter 11 for more details.



## Output Length

This numerical sets the number of steps in a Pattern that are played by a Voice. The Output Length can be less than the number of steps actually in a Pattern, but not more.



You can also use the Output Length Numerical to permanently add or subtract steps from a Pattern. To do this, hold down the Option key while using the numerical. When you release the button, the Pattern will change to contain the specified number of steps. If this number is more than the previous Pattern length, rests are added at the end. If it's less, notes are deleted from the end of the Pattern.

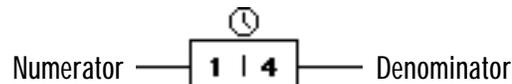
Setting the Output Length to 0 is a way of permanently muting a Pattern inside a Pattern Group Variable.

## Time Base

These two numericals control the basic speed at which a Voice plays. This speed is some fraction of a whole note, and is determined absolutely by the Tempo control in the Conducting Window. It's also modified by the Rhythm Variable, so you should check in these two places as well as the Time Base if a Voice isn't playing as fast or slow as you'd like.

The numerical on the left is the Denominator, and can be set to a number of basic and more exotic values. This divides the basic pulse of the Tempo. For example, a denominator of 8 means the Voice will play in terms of eighth notes. Possible values are 1-9, 11,12,13,15,16, 24, and **sa**, a special mode which is used for Step Advance in the Input Control System.

The numerical on the right is the Numerator, which acts to multiply the time of the Denominator by some value. Much of the time it will be 1. Higher numbers for the Numerator slow the Voice down, whereas higher numbers for the Denominator speed it up.



## Phase

This numerical sets an initial delay given to the Voice after starting the music or performing a Sync. This allows phasing, echo, and other effects.



The number is expressed in Ticks, where M's Time Base Denominators last for the following number of Ticks:

<u>Denominator (as displayed)</u>	<u>Ticks</u>
24	16
16	24
15	25.6
13	29.5
12	32
11	34.9
9	42.7
8	48
7	54.9
6	64
5	76.8
4	96
3	128
2	192
1	384
sa	0

For example, if you wanted to offset one Voice by an eighth note relative to the others, you would set its phase to 48.

# 14 The Pattern Editor Window

The Pattern Editor is opened by double-clicking in the column of Pattern Select in the Patterns Window...



...or by choosing **Edit...** from the **Pattern** menu with a Pattern selected.

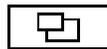
The Pattern Editor creates and edits Patterns — M's musical material — and manages the way in which you record into Patterns using MIDI.

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## Display Controls

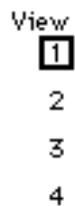
### Pattern Editor Size Box

Drag on this control to change the size of the Pattern Editor window.



### View selector

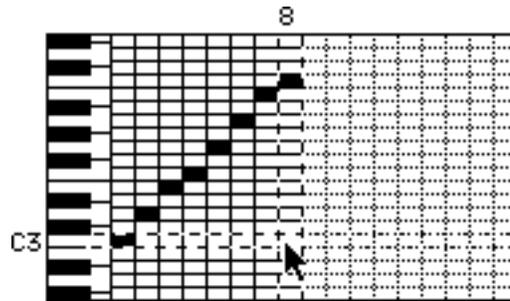
Click on a number 1-4 to select the Pattern to be edited in the Pattern Editor. Shift-click on a number to view a Pattern behind the one that's being edited.



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## Editing Grid

The Pattern Editor Editing Grid is where you draw in notes with the mouse. Notes are arranged chromatically from low to high, and steps in your Pattern are displayed from left to right. As you move around in the Editing Grid, a **Legend** with dotted-line guide marks shows you the current note and step you're on.



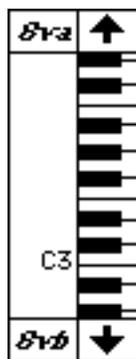
Clicking on a blank spot in the Editing Grid will place a note in the step. Clicking on a filled spot removes the note. The Pattern is grayed out past its last step; if you click in this area, your note is added to the Pattern and any intermediate steps are made into rests.

You can drag the mouse horizontally or vertically in the Editing Grid when adding or subtracting notes. Be aware that dragging vertically creates chromatic chord clusters, which may or may not be of interest to you.

You can always make chords out of steps, regardless of whether the Pattern is in Chord Record Mode or not.

## Keyboards

To the left and right of the Editing Grid are Reference Keyboards. You can click on these keys to hear a note played through the edited Voice's orchestration.



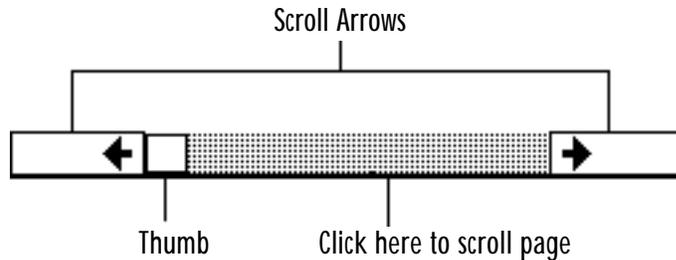
## Vertical Scroll Arrows and Octave Scroll Icons

You can see different regions of the keyboard by using the scroll arrows located above and below the left reference keyboard. The up and down scroll arrows scroll one note at a time, and the 8va and 8vb octave scroll icons scroll an octave at a time.



## Scroll Bar

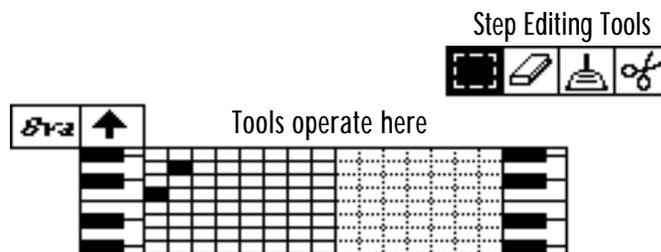
The Pattern Editor contains a scroll bar at the very bottom of the window that you use to move forwards or backwards in the Pattern. The extent of the scroll bar is a little more than the maximum *possible* size of the Pattern (not necessarily its current length). The large arrows to either side scroll forward or back one step at a time. The white Thumb can be dragged to set a specific step location relative to the Pattern's maximum size. And clicking in the gray area to either side of the Thumb will page the part of the Pattern you're viewing forward or backward one screenful.



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## Step Editing Tools

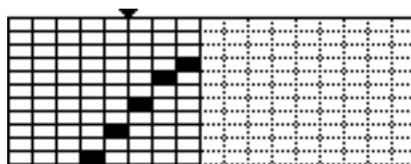
At the top of the Pattern Editor window are four Step Editing Tools, one of which is always selected. These tools operate when you click in the region just above the Editing Grid.



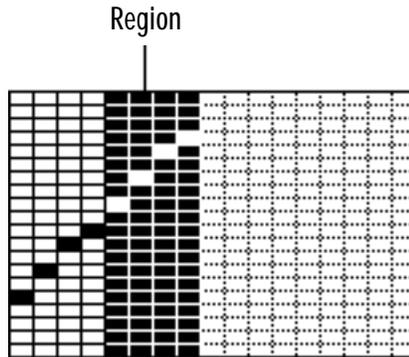
**Selector.** This tool selects a region of the Pattern for editing operations.



You can either make a Pointwise selection, in which case you get a little triangle at the top of the Editing Grid...



...or select a **Region** of one or more steps by dragging above the Editing Grid.



The only command that works with Pointwise Selection is **Insert Paste** from the **Edit** menu.

All the Pattern editing and modifying commands in the Edit and Pattern Menus work on a selected region of the Pattern, as well as the Eraser, Plunger, and Scissors tools described below.

**Eraser.** This tool makes the cursor turn into an eraser above the Editing Grid, and changes a step into a rest when you click. If you have a region selected, all the steps will be changed to rests.



**Plunger.** This tool turns the cursor into a Plunger above the Editing Grid, and will insert a new blank step before the step you click above.



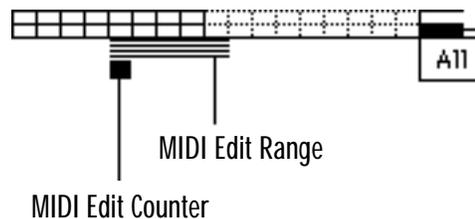
**Scissors.** Select this tool to turn the cursor into a Scissors, which will delete a step or region of steps when you click above the Editing Grid.



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## MIDI Edit Range Bar

This range bar sets a range of steps in the Editing Grid to be affected by incoming MIDI notes.



## MIDI Edit Counter

This is an indicator you can drag to move the point at which the next MIDI notes will affect the Pattern. It often moves automatically while recording notes into a Pattern or during editing operations. (Refer to the illustration on the preceding page.)

## All Button

This button sets the Edit Range to the entire Pattern.



## Counter Button

This button sets the Edit Range to the current position of the MIDI Edit Counter.



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## Editor Sound Enable

If highlighted, the Editor will play each step as you add new notes to it; it will play steps when you drag the MIDI Edit Counter beneath the Editing Grid; and it will play notes when you click on the Reference Keyboard. Notes are played at a velocity set by the Editor Sound Velocity Numerical (see below), and are played through the Voice's current Orchestration settings. If you're viewing more than one Pattern, steps for each Pattern (if they exist) are played when you drag the MIDI Edit Counter. **Editor Sound While Playing** in the **Options** menu turns the effect of dragging the MIDI Edit Counter on or off while the music is playing.

## Editor Sound Velocity



This numerical (shown above) sets the velocity of the notes played by the Editor Sound features in the Pattern Editor.

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## Record Mode, Insert Mode, Drum Machine Mode Selector

This contains the Record Mode, Insert Mode, and Drum Machine Mode Picture Matrices which allow you to select the appropriate Record Mode when recording MIDI data into a Pattern. See Chapter 13 for a complete discussion of Record Modes.

Chd	Ins	Dr
		
		
		
		

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## Pattern Size Numerical

This numerical sets the maximum size of a Pattern in number of steps. This number is based on an assumption that, on average, you will have no more than 4 notes in each step. If you plan to make a Pattern entirely full of large chords, you may want to increase the maximum size beyond the actual number of steps you plan to use. However, if you're going to have fewer than four notes per step, you can't reduce the maximum size to a value below the number of steps in the Pattern.

Size  
**20**

# 15 The Conducting Window

The Conducting Window contains the Conducting Grid and controls which apply to the entire program's functioning. Computer keyboard command equivalents are included next to the name of the control, when applicable.

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## Buttons

### Start (Space Bar)

This button starts the music.



### Stop (Return)

This button stops the music.



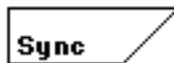
### Pause (Tab)

This button is like Pause on your tape recorder. When you click on Pause, the music stops and picks up at the same place when you click on Pause again or hit Start.



### Sync (Space Bar)

This button resets all Voices to the beginning — after you hit Sync, you will hear all Voices play the first note of their Patterns and use the first step of all the Cyclic Variables.



## Movie

Click on this button before hitting Start if you want to capture M's output into a Movie. After you've finished the performance for a movie, choose **Save Movie As Midi File...** from the **File** menu to save the movie as (what else) a MIDI File.



## Sequence Play Enable

If you have imported a MIDI File as a Sequence to play along with the four Voices, you Play-Enable it by highlighting this button. The control will only work if you have imported a Sequence into memory, or if you're using an M document which includes a Sequence.



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## Tempo

### Conducting Arrow

Enable the Conducting Arrow to conduct Tempo.



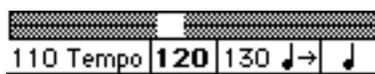
### Tempo Range Bar

This control is a range bar which sets the range over which tempo can be conducted. After setting the tempo range, the midpoint becomes the new tempo. When the music is going, a thin line indicates the current tempo.



### Tempo Numerical

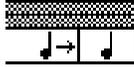
Sets the actual tempo.



Tempo Numerical

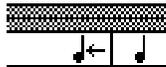
## Sync Ratio / Metronome Ratio

*When the arrow is pointing toward the Numerical, the numerical sets the ratio between M's quarter note pulse and its MIDI clock and metronome output.*



Setting the Sync ratio to a value above than a quarter note (e.g., an eighth note) will drive an external device faster, and setting the ratio to less than a quarter note (Eg. whole note) will drive an external device more slowly. The internal metronome will play at correspondingly faster or slower ratios. To use MIDI Clock you must have **Send Clock Modem** or **Send Clock Printer** enabled in the **Options** menu.

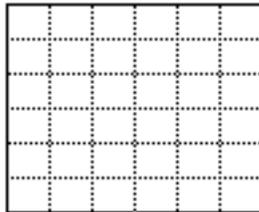
*When the arrow is pointing toward the fixed quarter note, the numerical sets the ratio between an incoming MIDI clock and M's quarter note. An eighth note setting will drive M twice as slowly as normal, and a whole note setting will drive M four times faster than normal. Click on the arrow to change its direction.*



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## Conducting Grid

Moving the mouse (which changes to the Baton) in this space lets you conduct changes in any Variables enabled for Conducting. Chapter 8 contains information about Conducting.



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## Automatic Conducting Enable (Robot Conductor)

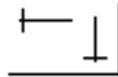
Selecting Automatic Conducting Enable (the Robot Conductor) enables the Baton to move by itself in the Conducting Grid, which allows automatic changes in any Variables enabled for Conducting.



## Automatic Conducting Movement Ranges

These controls let you set the range of possible movement for one jump of the Baton by the Automatic Conductor in the Conducting Grid. The miniature vertical range bar will

cause larger vertical jumps if it is at a setting closer to the top, and the miniature horizontal range bar will cause larger horizontal jumps if it is set toward the right. In the picture below, both horizontal and vertical ranges are set to their minimum value.



## Automatic Conducting Time Base

This control sets how often the Automatic Conductor makes a jump in the Conducting Grid.



Refer to Chapter 8 for more information on Automatic Conducting.

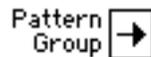
# 16 The Variables Windows

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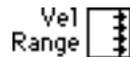
## Features of Variables

### Conducting Arrows

Each Variable has a Conducting Arrow, which enables and sets the direction of Conducting for that Variable.



The Velocity Range and Legato Variables have special Conducting Arrow boxes, which contain Continuous Conducting Arrows as well as Conducting Arrows.



### Miniature Representation

Each Variable has a miniature representation of each of its six Positions, so you have some idea of what the Variable Position will do. The miniature representation usually reflects the user interface design of the edit window. Each miniature representation contains four vertically arranged settings, one for each Voice.



For example, the lines with dots on the end in the Note Density Variable above represent how much of the time a Voice will play. The farther the line is to the right, the higher the percentage of time the Voice will play.

### Selecting Variable Positions

One of the six Positions is selected at all times. This is called the Active Position. To select a new Position, just click on its miniature representation.



## Copying/Swapping Variables

To swap two Variable Positions, drag one over the other and release the mouse.



First and Second Positions Swapped

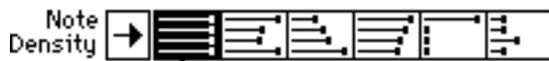
To copy one Variable Position to another, Option-drag from the source to the destination Position.



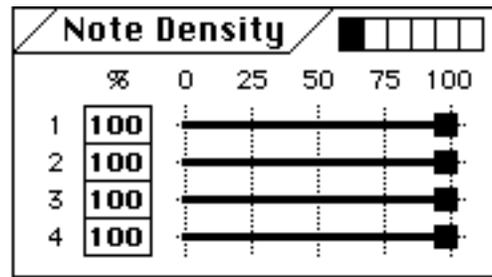
First Position Copied to Second Position

## Editing Variables

To edit the settings of a Variable Position, double-click on that Position, or choose the name of the Variable from the **Variables** menu. The edit window for that Variable will open. The exceptions to this are Pattern Group, where you double-click on the Pattern Select boxes to edit a Pattern, and Sound Choice, which is edited directly in the Midi Window.



Double-click here to open  
Note Density Edit Window



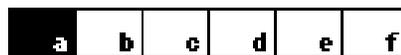
Note Density Edit Window

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## The Variables Window

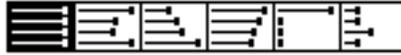
### Pattern Group

The six Positions of the Pattern Group Variable contain different groups of four independent Patterns, which are M's musical material.



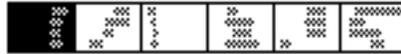
### Note Density

The six Positions of the Note Density Variable contain settings for introducing random skips in a Voice.



## Velocity Range

The six Positions of the Velocity Range Variable contain ranges of MIDI velocities for unaccented to accented notes.



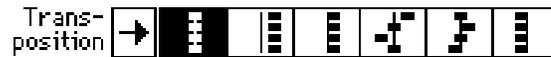
## Note Order

The six Positions of the Note Order Variable contain configurations of the three schemes for choosing a note or chord from a Pattern.



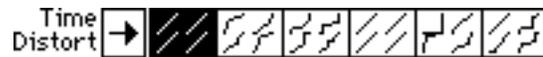
## Transposition

The six Positions of the Transposition Variable contain settings for transposing individual Voices in performance



## Time Distortion

The six Positions of the Time Distortion Variable contain re-mappings of time which produce swing, rubato, or more industrial effects.




---

## Cyclic Variables Window

### Accent

The six Positions of the Accent Variable contain repeating patterns of accents that work in conjunction with Velocity Range.

### Accent

■ ---			
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---

### .i.Legato

The six Positions of the Legato Variable contain repeating patterns of articulations (sustain as a percentage of time between notes).

### Legato

■ ---			
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---

### Rhythm

The six Positions of the Rhythm Variable contain repeating patterns of durations (times between notes) that work in conjunction with the Time Base.

### Rhythm

■ ---			
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---
■ ---	---	---	---

---

## Midi Window

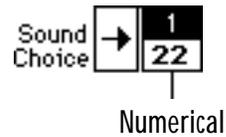
### Sound Choice

The sixteen Positions of the Sound Choice variable contain presets of MIDI program changes for each of the 16 M Output Channels. Select a Variable Position by clicking on a number 1-16.

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

### Sound Choice Program Numericals

These are numericals that send program changes on the channel indicated by the number above. Once you set a numerical to a program change value, it becomes part of the currently selected Sound Choice Variable Position.



### Orchestration

The six Positions of the Orchestration Variable contain assignments of Output Channels for each of the Voices.



# 17 Variable Edit Windows

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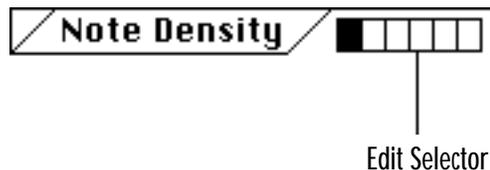
## About Edit Windows

### Parts of an Edit Window

Variable Edit Windows are where you configure the settings of any of the six Variable Positions. They're opened by double-clicking on a Variable Position, and closed by clicking on the Close "Box" (actually a triangle) next to the window's title.



Each edit window contains an edit selector for choosing which Position of the Variable you're editing, such as the one shown for Note Density.



### Marking a Variable Position

You can mark any Variable Position for example, to remind you that it's been edited and should be left alone. Select the Position in the selector and pull down. An asterisk will appear.



You can protect marked Variables from being changed by enabling the **Lock Marked Variables** option in the **Options** menu.

To remove the mark, click on the Position with the asterisk and pull down again.



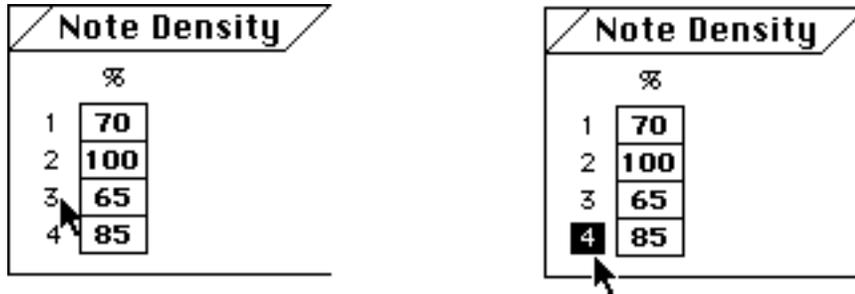
### Changing the Active Variable Position from an Edit Window

When you select a different Position of a Variable to edit, you aren't changing the Position that actually affects the music. However, you can do this from an Edit Window if you hold down the Option key when you select a new Position for editing. This can be useful if you're going to use the controls in an Edit Window as a performance device.

Shift-Option-selecting a new Position for editing quantizes the change in the Active Position according to the Snapshot quantization.

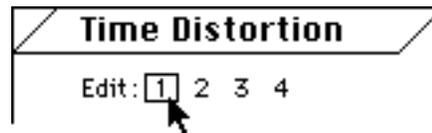
## Copying and Swapping Voice Settings

Each edit window (except the Time Distortion Edit Window) has four sets of editing controls, labelled 1-4, for Voices 1-4. You can swap the settings for two Voices by clicking on a number and dragging to another number, like this:



If you hold down the Option key, the information is copied instead of swapped.

In the Time Distortion Edit Window, you select numbers 1-4 to choose which Voice's Time Map to edit.



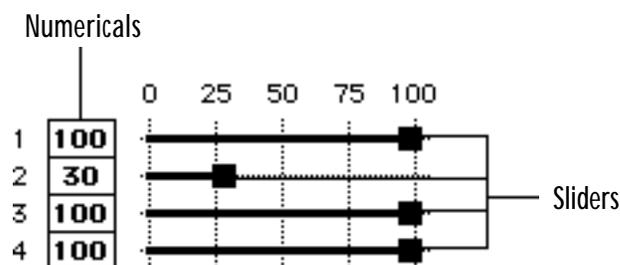
If you drag one of these numbers to another, you can perform the copy and swap operations.

---

## Using The Variable Edit Windows

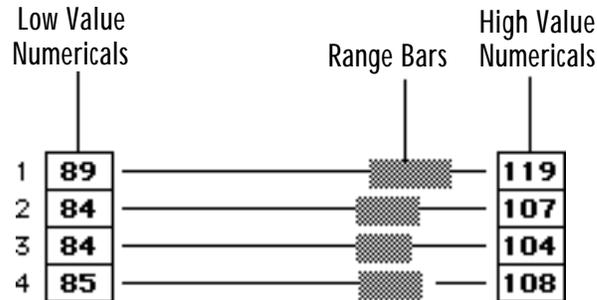
### Note Density

Click anywhere on the sliders to set the percentage of time the Voice will play. You can also use the numerals to the left.



## Velocity Range

The gray-shaded controls are range bars. You change them by clicking on one end of the desired range and then dragging to the other. Fine tuning can be performed with the numerals on either side, which represent the high and low Velocity Range values.

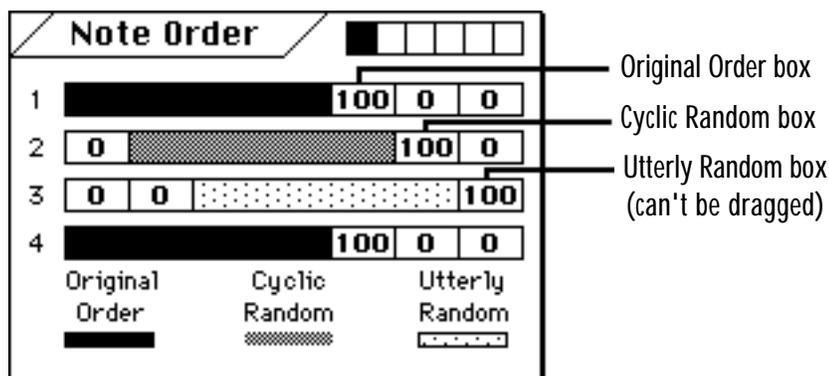


## Note Order

These controls consist of three boxes with numbers in them which you slide to the left and right to change the percentage of time each ordering scheme will be used. The box on the left represents Original Order, the middle box Cyclic Random, and the right one represents Utterly Random. Only the Original Order and Cyclic Random boxes actually move.

Here's a guide to using the Note Order configuration controls:

- Slide the left-hand box to increase or decrease Original Order.
- Slide the middle box to the left to increase Utterly Random.
- Slide the middle box to the right to increase Cyclic Random by decreasing Utterly Random.
- Slide the left box to the left to increase Cyclic Random by decreasing Original Order.
- Don't slide the right box (it doesn't move).

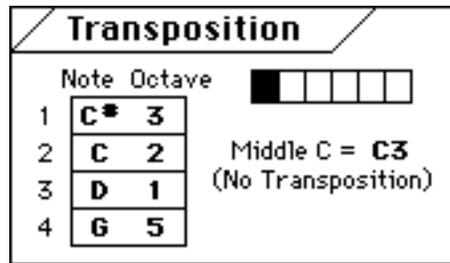


## Transposition

Each Voice's transposition settings are controlled by two numerals, one to set the Note and one to set the Octave. The actual note you're setting is relative to C3, which is

defined as no transposition. This is the same way that Keyboard Transpose works in M (and many other programs).

For example, if you were to play C#3 on the keyboard, you would transpose a Voice up 1 half step from C3. Setting a Voice's transposition setting to this value will accomplish the same thing here.



## Time Distortion

This window consists of a large area where you plot Time Distortion Maps for each Voice, and some associated controls.

### Map Edit selector

Selects which Voice's time distortion map you're editing.

Edit:  1  2  3  4

### Clear

This button erases the time distortion map currently being edited.

### Map Length

These two Numericals set the time distortion map length. The right-hand numerical sets the units of the length, for example, quarter notes. The left-hand numerical sets how many of these units are covered in the map. Obviously combinations are equivalent, such as 1 whole note and 4 quarter notes. There is absolutely no difference between one of these combinations and another.

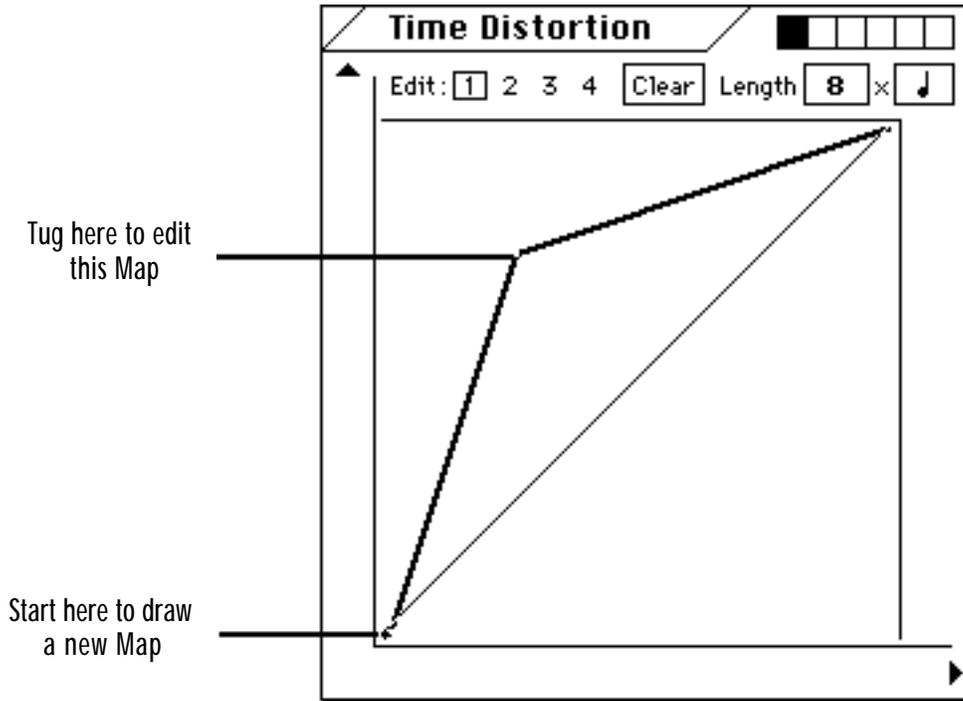
Length  x

## Time Distortion Map Editing

The graph displays Time Maps for all four Voices at the same time. One of these, which you've chosen with the Map Edit selector, is actively being edited, and is drawn in a

thicker line. If you're using color, this line will be drawn in gray where the others are in the respective Voice's color.

There are two ways to create Time Maps. One is by starting from scratch. Click anywhere off the highlighted line, then move the mouse to each successive breakpoint in the map and click. After you have a Time Map, you can tug on the breakpoints and move them around for fine tuning.



## Orchestration

Each square represents the assignment of a particular M Output Channel to a Voice. You can drag through the squares in any row to enable or disable them quickly. In the assignment shown below, Voices 1-4 are playing on the respective Output Channels 1-4.

	MIDI Channel															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	■															
2		■														
3				■												
4					■											

---

## Cyclic Editor (Accent, Legato, Rhythm)

The Cyclic Editor edits the three Cyclic Variables. You can switch between different Cyclic Variables as well as between Variable Positions. Double-clicking on any Cyclic Variable Position will open the Cyclic Editor window.

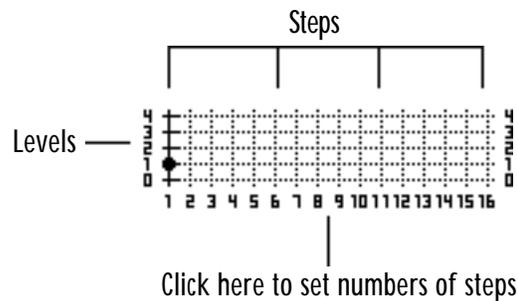
## Cyclic Variable Name Buttons

These three buttons select one of the Cyclic Variables for editing. The selectors for choosing a new Position for editing are located beneath the buttons. They're arranged vertically instead of horizontally because the Cyclic Variable Positions themselves are arranged vertically. If you click on a new Position in a selector, the Variable will switch as well as the Position, if necessary. In other words, if you're editing Rhythm and you click on the second Position in the Accent selector, you'll begin editing Accents.



## Editing Grids

These display and edit the cycles for each Voice that make up a Cyclic Variable Position. An Editing Grid consists of 16 steps, each of which can be set to one or more of five different levels. Specifying a number of steps defines a Cyclic Variable cycle. You set the length of a cycle by clicking on a number below the Editing Grid to set the last step. Any steps beyond the last step are grayed out. Each active step has a dot at one or more levels, from 0-4. Click on the intersection of the step line and the level line to assign a specific level to a step. You may also drag vertically to set a range of steps for M to pick from at random. Dragging horizontally is a quick way to set a bunch of steps to the same level.



## Rhythm Value Numericals

These controls let you assign a specific multiple of the current Time Base to each level of the Editing Grid for all Rhythm cycles. Refer to Chapter 7 for more details.

4 =	<b>5</b>
3 =	<b>2</b>
2 =	<b>1.5</b>
1 =	<b>1</b>
0 =	<b>1</b>

## Legato Value Numericals

These controls set levels in the Editing Grid to specific values. The numbers express the percentage of time between notes that a note will be sustained. Refer to Chapter 7 for more details.

4 =	<b>100</b>
3 =	<b>69</b>
2 =	<b>33</b>
1 =	<b>18</b>
0 =	<b>13</b>

# 18 The Snapshot Window

The Snapshot Window, on the far right side of the screen, is where you create and execute Snapshots — combinations of screen controls. The window also contains controls for Slideshows, which are sequences of Snapshots and Variable changes. Computer keyboard equivalent commands for certain controls are listed in parentheses.

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## Drag Area

The upper left corner of the Snapshot Window can be used to drag the window around on the screen or bring it to the front.



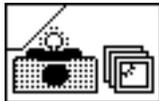
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## Snapshot Controls

### Hold/Do (Backspace Key)

This button initiates the action of collecting screen control settings. When you click on Hold/Do, the button begins to blink (the Hold stage), and any screen controls you click on will blink too. You then hit the button again (the Do stage) which will cause all the controls you clicked on while Holding to change together.

More importantly, instead of clicking on Hold/Do again, you can click on a Snapshot, and all the blinking controls will be stored in the Snapshot for later recall.



### Snapshot Conducting Arrow

This enables conducting of Snapshots. The first six snapshots will be executed (if they exist) based on the position of the Baton in the Conducting Grid.



### Snapshot Quantization

This Numerical sets the rhythmic value to which changes will be "rounded off" when executing Snapshots (including Conducting them), performing a Sync, initiating Slideshows, or making quantized changes to Variables by shift-clicking. The wave value (shown on the left below) means that no quantization is performed. The whole note value will delay the execution of an event until the next whole note quantization point. You can



## Edit Snapshot

This button begins blinking all the screen controls stored in the Current Snapshot, allowing you to add, change, or subtract controls. To delete an item from a Snapshot, click on the item while it's blinking.

After you've edited the Snapshot, you can store it in any Snapshot location by clicking on the desired location, or cancel the Edit by clicking on Hold/Do.



## Restore From Snapshot

This button undoes the changes brought about by the most recently executed Snapshot.



## Blink Everything

This button begins blinking all possible screen controls that can be included in a Snapshot. At this point, you can perform editing operations as with the Edit Snapshot command, or a normal Hold/Do, and then store the global collection in a Snapshot by clicking in the desired location.



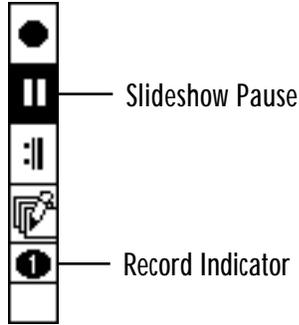
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## Slideshow Controls

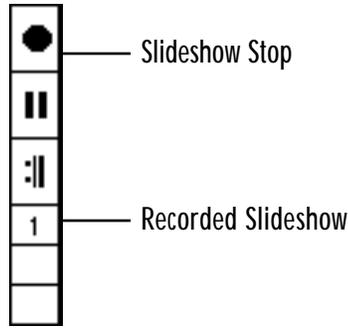
### The Slideshows (Number keys 1-9)

These buttons, at the right side of the Snapshot window, control Slideshow recording and execution.

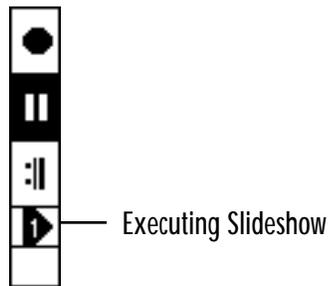
To record a Slideshow, Option-click on the location (which will be numbered 1-9) where you want to store the Slideshow (or type Option-1-9). The music must be going in order to add events to a Slideshow. The Slideshow Pause button will light up, as well as the Record Indicator in the Slideshow.



Slideshow Pause will unhighlight when you execute the first Snapshot or Shift-click on a Variable Position. The time between Snapshot executions is recorded as well as which Snapshot you've executed. Recording is stopped by clicking on Slideshow Stop or the Stop button in the Conducting Window, and a number appears in the Slideshow to indicate that something has been recorded.



To play back a Slideshow, click on the desired Slideshow or type **1-9**, just as you would execute a Snapshot. The start of the Slideshow is quantized by the Snapshot execution. While it's running, the Slideshow can be stopped by clicking on Slideshow Stop, paused with Slideshow Pause, or started over from the beginning by clicking on the Slideshow again. Note that the Slideshow does not record the contents of a Snapshot, only its location. So if you change a Snapshot after recording a Slideshow, the program will execute the new, altered Snapshot rather than the old one.



### Slideshow Stop (0 number key)

This button stops Slideshow recording or playback.



## Slideshow Pause (Option-Tab)

This button is lit up when a Slideshow is recording but no events have been executed, although you can begin recording immediately by disabling the Slideshow Record Wait option in the Options Menu. You can also click on this button to pause Slideshow recording or playback without stopping the music, in the same way the Pause button in the Conducting Window operates on the music as a whole.

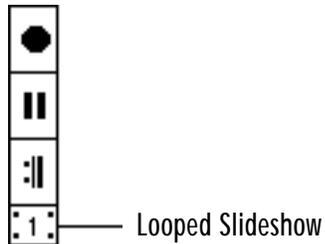


## Slideshow Loop (Vertical bar or Backslash key)

This button adds a loop point to any recording or playing Slideshow. If the Slideshow is in the process of being recorded, setting the loop point stops the recording and adds the loop at the very end. If the Slideshow is playing, the loop is added and the Slideshow subsequently begins to repeat. Keying Option-Vertical bar / Backslash on the computer keyboard or Option-clicking on Slideshow Loop removes a loop point during Slideshow playback.



Slideshows with loops in them display repeat marks, as shown below:



# 19 The File Menu

The File Menu contains commands for opening and saving files, and for quitting the program.



---

## New

**New** brings the program back to its startup state.

You can set the startup to whatever you like by using the **File Menu's Save State As Startup** command, described below.

---

## Open...

**Open...** allows you to select an existing M Document, which contains all of your work with the program, replacing whatever work you've already done. Some programs contain a **Close** command in the File Menu which closes the current document, after which you have to choose **Open...** to open another one. In M, since you can only have one document open at a time, we dispensed with the Close command, since the only thing you'd do afterwards is **New** or **Open...** anyway.

If you're working on something that you haven't saved before choosing **Open...**, you'll be asked if you want to save it first.

**Open...** first presents you with a standard file dialog that lists the names of all the M documents currently saved on disk.

When you open an M Document, the current state of the program will be overwritten by the contents of the newly opened Document. The name of the new Document will appear as the name of the Conducting Window.

## Open Midi File...

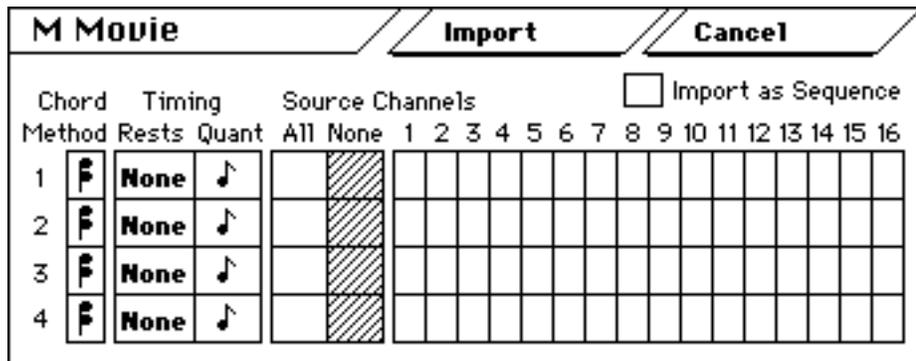
Opening a MIDI File is a way to import notes and chords into M which were saved by a MIDI-File compatible application (such as M, Jam Factory, or Upbeat). There are two ways you can do this: by reading the information into an M Pattern, or by reading it in as a Sequence.

This command does not ask you if you wish to save your work first, because you're not necessarily going to overwrite anything.

## Reading MIDI Files into Patterns

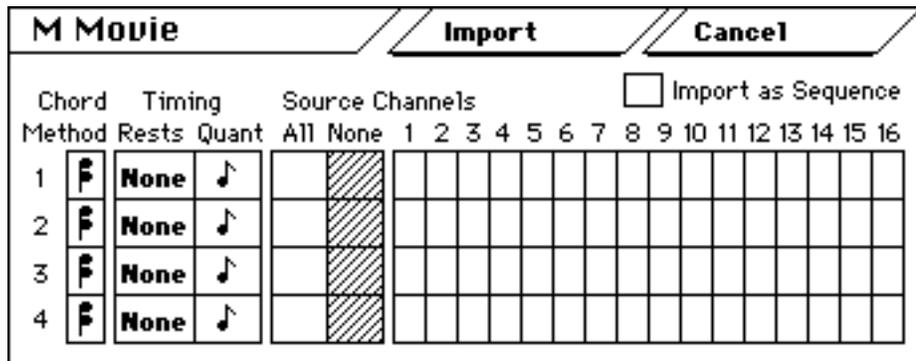
First, select the Pattern Group into which you'd like to read the notes in the MIDI File. The MIDI File is always imported into the currently selected Position in the Pattern Group Variable. Then choose **Open Midi File...** from the **File** menu.

You'll see the following dialog (with your own file name displayed in the title area).

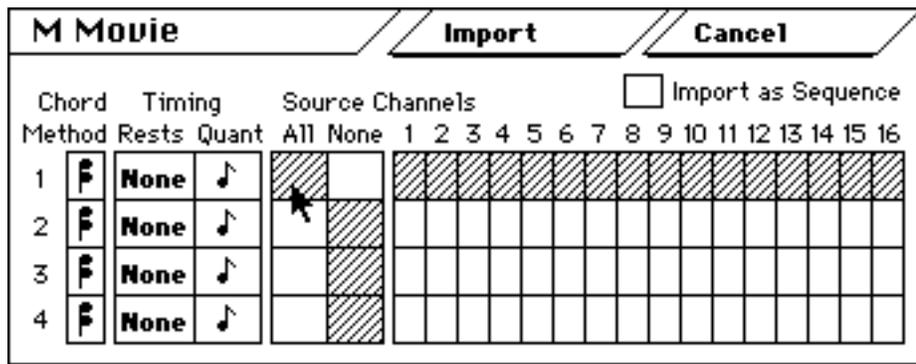


The Import Dialog allows you merge or separate different MIDI channels in the file into one or more of the four Patterns in the current Pattern Group. You can also control how timing information is interpreted when the data in the file is "recorded" into the Pattern.

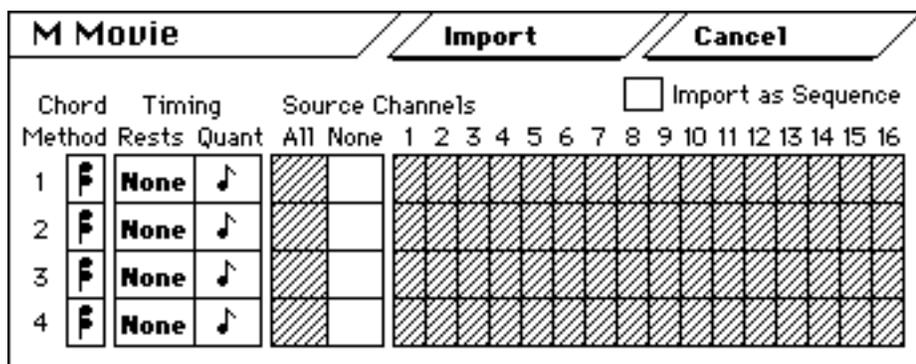
The controls under the heading of Source Channels let you assign data in the MIDI File to be read into specific Patterns. For example, here's the setup if you have a MIDI File with separate tracks on Channels 1-4, and you want to read each track into a separate Pattern:



Here's the channelization setup if you want to merge all tracks in the file into one Pattern. The easiest way to get this setting is to click on the All button.



Here's a setup in which all tracks are read into all four Patterns. This might be interesting if each of the File Recording Parameters (discussed below) were to be set differently.



## File Recording Parameters

Each of the MIDI File recording parameters can be set independently for each Pattern. They describe how M should interpret freeform MIDI File data into the format of an M Pattern, which is just a series of steps with notes, chords, or rests, and no durations.

## Chord Method

This is a Picture Matrix similar to the Chord Mode that you select when recording a Pattern from MIDI (see the discussion of the Patterns Window for details), but Build Mode is not available.

Chord Mode means that events in the MIDI File that M interprets to be chords will be saved as chords. Chords are interpreted by means of a quantization factor, which we'll discuss below.



In Single Note Mode, events are separated into steps with one note in them, regardless of how little time occurs between them.



## Timing

M has a quantization algorithm which can turn notes which last longer than a threshold setting into note steps followed by rest steps. The quantization algorithm also decides how much time to merge into a chord. For example, if you quantize to eighth notes, anything in the MIDI File closer together than an eighth note will be merged into a chord. If subsequent events are farther away than two eighth notes, a rest will be added (if you've set **Rests** to **Dur** instead of **None**).

Chord Method	Timing	
	Rests	Quant
1	None	~
2	None	♪
3	Dur	♩
4	None	○

The algorithm probably won't do what you want with complex multi-rhythmic parts, but you'll get the best results importing simple single line material into M in any case.

## Import As Sequence

If you click on this toggle button, the method of importing the MIDI File changes. Instead of being cut into steps for a Pattern, the MIDI data is imported faithfully as a Sequence which can be played along with the four Voices.

The only controls active in the Import Dialog when you're using Import As Sequence are the top row of channelization enable buttons, which are initially set to All. Deselecting a



**Save State As Startup** can be useful for tailoring M's default behavior to the way that you prefer to work. If you have only one MIDI synthesizer, for example, you might want to configure the Orchestration Variable to output all the Patterns through MIDI channel 1.

Your disk must be unlocked to perform Save State As Startup successfully, and there must be at least 50K of free space on it (this space won't actually disappear, it's just needed temporarily).

**Save State As Startup** does not save the contents of Patterns in Pattern Groups nor will it save Time Distortion Maps.

## Midi Assignment...

**Midi Assignment...** opens an edit window for configuring your MIDI setup. The most important function of this window is to map M Input and Output Channels to specific MIDI devices and channels. Midi Assignment works differently depending on whether you are using OMS, the MIDI Manager, QuickTime Musical Instruments or, on 68K machines only, M's internal MIDI driver.

### Midi Assignment

Input Channels		Output Channels		1st Send	
Port/Device	Chan	Port/Device	Chan	Pgm	Msg...
1	CZ-1000,	1	TX816	1	
2	CZ-1000,	2	QuickTime	2	1
3	CZ-1000,	3	QuickTime	3	1
4	CZ-1000,	4	QuickTime	4	1
5	CZ-1000,	5	QuickTime	5	1
6	CZ-1000,	6	QuickTime	6	1
7	CZ-1000,	7	QuickTime	7	1
8	CZ-1000,	8	QuickTime	8	1
9	CZ-1000,	9	QuickTime	9	1
10	CZ-1000,	10	QuickTime	10	1
11	CZ-1000,	11	QuickTime	11	1
12	CZ-1000,	12	QuickTime	12	1
13	CZ-1000,	13	QuickTime	13	1
14	CZ-1000,	14	QuickTime	14	1
15	CZ-1000,	15	QuickTime	15	1
16	CZ-1000,	16	QuickTime	16	1

**MIDI Conducting**

↔ Ctrl# 1      ↑↓ Ctrl# 2

**Send Sync**

None

**MIDI Messages**

Omni On    Omni Off

Mono Mode    Poly Mode

Local Control On

Local Control Off

System Reset

All Notes Off ⌘.

Panic

## Assigning Input Channels to OMS Devices and MIDI Channels

The Input Channels section of the Midi Assignment window allows you to assign an OMS Device and channel for each M Input Channel. If you are not using OMS, this feature is not available. You can choose an OMS input device from the popup menu in

the Port/Device column under Input Channels, and use the Numerical in the Chan column to select a specific MIDI Channel for an M input channel. Typically, if you have one input device, it will be selected for all input channels, and the Chan column will match the input channel, as is shown in the window above.

## Assigning Output Channels to Ports/OMS Devices and MIDI Channels

If you are using OMS, the Output Channels section of the Midi Assignment window allows you to assign an OMS Device and MIDI channel for each M Output Channel.

If you are using the internal MIDI driver or the MIDI Manager, you can choose between Modem and Printer output. If you are using QuickTime Musical Instruments, this will also be an option. If you are not using OMS, you can't change the numerical in the Chan column—the output MIDI channel will be the same as the M Output Channel.

When using OMS, you can choose an OMS output device from the popup menu in the Port/Device column under Output Channels, and use the Numerical in the Chan to choose a MIDI channel for each M output channel.

If you're not using OMS, the Port/Device column functions as a toggle. Click in the column to change the setting from Modem to Printer (then to QuickTime Musical Instruments, if applicable), or from Printer to Modem.

## First Program Change Number

As we explained in the discussion on the Sound Choice Variable, different synthesizers have different ideas about how to display the first MIDI program change number. First Pgm Change lets you tailor the display in each of the Sound Choice Numericals to the display behavior of your synthesizers.

The **1st Pgm** column of the Output Channels section of the window contains this setting for each M output channel. A value of 1 means the channel's program number display will start at 1 and go to 128, and a value of 0 means the channel's program number display will start at 0 and go to 127.

Clicking in the box for each MIDI channel reverses the current setting. The Sound Choice Numericals in the Midi Window are updated automatically to reflect the new setting.

## MIDI Messages

The **Send Msg...** column of the Output Channels section, along with the buttons in the lower right corner of the Midi Assignment window, can be used to transmit MIDI messages to devices to change how they're behaving. This feature is generally unnecessary with more recent multitimbral synthesizers.

To transmit a MIDI Message:

- Select the channels on which you want to transmit the message.

Input Channels		Output Channels		1st	Send
Port/Device	Chan	Port/Device	Chan	Pgm	Msg...
1	CZ-1000,	1	TX816	1	
2	CZ-1000,	2	QuickTime	2	1 
3	CZ-1000,	3	QuickTime	3	1 
4	CZ-1000,	4	QuickTime	4	1
5	CZ-1000,	5	QuickTime	5	1
6	CZ-1000,	6	QuickTime	6	1
7	CZ-1000,	7	QuickTime	7	1

- Click on the desired button and the message will be sent. In the example shown above, the message would be sent on channels 1, 2, and 3.

## What The Messages Do

**Omni On** tells your synthesizer to play notes received on *all* MIDI channels.

**Omni Off** tells your synthesizer to receive on only the MIDI channel(s) that it's been set to. With one synthesizer that plays only one timbre, such as an original DX7, use the setting of Omni On. If you have a multi-timbral synthesizer, or if you're using several synthesizers, you'll most likely choose Omni Off.

**Local Control Off** disconnects a synthesizer's keyboard from its sound generating mechanism, but still send the MIDI messages associated with what you're playing. This allows you to use the keyboard to transpose or control various functions in M without hearing the keys you depress played as notes.

**Local Control On** restores the connection. Some synthesizers, notably the original DX7, are always in Local Control On mode.

**System Reset** sends a special command that's supposed to cause any synthesizer that's listening to reset to its "power-up" state. You probably will never have to use this button. None of us have.

**All Notes Off** sends a message to your synthesizers to end any notes that may still be sustaining. This is useful to get rid of "stuck notes" caused by human error or software problems.

**Note:** You can send All Notes Off messages to all the channels in the Current Orchestration at any time by typing Cmd-period.

**Panic** is another version of All Notes Off which actually sends a Note-Off message for every possible MIDI note on the selected channels. This command will get rid of stuck notes on certain equipment that doesn't respond to the usual All Notes Off message.

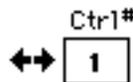
## Conducting with MIDI Controllers

MIDI Conducting allows you to use any two MIDI Controllers to move the Baton in the conducting grid. This could be useful in a live performance situation.

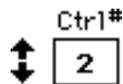
These controllers can be on any MIDI channel, port or OMS Device. Even if you don't have an OMS device utilized in the Input Channels column, it can still send controllers that will be used for MIDI Conducting.

One Controller will be assigned to move the Baton horizontally...

### MIDI Conducting



...and the other will move the Baton vertically.



Use the numerals to specify which MIDI Controller number you wish to use for each dimension. If you use the same controller number for both dimensions, you'll only be able to move in a diagonal line, which isn't all that useful. The controller numbers displayed in the numerals may be off by 1 compared to the user interface of the device you're configuring (such as the Kurzweil MIDIboard), but rest assured that, according to the MIDI specification, we're right and they're wrong.

In order to use MIDI Conducting feature, you must enable it by choosing **Midi Conduct** from the **Options** menu.

## Send Sync

If you are using OMS, you can choose a device for sending M's output MIDI clock. In order for this feature to work, you need must enable it by choosing Send Clock from the Options menu.

---

## Midi Setup...

This command is disabled except when running on a 68K processor. M has an unsupported internal MIDI driver that works on 68K machines only. You can only use the driver if you do not have OMS installed. Midi Setup... opens a dialog for configuring the internal driver.

If you are using the internal driver and have not previously specified MIDI connections to either port, you'll see this command when you start the program. Otherwise your setup is remembered from the last time you used M.

If the MIDI Manager is installed, you can choose Use Apple MIDI Manager. This causes M to connect to the MIDI Manager rather than use its internal MIDI driver. If the MIDI Manager is not installed, you can use this dialog to configure the internal MIDI driver's connection settings.

To specify a connection to a particular serial port, check the appropriate box under **Port:**.

You'll also need to specify the frequency at which your interface functions. Unless you own an older (1985 vintage) interface, the speed will be 1 MHz.

If you're not sure, try 1 MHz first, then try .5 MHz and 2 MHz. You won't hurt anything with the wrong frequency, but you won't hear anything either. And of course you could check with the manufacturer of your interface, if they're still in business.

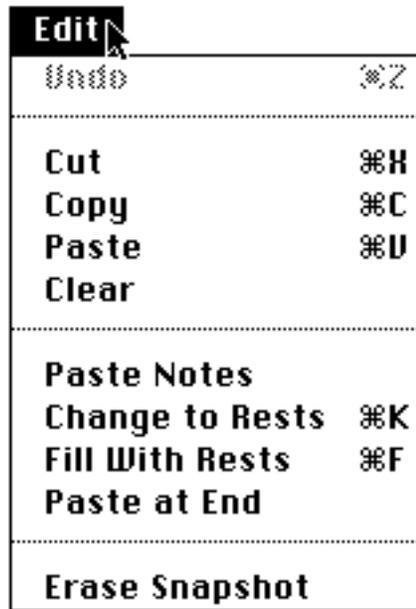
When you click **OK**, the settings are reinitialized and various menu items and controls in the Midi Assignment window will be enabled or disabled to reflect the new settings.

---

## Quit

For use only when other matters become pressing. We're always sorry to see you go, but we'll ask if you want to save your current file and we'll look forward to seeing you again.

## 20 The Edit Menu



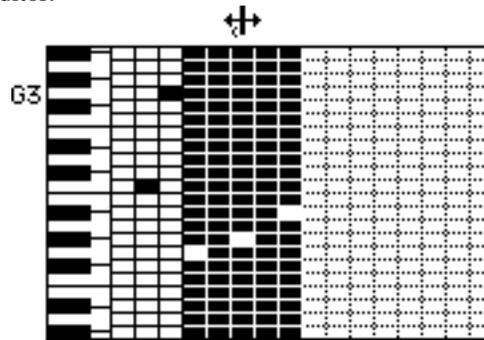
The Edit Menu commands allow you to move or duplicate information from one Pattern or Region of a Pattern to another.

In order to use these commands, you must indicate which Pattern or Patterns you'd like the operation to affect by selecting them in the Patterns Window, as shown below.



You can select all four Patterns at once by dragging from top to bottom. Shift-selecting also works, in case you'd like to perform the same operation on the first and third Patterns, as in the example above.

The Edit Menu also works on a Region of a Pattern, which you create with the Selector in the Pattern Editor.



---

## Cut, Copy, Paste

To copy information from one Pattern or Region to another:

- Select the Pattern or Region *from* which you want to Copy.
- Choose **Cut** or **Copy** from the **Edit** menu. Cut and Copy are identical except that Cut also removes all the selected steps from the Pattern.
- Select the Pattern *to* which you want to paste. You can paste to a Pattern location in a different Pattern Group by switching Pattern Groups first, or even a different file by opening another M document before pasting.
- Choose **Paste** from the **Edit** menu.

When **Paste** duplicates an entire Pattern, the Record Modes, Output Length, Time Base and Phase information are duplicated too. **Paste Notes** (discussed below) does not change any of this information in the destination Pattern. Both Paste commands, as well as the **Insert Paste** command, leave non-note information alone when copying from or pasting to Regions.

What happens when the destination Region is a different number of steps than what you're pasting? If the destination is too small, the Pattern being pasted is truncated (if this is not what you want, see **Insert Paste** below). If the destination is too large, the selected Region is filled out with rests.

---

## Clear

To clear the contents of a Pattern or Region:

- Select the Pattern or Region you want to clear.
- Choose **Clear** from the **Edit** menu. In the case of an entire Pattern being selected, the Pattern's Output Length will be set to 0, reflecting the fact that all notes have been deleted. In the case of a Region, all the selected notes are deleted, and Output Length is decremented by the number of steps deleted.

For Regions, this command is identical to using the Scissors.

The Clear key is equivalent to the **Clear** menu item.

---

## Paste Notes

This command is identical to **Paste** except that when pasting an entire Pattern, only note information is copied, without affecting the destination Pattern's Record Modes, Output Length, Time Base or Phase. Refer to the discussion of **Paste** above for more information.

---

## Change to Rests

This command replaces all the notes in the selected Pattern or Region with rests. For Regions, it's identical to using the Eraser. This is a useful command to clear a Pattern when using Drum Machine Record, as it doesn't change the length of the Pattern you've set up.

---

## Fill With Rests

This is one command you may not use very often. It fills the entire Pattern, up to its maximum size (as indicated by the Pattern Size Numerical in the Pattern Editor), with rests. **Fill With Rests** doesn't care whether you have a Region or Pattern selected. It obliterates everything in its path.

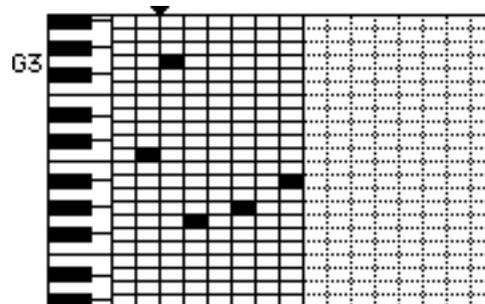
---

## Insert Paste/Paste at End

If an entire Pattern is selected, this item is displayed as **Paste At End**. If a Region is selected, the command is displayed as **Insert Paste**.

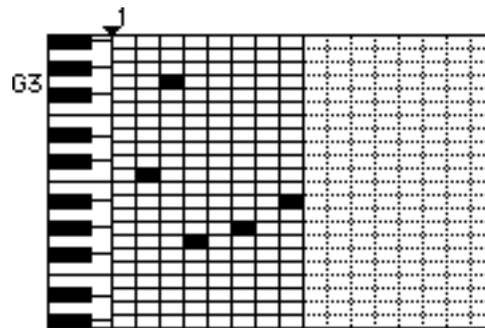
**Paste At End** places all the note information at the end of the selected Pattern, increasing the Pattern's length. It leaves the Pattern's non-note information alone.

Insert Paste is similar to Paste Notes except that it inserts any steps needed to completely Paste the information. Insert Paste is the only editing command that works with a Pointwise Selection, which is what you get when clicking on a single step and then releasing the mouse button without dragging.



In the Pattern shown above, Insert Paste would paste the information after the step containing C, so that the last note of what was pasted would come immediately before the G.

If you want to paste some notes at the beginning of a Pattern, make a Pointwise Selection before the first step, like this:



---

## Erase Snapshot

This command clears the currently selected Snapshot (the one with the black mark in the sun). If no Snapshot is so marked, the menu item will be dimmed.

# 21 The Variables, Pattern, and Windows Menus

---

## The Variables Menu



The commands of this menu open each Variable's Edit Window, with the currently active Position displayed for editing. It's identical to double-clicking on the active Position of a Variable. The Variables Menu might come in handy if your favorite Variable is buried deep beneath some other edit windows, and you want to bring its edit window to the front. If the edit window is already open, you can accomplish the same thing with the Windows Menu.

### Voice 1-4 Color...

These commands bring up the standard Color Picker dialog to change the color that's used to display information for one of the four Voices. The Voice Colors are not saved in files, but they are saved in the Startup State, so after you change them to something you like, choose **Save State As Startup** from the **File** menu to make the change permanent.

---

## The Pattern Menu

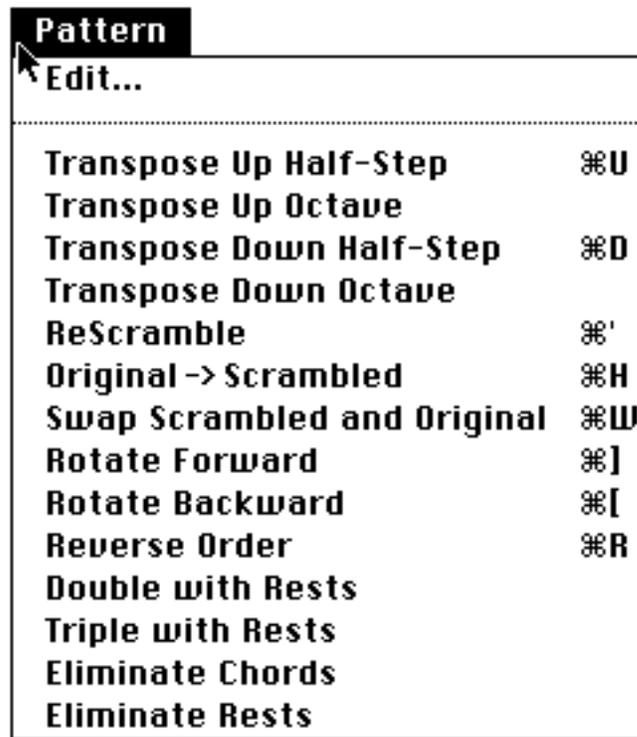
The commands in the Pattern Menu operate on any selected Patterns or Regions. Refer to the discussion of the Edit Menu for information about selecting commands.

The first command, **Edit...** merely opens the Pattern Editor and is a substitute for opening the Pattern Editor by double-clicking on the selected Pattern. **Edit...** might be useful if the Patterns Window is buried beneath a bunch of other windows.

The other commands in the Pattern Menu transform selected Patterns or Regions in permanent ways. Unlike those in the Edit Menu, these commands permanently modify, rather than replace, the selected Pattern or Region.

Notice that we said *permanently* modify. You can achieve some of the same results of choosing Pattern Menu commands by using M's Variables, but the difference is that the effect of a Variable is always temporary — you can change the effect by changing the Variable.

If there's a Pattern Menu command you have a question about, the best way to learn what it does is to select a Region in the Pattern Editor and watch how it is transformed after you issue the command.



Transpose Up Half-Step  
Transpose Up Octave  
Transpose Down Half-Step  
Transpose Down Octave

These commands will permanently transpose a selected Pattern or Region by the specified amount.

Note the difference between these commands and the Transposition Variable. The transpose commands change the key of the actual note material inside the Pattern, rather than merely playing that material with a pitch offset.

## ReScramble

This command generates a new Cyclic Random ordering of the selected Pattern or Region. You employ this ordering in a Voice by using the Note Order Variable. Refer to information on the Note Order Variable in Chapter 7 for more details.

## Original -> Scrambled

This command copies the Original list to the Cyclic Random list. It has very little use, except that if you perform only a few editing or recording operations, the order of only a few of the notes will have been changed in the two lists. However, you could probably get a similar effect by using a Note Order configuration of 90 per cent Original Order and 10 per cent Cyclic Random. The only advantage of doing it the Original -> Scrambled way is that you would be sure which steps were being scrambled.

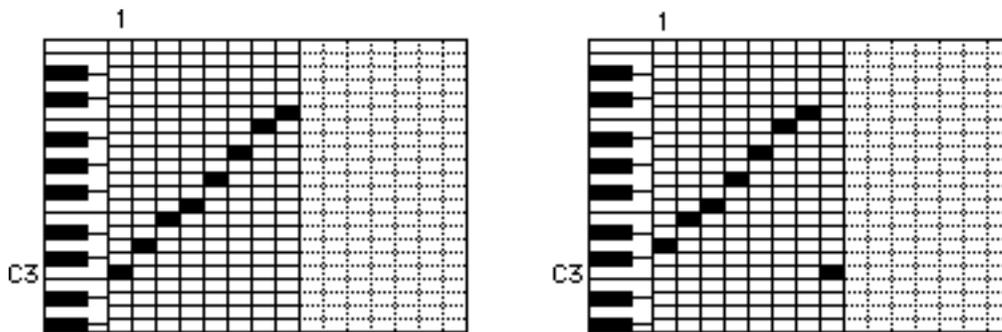
## Swap Scrambled and Original

This command exchanges the list created by the Cyclic Random ("scrambled") ordering of notes with the Original list (i.e., the order you see in the Pattern Editor). If operating on a Region, only the notes in the Region of the Original and Scrambled lists in the region are exchanged.

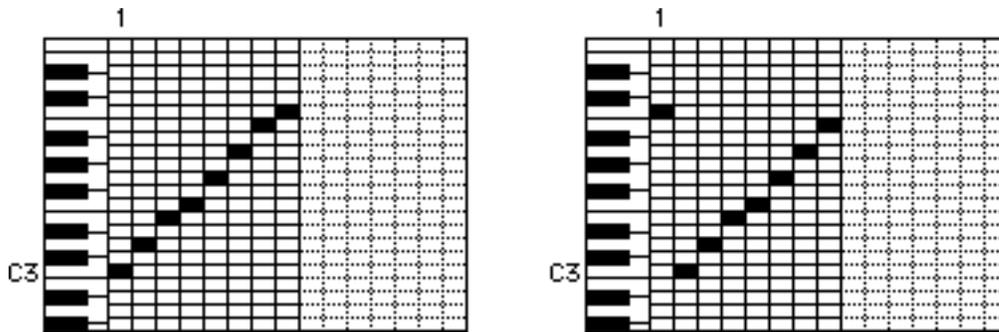
## Rotate Forward Rotate Backward

These commands rotate the steps of the selected Pattern. Great, you say. What does that mean, and why would I ever want to use it?

Rotating a Pattern *forward* means that the first step in the Pattern becomes the last step, the second step becomes the first step, the third step becomes the second step, and so on, as shown "before and after" below with a C scale.



Rotating a Pattern *backward* means that the last step becomes the first step, the first step becomes the second step, the second step becomes the third step, and so on, as shown below with the C scale.



If you think about it for a moment, it should be clear that if you performed a **Rotate Forward** followed by a **Rotate Backward**, you'd end up with your original Pattern again.

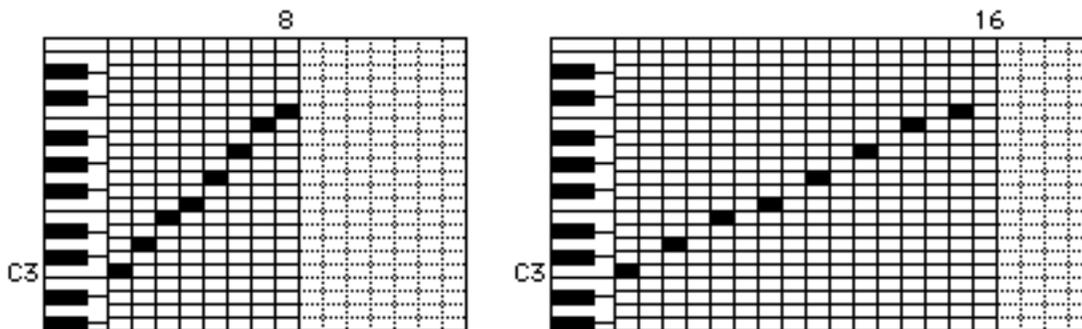
The Rotate commands can be useful in changing the melodic or rhythmic relationship between one Pattern and another, and can be especially interesting in working with Patterns with a lot of rests, such as those created in Drum Machine Record Mode.

## Reverse Order

This command reverses the notes in the Pattern or Region, for those who like things backwards (i.e., backwards things like who those).

## Double with Rests

This command expands the Pattern or Region by inserting a rest *after* each step, as shown in the before and after example below.



Here's something interesting you might try to illustrate Double with Rests.

- Create two different Patterns with the same number of steps. For proper aesthetics, just make Patterns with single notes in them.
- Select both Patterns and choose **Double with Rests** from the **Pattern** menu.
- Select one of the Patterns and choose **Rotate Forward** from the **Pattern** menu.

The notes of one Pattern are now offset from the other. You could have done the same thing with the Phase control, but this way of doing it makes the alternating nature of the music independent of the Time Base setting you're using.

## Triple with Rests

This command, as you might guess, expands the Pattern or Region by inserting *two* rests after each step.

## Eliminate Chords

This command expands the selected Pattern or Region by turning each step containing a chord into a series of steps, each one containing a note of the chord. The order of the new steps is determined by the order in which you entered the notes of the chord, which, when playing on a MIDI keyboard, isn't always predictable.

**Note:** When you use Double With Rests, Triple With Rests, or Eliminate Chords, the length of the Pattern is increased automatically.

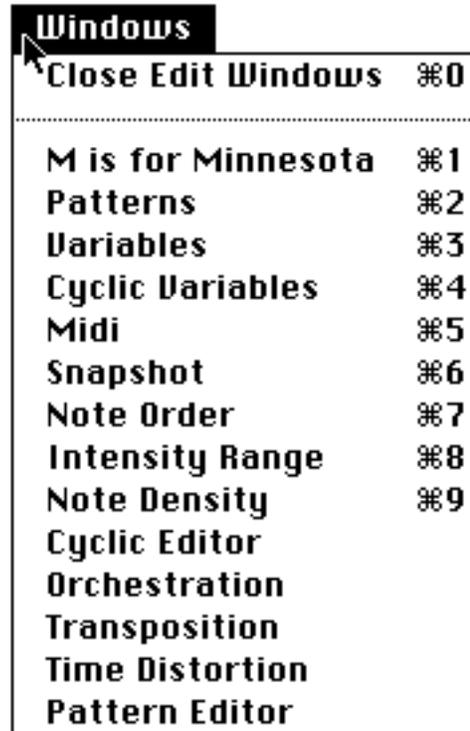
## Eliminate Rests

This command shrinks the selected Pattern or Region by deleting all rest steps. Eliminate Rests is a way to undo an unfortunate choice of **Double With Rests** or **Triple With Rests**.

---

## The Windows Menu

This menu manages M's many windows. The contents of the Windows Menu will vary as you open and close edit windows.



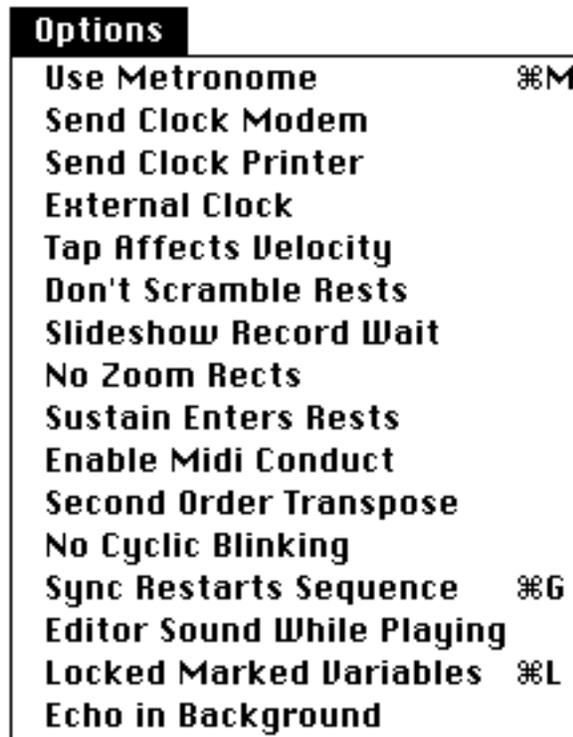
**Close Edit Windows** merely closes any edit windows you have open.

The other commands bring the named window to the front, as an alternative to clicking on their title bar or Cmd-clicking on any other part of the window. This is useful if the window you want to use is buried under a lot of other windows. Incidentally, the top window in the list is the Conducting Window.

Another keyboard shortcut for managing windows is Cmd-Option-Number. Typing this will send to the very back whatever window would have been brought to the front with Cmd-Number. So, for example, since Cmd-5 brings the Midi Window to the front, Cmd-Option-5 will send the Midi Window behind all other windows. If no windows are on top of each other, nothing will appear to have happened.

## 22 The Options Menu

The commands in the Options Menu are settings that can be turned on and off by choosing them. An Option is on when the menu item shows a check mark and off when there's no check mark. Below, all Options are shown unchecked, or Off.

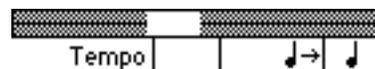


---

### Use Metronome

Choosing this command turns the Metronome on and off. When **Use Metronome** is enabled, you hear a click from the speaker to help synchronize your playing to M's clock.

The ratio of the metronome to the speed of a quarter note played at the current tempo can be adjusted with the Sync Ratio Numerical in the Conducting Window. For more information, refer to the discussion of this numerical in Chapters 8 and 15 on controls in the Conducting Window.



Sync Ratio Numerical

---

## Send Clock Modem

## Send Clock Printer

These commands enable or disable the sending of MIDI Clock messages from M to an external device. M could be said to be the Master in this case.

**Send Clock Modem** sends the MIDI clock signal out the modem port. **Send Clock Printer** sends the MIDI clock signal out the printer port. You can send the signal out both ports if you really want to.

Note that the setting of the Metronome Ratio / Sync Ratio Numerical determines the relationship between M's tempo and the tempo of the external device. See the discussion in Chapter 11 for more information.

Note the following points about Send Clock:

- The external device must be in "clock receive" mode.
- The device will start when you start M.
- The device will restart its pattern or sequence when you click on **Sync**. Well, maybe it will. Some machines don't seem to do this reliably.
- The device will stop when you stop M.

---

## Send Clock

When using OMS, the menu item for sending MIDI clock is called Send Clock. When enabled, M sends MIDI Clock messages to the OMS Device chosen in the Send Sync popup menu in the Midi Assignment window.

---

## External Clock

**External Clock**, when enabled, allows you to sync M to an external device, making the program follow the device's tempo. You can set the relationship between the tempo of the external device and M's tempo with the Sync Ratio Numerical in the Conducting Window. See Chapter 11 for more details. Incidentally, no control over tempo is possible from the screen of M when you are in External Clock mode. The Tempo Numerical changes to read Ext to indicate this.



---

## Tap Affects Velocity

This Option enables the effect of modifying the overall velocity of all M's Voices (plus the MIDI File Sequence) by the velocity of the last MIDI key pressed when using the Tap Conducting feature of the Input Control System. Velocities are modified depending on whether the key pressed was above velocity 64 (the defined "medium velocity"). See Chapter 10 for a discussion of the Input Control System and the Tap Affects Velocity feature.

---

## Don't Scramble Rests

This option preserves the location of rests in the Cyclic Random ordering when a reordering operation is performed each time you edit or record into a Pattern. It is not retroactive, so if you enable **Don't Scramble Rests** after having done some recording or editing, some of the Pattern's rests could be in different places in the Original and Cyclic Random lists. Choosing **ReScramble** from the **Pattern** Menu after enabling **Don't Scramble Rests** is the way to ensure consistency.

What's the use of this option? In Patterns where the position of notes versus rests is essential to the rhythm, you can use Cyclic Random ordering with confidence that the rhythmic relationships will remain consistent.

Incidentally, the algorithm used to perform this operation during Pattern editing is probably the most complicated in the entire program, so use and enjoy **Don't Scramble Rests** often and think of the suffering that went into creating it.

---

## Slideshow Record Wait

This option, when enabled, makes M wait for the first executed event (a Snapshot or quantized Variable) before recording time in the Slideshow. If this option is disabled, time is recorded immediately after starting the music (or if the music is going, immediately after the Slideshow is enabled for recording). Almost everyone will want this option checked, as is the default state.

---

## No Zoom Rects

This option disables the traditional window-zooming when opening a Variable's Edit Window. At faster tempos on slower machines, drawing the Zoom Rects can be somewhat slow, causing frustrating delays in response to user gestures and window updating. If this happens, or if you find Zoom Rects distasteful, try enabling **No Zoom Rects**.

---

## Sustain Enters Rests

**Sustain Enters Rests** enables the recording of rest steps into a Pattern each time you press down on the sustain pedal connected to your synthesizer keyboard or controller.

Don't forget that this option is on and use the sustain pedal while echoing MIDI data for expressive effect while recording, or you may get some unexpected rests in your Patterns.

---

## Midi Conduct

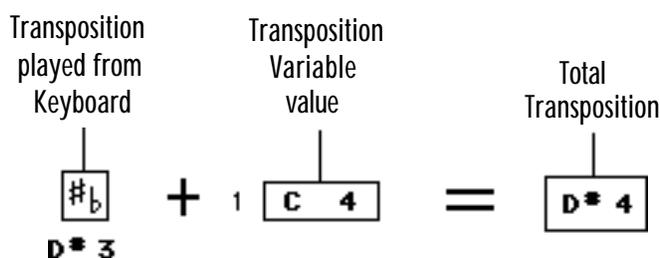
This option enables a mode of conducting in which the Baton is moved around the Conducting Grid by MIDI Controllers. Refer to MIDI Conducting in the discussion of the Midi Assignment Window in Chapter 19.

---

## Second Order Transpose

When enabled, this option preserves the relative transpositions set in the Transposition Variable when using the Keyboard Transpose feature to transpose Voices with your MIDI keyboard.

The following diagram illustrates the effect of Second Order Transpose.



If Second Order Transpose had not been enabled in this case, the total transposition would have been D#3, not D#4.

---

## No Cyclic Blinking

Turn this option on if the blinking that occurs when Cyclic Variables reset to the beginning of a cycle irritates you or seems to be degrading the response to the mouse and keyboard (such a problem will be sometimes be seen when M doesn't stop playing immediately when you type Return).

There's no way to disable the blinking that you see in the Pattern Group Variable when Patterns start over again. We feel this blinking is reasonably harmless and usually helpful.

---

## Sync Restarts Sequence

If this option is enabled, the imported MIDI File Sequence which plays along with the four Voices will restart at the beginning when you perform a Sync. You'll want to disable **Sync Restarts Sequence** if your MIDI File is rather long and you plan on performing a lot of Snapshots which will include Syncs. The four Voices will still sound synchronized to the sequence if you set the Snapshot Quantization Numerical appropriately.

---

## Editor Sound While Playing

If this option is enabled, the controls that play MIDI data in the Pattern Editor (the Reference Keyboards, adding notes to steps, and dragging the MIDI Edit Counter) will

continue to do so while the music is going. If this option is disabled (as is the default state), the Editor Sound features will only work when the music is *not* going. Note that you have to have the Editor Sound feature in the Pattern Editor enabled for this option to matter at all.

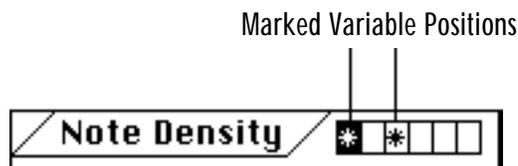


Editor Sound Button (enabled)

---

## Locked Marked Variables

The six Positions of all Variables, except Pattern Group and Sound Choice, can be marked in an edit window by clicking on the selector for editing a new Variable Position and dragging down with the mouse.



The mark can serve as a reference that you've already used the Position and don't wish to change it further. Or perhaps you want to reserve one Position in a Variable for using the edit window as a performance device, preserving the other Positions.

If you'd like M to reinforce these desires, you can enable **Locked Marked Variables**. When this option is checked, the edit windows become inoperative on Variable Positions that have been marked. You can always unmark a Variable Position by making the same click-and-drag-down gesture as you made to mark the Position in the first place, so **Locked Marked Variables** isn't such a bad deal.

---

## Echo In Background

If **Echo in Background** is enabled, M continues to process incoming MIDI while another application is in the foreground. This feature only works when using the MIDI Manager or OMS in either the MIDI Manager mode or when Run MIDI in Background is enabled in OMS MIDI Setup.

# Appendix A - M 2.5 Power User Guide

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## Modified Mouse Actions

### General

Cmd-click on any window brings that window to the front without performing any action.

If Cmd-# is a Cmd-key equivalent to a bringing a window to the front in the windows menu, Cmd-Option-# sends that window to the very back.

Shift-click on any Numerical changes the Numerical to match the value of the Numerical you changed most recently (within the limits of the Numerical you shift-clicked on).

### Variables and Edit Windows

Dragging on a variable position copies or swaps the information to another position. Drag swaps source and destination, Option-drag copies from source to destination.

Option-click on a variable position in an edit window changes that position to be both the currently edited position and the currently active position. You can also Shift-Option click, to quantize this selection.

Option-click on Pattern Group Variable position doesn't do a Sync when you select it.

Clicking on the the numbers 1-4 in edit windows (except Pattern Editor) can be used to copy or swap information for each Voice in that variable position. Drag swaps source and destination, Option-drag copies from source to destination.

### Pattern Editing

Shift-click on a number 1-4 in the View column in the Pattern Editor allows you to view a Voice's Pattern along with the Pattern currently being edited. The notes are shown in a gray pattern of the Voice's color.

Option-click on an Output Length Numerical in the Patterns Window permanently adds or subtracts steps from the Pattern (adds rests).

### Conducting

Option-click in the Conducting Grid clears the effect of Continuous Conducting (dragging has no effect when option-clicking).

Shift-click (or drag) in the Conducting Window quantizes conducting actions to the Snapshot quantization and includes any variable choices (and of course Snapshots) in a Slideshow, if you're recording one.

## Hold/Do, Quantization, Snapshots, and Slideshows

Shift-click on a variable position quantizes that position to the Snapshot Quantization and includes it in a Slideshow, if you're recording one.

Shift-click on the Hold/Do Button in the Do phase of the action quantizes the actions that will take place to the Snapshot Quantization. Shift-click when storing a Snapshot at the end of a Hold/Do has the same effect.

Shift-click when executing a Snapshot forces a Sync to be performed, even if none has been included in the Snapshot. This feature is also in effect if you type a capital letter A-Z to execute the Snapshot.

Option-click on a Slideshow 1-9 enables the Slideshow for recording.

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## Keyboard Equivalent to M Commands

### General

Space Bar - Start / Sync

Return Key - Stop

Tab Key - Pause / Unpause

Backspace - Hold/Do

Clear key - same as selecting Clear from the Edit menu

Tilde/Grave key - plays step at MIDI Edit Counter in Pattern Editor (held as long as you hold the key down). This works if the Editor window is open.

Comma/Greater Than key - plays step in Legend in Pattern Editor Editing Grid (the step at the cursor position, at the junction of the dotted lines). This only works if the mouse cursor is positioned within the Editing Grid.

Cmd & Option keys held down together - momentarily enables Mouse Advance

Caps Lock - indefinitely enables Mouse Advance

A thru Z - execute (or store, if in Hold/Do) Snapshot

### Slideshow Keys

1 thru 9 - Execute Slideshow

0 - Stop any Slideshow

Option-1 thru 9 - Slideshow Record

Option-Tab - Slideshow Pause

Backslash/Vertical Bar - Insert Slideshow Loop point

Option-Backslash/Vertical Bar - Remove Slideshow Loop point

# Appendix B - M Input Control System

	<u>Value</u>	<u>Function</u>	
C1	0	Ptn 1 On/Off	
		Exec Snapshot...	
	1	Ptn 2 On/Off	
		Ptn 1 Time Base...	
	2	Ptn 3 On/Off	
	3	Ptn 4 On/Off	
		Ptn 2 Time Base...	
	4	Clear Ptn 1	
		Ptn 3 Time Base...	
	5	Clear Ptn 2	
		Ptn 4 Time Base...	
	6	Clear Ptn 3	
	C2	7	Clear Ptn 4
			Pattern Group...
8		Step Adv Voice 1	
		Ordering...	
9		Step Adv Voice 1	
10		Tap Tempo	
		Sound Choice...	
11		Step Adv Voice 2	
		Orchestration...	
12		Step Adv Voice 2	
	Transposition...		
13	Stop		

	<u>Value</u>	<u>Function</u>	
C3 (Middle C)	14	Start	
		Intensity Range...	
	15	Step Adv All Voices	
		Note Density...	
	16	Step Adv All Voices	
	17	Sync	
		Duration...	
	18	Step Adv Voice 3	
		Accent...	
	19	Step Adv Voice 3	
		Legato...	
	20	Hold/Do	
	C4	21	Mute Sequence
			Execute Snapshot...
		22	Step Adv Voice 4
			Play Slideshow...
		23	Step Adv Voice 4
24		Stop Slideshow	
		Record Slideshow...	
25		Decelerando	
		Edit Snapshot...	
26		Freeze Tempo	
	Accelerando		
C5		Tap Conduct	

# Index

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- 1st Pgm 165
- Accelerando 113
- Accent 144
- Accent Button 24
- Accent Cycle 72, 74
- Accent Variable 23, 71
- Active Position 142
- All 33
- All Button 52
- All Notes Off 166
- Automatic Conducting 98
- Automatic Conducting Enable 140
- Automatic Conducting Movement Ranges 140
- Automatic Conducting Time Base 141
- Baton 92
- Blink Everything 156
- Blink Everything Button 103
- bombsight 84
- breakpoint 84, 151
- Build 128
- Build Mode 37
- Caps Lock key 117
- Change to Rests 41, 56, 171
- Chord 128
- Chord Method 162
- Chord Mode 37, 54, 128
- Chord Record Mode 25
- Clear 20, 56, 170
- Clear 150
- Clear Button 84
- Clear Current Pattern keys 111
- Clock Time 83
- Close All Edit Windows 101
- Close "Box" 147
- Close Edit Windows 178
- code key 114
- Conducting 92
- Conducting Arrow 92
- Conducting Arrow 139
- Conducting Arrows 12, 142
- Conducting Grid 9, 92, 138
- Conducting Window 9, 92, 138
- Conducting with MIDI Controllers 167
- Continuous Conducting 96
- Continuous Conducting Arrows 142
- Copy 56, 170
- Copying and Swapping Voice Settings 148
- Copying/Swapping Variables 143
- Counter Button 136
- Ctr (Counter) Button 52
- current Snapshot 103, 155
- Cut 56, 170
- Cyclic Editor 71, 151
- Cyclic Editor Window 24
- Cyclic Random 27, 87
- Cyclic Variable Name Buttons 152
- Cyclic Variables 70
- Cyclic Variables Window 9, 144
- Decelerando 113
- Denominator 130
- Disable 126
- Disabled 129
- Don't Scramble Rests 181
- Double with Rests 55, 176
- Drag Area 154
- Drum Machine Mode 129
- Drum Machine Record Mode 38, 54
- Drum Machine Record Mode Picture Matrix 39
- Echo In Background 183
- Echo Map 118, 127
- Echo Map Enable 119, 127
- Echo-Thru-Orchestration 18, 33, 127
- Edit menu 41, 169
- edit selector 147
- Edit Snapshot 156
- Edit Snapshot Button 105
- Edit Window 10, 173
- Edit Windows 66, 67, 147
- Edit... 42, 132, 174
- Editing Grid 42
- Editing Grids 24, 72, 152
- Editor Sound Enable 21, 46, 136
- Editor Sound Velocity Numerical 136
- Editor Sound While Playing 136, 182
- Eliminate Chords 56, 177
- Eliminate Rests 56, 177
- Enabled 129
- Erase Snapshot 172
- Eraser 48, 135
- External Clock 180
- External Sync Ratio 112
- File 32
- File Menu 159
- File Recording Parameters 161
- Fill with Rests 56, 171
- First Program Change Number 165
- Freeze Tap Conduct 113
- Hold/Do 154
- Hold/Do Button 101
- Import As Sequence 162
- Import as Sequence Button 124
- Import Button 123
- Import Dialog 123, 160
- Importing MIDI Files 125
- Input Control 127
- Input Control System 31, 110
- Input Control System Enable icon 110
- Input Control System Template 110
- Insert 128
- Insert Mode 53

Insert Paste 135, 170, 171  
 Insertion Mode 128  
 Insertion Mode Picture Matrix 39  
 internal MIDI driver 167  
 Keyboard Transpose 30, 117, 126, 182  
 Legato Button 29  
 Legato Cycle 80  
 Legato Value Numericals 80, 153  
 Legato Variable 79  
 Legend 133  
 Length Numericals 83  
 levels 72  
 Local Control Off 166  
 Local Control On 166  
 Lock Marked Variables 147  
 Locked Marked Variables 183  
 main screen 8  
 Map Edit selector 150  
 Map Length 150  
 Marking a Variable Position 147  
 metronome 62  
 Metronome Ratio 180  
 Metronome's Time Base 62  
 Midi Assignment 22, 168  
 Midi Assignment Window 91  
 Midi Assignment... 164  
 MIDI Clock 140, 180  
 Midi Conduct 182  
 MIDI Conducting 167  
 MIDI Edit Counter 46, 136  
 MIDI Edit Range 52  
 MIDI Edit Range Bar 135  
 MIDI Editing 51  
 MIDI File 120  
 MIDI Manager 167  
 MIDI Messages 165  
 Midi Setup... 167  
 Midi Window 9, 146  
 miniature representation 66, 142  
 Mode Selector 52, 137  
 Mouse Advance 116, 129  
 Mouse Advance Toggle 116  
 Movie 120, 139  
 Movie Button 120  
 New 159  
 No Cyclic Blinking 73, 182  
 No Zoom Rects 181  
 Note Density 60, 143, 148  
 Note Density Edit Window 30, 67, 70  
 Note Density Variable 30, 67, 70  
 Note Numerical 68  
 Note Order 144, 149  
 Note Order Edit Window 27, 87  
 Note Order Variable 27, 87  
 Numerator 130  
 Numerical 12  
 octave icons 45  
 Octave Numerical 68  
 octave scroll icons 133  
 Omni Off 166  
 Omni On 166  
 OMS Devices 164  
 One-Step Controls 110  
 Open Midi File... 160  
 Open... 159  
 Options menu 40, 179  
 Orchestration 146, 151  
 Orchestration Edit Window 18, 34, 58, 90  
 Orchestration Variable 17, 33, 58, 89  
 Original -> Scrambled 175  
 Original Order 27, 87  
 Output Channels 165  
 Output Length 59, 130  
 Output Length Numerical 37, 57, 62  
 Output-Length Numerical 19  
 Overdub 129  
 Overdub Mode 38, 54  
 Panic 166  
 Paste 56, 170  
 Paste at End 56, 171  
 Paste Notes 56, 170, 171  
 Pattern 9, 32  
 Pattern Editor 20, 132, 170, 174  
 Pattern Editor Editing Grid 133  
 Pattern Editor Size Box 132  
 Pattern Editor Window 42  
 Pattern Group 143  
 Pattern Group Variable 88  
 Pattern menu 42, 55, 173  
 Pattern Select box 127  
 Pattern Size Numerical 43, 137  
 Patterns Window 9, 126  
 Pause Button 61  
 Phase 130  
 Phase Numerical 64  
 Picture Matrix 14  
 Picture Numerical 62  
 Play Slideshow key 114  
 Play-Enable 129  
 Play-Enable Button 21, 58  
 Play-Enable Buttons 38  
 Plunger 48, 135  
 Pointwise selection 134, 172  
 Positions 66  
 push button 11  
 Quantization 154  
 quantization algorithm 162  
 Quantization Numerical 105  
 quantized 102  
 Quit 168  
 Range Bar 13  
 Real Time 83  
 Record 126  
 Record Indicator 156  
 Record Mode Picture Matrix 36  
 Record Modes 36, 128

Record Slideshow key 114  
 Reference Keyboards 133  
 Region 48, 135, 170  
 Replace 129  
 Replace Mode 38, 54  
 ReScramble 88, 175, 181  
 Restore From Snapshot 156  
 Restore From Snapshot Button 106  
 Reverse Order 55, 176  
 Rhythm 145  
 Rhythm Cycle 76  
 Rhythm Value Numericals 77  
 Rhythm Value Numericals 153  
 Rhythm Variable 76  
 Robot Conductor icon 99  
 Rotate Backward 55, 175  
 Rotate Forward 55, 175  
 "Running out of Film" 121  
 Save 41, 163  
 Save as... 32, 163  
 Save Movie As Midi File 121  
 Save Movie As Midi File... 163  
 Save State As Startup 159, 164  
 Scissors 48, 135  
 scroll arrows 45, 133  
 Scroll Bar 45, 134  
 Second Order Transpose 182  
 Select Box 19  
 Select Column 36  
 Selector 48, 134, 170  
 Send Clock 180  
 Send Clock Modem 140, 180  
 Send Clock Printer 140, 180  
 Send Msg... 165  
 Sequence 120, 125, 162  
 Sequence Play Enable 139  
 Sequence Play-Enable Toggle 125, 163  
 Sequence Play-Enable Toggle key 111  
 Shift-Click on Numerical 112  
 Single Note 128  
 Single Note Mode 37, 54  
 Size Box 43  
 sliders 14  
 Slideshow Loop 158  
 Slideshow Loop Button 108  
 Slideshow Pause 158  
 Slideshow Pause Button 107, 156  
 Slideshow Record Wait 181  
 Slideshow Stop 157  
 Slideshow Stop Button 107  
 Slideshows 9, 101, 106, 154, 156  
 Snapshot 102  
 Snapshot Conducting Arrow 154  
 Snapshot Window 9, 101, 154  
 Snapshots 101, 154  
 Sound Choice 146  
 Sound Choice Numericals 90  
 Sound Choice Program Numericals 146  
 Sound Choice Variable 22, 90  
 Source Channel Numerical 33  
 Source Channels 123  
 Src 19, 33  
 Src (Source Channel) 126  
 Start 138  
 Start Button 21, 34, 60  
 Step Advance 111  
 Step Advance all "sa" Voices 112  
 Step Editing Tools 42, 48, 134  
 steps 45, 72  
 Stop Any Slideshow key 111, 114  
 Stop Button 21, 35, 60  
 Sustain Enters Rests 181  
 Swap Scrambled and Original 175  
 Sync 138  
 Sync Button 28  
 Sync Ratio / Metronome Ratio 140  
 Sync Ratio Numerical 179  
 Sync Restarts Sequence 182  
 System Reset 166  
 Tap Affects Velocity 113, 180  
 Tap Conduct Tempo 112  
 Tap Tempo 112  
 tempo 61, 139  
 Tempo Numerical 61, 139  
 Tempo Range Bar 22, 61, 139  
 The Variables Menu 173  
 The Variables Window 143  
 Thumb 45, 134  
 Ticks 64, 77, 131  
 Time Base 22, 63, 130  
 Time Base Denominator 60, 63  
 Time Base Numerator 63  
 Time Base Numericals 22, 63  
 Time Distortion 150  
 Time Distortion 144  
 Time Distortion Edit Window 83  
 Time Distortion Map 82  
 Time Distortion Variable 82  
 Timing 162  
 toggle button 12  
 Transpose Down Half Step 55  
 Transpose Down Half-Step 174  
 Transpose Down Octave 55, 174  
 Transpose Up Half Step 55  
 Transpose Up Half-Step 174  
 Transpose Up Octave 55, 174  
 Transposition 144, 149  
 Transposition Edit Window 29, 68  
 Transposition Numerical 29  
 Transposition Variable 29, 68  
 Triple with Rests 55  
 Two-Step Controls 110  
 Undo 56  
 Use 18, 126  
 Use Apple MIDI Manager 167  
 Use Column 35

Use Metronome 40, 62, 179  
Use Picture Matrix 36  
Utterly Random 27, 87  
value key 114  
Variable 9, 66  
Variable Positions 10  
Variables Window 9  
Velocity Numerical 46  
Velocity Range 144, 149  
Velocity Range Edit Window 23, 71  
Velocity Range Variable 23, 71  
View 44  
View selector 132  
Voice 9, 32  
Voice 1-4 Color... 173  
Windows Menu 178