

# Studio 5

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**Opcode Part Number: 110-0214-02**

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If you still have a problem, call Opcode Systems, Inc. Technical Support Line at (650) 856-3331. See the Studio 5 manual for details.

## WARNING

NOTE: This equipment has been type tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Move the equipment away from the receiver
- Plug the equipment into an outlet on a circuit different from that to which the receiver is powered.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.

*CAUTION: Only equipment certified to comply with Class B (computer input/output devices, terminals, printers, etc.) should be attached to this equipment, and must have shielded interface cables.*

Finally, any changes or modifications to the equipment by the user not expressly approved by the grantee or manufacturer could void the users authority to operate such equipment.

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## ACKNOWLEDGMENTS

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# CHAPTER 1: Getting Started

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## OVERVIEW OF THE STUDIO 5

Opcodes's Studio 5LX (hereafter referred to as "Studio 5") is a multi-port Macintosh MIDI interface and patchbay with a built-in SMPTE time code generator and SMPTE-to-MIDI Time Code converter.

MIDI features of the Studio 5 include:

- Fifteen independently addressable MIDI inputs and outputs—this allows access to 240 separate MIDI channels with programs that support either OMS or Mark of the Unicorn's MIDI Time Piece™;
- OMS Studio Patches support—the Studio 5 has a built-in 16MHz 68000 microprocessor for processing Studio Patches. Studio Patches allow MIDI data to be split, transposed, modified and mapped in many useful ways;
- Storage for up to 128 OMS Studio Patches—the Studio 5 has 256K of RAM for storing Studio Patches;
- Networking—connect up to six Studio 5's for 1,440 separate MIDI channels;
- Standard (1MHz) and Fast communication speeds;
- Emulates either a standard MIDI interface or a MIDI Time Piece;

- A pair of MIDI activity indicators for each MIDI port;
- Patch number display and program change buttons;
- Front panel MIDI/Thru switches—these let you use external peripherals (such as printers or modems) without changing cables;
- Two assignable footswitch inputs and a foot controller input.

Sync functions of the Studio 5 include:

- SMPTE time code generation (five frame rates);
- SMPTE-to-MIDI Time Code conversion;
- SMPTE-to-Direct Time Lock conversion (both DTL and DTLe);
- Jam Syncing (rewrites fresh SMPTE when locked);
- Freewheeling (remains locked despite dropouts or other short SMPTE errors);
- Audio input to create a MIDI trigger.

The Studio 5 uses the Open Music System (OMS) and the Studio 5 OMS driver software to configure all MIDI and sync functions.

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## ABOUT THIS MANUAL

This manual does not attempt to teach fully the fundamentals of MIDI or SMPTE sync operations. A brief SMPTE overview is offered at the end of this chapter, but if you're new to either of these standards, you should read magazines specializing in music technology, or purchase basic MIDI and SMPTE books from your local bookstore or music dealer.

Also, you should be familiar with basic Macintosh operations. If you're not, please read the Macintosh manual before using the Studio 5.

This manual discusses how to connect, set up and use the Studio 5—it describes Studio 5 operations at the time of its printing. However, updates and changes may occur. Always look for hardware and software update information in the Read Me files installed onto your hard disk.

OMS Studio Patches are discussed in the Studio Patches manual. You should read this manual after setting up your Studio 5.

The Studio 5 uses the Open Music System (OMS) and the Studio 5 OMS driver software to program all mapping, channelizing, routing and sync functions. If you're already familiar with OMS, you can read this manual straight through.

*NOTE: If you are unfamiliar with OMS, read the first three chapters in this manual, then read the OMS manual before continuing with Chapter 4: Software Setup.*

## THE STUDIO 5 PACKAGE

Your Studio 5 package contains the Studio 5, two serial cables, one power cable, a mounting kit (consisting of 2 rack ears, 6 screws, and 4 rubber feet), OMS and Studio 5 software, an OMS manual, a Studio Patches manual, this Studio 5 manual, and your registration card.

## CUSTOMER SUPPORT AND REGISTRATION

### Registering your Studio 5

Please complete and return your registration card right away. Doing so will enable Opcode to deliver the best possible support to you; it also insures you'll receive important update/upgrade notices.

*IMPORTANT: Please write down your Studio 5 serial number here. The serial number is on the back of the Studio 5 by the power connector.*

S/N \_\_\_\_\_

Purchase Date \_\_\_\_\_

### Contacting Opcode

Opcode provides a variety of phone, fax, and online support options. Consult your *Technical Support Information* booklet on how best to contact Opcode.

## SYNC BASICS

The operational portions of this manual assume you're familiar with SMPTE time code, MIDI Time Code, and Direct Time Lock. If you're not, you should read this section to develop a basic understanding of synchronization and the various time code formats. Consult music technology magazines or introductory books if you need more information about any of these topics.

### SMPTE Time Code

SMPTE is a timing reference signal developed by the Society of Motion Pictures and Television Engineers. It specifies a format for recording digital timing information onto magnetic tape. Originally designed for keeping film and video in sync with audio, it is now commonly used in a variety of audio specific applications.

Using SMPTE requires two separate actions:

- Generating the SMPTE time code and recording it onto tape (a process often referred to as “striping”).
- Reading the SMPTE time code off the tape and using it as a master timing source for synchronizing playback of other tape machines and computers.

There are two types of SMPTE time code: Longitudinal Time Code (LTC), and Vertical Interval Time Code (VITC). LTC is recorded on tape tracks that run linearly across the length of the tape. This format is recorded on audio tape or on the audio

track of a video tape. VITC is recorded within the video portion of a video tape.

The Studio 5 will both generate and read SMPTE time code using the LTC format. If you have a tape striped with VITC, you'll need to use a VITC-to-LTC converter or a VITC-to-MTC converter.

Since different video systems run at different speeds (or “frame rates”), the SMPTE format also specifies a number of different rates. The Studio 5 supports five SMPTE format/frame rates (hereafter referred to as simply “frame rates”). These frame rates are as follows:

- 24 Frames/second—Film frame rate.
- 25 Frames/second—EBU (European) television frame rate.
- 29.97 Drop Frame—NTSC (North American) color television frame rate. This format runs at 30 Frames/second, but drops the first two frames every minute, except at minutes 0, 10, 20, 30, 40, and 50.
- 29.97 Frames/second (Non-Drop)—Used to sync to NTSC color television without dropping frames. SMPTE time does not match real time, but playback pitch is unaffected.
- 30 Frames/second (Non-Drop)—Original NTSC black and white television standard. Often used in audio-only situations since there are no dropped frames and the SMPTE time is equal to real time.

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## **MIDI Time Code and Direct Time Lock**

MIDI computer software cannot read SMPTE time code directly off tape, so the code must be converted into a format that the computer can understand. This format is called MIDI Time Code (MTC). The converter then sends MTC (which retains SMPTE's hour/minute/second/frame timing information) to the computer to control the playback of MIDI sequencers. You use MTC to synchronize your computer sequence to a master SMPTE timing source.

Direct Time Lock (DTL) and Enhanced Direct Time Lock (DTLe) are alternate MIDI synchronization formats developed by Mark of the Unicorn for their Performer sequencer. Very old versions of Performer require DTL to sync to tape. New versions of Performer use DTLe, which provides synchronization accuracy equal to MIDI Time Code.

The Studio 5 can convert SMPTE time code (recorded at one of the five supported frame rates) to either MTC or one of the Direct Time Lock formats.

## CHAPTER 2: Panel Descriptions

### THE STUDIO 5 FRONT PANEL



Figure 2.1: Studio 5 Front Panel

From left to right, the front panel ports, LED's and buttons are as follows:

### MIDI Ports 14 and 15

These two pairs of MIDI ports are on the front panel to facilitate quick, temporary connection of synthesizers, controllers or other MIDI devices. MIDI ports are discussed in detail in *The Studio 5 Rear Panel* (pg. 7).

MIDI port pairs 14 and 15 are in addition to the thirteen MIDI port pairs found on the rear panel.

### MIDI Activity LEDs

These Light Emitting Diodes (LEDs) indicate MIDI activity at any of the fifteen pairs of MIDI ports. The top row of red LEDs indicates when MIDI data arrives at one or more of the Studio 5's fifteen MIDI IN ports. The bottom row of green LEDs indicates when MIDI data leaves one or

more of the Studio 5's fifteen MIDI OUT ports.

### Patch Number Display

This three-digit display shows the Studio 5's current OMS Studio Patch. It also displays error messages should the Studio 5 experience difficulty (see *Appendix B: Troubleshooting*). A zero (0) is displayed when there are no patches stored in the Studio 5—this happens either the first time you turn on the interface or after you reset it. See the *Studio Patches* manual for more information about Studio Patches.

### Increment/Decrement Buttons

The increment/decrement buttons have three uses:

- Primarily, they allow you to step through the Studio 5's Studio Patches patches as defined by the current Patch document. Patch documents are discussed in the Studio Patches manual. The Studio 5 is "smart" because it knows exactly how many patches you have defined. Assume, for example, that you have defined three patches numbered 1, 15 and 78. When you push the top (increment)

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button, you step from patch 1 to patch 15. Press it again, and you'll step to patch 78. The Studio 5 stores only as many patches as you have defined, thus expediting front-panel patch access. Hold down either button to increment or decrement continuously.

- You can use the increment/decrement buttons to reset the Studio 5 and clear all OMS patches from its memory. To do this, hold down both buttons while turning on the Studio 5. You won't need to reset the Studio 5 unless it loses communication with the Macintosh and traditional methods (such as choosing **Studio 5>Re-establish Communication** or switching the Studio 5 off and then on again) do not correct the problem.
- When the Studio 5 is on, pushing the increment and decrement buttons simultaneously acts as a "panic button," silencing any MIDI devices that are connected to the Studio 5. The panic feature causes the Studio 5 to perform the following operations (in order):

First, it sends a Sustain Pedal Off MIDI control message to all 16 MIDI channels on all 15 MIDI OUT ports. Then, it sends a MIDI All Notes Off command to each channel on each port.

Finally, it sends MIDI Note Off commands for all 128 notes to each channel on each port. This is because some MIDI devices don't recognize the MIDI All Notes Off command.

## Thru Switches, A & B

These switches provide convenient access to printers, modems or other peripherals.

When a MIDI/Thru switch is in the MIDI position, the Studio 5 is in MIDI mode—transmitting MIDI data between your Macintosh and various studio devices.

When a MIDI/Thru switch is in the THRU position, data from the Macintosh (as received on either the "A" or "B" input port) is passed through the Studio 5 to the "A" or "B" THRU ports on the rear panel. Set a Thru switch to the THRU position when your Macintosh needs to communicate with an external peripheral (such as a printer or modem).

*NOTE: The routing of MIDI inputs to MIDI outputs (as defined by the current Studio Patch) is not affected by these switches.*

## SMPTE/Power Indicator Light

This LED blinks when there is SMPTE activity, or when a signal is present at the AUDIO IN jack. When no time code is sent or received (or Audio In mode is not employed) the LED is lit as a power indicator.

## Power Switch

When pushed in at the bottom (“0”), the power is OFF. When pushed in at the top (“1”), the power is ON. The SMPTE/Power LED should light when the switch is in the ON position, if the power cord is connected to the Studio 5 and plugged in.

## THE STUDIO 5 REAR PANEL

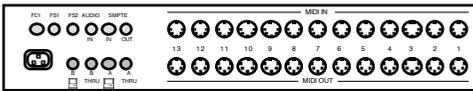


Figure 2.2: Studio 5 Rear Panel

Clockwise from the upper left, the Studio 5’s rear panel connectors are as follows:

## Footswitch Connectors

Use these 1/4” phone jacks to connect two momentary footswitches and a continuous foot pedal. Footswitches and foot pedals are available from Opcode Systems or your local music dealer.

### FC1

Use this input to connect an optional continuous control foot pedal (Opcode’s foot controller uses a 100k logarithmic taper). The Studio 5 reads the position of the pedal and interprets a MIDI value between 0 and 127. Foot controllers are ideal MIDI controllers for such effects as panning, portamento or volume control. You may turn the foot controller feature

on or off within the OMS Setup application. See *Foot Controller In* (pg. 47) for details. FC1 normally transmits on Channel 15 and is assigned to MIDI controller number 15.

### FS1 and FS2

Use these two inputs to connect optional momentary (on/off) footswitches. The Studio 5 sends a value of 127 when the foot pedal is depressed and a value of zero (0) when the foot pedal is released. FS1 is MIDI controller number 78; FS2 is number 79.

You can use either a normally open or normally closed footswitch—the Studio 5 recognizes the type upon powering up. You must plug in the footswitches prior to turning on the Studio 5—this will enable the unit to recognize the footswitches’ polarity. Do not step on any footswitches while turning on the Studio 5 so that the correct polarity can be determined.

*NOTE: The footswitches and foot controller will normally transmit on Channel 15. This channel can be changed when the footswitches and the foot controller are used in Studio Patches or as Virtual Controllers. See the Studio Patches Manual.*

Footswitches make ideal MIDIKeys in Opcode’s Vision sequencer—one switch could be used as the MIDIShift. The foot controller can also be used to control any of the faders.

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## Audio/SMPTE Connectors

These three connectors are used for SMPTE and audio sync. They are unbalanced stereo connectors capable of accepting either 1/4" mono phone plugs or stereo tip/ring/sleeve connectors. Input impedance is 500 k $\Omega$ . SMPTE output impedance is less than 5  $\Omega$ .

### Audio IN

This is an audio input that Vision or Studio Vision can use as a sync source. You can use any steady audio beat like a drum or bass as the timing source. This lets you synchronize MIDI tracks to material on tape that was recorded without using SMPTE time code. For a tutorial, see *Appendix A: Using Audio In with Vision*.

### SMPTE IN

This jack receives SMPTE time code from a tape deck or other SMPTE source. The Studio 5 converts the SMPTE input into the MIDI format specified by the Stripe SMPTE Window (see *Chapter 6: SMPTE Functions*).

### SMPTE OUT

This jack outputs SMPTE time code generated (or regenerated) by the Studio 5. It is normally connected to the line input of a tape deck. You may set the SMPTE output level in the Stripe SMPTE Window (See *Chapter 6: SMPTE Functions*).

## MIDI IN Connectors

Connect these ports to the MIDI OUT ports of your MIDI devices. Two additional MIDI inputs are on the front panel.

## MIDI OUT Connectors

Connect these ports to the MIDI IN ports of your MIDI devices. Two additional MIDI outputs are on the front panel.

## Computer Ports and THRU Ports

The Studio 5 does not implement the traditional Macintosh MIDI interface concept of a "printer port" and a "modem port." When using older interfaces there was a limit of 32 addressable MIDI channels, 16 on the printer port and 16 on the modem port. The Studio 5, however, can address up to 240 separate MIDI channels using either or both serial inputs. These input ports are labeled "A" and "B." The inputs (with the little Macintosh icons) connect to the Macintosh using standard 8-pin mini-DIN serial cables (supplied by Opcode with the Studio 5).

It doesn't matter whether the "A" or "B" ports are connected to the Mac's modem or printer ports—only that you remember which way you did it.

*IMPORTANT: If you are using only one Studio 5 port, it must be the A port, regardless of whether it is connected to the Macintosh's modem or printer port.*

Attach external peripherals (such as a printer or modem) to the “A THRU” and/or “B THRU” ports on the Studio 5. You can use these peripherals without disconnecting the Studio 5 from the Mac. Simply use the corresponding front panel MIDI/Thru switch to route data arriving at one of the Studio 5’s computer ports to its corresponding THRU port. See *Thru Switches, A & B* (pg. 6) and *Computer Connections—One Studio 5* (pg. 11).

You should use only high quality shielded MIDI and audio cables when operating your Studio 5 or any other professional audio equipment.

### **Power Cord Connector and Fuse**

The factory supplied 3-prong power cord plugs into this socket. Note that units are shipped from the factory configured for either 110V or 220V and are supplied with the appropriate cables. Check that you have the correct model for the voltage in the country where you will be using your unit. Should your Studio 5 ever require a change in voltage, it can be modified by a qualified technician.

The Studio 5 uses a 1 amp/250V fast blow fuse. It should be replaced *only* with the same type and rating.

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### **ABOUT THE INTERFACE CABLES**

The Studio 5 comes with standard 8-pin mini-DIN cables. If you are using cables other than the ones supplied with the Studio 5, please be certain they are equivalent to 8-pin mini-DIN cables such as Apple’s System Peripheral-8 cable.

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## CHAPTER 3: Hardware Installation

Rack ears are provided for rack mounting the Studio 5. If you wish to rack mount your Studio 5, connect these ears to both sides of the unit with the provided screws (see Figure 3.1).

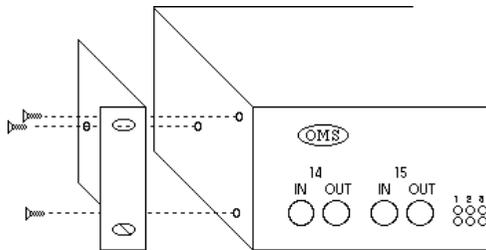


Figure 3.1: Installing Rack Mount Ears

Use the provided rack mounting screws to mount the Studio 5 in a standard 19" equipment rack (as shown in Figure 3.2). When placing the Studio 5 in a rack, you should leave at least 1" clearance above and below it.

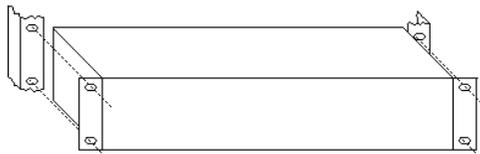


Figure 3.2: Rack Installation

If you do not wish to rack mount the Studio 5, it can rest on a steady surface.

Attach the four rubber feet (provided) to the bottom of the unit to prevent it from sliding.

*NOTE: To avoid interference with your monitor, the Studio 5 should be located at least two feet away from the computer's video display.*

### COMPUTER CONNECTIONS— ONE STUDIO 5

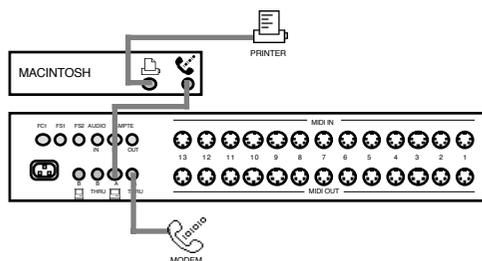
You can connect the Studio 5 to the Macintosh's modem or printer port, or to both. Connect the supplied serial cables between the Studio 5 and the Mac as discussed in the following sections.

#### Single Port Connection

Single port connections are useful if you frequently use one of the Mac's serial ports for non-MIDI purposes (such as printing) while running MIDI applications. You can use the spare Macintosh serial port without using the Studio 5's front panel MIDI/Thru switch.

Figure 3.3 illustrates a common single port connection. You can connect either the Mac's printer port or modem port to the "A" port of the Studio 5.

**IMPORTANT:** If you are using only one Macintosh serial port for MIDI (either modem or printer), that port must be connected to the Studio 5's "A" port.



**Figure 3.3: Single Port Connection, Modem**

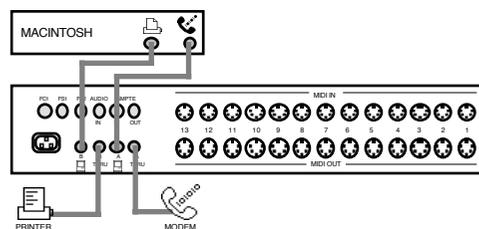
The example shown in Figure 3.3 uses only the modem port for communicating with the Studio 5. As a result, you can connect an external peripheral (such as a printer, in this example) directly to the printer port. You can connect an additional peripheral (such as a modem) to the "A THRU" jack on the Studio 5 and switch it in or out with the front panel's corresponding MIDI/Thru switch.

## Dual Port Connection

Use a dual port connection if you need increased MIDI "throughput" (for example, your MIDI data is densely packed with notes, continuous controllers, system exclusive messages and MIDI Time Code). It's a good idea to *always* use a dual port connection when synchronizing MIDI playback with SMPTE time code.

When using a dual-port connection, it doesn't matter which of the Mac's serial ports (modem or printer) are connected to the Studio 5's "A" (or "B") port.

Figure 3.4 illustrates a dual port connection. Connect both Macintosh serial ports to the Studio 5, and attach any external peripherals to the Studio 5's THRU jacks. You can switch between the Studio 5 and the external peripherals by using the corresponding MIDI/Thru switch on the front panel.



**Figure 3.4: Dual Port Connection**

**NOTE:** When transmitting data in a dual port configuration, as shown in Figure 3.4, the Studio 5 distributes MIDI equitably between ports "A" and "B."

However, when the Studio 5 receives data, information from MIDI instruments enters port "A" while MIDI generated by the Studio 5 (time code, footswitch and foot controller info, and Audio In events) enters port "B." Separating the incoming time code from incoming MIDI messages provides insures accurate synchronization.

## COMPUTER CONNECTIONS— NETWORKING

A network is defined as the connection of one or more Studio 5's to a single Macintosh serial port. The Macintosh has two serial ports, so it can support two networks. You may connect up to six Studio 5's to a single Macintosh (two networks of three Studio 5's) for a total of 90 MIDI ports and 1,440 MIDI channels. For details, see *Chapter 7: Networking*.

## AUDIO CONNECTIONS

The Studio 5 has three audio jacks on its rear panel. The SMPTE IN jack is used to receive a SMPTE time code signal. The SMPTE OUT jack sends SMPTE time code as specified in the Stripe SMPTE Window, discussed in *Chapter 6: SMPTE Functions*.

When receiving SMPTE at its SMPTE IN jack, the Studio 5 duplicates this time code and echoes it out the SMPTE OUT jack. The AUDIO IN jack is used to receive an audio trigger signal.

To use the Studio 5 as a synchronization device, connect a pair of shielded audio cables between the Studio 5 and a multi-track tape deck. Connect the SMPTE OUT jack to the audio input of a tape deck for SMPTE striping (usually the last track). Connect the SMPTE IN jack of the

Studio 5 to the audio output of the multi-track's SMPTE track. Connect the Studio 5 directly to the tape deck, bypassing the mixing console, equalizer, or any other signal processing equipment.

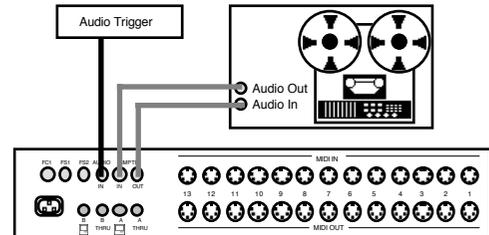


Figure 3.5: Audio Connections

To use the Studio 5 as a tempo controller, connect its AUDIO IN jack to the output of any device or instrument providing a rhythmic pulse (such as a bass drum, bass guitar, click track, etc.). Vision and Studio Vision can sync to an audio trigger received at this input. For a tutorial, see *Appendix A: Using Audio In with Vision* on page 49.

## MIDI CONNECTIONS

Connect a MIDI device's MIDI input to a Studio 5 MIDI OUT port. Connect the like-numbered Studio 5 MIDI IN port to the device's MIDI output. Figure 3.6 shows some typical MIDI connections.

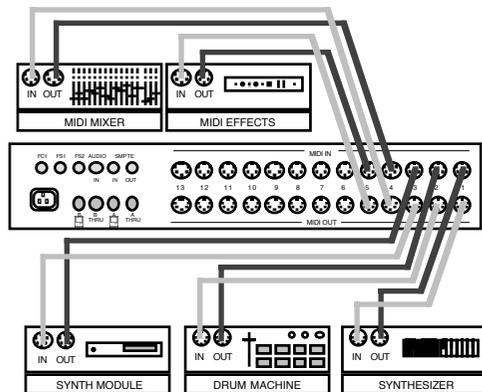


Figure 3.6: MIDI Connections

*NOTE: If you wish to retrieve patches from a device using Opcode's Galaxy program, you must connect that device's MIDI IN and OUT ports to identically-numbered ports on the Studio 5 (as shown in Figure 3.6).*

## FOOTSWITCH CONNECTIONS

You can connect two optional footswitches (FS1 and FS2) and an optional foot pedal (FC1) to the Studio 5. These footswitches perform numerous programmable functions depending on the Mac software being used. For more information, see *Footswitch Connectors* (pg. 7).

The Studio Patches Manual discusses using footswitches with OMS Patches. If using Vision or Studio Vision, consult your manual on using footswitches with MIDIKeys.

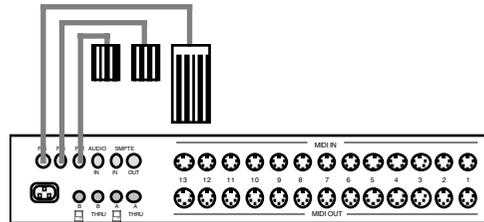


Figure 3.7: Footswitch Connections

## POWERING UP THE STUDIO 5

When powering up the Studio 5, it goes through a process called network synchronization. During this time, the Studio 5 examines both of its serial ports to see what is connected. As this is done, you'll see it display the number "1" in the middle of its display for one second, and then display the current Studio Patch number. The "1" indicates that the Studio 5 is connected to a Macintosh. The current patch will be "0" the first time the unit is turned on. Later, as patches are defined and stored, the Studio 5 remembers the last patch selected prior to shutting down.

*NOTE: Networked Studio 5's, when powered up, display their network number for one second before displaying the current patch number. See Chapter 7: Networking for networking details.*

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## CHAPTER 4: Software Setup

### INSTALL AND CONFIGURE OMS

To use the Studio 5 you must install and configure the Open Music System (OMS). OMS keeps track of how your MIDI studio is connected and configured and stores this information in Studio Setup documents. Studio Setups are created and edited in the OMS Setup application.

*NOTE: If you are unfamiliar with OMS, you should stop and read the OMS manual before continuing.*

To install and configure OMS:

- ① **Insert the provided OMS disk 1 and double-click *Install OMS*.**  
At the initial prompt, specify you are using a Studio 5.
- ② **When reaching the main install screen, choose the “Easy Install” option and then click the *Install* button.**
- ③ **Insert each disk as prompted.**
- ④ **When completed, exit the installer and restart your Macintosh.**

- ⑤ **After restarting, launch the *OMS Setup* application and configure a “New Studio Setup.”**



Consult your OMS manual for details on installation and Studio Setup configuration.

*NOTE: If you encounter installation problems, disable any extensions or control panels that may be causing a conflict. The easiest way to do this is to restart your Mac while holding down the shift-key.*

If turned on and connected properly, the Studio 5 is automatically detected by OMS when configuring a new Studio Setup. Once OMS knows that you're using a Studio 5, a **Studio 5 menu** appears in the OMS Setup application. Use this menu to stripe and monitor SMPTE, access the Compatibility Setup, set the Communication Speed, and check the ROM Version. For an explanation of each menu item, see *Chapter 8: Studio 5 Menu*.

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## OMS Studio Patches

*OMS Studio Patches* provide advanced MIDI processing capabilities for the Studio 5. Studio Patches are created in the Studio Patches Editor and stored in Patch documents.

An important thing to realize about Studio Patches is that they reside in the Studio 5's internal memory. This means that when a patch is chosen (from the front panel), its settings are always active—whether a MIDI software program is running, or even if the Studio 5 is *not* connected to a computer.

Consult the Studio Patches manual included with your Studio 5 package for more information.

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## USING THE STUDIO 5 WITH MIDI APPLICATIONS

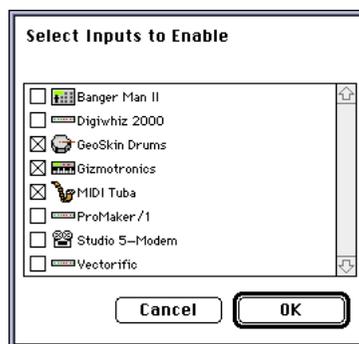
Unless you use the Studio 5 strictly for live performance, you'll probably use it with sequencers, editor/librarians and other MIDI applications.

### OMS Applications

Once you have configured an OMS Studio Setup, using OMS-compatible applications is quite seamless. Any devices contained in your Studio Setup are automatically available in OMS applications, and you can even select them by name. If at some point you make changes in your current Studio Setup, OMS applications are updated.

Some OMS applications require you to enable MIDI input devices—that is, you need to tell the application which MIDI device(s) you'll use to input MIDI data.

Figure 4.1 illustrates Vision's Enable Inputs dialog where OMS devices are enabled as input devices.



**Figure 4.1:** Enabling Inputs in Vision

In this example, the GeoSkin Drums, Gizmotronics and MIDI Tuba are enabled as input devices (checked). As a result, Vision “sees” MIDI data only from these devices. Data from other devices connected to the Studio 5 is not sent to Vision.

OMS applications can also specify the Studio 5 as a source for MIDI input; in doing so, data generated by the Studio 5 (time code, foot controller and foot-switches, and Audio In events) is sent to the application. If you wish to receive SMPTE time code, make sure to choose the Studio 5 as the sync source.

If you are using *Studio Patches* and have created a Studio Patches document, any

of its “virtual instruments” and “virtual controllers” are also accessible from OMS applications.

Consult your MIDI application manuals for more details on how it interacts with OMS.

## Using the Studio 5 with Non-OMS Applications

If using the Studio 5 with non-OMS applications, see *Chapter 5: Using the Studio 5 with Non-OMS MIDI Software*.

### SETTING A COMMUNICATION SPEED

You can specify the speeds at which your Macintosh and Studio 5 communicate with each other. Generally, most applications will work with the default values. However, if you get overrun messages, or if you wish to increase MIDI throughput, you can adjust the communication speeds.

From within the OMS Setup application, choose **Studio 5>Fast Mode Communication Speed** to open the Communication Speed dialog box.

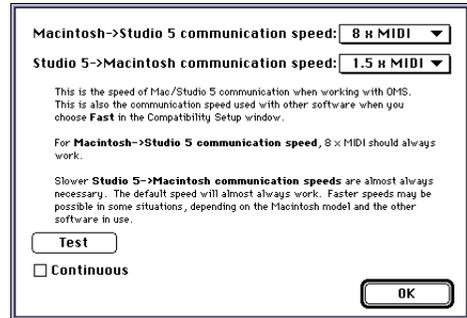


Figure 4.2: Communication Speed Dialog Box

Use this dialog to set a communication speed between the Macintosh and the Studio 5. Greater data throughput is obtained by transferring data at speeds faster than the MIDI standard. This can result in an increase in the number of simultaneous MIDI channels as well as improved timing—particularly in sequences with a dense MIDI data stream (e.g. numerous chords, 16th notes, timing information, and continuous controllers).

A Macintosh->Studio 5 communication speed of 8 x MIDI should work in most instances, as should a Studio 5->Macintosh speed of 1.5 x MIDI. It may be possible to increase the Studio 5->Macintosh speed on some computers (depending on which software is running), thereby allowing more simultaneous MIDI data to be transmitted to the Macintosh (e.g. playing multiple controllers). If you encounter warning messages indicating that overrun errors have occurred, you’ll need to decrease the Studio 5->Mac communication speed.

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To test the Studio 5->Macintosh communication speed, choose a serial port, check the **Continuous** check box, then click the **Test** button. The Studio 5 will begin to send about 4K of MIDI at the current speed settings. Click the mouse to stop continuous testing—any data loss will be reported.

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## CHAPTER 5: Using the Studio 5 with Non-OMS MIDI Software

This chapter discusses using the Studio 5 with non-OMS MIDI applications. If you will *always* use the Studio 5 with OMS applications (such as Vision, Studio Vision, Galaxy, Overture, and MAX), you will not need to use the Compatibility Setup Window and may skip ahead to the next chapter. If you plan to use the Studio 5 *mainly* with OMS applications, you may still wish to skip ahead to the next chapter, returning to this section when you're ready to use a non-OMS application. If you will be using mostly non-OMS applications, read this chapter now.

The Studio 5 requires OMS for its configuration, but it can be used with non-OMS MIDI software via its **Compatibility Mode**. This mode configures the Studio 5 to emulate either a standard MIDI interface or MIDI Time Piece (MTP).

By default, the Studio 5 acts like a standard interface, as defined by the current compatibility setup, with non-OMS applications. When Performer or some other MTP-aware program becomes active, the Studio 5 switches from standard interface emulation into MTP emulation. Similarly, when an MTP-aware program becomes inactive, the Studio 5 switches back into standard interface emulation.

When OMS is active, the Studio 5 is automatically in “OMS Mode.” When OMS becomes inactive, the Studio 5 returns to standard interface mode. OMS is active if an OMS application is currently being used, or if OMS is set to “Run MIDI in background.” When OMS is active, the Studio 5 operates transparently; applications send and receive to individual MIDI devices.

*NOTE: If OMS is set to “Run MIDI in the background,” OMS remains active even when a launched OMS application is not the current application.*

*NOTE: An important thing to remember is that Studio Patches reside in the Studio 5's internal memory. This means that when a patch is chosen (from the front panel), its settings are always active—no matter what type of MIDI software is running, or even if the Studio 5 is not connected to a computer.*

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## THE COMPATIBILITY SETUP WINDOW

To configure the Studio 5's Compatibility Mode, open the OMS Setup application and choose **Studio 5>Compatibility Setup**. The Compatibility Setup Window opens, similar to Figure 5.1.

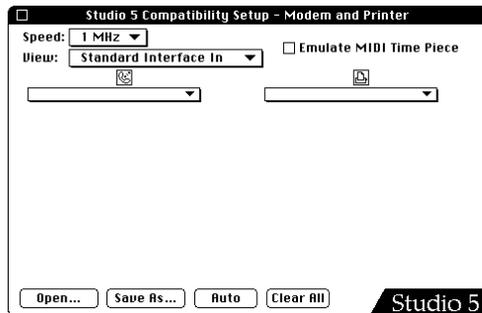


Figure 5.1: Compatibility Setup Window, 2 ports

The large area in the center of the window contains pop-up menus for choosing devices contained in the current Studio Setup. The left half of the window represents the Mac's modem port, the right represents the printer port.

If the Studio 5 is connected to just one port, the Compatibility Setup Window displays only that port (as shown in Figure 5.2).

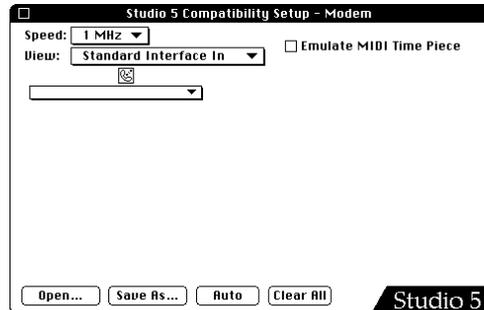


Figure 5.2: Compatibility Setup Window (Modem Port connected to Port A)

*IMPORTANT: If you are using only one Macintosh serial port for MIDI (either modem or printer), be certain to connect that port to the Studio 5's "A" port.*

### Speed pop-up menu

This must match the interface speed specified within your non-OMS MIDI application. Choose **1 MHz** if your MIDI applications do not support Fast mode. A 1 MHz communication speed is used by most standard MIDI interfaces (such as Opcode's MIDI Translator II). If your application supports a Fast mode and you wish to use it, choose **Fast**.

To set the Fast mode speed, choose **Studio 5>Fast Mode Communication Speed** and select transfer speeds from the pop-up menus. See *Setting a Communication Speed* (pg. 17) for more details.

***IMPORTANT:** If you plan to transmit system exclusive messages from the Macintosh, you must use a Compatibility Setup Speed of 1 MHz to insure successful data transfer. OMS applications are unaffected by this setting and can transfer system exclusive messages in Fast mode.*

### **View pop-up menu**

The pop-up **View** menu offers a choice of four different views—**Standard Interface In**, **Standard Interface Out**, **MIDI Time Piece In**, and **MIDI Time Piece Out**. Select a view to change the display in the lower portion of the Compatibility Setup Window. Use the **View** menu to see and change various aspects of the interface.

### **Emulate MIDI Time Piece check box**

If **Emulate MIDI Time Piece** is checked, the Studio 5 emulates Mark of the Unicorn's MIDI Time Piece and all views, except **Standard Interface In** are enabled. If **Emulate MIDI Time Piece** is not checked, the Studio 5 emulates a standard MIDI interface and only **Standard Interface In** and **Standard Interface Out** views can be selected.

***NOTE:** Mark of the Unicorn's Performer sends messages that put the Studio 5 into MIDI Time Piece emulation mode—even if you tell Performer you only have a standard MIDI interface. Performer users should check the Emulate MIDI Time Piece option.*

### **Open...**

This button opens a standard Macintosh dialog box from which you may open any stored Compatibility Setup document.

### **Save As...**

This button opens a standard Macintosh "Save As" dialog box for saving Compatibility Setups. Since the current Compatibility settings are kept within the Studio 5 driver, you should save all current settings before updating the Studio 5 driver.

### **Auto**

This button uses the current Studio Setup to make sensible default assignments for all of the pop-up menus in the current view. The **Auto** button yields different results depending on which view is active.

***NOTE:** The following information is better understood after you've learned to use each of the compatibility views. It's presented here for easy reference.*

For **Standard Interface In**, the **Auto** button enables the controllers and sync sources. If you have both the modem and printer ports connected, controllers are routed to the Studio 5's "A" port (usually connected to the Mac's modem port), and the sync sources (including the Studio 5's time code) are routed to the "B" port. A controller that sends sync is routed to the Studio 5's "B" port.

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For **Standard Interface Out**, the **Auto** button routes each MIDI channel only to devices that are set to receive on that channel. “MIDI beat clock” and time code are routed only to devices that receive sync. Other system events are routed to all devices. If you have both the modem and printer ports connected, devices on MIDI ports 1-8 are assigned to port “A,” ports 9-15 to port “B.”

For **MIDI Time Piece In**, the **Auto** button enables the controllers and sync sources. Controllers are assigned to the MIDI Time Piece cable numbers that match the Studio 5 port numbers to which they’re connected. If you are using both the modem and printer ports, Studio 5 time code, footswitch, and audio data enters the “B” port. Everything else comes in the “A” port.

For **MIDI Time Piece Out**, the **Auto** button routes cable 1 to the device on Studio 5 port 1, cable 2 to the device on Studio 5 port 2, and so on. Sync is routed to all devices that receive sync. “All” is not routed to anything by default, but can be set manually to any device or Virtual Instrument.

## Clear All

This button clears all port (or cable) selections for the current view.

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## THE FOUR COMPATIBILITY VIEWS

This section discusses how to set up and edit each of the four possible compatibility views.

### Standard Interface In View

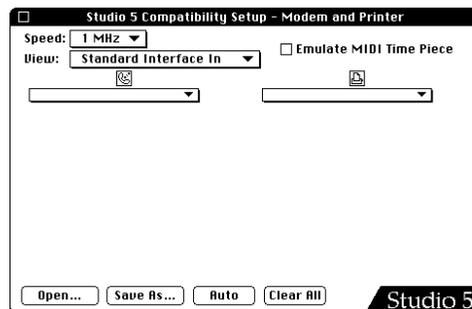


Figure 5.3: Standard Interface In View

Use this view to enable Studio 5 inputs when emulating a standard MIDI interface. There is one pop-up menu per port. From this menu, you can choose to enable any number of devices and Virtual Controllers. All enabled devices can send data to the Macintosh. Enabled devices have check marks next to their names in the pop-up menu. To enable a device, choose it from the pop-up menu (a check will appear). To disable a device, choose it again (the check will disappear).

*NOTE: This view is available only if Emulate MIDI Time Piece is not checked, however all devices enabled in the MIDI Time Piece In view are enabled when the Studio 5 emulates a standard MIDI interface.*

As an example, assume that your current Studio Setup looks like Figure 5.4:



Figure 5.4: Sample Studio Setup Document

You can enable any and all devices for Macintosh input by checking them in the pop-up menu. You could also use the **Auto** button to assign devices automatically according to the rules specified earlier in this chapter.

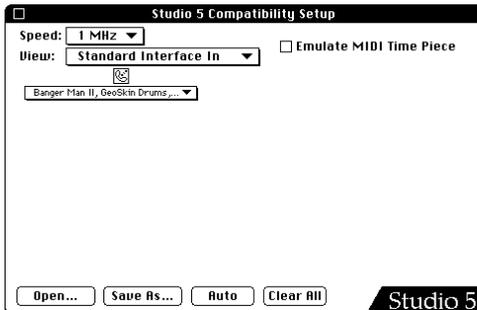


Figure 5.5: Enabling Standard Interface Inputs

## Standard Interface Out View

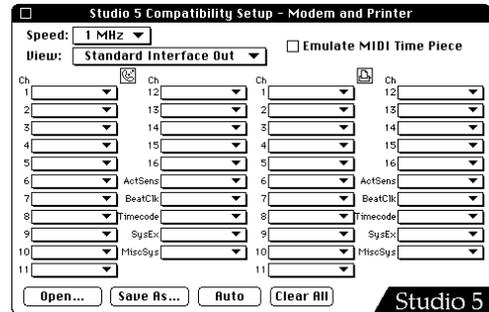


Figure 5.6: Standard Interface Out View

There are 22 pop-up menus per port—one for each of the 16 MIDI channels, plus six others for various non-channel-specific MIDI system events. Choose from each pop-up menu any number of devices or Virtual Instruments that need to receive data of the specified type or MIDI channel. You may also route a channel to the Studio Patches Pgm Chg device. Program changes received on this channel select Studio Patches contained in the Studio 5.

If, for example, your current Studio Setup is as displayed in Figure 5.4, then you could enable a device (or devices) for

each of the 16 MIDI channels as well as for various MIDI system events.

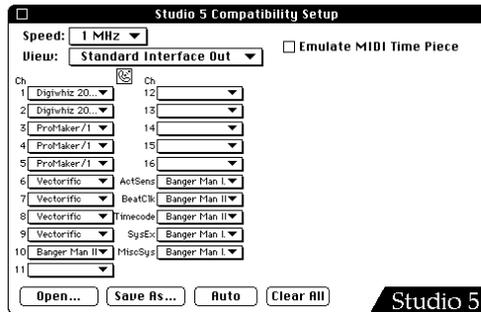


Figure 5.7: Enabling Standard Interface Outputs

In Figure 5.7, the Digiwhiz 2000 responds to data on channels 1 and 2, the ProMaker/1 receives on MIDI Channels 3 through 5, the Vectoriffo receives on Channels 6 through 9, and the Banger Man II drum module responds on MIDI Channel 10. All devices will receive active sensing, system exclusive, and miscellaneous MIDI system messages. Beat Clock and time code are sent only to the Banger Man II since it's the only device defined in the current Studio Setup that receives this type of data.

## MIDI Time Piece In View

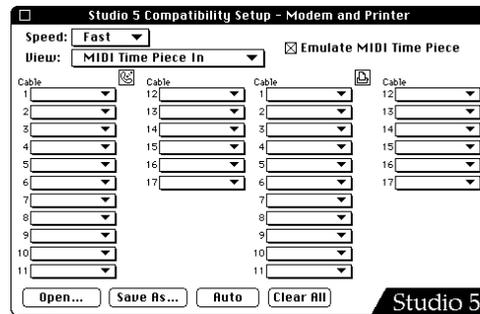


Figure 5.8: MIDI Time Piece In View

There are 17 pop-up menus per port—one for each of the 17 possible MIDI Time Piece cables. Choose, from each pop-up menu, those devices or Virtual Controllers that will send data to the Macintosh. The chosen devices or Virtual Controllers will appear to the Macintosh application as having been sent from the MIDI Time Piece cable number next to the menu.

*NOTE: All enabled controllers in the MIDI Time Piece In view are also enabled when the Studio 5 is in standard interface mode.*

## MIDI Time Piece Out View

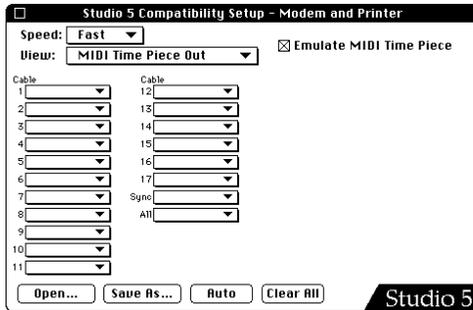


Figure 5.9: MIDI Time Piece Out View

There are 19 pop-up menus—including one for each of the 16 possible MIDI Time Piece cables. Choose the device or instrument from a cable’s pop-up menu. In addition, there is a pop-up menu that represents the MIDI Time Piece’s Network port (cable 17). “Sync” can be sent to any device or devices enabled for sync in the current Studio Setup document. “All” determines which device or Virtual Instrument is controlled by the “All” setting in Performer. You may also route a cable to the Studio Patches Pgm Chg device. Program changes received on this cable will select Studio Patches contained in the Studio 5.

*NOTE: Cable numbers do not necessarily have to correspond to Studio 5 port numbers (although this is the default mode if the Auto button is used). Each cable can be assigned to any device or Virtual Instrument of your choice.*

## Using Output Cables

A single Studio 5 emulates two networked MIDI Time Pieces. If you have both serial ports connected to the Studio 5, you will still see only one set of output cables in the Compatibility Setup Window—the Studio 5 does not distinguish between a cable on the modem port and a cable on the printer port.

Cable numbers have a specific and permanent meaning in the MIDI Time Piece: MIDI Time Piece #1 sends data to cables 1-8, MIDI Time Piece #2 sends data to cables 9-16, cable 17 is an optional standard interface connected to any MTP serial port (typically the network port of a single MTP, or the computer port of a second MTP), and “All” sends data to all 17 MIDI Time Piece cables.

With the Studio 5, you can assign *any* device or Virtual Instrument to *any* cable. This is much more flexible than the rigid MIDI Time Piece cable assignment described in the previous paragraph. Notice that there are three more cables (16, 17, and “All”) than Studio 5 MIDI ports. You could, as an example, assign the device attached to MIDI port 1 to cable 1, the device attached to MIDI port 2 to cable 2, and so on up to cable 15 (although any device or Virtual Instrument can be routed to any cable). This still leaves three cables free for complex routing schemes involving Virtual Instruments.

## Sync pop-up menu

This menu allows you to send sync to any single device or Virtual Instrument. If you need to send sync to more than one device, create a Virtual Instrument consisting of a simple splitter routed to all devices that need to receive sync. Then choose that Virtual Instrument in the **Sync** pop-up menu. See the Studio Patches manual for more information about Virtual Instruments.

## All pop-up menu

Implementation of the Studio 5's "All" function is slightly different (but much more flexible) than the "All" interaction between the MIDI Time Piece and Performer. In Performer, sending to "All Cables" causes data to be sent out all cables on that serial port.

When a Studio 5 emulates a MIDI Time Piece, *you* define what "All" means. The "All" cable can send data to a device from the current Studio Setup or even to a Virtual Instrument.

## COMPATIBILITY SETUP EXAMPLE: EMULATING A STANDARD INTERFACE

In the following example you'll use the Studio 5 to emulate a Standard MIDI Interface. You'll work with Opcode's EZ Vision sequencer.

Assume that you have the simple studio shown in Figure 5.10. Your Gizmatronics master keyboard controller is plugged into MIDI port pair 2, a Proteus/1 sound module is plugged into MIDI port pair 7, and the Macintosh Modem port is connected to the Studio 5 "A" port.

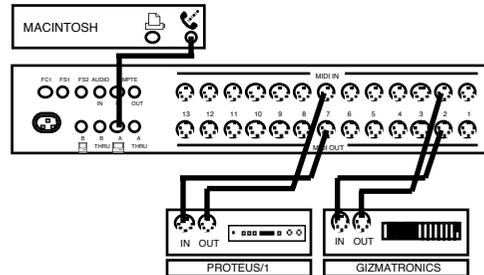


Figure 5.10: Sample MIDI Connections

- ① Open the OMS Setup application and choose **Studio 5>Compatibility Setup**.
- ② Verify that **Emulate MIDI Time Piece** is **NOT** checked since you want the Studio 5 to emulate a standard MIDI interface.
- ③ Choose **Standard Interface In** from the **View** pop-up menu.

- ④ Choose MIDI source devices from the “A” port side of the Compatibility Setup Window.

In your simple studio you have only two devices; a Gizmatronics keyboard and a Proteus/1, as shown below.

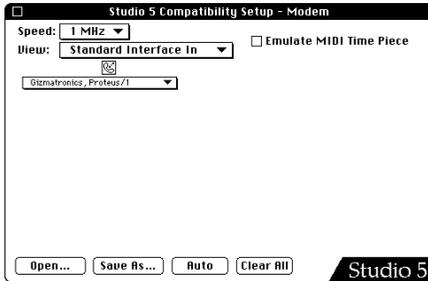


Figure 5.11: Standard Interface In Setup

- ⑤ Choose **Standard Interface Out** from the **View** pop-up menu.
- ⑥ Select those devices that will be MIDI destinations from the “A” port side of the Compatibility Window (or use the **Auto** button).

Since your simple studio has only one sound module, you’ll send all 16 MIDI channels on the modem port to the Proteus/1. You’ll also enable other types of MIDI messages to be sent to the Proteus/1.

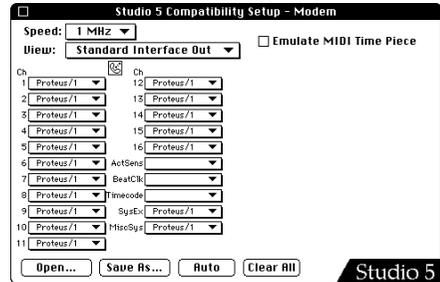


Figure 5.12: Standard Interface Out Setup

- ⑦ Select patch number 1 on the Studio 5. This should be defined as your “do nothing” patch—the patch used for sequencing applications.
- ⑧ Launch EZ Vision.
- ⑨ Choose **Setup>MIDI Setup** and make sure the modem port is enabled, MIDI Manager is off, and the interface speed is set for 1 MHz.

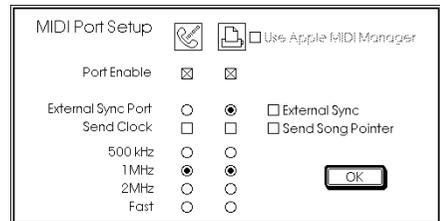


Figure 5.13: EZ Vision MIDI Setup Window

EZ Vision can now be used as though attached to any standard MIDI Interface (such as an Opcode Studio 3 or MIDI Translator).

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## CHAPTER 6: SMPTE Functions

You control SMPTE functions with two windows that are accessed from the Studio 5 menu in OMS Setup:

- SMPTE Reader Window
- Stripe SMPTE Window

The following sections discuss these two windows and provide a syncing tutorial.

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### SMPTE READER WINDOW

Choose **Studio 5>SMPTE Reader** to open the SMPTE Reader Window.

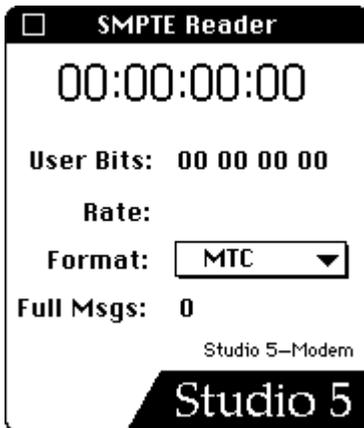


Figure 6.1: SMPTE Reader Window

From top to bottom, the SMPTE Reader Window contains a time code display, User Bits display, Rate display, Format pop-up menu and Full Message display. These are discussed in the following sections.

### time Code Display

This SMPTE Reader displays the SMPTE time code signal received at the SMPTE IN jack of the Studio 5, unless the Studio 5 is striping; then it displays the SMPTE time code being striped. It uses the MIDI format (MTC/DTL/DTLe) specified in the **Format** pop-up menu.

*NOTE: The SMPTE Reader cannot distinguish between 29.97 non-drop and 30 non-drop. When the Studio 5 is reading a frame rate of 29.97 non-drop, the SMPTE Reader displays the rate as 30 non-drop.*

### User Bits Display

If you choose MTC from the **Format** pop-up menu, then any user bits that are encoded with the SMPTE time code are displayed in the user bits display. User bits cannot be read if you use DTL or DTLe as the MIDI synchronization for-

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mat. For more information about user bits, see *User Bits* (pg. 34).

## Rate Display

This area displays the SMPTE frame rate of the incoming SMPTE signal.

## Format Menu

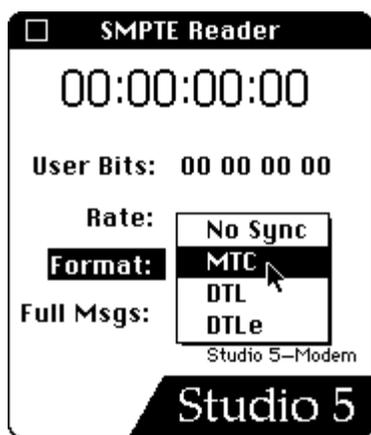


Figure 6.2: Setting MIDI Format

From the **Format** pop-up menu, choose the MIDI sync format your software will use. This pop-up menu duplicates the **MIDI Format** pop-up menu found in the **SMPTE Reader Window** (see *SMPTE Reader Window* (pg. 29)). The Studio 5 converts SMPTE time code into the MIDI format specified in this pop-up menu. The choices are:

- **No Sync:** The Studio 5 ignores the SMPTE input signal. Also, it doesn't show time code when striping.

- **MTC:** The Macintosh uses MIDI Time Code to read the value of the SMPTE signal.
- **DTL:** The Macintosh uses Direct Time Lock to read the value of the SMPTE signal.
- **DTLe:** The Macintosh uses Enhanced Direct Time Lock to read the value of the SMPTE signal.

*DTL NOTE: There is one important point you need to consider when using either Direct Time Lock or Enhanced Direct Time Lock: DTL and MIDI Beat Clock use identical messages. Consequently, any MIDI Beat Clock messages received by the Studio 5 merge with DTL messages generated by the Studio 5, making both messages unreadable. Therefore, when you sync your sequencer to DTL, you must not allow any devices to send MIDI Beat Clock to the Macintosh. Either stop the device from sending MIDI Beat Clock (use a Studio Patch to mute the MIDI Beat Clock messages) or use MIDI Time Code instead of DTL.*

## Full Message Display

If you choose MTC as the MIDI format, then every time the Studio 5 achieves sync, it generates a "Full Message." During a normal syncing situation, you will get only one full message (when the Studio 5 initially locks to tape). If the tape is of poor quality or the SMPTE signal isn't strong enough, additional full messages are sent. Each full message increments the counter and provides a good way to check the quality of your tape or incoming SMPTE signal. The SMPTE

Reader Window doesn't display Full Messages when using DTL or DTLe as the MIDI sync format.

## Using the SMPTE Reader Window with Multiple Studio 5's

The SMPTE Reader displays the time code received at the SMPTE IN jack of the selected Studio 5. You must select a Studio 5 from the bottom of the **Studio 5** menu *before* opening the SMPTE Reader Window. The SMPTE Reader Window isn't affected by new Studio 5 selections after it's open—the window continues to work with the Studio 5 that was selected at the time it was opened. The SMPTE Reader displays the name of the Studio 5 that it is referencing.



Figure 6.3: Studio 5 Identification in SMPTE Reader

*NOTE: If you have multiple Studio 5's connected in a network (see Chapter 7: Networking), you should use the Studio 5 that is connected directly to the Macintosh for SMPTE functions.*

## STRIPE SMPTE WINDOW

Choose **Studio 5>Stripe SMPTE** to open the Stripe SMPTE Window.

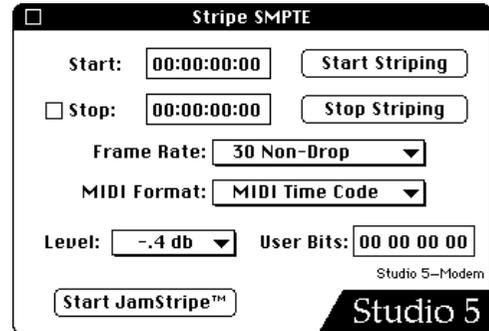


Figure 6.4: Stripe SMPTE Window

The following sections discuss the mechanics of this window. See *SMPTE Tutorial* (pg. 35) for a step-by-step syncing tutorial.

## Setting and Using Start and Stop Times

The **Start** field contains the SMPTE start time. Reading from left to right, the numbers represent hours, minutes, seconds and frames.

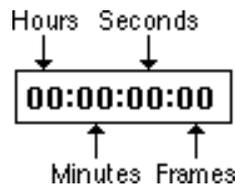


Figure 6.5: SMPTE Start Field

The Studio 5 can stop generating time code automatically. This is especially useful for unattended striping sessions. You can enter a stop time value in the **Stop** field. The check box to the left of the **Stop** field turns on the automatic stop feature. If the box is checked *and* a value is entered into the **Stop** field, the Studio 5 will automatically stop sending SMPTE time code when that value is reached. If the box is not checked, the Studio 5 will ignore the Stop value, and continue striping until the **Start Striping** button is clicked.



Figure 6.6: SMPTE Stop Field

The Studio 5 will begin to generate SMPTE time code from its SMPTE OUT jack as soon as the Start Striping button is clicked. The SMPTE value will begin at the time specified in the Start field. The Studio 5 will cease to generate SMPTE time code when the Stop Striping button is clicked (or when the Stop field value is reached and the Stop check box is checked).

*NOTE: The Stop check box must be checked BEFORE clicking the Start Striping button. If you check the Stop check box AFTER clicking Start Striping, then striping will not stop automatically.*

As an example, let's say you wanted to stripe a tape with exactly 33 minutes of time code, and you wanted this stripe to begin at 1 hour SMPTE time. You would type 01:00:00:00 into your **Start** field, check the Stop check box, enter

01:33:00:00 into your **Stop** field, roll tape, and press the **Start Striping** button.

## Setting and Using SMPTE Frame Rates

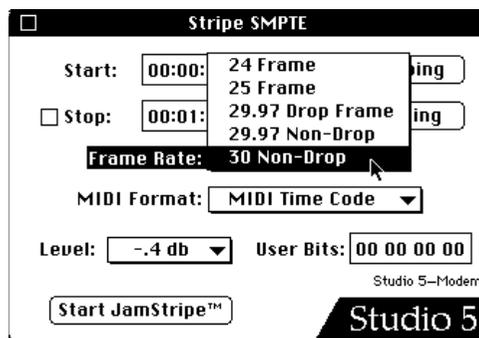


Figure 6.7: Setting SMPTE Frame Rate

You can choose one of five SMPTE frame rates from the **Frame Rate** pop-up menu. When you click the Start Striping button, the specified rate is generated within the Studio 5 and sent to the SMPTE OUT jack. The following is a brief description of the various SMPTE frame rates.

- 24 Frame: Film frame rate.
- 25 Frame: EBU (European) television frame rate.
- 29.97 Drop Frame: NTSC color television frame rate.
- 29.97 Non-Drop: Used to sync to NTSC color television without dropping frames. SMPTE time does not match real-time, but playback pitch is unaffected.

- **30 Non-Drop:** Original NTSC black and white television standard. Often used in audio-only situations since there are no dropped frames and the SMPTE time is equal to real time.

## Setting and Using the MIDI Format

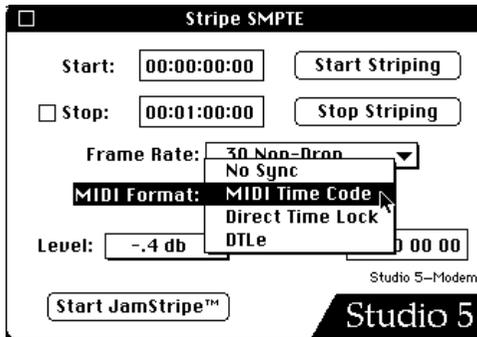


Figure 6.8: Setting MIDI Format

From the **MIDI Format** pop-up menu, choose the MIDI sync format your software will use. This pop-up menu duplicates the **Format** pop-up menu found in the SMPTE Reader Window. The Studio 5 converts SMPTE time code into the MIDI format set in this pop-up menu. The choices are:

- **No Sync:** The Studio 5 ignores the SMPTE input signal. Also, it doesn't show time code when striping.
- **MIDI Time Code:** The Macintosh uses MIDI Time Code to read the value of the SMPTE signal.
- **Direct Time Lock:** The Macintosh uses Direct Time Lock to read the value of the SMPTE signal.

- **DTLe:** The Macintosh uses Enhanced Direct Time Lock to read the value of the SMPTE signal.

## Guide to Setting SMPTE Levels

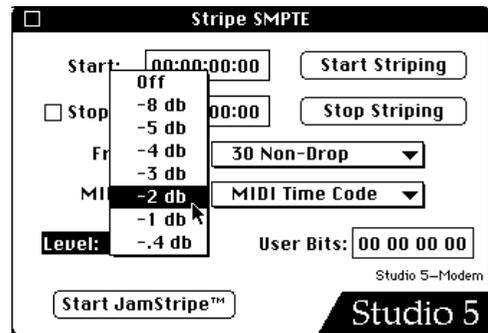


Figure 6.9: Setting SMPTE Output Level

The **Level** pop-up menu lists eight settings for the SMPTE output level. Choose one that provides the best input signal for your particular tape recorder. The following guide covers the optimum input levels for various types of machines. Choose a level that gives a SMPTE input value closest to the following:

- If your tape machine operates at -10 dB, adjust the SMPTE output level for a tape input of about -3 dB.
- If your tape machine operates at +4 dB, adjust the SMPTE output level for a tape input of about -7dB.
- If you are using a -10 dB machine with LED metering, adjust the SMPTE output level for a tape input between -1 and -2 dB.

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- 
- If your recorder uses dbx noise reduction and you can't defeat it, adjust the SMPTE output level for a tape input between -1 and 0 dB.
  - If you have a mixer in the SMPTE signal path (and you shouldn't), make sure that the equalization is either switched out or flat. Any filtering of the SMPTE signal will render it invalid.

## Jam Sync

The Studio 5 has a Jam Sync mode. In this mode, it generates a fresh SMPTE signal from the SMPTE OUT jack in sync with the signal received at the SMPTE IN jack. You should always use Jam Sync mode to regenerate a SMPTE track when you copy tapes; a copied SMPTE track may degrade enough to make it unusable.

The Studio 5 is always in Jam Sync mode unless you choose **Off** from the pop-up Level menu in the Stripe SMPTE Window.

If you want to copy a multitrack tape and its SMPTE track, connect the Studio 5 between the two tape recorders and enable Jam Sync mode by choosing a value other than **Off** from the pop-up Level menu. The Studio 5 will generate a fresh copy of SMPTE from the original tape's signal regardless of any dropouts in the original copy.

If you do not need to regenerate SMPTE (such as when you're using the Studio 5 to sync a sequencing application to tape), you should disable Jam Sync.

## Start JamStripe™ Button

JamStripe™ takes Jam Sync one step further. If a tape has a very large drop-out in the SMPTE signal, or if the SMPTE signal stops at some point in the tape, JamStripe will cause the Studio 5 to continue generating time code without having any SMPTE present at the SMPTE IN jack. To stop generating, click the **Stop Striping** button. If you have a tape in need of this kind of service, click the **Start JamStripe™** button when you make a copy of the tape. The Studio 5 will Jam Sync until it reaches the end of the SMPTE signal, at which point it will switch seamlessly into a generating mode.

*NOTE: When Jam Syncing or Jam Striping, the SMPTE frame rate at the SMPTE OUT jack is the same as that being received at the SMPTE IN jack. The SMPTE Frame Rate pop-up menu has nothing to do with the SMPTE signal in either Jam Sync or JamStripe modes. You can view the actual SMPTE frame rate by using the SMPTE Reader Window.*

## User Bits

This field allows you to enter user bits as defined by the SMPTE standard. User bits are often used to mark off and identify various sections of a tape. User bits are hexadecimal, so legal values are the numbers 0-9, and the letters A-F.

*DTL NOTE: You can stripe time code that includes user bits regardless of the MIDI synchronization format you specify. However, if you're reading time code using either DTL or DTLe, user bits are not displayed in the SMPTE Reader Window.*

## Using the Stripe SMPTE Window with Multiple Studio 5's

The Stripe SMPTE Window works with the selected Studio 5. You must select a Studio 5 from the **Studio 5** menu *before* opening the Stripe SMPTE Window. The Stripe SMPTE Window isn't affected by new Studio 5 selections after it's open—the window continues to work with the Studio 5 that was selected at the time it was opened. The Stripe SMPTE Window displays the name of the Studio 5 that it is referencing.



Figure 6.10: Studio 5 Identification in Stripe SMPTE Window

## SMPTE TUTORIAL

Follow through these tutorial sections to learn how to stripe a tape with SMPTE time code and to sync to SMPTE using either Vision or Performer.

## Striping a Tape

Unless you already have tapes with SMPTE on them, you will need to put SMPTE time code onto a blank tape. This process is usually called “striping” a tape with SMPTE.

To stripe a new tape with SMPTE time code, familiarize yourself with the Stripe SMPTE Window as well as the operation of your tape recorder. A typical striping operation might go something like this:

- ① Use a new roll of recording tape and turn off any noise reduction on your tape recorder. Do not use any equalization or alter the SMPTE signal in any way.
- ② Make sure that your Studio 5 is connected as discussed in Audio Connections (pg. 13).
- ③ Launch OMS Setup and choose **Studio 5>Stripe SMPTE** to open the Stripe SMPTE Window.

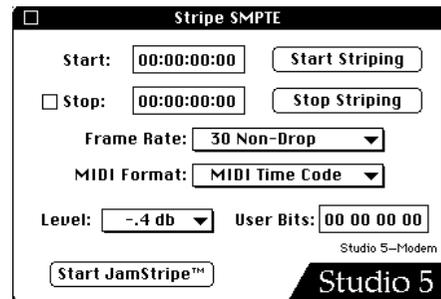


Figure 6.11: Stripe SMPTE Window

- ④ Enter the SMPTE frame rate using the **Frame Rate** pop-up menu. Enter a Start time. If you wish the striping to stop automatically, enter a Stop time

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and check the **Stop** check box. If desired, enter the User Bits. Set a SMPTE output level.

- ⑤ **Choose a MIDI Format.**
- ⑥ **Put your tape recorder into Record mode, but paused.**
- ⑦ **Click the **Start Striping** button in the Stripe SMPTE Window.**

The Studio 5 SMPTE/Power LED will begin to flash. You should see the SMPTE signal level on your recorder's input meters. Verify that the proper amount of SMPTE signal is going onto tape.

- ⑧ **Adjust, if necessary, either the SMPTE output level on the Mac, or the input level on your tape machine.**
- ⑨ **When you are satisfied with the levels, click the **Stop Striping** button in the Stripe SMPTE Window.**
- ⑩ **Choose **Studio 5>SMPTE Reader** so that you can monitor the SMPTE time.**
- ⑪ **Turn off the **Pause** on your audio recorder to begin recording. When tape is rolling, click the **Start Striping** button in the Stripe SMPTE Window.**

SMPTE time code stops generating when it reaches the time specified in the Stop field if the **Stop** check box is checked.

If the Stop check box is unchecked, you can click **Stop Striping** when you reach the end of the tape.

- ⑫ **When you are finished striping, the Studio 5's SMPTE/Power LED will cease to flash. Click the close box to close the Stripe SMPTE Window.**

## Syncing to Tape

Once you have a tape with SMPTE striped on it, you can use the Studio 5 to synchronize the Macintosh to the tape.

- ① **Connect the SMPTE track output of your multitrack tape recorder to the Studio 5's SMPTE IN jack, as discussed in **Audio Connections** (pg. 13).**
- ② **Turn **Jam Sync** off by choosing **Off** from the **Stripe SMPTE Window's** pop-up **Level** menu.**
- ③ **Open the **SMPTE Reader Window** and choose the **MIDI Format** that will be sent used by your **MIDI sequencer** (**MTC**, **DTL**, or **DTLe**).**
- ④ **Put your tape machine into play mode.**  

Verify that the SMPTE/Power LED is flashing. When the Studio 5 detects valid SMPTE code at its input, the SMPTE/Power LED flashes and MIDI Time Code (or, if selected, DTL or DTLe) is sent to the computer.
- ⑤ **View the **SMPTE time code** in the **SMPTE Reader Window**.**

The Studio 5 performs an operation known as "freewheeling." If your multitrack tape has time code dropouts, the Studio 5 will continue to send time code to the Macintosh as if the signal were still present at the input. If the Studio 5 loses sync there could be one of a number of problems. See *Sync Problems* (pg. 52) for more information.

## SMPTE, Vision and the Studio 5

This section discusses syncing the Studio 5 with Vision. The information is also applicable to working with Studio Vision.

- 1 Launch OMS Setup and choose **Studio 5>Stripe SMPTE** and choose **MIDI Time Code** from the MIDI Format pop-up menu.

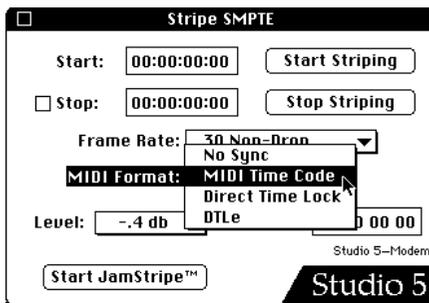


Figure 6.12: Choose a MIDI Format

- 2 Turn off Jam Sync by selecting **Off** from the Stripe SMPTE Window's Level pop-up menu.

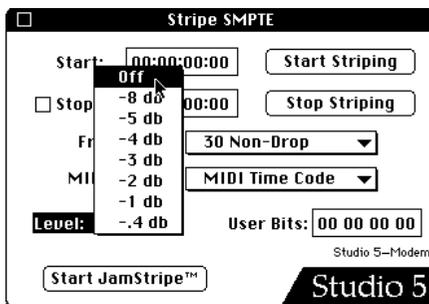


Figure 6.13: Turn Jam Sync Off

- 3 In Vision, set the sync mode to **MIDI Time Code**, choose Studio 5 as the

sync source, and specify the desired SMPTE frame rate.

- 4 Select the desired playback sequence and set its **SMPTE Offset**.
- 5 Click **Play** in Vision's Control bar. The play button will flash while Vision waits for sync.
- 6 Hit **Play** on your tape recorder and Vision will start playing back in sync with the tape.

Use a similar procedure for recording tracks into Vision while synced to tape. For more information concerning Vision's various sync modes, see your Vision manual.

## SMPTE, Performer and the Studio 5

This section discusses syncing the Studio 5 with Mark of the Unicorn's Performer.

- 1 Launch OMS Setup and choose **Studio 5>Compatibility Setup**. Check the **Emulate MIDI Time Piece** check box and set the View pop-up menu to **MIDI Time Piece In**.

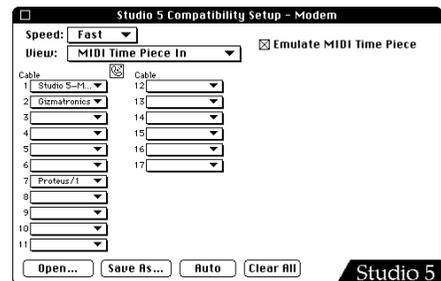
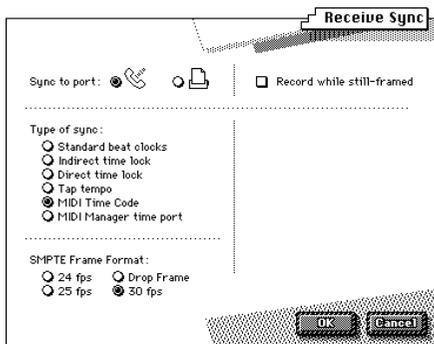


Figure 6.14: Setting the Compatibility Window

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- ② Choose **Studio 5** as an input source for one of the cables.

It doesn't matter which cable you use for the Studio 5 input—only that one of the cables lists the Studio 5 as an input. Footswitch, time code and Audio In events then appear to Performer as having come from that cable.

- ③ Choose **Studio 5>Stripe SMPTE** and select **MIDI Time Code** from the MIDI Format pop-up menu.
- ④ Turn off Jam Sync by selecting **Off** from the Level pop-up menu.
- ⑤ Launch Performer and choose **Receive Sync** from Performer's **Basics** menu and configure the window as shown in Figure 6.15.



**Figure 6.15: Performer's Receive Sync Window**

- ⑥ Choose **Slave to External Sync** from Performer's **Basics** menu to put a check to the left of the option.  
This causes Performer's playback to be locked to MTC.
- ⑦ Hit the **Play** button in Performer. It will be dimmed, indicating that

Performer is waiting to receive external sync.

- ⑧ Hit **Play** on your tape recorder and Performer will begin to play back in sync with the tape recorder.

*NOTE: Unless your tape is at SMPTE time 0:00:00:00, it will be necessary to set a SMPTE offset in Performer's Counter window. See your Performer manual for details.*

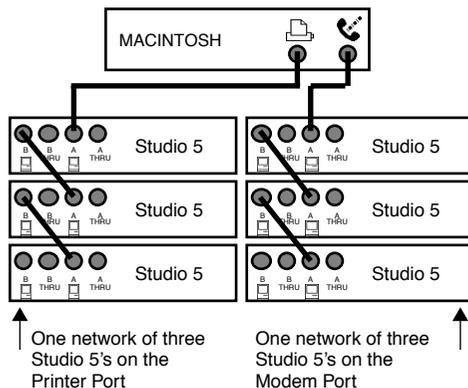
*NOTE: Performer may have difficulty handling time code, beat clock, active sensing and note data all on one serial port. For trouble-shooting tips, please see Sync Problems (pg. 52).*

# CHAPTER 7: Networking

You may connect more than one Studio 5 to a Macintosh. This is called networking. You can connect up to six Studio 5's to a single Macintosh for a maximum of 1,440 MIDI channels.

## NETWORKING BASICS

A network is defined as the connection of one or more Studio 5's to a Macintosh serial port. The Macintosh has two serial ports so it can support two networks. You can connect up to six Studio 5's to a single Macintosh (two networks of three Studio 5's).

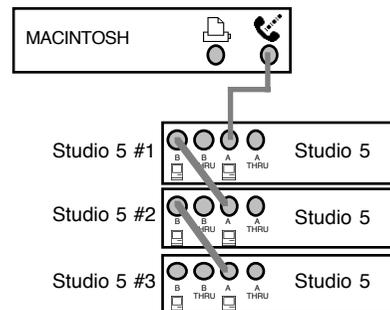


**Figure 7.1: Two Networks of Three Studio 5's Each**

When networking Studio 5's, always connect the "B" port of the first Studio 5 to the "A" port of the next Studio 5 (as shown in Figure 7.1).

## Studio 5 Numbering

When you turn on a Studio 5, it displays a number in the middle of its display for about one second before it displays the current patch number. This indicates Studio 5 unit number. Any Studio 5 connected directly to the Macintosh is number 1. The Studio 5 networked to it is number 2, and the Studio 5 furthest from the Macintosh is number 3. Figure 7.2 illustrates Studio 5 numbering.



**Figure 7.2: Numbering Studio 5's**

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## Changing Studio 5 Patches

When you change patches on one Studio 5, the patches change on all Studio 5's in the network. Each Studio 5 contains the patches defined by your current Patch document.

## Studio Setup Documents

Each Studio 5 has its own icon in the Studio Setup document. If you have two Studio 5's, you'll see two Studio 5 icons; four Studio 5's will produce four icons, and so on. The names of the icons depend on how you've connected the Studio 5's to the Macintosh.

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## NETWORKING OPTIONS

There are numerous ways to connect multiple Studio 5's. The following sections discuss your networking options.

### One Network/One Cable

The first option is to connect all Studio 5's in a single network as shown in Figure 7.3. You can connect no more than three Studio 5's in this fashion. The one network/one cable connection gives you the advantage of leaving a Macintosh serial port free while still accessing up to 720 MIDI channels.

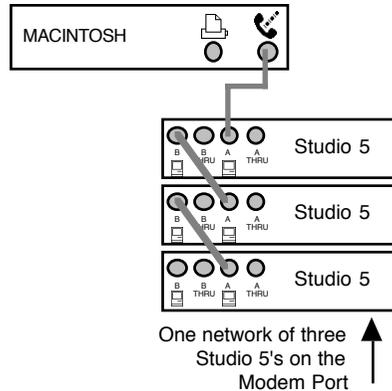


Figure 7.3: One Network of Three Studio 5's

Each Studio 5 has its own icon in the Studio Setup document. The icon contains the name of the serial port and the number of the Studio 5. The network shown in Figure 7.3 produces three Studio 5 icons in the Studio Setup shown in Figure 7.4.

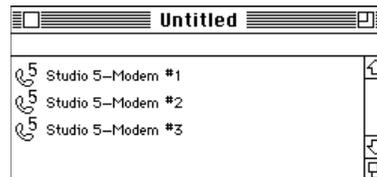
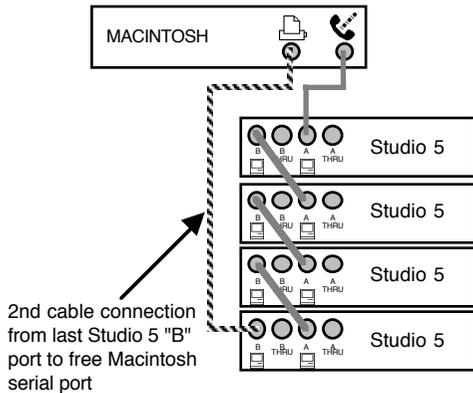


Figure 7.4: Studio Setup Document for Figure 7.3

### One Network/Two Cables, 4 Studio 5's

The second option is to connect all Studio 5's in a single network and connect a second cable between the last Studio 5's "B" port and the unused Macintosh serial port as shown in Figure 7.5. You can con-

nect no more than four Studio 5's in this fashion. This helps balance the MIDI data stream between the two Mac serial ports.



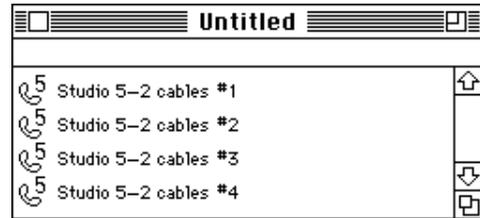
**Figure 7.5: One 2-cable Network of Four Studio 5's**

If you have four Studio 5's in a 2-cable network as seen in Figure 7.5, MIDI data distribution occurs as follows:

- The Studio 5 connected directly to the modem port will communicate exclusively over that port.
- The Studio 5 connected directly to the printer port will communicate exclusively over that port.
- Studio 5 #2 communicates through Studio 5 #1. Studio 5 #3 communicates through Studio 5 #4.

Each Studio 5 has its own icon in the Studio Setup document. The icon indicates the number of the Studio 5 and the fact that it's part of a 2-cable connection. The network shown in Figure 7.5 pro-

duces four Studio 5 icons as shown in Figure 7.6.



**Figure 7.6: Studio Setup Document for Figure 7.5**

### One Network/Two Cables, 3 Studio 5's

If you have three Studio 5's in a 2-cable network, MIDI data distribution occurs as follows:

- The Studio 5 connected directly to the modem port will communicate exclusively over that port.
- The Studio 5 connected directly to the printer port will communicate exclusively over that port.
- The middle Studio 5 sends all of its internally generated data (time code, footswitches and foot controller info, and Audio In note events) to the "B" port connection and all other MIDI data to the "A" port.

### One Network/Two Cables, 2 Studio 5's

If you have two Studio 5's in a 2-cable network, then each Studio 5 communicates exclusively with the Macintosh port to which it is directly connected.

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## Two Networks

Your final networking option is to split your Studio 5's between both Macintosh serial ports as shown in Figure 7.8. You can connect up to three Studio 5's on either network. Using two networks gives you complete control over which MIDI data goes to which Macintosh serial port.

You must use two networks if you have more than four Studio 5's connected to a Macintosh.

three Studio 5 icons as shown in Figure 7.8.

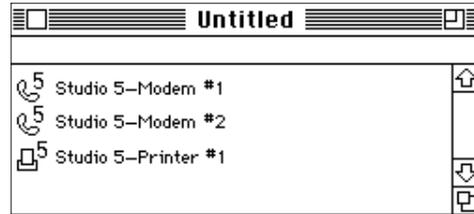


Figure 7.8: Studio Setup Document for Figure 7.7

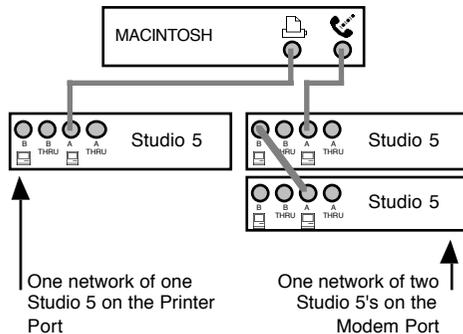


Figure 7.7: Two Studio 5 Networks

In this instance, each Studio 5 has its own icon in the Studio Setup document. The icon contains the name of the serial port and the number of the Studio 5. The connection shown in Figure 7.7 produces

## THE STUDIO 5 MENU WITH NETWORKS

Any time the current Studio Setup document contains more than one Studio 5, you'll see them listed at the bottom of the **Studio 5 menu**.

To select (check) a Studio 5, simply choose it from the menu.

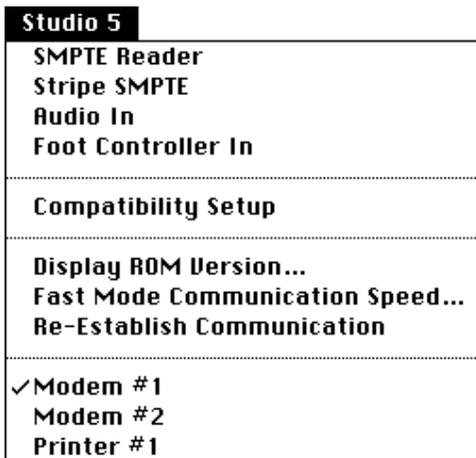


Figure 7.9: Multiple Studio 5's in the Studio 5 menu

The following sections discuss how each Studio 5 menu item behaves when more than one Studio 5 is present in a Studio Setup document. See *Chapter 8: Studio 5 Menu* for a description of each menu item.

In general, you must select a Studio 5 before choosing a Studio 5 menu command. Windows that are already open continue to work with the Studio 5 that was selected when they were opened.

### SMPTE Reader

The SMPTE Reader displays the time code received at the SMPTE IN jack of the selected Studio 5. If you're using multiple Studio 5's, you must select a Studio 5 *before* opening the SMPTE Reader window.

### Stripe SMPTE Windows

The Stripe SMPTE Window works with the selected Studio 5. If you're using multiple Studio 5's, you must select a Studio 5 *before* opening the Stripe SMPTE window.

### Audio In

This toggles the Audio In feature ON or OFF for the selected Studio 5.

### Foot Controller In

This enables or disables the Foot Controller for the selected Studio 5.

### Compatibility Setup

This command opens the Compatibility Setup Window, which recognizes *all* Studio 5's in the setup document. If you're using multiple Studio 5's, it doesn't matter which Studio 5 is selected when you open the Compatibility Setup Window.

*NOTE: If you use two Studio 5's to emulate four MIDI Time Pieces, you should use both Macintosh serial ports. This gives you access to 17 MTP cables on each port.*

## Display ROM Version...

This command displays the ROM Version for the selected Studio 5.

## Fast Mode Communication Speed

This command dictates communication speeds between the *Macintosh* and any Studio 5's that are connected directly to it. Communication between Studio 5's in a network is always at a speed of 8 x MIDI.

## Re-Establish Communication

This command re-establishes communication with all Studio 5's regardless of which is selected.

## SIMPLE NETWORK EXAMPLE: TWO STUDIO 5'S

You can network two Studio 5's to a single Macintosh using any of the methods discussed previously.

## One Network/One Cable Example

Figure 7.10 shows a single network of two Studio 5's. The Macintosh modem port connects to the first Studio 5's "A" port.

That Studio 5's "B" port connects to the second Studio 5's "A" port.

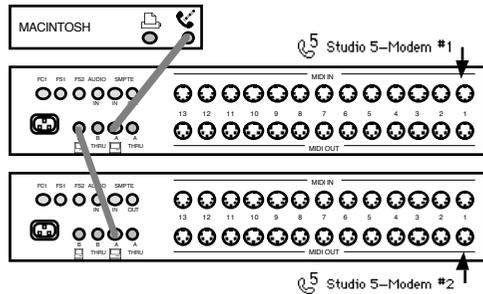


Figure 7.10: One Network of Two Studio 5's

- 1 Choose **File>New Studio Setup** and search the Macintosh modem port.

Your new Studio Setup document contains an icon for each Studio 5 in your network (see Figure 7.11).

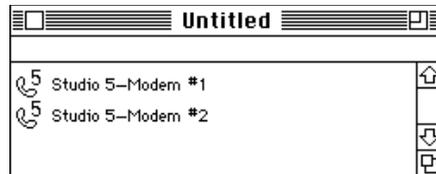


Figure 7.11: One Network/ One Cable

- 2 Add devices to your Studio Setup document and connect them to

Studio 5 icons to reflect the current conditions in your studio.

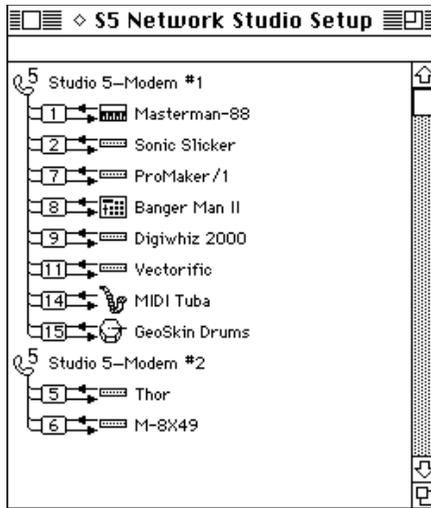


Figure 7.12: Sample Studio Setup Document

### One Network/Two Cable Example

You could add an additional cable between the second Studio 5's "B" port and the Macintosh printer port (as shown in Figure 7.13).

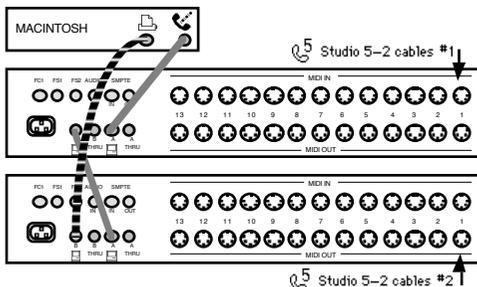


Figure 7.13: One 2-cable Network of Two Studio 5's

Connecting the Macintosh printer port to the second Studio 5 increases MIDI throughput capabilities by balancing the MIDI data load between the two Macintosh serial ports. Studio 5 #1 communicates with the modem port and Studio 5 #2 communicates with the printer port.

### Two Network Example

Figure 7.14 illustrates another possible way to connect two Studio 5's to the Macintosh. In this connection, all communication with the top Studio 5 is handled by the printer port, and all communication with the bottom Studio 5 is handled by the modem port.

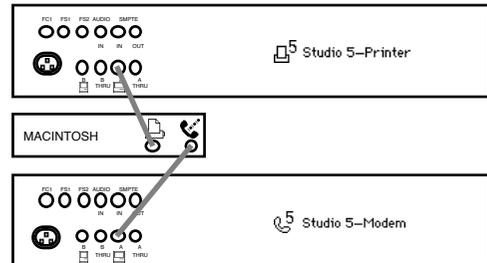


Figure 7.14: Two Networks of One Studio 5 Each

### Which Setup is Best?

The only real advantage of the "one network/one cable" setup is that it leaves you a free Macintosh serial port.

The advantages and disadvantages of the "one network/two cables" and "two network" options are more subtle. Each Studio 5 can communicate directly with

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the computer without having to go “thru” the other Studio 5. However, if you are using a Studio Patch and want to route data from a device on one Studio 5 to a device on the other Studio 5, the one network/two cable setup is more efficient because data can travel directly between the two Studio 5’s. In the two network setup, data must go from one Studio 5 to the Macintosh and then to the other Studio 5. In addition, the Macintosh will only know that it must thru the data from one serial port to another when OMS is active. This means you cannot use this type of patch with a two network setup without the Macintosh being present. With a one network/two cable setup, the routing will work even if the Macintosh is not present.

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## CHAPTER 8: Studio 5 Menu

### THE STUDIO 5 MENU

The Studio 5 menu appears in the OMS Setup application whenever a Studio 5 driver is installed and the current Studio Setup document contains one or more Studio 5's.

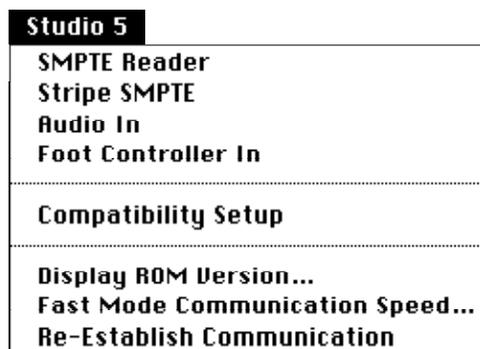


Figure 8.1: Studio 5 Menu

#### SMPTE Reader

This window reads the SMPTE time code signal at the Studio 5's SMPTE IN jack. See *SMPTE Reader Window* (pg. 29) for a detailed description of this window.

#### Stripe SMPTE

Use this window to define SMPTE attributes and to stripe tape with SMPTE time code. It also determines the MIDI format (MTC, DTL, DLTe) used by the Macintosh. *Stripe SMPTE Window* (pg. 31) discusses this window in detail.

#### Audio In

This enables the Studio 5's audio-to-MIDI conversion feature. Select this option to enable it (checked). Select it again to disable it (unchecked). You can use **Audio In** to sync Vision (or Studio Vision) to an external audio signal. Audio In status is saved in the Studio 5's internal memory. For a short tutorial, see *Appendix A: Using Audio In with Vision* on page 49.

#### Foot Controller In

This enables the Studio 5's continuous foot controller (FC1). Select this option to enable the foot controller (checked). Select it again to disable the foot controller (unchecked). Its status is saved in the Studio 5's internal memory.

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## Compatibility Setup

This opens a configuration window in which the Studio 5 can be set to emulate either a standard 2 port MIDI interface or a MIDI Time Piece. For details on using this window, see *Chapter 5: Using the Studio 5 with Non-OMS MIDI Software*.

## Display ROM Version...

This will display the version numbers of your Studio 5's internal ROMs. You should know your ROM versions if you call Opcode Technical Support about your Studio 5. Registered users will be notified of ROM updates.

## Fast Mode Communication Speed...

Choose **Fast Mode Communication Speed** to open a dialog for setting fast mode communication speeds between the Studio 5 and the Macintosh. This dialog is discussed in detail in *Chapter 4: Software Setup*.

## Re-Establish Communication

On rare occasions, the Studio 5 may lose contact with the Macintosh. This can be caused by a lost MIDI message (due to AppleTalk being on, for example) or a software error within the Mac or Studio 5. You won't need to use this command unless you see an alert message on the Macintosh telling you that you need to re-establish communication.

*NOTE: To re-establish communication from within most OMS compatible applications, choose the OMS MIDI Setup menu item and click OK.*

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## APPENDIX A: Using Audio In with Vision

This appendix discusses creating a tempo track in Vision or Studio Vision using the Studio 5's Audio In capabilities.

Suppose that you have a live band recorded on two tracks of a 4-track tape, and that you'd like to supplement the recording with some sequenced virtual tracks. Follow this step-by-step procedure for using the Studio 5's Audio In feature with Vision.

- ① **Make certain you have two blank tape tracks. You'll need one for an audio click track and one for SMPTE time code.**
- ② **Record a click track onto a blank tape track.**

A rim shot or similarly percussive sound works well. You'll want to include a one or two bar count-off before the song begins. The best way to do this is to turn the tape backward (so when you play the tape, you hear the music backwards), and record the click track this way. When the end of the song is reached, record an additional two bars. When the tape is played in the forward direction, you'll have two bars of clicks before the music begins. The click level should be between -2dB and +2dB.
- ③ **Record a SMPTE stripe on the remaining track, making sure it**

**begins a few seconds before the click track you just recorded.**

- ④ **Make sure that **Studio 5>Audio In** is checked in the **OMS Setup** application.**
- ⑤ **Launch Vision and record enable the TEMPO track of an empty sequence. Click on the tempo number itself, so it is selected.**
- ⑥ **Set the record mode to "Wait for Note."**
- ⑦ **Set the sync mode to "Internal."**
- ⑧ **Play the beginning of the song. Use the Macintosh's "single quote" (') tap tempo key to tap along with the song to establish a rough tempo. This will preset the sequence to about the right tempo.**
- ⑨ **Make sure **Setups>MIDIKeys** is enabled.**
- ⑩ **Make sure the Studio 5 is enabled in Vision's **Enable Input Device** dialog box.**
- ⑪ **Open the MIDIKeys Window and choose **Add Line** from its menu. Highlight the new line and play a rim shot or similarly percussive sound into the Studio 5's Audio IN jack.**

The Studio 5 sends a note (C#-1 or C#-2 on Channel 15, depending on the Middle C setting in the Preferences).

- ⑫ Click the right side of the new line, and type the single quote key ('). Your MIDIKey is now set up as shown below.

MIDIKeys			
MIDI Event	Device	Chan	Function
(none)			MIDI Shift
(none)			Erase
(none)			Repeat
(none)			Extend
C#-2	Studi...odem	15	'

- ⑬ Verify that the tempo track is still record-enabled.
- ⑭ Start the tape and listen to the countoff go by.
- ⑮ Play a MIDI note on the down beat of the first bar of your song. This will initiate recording of the tempo track. The actual note will not be recorded.
- ⑯ Let the song play through until the end.
- ⑰ Stop recording in Vision. Then stop the tape.

In the List Edit Window of the tempo track you will see one tempo change event for every beat. This is the tempo Vision has extracted from the click. It is, however, one beat later than it should be: each event is at the time it was recorded (indicating the tempo of the past beat), but needs to be moved to the beginning of the beat (so the beat will play at the right tempo). To correct this, you will have to shift all the tempos one beat earlier:

- ① Set “edit in” time in the upper left corner of the tempo track’s List Edit Window to 1.1.0, and the “edit out” time to one beat later.

- ② Choose **Edit>Delete Time**. If there was an event at 1.1.0, it will be deleted. Now the tempo track should correctly describe the tempos of the click signal on the tape.
- ③ Find the SMPTE time of the down beat of bar one and set the Start Time (offset).

If you don’t know the SMPTE time of the down beat, then set the sync mode to “Time Code,” and turn off the Studio 5’s Audio In feature in the **Studio 5** menu. Play the tape and watch the SMPTE numbers on Vision’s counter display. Set the sequence’s Offset to a SMPTE number five to ten seconds before the approximate down beat of bar one. Then, select an empty track, rewind the tape, click on Record, and start the tape. Listen to the countoff and record a note on the down beat of the first bar. Open the List Window for that track, and look at the absolute SMPTE time of the note you recorded. Use this time as the actual Offset for the sequence.

You may have to adjust the 80ths of a frame of the Offset to make it exact—especially if there is no specified offset from the previous recording session.

Once you have a SMPTE Offset and the tempo “map” in the tempo track of a sequence, you can record and play Vision’s MIDI tracks in sync with the music on tape. You can copy the tempo track and Offset to other sequences if you wish to record several MIDI versions for that tape recording.

---

# APPENDIX B: Troubleshooting

## STUDIO 5 DISPLAY PROBLEMS

### Studio 5 displays a zero

No patch is currently selected. Either the Studio 5 is new, it has been reset, or you have just deleted the current patch. As new patches are defined in the Studio Patches Editor, they are sent to the Studio 5. Opening the current Patch document sends patch data to the Studio 5 automatically. Patch #0 is an empty, “do nothing” patch.

If this doesn't work, your battery may be low. Contact Opcode for servicing.

### Studio 5 displays a number followed by a dash

When the Studio 5 encounters an error condition, it will display an error message. Error messages are recognized by a minus sign preceded by a number. The following is a list of Studio 5 error messages:

1	not enough memory in Studio 5 to complete a command
2	memory management error
3	memory management error
4	a command parameter was out of range
5	a command size was out of range
6	internal processor error
7	already executing another command
8	a Studio 5 serial port is busy
9	memory management error
10	Studio 5 received an undefined command
12	memory test failed (memory not valid)
13	power on failure

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## COMMUNICATION PROBLEMS

### Macintosh loses communication with Studio 5

From the OMS Setup application choose **Studio 5>Re-Establish Communication** or, within any OMS-compatible application, choose **OMS MIDI Setup** and click **OK**.

If that doesn't work, turn off the Studio 5. Hold in both inc/dec buttons while turning the Studio 5 back on. This resets the Studio 5 and empties its patch memory.

If the Studio 5 was turned off and then on while OMS was running, the Mac will not communicate with the Studio 5 again until...

- you open the **OMS MIDI Setup** dialog and click **OK** or **Cancel**, or
- you choose **Studio 5>Re-Establish Communication** in OMS Setup.

### You receive an Overrun Error Message on the Macintosh

This message indicates that some information may have been lost by the Macintosh serial port. Too much data is being transmitted too quickly to the Mac. Try thinning the MIDI data stream being sent to the Mac. Refer to *Studio 5 loses sync* (pg. 53) for various ways to thin the MIDI data stream.

If thinning the data stream either doesn't help or isn't possible, you will need to set

a slower Studio 5->Macintosh communication speed. Lower the speed in single step increments until the problem disappears, for more details see *Setting a Communication Speed* (pg. 17).

---

## PERIPHERAL PROBLEMS

### Images on the Macintosh screen appear distorted

The Studio 5 should be located at least 2 feet away from your computer monitor.

### Unresponsive modems, initialized printers, etc.

If the problem peripheral is connected directly to the Mac's serial port, you should choose **Edit>OMS MIDI Setup** from OMS Setup uncheck that port's check box, then click **OK**.

If the problem peripheral is connected to the Studio 5, make sure the front panel MIDI/Thru switch is set to the THRU position.

---

## SYNC PROBLEMS

### Studio 5 will not stripe tape

Make sure the power cord is firmly inserted into its connector, the power switch is on, and that the SMPTE/Power indicator light is lit.

Check all cables between your computer and the Studio 5, and between the Studio 5 and your tape deck.

Check the input level to your tape deck. Set levels as discussed in *Guide to Setting SMPTE Levels* (pg. 33).

## Studio 5 loses sync

Make sure that the heads on your tape deck are clean and that you are using a quality tape in good condition. Old or worn tape may contain dropouts that cause the Studio 5 to lose sync.

If you are syncing to tape, and your sequencer keeps starting and stopping erratically, you are probably losing sync. One possibility is that your SMPTE source is not good. This can be because you have a bad tape or possibly a bad connection from your tape machine to the Studio 5's SMPTE IN jack. This is easy to verify; if the Studio 5's SMPTE indicator light does not start blinking regularly when you try to sync, the Studio 5 is not getting a correct signal. Check your cables and make sure that the recorded SMPTE level is sufficient, see *Guide to Setting SMPTE Levels* (pg. 33). If the tape was recorded with too high a SMPTE level, then it will have to be re-stripped. If SMPTE was recorded at too low a level, you will need to boost the signal using a preamp or mixer between your tape deck and the Studio 5 SMPTE IN.

If the Studio 5's SMPTE indicator light blinks regularly, then a bad SMPTE signal is not the problem. You may have too much data going from the Studio 5

into the Mac. Some instruments output constant "active sensing" or MIDI clock messages. MIDI clock messages especially can be a problem, because they are sent more often than active sensing. Or, you could have a device sending MIDI Time Code. You don't need this if you're trying to sync your sequencer to the Studio 5's MIDI Time Code. In general, if you tell a real-time application (such as a sequencer) to play, and then send it too much data, it will start to lose some of the data. If it loses time code data, it will lose sync.

See if any MIDI devices attached to the Studio 5 are transmitting data to the Studio 5 (make sure none of them are playing). Look at the red Studio 5 MIDI IN LEDs. If any are lit or flashing, you know those devices are constantly sending some kind of data. You can verify if this is the cause of sync loss by turning off or disconnecting the MIDI IN cables (from the instrument into the Studio 5) and seeing if the sync problem goes away. If it does, you have a couple of choices:

- If you can stop the device from sending this data in the first place, do it. Unfortunately, some devices may not let you do this. Typically, the devices that send MIDI clocks have built in sequencers; some of them only send MIDI clocks when their sequencer is actually playing. Others send MIDI clock messages when they are in their "sequencer" mode, and "active sensing" (which is far less intrusive) when they are not. If you cannot stop the device from sending MIDI clocks, you can set its sequencer to the slowest possible tempo—this results in a

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- 
- slower MIDI clock transmission rate. You can see the tempo change on the Studio 5's MIDI IN LED for that device; it will blink slowly at slow tempos, and very rapidly at fast tempos.
- You can slow down the Studio 5->Macintosh communication speed. Decreasing the communication speed will give the Macintosh more time to "see" the incoming MIDI data, and will help if the Macintosh is busy with a lot of output as well as input.
  - If you're using only one serial cable between the Macintosh and the Studio 5, try using two. OMS applications, such as Vision and Studio Vision, will receive data generated from within the Studio 5 out the Studio 5's "B" port. This includes time code, Studio 5 footswitch and foot controller data, as well as Audio In note events. All other data coming from MIDI devices connected to the Studio 5 is received from the Studio 5's "A" port. If you are running a non-OMS application, select **Studio 5>Compatibility Setup** in OMS Setup and select either Standard Interface In or MIDI Time Piece In. Make sure that sync and *only* sync is sent out the Studio 5's "B" port (the **Auto** button will also do this).
  - If you are running Vision or Studio Vision, select **Setups>Enable Input Devices** and only enable those input devices from which you will receive MIDI. If you have 15 devices, but you only play one or two of them when you record, disable all other inputs.
  - With Studio Patches you can design *Virtual Controllers* to filter out MIDI clock messages, active sensing, or any other offensive data. You can then use these Virtual Controllers instead of the actual devices. In Vision or Studio Vision, select **Setups>Enable Input Devices**, then enable the Virtual Controllers and disable the actual devices on which they are based. For non-OMS applications, choose **Studio 5>Compatibility Setup**, select either **Standard Interface In** or **MIDI Time Piece In** views, then replace the unfiltered devices with their corresponding Virtual Controllers.

### Studio 5 will not sync to tape

Make sure the power cord is firmly inserted into its connector, the power switch is on, and that the SMPTE/Power indicator light is lit.

Check all the cables between your computer and the Studio 5, and between the Studio 5 and your tape deck.

Verify that the SMPTE/Power indicator light blinks when it is receiving time code from the tape deck. If not, you may have a bad cable or connection between the Studio 5 and your tape deck. Also, your SMPTE level may be recorded too low. If so, you may need to use a preamp or mixer to boost the SMPTE level before sending it to the Studio 5. See *Guide to Setting SMPTE Levels* (pg. 33).

Choose **Studio 5>SMPTE Reader**, then start the tape. If it displays time code correctly, the problem is with your application, not the Studio 5.

### **Sequencer gradually slows down rather than stopping when synced to a tape that has stopped**

Jam Sync mode is on. To turn off Jam Sync, choose **Studio 5>Stripe SMPTE**, and choose **Off** from the Level pop-up.

### **Audio In feature doesn't function**

Make sure the power cord is firmly inserted into its connector, the power switch is on, and that the SMPTE/Power indicator light is lit.

Check the cable between your audio input source and your Studio 5, and verify that **Studio 5>Audio In** is enabled in OMS Setup.

Make sure your software knows how to interpret the Studio 5's Audio In feature.

---

## **MIDI PROBLEMS**

### **More than one instrument sounds on a MIDI channel**

You may be using an Studio Patch that contains a splitter routed to more than one device on the same MIDI channel, or...

You may be using an Studio Patch that references a Virtual Instrument containing a splitter routed to more than one device on the same MIDI channel, or...

If you're playing into a sequencer, you should use an empty Studio Patch—the MIDI Thru instrument is usually controlled by your sequencer (see Part 2: OMS Patches), or...

If you're playing into a sequencer, it's possible that you've enabled both a virtual controller and the "actual" controller as input devices. If you're in Vision, choose **Setups>Enable Input Devices** and make sure you only have one MIDI input device enabled for the MIDI port used by your MIDI controller, or...

In compatibility mode, you may have "auto" enabled MIDI INs and OUTs, thus causing some devices (particularly those defined as multi-timbral) to sound on the same channel as other multi-timbral devices. There are only 16 channels available per port in a standard interface emulation mode.

### **Incorrect system exclusive data sent to Virtual Instruments**

You shouldn't send system exclusive data to a Virtual Instrument consisting of two or more MIDI channels from the same device, or the sysex data will be sent incorrectly.

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## Difficulty receiving large system exclusive data dumps

Reduce the Studio 5->Macintosh communication speed if you're having difficulty receiving large System Exclusive data dumps. Reduce the speed in small increments until the data is received properly, or...

If you're using Compatibility mode, make sure that the Compatibility Setup Speed is set to 1MHz.

This problem is unlikely to occur unless you have disabled the reporting of overrun errors since lost data is reported as an overrun error.

## Sound Designer II will not communicate with some samplers

The Studio 5 does not work with Sound Designer II and samplers (such as E-mu's and the Prophet 2000) that communicate using non-MIDI transfer rates. To use Sound Designer II with these samplers, you must use a standard MIDI interface. Either:

- Connect a standard MIDI interface to an unused Macintosh serial port, or...
- Connect a standard MIDI interface to one of the Studio 5's THRU ports, then use the front panel MIDI/Thru switch whenever you need to send data between Sound Designer II and a non-standard sampler.

## MIDI data stream clogging

If you're using Vision, choose **Set-ups>Enable Input Devices** and disable any devices which is not recording into the sequencer. Vision will ignore the data from these devices, and more processing power will be available for SMPTE sync or dense MIDI data handling chores.

Refer to *Studio 5 loses sync (pg. 53)* for more ways to thin the MIDI data stream.

## Foot Controller doesn't function

Check that the foot controller is connected to the proper connector (FC1), and that **Studio 5>Foot Controller In** is checked in OMS Setup.

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# APPENDIX C: Specifications

## General

- Processors—68HC000 @ 16MHz, 68B03 @ 8MHz
- Internal Memory—256k battery backed-up SRAM
- Power Supply—120VAC, 60Hz @ 280mA or 240 VAC, 50Hz @ 180mA
- External Dimensions (W x H x D)—44.45 x 8.64 x 28.02 cm (17.5" x 3.4" x 11.03"), 2 Rack Spaces (2U spaces)
- Weight—2.99 kg
- Operating Temperature—0°C to 32°C (32°F to 89.6°F)

## Connectors

- 15 MIDI Inputs
- 15 MIDI Outputs
- 1 SMPTE Input—Stereo phone jack, Input Impedance: 500k $\Omega$
- 1 SMPTE Output—Stereo phone jack, Output Impedance: <5 $\Omega$
- 2 Footswitch Inputs—Mono phone jack, Input Impedance: 10k $\Omega$
- 1 Foot Controller Input—Mono phone Jack, Input Impedance: 100k $\Omega$
- 2 Computer Ports—Serial, RS-422
- 2 Peripheral “Thru” Ports—Serial, RS-422

## Display

3-digit LED Display (0-127)

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## **Switches**

- 2 Patch Increment/Decrement switches
- 2 Peripheral “Thru” switches
- 1 Power on/off switch

## **Disclaimer**

Specifications and appearance subject to change without notice.

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